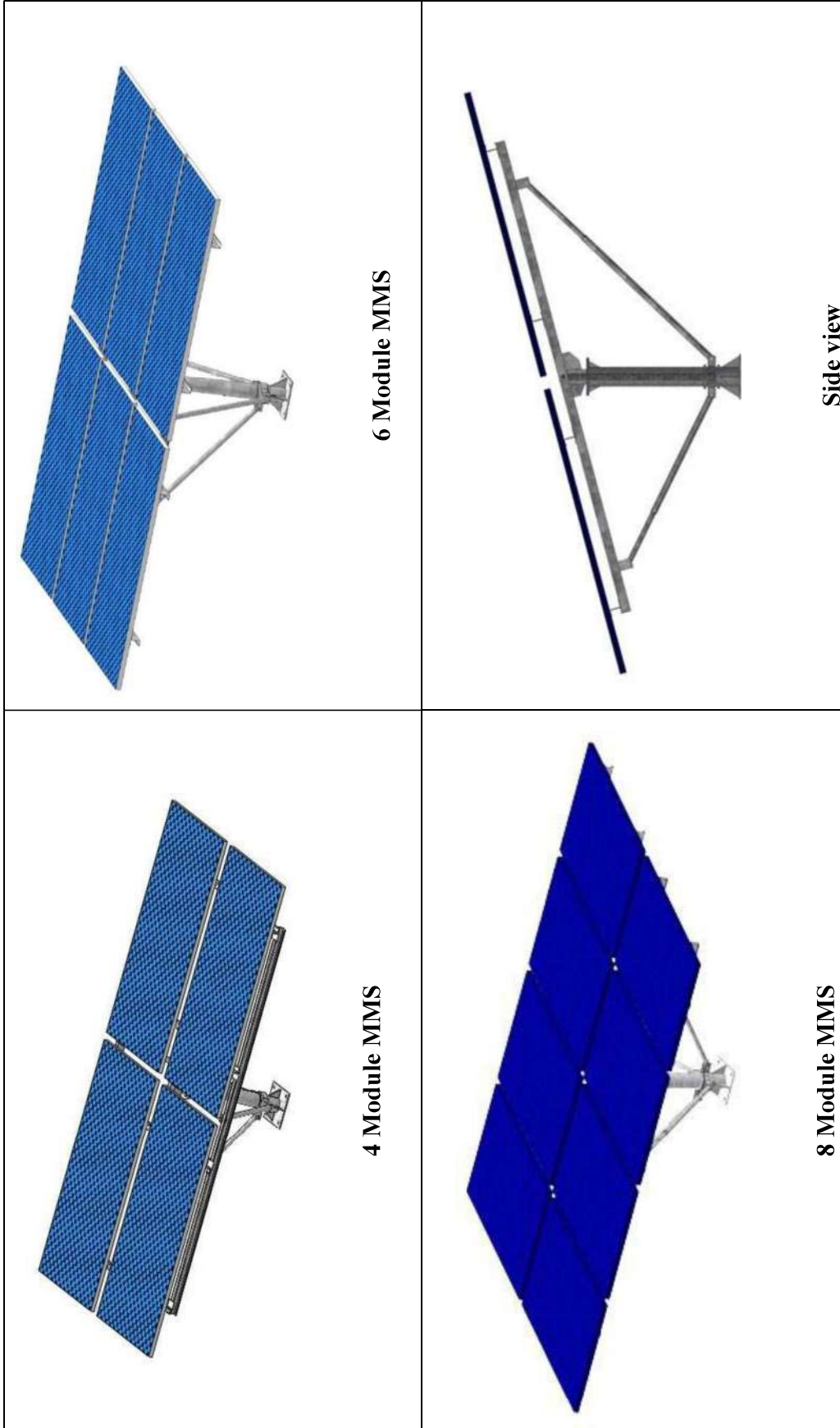


Standard MMS for 4, 6 and 8 solar modules have been specified. These standard MMS may be used in combinations for different capacities of solar water pumping systems as follows:

1. Standard MMS of 4 Modules for 1 HP
 2. Standard MMS of 6 Modules for 2 HP
 3. Combination of standard MMS of 4 Modules and 6 Modules for 3 HP
 4. Combination of two standard MMS of 8 Modules for 5 HP
 5. Combination of three standard MMS of 8 Modules for 7.5 HP
- and so on....

