

Appendix A1**Vendor Approval**

It shall be obligatory for the Contractor to obtain Notice of 'No Objection' from the Engineer for the selection of the vendors for all items of work, even if the name of the vendor is specified in the Contractor's Technical Submission and the works to be done including purchase of materials and equipment is in accordance with the Standards specified in the Contract.

In case of vendor selected from the vendor list provided in the contract,

- (a) A list of vendors is provided in this contract, whose material have been used by DMRC/JMRC in U/G stations.
- (b) Contractor in general shall use the material of make as per vendor list unless specified in BOQ or equivalent makes meeting the Bid specifications as approved by the Employer's representative.
- (c) The contractor shall ensure the correct selection of the make meeting the specifications and its application. Before placing the order for procurement, the sample of approved make shall be verified for its suitability to the specification and application. In case Employer's representative/ engineer, (whose decision will be final and binding on both parties) considers that the make/ model proposed by the contractor does not meet the Bid requirement, the contractor will be required to propose an alternative make acceptable to the Employer's Representative.
- (d) The contractor will submit a list 'A' of vendors for all the items of the BOQ contract
 - (i) The list should include the items for which the contractor is proposing the product of the vendor list.
 - (ii) The contractor will be advised 'No Objection' with following caveat:-
 - The model etc. to be supplied will be the latest or superior one.
 - The contractor will be required to submit the technical proposal for the scrutiny
 - (iii) For the items, contractor desires to propose new vendor, proposal to be submitted in accordance as List 'B'.
 - (iv) The contractor will submit the undertaking that above lists i.e. List 'A' and List 'B' includes all the items required in the contract.

Vendor to be selected who are capable to provide good after sales services available in Jaipur during DLP and thereafter.

Vendor Approval and Selection Procedure

- (1) In the event of contractor wanting to use alternate makes other than those stipulated, for any reason, The contractor can send a proposal after ensuring that what he proposes at least meets the specifications both, the quality and safety standard of the stipulated makes, the alternate proposed product should be a proven one. He shall also stand full guarantee to his alternate proposal and if at any stage it is found that the material is not suitable or meeting the Bid requirement, the contractor shall replace the material and provide the material from the vendor list alternative acceptable make without any additional cost to JMRC. The alternate makes material can be used only after an approval accorded by the Employer, whose decision will be final in the matter.
- (2) The approval of any equipment or product to be used shall be done in two stages:-
 - (a) **Stage-I**
 - Assessment of capability of proposed Vendor to supply a particular equipment or product, with quality and performance requirements, as required by Specifications as well as other contract conditions. The proposed product should be a proven product in service for at least 3 years.
 - Assessment of the financial and functional strength of the Vendor to supply the requisite quantity of equipment and product as per delivery schedule acceptable to contractor and engineer to deliver the project in time.
 - (b) **Stage-II**

Stage-II called as Technical Submission Approval Stage, selection of Equipment or product from the equipment / products manufactured / supplied by the vendor will be done. This stage includes thorough technical assessments about the conformance of the offered equipment / product to the Specifications and other requirements.
 - (c) To obtain Vendor Approval the Contractor must apply with the four sets of the following documents to the Engineer
 - (i) Company Profile and Experience of the Vendor
 - (ii) Clause wise compliance of the relevant Clauses of Specifications.
 - (iii) Details of supplies / orders executed in last ten years for the type of equipment / product offered. Supplies / orders executed for Underground Metro Systems shall be specifically mentioned
 - (iv) Details of the facilities available at the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured.
 - (v) ISO 9000 Certification for the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured (The Works / Manufacturing Unit where the proposed equipment / product shall be manufactured must have ISO 9000 Certification)
 - (vi) Proof regarding compliance to Manufacturer's Qualifications. The offered products must be proven in service.
 - (vii) Audited Financial Statements of the Vendor for the last three years.
 - (viii) Type test certificates/ Performance certificate from accredited laboratories for the proposed type of equipment / products to establish the technical capability of the vendor (In case, specific requirements are mentioned in

the relevant sections of Specifications with regard to type testing, same shall also be complied additionally). Type test should not be more than 5 years old.

- (ix) The vendor shall not have been blacklisted by any Govt. Agency in India.
- (x) Any other item as required by Employer / Employer's Representative.
- (d) Contractor must certify the check list provided that vendor Proposal is complete and all the above documents are available in the Vendor Proposal. In addition, the Contractor must check / certify compliance to the Specifications before forwarding the same.
- (e) Incomplete Vendor Proposal will not be treated as a submission and will be returned.
- (f) Engineer will give Approval to the Vendor Proposal (received complete with all the documents mentioned above) expeditiously.
- (g) Technical submission shall be accompanied with the calculations / other technical documents to justify the selection of any particular model of equipment / product, detailed technical features / parameters of the selected product, type test certificates from the accredited laboratories for the offered products, any other document required by the Engineer.
- (h) Engineer will give Approval to the Technical Proposal (received complete with all the documents mentioned above) expeditiously.
- (3) It may be noted that Approval of Vendors as per Point (3) above shall only be done by Employer / Engineer after the award of the work. Vendor submissions shall not be evaluated during the Bid evaluation. Conditional Bid offers received from Bidders with particular Vendors for supply of equipment/ products will not be evaluated during evaluation and will be dealt with after award of the work.
- (4) It may further be noted that Employer / Engineer shall be under no obligation to accept equipment / products manufactured by the successful Bidder, unless it meets the entire criterion mentioned above.

For Design and Build Contracts

In addition to above, in Design and Build Contracts the following shall also be ensured for the Vendor Approval and Selection:-

1. Proven Design

The Contractor shall develop the design based on this specification and on sound proven and reliable engineering practices. The broad design details shall be submitted with technical support data in the technical bid. Detailed calculations shall be submitted to the Engineer during the design process stage for review and approval.

1.1 Systems and Sub-Systems

Manufacturer shall have at least 5 years experience of design and manufacturing of similar system. Proposed systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 3 years in minimum.

All sub-systems, equipments and major components etc. (hereinafter referred as 'sub-systems') shall be state-of-art and of proven design.

Proposed Systems/ sub-systems shall have been in use and have established their satisfactory performance and reliability on at least Two mass rapid transit systems (including Railway or Airports) in revenue service over a period of three years or more either outside the country of origin at an average in two different countries or in JMRC/DMRC. Systems/ Sub-systems/ components used in JMRC/DMRC do not get automatically qualified for use unless specifically approved by the Engineer for this project. If required by the Engineer, Contractor shall provide certificate of satisfactory performance for a period of five years or more from the Metro operators. Where similar System/ Sub-systems of a different rating are already proven in service as per the above criteria then the supply shall be based on such sub-systems.

All 'sub systems' shall be procured from the approved vendors and sourced from only such manufacturing units that have supplied the sub-systems that fulfill the proven design requirements as above.

In case the contractor proposes to use systems or sub-system(s) that do not fulfill the above said criteria then the contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered systems and sub-system(s) for review of the Engineer.

The Engineer's decision on contractor's proposal shall be final and binding.

For sourcing the equipment from indigenous manufacturing facilities, following conditions shall be complied:-

- (i) In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, no change in design, component type/make, quality standards, manufacture procedure, etc. shall be made without specific approval of the Engineer.
- (ii) In case OEM wants to use manufacturing facilities in India (other than his own) for items for which the OEM has been approved, it shall enter into an agreement with such selected Indian equipment manufacturer and obtain prior approval from JMRC. No change in composition, rating, type, model no., manufacturing process, quality standards, design, etc. and make of the components used in assemblies/sub-assemblies of such equipment as manufactured by the approved parent vendor shall be made without specific approval of the Engineer.
- (iii) In case OEM wishes to change/make/type specifications, etc. of any sub-components for supplies to be sourced from Indian facility, specific prior approval of the Engineer shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the contractor.

Format for submitting the vendor approval request shall be given to the contractor during initial stages and approved format shall be followed throughout the contract.

VENDORS LIST

- (1) Contractor shall use the material of make mentioned in vendor list as indicated below unless specified in BOQ or equivalent make as approved by the Employer's representative.
- (2) The contractor shall ensure the correct selection of the make and rating meeting the specifications and application duties. Before placing order for procurement, the sample of make shall be got verified for its suitability to the specification and application duty. However, in case Employer's representative/ engineer, whose decision will be final and binding on both parties, considers that the make/ model proposed by the contractor does not meet the requirement, the contractor will be required to propose an alternative make acceptable to the Employer's Representative.

The Contractor shall quote the rates for material and equipments as per the list of makes in vendor list. In the event of contractor wanting to use alternate makes other than those stipulated for any reason, the contractor can send a proposal after ensuring that what he proposes at least meets both the quality, and safety standard of the stipulated makes. He shall also stand full guarantee to his alternate proposal. The alternate makes can be used only after an approval accorded by the Employer, whose decision will be final in the matter.

The Contractor shall submit the fresh vendor proposal for all items proposed to be utilized in the contract as per the procedure specified in the vendor approved procedure.

The order of precedence of BOQ, Specification and data sheet-

- (1) **BOQ**
- (2) **Specifications**
- (3) **Data sheet**

ECS Item	Vendor Name
AHU	Waves Aircon, Systemair India, ETA, Bluestar
Centrifugal Fan (AHU) Plug fan	Kruger Singapore
Air Filter	Spectrum
FCU	Waves Aircon, ETA, Bluestar
Water Cooled Chiller	Trane, Dunhambush, York
Air Cooled Chiller	Trane, York, Dunhambush
Pump Set	Kirloskar, ITT / Zylum
GI Sheet	Tata, Jindal
Prefabricated Duct	Rolastar, Waves Aircon
Motorised Fire Damper	Ruskin India, Greenheck India
Fusible Link Fire Damper	Ruskin India, Greenheck India
Motor Operated Damper	Systemair India
Manual Damper	Systemair India
Volume Control Damper	Systemair India
Grills	Systemair India, Caryaire
Diffuser	Systemair India, Caryaire
Fire rated Paint	Firespray International Ltd
Glasswool Insulation	UP Twiga
Rockwool Insulation	Rockwool India Pvt Ltd, Lloyd Insulation Ltd
Cooling Tower	Paharpur India
MS & GI Pipes	Jindal, Tata
Balancing Valve	Advance India
Check Valve	Advance India
Butterfly Valve (Non-motorised)	Advance India, Kitz Japan

Butterfly Valve (Motorised)	Belimo, Kitz Japan
PICV – AHU	Flowcon
PICV – FCU	Flowcon, Pettiranaroli
Y – strainer	Emerald, Sant
Axial Flow Fans (ECS)	Kruger Singapore, Systemair Malaysia
Propeller fan	Kruger Singapore, Systemair Malaysia
Flexible Coupling	Resistoflex
ECS Sound Attenuator	Systemair, Ruskin
Motor	ABB, Crompton, Siemens, Alstom
Automatic Expansion Tank	Anergy, CIMM, TACO
Automatic Air Vent	Anergy, Flamco, Rapid Control, Sant
Temperature Gauge	Waree, H Guru
Pressure Gauge	Waree, H Guru
VFD	ABB, Danfoss
Water Treatment System	Thermax, water Engineers

ELECTRICAL ITEM	Vendor Name
Cable (LSZH)	Bonton-Paramount, Polycab, KEI, Ducab
Cable (FS)	Bonton-Paramount, Polycab, KEI, Ducab
Panel	Tricolite, Adlec
Switchgear	Schneider
Cable Tray	MEM
Anti Fouling Device	Danfoss

TVS ITEM	Vendor Name
Tunnel Ventilation Fan	Flaktwood UK, Systemair Germany, WITT & Sohn Germany

Trackway Exhaust Fan	Flaktwood UK, Systemair Germany, WITT & Sohn Germany, Greenheck
Tunnel Booster Fan	Flaktwood UK, Systemair Germany, WITT & Sohn Germany
Tunnel Ventilation Damper	Ruskin Thailand, Trox Malaysia
TVS Attenuator	Ruskin India
Compressed Air System	Chicago Pneumatic
Insulation	UP twiga, Lloyd Insulation
Nozzle	Shefa, Ruskin

BMS EQUIPMENT	Vendor Name
Master Control Equipment {PLC}	GE/FANUC/Schneider/Rockwell/Honeywell
Air flow Differential pressure switches	Honeywell
Duct temperature sensor	Greystone
Two way and Three way motorised valves with actuators	Honeywell
Butterfly valves	Honeywell
A.C Current transducers	AE/Pyrotech/Meco
A.C Voltage transducers	AE/Pyrotech/Meco
Battery voltage transducer	AE/Pyrotech/Meco
KW transducer	AE/Pyrotech/Meco
Frequency transducer	AE/Pyrotech/Meco
Differential pressure switch for pumps	Honeywell, ABB
Temperature sensors (outside air)	Greystone
Flow meter	J.N. Marshall
Space RH sensor	OEM/Greystone
Pressure transducer	Greystone
Hub for TCP/IP	Emulux

Liquid level switch	Techtrol/Level Tech.
LS Panel Enclosure	Rittal
Cables	KEI/Bonton/Poycab

TVS/BMS/SACADA EQUIPMENT	Vendor Name
Master Control Equipment (PLC)	Rockwell/Honeywell/GE/FANUC/Schneider
Air flow Differential pressure switches	Honeywell/Rockwell
Duct temperature sensor	Greystone/Rockwell
AC current transducers	AE/MECO/Pyrotech
AC voltage transducers	AE/MECO/Pyrotech
Temperature sensors (outside air)	Greystone/Rockwell
Pressure transducer	Greystone/Rockwell
Liquid level switch	Techtrol/Level Tech.
LS Panel Enclosure	Rittal
Cables	KEI/Bonton/Polycab

S. No	Items (E&M) E&M Items	Vendor Name
1	Electrical Panels	M/s Neptune - Elsteel JV (Sri Lanka), Schneider Electric (Nashik), Siemens (Kalwa), L & T (Powai), M/s Tricolite-Schneider, Adlec-Schneider, Sudhir- Schneider
2	CI Pipes and fitting for Hydraulics	M/s JayaswalsNeco Ltd.
3	Hydraulics Piping	M/s Jindal, M/s TATA
4	Flow Switch For fire services	M/s System Sensor
5	Fire fighting pump (fire services)	M/s Kirloskar Brothers Ltd., M/s Armstrong
6	Fire alarm system	M/s Simplex. Ltd, M/s Notifier (USA)
7	Sprinkler head (Fire services)	M/s Grinnell Manufacturing Ltd.M/s Tyco

8	Check Valves	M/s Advance Valves Pvt. Ltd.
9	Fire Survival type Fire Alarm & Detection Cables, Fire Survival Type Wires and Control Cables.	M/s Reliance, DUCAB, M/s TYCO Thermal Singapore, M/s KEI, Ploycab
10	Butterfly valves (Fire and Hydraulics)	M/s AUDCO (L & T)
11	Power Cables (LSZH Type)	M/s Ducab, M/s Polycab, M/s KEI
12	Power Cables (Fire Survival Type)	M/s Ducab, Polycab, M/s KEI
13	UPS	M/s PCI, M/s Schneider, M/s Emerson
14	Cable Tray, Ladders, Floor Trunking	M/s Equiptech, M/s Bhart Exports, M/s Anil Steel, M/s Bharati, M/s Ratan Engineering MEM,, M/s MEMM/s Ratan Engeneering
15	Cable Trunking and Raceways	M/s Jamna Metal Company, M/s MEM
16	GI Conduit	M/s BEC Industries
17	Light Fixture	M/s Philips, M/s Keselec, M/s Bajaj, Crompton
18	Wiring Accessories	M/s Clipsal, M/s Legrand
19	Pipes For fire services	M/s Jindal (Hisar) Pipes, M/s TATA
20	Sprinkler Alarm Valve (fire Services)	M/s HD Fire Protect Co
21	Electrical Switchgear	M/s Schneider Electric Co (Merlin Gerin), ABB, L&T
22	Pressure gauges	M/s Warree, M/s H-Guru
23	Fire Extinguishers	M/s Safex, Fire Extinguisher
24	Hydrant Valves, Hose Coupling, Branch Pipe	M/s Minimax, M/s New age Industries
25	Hose reel Drum	M/s Steelage, M/s Minimax
26	Hose reel	M/s Maruti
27	Rubber Bellow	M/s Kanwal
28	Borewell pumps	M/s KSB
29	Water Heater	M/s Venus

30	CP Fittings	M/s Jacquar, M/s Hindware
31	Chinaware Sanitary Fittings	M/s Hindware
32	GI Fittings	M/s Jainsons
33	Ductile Iron Grooved pipe fittings	M/s Interfit India Ltd, M/s Recomb
34	Water Cooler	M/s Blue Star
35	Copper earthing material	M/s Citizen Metal alloys
36	Starnded bare Copper Conductor	M/s Mansfield, M/s Ducab
37	HDPE pipes	M/s Diaplast,
38	Medium velocity water Sray nozzle	M/s H.D.fire
39	Branch Pipe for Hose, Fire extinguisher	M/s Minimax, M/s Newage
40	Pressure Switch	M/s Indfos
41	Ball valve	M/s ZJoloto
42	Gate Valve	M/s ZJoloto
43	Water treatment Plant	M/s Thermax
44	Distribution board	M/s Sschneider Electric company,M/s Neptune, M/s Tricolite, M/s Legrand, L&T, Sudhir-Schneider
45	Sewage pump	M/s Grundfoss, Denmark, m/s Kirloskar
46	Seepage Pump	M/s Kirloskar
47	LT BUS DUCT	M/s EAE, M/s enikwon, M/s Schneider, M/s Siemens, M/s L&T, M/s C&S

BID TOTAL – PART - I

In accordance with the accompanying and signed form of bid, we (the Bidder) offer to supply, install, test, commission, and remedy at any defects of the whole said works, in conformity with the said drawings, particular specifications, conditions of contracts and other contract documents of **bid of Jaipur for ECS & TVS system for Chhoti Chaupar and Badi Chaupar** for the following sums:

PRICES FOR WORKS CHHOTI CHAUPAR & BADI CHAUPAR U/G STATIONS AND ASSOCIATE FOR TUNNEL SECTION.

Section No.	DESCRIPTION	Total Brought From above Bills	
		INR	Foreign Currency
PART-A	BOQ for ECS Electrical Works		
PART-B	BOQ for ECS Works		
PART-C	BOQ for TVS Works		
PART-D	BOQ for BMS works ECS and E&M		
PART-E	BOQ for TVS BMS works		
PART-F	BOQ for TVS-SCADA Works		
PART-G	BOQ for Civil Works as per DSR		
PART-H	BOQ for Additional Miscellaneous Items		
PART-I	BOQ for AMC beyond DLP		
PART- J	BOQ for Spares		
PART- K	BOQ for Training & Training Manuals		
PART- L	BOQ for Operation and Maintenance manuals		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES
TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

Note:-1.

All Sections will be part of evaluation. Employer reserves the rights not to award the any or all Items in BOQ. Additional items need to be operated with prior approval of employer.

Note:-2.

For items in BOQ. Price shall be quoted considering that price will be inclusive of all related equipments, parts/ accessories if not covered in BOQ elsewhere and required for successful installation, testing & commissioning of that item for its proper uses.

Note:-3.

The rates quoted against the rate only (RO) items shall not be unbalanced. The same shall be executed with prior approval of the employer.

PART-A BOQ for Associated Electrical Works

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
<u>PART - A</u>	BOQ for ECS Electrical Works		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-B BOQ FOR ECS Works

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - B	BOQ FOR ECS Works		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-C BOQ FOR TVS Works

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - C	BOQ FOR TVS Works		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-D BOQ FOR BMS Works- ECS

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - D	BOQ FOR BMS Works - ECS &E&M		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-E BOQ FOR TVS BMS Works

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - E	BOQ FOR TVS BMS Works		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-F BOQ FOR TVS-SCADA Works

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - F	BOQ FOR TVS-SCADA Works		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-G BOQ FOR CIVIL Works as per DSR

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - G	BOQ FOR CIVIL Works as per DSR		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF Foreign Currency

PART-H BOQ FOR Additional Misc. Items

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - H	BOQ FOR Additional Misc. Items		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-I BOQ FOR AMC beyond DLP

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - I	BOQ FOR AMC beyond DLP		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART- J BOQ FOR SPARES

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - J	BOQ FOR SPARES		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-K BOQ for Training & Training Manuals

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - K	BOQ FOR TRAINING MANUALS		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

PART-L BOQ for Operation and Maintenance Manuals

Section No.	DESCRIPTION	Total brought from above Bills	
		INR	FOREIGN CURRENCY
PART - L	BOQ for Operation and Maintenance manuals		
TOTAL SUM			

TOTAL SUM IN WORDS, OF INDIAN RUPEES

TOTAL SUM IN WORDS, OF FOREIGN CURRENCY

BID Total PART-I (ECS, TVS and BMS Works)			
<p>In accordance with the accompanying and signed form of tender, we (the Tenderer) offer to supply, install, test, commission, and remedy at any defects of the whole said works, in conformity with the said drawings, particular specifications, conditions of contracts and other contract documents of bid of Jaipur for ECS, TVS and BMS Works for Chhoti Chaupar and Badi Chaupar for the following sums: Prices for works at Chhoti Chaupar and Badi Chaupar U/G Stations and associate Tunnel Section.</p>			
SECTION No.	DESCRIPTION	TOTAL Brought from above Bills	
		INR	Foreign Currency
PART A	BOQ FOR ECS ELECTRICAL WORKS	-	-
PART B	BOQ FOR ECS WORKS	-	-
PART C	BOQ FOR TVS WORKS	-	-
PART D	BOQ FOR ECS-BMS WORKS	-	-
PART E	BOQ FOR TVS-BMS WORKS	-	-
PART F	BOQ FOR TVS-SCADA WORKS	-	-
PART G	BOQ FOR MISC. CIVIL WORKS	-	-
PART H	BOQ FOR ADDITIONAL MISCELLANEOUS ITEMS	-	-
PART I	BOQ FOR AMC BEYOND DLP	-	-
PART J	BOQ FOR SUPPLY OF SPARES	-	-
PART K	BOQ FOR TRAINING AND TRAINING MANUALS	-	-
PART L	BOQ FOR OPERATION & MAINTENANCE MANUALS	-	-
TOTAL SUM		-	-
TOTAL SUM IN WORDS, OF INDIAN RUPEES			
TOTAL SUM IN WORDS, OF FOREIGN CURRENCY			

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.0	Switch Boards/panels									
a	Main LV Switchboards must conform to Section A15 specifications and panel should be confirm to IEC 61439 with latest Amendment.									
b	All the items mentioned in relevant Sections / Clauses of the specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates									
c	In case of any contradiction between BOQ / Specifications and Drawings, the most stringent conditions of the above will									
d	The Switchboards shall be provided with detachable gland plates 3mm thick for less than and equal to 185sqmm and 5mm thick for more than 185sqmm. cable for entry of cables from the top / bottom as required.									
e	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. SMC / DMC shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.									
f	The panel shall have high conductivity copper busbars as specified in Specifications with bar type feeder connections, spacers etc. with full sized neutral.									
g	Earthing all components, frames etc. to a common internal earth bar size 50 x 6 mm. Cu., or higher, as required by the fault withstand level specified for the board.									
h	All accessories & supporting structures such as channels, ISMC-100 base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc. shall be provided as required.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i	Each incomer and outgoing feeder shall be provided with LED type status indication lamps suitable for 240 V, AC, as									
j	The make of all switchgear (ACB / MCCB / MCB etc.) must be same to have total discrimination.									
k	Components and accessories shall be same for switchboards and panels for uniformity, standardisation and replace ability and shall be applicable to all panels/ boards under the scope									
l	All interconnections, labeling, earthing, associated foundation / masonry work, sealing of gaps around the panels by chequered plates & erection etc. complete shall be executed as required.									
m	MCCB's shall be as per Specifications and shall be current limiting type with front adjustable electronic releases for required protections against fault, suitable for isolation as per Annexure 7.1.2 of IEC 60947 – 2, with Ics and Icu values as specified in relevant clauses of Section A15 Specifications and confirming to latest IEC 60947. The operating voltage (Ue) shall be 415 V and insulation voltage (Ui) 690V with trip free mechanism, handle indicating ON / OFF / tripped positions. The breaking capacity as mentioned in items of BOQ below, shall be Ics values and shall not be less than 50kA. Breakers must have Ics = 100% Icu. Electronic trip units (plugin type) shall comply with the requirements as specified in Appendix F (EMC /EMI Compatibility) of IEC 60947-2 or EN 60947-2.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
n	MCCBs for Network / Feeder Protection shall have adjustable protection against Overload and adjustable protection against Short Circuit as specified in Specifications, whether specifically asked in BOQ or not. MCCB's for Network / Feeder Protection shall have releases with Earth Fault protection feature, wherever and as indicated in Bill of Quantities or Drawings. However, on completion of Cable Sizing Calculations and Fault calculations by the Contractor, if Earth Fault releases are required for additional feeders, where this requirement is not indicated in the BOQ, same shall be provided at no extra cost to the Employer. For Motor Protection MCCB's, requirements of Specifications shall be followed.									
o	ACBs/MCCBs shall be compact, suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution, as required.									
p	Panel / Switchboard board design shall be compact and components / accessories of compact sizes shall be used to economize the room space available. Employer reserve the right to seek compact items in place of larger ones.									
q	Incomer ACB'S / MCCBs / MCBs of switchboards / panels shall be provided with NO / NC contacts as specified in specifications for interface with SCADA System and for manual / auto and local / remote operation.									
r	ACB's shall have Microprocessor based releases as specified in the Specifications.									

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S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
s	In case higher frame sizes (than those specified in the BOQ) are required to be provided to achieve the requirement of Total Discrimination mentioned in Specifications, due to selection of a particular make, the same shall be provided at no extra cost if other makes are able to achieve the same with the specified frame size.									
t	Contractor must carry out Cable Sizing based on actual lengths of cables and Discrimination study for selection of trip units and settings for the releases during production of									
u	All Motor feeders, having separate Electronic over current relay (EOCR) , shall be provided with Reset push button & group by pass arrangement.									
v	Even though, ratings of MPCB / Contactors for Motor Feeders are mentioned in BOQ items below, after Selection of a particular make of Switchgear, MPCB / Contactors with ratings as per tested Type II Coordination from the selected manufacturer, only shall be provided.									
w	Description of Various panels/boards covered under this BOQ is as given below:									
x	All panel internal wiring shall be of LSZH type complying to BS 7211.									
1.1	MAIN PLANT PANEL DB-170/270									
	Panel complete as per specifications, drawings, requirements & following details:	Sets		1	1	2				
1.1.01										
A	INCOMERS									
1)	2 Nos. 2500A, 415 V, 50KA, 50 Hz TPN EDO type ACBs interlocked with bus coupler and complete with microprocessor based releases having SCADA compatibility									

