

PART - C

PROFORMA OF SCHEDULES

SCHEDULE 'A'

Schedule of quantities, enclosed on separate sheets from Page : 221 to 251

SCHEDULE 'D'

Extra schedule for specific requirements / documents for the work, if any	:-	General Conditions and Specifications
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SCHEDULE 'E'

Reference to General Conditions of contract	:-	As per Part - A
Name of work:	:-	As per Part - A
Estimated cost of work	:-	As per Part - A
(i) Earnest money	:-	As per Part - A
(ii) Performance Guarantee	:-	As per Part - A
(iii) Security deposit	:-	As per Part - A

SCHEDULE 'F'

General Rules & Directions: -		
Officer inviting tender:	:-	As per Part - A
Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3	:-	See below under clause 12 of Schedule 'F'
Definitions:		
2 (vi) Engineer-in-Charge	:-	Executive Engineer (E), Guwahati, Electrical Division, CPWD, Guwahati-21
2(viii) Accepting Authority	:-	As per Part - A
2 (x) Percentage on cost of materials and labour to cover all overheads and profits.	:-	15%
2 (xi) Standard schedule of Rates	:-	Based on Electrical DSR'2025 (Upto date correction slip) & Market Rate
2 (xii) Department	:-	C.P.W.D.
9 (ii) Standard CPWD contract Form GCC 2023, (Construction work) C.P.W.D Form 7 as modified and corrected up to last date of submission of bid including extension if any.	:-	As per Part - A

Clause 1		
Time allowed for submission of Performance Guarantee, Program Chart (Time and Progress) and	:-	As per Part - A

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applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance		
Maximum allowable extension with late fee @ 0.1% per day of performance guarantee amount beyond the period provided in (i) above.	:-	As per Part - A

Clause 2

Authority for fixing compensation under clause- 2.	:-	As per Part – A
Clause 2 / Clause 2A		Clause 2 Applicable

Clause 5

Number of days from the date of issue of letter of acceptance for reckoning date of start	:-	As per Part - A
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Mile stone(s) as per table given below: -

Mile Stone Break up			
Sl. No.	Description of Milestone (Physical)	Time Allowed (from date of start)	Amount to be withheld in case of non-achievement of milestone (% of tender amount of electrical portion)
1.	15% completion of work	04 Months	0.75%
2.	30% completion of work	08 Months	0.75%
3.	50% completion of work	12 Months	1.00%
4.	75% completion of work	16 Months	1.25%
5.	100% completion of work	18 Months	1.25%

Time allowed for execution of work.	:-	18 (Eighteen) months.
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Authority to decide:

(i)	Extension of time	:-	As per Part - A
(ii)	Rescheduling of mile stones	:-	As per Part - A
(iii)	Shifting of date of start in case of delay in handing over of site.	:-	As per Part - A

Proforma of schedule clause 5 schedule of handing over of site.

Part	Portion of site	Description	Time period for handing over reckoned from date of issue of letter of intent
Part A	Portion without any hindrance	Full	As per CPWD 6 (Sl. No. 3)
Part B	Portion with encumbrances	Nil	NA
Part C	Portions dependent on work of other agencies	NA	NA

Clause 6

Mode of Measurement : computersised Measurement Book (CMB) / Electronic Measurement Book (EMB)	:-	EMB
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Clause 7

Gross work to be done together with net payment / adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment.	:-	Rs. 6.75 Lakh [Except Final Bill]
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Clause 7A

Whether Cluse 7A shall be applicable	:	Yes Applicable
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Clause 8

Competent Authorities to inspect and issue part / final completion certificate	:	As per Part – A
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Clause 8A

Authority to decide compensation on account If contractor fails to submit completion plans	:	As per Part – A
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Clause 10A

List of testing equipment to be provided by the contractor at site lab	:-	All equipment required for commissioning
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Clause 10 – B(ii)

Whether clause 10-B (ii) shall be applicable	:-	Not Applicable
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Clause 10 C

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Not Applicable

Component of labour expressed as percentage of value of work	:	NA
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Clause 10 CC

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As per Part – A

Clause 11

Specifications to be followed for execution of work	:-	CPWD General Specifications for Electrical Works Part-I (Internal) 2023, Part-II (External) 2023, Part-III Lift & Escalators - 2003, Part-IV Sub Station – 2013, Part V Wet Riser & Sprinkler Systems – 2020, Part VI Fire Detection and Alarm System – 2018, Part VII D.G. Sets - 2013, Part-VIII (Gas Based Fire Extinguishing System) 2013 with upto date correction slips, Indian Electricity Rule amended upto date and NBC – 2016 amended upto date relevant I.S. Codes where CPWD Specification is silent.
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Clause 12.2 (c)

Deviation limit beyond which clause 12.2 (c) shall apply for building work.	:	100%
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Clause 12.4

(i) Deviation limit beyond which clauses 12.2 (c) shall apply for foundation work (except items mentioned in earth works subhead in DSR and related items).	:	100%
(ii) Deviation Limit for items mentioned in earth work subhead of DSR and related items.	:	100%

Clause 16

Competent Authority for deciding reduced rates.	:-	As per Part - A
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Clause 18

List of mandatory machinery tools & plants to be deployed by the contractor at site.	:-	All tools & plants required for commissioning as follows mentioned below
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1.	Steel/Aluminium Ladder 1.5 m to 8 m.	2 Nos.
2.	Chase cutting machines.	2 Nos.
3.	Electrical wire drawing equipment.	2 Set.
4.	Torque wrench for nut/bolt/screws.	2 Nos.
5.	Conduit die set.	2 Set.
6.	Pipe vice.	1 No.
7.	Bench vice.	1 No.
8.	L.T. Meggar 500/1000 volts.	1 No.
9.	Tongue Tester.	1 No.
10.	Multimeter	1 No.
11.	Hydraulically operated	1 No. operated crimping machine
12.	Earth tester.	1 No.
13.	Portable Ordinary drilling machine.	2 Nos.
14.	Portable Hammer drilling machine.	2 Nos.
15.	Overhead conduit puller.	1 No.

Clause 19

Clause 19 C	Authority to decide penalty for each default	:-	Engineer-In-Charge authority to decide penalty for each Default.
Clause 19 D	Authority to decide penalty for each default	:-	Engineer-In-Charge authority to decide penalty for each Default
Clause 19 G	Authority to decide penalty for each default	:-	Engineer-In-Charge authority to decide penalty for each Default
Clause 19 K	Authority to decide penalty for each default	:-	Engineer-In-Charge authority to decide penalty for each Default

Clause 25

Conciliator	As per Part – A
Arbitrator Appointing Authority	
Place of Arbitration	

Clause 32**Requirement of Technical Representative (s) & recovery Rate**

Sl. No	Minimum Qualification of Technical representative	Number (of Major + Minor component)	Designation (Principal Technical / Technical representative	Minimum Experience (years)	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of Clause 36(i)	
					Figures	Words
As per part - A						

Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers.

Diploma Engineer with minimum 10 years relevant experience with a reputed construction co. can be treated at par with graduate engineers for the purpose of such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.

~~Minimum recovery for not deploying Building Information Model (BIM) professional shall be Rs. Two lac per month or as mentioned above, whichever is higher.~~

Clause 38

(i)	(a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of printed by CPWD with upto date correction slips :-	:	NA
(ii) Variations permissible on theoretical quantities:			
(a)	Cement for works with estimated cost put to tender not more than Rs. 5 lakhs	:	NA
	for works with estimated cost put to tender more than Rs 5 lakh	:	NA
(b)	Bitumen for all works.	:	NA
(c)	Steel Reinforcement and structural steel sections for each diameter, section and category	:	NA
(d)	All other materials.	:	Nil

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

Sl. No	Description of Item	Rates in figures and words at which recovery shall be made from the Contractor.	
		Excess beyond permissible variation	Less use beyond the permissible variation
---NIL---			

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GENERAL TERMS AND CONDITIONS

1. Location :

“SIB at Mathanguri (Assam)”

2. Related Documents

The work shall be carried out as per relevant part of the CPWD specification for Electrical works Part-I (Internal) 2023, Part-II (External) 2023, Part VIII Gas Based Fire Extinguishing System 2013 with upto date correction slips and relevant I.E. rules and BIS Specifications, Indian electricity rules amended up to date. National Building Code 2016 amended up to date and as per direction of Engineer –in - Charge. However, nothing extra shall be paid on account of these conditions, as the same are to be read along with schedule of quantities for the work. The work to be carried out as per NBC-2016, CPWD Specifications amended up to date, IS/BIS codes and as approved by Engineer-in-charge.

3. Terminology

The definition of terms used in these specifications shall be in accordance with relevant IS.

4. Order of Preference:

In case of discrepancy, if any, between the description of items as given in the Schedule of quantities, technical specifications for individual items of work (including additional and commercial conditions) and IS Codes etc., the following order of preference shall be followed:

- (i) Schedule of quantities.
- (ii) General Terms and Conditions.
- (iii) General Conditions of Contract for CPWD Works.
- (iv) Drawings.
- (v) CPWD General Specifications.
- (vi) Relevant IS or any other international code in case IS code is not available.

5. Site Information

The equipments will be installed at “**Construction of Office-Cum Residential Complex along with Boundary Wall for SIB at Mathanguri (Assam)**” The tenderer should, in his own interest, visit the site and familiarize himself with the site conditions before tendering.

- (i) General security restrictions are given as under:
 - a) No inflammable materials including P.O.L. shall generally be stored at site of work.
 - b) The movement of trucks and vehicles will be regulated in accordance with rules and regulations as approved by competent authorities.
 - c) The contractor shall inform in advance, the truck registration number, ownership of the trucks, names and address of the drivers and labours for necessary action by the security agency.
 - d) Due to the site conditions, no space for construction of go down and stay of site staff may be allowed.

- e) Names and addresses of labourers/staff along with identity proof and residence address proof etc. working at site shall be furnished in advance for security verification for issue of passes.
- f) The labourers/staff should not be changed too frequently once the verification of the character and antecedents is done.
- g) As and when there will be security requirements, certain additional restrictions can be proposed as per the requirement of the situation.
- h) **IDENTITY CARDS:-**The identity cards will be issued to the workmen employed by the contractor after proper police verification for which contractor shall submit a list of worker's to be deployed on site of work. The cost of photos would be borne by the contractor. They will be required to carry the identity- cards with them during their working inside the building.
- i) Therefore in view of the situation explained under above paragraphs, the tenderer must visit the site and must get himself acquainted with the proposed site of work, study specifications and conditions carefully before tendering rates. Nothing extra shall be paid on account of compliance of any of these clauses. The hindrance due to security constraints shall be not be accounted towards adjustment of completion time mentioned in the tender document.

6. Conformity with statutory Acts, Rules, Standards and codes

- (i) All components shall conform to relevant Indian Standard Specifications, International Standards and shall bear the stamp of the testing laboratory wherever existing and amended to date. All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 2003 and Indian Electricity Rules, 1956 amended to date. They shall also conform to CPWD General Specifications for Electrical Works Part-I (Internal) 2023, Part-II (External) 2023, Part-III-LITS & Escalators – 2003, Part-IV Sub Station – 2013, Part V Wet Riser & Sprinkler Systems – 2020, Part VI Fire Detection and Alarm System – 2018 , Part-VII (DG Set) – 2013, Part VIII Gas Based Fire Extinguishing System-2013, Heating, Ventilation & Air-Conditioning (HVAC) – 2017 with upto date correction slips and relevant I.E. rules and BIS Specifications.

7. Safety Codes and Labour Regulations

- (i) In respect of all labours employed directly or indirectly on the work for the execution of any work on contractor's part, the contractor at his own expense, will arrange for the safety provisions as per the statutory provision, B.I.S. recommendations, factory act, workman's compensation act & CPWD safety code and instructions issued from time to time. Failure to provide such safety requirements would make the tenderer liable for penalty. In addition the Engineer-in- charge, shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost incurred thereon from the contractor.
- (ii) The contractor shall provide necessary barriers, signals and other safety measures wherever necessary so as to avoid accident. He shall also indemnify CPWD against claims for compensation arising out of negligence in this respect. Contractor shall be liable, in accordance with the Indian law and Regulations for any accident occurring due to any cause. The department shall not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work. The contractor has to cover the risk. No extra payment would be made to the contractor due to the above provisions thereof.

8. Works to be arranged by the department

Unless otherwise specified in the tender documents, the following works shall be arranged by the Department:

- (i) Space for accommodating all the equipments and components involved in the works. However, arrangement to make it lockable and its watch & ward shall be made by contractor himself.

9. Works to be done by the contractor

Unless otherwise mentioned in the tender documents, the following works shall be done by the contractor and therefore, their cost shall be deemed to be included in their tendered cost-whether specifically indicated in the schedule of work or not: -

- (i) Suspenders, brackets and floor/wall supports for suspending/ supporting cable tray etc.
- (ii) Painting of all exposed metal surfaces of equipments and components appropriate colour as per relevant part of bid document.
- (iii) Making opening in the wall/floors/slabs or modifications in the existing openings wherever provided for cable/cable tray etc. Opening in the slab/retaining walls/brick wall etc. shall be made by means of core cutting machines only.
- (iv) All electrical works including cable/wires, earthing etc. beyond power supply made available by the department.
- (v) Making good all damages caused to the structure during installation and restoring the same to their original finish.
- (vi) Approval from Local Body as may be required as per local bye-laws. (The contractor's responsibility shall be limited to the work executed by him.)

10. Rates

The rate quoted by bidder, shall be firm and inclusive of all taxes, duties and levies and all charges for packing, forwarding insurance, freight and delivery, installation, testing, commissioning etc. at site including temporary constructional storage, risks, overhead charges, general liabilities / obligation etc.

11. Power Supply

The contractor shall make his own arrangements for obtaining electrical service connection if required and make necessary payments directly to the department concerned.

12. Acceptable Makes

The acceptable makes of the various equipments/components/accessories have been indicated in "Acceptable Makes" annexed with this document. The bidders shall work out the cost of the offers on this basis.

Successful bidder is to comply with the Public Procurement (Preference of Make in India), Order 2017 dated 15.06.2017, while executing the contract. If any provision made elsewhere in this NIT, which in contravention with the Make in India policy, the later shall have preference over the former. Engineer-in-charge will have the final authority to take appropriate decision in the matter.

13. Machinery for Erection

All tools and tackles required for unloading/handling of equipments and materials at site, their assembly, erection, testing and commissioning shall be the responsibility of the contractor.

14. Completeness of the tender, submission of programme, approval of drawings and commencement of work

(i) Completeness of the tender:-

All sundry equipments, fittings, assemblies, accessories, hardware items, foundation blots, supports, termination lugs for electrical connections, cable glands, junction boxes and all other items which are useful and necessary for proper assembly and efficient working of the various equipments and components of the work shall be deemed to have been included in the tender, irrespective of the fact whether such items are specifically mentioned in the tender or not.

(ii) Submission of programme:-

Within thirty days from the date of receipt of the letter of award, the successful tenderer shall submit his programme for submission of drawings, supply of equipment, installation, testing, commissioning and handing over of the installation to the Engineer-in-charge. This programme shall be framed keeping in view the building progress and the milestones fixed in Schedule 'F' Clause-5 shall be given priority.

(iii) Submission of drawings

The contractor shall submit the drawings to the Engineer-in-Charge for approval before start of work.

(iv) Commencement of work

The contractor shall commence work as soon as the drawings submitted by him are approved either in full or in part as the case may be.

15. Dispatch of materials to site and their safe custody

The contractor shall dispatch material to site in consultation with the Engineer-in-Charge. Suitable accommodation shall be made available free of charge temporarily. The arrangement to make it lockable/secure by means of partitions, locks etc. shall be responsibility of the contractor. Watch and ward however, shall be the responsibility of contractor. Program of dispatch of material shall be framed keeping in view the building progress. Safe custody of all machinery and equipment supplied by the contractor shall be the responsibility of the contractor till final taking over by the department.

16. Extent of Work

The work shall comprises of entire labour including supervision and all material necessary to meet a complete installation and such tests and adjustment and commissioning, as may be required by the department. The term complete installation shall not only mean minor items covered by the specification but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in detail in the tender documents in connection with this contract as this is a turnkey job.

17. Compliance with Regulations and Indian Standards:

- 17.1 All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

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- (i) Factories Act.
 - (ii) Indian Electricity Rules.
 - (iii) B.I.S. & other standards as applicable.
 - (iv) Workmen's compensation Act.
 - (v) Statutory norms prescribed by local bodies like CEA, Power Supply Co., Local Body etc.
 - (vi) NBC 2016
- 17.2 Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.
- 17.3 Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on the work by the tenderer. Failure to provide such safety requirement would make the tenderer liable for penalty of Rs. 50/- for each default. In addition, the department will be at liberty to make arrangement for the safety requirements at the cost of tenderer and recover the cost thereof from him.

18. Indemnity:

The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer on account of the above.

19. Co-ordination with other Agencies

The contractor shall co-ordinate with all other agencies involved in the construction work so that the work of other agencies is not hampered due to delay in his work. The work, which directly affect the progress of work of other agencies, shall be given priority. The contractor shall have to coordinate the agency executing the work for matching the external finishing & MEP services. The contractor shall be responsible for any damages done in the ongoing construction work and shall rectify at his own expenses.

20. Care of the Building

Care shall be taken by the contractor during execution of the work to avoid damage to the building. Care shall also be taken by the contractor to avoid the damage to any of these existing service/service lines, any part of the building etc. If any damage is caused to any of the existing services/service lines, or any part of the building the same shall be repaired / rectified and made functional or restored so its original finish by the contractor immediately at his own expenses failing which the same shall be repaired/ rectified and made functional by department at the risk and cost of the contractor. The decision of the Engineer-in-charge in this regard shall be final & binding. He shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.

21. INSPECTION BEFORE DESPATCH

All routine tests shall be conducted before dispatch of equipments. No equipment shall be dispatched from the manufacture's premises without such tests being conducted and test result recorded. These test certificates shall be given along with the supply of equipments. The Engineer In-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the contractor shall give 15 days' advance notice. Agency shall arrange for inspection by the department. Department shall bear expenses for inspection as far as traveling, boarding and / lodging is concerned. Agency should submit the compliance reports of defects noticed if any, before the dispatch of material. However, waiver if any, for inspection shall be at the discretion of the Engineer-in-Charge without any cost implication but ROUTINE TEST Certificates shall have to be submitted for equipments.

Prior to dispatch, all equipments shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat and humid climate.

22. INSURANCE

The contractor shall include storage cum erection insurance including third party insurance right from the storage to commissioning of various equipment with beneficiary as Engineer In-charge. All insurance which the contractor is required to enter into under the contract shall be affected with any authorized general insurance company and the contractor shall produce the policies of insurance.

If the contractor fails to effect and keep in force the insurance the department may effect and keep in force any such insurance and pay such premium as may be necessary for that purpose and from time to time and deduct the amount, so paid by the department, from any money due or which may become due to tenderer or recover the same as debit from the contractor's bill.

23. QUALITY OF MATERIAL AND WORKMANSHIP

All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site. None of the material/ items/ equipment etc supplied shall be more than six months old from date of supply at site. Copy of GST Gate Pass/ Invoice/ Shipment / Custom Clearance certificate/ details (in case of imported equipment) shall be submitted to prove the date of manufacture & genuineness of the equipment/ machines supplied. All components of the equipments shall have adequate factor of safety. The work of fabrication and assembly shall conform to sound engineering practice and on the basis of "Fail Safe Design". The mechanical parts subject to wear and tear shall be easily replaceable type. The construction of the equipments shall be such as to facilitate easy operation, inspection, maintenance and repairs. All connections and contacts shall be designed to minimize risk of accidental short circuits caused by animals, birds and vermin etc. All identical items and their component parts should be completely, interchangeable including spare parts. Similar parts of all switches, lamp holders, distribution fuse boards, switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

24. INSPECTION AND TESTING AT SITE

- i. The installation shall be subject to necessary inspection during every stage of erection, by the Engineer In-charge or his authorized representative. The successful tenderer shall provide all facilities and assistance for the purpose.
- ii. The completed installation shall be inspected and tested by the Engineer-in-Charge in the manner as will be laid down by him, in consultation with the contractor.
- iii. All instruments and facilities necessary for the tests shall be provided by the contractor.

- iv. For fabricated equipment, the contractor will first submit dimensional detailed drawings for approval before fabrication is taken up in the factory. Suitable stage inspection at factory also will be made to ensure proper use of materials, workmanship and quality control. Switch boards and LT panels shall be fabricated in a factory/ workshop having modern facilities like quality fabrication, seven tank process, powder/epoxy paint plant, proper testing facilities, manned by qualified technical personnel. The fabricators must have modern facilities of design, fabrication and testing capable of delivering high quality LT panels and switch boards after testing as per relevant specifications and having proper certification for the tests as applicable.

25. COMPLETENESS OF WORK

The installations shall be completed in all respects and put in to operation even where certain details are not specifically mentioned in these specifications and the same is deemed to be included within the scope of this tender.

26. Safety Measures

All equipments shall incorporate suitable safety provision to ensure safety of the operating personnel at all times. The initial and final inspection reports shall bring out explicitly the safety provisions incorporated in each equipment.

27. Guarantee

Comprehensively all the goods supplied shall under this contract be new, unused and incorporate all recent improvements in design and materials unless prescribed otherwise in the contract. The supplier further warrants that the goods supplied under this contract shall have no defect arising from design, materials (except when the design adopted and/or the material used are as per the Purchaser's/Consignee's specifications) or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under the conditions prevailing in India. The warranty shall include all spares, labour and preventive maintenance from the date of completion of the satisfactory installation and acceptance till warranty period. All electrical and mechanical fittings (except LED fittings) / fixtures / appliances such as fans, switches, fire-fighting equipments and sub-station equipments should be have **1 (one) year** guarantee period. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Engineer in-charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Engineer-in-charge in this regard shall be final.

- (i) The contractor shall guarantee the complete system to maintain the specified conditions under all conditions of ambient temperature.
- (ii) All equipments shall be guaranteed for a period of 12 months (except the LED fittings for which the guarantee shall be 5 years) from the date of acceptance and taking over of the installation by the department against unsatisfactory performance and/ or breakdown due to defective design, material, manufacture, workmanship or installation. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Engineer-in-Charge in this regard shall be final.

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- (iii) LED fittings i/c driver as a whole shall be guaranteed for 5 years.
- (iv) The guaranty for LED fittings is to be got submitted from the manufacturer also in addition to the guarantee from the contractor in form of tripartite agreement among CPWD, manufacturer and contractor. The manufacturer should give undertaking that in case of discontinuation of model and non-availability of spares, they will replace the fittings with equivalent/ high end model in case of manufacturing defect during the warranty period of respective services.
- (v) 20% of the cost of LED fittings as per purchase bill / GST invoice will be kept with the department as guarantee money and will be released after guarantee period of 5 year is over including defect liability period.**

28. Taxes and Duties

The tender is for entering into percentage rate works contract. The rates shall be inclusive of all taxes, duties, levies, cess, packing, transportation, handling etc. Statutory deduction of GST as applicable shall be made at source from each running /final bill payment. A certificate of TDS shall be issued by the department to the contractor.

29. Terms of Payments:

The following payment terms shall be applicable:

- (i) No advance payment shall be made.
- (ii) Following percentage of contract rates shall be payable against the stage of work shown herein:

Sl. No.	Stage of Work	LED fittings, Fans, MCB & MCB DBS	All other items
1.	After initial inspection (wherever specified) and delivery at site in good condition on pro-rata basis.	60%	70%
2.	On completion of installation in all respect on pro-rata basis.	25%	15%
3.	On testing, Commissioning, Obtaining Clearance from Local Body and handing over to the department for beneficial use.	15%	15%

30. Tender Drawings, Drawings for Approval and Completion Drawings Tender Drawings

Drawings for approval on award of the work

The contractor shall prepare and submit following drawings within 30 days of award of work for approval before commencement of installation. The approval of drawings however does not absolve the contractor of his responsibility to supply the equipments/ materials as per agreement. In case of any contradiction between the approved drawings and agreement the decision of the Engineer-in-Charge shall be final and binding on the contractor.

- Detailed layout plan of electrical points, cable laying, Electrical panels.
- Technical particulars of each and every item to be used at site.
- Any other drawings relevant to the work.

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31. Completion drawings

Contractor shall periodically submit completion drawings for all the E&M services as and when work in all respects is completed in a particular area. These drawings shall be submitted in the form of four sets of CD's / Pen Drives and four *in hard copy (A2 paper sheet)* each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate following:

- i. General layout of the building.
- ii. Locations of main switchboard and distribution boards, indicating the circuit numbers controlled by them.
- iii. Position of all points and their controls.
- iv. Types of fittings, viz LED, pendants, brackets, bulk head, fans and exhaust fans etc.
- v. Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division, and name of the firm who executed the work with their signature.
- vi. Single line diagram, power schematic, control schematic with detailed bill of materials, showing makes, types and description of all components and accessories.

Successful contractor shall also furnish the Manufacturer's instructions on Installation, Operation & Maintenance for all the capital items.

32. Documents to be Furnished on completion of Installation

Three sets of the following documents shall be furnished shall be the department by the contractor on completion of works:-

- Completion drawings as per paragraph 34.
- Sets of manufacturer's technical catalogues of all equipments and accessories.
- Operation and maintenance manual of all minor equipments, detailing all adjustments, operation and maintenance procedure.

33. Submission of authenticated copies of itemized bills of materials.

In the reference of OM No. DG/SE/CM/Misc./77 dated 04.05.2018 it is mandatory for the field staff of CPWD to obtain written authenticated copies of itemized bill of materials which is as LED fittings, fans, wires, conduit, MCB, MCB DB, Panel, LT UG cable, etc., This is irrespective of existences of any terms and condition specified in contract/ agreement. Authenticated copies must be obtained by CPWD authorities from the agency/ contractors before settling payment.

34. Agency / contractor should submit following documents.

- (i) LM79 & LM80 reports of LED fittings has to be submitted.

5 years warranty certificates from OEM for LED fittings has to be submitted. 20% of the cost of LED fittings as per purchase bill / GST invoice will be kept with the department as guarantee money and will be released after guarantee period of 5 year is over including defect liability period.

- (ii) If any defect is noticed during the guarantee period, it should be rectified by the contractor within seven days and if not attended, the same will be got done by the Engineer-In-Charge through another agency at the risk and cost of the contractor.

The Similar Work Experience of E&M Services

1. The similar work experience for determining the eligibility of Associate agencies as prescribed at Bid Documents – “Information and Instructions for Bidders for e-bidding” is as given below:
2. For Each E&M Works, the composite contractor shall have to associate with other agency, who fulfils the following requirements. Joint ventures for associate agencies are not accepted. Should have satisfactorily completed the works as mentioned below during last 7 years ending previous day of last date of submission of bid:

Sl. No.	Components of Specialized Works	Approx. Cost & Eligibility Criteria	Definition of similar work
1.	<u>C-1</u> Internal Electrical & External Installation i/c Pump etc. ECPT Rs. 67,17,846.00	CPWD Enlisted Contractor in composite category having valid electric license. Otherwise, the agency shall associate with an agency having valid electrical contractor license and shall fulfill following criteria. 3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package	Providing Installation, Testing & Commissioning of Internal Electrical Installation in the buildings.
2.	<u>C-2</u> Fire fighting system ECPT Rs. 6,93,636.00	3 similar works, each of value not less than @ 40% of ECPT of this Package. OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package.	Providing Installation, Testing & Commissioning of Fire fighting system
3.	<u>C-3</u> Fire Detection, Fire Alarm System i/c PA System ECPT Rs. 4,38,445.00	3 similar works, each of value not less than @ 40% of ECPT of this Package. OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package.	Providing Installation, Testing & Commissioning of Fire Detection, Fire Alarm System i/c PA System
4.	<u>C-4</u> CCTV, LAN & IPABX System ECPT	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR	Providing Installation, Testing & Commissioning of CCTV, LAN & IPABX System

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	Rs. 13,06,865.00	1 similar works, each of value not less than @ 80% of ECPT of this Package	
5.	<u>C-5</u> Lifts ECPT Rs. 14,30,968.00	Eligibility criteria for Original Equipment Manufacturer as per CPWD Lift Works OM dated 28.09.2020 enclosed in Lift subhead under part C (Revision-3)	Providing Installation, Testing & Commissioning of Lift.
6.	<u>C-6</u> Sub-Station i/c service connection ECPT Rs. 1,40,144.00	3 similar works, each of value not less than @ 40% of ECPT of this Package with 63KVA of individual capacity of Sub-station. OR 2 similar works, each of value not less than @ 60% of ECPT of this Package with 63 KVA of individual capacity of Sub-station. OR 1 similar work, each of value not less than @ 80% of ECPT of this Package with 63 KVA of individual capacity of Sub-station.	Providing Installation, Testing & Commissioning of Substation equipments i/c service connection.
7.	<u>C-7</u> DG Set ECPT Rs. 5,30,460.00	3 similar works, each of value not less than @ 40% of ECPT of this Package with 35 KVA of the individual capacity of DG Set. OR 2 similar works, each of value not less than @ 60% of ECPT of this Package with 35 KVA of individual capacity of DG Set. OR 1 similar works, each of value not less than @ 80% of ECPT of this Package with 35 KVA of individual capacity of DG Set.	Providing Installation, Testing & Commissioning of DG set
8	<u>C-8</u> UPS ECPT Rs. 2,48,290.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Providing Installation, Testing & Commissioning of UPS
9.	<u>C-9</u> Solar PV Power Generation ECPT Rs. 6,45,172.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar works, each of value not less	Providing Installation, Testing & Commissioning of Solar PV Power Generation

	than @ 80% of ECPT of this Package	
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3. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last date of submission of bid. The composite category contractor is also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided: -

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

Or

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

The composite contractor and the associated agencies shall give required affidavit to confirm their association. Tender accepting authority may approve change of associate in case it is required during the currency of the contract.