Specifications of main parts used in MMS are given below:

1. Centre Shaft: - Centre shaft used in structure should be of minimum 139 OD with minimum thickness of 4 mm with base plate minimum 10 mm thickness if used and foundation hardware should be as per IS 5624. For system without base plate i.e. direct pilling is should be as per the site condition based on the properties of Soil and refer (IS 6403 / 456 / 4091 / 875) for foundation design.
2. Rafters: - The Main and secondary rafter used in structure should be of either SHS & RHS pipe sections.
3. Purlin: - Mounting Purlins used in the structure should be made of Cold form steel section as per IS 1079 with minimum thickness of 2mm.
4. Provision for Seasonal Tilt: - In one structure at least four telescopic supports (three may be used in MMS for 4 modules) either round hollow sections or square hollow section to be provided to support the mounting structure.
5. Provision for Daily Tracking: - Provision for Daily tracking should be provided by the way of providing min. 8 mm thick metal sheet with precision cut grooves.
6. Module Locking System: - Modules should be locked with antitheft bolts of SS 304 Grade.
7. General Hardware for Structure Fitment: - Either SS 304 or 8.8 grade hardware should be used for fitment.
8. Hot Dip Galvanizing: - All structure parts should be hot dip galvanized according to IS 4759.
9. Tolerance for fabrication: - Tolerance for fabrication of steel structure should as per IS 7215.
10. Welding: - Welding should be done as per IS: - 822 & grade of welding wire should be (ER70S-6).

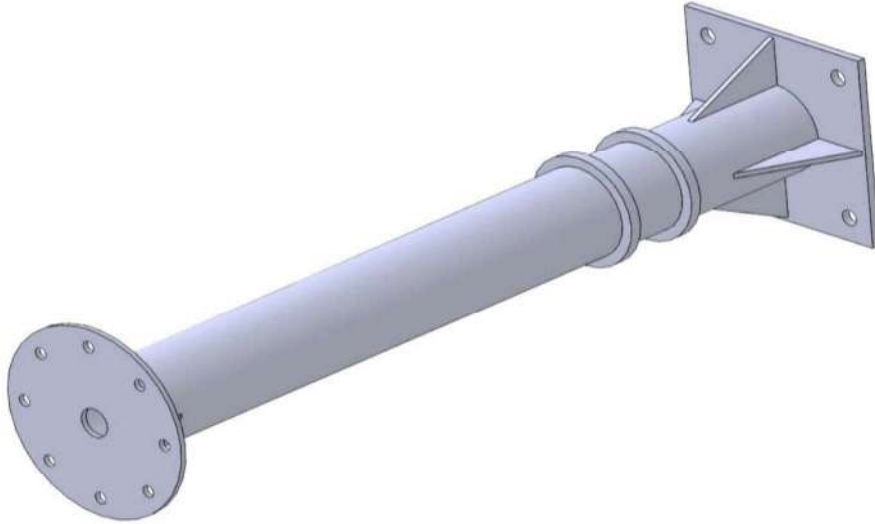
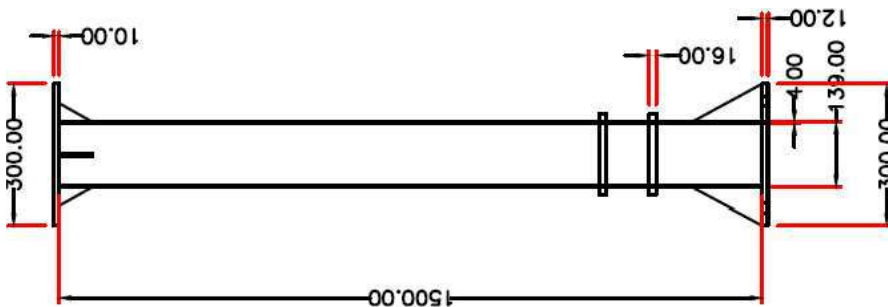


Raw material test certificates (MTC) of all types of raw material used in dual axis manual tracking type MMS as per appropriate IS code should be submitted along with dispatch documents.

