MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

2024/DOP/Solar/Technical-Desk-1/CR-58 Date: - 10th July 2024

Quotation Call

To,
(Supplier/ Developer/ Contractor/ Integrator)

Sub - Survey, Design, Manufacture, Supply, Installation, Testing and Commissioning of 02 no's Solar Based LED High Mast Lighting System (9 Mtr.) with Five Years Comprehensive Maintenance Contract (CMC) at Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur under Tribal Department Solapur District Solapur - Invitation to Quote

With reference to subject matter, we would like to invite your quotes in sealed condition for undertaking the work with given technical specifications and technical standards with following terms and conditions –

- **Details and Dates: -**

1	System details	**Name of Site**	**System type**	**Project Cost Rs.**
		Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur	9 Mtr x 2 no's Solar Based LED High Mast Lighting System	8,50,501/-
2	Estimated Cost	8,50,501/- (Inclusive of all taxes and charges)		
3	Date and time for submission of quotations.	From 10/07/2024; 11:00 Hrs to 19/07/202417:00 Hrs		
4	Date and time for Opening of quotations.	22/07/2024; 11:30Hrs		
5	Security Deposit	25,515/- (to be deposited by online mode in favor of Maharashtra Energy Development Agency, Pune)		
6	Address for communication and for quotation opening	Maharashtra Energy Development Agency, Divisional Office Pune, Aundh Road, Near Commissionerate of Animal Husbandry, Opposite Spicer College, Aundh, Pune-411007		
7	Site location	Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur		

1. ELIGIBILITY CRITERIA–

The manufacturer/supplier shall be eligible to quote for this work provided fulfillment of following.

1. Shall have a registered firm/company with GST registration with in Pune division.
2. Shall provide brief information in prescribed format (enclosed).
3. Shall not be black listed in any govt. and/or other organizations.
4. Shall provide documentary proof about having experience of supply, installation and commissioning of minimum 5 nos. of Solar based LED High Mast Lighting System of 9 meter to any Nodal Agency/ Govt. Organization/ Private Organization etc in India during last 3 years. The bidder needs to submit work order and successful commissioning certificate. DGM, MEDA Pune reserve rights to ask for any additional document for validation purpose.
5. Preference will be given to the Bidders those have Successfully Commissioned Solar Based LED High Mast Lighting System Projects in Nodal Agency/ Govt. Organization/ Private Organization etc.
6. Shall have an Average annual turnover of minimum 20 Lakh in each financial year during last three years 2020-21, 2021-22, 2022-23) duly certified by chartered accountant.
7. Shall provide self-attested copy of IT returns for FY 2020-21, 2021-22 and 2022-23.
8. Is a manufacturer of SPV system/ Solar Based LED High Mast Lighting System or System Integrator and shall provide the test certificate of SPV system issued by MNRE or its authorized test centres.
9. Subcontractor experience will not be considered.
10. **Joint venture/ consortium/ subcontract/ subletting is not permitted**.
11. Shall have arrangement of providing after sales service in area of installation of systems.

2. TERMS AND CONDITIONS–

1) Location for installation of 02 no's Solar Based LED High Mast Lighting System (9 Mtr.) shall be assigned immediately by the user agency to the selected manufacturer/ supplier to get the work done in stipulated time.
2) The installation of 02 no's Solar Based LED High Mast Lighting System (9 Mtr.) should be done in excellent manner and meet technical standards prescribed by the MEDA.
3) As per the technical criteria set by the Ministry of New and Renewable Energy, Govt. of India the Solar modules should fulfill the IEC standards and shall be procured from manufacturer providing module with RFID tag.
4) The manufacturer/ supplier shall provide valid test certificate of Solar Modules, Battery, LED light, luminaries test report and other equipment's/ component from govt. approved test centers.
5) The manufacturer/ supplier shall provide Solar Modules from the approved Manufacturers which are enlist in MNRE's ALMM list.
6) The Solar module should be engraved with name of company supplying the same along with installation date etc.
7) If the 02 no's Solar Based LED High Mast Lighting System (9 Mtr.) does not function as per given standards then the loss incurred shall be borne by the supplier and paid to Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur.
8) If contractor fails to complete the work then Security Deposit will be forfeited and contractor shall be blacklisted.