Note: The main contractor/agency has to submit details of such agency to be associated/manufacturer or their authorized service provider to the Engineer-in-charge within prescribed time. The associated agency shall be approved by Engineer-in-charge. In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge. The new agency/agencies shall also have to satisfy the laid down eligibility criteria mentioned above. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the main contractor to change the agency executing such items of work and this shall be binding on the contractor.

4. Approval of the specialized agencies for each specialized work shall be obtained from the Engineer-in-Charge within prescribed time. Even if, such specialized items of work shall be executed by the specialized agencies at later date the work shall be deemed to be executed by the tenderer for all purposes and the responsibility of the quality of items of works executed etc. shall continue to be that of the tenderer only.
5. The associate agency shall submit the willingness to get associated with the main contractor for execution of the E&M component of works in wholesome manner and as per the conditions set out in the MOU to be entered into, between the one who is awarded the work and the associate eligible electrical contractor/ manufacturer or their authorized service provider. (Format of willingness and MOU is given below).
6. In support of the eligibility conditions of the proposed associated electrical contractor, copy of their registration documents, Electrical Contractor's License, GST documents, eligibility documents duly attested by Main contractor shall be submitted to the Engineer-in-Charge for deciding the eligibility. Such associate electrical contractor will certify that they are not debarred as on date from the any department of Central Govt./Central PSU/State Govt./State Govt.PSU/Autonomous bodies of Central and State Govt..
7. In the event of the concerned E&M agency not performing satisfactorily or failure of associate/ sub-contractor to complete the E&M work, the main contractor on the written direction of the department, shall remove the Associate/sub-contractor deployed on the work and shall submit name of new associate who fulfils the conditions mentioned in NIT

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to execute the leftover work without any loss of time or variation in cost to the department in this regard. Such associates shall also enter into Agreement with the main tenderer shall meet all the guarantee for the equipment already supplied for which payment has been released by the department in part. If any equipment supplied for the work, during the currency of the earlier Associate/sub-contractor and paid partly by the department becomes redundant/not in a position to be installed and commissioned and put to beneficial use due to change in agency for execution of E&M work, the main contractor shall be liable for replacement of the equipment(s) at no cost to Department. No change of Electrical Contractor will be allowed without prior approval of the Engineer-in-Charge.

8. The main contractor shall be responsible and liable for proper and complete execution of the E&M works and ensure coordination and completion of both civil and electrical work.
9. The associate agency shall attend the inspection of the work by the Engineer-in-Charge as and when required.
10. The agencies executing the electrical work should have valid license for LT/HT as applicable. Contractor will have to submit self attested copies of completion certificate(s) for similar works issued by the officer of the department (Central Govt. / State Govt. / PSU / Autonomous Body), not below the rank of Executive Engineer of equivalent. In case of work done in private sector, then **26AS of the Income Tax Department** confirming the payments must be submitted. The completion certificate must clearly indicate :-
 - (i) Name of Work.
 - (ii) Stipulated date of start and actual date of completion.
 - (iii) Gross value of work done.
 - (iv) That the work has been completed satisfactorily.
 - (v) Full address of the client, officer issuing certificate and location where work is executed.
11. The composite contractor and the associated specialized agencies are to give required affidavit to confirm their association. The Engineer-in-Charge approves the change of Sub-Agency in case it is required during the currency of the contract but the proposed agency shall also meet eligibility criteria.
12. The composite category contractor is also be eligible to carry out himself/herself any or all of these works without associated and specialized agency provided.
 - (a) He fulfills the prescribed eligibility criteria respectively for these work(s).
 - (b) He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
 - (c) For specialized E&M works and other original E&M works, wherever required, agency to submit along with the performance guarantee after the acceptance of tender, an undertaking from the OEM regarding:
 - (i) Authorization certificate.
 - (ii) The OEM will unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance/ Comprehensive Maintenance Contract for the useful life of the system, and

(iii) OEM will provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.

13. The contractor shall be a licensed electrical contractor of appropriate class suitable for execution of the electrical work. He shall engage suitably skilled/ licensed workmen of various categories for execution of work supervised by supervisors / Engineer of appropriate qualification and experience to ensure proper execution of work. They will carry out instructions of Engineer-in-charge and other senior officers of the Department during the progress of work.
14. Main agency shall have to submit credentials of the proposed associated agencies for verification and approval of the department in proforma at 'Form-H' and willingness as per Annexure C. After approval of agency by the Engineer-in-charge of major component (E&M), the main contractor has to submit MOU as per Annexure D within 30 days from the date of issue of award letter.
15. After approval of the associate contractor, the main contractor will submit separate MOU signed with each of associate contractor associated with the main contractor. The MOU in the enclosed form shall be signed by both the parties' i.e. main contractor as 1st party and associated electrical contractor as 2nd party, independently for all electrical and mechanical components.
16. In the event of the concerned associated contractor not performing satisfactorily or failure of associate contractor to complete the E&M work, the main contractor, on written directions of the department, shall remove the Associate contractor deployed on the work and shall submit name of new associate who fulfil the conditions mentioned in NIT to execute the left over work without any loss of time or variation in cost to the department. Such associates shall also give an undertaking along with the main tenderer that both of them shall stand guarantee for which payment has been released by the Department in part for any equipment supplied for the work, during the currency of the earlier Associate contractor and paid partly by the Department. Also if any such material becomes redundant/ not in a position to be installed and commissioned and put to beneficial use due to change in agency for execution of E&M work, the main contractor shall be liable for replacement of the equipment(s) at no cost to Department. No change of Electrical Contractor will be allowed without prior approval of the Engineer-in-charge of the work.
17. All technical discussions shall be attended by the associate agencies and the main agency. Commercial/Technical submissions for the electrical works shall be signed and submitted by the associate agencies along with the main agency.
18. The main contractor shall be entirely responsible and answerable for all the works done by his associated electrical agencies regarding their quality, adherence to the laid down specification, terms and conditions, warranty/guarantee etc. and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.
19. In respect of works i.e. **"Construction of Office-Cum Residential Complex along with Boundary Wall for SIB at Mathanguri (Assam)"** the materials and equipments shall be procured only from the original equipment manufacturers/ authorized dealers of OEM. The contractor shall submit all documentary details in fulfilment of this conditions regarding procurement of materials including relevant test certificates.
20. Executive Engineer (E) shall be the Engineer-in-charge as far as electrical and mechanical

works are concerned. Separate tender schedule abbreviated CPWD-7 and Special Conditions for Electrical Work are appended with this tender. It will be obligatory on the part of the contractor/ tenderer to sign the tender documents for all the component parts.

21. The main contractor shall be responsible and liable for proper and complete execution of the Electrical and mechanical work and ensure coordination and completion of both civil and electrical work.
22. The main contractor, who is not having desired experience as per eligibility criteria has to enter into agreement with eligible contractors associated by him for executing of minor components (E&M). Copy of such agreement shall be submitted to Executive Engineer (E) in charge of minor component (E&M).
23. The associate contractor shall attend the inspection of the work by the Engineer –in-charge of E&M works as and when required.
24. No change of Electrical Contractor will be allowed without prior approval.
25. Components of work executed other than those included in definition of similar work shall be deducted while calculating cost of similar work. Bidder shall submit abstract of cost of work in support of this.
26. For the purpose, “Cost of work” shall mean gross value of the completed work including the cost of material supplied by the Government/ client, but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/ project manager or equivalent.
27. If the main contractor fails to associate agency for execution of Minor components of work within 30 days of award of work OR before start of Minor components of work whichever is earlier or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of work shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-charge at the risk and cost of the main contractor.
28. Verifiable completion certificates of the work, registration/ approval documents as the case may be, duly attested by the applicant shall be submitted within 30 days of award of work OR before start of Minor component of work whichever is earlier. Valid Electrical Contractor’s license, as the case may be, duly attested by the applicant shall also be submitted within 30 days of award of work OR before start of Minor component of work whichever is earlier.
29. Self attested GST registration documents in respect of the associated agencies shall be submitted within 30 days of award of work or before start of Minor component of work whichever is earlier.

**ADDITIONAL CONDITIONS AND SPECIFICATIONS FOR THE WORK OF
INTERNAL & EXTERNAL ELECTRICAL INSTALLATIONS**

1. The wires / cables used for point wiring, circuit wiring, sub-main wiring, power wiring and other wirings shall be done by FRLSH/HFFR grade of ISI marked PVC insulated copper conductor single core cable of 1100 V grade and of makes as specified in the list of accepted makes of materials.
2. All the wires should be terminated to the switch box / DB / MCB etc. by crimping with suitable size tinned copper lugs, unless the wire is single stranded. For termination to switches soldering is permissible. Nothing extra shall be paid on this account.
3. Hidden / concealed items and earthing work shall be done in the presence of the Engineer-In-charge of the work or his authorized representative only. The contractor shall give due notice for such work in advance to the department.
4. The wireman / electrician engaged shall possess valid electrical workman permit in appropriate category as per rule.
5. The drawing showing layout of the main board, allied equipment, if any, shall be got approved by the contractor from the engineer-in-charge before fabrication and execution.
6. All hardware, fastening material viz nuts, bolts, washer and screws etc. to be used on work shall be of zinc / cadmium plated iron.
7. The contractor shall have to furnish the insulation test report, earth test report, along with all required detailed of electrical load on the prescribed proforma for the electric connection from the supply company.
8. The contractor shall submit the completion certificates and completion plan as per clause 1.26 of General specification for Electrical work (Part-I internal)-2023.
9. The chases in wall shall be done by chase cutting machines, for which the contractor shall arrange adequate numbers of chase cutting machines (chase cutters) for cutting chases in wall etc. for laying of conduit within the scope of work nothing extra shall be paid.
10. The contractor shall be entirely responsible and answerable for all the works done by him regarding quality, adherence to the laid down specifications, terms and conditions, warranty/guarantee etc. and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.
11. The contractor is advised to visit the site before quoting for his tender to apprise himself about the site environments and other conditions. Drawings and inventories can be seen in the office of the Engineer – in – charge.
12. The contractor will make his own storage of his own materials. The watch and ward of the materials and of the installations would be responsibility of contractor till the work is completed / handed over to the department. Nothing extra shall be paid to the contractor on this account.
13. The contractor should use only the approved makes of materials in the work specified in the NIT.

The agency will provide lay out drawing prepared by his Engineer with consultation with Engineer-In-Charge or his representative for approval before execute of work.

16. All multi data matters specified in item shall be suitable to measure voltage, current, PF, Kwh, frequency etc.
17. The department reserves the right to send such materials to the manufacturers / authorized test laboratory to verify the genuineness and quality of the product.
18. The work shall be carried out in engineering like manner and bad workmanship shall be rejected summarily. For redoing the job, no claim of the contractor shall be entertained on this account.

19. LUMINAIRES:

- 19.1. A sample of each item of schedule of supply shall be handed over by the bidder in the office of the Engineer – in – charge (Electrical) before procurement of the fittings. These samples shall be returned back afterwards.
 - 19.2. The makes of luminaries shall be strictly as per the tender conditions. The contractor must submit technical literature & photometric data, LM 79 and LM 80 type test certificates along with write up of the luminaries to be supplied by him.
 - 19.3. Copy of type test certificate for all types of luminaries as per BIS, including type test certificate from a Central / State government or public sector laboratory or a laboratory recognized / accredited by the Central / State Government for such tests for the light fittings shall be submitted before acceptance of the fittings.
 - 19.4. Contractors should obtain an undertaking from the manufacturer that they have a system of quality control to ensure consistent good quality of the finished product and as such has a scheme of inspection of the light fittings. They should agree for inspection of the light fittings and testing as per relevant IS and other standards in their labs.
- 19** It will be the obligatory on the part of the contractor to get all the light fittings and fixtures and their components / accessories inspected by authorized engineer / personnel of the manufacturer of the fittings at site after the materials are received at site and obtain certificate that the materials reached at site are genuine and manufactured by them.
- 20** All MCCBs with $I_{cs} = 100\% I_{cu}$ shall only be provided except mentioned.
- 21** All the MCCBs / RCCBs/ MCBs/ MCB DBs shall be of similar make. MCBs shall be of 10 kA rating. For incomer MCCBs in panel's earth leakage protection shall be provided. The kA rating for MCCB shall be as per the item.
- 22** The contractor will have to arrange for insulation and other tests like cable test etc. as per rules in the presence of the representative of Engineer-in-Charge as and when required by him and submit the test report in triplicate before the work can considered as complete.
- 23** The contractor shall be responsible for the safe custody of the electrical installation in the building, including fitting and fixtures till the installations handed over to the department. He should make his own arrangement for proper watch and ward at his risk and cost. No claim will be entertained on this account.

- 24 The work is to be carried out in workman like manner and generally in accordance with the plans. However, the contractor will be bound to carry out the work with minor deviation over the plan supplied if desired by the Engineer-in-Charge of the work.
- 25 Any Damage done to the building during the execution of electrical work shall be made good immediately at his own cost to the entire satisfaction of the Engineer-in-Charge.
- 26 The connections, inter-connections, earthing and inter-earthing shall be done by the contractor wherever required to be done for energization of the installation and nothing extra shall be paid on this account.
- 27 General arrangement drawing of Meter Panel shall be got approved before fabrication work starts. Drawing with details shall be submitted to the Engineer-in-Charge and got approved before fabrication.
- 28 Cable route and pole locations shall be marked in drawing / site and got approved by the Engineer-in-charge or his representative before commencement of work.

QUALITY ASSURANCE PLAN & CHECKLIST FOR E&M SERVICES

1. Main contractor/ Associate Agency shall submit the required quantity of material as sample for testing from Govt./ Approved Private Laboratory.
2. The decision on testing shall be as per E&M quality checklist of CPWD vide OM no. 51(4)/CE(E) /CSQ/2016/293(H) dated 31/03/2016 as applicable or as per direction of E-in-C and shall be binding on contractor.
3. Contractor shall submit the required size and quantity of samples for the testing. Department shall send the samples to the testing laboratory & the test results shall directly come to department however the cost of all testing shall be borne by the Contractor. If in case the materials fail the test in that case the contractor shall remove the materials from the site and supply the new materials at his own cost.

Annexure- A

A- Internal EI								
Stage /SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab.
1	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N
2	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
3	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan	Length upto 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N
4	Rigid MS Conduit	IS 9537 Pt I &2	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece of 1 mtr for every 1000 mtr	N	Y

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Stage / Sl no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab.
5	Rigid PVC Conduit	IS 3419 :1989	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece of 1 mtr for every 1000 mtr	N	Y
6	Cable Tray	CPWD Spec. Part-I/II: Check for perforation area, paint/Galvanising thickness and Material Composition	Length upto 500 mtr	Y	Y	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
7	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
8	Wire	IS 694:1990	up to 10000 mtr	Y	N	N	N	N
			>10000 mtr	Y	Y	1 piece for every 10000 mtr or less	N	Y

Y Stands Yes

Correction...Nil Deletion... Nil Insertion...Nil Over writing... Nil Ch. Estt (E) AE (E) AE (C) EE(P)

B- Street /Compound Lighting								
Stage /SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacture works	At third Party Lab.
1	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N
2	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
3	Poles	Whether in conformity with tender specs	up to 100	Y	Y	N	N	N
			>100	Y	Y	2%	Y	N
4	LT Cable	IS 1554 Part I	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece for every 2500 mtr	N	Y
5	DWC/ Corrugate d HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
6	Fittings	Whether in conformity with tender specs	>100	Y	Y	NA	N	N

Correction...Nil Deletion... Nil Insertion...Nil Over writing... Nil Ch. Estt (E) AE (E) AE (C) EE(P)

C- Sub Station, DG Set, UPS								
Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacture works	At third Party Lab
1	HT Panel	CPWD specs part IV/QA Plan: CT ratio and accuracy Class should be invariably checked	Any	Y	Y	1	Y	N
2	HT Panel: metering and protection devices	Check CT ratio and accuracy Class , Relays and Meters	Any	Y	Y	1	Y	N
3	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	1	Y	N
4	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
5	Capacitor Panel	CPWD specs part IV/QA Plan: Check for type of capacitors used, operation of relay, settings. Change the load and its type and check functionality	Any	Y	Y	1	Y	N
6	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan.	Length upto 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N

Correction...Nil Deletion... Nil Insertion...Nil Over writing... Nil Ch. Estt (E) AE (E) AE (C) EE(P)

Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacture works	At third Party Lab
7	Cable Tray	CPWD Specs. Part I/II: Check for perforation area, paint/Galvanising thickness and Material Composition	Length upto 500 mtr	Y	Y	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
8	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
9	Transformer	CPWD Specs. Part IV/QA Plan: Physical verification of accessories as per agreement and Routine tests as per IS:2026/IS 11171:1985(which ever applicable), with particular attention to losses meeting ECBC norms / as per agreement, Type test certificate for exact same design for impulse withstand and short circuit withstand shall be made available by Manufacturer , Temperature rise test of one transformer of each design shall be done. Copies of the certificate for pressure test, test for bushings shall be supplied to the department.	Any	Y	Y	100%	Y	N

Correction...Nil Deletion... Nil Insertion...Nil Over writing... Nil Ch. Estt (E) AE (E) AE (C) EE(P)

Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacture works	At third Party Lab
10	DG set	Load testing as per CPWD specs	Any	Y	Y	100%	Y	N
11	UPS	Load testing and operation logic as per CPWD specs , Check for input and output power quality as per agreement	Any	Y	Y	100%	Y	N
12	HT Cable	IS 1554 Part II	Up to 500 mtr.	Y	Y	1	N	N
			>500 mtr	Y	Y	1 Piece for every 500 mtr	N	Y
13	LT Cable	IS 1554 Part I	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece for every 2500 mtr	N	Y

Y* Tested for its capacity at AHRI Certified test bed (either at manufacturer's work or at Third Party)

4. QUALITY ASSURANCE PLANS :

Internal Electrical Installations:

- The detailed instructions on safety procedures given in BIS code no. 5216:1982 "Code of safety Procedures and Practices in Electrical works" shall be strictly followed.
- Safety procedures given in Chapter 10 of CPWD General Specifications for Electrical works Part-1(Internal) shall be followed.
- Safety recommendation as per IE rules 1956 as per Appendix "C".
- The materials shall be tested from 3rd Party laboratories are conduit, wires, cables etc. as per QA.
- Providing and fixing of conduit work as per CPWD Specifications.
- No. of wires in one conduit shall be ensure as per CPWD Specifications.

- vii) Colour coding of the wires are to be ensured.
- viii) Lugs and thimbles at cable/ wire ends in switch boxes as per CPWD Specifications.
- ix) Labeling of switch boxes & DBs shall be ensured.
- x) Termination of earth terminals in earth pits, switch box, DBs and accessories to be ensured. Earth chamber to be constructed and proper marking to be done.
- xi) A comprehensive schematic diagram is prepared starting from the main board up to the final DBs. All such boards are duly marked and numbered.
- xii) The pre-commissioning testing of the installation shall be carried out such as Insulation resistance test.
- xiii) Polarity test of switch. Earth continuity test.
- xiv) Earth electrode resistance test.
- xv) All the tests at site shall be carried out for the completed installations, in the presence of and to the satisfaction of the Engineer in Charge by the contractor. All the test results shall be recorded and copy of the same shall also be submitted to the Department.
- xvi) On completion of an electrical installation (or an extension to an installation), a certificate shall be furnished by the electrical contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix “E” of CPWD General Specifications for Electrical Works Part-1(Internal) in addition to the test certificate required by the local electric supply authorities.
- xvii) Contractor shall keep constant liaison with the local municipal authority, Fire service Department of Assam, Central Electricity authority, National Green Tribunal, Assam Power Distribution Company Limited (APDCL), Pollution Control Board, Assam and all other statutory authorities etc, whose approvals and permissions are required before, during course of execution and after execution of the work. Contractor shall make all expenses related to these approvals and shall be responsible for time bound approvals. No extension of time shall be given if the approvals are delayed on the side of the contractor. Any payment made by contractor to statutory authorities shall be reimbursed on production of the vouchers.

WILLINGNESS CERTIFICATE

Name of Work: - “Construction of Office-Cum Residential Complex along with Boundary Wall for SIB at Mathanguri (Assam)”

NIT No. : 05/NIT/CE/GHY/2026-27

I hereby give my willingness to work as associated contractor for the above mentioned work.

I will execute the work as per specifications and conditions for the agreement and as per direction of the Engineer-in-charge. Also, I will employ full time technically qualified supervisor for the works. I will attend inspection of officers of the department as and when required.

Date:

Contractor

Signature of Associated

Annexure 'D'**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**

- 1] M/s [Name of the firm with full address]**

Enlistment Status

Valid Upto:

[Henceforth called the main contractor]

AND

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

[Henceforth called the Associated Contactor]

Name of Work:- “Construction of Office-Cum Residential Complex along with Boundary Wall for SIB at Mathanguri (Assam).”

NIT No. : 05/NIT/CE/GHY/2026-27

We state that M.O.U between us will be treated as an agreement and has legality as per Indian Contract Act [amended up to date] and the Department [CPWD] can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent this MOU allows. Only Main Contractor shall be paid consequent to the execution of this sub-head as per agreement. In case of any dispute, either of us will go for mediation by the Superintending Engineer. However Only Main Contractor may appeal against the mediation/arbitration before the designated authority. His decision shall be final and binding on both of us.

We have agreed as under:

- 1]** The associated contractor will execute the sub head in the wholesome manner as per terms and conditions of the agreement. Payment of the associated contractor shall be given by main contractor.
- 2]** The Main contractor shall be liable for disciplinary action and other legal action as per agreement besides forfeiture of the security deposit if the associated firm fails to discharge the work as per the terms and conditions of the respective sub-head of the agreement.
- 3]** All the machinery and equipment, tools and tackles required for execution of the sub head works, as per agreement, shall be the responsibility of the associated contractor.

- 4] The site staff required for the sub head work shall be arranged by the associated contractor as per terms and conditions of the agreement.
- 5] Site order book maintained for the said work shall be signed by the main contractor as well as by the Engineer of the Associated Contractor and by Associated Contractor himself.
- 6] All the correspondence regarding execution of the work shall be done by the Department with the Main Contractor with a copy to the Associated Contractor. In case of non-compliance of the provisions of agreement, the main contractor shall be responsible. The action under clauses 2 and 3 shall be initiated and taken against the main contractor.

SIGNATURE OF MAIN CONTRACTOR

SIGNATURE OF ASSOCIATED
AGENCY/OEM

Date :

Date :

Place :

Place :

COUNTERSIGNED

Executive Engineer (E)
Guwahati Electrical Division
CPWD, Guwahati – 781021

FORM OF COMPLETION CERTIFICATE

[Clauses 1.26]

I/We certify that the installation detailed below has been installed by me/us and tested and that to the best of my/our knowledge and belief it complies with Indian Electricity Rules, 2003, as well as the C.P.W.D. General Specifications of Electrical Works 2023.

Electrical installation at.....
Voltage and system of supply.....

I. Particulars of work:

(a) Internal Electrical Installation

	No.	Total Load	Type or system of wiring
(i) Light point			
(ii) Fan point			
(iii) Plug Point			
(a) 3 pin 5 Amp.			
(b) 3 pin 15 Amp.			
(b) Others	Description	HP/KW/	Type of Starting

(a) Motors:

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

(b) Other plants:

(c) If the work involves installation of overhead line and/or underground cable.

(d) (i) Type & description of overhead line.

(ii) Total length and no. of spans.

(iii) No. of street lights and its description.

(e) (i) Total length of underground cable & its size.

(ii) No. of joints:

End joint:

Tee joint:

St. through joint:

II. Earthing

(i) Description of earthing electrode.

(ii) No. of earth electrodes.

(iii) Size of main earth lead.

III. Test results:

(a) Insulation resistance

(i) Insulation resistance of the whole system of Conductors to earth – Megaohms

(ii) Insulation between the phase conductor and neutral
Between Phase R and neutral – Mega ohms
Between Phase Y and neutral – Mega ohms
Between Phase B and neutral – Megaohms

(iii) Insulation resistance between the phase conductors in case of polyphase supply.

Between Phase R and Phase Y – Mega ohms

Between Phase Y and Phase B – Mega ohms

- Between Phase B and Phase R — Mega ohms
- (b) Polarity test
Polarity of linked single pole branch switches.
- (c) Earth continuity test
Maximum resistance between any point in the earth continuity conductor including metal conduits and main earthing lead.....Ohms
- (d) Earth electrode resistance
Resistance of each earth
Electrode
- | | |
|-------|------|
| (i) | Ohms |
| (ii) | Ohms |
| (iii) | Ohms |
| (iv) | Ohms |
- (e) Lighting protective system
Resistance of the whole of lightning protective system to earth before any bonding is effected with earth electrode and metal in/on the structure Ohms.

Signature and name of
the Junior Engineer (E) /AE (E)

Signature and Name of
Contractor

**ADDITIONAL CONDITIONS AND
SPECIFICATIONS FOR THE WORK OF
ELECTRO-MECHANICAL INSTALLATIONS**

C-1

INTERNAL & EXTERNAL ELECTRICAL INSTALLATION

1.1 Scope of work: -

- 1.1.1 It includes internal Electrical works of all the buildings and ancillary buildings as well as external Electrical installation of the entire campus as per approved drawings and as per schedule of work including all materials, manpower, testing, inspections, obtain approval from competent authority central, state ,local bodies and commissioning in all respects for successful operation/ utilization in true sense and handed over to end user in complete shape and to be maintained up to defect liability period as mentioned in the bid documents. However, bidder has to submit the drawings and design and got corrected if any and take approval of drawings and materials from Engineer-in-charge of E&M components before execution of work.
- 1.1.2 The wiring of all the buildings proposed in this works i/c lift shaft, machine room wirings and entire external electrifications i/c power distribution to buildings complete as required as manner mentioned in respective specification of package and as per schedule of work enclosed along with Bid document.
- 1.1.3 The work shall be carried out as per CPWD General Specifications of Electrical Works Part- I (Internal) 2023, Part-II (External) 2023, Part-IV (Sub-station) 2013 as amended upto date, relevant IE rules.
- 1.1.4 All wiring shall be carried in recessed Medium duty PVC conduit (ISI marked) having **Cross- Linked HFFR/ FRLSH Copper conductor (class-2) wires / cables (ISI marked) wires / cables (ISI marked)** of suitable size i/c earthing wire. The wiring shall be carried out loop-in system. The switch-socket, and other accessories shall be modular type and to be installed on G.I. modular boxes (1.6 mm thick) of required modules.
- 1.1.5 TV wiring (RG-6) Cable, Cat-6/6A Cable /telephone cable shall also be Cross- Linked HFFR/FRLSH Copper conductor (class-2) as required for EPABX / Data networking cable shall be drawn in suitable size **medium duty PVC conduit**. Wherever required, hot Dip Galvanized GI Cable trays (perforated) cable tray / DLP trunking may also to be used.
- 1.1.6 All internal as well as external light shall be LED type, based on required lux level and design and specification mentioned in the schedule of work. Ceiling fans, exhaust fans etc. should be of highest star rating, wherever available. However, Ceiling fans should be regulator type BLDC, 5 star rating and ISI marked. The LED fittings and fans shall be got approved from the Engineer-in-charge before placing the order.
- 1.1.7 In multi standard cables shall be terminated on the ends with copper lugs/ thimbles of suitable size.
- 1.1.8 Earth wire as per CPWD specification for electrical work, part-I (Internal-2023), shall be drawn along with other wire in recessed/ surface heavy duty PVC conduit system.
- 1.1.9 'Power' wiring shall be kept separate and distinct from light wiring, from the level of circuits, i.e., beyond the branch distribution boards. Conduits for light/power wiring

shall be separate.