Tests to be performed on Dual Axis Manual Tracking Type MMS for Solar Water Pumping System: -

1. For ascertaining proper welding of structure part following should be referred.
 - a. Weld wire grade should be of grade **(ER 70 S - 6)**
 - b. D.P. Test (Pin Hole / Crack) **(IS 822)**
2. For ascertaining hot dip galvanizing of fabricated structure following should be referred: -
 - a. Min coating required should be as per IS 4759.
 - b. Testing of galvanized material.
 - i. Preece Test (CuSO₄ Dip Test) **(IS 2633)**
 - ii. Mass of Zinc **(IS 6745)**
 - iii. Adhesion Test **(IS 2629)**

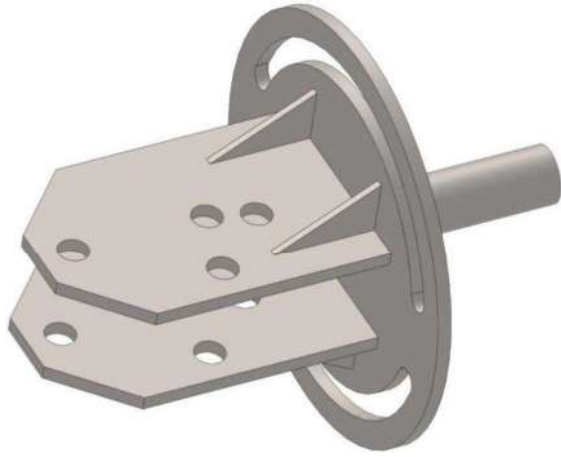
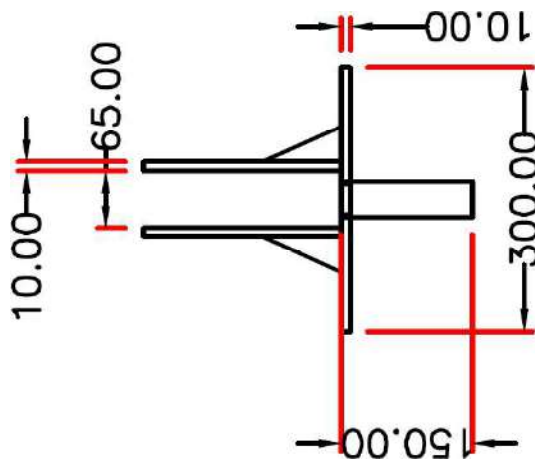
Part1 – Mail Column