9) Supplier shall give training of system operation to a person duly nominated by user agency and same shall be informed to Divisional office Pune.
10) The Contractor/ Agency should successfully complete the project within time frame set out by the MEDA.
11) The manufacturer/ supplier shall provide the user manual, warranty card to the user agency and copy of same shall be provide to MEDA Pune.
12) The manufacturer/ supplier shall visit the site and ensure scope of work before submission of quote against the enquiry. In this context, it is mandatory to the manufacturer/ supplier should submit the Site Visit Report in given prescribed format along with this quote.
13) The work being of limited nature and to seek prompt after sales service the manufacturer/ supplier within Pune Division will be preference while allotting the work against the invited quotes.
14) The Contractor shall provide the detailed information about Company/ firm in attached Format (Contractor's Information sheet)
15) ***The manufacturer/ supplier shall submit their quotations in two different sealed envelopes i.e. First envelop shall contains documents as per the technical eligibility criteria and Second envelop shall contain Financial details (quoted rate)***.
16) ***The manufacturer/ supplier should mention the subject on each sealed envelope i.e. Technical Envelop and Financial Envelop.***
17) ***The financial envelop of technically qualified bidders will only be opened.***

3. Scope of contract

The Scope of contract is as below:

1) Survey, Design, Manufacture, Supply, Installation, Testing and Commissioning of 2 no's Solar LED High Mast Lighting System (9 Mtr) with Five Years Comprehensive Maintenance Contract (CMC) at Government Residential School Village Hotagi, Taluka South Solapur, dist. Solapur under Tribal Department Solapur in the State of Maharashtra.
2) Free replacement of defective/ damaged components of systems within Comprehensive Maintenance Contract period (CMC) of 5 years after commissioning for efficient running of the system.
3) Selected Bidder(s) shall be bound by operation and management arrangements and rules, regulations and modalities as per MNRE and as established by MEDA and mutually agreed between MEDA and the contractor for effective implementation of the project.
4) The works are to be carried out at Hotagi village in Solapur District in the State of Maharashtra. Bidder can quote for all the Systems.
5) The responsibility of electrical works, safety precautions and safety parameters of the project will be of awarded bidder, which must be as per standards specified.
6) Civil Structure must be certified by Chartered Engineer/ Structural Engineer (Civil) and provide structure stability certificate.
7) The bidder must acknowledge that all the work of the project must be in the observance of licensed electrical contractor. The responsibility of electrical works, safety precautions and safety parameters of the project will be of licensed electrical contractor and awarded bidder, which must as per standards specified.
8) Bidder will have to submit a copy of engineering document with test report including system and foundation drawing and FEA report for structure duly certified by authorized test lab and certified structural engineer of this system for its safety and stability against a wind speed of minimum 180 kmph which they want to bid even if the drawing mentioned in the bid are submitted by the bidder.

9) Bidder has to submit test report from authorized test lab for load capacity.
10) The Solar panel and battery must be separate for each LED. e.g. If there is 9-meter-high mast having 6 LED's then each LED must illuminate by separate battery and solar panel.
11) Time is the essence in completing the Works. The successful Bidder will be required to complete the works within the stipulated time as specified in this document. The bidder shall ensure that Solar LED High Mast Lighting System should be commissioned within stipulated time frame of work order.
12) Bids shall complete and cover all Works described in the quotation/ Work order. Any item of works required for complete usable system shall be deemed to be included in bidder's scope irrespective of whether it is specifically mentioned or not in the quotation/ Work order.
13) Bidder should note that obtaining permissions from statutory bodies wherever required for execution of works, shall be entirely in bidder's scope. Bidder should note that during progress of the work he has to submit the progress report of the work in every 15 days along with the photograph of the site to District office MEDA Solapur.

4. COMPREHENSIVE MAINTENANCE CONTRACT(CMC)

i. The complete Solar Based LED High Mast Lighting System must have warrantee against any manufacturing/ design/ installation defects for a minimum period of 5 years.
ii. Responsibility of cleaning of SPV panels (once in fortnight) of system shall be the responsibility of the Beneficiary.
iii. During the CMC period, successful supplier should visit the site quarterly (after each 03months) and ensure the successful working of Solar Power Plants. Also, supplier shall maintain the visit log book at the site. If any problem occurs in working of Solar Power Plants shall attend the system within 48 hours and rectify the problem immediately.
iv. Incase if supplier fail to provide service during the CMC period, the Performance Bank Guarantee should be forfeited and Contractor/ Supplier shall be blacklisted.