- 1.1.10 Conduit carrying submain will not carry circuit/point wiring. Similarly, conduit carrying circuit wiring will not carry submain/point wiring. Conduit carrying point wiring will not carry submain/circuit wiring.
- 1.1.11 Essential/non-essential/UPS distribution each will have a completely independent and separate distribution system starting from the main, switchboard upto final wiring for each system. As for example, conduit carrying non-essential wiring shall not have essential or UPS wiring.
- 1.1.12 Wiring for essential and UPS supply will have their own conduit system. No mixing of wiring is allowed.
- 1.1.13 No switchboard will have more than one source of incoming supply. More than one incoming supply will be allowed only at main board with proper safety and interlocking so that only one source can be switched on at a time.
- 1.1.14 Fish wire shall be provided in each conduit where wiring is not carried out.
- 1.1.15 **Earthing :-**
 - a) Earthing materials w.r.t. weight and size shall be checked at site.
 - b) Termination of earth terminals in earth pits, switch box, DBs and accessories to be ensured. Earth chamber to be constructed and proper marking to be done.
 - c) Earth electrode resistance to be tested and recorded.
 - d) Earth continuity.
- 1.1.16 **Cabling :-**
 - a) Cable to be tested from 3rd party lab for meeting the relevant BIS and CPWD Specifications.
 - b) The cable drums shall be stored properly to avoid damages.
 - c) The cable route drawing shall be approved by Engineer-in-charge.
 - d) Laying of cable including bends as per CPWD Specifications and necessary protection shall be provided as per agreement.
 - e) The cable shall be tested for continuity and insulation resistance before laying as well as before covering.
 - f) Extra loop cable shall be provided on each terminal end of the cable and joints.
 - g) Suitable protection shall be provided for road crossing and cable entry to the building.
 - h) Route marker shall be installed.
 - i) Lugs and thimbles at cable/ wire ends in panels as per CPWD Specifications.
 - j) Cables shall be tested after laying as per CPWD Specifications.
 - k) Cables laid on cable trays to be provided with suitable marker tags for cable identification.
- 1.1.17 **Cable Tray:-**
 - a) Material to be tested in 3rd party laboratories.
 - b) Visual inspection for dimensions & perforation area shall be done.
 - c) Fastener & rods of adequate size and strength.
 - d) Factory fabricated bends, reducer, tee/cross junctions shall be provided.
 - e) Cable tray shall be earthed at both ends.
 - f) Proper painting to be ensured.

- 1.1.18 Pre commissioning test such as phase sequence test, polarity test, Hi-pot test and earth resistance test shall be done at site before commissioning the installations.
- 1.1.19 Setting of relays, timers, meters, interlocking (mechanical & electrical) etc., selection of tap of CTs in HT & LT Panels as required.
- 1.1.20 The line diagram including schematic scheme and operation logics will be made and displayed in Sub-Station as well as control room.
- 1.1.21 Shock treatment chart & safety equipment, insulating mats, etc. to be appropriately placed.
- 1.1.22 **Street/ Compound Lighting :-**
 - (i) Proper alignment of poles to be ensured.
 - (ii) Cables to be laid as per CPWD Specifications.
 - (iii) Makes and models of poles/ luminary shall confirm to technical specifications etc. as per agreement and shall be got approved from the Engineer-in-Charge before placing the order.
 - (iv) Photometry test of each type of luminary shall be conducted at manufacturer's works.
 - (v) Cables, Feeder Pillar & Earthing shall be done as per sub-station section.
 - (vi) Display of Schematic in control room as well as feeder pillars includes operations and logics etc.
 - (vii) Poles shall be tested at manufacturer's works for the following tests :-
 - a) Tensile test,
 - b) Deflection test,
 - c) Permanent set test,
 - d) Drop test.
 - e) Visual inspection for dimensional check & finish.

C-2**FIRE FIGHTING SYSTEM**

1. The work shall be carried out as per CPWD General Specifications for Wet riser & Sprinkler System (Part-V) 2020 as amended and corrected up to date, CPWD General Specifications of Electrical Works Part-I 2023 as amended and corrected up to date, Part- II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, NBC 2016 amended and corrected up to date, NFPA 2013, IBC (International Building Code). **Contractor will submit the Fire recommendation from Local Fire officers before carrying out the Fire Fighting work and will submit the Fire NOC after completion of the work for handing over to the client department as official record.** The work shall be deemed to be completed only after receiving NOC from the Authority mentioned above. Statutory fee if any shall be paid by the contractor. Enabling all liaising work, arranging inspection of the local body shall be within the scope of the contractor. The contractor shall follow the following guidelines while designing and executing the work:

- NBC 2016 (India), Part 4 (Fire and Life Safety)
- NFPA 13 (Sections 11.3.3.1, 8.15.4.3.2)
- IBC 705.8.2 (International Building Code)

Scope of work include preparation of drawings, supply, installation, testing and commissioning of Downcomer system i/c supply of different motor pump set having higher efficiency highest BEE star rating, Multistage Terrace pump, piping networks and its necessary accessories, valves, hydrant (Internal & external), Hose pipe, Hose reel, GM Branch pipe, nozzle, fire service inlet, fire service connections, fire brigade draw out collecting head, Air vessels, pressure gauge, pressure meter, Electrical Panel, cabling, earthing etc. complete as required to make the system fully functional. Approval from state fire department, handing over to client department in working conditions. In addition to above, portable fire extinguisher (ABC and CO₂) type shall also be installed at site.

2. The distribution pipe to be laid as per the relevant IS code and CPWD Specification Part V (Wet Riser & Sprinkler system) 2020 as amended and corrected up to date.
3. The provision of sleeves in the beams shall be kept for running the distribution range pipe if required.
4. **TECHNICAL SPECIFICATIONS: -**
 - a. **Down Comer System:** Type, rating, material construction accessories & installation work shall be as per schedule of work & relevant chapter of General specifications for electrical works Part- V (wet riser & sprinkler system) 2020, amended to date.
 - b. **Fire Extinguisher :** The same shall be supplied and installed as per relevant BIS.
 - c. **ELECTRICAL WORKS :** Electrical works associated with this work namely motors, switch boards, power cabling control wiring, earthing etc. shall be as per schedule of work & General specifications for electrical works. Part – I (Internal) 2023, Part II(External) 2023, Chapter 10 of Part – V 2020 amended to date.

C-3**ADDRESSABLE FIRE DETECTION, FIRE ALARM SYSTEM
AND PUBLIC ADDRESS SYSTEM**

1. The work shall be carried out as per CPWD General Specifications for Fire Detection and Alarm System (Part-VI) 2018 as amended and corrected up to date, CPWD General Specifications of Electrical Works Part-I 2023 corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, NFPA-72, NBC 2016 amended upto date and complete as required as per site and local by laws and as per requirements of the CFO. It also comply BIS Code of practice (IS: 2189 – 1988) for Selection, Installation and Maintenance of Automatic Fire detection and Alarm system with amendments up to date.
2. The Scope of work shall consist of Planning, designing, supplying, installation, testing & commissioning of Addressable fire detection & alarm system, LED Exit and Fire Signages with battery backup, public announcement and talk back system i/c wiring etc..
Contractor will submit the Fire recommendation from Local Fire officers before carrying out the Fire Alarm and PA system work and will submit the Fire NOC after completion of the work for handing over to the client department as official record. The work shall be deemed to be completed only after receiving NOC from the Authority mentioned above. Statutory fee if any shall be paid by the contractor. Enabling all liaising work, arranging inspection of the local body shall be within the scope of the contractor.
3. All major components of fire alarm system shall be product of a single manufacturer as per the list of approved make and shall conform to the requirement of EN54/ VDS/NFPA/ UL/ IS approved and designed according to Fire Alarm Systems Code of Practice for System Design, Installation and Servicing.
4. The system shall be addressable type and fully networkable. All fire panels shall be networked with each other with single mode fiber optic cable and also the fire system shall be **inter linked seamlessly** on RS 485 or Ethernet communication with each other so as in case of any emergency automatically the prerecorded message shall be played on defined areas speakers.
5. **Inspection and Testing:**
The contractor shall provide all necessary facilities for inspection of his equipment. In case of imported equipments, the contractor shall furnish the routine and type test certificates to the satisfaction of Engineer-in- charge.
6. **GENERAL DESCRIPTION OF INTELLIGENT FIRE ALARM SYSTEM:**
 - 6.1 The Proposed Fire Detection and Early Warning System consists of Analog Addressable Detectors. All the Analog Addressable Detectors, Addressable Manual Call Points and the Addressable input, output Modules will be looped together and terminated onto an Analog Intelligent Addressable Main Fire Alarm Control Panel.
 - 6.2 The Fire alarm system consists of the following elements :
 - 6.2.1 Addressable Photo-Electric cum Thermal Detectors for areas above false ceiling Electric Rooms, Electrical Shafts, Telecom Room, BMS Control Room, Fire Control Room, Pump Rooms, Transformer Rooms, HT Panel Rooms and Lift head Rooms etc. where ever required and suggested by Engineer in charge.
 - 6.2.2 Addressable Manual Call Points are proposed to be installed at each Fire Exit Staircase on each floor.

- 6.2.3 Addressable Input Module shall be provided in suitable location for the purpose of providing location address for flow switch.
- 6.2.4 Addressable Output Modules shall be provided in suitable location for the purpose of shutting off Fire Dampers on detection of smoke within its zone and for increasing the speed of exhaust / ventilation fans.
- 6.2.5 Entire Floor area of the building shall be divided into suitable number of loops.
- 6.3 **Main Fire Alarm Control Panel:** All the above Addressable Input Modules, Addressable Output Modules, Addressable Manual Call Points and the Addressable Detectors, shall be connected to 1 loop, Sounders will be located on each floor which will be activated in emergency.
- 6.4 Sounder Circuit controllers shall be provided for the purpose of operating sounders at any location on an addressable loop on the basis of command from control panel. It shall be possible to set a unique address to the devices fed from sounder circuit controller.
- 6.5 Controller shall monitor open/short circuit in the wiring to the sounders as well as the external power supply to the sounders.
- 6.6 Power for Modules shall be provided from Main Fire Alarm Control panel.
- 6.7 Sounders, Battery Back-up, Power Transformers, Software, Communication link shall be provided. The general scheme for spatial and logical disposition of the various elements of the system which will be strictly as per NBC 2016:
- 6.8 Detectors to be located under the false ceiling and distributed in open areas such that there is one detector in every 50 sq.mtr. area. The maximum distance between the detectors shall be as per NBC 2016.
- 6.9 Detectors to be located above the false ceiling area where the height exceeds 800mm between ceiling and false ceiling. These detectors shall be provided with response indicators.
- 6.10 Addressable Manual Call Points shall be located near all escape routes to enable any person to raise a fire alarm.
- 6.11 The Fire Panel that connects all the detector devices shall be capable of polling all the points in its loop so as to register an alarm within 3/7 seconds. The Fire Panel shall be capable of displaying the zone/address of the occurrence of the smoke and shall be capable of initiating action like Voice Evacuation, Activating Hooters, Dampers, Ventilation /Exhaust Fans and initiating other alarm procedures.
- 6.12 It shall be possible to program the Fire Panel such that meaningful alpha-numeric descriptions can be assigned to each Detector Address. This shall be useful in identifying the location of Fire very quickly and easily.
- 6.13 Output Modules shall be logically attached to particular Fans. As soon as Fire/Smoke is detected in a particular area, the Fire Panel through its software shall activate the appropriate Output Module program linked to the affected area.
- 7. **EQUIPMENT AND MATERIALS**
- 7.1 **MAIN FIRE ALARM CONTROL PANEL:**
- 7.1.1 The Main Fire Alarm Control Panel shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: analog addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other systemcontrolled devices.
- 7.1.2 The system shall include Eight or more loops (Each loop accessing minimum 240 addressable devices) or system having lesser loop capacity need to increase the no of loops accordingly and supply the same in the same cost.

- 7.1.3** The microprocessor shall be a state-of-the-art, high speed, at least 32-bit device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
- 7.1.4** The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
- 7.1.5** The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
- 7.1.6** The Main Fire Alarm Control Panel display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
- 7.1.7** The display shall include MINIMUM 320-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide Light-Emitting-Diodes (LEDs), that indicate the status of the following system parameters:
- a) AC POWER,
 - b) FIRE ALARM,
 - c) PREALARM WARNING,
 - d) LOW BATTERY,
 - e) SUPERVISORY SIGNAL,
 - f) SYSTEM TROUBLE,
 - g) DISABLED POINTS,
 - h) ALARM SILENCED.
- 7.1.8** The Main fire alarm control panel shall include a full featured operator interface control and annunciation panel that shall include as part of the standard system a backlit Liquid Crystal Display (LCD), individual color-coded system status LEDs, and an alphanumeric keypad for entry of any alphabetic or numeric information, for field programming and control of the fire alarm system. Minimum two different password levels shall be provided to prevent unauthorized system control or programming.
- 7.1.9** All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers.
- 7.1.10** The main power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:
- a) Ground Fault LED
 - b) Battery Fail LED
 - c) AC Power Fail LED
- 7.1.11** The main power supply shall operate on 230 VAC, 50 Hz, and shall provide all necessary power for the Main Fire Alarm Control Panel. It shall be provided with SMF Battery for 24 hours along with charger for stand-by supply with a provision to indicate battery voltage and charging current. It shall provide very low frequency sweep earth fault detect current capable of detecting earth fault on sensitive addressable module. It shall be power limiting using positive temperature coefficient (PTC) resistor.
- 7.1.12** The Main fire alarm control panel shall receive analog information from all addressable detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation

of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

- 7.1.13** To eliminate nuisance alarms each smoke detector shall be provided with alarm verification with fieldadjustable time from 0 to 55 seconds. Only a verified alarm shall initiate the alarm sequence for the zone.
- 7.1.14** Maintenance alert shall be provided with two levels to warn of excessive smoke detector dirt or dust accumulation.
- 7.1.15** A means shall be provided for adjusting the sensitivity of any or all Analog Addressable detectors in the system from the system keypad. Day/Night Adjustment of detector sensitivity shall be possible.
- 7.1.16** Any addressable device or conventional circuit in the system may be enabled or disabled.
- 7.1.17** Upon command from an operator of the system, a status report will be generated and printed, listing all system status. The system shall be able to display or print the following point status diagnostic functions:
 - a) Device status
 - b) Device type
 - c) Custom device label
 - d) View analog detector values
 - e) Device zone assignments
 - f) All program parameters
- 7.1.18** All the loop elements are able to isolate the short circuits on the loop wiring and thus no element is isolated in the event of single short circuit and the exact location of the short circuit is indicated on the respective fire alarm panel.
- 7.1.19** The printer shall provide hard-copy printout of all changes in status of the system and shall time-stamp such printouts with the current time-of-day and date. The printer shall be enclosed in a separate cabinet suitable for placement on a desktop or table. The printer shall communicate with the control panel using an interface. Power to the printer shall be 230 VAC @ 50 Hz.
- 7.1.20** The fire alarm control panel shall contain a history buffer that will be capable of storing up to 2500 events. Each of this activation will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory.
- 7.1.21** The system shall include one serial EIA-232/ Centronics Parallel interfaces. Each interface shall be a means of connecting multiple printers, CRT monitors and other similar peripherals.
- 7.1.22** Smoke Detectors (Photo-Electric) and Heat Detectors shall be located as shown in the drawings. Loop communications and processing scheme shall assure that in a fully loaded loop, alarms will be detected in no more than 3 seconds.
- 7.1.23** The Output module shall provide auxiliary relay circuits rated at minimum 5 amperes, 58 VDC. An expansion circuit board shall allow expansion to eight relays per module.
- 7.1.24** The control panel shall be housed in a cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
- 7.1.25** The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. The control panel shall be modular in structure for ease of installation, maintenance & future expansion.
- 7.1.26** When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur.
- 7.1.27** A local piezo electric signal in the Main fire alarm control panel shall sound.

- 7.1.28 A backlit 350-character LCD display / Touch screen on the Main fire alarm control panel shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
- 7.1.29 Printing on the Main fire alarm control panel and history storage equipment shall log the information associate each new fire alarm control panel condition, along with time and date of occurrence.
- 7.1.30 All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated. Acknowledge Switch: Activation of the control panel acknowledge switch in response to a single new alarm and/or trouble condition shall silence the local panel piezo electric signal and change the system alarm or trouble LED from flashing mode to steady-ON mode. If additional alarm or trouble conditions exist or are detected and reported in the system, depression of this switch shall acknowledge and/or advance the 80-character LCD display to the nest alarm or trouble condition.
- 7.1.31 Alarm Silence Switch: Activation of the alarm silence switch shall cause all notification appliances and relays, which are programmed to de so to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silence able by this switch shall be fully programmable within the confines of all applicable standards.
- 7.1.32 Alarm Activate (Drill) Switch: Activation of system drill switch shall initiate an automatic test of all analog/addressable detectors in the system. The system test shall activate the electronics in each analog/addressable sensor, simulating an alarm condition and causing the transmission of the alarm condition from that sensor to the Main fire alarm control panel. The Main fire alarm control panel shall interpret the datafrom each sensor installed in the system. A report summarizing the results of this test shall be displayed automatically on the control panels LCD display, CRT and printer. This report shall display the number of detectors tested per SLC/Loop, the total number tested in the system, any detector that failed, or an all "Tested OK" message. Time/Date stamp of when the test was performed shall also be included in the report.
- 7.1.33 System Reset Switch: Activation of the system reset switch shall cause all electronically-latched initiating devices, appliances or software zone, as well as all associated output devices and circuits, to return to their normal condition. If the alarm conditions still exist, or if they reoccur in the system after system reset switch activation, the system shall then respond the alarm condition.
- 7.1.34 **Lamp Test:** Activation of the lamp test switch shall sequentially turn on all LED indicators, LCD display and local piezo electric signal, and then automatically return the fire alarm panel to the previous condition.
- 7.1.35 An alarm from a water flow detection device shall activate the appropriate alarm message on the 200- character display; turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
- 7.1.36 The Main fire alarm control panel shall be capable of mapping diagnostics with the diagnostic codes so that the alphanumeric description of the same shall be displayed on the Fire Display Panel.
- 7.1.37 The Response Time for each loop shall not exceed 750 milli second.
- 7.2 **REPEATER PANEL**
 - 7.2.1 The panel should have 350-character Liquid Crystal Display / Touch screen with backlit control. It should have on board input, output and status indicators to support diagnostics. Should be provided with keypads or touch screen.
 - 7.2.2 It should be provided with the features of display and control center participation/indication proper cabinet to house the above devices.

- 7.2.3** It shall have Built-in-isolator to maintain complete functions of all elements in loop if wires are broken or if there is a short circuit.

7.3 ADDRESSABLE DEVICES

- 7.3.1** Addressable Detectors Shall be of Optical, Photoelectric type, Photoelectric cum Heat Type and Thermal type.
- 7.3.2** The Detectors shall be Analog Addressable and shall connect with two wires to the Main fire alarm control panel Signaling Line Circuit (SLC) loops.
- 7.3.3** Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the Main fire alarm control panel based on real-time measured values.
- 7.3.4** The Main fire alarm control panel software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the Main fire alarm control panel program and allowing the system operator to view the current analog value of each detector.
- 7.3.5** The Detectors above false ceiling shall be ceiling-mounted and mount to a single suitable square/round M.S. box fixed direct on the ceiling and detectors below false ceiling shall have anchoring arrangement of the base with the false ceiling with use of a round / square 16 gauge M.S. plate mounted above false ceiling to which the base shall be screwed and shall have a twist-lock removable base and insect- resistant screen for field cleaning.
- 7.3.6** The Detectors shall be Compact of a Stylish Design and shall have built-in tamper- resistant feature.
- 7.3.7** The detectors shall provide auto address setting. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL, PHOTO cum THERMAL).
- 7.3.8** The detectors shall be provided with a LED. The LED will flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel.
- 7.3.9** The LED shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. It shall also be possible to connect an external remote alarm LED if required.
- 7.3.10** Detectors shall have a plug-in wiring connector for ease of installation and serviceability. Easy wiring using terminal block shall be provided to enable removing the detector without loss of power to the remaining loop.
- 7.3.11** The detectors will provide a means to test whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself, by activating a magnetic switch, or may be activated remotely on command from the Control Panel.
- 7.3.12** The detectors shall have fully coated circuit boards, RF/transient protection circuits and shall withstands air velocities exceeding 1,500 feet-per-minute without triggering false alarm.

7.4 ADDRESSABLE THERMAL DETECTORS

- 7.4.1** The addressable Thermal sensor shall have low profile and operate on the combination of “rate of rise” and “fixed” temperature principles with fixed temperature set point at 135 degree F (58 degree C) & have a rateof- rise element rated at 15 degree F(9.4 degree C) per minute. It shall connect via 5 wires to the fire alarm control panel signaling line circuit.

7.5 ADDRESSABLE PHOTO-ELECTRIC CUM HEAT DETECTORS

- 7.5.1** The analog addressable photo-electric cum Heat detector shall use both photo-electric (light scattering) principle as well as on thermal sensing by combination of rate of rise and fixed temperature.

- 7.5.2** All the detector shall have preferably with integrated built in short circuit isolator or as per manufacturer design with isolator base so that in case of any short circuit in the detector, the detector can be isolated so that loop should be able to retain the full functionality but in later case isolator unit shall ensure that the loop is functional except the faulty detector.

7.6 ADDRESSABLE INPUT MODULE

- 7.6.1** The addressable input module shall allow the connection of simple contacts to an addressable detection line of the control panel.
- 7.6.2** No separate power supply shall be required. The addressable monitor module shall represent one address on the control panel.

7.7 ADDRESSABLE OUTPUT MODULE

- 7.7.1** Addressable output Modules shall be provided to allow a compatible Main fire alarm control panel to switch discrete contacts by code command.
- 7.7.2** The Module shall mount in a standard electrical box or to a surface mounted back box. The Module shall provide two isolated sets of Form-C contacts for fan shutdown and other auxiliary control functions.
- 7.7.3** The Module contact ratings shall support up to 1 Amp/30 VDC of Inductive load or 5Amps/30VDC (coded) of Resistive load (up to 3 Amps in non-coded applications).
- 7.7.4** The relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure that 100% of all auxiliary relays or may be energized at the same time on the same pair of wires.
- 7.7.5** The Module shall provide address-setting and shall also store an internal identifying code that the Main fire alarm control panel shall use to identify the type of device.
- 7.7.6** An LED shall be provided that shall flash under normal conditions, indicating that the Module is operational and is in regular communication with the control panel.
- 7.7.7** A magnetic test switch shall be provided to test the module without opening or shorting its internal circuit wiring.
- 7.7.8** The interface unit shall be suitable for connecting normally open (N.O.) alarm initiating devices such as pressure switch, flow switch, level switch, potential free contacts etc in the addressable loop.
- 7.7.9** The interface unit shall be a sealed electronic unit with individual address. It shall be housed in a metallic/high impact plastic enclosure and suitable for indoor/outdoor installation. The operating voltage shall be 50 v to 58 volts D.C.
- 7.7.10** The module should contain an integrated short circuit isolator which ensures that the fault is localized and the loop continues to function fully in the event of a wire break or a short circuit.

7.8 FAULT ISOLATOR MODULE

- 7.8.1** Fault Isolator Modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop.
- 7.8.2** The Isolator Module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop.
- 7.8.3** At least one isolator module shall be provided after group of 10-50 detectors. If a wire-to-wire short occurs, the Isolator Module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the Isolator Module shall automatically reconnect the isolated section of the SLC loop.
- 7.8.4** The Fault isolator module shall be an automatic switch and shall open when the line voltage drops below 4 volts. The Fault Isolator Module shall not require any address setting, and its

operations shall be totally automatic. It shall not be necessary to replace or reset an Isolator Module after its normal operation.

7.8.5 The Fault Isolator Module shall mount in a standard electrical box or in a surface mounted back box. It shall provide a single LED that shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

7.8.6 All the detector shall have preferably with integrated built in short circuit isolator or as per manufacturer design with isolator base so that in case of any short circuit in the detector, the detector can be isolated so that loop should be able to retain the full functionality but in later case isolator unit shall ensure that the loop is functional except the faulty detector.

7.9 RESPONSE INDICATOR

7.9.1 The response indicator shall provide a remote indication for any analogue addressable detector installed above the false ceiling. The response indicator shall be driven directly from its associated local detector. The connection to the response indicator shall be monitored for open and short circuits. Each Response indicator shall be looped with 3 to 5 detectors above the false ceiling.

7.10 BATTERIES:

7.10.1 The battery shall have sufficient capacity to power the fire alarm system for not less than 54 hours upon a normal AC power failure. Battery Capacity Calculation shall be submitted to Engineer – in charge for their approval. The batteries are to be completely maintenance free. No liquids are required to replenish.

7.11 LIST OF STANDARDS AND CODES APPLICABLE

7.11.1 The Fire Alarm system shall comply with latest requirements of NFPA standard No. 75 / EN Standard for protected premises signaling system, Indian Standards IS 2189, IS 2175, IS 11360 and local Statutory Regulations. The system shall be as per above IS standards but not limited to it. The specifications and standards listed below form a part of this specification.

7.11.2 The system shall fully comply with the latest issue of these standards.

7.11.2.1 Underwriters Laboratories Inc. (UL) – USA& FM or EN 54 Signaling Systems.

Detectors, manual call points, spot indicators and PA system shall be installed at locations as per requirement of local fire authority, NBC-2016 and CPWD specifications as required. The type of detector to be installed shall be decided as per the utility and as per direction of Engineer- in-charge based on requirements of local fire authority, NBC-2016 and CPWD specifications.

- (i) In the event of a fire alarm, but not in a fault condition, in addition to other activities described in the CPWD Specifications, all lifts initiated through the system shall automatically be returned to Main landing or Ground Floor.
- (ii) FAS shall have an emergency voice alarm & communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported.

C-4**CCTV, LAN & IPABX System****CCTV**

1. Scope of work involves preparation of drawing, supply, installation, testing and commissioning of Day / Night IR IP Based Dome cameras, Bullet cameras, Network Video Recorder, Hard Disk and Display in building as approved drawing and Engineer-in-charge direction, with suitable mounting arrangement etc. complete as required to make system fully functional. It will be the responsibility of the vendor/bidder to make the entire system fully functional as per the specifications. Vendor/bidder shall consider any equipment/devices required to make the system functional if not mentioned herewith.
2. The scope also included guaranty/warranty of entire installation and equipment's/accessories supply by them as per OEM.
3. The work shall be carried out as CPWD General Specifications of Electrical Works Part-I 2023 corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, good engineering practice.

NOTE: The firm will be required to provide items/material as per the specifications indicated in Schedule of work. The department reserves the right to accept items/materials with richer specifications as available in the market/ with manufacturer due to technological up gradations/ model up-dation, without any extra cost implication with the approval of Engineer in charge.

LAN & EPABX System

1. The work shall be carried out as per CPWD General Specifications for Electrical Works Part-I (Internal 2023, Part-II (External) 2023 as amended, relevant IE rules & Acts.
2. Scope of work involves preparation of drawing, supply, installation, testing and commissioning of EPABX and LAN system including 24 port PoE/Non-PoE layer2 switches, SFP module, Wireless access Point having range of minimum 80 mtr, Cat6/6A cabling, I/O Boxes, Racks, OFC Cabling, LIU, Patch Cords etc inside the building to complete as required to make system fully functional. It will be the responsibility of the vendor/bidder to make the entire system fully functional as per the specifications of schedule of work. Vendor/bidder shall consider any equipment/devices required to make the system functional if not mentioned herewith. The system should be capable to communicate to office require persons, securities and control rooms. The scope of work also included guaranty/warranty of entire installation and equipment's/ accessories supply by them as per OEM.
3. **System requirement:-**
 - 3.1. The system shall be capable of working in a suitable ventilated non air conditioned environment as well as air conditioned environment.

- 3.2. The environment conditions limit:
 - a. Temperature—0 to 50Deg.C
 - b. Humidity —0 to 95%
- 3.3. The System must be based on latest micro control based/digital technology using pulse code modulation/time division multiplex in (PCM/TDM).
- 3.4. The EPABX shall be able to handle analogue/digital trunk inter face as per National / International standard.
- 3.5. The cabinet design shall provide for adequate ventilation to dissipate heat due to energy loss.
- 3.6. There shall be protection EPABX system from high voltage, current transient lightening occurring on junction line so the exchange etc.

Standards

This system shall comply with following standards.

- (i) ISO/IEC 11801 Ed.2:2002. Information Technology—Generic Cabling for Customer Premises.
- (ii) ANSI/TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components.
- (iii) ANSI/TIA-568-C.3 Optical Fiber Cabling Components Standard, and its published addenda.
- (iv) IEEE 802.
- (v) IEEE 802.3-2018: IEEE standard for Ethernet.
- (vi) IEEE 802.7-1989: IEEE standard for Broadband Local Area Networks.
- (vii) IEEE 802.8: IEEE standard for Fiber Optic Local and Metropolitan Area Networks

NOTE: The firm will be required to provide items/material as per the specifications indicated in Schedule of work. The department reserves the right to accept items/materials with richer specifications as available in the market/ with manufacturer due to technological up gradations/ model up-dation, without any extra cost implication with the approval of Engineer in charge.