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S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2)	2 sets of Red (on), Green (off) and amber (C.B. Fault) indicating lamps									
3)	2 sets of (three) R, Y, B phase indicating lamps									
4)	TNC switch									
5)	Selector switch for auto/manual operation.									
6)	Metering									
i)	3 Nos. CTs 2500/5A, 15VA, CL-1 for metering.									
ii)	2 Nos. CTs 2500/5A, 15VA, CL-1 for APFCR.									
iii)	2 Nos. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
7)	Terminals to receive XLPE insulated armoured power & control cables									
8)	2 Nos. Front Display Module									
1.1.02										
B	BUSBAR									
	2 Nos. Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 2500 A, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 V .									
1.1.03										
C	BUS COUPLER									
a)	1 Nos. 2500A, 415 V, 50KA for 1 second, 50 Hz TPN EDO type ACBs interlocked with bus coupler and complete with microprocessor based releases having BMS and SCADA compatibility.									
b)	TNC switch									
c)	Selector switch for auto/manual operation.									
d)	LED indication lamp for ON, OFF & TRIP.									
e)	3 Nos. CTs, 2500/5A, 15VA, CL-1 for metering.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
f)	1 No. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
g)	Terminals to receive XLPE insulated armoured power & control cables.									
h)	1 Nos. Front Display Module									
D	OUT GOING FEEDERS									
1.1.04	3 Sets feeder for Chiller Motors up to 250 KW each shall be equipped with the followings but not limited to:									
a)	1 No. 800 A, 415V, 50kA, 3 Pole, Electrically operated Draw Out type, ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays) (2) NO / NC contacts for interlocks and indications (3) 1 no CT in neutral to connect with the trip unit.									
b)	TNC switch									
c)	Selector switch for auto/manual operation.									
d)	LED indication lamp for ON, OFF & TRIP.									
e)	3 Nos. CTs 800/5A, 15VA, CL-1 for metering.									
f)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
g)	Power & control terminals for cable connections.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.1.05	4 Sets of Star - Delta Starter Unit for Primary Chilled Water Pump Motors of 11KW (3 Working + 1 Standby) and each shall be equipped with the followings but not limited to:(For - CHWP-001P, CHWP-002P, CHWP-003P, CHWP-04P)									
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual pump selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 Nos with suitable rating AC-3 duty, 3 Pole Contactor with Auxiliary Contacts, Operating coil 230V / 110V AC (for Main, Star & Delta Contactor).									
i)	One no star-delta timer.									
j)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
k)	1 No Single Phasing Preventer Relay.									
l)	Power & control terminals for cable connections.									
m)	Provision for terminals for wiring to Local control panel (LCP)									
1.1.06	3 Nos. Feeder for Secondary Chilled Water Pump Motors of 37 KW (2 Working + 1 Standby) and each shall be equipped with the followings but not limited to:(For CHWP-001S, CHWP-002S, CHWP-003S)									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range according to motor selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
d)	LED indication lamp for ON, OFF, Trip.									
1.1.07	4 Sets of Star - Delta Starter unit for Condenser Water Pump Motors up to 37 KW (3 Working + 1 Standby) and each shall be equipped with the followings but not limited to:(For CDWP-001, CDWP-002, CDWP-003, CDWP-04)									
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual pump selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 Nos with suitable rating AC-3 duty, 3 Pole Contactor with Auxiliary Contacts, Operating coil 230V / 110V AC (for Main, Star & Delta Contactor).									
i)	One no star-delta timer.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
j)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
k)	1 No Single Phasing Preventer Relay.									
l)	Power & control terminals for cable connections.									
m)	Provision for terminals for wiring to Local control panel (LCP)									
1.1.08	8 Sets of Star - Delta Starter unit of 11 kW and each shall be equipped with the followings but not limited to:(For CT-001-F1, CT-001-F2,CT-002-F1,CT-002-F2,CT-003-F1,CT-003-F2 & 2 no spare)									
a)	1 No. 3 Pole 25 Amps MPCB (with Under Voltage Protection and inbuilt Single Phasing Preventer) with 20-25 A Over - load release and having contacts for indications - On, Off, Trip.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 25/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230 V / 110 V AC.(for Main, Star & Delta Contactor).									
i)	One no Star-Delta timer.									
j)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
k)	Power & control terminals for cable connections.									
l)	Provision for terminals for wiring to Local control panel (LCP)									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.1.09	2 nos outgoing feeders for Capacitor Panel with each consisting of the following									
a)	1 No. 800 A, 415V, 50kA, 3 Pole, Electrically operated Draw Out type, ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays) (2) NO / NC contacts for interlocks and indications (3) 1 no CT in neutral to connect with the trip unit.									
b)	TNC switch									
c)	Selector switch for auto/manual operation.									
d)	LED indication lamp for ON, OFF & TRIP.									
e)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
f)	3 Nos. CTs 800/5A, 15VA, CL-1 for metering.									
g)	Power & control terminals for cable connections.									
1.1.10	4No. 100 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.(For DB-330, LDB-AB, SPDB-AB & 1NO. SPARE).									
a)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
b)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
c)	LED indication lamp for ON, OFF, Trip.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
8)	4 No. 400 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit for Fire Pump Panel, Air Cooled Chiller Panel, Pump Room Panel & 1 no. spare with adjustable protection against Overload, adjustable protection against Short Circuit.									
a)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
b)	3 Nos. CT 400/5A, 15VA, class - I for metering.									
c)	LED indication lamp for ON, OFF, Trip.									
1.1.11	Delivery of equipment to site	set		1	1	2				
1.1.12	Installation and Equipment testing	set		1	1	2				
1.1.13	System testing, Commissioning and hand over	set		1	1	2				
1.1.14	Interlocking Arrangement	set		1	1	2				
1.1.15	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		1	1	2				
1.2	Sub-Distribution Boards, DB-330 as per Specifications , as per tender drawings Complete and as per the following details.	Sets		1	1	2				
1.2.01										
A.	INCOMER									
a)	1 No. 100 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.									
b)	LED indication lamp for the following- ON, OFF, TRIP (each for both the supplies)									
c)	LED phase indication lamp for R-Y-B.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
d)	1 No. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
e)	3 Nos. CTs, 100/5A, 15VA, CL-1 for metering.									
f)	Local / Remote Selector Switch key operated.									
1.2.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N (full size) copper conductor bus-bars (as specified in A15 Specifications) rated 100 Amps, suitable to withstand symmetrical fault level of 50kA for 1 second at 415 volts.									
C.	OUTGOING									
1.2.03	5 Sets of Star - Delta Starter unit (2 Nos. For VSF & 2 Nos. for VEF +1 No. Spare) of up to 7.5 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole suitable rating MPCB (with Inbuilt Single Phasing Preventer) with Over - load release and having contacts for indications - On, Off, Trip.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT suitable rating, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 No. with suitable rating , AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230 V / 110 V AC.(for Main, Star & Delta Contactor).									
i)	One no Star-Delta timer.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
j)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
k)	Power & control terminals for cable connections.									
1.2.04	8 Sets of DOL Starter Unit (for 4 Nos. Single Phase Damper & 2 Nos. PF motors & 2 nos. spare) of 0.5 KW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole suitable rating MPCB with only magnetic tripping (for short circuit protection) with overload range 2.5-4 Amp and having contacts for indications - On, Off, Trip.									
b)	Local / Remote Selector Switch key operated.									
c)	Door mounted push buttons for Start, Stop and over load by pass functions.									
d)	Emergency stop push button lockable type.									
e)	LED indication lamp for ON, OFF, Trip.									
f)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
g)	Auxiliary Contactors for Local / Remote Operation.									
h)	Power & control terminals for cable connections.									
1.2.05	14 Nos, DOL 0.5 kW single phase feeder for Motor Operated Valves									
1.2.06	Delivery of equipment to site	set		1	1	2				
1.2.07	Installation and Equipment testing	set		1	1	2				
1.2.08	System testing, Commissioning and hand over	set		1	1	2				
1.2.09	Interlocking Arrangement	set		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.2.10	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		1	1	2				
1.3	DB-310 Air Cooled Scroll Chillers	No.		1	1	2				
1.3.01										
A.	INCOMER									
1)	Automatic transfer switch with 2 Nos 400A, 4 pole 50kA, MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit, Earth fault.									
a)	1 No. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
b)	3 Nos. CT 400/5A, 15VA, class - I for metering.									
c)	LED indication lamp for ON, OFF, Trip.									
1.3.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N (full size) copper conductor bus-bars (as specified in A15 Specifications) rated 400 Amps, suitable to withstand symmetrical fault level of 50 kA for 1 second for 1 second at 415 volts.									
C.	OUTGOING									
1.3.03	3 Nos. 250 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.(For Air Cooled Chiller-2 Nos. Working+ 1 No. Spare).									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
b)	3 Nos. CT 250/5A, 15VA, class - I for metering.									
c)	LED indication lamp for ON, OFF, Trip.									
1.3.04	3 Sets of Star - Delta Starter unit (2 No. For Pump + 1 No. for Spare) of up to 7.5 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole -suitable rating MPCB (with inbuilt Single Phasing Preventer) with 11 - 16 A Over - load release and having Auxiliary contacts for indications - On, Off, Trip.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 15/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
i)	One no Star-Delta timer.									
j)	Auxiliary Contactors for Auto / Local / Remote Operation.									
k)	Power & control terminals for cable connections.									
1.3.05	8 nos.(6 Nos. for MOV+2NOS. FOR SPARE) 0.5 kW single phase feeder for Motor Operated Valves									
1.3.06	Delivery of equipment to site	set		1	1	2				

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S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.3.07	Installation and Equipment testing	set		1	1	2				
1.3.08	System testing, Commissioning and hand over	set		1	1	2				
1.3.09	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & tranducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		1	1	2				
1.4	Main Distribution Board (MDB), DB-130 & DB-230 as per Specifications, as per tender drawings Complete & as per following details:	Sets		2	2	4				
1.4.01										
A	INCOMER									

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S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Automatic transfer switch with 2 Nos 1000A, 4 pole 50kA electric drawout (EDO) ACBs, electrically and mechanically interlocked, controller having selector switch for automatic & forced operation on normal and emergency sources, monitoring of normal source and automatic changeover, test facility, circuit breaker status indication (On, Off & Trip), 3 ph Under - voltage protection, Phase Sequence Protection inbuilt in the controller or separately provided, the controller should have communication capability with BMS/SCADA. The ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Communication capability (2) Provision for measurement of three phase current (3) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays), Energy metering (4) Zone Selective Interlocking Unit for Total Discrimination (5) Communication options to remotely read and set parameters for the protection functions, transmission									
	of ammeter measurements (6) Signaling of the cause of tripping and alarms, maximum meter reset etc. (7) NO / NC contacts for interlocks and indications (8) 1 no CT in neutral to connect with the trip unit. must have Electronic Trip Unit (plugin type) with Overload & Short Circuit Protection, closing & shunt trip coil, auxiliary contacts for ON, OFF, TRIP indication etc. as per drawing and specification.									
a)	LED indication lamp for the following-									
	ON, OFF, TRIP (each for both the supplies)									
b)	LED phase indication lamp for R-Y-B.									
c)	Metering									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i)	Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
ii)	3 Nos. CTs 1000/5A, 15VA, CL-1 for metering.									
iii)	1 Nos. CTs 1000/5A, 15VA, CL-1 for APFCR relay.									
d)	2 Nos. Front Display Module									
1.4.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N+E copper conductor bus-bars (as specified in the Specifications) rated 1000 Amps, suitable to withstand symmetrical fault level of 50KA for 1 second at 415 volts.									
C.	OUTGOING									
1.4.03	5 Sets of Star - Delta Starter unit for AHU Motors up to 45 kW , 1 no spare and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 160A, 50kA at 415V, 3P Motor Duty MCCB (with inbuilt over load and short circuit protection and having add-on type earth leakage protection) over load range to suit AHU motor selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 160/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
g)	LED indication lamp for ON, OFF, Trip, Damper Open, Earth leakage trip.									
h)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
l)	One no star delta timer.									
j)	Auxiliary Contactors for Local / Remote Operation.									
k)	Power & control terminals for cable connections.									
l)	1 No Single Phasing preventer Relay.									
1.4.04	3 Sets of Star - Delta Starter unit for Track way exhaust Fan Motors up to 75 kW, (2 Nos. For TEF+ 1 No. Spare) and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 250A, 50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual pump selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 250/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip,									
h)	LED indication lamp for Earth leakage, Over load bypass, Damper Open.									
l)	Over load by pass switch.									
j)	1 No. with suitable rating Soft starter.									
k)	Auxiliary Contactors for Local / Remote Operation.									
l)	Power & control terminals for cable connections.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
m)	Triple pole saturable C.T. operated electronic over Current relays (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
1.4.05	3 Sets of Star - Delta Starter unit (1 No. FAF, 1 Nos. SPF & 1 No. spare) of 7.5 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole suitable rating MPCB (with inbuilt Single Phasing preventer) with 14 - 18 A Over - load release and having Auxiliary contacts for indications - On, Off, Trip.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 20/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	LED indication lamp for Earth leakage, Damper Open.									
i)	Auxiliary Contactors for Local / Remote Operation.									
j)	Power & control terminals for cable connections.									
k)	VFD for FAF operation with the CO ₂ sensor.									
	SPF shall be equipped with following extra item									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
b)	OLR by Pass Switch									
c)	OLR by Pass Indication Lamp									
d)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
e)	One no Star-Delta timer.									
1.4.06	5 Sets (4W+1S) of Star - Delta Starter unit for VEF(4Working+1 Spare) of up to 11 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P Motor Duty MCCB (with inbuilt over load and short circuit protection and having add-on type earth leakage protection) over load range to suit the motor selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100 / 5A, 15VA, class - I for metering.									
d)	Auto / Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i)	One no star-delta timer.									
j)	Auxiliary Contactors for Auto / Local / Remote Operation.									
k)	Power & control terminals for cable connections.									
1.4.07	3 Sets of Star - Delta Starter unit for VSF (2Working+1Spare) of up to 15 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P Motor Duty MCCB (with inbuilt over load and short circuit protection and having add-on type earth leakage protection) over load range to suit the motor selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100 / 5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	LED indication lamp for Earth leakage, Damper Open.									
i)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
j)	One no star-delta timer.									
k)	Auxiliary Contactors for Local / Remote Operation.									
l)	Power & control terminals for cable connections.									
1.4.08	3 Sets of Star - Delta Starter Unit (2 Nos. SEF & 1 No Spare) of 15 kW and each shall be equipped with the followings but not limited to:									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 3 Pole 100A, 50kA at 415V, 3P Motor Duty MCCB (with inbuilt over load and short circuit protection and having add-on type earth leakage protection) over load range to suit the motor selection, and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	LED indication lamp for Earth leakage, Damper Open.									
i)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230/110 V AC.									
j)	One no star delta timer.									
k)	Auxiliary Contactors for Auto / Local / Remote Operation.									
l)	Power & control terminals for cable connections.									
	Each SEF shall be equipped with following extra item.									
a)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
b)	OLR by Pass Switch									
c)	OLR by Pass Indication Lamp									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.4.09	28 Sets of DOL Starter unit of 0.50 kW and each shall be equipped with the followings but not limited to: To be interlocked in panel with different fan motors etc.									
a)	1 No. 3 Pole suitable rating MPCB (with inbuilt Single Phasing preventer) with 2.5-4.0 A Over - load release and having Auxiliary contacts for indications - On, Off, Trip.									
b)	Door mounted push buttons for Start and Stop functions.									
c)	Emergency stop push button lockable type.									
d)	Local / Remote Selector Switch key operated.									
e)	LED indication lamp for ON, OFF, Trip.									
f)	1No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230/110 V AC.									
g)	Auxiliary Contactors for Auto / Local / Remote Operation.									
h)	Power & control terminals for cable connections.									
	Each MFD shall be equipped with following extra item.									
a)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
b)	OLR by Pass Switch									
c)	OLR by Pass Indication Lamp									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.4.10	3 Nos. 100 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.(For FCU unit panel , Damper panel & 1 No. spare). equipped with the followings but not limited to:									
a)	LED indication lamp for the following- Phase indication lamp for R-Y-B									
b)	Indication lamp for ON, OFF, TRIP.									
c)	1 No. Digital Ammeter, CT operated.									
d)	1 Nos. CTs100/5A, 15VA, CL-1 for metering.									
8)	1 No. outgoing feeders for Capacitor Panel with each consisting of the following-									
a)	1 No. feeder (for Capacitor Panel) with 630 A, 415V, 50KA, 3P MCCB having (1) Electronic Trip Unit with adjustable Overload, adjustable Short Circuit and adjustable E/F (All with adjustable time delays) protection; (2) NO/NC contacts for operation and neutral sensor for earth fault protection.									
b)	LED indication lamp for ON, OFF & TRIP.									
c)	1 No digital Ammeter with Inbuilt Selector Switch.									
d)	3 Nos. CTs 630/5A, 15VA, CL-1 for metering.									
1.4.11	Delivery of equipment to site	set		2	2	4				
1.4.12	Installation and Equipment testing	set		2	2	4				
1.4.13	System testing, Commissioning and hand over	set		2	2	4				
1.4.14	Interlocking Arrangement	set		2	2	4				
1.4.15	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		2	2	4				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.5	Sub-Distribution Board DB-131 & DB-231 as per Specifications & Drawing complete and as per the following details.	Sets		2	2	4				
1.5.1										
A	INCOMER									
a)	1 No. 100A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.									
b)	1 Nos with suitable rating, 4 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230V AC, with mechanical & electrical interlock between the contactors.									
c)	LED indication lamp for the following-									
	Phase indication lamp for R-Y-B									
d)	Indication lamp for ON, OFF, TRIP.									
e)	1 Nos. digital Ammeter with Inbuilt Selector Switch.									
f)	3 Nos. CTs100/5A, 15VA, CL-1 for metering.									
1.5.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N copper conductor bus-bars (as specified in the Specifications) rated 100 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C.	OUTGOING									
1.5.03	16 Sets of DOL Starter Unit (for 13 nos. Single Phase Damper & PF motors & 3 nos. spare) of 0.5 KW and each shall be equipped with the followings but not limited to:									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 3 Pole suitable rating MPCB with only magnetic tripping (for short circuit protection) with overload range 2.5-4 Amp and having contacts for indications - On, Off, Trip.									
b)	Local / Remote Selector Switch key operated.									
c)	Door mounted push buttons for Start, Stop and over load by pass functions.									
d)	Emergency stop push button lockable type.									
e)	LED indication lamp for ON, OFF, Trip.									
f)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230\110 V AC.									
g)	Auxiliary Contactors for Local / Remote Operation.									
h)	Power & control terminals for cable connections.									
	Each MFD shall be equipped with following extra item.									
i)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
j)	OLR by Pass Switch									
k)	OLR by Pass Indication Lamp									
1.5.04	5 Sets of Star - Delta Starter unit (Two Nos. For VEF, Two Nos. for SEF One no. for spare) of up to 7.5 kW and each shall be equipped with the followings but not limited to:									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 3 Pole suitable rating MPCB (with inbuilt Single Phasing preventer) with 14 - 18 A Over - load release and having Auxiliary contacts for indications - On, Off, Trip.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 20/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Start and Stop functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 No. with suitable rating AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230/110 V AC.									
i)	One no Star-Delta timer.									
j)	Auxiliary Contactors for Local / Remote Operation.									
k)	Power & control terminals for cable connections.									
1.5.05	Delivery of equipment to site	set		2	2	4				
1.5.06	Installation and Equipment testing	set		2	2	4				
1.5.07	System testing, Commissioning and hand over	set		2	2	4				
1.5.08	Interlocking Arrangement	set		2	2	4				
1.5.09	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		2	2	4				
1.6	Sub Distribution Board DB- FCU panel 132 with PLC to operate working and standby FCUs as per programmed set and as per Specifications & Drawing complete and as per the following details.	Sets		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.6.01										
A	INCOMER									
a)	1 No. 100 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.									
b)	1 Nos suitable rating 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230\110 V AC, with mechanical & electrical interlock between the contactors.									
c)	LED indication lamp for the following-									
i)	Phase indication lamp for R-Y-B									
ii)	Indication lamp for ON, OFF, TRIP.									
iii)	1 Nos. digital Ammeter with Inbuilt Selector Switch.									
iv)	3 Nos. CTs100/5A, 15VA, CL-1 for metering.									
1.6.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N copper conductor bus-bars (as specified in the Specifications) rated 100 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C.	OUTGOING									
1.6.03	46 Sets of feeder (Single Phase) (for Fan coil unit) and each shall be equipped with the followings but not limited to:									
a)	1 No. 10 Amps, DP MCB (C Curve)									
b)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230 VAC.									
c)	Local / Remote Selector Switch key operated.									
d)	Door mounted push buttons for Start and Stop functions.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
e)	LED indication lamp for ON, OFF.									
f)	Auxiliary Contactors for Local / Remote Operation.									
g)	Power & control terminals for cable connections.									
1.6.04	Delivery of equipment to site	set		1	1	2				
1.6.05	Installation and Equipment testing	set		1	1	2				
1.6.06	System testing, Commissioning and hand over	set		1	1	2				
1.6.07	Interlocking Arrangement	set		1	1	2				
1.6.08	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		1	1	2				
1.7	Sub Distribution Board DB- FCU panel 232 with PLC to operate working and standby FCUs as per programmed set and as per Specifications & Drawing complete and as per the following details.	Sets		1	1	2				
1.7.01										
A	INCOMER									
a)	1 No. 100 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.									
b)	1 Nos suitable rating 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230\110 V AC, with mechanical & electrical interlock between the contactors.									
c)	LED indication lamp for the following- Phase indication lamp for R-Y-B									
d)	Indication lamp for ON, OFF, TRIP.									
e)	1 Nos. digital Ammeter with Inbuilt Selector Switch.									
f)	3 Nos. CTs100/5A, 15VA, CL-1 for metering.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.7.02										
B.	BUS BAR									
	Electrolytic high conductivity T P &N copper conductor bus-bars (as specified in the Specifications) rated 100 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C.	OUTGOING									
1.7.03	10 Sets of feeder (Single Phase) (for Fan coil unit) and each shall be equipped with the followings but not limited to:									
a)	1 No. 10 Amps, DP MCB (C Curve)									
b)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with Auxiliary Contacts and Operating Coil of 230 VAC.									
c)	Local / Remote Selector Switch key operated.									
d)	Door mounted push buttons for Start and Stop functions.									
e)	LED indication lamp for ON, OFF.									
f)	Auxiliary Contactors for Local / Remote Operation.									
g)	Power & control terminals for cable connections.									
1.7.04	Delivery of equipment to site	set		1	1	2				
1.7.05	Installation and Equipment testing	set		1	1	2				
1.7.06	System testing, Commissioning and hand over	set		1	1	2				
1.7.07	Interlocking Arrangement	set		1	1	2				
1.7.08	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired up to Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.8	Power Factor Correction Panel of 250 KVAR for Panel 130 & 230 as per specifications & Drawing Complete & as detailed below:(CP-130 & CP-230)	Sets		2	2	4				
1.8.01										
A	INCOMER									
a)	1 No. 630 A, 415V, 50kA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit and Earth Fault (With Adjustable time delay); having Zone Selective Interlocking and NO/NC contacts for operation and neutral sensor for earth fault protection.									
b)	LED indication lamp for the following-									
	ON, OFF, TRIP									
c)	LED phase indication lamp for R-Y-B.									
d)	12 Step APFCR relay communication type.									
e)	1 No Auto / manual Selector Switch.									
f)	1 No Off delay timer									
	Metering									
i)	1 No digital Voltmeter with Inbuilt Selector Switch.									
ii)	1 No digital Ammeter with Inbuilt Selector Switch.									
iii)	3 Nos. CTs 630/5A, 15VA, CL-1 for metering.									
1.8.02										
B	BUS-BARS									
	Electrolytic high conductivity T P & N copper conductor bus-bars (as specified in M & W Specifications) rated 630 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C	OUTGOINGS									
1.8.03	10 nos feeder with following-									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 100 / 100 A, 3 pole, 50kA, MCCB having Electronic Trip Unit with adjustable protection against Overload and Short Circuit									
b)	Capacitor Duty 3 - Pole Contactor suitable for 25 kVAR capacitor , with Auxiliary Contacts.									
c)	Local / Remote Selector Switch key operated.									
d)	2 Nos Push Button for ON & OFF.									
e)	2 Nos LED Indication Lamp for ON & OFF indication.									
f)	1 No. 25 KVAR, 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters (as specified in M & W Specifications).									
1.8.04	Delivery of equipment to site	set		2	2	4				
1.8.05	Installation and Equipment testing	set		2	2	4				
1.8.06	System testing, Commissioning and hand over	set		2	2	4				
1.8.07	Interlocking Arrangement	set		2	2	4				
1.8.08	Scada\BMS Connectivity	set		2	2	4				
1.9	Power Factor Correction Panel of 300 KVAR for Panel 170/270 as per specifications & Drawing Complete & as detailed below:(CP-300)	Sets		2	2	4				
1.9.01										
A	INCOMER									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 800 A, 415V, 50kA, 3 Pole, Electrically operated Draw Out type, ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays) (2) NO / NC contacts for interlocks and indications (3) 1 no CT in neutral to connect with the trip unit.									
b)	TNC switch									
c)	Selector switch for auto/manual operation.									
d)	LED indication lamp for ON, OFF & TRIP.									
e)	3 Nos. CTs 800/5A, 15VA, CL-1 for metering.									
f)	LED phase indication lamp for R-Y-B.									
g)	12 Step APFCR relay communication type.									
h)	Power & control terminals for cable connections.									
i)	1 No Off delay timer									
	Metering									
i)	1 No digital Voltmeter with Inbuilt Selector Switch.									
ii)	1 No digital Ammeter with Inbuilt Selector Switch.									
1.9.02										
B	BUS-BARS									
	Electrolytic high conductivity T P & N copper conductor bus-bars (as specified in M & W Specifications) rated 800 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C	OUTGOINGS									
1.9.03	10 Nos. feeder with following-									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	1 No. 100 / 100 A, 3 pole, 50 kA, MCCB having Electronic Trip Unit with adjustable protection against Overload and Short Circuit									
b)	Capacitor Duty 3 - Pole Contactor suitable for 30 kVAR capacitor , with Auxiliary Contacts.									
c)	Local / Remote Selector Switch key operated.									
d)	2 Nos Push Button for ON & OFF.									
e)	2 Nos LED Indication Lamp for ON & OFF indication.									
f)	1 No 30 KVAR, 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters (as specified in M & W Specifications).									
1.9.04	Delivery of equipment to site	set		2	2	4				
1.9.05	Installation and Equipment testing	set		2	2	4				
1.9.06	System testing, Commissioning and hand over	set		2	2	4				
1.9.07	Interlocking Arrangement	set		2	2	4				
1.9.08	Scada\BMS Connectivity	sets		2	2	4				
1.10	Providing, fixing, connecting, testing and commissioning of 15A single phase flush type socket outlet in recess/surface mounted complete as per specification.(For FCU)	Nos.		45	45	90				
1.11	Main Distribution Board DB-140/ DB-240 as per Specifications & Drawing Complete & as per following details: (Type-1 with TVS motors up to 220kW)	Sets		0	1	1				
1.11.01										
A	INCOMER									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Automatic transfer switch with 2 Nos 1600A, 4 pole, 50kA electric drawout (EDO) ACBs, electrically and mechanically interlocked , controller having selector switch for automatic & forced operation on normal and emergency sources, monitoring of normal source and automatic changeover, test facility, circuit breaker status indication (On, Off & Trip), 3 ph Under - voltage protection, Phase Sequence Protection inbuilt in the controller or separately provided, the controller should have communication capability with BMS/SCADA. The ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Communication capability (2) Provision for measurement of three phase current (3) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays) (4) Zone Selective Interlocking Unit for Total Discrimination (5) Communication options to remotely read and set parameters for the protection functions, transmission of ammeter measurements (6) Signaling of the cause of tripping and alarms, maxi meter reset etc. (7) NO / NC contacts for									
b)	LED indication lamp for the following-									
	ON, OFF, TRIP (each for both the supplies)									
c)	LED phase indication lamp for R-Y-B.									
d)	<u>Metering</u>									
i)	1 No. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
ii)	3 Nos. CTs as per breaker rating, 15VA, CL-1 for metering.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
iii)	1 Nos. CTs as per breaker rating, 15VA, CL-1 for APFCR relay.									
1.11.02										
B.	BUS BAR									
	Electrolytic high conductivity T P &N+E copper conductor bus-bars (as specified in the Specifications) rated 1600 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C.	OUTGOING									
1.11.03										
1	2 Sets of Soft Starter for bidirectional (Forward and reverse rotation) TVF Motors up to 220KW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 630 A, 50kA at 415V, 3P Motor Duty MCCB with Magnetic Trip Unit (having only short circuit protection) and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 630/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Supply, Exhaust and Stop & over load by pass functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for Supply, Exhaust, Off & Trip.									
h)	2 Nos 630A, 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230V.									
i)	Auxiliary Contactors for Local / Remote Operation.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
j)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
k)	OLR by Pass Switch									
l)	OLR by Pass Indication Lamp									
m)	1 No. 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters to suit the TVF Fan selection (as specified in A18 of the Specifications).									
n)	1 No. 3P, suitable rating Capacitor duty contactor for TVF Fan .									
o)	Power & control terminals for cable connections.									
1.11.03 a										
i)	4 Sets of soft Starter Unit for bidirectional (Forward and reverse rotation) TBF Motors up to 75 KW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 160 A, 50kA at 415V, 3P Motor Duty MCCB with Magnetic Trip Unit (having only short circuit protection) and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 160/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Supply, Exhaust and Stop & over load by pass functions.									
f)	Emergency stop push button lockable type.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
g)	LED indication lamps for Supply, Exhaust, Off & Trip.									
h)	2 Nos suitable rating, 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230\110 AC.									
i)	Auxiliary Contactors for Local / Remote Operation.									
j)	Triple pole saturable C.T. operated Electronic over load relays (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.)									
k)	1 No. 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters to suit the TBF Fan selection (as specified in A18 of the Specifications).									
l)	1 No. 3P, suitable rating Capacitor duty contactor for Capacitor Bank .									
m)	Power & control terminals for cable connections.									
ii)	1 Sets of soft Starter Unit for bidirectional (Forward and reverse rotation) TBF Motors up to 55 KW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 160 A, 50kA at 415V, 3P Motor Duty MCCB with Magnetic Trip Unit (having only short circuit protection) and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 160/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Supply, Exhaust and Stop & over load by pass functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamps for Supply, Exhaust, Off & Trip.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
h)	2 Nos suitable rating, 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230\110 AC.									
i)	Auxiliary Contactors for Local / Remote Operation.									
j)	Triple pole saturable C.T. operated Electronic over load relays (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.)									
k)	1 No. 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters to suit the TBF Fan selection (as specified in A18 of the Specifications).									
l)	1 No. 3P, suitable rating Capacitor duty contactor for Capacitor Bank .									
m)	Power & control terminals for cable connections.									
1.11.04										
2)	11 Nos. 10 A Single phase MCB feeder for space heaters in TVF +TBF									
3)	10 Sets of DOL Starter Unit (9Nos. Damper Motor +1 No. spare) of 0.5 KW (single phase) and each shall be equipped with the followings but not limited to:									
a)	1 Nos. 3 Pole 4 Amps MPCB (with inbuilt Single Phasing preventer) with 2.5-4 A Over - load release and having contacts for indications - On, Off, Trip.									
b)	Local / Remote Selector Switch key operated.									
c)	Door mounted push buttons for Start and Stop functions.									
d)	LED indication lamp for ON, OFF, Trip.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
e)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with 8 Nos. Auxiliary Contacts and Operating Coil of 230 V / 110 V AC.									
f)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
g)	Power & control terminals for cable connections.									
1.11.05	2 No. 10 A MCCB feeder for compressor Drier									
1.11.06	2 No. 100 A MCCB feeder for compressor									
1.11.07	Delivery of equipment to site	set		0	1	1				
1.11.08	Installation and Equipment testing	set		0	1	1				
1.11.09	System testing, Commissioning and hand over	set		0	1	1				
1.11.10	Interlocking Arrangement	set		0	1	1				
1.11.11	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired upto Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		0	1	1				
1.12	Main Distribution Board DB-140/DB-240 as per Specifications & Drawing Complete & as per following details: (Type-2 with TVS motors upto 270kW)	Sets		2	1	3				
1.12.01										
A	INCOMER									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Automatic transfer switch with 2 Nos 1600A, 4 pole, 50kA electric drawout (EDO) ACBs, electrically and mechanically interlocked, controller having selector switch for automatic & forced operation on normal and emergency sources, monitoring of normal source and automatic changeover, test facility, circuit breaker status indication (On, Off & Trip), 3 ph Under - voltage protection, Phase Sequence Protection inbuilt in the controller or separately provided, the controller should have communication capability with BMS/SCADA. The ACB complete with safety shutters, 240V AC or 110V DC (control supply voltage to be selected in consultation with BMS Contractor) shunt trip coil & closing coil and having microprocessor based releases with (1) Communication capability (2) Provision for measurement of three phase current (3) Protection against long time + short time + instantaneous + earth fault (all with adjustable time delays) (4) Zone Selective Interlocking Unit for Total Discrimination (5) Communication options to remotely read and set parameters for the protection functions, transmission									
	of ammeter measurements (6) Signaling of the cause of tripping and alarms, maxi meter reset etc. (7) NO / NC contacts for interlocks and indications (8) 1 no CT in neutral to connect with the trip unit. must have Electronic Trip Unit with Overload & Short Circuit Protection, closing & shunt trip coil, auxiliary contacts for ON, OFF, TRIP indication etc. as per drawing and specification.									
b)	LED indication lamp for the following-									
	ON, OFF, TRIP (each for both the supplies)									
c)	LED phase indication lamp for R-Y-B.									
d)	Metering									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i)	1 No. Multifunction energy meter for measurement of voltage, current, power factor, power & energy with BMS connectivity (RS 485).									
ii)	3 Nos. CTs 1600/5A, 15VA, CL-1 for metering.									
iii)	1 Nos. CTs 1600/5A, 15VA, CL-1 for APFCR relay.									
1.12.02										
B.	BUS BAR									
	Electrolytic high conductivity T P & N+E copper conductor bus-bars (as specified in the Specifications) rated 1600 Amps, suitable to withstand symmetrical fault level of 50 KA for 1 second at 415 volts.									
C.	OUTGOING									
1.12.03										
1	2 Sets of Soft Starter for bidirectional (Forward and reverse rotation) TVF Motors up to 270KW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 1000 A, 50kA at 415V, 3P Motor Duty ACB with Trip Unit and auxiliary Contacts.									
b)	1 No. Multifunction energy meter for measurement of current & energy with BMS connectivity (RS 485).									
c)	3 Nos. CT 1000/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Supply, Exhaust and Stop & over load by pass functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for Supply, Exhaust, Off & Trip.									
h)	2 Nos 1000A, 3 Pole, AC-3 duty Contactor with Auxiliary Contacts, Operating coil 230V.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i)	Auxiliary Contactors for Local / Remote Operation.									
j)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
k)	OLR by Pass Switch									
l)	OLR by Pass Indication Lamp									
m)	1 No. 3 - phase, 415V, hermetically sealed metalized polypropylene capacitor (heavy-duty) with 7% harmonic D-tuned filters to suit the TVF Fan selection (as specified in A18 of the Specifications).									
n)	1 No. 3P, suitable rating Capacitor duty contactor for TVF Fan .									
o)	Power & control terminals for cable connections.									
p)	Provision for terminals for wiring to Local control panel (LCP)									
1.12.04										
2)	3 Nos. 10 A Single phase MCB feeder for space heaters in TVF (2W+1 Spare)									
3)	10 Sets of DOL Starter Unit (9Nos. Damper Motor +1 No. spare) of 0.5 KW (single phase) and each shall be equipped with the followings but not limited to:									
a)	1 Nos. 3 Pole 4 Amps MPCB (with inbuilt Single Phasing preventer) with 2.5-4 A Over - load release and having contacts for indications - On, Off, Trip.									
b)	Local / Remote Selector Switch key operated.									
c)	Door mounted push buttons for Start and Stop functions.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
d)	LED indication lamp for ON, OFF, Trip.									
e)	1 No. 9A, AC-3 Duty, 3 - pole Contactor with 8 Nos. Auxiliary Contacts and Operating Coil of 230 V / 110 V AC.									
f)	1 No. Auxiliary Contactor with 4 Nos. Auxiliary Contacts for Remote Operation.									
g)	Power & control terminals for cable connections.									
1.12.05	2 No. 10 A MCCB feeder for compressor Drier									
1.12.06	2 No. 100 A MCCB feeder for compressor									
1.12.07	Delivery of equipment to site	set		2	1	3				
1.12.08	Installation and Equipment testing	set		2	1	3				
1.12.09	System testing, Commissioning and hand over	set		2	1	3				
1.12.10	Interlocking Arrangement	set		2	1	3				
1.12.11	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired upto Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		2	1	3				
1.13.	Adjustment of rates for addition/deletion of supply of compartmentalized switchgear in the panels DB-140/DB240 of following ratings including the supply fabrication , extension, modifications of enclosures, earthing, bus bars, other sub system accessories etc. complete as required and as per specification									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
i)	addition of 2 Sets of Star - Delta Starter Unit for Compressor motors (1no working + 1 no Standby) up to 20 kW and each shall be equipped with the followings but not limited to:									
a)	1 No. 3 Pole 100 A, 50kA at 415V, 3P Motor Duty MCCB with Magnetic Trip Unit (having only short circuit protection) and auxiliary Contacts.									
b)	1 No. digital Ammeter with Inbuilt Selector Switch, CT operated.									
c)	3 Nos. CT 100/5A, 15VA, class - I for metering.									
d)	Local / Remote Selector Switch key operated.									
e)	Door mounted push buttons for Supply, Exhaust and Stop & over load by pass functions.									
f)	Emergency stop push button lockable type.									
g)	LED indication lamp for ON, OFF, Trip.									
h)	3 Nos suitable rating , AC-3 duty, 3 Pole Contactor with Auxiliary Contacts, Operating coil 230V110V AC.									
i)	One no star-delta timer.									
j)	Auxiliary Contactors for Local / Remote Operation.									
k)	Triple pole saturable C.T. operated Electronic over Current relays(EOCR) (with in built single phasing protection) suitable for above mentioned motor; by passing arrangement in case of emergency with all accessories (3nos saturable C.T.s, auxiliary contactors etc.).									
l)	Power & control terminals for cable connections.									
	in Type-1 DB 140 or DB- 240 Panel	set		0	1	1				
	in Type-2 DB 140 or DB- 240 Panel	set		1	0	1				
1.14	Local Control Panel for(LCP) DBs for chilled water, condenser water, Cooling tower pump, & TVF fan	set		23	23	46				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.14.01	Local Push button control for chilled water, condenser water, Cooling tower pump, & TVF fan, each shall be equipped with:									
a)	Auto / Manual Selector Switch Key operated.									
b)	Door mounted push buttons for Start, Stop, Emergency Stop									
c)	LED indication lamp for On, Off & Trip.									
1.14.02	Delivery of equipment to site.	set		23	23	46				
1.14.03	Installation and Equipment testing	set		23	23	46				
1.14.04	System testing, Commissioning and hand over	set		23	23	46				
1.14.05	Scada\ BMS Connectivity at the separate Marshelling box in the panel with provision of all necessary I/O points & transducers mounting prewired upto Marshelling box terminal boards from the factory itself and audited in factory from the BMS provider.	set		23	23	46				
1.15	Supply & Installing of Key lockable Emergency Stop push button box (including Emergency push button with contact, gland plate at both end for cable connection) conforming to IP-65 protection for each motor & pump.	Nos.		20	20	40				
1.16	Supply & placing of ribbed surface rubber mat 12 mm thick and 900 mm width as required including cutting or required lengths, of approved make, with test certificates for L.T. panels.	Mtr		100	100	200				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.17	Providing and fixing of M.V danger plate of 200 X 150 mm of mild steel at least 2 mm thick and vitreous enameled white on both side and with inscription in signal red colour on front side as required.	Nos.		1	1	2				
	TOTAL FOR SH01									
2.0	CABLES, CABLE TRAYS & STEELWORK									
	The Cable and Cable Containment System specified herein, must conform to Specifications, in addition to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between M & W specifications and description in BOQ, the most stringent of the condition will prevail.									
	All the items / parts mentioned in relevant clauses of the specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded.									
	It may be noted that Contractor will be required to carry out cable sizing based on actual cable lengths, as per Working Drawings developed by him and after incorporating any changes in load requirements from the tendering stage. Optimization must be carried out during cable sizing to reduce the cable requirement and size. Further, Contractor must obtain Engineer's approval on the Cable Sizing Calculation.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2.01	Supply at the site of work of 600/1000 V grade, Copper Conductor, XLPE Insulated, armoured, Low Smoke Zero Halogen Type Cables conforming to specifications of the following sizes:									
	(Note: In case of any contradiction between BS 6724 and Specification, the stringent conditions of the two will apply)									
a	1 x 630 Sq.mm	Metres		RO	RO	0				
b	4 x 400 Sq.mm	Metres		RO	RO	0				
c	3 x 400 Sq.mm	Metres		RO	RO	0				
d	4 x 300 Sq.mm	Metres		RO	RO	0				
e	3 x 300 Sq.mm	Metres		RO	RO	0				
f	4 x 240 Sq.mm	Metres		115	115	230				
g	3 x 240 Sq.mm	Metres		RO	RO	0				
h	4 x 185 Sq.mm	Metres		143	143	286				
i	3 x 185 Sq.mm	Metres		196	196	392				
j	4 x 150 Sq.mm	Metres		RO	RO	0				
k	3 x 150 Sq.mm	Metres		RO	RO	0				
l	4 x 120 Sq.mm	Metres		242	242	484				
m	3 x 120 Sq.mm	Metres		RO	RO	0				
n	4 x 95 Sq.mm	Metres		RO	RO	0				
o	3 x 95 Sq.mm	Metres		140	140	280				
p	4 x 70 Sq.mm	Metres		RO	RO	0				
q	3 x 70 Sq.mm	Metres		RO	RO	0				
r	4 x 50 Sq.mm	Metres		30	30	60				
s	3 x 50 Sq.mm	Metres		296	296	592				
t	4 x 35 Sq.mm	Metres		311	311	622				
u	3 x 35 Sq.mm	Metres		207	207	414				
v	4 x 25 Sq.mm	Metres		40	40	80				
w	3 x 25 Sq.mm	Metres		RO	RO	0				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
x	4 x 16 Sq.mm	Metres		150	150	300				
y	3 x 16 Sq.mm	Metres		RO	RO	0				
z	4 x10 Sq.mm	Metres		RO	RO	0				
aa	3 x 10 Sq.mm	Metres		699	699	1398				
ab	4 x 6 Sq.mm	Metres		RO	RO	0				
ac	3 x 6 Sq.mm	Metres		711	711	1422				
ad	4 x 4 Sq.mm	Metres		RO	RO	0				
ae	3 x 4 Sq.mm	Metres		2118	2118	4236				
af	4 x 2.5 Sq.mm	Metres		RO	RO	0				
ag	3 x 2.5 Sq.mm	Metres		RO	RO	0				
ah	2 x 2.5 Sq.mm	Metres		3476	3635	7111				
ai	2 x 4 Sq.mm	Metres		368	2553	2921				
2.02	Supply at the site of work of 600/1000 V grade, Copper Conductor, XLPE Insulated, armoured, Low Smoke Zero Halogen, Fire Resistant / Survival Type Cables conforming to BS 7846 and specifications, of the following sizes:									
	(Note: In case of any contradiction between BS 7846 and Specification specifications, the stringent conditions of the two will apply)									
a	1 x 630 Sq.mm	Metres		RO	RO	0				
b	4 x 400 Sq.mm	Metres		RO	RO	0				
c	3 x 400 Sq.mm	Metres		RO	RO	0				
d	4 x 300 Sq.mm	Metres		RO	RO	0				
e	3 x 300 Sq.mm	Metres		RO	RO	0				
f	4 x 240 Sq.mm	Metres		RO	RO	0				
g	3 x 240 Sq.mm	Metres		782	782	1564				
h	4 x 185 Sq.mm	Metres		RO	RO	0				
i	3 x 185 Sq.mm	Metres		RO	RO	0				
j	4 x 150 Sq.mm	Metres		RO	RO	0				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
k	3 x 150 Sq.mm	Metres		RO	1840	1840				
l	4 x 120 Sq.mm	Metres		RO	RO	0				
m	3 x 120 Sq.mm	Metres		RO	345	345				
n	4 x 95 Sq.mm	Metres		RO	RO	0				
o	3 x 95 Sq.mm	Metres		530	1320	1850				
p	4 x 70 Sq.mm	Metres		RO	RO	0				
q	3 x 70 Sq.mm	Metres		552	552	1104				
r	4 x 50 Sq.mm	Metres		621	621	1242				
s	3 x 50 Sq.mm	Metres		RO	RO	0				
t	4 x 35 Sq.mm	Metres		RO	RO	0				
u	3 x 35 Sq.mm	Metres		RO	RO	0				
v	4 x 25 Sq.mm	Metres		RO	RO	0				
w	3 x 25 Sq.mm	Metres		RO	RO	0				
x	4 x 16 Sq.mm	Metres		RO	RO	0				
y	3 x 16 Sq.mm	Metres		748	748	1496				
z	4 x10 Sq.mm	Metres		RO	RO	0				
aa	3 x 10 Sq.mm	Metres		566	566	1132				
ab	4 x 6 Sq.mm	Metres		RO	RO	0				
ac	3 x 6 Sq.mm	Metres		299	299	598				
ad	4 x 4 Sq.mm	Metres		RO	RO	0				
ae	3 x 4 Sq.mm	Metres		RO	RO	0				
af	4 x 2.5 Sq.mm	Metres		RO	RO	0				
ag	3 x 2.5 Sq.mm	Metres		RO	RO	0				
ah	2 x 2.5 Sq.mm	Metres		5808	6054	11862				
ai	2 x 4 Sq.mm	Metres		368	2553	2921				
2.03	Supply & Laying at the site of work of 600/1000 V grade, Copper Conductor, XLPE Insulated, armoured, Low Smoke Zero Halogen Type Control Cables conforming to BS 6724 and Specifications, of the following sizes:									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	(Note: In case of any contradiction between BS 6724 and Specification A16, the stringent conditions of the two will apply)									
a	2 C x 1.5 Sq. mm Copper cable	Metres		500	500	1000				
b	2 C x 2.5 Sq. mm Copper cable	Metres		3000	3000	6000				
c	3 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
d	4 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
e	5 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
f	7 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
g	9 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
h	12 C x 2.5 Sq. mm Copper cable	Metres		250	250	500				
l	15 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
j	19 C x 2.5 Sq. mm Copper cable	Metres		400	400	800				
2.04	Supply & Laying at the site of work of 600/1000 V grade, Copper Conductor, XLPE Insulated, armoured, Low Smoke Zero Halogen, Fire Resistant / Survival Type Auxiliary / Control Cables conforming to BS 7846 and Section A16 of M&W Specifications , of the following sizes:									
	(Note: In case of any contradiction between BS 7846 and Specification E02, the stringent conditions of the two will apply)									
a	2 C x 1.5 Sq. mm Copper cable	Metres		100	100	200				
b	2 C x 2.5 Sq. mm Copper cable	Metres		2000	2000	4000				
c	3 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
d	4 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
e	5 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
f	7 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
g	9 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
h	12 C x 2.5 Sq. mm Copper cable	Metres		250	250	500				
l	15 C x 2.5 Sq. mm Copper cable	Metres		20	20	40				
j	19 C x 2.5 Sq. mm Copper cable	Metres		300	300	600				
2.05	Laying, testing and commissioning of 600/1000 V grade, Copper Conductor, XLPE Insulated, armoured, Low Smoke Zero Halogen Type and Fire Resistant / Survival Type Cables (as specified in Schedule 2.01 & 2.02) on existing trays/ walls/ columns/ indoor/ trenches with suitable clamps, saddles, hooks, bolts etc.									
a	1 x 630 Sq.mm	Metres		RO	RO	0				
b	4 x 400 Sq.mm	Metres		RO	RO	0				
c	3 x 400 Sq.mm	Metres		RO	RO	0				
d	4 x 300 Sq.mm	Metres		RO	RO	0				
e	3 x 300 Sq.mm	Metres		RO	RO	0				
f	4 x 240 Sq.mm	Metres		115	115	230				
g	3 x 240 Sq.mm	Metres		782	782	1564				
h	4 x 185 Sq.mm	Metres		143	143	286				
i	3 x 185 Sq.mm	Metres		196	196	392				
j	4 x 150 Sq.mm	Metres		RO	RO	0				
k	3 x 150 Sq.mm	Metres		RO	1840	1840				
l	4 x 120 Sq.mm	Metres		242	242	484				
m	3 x 120 Sq.mm	Metres		RO	345	345				
n	4 x 95 Sq.mm	Metres		RO	RO	0				
o	3 x 95 Sq.mm	Metres		670	1460	2130				
p	4 x 70 Sq.mm	Metres		RO	RO	0				
q	3 x 70 Sq.mm	Metres		552	552	1104				
r	4 x 50 Sq.mm	Metres		651	651	1302				
s	3 x 50 Sq.mm	Metres		296	296	592				
t	4 x 35 Sq.mm	Metres		311	311	622				
u	3 x 35 Sq.mm	Metres		207	207	414				
v	4 x 25 Sq.mm	Metres		40	40	80				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
w	3 x 25 Sq.mm	Metres		RO	RO	0				
x	4 x 16 Sq.mm	Metres		150	150	300				
y	3 x 16 Sq.mm	Metres		748	748	1496				
z	4 x10 Sq.mm	Metres		RO	RO	0				
aa	3 x 10 Sq.mm	Metres		1265	1265	2530				
ab	4 x 6 Sq.mm	Metres		RO	RO	0				
ac	3 x 6 Sq.mm	Metres		1010	1010	2020				
ad	4 x 4 Sq.mm	Metres		RO	RO	0				
ae	3 x 4 Sq.mm	Metres		2118	2118	4236				
af	4 x 2.5 Sq.mm	Metres		RO	RO	0				
ag	3 x 2.5 Sq.mm	Metres		RO	RO	0				
ah	2 x 2.5 Sq.mm	Metres		9284	9689	18973				
ai	2 x 4Sq.mm	Metres		736	5106	5842				
2.06	Supply and providing terminations conforming to Specifications for XLPE insulated, LSZH (as specified in Schedule 2.01) and Fire Survival (as specified in Schedule 2.02) armoured / unarmoured cables of sizes given below including the cost of supplying, fixing and crimping copper lugs, double compression Flame proof brass glands, insulation tape etc. This also includes making holes in gland plate complete as per specifications and as required.									
a	1 x 630 Sq.mm	Nos.		RO	RO	0				
b	4 x 400 Sq.mm	Nos.		RO	RO	0				
c	3 x 400 Sq.mm	Nos.		RO	RO	0				
d	4 x 300 Sq.mm	Nos.		RO	RO	0				
e	3 x 300 Sq.mm	Nos.		RO	RO	0				
f	4 x 240 Sq.mm	Nos.		8	8	16				
g	3 x 240 Sq.mm	Nos.		16	16	32				
h	4 x 185 Sq.mm	Nos.		10	10	20				
i	3 x 185 Sq.mm	Nos.		16	16	32				
j	4 x 150 Sq.mm	Nos.		RO	RO	0				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
k	3 x 150 Sq.mm	Nos.		RO	8	8				
l	4 x 120 Sq.mm	Nos.		2	2	4				
m	3 x 120 Sq.mm	Nos.		RO	2	2				
n	4 x 95 Sq.mm	Nos.		RO	RO	0				
o	3 x 95 Sq.mm	Nos.		4	4	8				
p	4 x 70 Sq.mm	Nos.		RO	RO	0				
q	3 x 70 Sq.mm	Nos.		16	16	32				
r	4 x 50 Sq.mm	Nos.		6	6	12				
s	3 x 50 Sq.mm	Nos.		26	26	52				
t	4 x 35 Sq.mm	Nos.		4	4	8				
u	3 x 35 Sq.mm	Nos.		28	28	56				
v	4 x 25 Sq.mm	Nos.		2	2	4				
w	3 x 25 Sq.mm	Nos.		RO	RO	0				
x	4 x 16 Sq.mm	Nos.		4	4	8				
y	3 x 16 Sq.mm	Nos.		24	20	44				
z	4 x10 Sq.mm	Nos.		RO	RO	0				
aa	3 x 10 Sq.mm	Nos.		78	78	156				
ab	4 x 6 Sq.mm	Nos.		RO	4	4				
ac	3 x 6 Sq.mm	Nos.		64	64	128				
ad	4 x 4 Sq.mm	Nos.		RO	RO	0				
ae	3 x 4 Sq.mm	Nos.		92	92	184				
af	4 x 2.5 Sq.mm	Nos.		RO	RO	0				
ag	3 x 2.5 Sq.mm	Nos.		RO	RO	0				
ah	2 x 2.5 Sq.mm	Nos.		218	216	434				
ai	2 x 4 Sq.mm	Nos.		8	18	26				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2.07	Supply and Providing terminations conforming to Section A16 of M & W Specifications for XLPE, LSZH, armoured / unarmoured cables (as specified in Schedule 2.03 and 2.04) of sizes given below including the cost of supplying, fixing and crimping copper lugs, double compression Flame proof brass glands, insulation tape etc. This also includes making holes in gland plate complete as per specifications and as required.									
a	2 C x 1.5 Sq. mm Copper cable	Nos		200	200	400				
b	2 C x 2.5 Sq. mm Copper cable	Nos		500	500	1000				
c	3 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
d	4 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
e	5 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
f	7 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
g	9 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
h	12 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
l	15 C x 2.5 Sq. mm Copper cable	Nos		5	5	10				
j	19 C x 2.5 Sq. mm Copper cable	Nos		10	10	20				
	CABLE TRAY									
2.08	Supply & installation of Prefabricated, wrap around type, perforated GI cable trays made of GI sheets continuously connected including Factory made horizontal and vertical bends, reducers, tees, coupling plate and nut bolts washers and all material required for installation i.e. Tie Rods, GI angles, Channels, earth link etc,conforming to - Specifications, complete as required.									
a	600 mm wide x 50 mm deep x 2 mm thick	Meters		250	250	500				
b	450 mm wide x 50 mm deep x 2 mm thick	Meters		100	100	200				
c	300 mm wide x 50 mm deep x 2 mm thick	Meters		900	900	1800				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
d	150mm wide x 50mm deep x 2 mm thick	Meters		1100	1100	2200				
d	100mm wide x 50mm deep x 2 mm thick	Meters		300	300	600				
	CABLE LADDER									
2.09	Supply & installation of prefabricated, GI, ladder type cable tray conforming to Specifications - continuously connected including Factory made horizontal & vertical bends reducers, tees, coupling plate, nut bolts washers and all material required for installation i.e. Tie Rods, GI angles, Channels, earth link etc. The side runners shall be 100 x 20 x 2.5 mm and center rungs shall be of size 30 x 15 x 2.5 mm with center to center distance of 250 mm, as required.									
a	900 mm wide x 50 mm deep x 2 mm thick	Meters		50	50	100				
b	750 mm wide x 50 mm deep x 2 mm thick	Meters		50	50	100				
a	600 mm wide x 50 mm deep x 2 mm thick	Meters		180	180	360				
b	450 mm wide x 50 mm deep x 2 mm thick	Meters		100	100	200				
c	300 mm wide x 50 mm deep x 2 mm thick	Meters		100	100	200				
d	150 mm wide x 50 mm deep x 2 mm thick	Meters		50	50	100				
e	100 mm wide x 50 mm deep x 2 mm thick	Meters		50	50	100				
2.10	Supply, fabrication & installation of fabricated GI steel work conforming to specification - to support bus duct, light fixtures, conduit wirings, Bracket, & other electrical works including Tunnel services etc., as required. This includes all the fixing accessories like fastners and all masonry works.	Kgs		1500	1500	3000				
	TOTAL FOR SH02									
3.0	EARTHING									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The Earthing and Lightning Protection System specified herein, must conform to Specifications, in addition to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between M & W specifications and description in BOQ, the most stringent of the condition will prevail.									
	All the items / parts mentioned in relevant clauses of the M & W specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded.									
3.01	Supply of copper strips / rods / wires (minimum 97% conductivity) of the following sizes (as specified Specifications) for provision in Earthing System.									
a	50 mm x 4 mm copper strip	Metres		50	50	100				
b	32 mm x 5 mm copper strip	Metres		50	50	100				
c	25 mm x 3 mm copper strip	Metres		50	50	100				
d	8 SWG / 4 mm diameter, copper Wire	Metres		100	100	200				
3.02	Laying, testing and commissioning of the following sizes of copper strips / rods / wires in trenches / surface / wall / trays / ladders etc. including provision of spacers and saddles etc. for interconnecting the Earthing Stations, Earth Grid, Electrical Distribution Switchboards, Distribution Boards, Motor Control Centers, Transformer, DG Set, Motors and any other equipment / service / structure etc. required to be earthed.									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	50 mm x 4 mm copper strip	Metres		50	50	100				
b	32 mm x 5 mm copper strip	Metres		50	50	100				
c	25 mm x 3 mm copper strip	Metres		50	50	100				
d	8 SWG / 4 mm dia copper. Wire	Metres		100	100	200				
3.03	Supply, laying and testing of unarmoured, stranded copper conductor, Low Smoke Zero Halogen, green coloured cables of following sizes, conforming to BS 7211 and Specifications, for earthing, including termination of the same by copper lugs at both ends.									
a	1 x 6 sq. mm	Metres		50	50	100				
b	1 x 10 sq. mm	Metres		50	50	100				
c	1 x 16 sq. mm	Metres		50	50	100				
d	1 x 70 sq. mm	Metres		50	50	100				
e	1 x 150 sq. mm	Metres		50	50	100				
	MS /GI As per IS/IEEE									
3.04	Supply of GI earthing strips for provision in Earthing System as per IS Or Steel ropes of equivalent cross sectional area suitable for earthing as per best international practices.									
a	25 mm x 3 mm GI strip	Metres		50	50	100				
b	32 mm x 5 mm GI strip	Metres		50	50	100				
c	40 mm x 5 mm GI strip	Metres		8000	8000	16000				
d	50 mm x 6 mm GI strip	Metres		50	50	100				
e	65 mm x 6 mm GI strip	Metres		50	50	100				
f	75 mm x 6 mm GI strip	Metres		50	50	100				
g	8 SWG Rope	meters		2000	2000	4000				