Notes: -

1. All Dimensions are in mm.
2. Main Column material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

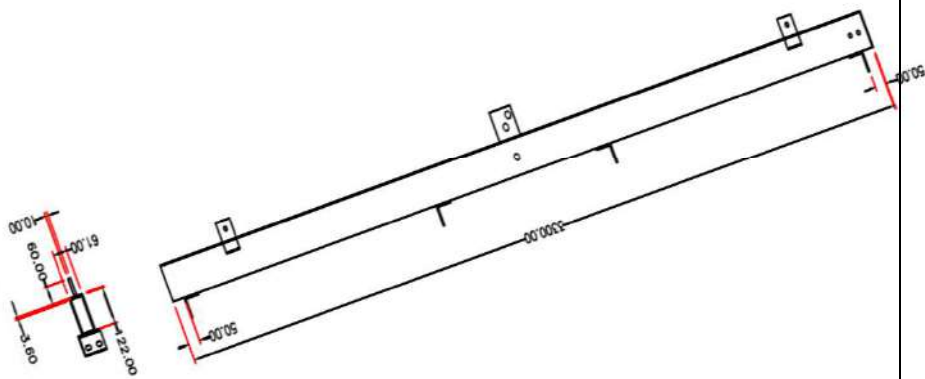
Part 2 – Top Plate



Notes: -

1. All Dimensions are in mm.
2. Top Plate material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

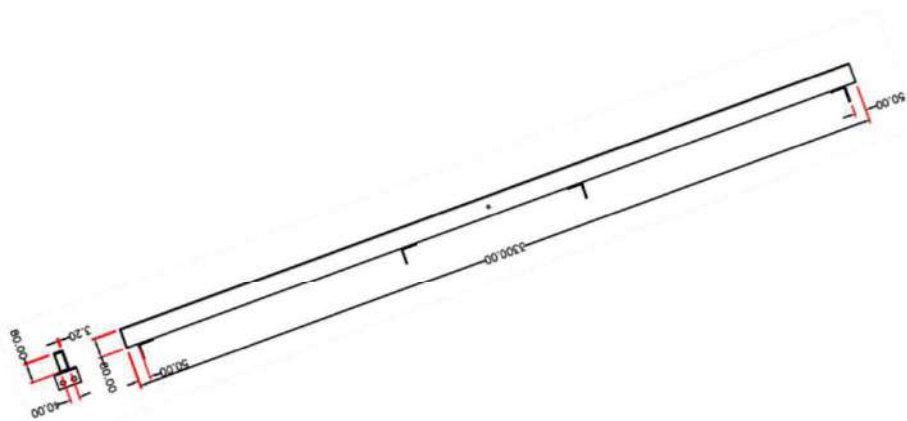
Part 3 – Main Tube



Notes: -

- 1. All Dimensions are in mm.
- 2. Main Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