5. INSURANCE:

i. The manufacturer/ supplier shall provide complete insurance of Solar Based LED High Mast Lighting System coverage ex-factory until commissioning of project and acceptance for replacement or repair of any part of the consignment due to Natural calamity, theft, damage, fire, burglary.
ii. It is the responsibility of successful manufacturer/ supplier to drawn the complete insurance of Solar Based LED High Mast Lighting System in the name of MEDA Pune on behalf of user agency (name of the user agency to be mentioned in insurance policy) from the date of commissioning up to 05 Years period covering the natural calamity, theft, burglary, fire and damage of project.
iii. The Successful manufacturer/ supplier should pay the necessary insurance premium for the said project.
iv. 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 appropriate insurance during O&M period, if required.
v. The Bidder shall also take insurance for Third Party Liability covering loss of human life including students (User), 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 bidder.

vi. Any complaint registered due to Natural calamity, theft, damage, fire, burglary by user agency shall be attended by the manufacturer/ supplier and claims be settled with insurance company accordingly.

vii. In case of any loss encountered by the project due to natural calamities, theft, burglary, fire and damage etc. the manufacturer/ supplier shall be responsible for filing the insurance claim with the respective insurance company and ensure to get compensation for loss in the project equipment.

6. TERMS OF PAYMENT:

1. 80% of the total cost will be released after supply, installation & successful commissioning of the Solar LED High Mast Lighting system duly certified by Bidder, Officer of MEDA & authorized person of User Agency in the Solapur District along with submission of undertaking of comprehensive contract (CMC) for 5 years from date of commissioning, complete Insurance policy documents of Solar LED High Mast Lighting system (covering Natural calamity, damage, fire, burglary) effective from date of installation up to five-year period from date of commissioning, Warranty/ Guaranty Certificate of materials used in project, Serial Wise Test Reports of Panel comprising I-V curve and detail parameters of each panel, Test Report of batteries and other components.
2. 20% of the total cost shall be released on submission of next three-month successful performance report which should be duly certified by Officer of MEDA, authorized person of Beneficiary and submission of Performance Bank Guarantee of 10 % of total project cost from any Nationalized Bank valid for period of 5 years.
3. Performance Bank Guarantee shall be released after 5 years on submission of latest report of system functioning at Government Residential School Tribal Department Solapur, Hotagi Tal. South Solapur, dist Solapur Maharashtra duly certified by authorized person of User Agency.
4. In case if “Bidder” does not provide service during the warrantee period, PBG will be forfeited and “Bidder” will be blacklisted (in case of “Consortium”: all the partners be blacklisted)

7. DEDUCTION:-

1. The TDS at the source will be deducted as per the Govt. rule and regulations.
2. MEDA will issue necessary certificates of TDS deduction.
3. C’/ ‘D’ form will not be issued by MEDA.

8. SECURITY DEPOSIT–

i. The Bidder shall furnish security deposit at 3% of the total contract value i.e Rs.25,515/- within 10 days from the date of issue of work order (including Sunday and public holiday) by way of demand draft of nationalized bank in favor of Maharashtra Energy Development Agency, Pune.

ii. If the contractor fails to execute the work in given time or terminates the order prematurely then the security deposit will be forfeited and no excuses will be entertained.

iii. The security deposit will be returned to the contractor without interest after successful commissioning of system and receipt of commissioning report duly signed by user agency, MEDA official and representative of the contractor.

9. PENALTY–

- A penalty of 1/2% of the total project cost shall be imposed on the contractor against a delay of one week in project completion subject to a maximum of up to 10% of the total project cost. In case the penalty exceeds 10% of the total project cost, the given order will be canceled & the security deposit will be forfeited and the Contractor/ Supplier shall be blacklisted.

10. TIME FRAME:

a. The successful Bidder will be required to complete the project installation work within the 90 Days from the date of issue of work order.
b. If project not installed or commissioned within the given time then contractor shall seek the time extension from MEDA by mentioning the valid reasons thereof.

11. CHECK LIST OF DOCUMENTS TO BE FURNISHED WITH BELOW QUOTATION–

- PAN and GST Details.
- Copy of IT Returns.
- Declaration on company letter head.
- Contractors Information Sheet.
- Annual Turnover Certificate.
- Work Experience Details.
- Site Visit Report (in format)

We look ahead to seek your sealed quotation on or before 19/07/2024 till 17 Hrs.

Thanking you,

SD/-
Divisional General Manager
MEDA, Divisional Office, Pune

Encl.: -

1. Contractor Information Sheet.
2. Declaration Format.
3. Annual Turn Over certificate format.
4. Site Survey Form.
5. Technical Specifications of Grid Connected Solar System.
6. 9 Mtr diagram.