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
3.05	Laying, testing and commissioning of the following sizes of GI (MS) strips / rods / wires / ropes in trenches / surface / wall / trays / ladders etc. including provision of spacers including welding and treatment as per earthing practices and saddles etc. for interconnecting the Earthing Stations, Earth Grid, Electrical Distribution Switchboards, Distribution Boards, Motor Control Centers, Transformer, Motors and any other equipment / service / structure etc. required to be earthed. Including Bimetallic connectors as required at site									
a	25 mm x 3 mm GI strip	Metres		50	50	100				
b	32 mm x 5 mm GI strip	Metres		50	50	100				
c	40 mm x 5 mm GI strip	Metres		8000	8000	16000				
d	50 mm x 6 mm GI strip	Metres		50	50	100				
e	65 mm x 6 mm GI strip	Metres		50	50	100				
f	75 mm x 6 mm GI strip	Metres		50	50	100				
g	8 SWG Rope	meters		2000	2000	4000				
3.06	PANEL INTERNAL Clean Agent FLOODING SYSTEM									
	All the items not specifically mentioned here but necessary to make the system complete and suitable for desired application as per M & W Specifications and Drawings will be deemed to be included in the quoted prices									
	Providing, Installation, Testing and Commissioning of internal clean agent Panel Flooding System complete in following Panels	Lot		1	1	2				
a	Panel 130									
b	Panel 230									

SCHEDULE OF QUANTITIES FOR PART-A ECS ELECTRICAL WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
c	Panel 170/270									
d	Panel 140									
e	Panel 240									
	TOTAL FOR SH 03									
	Note:- 1.Quantity may be vary as per latest drawing.									
Grand Total Amount for Electrical Works(SH01+SH02+SH 03)										