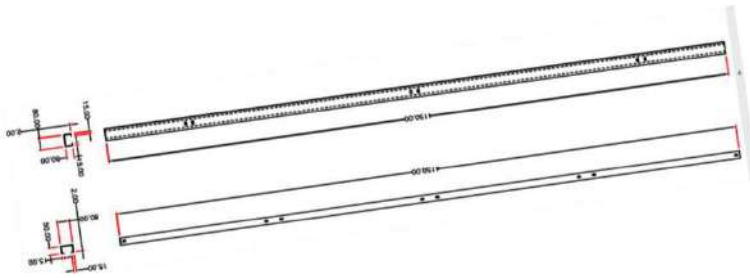
Part 4 – Side Tube



Notes: -

1. All Dimensions are in mm.
2. Side Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

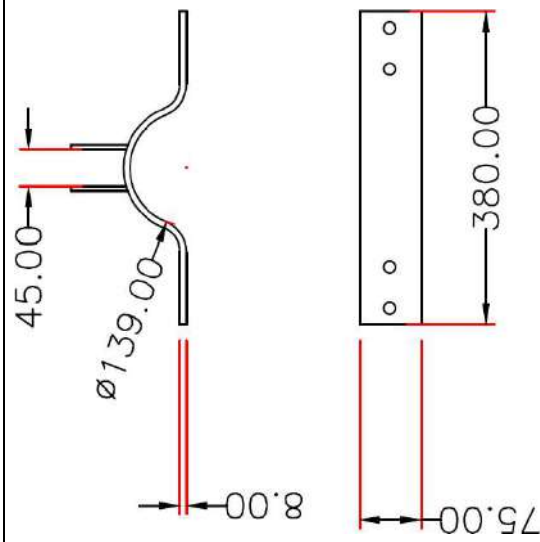
Part 5 – Purlin



Notes: -

1. All Dimensions are in mm.
2. Mounting Purlin material grade should be E250 as per: - IS: 1079 / 2062 & IS: 811.

Part 6 – Clamp with Blade

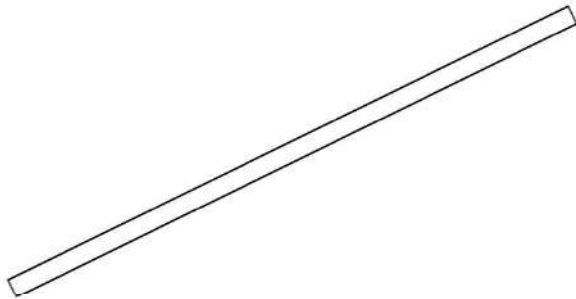


Notes: -

1. All Dimensions are in mm.
2. Clamp with Blade material grade should be as per: - IS: 1079 & E250 as per: - IS: 2062.

Part 7 – Supporting Pipes

o

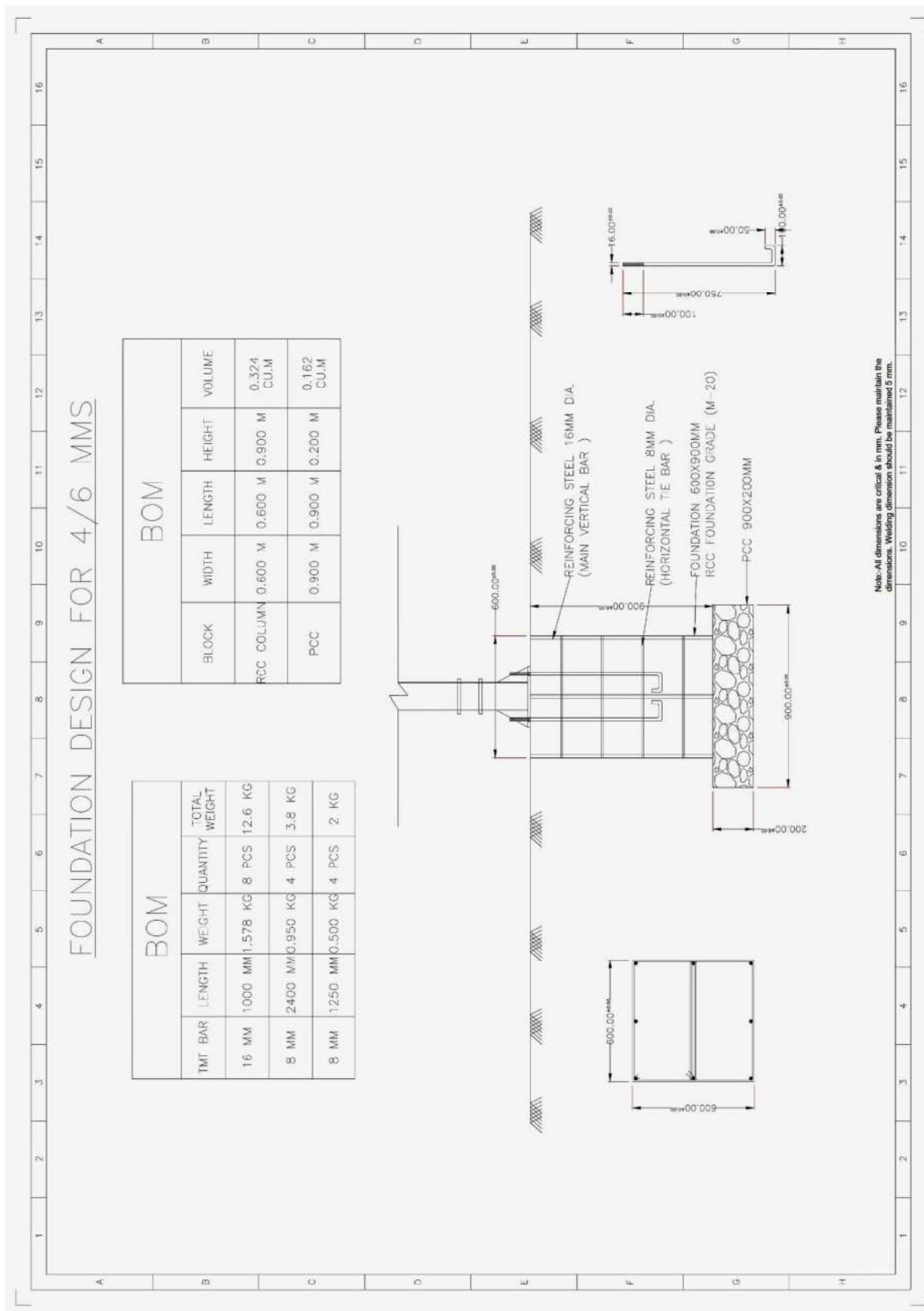


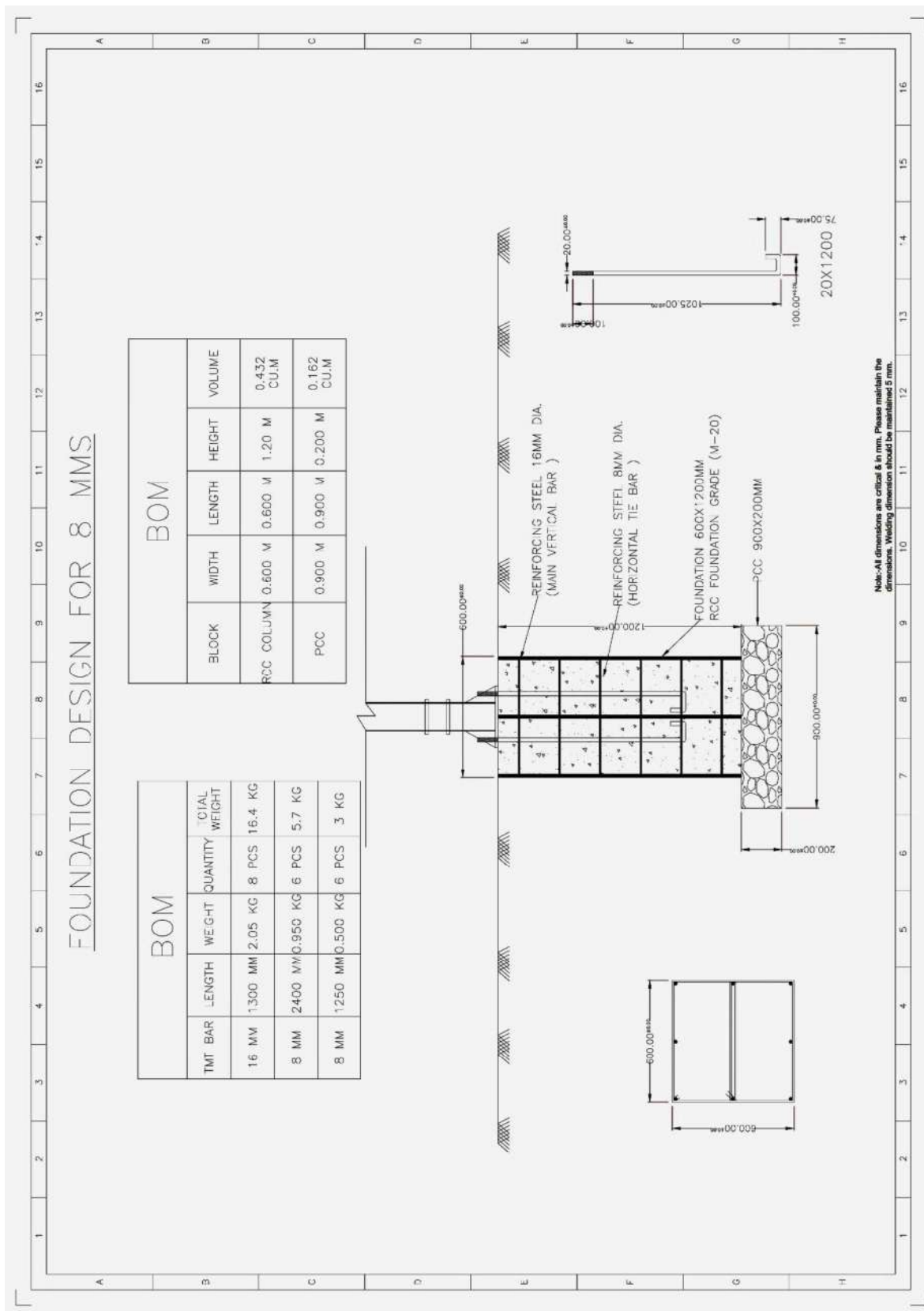
Notes: -

1. All Dimensions are in mm.
2. Supporting Pipes material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Bill of Quantity for main parts of MMS for Solar Water Pumping System

SR. NO.	PART NAME	CROSS SECTION DETAIL	LENGTH (MM)	QUANTITY PER SET
A	Common for MMS for 4, 6 and 8 Modules			
1.	MAIN POLE	139 OD	1500	1
2.	TOP PLATE	300 OD	--	1
3.	CLAMP WITH BLADE	75X8	380	2
4.	SUPPORTING PIPES	41 OD & 33 OD	--	6
B	Different for MMS for 4, 6 and 8 Modules			
5.	MAIN TUBE			
	4 and 6 Module	60X60X3.6	3300	1
	8 Modules	122X61X3.6	3300	1
6.	SIDE TUBE			
	4 and 6 Module	50X50X3.6	3300	2
	8 Modules	80X40X3.2	3300	2
7.	MOUNTING PURLIN			
	4 Module	80X50X15X2	2050	4
	6 Module	80X50X15X2	3100	4
	8 Modules	80X50X15X2	4150	4





ANNEXURE – II

Indicative Technical Specifications of Shallow Well (Surface) Solar Pumping Systems with D.C. Motor Pump Set with Brushes or Brushless D.C. (B.L.D.C.)

