

Electrical, HVAC, ELV, LIFT, Fire Hydrant work Terms & Condition (Executed by Electrical Department)

Sr. No.	Documents	Attached (Yes / No)	Remark if N.A.
1	Special Conditions for Electrical Works for Composite Tenders (For G.S.P.H.C.L.)	YES	
2	Summary for the stage wise document submission by agency has to produce.	YES	
3	Performa-X for Associate Electrical Agency	YES	
4	Performa-Y (Elect. Agency MOU)	YES	
5	Performa-L (Lift Agency MOU)		NA
6	Performa-F (Fire Hydrant Agency MOU)	YES	
7	Performa-G for Associate ELV+ CCTV Agency	YES	
8	Performa-H (ELV Agency MOU)	YES	
9	Performa-U for Associate AUDIO VIDEO Agency		NA
10	Performa-Z (AUDIO VIDEO Agency MOU)		NA
11	Performa-W for Associate HVAC Agency		NA
12	Performa-V (HVAC Agency MOU)		NA
13	Performa-S for Associate Sport Ground lighting Agency		NA
14	Performa-T (Sport Ground lighting Agency MOU)		NA
15	Performa-M (For DC Live wire system Agency)		NA
16	Performa- for Associated Lightning protection work Agency		NA
17	Performa-LP (LPS Agency MOU)		NA
18	Performa-S2 for Associate Solar Agency	YES	
19	Performa-S1 (For MOU with Solar Roof Top)	YES	
20	Confirmation by agency to depute approved license ele. Agency for work	YES	
21	Important Instructions to the Electricals/LIFT/ Fire Hydrant/LPS Work	YES	
22	Running Bill Payment condition.	YES	
23	Necessary Temporary Power Connection Terms & condition	YES	
24	Confirmation given by agency regarding Vij bill for temporary connection	YES	
25	Necessary instructions regarding operation related to electric work	YES	

26	Important instructions to Bidders for Drainage and Water Supply Network line work in existing & new campus	YES	
27	Special Condition for RA / Final Bill	YES	
28	Electrical workmanship & Item details	YES	
29	Qualification Criteria & Technical Specification For LT Panel (IEC 61439-TTA)	YES	
30	Annexure- P (Confirmation for panel manufacture for service)	YES	
31	List of Applicable Indian standards for electrification work	YES	
32	Important instructions to Bidders for Octagonal pole work	YES	
33	Important Instructions for Floor Junction Box.	YES	
34	Important Instruction for LIFT work		NA
35	Important notes for Main Civil Agency and Lift Agency to be considered while quote rates and making MOU		NA
36	Lift Specification (Annexure-A)		NA
37	Annexure-AC for Lift (Declaration of Prime agency for Lift comprehensive service & maintenance contract during defect liability period)		NA
38	Annexure AC-1 (Lift comprehensive maintenance contract)		NA
39	Lift Checking, Testing at factory & site Performa		NA
40	Testing of Lift Installation		NA
41	(Annexure-I L)Comprehensive Maintenance check list point Annexure- II L - Report of Yearly Inspection by Person Authorized Under Section 13		NA
42	Annexure- D.G. (Declaration of Prime agency for D.G. Set comprehensive service & maintenance contract during defect liability period)		NA
43	Annexure-E1 (Declaration of OEM for D.G. set Maintenance)		NA
44	Annexure-E2 (Agency Declaration to be Submitted at time of Approval & Submitted with final Bill)		NA
45	Testing Proforma for DG set		NA
46	Annexure for D.G. Specification		NA
47	APFCR Panel Specification & details		NA
48	BOM & Specification for Fire Motor Panel & Fire alarm panel	YES	

49	Annexure-I for Fire extinguisher (6 Kg. ABC and 4.5 Kg. CO2 type)	YES	
50	Duty & Responsibilities of fire hydrant agency for proper & quality work	YES	
51	Testing Performa for Fire Hydrant and Fire Alarm system	YES	
52	Annexure - II Scope of AMC work for Fire Hydrant System & Fire Alarm System	YES	
53	HVAC System Particular Conditions of Contract		NA
54	Undertaking for HVAC work comprehensive maintenance		NA
55	Annexure for HVAC comprehensive maintenance		NA
56	Technical Specification for Package Substation with Breaker as Protection on HT Side		NA
57	ANNEXURE–H Undertaking for HT/LT Work Maintenance		NA
58	Technical Specification Check List for ELV (Data + Networking) System		NA
59	ANNEXURE – AV Undertaking for ELV + Fire Alarm+ Audio- Video Work Maintenance.		NA
60	ANNEXURE – AC for ELV + Fire Alarm+ Audio- Video Work Comprehensive Maintenance & routine / periodic maintenance.		NA
61	No Defect and Satisfactory maintenance Certificate for Civil/ Electrical/Fire hydrant/ Lift/DG set	YES	
62	Annexure – B/1 Certificate for Demonstration, Minor maintenance and operation of Fire HYDRANT system at site	YES	
63	Annexure – B/2 Certificate for Demonstration, Minor maintenance and operation of DG Set system at site		NA
64	Annexure – B/3 Certificate for Demonstration, Minor maintenance and operation of HVAC system at site		NA
65	Annexure – B/4 Certificate for Demonstration, Minor maintenance and operation of Lift system at site		NA
66	Annexure – B/5 Certificate for Demonstration, Minor maintenance and operation of DC Live Wire at site		NA
67	Annexure – B/6 Certificate for Demonstration, Minor maintenance and operation of ELV + FIRE Alarm + Audio Video & Relevant Items at Site	YES	
68	Stability & Safety Certificate for Lift by Lift OEM (Annexure-D1)		NA
69	Stability & Safety Certificate for D.G. SET (Annexure-D2)		NA
70	Stability & Safety Certificate for Fire Hydrant System (Annexure-D3)	YES	
71	Stability & Safety Certificate for HVAC System (Annexure-D4)		NA
72	Stability & Safety Certificate for DC Live wire System (Annexure-D5)		NA
73	Stability & Safety Certificate for Audio-Video system (Annexure-D6)		NA
74	Stability & Safety Certificate for HT Substation system (Annexure-D7)		NA

75	Stability Certificate for LPS system (Annexure-D8)	YES	
76	Earthing Details	YES	
77	Rojkam for Hidden items at site during work	YES	
78	Factory Acceptance test for all bought out Items	YES	
79	Safety Instruction to be followed by Contractor	YES	
80	Detail for stages of works done by civil & Electrical/ HVAC/ ELV/ FIRE HYDRANT agency	YES	
81	Duty & Responsibilities of civil agency for Electrical/ HVAC/ ELV/GEB Infrastructure work	YES	
82	Duty & Responsibilities of elect agency for good workmanship.	YES	
83	Duty & Responsibilities of Lift agency for good workmanship.		NA
84	Duties of site engineer (Elect)	YES	
85	Checklist of points during free service period and annual maintenance period of lift		NA
86	Authorization of Lightning Protection	YES	
87	Annexure-A(E), SPD Specifications	YES	
88	Important instructions to Bidders for DC Live wire work		NA
89	Technical Specification (General) For DC Live Wire System		NA
90	Technical Specification High Mast Lighting System		NA
91	Technical Specification For Universal Astro Timer	YES	
92	Important Instructions for Solar Roof Top System Work	YES	
93	Important Standards for Solar Roof Top System Work	YES	
94	Technical Specifications of Roof Top Solar Panel System Components	YES	
95	List of Approved Products	YES	

Index serial no:-1

If prime bidder have not experience of following works, Primer bidder must have to execute FIVE MOU with (1) Electrical installation Work (2) ELV System (3) Fire Hydrant Work and (4) Solar System submit at the time agreement / Before starting of work as per tender condition.

SPECIAL CONDITIONS FOR ELECTRICAL WORKS FOR

COMPOSITE TENDERS (For G.S.P.H.C.L.)

- 1. I (A) For (Electrical work, Fire work, solar work etc.)** Bidder will have to submit qualification & work experience related documents at the time of agreement which are mentioned in Performa for associated electrical agency (Performa-X) & M.O.U. (Performa-Y), for associated Lift agency M.O.U. (Performa-L) & For associated Fire system work Agency M.O.U. (Performa-F), Performa for associated ELV agency (Performa-G) & M.O.U. (Performa-H)
- 2. II (B) For (ELV system work)** Bidder will have to submit qualification & work experience related documents after receiving work order and before work will start, which are mentioned in Performa for associated ELV agency (Performa-G) & M.O.U. (Performa-H) from Executive Engineer (Elect), G.S.P.H.C.L.
3. All technical discussions regarding Electrical work, Lift Work, ELV Work, Fire Hydrant, Solar work shall be attended by the respective associated Electrical agency, Lift agency, ELV Agency, Fire Hydrant agency, Solar work agency, along with the Main agency.
4. The main contractor shall be entirely responsible for all the works done by all his associated electrical contractor 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 cause of the agreement.
5. The Defect liability for all the electrical work shall be as per original tender condition. The main contractor will ensure that the maintenance during the defect liability period shall also be carried out timely & properly & submit their records regularly to G.S.P.H.C.L. Without those documents balance security deposits will not be released. For that main agency will have to give work order of SITC work & service & maintenance during defect liability to his associated agency & submit M.O.U to G.S.P.H.C.L.
6. In the case, if any concerned associated agency not performing satisfactory or not completing the work, the department may direct the main contractor to remove the associate agency deployed on the work and ask him to deploy another agency who fulfills the eligibility criteria and fresh M.O.U. will have to be executed Under such circumstances main contractor will ensure that the new agency will be executing the left over work without any delay or variation in cost to the department. Such associate shall also submit its details as per requirement & corporation will debar that associated agency for future work of corporation.
7. The main contractor shall be responsible for coordinating the activities of all the works and will ensure progress of all works as per the laid down programme. The contractor shall also arrange for proper storage of the electrical accessories at site, temporary power connection and will be responsible for their watch and ward.
8. Delay in work due to lack of Co-ordination among different agencies, delay in supplying necessary materials, no time limit will be given to main agency. For that agency has to give techno commercial purchase order to manufacturer/ dealer well in advance considering delivery period of materials.
9. To start the work immediately after work order & maintain progress of work as per tender, proper material management will be required. For that agency has to take approval of

material as per tender specification, make & model, well in advance, keeping in mind delivery period of specific materials and their requirement at site. Payment of work will be done after proper erection of the item as per instruction of EIC & Drawing.