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	GENERAL									
a.	The equipment covered below shall confirm to the latest relevant standards, specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. The rates quoted shall be deemed to have included the specifications/standards and the preferred make of the material and intend to provide the material/equipment for the specified service life or the endurance limits which ever is adequate in the opinion of employer's representative. All the samples/ material intended to use shall be subject to approval before use as the Employer's representative may opt.									
b.	The foundation for the equipment shall be provided by civil contractor. The ECS/TVS contractor shall provide foundation detail to civil contractor, incase details are not provided on time then the foundation shall be provided by ECS/TVS system contractor without any extra cost to JMRC.									
c	The pump head/ fan pressure shown in BOQ in approximate, same shall be augmented as per final design calculation without any extra cost to JMRC (within limit of 10% of BOQ)									
1	Chilling Units with Screw Compressor (1225 KW)									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1A	Water cooled chillers(AHRI Certified) at below mentioned operating conditions with R-134a refrigerant, semi hermetically sealed compressor, driven by suitable kW. Sq.Cage induction motor complete with water cooled shell and tube condenser with Anti Fouling Device on inlet connection, insulated shell and tube chiller, refrigerant piping, Refrigerant and oil (First Charge), Microprocessor based control panel and accessories etc. as per specifications and data sheet. Motor shall be suitable for 415 volts \pm 10% , 50 Hz \pm 3%, three phase AC supply.									
	Minimum COP at AHRI conditions : 6.1, 0.576KW/TR									
	Water in condenser : 30.0°C									
	Water out condenser : 34.4°C									
	Chilled water 'In' : 15 °C									
	Chilled water 'Out' : 8 °C									
	Chiller FF (MKS) : 0.000088 m ² °C/W									
	Condenser FF (MKS): 0.000176 m ² °C/W									
1A.1	Capacity : 1225KW									
1A.1.1	Delivery of Equipment to site	No.		3	3	6				
1A.1.2	Installation and equipment testing	No.		3	3	6				
1A.1.3	System testing, commissioning and hand over	No.		3	3	6				
1A.2	Capacity : 1300KW									
1A.2.1	Delivery of Equipment to site	No.		RO	RO	RO				
1A.2.2	Installation and equipment testing	No.		RO	RO	RO				
1A.2.3	System testing, commissioning and hand over	No.		RO	RO	RO				
1A.3	Capacity : 1400KW									
1A.3.1	Delivery of Equipment to site	No.		RO	RO	RO				
1A.3.2	Installation and equipment testing	No.		RO	RO	RO				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1A.3.3	System testing, commissioning and hand over	No.		RO	RO	RO				
1B	Chiller Plant Manager									
	32 bit, UL Listed BACnet (BTL certified) Supervisory Controller for management level interface in MS Enclosuer powder coated SIEMENS grey for SUPERVISORY CONTROLLER, IO CARDS (with accessories like Transformer, MCB, internal wiring and Relays with bases) (A) The Network supervisory Controller shall have imbedded graphic capability for generating web based user graphics and support Multi user with simultaneous minimum 4 user login facility (B) Unlimited user without additional licence (C) Shall be browsed by Microsoft Internet Exlporer and Netscape Navigator(D) BTL certified (E) Web engine should be 32bit configuration (F) Should have inbuilt display and keys to operate in absence of PC (G) Should have inbuilt IO points (H)Functionally able to act as a DDC controller also apart from Supervisory controller function (I) Web engine should support AHARAE standard BACnet MS/TP protocol , Proprietary Protocol shall not be accepted(J) Web engine should support integration of third party protocol (eg MODbus-RTU) remotely read and set parameters for the protection functions, transmission	Set		1	1	2				
	DDC / IOM CONTROLLERS for equipment control									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	SITC of Programmable and Application specific 32 bit, UL Listed BACnet (BTL certified) controllers, field mounted configured as per Data Point Summary for respective building services and as per below distributions. The controller shall be housed in vandal proof lockable MS cabinets. The Expansion controller connected with Controller shall also be 32 Bit, UL Listed BACnet(BTL)/Mod Bus controller and communication with Expansion units to Main Controller shall be on BACnet MS/TP. Proprietary Protocol shall not be accepted.									
	Chiller / Pump / Cooling Tower / Isolation valve DDC/IOM									
	Field Devices (In scope of Contractor)									
	Immersion type temperature sensors with all accessories for measuring temperature of Chilled and Condenser Header Temperature									
	Outside air & temperature sensor									
	Peripheral Systems									
	Interface for software integration on Chiller on N2/BACnet MS/TP protocol									
	2 core, ATC, multistrand, 1.0 sqmm, twisted, shielded, LSZH sheathed cable (BAS Signal)									
	25 mm GI Conduit.									
	Design, Supply, installation, testing and commissioning of above equipments.									
2)	Air Cooled Chillers (231 KW)									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2A	Air cooled packaged Scroll Water chillers (AHRI/Eurovent Certified) at below mentioned operating conditions with R-410a refrigerant, hermetically sealed multiple compressor, driven by suitable rated. sq.cage induction motor complete with air cooled condenser, insulated shell and tube chiller, refrigerant piping, Refrigerant and oil (First Charge), Microprocessor based control panel and accessories etc. as per specifications, all mounted on M.S. frame. Motor shall be suitable for 415 volts \pm 10% , 50 Hz \pm 3%, three phase AC supply.									
	Capacity : 231 KW (66TR)									
	Chilled water 'In' : 15 °C									
	Chilled water 'Out' : 8 °C									
	Chiller FF (MKS) : 0.000089 m ² °C/W									
	Minimum COP (at AHRI/Eurovent conditions): 3.0									
2A.1	Delivery of Equipment to site	No		2	2	4				
2A.2	Installation and equipment testing	No		2	2	4				
2A.3	System testing, commissioning and hand over	No		2	2	4				
3	Pumps									
3.1	<u>Chilled Water Pumps</u>									
3.1.1	Supply, installation, testing and commissioning of primary end suction centrifugal pump set with bronze impeller, TEFC IP-55 motor (IE-2) with class 'F' insulation and SS shaft complete with base plate inertia base foundation, insulation and complete as per specification and data sheet . The system shall be complete in all respects and suitable for following ratings									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a)	Capacity : 41.67 LPS , Operating Head 130 Kpa									
3.1.1.1a	Delivery of Equipment to site	Nos.		4	4	8				
3.1.1.2a	Installation and equipment testing	Nos.		4	4	8				
3.1.1.3a	System testing, commissioning and hand over	Nos.		4	4	8				
b)	Capacity : 44.05 LPS , Operating Head 130 Kpa									
3.1.1.1b	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.1.2b	Installation and equipment testing	No.		RO	RO	RO				
3.1.1.3b	System testing, commissioning and hand over	No.		RO	RO	RO				
c)	Capacity : 47.6 LPS , Operating Head 130 Kpa									
3.1.1.1c	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.1.2c	Installation and equipment testing	No.		RO	RO	RO				
3.1.1.3c	System testing, commissioning and hand over	No.		RO	RO	RO				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
3.1.2	Supply, installation, testing and commissioning of secondary variable speed pumping system with Horizontal/Vertical split case double suction centrifugal pump set with bronze impeller, TEFC IP-55 motor (IE-2) with class 'F' insulation and complete with base plate inertia base foundation,insulation and consisting of adjustable frequency drive (AFD) for each pump &1 no. Microprocessor based pump controller with pumping software duly down loaded single / multiple differential pressure sensor / transmitter compatible with BMS system, energy optimization sequencing system complete as per specification and datasheet . The system shall be complete in all respects and suitable for following ratings. The AFD's shall be mounted in a factory built panel and in AFD panel no internal wiring shall be permitted at site.									
a)	Capacity : 62.5 LPS , Operating Head 300 Kpa									
3.1.2.1a	Delivery of Equipment to site	Nos.		3	3	6				
3.1.2.2a	Installation and equipment testing	Nos.		3	3	6				
3.1.2.3a	System testing, commissioning and hand over	Nos.		3	3	6				
b)	Capacity : 66.07 LPS , Operating Head 300 Kpa									
3.1.2.1b	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.2.2b	Installation and equipment testing	No.		RO	RO	RO				
3.1.2.3b	System testing, commissioning and hand over	No.		RO	RO	RO				
c)	Capacity : 71.4 LPS , Operating Head 300 Kpa									
3.1.2.1c	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.2.2c	Installation and equipment testing	No.		RO	RO	RO				
3.1.2.3c	System testing, commissioning and hand over	No.		RO	RO	RO				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
3.1.3	Supply, installation, testing and commissioning of monobloc/END Suction chilled water pump set with bronze impeller, TEFC IP-55 motor (IE-2) with clas 'F' insulation and SS shaft complete with base plate inertia base foundation, vibration isolators, insualtion,complete as per specification and data sheet. The system shall be complete in all respects and suitable for following ratings.									
	Capacity : 7.85 LPS , Operating Head 350 Kpa									
2.1.3.1	Delivery of Equipment to site	No		2	2	4				
2.1.3.2	Installation and equipment testing	No		2	2	4				
2.1.3.3	System testing, commissioning and hand over	No		2	2	4				
2.1.4	<u>Condenser Water Pumps</u>									
	Supply, installing, testing and commissioning of Horizontal/vertical Split casing condenser water circulating centrifugal pump sets with bronze impeller, for condenser water recirculation complete with TEFC IP-55 motor (IE-2) with class 'F' insulation and SS shaft (suitable for 415 V + 10%, 50Hz + 3% 3 phase AC) with base plate etc. complete as per technical specification and data sheet									
a)	Capacity : 86.04 LPS , Operating Head 280 Kpa									
3.1.4.1a	Delivery of Equipment to site	Nos.		4	0	4				
3.1.4.2a	Installation and equipment testing	Nos.		4	0	4				
3.1.4.3a	System testing, commissioning and hand over	Nos.		4	0	4				
b)	Capacity : 86.04 LPS , Operating Head 340 Kpa									
3.1.4.1b	Delivery of Equipment to site	Nos.		0	4	4				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
3.1.4.2b	Installation and equipment testing	Nos.		0	4	4				
3.1.4.3b	System testing, commissioning and hand over	Nos.		0	4	4				
c)	Capacity : 90.96 LPS , Operating Head 280 Kpa									
3.1.4.1c	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.4.2c	Installation and equipment testing	No.		RO	RO	RO				
3.1.4.3c	System testing, commissioning and hand over	No.		RO	RO	RO				
d)	Capacity : 90.96 LPS , Operating Head 340 Kpa									
3.1.4.1d	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.4.2d	Installation and equipment testing	No.		RO	RO	RO				
3.1.4.3d	System testing, commissioning and hand over	No.		RO	RO	RO				
e)	Capacity : 98.33 LPS , Operating Head 280 Kpa									
3.1.4.1e	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.4.2e	Installation and equipment testing	No.		RO	RO	RO				
3.1.4.3e	System testing, commissioning and hand over	No.		RO	RO	RO				
f)	Capacity : 98.33 LPS , Operating Head 340 Kpa									
3.1.4.1f	Delivery of Equipment to site	No.		RO	RO	RO				
3.1.4.2f	Installation and equipment testing	No.		RO	RO	RO				
3.1.4.3f	System testing, commissioning and hand over	No.		RO	RO	RO				
4	Cooling Towers									
4.1	FRP Vertical induced draft counter/cross flow type CTI Certified Cooling Towers, each complete with FRP basin, FRP body, Fan and Motor (IE-2), necessary drive mechanism, sprinkler, fill media, distribution basin pipe connections, Ladder etc. as per specifications and data sheet									
	Hot Water Temperature: 34.4°C									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Cold Water Temperature: 30.0 °C									
A)	Capacity :- 86.04 LPS									
4.1.1A	Delivery of Equipment to site	Nos.		3	3	6				
4.1.2A	Installation and equipment testing	Nos.		3	3	6				
4.1.3A	System testing, commissioning and hand over	Nos.		3	3	6				
B)	Capacity :- 90.96 LPS									
4.1.1B	Delivery of Equipment to site	No.		RO	RO	RO				
4.1.2B	Installation and equipment testing	No.		RO	RO	RO				
4.1.3B	System testing, commissioning and hand over	No.		RO	RO	RO				
C)	Capacity :- 98.33 LPS									
4.1.1C	Delivery of Equipment to site	No.		RO	RO	RO				
4.1.2C	Installation and equipment testing	No.		RO	RO	RO				
4.1.3C	System testing, commissioning and hand over	No.		RO	RO	RO				
5	Air handling Units(Double Skin)									
5.1	Sectional Air Handling Unit double skin type (Euro Vent Certified for mechanical & unit Performance), complete with twin plug type fans , fan section, twin cooling coils, coil section,V filter section with 50mm thick panel type filters, fan motor(IE-2) with VFD and with UVC emitter fitted etc. AHU shall be with cooling coil minimum 8 Row Deep and fin spacing shall be Max 10 FPI. The complete compartmentation shall be provided in fan and coil section.									
a)	126000 CMH Capacity; 920 kW, Rows to suite ,1500Pascal									
5.1.1	Delivery of Equipment to site	Nos.		4	4	8				
5.1.2	Installation and equipment testing	Nos.		4	4	8				
5.1.3	System testing, commissioning and hand over	Nos.		4	4	8				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
b)	108000 CMH , Row to suite , 920 kW,1400Pascal									
5.2.1	Delivery of Equipment to site	Nos.		R.O	R.O					
5.2.2	Installation and equipment testing	Nos.		R.O	R.O					
5.2.3	System testing, commissioning and hand over	Nos.		R.O	R.O					
6	Fan Coil Units									
6.1	Fan Coil unit complete with fan section, cooling coil(AHRI certified), filter section with standard filters, fan motor, return air plenum etc. as per specifications and data sheet, Including drip tray over whole unit and valve assembly.									
a)	1020 CMH									
6.1.1	Delivery of Equipment to site	No.		15	15	30				
6.1.2	Installation and equipment testing	No.		15	15	30				
6.1.3	System testing, commissioning and hand over	No.		15	15	30				
b)	1360 CMH									
6.2.1	Delivery of Equipment to site	Nos.		10	10	20				
6.2.2	Installation and equipment testing	Nos.		10	10	20				
6.2.3	System testing, commissioning and hand over	Nos.		10	10	20				
c)	1700 CMH For									
6.3.1	Delivery of Equipment to site	Nos.		25	25	50				
6.3.2	Installation and equipment testing	Nos.		25	25	50				
6.3.3	System testing, commissioning and hand over	Nos.		25	25	50				
7	Providing and installing Temporary SPLIT A.C. SYSTEM on monthly rent									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
7.1	1.5 TR with wall-mounted indoor unit with Cordless remote	Months		10	10	20				
7.2	2.0 TR with wall-mounted indoor unit with Cordless remote	Month		15	15	30				
7.3	2.5TR with wall-mounted indoor unit with Cordless remote	Month		15	15	30				
7.4	2.5TR with Tower type indoor unit with Cordless remote	Month		10	10	20				
8	<u>Chilled Water Piping</u>									
8.1	MS C class Chilled water piping, Y-Strainer, Valves, Expansion Tank etc. complete with companion flanges, nuts, bolts, gaskets fittings supports etc. as required and as per specifications and drawings including all necessary civil work, Duly Insulated with sections/ roll of rockwool/fibre glass of thickness as per specifications. Density of insulation material as per specification.									
8.1.1	<u>Under Ground / Buried Piping</u> <u>Insulation</u> <u>Thickness(mm)</u>									
a	300 MM 75	RM		5	5	10				
b	250 MM 75	RM		5	5	10				
c	200 MM 75	RM		5	5	10				
d	150 MM 50	RM		5	5	10				
8.1.2	<u>Over Ground Piping</u> <u>Insulation</u> <u>Thickness(mm)</u>									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	350 MM 75	RM		0	0	0				
b	300 MM 75	RM		300	140	440				
c	250 MM 75	RM		40	40	80				
d	200 MM 75	RM		550	550	1100				
e	150 MM 50	RM		60	60	120				
f	125 MM 50	RM		20	20	40				
g	100 MM 50	RM		500	500	1000				
h	80 MM 50	RM		100	100	200				
i	65 MM 50	RM		80	80	160				
j	50 MM 50	RM		50	50	100				
k	40 MM 50	RM		20	20	40				
l	32 MM 50	RM		450	450	900				
m	25 MM 50	RM		200	200	400				
n	20 MM 50	RM		20	20	40				
8.2	Butterfly Valves/Gate Valves									
8.2.1	Butterfly valves									
a	250 MM 75	Nos.		0	0	0				
b	200 MM 75	Nos.		22	22	44				
c	150 MM 50	Nos.		1	1	2				
d	125 MM 50	Nos.		0	0	0				
e	100 MM 50	Nos.		26	26	52				
f	80 MM 50	No.		8	8	16				
g	65 MM 50	Nos.		1	1	2				
h	50 MM 50	Nos.		4	4	8				
i	40 MM 50	Nos.		2	2	4				
j	32 MM 50	Nos.		2	2	4				
8.2.2	Balancing (Double Regulating) Valve Insulation Thickness(mm)									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	350 MM 75	Nos.		0	0	0				
b	300 MM 75	Nos.		0	0	0				
c	250 MM 75	Nos.		0	0	0				
d	200 MM 75	Nos.		6	6	12				
e	150 MM 50	Nos.		1	1	2				
f	125MM 50	Nos.		0	0	0				
g	100 MM 50	No.		14	14	28				
h	25 MM 50	Nos.		0	0	0				
i	50 MM 50	Nos.		2	2	4				
j	Portable electronic computerised flow meter for balancing valves	No.		1	1	2				
8.3	<u>Non-Return Valve</u>									
a	200 MM 75	Nos.		7	7	14				
b	150 MM 50	Nos.		0	0	0				
c	100 MM 50	Nos.		4	4	8				
d	50 MM 50	Nos.		0	0	0				
8.4	<u>Y-Strainer</u>									
a	200 MM 75	Nos.		7	7	14				
b	100 MM 50	Nos.		0	0	0				
c	150 MM 50	Nos.		0	0	0				
d	100 MM 50	Nos.		10	10	20				
e	65 MM 50	Nos.		0	0	0				
f	50 MM 50	Nos.		0	0	0				
8.5	Pressure Independent control valve set factory fitted with (GM) Ball valve and Y-Strainer at return and (GM) Ball valve at supply.									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	25 MM 50	Set		35	35	70				
b	20 MM 50	Set		15	15	30				
c	40 MM 50	Set		0	0	0				
8.6	Motorised Butterfly Valves									
	Motorised butterfly valves complete with actuator (Should be BMS compatible) as per specifications & drawings.									
a	200 MM 75	Nos.		3	3	6				
b	125 MM 50	Nos.		0	0	0				
c	100 MM 50	Nos.		6	6	12				
d	65 MM 50	Nos.		0	0	0				
e	50 MM 50	No.		0	0	0				
8.7	Pressure Independent control valve for AHU as per Specs									
	For following pipe sizes									
a	25 MM 50	No.		0	0	0				
b	32 MM 50	Nos.		0	0	0				
c	80 MM 50	Nos.		0	0	0				
d	100 MM 50	Nos.		8	8	16				
e	125 MM 50	Nos.		0	0	0				
8.8	Pressure Gauges with nipple, elbow and ball valve including of syphon & lock.	Nos.		44	44	88				
8.9	Thermometers	Nos.		26	26	52				
8.10	Flow Switches	Nos.		5	5	10				
8.11	Automatic Air Vents	Nos.		20	20	40				
8.12	Differential Pressure Switch	Nos.		6	6	12				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
8.13	Water level switch for expansion tank	No.		1	1	2				
8.14	<u>Air & dirt Separators & Vacuum Degaser as per specifications</u>									
a)	For Main Plant	Set		1	1	2				
b)	For air cooled chiller	Set		1	1	2				
8.15	<u>Expansion Tank</u>									
a)	Closed type Expansion Tank of size for operating pressure up to 10 bars as per specifications.									
8.15.1	1000 Ltrs. Capacity	No.		1	1	2				
8.15.2	500 Ltrs capacity	No.		1	1	2				
9	<u>Flexible Couplings:</u>									
a	200mm	Nos.		20	20	40				
b	150mm	Nos.		0	0	0				
c	100mm	Nos.		24	24	48				
d	125mm	Nos.		0	0	0				
e	80mm	Nos.		0	0	0				
f	25mm	Nos.		0	0	0				
10	<u>Condenser Water Piping</u>									
10.1	MS C class Condenser water piping, Y-Strainer, Valves, Expansion Tank etc. complete with companion flanges, nuts, bolts, gas kits fittings supports etc. as required and as per specifications and drawings including all necessary civil work.									
10.1	<u>Under Ground / Buried Piping</u>									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	450 mm	mtrs.		5	250	255				
b	400 mm	mtrs.		5	5	10				
c	350 mm	mtrs.		5	5	10				
d	300 mm	mtrs.		5	5	10				
10.2	Overground Piping									
a	450 MM	RM		180	380	560				
b	400 MM	RM		0	0	0				
c	350 MM	RM		25	25	50				
d	300 MM	RM		100	25	125				
e	250 MM	RM		120	170	290				
f	200 MM	RM		50	55	105				
g	150 MM	RM		15	35	50				
h	125 MM	RM		10	60	70				
i	100 MM	RM		10	7	17				
j	80 MM	RM		10	18	28				
k	65 MM	RM		60	6	66				
l	50 MM	RM		30	12	42				
m	25 MM	RM		10	0	10				
10.3	Butterfly Valves									
a	250 MM	No.		11	11	22				
b	200 MM	Nos.		12	12	24				
c	150 MM	Nos.		0	0	0				
d	100 MM	Nos.		6	6	12				
e	75 MM	No.		0	0	0				
f	65 MM	Nos.		0	0	0				
g	50 MM	Nos.		6	6	12				
h	40 MM	Nos.		0	0	0				
i	32 MM	Nos.		10	10	20				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.4	Motorized Butterfly Valves									
a	250 mm	Nos.		9	9	18				
10.5	Balancing (Double regulating) Valves									
a	250 MM	No.		3	3	6				
b	200 MM	Nos.		6	6	12				
c	150 MM	Nos.		0	0	0				
d	100 MM	Nos.		0	0	0				
10.6	U tube manometer for measuring water flow through balancing valves.	No.		0	0	0				
10.7	Non-Return Valves									
a	250 MM	Nos.		4	4	8				
b	150 MM	Nos.		0	0	0				
c	200 MM	Nos.		0	0	0				
10.8	Y-Strainer									
a	250 MM	Nos.		4	4	8				
b	200 MM	Nos.		0	0	0				
11	Pressure Gauges with nipple, elbow and ball valve instead of syphon & lock.	Nos.		14	14	28				
12	Thermometers	Nos.		3	3	6				
13	Flow Switches	Nos.		3	3	6				
14	Air Vent	Nos.		10	10	20				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
15	<u>Flexible Couplings</u>									
a	250mm	Nos.		14	14	28				
b	200mm	Nos.		0	0	0				
16	<u>Drain Piping</u>									
16.1	GI drain piping complete with fittings, supports and insulations per specifications and drawings including all necessary civil work. Duly Insulated with sections/roll of rockwool/fibre glass of thickness as per specifications.									
	Size Insulation									
a	100 MM 50 mm	RM		30	30	60				
b	80 MM 50 mm	RM		23	23	46				
c	65 MM 50 mm	RM		23	23	46				
d	50 MM 50 mm	RM		0	0	0				
e	40 MM 50 mm	RM		47	47	94				
f	32 MM 50 mm	RM		7	7	14				
g	25 MM 50 mm	RM		14	14	28				
h	20 MM 50 mm	RM		0	0	0				
16.2	<u>Drain Valve</u>									
16.2.1	<u>Gate Valve</u>									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	25mm	Nps.		12	12	24				
b	32mm	Nps.		10	10	20				
c	40mm	Nps.		10	10	20				
d	50mm	No.		5	5	10				
17	Water Treatment System									
17.1	Water Treatment system consisting of dosing tank pumps, chemical formulation to (a) keep water circulating system clean and free from corrosion and b) to control organic and algae growth in the circulating water (broad spectrum biocide), piping from dosing pumps to condenser water return header, necessary valves and accessories, pump mounting arrangement on tanks, tank covers, and piping insulation wherever necessary. the system shall consist of, but not limited to, the following:-									
	a) Dosing tank 100 liters capacity	Nos.		4	4	8				
	b) Electronic Positive Displacement Dosing pump made from polypropylene capable of withstanding a back-pressure of 3.5 Kg/Sq.cm complete with 1 phase motor, low-level switch and anti syphon valve assembly.	Nos.		4	4	8				
	c) UPVC piping from dosing pumps to header.	Lot		1	1	2				
	d) Valve and accessories	Lot		1	1	2				
17.2	TESTING EQUIPMENT AND KITS:									
	a) Corrosion test rack									
	b) pH reagents									
	c) T.d.S. meter									
	d) Hardness testing reagent									
	e) Nitrite test kit (5547/5137)									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	f) Chemical for 1 year	Lot		1	1	2				
17.3	Automatic motorised Condenser water bleed off 25 mm valve complete with sensing device	No.		1	1	2				
18	<u>Ducting</u>									
	Sheet metal ducting complete with supports, vanes etc. as per specifications and drawings including all necessary civil work.									
18.1	<u>GI Sheet Metal Ducting</u>									
a	0.63 mm thick (24 Gauge)	Sqm		400	400	800				
b	0.83 mm thick (22 Gauge)	Sqm		3400	3400	6800				
c	1.00 mm thick (20 Gauge)	Sqm		1400	1400	2800				
d	1.20 mm thick (18 Gauge)	Sqm		1600	1600	3200				
18.2	<u>Fire Rated Ducting</u>									
	Fire rated Sheet metal ducting complete with supports, vanes, insulation etc. as per manufacturer's recommendations complying to relevant standards such as BS 476 part 24 s including all necessary civil work.									
18.2.1	<u>Sheet Metal Duct painted with fire-resistan paint and 100 mm thick, 120 kg/m³ density Rock wool insulation (Price shall include cost of paint and Rock wool insulation)</u>									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	0.63 mm thick (24 Gauge)	Sqm.		0	0	0				
b	0.83 mm thick (22 Gauge)	Sqm.		600	600	1200				
c	1.00 mm thick (20 Gauge)	Sqm.		1100	1100	2200				
d	1.20 mm thick (18 Gauge)	Sqm.		1300	1300	2600				
18.3	Duct Insulation									
	Providing and Fixing insulation on ducts complete as per specifications and drawings.									
a	25 mm thick fiber glass with density 32 kg/m3	Sqm.		3000	3000	6000				
b	50 mm thick fiber glass with density 32 kg/m3	Sqm.		3500	3500	7000				
c	100 mm thick Rock wool with 20 kg/m3 density(This item will be paid if instructed by employer on any duct required to be insulated with Rockwool)	Sqm.		200	200	400				
19	Accoustic Lining as per specification	Sqm.		5	450	455				
20	Grilles/Diffusers/Louvres Aluminium powder coated									
	Grilles/ diffusers/Louvers complete as per specifications and drawings.									
20.1	Supply air Linear grilles with VCD.	sqm		5	5	10				
20.2	Square S.A diffusers with VCDS	sqm		5	5	10				
a	450x450 mm									
b	375x375									
c	300x300									
d	150x150									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
20.3	S.A grills with VCDS	Sq.m		55	55	110				
a	900 X 200									
b	3400 x 1200									
c	150 X 150									
d	150 X 100									
20.4	Square Return air Diffuser without dampers	sqm		10	10	20				
a	500 X 500 mm									
b	450 X 450 mm									
c	300x300 mm									
d	200x200 mm									
e	200x200 mm									
f	150x150 mm									
20.5	Back plate dampers (OTE)									
a	750 x 800 mm	Nos.		48	48	96				
20.6	Return air grilles with volume Control dampers									
a	635 x 635	Nos.		80	80	160				
20.7	Exhaut air grills without VCD	Sq.m		15	15	30				
a	1000 X 300 mm									
b	1200 X 300 mm									
20.8	Fire Rated Exhaust air grilles with MFD	Sq.m		5	5	10				
a	1200 X 300 mm									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
b	500 X 100 mm									
c	400 X 100 mm									
d	250 X 100 mm									
e	200 X 100 mm									
f	100 X 100 mm									
g	1000 x 2500									
20.9	Exhaust air grilles with VCD	Sq.m		15	15	30				
20.10	Fresh air grilles with VCD	Sq.m		10	10	20				
a	900x300									
b	1200x300									
d	500x300									
20.11	Air transfer Grills	Sq.m		20	20	40				
a	500 x 250									
b	400 x 300									
c	500 x 300									
20.12	0.8mm Aluminium Cladding	sqm		750	750	1500				
20.13	Exhaust /Fresh air Louvers (Aluminium)	Sqm		50	50	100				
21	Dampers									
	Dampers complete as per specifications & drawings									
21.1	Manual dampers(In various sizes like or to suite site)	SQM		40	40	80				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
a	001 - 2650x1300 (AHU INLET)									
b	002 - 2650x1300 (AHU INLET)									
21.2	Fire Rated Manual Damper (FMD)	SQM		5	5	10				
a	001 - 1800x1800 (TEF IN)									
b	002 - 1800x1800 (TEF IN)									
c	003 - 1300x1300 (SEF Conc)									
d	004 - 1300x1300 (SEF Conc)									
21.3	Motor Operated dampers(In various sizes like or to suite site)	SQM		50	50	100				
a	001 - 2600x2350 (Supply Shaft)									
b	002 - 1200x1200 (FAF)									
c	003 - 1300x1300 (VSF DUCT)									
d	004 - 1300x1300 (VSF DUCT)									
e	005 - 1300x1300 (VEF DUCT)									
f	006 - 1300x1300 (VEF DUCT)									
g	007 - 1300x1300 (AHU)									
h	008 - 1300x1300 (AHU)									
i	009 - 1300x1300 (AHU)									
j	010 - 1300x1300 (AHU)									
21.4	Motor operated fire dampers	SQM		62	62	124				
a	001 - 1350x4100 (Ex Shaft)									
b	002 - 1800x1800 (TEF OUTLET)									
c	003 - 1800x1800 (TEF OUTLET)									
d	004 - 1600 x 600 (UPE)									
e	005 - 1600 x 600 (UPE)									

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
21.5	Duct volume control dampers	SQM		20	20	40				
21.6	Fire Damper with Spring and Fusible Link	SQM		50	50	100				
21.7	Pressure release damper	SQM		5	5	10				
a	800 x 800									
22	Propeller Fans									
	Propeller fans as per specifications and drawings									
a	300 mm	No.		1	1	2				
a	380 mm	No.		8	8	16				
b	450 mm	No.		5	5	10				
c	400 mm	No.		1	1	2				
23	Axial Flow Fans & Attenuators									
23.1	Axial flow fans including motors, anti vibration mounts, up and downstream metallic diffusers with their supports and flexible sleeves. Fans, motors, sound attenuators, and all accessories shall be complete as per Specifications.									
a	VEF 7 cms , 750 PaFor ECS Plant Rooms	Nos.		4	4	8				
b	VSF 7.5 cms , 750 paFor ECS Plant Rooms	Nos.		4	4	8				
c	VEF 8.5 cms, 850 pa For ventilation of rooms	Nos.		2	2	4				
d	VEF 6 cms,550 pa Fire rated for Chiller and Fire pump	Nos.		2	0	2				
e	VSF 6.5 cms ,550 pa cms For Chillerand Fire pump Plant Rooms	Nos.		2	0	2				
f	Fire Rated VEF 6 cms,750 pa For Chillerand Fire pump Plant Rooms	Nos.		0	2	2				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
g	VSF 6.5 cms ,750 pa cms For Chillerand Fire pump Plant Rooms	Nos.		0	2	2				
h	Fire Rated VEF 4.8 cms, 600 Pa. For ASS Rooms at Concourselevel	Nos.		6	6	12				
j	Fire rated SEF11.76, 850 Pa cms	Nos.		4	4	8				
k	SPF-5.5 cms	Nos.		3	3	6				
l	WEF-Capacity 1.3 CMS, total pressure 150 pascals	Nos.		2	2	4				
m	FAF 7 cms, 650 pa compatible with VFD and CO2 level monitor controlled	Nos.		2	0	2				
n	FAF 6 cms, 650 pa compatible with VFD and CO2 level monitor controlled	Nos.		R.O.	R.O.					
o	Toilet exhaust Inline Fan 3.85 cms, 400 Pa	Nos.		2	2	4				
23.2	Attenuators as per specifications (Sizes are indicative, Bidders to supply as per selection of fans & equipments)	SQM		1	1	2				
a	Attenuator AHU Supply- (2300x1400)	No.		4	4	8				
c	Attenuator VSF Supply-ECA- (1200x1200)	Nos		12	12	24				
d	Attenuator VEF Exhaust-ECA- (1200x1200)	Nos		16	16	32				
g	Attenuator FAF ECS PLANT ROOM-ECA- (1000x1000)	No.		4	4	8				
h	Attenuator S.E.F. -ECA-(1400x700)	Nos.		2	2	4				
24	EU4 Panel type Filters, complete with filter fixing frame, holding frame gaskets etc. complete filter shall have arrestance efficiency as per specifications.									
a	(610x610x50) mm	Nos.		6	6	12				

SCHEDULE OF QUANTITIES FOR PART-B ECS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
b	(450x450x50) mm	Nos.		2	2	4				
25	Gas leakage detection system	Nos.		1	1	2				
26	Misc. items									
26.1	Supply, Installation, Testing & commissioning of CO2 & Air quality monitor sensors with controller with all the mounting accessories included. The sensor shall be Infra Red Type with 4 to 20 mA transmitter. The measurment shall be 0 to 2000 ppm. To control the operation of FAFs in ECS Plant Room through VFD.	Lot		1	1	2				
26.2	Supply, installation, testing & commissioning of flow meter compatible with BMS including all wiring	No.		0	0	0				
	GRAND TOTAL FOR ECS WORK									

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	GENERAL									
a.	The equipment covered below shall confirm to the latest relevant standards, specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. The rates quoted shall be deemed to have included the stringent specifications/standards and the preferred make of the material and intend to provide the material/equipment for the specified service life or the endurance limits which ever is stringent/adequate in the opinion of employer's representative. All the samples/ material intended to use shall be subject to approval before use as the Employer's representative may opt.									
b.	The tender shall normally be quoted through a competent ventilation team . The Ventilation Sub-Contractor shall not be subject to change to ensure the quality of work unless approved by the employer's representative for change in cases of poor quality or delay in work during construction stage.									
c.	The foundation for the equipment shall be provided by civil contractor. The ECS/TVS contractor shall provide foundation detail to civil contractor, incase details are not provided on time then the foundation shall be provided by ECS/TVS system contractor without any extra cost to JMRC.									
d	The fan pressure shown in BOQ is approximate, same shall be augmented as per final design calculation, without any extra cost to JMRC. (within limit of 10% of BOQ)									

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	SECTION-1									
1	TUNNEL VENTILATION FAN UNITS									
1.1	Supply, installation, testing and commissioning of axial flow fans including motors, anti vibration mounts, up and downstream metallic diffusers with their supports and flexible sleeves. Fans shall be axial flow type with reversible operation. Emergency fan-motor units shall be required to operate in the forward or reverse direction of airflow, with a capability of starting, stopping, or reversing the direction of flow at any time. Fans, motors, transitions shall be as per specifications and datasheet. All components of complete fan unit shall be rated for 250 Deg.C for two hour.									
1.1.1	Reversible axial flow fans, 2.0m diameter, 85cum/s, 1150 Pa with their motors and all accessories.									
1.1.1.1	<u>Delivery of equipment to the site.</u>	Nos.		0	2	2				
1.1.1.2	<u>Installation and Equipment Testing</u>	Nos.		0	2	2				
1.1.1.3	<u>System Testing, Commissioning and Handover</u>	Nos.		0	2	2				
1.1.2	Reversible axial flow fans, 2.0m diameter, 85cum/s, 1750 Pa with their motors and all accessories									
1.1.2.1	<u>Delivery of equipment to the site.</u>	Nos.		4	2	6				
1.1.2.2	<u>Installation and Equipment Testing</u>	Nos.		4	2	6				
1.1.2.3	<u>System Testing, Commissioning and Handover</u>	Nos.		4	2	6				

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.2	Supply, installation, testing and commissioning of axial flow jet fans including motors, anti vibration mounts, up and downstream metallic diffusers with their supports and flexible sleeves. Fans shall be axial flow type with reversible operation. Emergency fan-motor units shall be required to operate with a capability of starting, stopping at any time. Fans, motors, transitions shall be as per specifications and schedule of equipment. All components of complete fan unit shall be rated for 250 Deg.C for two hour.									
1.2.1	Reversible axial flow jet fans(Tunnel Booster Fans),1.25 M diameter, Thrust 1250 N, with their motors, Silencers and all accessories.									
1.2.1.1	<u>Delivery of equipment to the site.</u>	Nos.		0	1	1				
1.2.1.2	<u>Installation and Equipment Testing</u>	Nos.		0	1	1				
1.2.1.3	<u>System Testing, Commissioning and Handover</u>	Nos.		0	1	1				
1.2.2	Reversible axial flow jet fans(Tunnel Booster Fans),1.4 M diameter, Thrust 1600 N, with their motors, Silencers and all accessories.									
1.2.2.1	<u>Delivery of equipment to the site.</u>	Nos.		0	4	4				
1.2.2.2	<u>Installation and Equipment Testing</u>	Nos.		0	4	4				
1.2.2.3	<u>System Testing, Commissioning and Handover</u>	Nos.		0	4	4				