C-5

LIFT

1. The work shall be carried out as per CPWD General Specifications for Electrical Works Part-I (Internal) 2023 as amended and corrected up to date, Part-II (External) 2023 as amended and corrected up to date, Part-III (Lifts & Escalators)- 2003 as amended and corrected up to date, and relevant IE rules.
2. The Scope of work includes drawings, designs, testing, inspection as may be necessary before despatch, delivery at the site, installation, testing, commissioning, inspections from the competent authority and handing over to the client in fully working condition.
3. **The Contractor shall enable to obtain NOC for the erection of the lift before commencement of work and a license for operation of lifts on its completion from the Lift Inspector, Guwahati, Assam or any appropriate authority appointed by the Govt in this regard.** The work shall be deemed to be completed only after receiving NOC from the Authority mentioned above. Statutory fee if any shall be paid by the contractor. Enabling all liaising work, arranging inspection of the local body shall be within the scope of the contractor.
4. The work will be executed as per the general arrangement drawing and detailed fabrication drawings as submitted by OEM, duly approved by the Engineer-in-charge. The equipment will be ordered only after approval of drawings from the Engineer in Charge.
5. Equipment will be inspected at the manufacturer's premises (within India) before despatch to the site. The Engineer-in-Charge or his authorized representative may witness such inspection. The contractor shall give sufficient advance notice regarding the date of inspection to the department. The cost of the representative's visit to the factory will be borne by the department.
6. Lift shafts, Machine room wiring and power distribution, power supply cable shall be done as per CPWD General Specifications for Electrical Works Part -I (Internal) 2023 and local body requirements it shall be provided of the tender.
7. Earthing and loop earthing as per CPWD General Specifications for Electrical Works Part-I Internal 2023 and Lifts & Escalators-2003 as amended and corrected up to date and provided under Package – I of the tender.

ADDITIONAL SPECIFICATIONS OF 13 Passenger			
1)	Type of Lift	:	13 Passenger Lift (MRL)
2)	No. of lifts Required :	:	1 No.
3)	Load	:	884 Kg
4)	Rated speed	:	1 MPS
5)	Travel in meters	:	As per actual
6)	Number of floors served	:	G+1
7)	Stops & Opening	:	As per actual
8)	For 13 Passenger Lift		
a)	Inside size of lift well	:	2500 mm wide x 1900 mm deep (approx.)
b)	Pit depth	:	As per approved by Engineer-In-Charge
c)	Head Room	:	As per approved by Engineer-In-Charge
9)	Clear inside size of the lift car		Minimum size 1900 mm wide x 1900 mm deep
10)	Position of the counter weight	:	As per IS
11)	Position of machine room	:	Machine Room less and Gear less
12)			
a)	Type of control	:	Microprocessor based A.C. variable voltage variable frequency (VVVF) control
b)	Type of operation	:	Microprocessor based full collective simplex control with/without attendant.
c)	Potential free contacts	:	Required for each floor position and up & down movement of the lift for building automation and central indicating panel.
13)	Car Entrance Door	:	
a)	Number	:	1 No. Stainless Steel scratch proof Moon rock finish, center opening horizontal sliding power operated door without vision panel.
b)	Size	:	As per approved by Engineer-In-Charge
c)	Type of door	:	Centre opening horizontal sliding door
d)	Car opens in front only or open through	:	In front only.
14)	Construction design and finish of car body work	:	Stainless Steel scratch proof Moon rock finish body work, stainless steel drop ceiling and LED lights for lighting inside the car and fan. Granite flooring. All other items as per CPWD General Specifications Part III for Lifts 2003.
15)	Type of signal system	:	a) Digital floor position indicator in the car and at all landings (to be provided above the car/ landing doors). b) Travel direction indicator in the car and at all landings. c) Gongs & visual indication through directional arrows on all landings for pre-arrival of the car at all floors. d) Overload warning Audio & Visual indicator, inside the car (lift should not start on overload). e) Battery operated alarm bell and emergency light.

			f) Car operating panel with fade proof luminous buttons in car and with intercom.
			g) Luminous hall buttons at all landings. Landing call registered indicator at all floors.
			h) Voice annunciation system. This will announce the position of the car landing in Hindi & English besides facilities for any other announcement to be made from the central control room/ reception of the building.
			i) Intercom system with (One at Ground floor and inside the car).
			j) Protection against over-voltage, under-voltage and single phasing should be provided.
			k) Brail system including all facilities for physically challenged person.
16)	Landing Entrance		
a)	Location of landing entrance on different floor	:	All doors on the same side
b)	Number	:	1 No. Stainless Steel scratch proof Moon rock finish
c)	Size	:	Minimum door size is 2000mm X 900mm (width) as per approved by Engineer-In-Charge
d)	Type of doors	:	Centre opening Horizontal sliding SS scratch proof
e)	Life in use / lift out of order sign	:	A suitable box above the landings with LED illuminated bilingual (in English & Hindi) sign of "Lift Out of Order" coming up simultaneously on all floors.
17)	Electric supply	:	415 V, 50 Hz, 3 phases 4 wire A.C. Supply, system.
18)	Is neutral wire available for control circuits	:	Yes
19)	Storage space provided	:	Yes,
20)	Additional items	:	
a)	Dimensions of car platform	:	Should be approximately to have the clear inside size of car
b)	Ventilation opening in the car body	:	The fan should be auto switch off when there is no passenger inside the lift car.
c)	Opening panel inside car	:	Automatic cum manual flush mounted with luminous switches suitable for barrier free environment for differently abled persons at ground floor.
d)	Fireman's switch	:	Required for both lifts at ground floor.
e)	Emergency power supply	:	Available from DG set.
f)	Automatic Rescue Device (ARD) : Automatic Rescue Device complete with dry maintenance free battery of requisite capacity for the purpose of bringing the lift car to the nearest floor should be provided, one for each individual lift are to be provided for each lift. This shall consist of		
	i)	Control panel with necessary interface/ integration of device with the main controller.	
	ii)	Inverter of required capacity.	
	iii)	Maintenance free batteries of required Ampere-hours capacity.	

	iv) Battery charging unit.
	v) 'Rescue Operation on' indicator in the lift car.
g)	Free maintenance for a period of one year from the date of commissioning and taking over by the Department. The maintenance period of 12 months for each lifts shall be reckoned from the date of handing over of each lift separately.
h)	Lift car door & landing door shall have a fire resistance rating minimum two hours and above.
i)	System including all facility for differently abled persons.
j)	Call push & Control Panel height shall be within 900mm.
Guarantee LIFT : All equipments shall be guaranteed for a period of 12 months from the date of taking over the installation by the department against unsatisfactorily performance and/or break down due to defective design, workmanship of material. The equipment or components, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of the Engineer-in-Charge in this regard shall be final. The contractor has to carry out routine and preventive maintenance for 12 months from the date of handing over. Nothing extra shall be paid against this.	

Test Certificate: Test certificates including warranty/guarantee certificates of all the materials supplied for the work carried out shall also be submitted mentioning order date/ no/ lot no etc. Failing which recovery @ Rs 50,000/- per service shall be made from final bill.

The eligibility criteria of Lift works shall be as per DG O.M. No. DG/SE (E)-TAS/PPP-M/II order /22(H) dated 28/09/2020 as attached below:-

	
केंद्रीय लोक निर्माण विभाग	
कार्यालय ज्ञापन	
सं.- महानिदेशक/अधीक्षण अभियंता(वै)टास/पीपीपी-एम आई आई आर्डर/22	दिनांक 28.09.2020
निर्माण भवन, नई दिल्ली	
विषय: Eligibility Criteria for Lift Works (Revision-3)	

Eligibility Criteria for Lift Works (Revision-2) in CPWD notified vide OM No. महानिदेशक/अधीक्षण अभियंता(वै)टास/ पीपीपी-एम आई आई आर्डर/17 dated 20-04-2020 is hereby revised and notified as enclosed, since the list of designated labs or certifying agencies has not been issued by the Bureau of Indian Standards yet. This supersedes all earlier issued eligibility criteria for lift works. This shall come into force with effect from the date of issue of this order.

This issues with the approval of DG, CPWD.

अनुलग्नक: यथोपरि

(डी के तुलानी)
अधीक्षण अभियंता (वै)
तकनीकी अनुप्रयोग एवं मानक

फाइल नं ई-9077096/30(1)/लिफ्ट-बैठक/मु. अभि. सी एस क्यू (वै)/2017 से जारी

सेवा में, (केवल केंद्रीय लोक निर्माण विभाग की वेबसाइट के माध्यम से)

सभी विशेष महानिदेशकों, अतिरिक्त महानिदेशकों, के. लो. नि. वि., प्रमुख अभियंता, लो. नि. वि., दिल्ली, सभी मुख्य अभियंताओं, मुख्य अभियंता एवं कार्यकारी निदेशकों, अधीक्षण अभियंताओं, अधीक्षण अभियंता एवं परियोजना निदेशकों, कार्यपालक अभियंताओं, कार्यपालक अभियंता एवं वरिष्ठ प्रबंधकों, के. लो. नि. वि. को सूचनार्थ एवं आवश्यक कार्रवाई हेतु।

Eligibility Criteria for Lift Works (Revision-3)

1. The lift manufacturer shall comply with BIS standards, duly certified by the manufacturer itself.
2. The manufacturer shall be compliant to the Public Procurement (Preference to Make In India), Order 2017 (as amended from time to time) issued by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry.
3. The experience of successful completion of similar works shall be as per CPWD Works Manual/SoP.
4. The manufacturer shall furnish an undertaking regarding availability of spares for the entire expected life of the lift i.e. 15 to 20 years.
5. The complete lift installation including its components, safety devices, various types of controls etc., testing, inspection, operation & maintenance shall conform to relevant Codes, Standards, code of practices, guidelines, safety rules, inspection manual(s), rules issued by Bureau of Indian Standards, as amended up to the last date of receipt of tenders.
6. Quality standards shall conform to latest IS/ISO-9001:2015.
7. The down time of installed lifts being maintained by the manufacturer shall not be more than 8 hours (average) in case of minor faults and 7 days (average) in case of major faults during the last one financial year.

Govt. of India
Central Public Works Department
O/o Chief Engineer (CSQ) E
A Wing, Room no. 229
Nirman Bhawan, New Delhi -110011
Tel. 011-23061418

OFFICE MEMORANDUM

No. 30(01)/LIFTS/CE,CSQ(E)/E-3141577/2024/02 E

Dated 19/01/2024

ISSUED BY THE AUTHORITY OF DIRECTOR GENERAL, CPWD

Sub: Amendments in CPWD General Specification for Electrical Works (Part III Lift & Escalators) 2003 – Amendment No. 1.

The following amendments shall be made in provisions of CPWD General Specification for Electrical Works (Part III Lift & Escalators) 2003 in regard to barrier free requirements in Lifts & Escalators :-

Para No.	Existing provisions	Amended Provisions
1. Appendix –VII (Barrier Free Requirements).	1)Wherever lift is required as per by-laws, provision of at least one lift shall be made for the wheel chair user with the following cage dimensions of lift recommend for passenger lift of 13 persons capacity by Bureau of Indian Standards. Clear internal depth : 1100 mm Clear internal width : 2000 mm Entrance door width : 900 mm 2) hand rail not less than 600 mm long at 900 mm above floor level shall be fixed adjacent to the control panel. 3)The lift lobby shall be of an inside measurement of 1800 x 2000 mm or more. 4) The time of an automatically closing door	A. Lift Location & Size 1. Lifts shall be conveniently located and appropriately guided from the entrance by signage (Internal of Symbol of Accessibility) and tactile guiding systems to the lift lobbies in all building typologies. It is recommended that in multi-storied buildings, there should be at least one lift accessible to transport persons with disabilities at all usable levels and all levels used by the general public or staff. The requirements given below are to be considered and provided by building planners and building designers. a) Lift shall be located at accessible routes. b) Accessible landings at lift entrance shall be provided on each eligible floors. c) Lift shall be marked with international symbol of accessibility. d) It is recommended to install a floor directory of the main facilities and services available on the lift landing, along with an accessible emergency exit route that clearly indicates the location of

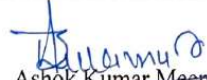
	should be minimum 5 seconds and the closing speed should not exceed 0.25 M/Sec. 5) The interior of the cage shall be provided with a device that audibly indicate the floor the cage has reached and indicate that the door of the cage for entrance/exit is either open or closed. 6) The Braille signage will be posted outside the lifts.	the nearest refuge area for persons with disabilities. e) A sign indicating the number of the floor arrived shall be provided on each lift landing on the wall opposite the lift in big font with big colour contrast. 2. The minimum Internal clear size of the lift car should be 1900 mm x 1900 (Width x Depth) mm for all new establishments. In case where the space is not available the lift size shall be a minimum of 1500 mm x 1500 mm (Width x Depth) if approved by Engineer in charge. 3. It is recommended to install a 13 passenger lift which allows easy users, baby strollers and other wheeling devices. 4. The floor of the lift car shall be rigid and non-reflective matt finish and shall be slip resistant to decrease the risk of stumbling. 5. Internal car lighting should provide minimum level of illumination of 100 lux at floor level, uniformly distributed, avoiding spotlights. B. Lift Door : 1. The lift door should have a clear opening of not less than 900 mm and contrasting in colour from the adjoining wall. 2. There should be no difference in level between the lift door and the floor surface at each level. The gap between the lift door and building floor should not be more than 12 mm. Obstacle-free accessibility on the landing floors is required on all eligible floors. 3. Doors shall be automatic horizontal sliding type and shall remain opened at least 3 seconds and adjustable upto 20 seconds. . 4. Time of closing of an automatic door should be more than 5 seconds and the closing speed should not exceed 0.25 meters per second. 5. The lift doors shall have a vision panel to enable persons with hearing impairment to signal for help or assistance in the event of
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		an emergency. Further an appropriate technological support be provided (Through CCTV intercom or emergency messaging services or alarms etc.) to respond to the emergency requirements of person with hearing impairment or deafness. 6. A non-contact sensor device shall be provided in the door opening to detect an entering or exiting passenger or an assistive device to prevent the risk of the passenger or an assistive device from being hit by the leading door panel(s). The sensor device shall cover at least 1600 mm of the door height measured from a distance of 25 mm above the door sill. If there is a user in the doorway, the door shall automatically reopen and shall not produce a force greater than 135 N. C. Call Button : The call button located outside the lift and it should have : 1. A clear floor space of at least 900 mm x 1200 mm with no obstruction placed to prevent a wheelchair user from reaching the call button. 2. Be installed at a height between 800 mm and 1000 mm. 3. Call buttons in each floor can contain icons instead of digits in tactile and colour contrasted against the background. 4. Buttons shall always provide a two-channel feedback when pressed: visual and acoustic or visual and tactile. 5. Colour of any face plate of landing push button shall be contrasted to its surroundings. 6. For the benefit of wheelchair users, the minimum distance to the centre line of any of the buttons from any wall or door at right angles, shall be 500 mm. 7. Active part of the button shall be identifiable visually and by touch / acoustic from the face plate or its surroundings. Additionally, braille markings may be provided apart from raised letters. D. Control Panel The control panel should have :
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		1. A clear floor space of at least 900 mm x 1200 mm with no obstruction placed to prevent a wheelchair user from reaching it 2. Be placed at a height of between 900 mm to 1200 mm from the floor level. 3. Provide equidistant access to control panel buttons, especially for independent wheelchair users or others, the control panel shall be placed horizontally. 4. The buttons with Braille/raised letters and in sharp contrast from the background to aid people with visual impairments. Touch sensitive buttons or keypads shall be avoided. E. Grab Bars/Hand Rail : Grab bars in lifts should have following minimum provisions: 1. Slip-resistant with round ends. 2. The bar / rail shall be circular section of 38-50 mm in diameter. 3. The free space between the wall and the gripping part shall be at least 40-60 mm from the walls; 40 mm min. for smooth wall surfaces and 60 mm min. for rough wall. The bar surfaces shall Be free of any sharp or abrasive elements and Have continuous gripping surfaces, without interruptions or obstructions that can break a hand hold. The Grab bar may be interrupted where the car operating panel is located in order to avoid obstructing buttons or controls and be allowed to have a gap of 150 mm or less if it is not continuous. 4. It shall able to bear a weight of 250 kg. 5. Manufactured from a material which contrasts with the wall finish, be not too warm/cold to the touch and provide good grip. 6. Placed at a height of 800 mm to 900 mm from the floor level.
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		7. Be fixed on both sides and at the rear of the lift. 8. Grab bars should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall . F. Audio and Visual Indicators 1. The lift should have a voice announcement system along with a visual display to indicate the floor level, car status and also the information that the door of the elevator is open or closed for entrance or exit. 2. The announcement system should be clearly audible i.e. the announcement should be 50 Db. 3. The emergency bell in the lift must be connected to a blinking light in the lift car to signal to persons with hearing. 4. Two illuminated indicator arrows giving advance information on the next departure direction of the car (only one at the terminal landings) placed above or near the doors in a visible position, to indicate the direction in which the car will subsequently move. Landing indicator arrows shall be located between 1.80 m and 2.50 m above the floor. The height of the arrows shall be at least 40 mm. 5. An audible signal shall accompany the lighting of arrows. The audible signal shall use different sounds for up and down. i) One sound for up; and ii) Two sounds for down 6. A car position signal shall be located with or above the car operating panel. The center line of the indicator shall be positioned between 1.60 m and 1.80 m from the car floor. The height of the floor number shall be between 25 mm and 60 mm and have a contrasted colour to its surroundings. G. General:
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		1. Battery operated/ back up emergency light, alarm and intercom preferably hands-free type, shall be provided. 2. Automatic Rescue Device (ARD) : In the event of a power failure during normal operation, a battery operated ARD shall automatically move the stalled lift to the nearest floor, open the doors, thereby facilitating rescue of the stranded passengers in the lift. 3. The lift car shall not start when the car is overloaded. The lift operation shall resume only upon removal of the overload. 4. The floor of the lift car should be slip resistant and have similar frictional qualities to the floor of the lift landing to decrease the risk of stumbling. 5. The provision of a mirror (Laminated safety glass) on the wall of the lift car opposite the lift door is a positive aid to navigation for wheelchair users. It allows the wheelchair user to see if anyone is behind them and also to see the floor indicator panel. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments. 6. The other provision related to disable person friendly for lifts in conformity with Harmonised Guidelines & Standards for Universal Accessibility in India 2021 by MoHUA, Govt. of India and IS : 15330 : 2020.
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 Ashok Kumar Meena
 Executive Engineer (E) TAS 19/11/2024

To,

(CPWD Website only)

All SDGs, ADGs, CEs, SEs and EEs CPWD for necessary action.


 Executive Engineer (E) TAS
 19/11/2024

C-6

SUB-STATION AND SUB-STATION EQUIPMENT'S

1.1 INSPECTION, TESTING AT MANUFACTURERS WORKS

The contractor will be required to furnish such facilities as will be necessary for inspection of the equipment before dispatch at the manufacturer's works and also for witnessing such tests, at the works, if so required by the department. The contractor shall furnish information for this purpose and will also give sufficient notice regarding the dates proposed for such test to Inspection agency.

1.2 TEST CERTIFICATE

Copies of all documents for routine, acceptance and type test certificates of the equipment carried out at the manufacturers premise shall be furnished to the department alongwith supply of the equipment.

1.3 COMPLETION DRAWING

Three sets of completion drawings comprising the following shall be submitted by the contractor while handing over the installation:

- a) Equipments layout drawing(s) giving complete details of the entire equipments.
- b) Electrical drawings for the entire electrical equipments showing cable sizes, equipment capacities, switch-gear's ratings, control components, control wiring etc.
- c) Schematic diagram of the entire sub-station installation.

1.4 FINAL INSPECTION AND TESTING

When the installation is complete, the contractor shall arrange for inspection and testing of the installation. Test results obtained shall be recorded. The installation shall not be accepted until it complies with the requirement of these Specifications. The Sub Station installation shall be got inspected by the contractor from local licensee and/or CEA and their clearance taken before energizing the Sub Station. All the observations/ deficiencies pointed out by the inspecting authorities shall be complied with by the contractor on priority. The department shall render all help and pay mandatory charges to CEA and local licensee, if any, in this regard.

1.5 TRANSFORMER

Scope of Work : Supplying, installation, testing & commissioning of Energy efficiency level 2 or amended up to date as per IS 1180 : (Part 1) as amended up to date (Amendment 4), 63 KVA, 11/0.433 KV, 3 phase, 50 Hz, Dyn11 ,ONAN type, copper wound distribution outdoor type transformer suitable for floor mounting with CRGO Stacked core, 'OFF' load tap changing arrangement on HV side having HV side Cable end box suitable for suitable size XLPE cable of grade 11KV or suitable for 11 KV ACSR conductor arrangement and suitable size bus trunking/cable termination on LV side, neutral brought out separately, complete with all accessories including first filling of filtered dehydrated transformer oil and confirming to IS: 1180 , etc complete as required at the site. Rated KVA at the ambient air temperature 45°C maximum -63KVA , Rated voltage of HV -11KV, Rated voltage of MV -0.433KV , Temperature rise in oil/windings -40/45°C , Rated Frequency -50Hz c/s, Number of Phase -3 , Winding Connections HV/LV -DELTA/STAR, Percentage Impedance-4.5% (max), Vector Group Reference -Dyn-11, Tappings on HV/LV to vary HV/LV + 5% to - 5% steps of 2.5%, Total loss @ 50% load - 300 Watt (Max), Total loss @ 100% load - 1050 Watt (Max), Transformer should be tested APDCL Lab Test, if required.

Tests at Site :

In addition to tests at manufacturer's premises, all relevant pre-commissioning checks and tests conforming to IS code of practice No. 10028 (Part II & III) shall be done before energization. The following tests are to be particularly done before cable jointing or connecting up the bus bar trunking:

- a) Insulation test between HV to earth and HV to MV with 5000 volts Megger.
- b) Insulation test between MV to earth with 500 volts Megger.
- c) Di-electric strength Test on oil.
- d) Buchholtz relay operation by simulation test when fitted.

All test results are to be recorded and reports should be submitted to the department.

1.6 Installation and Commissioning

The transformer shall be installed in accordance with IS 10028 (Part II & III)-Code of practice for Installation and maintenance of transformer. Necessary support channels shall be grouted in the flooring.

The transformer shall be moved to its location and shall be correctly positioned. Transformer wheels shall be either locked or provided with wheel stoppers. All parts of the transformers which are supplied loose, such as conservator, radiator banks, Buchholtz relay, dial thermometer, bushing etc. shall be fitted on the transformer. Transformer oil supplied in drums shall be topped up into the transformer after duly testing/filtering upto the correct level required.

Wiring of devices such as Buchholtz relay, dial thermometer etc. shall be carried out as per drawings, Earthing of neutral and body of the transformer shall be done in accordance with section (7) of these specifications.

Drying out of transformer winding will be necessary when the di-electric strength of the oil is lower than the minimum value as per IS10028 or the transformer has not been energized within 6 months of leaving the works or where the radiator assembly is done at site. The transformer shall be dried out by one of the methods specified in IS 10028. Drying out with centrifugal or vacuum type filters will, however, be preferred. The contractor shall carry out the process of drying without interruption and shall maintain a log sheet indicating time, oil temperature and insulation resistance.

After complete drying out of the transformer, oil sample shall be collected by the contractor and shall be tested for di-electric strength as specified in IS 335:1993 with approved test kit.

All devices such as dial type thermometers, Buchholtz relays and main alarm and trip contacts shall be checked for satisfactory operation.

All tests specified of these specifications shall be carried out by the contractor in the presence of inspecting officer/consignee free of cost.

Maximum Allowable Power Transformer Losses

Power transformers of the proper ratings and design must be selected to satisfy the minimum acceptable efficiency at 50% and full load rating. In addition, the transformer must be selected such that it minimizes the total of its initial cost in addition to the present value of the cost of its total lost energy while serving its estimated loads during its respective life span.

1.7 Guarantee Substation :

The contractor shall guarantee the entire sub-station installation as per specifications. All equipments shall be guaranteed for **one year** from the date of acceptance against unsatisfactory performance or break down due to defective design, manufacture and installation. The

installation shall be covered by the conditions that whole installation or any part there of found defective within one year from the date of taking over shall be replaced or repaired by the contractor free of charge as decided by the department. The warranty shall cover the following:-

- a) Quality, strength and performance of materials used.
- b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
- c) Satisfactory operation during the maintenance period.
- d) Performance figures and other particulars as specified by the tenderer under schedule of guaranteed technical particulars.

However, the main contractor shall also be allowed to carry out the works included in the enlistment provisions as per the eligibility and the category of the enlistment, without associating any specialized agency provided the agency shall submit within 30 days after award of work an undertaking from the OEMs for Specialized E&M works failing which a penalty of Rs. 10000/- per service per week shall be levied for each package.

Names and required eligibility documents of associate agencies for all packages have to be submitted within one month from date of award of work so that the approval of specialized agency from the department can be done. After getting eligibility criteria of associate agency satisfactory, approval will be issued for specialized agencies. Department will also verify eligibility criteria of specialized agencies. In case of failure to submit the documents to associate the agencies within one month, a penalty of Rs. 10000/- per service per week shall be levied for each package. If the agencies are not found eligible, main firm has to submit the names of another associate agency within next 15 days, failing to which a penalty of Rs. 10000/- per service per week shall be levied for each package. The order of all associate agencies for all packages will be placed by the main contractor within 7 days from the date of approval of agencies by department.

Test Certificate: Test certificates including warranty/guarantee certificates of all the materials supplied for the work carried out shall also be submitted mentioning order date/ no/ lot no etc. failing which recovery @ Rs 50,000/- per service shall be made from final bill.

C-7

DG SET

1. The work shall be carried out as per CPWD General Specifications for Electrical Works Part- VII (DG SETS-2013), CPWD General Specifications for Electrical Works Part-IV- (SUB STATION) 2017, CPWD General Specifications for Electrical Works Part-I (Internal) 2023, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules & Acts shall be the latest norms as modified by Government of India on the date of execution.
2. The Scope of works includes supplying, installation, testing & commissioning of 1 No. 35 KVA DG set with AMF panel, testing, inspection as may be necessary before despatch, delivery at site, installation, testing, commissioning, inspections from competent authority and handing over to client in fully working condition.
3. The Contractor shall be required to obtain NOC from appropriate authority. The work shall be deemed to be completed only after receiving NOC from CEA and any other local body and rectification if any pointed out by the authority. Enabling all liaison work/ arranging inspection of local body or statutory body shall be within scope of the contractor.
4. The D.G. Sets shall be kept in the space specified on drawings building on suitable foundation and connected with 3½ core of suitable size of Cross- linked XLPE insulated LT armoured Aluminium cable to the synchronization panel. The incomers of the panels shall be properly electrically & mechanically interlocked with each other and with bus coupler to ensure that no short circuit should occur.
5. The outgoings of synchronizing Panel will be connected to the main LT panel with the help of sandwich type aluminium bus duct/cable as defined in the BOQ.
6. The DG set shall be silent type with acoustic enclosure and as per latest CPCB norms at the date of execution.
7. The height of the exhaust pipe shall be as per CPWD specification and CPCB norms modified by Government of India on the date of execution.
8. Suitable size MS structure with RCC foundation shall be provided for supporting the exhaust pipes. The MS structure shall be designed from the structural Engineer.
9. Brief technical details of 1 (One) No, 35 KVA silent DG set, CPCB norms modified by Government of India on the date of execution. Silent type Diesel Generating set having Prime Power Rating of 35 KVA 415 Volts at 1500 RPM, 0.8 lagging power factor at 415V suitable for 50 Hz, 3 phase system and consisting of the followings:
 - i) Synchronous alternator- rated at 35 KVA, 415 volts at 1500 RPM, 3 phase 50 Hz, Self- excited, screen protected, self-regulated, brush less alternator, Horizontal foot mounted in single bearing construction with SPDP enclosure, IP-23 protection and H class of insulation.
 - ii) Diesel Engine – The engines shall be direct injection multi cylinder, vertical, 4 stroke cycles, water cooled, turbo charged diesel engine developing suitable BHP

for giving a prime power output of 35 KVA at 0.8 P.F. at the load terminals of the respective alternators (exclusive of the power requirements of auxiliaries driving power from the engine) (as per ISO 8528 part- I).