CONTRACTOR'S INFORMATION

Sr. No	Particulars	
1	Name of the Firm	
2	Details of Mailing Address	
3	Firm Status (PSU/ Incorporate/ Ltd/ Pvt.Ltd/ LLP/ Partnership/ Proprietary)	
4	Name & Designation of Contact Person	
5	Contact No.	
6	E-mail Address for correspondence	
7	Firm website Address	
8	Firm registration No/ ROC Establish Year of firm	
9	PAN No.	
10	GST No.	
11	Turnover (in Rs.) for FY 2020-21, 2021-22 and 2022-23	
12	Skilled manpower	
13	*Experience in Solar LED High Mast Lighting system	

Authorized Sign and Stamp

*Enclose documentary evidence accordingly.

DECLARATION

(On company's letter head)

To,

Divisional General Manager,
Divisional Office Pune
Maharashtra Energy Development Agency
(A Government of Maharashtra Institution)
Address: Aundh Road, Near Commissionerate of Animal Husbandry,
Opposite Spicer College, Aundh, Pune-411007

Respected Sir/ Madam,

1. We have carefully read and understood all the terms and conditions of the quotation and hereby convey our acceptance to the same.
2. The information/ documents furnished along with our offer are true and authentic to the best of my knowledge and belief, we are well aware of the fact that furnishing of any false information/ fabricated document would lead to rejection of our quotation at any stage besides liabilities towards prosecution under appropriate law.
3. We have apprised our self fully about the job to be done during the currency of the period of agreement and also acknowledge bearing consequences to of non-performance or deficiencies in the services on our part.
4. We have no objection, if enquiries are made about the work listed by us.
5. We have not been barred or blacklisted by any Government Agency/ Department/ PSU or any such competent Government authority, organization where we have worked. Further, if any of the partners/ directors of the organization/ firm is blacklisted or having any criminal case against them, our quote shall not be considered. At any later point of time, if this information is found to be false, Divisional General Manager, Divisional Office Pune, Maharashtra Energy Development Agency, may terminate the assigned contract immediately.
6. We have not been found guilty by a court of law in India for fraud, dishonesty or moral turpitude.
7. We agree that the decision of Divisional General Manager, Divisional Office Pune, MEDA in selection of quotation and shall final and binding to us.

For
(Company Name)
Name of signing authority/ Designation/ Place/ Date

Annual Turnover

Each Contract or must fill in this form including private/ public limited company.

- **Annual Turnover Data for the FY 2020-21,2021-22 and 2022-23**
- **Name of Company:**

Year	Rs in Lacs
2020-21	
2021-22	
2022-23	

The information supplied should be the Annual Turnover of the Contract or in terms of the amounts billed to clients for each year for work in progress or completed.

Signature of Applicant

Certified by Applicant's Auditor

(Affix Stamp)

SITE VISIT REPORT

(To be submitted on letter head of contractor)

Date: _____

To,

The Divisional General Manager,
Divisional Office Pune,
Maharashtra Energy Development Agency
(A Government of Maharashtra Institution)
Address: Aundh Road, Near Commissionerate of Animal Husbandry,
Opposite Spicer College, Aundh, Pune-411007

Sub.: Site Visit Report for Installation and Commissioning of Solar LED High Mast Lighting system at Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur.

Ref.: Quotation Call No .....Date:

Sir,

This has reference to above referred quotation call for Installation and Commissioning of Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur at Government Residential School Village Hotagi, Taluka South Solapur, Dist. Solapur in state of Maharashtra.

I/ We hereby declare that we have visited the site.
I/We have made my ourselves acquainted with site conditions, approach to site, requirement of area, soil conditions, availability of water, requirement of quotation conditions etc.
I/ We have verified all details required to execute the project.
I/ We have no problems in undertaking the project and complete them in the given time period.
Thanking you

Yours faithfully,
(Signature of Contractor)
Name of Contractor----------
Designation ----------
Seal:

Signature of User Agency authorities. Seal:
.....

TECHNICAL SPECIFICATIONS OF

SOLAR LED HIGH MAST LIGHTING SYSTEM:

1. Definition

- A standalone Solar High Mast Lighting system (SHMLS) is an outdoor lighting unit used for illuminating a street or an open area. The Solar High Mast Lighting System consists of solar photovoltaic (SPV) module, a luminaire, storage battery, control electronics, inter-connecting wires/ cables, module mounting steel tower/ pole including hardware without battery box. The luminaire is based on White Light Emitting Diode (W-LED), a solid-state device which emits light when electric current passes through it. The luminaire is mounted on the steal tower/ pole at a suitable angle to maximize illumination on the ground.
- The PV module must be place on separate structure placed at the top of the steel tower/ pole at an angle facing south so that it receives solar radiation throughout the day, without any shadow falling on it. A battery should be placed in the luminary to avoid the risk of theft. Electricity generated by the PV module charges the battery during the day time which powers the luminaries from dusk to dawn. The system lights at dusk and switches off at dawn automatically.