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.3	Supply, installation, testing and commissioning of axial flow fans including motors, anti vibration mounts, up and down stream diffusers with their supports and flexible sleeves. Fans shall be axial flow type with unidirectional operation. Fans, motors, transitions and all other accessories shall be as per specifications and schedule of equipment. Shall be fire rated for 250 degree centigrade for two hour.									
1.3.1	Unidirectional axial flow fans 1.4 M diameter, 31.5 cum/sec 1250 Pascal's.									
1.3.1.1	<u>Delivery of equipment to the site.</u>	Nos.		4	4	8				
1.3.1.2	<u>Installation and Equipment Testing</u>	Nos.		4	4	8				
1.3.1.3	<u>System Testing, Commissioning and Handover</u>	Nos.		4	4	8				
	SECTION-2									
2	TUNNEL VENTILATION COMPRESSED AIR OPERATED DAMPERS									

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Supply, installation, testing and commissioning of Compressed Air Operated dampers. Dampers shall be furnished complete with damper mounting frames for each damper module and all components and incidentals as specified, with all structural support elements and hardware required for installation of the damper modules into composite damper units, and with any additional accessories which may be needed in order to meet the performance requirements as provided in the Specifications. Dampers are compressed air operated. Shall be fire rated for 250 Degree Celsius for 2 hrs. (In case of variation in size of dampers at site ,price quoted shall be paid as per the per square meter rates derived from the item rates of respective dampers)									
2.1	Fan isolation dampers 3.0m x4.0m									
<u>2.1.1</u>	<u>Delivery of equipment to the site.</u>	Nos.		4	4	8				
<u>2.1.2</u>	<u>Installation and Equipment Testing</u>	Nos.		4	4	8				
<u>2.1.3</u>	<u>System Testing, Commissioning and Handover</u>	Nos.		4	4	8				

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2.2	Nozzle dampers									
2.2.1	Nozzle dampers 2.6 mx3.5m									
2.2.1.1	<u>Delivery of equipment to the site.</u>	Nos.		4	4*	8				
2.2.1.2	<u>Installation and Equipment Testing</u>	Nos.		4	4*	8				
2.2.1.3	<u>System Testing, Commissioning and Handover</u>	Nos.		4	4*	8				
	* 2 Nos. Nozzle Dampers for Chand Pole Station									
2.2.2	Draught relief dampers, 4.5m x 4.5m .									
2.2.2.1	<u>Delivery of equipment to the site.</u>	Nos.		4	4	8				
2.2.2.2	<u>Installation and Equipment Testing</u>	Nos.		4	4	8				
2.2.2.3	<u>System Testing, Commissioning and Handover</u>	Nos.		4	4	8				
2.3	Tunnel ventilation dampers, 3m x 4m									
2.3.1	<u>Delivery of equipment to the site.</u>	Nos.		4	9	13				
2.3.2	<u>Installation and Equipment Testing</u>	Nos.		4	9	13				
2.3.3	<u>System Testing, Commissioning and Handover</u>	Nos.		4	9	13				
2.4	Shaft damper, 4.5m x 4.5m									
2.4.1	<u>Delivery of equipment to the site.</u>	Nos.		2	2	4				
2.4.2	<u>Installation and Equipment Testing</u>	Nos.		2	2	4				
2.4.3	<u>System Testing, Commissioning and Handover</u>	Nos.		2	2	4				
2.5	Pneumatic ventilation dampers for ECS plant room 2.5mx2.6m (ETVD).									
2.5.1	<u>Delivery of equipment to the site.</u>	Nos.		2	2	4				
2.5.2	<u>Installation and Equipment Testing</u>	Nos.		2	2	4				
2.5.3	<u>System Testing, Commissioning and Handover</u>	Nos.		2	2	4				

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	SECTION-3									
3	TUNNEL VENTILATION SOUND ATTENUATORS									
3.1	Supply, installation, testing and commissioning of sound attenuators as per Specifications and schedule of equipment, Casing shall be considered as a part attenuation system and casing thickness shall be considered while considering the acoustic properties. Bidders has to design & select attenuators as per site requirements & TVF equipment selected to meet the performance requirement , substantiated with calculations, without any extra cost to employer. Cross sections of attenuators provided is indicative.									
	Sound attenuators for TVF, 3.0m x 4.0m									
3.1.1	<u>Delivery of equipment to the site.</u>	Nos.		8	8	16				
3.1.2	<u>Installation and Equipment Testing</u>	Nos.		8	8	16				
3.1.3	<u>System Testing, Commissioning and Handover</u>	Nos.		8	8	16				
	Sound attenuators for TEF, 2.1 x 2.1m									
3.2.1	<u>Delivery of equipment to the site.</u>	Nos.		8	8	16				
3.2.2	<u>Installation and Equipment Testing</u>	Nos.		8	8	16				
3.2.3	<u>System Testing, Commissioning and Handover</u>	Nos.		8	8	16				
	SECTION-4									
4	TUNNEL VENTILATION NOZZLES									

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
4.1	Supply, installation, testing and commissioning of nozzles to suite 85 cms for fans at Platform level made of SS-304 as per drawing enclosed herewith. Nozzles shall be complete with structural supports, mounting flanges and hardware required to complete the installation. All supports shall be galvanised mild steel.	Nos.		4	2	6				
4.2	Supply, installation, testing and commissioning of nozzles to suite 75 cms for fans at Platform level made of SS-304 as per drawing enclosed herewith. Nozzles shall be complete with structural supports, mounting flanges and hardware required to complete the installation. All supports shall be galvanised mild steel.	Nos.		0	0	2				
	* The item no. 4.2 is applicable for Chandpole station									
	SECTION-5									
5	COMPRESSED AIR SYSTEMS									
5.1	AIR COMPRESSORS									

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
5.1.1	Supply, installation, Testing & commissioning of, screw type air cooled compressed air package consisting of 2 nos. air compressors with safety devices and each having capacity of 0.79m ³ /Minute with working pressure of 13 bar and a air receiver of 500 litre capacity. Compressed shall be as per specifications, data sheet, drawings & as required. Each compressor shall have its own Air Tank & Refrigerated Air Dryer control panel, Air Dryer, Filters as per air flow diagram, specifications and data sheets enclosed. Price shall include hard drawn copper tubing, Ball Valves, Strainers Float Traps, Solenoid Valves, Pressure Regulating Valves, Electronic Drain Valves, Pressure Reducing Station, Moisture Separator and trap, solenoid boxes for BMS Control as per drawings, data sheets and specifications.	lot		1	0	1				

SCHEDULE OF QUANTITIES FOR PART-C TVS WORKS										
S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
5.1.2	Supply, installation, Testing & commissioning of, screw type air cooled compressed air package consisting of 2 nos. air compressors with safety devices and each having capacity of 1.21m ³ /Minute with working pressure of 13 bar and a air receiver of 500 litre capacity. Compressed shall be as per specifications, data sheet, drawings & as required. Each compressor shall have its own Air Tank & Refrigerated Air Dryer control panel, Air Dryer, Filters as per air flow diagram, specifications and data sheets enclosed. Price shall include hard drawn copper tubing, Ball Valves, Strainers Float Traps, Solenoid Valves, Pressure Regulating Valves, Electronic Drain Valves, Pressure Reducing Station, Moisture Separator and trap, solenoid boxes for BMS Control as per drawings, data sheets and specifications.	lot		0	1	1				
	SECTION-6									
6	Fire rated Galvanized Iron ducting complete with supports as per specifications and drawings including all necessary civil work required for installation of complete TVS System in both the TVS Plant rooms in each station .	LS		1	1	2				
	TOTAL SECTION 6									
	GRAND TOTAL of Part - C									
	Note:- 1.Quantity may be vary as per latest drawing.									
	GRAND TOTAL FOR TVS WORK									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	GENERAL									
	The prices to be quoted are to be entered in the appropriate sections below, and shall include the supply, installation, testing and commissioning at site for all the equipment, and ancillary materials as specified inclusive of all such items whatsoever which may be required to fulfill the intent and purpose as laid down in the specification and/or the drawings. Details are to be supplemented.									
1.00	BMS Central Processing Equipment (Work Station)									
	Stand alone commercial grade Workstation, features latest Intel Xeon, Quad core processor with 3.0 GHz or higher, 8 GB RAM, 1TB Hard Disk drive, DVD R/RW, Dual LAN card, 2GB Dual Video Accelerator, Dual Monitor support, 2 Nos. spare USB ports, Optical Mouse & key board, 2 Serial, 1 parallel, Windows based with standard MS office package, Latest Norton/Mcafee virus vaccine suitable for operation on 230 volts A/C. 50 Hz, all as per specifications as required. Energy star rating is preferred.	No.		1	1	2				
	Note: To ensure quality clone computers shall not be acceptable.									
	Manufacturer :									
	Country of Origin :									
	Local Agency :									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Type :									
	Model :									
	Processor :									
	Core:									
	Cache Memory :									
	Clock Speed :									
	RAM Capacity Installed :									
	RAM Capacity Expandable :									
	Hard Disk Capacity :									
	Hard Disk Expandable:									
	Hard Disk Access Time :									
	CD-R/RW Speed :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
	Ambient Operating Temp :									
	Ambient Operating R.H. :									
	Heat Dissipation:									
2.00	BMS Colour Monitor									
	Colour monitor shall be minimum 19 inch diagonal antiglare, antistatic flat LED screen, high resolution of 1280x1024 and 16 Million colour support, on screen control support, Vertical & Horizontal viewing angle 160 ⁰ . Tilt Swivel Support as per specifications etc. as required.	Nos.		1	1	2				
	Manufacturer :									
	Country of Origin :									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Local Agency :									
	Type :									
	Model :									
	Screen Size :									
	Resolution :									
	Colours :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
	Ambient Operating Temp :									
	Ambient Operating R.H. :									
3.0	BMS PRINTERS									
	The printers shall be suitable for trend log, summary, totalizer logging, recording alarms and									
3.01	Dot Matrix Printer - 132 column/300 character per second print speed 24 pins dot matrix character structure switchable to 29x23 dot matrix for letter quality output with 96 ASCII upper/lower case character set, Software selectable under, emphasized, double strike, and expanded (double width) characters capability, adjustable line spacing of six or eight lines per inch with compressed mode option for 220 characters/line and bidirectional printing and logic seeking as per specification etc as required.	Nos.		1	1	2				
	Manufacturer :									
	Country of Origin :									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Local Agency :									
	Type :									
	Model :									
	Print Speed :									
	Number of Columns :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
4.00	LAN INTERFACES	Lot		1	1	2				
4.01	OFC Ethernet Switches	Lot								
4.02	Ethernet switches, 100 base TX, 8 port	Lot								
4.03	Miscellaneous Network components	Lot								
5.00	SOFTWARE									
5.01	BMS Software for ECS as well E&M for HMI, Event & Alarm, PLC Logic Development and Debugging etc as per specification and support dual display workstation	Lot		1	1	2				
	Manufacturer :									
	Country of Origin :									
	Local Agent :									
	S/W Title :									
	Version / Release :									
6.00	NOTEBOOK PC									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
6.01	Color note book with built-in modem for remote dialing-in for use as a portable programming and operational (POT) tool to develop, debug, and monitor ladder logic programs, to monitor data tables and viewing HMI with high quality color LED, latest high resolution min graphic touch(HD) display which supports Intel Core i7 3rd Generation or higher and be complete with min standard 4 GB RAM, 1TB hard disk capacity with high speed disk access, high speed DVD-R/RW, and with 82-key sculptured keyboard (101 keyboard compatible), USB mouse etc as per specification complete with all neecessary software 2GB. Graphics card, latest Norton (McFee / kaspersky antivirus	Nos.		1	1	2				
	HDMI, USD 3.0 at least 2 Ports, Bluetooth 4.0, Energy star rating.									
	Manufacturer :									
	Country of Origin :									
	Local Agent :									
	Model :									
	Screen Size :									
	Resolution :									
	Colours :									
	Dimension :									
	Weight :									
7	BMS PLC HOUSING CUBICLES/PANELS									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
7.01	Front operated front/back access cubicle type indoor duty floor/wall/recess/surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in PU gaskets, fabricated from 2mm thick CRCA sheets incorporating.	Lot		1	1	2				
	Incorporating IP 54 protection, Free standing PLC enclosure and BMS PLC equipment complete with Single ended TBs, SMPS, MCBs, etc including interconnections, labelling, earthing, associated foundation/masonry work and all cable ducting, control wiring, fixing accessories, LV Power isolation indicator lamps, LED's, fuses, circuit breakers, terminal rail, terminals, marker ferrules and all accessories as pay be called for under the specifications.									
Note-1	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.									
2.	All accessories and supporting structures such as channels, ISMC075 base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
3.	The makes of components and accessories shall be same for panels for uniformity, standardisation and replaceability and shall be applicable to all panels/boards under the scope of work									
8.00	BMS PLC EQUIPMENT									
8.01	The PLC features shall be, modular complete with Power supply, base plate incorporating terminals for field wiring and shall include: An industrial computer that has been hardened to operate in the harsh environment; Familiar relay ladder diagram programming; I/O control through user logic programming' Instruction set designed specifically for the BMS industrial control and process control environment; Previously used on Metro Projects; Communications with cell controllers, operator interface terminals, dumb terminals, personal computers, and similar devices. The contractor shall cross reference the PLC Panel Ref No. to Housing Type as above. A by-pass switch/s shall be provided to completely by-pass the PLC in the event of a total failure of the PLC and associates equipment to enable the normal operation of the quipment controlled by the PLC. Panels shall be fitted with a suitable pocket to contain circuit diagrams and other relevant Definitive Design Drawings. An "as installed" set shall be ha remotely read and	Lot		1	1	2				

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	CPU Module with on board Ethernet RS 485 port, . Integrated Remote I/O Bus Manager, 96 word Base memory, 12,000 I/O capacity, 64 process channels :4 nos									
	CPU Module with Remote I/O Bus manager : 2 nos									
	256 KB memory Extension Capsule: 2 nos									
	AI Module									
	DI Module									
	DO Module									
	AO Module									
	IO Rack Power Supply Module , 230 V , 50 W									
	6 slot CPU rack									
	Redundancy Module									
	Back Plane Rack for PC modules & IO									
	Expansion Rack for remote IO modules									
	FIPIO trunk cable									
	Ethernet Module TCP/IP 10/100 MBPS CP 343-1									
	FIPWAY adopter for remote IO rack									
	Remote FIPWAY Agent Module									
	Tap for each Node on the remote IO module									
8.02	Assorted connectors, pre-formed connecting cables, special terminal blocks, bus cables, taps, tap links, networking accessories consisting of patch Pannels, Cat 5 patch cords etc.	Lot		1	1	2				
	Manufacturer :									
	Country of Origin :									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Local Agent :									
	Operating Temperature :									
	Storage Temperature :									
	Humidity :									
	Vibration :									
	AC Power Source :									
	Module Weight :									
	I/O Power Supply Base :									
	Module Dimensions :									
	Shock :									
	Back-up Battery Type :									
	Typical Battery :									
	Battery Shelf Life :									
	Typical Scan Rate :									
	Maximum number of Discrete Physical I/O Points :									
	Allowance for 20% Spare I/O Points Modules to be included									
9.00	Transducer and Actuators									
a	Voltage Transducer to give output in 4 - 20 ma DC	Lot		1	1	2				
b	Current Transducer	Lot		1	1	2				
c	Frequency Tansducer	Lot		1	1	2				
d	Power Factor Transducer	Lot		1	1	2				
e	Battery (DC) Voltage Transducer	Lot		1	1	2				
f	Liquid Flow Switch	Lot		1	1	2				
g		Lot		1	1	2				

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
h	Differential Pressure Transmitter for Filter Status, Micro Filter & air flow status complete with sensor tubes.	Lot		1	1	2				
i	Immersion type Temperature Sensor, thermowell type	Lot		1	1	2				
j	External Air Temperature Sensor	Lot		1	1	2				
k	Duct type air Temperature Sensor	Lot		1	1	2				
l	CO ₂ Tansducer, PM _{2.5} , & PM _{10.5}	Lot		1	1	2				
m	Humidity Sensor	Lot		1	1	2				
10.00	WIRING CONTAINMENT SYSTEMS									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The class of protection against corrosion shall be as scheduled in the specifications. Class 2 conduit and fittings shall have black enameled finished and Class 4 shall be hot dipped galvanized. The minimum size of conduit shall be 20 mm. To satisfy requirements for earth fault loop impedance, the layout of conduit, trucking and ducting and routing of cables shall ensure that the maximum circuit lengths allowable are not exceeded. Bending of conduit shall be done, without the use of heat, using a bending tool that complies with the British standard appropriate to the conduit material, Draw inboxes shall be provided in conduit at the following maximum intervals; a. Straight run 8 m, b. Run with one or two bends 6m, C. Run with three bends 4m, d. run with four bends 2.5 m, no. conduit shall be under mechanical stress. At expansion and settlement joints suitable provision shall be made in conduit to allow for movement of the structure. Temporary plugs shall be fitted to open ends of conduit and ducting to prevent remotely read and set parameters for	Lot		1	1	2				
	<u>CONDUIT</u>									
10.01	20mm Galvanized (M.S) 16gauge									
10.02	25mm Galvanized (M.S) 16gauge									
10.03	32mm Galvanized (M.S) 16gauge									
10.04	40mm Galvanized (M.S) 14gauge									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.05	50mm Galvanized (M.S) 14gauge									
	CONDUIT ACCESSORIES									
10.06	20mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.07	25mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.08	32mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.09	40mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.10	50mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.11	Miscellaneous Fixings, saddles, Brackets etc.									
	FLEXIBLE STEEL CONDUIT									
	Flexible conduit and adaptors shall comply generally with the requirements of BS 731 Part 1 for packed construction, except that under no circumstances shall asbestos packing be used. Adaptors shall be of the solid type in brass or zinc plated mild steel. The flexible conduit shall be LSZH sheathed.									
10.12	20mm									
10.13	25mm									
10.14	32mm									
10.15	Miscellaneous Fixings, saddles, Brackets etc.									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	CABLE TRAY									
	Supply, fabrication & installation of perforated GI cable tray from 2mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, suspenders and other accessories and duly suspended from the ceiling with GI suspensions.									
10.16	900 mm wide x 75 mm deep									
10.17	750 mm wide x 75 mm deep									
10.18	600 mm wide x 75 mm deep									
10.19	450 mm wide x 75 mm deep									
10.20	300 mm wide x 75 mm deep									
10.21	150 mm wide x 50 mm deep									
10.22	100 mm wide x 50 mm deep									
	CONTROL CABLE WIRING									
	600/1000V grade armoured XLPE FRZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.									
10.23	2Cx1.5sq.mm									
10.24	4Cx1.5sq.mm									
10.25	12Cx1.5sq.mm									
10.26	19Cx1.5sq.mm									
10.27	24C x1.5sq.mm									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	600/1000V grade SS armoured Fire Survival cables tested to BS-6387 for circuit integrity under fire, ZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.									
10.27	2Cx1.5sq.mm									
10.28	4Cx1.5sq.mm									
10.29	12Cx1.5sq.mm									
10.30	19Cx1.5sq.mm									
10.31	24C x1.5sq.mm									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The control cable for critical/emergency/fire equipment shall be fire resistant type in accordance with the Specification. Control panel, switchboards and distribution boards wiring shall be clearly identified in accordance with the Definitive Design Drawings using cable core markers. Cable core markers shall read left to right or top to bottom. Wiring shall be enclosed in metal ducts or neatly loomed with nylon ties or spiral binding as required. Wiring ducts shall be filled to a maximum space factor to 50%. Where wiring is required to connect to devices mounted on doors it shall be arranged such that opening and closing of the door is not impeded whilst minimising flexing of the wiring loom. The loom shall be effectively fixed at both ends of the door opening with insulated saddles or clamps. Wire colours shall comply with the following requirements: Phases Red, Yellow, Blue, Neutral Black AC Control Grey, DC Positive Orange, DC Negative Lilac, Earth Green with Yellow trace.									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Terminals shall be clearly numbered, and shall be rail mounted, adequately sized to suite wiring size and provided with 20% spare rail space. The bridging of terminals shall be provided by the use of terminal bridging links as supplied by the terminal manufacturer. Control wiring shall be terminated using pre-insulated pin or spade type crimb lugs. Condcutors terminating to study type terminals shall be fitted with spade type crimb lugs. A separate earth bar shall be provided for the termination of all earth wires. Only one wire shall be connected into each termination point. Minimum conductor size shall be 1.5 mm2.									
10.32	LAN Cable Cat 6e or higher (LSZH)									
10.33	Miscellaneous field termination of all controll cables to be provided under item No. 10.23 to 10.31 above to final TVS Systems including the cost of supplying and fixing crimping lugs, compression type brass glands, insulation tape etc. complete as per specifications and as									
	EARTHING									

SCHEDULE OF QUANTITIES FOR PART - D BMS WORKS FOR ECS and E&M

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.34	Copper Strips/ LSZH wire for interconnecting the equipments, panels, etc. of the following sizes in built up trenches/surface/wall/ground & alongwith cable trays etc complete with holes and fixing, jointing/terminating accessories as per specifications.									
10.35	6 SQ MM GI Rope for earthing with bimetalic connector if required.									
	TOTAL AMOUNT FOR PART D									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	GENERAL									
	The prices to be quoted are to be entered in the appropriate sections below, and shall include the supply, installation, testing and commissioning at site for all the equipment, and ancillary materials as specified inclusive of all such items whatsoever which may be required to fulfill the intent and purpose as laid down in the specification and/or the drawings. Details are to be supplemented in Annexure 'A'.									
1.00	BMS Central Processing Equipment (Work Station)									
	Stand alone commercial grade Workstation, features Intel Xeon, Quad core processor with 3.0 GHz or higher, 8 GB RAM, 1TB Hard Disk drive, DVD R/RW, Dual LAN card, 1 GB Video Accelerator, 2 Nos. spare USB ports, minimum 4 Nos. High speed parallel ports, Optical Mouse & keyboard, 2 Serial, 1 parallel, Windows based with standard MS office package, Latest Norton/Mcafee virus vaccine suitable for operation on 230 volts A/C. 50 Hz, all as per specifications as required. Energy Star Rating is Preferred.	No.		1	1	2				
	Note: To ensure quality clone computers shall not be acceptable.									
	Manufacturer :									
	Country of Origin :									
	Local Agency :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Type :									
	Model :									
	Processor :									
	Core:									
	Cache Memory :									
	Clock Speed :									
	RAM Capacity Installed :									
	RAM Capacity Expandable :									
	Hard Disk Capacity :									
	Hard Disk Expandable:									
	Hard Disk Access Time :									
	CD-R/RW Speed :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
	Ambient Operating Temp :									
	Ambient Operating R.H. :									
	Heat Dissipation:									
2.00	BMS Colour Monitor									
	Colour monitor shall be minimum 19 inch diagonal antiglare, antistatic flat LED screen, high resolution of 1280x1024 and 16 Million colour support, on screen control support, Vertical & Horizontal viewing angle 160 ⁰ , Tilt Swivel Support as per specifications etc. as required.	No.		1	1	2				
	Manufacturer :									
	Country of Origin :									
	Local Agency :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Type :									
	Model :									
	Screen Size :									
	Resolution :									
	Colours :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
	Ambient Operating Temp :									
	Ambient Operating R.H. :									
3.0	BMS PRINTERS									
	The printers shall be suitable for trend log, summary, totalizer logging, recording alarms and providing system reports.									
3.01	Dot Matrix Printer - 132 column/300 character per second print speed 24 pins dot matrix character structure switchable to 29x23 dot matrix for letter quality output with 96 ASCII upper/lower case character set, Software selectable under, emphasized, double strike, and expanded (double width) characters capability, adjustable line spacing of six or eight lines per inch with compressed mode option for 220 characters/line and bidirectional printing and logic seeking as per specification etc as required.	Nos.		1	1	2				
	Manufacturer :									
	Country of Origin :									
	Local Agency :									
	Type :									
	Model :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Print Speed :									
	Number of Columns :									
	Dimension :									
	Voltage Requirement :									
	Current Consumption :									
4.00	LAN INTERFACES	Lot		1	1	2				
4.01	OFC Ethernet Switches									
4.02	Ethernet switches, 100 base TX, 8 port.									
4.03	Miscellaneous Network components,									
5.00	SOFTWARE									
5.01	TVS Software for HMI, Event & Alarm, PLC Logic Development and Debugging etc as per specification	Lot		1	1	2				
	Manufacturer :									
	Country of Origin :									
	Local Agent :									
	S/W Title :									
	Version / Release :									
6.0	BMS PLC HOUSING CUBICLES/PANELS									
6.01	Front operated front/back access cubicle type indoor duty floor/wall/recess/surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in PU gaskets, fabricated from 2mm thick CRCA sheets incorporating.	Lot		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Incorporating IP 54 protection, Free standing PLC enclosure and BMS PLC equipment complete with Single ended TBs, SMPS, MCBs, etc including interconnections, labelling, earthing, associated foundation/masonry work and all cable ducting, control wiring, fixing accessories, LV Power isolation indicator lamps, LED's, fuses, circuit breakers, terminal rail, terminals, marker ferrules and all accessories as may be called for under the specifications.									
Note-1	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.									
2.	All accessories and supporting structures such as channels, base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.									
3.	The makes of components and accessories shall be same for panels for uniformity, standardisation and replaceability shall be applicable to all panels/boards under the scope of work									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
4.	Incorporating IP 54 protection, Free standing PLC enclosure and BM PLC equipment complete with Single ended TBs, SMPS, MCBs, etc including interconnections, labelling, earthing, associated foundation/masonry work and all cable ducting, control wiring, fixing accessories, LV Power isolation indicator lamps, LED's, fuses, circuit breakers, terminal rail, terminals, marker ferrules and all accessories as may be called for under the specifications.									
7.0	BMS PLC EQUIPMENT									
	The PLC features shall be, modular with onboard dedicated RS485 ports for profibus/Modbus communication, maintenance free without battery for data retentivity, with micromemory card for program databackup. Power supply, base plate incorporating terminals for field wiring and shall include: An industrial computer that has been hardened to operate in the harsh environment; Familiar relay ladder diagram programming; I/O control through user logic programming' Instruction set designed specifically for the BMS industrial control and process control environment; Previously used on Metro Projects; Communications with cell controllers, operator interface terminals, dumb terminals, personal computers, and similar devices.	Lot		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The contractor shall cross reference the PLC Panel Ref No. to Housing Type as above. A by-pass switch/s shall be provided to completely by-pass the PLC in the event of a total failure of the PLC and associates equipment to enable the normal operation of the quipment controlled by the PLC. Panels shall be fitted with a suitable pocket to contain circuit diagrams and other relevant Definitive Design Drawings. An "as installed" set shall be having.									
7.01	CPU with onboard RS485port for profibus/Modbus communication. Data and program backup without external battery. CPU shall have scan time of not less than 0.1ms per 1k bit instruction and 5ms per 1k floating point instructions.									
7.02	Micro-Memory Card									
7.03	Power Supply 2 A									
7.04	AI MODULE									
7.05	DI MODULE									
7.06	DO MODULE									
7.07	AO MODULE									
7.08	Redundancy Kit									
7.09	Active Bus Module for IO Module 40mm									
7.10	Active Rail 530 mm									
7.11	Active bus for ET 200									
7.12	Mounting Rail 160 mm									
7.13	Bus Connector without PG interface									
7.14	Bus Connector with PG interface									
7.15	Bus cable per meter									
7.16	Interface Module 153-1									
7.17	Ethernet Module TCP/IP 10/100 MBPS									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
7.18	CP 341 RS485 modbus card									
7.19	Terminal block 8 slots									
7.20	Modbus driver software									
7.21	16 channels Relay Board PCB Mounted type, plug in relays.									
7.22	Touch Screen LCD type Local control Panel Directly mounted on the PLC Housing itself, with Screen Guard protection.									
7.23	Assorted connectors, pre-formed connecting cables, special terminal blocks, bus cables, taps, tap links, networking accessories consisting of patch Pannels, Cat 6 patch cords etc.									
	Manufacturer :									
	Country of Origin :									
	Local Agent :									
	Operating Temperature :									
	Storage Temperature :									
	Humidity :									
	Vibration :									
	AC Power Source :									
	Module Weight :									
	I/O Power Supply Base :									
	Module Dimensions :									
	Shock :									
	Back-up Battery Type :									
	Typical Battery :									
	Battery Shiefl Life :									
	Typical Scan Rate :									
	Maximum number of									
	Discrete Physical I/O									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Points :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
7.24	Allowance for 20% Spare I/O Points Modules									
7.25	Transducer and Actuators									
7.26	Voltage Transducer									
7.27	Current Transducer									
7.28	Air Flow Transmitter									
7.29	KWH Transducer									
7.30	Pressure Transmitter									
8.0	NOTEBOOK PC									
	Color note book with built-in modem for remote dialing-in for use as a portable programming and operational (POT) tool to develop, debug, and monitor ladder logic programs, to monitor data tables and viewing HMI with high quality color LED, latest high resolution min graphic touch(HD) display which supports Intel Core i7 3rd Generation or higher and be complete with min standard 4 GB RAM, 1TB hard disk capacity with high speed disk access, high speed DVD-R/RW, and with 82-key sculptured keyboard (101 keyboard compatible), USB mouse etc as per specification complete with all neecessary software 2GB. Graphics card, latest Norton (McFee / kaspersky antivirus	Nos.		1	1	2				
	HDMI, USD 3.0 at least 2 Ports, Bluetooth 4.0, Energy star rating.									
	Manufacturer :									
	Country of Origin :									
	Local Agent :									
	Model :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Screen Size :									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Resolution :									
	Colours :									
	Dimension :									
	Weight :									
9.0	Additional Panels									
	<u>VENTILATION CONTROL PANEL (VCP)</u>									
9.01	For Manual activation of the congestion and emergency operation mode from the Station Control Room complete with all Mimic diagrams on Mosaic Tiles, LED's, Selector switches, cable ducting, control wiring, fixing accessories, LV Power isolation, indicator lamps, fuses, circuit breakers, terminal rail, terminals, marker ferrules and all other accessories as may be called for under the specifications.	set		1	1	2				
10.0	WIRING CONTAINMENT SYSTEMS	LS		1	1	2				

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The class of protection against corrosion shall be as scheduled in the specifications. Class 4 shall be hot dipped galvanised. The minimum size of conduit shall be 20 mm. To satisfy requirements for each fault loop impedance, the layout of conduit, trunking and ducting and routing of cables shall ensure that the maximum circuit lengths allowable are not exceeded. Bending of conduit shall be done, without the use of heat, using a bending tool that complies with the British Standard appropriate to the conduit material. Draw-in boxes shall be provided in conduit at the following maximum intervals: a) Straight run 8 m, b) Run with one or two bends 6 m, c) Run with three bends 4 m, d) Run with four bends 2.5 m, No conduit shall be under mechanical stress. At expansion and settlement joints suitable provision shall be made in conduit to allow for movement of the structure., Temporary									
	<u>CONDUIT</u>									
10.01	20mm Galvanized (M.S) 16gauge									
10.02	25mm Galvanized (M.S) 16gauge									
10.03	32mm Galvanized (M.S) 16gauge									
10.04	40mm Galvanized (M.S) 14gauge									
10.05	50mm Galvanized (M.S) 14gauge									
	<u>CONDUIT ACCESSORIES</u>									
10.06	20mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.07	25mm Galvanised, Insection Box, T Boxes, Bends etc.									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.08	32mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.09	40mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.10	50mm Galvanised, Insection Box, T Boxes, Bends etc.									
10.11	Miscellaneous Fixings, saddles, Brackets etc.									
	FLEXIBLE STEEL CONDUIT									
	Flexible conduit and adaptors shall comply generally with the requirements of BS 731 Part 1 for packed construction, except that under no circumstances shall asbestos packing be used. Adaptors shall be of the solid type in brass or zinc plated mild steel. The flexible conduit shall be LSZH sheathed.									
10.12	20mm									
10.13	25mm									
10.14	32mm									
10.15	Miscellaneous Fixings, saddles, Brackets etc.									
	CABLE TRAY									
	Supply, fabrication & installation of perforated GI cable tray from 2mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, suspenders and other accessories and duly suspended from the ceiling with GI suspensions.									
10.16	900 mm wide x 75 mm deep									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.17	750 mm wide x 75 mm deep									
10.18	600 mm wide x 75 mm deep									
10.19	450 mm wide x 75 mm deep									
10.20	300 mm wide x 75 mm deep									
10.21	150 mm wide x 50 mm deep									
10.22	100 mm wide x 50 mm deep									
	CONTROL CABLE WIRING									
	600/1000V grade armoured XLPE FRZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/ trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.									
10.23	2Cx1.5sq.mm									
10.24	4Cx1.5sq.mm									
10.25	12Cx1.5sq.mm									
10.26	19Cx1.5sq.mm									
10.27	24C x1.5sq.mm									
	600/1000V grade armoured Fire Survival cables tested to BS-6387 for circuit integrity under fire, ZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.									
10.28	2Cx1.5sq.mm									
10.29	4Cx1.5sq.mm									
10.30	12Cx1.5sq.mm									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
10.31	19Cx1.5sq.mm									
10.32	24C x1.5sq.mm									
	The control cable for critical/emergency/fire equipment shall be fire resistant type in accordance with the Specification. Control panel, switchboards and distribution boards wiring shall be clearly identified in accordance with the Definitive Design Drawings using cable core markers. Cable core markers shall read left to right or top to bottom. Wiring shall be enclosed in metal ducts or neatly loomed with nylon ties or spiral binding as required. Wiring ducts shall be filled to a maximum space factor to 50%. Where wiring is required to connect to devices mounted on doors it shall be arranged such that opening and closing of the door is not impeded whilst minimising flexing of the wiring loom. The loom shall be effectively fixed at both ends of the door opening with insulated saddles or clamps. Wire colours shall comply with the following requirements: Phases Red, Yellow, Blue, Neutral Black AC Control Grey, DC Positive Orange, DC Negative Lilac, Earth Green with Yellow trace.									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Country of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Terminals shall be clearly numbered, and shall be rail mounted, adequately sized to suite wiring size and provided with 20% spare rail space. The bridging of terminals shall be provided by the use of terminal bridging links as supplied by the terminal manufacturer. Control wiring shall be terminated using pre-insulated pin or spade type crimp lugs. Conductors terminating to study type terminals shall be fitted with spade type crimp lugs. A separate earth bar shall be provided for the termination of all earth wires. Only one wire shall be connected into each termination point. Minimum conductor size shall be 1.5 mm ² .									
10.33	LAN Cable Cat 6e or higher (LSZH)									
10.34	Miscellaneous field termination of all control cables to be provided under item No. 10.23 to 10.31 above to final TVS Systems including the cost of supplying and fixing crimping lugs, compression type brass glands, insulation tape etc. complete as per specifications and as required.									
	EARTHING									
10.35	Copper Strips/ LSZH wire for interconnecting the equipments, panels, etc. of the following sizes in built up trenches/surface/wall/ground & alongwith cable trays etc complete with holes and fixing, jointing/terminating accessories as per specifications.									
10.36	6 SQ MM GI Rope for earthing with bimetallic connector if required.									