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII
PV array (Wp)	900	1800	2700	2700	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	12	12	12	25	12	25	45	12	25	45	12	25	45
Water output * (Liters per day)	99000 (from a total head of 10 meters)	198000 (from a total head of 10 meters)	297000 (from a total head of 10 meters)	148500 (from a total head of 20 meters)	528000 (from a total head of 10 meters)	264000 (from a total head of 20 meters)	182400 (from a total head of 30 meters)	742500 (from a total head of 10 meters)	371250 (from a total head of 20 meters)	256500 (from a total head of 30 meters)	990000 (from a total head of 10 meters)	495000 (from a total head of 20 meters)	342000 (from a total head of 30 meters)

* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 kWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. Suction head, if applicable, maximum 7 meters.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4 (i.e. Performance Requirements) specified earlier.
3. If submersible pumps are used in lieu of surface pumps, the water output must match that of the surface pumps as specified in this table.

ANNEXURE – II (CONTD.)**Indicative Technical Specifications of Solar Deep well (submersible) Pumping Systems with D.C. Motor Pump Set with Brushes or Brushless D.C. (B.L.D.C.)**

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII	Model-XIV
PV array (Wp)	1200	1800	3000	3000	3000	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	45	45	45	70	100	70	100	150	70	100	150	70	100	150
Water output * (Liters per day)	45600 (from a total head of 30 meters)	68400 (from a total head of 30 meters)	114000 (from a total head of 30 meters)	69000 (from a total head of 50 meters)	45000 (from a total head of 70 meters)	110400 (from a total head of 50 meters)	72000 (from a total head of 70 meters)	50400 (from a total head of 100 meters)	155250 (from a total head of 50 meters)	101250 (from a total head of 70 meters)	70875 (from a total head of 100 meters)	207000 (from a total head of 50 meters)	135000 (from a total head of 70 meters)	94500 (from a total head of 100 meters)

* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 kWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4 (i.e. Performance Requirements) specified earlier.
2. If surface pumps are used in lieu of submersible pumps, the water output must match that of the submersible pumps as specified in this table.

ANNEXURE – III**Indicative Technical Specifications of Shallow Well (Surface) Solar Pumping Systems with A.C. Induction Motor Pump Set**

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII
PV array (WP)	900	1800	2700	2700	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	12	12	12	25	12	25	45	12	25	45	12	25	45
Water output * (Liters per day)	89100 (from a total head of 10 meters)	178200 (from a total head of 10 meters)	267300 (from a total head of 10 meters)	132300 (from a total head of 20 meters)	475200 (from a total head of 10 meters)	235200 (from a total head of 20 meters)	168000 (from a total head of 30 meters)	641025 (from a total head of 10 meters)	330750 (from a total head of 20 meters)	236250 (from a total head of 30 meters)	890000 (from a total head of 10 meters)	441000 (from a total head of 20 meters)	324000 (from a total head of 30 meters)

* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 kWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. Suction head, if applicable, maximum 7 meters.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4. (i.e. Performance Requirements) specified earlier.
3. If submersible pumps are used in lieu of surface pumps, the water output must match that of the surface pumps as specified in this table.

ANNEXURE – III (CONTD.)**Indicative Technical Specifications of Solar Deep well (submersible) Pumping Systems with A.C. Induction Motor Pump Set**

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII	Model-XIV
PV array (WP)	1200	1800	3000	3000	3000	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	45	45	45	70	100	70	100	150	70	100	150	70	100	150
Water output * (Liters per day)	42000 (from a total head of 30 meters)	63000 (from a total head of 30 meters)	105000 (from a total head of 30 meters)	63000 (from a total head of 50 meters)	42000 (from a total head of 70 meters)	100800 (from a total head of 50 meters)	67200 (from a total head of 70 meters)	43200 (from a total head of 100 meters)	141750 (from a total head of 50 meters)	94500 (from a total head of 70 meters)	60750 (from a total head of 100 meters)	189000 (from a total head of 50 meters)	126000 (from a total head of 70 meters)	81000 (from a total head of 100 meters)

* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 kWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4 (i.e. Performance Requirements) specified earlier.
2. If surface pumps are used in lieu of submersible pumps, the water output must match that of the submersible pumps as specified in this table.

CONSORTIUM AGREEMENT

This consortium agreement (the "Agreement") is made and executed on _____ Day _____ Month _____ 2017 for the bid for _____ " _____ for CEL (Central Electronics Limited, a company registered under Companies Act, 1956, having its registered office at 781, Desh Bandhu Gupta Road, Karol Bagh, New Delhi - 110005 (herein after referred to as "Employer"), by and between:

THE _____ COMPANIES/FIRMS/SOLE _____ PROPRIETRESHIPS _____, having its registered Office at _____ (herein after referred to as " _____ ")

AND

M/s _____ a company/firm/proprietorships having its registered office at _____ herein after referred to as " _____ ")

(herein after referred to individually as PARTY and collectively as "PARTIES" and as "consortium")

WHEREAS Employer has issued to the said consortium the document (Tender/EOI/RFP)No. _____ Dated _____

for _____ for _____ CEL.