2. Specifications

For 9 Meter Solar LED High Mast Lighting System:

PV Module	Only indigenous modules shall be used in the project. For each High mast SPV module aggregate capacity 1980 Wp (min 330 Wp X 6 No's Module.)
Battery	Li Ferro Phosphate (LifePo4) Batteries of capacity 12.8 Volt, 600 Ah @, (12.8V, 100Ah x 6 nos.) for each High Mast. With cells in a suitable weather resistant enclosures and sophisticated designed battery management system (appropriate over charging, over heating deep discharge protection) without paralleling battery bank. Battery should be in IP-65 enclosure
Light Source	White Light Emitting Diode (W-LED) flood light 6*50Watt (LED + Driver) DC Operated confirming to IP 65 or above with proper dimmer arrangement Using LEDs which emits ultraviolet light will not be permitted
Light Output	White colour (colour temperature 5500-6500 K.) Lumen efficiency of LED – min 140 lumens/ Watt. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.
Pole (Minimum 80 Microns)	9 M Long, Polygonal Raising lowering mast shaft in single section suitable for basic wind speed 50m/ sec (180km/ Hr) complete with head frame Luminaries carriage suitable to install 6 nos. Luminaries, solar panels & battery on the top of the mast. There should be provision to install the type tested winch inside the mast for raising & lowering of complete solar lighting system along with compact unit of modules through a mounting structure around the pole including hardware. The mast must be hot dip galvanized 20 sided polygonal structure having Bottom A/ F minimum Dia 330 mm and top A/ F Dia 150 mm of 3mm thick. The high mast should have a designed life of 25 years.

Stainless steel wire Rope	Wire rope of Grade AISI 316 grade, 7/19 construction, with two ropes continuous min. 6 mm diameter and breaking load capacity min. 2000 kg x2. The breaking load test report obtained from govt. laboratory of the wire rope should justify the desired breaking load capacity.
Raising and Lowering lighting mast	Manual pulley system
Electronics Efficiency	Minimum 85% total
Autonomy	3 days or minimum 30 operating hours per permissible discharge.

- **MINIMUM TECHNICAL REQUIREMENTS / STANDARDS:**

3. Duty cycle

The Solar PV White- LED High Mast Light system should be designed to operate from dusk to dawn.

4. Modules

- Only indigenous modules (Make in India) of reputed brand IEC Tested shall be used in the project. Crystalline high power/ efficiency cells shall be used in the Solar Photovoltaic module.
- The open circuit voltage of the PV modules under STC should be at least 21.0 Volts.
- Crystalline high power/ efficiency cell shall be used in the Solar Photovoltaic module. The cell efficiency should not be less than 16%.
- PV module must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- The terminal box on the module shall be IP 65 and designed for long life out door operation in harsh environment should have a provision of opening for replacing the cable, if required.
- The offered module shall be in accordance with the requirements of MNRE.
- Latest edition of IEC 61215 edition II / IS 14286 for Crystalline and shall be certified by MNRE authorized test centre. The bidder shall submit appropriate certificates.
- PV modules must qualify to IEC 61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification.
- Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided and if required, blocking diode(s) may also be provided.
- Identification and traceability
- Each PV module must use a RF identification tag (RFID), which must contain the following information:
    a) Name of the manufacturer of PV Module
    b) Name of the Manufacturer of Solar cells
    c) Month and year of the manufacture (separately for solar cells and module)
    d) Country of origin (separately for solar cells and module)
    e) I-V curve for the module
    f) Peak Wattage, Im, Vm and FF for the module
    g) Unique Serial No and Model No of the module
    h) Date and year of obtaining IEC PV module qualification certificate
    i) Name of the test lab issuing IEC certificate
    j) Other relevant information on traceability of solar cells and module as per ISO 9000 series.
    k) The RFID should be inside the module laminate

l)

5. Battery:

Battery shall be Lithium Ferro phosphate (LiFePo4) with maximum Depth of Discharge 90%, the batteries should conform to the latest BIS/ International standards. The battery shall be of LiFePo4 storage batteries as per MNRE/ BIS/ IEC standards with control electronics, BMS, interconnecting wire/ cables properly sealed. Should have designed battery management system (appropriate over charging, over heating deep discharge protection).

a) Capacity of each battery shall not be less than 12 .8V, 100Ah as per above table.
b) DOD shall be 90% i.e., at least 90% of the rated capacity of the battery should be between fully charged & load cut off conditions.
c) Battery terminal shall be provided with covers.
d) Suitable carrying handle shall be provided.
e) Bidder shall mention the design cycle life of batteries at 75%, 50% and 25% depth of discharge at ambient temperature up to 45-degree C.
f) The batteries shall be designed for operating in ambient temperature of site up to 55-degree C.
g) The self-discharge of batteries shall be less than 2 % per month of rated capacity at 27-degree C.