SCHEDULE OF QUANTITIES FOR PART-E BMS WORKS FOR TVS

S.No.	Description	Unit	Countr y of Origin	Qty. Chhoti Chaupar	Qty. Badi Chaupar	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	TOTAL AMOUNT FOR PART E									

SCHEDULE OF QUANTITIES FOR PART- F SCADA FOR TVS

S.No.	Description	Unit	Country of Origin	Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	GENERAL							
	The prices shall include the supply, installation, testing, commissioning, maintenance, training at site for all the equipment and ancillary materials as specified inclusive of all such items whatsoever which may be required to fulfill the intent and purpose as laid down in the specifications, scope of work and drawings. The TVS-SCADA for Chand Pole station is also in the scope of the bidder. Modification required in MODE table of TVS scada at local level is in the scope of bidder.							
1.0	SCADA System for OCC							
1.01	Detailed Design, Supply Installation , Testing Commissioning of SCADA System at OCC complete for Chand Pole - Badi Chaupar Corridor with; latest Intel Xeon 6 Core Servers with min 8 GB RAM and 1TB RAID 5 HDD, Dual Monitor Work Stations, interfaces, LAN network, with full redundancy at all levels to avoid single point failure, to be installed at OCC for monitoring and control of Tunnel Ventilation System, ECS System & E&M System complete with all latest State-of-the-Art hardware and software for Centralized Operation, to include all spares, software development and hardware support, maintenance, guarantees & warantees, training of client's staff (both hardware & Software), supply of manuals etc. as per specifications, scope of work, schematic and BOQ.(Including RTUs, Gate ways, Modems Etc. at station Level).	Lot		1				
	Note: To ensure quality clone computers shall not be acceptable.							
	Manufacturer :							
	Country of Origin :							
	Local Agency :							

SCHEDULE OF QUANTITIES FOR PART- F SCADA FOR TVS

S.No.	Description	Unit	Country of Origin	Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Type :							
	Model :							
	Processor :							
	Core:							
	Cache Memory :							
	Clock Speed :							
	RAM Capacity Installed :							
	RAM Capacity Expandable :							
	Hard Disk Capacity :							
	Hard Disk Expandable:							
	Hard Disk Access Time :							
	CD-R/RW Speed :							
	Dimension :							
	Voltage Requirement :							
	Current Consumption :							
	Ambient Operating Temp :							
	Ambient Operating R.H. :							
	Heat Dissipation:							
	Colour Monitor							
	Colour monitor shall be minimum 24 inch diagonal antiglare, antistatic flat LED screen, high resolution of 1280x1024 and 16 Million colour support, on screen control support, Vertical & Horizontal viewing angle 160°. Tilt Swivel Support as per specifications etc. as required.							
	Manufacturer :							
	Country of Origin :							
	Local Agency :							
	Type :							

SCHEDULE OF QUANTITIES FOR PART- F SCADA FOR TVS

S.No.	Description	Unit	Country of Origin	Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Model :							
	Screen Size :							
	Resolution :							
	Colours :							
	Dimension :							
	Voltage Requirement :							
	Current Consumption :							
	Ambient Operating Temp :							
	Ambient Operating R.H. :							
	PRINTERS							
	The printers shall be suitable for trend log, summary, totalizer logging, recording alarms and providing system reports.							
1.02	Dot Matrix Printer - 132 column/300 character per second print speed 24 pins dot matrix character structure switchable to 29x23 dot matrix for letter quality output with 96 ASCII upper/lower case character set, Software selectable under, emphasized, double strike, and expanded (double width) characters capability, adjustable line spacing of six or eight lines per inch with compressed mode option for 220 characters/line and bidirectional printing and logic seeking as per specification etc as required.	No		1				
	Manufacturer :							
	Country of Origin :							
	Local Agency :							
	Type :							
	Model :							
	Print Speed :							
	Number of Columns :							

SCHEDULE OF QUANTITIES FOR PART- F SCADA FOR TVS

S.No.	Description	Unit	Country of Origin	Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	Dimension :							
	Voltage Requirement :							
	Current Consumption :							
1.03	A hard copy multi-color graphics laser printer for recording graphic displays and associated dynamic data having Print speed - Black: up to 20 ppm; colour: up to 4 ppm, First page out - 18 seconds black, 29 seconds color, Resolution - 600 by 600 dpi, Memory - 64 MB built-in SDRAM; expandable to 192 MB with one open memory SDRAM DIMM slot, Duty cycle - 30,000 pages per month, Media, Types Paper (plain, letterhead, bond, color, rough, preprinted, recycled), Glossy Media, Cover Paper, Color LaserJet Transparencies, labels, envelopes, and card stock, Compatability - Interfaces Hi-Speed USB 2.0, IEEE 1284-B complaint parallel port, Languages - PCL 6 and Postscript level 3 emulation with automatic language switching, Font capacities - 80 True Type TM internal scalable PCL 6 fonts; 80 True internal as per specification etc as required.	No.		1				
	Manufacturer :							
	Country of Origin :							
	Local Agency :							
	Type :							
	Model :							
	Print Speed :							
	Number of Columns :							
	Dimension :							
	Voltage Requirement :							
	Current Consumption :							

SCHEDULE OF QUANTITIES FOR PART- F SCADA FOR TVS

S.No.	Description	Unit	Country of Origin	Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2.0	NOTEBOOK PC							
2.01	Color note book with built-in modem for remote dialing-in for use as a portable programming and operational (POT) tool to develop, debug, and monitor ladder logic programs, to monitor data tables and viewing HMI with high quality color LED, latest high resolution min graphic touch(HD) display which supports Intel Core i7 3rd Generation or higher and be complete with min standard 4 GB RAM, 1TB hard disk capacity with high speed disk access, high speed DVD-R/RW, and with 82-key sculptured keyboard (101 keyboard compatible), USB mouse etc as per specification complete with all neecessary software 2GB. Graphics card, latest Norton (McFee / kaspersky antivirus	Nos.		2				
	HDMI, USD 3.0 at least 2 Ports, Bluetooth 4.0, Energy star rating.							
	Manufacturer :							
	Country of Origin :							
	Local Agent :							
	Model :							
	Screen Size :							
	Resolution :							
	Colours :							
	Dimension :							
	Weight :							
3.0	Operator Training	LS		1				
4.0	Maintenance & Operator Manuals	LS		1				
	TOTAL AMOUNT FOR PART F							

SCHEDULE OF QUANTITIES FOR PART-G MISC. CIVIL WORKS

S.No.	Description	Unit	Country of Origin	Total Quantity	Total amount of estimated work as per State PWD Rates in (Lacs.) INR	% quote above or below the State PWD Rates price	Total Amount in INR
1	Latest State PWD Rates FOR CIVIL WORKS						
	Works in this Schedule shall be done under State PWD rates, as per latest CPWD Specifications for Civil Works.						
	It may be noted that part of those Civil Works relating to ECS/TVS/BMS/TVS SCADA Works which are not covered in Scope of work else where will be the responsibility of the Contractor. Actual work order will be issued by jmrc towards this item of BOQ as per the requirement. Measurement will be made as per the units of items of State PWD Rates operated and payment will be made after applying the accepted rate of tender (in percentage) above / below to the rates given in items of State PWD Rates . Amount given in Schedule for this item is the total amount, which is estimated towards Civil Works for which work order will be issued. This may also vary by + 25 percent. Approximate value of work on State PWD Rates is 15 lakhs/station and associated tunnel sections and intermediate vent shaft provisions. The amount after adding % above or below is to be quoted as amount. Any item of State PWD Rates . Seperate work order will be issued for this item as per Note above.	L/S		2 stations works	30		
	Total Amount in INR for Schedule -G						

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.0	WIRING CONTAINMENT SYSTEMS							
	The class of protection against corrosion shall be as scheduled in the specifications. Class 4 shall be hot dipped galvanised. The minimum size of conduit shall be 20 mm. To satisfy requirements for each fault loop impedance, the layout of conduit, trunking and ducting and routing of cables shall ensure that the maximum circuit lengths allowable are not exceeded. Bending of conduit shall be done, without the use of heat, using a bending tool that complies with the British Standard appropriate to the conduit material. Draw-in boxes shall be provided in conduit at the following maximum intervals: a) Straight run 8 m, b) Run with one or two bends 6 m, c) Run with three bends 4 m, d) Run with four bends 2.5 m, No conduit shall be under mechanical stress. At expansion and settlement joints suitable provision shall be made in conduit to allow for movement of the structure., Temporary plugs shall be fitted to open ends of conduit and ducting to prevent ingress of water and solid material.							
	<u>CONDUIT</u>							
1.01	20mm Galvanized (M.S) 16gauge	meter		50				
1.02	25mm Galvanized (M.S) 16gauge	meter		50				
1.03	32mm Galvanized (M.S) 16gauge	meter		50				
1.04	40mm Galvanized (M.S) 14gauge	meter		50				
1.05	50mm Galvanized (M.S) 14gauge	meter		50				
	<u>CONDUIT ACCESSORIES</u>							
1.06	20mm Galvanised, Insection Box, T Boxes, Bends etc.	No.		10				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1.07	25mm Galvanised, Insection Box, T Boxes, Bends etc.	No.		10				
1.08	32mm Galvanised, Insection Box, T Boxes, Bends etc.	No.		10				
1.09	40mm Galvanised, Insection Box, T Boxes, Bends etc.	No.		10				
1.10	50mm Galvanised, Insection Box, T Boxes, Bends etc.	No.		10				
1.11	Miscellaneous Fixings, saddles, Brackets etc.	No.		10				
2.00	CONTROL CABLE WIRING							
	1100V grade armoured XLPE FR ZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.							
2.10	2Cx1.5sq.mm	meter		50				
2.20	4Cx1.5sq.mm	meter		50				
2.30	12Cx1.5sq.mm	meter		50				
	1100V grade SS armoured Fire Survival cables tested to IEC-331 for circuit integrity under fire at 750 deg C for three hours, ZH Copper (Cu) conductor STP cable screened control cables on existing trays/walls/columns/indoor/trenches including the cost of supports with suitable clamps, hooks, bolts etc and including the cost of proper dressing of cable.							
2.31	2Cx1.5sq.mm	meter		500				
2.32	4Cx1.5sq.mm	meter		500				
2.33	12Cx1.5sq.mm	meter		500				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	The control cable for critical/emergency/fire equipment shall be fire resistant type in accordance with the Specification. Control panel, switchboards and distribution boards wiring shall be clearly identified in accordance with the Definitive Design Drawings using cable core markers. Cable core markers shall read left to right or top to bottom. Wiring shall be enclosed in metal ducts or neatly loomed with nylon ties or spiral binding as required. Wiring ducts shall be filled to a maximum space factor to 50%. Where wiring is required to connect to devices mounted on doors it shall be arranged such that opening and closing of the door is not impeded whilst minimising flexing of the wiring loom. The loom shall be effectively fixed at both ends of the door opening with insulated saddles or clamps. Wire colours shall comply with the following requirements: Phases Red, Yellow, Blue, Neutral Black AC Control Grey, DC Positive Orange, DC Negative Lilac, Earth Green with Yellow trace.							
	Terminals shall be clearly numbered, and shall be rail mounted, adequately sized to suite wiring size and provided with 20% spare rail space. The bridging of terminals shall be provided by the use of terminal bridging links as supplied by the terminal manufacturer. Control wiring shall be terminated using pre-insulated pin or spade type crimb lugs. Conductors terminating to study type terminals shall be fitted with spade type crimb lugs. A separate earth bar shall be provided for the termination of all earth wires. Only one wire shall be connected into each termination point. Minimum conductor size shall be 1.5 mm ² .							

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
2.34	1.5 mm2	No.		10				
2.35	1.5mm 2 LSF0H	No.		10				
2.36	1.5mm 2 FS	No.		10				
2.37	2.5 mm2	No.		10				
2.38	2.5mm2 LSF0H	No.		10				
2.39	2.5mm2 FS	No.		10				
2.40	LAN Cable Cat 6	No.		10				
	EARTHING							
3.00	Copper Strips/wire for interconnecting the equipments, panels, etc. of the following sizes in built up trenches/surface/wall/ground & alongwith cable trays etc complete with holes and fixing, jointing/terminating accessories as per specifications.							
3.01	6 SWG	meter		100				
	Aluminium cladding							
4	0.8 mm aluminium clading as per ASHRAE Standards for duct & Piping in ECS Plant room	sq.m		500				
	Temperature & Humidity display at stations							
5	Temperature & Humidity display at Plateform & Concourse (4 No.s in a set) for inside and out side ambient conditions with digital display of size approx. 800mmx300mm along with sensors and necessary cabling and accessories complete.	set		4				
6	<u>Electrical Feeders</u>							

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
6.1	Adjustment of rates for addition/deletion of supply of compartmentalised switchgear in the panels MDB- 170/270 of following ratings including the supply fabrication , extension, modifications of enclosures, earthing, bus bars, other sub system accessories etc. complete as required and as per specification							
6.2	1 No. 3 Pole 100A,50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts. With star delta starter complete	no.		1				
6.3	1 No. 3 Pole160A,50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts.With star delta starter complete .	no.		1				
6.4	1 No. 3 Pole250A,50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual pump selection, and auxiliary Contacts.With star delta starter complete .With star delta starter complete .	no.		1				
6.5	1 No. 3 Pole400 A,50 kA at 415V, 3P MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual pump selection, and auxiliary Contacts.	no.		1				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
6.6	1 No.630 A, 415V, 50KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
6.7	1 No.400 A, 415V, 50 KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
6.8	1 No.250 A, 415V,50 KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
6.9	1 No.160 A, 415V, 50 KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
6.10	1 No.100 A, 415V, 50 KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
6.11	1Sets of Star - Delta Stater unit complete with MPCB , indication, lamps etc. and contactors for following ratings of electrical motors							
	11.00 kW	no.		1				
	15kW	no.		1				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
	7.5kW	no.		1				
	9 kW	no.		1				
7	Adjustment of rates for addition/deletion of supply of compartmentalised switchgear in the panels DB-130/DB230 of following ratings including the supply fabrication , extension, modifications of enclosures, earthing, bus bars, other sub system accessories etc. complete as required and as per specification							
7.1	1 No. 3 Pole 100A,50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts. With star delta starter complete	no.		1				
7.2	1 No. 3 Pole160A,50 kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts.With star delta starter complete .	no.		1				
7.3	1 No. 3 Pole250A,50kA at 415V, 3P motor duty MCCB with Electronic Trip Unit(with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts.With star delta starter complete .With star delta starter complete .	no.		1				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
7.4	1 No. 3 Pole 400 A, 50kA at 415V, 3P MCCB with Electronic Trip Unit (with inbuilt over load and short circuit protection) over load range to suit actual equipment selection, and auxiliary Contacts.	no.		1				
7.5	1 No. 630 A, 415V, 50 KA, 3P MCCB having Electronic Trip Unit with adjustable protection against Overload, adjustable protection against Short Circuit.	no.		1				
7.6	1 Sets of Star - Delta Starter unit complete with MPCB, indication, lamps etc. and contactors for following ratings of electrical motors							
	11.00 kW	no.		1				
	15kW	no.		1				
	7.5kW	no.		1				
	5.5kW	no.		1				
8	Adjustment of rates for addition/deletion of supply of compartmentalised switchgear in the panels DB-140/DB240 of following ratings including the supply fabrication, extension, modifications of enclosures, earthing, bus bars, other sub system accessories etc. complete as required and as per specification							
8.1	1 Sets of DOL Starter Unit with MPCB for 0.5 KW motor (single phase) and each shall be equipped with all necessary contactors, indication lamps and auxiliary contacts	no.		1				

SCHEDULE OF QUANTITIES FOR PART-H ADDITIONAL MISCELLANEOUS ITEMS

S.No.	Description	Unit	Country of Origin	Qty.	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
9	Fire Sealing							
9.1	Supply, Installation & Testing of 4 hours fire rated Similar to Llyod Firestop sealing system or equivalent for sealing of cable pipe sleeves projecting less than 100 mm from the surface of the wall.(Qty measured will be the size of opening)	Sq. Mtr.		500				
9.2	Supply, Installation & Testing of 2 hours Fire rated system for closing the openings between rooms with help of Rock wool, G.I Sheet and Hilti or equivalent Sealants(Qty measured will be the size of opening)	Sq. Mtr.		1500				
10	Fire rated access door	Sq.m		50				
11	EPDM modular based cable & pipe sealing system for the Sealing of Critical area .The EPDM Modules shall be "Low Smoke Index, Halogen free cross-linkable rubber compound based on EPDM (Ethylene - Propylene DieneTerpolymer)". The system shall ensure foolproof protection against hazards induced by Water, Dust, Humidity, Fire, Vibrations, Pull Tension, Noise as well as Rodents	sq ft		500				
12	Supply & installation Checker Plate 6mm thickness with anchor & fastners to cover the openings left out on the floor for Nozzle, Electrical panels and other equipments etc.	Sq.m		200				
	TOTAL AMOUNT FOR PART-H							

SCHEDULE OF QUANTITIES FOR PART-I AMC BEYOND DLP

S. No.	Description	Unit	Country of Origin	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Annual maintenance beyond DLP for 3 years with the same scope as mentioned for maintenance in DLP period for systems and equipments covered in the contract as per APPENDIX-B1.	LS		1				
	Total Amount for Part-I							

SCHEDULE OF QUANTITIES FOR PART-J SUPPLY OF SPARES

S.No.	Description	Unit	Country of Origin	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Spares Supply of spares as per the spares provision in Appendix -C1 of PREAMBLE.	LS		1				
	TOTA AMOUNT FOR PART-J							

<u>SCHEDULE OF QUANTITIES FOR PART-K TRAINING AND TRAINING MANUALS</u>								
S.No.	Description	Unit	Country of Origin	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	TRAINING, TRAINING MANUALS & WORKING Providing training and training manuals as per scope and specifications given in the contract Including all necessary expenses and training materials and working models of following:	LS		1				
a)	Air Circuit working Model							
b)	Water Circuit Working Model							
c)	TVS system working Model (Training Simulator) for Practicing Smoke Extraction and Evacuation by Staff at regular intervals							
	TOTAL AMOUNT FOR PART K							

SCHEDULE OF QUANTITIES FOR PART-L OPERATION & MAINTENANCE MANUALS

S.No.	Description	Unit	Country of Origin	Total Quantity	Rate in INR	Rate in Foreign Currency	Amount in INR	Amount in Foreign Currency
1	Operation and Maintenance Manuals	LS		1				
	Providing Operation & Maintenance, interactive manuals as per scope and specifications given in the contract							
	TOTAL AMOUNT FOR PART-L							

3 Years AMC (Post DLP)

S. No.	Description	Annexure
1	Brief Scope of Work	I
2	Services by JMRC	II
3	Price Schedule	III
4	Manpower Deployment	IV
5	AMC Spares	V
6	AMC Consumables	VI
7	Tools and Test Equipment	VII
8	Maintenance Schedule	VIII

Note:-

- 1 All responsibility of maintaining equipment/system is that of contractor.
- 2 The contractor shall deposit all the spares to JMRC, which will be issued as and when required. The attached list of Spares, Consumable is based on experience of JMRC, this list need to be updated as per the actual selection of the equipment/ System. This will be
- 3 responsibility of the contractor to ensure that all the required spares, consumables are available every time. No financial implication in this regard shall be acceptable.
- 3 Rs. 10,000 penalty /24 hours if major equipment is out of order for > 24 hours.
- 4 **The Price Quoted for AMC is Part of Evaluation, JMRC reserves the right to award.**

ANNEXURE- I

Brief Scope of Work FOR AMC Works

System	ECS and TVS system and all related Electrical & BMS works and TVS SCADA works pertaining to the contract scope of work
Duration	3 Years after DLP.
Location	As per the scope of the contract LOT

S. No.	Description
1	Providing routine maintenance & breakdown services, to attend complaints as and when they occur in the system and annual maintenance comprehensive but not limited to
a	To carry out Preventive maintenance as per schedule.
b	Providing all man power, labour, tools and tackles and replacement of defective spare parts including consumables.
c	The rates quoted for the AMC services shall also include all taxes (Including service tax) and duties as applicable and cost of transportation of freight, insurances etc.
d	To maintain proper inventory of spares & consumables at site.
e	To maintain record of defects attended with the consumption of spares & consumables.
2	<i>The scope of work does not include :</i> Deterioration of parts due to general wear & tear. Replacement of any equipment or its body as a whole.

Annexure - II
Services by JMRC during AMC

S. No.	Description
1	Arranging & providing work permits, power blocks etc. if any needed for restricted zones.
2	Provision of Photo Gate Passes to Contractor's staff.
3	Any type of work pertaining to civil, carpentry, painting, false ceiling, house keeping, safety, watch & ward, insurance etc.
4	Provision of system access for components located above false ceiling, in restricted area etc.
5	Provision of lockable space inside station for contractor's service staff & storage space for spares, consumables & equipment.
6	Any alteration, addition in the built up system.
7	operation of the system

JMRC

Annexure - III
Price Schedule for AMC

S. No.	Description	Reference	Amount	Remarks
1	Man Power Deployment	As per Annexure IV		
2	AMC Spares	As per Annexure V		
3	AMC Consumables	As per Annexure VI		
		Total		

Annexure - IV

Manpower Deployment (Minimum requirement, need to be updated if required without any extra financial implication)

S. No.	Description	Experience	Nos.	Unit Charges	Amount	Remarks
1	VAC Engineer	5 Years (Min.)	1			
2	Electrical Engineer	5 Years (Min.)	1			
3	AC Technicians	3 Years (Min.)	3			
4	Electrician	3 Years (Min.)	1			
5	TVS Engineer	3 Years (Min.)	1			
6	TVS Technician	3 Years (Min.)	2			
7	SCADA Engineer	3 Years (Min.)	1			
8	BMS engineer	3 Years (Min.)	2			
				Total		

Recommended Spares required for 3 Years of AMC

S. No.	Description	Spare Part Description	Country of Oriain	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
1	Centrifugal/ Screw	Transducer Cond. Oil & Discharge		No.	2				
		Transducer Evap		No.	2				
		Valve Relief (Centrifugal)		No.	1				
		Valve Relief (Screw)		No.	1				
		Actuator Motor		No.	1				
		Sensor Temp. Evaporator		No.	1				
		Strainer Suction		No.	1				
		Ring Kit		No.	3				
		Ref. Sensor Level		No.	1				
		Heater Immersion		No.	1				
		Filter Oil Assy		No.	1				
		Refrigerant Filter		No.	1				
		Refrigerant Pressure Sensor		No.	2				
		Valve Solenoid (Centrifugal)		No.	1				
		Valve Solenoid (Screw)		No.	1				
		H.P. Cutout (Centrifugal)		No.	3				
		H.P. Cutout (Screw)		No.	3				
		Sensor Temp. Discharge		No.	3				
		Valve Assy Capacity Control		No.	1				
		Flow Switch		No.	2				
		Sensor. Drop leg		No.	1				
		Sensor. Water Temp.		No.	3				
		Transformer		No.	3				
		Coolant Pump		No.	1				
		MCB/ Breaker		No.	1				
		Orifice Valve		No.	1				
		Eductor		No.	1				
		SCR Assembly		No.	1				
		Kit Optiview		No.	1				
		Trigger Board		No.	1				
		Relay Board		No.	1				
		Power Supply Board		No.	1				
		Micro Gateway		No.	1				
		Kit Display		No.	1				

S. No.	Description	Spare Part Description	Country of Origin	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
		Key Pad		No.	1				
		Angle Valve		No.	3				
		Bram		No.	1				
		Eprom		No.	1				
2	Air Cooled Chiller	Expansion Valve		No.	1				
		Filter Drier		No.	1				
		Indicator Moist		No.	1				
		Temperature Sensor		No.	1				
		Low Pressure Sensor		No.	1				
		High Pressure Sensor		No.	1				
		Transformer		No.	3				
		Single phase Preventer Relay		No.	1				
					0				
3	Primary Chilled Water Pump	Wear Ring		Sets	1				For each type
		Shaft Sleeve		Sets	1				For each type
		Mechanical Seal		Sets	1				For each type
		Impeller Keys		Sets	1				For each type
		Pump Bearings		Sets	1				For each type
		O Rings		Sets	1				For each type
		Gaskets		Sets	1				For each type
		Oil Seal		Sets	1				For each type
		Coupling		Sets	1				For each type
		Motor Bearing		Sets	1				For each type
4	Secondry Chilled Water Pump	Wear Ring		Sets	1				For each type
		Shaft Sleeve		Sets	1				For each type
		Mechanical Seal		Sets	1				For each type
		Impeller Keys		Sets	1				For each type
		Pump Bearings		Sets	1				For each type
		O Rings		Sets	1				For each type
		Gaskets		Sets	1				For each type
		Oil Seal		Sets	1				For each type
		Coupling		Sets	1				For each type
		Motor Bearing		Sets	1				For each type

S. No.	Description	Spare Part Description	Country of Origin	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
		Rotating Elementary Set		Sets	1				For each type
		Differential pressure Sensor		No.	1				For each type
		VFD Drive		No.	1				For each type
		VFD Controller		No.	1				For each type
5	Condenser Water P	Wear Ring		Sets	1				For each type
		Shaft Sleeve		Sets	1				For each type
		Mechanical Seal		Sets	1				For each type
		Impeller Keys		Sets	1				For each type
		Pump Bearings		Sets	1				For each type
		O Rings		Sets	1				For each type
		Gaskets		Sets	1				For each type
		Oil Seal		Sets	1				For each type
		Coupling		Sets	1				For each type
		Motor Bearing		Sets	1				For each type
6	Cooling Tower	Gear Box		Sets	1				(6202M and 6302M) Separate for each
		Fan Assembly		Sets	1				For each type
		Drive Shaft		Nos.	1				For each type
		PP Nozzles		Nos.	15				
		Motor Bearing		Sets	2				
		Float Valve Assembly		Nos.	5				
		Pinion shaft Oil Seal, O ring Seal for series 20T gear reducer assembly ratio		Nos.	2				For each type
		Shim Set for Motor		Nos.	2				For each type
		Shim Set for Gear Reducer		Nos.	2				For each type
		NBM Inserts with hardware for series 6Q drive shaft assembly		Sets	1				1 Set comprising of 8 Nos NBM inserts
		Fill Material		Sets	1				For One Cooling Tower
7	Air Handling Units	Fan Bearing		Sets	1				For each type
		Motor Bearing		Sets	1				For each type
		Door Limit switch		Set	5				
		Door Handle		Set	5				
		Spring Isolators		Set	2				
		Filter Knob		Nos.	5				

S. No.	Description	Spare Part Description	Country of Origin	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
		UV Emitter Tubes		Nos.	5				For each type
8	Fan Coil Units (3 M	Motor		Nos.	1				For each type
		Room Thermostat		Nos.	3				
		Fan Blower		Nos.	3				2 For each model
		Filter Knob		Nos.	5				
		Capacitor		Nos.	3				2 For each model
9	Axial Flow Fans	Motor Bearings		Set for each model	1				For Each type
		Spring Isolators		Set for each model	3				For Each type
10	Propeller Fans	Motor Bearings		Set for each model	1				For Each type
11	Electrical MCC	Trip Coil		Set	3				For Each type
		Closing Coil		Set	3				For Each type
		Auxillary Contactor		Nos.	3				For Each type
		Selector Switch		Nos.	3				For Each type
		Timer		Nos.	3				For Each type
		Relay		Nos.	3				For Each type
		Digital Ammeters		Nos.	3				For Each type
		Digital Voltmeters		Nos.	3				For Each type
		Energy Meters		Nos.	3				For Each type
		Current Transformer		Nos.	3				For Each type
		ATS		Nos.	3				For Each type
		Emergency Stop P.B.		Nos.	5				
		MCB		Nos.	3				
		RCCB		Nos.	3				
		Space Heater		Nos.	3				
		Humidistat		Nos.	3				
		CFL with door switch		Nos.	3				
		Control Terminal		Nos.	15				
12	Fusible Link fire Da	Fusible Link (UL stamped)		Nos.	15				
13	Motorized fire Dam	Motor Actuator with limit switch		Nos.	5				of supplied make
		Thermal Casing		Nos.	3				

S. No.	Description	Spare Part Description	Country of Origin	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
14	Motor Operated Da	Motor Actuator with limit switch		Nos.	5				
15	Pressure Guage	Pressure Guage		Nos.	5				
16	Temperature Guag	Temperature Guage		Nos.	5				
17	Air Vent	Automatic Air Vent		Nos.	5				
18	Two Way Valves	Two Way Valve Actuators		Nos.	3				For Each type
18	Water Treatment S	Pulser with Varister		Nos.	1				
		Fuse		Nos.	3				
		Stroke Knob		Nos.	1				
		Oil Seal Liquiframe shaft		Nos.	1				
		Diaphragm 0.5		Nos.	1				
		Ring Seal		Nos.	1				
		Spring A/S valve		Nos.	1				
		Antisyphon Valve		Nos.	1				
		Sensors		Nos.	3				
		Controllers		Nos.	3				
12	BMS	Duct type Temperature Sensor		Set	3				
		Duct type RH Sensor		Set	3				
		Current Transducer		Set	3				
		Voltage Transducer		Nos	3				
		DP Switch air		Nos	3				
		Ambient Temperature and RH sensor		Set	3				
		DP Switch for water		Nos	3				
		CPU		Nos	1				
		I/O Module (AI, AO, DI & DO0		Nos	3				One for each type per station
13	Miscellaneous								
		Filters for FAF, VSF etc.		Nos.	5				
		Gate Valve - 25mm dia		Nos.	3				
		Ball Valve with strainer		Set	3				
		Ball Valve without strainer		Set	3				

S. No.	Description	Spare Part Description	Country of Origin	Unit	Quantity	Part No.	Drg. No.	Shelf Life	Remarks
		Strainer Basket		Nos.	3				For Each type
		Ball Valve for Pressure Gauge		Nos.	5				
		Cable Glands		Nos.	1				For Each Type
		25 x 3 Copper Strip		Meter	19				
		8 SWG Copper Wire		Meter	19				

Recommended Consumables for 3 Years of AMC. This list is to be updated as per the proportionate basis for more or less number of stations.