- iii) The engines shall be capable for delivering specified prime power rating at variable loads for PF of 0.8 lag with 10% overload available in excess of specified output for one hour after every 12 hours. The average load factor of the engine over period of 24 hours shall be 0.85 for prime power output. The engines shall conform to BS 5514/ BS 649/ IS10000/ ISO: 3046 amended up to date.
- iv) The engines shall be fitted with all the accessories as per CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013) as amended and corrected up to date.
- v) Engine mounted Instrument Panel shall be as per manufacturer standard with digital display for indication of various parameters etc.
- vi) In addition to daily fuel service tank provided by the OEM in the DG set canopy as per Manufacturer's standard, Fuel tank of minimum 990 ltrs capacity fabricated out of 3 mm thick MS sheet complete with all standard accessories and fuel piping between fuel tank and daily service tank with GI heavy duty (class 'C') pipes of suitable dia. Complete with valves, level indications & accessories etc. as required as per specifications.
- vii) Dry exhaust system with residential type exhaust silencer with catalytic converter shall be provided.
- viii) 12V/24V DC starting system with suitable nos. of batteries (25 plates, 180 Amp. Hour capacity lead acid type) or as per OEM standard shall be provided.
- ix) Acoustic and weather proof enclosure as per CPCB norms as applicable at the date of execution with arrangement for fresh air intake for cooling of the engine & alternator, suitable extraction fan discharging hot air in to the atmosphere as per specification shall be provided.
- x) Suitable rating Four Pole MCCB with rotary handle confirming to CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date) for each DG set.

10. Terminal Boxes:

Terminal boxes shall be suitable for terminating multiple nos. of required size UG cables. The terminal box shall be suitable to withstand the mechanical and terminal stresses developed due to any short circuit at the terminals.

11. Earthing system:

Earthing system including type & selection of earth electrodes, earth conductor, earth bus and protective conductors etc shall be as per CPWD General Specification for Elect. Works (Part-I Internal) 2023 as amended and corrected up to date.

12. Cabling

Power cabling from MCCB near alternator to main panel shall be done with multiple numbers of required size Cross- linked XLPE insulated LT armoured Aluminium cable and shall be as approved by engineer-in-charge. Multi core armoured copper cable of

1.1 KV grade shall be used for inter connecting the engine controls with the switch gear and other equipment's.

13. Foundation

The Genset along with acoustic enclosure shall be installed on suitable CC foundation as per the OEM design. Genset should be mounted on AVM's pad inside the enclosure.

14. Acoustic enclosure:

The enclosure shall be out door type and to reduce the sound level as per CPCB norms as modified by Government of India on the date of execution and CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013) as amended and corrected up to date. The enclosure shall be provided by the OEM as per CPCB certification and corrected up to date on the date of execution.

15. The canopy will enclose the following items inside: -

- i) Diesel Engine.
- ii) Alternator.
- iii) Control Panel.
- iv) Starting Battery.
- v) Daily service fuel tank.
- vi) MCCB (Four Pole) of suitable capacity.
- vii) Other accessories so that the DG set with all items and accessories could be placed in open space without any other requirement of Diesel Generator room suitable to withstand all weather conditions.

16. Adequate ventilation shall be provided to meet total air requirement. Suitable numbers and size of ventilation fans complete with necessary auto start arrangement shall be provided as per the manufacturers design. It shall also be provided with auto stop arrangement to stop the fan after 5 minutes of the stopping of D.G. sets.

There should have a provision of DC Emergency light operated automatically with door opening. The inside of the enclosure shall be illuminated by the LED tube with the help of PVC insulated FRLS copper conductor wiring in recess/surface conduit suitable for single phase AC supply and shall be operated automatically with door opening as well as manually. To avoid re-circulation of hot air, durable sealing shall be done between radiator and canopy. The acoustic enclosure should be suitable for cable connection. Such arrangements on acoustic enclosure should be water proof and dust-proof confirming to IP- 65 protection.

17. DG Control Panel

DG control panel shall be manufacturer standard and shall provide the following minimum operational requirements. Control panel must be BMS compatible and it should have Rs 485 port with ModBus / BacKnet/ LON interface protocol:

- a) Auto mode:

- i) A line voltage monitor shall monitor supply voltage in each phase. When the mains supply fails completely or falls below set value variable between 80% to 95% of the nominal value on any phase the monitor module shall actuate startup of diesel engine. To avoid initiation due to momentary drips or system disturbance a time delay adjustable between 0.5 to 5 second shall be incorporated in the startup module.
 - ii) A three-attempt starting facility shall be provided with the sequence. 6 seconds ON, 5 seconds OFF, 6 seconds ON, 5 seconds OFF, and 6 seconds ON, if at the end of the third attempt, the engine does not start, engine shall be locked out to start, a master timer shall be provided for the function. Suitable adjustment timers be incorporated which will make it feasible to vary independently ON-OFF setting periods from 1-10 sec. An audio-visual alarm shall be given.
 - iii) Suitable adjustable timers shall be incorporated which will make it possible to vary independently ON-OFF setting periods from 1 second to 10 second. If on starting the alternator does not build up voltage after the first or any start as the case may be, further starting attempts will not be made and the starting facility will be reset.
 - iv) Once alternator has built up voltage, signals shall be provided to each of the alternator circuit breaker and mains circuit breakers as required. The Mains supply circuit breaker shall open before the alternator circuit breaker closes. System provided in the logic panel shall check and ensure that all the engine oil pump etc. are running and healthy. In case of any fault in engine auxiliaries the system shall automatically stop the DG set and audio-visual alarm shall be given.
 - v) When the mains supply is restored and is healthy as sensed by the line voltage monitor the load shall be transferred automatically to mains by providing signals to mains and alternator circuit breakers as required. The alternator supply circuit shall open before mains circuit breaker closes.
 - vi) The diesel alternator set reverts to standby mode for next automatic operation.
- b) Manual mode:
- (i) Under manual mode it shall be possible for the operator to start the generator by 'Pressing the (START) push button.
 - (ii) Three attempt starting facility shall also be operative for the startup function.
 - (iii) Alternator and mains circuit breakers "CLOSE" and "TRIP" operations as required shall be manual by pressing the appropriate push button on the panel "closure shall be feasible only after alternator has built up voltage. If the load is already on "MAINS" pressure on "CLOSE" button shall be ineffective.
 - (iv) Engine shut down other than due to fault shall be manually by pressing a "STOP" button, in manual mode.
- c) Test mode
- i) When under "TEST" mode pressure on "TEST" button shall complete the startup sequence simulation and start the engine. The simulation will be that of mains failure.

- ii) Engine shall build up voltage but the set shall not close alternator circuit breaker when the load is on the mains. Monitoring performance of voltage/frequency etc. should be feasible without supply to load.
 - iii) If during “TEST” run the power supply has failed the load shall automatically get transferred to alternator.
 - iv) Bringing the mode selector to auto position shall shut down the sets as per the required sequences.
- d) Automation failure operation
- i) Operation of DG Set shall be monitored and controlled by PLC panel. In case of mains failure this logic panel shall control auto change over from mains to DG Set supply and interlocking the MCCBs/ACBs, auto load management functions along with annunciation for alternate control and protection. The logic panel shall be provided with a total manual over ride facility.
 - ii) The logic panel shall be complete with all Auxiliary Relays. Timers, Contactors, Programmable logic controller of approved make, control wiring with not less than 1.5 sq.mm. 1.1 KV grade FRLS PVC insulated copper conductor wires etc. The PLC based logic panel shall ensure providing suitable software interlocks.
- e) Automatic start & stop of Engine.

The system should come in operation after sensing of grid failure and automatically start & stop of the engine depending on the pre-defined load setting on the PLC. The automatic start & stop of engine, Back up protection and sequence of operation shall be as described in chapter 3 of CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013).

18. The factory inspection, trial run, running in period, safety measure and statutory clearances shall be as per CPWD specification for DG Set 2013 and amended upto date.

C-8**UPS**

1. The scope of work covers supply, installation, testing and commissioning of 10 KVA True online Modular type UPS system with VRLA SMF batteries, battery rack and all associated work to care uninterrupted power supply to ELV services and emergency lighting load The online UPS shall be compatible with IBMS. The UPS shall include a rectifier, inverter, battery bank suitable for 30 min back up i.e minimum of 8000 VAh, (Battery VAh capacity shall not less than 1600 VAH per KVA of UPS rating per Hour back up time) on full load (Battery shall be VRLA, SMF in ABS container) and static bypass switch along with provision for manual bypass, suitable isolation transformer for additional protection against neutral fault and other features as described in the specifications.

2. **Technical Specification**

Three phase input 415V AC, 50Hz and Three phase output 415 V AC 50Hz online double conversion, IGBT PWM rectifier based input charger (float cum equalizing) based UPS system, having in built automatic Bi-directional static transfer switch for auto switchover, in built Manual bypass switch, K13 Copper wound Galvanic Isolation transformer at UPS output after the static Galvanic inverter output isolation transformer (inbuilt) switch as per IEEE 1100-2005 in a separate cabinet, PWM controlled using DSP logic as Analog control shall not be acceptable, inbuilt/ external Back feed protection, Input phase reversal protection & correction, provision for separate input for rectifier and for Bypass, microprocessor based built in protection against short circuit, overload, high/low voltage cut-off, TVSS protection and all required protections and LED display panel for display parameters and event Monitoring & Diagnostics last 100 events with exact date and time & upto 900 events from UPS system memory using Laptop etc complete as required.

A UPS shall be tested against EMC (Electromagnetic compatibility) category C2. The UPS system shall be continuous duty, highly reliable and solid state. The system shall be modular in design so that any individual unit can be easily isolated/ taken out for repair or any additional added in future for enhancement of the capacity.

Reference standards for UPS: EN 62040-2, EN62040-1, EN62040-3, IS Standard: 16242

SYSTEM DESCRIPTION

A. Components:

1. Rectifier
2. Inverter
3. Sealed Lead Acid Batteries
4. Battery Charger
5. Automatic Bypass
6. User Interface Panel/ Display
7. USB Communication Interface for service use

- 8.Communication Card Slots (2)
- 9.Remote Emergency Power Off Contacts
- 10.Environmental (Building Alarm) Inputs (3)
- 11.Hardwired Input, Output
- 12.Internal Maintenance Bypass Isolator
- 13.Input, Output & Bypass Isolators
- 14.External Top Covered Battery Racks
- 15.Inbuilt Isolation transformer before Rectifier
- 16.Base Frame for UPS
- 17.Communications - Mandatory
 - I. SNMP/Web adapter
 - II. Modbus RTU interface
 - III. SNMP & MODBUS Combo Card should be Cyber security Certified (UL & IEC Standards both) Certificates to be submitted before manufacturing start.

B. Modes of Operation: The UPS shall operate as an online, double-conversion UPS with the following modes:

- (i) Normal: During the Normal or Double-conversion Mode the rectifier shall derive power as needed from the commercial AC utility or generator source and supply filtered and regulated DC power to the online inverter. The inverter shall convert the DC power to highly regulated and filtered AC power for the critical loads. The Inverter shall be Three Level latest technology.
- (ii) Battery: Upon failure of the AC input source, the critical load must continue to be supplied by the inverter without switching. The inverter must obtain its power from the battery. There must be no interruption in power to the critical load upon failure or restoration of the AC input source.
- (iii) Recharge: Upon restoration of the AC input source, the rectifier/battery charger must recharge the battery. The inverter shall, without interruption of power, regulate the power to the critical load.
- (iv) High Efficiency or ECO Mode: The static bypass switch will conduct, and the UPS rectifier and inverter will be operated in a “suspended” mode, unless incoming power conditions require conventional double conversion operation. In High Efficiency mode the UPS input and output filters shall remain in-circuit to provide surge suppression. Transfer time from HE mode to Double Conversion mode, and vice versa, shall be typically less than 4ms.
- (v) Bypass: The static bypass switch must be used for transferring the critical load to the AC utility supply without interruption, and shall be rated for

continuous operation. Automatic re-transfer to normal operation must also be accomplished without interruption of power to the critical load. The static bypass switch must be capable of manual operation via the front panel controls. An optional integrated bypass back-feed protection contactor, in series with the static switch, shall prevent system voltages from bleeding backwards through the static switch and rectifier snubber components to the utility source in the event of a utility failure and shall also open upon detection of a short circuit static bypass SCR.

- (vi) Internal load testing: The UPS system will be capable of utilizing the Internal Capacity Test function, including internally adjustable load testing at the customer site, without the need for a load bank. Testing shall only be initiated using the UPS OEM Engineer's Software Service Tool. This testing is not intended to be performed while the UPS is servicing the critical load.

C-9**GRID INTERACTIVE SOLAR PHOTOVOLTAIC
POWER GENERATION**

1. The scope of work includes supply, installation, testing and commissioning of 10 kWp Grid connect solar generating system. The scope includes solar photovoltaic (SPV) system of required capacity as mentioned in schedule of work and optimum utilization of the available Roof Top areas, including liaison with APDCL, net metering 'will be done as per Assam Power Distribution Company Limited (Net Metering for Rooftop Solar Systems) rules amended up to date and other related rules and code, as applicable, conversion system and successful commission and handed over to client in good working conditions. The scope of works also included guaranty/warranty of entire installation and equipment's/ accessories supply by them as per OEM etc. as required.
2. Adequate capacity of SPV modules, PCUs, Junction boxes etc. to ensure generation of power as per design estimates. This will be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of PCUs, conductor losses, system losses, site conditions etc.
3. The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance. SPV power plant should be designed to operate satisfactorily in synchronization with the grid within permissible limits of high voltage and frequency fluctuation conditions. It is also extremely important to safeguard the system during major disturbances, internal and external surge conditions while ensuring safe operation of the plant.
4. Shadow free plant layout with optimum tilt and orientation to ensure minimum losses and to maximize generation by using less area.
5. Higher system voltage and lower current options to be followed to minimize ohmic losses.
6. Selection of PCUs with proven reliability and minimum downtime. Ready availability of requisite spares.
7. The designed array capacity at STC shall be suitably determined to meet the proposed\ guaranteed generation output at the point of interconnection by the contractor in his bid. Bidder shall design the plant and equipment in order to have sustained life of 25 years with minimum maintenance efforts.
8. The specifications provided with this bid document are for guidelines only and generic; any design provided in this document is only meant as an example. The Contractor must submit a detailed design philosophy document for the project to meet the functional requirements based upon their own design in-line with the above. The bidders are advised to visit the site and satisfy themselves before bidding.
9. The supporting structure of solar panel shall be designed to withstand the wind speed of 150 Km/hour, The support structure shall be strong enough to cater the wind and other seismic zone protection of that area. The contractor shall submit the design report and drawings of supporting structure to the Engineer-in-charge before starting of fabrication.

10. All the items like Solar PV Module, Solar Inverter should have warrenty certificate for minimum of 10 years.

11. Standards and Codes for Photovoltaic Modules

The following standards & codes shall be complied with latest amendments:

- i) Standard Description IEC 61215-1: 2016 Ed.1 Terrestrial photovoltaic (PV) modules -Design qualification and type approval - Part 2: Test requirements.
- ii) IEC 61215-1-1:2016 Ed.1 : Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules.
- iii) IEC 61215-1-2 Ed.1 : Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules.
- iv) IEC 61730-1:2016 Ed.2: Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction.
- v) IEC 61730-2:2016 Ed.2 : Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing.
- vi) IEC 61701:2011 Ed.2 : Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment).
- vii) IEC 62716:2013 Ed.1 : Photovoltaic (PV) modules - Ammonia corrosion testing.
- viii) IEC TS 62804-1:2015 Ed.1: Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon (under conditions of 85oC/85% RH for minimum 192 hours).
- ix) As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017.

12. **PV Modules used in the grid connected solar power projects shall be registered with BIS and bear** the Standard Mark as notified by the Bureau of Indian Standards. Further, PV Modules should have been included in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019.

LIST OF MATERIALS OF PREFERRED MAKE (ELECTRICAL WORK)

The materials of first/standard quality from the following preferred makes are to be used. In case it is established that the brands specified below are not available in the market, contractor shall submit alternative proposal to Engineer-in-Charge for the approval of NIT approving authority.

SN	List of Materials	Approved Make.
1.	FRLSH PVC insulated copper wire /Power cable / XLPE Cable / Telephone cable/ Coaxial cable / TV cable	Havells / KEI / Finolex / RR Kabel / Polycab
2.	Communication cables	Beldon / Molex / Legrand / Commscope / Avaya / Amp/ Derwiser/ 3C3
3.	PVC Conduit (ISI Marked) with PVC conduit pipe accessories	BEC / AKG / Norpack / Precision/Welkm
4.	Modular Type Switch/Socket /Fan Regulator/Telephone Socket/ TV Socket/ Bell Push and GI Boxes etc (Same make GI Box and wiring accessories)	Legrand (Myrius Nextgen+)/ Schneider (LIVIA) / ABB(Tvisha) / Honeywell (Blenze Pro) / Havells (Murano)
5.	MCB/RCBO/Isolator /RCCB	Legrand(DX3) / Siemens (Betagard) / Lauritz Knudsen / (Schneider (Acti-9)/ ABB (SB-200M)/C&S(Wintrip)
6.	MCB DB's (Same make MCB DB and MCB's)	Legrand (Ekinox-3) / Siemens (Betagard) / Schneider (Acti-9) / ABB(Itus)/ C&S(Epitom)/ LK (L&T Exora)
7.	MCCB's	Legrand (DPX3) / Siemens (3VA) / LK (L&T) (D-sine) / LK (L&T) (D-sine) / ABB(XT) / C&S (Winbreak 1/2) / Schneider (NSX)/ C&S(Winbreak-I/II)
8.	ACB's	Legrand (DMX3) / Siemens (3WA) / LK (L&T) (Omega -U power) / ABB (Emax2) / C&S (Winmaster3) / Schneider (MTZ)/
9.	LED Fittings/Compound light/ Street light/Post top Lantern/ Flood Light	Philips / Lighting Technology / Havells / Wipro / Crompton/Jaquar
10.	Ceiling fan/ Exhaust fan/Fresh air fan	Khaitan / Crompton/ Havells/ Orient / Usha
11.	GI Hot Deep Cable trays (perforated)	BEC / RMCON / Apex / Slotco / Steelways / Pilco / AKG / Indiana
12.	DLP Trucking / Floor Trunking (UPVC / GI)	Legrand / Schneider / MK/ OBO-Betterman
13.	Occupancy sensor for Light Control	ABB / Honeywell / Schneider / Siemens / Hager / Lutron.
14.	Decorative Ornamental Powder Coated metallic pole and fittings	K-lite / Bajaj/ Home Décor/ Hi-lite/ Jaquar/Havells/Crompton
15.	G.I. Octagonal Pole	Bajaj / Transrail / Valmont/ Crompton/ Nezone /B.P. Project/ Utkarsh/Hilite
16.	Weather proof Junction box	Hensel/ OBO Bettermann/ Cape Spelsberg/ Rittal/ Anchor/ Havells
17.	Cable lugs & Glands	Comet/Dowells/Gripwel/Raychem
18.	Fire Pumps	Grundfos/ Kirloskar /Wilo/Beaconwier/ Xylem Mather & Platt
19.	Pressurization (Jockey Pump)	Grundfos/ Kirloskar /Wilo/Beaconwier/ Xylem Mather & Platt
20.	Diesel Engine for Fire Pump	Cummins/ KOEL/ Caterpillar/Perkins /Ashok Leyland/ Mather & Platt/ Greaves
21.	Terrace Pump	Grundfos/ Kirloskar /Wilo/Beaconwier/Xylem Mather & Platt

22.	Electric Motors	Siemens / Kirloskar /Crompton / ABB/Bharat Bijlee/ Mather & Platt/ Stamford.
23.	Anti-Vibration Mounting	Resistoflex / Dunlop / Easy flex / Vimpa Flexionics
24.	Starters	Siemens/LK(L&T)/ABB/ Schneider/Merlin Gerin/BCH.
25.	Sluice Valve(ISI marked)	SANT / Kirloskar /Kartar/Audco/ Zoloto
26.	Gunmetal - Gate Valve/ NRV(ISI marked)	SANT / Kirloskar /Kartar/Audco/ Zoloto
27.	CI Sluice Valve(ISI marked)	SANT / Kirloskar /Kartar/Audco/ Zoloto
28.	Valves/ Check Valves(ISI marked)	SANT / Kirloskar /Kartar/Audco/ Zoloto
29.	Butterfly Valve/ Air Release Valve(ISI marked)	SANT / Kirloskar /Kartar/Audco/ Zoloto
30.	Y-type Strainer	SANT/Kartar/Leader/Advance/Audco/ Zoloto/ Atasee
31.	GI Pipes/ MS Pipes	Jindal (Hissar)/ TATA / Sail (ISI Marked)
32.	Pressure gauge	H Guru / Fiebig / Danfoss/ Indfoss / Emerald
33.	Hydrant Valve	Life Guard / Minimax / Armor fire / Safeguard/Fire Shild/ Kartar / Atasee
34.	Branch Pipe	Life Guard / Minimax / Armor fire / Safeguard /Kartar / Atasee
35.	Drum of Hose Reel	Life Guard / Minimax / Armor fire / Safeguard /Fire Shild/ Kartar/ Atasee
36.	Hose Coupling	Life Guard / Minimax / Armor fire / Safeguard/Fire Shild/ Kartar/ Atasee
37.	Fire Hose Pipe/ Hose Box	Life Guard / Minimax / Armor fire / Safeguard/ Fire Shild /Kartar/ Atasee
38.	First-AID Rubber Reel	Life Guard / Minimax / Armor fire / Safeguard/ Fire Shild /Kartar / Atasee
39.	First Aid Hose Reel	Life Guard / Minimax / Armor fire / Safeguard/ Fire Shild/ Kartar / Atasee
40.	2 way/ 4 way FBC	Life Guard / Minimax / Armor fire / Safeguard/ Fire Shild/ Kartar / Atasee
41.	Sprinkler Heads	New Age/ Minimax / Armor fire / Fire shield / Tyco/HD.
42.	Alarm Control Valve	HD / Omex/Viking/Tyco
43.	Anchor Fastener	Fischer / Hilti / OBO
44.	Fire Extinguisher	Cease Fire / Fire shield / ASES / Minimax/ Safex/ Life Guard / Atasee
45.	Pressure Switch	System Sensor/ Indfoss/Danfoss / Honeywell / Viking.
46.	LED signage	Hochiki/ Cooper lighting & Safety/ ASES / Aldo LED/ Bajaj / K lite.
47.	Pipe protection pypcoat (Aw4)wrapping	IWL/ Taxa/ Mac-polycoat
48.	Automatic fire Alarm system- Smoke Detectors/ optical cum Thermal Detectors/ Thermal Detectors/ Manual call Points/ Main Fire Alarm Control Panel with Battery Backup/Repeater panel/Mimic Panel/ Monitor Module / Control Module/ Response indicator/ Low Intensity Hooters	<u>Automatic fire Alarm system-</u> Siemens- Cerberus/ Bosch / ASES / Honeywell – Notifire / Edwards-EST3 <u>Manual Fire Alarm system</u> – ASES / System Sensor/ Appllo
49.	Public address components like amplifiers, gooseneck microphone, speakers	Bosch/JBL/ Crown / ASES / Honeywell

50.	Speaker cable	Krystal / JAD/ Belden/ DAC/ Monster
51.	Wall Mount Rack	Valrack / Rittal/APC/APW
52.	Lift	The OEM shall be selected as per guideline of CPWD vide DM No: DG/ SE(E)TAS/ PPP- MII order/22 dt; 28/09/2020. The agency has to give at least 3 options of OEM as per above guidelines for lift and the department has right to select any one of them.
53.	Transformer	Shree Sai Electrical / Technovel / Prag / Power Maker-II / Raychem RPG Pvt. Ltd
54.	HT Panel	ABB/ Crompton/ Schneider-Electric/ Siemens/LK(L&T) (Panel Shall be tested at OEM manufacturing plant)
55.	MV Panel Fire Fighting Panel /Outdoor feeder pillar / Street light panel/ VRF panel/ Pump panel/ Meter panel etc.	Siddhi Vinayak Power Solution / Brahmaputra Power & Control / Amit Project Powers & Controls/ Precision System Control/ R. P. Control / Kratos (The manufacturer must have CPRI test certificate of appropriate rating not older than 5 years from the date of call of tender)
56.	APFC Relay/ Reactor /Thyristor module	LK (L&T)/Enercon/ Siemens/ Schneider Electric
57.	Capacitor	LK (L&T)/ Legrand /Siemens/ABB/ Schneider
58.	Sandwich bus duct and accessories (Rising Main/ Bus-duct)	Schneider / C & S / Legrand / LK(L&T)/ ABB
59.	Bus coupler	Same make as ACB
60.	Rubber Mat	Tata rubber/padam prabhu/Voltech India/ Jyoti/ Vardhman
61.	Multi function meter/Digital Ammeter/ Volt meter	Schneider/Conzerve/LK(L&T)/ Sceure/AE/ ABB/ Siemens
62.	Selector Switches	Kaycee / LK(L&T) / AE / Legrand/Salzer/ Rass Control/ C&S
63.	Current Transformer, Potential transformer	AE / Kappa / L&T/ ABB/Siemens
64.	Indicating Lamp/Push Button/LED	LK(L&T) / Raas Control / Schneider / C&S/ ABB/Siemens
65.	Contactors, Relays, Timer	LK(L&T) / Siemens /ABB/Siemens
66.	Lugs/Thimble	Dowell's / Comet / Braco / Raychem / Johnson
67.	Cable Gland / Termination	Dowell's / Comet / Braco / Raychem / Johnson
68.	DWC / HDPE PIPE	Sudhakar/ Finolex/ REX/ VIJAY /Ashirvad Precision/ Supreme / Astral/Sri Tulsi
69.	Diesel engine	Cummins / KOEL/ Caterpillar/Perkins /TATA / Ashok Layland
70.	Alternator	Stamford/ Leroy Somer / Crompton Greaves/ Kirloskar/ Cooper
71.	DG set	OEM/OEA of above Makes of Diesel Engine.
72.	AMF panel	OEM / OEA of Diesel engine

73.	Acoustic Enclosure	OEM / OEA of DG Set
74.	Anti Vibrations Mountings	Resistoflex / Dunlop / Easy flex / Vimpa Flexionics / Emerald.
75.	Batteries for DG Set/ UPS	Exide / Amara Raja /Amaron
76.	UPS	Schneider (APC)/ Numeric / Vertiv /Delta/Toshiba/ Power One
77.	Battery Mounting Rack	As per OEM of UPS
78.	CCTV Camera	Tyco/Bosch/ Honeywell (35/50 Series) (STQC Certified)
79.	NVR	Tyco/Bosch/ Honeywell (35/50 Series)
80.	All hardware's for CCTV Surveillance system	Tyco/Bosch/ Honeywell (35/50 Series)
81.	Professional Display	Panasonic / Sony/LG / Samsung
82.	OFC cable	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
83.	OFC Patch Cord and LIU	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
84.	Cat 6A / CAT 6 UTP cable	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
85.	Patch Panel	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
86.	CAT6A / Cat 6 UTP Patch Cord	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
87.	I/O Box and Face Plate	Beldon / Molex / Legrand / Commscope / Avaya / Amp / Derwiser/3C3/JAD
88.	Wall Mount Rack	Valrack / Rittal/APC/APW
89.	POE switches Layer 2/3	Cisco/Juniper/Arista/Allied Telesis
90.	Wi-Fi Access Point	Cisco/Juniper/Arista/ Allied Telesis
91.	Workstation	IBM / Lenovo / Dell / HP
92.	Solar PV Module	MNRE approved.
93.	ACDB & DCDB	As per OEM
94.	String combiner Box(S.C.B)/ String Monitoring Box	Solaris/Geesys/ Hensel/ Syntex / Hensel / Statcon
95.	Data Logging system with remote monitoring	Statcon / Solaris / Dataglen / Aeron / Vortex
96.	P.C.U (Power Conditioning Unit)(Solar inverter)	Delta / Siemens / A.B.B / S.M.A (Germany) / Schneider-Electric / Havells
97.	Solar Water Heater	Racold / Tata solar/ Bosch/ V-Guard – MNRE Approved solar panel
98.	Insulation of Hot Water Pipes	K-Flex/ Armaflex/ Thermaflex
99.	Material for structure	Tata/Jindal Hissar/Sail
100.	Hydro Pneumatic Pump set	Grundfos/ Kirloskar / Mather & Platt / KSB/ Wilo /Xylem/Beacon
101.	Motorized Solenoid Valve	Advance/ Honeywell/ Belimo/ Danfoss
102.	Butterfly Valve/ Balancing Valve/ Isolation Valve/ Gate Valve/ Non-Return Valve etc. all other Valves	Belimo / Kirloskar /Advance/Audco/ Zoloto/Castle/Victaulic
103.	Liquid Level Controllers/ Indicators	Minilec/ Radar/ Advance/ Famac/ Switzer
104.	PLC system	Schneider/ Siemens/ ABB/ GE/ Honeywell/ Mitsubishi
105.	GI/MS/SS pipes (IS: 1239 and IS:3589)	TATA/Jindal Hissar/ SAIL
106.	GI/MS/SS pipes Fittings	Pot/Unik
107.	PVC Pipe Sch80/Sch40	Astral/Supreme/Finolex
108.	GM / Forged Brass Ball Valves	Intervalve / Audco/Sant
109.	Sluice Valves	Kirlosakar/Ivc/Sant/ Leader/ Audco
110.	Butterfly Valve	Audco / Intervalve / Bray /Sant
111.	Wafer Type Check Valve	Advance / Intervalve / Bray /Sant
112.	Multiport Valve	Pharer (U.S.A)/ Flack (U.S.A) / Initiative / Aventura