6. Light source:

- The light source will be of white LED type The colour temperature of white LEDs used in the system should be in the range of 5500 degree K – 6500 degree K. Use of LEDs which emits ultraviolet light will not be permitted.
- The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred. The light output from the white LED light source should be almost constant.
- The lamps should be housed in an assembly suitable for outdoor use and shall comply with IP65. The LED housing should be made of pressure die cast aluminium having sufficient area for heat dissipation and heat resistant toughened clear glass/ high quality poly carbonate fitted with pressurized die cast aluminium frame with SS screws. The temperature of heat sink should not increase more than 30 degree C above ambient temperature even after 48 hrs of continuous operation. This condition should be complied for the dusk to dawn operation of the lamps while battery operating at any voltage between the loads disconnect and charge regulation set point.
- High power LED of minimum capacity 1 watt each capable to withstand maximum 1 amp driving current having lens angle greater than 120 degree shall be used. The LED LM 80 test report shall only be used**.**
- The LED efficiency should be more than 140 lumen / watt.
- All LED in circuit must be connected in series only. It must incorporate fail short mechanism in all LEDs
- The LEDs used in the luminary should have life time more than 50,000 hrs.
- The lumen depreciation of LED shall not be more than 30% even after 50,000 burning hours.
- Power consumption of the each LED Luminary / Lighting unit shall not be more than 30 W (including LED Driver power loss).
- The LED efficacy should be more than 140 lumen / watt.
- Other Parameters :
    5. LED DC current regulation – better than 3 %
    6. Input – 12 V DC

7. Driver Type- DC-DC (as per IEC 62384)
8. CRI - 70 % Typical
9. Lighting quality- Free from glare and flickering and UV
10. Ambient temp– up to 50 deg
11. DC to DC converter efficiency> =90 %

- The connecting wires used inside the luminaries, shall be low smoke halogen free, fire retardant e-beam cable and fuse protection shall be provided at input side.
- Auto reset table reverse polarity protection shall be provided
- LED lighting unit shall comply with LM -79-08 and LM -80-08 Standards and copy of test certificate (LM 80-08) should be submitted.
- The make, model number, country of origin and technical characteristics of white LEDs used in the lighting system must be furnished.
- The luminaries must have light distribution polar curve as per LM 79 test specifications.

7. <u>Electronics:</u>

MPPT charge controller to maximize energy drawn from the Solar PV array. The MPPT charger shall be microcontroller based. The MPPT should have four stage charging facilities i.e Bulk, Absorption, Float and Equalization. The auto equalization facilities for every (30 +_3 days) and provision to verify it during testing. The PV charging efficiency shall not be less than 90% and shall be suitably designed to meet array capacity. The charge controller shall confirm to IEC 62093,

IEC 60068 as per specifications

a. Protection against polarity reversal of PV array and battery, Over Current, Short Circuit, Deep Discharge, Input Surge Voltage, Blocking diode protection against battery night time leakage through PV Module
b. Electronics should operate from 10 volt to 21 volt and its Euro efficiency should be at least 90%.
c. The system should have protection against battery overcharge and deep discharge conditions. The numerical values of the cut off limits of lower voltage should not be less than 12 Volt
d. The system should have protection against Microwave radar sensor auto Dimming system.
e. Full protection against open circuit, accidental short circuit and reverse polarity should be provided.
f. Charge controller shall have automatic dusk-dawn circuit based on SPV module as sensor for switching on/off the high mast light without manual intervention. The sensor must not get triggered by impulse lighting like lightning flashes and firecrackers.
g. The self-consumption of the charge controller shall not be more than 20 mA at rated voltage and rated current. Adequate protection shall also be incorporated under no-load conditions (i.e. when the system is ON & the load (LED Lamp is removed)
h. The system should be provided with 2 LED indicators: a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.
i. All capacitors shall be rated for max. temp. of 105° C.
j. Resistances shall preferably be made of metal film of adequate rating.
k. Device shall have adequate thermal margin should be at least 25 degree below the allowable junction temperature while operating at an ambient temperature of 55-degree C and full load.
l. Fibre glass epoxy of grade FR 4 or superior shall be used for PCB boards.

8. Mechanical hardware

I. A galvanized metallic frame structure to be fixed on the pole to hold the SPV module(s). The frame structure should be fixed at 30 degree from horizontal facing true south.