10. Main agency has to give support & co-ordinate for comprehensive maintenance of Electrical work, Lift Work, Fire hydrant system, ELV system, Solar system during defect liability period. Written confirmation will be given on Rs.300/- stamp paper at the time of Final Bill.
11. M.O.U. with Electrical/Lift/Fire Hydrant/ELV system/Solar work/LPS work etc. will not be cancelled without N.O.C. of associated agency of Electrical agency/Lift Agency/Fire Hydrant agency/ELV agency/Solar work agency/LPS work agency without justification.
12. Main agency has to submit the written application for cancellation of the M.O.U. and Re-M.O.U. with other qualified agency. After that corporation will accept new agency.
13. Main agency / OEM should give 10 years guarantee for availability of spare parts on Rs. 300/- stamp paper as per EIC instruction for important item.
14. Main agency has carried out Lift Work, Fire hydrant work, Solar system work, LPS work with qualified, experienced & authorized agency. For that main agency has to execute M.O.U. with such Lift OEM, Fire hydrant agency, Solar work agency, LPS work agency as per draft given.
15. Main agency will have to depute electrical related agency having full site work including maintenance during handing over to defect liability period.
16. All necessary supporting documents with M.O.U. agency has to start the procedure for nominating the qualified & experience relevant agency (Elect. / Lift / HVAC / fire / ELV / Solar / LPS work etc.) as per tender requirement and submit to the complete M.O.U. within 10-days after getting acceptance letter. So, delay in agreement & work order can be avoided.
17. Civil agency has to give written confirmation that they have completed all civil, electrical, data networking, Water supply work etc. and tested at their end, rectify all checklist points and buildings are ready to hand over to beneficiary with testing, training etc. On basis of the confirmation, GSPHCL will write letter to beneficiary for starting procedure of handing over the buildings. Main agency has to keep present all associated agencies engineers with necessary testing equipment and manpower. As soon as the work is completed, the contractor shall give a notice of such completion to the concern officer and on receipt of such notice, concern officer shall inspect the work and if found any pending work agency must complete it soon without any extra payment and time limit and it is total responsibility of main agency.
18. Civil agency has to submit Lift, D.G. set, Fire system, Solar system work etc. related All-in-All comprehensive maintenance FDR before declaration of work completion of whole project because it is tender item.
19. Agency has to give contract to same OEM of Lift, D.G. set, Solar system and Fire work for comprehensive maintenance during defect liability period. It could not be changed by any how during defect liability period.

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Note: - Agency has to produce/submit the document as shown below at various stages.

Main agency / associated agency have to read carefully & produce / submit below documents at various stages as demanded. If main agency / associated agency fail to do so actions will be taken as per tender clause / condition.

**Name of work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

Sr. No	Documents required to be submitted at the time of online tender	Documents required to be submitted At the time of Agreement	Documents required to be submitted After Receiving work order/ Before work start	Documents required to be submitted At the time of Final Bill	Documents required to be submitted At the time of final SD Release
1			Performa-S1 (M.O.U. of Solar rooftop Agency with main agency)	FDR of Rs. <u>5492.00+GST</u> or quoted rate whichever is higher for Fire system All-In-All maintenance job during defect liability period	Stability and safety certificate for Fire hydrant system by Fire hydrant agency with Periodic service reports
2			Performa-Y (M.O.U. of Electrical Agency with main agency)	FDR of Rs. <u>15002.00+GST</u> or quoted rate whichever is higher for R. O. System maintenance job during defect liability period	Stability and safety certificate for LPS system by LPS agency with Periodic service reports
3			Performa-F (M.O.U. of Fire hydrant agency with main agency)	FDR of Rs. <u>77126.00+GST</u> or quoted rate whichever is higher for SOLAR. System maintenance job during defect liability period	

4				FDR of Rs. <u>5256.00+GST</u> or quoted rate whichever is higher for Water Cooler System maintenance job during defect liability period	
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NOC description: Other charges like preparing and submission of all the documents, Photographs, CD/DVD require getting the N.O.C. from concern fire department and also liasoning Work with concern department. The legal and other charges to get N.O.C. will be borne by contractor

All-In-All: Re-filling of CO₂ and ABC type fire extinguisher if required to get the N.O.C. from fire department. Agency has to give one live demonstration of fire Mock drill for fire fighting with minimum 01 no. CO₂ and 01 no. ABC type fire extinguisher at the time of handing over this system to the Police department and at the time of releasing final Security deposit. The necessary certificate for that must be submitted.

Fire Extinguisher: Detail specification of Fire Extinguisher are as per attached specification Annexure-I. Necessary certificate and guarantee must be given by Manufacture / Dealer on their letter head.

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Proforma-X for Associated Electrical Agency

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

Estimate Amount of Electrical work Rs. 1447210.77

Minimum requirement of registration class in R & B department electrical wing in Gujarat

State & work experience for executing electrical work.

(i) Up to 50.00 Lacs Estimated Amount of Electrical Work.

Sr. No	Range of electrical work amount	General required class of registration in R & B Government electrical wing	For this work class of registration required	Minimum requirement of work experience as per Important Instruction	For this work requirement of experience
1	Up to 15 Lac	E2	-----	One work of 40% of tender cost of electric work	-----
2	Above 15 lacs to 50 Lacs	E2	E2	One work of 40% of tender cost of electric work	One work of Rs. 5.78 Lacs of elect work
3	Above 50.00 Lac to 1.00 crore			One work of 40% of tender cost of electric work	-----

Note:- Similar type of work means (A) SITC of minimum one single work of Rs. 5.78 lacs of concealed type Internal electrical wiring & external lighting, electrical fitting, fan, switchgear, earthing, AC, streetlight work, D.G. set work etc. in a building/Campus as per MOU criteria. Agency has completed work satisfactory in last five years in Govt. / Semi-Government / PSU department.

Date:-

Place:-

Contractor Signature & Stamp

Successful bidder has to submit M.O.U at the time of agreement as per following criteria For Electrical work

- (1) Electrical agency should have Gujarat R&B registration in appropriate class with Government approved license.
- (2) Electrical agency must have full set up for designing & preparing drawing, erection testing, supervision & prepare documents & liaison work for high rise permission, test report for getting Electricity power connection from power distribution company vij connection giving training & demonstration of all electric system while handing over material labor management system, getting the approval of materials, co-ordination with other different agency preparing As built/ drawing w.r.t. Structure & false ceiling architect drawing, furniture layout, equipment footprint, plumbing & drainage system, pump room equipment layout etc.
- (3) List of dedicated B.E (Elect) engineer 1 No. having minimum 05 years experience & 2 No. having minimum 02 years experience of this type of work for planning, day to day supervision, day to day co-ordination, testing, liasoning & approval work with GEB local power distribution company/ elect inspector/ GSPHCL engineer/ consultant etc. this three engineers appointment & their agreement should be up to project time limit.
- (4) Electrical agency must be engaged in this type of work since last 10 years and should have completed this type of projects. Necessary proof shall be submitted.
- (5) Electrical agency must have all the erection & testing equipment (calibrated) as per GSPHCL.
- (6) Electrical agency must have office with full set up of electrical engineer, auto cad designer & computer operator, erection & maintenance supervisor & workmen, having minimum 03 years experience of respective work.
- (7) H.T substation & D.G set work shall be carried out by qualified & experience wireman / supervisor. Bio-data of this wireman shall be approved by GSPHCL prior to start work.

Date:-

Place:-

Contractor Signature & Stamp

Proforma For Associated Electrical Agency.

Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]

1.	Name of Electrical Agency:-
2.	Address of the firm:-
3.	Name of responsible person to execute work:-
4.	E-mail ID of Civil Agency:-
5.	Contact no. of Responsible person of civil agency:-
6.	E-mail ID of Electrical Agency:-
7.	Contact no. of Responsible person of Electrical agency:-
8.	Required class <u>E2</u> of registration in R&B department electrical wing & Rs. <u>5.78</u> Lacs Work experience as per Performa-X.
9.	Electrical contract license no & Validity.

Note:- Agency has to submit attested copy of registration, electrical license & work experience certificate & M.O.U. as per draft given in tender after receiving work order. Without MOU agreement will not be executed.

Date: -

Contractor Signature & Stamp

Place:-

Assistant Engineer (Ele.)
G.S.P.H.C.Ltd., Rajkot

Dy. Ex. Engineer (Ele.)
G.S.P.H.C.Ltd., Rajkot

Executive Engineer (Ele.)
G.S.P.H.C.Ltd., Rajkot

(Civil Agency has to execute MOU with Electrical Agency well before starting related civil work)

*Main agency has to execute MOU with qualified experience (as per tender condition) electrical agency at the time of excavation of building foundation.

MEMORANDUM OF UNDERSTANDING (Draft)

*** Proforma-Y ***

(On Rs.300 stamp paper notarized)

Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]

MEMORANDUM OF UNDERSTANDING

1. M/s. _____, registered firm having their office at _____, hereafter called "The Main Contractor and party hereto the First Part" (which express shall mean that include its heirs, executors, administrators, assignees)

AND

2. M/s. _____, registered firm having their office at _____, herein after called "The Nominated Electrical Sub-Contractor", the party hereto of the second part (which express shall mean that include its heirs, executors, administrators, assignees)

Introduction about party of first part and then introduction of party of second part. That purpose of the MOU is for Carried out work of Electrical installation **Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]**

1. The party of the first part (Prime Contractor) has deemed fit to carry out work of Electrical installation from the party of the second part. (Associated Agency)
2. The party of the second part must carry out Electrical installation work as per prevailing Indian electricity Act / Rule and specification of GSPHCL and that tender specification with conditions and conceptual drawings, Schedule – C.
3. The party of the second part shall not be entitled to ask for any payment from concern department directly and instead should ask for all payments from the party of the first part and it is the responsibility of party of the first part to ensure progress of the electrical work and financial liquidity of second party. However, If first party fails to give payment (which is given by GSPHCL towards Electrical work as a running or final bill) to second party, first party has to give reason / justification in written to GSPHCL otherwise GSPHCL cannot give no due certificate for final bill.
4. Maintenance of Electrical installation must be carried out by the party of the second part during defect liability period as per tender clause. If second party fails to do so, first party has to do it. In that case second party has to give reason / justification otherwise for future tendering electrical related agency will have to be debarred.
5. After installation if there is any defect, fault or any complaint as regards to the said work same shall be rectified by the party of the second part. If second party fails to do so, first party has to do it and it is mandatory.
6. The Main Contractor in this bid shall be responsible to deploy all required plant, machineries, and store for material, power connection & water supply for construction /electrical work as per the bidding document.
7. We have read the detail specification of the tender. Also read & understand the terms & condition of contract. We have also read tender clause for delay in rectification of fault during

defect liability period. We agree to resolve the complaints occurred during defect liability period as per terms and conditions of tender.

8. Following works must be carried out by main civil agency to maintain the quality and workmanship and to maintain the progress of the work under close supervision, monitoring and co-ordination of project manager (Civil).
9. For electrical work qualified and experience site engineer must be deputed by electrical agency as per M.O.U to maintain quality, workmanship, day to day supervision & monitoring progress, co-ordination between different agency, presence of site engineer during site visit of Assistant Engineer(Ele), Deputy Executive Engineer(Ele) , Executive Engineer(Ele), Superintending Engineer, Architect, Managing Director etc. It is mandatory.
10. Main Civil agency has to execute necessary MOU as per tender so, agency must have to print the draft/ format of this tender and fill the necessary details & submit.