[illegible]

[illegible]

Recommended Tools and Testing Equipment required during 2 Years of DLP

S. No.	Description	Tools and Testing Equipment Description	Country of Origin	Qty (Nos.)	Make	Range	Remarks
1	Tools	Drille Machine		1			
		Tool Kit containing the following		2			The tool kit shall be of reputed make with ISI marking.
		Plier Set					
		Screw Driver Set					
		Spanner Kit					
		Crow Plier					
		Tester					
		Allenkey Set					
		Torque Wrench					
		Aluminium Ladder (3 meter High)		2			
		Aluminium Ladder (5 meter High)		2			
		Gauge Manifold		2			
2	Testing Equipment	Vibration Meter		2			
		Noise Level Meter		2			
		Anemometer		2			
		Tachometer		2			
		Megger		2			
		Tong Tester		2			
		Pitot Tube		2			
		Air Flow Manometer		2			
		Dry and Wet Buld Thermometer		2			
		Digital Multi Meter		2			

JMRC			Annexure-VIII				
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUARTERLY	HALF YEAR	YEARLY
GENERAL							
1	Keep service zones clean,well lit & ventilated.	X					
2	Check for abnormal noise and vibration.	X					
3	Visual check for any leaks and damages.		X				
4	Check for any visual damage.		X				
WATER COOLED CHILLER							
1	Check oil & refrigerant level in running condition.	X					
2	Check 3 phase voltage, current balance and earthing.	X					
3	Check the heat sink temperature	X					
4	Check for any abnormal noise	X					
5	Check delta t($T_{COND.WTR.OUT.}-T_{liquid\ ref.}$)for condenser fouling.		X				
6	Verify proper water treatment		X				
7	Check oil return system operation.		X				
8	Inspection of starters.		X				
9	Check oil heater operation			X			
10	Refrigerant leak check.			X			
11	Check oil pump discharge pressure			X			
12	Clean all sensors.			X			
13	Measure oil filter pressure drop.			X			
14	Measure and log the sub cooling and super heat.			X			
15	Verify proper operation/setting/calibration of safety controls.				X		
16	Check and tighten all ealectrical connections.				X		
17	Clean all water strainers in both chilled and condenser water line.				X		
18	Check all piping components for leakage or damage.					X	
19	Cheak for proper sealing of relief valve.					X	
20	Clean and repaint any area that shows sign of corrossion.					X	
21	Replace oil filter & oil return filter/driers, if required.						X
22	Clean or back flush heat exchanger of SS starter.						X
23	Replace coolant after cleaning heat exchanger.						X
24	Perform descaling of condensers.						X
25	Check all safety switches & alarms for proper operation.						
	This shall include,but not limited to:-						
25a	High pressure cut off.						X
25b	Low pressure cut off.						X
25c	Low oil prssure switch.						X
25d	Oil pump timers.						X
25e	Flow switches						X
25f	Pump interlocks						X
25g	System monitor timers						X
25h	System freeze stats						X
25i	Vane closing switches						X
26	Check operation of all operating controls:-						X
26a	Temperature control ststs						X
26b	Motor load limit controls						X
27	Megger motor winding						X
28	Compressor oil analysis.						X
AIR COOLED CHILLER							
1	Check 3 phase voltage, current balance and earthing.	X					
2	Check for any abnormal noise	X					
3	Cleaning condenser coil.		X				

JMRC		Annexure-VIII					
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUARTERLY	HALF YEAR	YEARLY
4	Inspection of starters.		X				
5	Check oil heater operation			X			
6	Refrigerant Leak check.			X			
7	Verify proper operation/setting/calibration of safety controls.				X		
8	Check and tighten all electrical connections.				X		
9	Clean all water strainers.				X		
10	Check all piping components for leakage or damage.					X	
11	Check oil filter /driers,replace if required.						X
12	Check all safety switches & alarms for proper operation.						
	This shall include,but not limited to:-						
12a	High pressure cut off.						X
12b	Low pressure cut off.						X
12c	Low oil pressure switch.						X
12d	Flow switches						X
12e	Pump interlocks						X
12f	System monitor timers						X
12g	System freeze stats						X
13	Check operation of all operating controls:-						
13a	Temperature control stats						X
13b	Megger motor winding						X
	PUMP(Primary Pump)						
1	Check for 3-phase voltage,current balance, and earthing.	X					
2	Check the motor rotation with directional arrow on pump casing	X					
3	Check for any abnormal noise and vibration.	X					
4	Hand test bearing housing for high temperature			X			
5	Check shaft sealing.A small leak is normal			X			
6	Check seals,bearings for lubrication,replace if required.				X		
7	Check shaft/shaft sleeve for scoring				X		
8	Check alignment for pump & motor					X	
9	Check tightness of base frame bolts					X	
10	Check coupling for wear					X	
11	Check for EPB(Emergency Push Button)					X	
12	Check rotating element for wear						X
13	Check wear ring clearance						X
	PUMP(Secondary Pump)						
1	Check for 3-phase voltage,current balance, and earthing.	X					
2	Check the motor rotation with directional arrow on pump casing	X					
3	Check for any abnormal noise and vibration.	X					
4	Check the cable of VFD for heating up		X				
5	Check for any leakage in valves strainers and flexible connection.		X				
6	Hand test bearing housing for high temperature			X			
7	Check shaft sealing.A small leak is normal			X			
8	Cleaning of pump, strainers and motors.				X		
9	Check and tighten all electrical connection.				X		
10	Check seals,bearings for lubrication,replace if required.				X		
11	Check shaft/shaft sleeve for scoring				X		
12	Check alignment for pump & motor					X	
13	Check tightness of base frame bolts					X	
14	Check coupling for wear					X	
15	Check for EPB(Emergency Push Button)					X	

JMRC		Annexure-VIII					
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUARTERLY	HALF YEAR	YEARLY
16	Check rotating element for wear						X
17	Check wear ring clearance						X
	PUMP(Condenser Pump)						
1	Check for 3-phase voltage,current balance, and earthng.	X					
2	Check the motor rotation with directional arrow on pump casing	X					
3	Check for any abnormal noise and vibraton.	X					
4	Hand test bearing housing for high temperature			X			
5	Check shaft sealing.A small leak is normal			X			
6	Check seals,bearings for lubrication,replace if required.				X		
7	Check shaft/shaft sleeve for scoring				X		
8	Check alignment for pump & motor					X	
9	Check tightness of base frame bolts					X	
10	Check coupling for wear					X	
11	Check for EPB(Emergency Push Button)					X	
12	Check rotating element for wear						X
13	Check wear ring clearance.						X
	PUMP(Air Cooled Pump)						
1	Check for 3-phase voltage,current balance, and earthng.	X					
2	Check the motor rotation with directional arrow on pump casing	X					
3	Check for any abnormal noise and vibraton.	X					
4	Hand test bearing housing for high temperature			X			
5	Check seals,bearings for lubrication,replace if required.				X		
6	Check shaft sealing.A small leak is normal			X			
7	Check shaft/shaft sleeve for scoring.				X		
8	Check tightness of base frame bolts.					X	
9	Check rotating element for wear.						X
10	Check wear ring clearance						X
	COOLING TOWER						
1	Check water level and leakage in basin.	X					
2	Check the air intake is free from blockage.	X					
3	Check for any abnormal noise and vibraton.	X					
4	Check for 3-phase voltage,current balance, and earthng.	X					
5	Check the operating level & oil leakage in gear box		X				
6	Inspect basin for clogging.		X				
7	Inspect Eliminator & Fills for clogging.			X			
8	Check static oil level in gear box and oil seal in gear reducer.			X			
9	Check sludge in gear box.			X			
10	Check basin & float valve for leakage.			X			
11	Check for unusual noise and vibration in fan,fan guard motor,driver shaft and gear reducer.			X			
12	Check motor winding for over heating.			X			
13	Cleaning of cooling tower from inside and outside.			X			
14	Suction screen cleaning.				X		
15	Check and top up oil in gear box.				X		
16	Check and record insulation resistance.				X		
17	Check operation of MBV.				X		
18	Check connection of cooing tower motor and MBV.				X		
19	Check operation of auto bleed offvalve and its electrical connections.				X		
20	Inspect keys, keyways & set screws.					X	

JMRC		Annexure-VIII					
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUARTERLY	HALF YEAR	YEARLY
21	Check gear box vents are open.					X	
22	Check fan blade tip clearance.					X	
23	Check for EPB(Emergency Push Button).					X	
24	Check FRP & structure bolted connection.					X	
25	Check rotating element for wear.						X
26	Check grease, clean & relubricate bearings of motor and MBVs.						X
27	Tighten loose bolts of FRP,gearbox,structure bolt connection & motor						X
28	Check and change nozzles, fill if required,						X
	AIR HANDLING UNITS						
1	Check for any abnormal noise and vibraton.	X					
2	Check for 3-phase voltage,current balance, and earthng.	X					
3	Check for damage esp. to coil & filter		X				
4	Check for air & water leak		X				
5	Check condensate drain pan for any blockage,clean if required.		X				
6	Clean air filters.		X				
7	Check for UV emitter tubes for termination and clealiness			X			
8	Check fan belts for correct tension & signs of wear & alignment of fan and motor.			X			
9	Inspect coils and remove any built dust or dirt.			X			
10	Check functioning of marine lights & limit switch interlock.			X			
11	Check for bearing of motor and blower.			X			
12	Check of tightness lock of vee belt pulley.			X			
13	Check looseness of any bolt in fan casing motor base etc.			X			
14	Check associated damper movement and apply grease for bearings			X			
15	Check for vibration in blowers and motors.			X			
16	Check access door and hinges for easy operation.			X			
17	Check tightness of electrical connections.				X		
18	Check flexible connections,spool piece for leakage.				X		
19	Top up grease for blower and motor bearings,if required.				X		
20	Chek for condition of inlet strainers and clean.				X		
21	Check blower shaft,scroll,impeller & bearing.					X	
22	Check for EPB(Emergency Push Button).					X	
23	Check /clean cooling coils and fins.						X
24	Clean interiors and check for corrosion and check tightness of all sections.						X
25	Check anti vibration mounting.						X
26	Check alignment and security of driver pulleys.						X
27	Check insulation resistance (megger) of motor.						X
	VENTILATION FANS						
1	Check for any abnormal noise ,vibratons and any damage.	X					
2	Check for 3-phase voltage,current balance, and earthng.	X					
3	Clean air filters.		X				
4	Examine motor,fan & ancillary fittings(flexible connections and cone)			X			
5	Check looseness of any bolt in fan casing motor base etc.			X			
6	Check associated damper movement and apply grease for bearings			X			
7	Examine impeller for dirt build up &for any physical damage					X	
8	Check and record the vibration value and compare with recommended values.					X	
9	Check tightness of electrical connections						X
10	Examine the clearance between the fan impeller blade tips & casing						X

JMRC				Annexure-VIII			
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUATERLY	HALF YEAR	YEARLY
10	& security of impeller blades						X
11	Check insulation resistance (megger) of motor.						X
12	Check tightness of fan to support fixing						X
13	Check movement of vibration isolators/mounting,replace if required						X
14	Grease motor bearings,if required						X
15	Check for EPB(Emergency Push Button)						X
	FAN COIL UNIT						
1	Check for any abnormal noise and vibraton.	X					
2	Check the water leakage.		X				
3	Clean air filters.		X				
4	Check drain pan/point for any blockage.		X				
5	Clean air filters.			X			
6	Check looseness of any bolt in fan casing motor base etc.			X			
7	Check associated damper movement and apply grease for bearings			X			
8	Check condition for access door			X			
9	Check operation of 3 speed switch.			X			
10	Check the operation of inlet / outlet isolation valves.			X			
11	Inspect cooling coils and remove any built up dust or dirt.				X		
12	Clean Y- strainer(For FCU)				X		
13	Check blower,motor unit etc.,clean & lubricate.(For FCU)					X	
14	Check and record the vibration value and compare with recommended values.					X	
15	Check tightness of electrical connections					X	
16	Check FCU 2 way valves for proper functioning.						X
17	Check insulation resistance (megger) of motor.						X
18	Check /clean cooling coils and fins.						X
	DUCT SYSTEM						
1	Check for any abnormal noise	X					
2	Check for air leakage.		X				
3	Check condition of terminations to damper motors/controls.						X
4	Clean lubricate if needed,damper pivots & linkage.						X
5	General check for loose suspenders/supports etc.						X
6	Check the condition of insulation,repair if needed.						X
	PIPING SYSTEM						
1	Visual check for water leaks in pipe,fittings & valves.	X					
2	Check valves position before operating the system.	X					
3	Check drain points/floor traps for blockage.		X				
4	Test quality of water.		X				
5	Check for any damage to water handling components.			X			
6	Check pressure gauges & thermometers for correct functions.			X			
7	Check & clean Y-strainers.				X		
8	Conduct manual test for 3 way valves for full operating range.						X
9	Check isolating valves through full travel for operation.						X
10	Lubricate valve spindles for smooth operation.						X
11	General check for loose brackets,supports etc.						X
12	Check the condition of insulation,repair if needed.						X
	MCC						
1	Check the incoming voltage in 3 phases.	X					

JMRC		Annexure-VIII					
The following AMC schedule is to be followed & is to be aligned during AMC if considered necessary							
ITEM	DESCRIPTION	DAILY	WEEKLY	MONTHLY	QUARTERLY	HALF YEAR	YEARLY
2	Check humming or chattering noise.	X					
3	Check relay status.	X					
4	Check control supply.	X					
5	Check for foul or burning smell.	X					
6	Check for tripping,reset after setting right the fault.	X					
7	Check indicating lamps,replace if damaged.		X				
8	Check measuring instruments,replace if damaged.		X				
9	Check selector switch-A/M.		X				
10	Clean MCC from outside.			X			
11	Clean MCC from inside.						X
12	Check breaker & switch for proper operation.						X
13	Check the contactor contacts for pitting,replace if needed.						X
14	Check & tighten nut,bolts of bus bar,solid links etc.						X
15	Check & tighten terminations etc.						X
16	Look for signs of discoloration due to overheating.						X
17	Carry out lubrication of switchgears as required.						X
	WATER TREATMENT						
1	Visual check for waterleaks in pipe,fittings & valves.	X					
2	Test quality of water.	X					
3	Check proper functioning of chemical pump.		X				
4	Check for choking of antisiphon valve.			X			
5	Check & clean the chemical dosing tank.			X			
6	Check & clean the cooling tower.				X		
	BMS						
1	Check humming or chattering noise.	X					
2	Check for foul or burning smell.	X					
3	Check the status of PLC ,CPU and modules	X					
4	Check the healthy status of n/w switches	X					
5	Check the incoming voltage in the panel.		X				
6	Check indicating lamps,replace if damaged.		X				
7	Check selector switch-A/M.		X				
8	Clean PLC panels outside.			X			
9	Check the functioning of sensors/transmitters			X			
10	Clean PLC panels inside.						X
11	Check & tighten nut,bolts etc.						X
12	Check & tighten terminations etc.						X
13	Look for signs of discoloration due to overheating.						X

Appendix- C 1
Spare Provision for JMRC

1.1 General

1.1.1 The Contractor shall supply the following spares:-

I. Consumable Spares

- (i) The '**consumable spares**' shall include items such as lubricants, oils, greases, sealants, filter Medias, gaskets, lamps and wearable parts etc. whose declared life is less than one year. This will not include the consumables like Diesel Salt etc. required for operation of the equipment.
- (ii) The Tenderer shall quote for the minimum list of consumable spares required during DLP as attached at Annexure-1 for maintenance and repairs of equipment in technical package. Any consumable item if required but not included in the above list will be deemed to have been included and shall be supplied as per the provisions of this contract without any extra financial implication to the Employer. Contractor will be required to supply the requisite quantity of spares, as required irrespective of the quantities indicated by the contractor in the recommended list. Employer's decision in determining any particular item(s) as consumable in line with above guideline will be final and binding. In case any changes are required in the supply of consumables on account of changes at design stage, the contractor shall have to supply the required consumables also.
- (iii) List of consumable spares furnished in the technical package shall be updated during the execution of Contract and following information as minimum shall be provided.
 - (a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;
 - (b) Procuring Specification
 - (c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly which can be broken down into component parts;
 - (d) Quantity installed in the system;
 - (e) Expected consumption rates;
 - (f) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;
 - (g) Inter-changeability or otherwise with similar parts;
 - (h) Normal manufacturing and shipment lead times; and
 - (i) Shelf life.
- (iv) The consumable spares shall be stored at the location agreed to by the Engineer.
- (v) It shall be the responsibility of the contractor to maintain sufficient stock of consumable spares till the end of DLP. These spares will be utilized by the Contractor during the maintenance etc. and its consumption to

be countersigned with Operation & Maintenance of JMRC and the old replaced parts shall be destroyed in the presence of JMRC representative. Unused spares, if any, by the end of DLP shall be handed over to JMRC and it will become property of employer.

- (vi) Recommended list shall be furnished by the contractor as part of design submission / vendor approval for respective systems and subsystems. (The price of these spares will be part of tender evaluation while assessing the L-1 bidders).

II. Unit Exchange Spares

The Contractor shall supply the Unit Exchange Spares as listed in the Annexure-2 of this Chapter on Employer's Requirements. The Unit Exchange Spares shall be supplied in the Store nominated by the Engineer. The delivery requirements of different lots are mentioned in the Annexure-2. These shall be delivered before ROD. Any delay in this regard will make the Contractor liable for liquidated damages as per tender conditions. This will be part of tender evaluation while assessing the L-1 bidder.

III. Commissioning And DLP Spares

- (i) The Contractor shall submit to the Engineer for review a list of minimum spare parts that that he intends to make available during the installation, erection, commissioning and defect liability periods. The minimum list of DLP spares is enclosed as Annexure 1.
- (ii) The Contractor shall keep on Site, at his own cost, throughout the installation, erection, commissioning and defect liability periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the Specification.
- (iii) The Contractor shall generally not be entitled to use any of the Employer's spare parts during the installation, erection and commissioning periods or during the Defects Liability Period.
- (iv) Contractor shall not be permitted to remove any working/healthy equipment / components / sub-systems / systems for any reason whatsoever without specific approval in writing from JMRC's Engineer or Engineer's authorised representative.
- (v) Spares as per the agreed list shall be supplied at least three months before ROD. Stocks of such spares as available in Contractor stores will be jointly checked with Engineer every three months. Certificate by Engineer confirming availability of the spares in contractor stores / in Depots as per agreed list will be a pre-requisite for release of interim payments of the Contractor. However, this condition will not be applicable for six months before the expected expiry of the DLP period.
- (vi) The Contractor shall include the price of this item in cost of DLP in their Financial bid. This will be part of tender evaluation while assessing the L-1 bidder.

IV. Mandatory spares

- (i) The Contractor shall supply the Mandatory Spares as listed in the Annexure-3 of this Chapter of Employer's Requirements. The Spares

shall be supplied at the location nominated by the Engineer. The price of these spares shall be quoted at actual and will also be part of the evaluation for assessing L-1 bidder.

- (ii) No change in quoted price of any spare will be allowed even when there is change in design of any equipment/sub-system during the execution of the contract.
- (iii) Contractor will furnish complete details during contract execution (detailed design stage) as noted below for the listed spares;
 - (a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;
 - (b) Procuring Specification
 - (c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly, which can be broken down into component parts;
 - (d) Quantity installed in the system;
 - (e) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;
 - (f) Designed and shelf life;
 - (g) Interchangeability or otherwise with similar parts;
 - (h) Normal manufacturing and shipment lead times;
 - (i) Purchase Technical Specification with relevant drawings.

The information as above shall also be given for all other components/equipments etc. which may have to be changed / replaced during maintenance as decided by the Engineer based on the proposed maintenance practices.

V. Recommended Spares

- (i) The Tenderer shall furnish priced list of the 'recommended spares' not covered under 'Unit Exchange Spares', 'consumables' and 'mandatory' spares but the Contractor expects them to be required during three years after expiry of defect liability period, along with the bid as per format enclosed in Annexure-4 of this Chapter of Employer's Requirements. The prices should be proportionate and reasonable. Employer may decide to procure any number of these spares at quoted / negotiated rates before the end of DLP. The Spares shall be supplied at a location nominated by the Engineer.
- (ii) Contractor shall supply all the spares recommended by equipment/sub-system manufacturers within the quoted cost for recommended spares. Contractor shall update list of spares recommended by equipment/sub-system manufacturers at design submission stage.
- (iii) This will not be part of tender evaluation while assessing the L-1 bidder.

VI. 10 years spares beyond DLP (Purchase of spares from Vendors)

- (i) The Contractor shall ensure availability of spare parts for a period of ten years from the last date of taking over of whole of Works. The Tenderer shall furnish an unpriced list of spares for maintenance and repair for a period of ten years from the date of taking over in the

Technical Package in Annexure-5. The spares shall be in kit form/ items. The Tenderer shall also quote unit prices for the kit / items, spare item with escalation clause in the Financial Package. The Employer at his discretion, during a period of ten years from the date of taking over of the whole works, purchase as many kits / items of spare parts as required by him, at the rates indicated in this schedule.

- (ii) If during the period of ten years, the manufacturer / vendor intends to discontinue the manufacture of spare or replacement parts, the manufacturer / Contractor shall immediately give notice to the Employer of such intention. The Employer shall be given the opportunity of ordering at contracted prices such quantities of such spare or replacement parts as the Employer shall reasonably require in relation to the anticipated life of the equipment.
- (iii) In the event of Vendor / manufacturer / Contractor failing to supply the spare parts in accordance with this Clause, he shall in respect of each item of spare, furnish free of cost to the Employer, the drawings, specifications, patterns and other information to enable the Employer to make or have made such spare parts. The Employer shall be entitled to retain the aforesaid drawings etc., for such time only as is necessary for the exercise by the Employer of his rights under this clause and the drawings, if the Manufacturer / Contractor so requires, shall be returned by the Employer to the Contractor in good order and condition (fair wear and tear excepted). Also in the event of vendor / manufacturer / contractor failing to supply the spare parts in accordance with this clause are liable to be blacklisted.
- (iv) Under such circumstances, the Contractor shall also grant to the Employer, without payment of any royalty or charge, full right and liberty to make or have made spare or replacement parts as aforesaid and for such purposes only to use, make and have made copies of all drawings, patterns, specifications and other information supplied by the Contractor to the Employer pursuant to the Contract.
- (v) The Contractor will, so far as he is reasonably able to bind his sub-contractors / vendors to conform with the requirements of this Clause and shall, prior to entry into any sub-contracts, provide the Employer with full details of any sub-contractor / vendor who will not so conform in which event the Employer may direct the Contractor to seek an alternative sub-contractor/vendor.
- (vi) If the Contractor fails to provide spare or replacement parts as described in this Sub-clause and these are available from the Contractor's sub-contractor, the Employer shall have the right to obtain such spare and replacement parts from the sub-contractor or any other supplier. (and any additional cost incurred by the Employer shall be recoverable from the Contractor)
- (vii) In case the Contractor is unable to supply spares in accordance with Clause above, he shall furnish procuring specification, free of cost to the Employer, the drawings, specifications, and other technical details, to enable the Employer to manufacture parts, or have them manufactured. Such drawings and technical data shall be provided free of any charge or royalty, on the understanding that the Employer will use such data and drawings, only for the manufacture of parts for his own use.

- (viii) The foregoing shall hold equally good for the Contractor, any or all of his sub-contractors, and vendors.
- (ix) In the event that technological progress results in improved versions of spares and replacement parts, the latest version shall have the same plug compatibility, and spatial needs of its predecessor, to avoid modifications being required, to accept the up-graded version of the part.

1.2 Manufacture, Delivery and Warranty

- (i) The major spare parts ordered under the Contract shall be manufactured, tested and inspected in accordance with the relevant quality system, suitably packed and labelled. All spares shall be subject to inspection by the Engineer. In the event that any item is known to be going out of production, then the Contractor shall give advance notice to the Engineer.
- (ii) The warranty period of 'unit exchange' and 'mandatory spares', delivered shall be:
 - (a) Either 24 months from the date of acceptance or
 - (b) Upto expiry of the defect liability period, whichever is later.

1.3 Purchase of Spares from Vendors

- (i) The Contractor shall furnish an undertaking that he has no objection whatsoever to and shall not in any way deter or obstruct the Employer, its licensee or its representative from dealing directly with the Contractor's Vendors for the purchase of the spares during the Contract period. The spares purchased shall be subject to inspection by the Engineer.
- (ii) Contractor shall obtain an undertaking from vendors, OEMs etc. at detailed design submission stage that they will deal directly with Employer for supply of spares, equipments and/or sub-systems.

1.4 The relevant list of the spares mentioned above shall be submitted in the technical bids after blanking the prices, where applicable. The financial bid shall have the price details.

1.5 Contractor shall submit technical specifications of the items used in this project for the purpose of purchasing. Engineer's views, if any, shall be suitably incorporated.