113.	Isolation Ball / Gate / Globe Valve	Sant/Hawa/Honeywell/Lehry
114.	Air Release Valve	Sant/ Watts/ Studor/Honeywell
115.	Y Strainer	Honeywell/ Emerald/ Sant / Vtm/Audco (LK)/Kirloskar
116.	Submersible Pumps	Grundfos / Xylem / Wilo / Ebara/ Pullen/KSB/ Kirloskar
117.	Sludge Pumps/MBR feed pumps and other pumps	Johnson / Wilo / Ebara / Grundfos/ KSB/ Kirloskar
118.	Mixer	Wilo / Grundfos / Xylem
119.	Clear Water Pumps & HSCF Pumps	Grundfos / Xylem / Suzler/ Kirloskar/KSB
120.	Centrifuge	Alfa Level / Hiller / Humbolt / ADINO Technologies
121.	Mechanical Seal	Burgmann / Sealol
122.	Anti Vibration Mounting	Dunlop / Resistoflex/ Easyflex
123.	Pressure Gauge	Waree / Baumer/ Ashcroft
124.	Water Meter (Mechanical Type)	Actaris . Capstan – Woltman / Kranti
125.	Electromagnetic Flow Meter	Emerson / E&H / Siemens / Jumo
126.	Pressure Transmitter	Siemens/ Emerson/ E&H/ Jumo
127.	DO Transmitter	Emerson /ABB /E&H /Hach
128.	Turbidity Transmitter	Emerson/ABB/E&H/Hach
129.	Level Switch / controller	Pune Techtrol/ Nolta / Jumo
130.	Level Indicator	Levcon / Pune Techtrol/ cirrus
131.	Paints	Asian Paints / Berger / ICI /Jotun
132.	F.R.P Pressure Vessel	Pentair / Structural / Equivalent Fabricated
133.	UV unit	Alfa UV / Wallance& Tiernan/ Aquatech / Sukrut
134.	MBR Modules	Toray/GE/Kubota/Ovivo / Hydronautics/ Coke Membrane/ Alfalaval
135.	Dosing Pumps	Milton Roy/ prominent/ Grundfos/Kirloskar /KSB
136.	MSEP Filter Vessel	OEM Fabricated
137.	Mechanical Screen	Ovivo / Aquaseptence / Jash / Auric
138.	HDPE Tanks	Reno / Sintex / Infra
139.	Air Diffusers	Ovivo / OTT / EDI
140.	Air Flow Rotameter	Eureka ind / Aster / Tansa
141.	HDPE Pipe	Noble / Reliance/ Astral / Supreme / Ashirvad
142.	Filter Press	Pharma / Royal / Thorat / Sachin / ADINO Technologies
143.	Screw Pumps/Filter Press feed pumps	Rotomac / Alfa / Roto/Minimax/Helyflow
144.	Agitator	Remi / Fluidyme
145.	Air Compressor	Ingersol Rand / ELGI
146.	Electrical Actuators Valves	Cair / Jonson / Auma / Honeywell
147.	Air Blower	Aerzen / Ingersol Rand / TMVT /Everest/Beta
148.	Fasteners	Hilti / Fisher/ Wurth
149.	Motor	Siemens / Kirloskar /Crompton / ABB/As per OEM standard
150.	VRF/VRV Indoor/ outdoor unit	Carrier / Mitsubishi / Daikin / Toshiba / Hitachi
151.	HI - WALL SPLIT A.C SYSTEMS	Carrier / Mitsubishi / Daikin / Toshiba/ Hitachi
152.	Indoor Units	Carrier / Mitsubishi / Daikin / Toshiba/ Hitachi
153.	TFU	Carrier / Mitsubishi / Daikin / Toshiba/ Hitachi

154.	Copper Tubes/ Pipe	Mexflow/ Rajco/ Mandev Tubes/ Jindal Refrigeration / RR Shramik
155.	Nitrile Rubber	Armaflex/ Aflex / K-Flex / Aerocell
156.	UPVC/ CPVC AC Drainage Pipe	Oriplast/ Finolex/ Supreme/ Ashirvad/Astral (ISI Marked)
157.	Delegate Unit/Chairman Unit/ Conference System Controller	OSL/Beyerdynamic/Shure/Sennheiser/Bose / Erthpot
158.	12 analog mic/line/ Wireless Handheld Microphone & Transmitter & associated Receiver /Wireless Handheld Receiver with Lapel micro phone	OSL/Beyerdynamic/Shure/Sennheiser/Bose /Yamaha
159.	Speaker/Digital Signal Processing Amplifier Systems/Amplifier	BRITISH ACOUSTICS/MARTIN AUDIO/ ASES / OHM/BOSE/Xilica
160.	PTZ conferencing camera	Lumens/Poly/Cisco/ OSL
161.	HDMI cables / Audio Cable / Snake Cable / Speaker Cable	Molex/Crestron / Kramer / Aten / Klotz /JAD/ Extron / Krystal / Belden
162.	Harddisk	WD/Segate
163.	Motirized Display	Albiral/Arthur Holm/Element One
164.	AV over IP Encoder/Decoder/HDMI Cable/AV Control processor/HDMI Switcher/HDMI Splitter	Aten / 4 the Wall / Lightware / Crestron / Extron
165.	Video Conferencing Camera/Media Station/ Capture Card	Lumens / Poly / Cisco / Arec
166.	HDMI cables / Audio Cable / Snake Cable / Speaker Cable	Milestone Pro / Extron / Kramer / Creston / Klotz / JAD / Extron / Krystal / Belden
167.	Touch pad	Apple / Samsung / Microsoft
168.	LAN Switches/Wireless Access Point/Wireless Controller	Cisco / Juniper / Rukus / HPE/Netgear
169.	All other items not covered above	As per approval of Engineer-in-charge

Note :-

1. When two or more alternative brands have been mentioned, the brand to be finally used shall be as decided by the Engineer-In-Charge. Nothing extra on this account is payable.
2. Article / Material / Brand which are not mentioned in the above list may be approved by the Chief Engineer on the request of Contractor / Agency provided that the Material / Article / Brand proposed by the contractor should have equivalent or better specifications and rates which are already mentioned in the list.
3. All other items shall be of ISI marked / as per approved sample kept at site of work.

SCHEDULE OF WORK (ELECTRICAL)

Name of Work:- “Construction of Office-Cum Residential Complex along with Boundary Wall for SIB at Mathanguri (Assam).”

Sl. No	Description of Item Subhead and Nomenclatures	Qty	Unit	Rates	Amount	
					DSR-25	MR
1	SH : I [Internal Electrical Installation]					
1.1	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS/HFFR PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm. FRLS/HFFR PVC insulated copper conductor single core cable etc as required.					
1.1.1	Group A	107	Point	1189.00	1,27,223.00	-----
1.1.2	Group B	53	Point	1362.00	72,186.00	-----
1.1.3	Group C	90	Point	1704.00	1,53,360.00	-----
1.2	Wiring for twin control light point with 1.5 sq.mm FRLS/HFFR PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, 2 way modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm. FRLS/HFFR PVC insulated copper conductor single core cable etc as required.	17	Point	1803.00	30,651.00	-----
1.3	Wiring for light/ power plug with 2X4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed medium class PVC conduit along with 1 No 4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable for loop earthing as required.	2700	Meter	373.00	10,07,100.00	-----
1.4	Wiring for light/ power plug with 4X4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed medium class PVC conduit along with 2 Nos 4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable for loop earthing as required.	500	Meter	587.00	2,93,500.00	-----
1.5	Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS/HFFR PVC insulated copper conductor, single core cable in surface/ recessed medium class PVC conduit as required.					
1.5.1	2 X 1.5 sq. mm + 1 X 1.5 sq. mm earth wire	850	Meter	267.00	2,26,950.00	-----
1.5.2	2 X 6 sq. mm + 1 X 6 sq. mm earth wire	70	Meter	482.00	33,740.00	-----
1.5.3	4 X 6 sq. mm + 2 X 6 sq. mm earth wire	95	Meter	813.00	77,235.00	-----
1.5.4	4 X 10 sq. mm + 2 X 6 sq. mm earth wire	80	Meter	1,078.00	86,240.00	-----
1.6	Supplying and drawing co-axial TV cable RG-6 grade, 0.7 mm solid copper conductor PE insulated, shielded with the fine tinned copper braid and protected with PVC sheath in the existing surface/ recessed steel/ PVC conduit as required.	280	Meter	54.00	15,120.00	-----
1.7	Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.					
1.7.1	20 mm	600	Meter	151.00	90,600.00	-----
1.7.2	25 mm	1050	Meter	168.00	1,76,400.00	-----
1.7.3	32 mm	60	Meter	209.00	12,540.00	-----

Correction...Nil Deletion... Nil Insertion...Nil Over writing... Nil Ch. Estt (E) AE (E) AE (C) EE(P)

1.8	Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.					
1.8.1	TV antenna socket outlet	15	Each	168.00	2,520.00	-----
1.8.2	6 pin 15/16 amp socket outlet	40	Each	219.00	8,760.00	-----
1.8.3	15/16 amp switch	14	Each	176.00	2,464.00	-----
1.8.4	16 A AC Starter	26	Each	943.00	-----	24,518.00
1.9	Supplying and fixing two module stepped type electronic fan regulator on the existing modular plate switch box including connections but excluding modular plate etc. as required.	35	Each	402.00	14,070.00	-----
1.10	Supplying and fixing following size/ modules, GI box along with modular base & cover plate for modular switches in recess etc as required.					
1.10.1	1 or 2 Module (75mmX75mm)	155	Each	354.00	54,870.00	-----
1.11	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 3 pin 5/6 amps modular socket outlet and 5/6 amps modular switch, connection etc. as required	61	Each	545.00	33,245.00	-----
1.12	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 6 pin 5/6 & 15/16 amps modular socket outlet and 15/16 amps modular switch, connection etc. as required.	91	Each	659.00	59,969.00	-----
1.13	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 2 Nos. 3 pin 5/6 A modular socket outlet and 2 Nos. 5/6 A modular switch, connections etc. as required.	35	Each	757.00	26,495.00	-----
	Total SH : I [Internal Electrical Installation]				26,05,238.00	24,518.00
2	SH : II [FANS & FITTINGS]					
2.1	LED Down lighter (SMD Type) (System lumen efficacy $\geq 105 < 120$ lm/Watt) Supplying, installation, Testing & Commissioning of LED Recessed/ surface Down lighter (Round/ square/ Rectangular) SMD type of following body material with PMMA and prismatic diffuser and construction as per IS: 10322 with driver as per the requirement with Driver efficiency >85%, Operating voltage AC 140-270 Volt, frequency 50/60 hz, Operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection, THD < 10% , P. F. ≥ 0.95 , IP20, CRI ≥ 80 , UGR (Unified Glare Rating) < 19, Flicker free (flicker should be below 5%), life time (LED, Driver & electrical circuitry), of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends , CCT 3000°K / 4000°K / 5700°K / 6500°K (As per ANSI Bin), SDCM (Standard Deviation Colour Matching) <3, Maximum power consumption should not more than the specified rating and Fixture shall be confirming to relevant BIS standards and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing Complete in all respect i/c external connections with 1.5 sq. mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy $\geq 105 < 120$ lm/Watt output. LM79 & LM80 Test report and all testing required for LED					

	fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C). Powder coated die cast/ Extruded aluminium Body including trim.					
2.1.1	12 -15 watt	18	Each	715.00	12,870.00	-----
2.1.2	18 watt	55	Each	920.00	50,600.00	-----
2.2	Supplying,Installation, testing and commissioning of surface mounted LED batten (length 2') with LED fitting having Lumen efficacy ≥ 100 lm/watt, System Lumen output ≥ 1000 lm, CRI ≥ 80 , Power factor ≥ 0.9 having suitable diffuser and CCT in between 4000K to 6500 K (i/c both Limits), minimum life 50000 hours,complete with all accessories etc. directly on ceiling/wall including connection with 1.5 sq. mm FRLS/HFFR PVC insulated, copper conductor, single core cable and earthing etc. as required.	14	Each	634.00	-----	8,876.00
2.3	Supplying, Installation, Testing & commissioning of pressure die cast aluminium housing LED Bulk head fitting with lamp having minimum lumen out of ≥ 1000 lumen, minimum luminous efficacy ≥ 100 lumen / watt IP65 protection directly on wall including connection with 1.5 sq.mm FRLS PVC insulated, copper conductor, single core cable & earthing etc. as reqd.	4	Each	897.00	-----	3,588.00
2.4	LED Panel light 2x2 ft. (System lumen efficacy ≥ 105 <120 lm/Watt) Supplying, installation, Testing & Commissioning of surface/recess Panel light 2x2 ft., of following body material and construction as per IS: 10322 with driver as per the requirement with Driver efficiency $>85\%$, Operating voltage AC 140-270 Volt, freq 50/60 hz, Operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection, THD $< 10\%$, P. F. ≥ 0.95 , IP20, CRI ≥ 80 , UGR (Unified Glare Rating) < 19 , Flicker free, (flicker should be below 5 %), life time (LED, Driver & electrical circuitry), of minimum 50000 Burning Hours with, 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM-21-11 report, CCT 3000°K / 4000°K/ 5700°K /6500°K (As per ANSI Bin), SDCM (Standard Deviation Colour Matching) <3 , Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing. complete in all respect i/c external connections with 1.5 sq. mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy ≥ 105 <120 lm/Watt output. LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C).Powder coated die cast /Extruded aluminium Body (Thickness > 1.20 mm)					
2.4.1	36 watt	27	Each	2,508.00	67,716.00	-----

2.5	LED Batten light (System lumen efficacy $\geq 105 < 120$ lm/Watt) Supplying, installation, Testing & Commissioning of LED surface mounted Batten light of following body material and construction as per IS: 10322 with driver (Replaceable) as per the requirement with Driver efficiency $> 85\%$, Operating voltage AC 140-270 Volt, freq 50/60 hz, Operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection, THD $< 10\%$, P. F. ≥ 0.95 , IP20, CRI ≥ 80 , Flicker free, (flicker should be below 5 %), life time (LED, Driver & electrical circuitry), of minimum 50000 Burning Hours with, 70% of initial Lumen maintained till life ends, CCT 3000°K / 4000°K / 5700°K / 6500°K (As per ANSI Bin), SDCM (Standard Deviation Colour Matching) < 3 , Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing. complete in all respect i/c external connections with 1.5 sq. mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy $\geq 105 < 120$ lm/Watt output. LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C). Powder coated die cast /Extruded aluminium Body (Thickness > 1.20 mm)					
2.5.1	18-22 watt	25	Each	681.00	17,025.00	-----
2.6	Supplying, Installation, Testing and Commissioning of decorative Wall light having brushed nickel finish fixture with opal glass diffuser along with 9W LED lamp including connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.	33	Each	1,764.00	-----	58,212.00
2.7	Supplying, Installation, testing and commissioning of Skirting/Foot light in existing GI box i/c suitable for operation of 240 Volts 50Hz AC etc. as reqd.	12	Each	1,042.00	-----	12,504.00
2.8	Brush Less Direct Current (BLDC) Fan without Remote Supply, Installation, Testing and Commissioning of ceiling fan with Brush Less Direct Current (BLDC) Motor, class of insulation: B, 3 nos. metal(Aluminium alloy) blades, 30 cm long down rod, 2 nos. canopies, shackle kit, safety rope, copper winding, steel/Al body Power Factor not less than 0.9, Service Value (CM/M/W) minimum as below, 350 RPM (tolerance as per IS : 374-2019), THD (Total Harmonic Distortion) less than 10%, suitable for operation with regulator for speed control and all remaining accessories including safety pin, nut bolts, washers, temperature rise= 75°C (max.), insulation resistance more than 2 mega ohm, suitable for 230 V, 50 Hz, single phase AC supply, Ceiling Fan compliant to IS 374:2019 fan i/c external connections with 1.5 sq.mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required.					

2.8.1	1200mm, service value> 6.0 CM/Min/watt, air delivery 210 CM/Min (Minimum)	35	Each	2,695.00	94,325.00	-----
2.9	Supply, Installation, testing & commissioning of 250 mm sweep exhaust (Ventilating) fan (PVC body) suitable for single phase 50 Hz AC supply in the existing hole including connection with 1.5 sq.mm FRLS PVC insulated, copper conductor, single core cable & earthing etc. as reqd.	14	Each	1,682.00	-----	23,548.00
2.10	Supplying, installation, testing and commissioning of Heavy duty metal body 300 mm sweep exhaust fan with rpm not less than 900 and air flow not less than 700 cum/h in the existing opening i/c , connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as reqd.	4	Each	2,545.00	-----	10,180.00
2.11	Supplying, Installation, Testing & Commissioning of vertical type water heater of following capacity with glass line tank coating, Incoly heating element and ABS (Plastic) body material (5 star rating) operating in 230 volts 50 Hz single phase complete with all modern safety devices like as thermostate, thermal cut out, pressure cum vacuum release valve, fuseable plug metal tank, and all accessories along with water pipe connection (inlet and outlet pipe) etc complete as required.					
2.11.1	15 Ltrs	4	Each	12,300.00	-----	49,200.00
	Total SH : II [FANS & FITTINGS]				2,42,536.00	1,66,108.00
3	SH : III [MCB DBs]					
3.1	Supplying and fixing following way, single pole and neutral, sheet steel, MCB distribution board, 240 volts, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)					
3.1.1	16 way, Double door	3	Each	3,367.00	10,101.00	-----
3.2	Supplying and fixing following way, horizontal type three pole and neutral, sheet steel, MCB distribution board, 415 volts, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)					
3.2.1	4 way (4 + 12), Double door	8	Each	4,377.00	35,016.00	-----
3.2.2	8 way (4 + 24), Double door	5	Each	6,337.00	31,685.00	-----
3.3	Supplying and fixing following ways surface/ recess mounting, vertical type, 415 volts, TPN MCCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 amps tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCB's, with provision of MCCB as incomer, interconnection between incomer MCCB and bus bars (but without MCB's/ MCCB) as required . (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)					
3.3.1	4 way (4 + 12), Double door	1	Each	13,152.00	-----	13,152.00
3.3.2	6 way (4 + 18), Double door	3	Each	14,891.00	-----	44,673.00
3.4	Supplying and fixing 5 A to 32 A rating, 240/415 V, 10 kA, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.					

3.4.1	Single pole	200	Each	285.00	57,000.00	-----
3.4.2	63A DP MCB	3	Each	1,415.00	-----	4,245.00
3.4.3	32A TP MCB	8	Each	1,070.00	8,560.00	-----
3.4.4	32 A FP MCB	8	Each	1,869.00	-----	14,952.00
3.4.5	63 A TP MCB	5	Each	2,094.00	-----	10,470.00
3.4.6	63 A FP MCB	5	Each	2,593.00	-----	12,965.00
3.5	Providing and fixing following rating and breaking capacity and pole MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as required.					
3.5.1	40 Amp, 16/18 KA, FPMCCB	1	Each	5,724.00	-----	5,724.00
3.5.2	63 Amp, 16/18 KA, FPMCCB	2	Each	5,556.00	-----	11,112.00
3.5.3	100 Amp, 25 KA, FPMCCB	1	Each	13,570.00	-----	13,570.00
3.6	Supplying and fixing Cable End Box (Loose wire box)(IP 43) suitable for following single pole and neutral, sheet steel, MCB distribution board, 240 V, on surface/ recess, complete with testing and commissioning etc. as required.					
3.6.1	For 14 way, Double door SPN MCBDB	3	Each	990.00	2,970.00	-----
3.7	Supplying and fixing Cable End Box (Loose wire box) (IP 43) suitable for following triple pole and neutral, sheet steel, MCB distribution board, 415 V, on surface/ recess, complete with testing and commissioning etc. as required.					
3.7.1	For 6 way, Double door TPN MCBDB	8	Each	1,223.00	9,784.00	-----
3.7.2	For 8 way, Double door TPN MCBDB	5	Each	1,448.00	7,240.00	-----
	Total SH : III [MCB DBs]				1,62,356.00	1,30,863.00
4	SH : IV [Earthing & Lighting]					
4.1	Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.	4	Set	15004.00	60,016.00	
4.2	Providing and fixing 25 mm X 5 mm copper strip in 40 mm dia G.I. pipe from earth electrode including connection with brass nut, bolt, spring, washer excavation and re-filling etc. as required.	40	Meter	1,638.00	65,520.00	-----
4.3	Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as required.	20	Meter	1,246.00	24,920.00	-----
4.4	Earthing with G.I. earth pipe 4.5 metre long, 40 mm dia including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal/ coke and salt as required.	4	Set	7,658.00	30,632.00	-----
4.5	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.	12	Set	8,351.00	1,00,212.00	
4.6	Providing and fixing 25 mm X 5 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode including connection with G.I. nut, bolt, spring, washer excavation and re-filling etc. as required.	80	Meter	755.00	60,400.00	-----
4.7	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	50	Meter	287.00	14,350.00	-----

4.8	Providing and fixing of lightning conductor finial, made of 25 mm dia 300 mm long, G.I. tube, having single prong at top, with 85 mm dia 6 mm thick G.I. base plate including holes etc. complete as required.	4	Each	609.00	2,436.00	-----
4.9	Jointing copper / G.I. tape (with another copper/ G I tape, base of the finial or any other metallic object) by riveting / nut bolting/ sweating and soldering etc as required.	12	Each	139.00	1,668.00	-----
4.10	Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as required.(For horizontal run)	65	Meter	148.00	9,620.00	-----
4.11	Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as required.(For vertical run)	25	Meter	238.00	5,950.00	-----
4.12	Providing and fixing testing joint, made of 20 mm X 3 mm thick G.I. strip, 125 mm long, with 4 nos. of G.I. bolts, nuts, chuck nuts and spring washers etc. complete as required.	4	Each	140.00	560.00	-----
4.13	Providing and laying G.I. tape 32 mm X 6 mm from earth electrode directly in ground as required.	40	Meter	221.00	8,840.00	-----
4.14	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing along with existing surface/ recessed conduit/ submain wiring/ cable as required.	450.0	Meter	50.00	22,500.00	-----
	Total SH : IV [Earthing & Lighting]				4,07,624.00	0.00
5	SH : V [Panels]					
	(Main Non essential panel)					
5.1	Supplying, installation , testing & commissioning of cubical type Outdoor LT Panel with Degree of protection IP:54 having in-built locking arrangement suitable for 415 V, 3 Phase, 4 Wire 50 Hz AC supply system fabricated in compartmentalized (preferably) design from CRCA sheet steel of 2 mm thick for frame work and covers, 3 mm thick for gland, plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having 150 Amp capacity extensible type TPN aluminium alloy bus bars of high conductivity, DMC/SMC bus bar supports, bottom base channel of MS section not less than 100 mm X 50 mm X 5 mm thick, fabricated shall be done in transportable sections, entire panel shall have a common copper earth bar of size 25 mm X 5 mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of AL. bus bars and control wiring with sq. mm PVC insulated copper conductors S/C cable, cable alleys, cable glad plates in suitable section ,i/c Civil foundation i/c providing following switch gears :-					
	Incomming					
	125A 4Pole 25 kA MCCB with Thermal magnetic release, including Spreader Links & Extended Rotary Handle - 1 No.					
	Multifunction meter- 1no					
	LED Red/Amber/Green Phase Indication Lamps - 1set.					
	Outgoing					
	(V) Outgoing :					
	1. 100 A FP MCCB, 25 kA breaking capacity with thermal maganetic release, spreader link and extended rotatry handle with ON,OFF and trip indicator lamp -- 2 Nos.					

	2. 80 A FP MCCB, 25 kA breaking capacity with thermal magnetic release, spreader link and extended rotary handle with ON,OFF and trip indicator lamp -- 1 Nos.					
	3. 63 A FP MCCB, 16 kA breaking capacity with thermal magnetic release, spreader link and extended rotary handle with ON,OFF and trip indicator lamp -- 3 Nos.					
	4. 32 A FP MCCB, 16 kA breaking capacity with thermal magnetic release, spreader link and extended rotary handle with ON,OFF and trip indicator lamp -- 1 Nos.	1	Job	2,40,042.00	-----	2,40,042.00
	(Main essential panel)					
5.2	Supplying, installation , testing & commissioning of cubical type Outdoor LT Panel with Degree of protection IP:54 having in-built locking arrangement suitable for 415 V, 3 Phase, 4 Wire 50 Hz AC supply system fabricated in compartmentalized (preferably) design from CRCA sheet steel of 2 mm thick for frame work and covers, 3 mm thick for gland, plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having 100 Amp capacity extensible type TPN aluminium alloy bus bars of high conductivity, DMC/SMC bus bar supports, bottom base channel of MS section not less than 100 mm X 50 mm X 5 mm thick, fabricated shall be done in transportable sections, entire panel shall have a common copper earth bar of size 25 mm X 5 mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of AL. bus bars and control wiring with sq. mm PVC insulated copper conductors S/C cable, cable alleys, cable glad plates in suitable section ,i/c Civil foundation i/c providing following switch gears :-					
	Incomming					
	80A 4Pole 25 kA MCCB with Thermal magnetic release, including Spreader Links & Extended Rotary Handle - 1 No.					
	Multifunction meter- 1no					
	LED Red/Amber/Green Phase Indication Lamps - 1set.					
	Outgoing					
	(V) Outgoing :					
	1. 63 A FP MCCB, 16 kA breaking capacity with thermal magnetic release, spreader link and extended rotary handle with ON,OFF and trip indicator lamp -- 5 Nos.					
	2. 32 A FP MCCB, 16 kA breaking capacity with thermal magnetic release, spreader link and extended rotary handle with ON,OFF and trip indicator lamp -- 2 Nos.	1	Job	1,96,869.00	-----	1,96,869.00
	(Meter Panels)- For Ty-II& III Combined block					
5.3	Fabrication , Supply, erection, testing & commissioning of totally enclosed, dust and vermin proof, freestanding, cubical type, compartmentalised, Meter Panel Board of suitable size fabricated from workshop having modern fabrication and testing process,made out of 2mm thick CRCA sheet steel (depth not less than 300mm) with 100 A 4 strip Aluminium bus bar of complete with insulators,separators, inter connecting aluminium bars / cables, cable alleys, bus alleys, cable connecting / terminating bars / terminals / studs, glandplate, screw, bolts, nuts and washers, earth bus, earth stud/bolt,mounting channel, control wiring for meters and indicators and protective devices with suitable size PVC					

	insulated copper conductor cable and powder coating of approved quality and shade including providing and fixing of following switch gears, meters and accessories etc.complete as required as per specification.					
	Incomming					
	63A 4Pole 25 kA MCCB with Thermal magnetic release, including Spreader Links & Extended Rotary Handle - 1 No.					
	Multifunction meter- 1no					
	LED Red/Amber/Green Phase Indication Lamps - 1set.					
	Outgoing					
	1Ph,10-60A rating Energy meter Class:1.0 - 04 Nos.					
	63A MCB 2 Pole 10kA 'C' Curve for Protection - 04 Nos.	1	Job	77,711.00	-----	77,711.00
	(Meter Panels)- For Ty-IV					
5.4	Fabrication , Supply, erection, testing & commissioning of totally enclosed, dust and vermin proof, freestanding, cubical type, compartmentalised, Meter Panel Board of suitable size fabricated from workshop having modern fabrication and testing process,made out of 2mm thick CRCA sheet steel (depth not less than 300mm) with 100 A 4 strip Aluminium bus bar of complete with insulators,separators, inter connecting aluminium bars / cables, cable alleys, bus alleys, cable connecting / terminating bars / terminals / studs, glandplate, screw, bolts, nuts and washers, earth bus, earth stud/bolt,mounting channel, control wiring for meters and indicators and protective devices with suitable size PVC insulated copper conductor cable and powder coating of approved quality and shade including providing and fixing of following switch gears, meters and accessories etc.complete as required as per specification.					
	Incomming					
	63A 4Pole 25 kA MCCB with Thermal magnetic release, including Spreader Links & Extended Rotary Handle - 1 No.					
	Multifunction meter- 1no					
	LED Red/Amber/Green Phase Indication Lamps - 1set.					
	Outgoing					
	63 A MCB 4P 10kA, 'C' Curve for protection- 1 Nos..					
	10-40 A Three Phase digital energy meter-1 NO.	1	Job	58,715.00	-----	58,715.00
	Street Light panel					
5.5	Supplying, installation , testing & commissioning of cubical type Outdoor LT Panel with Degree of protection IP:54 having in-built locking arrangement suitable for 415 V, 3 Phase, 4 Wire 50 Hz AC supply system fabricated in compartmentalized (preferably) design from CRCA sheet steel of 2 mm thick for frame work and covers, 3 mm thick for gland, plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having 100 Amp capacity extensible type TPN aluminium alloy bus bars of high conductivity, DMC/SMC bus bar supports, bottom base channel of MS section not less than 100 mm X 50 mm X 5 mm thick, fabricated shall be done in transportable sections, entire panel shall have a common copper earth bar of size 20 mm X 3 mm at the					

	rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of AL. bus bars and control wiring with sq. mm PVC insulated copper conductors S/C cable, cable alleys, cable glad plates in suitable section ,i/c Civil foundation i/c providing following switch gears :-					
	Incomer					
	32 A FP MCCB, 16 kA breaking capacity with thermal magnetic release, spreader link and extended rotatory handle- 1 Nos.					
	Multifunction meter- 1no					
	LED Red/Amber/Green Phase Indication Lamps - 1set.					
	iv) 32 Amp or suitable TP contactor - 1 No.					
	v) Astronomical Digital daily timer switch - 1 No.					
	vi) Auto Manual selector switch - 1 No.					
	Outgoings and Street Light Feeder					
	i) 6-32 A 'C' curve 10 kA breaking capacity DP MCB - 6 Nos.	1	Job	65,623.00	-----	65,623.00
	Total SH : V [Panels]				0.00	6,38,960.00
6	SH : VI [Fire Fighting Systems] (For office Bldg)					
6.1	(a) Supplying, installation, testing and commissioning of electric driven terrace pump conforming to IS 12469: 2019 suitable for automatic operation and consisting of following, complete in all respects, as required: (Terrace Pump) (b) Horizontal type, multistage, centrifugal, split casing pump of cast iron body & bronze impeller with stainless steel shaft, mechanical seal as required. (c) Suitable HP squirrel cage induction motor TEFC type suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply with IP55 class of protection for enclosure, horizontal foot mounted type with Class- 'F' insulation, conforming to IS-12615: 2018. (d) M.S.fabricated common base plate, coupling, coupling guard, foundation bolts etc.as required. (e) Suitable cement concrete foundation duly plastered and with anti vibration pads					
6.1.1	450 lpm at 35 m Head	2	Each	91,384.00	1,82,768.00	-----
6.2	Fabrication, Supplying, Installation, Testing & Commissioning of an electrical control panel of cubical construction, floor mounted type, fabricated out of 2mm thick CRCA sheet, compartmentalised with hinged lockable doors, dust and vermin proof, powder coated in approved shade after a 7- tank treatment process with an automatic terrace pump system controller designed to provide audio and visual indication of the entire system's fault and operational status. It should be of 100 Amp(20x5 mm) capacity Aluminium Bus bars of high conductivity with heat-shrinkable colored sleeves, interconnection of cable alley having switchgears and internal wiring with FRLSH wires and cables i/c all accessories, mounting on minimum 450mm stand to withstand the weight with 2 nos. GI Earth studs, numbering etc. complete in all respect, suitable for operation on 415 V, 3 phase, 50 HZ. AC supply with enclosure protection class IP 54 as required.					