1. CIVIL and elect agency Co-ordination and co-operation during work/before MOU up to defect liability period.

Sr. No.	Task of Work	Scope of work (Civil agency/electrical agency)
1	Providing copy of tender document having schedule-B, detail technical specification, general terms & condition Etc., at the time of agreement.	CIVIL
2	Providing civil architect / structure drawing related to concealed internal/ external electrical work for preparing execution drawing (GFC) after receiving conceptual drawing from GSPHCL.	CIVIL
3	For preparing GFC drawing related to elect internal/external work (internal wiring, road & campus street light, UG cabling work, domestic water pump & fire hydrant pump & its panel work, CSS , D.G set, LPS system, Elect room, earthing, erection of road crossing pipe for elect cable, fire M.S pipe etc..). Main civil agency nominated agency's their field worker civil engineer & elect engineer of GSPHC and arrange joint site visit and finalized location of each equipment & it's route of each cable pipe, etc.	CiVIL + Nominated all agency

2. Laying of pipes before slab casting

Sr. No.	Task of Work	Scope of work (Civil agency/electrical agency)
1	Laying of pipes in slab	Electrical agency
2	Laying of pipes in grade slab	Electrical agency
3	Binding of pipes with steel bars	Electrical agency
4	Binding of fan boxes and junction boxes with steel bars	Electrical agency
5	To give Dimensions of wall below beam to drop pipes in beam as per latest architect and structure drawing & preparing slab piping drawing by Electrical Agency if required.	Civil agency + Electrical Agency

6	To put hard board / thermocol below fan box and junction box	Electrical agency
7	To make marking or bind pipes of drops in beam to avoid breaking / shifting pipes at the time of casting slab.	Electrical agency
8	Be careful to not break or shift pipes laid in beam while using vibrator	Civil agency

Note: (1) For Sr. no. 1 to 6 enough time should be given to Electrical agency & GSPHCL Engineer by civil agency.

(2) We (First and second party) are agree to execute above work as per given guideline.

3. Zari pipe work and switch box/MCBDB fitting work

Sr. No.	activity	Scope of work (Civil agency/electrical agency)	Remarks
1	Making zari work in wall	Electrical agency	
2	Fix switch box, junction box, MCBDB box etc. in wall	Electrical agency	
3	To cover all boxes / MCBDB using brown tape / plastic bag / thermocol / paper etc. to prevent mortar going inside boxes / MCBDB	Electrical agency	
4	Filling rich mortar in zari and around all boxes, MCBDB using chicken mess where more than 1 pipe fixed in wall to avoid cracks in plaster with the help of skilled craftsman immediately after plastering.	Civil agency	
5(a)	Box cutting and finishing plaster work around fan box, switch box, junction box, MCBDB etc. with the help of skilled craftsman. This is to be done at the time of plastering & supervise by civil site engineer. This must be done immediately after completion of plaster & well before lapi putti.	Civil agency	
5(b)	If any box, fan hook found missing or cover during plastering. Civil & Elect. agency has to remove the mortar immediately after plastering. All the box must be clean & visible after plastering.	Civil + Electrical agency	
6	To maintain line level of all switch boxes, point boxes, MCBDB as per approved drawing and dimensions given by GSPHCL	Civil agency + Electrical agency	
7	Curing work after filling zari of pipe & box cutting plastering with rich mortar	Civil agency	
8	If mortar going inside box, MCBDB during plaster work, remove mortar from boxes, MCBDB, fan boxes etc. immediately .For that dedicated labour shall be deputed for	Civil agency	

	cleaning of mortar. Use of grinder to level the surface around MCBDB, switch box.		
9	Co-ordination slab, masonry for civil, plumbing, flooring, plastering wall tiles, elect work.	Civil agency	
10	If any pipe found missing after dismantling centering plate. Civil & elect agency has to combined check it and necessary action must be taken for that and finish the surface with mortar immediately.	Civil agency	
11	Use of chicken mess where more than two pipes to be filled with plaster.	Civil agency	

Note: (1) For Sr. No. 1 to 3 civil agency has to give enough time and do proper co-ordination among different agencies / technicians / labour.

(2) We (First and second party) are agree to execute above work as per given guideline.

4. Earthing work

Sr. No.	activity	Scope of work (Civil agency/electrical agency)
1	Making bore for earthing as per location approved by GSPHCL	Electrical agency
2	Making earthing chamber with rich mortar and fine bricks and to be flushed according to the level of plinth or paver block as per site situation and instructions of EIC	Civil agency
3	Height of chamber decided as per road level / plinth level / paver block level as per EIC instruction.	Civil agency

Note: (1) We (First and second party) are agree to execute above work as per given guideline.

5. Streetlight work

Sr. No.	activity	Scope of work (Civil agency/electrical agency)
1	Preparing of final streetlight drawing as per conceptual drawing provided by GSPHCL	Electrical agency
2	Laying of road crossing pipes for road, paver block, plinth protection etc. for streetlights as per approved drawing & site requirement.	Civil agency + Electrical agency
3	Erection work of streetlight poles	Electrical agency
4	Foundation work of streetlight poles as per drawing provided by GSPHCL & Paint on foundation with colour	Civil agency + Electrical agency

	same as building shed.	
5	Co-ordination for civil & elect. work	Civil agency

Note: (1) As shown in above table the scope of work executed by civil agency, supervisor / engineer of 2nd party (Electrical agency) must do necessary follow up, close monitoring and supervision of that work. The 2nd party is fully responsible for that type of work and also No extra time limit given for that type of work by GSPHCL.

6. D.G. Set work

Sr. No.	activity	Scope of work (Civil agency/electrical agency)
1	Preparing of final drawing for Foundation and shed for DG set as per conceptual drawing provided by GSPHCL	Civil agency + Electrical agency
2	Making foundation for DG set as per required capacity and as per location approved by GSPHCL Provision of conceal pipe for earthing wire.	Civil agency + Electrical agency
3	Fabrication work for DG set shed and grill	Civil agency + Electrical agency
4	DWC pipes and Cables laying and connection work to DG set	Electrical agency
5	Liasioning work to get approval from Electrical inspector for DG set	Electrical agency
6	Testing of CT and energy meter with seal from local power company testing laboratory	Electrical agency
7	Preparing Earthing Chambers.	Civil agency + Electrical agency
8	Execution of civil & fabrication work for elect room, D.G set, pump room & vij company infra getting power connection.	
9	Testing of DG set at factory work shop	Electrical agency + Civil agency
10	Co-ordination for civil elect work. Those are purchasing this.	Civil agency

Note: (1) As shown in above table the scope of work executed by civil agency, supervisor / engineer of 2nd party (Electrical agency) must do necessary follow up, close monitoring and supervision of that work. The 2nd party is fully responsible for that type of work and also No extra time limit given for that type of work by GSPHCL.

11. Qualification & Experience Criteria detail are as under:-

Sr. no.	As per Tender Requirement	As per electric Agency Document
1.	R&B registration <u>E2</u> & above Class	R&B Registration_____ Class. Validity up to_____
2.	Electrical Contractor License	(1) License No:-_____ (2) Name Firm:-_____ (3) Validity:-_____
3.	Detail of qualified & experience engineer. Who will remain present during execution to handing over the project.	(1) Name:- _____ (2) Designation:- _____ (3) Mobile No.:- _____ (4) E-mail ID:- _____ (5) Experience details & documents.
4.	Work Experience:- one single work of Rs:- 5.78 Lac for similar type work as in schedule-B	

Note:-

- If electrical agency fails to depute dedicated elect. Engineer for particular projects. Who should be available every stage of work.
- Electrical engineer must have knowledge of M.S office, AutoCAD etc for preparing project report, Tabapavati, as built drawings etc.

➤ **List of Key Personnel to be deployed on Contract Work**

- # Employment of a qualified site Engineer by the Contractor.
- The Contractor shall employ full-time technically qualified staff during the execution of this work as under: -

Sr. No	Project Cost of electrical & related work	Minimum electrical & related Engineer Requirement			Total electrical & related Engineers required	Penalty to be deducted per Engineer per month (in Rs.)
		Qualification	Number	Experience (Years)		
1	Up to 1 Cr.	B.E Electrical	1	2 years	1 Nos.	30,000/-
		OR Diploma Electrical	1	5 years		
2	More than 1 Cr. To 5 Cr.	B.E Electrical	1	3 years	1 Nos.	40,000/-
		OR Diploma Electrical	1	8 years		
3	More than 5 Cr. To 15 Cr.	B.E Electrical	1	5 years	1 Nos.	50,000/-
		OR Diploma Electrical	1	10 years		
4	More than 15 Cr. To 40 Cr.	B.E Electrical	1	8 years	1 Nos.	70,000/-
		OR Diploma Electrical	1	12 years		

5	More than 40 Cr.	B.E Electrical &	1	8 years	2 Nos.	70,000/-
		B.E Electrical OR	1	5 years		50,000/-
		Diploma Electrical	1	12 years		
6	More than 40 Cr., for every additional 25 Cr.	For every additional 25 Cr. One B.E Elect. Engineer of 5 year experience or Diploma Elect. Engineer having experience of 12 years are to be deployed in addition to Sr. 5 above				50,000/-
Note: In case of non-appointment of number of Engineers required as above for a continuous period of one month shall be considered as a breach of contract under clause 59 of section-3. The Corporation may issue notice of termination and terminate the contract.						

- **Note:** Electrical site Engineer is required to be deployed at site full time when concern work is ongoing as per EIC instruction.
- The Engineer also employed for the Government work must have sufficient experience to handle the work independently. Such an Engineer shall have to stay at the site of work and he shall not be entrusted with other duty except this work.
- In case the contractor or partner of the contractor firm is a Electrical Graduate Engineer, Employment of a separate Engineer will not be necessary. Provided that the Engineer partner himself attends the execution of the work on the site as a site engineer.
- At the time of M.O.U. Contractor will have to submit electrical engineer's Qualifications details, Degree/ Diploma certificate, Bio-data & appointment order issued by elect. agency. If designated Site Engineer is not appointed by agency penalty shall be imposed as per tender document & instruction of EIC. Such recovery shall be non-refundable.
- For delaying the M.O.U., no extra time limit or compensation regarding modification or rework in civil/Elect. Work shall be given to agency. Without executing MOU civil work can not be started. Subsequently getting approval of materials execution of Electrical work shall be delayed.

❖ Electrical agency has following Equipments.

At Office

- (1) Computer with printer with M.S office & AutoCAD software for preparing projects reports, correspondence & measurement sheet & preparing customized drawing as per site situation & instruction of EIC. Also for preparing as built drawing for final bill submission.