JMRC Annexure-1					
Minimum List of Consumable & DLP spare					
S. No	Item Description	Unit	Recommendation for 2 stations		Country of Origin
	Electrical				
1	Indicating Lames (RED)	Nos	8		
2	Indicating Lamps (GREEN)	Nos	8		
3	Indicating lamps (AMBER)	Nos	8		
4	Indicating Lamps (WHITE)	Nos	8		
5	Ememency STOP Push Button	Nos	3		
6	GREEN START Push Button	Nos	3		
7	BLACK TEST Push Button	Nos	3		
8	ACB Trip Coil	Nos	2		
9	ACB closing Coil	Nos	2		
10	Auxiliary Contractor	Nos	3		
11	MCB 6A	Nos	2		
12	MCB 10A	Nos	2		
13	Control Terminals 1.5 Sqmm	Nos	28		
14	Control Terminals 2.5 Sqmm	Nos	28		
15	Digital Ammeter	Nos	2		
16	Digital Voltmeter	Nos	2		
17	Scace Heater	Nos	2		
18	Small rear connector	Nos	2		
19	Long rear connector	Nos	4		
20	Door Lock with Key	Nos	10		
21	Terminal Shield	Nos	2		
22	Door Handle	Nos	10		
23	Clip Resort	Nos	10		
24	Insulator Wire	Nos	10		
TVF					
1	Flexible connectionswith fixing clamp For TVF	No.	2		
2	Flexible connectionswith fixing clamp For TEF	No.	2		
3	limit Switch for TVDs	No.	2		
4	Vibration Sensor	No.	2		
Compressed Air System					
1	Air Filter	No.	16		
2	Oil Filter	No.	16		
3	Oil separator	No.	8		
4	Compressor Oil	Litre	48		
5	V-belt	Set	2		
6	Complete unloader valve kit assembly	set	2		

7	Non return valve	No.	2	
8	Pre-filter panel	No.	2	
9	Grease for fan	Kg	2	
ECS				
AHU				
1	UV Light	set	2	
2	U V Lamp	Nos	160	
3	V-belt	Nos	2set of each rating.	
4	Pressure Gauge and Thermometer	set	8 Set	
5	Bearing	set	2	
6	Door limit switch	set	1	
7	Door Handle	set	2	
8	Marine Lamp Bulb	Nos	5	
9	Filter	set	9	
10	Flexible Canvass Connection	Nos	2	
11	Chemical for coil Cleaning.	Lot	18	
12	Pulley	Set	1 set of each rating	
FCU				
1	Filter FCU	Nos	20	
2	Ball Valve with strainer	Nos	2	
3	Motor for FCU	Nos	2 set of each rating.	
4	Thermostat for FCU	Nos	2	
5	Door locking clip	Nos	3	
6	Bearing	Nos	2	
7	Pulley	Set	1 set of each rating	
8	Capacitor	Nos	2	
PUMP				
1	Bearing for Cond water Pump	Set	1	
2	Bearing for Chill. water Pump(P)	Set	1	
3	Bearing for Chill. water Pump(S)	Set	1	
4	Pressure Gauge and Thermometer	Set	4	
5	mechanical Seal	Set	2	
6	Pump Coupling	set	2	
Air Cooled Chiller				
1	MOV for aircooled chiller	Nos	1	
2	Flexible Bellows	Nos	2	

3	Chemical for condensor coil cleaning	Litre	2	
4	Pressure Gauge & Thermometer	Set	4 Set	
5	Compressor	Nos	1	
6	Flow Switch	Nos	1	
7	Refrigerant	Kg	48	
8	Filter Drier	Nos	1	
9	Solenoid Valve	Set	1 Set of each rating	
10	Heater element	Set	1 Set of each rating	
11	Strainer	Set	1 Set of each rating	
Water Cooled Chiller				
1	Pressure Gauge & Thermometer	set	4	
2	Flow Switch	No	1	
3	MOV	No.	1 Nos of each rating.	
4	Refrigerant	Kg	70	
5	Coolant	gallon	2	
6	Filter Drier	Nos	4	
7	Oil filter	Nos	4	
8	Fuse 5A	Nos	5	
9	Fuse2A	Nos	4	
10	Fuse Holder	Nos	2	
11	Compressor Oil(5 Gallon Pkg)	Nos	2	
12	Solenoid Valve	Set	1 Set of each rating	
13	Heater element	Set	1 Set of each rating	
14	Strainer	Set	1 Set of each rating	
	Condenser Descaling Chemicals (Condensor descaling is to be done Max. once a year depending upon Fouling)	Lots	2	
Cooling Tower				
1	MBV	Nos	1	

2	Level Sensor	Nos	2	
3	Float Valve	Nos	4	
4	Gate Valve	Nos	2	
5	Gear Oil	Ltr	96	
6	Fills	Set	10 (set)	
7	Nozzles	Nos	100(Nos)	
8	Fan Blades	Set	1	
Axial Flow Fan				
1	Flexible Convass Connection	Sets	20	
2	Grease	Kgs	40	
3	Lubricant Oil Can(500ml)	Nos	4	
4	Water Treatment Chemical for 1 year dosing	Lots	2	
5	Filter for VSF	Sets	1	
Damper				
1	Fusible link	Nos	12	
2	Actuators for MFD	Nos	4	
3	Actuator for MOD	Nos	4	
BMS SPARES				
DLP SPARE				
S.No	ECS System	Unit	Quantity	
1	Input 24 VDC POS/NEG Logic (4 Groups of 8) 32 points	Nos	1	
2	Output 12/24 VDC POS Logic 0.5A, 2 Groups of 16, 32 Points	Nos	1	
3	Analog Input 15 Bit Current 15 Channel	Nos	1	
4	Analog Output 13 Bit Current 8 Channel	Nos	1	
5	Remote I/O Ethernet Network Interface Unit	Nos	1	
6	Power Supply with Expeded 3.3 VDC 24 VDC Input	Nos	1	
7	Relay Board 16 Channel with 2C/O Omron G2R2 Relays 24 VDC Coil and Contact rating 223 VAC/24 VDC 5A	Nos	1	
8	PS/1AC/24DC/20 Power Supply- Input AC : 85-264, Output : 24V DC, 20 A	Nos	1	
9	PS/1AC/24DC/10 Power Supply- Input AC : 85-264, Output : 24V DC, 10 A	Nos	1	
10	Fan 220 VAC Operated, 4 inch	Nos	1	
11	Glass Cartridge Fuse link, 0.5 A	Nos	15	
12	Glass Cartridge Fuse link, 1.0 A	Nos	15	
13	Glass Cartridge Fuse link, 50 MA	Nos	15	
14	Normal Terminals	Nos	15	
15	Terminal block 4SQMM-Grey, Fuse type	Nos	15	

16	Terminal block 4SQMM-Grey, Fuse type with 230V AC LED	Nos	15	
S.No	TVS SYSTEM	Unit	Quantity	
1	System PSU 12 VDC 5A+24 VDC 5A	Nos	1	
2	8CH SNET AI 4-20MA Hart Module	Nos	1	
3	8CH SNET Discret IO Module	Nos	1	
4	SNET Controller	Nos	1	
5	Glass Cartridge Fuse link, 0.5 A	Nos	15	
6	Glass Cartridge Fuse link, 1.0 A	Nos	15	
7	Glass Cartridge Fuse link, 50 MA	Nos	15	
S.No	OTHER SPARE	Unit	Quantity	
1	Power Supply with Expended 3.3 VDC 24 DC Input	Nos	1	
2	Power supply - PAC 8000	Nos	1	
3	Ethernet Module- RX3I	Nos	1	
4	CMM020 Modbus communication Module- RX3I	Nos	1	
5	RX3I CPE305	Nos	1	
6	VERSAMAX	Nos	1	
7	SNET Controller	Nos	1	
8	Input 24 VDC POS/NEG Logic (4 Groups of 8) 32 points	Nos	1	
9	Output 12/24 VDC POS Logic 0.5A, 2 Groups of 16, 32 Points	Nos	1	
10	Analog Input 15 Bit Current 15 Channel	Nos	1	
11	Analog Output 13 Bit Current 8 Channel	Nos	1	
12	8CH SNET AI 4-20MA Hart Module	Nos	1	
13	8CH SNET Discret IO Module	Nos	1	
14	AC Voltage Trasnsducer	Nos	1	
15	AC Current Trasnsducer	Nos	1	
16	Frequency Trasnsducer	Nos	1	
17	Active Power Transducer	Nos	1	
18	Reactive Power Transducer	Nos	1	
19	Power Factor Transducer	Nos	1	
NOTE:				
The above list is indicative and not exhaustive. Any additional spares if required the same may be indicated by the Firm in their Technical Offer. However, nothing extra will be paid for any additional spares indicated by the firm.				
We hereby confirm that:				
1	The cost of items listed above, for maintenance during DLP have been included in our quoted prices. Nothing extra will be payable for such spare parts.			

2	If any additional items apart from the ones mentioned above are required during the DLP period the same will be arranged by us, without any Extra Payments.	
3	This will not absolve us of the responsibility to fulfill the DLP obligations as per relevant clauses of tender conditions.	
4	We certify that the availability of above spares along with the required skilled personnel, T&Ps, M&P, Testing Instruments, Material Handling Equipments, Jigs & Fixtures and ladder etc. will be ensured in desired location at specified intervals as approved by the employer during DLP to ensure that maintenance of Equipment is not affected.	
Signature and Stamp of tenderer		

Annexure-2**Unit Exchange Spares**

S.No.	Item	Unit	Country of Origin	Quantity	Unit Price		Total Amount	
					INR	Foreign Currency	INR	Foreign Currency
1	Primary Pump One number each Type	Set		1				
2	Secondary Pump One number each Type	Set		1				
3	Condenser Water Pump One number each Type	Set		1				
4	FCU Complete: 2.5 TR, 2 TR and 1 TR One number each Type	Set		1				
5	TEF fan One number each Type	Set		1				
6	VSF Fan One number each Type	Set		1				
7	VEF Fan One number each Type	Set		1				
8	FAF Fan One number each Type	Set		1				
TOTAL AMOUNT FOR UNIT EXCHANGE SPARES								

Annexure-3**Mandatory Spares**

S.No.	Item	Unit	Country of Origin	Quantity	Unit Price		Total Amount	
					INR	Foreign Currency	INR	Foreign Currency
1	Soft Starter for Water Cooled Chillers One number each Type	Set		1				
2	Soft Starter for Air Cooled Chillers One number each Type	Set		1				
3	Soft Starter for TVF Fan One number each Type	Set		1				
4	Soft Starter for TBF Fan One number each Type	Set		1				
5	Motor for Cooling Towers One number each Type	Set		1				
6	Air Cooled Chiller Pump Motor One number each Type	Set		1				
7	AHU Motor One number each Type	Set		1				
8	AHU Fan belt three number each Type	Set		1				
9	Fan Blade, Impeller, Hub assembly complete One number each Type	Set		1				
10	FCU Motor One number each Type	Set		1				
11	Valve Set Complete One number each Type	Set		1				
12	ACB One number each Type	Set		1				
13	MCCB One number each Type	Set		1				
14	MPCB One number each Type	Set		1				
15	Transducer Set One number each Type	Set		1				
16	BMS PLC Cards One number each Type	Set		1				
17	Actuator for motorized Dampers One number each Type	Set		1				
		TOTAL AMOUNT FOR MANDATORY SPARES						

Annexure-4 (ADDENDUM)

Recommended Spares for three years After DLP

[illegible]

Contractor need to submit the unpriced list in the technical package.

List of Spares for 10 years beyond the DLP

Page 15 of 14

MINIMUM LIST OF MANDATORY TOOLS & TEST EQUIPMENT		
S.No.	DESCRIPTION	QUANTITY
1	VACUUM CLEANER (With Extension)	1 for each Station
2	AIR BLOWER	1 for each Station
3	LED TORCH	2 for each Station
4	TESTER	2 for each Station
5	CRIMPING TOOL suitable for installed sizes of cable	1 for each Station
6	HACKSAW	1 for each Station
7	TOOLS KIT	1 for each Station
8	MAGNET	1 for each Station
9	ROPE NYLON 50 METER	1 for each Station
10	HAND HELD DRILL MACHINE	1 for each Station
11	PLIER SET	1 for each Station
12	ALUMINIUM LADDER	1 for each Station
A)	3 METER HIGH	1 for each Station
B)	5 METER HIGH	1 for each Station
13	FIRST AID BOX with medicines	1 for each Station
14	KEY BOX suitable for 40 keys	1 for each Station
15	SCREW DRIVER SET consisting of at least-	1 for each Station
A)	SCREW DRIVER-6"	1 for each Station
B)	SCREW DRIVER-8"	1 for each Station
C)	SCREW DRIVER-10"	1 for each Station
D)	SCREW DRIVER-12"	1 for each Station
16	SPANNER KIT consisting of at least-	1 for each Station
A)	D end SPANNER-6/7 TO 22/23,24/27,30/32	1 for each Station
B)	Ring SPANNER-6/7 TO 22/23,24/27,30/32	1 for each Station
17	CROW PLIER	1 for each Station
18	TORQUE WRENCH	1 for each Station
19	PIPE WRENCH suitable for 150 mm pipe	1 for each Station
20	ADJUSTABLE WRENCH	1 for each Station
21	HAMMER (2 Kg)	1 for each Station
22	CHISEL FLAT	1 for each Station
23	ALLEN KEY set	1 for each Station
24	SCISSOR	1 for each Station
25	SPIRIT LEVEL	1 for each Station
26	HYDRAULIC OPERATED HANDLING TRUCK SUITABLE FOR HANDLING ALL SIZES OF AIR CIRCUIT BREAKERS	1 for each Station
27	DRILLE MACHINE	1 for each Station
28	TESTING EQUIPMENT	
A	VIBRATION METER	1 for each Station
B	NOISE LEVEL METER	1 for each Station

C	ANEMOMETER	1 for each Station
D	TECHOMETER	1 for each Station
E	MEGGER	1 for each Station
F	TONG TESTER	1 for each Station
G	PITOT TUBE	1 for each Station
H	AIR FLOW MANOMETER	1 for each Station
I	DRY AND WET BULB THERMOMETER	1 for each Station
J	DIGITAL MULTI METER	1 for each Station
K	DIGITAL ENERGY METER	1 for each Station
L	GAUGE PRESSURE METER	1 for each Station
M	DIGITAL THERMOMETER	1 for each Station

Note:

The above list is indicative and not exhaustive. Any additional Tools & Test Equipment are required the same may be indicated by the Firm in their Technical Offer. However, nothing extra will be paid for any additional Tools & Test Equipment indicated by the firm. The makes of the above items shall be of reputed with minimum ISI mark. The contractor shall submit the make for approval along with latest specification before procurement.

We hereby confirm that:

1. The cost of Tools & Test Equipment listed above for maintenance during DLP have been included in our quoted prices. Nothing extra will be payable for such Tools & Test Equipment.
2. If any additional Tools & Test Equipment apart from the ones mentioned above are required during the DLP period the same will be arranged by us, without any Extra Payments.
3. This will not absolve us of the responsibility to fulfill the DLP obligations as per relevant clauses of Bid conditions.
4. The requirement given above is indicative and minimum in nature. Prior approval of engineer-in-charge will be taken before supply of Tools & Test Equipment along with details regarding the make & model no. of items specified above.

Signature and Stamp of Bidder

Annexure-1

<u>MINIMUM LIST OF DLP SPARES</u>		
S.No	DESCRIPTION	MINIMUM NUMBER OF SPARES
A	ACB	
1	ACB OF EACH RATING OF EACH MAKE	1 nos. for each rating for each make
2	COMMUNICATION PORT FOR BREAKER RS 485	2 nos. for each rating for each make
3	CLOSING COIL	4 nos. for each rating for each make
4	SHUNT TRIP	4 nos. for each rating for each make
5	UNDER VOLTAGE WITH CONNECTOR	4 nos. for each rating for each make
6	SP CH MOTOR	2 nos. for each rating for each make
7	3 WIRE CONNECTOR (AUX CONTACT ADD-ON BLOCK)	2 nos. for each rating for each make
8	4NO+4NC AUX CONTACT BLOCK (OF)	4 nos. for each rating for each make
9	FAULT SIGNILING CONTACT	2 nos. for each rating for each make
10	3P ACB NEUTRAL CT	2 nos. for each rating for each make
11	ACB RELEASE	2 nos. for each rating for each make
12	SMPS FOR CONTROL SUPPLY	2 nos. for each rating for each make
B	MCCB	
1	MCCB OF EACH RATING OF EACH MAKE	1 nos. for each rating for each make
2	MOTOR MECHANISM	4 nos. for each rating for each make
3	AUX + TRIP CONTACT	2 nos. for each rating for each make
4	NETURAL SENSER CT	2 nos. for each rating for each make
5	SHUNT TRIP COIL	4 nos. for each rating for each make
6	EXTENDED ROM	2 nos. for each rating for each make
7	ULP COMMUNICATION MODULE	2 nos. for each rating for each make
8	ANY OTHER PART OF SIMILAR NATURE RECOMMENDED BY OEM	As recommended
C	MPCB	
1	MPCB OF EACH RATING OF EACH MAKE	2 nos. for each rating for each make

2	AUX CONTACT 1NO+1NC	2 nos. for each rating for each make
3	FAULT TRIP CONTACT 1NO+1NC	2 nos. for each rating for each make
4	ANY OTHER PART OF SIMILAR NATURE RECOMMENDED BY OEM	As recommended
D	METERS	
1	MULTIFUNCTION METER	2 nos. for each rating for each make
2	AMMETER	2 nos. for each rating for each make
3	VOLTMETER	2 nos. for each rating for each make
E	CT	
1	CURRENT T/F WITH MOUNTING INSERT & TERMINALSHROUDING	2 nos. for each rating for each make
F	LIGHT & PUSH BUTTON	
1	INDICATING LAMP RED	40 nos.
2	INDICATING LAMP YELLOW	40 nos.
3	INDICATING LAMP BLUE	40 nos.
4	INDICATING LAMP GREEN	40 nos.
5	INDICATING LAMP AMBER	40 nos.
6	EMERGENCY PUSH BUTTON LOCKABLE	40 nos.
7	RED PUSH BUTTON WITH NO	8 nos.
8	GREEN PUSH BUTTON WITH NC	8 nos.
G	RELAY & TIMERS	
1	MICRO RELAY WITH 14PIN BASE WITH SURGE SUPPRESSOR	100 nos.
2	RELAY BASE, RELAY WITH LED, RC CIRCUIT	100 nos.
3	MULTIFUNCTION TIMER	10 nos.
4	S/D TIMER	10 nos.
5	HOUR METER	10 nos.
6	MOISTURE PROTECTION RELAY AUX SUPP.230VAC WITH O/P CONTACT 1C/O RESET MODE AUTO (1NO+1NC)	10 nos.
7	TVMR RELAY	10 nos.
H	SWITCHES	
1	TNC SWITCH WITH KEY WITH ELEMENT	8 nos.
2	LOCAL/REMOTE WITH SWITCH 2 STAY PUT, LOCKABLE	8 nos.
3	AUTO/LOCAL/REMOTE WITH SWITCH 3 STAY PUT, LOCKABLE	8 nos.
4	INTERLOCKING BYPASS S/SWITCH 2 STAY PUT, LOCKABLE	8 nos.
5	WORK STAND BY S/S 1P2W, LOCKABLE	8 nos.
I	CAPACITORS	
1	7% HARMONIC D- TUNED FILTER	10 nos.
2	3P 415V CAPACTOR HERMATICALLY SEALED	10 nos.

	METALISED POLYPROPYLENE HEAVY DUTY	
J	MCB & RCCB	
1	MCB	4 nos. of each rating of each make
2	RCCB	4 nos. of each rating of each make
3	RCCB AUX CONTACT	8 nos.
K	CONTACTORS	
1	AUX CONTACTOR	4 nos. of each rating of each make
2	POWER CONTACTOR 3P	4 nos. of each rating of each make
3	CAP. DUTY CONTACTOR 3P	4 nos. of each rating of each make
4	ADD ON BLOCK 2NO+2NC	4 nos. of each rating of each make
5	ADD ON BLOCK 1NO+1NC	4 nos. of each rating of each make
L	HEATER & FAN & HUMIDISTAT	
1	HUMIDISTAT	8 nos. of each rating of each make
2	SPACE HEATER	8 nos. of each rating of each make
3	CFL WITH DOOR SWITCH	8 nos. of each rating of each make
4	CONTROL TERMINAL	8 nos. of each rating of each make
M	FUSES	
1	FUSES	8 nos. of each rating
N	LIGHTS	
1	LIGHT FIXTURES (COMPLETE ASSEMBLY WITH FIXTURE, BALLAST, LAMP etc.)	5% spare quantity of each type of light
2	BALLAST	10 nos. of each type
3	LAMP	10% spare quantity of each type of light
4	HOLDER	10 nos. of each type
O	ATS	
1	ATS (COMPLETE ASSEMBLY)	4 nos. of each type
2	CONTROLLER	4 nos. of each type
3	AUXILLARY CONTACT BLOCK	4 nos. of each type
4	MOTOR MECHANISM/MOTOR	4 nos. of each type
P	UPS	
1	FUSES	50 nos. of each type
2	CARDS	2 nos. of each type
3	MCB/MCCBs	5 nos. of each type
Q	FIRE ALARM SYSTEM	
1	CARDS	2 nos. of each type
2	ADDRESSABLE POWER SUPPLY, 240VAC	2 nos. of each type
3	INTELLIGENT PHOTO THERMAL DETECTOR	50 nos. of each type
4	INTELLIGENT DETECTOR BASE	50 nos. of each type
5	INTELLIGENT ADDRESSABLE DUCT PHOTO DETECTOR	4 nos. of each type
6	LOOP ISOLATOR MODULE	4 nos. of each type
7	ADDRESSABLE CONTROL MODULE	4 nos. of each type
8	ADDRESSABLE RELAY MODULE	4 nos. of each type

9	ADDRESSABLE MONITOR MODULE	4 nos. of each type
10	ADDRESSABLE PULL STATION	4 nos. of each type
11	HOOTER STROBE	4 nos. of each type
12	FLOW SWITCHES	4 nos. of each type for each pipe size
13	ISOLATOR BASE	8 nos. of each type
14	RESPONSE INDICATOR	8 nos. of each type
15	CPU OF FACP	2 nos. of each type
R	PANEL GAS FLOODING SYSTEM	
1	FILLING ADAPTER	8 nos.
2	OUTLET ADAPTER	8 nos.
3	END OF LINE ADAPTER	8 nos.
4	PRESSURE SWITCH	8 nos.
5	DETECTION TUBE	40 meters
6	MASTER CONTROL UNIT	2 nos.
7	AUTO WEIGHT MEASURING UNIT	2 nos.
S	PUMPS	
1	JOCKEY PUMP HYDRANT	1 nos.
2	JOCKEY PUMP SPRINKLER	1 nos.
3	SEEPAGE PUMPS	2 nos. of each rating
4	WATER SUPPLY PUMPS	2 nos. of each rating
5	SEWAGE PUMPS	2 nos. of each rating
6	WEAR RINGS	5 nos. for each type of pump
7	GLAND PACKING	5 nos. for each type of pump
8	SHAFT SLEEVE	5 nos. for each type of pump
9	SET OF O RINGS	5 nos. for each type of pump
4	GASKET SET	5 nos. for each type of pump
11	MECHANICAL SEAL	5 nos. for each type of pump
T	LEVEL CONTROLLERS	
1	LEVEL SENSOR	4 nos. of each type
2	LEVEL CONTROLLER	4 nos. of each type
U	VALVES	
1	HYDRANT VALVES	5 nos. of each type
2	BUTTERFLY VALVES	5 nos. of each type
3	GATE VALVES	5 nos. of each type
4	BALL VALVES	5 nos. of each type
5	MOTORIZED BUTTERFLY VALVES	5 nos. of each type
6	EXPANSION BELLOW	5 nos. of each type
7	Y-STRAINERS	5 nos. of each type
8	MOTOR MECHANISM BUTTERFLY VALVES	5 nos. of each type
9	STRAINER OF Y-STRAINER	4 nos. of each type
10	PRESSURE RELIEF VALVE (PRV)	5 nos. of each type
11	GLOBE VALVE	5 nos. of each type
12	GASKETS	50 nos. for each type of valve

13	AUTO COUPLING	5 nos. of each type
V	PRESSURE GAUGE/SWITCH	
1	PRESSURE GUAGE	5 nos. of each type
2	PRESSURE SWITCH	5 nos. of each type
W	POWER/CONTROL CABLE	
1	POWER CABLE AS PER BOQ	10% Spare quantity for each size
2	CONTROL CABLE	5% Spare quantity for each size

NOTE:

The above list is indicative and not exhaustive. Any additional spares if required the same may be indicated by the Firm in their Technical Offer. However, nothing extra will be paid for any additional spares indicated by the firm.

We hereby confirm that:

1. The cost of items listed above, for maintenance during DLP have been included in our quoted prices. Nothing extra will be payable for such spare parts.
2. If any additional items apart from the ones mentioned above are required during the DLP period the same will be arranged by us, without any Extra Payments.
3. This will not absolve us of the responsibility to fulfill the DLP obligations as per relevant clauses of tender conditions.
4. We certify that the availability of above spares along with the required skilled personnel, T&Ps, M&P, Testing Instruments, Material Handling Equipments, Jigs & Fixtures and ladder etc. will be ensured in desired location at specified intervals as approved by the employer during DLP to ensure that maintenance of Equipment is not affected.

Signature and Stamp of tenderer

JMRC			Annexure-1	
Minimum List of Consumable & DLP spare				
S. No	Item Description	Unit	Country of Origin	Recommendation for 2 stations
	Electrical			
1	Indicating Lames (RED)	Nos		8
2	Indicating Lamps (GREEN)	Nos		8
3	Indicating lamps (AMBER)	Nos		8
4	Indicating Lamps (WHITE)	Nos		8
5	Ememency STOP Push Button	Nos		3
6	GREEN START Push Button	Nos		3
7	BLACK TEST Push Button	Nos		3
8	ACB Trip Coil	Nos		2
9	ACB closing Coil	Nos		2
10	Auxiliary Contractor	Nos		3
11	MCB 6A	Nos		2
12	MCB 10A	Nos		2
13	Control Terminals 1.5 Sqmm	Nos		28
14	Control Terminals 2.5 Sqmm	Nos		28
15	Digital Ammeter	Nos		2
16	Digital Voltmeter	Nos		2
17	Scace Heater	Nos		2
18	Small rear connector	Nos		2
19	Long rear connector	Nos		4
20	Door Lock with Key	Nos		10
21	Terminal Shield	Nos		2
22	Door Handle	Nos		10
23	Clip Resort	Nos		10
24	Insulator Wire	Nos		10
TVF				
1	Flexible connectionswith fixing clamp For TVF	No.		2
2	Flexible connectionswith fixing clamp For TEF	No.		2
3	limit Switch for TVDs	No.		2
4	Vibration Sensor	No.		2
Compressed Air System				
1	Air Filter	No.		16
2	Oil Filter	No.		16
3	Oil separator	No.		8
4	Compressor Oil	Litre		48
5	V-belt	Set		2
6	Complete unloader valve kit assembly	set		2
7	Non return valve	No.		2
8	Pre-filter panel	No.		2
9	Grease for fan	Kg		2
ECS				
AHU				
1	UV Light	set		2
2	U V Lamp	Nos		160
3	V-belt	Nos		2set of each rating.
4	Pressure Gauge and Thermometer	set		8 Set
5	Bearing	set		2

6	Door limit switch	set		1
7	Door Handle	set		2
8	Marine Lamp Bulb	Nos		5
9	Filter	set		9
10	Flexible Canvass Connection	Nos		2
11	Chemical for coil Cleaning.	Lot		18
12	Pulley	Set		1 set of each rating
FCU				
1	Filter FCU	Nos		20
2	Ball Valve with strainer	Nos		2
3	Motor for FCU	Nos		2 set of each rating.
4	Thermostat for FCU	Nos		2
5	Door locking clip	Nos		3
6	Bearing	Nos		2
7	Pulley	Set		1 set of each rating
8	Capacitor	Nos		2
PUMP				
1	Bearing for Cond water Pump	Set		1
2	Bearing for Chill. water Pump(P)	Set		1
3	Bearing for Chill. water Pump(S)	Set		1
4	Pressure Gauge and Thermometer	Set		4
5	mechanical Seal	Set		2
6	Pump Coupling	set		2
Air Cooled Chiller				
1	MOV for aircooled chiller	Nos		1
2	Flexible Bellows	Nos		2
3	Chemical for condensor coil cleaning	Litre		2
4	Pressure Gauge & Thermometer	Set		4 Set
5	Compressor	Nos		1
6	Flow Switch	Nos		1
7	Refrigerant	Kg		48
8	Filter Drier	Nos		1
9	Solenoid Valve	Set		1 Set of each rating
10	Heater element	Set		1 Set of each rating
11	Strainer	Set		1 Set of each rating
Water Cooled Chiller				
1	Pressure Gauge & Thermometer	set		4
2	Flow Switch	No		1
3	MOV	No.		1 Nos of each rating.
4	Refrigerant	Kg		70
5	Coolant	gallon		2
6	Filter Drier	Nos		4
7	Oil filter	Nos		4
8	Fuse 5A	Nos		5
9	Fuse2A	Nos		4
10	Fuse Holder	Nos		2
11	Compressor Oil(5 Gallon Pkg)	Nos		2
12	Solenoid Valve	Set		1 Set of each rating
13	Heater element	Set		1 Set of each rating
14	Strainer	Set		1 Set of each rating

	Condenser Descaling Chemicals (Condensor descaling is to be done Max. once a year depending upon Fouling)	Lots		2
Cooling Tower				
1	MBV	Nos		1
2	Level Sensor	Nos		2
3	Float Valve	Nos		4
4	Gate Valve	Nos		2
5	Gear Oil	Ltr		96
6	Fills	Set		10 (set)
7	Nozzles	Nos		100(Nos)
8	Fan Blades	Set		1
Axial Flow Fan				
1	Flexible Convass Connection	Sets		20
2	Grease	Kgs		40
3	Lubricant Oil Can(500ml)	Nos		4
4	Water Treatment Chemical for 1 year dosing	Lots		2
5	Filter for VSF	Sets		1
Damper				
1	Fusible link	Nos		12
2	Actuators for MFD	Nos		4
3	Actuator for MOD	Nos		4
BMS SPARES				
DLP SPARE				
S.No	ECS System	Unit		Quantity
1	Input 24 VDC POS/NEG Logic (4 Groups of 8)	Nos		1
2	Output 12/24 VDC POS Logic 0.5A, 2 Groups	Nos		1
3	Analog Input 15 Bit Current 15 Channel	Nos		1
4	Analog Output 13 Bit Current 8 Channel	Nos		1
5	Remote I/O Ethernet Network Inteface Unit	Nos		1
6	Power Supply with Expended 3.3 VDC 24 VDC Input	Nos		1
7	Relay Board 16 Channel with 2C/O Omron G2R2 Relays 24 VDC Coil and Contact rating 223 VAC/24 VDC 5A	Nos		1
8	PS/1AC/24DC/20 Power Supply- Input AC : 85-264, Output : 24V DC, 20 A	Nos		1
9	PS/1AC/24DC/10 Power Supply- Input AC : 85-264, Output : 24V DC, 10 A	Nos		1
10	Fan 220 VAC Operated, 4 inch	Nos		1
11	Glass Cartridge Fuse link, 0.5 A	Nos		15
12	Glass Cartridge Fuse link, 1.0 A	Nos		15
13	Glass Cartridge Fuse link, 50 MA	Nos		15
14	Normal Terminals	Nos		15
15	Terminal block 4SQMM-Grey, Fuse type	Nos		15

16	Terminal block 4SQMM-Grey, Fuse type with 230V AC LED	Nos		15
S.No	TVS SYSTEM	Unit		Quantity
1	System PSU 12 VDC 5A+24 VDC 5A	Nos		1
2	8CH SNET AI 4-20MA Hart Module	Nos		1
3	8CH SNET Discret IO Module	Nos		1
4	SNET Controller	Nos		1
5	Glass Cartridge Fuse link, 0.5 A	Nos		15
6	Glass Cartridge Fuse link, 1.0 A	Nos		15
7	Glass Cartridge Fuse link, 50 MA	Nos		15
S.No	OTHER SPARE	Unit		Quantity
1	Power Supply with Expended 3.3 VDC 24 DC	Nos		1
2	Power supply - PAC 8000	Nos		1
3	Ethernet Module- RX3I	Nos		1
4	CMM020 Modbus communication Module- RX3I	Nos		1
5	RX3I CPE305	Nos		1
6	VERSAMAX	Nos		1
7	SNET Controller	Nos		1
8	Input 24 VDC POS/NEG Logic (4 Groups of 8) 32 points	Nos		1
9	Output 12/24 VDC POS Logic 0.5A, 2 Groups of 16, 32 Points	Nos		1
10	Analog Input 15 Bit Current 15 Channel	Nos		1
11	Analog Output 13 Bit Current 8 Channel	Nos		1
12	8CH SNET AI 4-20MA Hart Module	Nos		1
13	8CH SNET Discret IO Module	Nos		1
14	AC Voltage Trasnsducer	Nos		1
15	AC Current Trasnsducer	Nos		1
16	Frequency Trasnsducer	Nos		1
17	Active Power Transducer	Nos		1
18	Reactive Power Transducer	Nos		1
19	Power Factor Transducer	Nos		1

NOTE:

The above list is indicative and not exhaustive. Any additional spares if required the same may be indicated by the Firm in their Technical Offer. However, nothing extra will be paid for any additional spares indicated by the firm.

We hereby confirm that:

1	The cost of items listed above, for maintenance during DLP have been included in our quoted prices. Nothing extra will be payable for such spare parts.
2	If any additional items apart from the ones mentioned above are required during the DLP period the same will be arranged by us, without any Extra Payments.
3	This will not absolve us of the responsibility to fulfill the DLP obligations as per relevant clauses of tender conditions.
4	We certify that the availability of above spares along with the required skilled personnel, T&Ps, M&P, Testing Instruments, Material Handling Equipments, Jigs & Fixtures and ladder etc. will be ensured in desired location at specified intervals as approved by the employer during DLP to ensure that maintenance of Equipment is not affected.

Signature and Stamp of tenderer