II. The pole should be hot dip Galvanized Iron Octagonal pole of 12.0 Mtr. Height as per specification as under:

III. The Octagonal poles shall be Hot dip galvanized to min 80 microns. The material of pole shall be as per specification of BS EN 100025, ISO1461.

IV. The size of the pole shall be min 150 mm (A/F) at Top side, 330 mm (A/F) at bottom side with thickness of 3 mm minimum.

V. Diameter of base plate min. (mm)= 540mm; Thickness of base plate (mm)= min 16 mm.

VI. Separate Pole should have the arrangement for module and battery at top for mounting of Solar panel of design capacity with mounting structure at an angle of latitude $\pm 2^0$ degree.

VII. The batteries shall also be mounted on this pole at suitable height hence provision should be made accordingly

VIII. The pole shall be mounted on suitable RCC foundation at least 1.5-meter-deep and 600mm above ground with 6 bolt of min 24 mm size

IX. The Nut -Bolts in battery box and panel structures should be proper riveted to ensure the theft proof.

X. The design and foundation details of the pole shall be got approved before execution of work.

XI. Battery box:

Two vented metallic box of 20 SWG thick made of pre coated galvanized MS sheet with 60 microns thickness for housing the storage battery outdoors should be provided with proper lock and key. The size of box should be as per battery size (including vent plug/level indicator) providing minimum clearance of 25 mm on all sides. The battery box is to be properly rest/mounted on pole at least 04 meters of height from ground level. Louvers for proper ventilation should be provided on one side and back of the battery box. No vents shall be provided on top of battery box. Box should be provided with proper locking arrangement. The edges of box should be turned properly to give smooth edge and good strength. Two wooden battens should be fixed inside the battery box to avoid the electrical contact between battery and box. Components and hardware shall be vandal and theft resistant. All parts shall be corrosion- resistant

Electric cable:

The electric cable used shall be twin core PVC insulated water and UV resistance copper cable of minimum size 1.5sq mm. Cable shall meet IS 1554 / 694 Part 1:1988 & shall be of 650 V/ 1.1 kV.

9. Installation of system:

The system should be properly installed at site. The SPV module mounting structure along with telescopic octagonal pole should be properly grouted depending upon the location and requirement of the site. The grouting should be such that it should withstand the maximum wind speed/ storm of 180 kmph. The pole should rest on a suitable RCC foundation. Of (RCC Foundation minimum size of 900 mm x 900 mm x 1500 mm deep and 600 mm above the ground level. must have min 6 nos. foundation bolts of min 1000 mm & 24mm dia.) Adequate space should be provided behind the PV module/array for allowing un-obstructed air flow for passive cooling. Cables of appropriate size should be used to keep electrical losses to a bare minimum. Care should be taken to ensure that the battery is placed with appropriate levelling on a structurally sound surface. The control electronics should not be installed directly above the battery. All wiring should be in a proper conduit or capping case. Wire should not be

hanging loose. Any minor items which are not specifically included in the scope of supply but required for proper installation and efficient operation of the SPV systems is to be provided by the manufacturer as per standards.

10. Warranties:

The mechanical structures, electrical works including power conditioners/ charge controllers/ maximum power point tracker units/ distribution boards/ digital meters/ switchgear/ storage batteries, etc. and overall workmanship of the Solar LED High Mast / systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 5 years.

11. Protections:

Lighting protection:

The SPV module shall be provided with lightning & over voltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc the entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per NFC 17-102:2011 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

Earthing

1. 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.
2. The complete earthing system shall be electrically connected to provide return to earth from all equipment independent of mechanical connection.
3. The equipment grounding wire shall be connected to solar PV module.
4. Earthing system design should be as per the standard practices.

Cables & wires

Cabling shall be carried out as per IE Rules

- Wires: Only FRLS copper wires of appropriate size and of reputed make shall have to be used.
- Cables Ends: All connections are to be made through suitable cable / lug / terminals; crimped properly & with use of Cable Glands.
- Cable Marking: All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified. Any change in cabling schedule/sizes if desired by the bidder/supplier be got approved after citing appropriate reasons, All cable schedules/layout drawings have to be got approved from the purchaser prior to installation. All cable tests and measurement methods should confirm to IEC 60189.

Electrical Safety, Earthing Protection Electrical Safety

- Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is obligatory.
- Over Voltage Protection: Over Voltage Protection against atmospheric lightning discharge to the PV array is required
- Cabling practice: Cable connections must be made using PVC Cu cables, as per BIS standards. All

cable connections must be made using suitable terminations for effective contact. The PVC Cu cables must be run in GL trays with covers for protection.