At Site

- (1) Megger, earth tester, clip on meter, multi meter, measure tape 5 mtr. metal, 30 mtr. measure tape PVC/SWG, spirit level, vertical / horizontal water pipe for leveling, thread for printing line, calculator, micrometer, venire caliper, 30cm scale, drill

machine, cutter, spanner, screw driver, tester, test lamp, plier, magnet, brown tape, blower, weighing machine, magnifying glass , marker pen, chalk & its powder, ladder, hole saw cutter, lugs, crimping machine as per site requirement.

- (2) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For Elect agency)
- (3) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For Elect site engineer)

The aforesaid understating has been arrived at amongst the parties without any undue coercion, force and the same is binding not only to the parties herein, but also to the legal heirs, successors of all the parties.

We have read (nominated agency) all the items. its details specification, make list, terms & condition, annexure, responsibility during defect liabilities, quoted rates etc and executed the M.O.U with main agency. I confirm that I will execute the work as per tender specification terms & condition including responsibilities during defect liabilities.

This MOU is arrived at _____ on _____ day of _____, 20____ amongst
SIGNED SEALED AND DELIVERED
By the within named

(Prime Contractor)

Witness - I

Nominated Agency

Witness – II

(Civil agency has to execute MOU with **Fire Hydrant** Agency after receiving work order and before related civil work will start)

MEMORANDUM OF UNDERSTANDING (Draft)

*** Proforma - F ***

(On Rs.300 stamp paper notarized)

Name of work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]

MEMORANDUM OF UNDERSTANDING

1. M/s. _____, registered firm having their office at _____, hereafter called "The Main Contractor and party hereto the First Part" (which express shall mean that include its heirs, executors, administrators, assignees) (Civil Agency)

AND

2. M/s. _____, registered firm having their office at _____, herein after called "The Nominated Fire Hydrant Agency", the party hereto of the second part (which express shall mean that include its heirs, executors, administrators, assignees) (Fire hydrant agency)

Introduction about party of first part and then introduction of party of second part. That purpose of the MOU is for Carried out work of Fire Hydrant System at **Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]**

1. The party of the first part (Prime Contractor) has deemed fit to carry out work of fire hydrant system from the party of the second part. (Associated Agency)
2. The party of the second part must carry out fire hydrant work as per NBC norms, guideline & rules of local municipal & fire safety department and specification of GSPHCL and tender specification with conditions and conceptual drawings.
3. MOU for fire hydrant system must be executed and submitted to GSPHCL EE(Elec.) & EE(Civil) before starting Civil & Electrical work which is related to fire hydrant system & sprinkler system like (excavation of sump & pump room).fire agency has to provide list of information and document required to get Pre-NOC in well in advance. Main agency has to collect all architect & Structure drawing required to get NOC from GSPHCL Architect branch & civil branch & give to fire agency for getting Pre-NOC. Fire agency has to provide Pump Head and discharge calculation sheet along with all pump TDS, GA drawing with sign and stamp to Executive Engineer (Ele) & get approval of it. Fire agency also submit SLD of electrical panel and get approval of Executive Engineer (Ele) as per tender specification. Agency has to do online application to get Pre-Fire NOC before construction of sump & pump room. To get fire NOC many information, points, documents are related to Civil work required to be submitted like width of road, width of staircase, sprinkler system, overhead tank capacity. Pump room width & length depth should be sufficient to install & operate & maintain all the fire pump, panel & domestic water pump & panel as per pre-noc. So fire agency has to prepared color floor layout showing all pumps, panel, plumbing, man hole chamber etc. with dimension and space between two equipment and wall & equipment as per operation & maintenance & get approval of GSPHCL & fire department. Main agency has to execute MOU with fire agency as per for qualification and experience certification mention in tenders. For delaying the MOU, no extra time limit or compensation regarding modification or rework in Civil/Ele. Work shall be given to

agency. Without executing MOU at above mention stages the civil work cannot be started, approval of materials, guidance at site and execution of Fire work shall be delayed.

4. The party of the second part shall not be entitled to ask for any payment from concern department directly and instead should ask for all payments from the party of the first part and it is the responsibility of party of the first part to ensure necessary payment to the party of the second part. However, If first party fails to give payment (which is given by GSPHCL towards Electrical work as a running or final bill) to second party, first party has to give reason / justification in written to GSPHCL otherwise GSPHCL can not give no due certificate for final bill
5. Comprehensive Maintenance of fire hydrant must be carried out by the party of the second part during defect liability period as per tender clause. If second party fails to do so, first party has to do it. In that case second party has to give reason / justification otherwise for future tendering Fire hydrant agency will have to be debarred.
6. After installation if there is any defect, fault or any complaint as regards to the said work same shall be rectified by the party of the second part. If second party fails to do so, first party has to do it and it is mandatory.
7. The Main Contractor in this bid and shall be responsible to deploy all required plant, machineries, store for material, power connection & water supply for construction/electrical work/ fire hydrant work as per the bidding document.
8. We have read the detail fire hydrant specification of the tender. Also read and understand the terms and condition of All-in-All comprehensive maintenance contract. We agree to execute the maintenance contract during defect liability period as per tender terms and condition and necessary record & photograph will be provided by civil agency to GSPHCL.
9. All civil, fabrication and electrical work shall be carried out by civil agency as per site requirements.
10. Civil agency has to provide dedicated & safe storage facilities to fire hydrant work agency for storage the material.
11. Complete the work as per tender specification and NBC norms. (Fire hydrant work agency)
12. Inspection of all materials & provide test certificate all materials to GSPHCL.
13. Fire hydrant work agency has to provide all functional and safety testing schedule to GSPHCL prior to final testing.
14. All the wiring on wall or flooring should be well dressed and totally concealed & in line & level.
15. Following works to be carried out by main civil agency to maintain the quality and work man ship and maintain the progress of the work under close supervision, monitoring and co-ordination of project manager.
16. Civil and Fire hydrant agency would be legal responsible in case of fire or accident.
17. Main Civil agency has to execute necessary MOU as per tender so, agency must have to print the draft/ format of this tender and fill the necessary details & submit.

Sr. No.	Work to be done at site	Scope of work (Civil agency / Electrical agency / Fire hydrant work agency)
1	Preparation of drawings and taking approval from GSPHCL Officer	Civil agency + Fire work agency
2	Preparation of drawings for fire hydrant system as per NBC norms to get approval from local fire officer (Pre NOC & final NOC)	Civil agency + Fire work agency
3	Fire extinguisher installation and testing	Fire work agency
4	Hose reel installation and testing	Civil agency
5	Wet riser, dry riser installation and testing	Civil agency
6	Down comer installation and testing	Civil agency
7	Yard hydrant installation and testing	Civil agency
8	Auto sprinkler system installation and testing	Civil agency
9	Fire alarm system installation and testing	Fire work agency / Electrical agency
10	Underground reserve water tank / overhead reserve water tank	Civil agency
11	Construction of Fire pump room	Civil agency
12	Laying of all fire pipes	Civil agency + Fire work agency
13	Main fire pump installation and testing	Fire work agency
14	Jockey pump installation and testing	Fire work agency
15	Terrace pump installation and testing (if required)	Fire work agency
16	Valves installation and testing	Civil agency
17	Pressure guage, pressure switch installation and testing	Fire work agency
18	MCP, Hooter, ON-OFF switch installation and testing	Fire work agency
19	Cable required for fire pump and jockey pump installation and testing	Fire work agency / Electrical agency
20	Fire pump panel installation and testing	Fire work agency
21	Foundation required for pumps (if required)	Civil agency

Note: (1) The scope of work as shown on above must be executed by that agency for that necessary follow up, close monitoring and supervision will be done. The 2nd party is fully responsible for fire hydrant work.

(2) We (First and second party) are agree to execute above work as per given guideline.

Fire hydrant agency has following Equipments.

At Office

- (1) Computer with printer with M.S office & AutoCAD software for preparing projects reports, correspondence & measurement sheet & preparing customized drawing as per site situation & instruction of EIC. Also for preparing as built drawing for final bill submission.

At Site

- (2) Megger, earth tester, clip on meter, multi meter, and measure tape 5 mtr. Metal, 30 mtr. measure tape PVC/SWG, spirit level, vertical / horizontal water pipe for leveling, thread for printing line, calculator, micrometer, venire caliper, 30cm scale, drill machine, cutter, spanner, screw driver, tester, test lamp, plier, magnet, brown tape, blower, weighing machine, magnifying glass, marker pen, chalk & its powder, ladder as per site requirement.
- (3) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For Elect agency)
- (4) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For Elect site engineer)

15. Qualification & Experience Criteria detail are as under:-

Sr. No.	As per Tender Requirement	As per fire hydrant Agency Document
1.	Agency has to submit the work Experience certificate of minimum one work of fire hydrant system in high-rise building and N.O.C. copy given by local authority & also maintenance contract experience certificate. Fire Hydrant agency must be capable, Experienced, Resourceful and competent to get provisional fire N.O.C, Final fire N.O.C., Renewal of N.O.C. of each year and maintain the system during defect liability period.	(1) Agency should have completed minimum one work of similar SITC job of <u>Fire hydrant</u> of Rs. 0.67 Lakhs or similar work height more than 20/30 mtr. building and basement more than 1000 sq. mtr. in Government / Semi Government / PSU in last 5 years.
2.	Responsible person details.	(1) Name:-_____ (2) Designation:-_____ (3) Mobile Contact No:-_____ (4) Email ID:-_____

➤ **Successful bidder has to submit M.O.U. as per following criteria.**

1. Fire Hydrant agency must be established since last 10 years.
2. Fire hydrant agency has full setup for design & prepare autocad drawings, erection, commissioning, testing of all type of fire safety system.
3. Fire hydrant agency must have service & maintenance setup.
4. Documents:- Last 10 years' experience certificate in Govt. / PSU / Corporate sector.
5. Details of full time employees and outsource employees for design, drawings, erection, testing, NOC procedure, service & maintenance with necessary proof.
6. List of tools & tackle and go-down detail for storage of material & equipment. Appreciation Certificates given by fire authority / Institute for excellence work.

7. Minimum one Fire system engineer / Mechanical engineer having 5 years' experience in design, drawing, erection, testing & handing over system and also knowledge of latest NBC, GDCR, NEC, fire act & local municipal corporation fire guideline.

The aforesaid understating has been arrived at amongst the parties without any undue coercion, force and the same is binding not only to the parties herein, but also to the legal heirs, successors of all the parties.

We have read (nominated agency) all the items. its details specification, make list, terms & condition, annexure, responsibility during defect liabilities, quoted rates etc and executed the M.O.U with main agency. I confirm that I will execute the work as per tender specification terms & condition including responsibilities during defect liabilities.