	(FOR TERRACE PUMP)					
	INCOMER					
	a) 63 Amps., 4P,18kA, MCCB,Thermal Magnetic release for O/L & S/C Protection (Ics = 100% Icu) With spreader links and extended rotary handle - 1 No.					
	b) Spreader Links 4 Pole for above (MCCB Set of 8) - 1 No.					
	c) Extended Rotary Handle for above MCCB - 1 No.					
	d) Digital Voltmeter (0-500 Volts) with selector switch. - 1 set.					
	e) Digital Ammeter (0 - 100 Amps.) with selector switch & 3 Nos of 100/5 A, Cl-1, CTs etc.- 1 set.					
	f) Set of 3 Phase indicating lamp R/Y/B -1 set.					
	g) 2A, 10 kA SP 'C' curve MCB for protection- 3 Nos.					
	h) 32 A Neutral Link for Protection - 1 No.					
	i) Type-2, SPD TPN 40 KA - 1 No.					
	OUTGOING.					
	a) 32 Amp, 4P,18kA,MCCB having breaking capacity 18KA,Thermal Magnetic release (Ics = 100% Icu) With spreader links and extended rotary handle - 2 Nos					
	b) Suitable HP fully automatic Star/Delta starter with over load protection, overload relay, star delta timer , current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation. - 2 sets.					
	c) Selector Switch for local/remote, auto/ manual / off operation ON/OFF indication lamp etc.- 2 set.					
	d) 2A, 10 kA SP 'C' curve MCB for protection- 2 Nos.					
	e) 32 A Neutral Link for Protection - 2 Nos.	1	Set	1,20,021.00	-----	1,20,021.00
6.3	Providing, laying, testing & commissioning of 'C' class heavy duty MS pipe conforming to IS 1239/Class -II of IS: 3589 including Welding, fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. and fixing the pipe on the wall/ceiling with suitable clamp/support frame and painting with two or more coats of synthetic enamel paint of required shade complete as required :					
6.3.1	80 mm	15	Meter	2,277.00	34,155.00	---
6.3.2	100 mm	15	Meter	3,077.00	46,155.00	---
6.4	Supplying and fixing single headed internal hydrant valve with instantaneous Gunmetal/Stainless Steel coupling of 63 mm dia with cast iron wheel ISI marked conforming to IS 5290 (Type -A) with blank Gunmetal/Stainless Steel cap and chain as required :					
6.4.1	Single headed Stainless steel	2	Each	6,632.00	13,264.00	---
6.5	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required :					
6.5.1	80 mm dia	4	Each	5,406.00	21,624.00	---
6.5.2	100 mm dia	2	Each	7,271.00	14,542.00	---
6.6	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required:					

6.6.1	80 mm dia	3	Each	8,255.00	24,765.00	---
6.6.2	100 mm dia	1	Each	11,853.00	11,853.00	---
6.7	Supplying and fixing 63 mm dia, 15 m long RRL hose pipe with 63 mm dia male and female couplings duly bound with GI wire, rivets etc. conforming to IS 636 (type-A) as required:					
6.7.1	Stainless Steel (Grade 304)	4	Each	4,667.00	18,668.00	---
6.8	Supplying and fixing first-aid Hose Reel with MS construction spray painted in post office red, conforming to IS 884 complete with the following as required.(a) 20 mm nominal internal dia water hose thermoplastic (Textile reinforced) type -2 as per IS: 12585(b) 20 mm nominal internal dia gun metal globe valve & nozzle.(c) Drum and brackets for fixing the equipments on wall.Connections from riser with 25 mm dia stop gun metal valve &(d) M.S. Pipe and socket.					
6.8.1	30 m	2	Each	9,440.00	18,880.00	---
6.9	Supplying & fixing 63 mm dia gun metal short branch pipe with 20 mm nominal internal diameter size nozzle conforming to IS 903 suitable for instantaneous connection to interconnect hose pipe coupling as required:					
6.9.1	Stainless Steel (Grade 304)	2	Each	1,756.00	3,512.00	---
6.10	Supplying and fixing air vessel made of 250 mm dia, 8 mm thick MS sheet, 1200 mm in height with air release valve on top and flanged connection to riser, drain arrangement with 25 mm dia gun metal wheel valve with required accessories, pressure gauge and painting with synthetic enamel paint of approved shade as required.	1	Each	19,402.00	19,402.00	---
6.11	Providing & fixing of pressure switch in M.S. pipe line including connection etc. as required.	2	Each	1,670.00	3,340.00	---
6.12	Providing and fixing in position industrial type pressure gauges with gun metal / brass valves complete etc. as required.	2	Each	1,491.00	2,982.00	---
6.13	Supplying and fixing of hose cabinet of size 750 mm X 600 mm X 250 mm made of 2 mm thick MS sheet with 6 mm thick glazed glass doors i/c necessary locking arrangement suitable to accommodate 2 Nos. 15 mtr. Long Hose pipe, 1 No. branch pipe, mounted on wall & duly painted with Post office red externally and white internally with synthetic enamel paint complete in all respect, for internal hydrant, as required.	2	Each	4663.00	---	9,326.00
6.14	Supplying and fixing of fire brigade connection of cast iron body with gun metal male instantaneous inlet couplings complete with cap and chain as reqd. for suitable dia MS pipe connection conforming to IS 904 as required:					
6.14.1	2 way-100 mm dia M.S. Pipe	1	Each	7262.00	7,262.00	---
6.15	Supplying and fixing of ISI marked Powder fire extinguisher ABC type fire extinguisher 6 kg. capacity conforming to IS-15683 : 2018 with IS 4308, ISI marked ABC Powder, complete with IS 4947 ISI marked Gas Cartridge with squeeze grip release valve, discharge pipe locking arrangement, operation manual and bracket suitable for operating between -30 degree centigrade to +60 degree centigrade complete as reqd.	5	Each	2796.00	---	13980.00

6.16	Supplying and fixing of ISI marked CO2 type fire extinguisher of following capacities conforming to IS: 2878 made from seamless cylinder conforming to IS: 7285, fitted with ISI marked controlled valve conforming to IS: 3224, high pressure 1 mtr. long discharge hose and horn complete with initial gas charging with carrying handle and wall mounting bracket and suitable for operating -30 Degree to +55 Degree etc. as required.					
6.16.1	4.5 Kg	5	Each	7455.00	---	37275.00
6.17	Supplying, installation, testing & commissioning of Green / white 5W LED, emergency exit signage double Sided Ceiling hung sign Emergency Ni-Cd rechargeable battery Backup of minimum 2 hours. confirming to IS 10322 IP 20 type made of extruded aluminium coated housing size of 180mmx300mm and 8mm acrylic sheet Glow wire test up to 650 degree with light source as per NBC, to complete the job.	4	Each	2,513.00	---	10,052.00
	Total SH : VI [Fire Fighting Systems]				4,23,172.00	1,90,654.00
7	SH : VII [Fire Detection, Fire Alarm and PA Systems]					
7.1	INTELLIGENT FIRE ALARM SYSTEM Supplying, installation, testing and commissioning of microprocessor based intelligent addressable main fire alarm panel, central processing unit with the following loop modules and capable of supporting not less than 240 devices (including detectors) and minimum 120 detectors per loop and loop length up to 2 km, network communication card, minimum 320 character graphics/ LCD display with touch screen or other keypad and minimum 4000 events history log in the non volatile memory (EPROM), power supply unit (230 ± 5% V, 50 hz), 48 hrs back-up with 24 volt sealed maintenance free batteries with automatic charger. The panel shall have facility to connect printer to printout log and facility to have seamless integration with analog/digital voice evacuation system (which is part of the schedule of work under SH: PA System) and shall be complete with all accessories. The panel shall be compatible for IBMS system with open protocol BACnet/ Modbus over IP complete as per specifications.					
7.1.1	Two Loop Panel	1	Each	2,50,420.00	2,50,420.00	---
7.2	Supplying, installation, testing & commissioning of intelligent analog addressable photothermal detector complete with mounting base complete as required.	23	Each	3,004.00	69,092.00	---
7.4	Supplying, installation, testing & commissioning of addressable fire control module complete as required.	1	Each	3,156.00	3,156.00	---
7.5	Supplying, installation, testing & commissioning of response indicator on surface/recessed MS Box having two LED, metallic cover complete with all connections etc as required.	4	Each	306.00	1,224.00	---
7.6	Supplying, installation, testing & commissioning of fault isolator complete with base as required.	2	Each	3,434.00	6,868.00	---
7.7	Supplying, installation, testing & commissioning of addressable manual call point complete as required.	2	Each	4,063.00	8,126.00	---
7.8	Supplying, installation, testing & commissioning of addressable horn cum strobe complete as required.	2	Each	3,682.00	7,364.00	---
	CABLING & WIRING					

7.9	Supplying and drawing following sizes of FRLS/HFFR PVC insulated copper conductor, single core cable in the existing surface/ recessed steel/ PVC conduit as required.					
7.9.1	2 x 1.5 Sq. mm	200	Meter	77.00	15,400.00	---
7.10	Supplying and fixing of following sizes of steel conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required.					
7.10.1	25 mm	25	Meter	289.00	7,225.00	---
	Total SH : VII [Fire Detection, Fire Alarm and PA Systems]				3,68,875.00	0.00
8	SH : VIII [Air Conditioning System)					
	Outdoor Unit					
8.1	Hi-Wall Split System Supplying , Installation, Testing and Commissioning of Air Cooled Hi Wall split type Air conditioners complete with Indoor unit(IDU), Out door unit (ODU), surface / concealed copper Refrigerant piping with insulation (closed cell elastomeric nitrile rubber tubular pipe section) upto 3 Mtr (IDU to ODU), copper power cable upto 3.5 Mtr (IDU to ODU) i/c drain pipe R-32/R-410/ R-407 Green Refrigerant, wireless Remote control, suitable for working between 180-260V with low & high voltage cutoff and 50 hz ,1 phase AC supply capable of performing cooling, dehumidification, air circulation of following capacity with Scroll / rotary compressor. The system shall be able to deliver 100% of the rated capacity upto 42 0C. Min 5 year Original Equipment Manufacturer (OEM) warranty both compressor and Printed Circuit Board (PCB). Must comply : Electrical cable IS 694 or IS 9968 temperature sensing control IS /International Electrotechnical Commission (IEC) 60730, hermetic compressor IS 10617, heat exchanger IS 11329, capacitor IS 2993 and motor IS 12615. Complete as per CPWD specification and IS : 1391 Part II 2023. The system shall be able to operate up to 50 0C (out door ambient temperature).					
	Inverter Type - Cooling only					
8.1.1	1.0 TR with 5 Star BEE Rating	5	Each	40,580.00	2,02,900.00	---
8.1.2	2.0 TR with 5 Star BEE Rating	2	Each	57,396.00	1,14,792.00	---
	Total SH : VIII [Air Conditioning System)				3,17,692.00	0.00
9	SH : IX [CCTV, LAN & IPABX System] (For Office Building)					
9.1	5/6MP IP IR Dome Camera Supplying Installation Testing and Commissioning of 5/6MP IP IR Dome Camera having following specifications and features etc :- 1) Type of Camera: Dome Camera 2) Image Sensor: 1/2.8" or better progressive Scan CMOS get color image even at night condition 3) Signal System: PAL/NTSC 4) Minimum Illumination: 0.008Lux@ F1.4, AGC ON, 0 lux with IR or better 5) Imaging: 1/3s to 1/30000s Shutter Support, Auto Gain Control , White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC,					

	Digital Watermarking. 6) On Screen Display: Camera should display Camera title, Date & Time in live & recorded video both. 7) Signal to Noise Ratio: > 50 dB 8) Day & Night: True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source-Inbuilt IR LED's with effective distance upto 50 Mtrs integrated IR 30 Mtrs for colour view in night. 9) Video Compression (Minimum): H.265 or better, H.265, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723 10) Wide Dynamic Range: WDR (120db or more) 11) Digital Noise Reduction: DNR (2D/3D) On/Off 12) Streaming: Triple streaming, configurable 13) Video Streaming & Frame Rates: Triple streaming, configurable Main stream: 5/6MP @25/30 fps, Sub streams: D1@25/30 fps or better 14) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser 15) Profile Management: User configuration import, export 16) Security: User Authentication, Water Marking 17) On board Storage: Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card. 18) Recording Management: Format SD, overwrite, storage management, video to NAS device, 19) Edge Analytics : Tripwire, Intrusion, Motion Detection 20) Alarm Trigger : Motion/tampering detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection 21) Alarm Support: It should have 1/1 Alarm In/ Out Port 22) Audio Support: It should have 1x Built-In Mic and 1/1 Audio In/ Out Port for external Mic. and Speaker (As per site requirement) with G.711U/A/ G.711Mu/ AAC/ G.726 audio compression 23) Network Protocol: SFTP, IPv6, IPv4, DNS,RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast, 24) System Capability: ONVIF 25) VMS: Camera shall support open source VMS 26) Cyber Security: trusted boot, AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, , account lockout, video encryption, IP/MAC filtering, HTTPS, trusted upgrade. 27) Ethernet: 1 RJ 45 10/100 Ethernet port 28) Power Input: The camera should support simultaneous dual power input—12 VDC (via power adapter) and PoE - to ensure continuous operation in the event of a failure in one power source. 29) Power Requirement: 12VDC/24 VAC/PoE (802.3af)/ePoE 30) Enclosure: IP67 weather proof, IK1031 31) Operating Condition: Ambient Temperature:- (-)05°C to 50°C, humidity 95% (max) (non-condensing) 32) IR life: 40000 hours or higher 33) Video Bit rate: 32 KBPS - 8 MBPS or better 34) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS				
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9.1.1	5/6MP ((3200 × 1800)@20 fps or better) IP IR 2.7mm ~13.5mm Motorized lens, Vari Focal Dome Camera, Angle of View: H: 104°–32°, V: 54°–18°, D: 125°–36° or better	4	Each	26,993.00	1,07,972.00	---
9.2	5MP /6MP IP IR Bullet Camera Supplying Installation Testing and Commissioning of 5/6 MP IP IR Bullet Camera having following specifications and features etc :- 1) Type of Camera: Bullet Camera 2) Image Sensor: 1/2.8" or better progressive Scan CMOS get color image even at night condition 3) Signal System: PAL/NTSC 4) Minimum Illumination: 0.006Lux@ F1.4, AGC ON, 0 lux with IR or better 5) Imaging: 1/3s to 1/30000s, Auto Gain Control, White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC, Digital Watermarking. 6) On Screen Display: Camera should display Camera title, Date & Time in live & recorded video both. 7) Signal to Noise Ratio: > 50 dB 8) Lens Type & Focus: 3.6mm/6mm fixed lens (optional as per site requirement) 9) Day & Night: True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source-Inbuilt IR LED's with effective distance upto 50 Mtrs integrated IR and 30 Mtrs for colour view in night. 10) Video Compression (Minimum): H.265 or better, H.265, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723 11) Wide Dynamic Range: WDR (120db or more) 12) Digital Noise Reduction: DNR (2D/3D) On/Off 13) Streaming: Triple streaming, configurable 14) Video Streaming & Frame Rates: Triple streaming, configurable Main stream: 5/6MP @25/30 fps, Sub streams: D1@25/30 fps or better 15) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser 16) Profile Management: User configuration import, export 17) Security: User Authentication, Digital Water Marking 18) On board Storage: Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card. 19) Recording Management: Format SD, overwrite, storage management, video to NAS device, 20) Edge Analytics: Tripwire, Intrusion, Motion Detection 21) Alarm Trigger : Motion/tampering detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection 22) Alarm Support: It should have 1/1 Alarm In/ Out Port 23) Audio Support: It should have 1x Built-In Mic and 1/1 Audio In/ Out Port for external Mic. and Speaker (As per site requirement) with G.711U/A / G.711Mu/ AAC/ G.726 audio compression 24) Network Protocol: SFTP, IPv6, IPv4, DNS,RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast, 25) System Capability: ONVIF 26) VMS: Camera shall support open source VMS					

	27) Cyber Security: trusted boot, AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, account lockout, , video encryption, IP/MAC filtering, HTTPS, trusted upgrade. 28) Ethernet: 1 RJ 45 10/100 Ethernet port 29) Power Input: The camera should support simultaneous dual power input - 12 VDC (via power adapter) and PoE - to ensure continuous operation in the event of a failure in one power source. 30) Power Requirement: 12VDC/24 VAC/PoE (802.3af)/ePoE 31) Enclosure: IP67 weather proof, IK10 32) Operating Condition: Ambient Temperature:- (-)05°C to 50°C, humidity 95% (max) (non-condensing) 33) IR life: 40000 hours or higher 34) Video Bit rate: 32 KBPS - 8 MBPS or better 35) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS					
9.2.1	5/6MP ((3200 × 1800)@20 fps or better) IP IR 2.7mm ~13.5mm Motorized lens, Vari Focal outdoor Bullet Camera, Angle of View: H: 104°–32°, V: 54°–18°, D: 125°–36° or better	6	Each	26,993.00	1,61,958.00	---
9.3	Supplying Installation Testing and Commissioning of following Channel Network Video Recorder (NVR) with camera licenses to record for all channels having specifications and features etc as mentioned below : 1) Network Video Recorder Embedded/ Installed OS (Linux) along with Camera Licenses to record per NVR and to provide a live view, storage and simultaneously Multi-channel playback of all IP camera or more and must be ONVIF with minimum support of 384 Mbps incoming Bandwidth. 2) NVR should support video compressions : H.265 or better, H.264, MJPEG. 3) Must support 1 channel RCA Input, 2 channel RCA Output for Two-way Talk with G.711U/A, G.711u, PCM, G726 audio compressions. 4) Intelligent auto power on when power resumes after power outage. 5) Storage: It should support minimum 8 SATA Slots with 20TB capacity/ Slot and RAID support of RAID 0/1/5/6/10. (4 SATA (32 Channel) & 8 SATA Slot for 64 Channel) 6) Connectivity Interface : 2 Nos. x 10/100/1000 Mbps Ethernet Ports, 1x RS485, 1x RS232, 1x eSATA Port 7) Backup Interface : Its should have 4 Nosx USB port (2x USB3.0, 2xUSB2.0) 8) Video Output Ports: 2x HDMI and 2 VGA 9) Alarm Ports: It should have 16/8 Ch In/ Out ports to connect various type of external sensors and output devices like hooter/ Siren etc. 10) Email & SMS Alert options: Option for SMS/ Email Alerts to minimum 5 designated mobile number for power failure, HDD failure, vandalism, tempring, network disconnection and panic 11) Web & Mobile Application: Web, Mobile app (For iPhone, iPad, Android Phone) for alerts and viewing. 12) Protocols: HTTP, HTTPS, TCP/IP, IPv4/IPv6, UDP, DHCP, DNS, SMTP, UPnP, IP Filter, PPPoE,					

FTP, DDNS, Alarm Server, IP Search, Multicast, Auto Registration, ONVIF (Profile T, Profile S, Profile G), CGI, SDK and OEM Cloud for remote monitoring without any public IP need. 13) Standards: CE, FCC, RoHS, BIS Certified. 14) Power Supply : Should support AC100-240V, 50/60Hz Power supply. 15) Operating Condition : -5°C to 50°C, humidity 90% (max) (non-condensing). 16) The VMS application shall support all the features & functionalities of the offered cameras. 17) VMS should consist Licenses for all channels to record Cameras with General, motion detection, intelligent, alarm and POS recording modes. VMS should be provided with Camera Licenses , with no dependency of VMS licenses by binding with the MAC address of the cameras to achieve the functionality. 18) The NVR OEM shall be responsible for providing a mobile application compatible with both Android and iOS devices, enabling remote monitoring and playback of cameras/NVR footage. 19) The OEM must provide its own DDNS server hosted in India, eliminating the need for a public IP address for remote monitoring over the Internet. 20) Must support Continuous, Alarm, Motion, Instant, Panic Recording Mode 21) It should support Resolution: 32MP; 24MP; 16MP; 12MP; 8MP; 5MP; 4MP; 1080p; 720p; D1; CIF; QCIF 22) When alarm recording is enabled and an event occurs, you can click the alarm icon on monitoring page to view the alert details. The snapshot function is supported on monitoring and playback page 23) The Network Video Recorder (NVR) shall be configured to send email whenever a system message is created or an alarm event occurs. The email server shall be a valid SMTP server. Each recipient email address shall be configured to receive any combination of critical, warning, or informational messages or alarm notifications. When an alarm occurs, the email message includes the NVR name, time of alarm and a list of camera that is configured to record upon alarm. 24) It should have Web and GUI interface. 25) Built-In Artificial Intelligence: NVR should have built-in AI :- 2 Channel face detection and recognition, Minimum 4 Channel perimeter protection, - Minimum 8 Channel Smart Motion Detection. 26) Face Recognition Database Capacity: It should support total Blacklist and Whitelist capacity of Minimum 20,000 Faces or more with Face Detection speed of 12 face images/sec and facility to add Name, gender, birthday, address, credential type, credential No., countries & regions and state to each face image. 27) Face & Human Attributes Search: Search Pictures/ Video by Gender, age group, glasses, expressions, face mask, beard, Top color, top type, hat, bag, age, gender and umbrella. 28) ANPR Capability: It should support ANPR Camera with License plate, plate color, vehicle body, vehicle model, vehicle logo, calling, seatbelt, vehicle registration location etc vehicle attributes.						
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	29) Alarm Notifications based on: Motion detection, video tampering, video loss, scene changing, PIR alarm, Camera external alarm, Face detection, face recognition, perimeter protection (intrusion and tripwire), ANPR, people counting, stereo analysis, crowd distribution, heat map, Disk Full, Storage Error, IP Conflict and abnormal behavior of fan, cyber security exception. 30) Alarm Notification should be linked with Recording, snapshots, Camera external alarm output, buzzer, logs, presets and email. 31) General AI Based Search: Search Pictures by channel, time, event type, target classification (Fall Detection, People Approach Detection, People No. Exception Detection, People Staying Detection, Violence Detection. 32) Smart playback function: Should support smart search for the selected area in the video and smart playback to improve the playback efficiency. 33) VCA (Video Content Analytic): Should support multiple video contented analytics based on camera analytics. 34) Analytics by NVR: Perimeter protection and face recognition					
9.3.1	32 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9/16/25/32(36), 2nd screen: 1/4/8/9/16	1	Each	64,784.00	64,784.00	---
9.4	Hard Disk Drive Supplying, Installation, Testing and Commissioning following capacity Surveillance grade Hard Disk with upto 256MB/s Transfer Rate, 256 MB Cache, 7200 RPM Disk Speed, 3.5 inch form factor, SATA Interface, BSMI, ICES-003/NNB-003, CE, FCC, KC, Maghreb, RCM, UKCA, VCCI, CB-Scheme, TUV, UL Certifications.					
9.4.1	10 TB (Terabytes)	1	Each	24,798.00	24,798.00	---
9.5	LED Display Supplying, Installation, Testing and Commissioning of following size LED display (LED monitor) industrial grade with 3840x2160 resolution or better, USB playback, bluetooth and miracast connectivity, 4X HDMI 2.0, DP 1.2, HDR 10/10+, brightness: 500-nits or better, Video wall mode should be available, contrast ratio: 1200:1, OPS slot, viewing angle (H/V): 170°/ 170°, response time less than 12ms, Display control shall be on monitor screen and programmable with remote (remote shall be supplied with system), Key Board, Optical Mouse, etc. as required.					
9.5.1	55 inch or larger	1	Each	82,057.00	82,057.00	---
9.6	Supplying, installation, Testing and commissioning of following capacity 24 port Layer 2 indoor Network Switch having features and specifications etc. as mentioned here under: At least 24 X RJ-45 Gigabit Ethernet Ports and additional 2 X 10G Base -T with 4 X SFP Ports with non-blocking architecture by having Switching capacity of min. 128Gbps and packet forwarding rate of 95Mpps or higher, 16K MAC table. Console Port, USB port, Stacking support of min. 8 units per stack. Internal dual AC Power supply, STP, RSTP, MSTP, BPDU Filter, BPDU Restriction, Min. 9K Jumbo Frame, LBD, IGMP Snooping V1/V2/V3, MLD					

	Snopping V1/V2. IGMP /MLD Groups 1K or more, IPv4/IPv6 Loopback Interface, 16 L3 IP Interface, Ipv6 ND, VRRPv3, UDP Helper, ECMP. VLAN: 802.1Q, Port based, Q-in-Q, Multicast VLAN, Protocol VLAN, VLAN Trunking, DHCP Snopping, Server, server Screening. RADIUS , TACACS+ Authentication, QoS: 802.1P, 8 queues per port, QoS : WRR, Strict+WRR, WRED, 802.1p. ACL: MAC based, IPv4C IPv6, TCP/UDP Port number, time based ACL, TFTP Client, SNMP V1, v2c, v3, SNMP traps, RMON, DHCP server, relay, client, LLDP, LLDP-MED, OAM, Dying Gasp, 802.3ah, sflow, RIP, OSPF v2/v3, policy based route, SSL, SSH. 6 kV surge protection on all Gigabit Ethernet ports and on all GE RJ-45 access ports. Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE (TEC)/BIS compliance/certification as applicable etc. complete as required.					
9.6.1	24 port PoE Layer 2 Network Switch with PoE Support of 370W or higher with each copper port supporting 802.3at PoE+ min.	1	Each	1,25,393.00	1,25,393.00	----
9.6.2	24 port Layer 2 Non-PoE Network Switch	2	Each	86,163.00	1,72,326.00	----
9.7	Supplying, Installation, Testing and commissioning of indoor Wireless Access Point for High density use having features and specifications etc. as mentioned here under-WiFi6802.11ax 574Mbps (2.4GHz) + 2402Mbps (5GHz), WIFI 6Certified/Wi-Fi Alliance, MG 2.5G LAN POE Port, having console management function, factory reset, WPA/WPA2/WPA3™ Personal/Enterprise, WEP64/128-bit, SSID broadcast disable, MAC address access control, Internal RADIUS server, SNMP, Customizable Captive Portal, Auto Channel, Works as Access Point, WDS, WDS with AP, Wireless Client/MESH, Web (HTTP), Secure Socket Layer(SSL), Traffic control, Support ATF/Fast Roaming/Band Steering, Supports enhanced security – WPA-PSK/WPA2-PSK/WPA3-PSK and RADIUS client, and Cipher negotiation, and MAC/ IP ACL for networks, Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE(TEC)/BIS compliance/certification as applicable. Works as Standalone, Compatible with S/W & H/W Controller with additional features like - Real-Time Monitoring and Alerts, Rich Advanced Features, Centralized Device Management, Role-Based Administration, Real-Time Monitoring, VLAN and Access Control, Auto RF Management and Bandwidth Optimization, Multi- SSID and Captive Portal Authentication, etc. complete as required.	2	Each	35,559.00	71,118.00	----
9.8	Supplying Installation Testing and Commissioning of 24 port Cat6 Patch Panel loaded. Must be of 1U height with clear label holders and white label with the panel. 24 Ports Cat-6 Patch Panel should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D etc. complete as required.	3	Each	5,278.00	15,834.00	----
9.9	Supplying, Installation, Testing and commissioning of following CAT6A Patch Cord should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D etc. complete as required.					
9.9.1	Copper Patch Cords of length 1m (3ft)	57	Each	173.00	9,861.00	----
9.9.2	Copper Patch Cords of length 3m (10ft)	5	Each	405.00	2,025.00	----