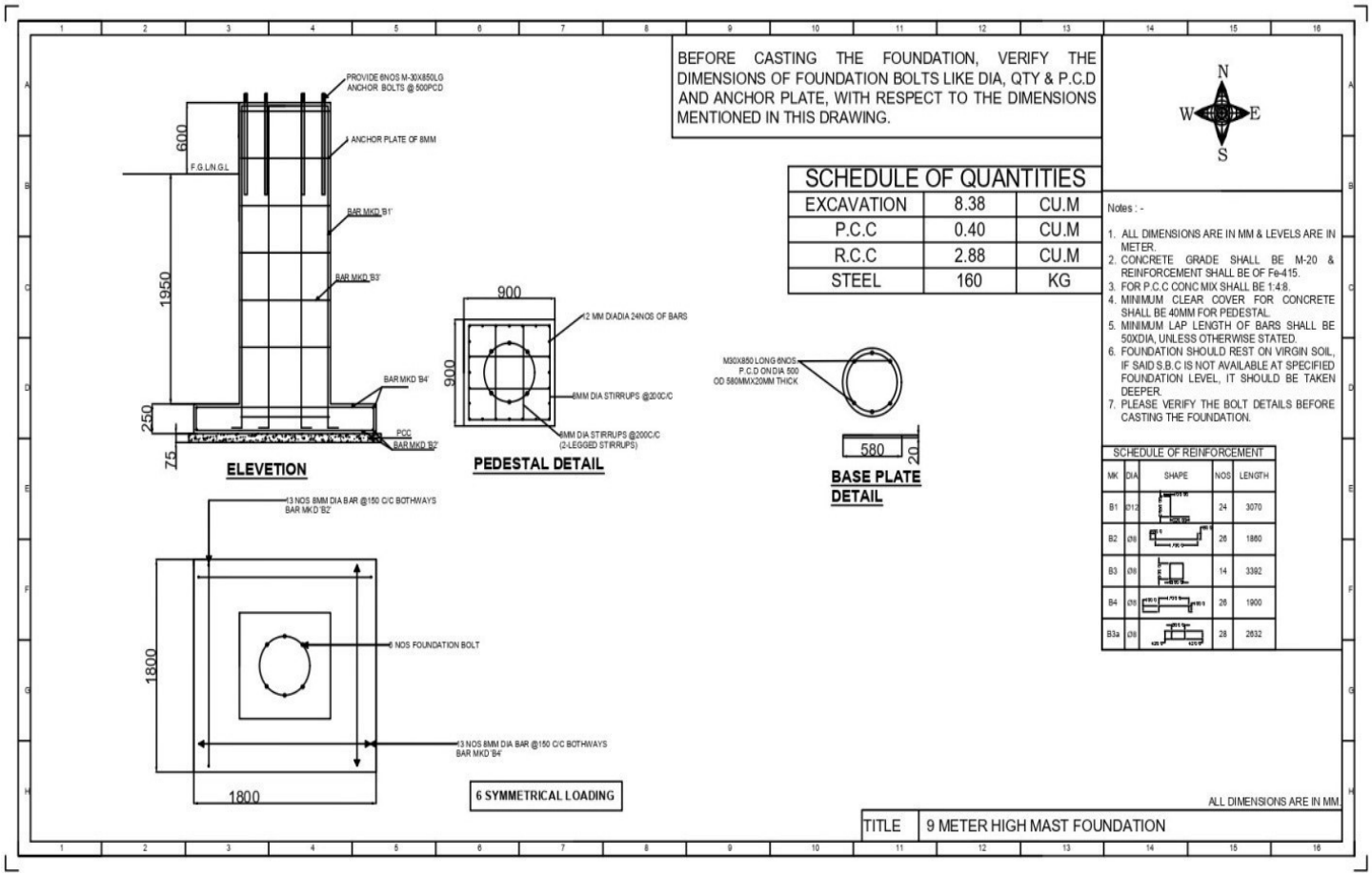
Earthing protection

Each array structure of the PV yard should be grounded properly. In addition, the lighting arrester/masts should also be provided inside the array field. Provision should be kept be provided inside the array field. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work

Warranties and Guarantees

1. Solar Modules: Workmanship/ product replacement for 10 years.
2. Solar Modules: 90% power output for 10 years & 80% power output for 25 years.
3. BoS: Parts and Workmanship for 10 years, service for 25 years.
4. Power Plant Installation: Workmanship for 10 years, service for 25 years
5. PV Array Installation: Structural for 25 years

Solar High Mast Foundation Drawing



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