This MOU is arrived at _____ on _____ day of _____, 20____ amongst

SIGNED SEALED AND DELIVERED
By the within named

(Prime Contractor)

Witness - I

(Fire hydrant Agency)

Witness – II

Index serial no:-7

(Civil Agency has to execute MOU with ELV Agency after receiving work order & before work will start)

Performa-G for Associated ELV Agency.

Name of work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]

Estimate Amount of ELV work Rs. 1.07 Lac

Sr. No.	Particular Special Work Experience
1	Agency should have completed satisfactorily similar <u>ELV (Data, Voice & Fire Alarm system)</u> One work of Rs 0.43 Lac in Government/ Semi Government/ PSU.

Note:- (1) For ELV (Data , Voice & Fire alarm system) system work, Similar type of work means SITC Job of ELV (Data, Voice & Fire alarm system) system work in none residential new building. Agency should have completed the work satisfactorily in Government/ Semi Government/ PSU.

(2) Prime Bidder has to submit following document of associate ELV (Data, Voice & Fire alarm system) work system work agency.

(1) Work completion certificate (Form-3A) by competent authority indicating Specific ELV (Data, Voice & Fire alarm system) work experience & Amount as above (If Work completion certificate (Form-3A) does not mention Specific work Experience & Amount then Copy of Final Bill as proof of Execution of specific work experience must be submitted with Income tax TD)

(2) Copy of work order (a) SITC Job of ELV (Data, Voice & Fire alarm system) work as above

Date:-

Contractor Signature & Stamp

Performa For Associated ELV (Data , Voice & Fire alarm system) Agency.

**Name of work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

1.	Name of ELV Agency:-
2.	Address of the firm:-
3.	Name of responsible Engineer to execute work:-
4.	E-mail ID of Civil Agency:-
5.	Contact no. of Responsible Engineer of Civil Agency:-
6.	E-mail ID of ELV Agency:-
7.	Contact no. of Responsible Engineer of ELV Agency:-
6.	Similar Experience of <u>ELV (Data, Voice & Fire Alarm system) system</u> One work of Rs 0.43 Lac in Government/ Semi Government/ PSU.

Note:- Agency has to submit attested copy of work experience certificate & M.O.U. as per draft given in tender Before Work Will Start. Without MOU agreement will not be executed.

Date: -

Contractor Signature & Stamp

Place

Index serial no:-8

(Civil Agency has to execute MOU with ELV Agency after receiving work order & before work will start)

MEMORANDUM OF UNDERSTANDING (Draft)

*** Performa-H***

(On Rs.300 stamp paper notarized)

Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]

MEMORANDUM OF UNDERSTANDING

1. M/s. _____, registered firm having their office at _____, hereafter called "The Main Contractor and party hereto the First Part" (which express shall mean that include its heirs, executors, administrators, assignees)

AND

2. M/s. _____, registered firm having their office at _____, herein after called "The Nominated Electrical Sub-Contractor", the party hereto of the second part (which express shall mean that include its heirs, executors, administrators, assignees)

Introduction about party of first part and then introduction of party of second part. That purpose of the MOU is for Carried out work of ELV installation at **Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]**

1. That the party of the first part (Prime Contractor) has deemed fit to carry out work of ELV installation from the party of the second part. (Associated Agency)

2. That the party of the second part must carry out ELV installation work as per prevailing Indian electricity Act / Rule and specification of GSPHCL and that tender specification with conditions and drawings.

3. That the party of the second part shall not be entitled to ask for any payment from concern department directly and instead should ask for all payments from the party of the first part and it is the responsibility of party of the first part to ensure necessary payment to the party of the second part.

4. Maintenance of ELV installation must be carried out by the party of the second part as per defect liability period in tender. If second party fails to do so, first party has to do it. In that case second party has to give reason / justification otherwise for future tendering ELV related agency will have to be debarred.

5. That after installation if there is any defect, fault or any complaint as regards to the said work same shall be rectified by the party of the second part and it is mandatory.

6. The Main Contractor in this bid and shall be responsible to deploy all required plant, machineries, store for material, power connection & water supply for construction/ ELV work,, as per the bidding document.

Especially in non-residential houses computer wiring, telephone wiring and wiring of plug point for computer in which cluster table or individual table which is to be fitted away from the wall, in this case the floor junction box/raceway/pvc pipe should be erected before slab cleaning / unnecessary mortar removing and levelling, the junction box is maximum 60 mm thick. So that unnecessary bedding does not increase. Also keep in mind the size of the cutting floor junction of the tiles on it so that the cover of the junction box does not bend and make systematic cementation inside the junction box. Due to this the sand of the bedding does not stuck in the box and the question of breaking the flooring does not arise.

Quoting will have to be done by calculating the flooring and its bedding keeping in view the above matters. Please note that there will be no extra payment made for bedding due to the thickness of the floor junction box under any circumstances

7. Qualification & Experience Criteria detail are as under:-

Sr. No.	As per Tender Requirement	As per ELV Agency Document
1.	Name of ELV Agency	(1) Authorization letter from OEM for Installation , Testing, & maintenance (2) Work experience certificate of similar work (3) Maintenance experience certificate (4) Company profile
2.	Responsible Engineer Details	(1) Name:- _____ (2) Designation & Document :- _____ (3) Mobile no.- _____ (4) E-mail ID:- _____ (5) Experience detail & document:- _____

The aforesaid understating has been arrived at amongst the parties without any undue coercion, force and the same is binding not only to the parties herein, but also to the legal heirs, successors of all the parties.

ELV agency has following Equipments.

At Office

- (1) Computer with printer with M.S office & autocad soft ware for preparing projects reports, correspondence & measurement sheet & preparing customized drawing as per site situation & instruction of EIC. Also for preparing as built drawing for final bill submission.

At Site

- (2) Clip on meter, multi meter, Lane tester, Fiber testing kit, Speed measuring instrument, measure tape 5 mtr. metal, 30 mtr. measure tape PVC/SWG, spirit level, vertical / horizontal water pipe for leveling, thread for printing line, calculator, micrometer, venire caliper, 30cm scale, drill machine, cutter, spanner, screw driver, tester, test lamp, plier, magnet, brown tape, blower, weighing machine, magnifying glass , marker pen, chalk & its powder, ladder as per site requirement.

- (3) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For ELV agency)

Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For ELV site engineer)

We have read (nominated agency) all the items. its details specification, make list, terms & condition, annexure, responsibility during defect liabilities, quoted rates etc and executed the M.O.U with main agency. I confirm that I will execute the work as per tender specification terms & condition including responsibilities during defect liabilities.

This MOU is arrived at _____ on _____ day of _____, 20____ amongst

SIGNED SEALED AND DELIVERED

By the within named

(Prime Contractor)

Witness

(Sub-Contractor)

Witness

Index serial no:- 18

(Civil Agency has to execute MOU with Solar Roof Top Agency after receiving work order and before work will start)

Proforma-S2 for Associated Solar Agency

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

Estimate Amount of Solar work Rs. 399071.00

SR No	Particular Special Work Experience
1	Agency should have completed satisfactorily similar <u>Roof Top Solar System</u> One work of <u>Rs. 1.59 Lac of work. (Solar).</u>
2	Solar agency has experience of minimum 5 years in this field.

Note:- (1) For Solar Roof Top system work, Similar type of work means SITC Job of Roof Top Solar system work in none residential new building. Agency should have completed the work satisfactorily in Government/ Semi Government/ PSU.

(2) Prime Bidder has to submit following document of associate Solar rooftop work agency.

(1) Work completion certificate (Form-3A) by competent authority indicating Specific Solar system work experience & amount as above (If Work completion certificate (Form-3A) does not mention Specific work Experience & Amount then Copy of Final Bill as proof of Execution of specific work experience must be submitted with Income tax TDS)

(2) Copy of work order (a) SITC Job of Solar system work as above

Date:-

Contractor Signature & Stamp

Proforma For Associated Solar Roof Top System Agency.

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

1.	Name of Solar Agency:-
2.	Address of the firm:-
3.	Name of responsible Engineer to execute work:-
4.	E-mail ID of Civil Agency:-
5.	Contact no. of Responsible Engineer of Civil Agency:- (For Foundation & Plumbing works)
6.	E-mail ID of solar Agency:-
7.	Contact no. of Responsible Engineer of Solar Agency:-
8.	Similar Experience of <u>Solar roof top system</u> One work of <u>Rs. 1.59 Lac</u> in Government / Semi Government / PSU/ Private.
9.	GEDA Registration (Copy shall be attached)

Note:- Agency has to submit attested copy of work experience certificate & M.O.U. as per draft given in tender after receiving work order and before work will start. Without MOU agreement will not be executed.

Date: -

Contractor Signature & Stamp

Place:-

Index serial no:-19

(Civil Agency has to execute MOU with Solar Roof Top System Agency after receiving work order and before work will start)

MEMORANDUM OF UNDERSTANDING (Draft)

*** Proforma – S1 ***

(On Rs.300 stamp paper notarized)

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

MEMORANDUM OF UNDERSTANDING

1. M/s. _____, registered firm having their office at _____, hereafter called “The Main Contractor and party hereto the First Part” (which express shall mean that include its heirs, executors, administrators, assignees)

AND

2. M/s. _____, registered firm having their office at _____, herein after called “The Nominated Electrical Sub-Contractor”, the party hereto of the second part (which express shall mean that include its heirs, executors, administrators, assignees)

Introduction about party of first part and then introduction of party of second part. That purpose of the MOU is for Carried out work of Solar at **Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath. [Including Electrical Work]**

1. That the party of the first part (Prime Contractor) has deemed fit to carry out work of Solar installation from the party of the second part. (Associated Agency)
2. That the party of the second part must carry out solar installation work as per prevailing Indian electricity Act / Rule and specification of GSPHCL and that tender specification with conditions and drawings.
3. That the party of the second part shall not be entitled to ask for any payment from concern department directly and instead should ask for all payments from the party of the first part and it is the responsibility of party of the first part to ensure necessary payment to the party of the second part.
4. Maintenance of solar installation must be carried out by the party of the second part as per defect liability period in tender. If second party fails to do so, first party has to do it. In that case second party has to give reason / justification otherwise for future tendering solar related agency will have to be debarred.
5. That after installation if there is any defect, fault or any complaint as regards to the said work same shall be rectified by the party of the second part and it is mandatory.
6. The Main Contractor in this bid and shall be responsible to deploy all required plant, machineries, store for material, power connection & water supply for construction/ solar work as per the bidding document.