9.10	Supplying, Installation, Testing and commissioning of CAT6A Copper Information Outlet (IO) with face plate of color as per site requirement, should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D. All copper Cable and Components should be from same OEM to maintain compatibility and interoperability etc. complete as required.	57	Each	302.00	17,214.00	----
9.11	Supplying, Installation, Testing and commissioning of RJ45 Connector for CAT 6/6A Cables. RJ45 modular plug supports 4 twisted pairs, 8 positions, 8 connectors. Housing: PC, UL94V-2, transparent color, Use for 24- 26 AWG stranded wires etc. complete as required.	57	Each	9.00	513.00	----
9.12	Supplying, drawing, Testing and commissioning of Cat6A UTP 4 pair, 23 AWG solid copper cable in existing conduit/ on surface, U/FTP, LSZH, Non- Plenum, Horizontal (solid) Cable suitable for high speed data networking application supporting upto 10Gbps over a 100 meter channel. The 4 Unshielded Twisted Pairs (UTP) cable with color coded insulation for easy identification should have FLAME PROPERTIES i.e. Flammability Test - IEC 60332-1, Smoke Density - IEC 61034, LSZH standards compliance: ANSI/TIA-568 C.2, ISO/IEC 11801, IEEE 802.3an, RoHS. Delay Skew should be < 45NS. The outer Cable Diameter should be 7.5 + 2 mm. Cable should have been tested and verified by UL/ ETL etc. complete as required.					
9.12.1	1 Run of cable	1450	Meter	62.00	89,900.00	----
9.13	Supply and fixing of following size Wall Mount Rack having Fixed Structure with 0.8mm CRCA Sheet, completely knocked-down condition (CKD) Shape, Vertical Mounting Rail 1.6 mm with 'U' Marking, Minimum 2 cable entry/exit provision at Top and bottom with rubber protection, Front 5mm Toughened Glass with lock, wall mounting kit, Powder coated Color- RAL-7035, complied with UL & RoHS, 2 x 6 sockets 16A power distribution units, 3 numbers closed cable organizer, Hardware mounting screws packet of 20 x 1 number, etc. complete as required.					
9.13.1	15U Rack	1	Each	13,330.00	13,330.00	----
9.14	Supply Installation Testing & Commissioning of IP PBX System with 4 Trunk Port, 4 Digital Port, 8 Analog Port and 20 IP Extension; support multiline telephony, scalable hybrid cloud communications, support 6 party conference, smart call routing up to 10000 routes, personal assistant, attendant services, greetings, automated attendant, OS: Linux, supports up to 300 users etc complete as required.	1	Each	116699.00	----	1,16,699.00
9.15	Supply Installation Testing & Commissioning of of SIP DeskPhones with 2.3 inch, 128 x 64 pixels black and white display with backlight, 2 Line Keys with LED, 2 SIP accounts, local 3 party conference, g.722, g711, PoE powered etc complete as required.	10	Each	5020.00	----	50,200.00
	Total SH : IX [CCTV, LAN & IPABX System]				9,59,083.00	1,66,899.00
10	SH : X [Lift]					
10.1	Passenger Lifts Supplying, Installation, Testing & Commissioning of following capacity passenger Machine room less (MRL) lift with regenerative drive as per CPWD General Specification for Electrical Works (Part-III Lift &					

	Escalator) 2003, BIS Codes, NBC 2016 as amended upto date having provision for barrier free access as per Harmonised Guidelines & Standards for Universal Accessibility in India - 2021 of MoHUA, serving different floors in the lift shaft as per detailed specifications enclosed and as under including all other equipment and accessories complete as required:-					
	(i) Speed : 1 MPS (ii) Floors : 2 (G+1) (iii) Travel : 7 Meters (approx.) (iv) Stops & Opening : 2 Stops and 2 Openings (v) Controller: A.C. variable voltage & variable frequency (vi) Automatic rescue device (ARD) complete with dry maintenance free batteries as required. vii) Operation: Microprocessor based single automatic push button/simplex selective collective/duplex collective selective with/without attendant (viii) Power-415 Volts+10%, 3 phase, 50 Hz, 4 wires system (ix) Car Enclosure: Stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting. (x) The car flooring should be smooth and antiskid as approved by engineer-in-charge. (xi) Type of doors (a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish). (b) Landing doors: stainless steel scratch proof. (xii) A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car. (xiii) Car Enclosure: Stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting.(x) The car flooring should be smooth and antiskid as approved by engineer-in-charge.(xi) Type of doors(a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish).(b) Landing doors: stainless steel scratch proof.(xii) A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car.(xiii) Voice announcement system in the car to announce the position of the elevator in the hoist way as the car passes or stops at floor served by the elevator. (xiv) Closed loop Control System, protection against power fluctuation, self diagnostic control, Landing doors 2 hours Fire rated, Overload detection and protection, Overspeed Governor, Dot Matrix LED D & P Indicators In Car & Landings, BMS Compatibility, tamper proof infrared curtain covering almost the entire height of the lift car door, Alarm horn, Anti Nuisance Operation, CCTV camera system with 4 MP IP camera, suitable NVR and HDD for 30 days storage backup , Firemen switch, 2/3 way intercom, Emergency Stop Switch with battery backup for fan and light fitting for 1 hour, pit ladder. (xv) The lift doors shall have a vision panel to enable persons with hearing impairment to signal for help or					

	assistance in the event of an emergency. (xvi) An appropriate technological support be provided (Through emergency messaging services or alarms etc.) to respond to the emergency requirements of person with hearing impairment or deafness. (xvii) In case of failure of ARD or other electronic devices, a provision of manual rescue be provided					
10.1.1	13 passenger (884 kg)	1	Job	14,30,968.00	----	14,30,968.00
	Total SH : X [Lift]				0.00	14,30,968.00
11	SH : XI (Transformer)					
11.1	Supplying, installation, testing & commissioning of Energy efficiency level 2 or amended up to date as per IS 1180 : (Part 1) as amended up to date (Amendment 4), 63 KVA, 11/0.433 KV, 3 phase, 50 Hz, Dyn11, ONAN type, copper wound distribution outdoor type transformer suitable for floor mounting with CRGO Stacked core, 'OFF' load tap changing arrangement on HV side having HV side Cable end box suitable for suitable size XLPE cable of grade 11KV or suitable for 11 KV ACSR conductor arrangement and suitable size bus trunking/cable termination on LV side, neutral brought out separately, complete with all accessories including first filling of filtered dehydrated transformer oil and confirming to IS: 1180, etc complete as required at the site. The Transformer is to comply with following technical specification as mentioned below, complete in all respect as reqd. at site.					
	Rated KVA at the ambient air temperature 45°C maximum -63KVA					
	Rated voltage of HV -11KV					
	Rated voltage of MV -0.433KV					
	Temperature rise in oil/windings -40/45°C					
	Rated Frequency -50Hz c/s					
	Number of Phase -3					
	Winding Connections HV/LV -DELTA/STAR					
	Percentage Impedance-4.5% (max)					
	Vector Group Reference -Dyn-11					
	Tappings on HV/LV to vary HV/LV + 5% to - 5% steps of 2.5%,					
	Total loss @ 50% load - 300 Watt (Max)					
	Total loss @ 100% load - 1050 Watt (Max)					
11.1.1	Transformer should be tested APDCL Lab Test, if required	1	Each	117907.00	1,17,907.00	-----
	Total SH : XI (Transformer)				1,17,907.00	0.00
12	SH : XII (DG Set)					
12.1	Supplying, Installation, Testing & Commissioning of 'Silent Type Diesel Generating set as per CPCB IV + or better norms along with having Prime Power Rating of KVA as below, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system & for 0.85 Load Factor, including testing at factory and site with fuel, load for test and other necessary arrangements Complete as per CPWD specifications, should have QR code which should contain drawing, test report OEM manual, Geo- Tag of manufacturing location, rating plate as per relevant IS Code etc. and consisting of the followings:					

(A)	Diesel Engine: Tourbocharged Diesel engine 4 stroke water cooled, multi cylinder, dynamically balanced fly wheel, electric start of suitable BHP at 1500 RPM suitable for above output of alternator at 40 °C, 50% RH & at 1000 Meter MSL , capable of taking 10% over loading for one hour after 12 hours of continuous operation. The engine will be with Electronic governor, Dry type Air filter with service indicator, first filling of engine fuel (after commissioning) lubricating Oil, Coolant and other consumables complete with all the required accessories, the Electronic governor shall be as per ISO 8528. The engine shall comply to the latest CPCB norms (CPCB IV + or better) and Conforming to BS 5514, BS 649, IS 10000, IS 10002, IS 13018 and as per CPWD specifications.					
(B)	Engine mounted Instrument Panel fitted with and having digital display Plate for following:					
(i)	Start-stop switch with key					
(ii)	Water temperature indication					
(iii)	Lubrication oil pressure indication					
(iv)	Lubrication oil temperature indication					
(v)	Battery charging indication and Voltage indication					
(vi)	RPM indication					
(vii)	Over speed indication					
(viii)	Low lubrication Oil trip indication					
(ix)	Engine Running Hours indication					
(x)	Fuel Level					
(C)	Alternator: Synchronous alternator rated of appropriate KVA, 415 volts at 1500 RPM, 3 phase 50 Hz, AC supply with 0.8 lagging power factor at 40 °C, 50% RH & at 1000 Meter MSL. The alternator shall be having Screen Protected Drip Proof (SPDP) enclosure IP23, brushless, continuous duty, dynamically balanced rotor, capable of taking 10% over loading for one hour after 12 hours of continuous operation, self cooled, self-excited and self-regulated through AVR conforming to IS13364(Part 2)/IS: 4722/BS 2613 suitable for tropical conditions and with class - H insulation.					
(D)	Base Frame & Foundation: Both the engine and alternator shall be mounted on suitable base frame made of MS channel with necessary reinforcement which shall be installed on suitable cement concrete foundation and vibration isolation arrangement as per recommendations of manufacturer.					
(E)	FUEL TANK: Daily service fuel tank of suitable liters capacity as per CPWD Specifications, fabricated out of 3 mm thick M.S. sheet complete with all standard accessories and fuel piping between fuel tank and diesel engine with MS class 'C' pipes of suitable dia. Complete with valves, level indications & accessories as required as per specifications.					
(F)	Exhaust System: Dry exhaust manifold with hospital type exhaust silencer and catalytic converter.					

	(G) Starting System: 12V/24V DC starting system comprising of starter motors: voltage regulator and arrangement for initial excitation complete with suitable numbers of batteries (180 AH capacity lead acid SMF type) as required as per specifications. The battery shall be housed inside the acoustic enclosure of DG Set.					
	(H) Acoustic and weather proof enclosure with arrangement for fresh air intake for cooling of the engine & alternator, extraction, discharging hot air in to the atmosphere and the temperature rise inside the enclosure, noise level outside enclosure. The acoustic enclosure should be suitable for cable connection/connection through bus-trunking. Such arrangements on acoustic enclosure should be water proof & dust-proof conforming to IP-65 protection. The enclosure shall be as per CPCB IV + or better norms etc. and as per CPWD specifications.					
	(I) AMF Panel: Free standing floor mounted IP 42 automatic mains failure control panel including auto by-pass, suitable for KVA as below for silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, Kilo Volt Ampere Reactive Hour (KVARH), KVA (Phase & Total), KW & provision for overload, short circuit, restricted earth fault, under frequency, power (aluminium) and control (copper)					
	cabling of suitable size upto 15 meter between AMF panel, LT Panel and DG Set including connection interconnection etc. as required, all complete and inter locking and communication/ Ethernet /RS485/SNMP port open protocol for BMS integration including suitable software, the panel shall be of DG Set OEM make etc. as per approved by Engineering in charge and including the following:					
	1. Suitable numbers and appropriate capacity 4 pole motorised electrically operated draw out with cradle type 3 position ACB/ MCCB with electronic release for O/C & E/F and shunt trip.					
	2. Auto/Manual/Test/Off selector switch					
	3. Protection for under and over voltage phase reversal (2 nos Over voltage relay, 2 Nos. reverse power relay and 2 Nos. under voltage relay).					
	4. 3 Sets of current transformers 15 P 10 accuracy for protection and 15 VA class-I for metering					
	5. Energy analyser unit to indicate current, Voltage(L- N & L L), kW, kVA (Phase & Total), Frequency, KWH, PF.					
	6. LED Indicating lamps for load on mains and load on set					
	7. Fuse/ MCB for instruments					
	8. Battery charger, complete with transformer/ rectifier, D.C. voltmeter and ammeter, selector switch for trickle, off and boost and current adjustment.					
	9. Main supply failure monitor					
	10. Supply failure timer					
	11. Restoration timer					
	12. Control unit with three impulse automatic engine start/stop and failure to start lockout.					
	13. Impulse counter with locking and reset facility.					

	14. ON/OFF/Control circuit switch with indicator					
	15. Audio/Video annunciation for					
	(i) High water temperature					
	(ii) Low lubricating oil pressure					
	(iii) Engine over speed					
	(iv) Engine fails to start					
	(v) Full load/maximum load warning					
	16. Protection for over/under Frequency, Loss of AC sensing, Over Current, Unbalancing load with suitable number of relays and accessories					
	17. Maintenance notification based on Engine Run Hour & due date.					
	18. Load Management through PLC to achieve auto opening and closing of incomer breakers, bus coupler switching of essential panel , interlocking providing signal to AMF Panel for load status and AMF shall give command to DG Set to auto start / auto stop depending upon load status and requirement etc. and necessary hardware and software required to perform the operation shall be provided by the contractor including all control wiring.					
12.1.1	35 KVA	1	Each	446290.00	4,46,290.00	----
	Total SH : XII (DG Set)				4,46,290.00	0.00
13	SH : XIII [UPS]					
13.1	Online UPS-Input Supply : Three Phase, Output Supply Three Phase Supplying, installation, Testing & Commissioning of following capacity at full load (Unity Power Factor) at operating temperature 0 to 40 0C, Relative humidity 0 to 95%, Online double conversion true sine wave Uninterrupted hot swappable (allow for the replacement or addition of battery modules without shutting down the entire system) modular Power Supply (UPS) system with N+1 modules (N denotes total number of modules required for rated capacity). The UPS shall include a Rectifier, inverter, battery bank suitable for 30 minutes back up (Battery VAH capacity shall not be less than 1600 VAH per KVA of UPS rating per Hour backup time) on full load (Battery shall be VRLA, SMF in ABS Container) and Static Bypass switch along with provision for manual bypass, suitable isolation transformer for additional protection against neutral faults etc. UPS shall have inbuilt phase sequence correction. The UPS systems offered are to be of the latest technology with Digital Control Microprocessor based for reliable operation using Insulated Gate Bipolar Transistor (IGBT)'s both for the rectifier & inverter (3 Level) with PWM (Pulse Width Modulation). The quality of design, manufacturing and inspection process should confirm to the relevant Inter-national standards such as IEC/EN/VDE. The operating efficiency of the UPS systems shall be >96% while operating on battery mode and delivering quality power to the 100% non-linear loads. Current total harmonic effect(ITHD) on the input grid shall be < 5% at 50 %load. (The required LC (inductor (L) and a capacitor (C)) filters shall be					

	included in UPS cost), extreme power factor kit to be included to limit the input power factor (PF) to 0.99 and output power factor shall be unity (i.e. kw rating of the UPS shall be kva rating x 1), however UPS shall be suitable to take load at 0.7 lagging to 0.7 leading power factor loads. UPS shall be suitable for incoming supply AC : 3Phase 400V +/-20%, 50 Hz +/-5 Hz, AC Output voltage: 3Phase 415 Volt, 50 Hz +/- 0.2Hz, Overload capacity of 120% for 10 mins, Sine wave output. Non condensing, noise level less than 60db at 1 meter distance, protections: Input Under voltage over voltage, abnormal out voltage, battery over charging, output over current, short circuit protection, battery deep discharge protection, 10KV surge. UPS must comply with low voltage electromagnetic compatibility (EMC) achieved as per EN 6204, EN6204 Part I and Part 2, it shall be a Voltage and Frequency Independent (VFI)-type UPS. Communication RS232/RS485/SNMP port open protocol for BMS integration, all hardware & software for IoT Communication as per approved by Engineering in charge. Required battery racks and interconnecting copper conductor cables of suitable size and connectors and all required accessories are inclusive of the cost). This system must provide a means for logging and alarming of all monitored points plus email notification. Forced air-cooling with integral inbuilt fans with redundancy (if one fan fail UPS should be able to handle at least 80% of the load, Noise Level 65 DB at 1 meter distance. The system shall be in compliance IEC 62040- 1,2 & 3, IS: 16242 and CPWD Specification. Display Panel (minimum) (In-built 5 inch or more LC Display /LED) to display : a) Input: Voltage, current, Frequency. b) Bypass: Voltage, Frequency. c) Output: Voltage, frequency, Current. d) Battery: Voltage, Capacity. e) Load: KVA, KW, Percentage.f) Temperature: STS, Inverter, PFC. g) Event Logging & Statistical Data (On LCD/LED): UPS should capture and display up to 3000 events like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload / Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc. h) Statistical Data: No. of power failures / Transfers to Bypass / Total Running time, etc. i) Mains Mode of Operation /Battery Mode of Operation / Bypass feeding the load / UPS Fault /Battery charging and discharging, overload, battery voltage and battery capacity. j) Audible Alarms : Mains Failure, Battery Low Alarm, UPS Overload, Fault, Shutdown, Input Over, Under Voltage, Output Over, Under Voltage, Battery Over, Under Voltage, Over Load and short circuit, Over Temperature. The UPS should have QR code which should contain drawing, test report OEM manual, Geo- Tag of manufacturing location etc					
13.1.1	10KVA (Each Power module shall be < 10 KVA)	1	Each	208893.00	2,08,893.00	----
	Total SH : XIII [UPS]				2,08,893.00	0.00

14	SH : XIV [Solar PV Power Generation]					
14.1	Solar Photovoltaic Power Plant Supplying Installation, Testing and Commissioning of on-grid Solar Photovoltaic Power Plant conforming to various applicable standards BIS, IEC, MNRE guidelines, the Central Electricity Authority Regulations and CPWD Specifications as amended up to date, consisting of Mono/Poly Crystalline silicon solar cells module, net metering facility, necessary control, protections, earthing, cabling, mounting structure, junction boxes, power conditioning units, Real time online web interfaced Data Monitoring System, Distribution panels, grid connecting arrangement, conduits, pipes, cable trays and other accessories etc. as required. a) High Energy Efficiency Solar Photovoltaic Module of capacity 330 Wp or above, manufactured in India, conforming to IS 14286/IEC 61215, IS/IEC 61730-Part-1, IS/IEC 61730-Part-2. Solar Photovoltaic Module conversion efficiency shall not be less than 23% at STC with temperature coefficient of Pmax better than -0.30% per 0C. PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. Solar Modules shall be designed to operate in relative humidity upto 100% with temperature between -10 0C and +85 0C. Further, each PV module used in any solar power project must have Radio frequency identification tag with information such as name of manufacturer, month and year of manufacturing, country of origin (separately for Solar cell and module), I-V curve, Unique Serial No and Model No of the module, Wattage, Im, Vm and FF, name of test lab issuing IEC certificate. b)Power Conditioning Unit (PCU) of 350-800 V DC Input voltage range and 415 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz, output voltage suitable to generate AC with a variation of 10% at nominal voltage. Power with efficiency not less than 97%, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 0C, Minimum IP-65 for outdoor and Minimum IP 21 for indoor, Built-in meter and data logger, MPPT, switching devices IGBT/MOSFETs and controller Microprocessor /DSP. PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown. The PCU shall be able to withstand unbalanced load conforming to IEC standard with shutdown/standby mode. It must be provided with grid islanding along with manual disconnect pole isolation switch besides automatic disconnection. Minimum protections: Mains Under / Over Voltage, Over current, Over/Under grid frequency, Over temperature, Surge					

	voltage induced at output due to external source, Short-circuit, Lightning, Anti Islanding (for grid synch. Mode) and other protections as per applicable standards. LCD/LED display of minimum parameters: DC input voltage, DC current, AC Voltage and current (all 3 phases, in case of 3 phase), Instantaneous & cumulative AC output power, Daily DC energy produced and other parameters applicable standard. Communication interface RS 485 / RS 232. c) Module mounting structure: The roof top solar plant generation units shall be installed by using supporting Aluminium/Galvanized MS structure (mass of zinc coating shall be as per IS4759) having minimum head room clearance of 2.4 meter above the terrace level / ground level. The mounting structure would be designed to sustain wind load and seismic parameter of the site of installation. All the structure shall be design as per applicable BIS code and the material shall also confirm the applicable BIS Code. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. The suitable arrangements for maintenance and cleaning shall be provided. d) Real time online web interfaced Data Monitoring System complete with accessories for various parameters such as Solar Irradiance, temperature, AC Output Voltage and current, Output Power, Power factor, DC Input Voltage and Current, Time Active, Time disabled, Time Idle, Power produced and other parameters as per standard practices. e) Array junction box & Main junction box with IP 65 protection and termination arrangement for incoming and outgoing cable along with glands, lugs and other accessories etc. as required. Each junction box shall be made of GRP/FRP/Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement with High quality Suitable capacity Metal Oxide Varistors(MOVs) (semi conductor diode with resistant applied voltage)/ surge arrestors and suitable Reverse Blocking Diodes, isolation switches isolate the DC input to Inverter, copper bus bar etc. f) Lightning, surge voltage protection, earthing protection and grid islanding. g) Cables: Connections & Interconnections by required size IR/UV protected XLPE insulated copper conductor 1.1 kV grade armored power and control cables(ISI Marked) along with supplying & fixing of necessary channel/conduit, GI cable trays, supports, lugs, thimble and other accessories etc. as required. h) DC Distribution Board And AC Distribution Panel Board: IP65, free standing, metal clad, having copper bus bar, having required protection and control gears, connection-interconnection, etc. as required.					
		10	kWp	54,280.00	5,42,800.00	----
	Total SH : XIV [Solar PV Power Generation]				5,42,800.00	0.00
15	SH : XV [Compound / Street Light]					

15.1	Supplying & Erection of hot dipped galvanised 6 mtr height octagonal pole with 1.0 mtr long (approx) single sided GI bracket in approved design capable of holding of luminaires. The pole shall also be provided with hindged / clained flush door of approx 500mm length at an elevation of 500mm/1m from the base plate with proper strengthening to the cutout of the door opening. Each pole shall be complete with a Bakelite sheet complete with DIN rail, 10 amps, 10 kA SP MCB, Screwless DIN mounting Connectors suitable for 16 sq.mm. terminations complete with DIN bar, shorting links, end locks etc as required and 3 x 1.5 sqmm FRLS/HFFR PVC insulated copper conductor single core cable from junction box to the luminaire complete including 1 No.3(three) terminations with insulated copper lugs etc as required. The pole shall be with suitable size of GI base plate, 600mm long 'J' type GI foundation bolts of min. 20mm dia each with three GI nuts and two GI washers (EN.8 grade) etc complete as required. The pole shall have a minimum dia of 130mm at bottom and 70 mm at top. The pole shall have a minimum section thickness of 3 mm. The pole shall be fabricated in a single section and shall be provided with necessary gaskets of 12mm thickness at the bottom. The installation shall include making RCC foundation suitable for a soil bearing capacity of 5 Ton/ Cum (Design & drawing must be approved by Engineer-in-Charge)'	10	Each	20175.00	---	201750.00
15.2	LED Street light fixture, powder coated pressure die cast aluminium body (System lumen efficacy ≥ 120 <135 lm/Watt) Supplying, installation, Testing & Commissioning of Street light LED fixture powder coated pressure die cast aluminium body with driver as per the requirement with Driver efficiency >85%, Input voltage: 140-270 Volt AC, frequency 50/60 hz, Operating temp range -5 0C to 50 0C, internal surge protection of 5 KV L,N,E as per IEC 61000-4-5, Driver efficiency >85%, THD < 10% as per IEC 61000-3-2, P. F. ≥ 0.95, IP-66, IK-10, CRI >70, under voltage and over voltage protection, EMI- EMC As per CISPR 15, lenses for beam angle as per IESNA type I/II/III as per the width of the road and the project requirement., suitable to fit in up to 65mm dia pipe, life time (LED, Driver & electrical circuitry) of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM-21-11 report, CCT 3000°K / 4000°K / 5700°K / 6500°K (As per ANSI Bin), SDCM(Standard Deviation Colour Matching) <5, Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy ≥ 120 <135 lm/Watt output . LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-					

	in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C).					
15.2.1	50 watt	10	Each	1934.00	19,340.00	----
15.3	Supply ,installation, testing and commissioning of LED bollard light fitting having extruded aluminium housing , polycarbonate clear diffuser , height of 800mm ,colour Temp 3000-4000K suitable for outdoor with IP65 rating, having wattage of min 10 watts with all required accessories i/c fixing on the foundation with require nut ,bolt & plate etc as required.(Cost of Foundation included)	20	Each	5,870.00	-----	1,17,400.00
15.4	Supplying of following sizes XLPE insulated and PVC sheathed aluminium/copper conductor armoured power cable of 1.1 KV grade conforming to IS 7098 (Part - I) / 1988 with amendment up to date etc as required.					
15.4.1	2 X 16 sqmm	500	Meter	318.00	----	1,59,000.00
15.4.2	3½ X 35 sq. mm	400	Meter	663.00	----	2,65,200.00
15.4.3	3½ X 70 sq. mm	90	Meter	1,204.00	----	1,08,360.00
15.5	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required.					
15.5.1	Upto 35 sq. mm	850	Meter	47.00	39,950.00	----
15.5.2	Above 35 sq. mm and upto 95 sq. mm	70	Meter	72.00	5,040.00	----
15.6	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing masonry open duct as required.					
15.6.1	Upto 35 sq. mm	50	Meter	36.00	1,800.00	----
15.6.2	Above 35 sq. mm and upto 95 sq. mm	20	Meter	58.00	1,160.00	----
15.7	Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II complete with fitting and cutting, jointing etc..direct in ground (75 cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc., complete as required.					
15.7.1	63 mm dia (OD-63 mm & ID-51 mm nominal)	800	Meter	289.00	2,31,200.00	----
15.7.2	90 mm dia (OD-90 mm & ID-76 mm nominal)	60	Meter	336.00	20,160.00	----
15.8	Providing, laying and fixing following dia G.I. pipe (medium class) in ground complete with G.I. fittings including trenching (75 cm deep) and re-filling etc as required					
15.8.1	100 mm dia	24	Meter	1,918.00	46,032.00	----
15.8.2	150 mm dia	6	Meter	2,894.00	17,364.00	----
15.9	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium/Copper etc complete as required.					
15.9.1	3½ X 35 sq. mm (32mm)	10	Each	437.00	4,370.00	----
15.9.2	3½ X 70 sq. mm (38mm)	10	Each	542.00	5,420.00	----
	Total SH : XV [Compound / Street Light]				3,91,836.00	8,51,710.00
	All SH Total			Rs.	71,94,302.00	36,00,680.00

	Add Cost Index of Bongaigaon nearby station of Mathanguri i.e. 131 based on PAR'21 (Base as 100) issued by ADG, Guwahati vide letter No. 17(6)/ADG(GR)/Works/2022/4133(H) Dated 17.11.2022 Modified Cost Index on PAR'2023 / DSR'25 (C.I. is 107 on PAR'21) = $[(131-107)/107] = 122.43$ Modified Cost Index on PAR'2025 / DSR'25 (C.I. is 103 on PAR'23) $[(122.43-103)/103 \times 100] = 18.86\%$ [Excluding MR Items]			Rs.	13,56,845.00	----
	Total			Rs.	85,51,147.00	36,00,680.00
	Grand Total DSR'25 + MR			Rs.	1,21,51,827.00	