ANDWHEREAS the Employer has been assured by the parties that:

- a) _____ has proven technology, design & engineering expertise in supply (SITC) of _____ Solar Power Plants.
- b) _____ has _____ expertise in _____
- c) _____ shall be the leader of the consortium for the contract.

[Handwritten signatures and initials]

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- d) The PARTIES jointly meet the eligibility criteria for tender/RFP/EOI No _____ Dated _____ as per employer.
- e) The parties shall coordinate their resources in such a way that they will jointly & severally fulfill the requirements of the employer and shall be awarded contract _____ for execution of _____ " (here in after referred to the 'CONTRACT/PROJECT/WORK')
- f) M/s _____ and M/s _____ Ltd. shall be jointly and severally liable for the execution & completion of this CONTRACT/PROJECT/WORK.

NOW THEREFORE, the parties have entered into the following consortium agreement (the "Agreement") on _____ Day _____ Month 2017 to which the parties witnessed as follows:

1. The PARTIES, each having its own expertise and each as a separate legal entity, shall join their efforts in order to make the consortium successful for award of the CONTRACT and execution of the PROJECT/WORK.
2. Leader of the Consortium (i.e. _____) shall be overall responsible for the execution of the contract. But the Leader and other member of the consortium will be jointly and severally responsible for the execution of the CONTRACT and shall also be liable jointly and severally for damages (in case of successful bidding and Contract award) in accordance with the CONTRACT terms.
3. However, the leader of this consortium shall be solely responsible for overall coordination of the scope of work of the PARTIES and of overall execution of the CONTRACT. However, each PARTY shall remain responsible towards the other PARTY for project execution and for its actions and deficiencies.
4. The parties undertake to co-operate with each other according to the principles of good faith and to refrain from acting in any way that may contravene good faith and to refrain from acting in any way that may contravene aims and objectives of this agreement and to make reasonable effort in order to prevent or minimize any possible disadvantage for the other PARTY. The co-operation of the PARTIES under the agreement is on mutually exclusive basis. Therefore, no PARTY shall in any way whether directly or indirectly - coordinate or tie up with any new person, company or firm (whether it is a competitor of the PARTIES or not) for the subject matter of this agreement.

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(13)

5. Each PARTY shall bear its costs, incurs for the offer prepared and in case of award, each PARTY will be fully responsible and liable for the complete performance of the CONTRACT and this agreement. This includes but is not limited to the liability of a PARTY under the CONTRACT and under this agreement and each PARTY's liability for damage from its non-performance, defective faulty or delayed performance whether of a PARTY itself or its sub-contracts as per the provision of the CONTRACT. Each party shall bear all related costs, charges and risks as shall be agreed in the CONTRACT.
6. Any dispute, which may arise at any time out of this agreement and any subsequent amendment or in connection with the same shall be finally/settled under the rules of arbitration of International Chamber of Commerce (ICC) (only when foreign party is there in consortium)/ Indian Council of Arbitration (ICA) (in case there is no foreign party in the consortium) by an arbitration panel to be appointed according to the said Rules. The venues of the arbitration panel shall be Factory premises of CEL and the language of the proceeding shall be English.
7. This Agreement shall become effective upon signature by the PARTIES and shall remain in full force and effect until all obligations, liabilities and warranties undertaken/ given by the PARTIES in connection with the present agreement have been settled.
8. The agreement may be terminated by either PARTY with immediate effect by written notice of 30 days to the other PARTY if:
 - the other PARTY is declared insolvent or bankrupt or if a liquidator or receiver is appointed to that PARTY, or if an event happens that has a similar effect; or
 - the CONTRACT is not awarded by the employer or if the employer abandons the PROJECT or if the Employer awards the CONTRACT to the third party other than the PARTIES hereto.
9. Any matter, which is not stipulated in the Consortium agreement, shall be settled in good faith by discussion among the parties in the spirit of understanding and co-operation. Modification and supplement to this agreement requires mutual agreement between the PARTIES and must be in writing in order to be effective.

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