7. Qualification & Experience Criteria detail are as under:-

Sr. No.	As per Tender Requirement	As per Solar Agency Document
1.	Name of Solar Agency	(1) Authorization letter from GEDA for Installation , Testing, & maintenance (2) Work experience certificate of similar work (3) Maintenance experience certificate (4) Company profile
2.	Responsible Engineer Details	(1) Name:- _____ (2) Designation & Document :- _____ (3) Mobile no.- _____ (4) E-mail ID:- _____ (5) Experience detail & document:- _____

The aforesaid understating has been arrived at amongst the parties without any undue coercion, force and the same is binding not only to the parties herein, but also to the legal heirs, successors of all the parties.

solar agency has following Equipments.

At Site

(1) Clip on meter, multi meter, Lane tester, Fiber testing kit, Speed measuring instrument, measure tape 5 mtr. metal, 30 mtr. measure tape PVC/SWG, spirit level, vertical / horizontal water pipe for leveling, thread for printing line, calculator, micrometer, venire caliper, 30cm scale, drill machine, cutter, spanner, screw driver, tester, test lamp, plier, magnet, brown tape, blower, weighing machine, magnifying glass , marker pen, chalk & its powder, ladder as per site requirement.

(2) Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For solar agency)

Smart mobile phone with internet for whatsapp, E-mail etc for project correspondents (For solar site engineer)

We have read (nominated agency) all the items. its details specification, make list, terms & condition, annexure, responsibility during defect liabilities, quoted rates etc and executed the M.O.U with main agency. I confirm that I will execute the work as per tender specification terms & condition including responsibilities during defect liabilities.

This MOU is arrived at _____ on _____ day of _____, 20____ amongst

SIGNED SEALED AND DELIVERED

By the within named

(Prime Contractor)

Witness-I

(Sub-Contractor)

Witness-II

- એજન્સીના લેટરપેડ ઉપર આપવાનો રહેશે.

:::: બાંહેધરી પત્રક::::

આથી હું/અમો ઉંમર..... તે ગુજરાત સરકાર તથા કાર્યપાલક ઈજનેરશ્રી.....ને બાંહેધરી પત્ર લખી આપીએ/આપુ છું કે મને/અમારી પેઢીને સિવિલ કામનો કોન્ટ્રાક્ટ મળે તેમાં વિદ્યુત કામનો સમાવેશ થતો હોય ત્યારે વિદ્યુત કામ કરાવવા માટે લાયસન્સ ધરાવતા વિદ્યુત કોન્ટ્રાક્ટરોને રોકીને જ વિદ્યુત કામ કરાવીશું જેની હું/અમો બાંહેધરી આપું છું/આપીએ છીએ.

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બાંહેધરી આપનારની સહી

Important Instructions to the Electricals/LIFT/ Fire Hydrant/LPS/ELV/ AC/ AUDIO VIDEO Work

- (1) Bidders shall have to quote the rates according to the item make and detail specification of the tender and also execute the items as per tender specification & approved by Engineer of the corporation. Agency has to get the sign & stamp of Manufacturer /Supply agency on tender item description & detail tender specification for confirming that they will supply material as per tender specification. Agency has to verify & confirm the material which is as per tender specification and after that installation shall be started. If material find not as per tender specification at any stage, agency is fully responsible for that and they have to replace at their risk & cost. No time limit will be given for that.
- (2) Agency has to submit the time schedule (bar chart) for completing the project within given time limit.
- (3) Agency has to provide every item new brand & latest manufacturing year. Agency has to obey latest rules & regulation of Government department for necessary permission or approval of from Government department.
- (4) THE ADDITIONAL RESPOSIBILETY: Additionally the Prime bidder shall arrange the inspection of all the major electrical items at the supplier's shop floor itself. Prime bidder itself will provide the air/railway (First class A.C.) tickets for client and consultant, (Three persons) from concern office to the company shop floor. Including lodging, boarding, transportation etc. All major equipments will be inspected like Light fitting, MCB & MCB DB, HT/ LT Cable, wire, PVC pipe, Fan, DWC pipe, Lift, DG Set, Panel Board, All type Pumps, Stabilizer, HVAC items, high mast Pole, CCTV camera, Fire Alarm, ELV, VCB Panel, Compact Substation, RO, Water Cooler, Audio Video Items, UPS, LPS etc. at the shop floor before dispatching the material. If prime bidder has fails to do so, Rs 50000.00 per above each item will be deducted from bill and product OEM has to give online testing to GSPHCL & necessary testing certificate will be provided.
- (5) To maintain the quality in workmanship experienced & enough technician shall be provided.
- (6) The Bidder shall give the written guarantee for availability of spare parts for a minimum 10 years from OEM after completion of work (Light fitting, MCB & MCB DB, Fan, Lift, DG Set, Panel Board, All type Pump, Stabilizer, HVAC item, high mast , CCTV camera, Fire Alarm, ELV, VCB Panel, Compact Substation, RO, Water Cooler, Audio Video Item, UPS).
- (7) The LED light Fitting, CCTV camera, HVAC, UPS, DG Set, RO, Water cooler, Audio Video, Compact Substation, VCB, Panel board, Pump etc. manufacturer/authorized Channel partner of the manufacturer has to give 4yr free Repair/ Replacement Guarantee for complete from date of installation.
- (8) Special work like fire alarm system, computer LAN wiring, CCTV etc shall be carried out by OEM or authorized dealer or experience agency for that Agency shall have to take prior written approval for Executive Engineer(Elect), After that Agency can start the work. Standard testing & commissioning check list & perform, Measurements, drawings, photographs, material test certificate shall be received from concern Agency & submitted in R.A / final Bill.
- (9) Agency has to remain present at site at the time of actual handing over of project to police department and also when actual use of building starts. Agency has to check all installation, cleaning all equipment and putting all equipment in working order. Agency has to be present and provide at least two qualified technician of related work and provide proper training and demonstration to beneficiaries for thirty days. Agency has to provide technical support to beneficiaries particularly for computer, telephone, water supply system, CCTV camera, fire alarm system, lift, auditorium, D.G. Set, fire alarm/ hydrant, HVAC, Substation and Lighting etc. Agency has to submit training photographs and video recording in Pen drive to GSPHCL.

- (10) Wherever required, Agency has to erect the LED light fitting in gypsum/Armstrong ceiling. So, necessary cutting must be done by agency as per drawing & fitting dimension. Location will be decided by GSPHCL.
- (11) The defect Liability period shall be Three year or elapse of three monsoon periods following date of possession of building taken over by user or Four Years or elapse of four monsoon periods following the certificated date of completion, whichever is earlier as per tender clause.
- (12) All Electrical system, HVAC system, Audio-Video system, fire system, Lift, ELV & CCTV, Fire Alarm, DG set, Lighting, Pump work, HT Substation, RO, Water cooler, UPS, fire hydrant etc. work is a special work. For that experienced men power is required for service & maintenance. Agency will have to carry out routine service & comprehensive maintenance through qualified & experience person during defect liability period. Agency will have to repair/replaced spare parts & consumable items during Defect liability period. Agency has to submit routine & periodically maintenance chart as per OEM guideline before completion of work. (It is mandatory for final bill)
- (13) Agency shall maintain written record of the service & maintenance which is done by agency during defect liability period with signature & stamp of In-charge user department officer. Satisfactory maintenance certificate as per given draft shall be submitted for releasing the security deposit. If agency fails to maintain the above mentioned equipment or rectify the defect with specified time limit it is consider as breach of contract & balance amount of operation & maintenance payment & balance security deposit will be forfeited.
- (14) The scope also covers the Liasioning work with electrical supply authority, the electrical inspector, Fire officer. The legal charges for approval from Government department shall be borne by G.S.P.H.C.L. The contractor has to liaison with all the authorities and finally gets the temporary power & Upgrade Permanent connection at site. All the approvals pertaining to the electrical installation as per the norms including power connection approvals etc. what so ever. The necessary drawings as per standard practice shall be prepared by contractor & three copies will be submitted.
- (15) Necessary training for operation & routine maintenance of Fire System, ELV, HVAC, CCTV, Lighting system, Audio Video system, Lift, DG set, etc. shall be given to the authority and certificate of same will be received from concern Police officers or beneficiary & will be submitted to corporation at the time of Final Bill.
- (16) Agency shall have to depute Three responsible & experienced Electrical Engineer for Electrical work , Two Mechanical Engineer For HVAC System , Two IT/ Electronic Engineer For ELV + CCTV, One IT/ Electronic engineer for Audio video system & One Fire system Engineer for work planning & execution, monitoring the quality of work & time schedule, day to day Measurement verification & Submission to GSPHC Engineer. Same will be present at site during site visit of police officer, G.S.P.H.C.L. officer, consultant etc.
- (17) To maintain the quality in workman ship, Experienced & enough technicians shall be provided.
- (18) Agency has to prepare actual execution drawings for final bill and submit in six colour copies. Agency has to prepare maintenance & operation drawing / detail information & erected at proper place as per EIC instruction.
- (19) Material approval required following documents:-
 Make & Model as per tender specification.
 GTP & QAP from OEM.
 Stamp & sign of OEM/ dealer & Contractor on BOQ & Specification for confirmation.
 Photograph and electro- mechanical drawing with spare parts & measurement.
 Comparison sheet for detail specification
 Factory site visit as required by GSPHCL.
 All IS/ IEC/ CE/ UL certification
 Testing/ Inspection of material before dispatch.
 Manufacturing year

Provide all equipment required for field test at site.

Submit relevant IS code for material and installation/ testing procedure.

- (20) Agency has to consider material approval/ testing/ inspection period, delivery period, installation & testing time. No time limit will be given for late approval/ not submitting requirement/ Delivery period of material etc.
- (21) Agency has to study the BOQ & All detail specification and special condition & relevant latest IS/ IEC code and quote the rate according , If any discrepancy / ambiguity found in above, Agency has to clear it before quoting the rate. After that no arguments or Explanation will be considered and Agency has to supply/ Installation/ Testing as per Instruction of EIC/ Higher authority of GSPHC.
- (22) Agency has to provide the material as per work stage & site requirement and store at lockable, Clean & dust proof dedicated space.
- (23) No part payment will be given to agency if agency dump the material at very early stage.
- (24) For part payment / secured advance, Agency has to submit bar chart & confirmation for installing material immediately after providing it to site. It will be considered for only company manufactured and tested items.
- (25) Agency has to submit detail list, qualification & experience details for wireman, HVAC technician and ELV technician.
- (26) Civil agency has to make cables chamber as per site requirements and instructions of electrical engineer and agency.
- (27) Audio-Video agency / HVAC agency / ELV / CCTV agency / Fire agency has to provide training for operation of concern system to the concern beneficiary whenever requires.
- (28) In all Electrical, HVAC, Light fitting, CCTV, ELV, Fire & Audio-video work If any model of approved brand is discontinued following procedure must be done by agency and manufacturer otherwise GSPHCL can not approve new model or equivalent model. For that, Sample TDS, QAP and necessary test certificate etc., of both models shall be submitted. Also submit the comparison sheet of old and new model and justify that the new model is equivalent or better than old one.
- (29) All Tender items approval is given strictly subject to quality as per ISI or relevant standard code and also as per tender specifications. Manufacturer must maintain the quality every time. For that manufacturer have to test the material before dispatch. Agency has to give clear written purchase order with tender items description and specifications. Manufacturer will have to perform the testing at their lab / factory floor, If required manufacturer shall provide related test certificate with materials.
- (30) Agency has to give purchase orders to authorized dealer distributor considering the delivery period of the material. Agency has to verify the material at site and give clearance to skilled labour for work execution. If agency fail to do the same and materials will not as per tender specifications then all the material shall be replaced by agency and it is alone agency's responsibility on own risk & cost .
- (31) Agency has to take written permission of each tender item by submitting items specifications, test certificate, sample, drawing etc.
- (32) Rodents / Rats are major concern for all the buildings. Generally , Rats/Insects enters in underground duct, vertical duct, Raceway, Above false ceiling area, false flooring, etc. and cuts/damages the ELV & Electrical cables/wires, HVAC drainage pipe & other equipments. It is difficult to find the particular location of damaged and subsequently delay in repairing and recover the system in working condition as actual. To avoid such situation agency has to pack / close all the openings from where Rats/Insects/Rodents can enters in such places.
- (33) For safety purpose from Rodents, GSPHCL have taken rodent control system item in tender. Agency has to implement proven & effective Rodent control system. For that one live demo shall be given. If Agency has another alternate full-proof rodent control system than they can suggest it to GSPHCL.
- (34) If any damage occurred due to rodents, Agency has to repair / replace immediately during defect liability period. No extra payment shall be done for that.

- (35) Civil Agency has to construct the Lift well, pit, machine room as per drawing & lift act. For that civil agency has to provide lifting hook as per OEM of lift instruction. Civil Agency has to get the detail of lifting hook from lift OEM & execute the same. If civil agency fails to do so no extra payment shall be done for alternative arrangement.
- (36) Lift OEM / Civil agency shall do core cutting in RCC / Brick masonry wall as per site requirement and Lift OEM drawing under supervision of GSPHCL Civil engineer for structural point of view. No extra payment shall be done for that.
- (37) Non Payment due to Surge:
No payment will be made to the contractor for any damages in electrical, electronic equipment/parts caused by Transient high voltage in Vij-company supply and lighting high voltage, Lift agency must have to repair/replace the same immediately and put the lift in working order.
- (38) Natural Calamity:
No payment will be made to the contractor for any damages caused by rain, snow fall, floods, dampness, fire, sun or any other natural causes whatsoever during the execution of work. The damages to the work due to above reasons, if any, shall have to be made good by the contractor at his own cost and no claim on this account shall be entertained.

Signature of Contractor

Dy. Ex. Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Executive Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Sheet showing payment of running bill of eligible electrical wiring (for wiring and streetlights work only)

Sr. No.	Phase of operation	Maximum payment eligible
1.	<ul style="list-style-type: none"> - Zari pipe box operation should be completed in the buildings / rooms of the building. - Zari Rich Mortar will have to be systematically proved by the civil agency. - The box should be cleaned by clearing the mortar inside the box. - Box cutting should be plastered around the fan hook& switch box - All boxes should be fitted in line level as per given map and given guidelines. 	In such a case, a maximum of 40% of the quoted rate is eligible for the number of houses / rooms in which the operation of Zari pipe box has been completed with Zari proof at the time of running bill. In which plaster work should be completed by Civil agency
2.	Point wiring and mains line operation completed and switch board / plate installation pending and MCBDB, ELCB erection pending	In such cases, a maximum of 70% of the quoted rate will be paid at the time of running bill is eligible
3.	Point wiring and mains erection work is completed and switch board / plate is installed and MCBDB, e. If LCB erection is completed	In such cases, 95% of the quoted rate will be paid at the time of running bill is eligible

Stages for bringing electrical goods to the place.

The following work has been completed by the agency to bring MCB DB, MCB, Fan, Tube light, Down Lighter, Mirror Light, Decorative Fittings, Bakelite Sheet, Earthing and other tender items on site. It is mandatory.

- Plaster and flooring work inside the house as well as civil work of windows and doors should be completed as well as electrical work as per the aforesaid note No.-3. In this case only the payment of the above items in the running bill will be released and it will required guarantee on stamp paper of 300.
- The following work must be completed by the agency to bring the street light and its related items to the site.
- R.C.C. Road, paver block and landscaping work should be completed. As well as the necessary access to dig the trench by the Civil Department.
- The following operations must be completed by the agency to bring the pumping machinery and its related items to the site.
- The flooring, plaster and window work of the whole room / pump room should be completed.
- In addition agency has to plan work for wiring material or loose electrical appliances to avoid any interruption in the civil work, the Civil / Electric Agency will have to place a written purchase order of material in advance by keeping in mind of tender period and make of material.

- **Sheet showing details of eligible payment to be met in phases of lift work. (For lift work)**

Sr. No.	Phase of operation	Maximum payment eligible
1	All the materials approved by the corporation and as per the specification of the tender will be brought to the site for erection and completion of lift operation in all respects like machine, control panel and its wiring work, car cabin, door frame, well lighting and ARD work etc. and after obtaining permission for lift erection from the lift electrical inspector by OEM of the lift.	70%
2	After the lift commissioned on site	Another 20%
3	After the lift tested on site with Voltage Stabilizer.	Another 05%
4	Written Permission to operate the lift by an electrical inspector after final testing of the lift and submitting lift testing Performa with sign and stamp by OEM & stability certificate that comply all safety features are in working condition & lift is safe for Use.	Another 05%
		100%

Note: - ISI certificate / testing report of all lift goods should be submitted by the lift manufacturers accurately and the goods should be sent to the site only after the factory inspection and availability of safe storage on site.

➤ **Necessary instructions regarding reimbursement of electricity consumption of temporary power connection for construction & testing purpose.**

Considering the time limit of work, in order to get electricity connection in new houses on time, action is taken by the office here. But there are many factors that can cause a power outage. In order to reimburse the electricity bill of the new connection as follows.

1. If electricity connection is provided by the power company for new houses before the completion of the project period, then the minimum bill will be reimbursed by the corporation till the time limit of the project. If it is used by agency for construction of main connection or used for installation, testing and commissioning of electric wiring and electrical equipment, then the full electricity bill will have to be reimbursed by agency till handover.
2. If the project of agency is completed and electricity is used by the agency for construction or other purpose (testing, security lighting for water) then the full electricity bill will have to be reimbursed by the agency till the building is handed over. Make sure the connection is not misused. If the monopolist has not consumed any electricity then only minimum bill has to be paid.
3. If the agency has completed the work within the time limit and before that the handing over memo has been sent to the Police Department by the CAE (Civil) then the minimum bill after that date will be reimbursed by the Corporation. In this case the monopolist has all the lie. Lock and key the room so that it is not misused. If any electricity is consumed for testing or other purposes, the agency will have to compensate.
4. (Especially in case of NRB houses to get high capacity (KW) LT connection or HT connection)

The tender includes high voltage equipment such as air conditioning machine, fire hydrant pump, elevator, large water pump, lighting, fan etc. Erection and testing commissioning by the contractor has to obtain a suitable power connection of suitable capacity or bring a generator of suitable capacity. If the monopolist wants to use the permanent connection obtained by the corporation instead of the aforesaid option, he will have to reimburse the fixed charges, all power consumption and its ancillary charges, taxes etc. till the house is handed over regularly and any question regarding meter burning or power theft. If it arises, it will be the sole responsibility of the monopolist. In case HT connection is obtained by the corporation and due to this the agency's temporary LT connection is disconnected, only fixed charges will have to be reimbursed by the corporation and power consumption and its associated taxes by the agency. (Until the building handover)

5. The electricity connection of the existing building of the Police Department on the site should not be used by the agency for construction or any other purpose and if it is done then the entire responsibility will be on the monopolist. The corporation will have no liability. If any other question arises except the aforesaid five cases, for the electricity consumption bill, the agency has to immediately inform the corporation in writing, otherwise the monopolist will have to reimburse all the bills of the new electricity connection till handover.

Agency signature& Stamp

બાંહેધરી પત્રક
(એજન્સીના લેટરપેડ પર)

કામનું

નામ:-

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એજન્સીનું

નામ:-

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અમો નીચે સહી કરનાર શ્રી....., કંપનીના માલિક/પાર્ટનર/ડીરેક્ટરના હોદ્દાની રૂએ બાંહેધરી આપીએ છીએ કે, અમારા દ્વારા વિજકંપની તરફથી બાંધકામ હેતુ માટે લેવામાં આવેલ ટેમ્પરરી વિજકનેક્શનના વિજબિલના આજદિન સુધીના તમામ નાણાં ભરપાઈ કરેલ છે. જેની છેલ્લી રસીદ આ સાથે સામેલ છે અને કરારખતની જોગવાઈઓ મુજબ હજુ સુધી કોઈ વિજબિલની રકમ ભરપાઈ કરવાની થશે તો અમો ભરવા સહમત છીએ. જેને ધ્યાને લઈ અમારું ફાઈનલ બિલ પ્રોસેસ કરવા વિનંતી છે. જો અમો આમ કરવામાં કસુરવાર ઠરીએ તો અમારી સિક્યોરીટી ડિપોઝીટમાંથી બાકી લેણાં ભરપાઈ કરવાની અમો મંજૂરી આપીએ છીએ.

તારીખ:-

સ્થળ:-

એજન્સીના સહી-સિક્કા

➤ **Necessary instructions regarding operation related to electric Installation**

The T-type angle / anchor fastener hook will have to be fitted at the level above the first floor window as shown by the Assistant Engineer (Electrical) to tie the cable for the power connection to be obtained from the power company attached to the electrical room. The above work should be done immediately after the completion of flooring work. Items installed in the electrical room will not be paid until the operation is completed. Also, the civil agency has to make a hole in the wall to take cable into the electrical room. Necessary fabrication, cable tray, etc. should be done by civil + electrical agency for erection of power company cable to maintain the elevation and aesthetic outlook of the building.

Agency has to get separate temporary electric connection for construction work, electrical work and water requirement on site. Agency has to use this temporary connection as per rules of local power supply company and has to pay the bill regularly. After completion of work agency has to complete all commissioning and testing work with the use of temporary power connection and if needed have to upgrade power connection for the same. For Water pumps, Lift, Fire hydrant system, HVAC system etc. work testing need adequate capacity three phase connection. For this agency has to get temporary power connection of necessary capacity. If the temporary power connection for construction purpose is not of suitable capacity, then a generator of suitable capacity should be brought and tested on site for which the cost of diesel will have to be borne by the agency. Meanwhile, if any permanent electricity connection is released, it can be used for testing and all electricity consumption bills till handing over have to be paid by the agency at concern electricity board office. No extension of time will be given by the Corporation in case of not being able to complete the work or not being able to do the testing due to unavailability of permanent power connection and the agency will be fully responsible for the same.

Agency or concern OEM has to do stamp and sign on any product GTP, drawings, technical data sheets tender item specification and BOQ for material approval. After that permission will be given to use the material. If Gujarat State Police Housing Corporation Limited wants any item or material to be tested in the testing laboratory of the manufacturer, it will be the sole responsibility of the agency and no separate payment will be made for the same. Agency has to submit samples of all materials as per tender specification, make and model approved by Corporation well in advance before execution of work and agency has to place order in writing to concern company dealer / distributor so the project does not get delayed due to lack of materials. No time limit can be given for project delay due to non-arrival of approved materials on site on time as per tender.

The quantity of each item given in tender is approximate. The quantities of items have to be brought to the site as per drawings, guidance given at the site and the requirement of the police department / beneficiary for work. The measurement will be given as per materials fixed or reached on site as per actual requirement and agency has to plan as per that.

The house number should be written in legible letter / radium sticker as per the item taken in tender on ICDP switch / DP MCB / FP MCB and electricity-meter box in electrical room. The number written on the building and the number written in the application form should be the same after the power connection is given by the affiliated power company and the meter should be fitted as per the number written on the ICDP switch / DP MCB switch. The agency has to be present at the place of action in consultation with the concerned power company and verify it and issue a certificate.

As per Regulation 36(3) in high-rise/above the height of 15 mtr. building power supply should be switch off with SFU (Switch fuse unit) or 3-Phase breaker isolating device with cut-out or breaker to operate on all phases except neutral in 3 Phase 4 wire circuit. Cut-out switch or breaker max height should not be 1.7 mtr. from FFL.

Electrical installation related tests such as IR test, Megger test, voltage test, earthing test, polarity test, ELCB tripping test etc. after completion of electrical related work. The bill will be submitted only after signing in the testing proforma and attaching it to the RA bill / final bill. Necessary equipments like Megger, Earth Tester, Tester, Grip, Dismissal, Clip-on Meter, Test Lamp etc. will have to be brought by the agency.

Agency signature & Stamp

Important instructions to civil agency for the work of Drainage and Water Supply Network line work

- Bidder shall has to do site visit before starting the work and making route about existing underground cable and pipe line and mark out existing streetlight pole and underground cable and pipe line route in layout plan for whole campus
- Agency shall has to prepare the drawing for existing streetlight pole and cable route and inform to concern Assistant Engineer (Ele.) / Deputy Engineer (Ele.) for that. Before starting the work agency has to study all existing underground cable, underground pipes, telephone cable, network cable route etc. and prepare drawing for drainage and water network lines according to it.
- If existing streetlight cable, telephone cable, network cable, water supply line will be damaged / broke by agency, agency has to repair / replace it by own cost and putting in working condition, no other payment will be given to agency for that work.
- If agency will break existing streetlight cable, network cable, telephone cable during drainage and water supply network work, agency has to make joints with epoxy termination kit and make it water proof. Also agency has to inform concern G.S.P.H.C.L. Assistant Engineer (Ele.) / Deputy Engineer (Ele.) and agency will have to do cable joint work with use of epoxy termination kit and weather proof cable joints in presence of Assistant Engineer (Ele.) / Deputy Engineer (Ele.) and take satisfactory work certificate from Police department and G.S.P.H.C.L. Officer and submit with final bill.
- Main agency shall also has to take No defect certificate for existing Streetlight work from Assistant Engineer (Ele.) / Deputy Engineer (Ele.) of G.S.P.H.C.L. and with sign of Police officer of existing police line and submit with final bill.
- If agency will damage existing streetlight work, water supply line, telephone cable, network cable and fails to repair / replace it, the total cost to repair / replace the damaged work will be deducted from S.D.

Agency signature& Stamp

Special Condition for Running/ Final Bill Payment for HVAC system / Audio Video system / Electrical installation / LIFT work / Fire Hydrant work etc.

1. Agency has to give written inward application to corporation for running / final bill mentioning the work done by him, also give detail measurement sheet and relevant test certificates of materials. Corporation engineer verify specification of work done by contractor and also verify the measurement given by agency. For that agency has to remain present at site and give written confirmation about measurement and date of measurement and actual date of completion in measurement book and stamp and sign with date. Thereafter procedure of preparing of bill will be started.
2. Without written application and measurement sheet corporation engineer will not start the procedure for running / final bill.
3. Agency has to prepare proper schedule for procurement of materials at site considering requirement of materials for erection at site & delivery period of approved material. No payment will be done on loose items so agency will have to do proper planning for running bill payment.
4. Agency has to provide all necessary documents/company test certificate/ photographs etc. Required running / final bill before preparing bill.

Agency signature& Stamp

Dy. Ex. Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Executive Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Detail specification and work procedure to get quality work will be strictly followed by civil & Electrical Agency for that Civil agency has to provide schedule-B, detail technical specification, draft of MOU, architect and structure drawings and make list of material to associated agency prior to execute MOU.

➤ **Workmanship and erection work procedure:**

- Conceptual drawing of slab work provided by GSPHCL & agency has to prepare GFC AutoCAD electrical drawing as per structure & architecture drawing and take approval from concern DEE (Ele.)/EE (Ele.) well in advance before slab casting work & has to strictly follow drawing for work.
- Agency has to bring materials like pipes, fan box, coupler, bend etc. well in advance before slab casting work & take approval of material from concern DEE (Ele.) / EE (Ele.) before erection. For that sample of each material shall be provided for approval.
- Necessary DWV Pipe/PVC pipes shall be laid in grade slab, where required for power supply cable, Fire cable, streetlight cable, lift cable etc. for that work drawing provided by GSPHCL, agency has to bring required materials for that well in advance.
- Agency has to study the architect drawing and pipes wall drops for SB, light point, MCBDB shall be dropped and checked for face of wall/beam and according to wall face below beam. If any pipe comes out from wall, agency is responsible for that.
- Fan box used for slab work shall be as per tender specification & agency has to give one sample for approval before execution. The fan box shall be wrapped by brown tape or thermocol to avoid going cement mortar inside it during slab casting work. Also the punching holes shall be opened as per requirements of pipes going into fan box. No extra punching holes shall be opened to avoid going cement Mortar inside it.
- Fan box shall be tie with steel bars by using tie wire & both side hook rod shall be tied tightly in such a manner that fan box shall not be shifted during concreting.
- If 2 or more pipes are dropped in beam near to each other for SB or MCBDB min. 5 mm distance is required between 2 pipes & according to that piping work shall be done on site.
- The pipe laid in slab shall be tied with steel using binding wire at every 18 inch distance. Also where pipes are dropped in beam with use of bend, the bend shall be tied vertically & horizontally, so pipes can not be throw out from bend & can not be shift from its decided location during slab casting work. Do not use sand for pipes drops in beam.
- For pipes joints, work agency has to use ISI mark standard make PVC solutions so the pipes will not be opened or throw out from its joint/ bend/ coupler during slab casting work.
- All the pipe shall be laid in slab/ beam in such a way that minimum 5 to 10 mm concrete cover can be achieved.
- If 2 or more pipes laid in slab near to each other, keep min.10 mm distance between 2 pipes to achieve strength of slab.
- Agency has to use fan box holes to avoid pipe crossing for pipe laying work as per actual requirement on site & as per instruction given by EIC.
- Preferably slab conduits shall be laid in between top and bottom reinforcement. Please ensure concrete thickness i.e. cover to PVC conduits incase of singly reinforced slabs.
- Special precaution shall be taken during concreting of slab.
 - All broken pipes are to be replaced.
 - All joints have are to be watertight joints to avoid choke up.
- GI wire passing shall be carried out immediately after de-shuttering of slab & beam. (any choke up to be documented and alternate routing to be shown in shop drawings and documented for future references).

- After de-shuttering of slab, agency has to check all drops of pipes according to drawing & has to do necessary cleaning work at site. All the conducting shall be checked as per services drawing, which contains locations of switch boards and number of points to be installed at each location.
- After finding all drops as per drawing agency has to provide pipe cap or coupler as per actual requirement on site. If any pipe blocked or broken during slab casting work agency has to inform concern electrical engineer of GSPHC well in advance before masonry work & lintel filling work done on site & has to do work as per site condition & instruction given by EIC.
- After completing masonry work & lintel filling work agency has to do marking of all SBs. MCBDB light point etc. on site with use of water level tube as per drawing & given dimensions & do check with concern electrical engineer & get prior approval for zari work.
- The concealed conduit work shall be carried after construction of masonry walls but prior to plaster. Wall chasing work shall be carried out after completion of curing of brick work. After marking of all SB, MCBDB, points agency has to concealed first all SB as per given dimensions & with use of water level tube.
- The top level of boards shall be matched as per given in drawing with use of water level tube.
- All SB shall be concealed in wall before zari work of pipes. All SB shall be horizontally in line level & is checked by water level compass.
- The wall chasing should be done with wall cutters only; this would avoid damage to walls.
- After fixing the conduits, boxes and accessories, the chiseled surface should be filled with cement mortar and chick mesh wrapped around conduits.
- Wall conduiting activity shall start with level marking on the wall (usually box level), knowing its height above FFL (Finished floor level)
- The width of chasing shall be limited as per number of conduits.
- The depth of chasing to have conduit recess at least 10 mm from masonry wall.
- All horizontal conduit runs shall be straight at box level. Light point conduit shall run straight vertical to switch box. No wall conduit shall be taken haphazardly.
- No Elbows & bends shall be used. In case of change in direction in pipe use spring to bend the pipe.
- Power conduits should not be run near any communication line.
- Conduits above false ceiling shall run with proper supports/ suspenders. Conduits shall not be rested on false ceiling grid in any case. All vertical runs with open ends shall be sealed at top in case of false ceiling work. While masonry civil works going on.
- All concealed switch board shall be fixed properly in level as per given drawing (Height, distance from finished floor (FFL) should be as per architect's recommendation).
- The gap between two concealed switch boards shall be uniform & maintain same for all installation.
- The switchboards shall be readymade modular type metal boxes of approved makes & drawing.
- Concealed box shall be fixed 3 mm below the plastered surface.
- Box fixing shall be done before plastering work along with wall conduiting. These boxes shall be filled with thermocol/plastic bag/brown tap while plastering work.
- DB's shall be concealed before plaster work. DB box shall be fixed in proper line & level in the recess provided in brickwork. DB's shall be ready-made as per design (fixing no. of conduits pipe entering DB) All PVC pipes shall enter in to DB from given entry holes only.
- Keep all concealed SB, MCBDB, point boxes edge outside of wall according to thickness of plaster, so all SB, MCBDB, point boxes shall be in level with wall after plaster work & not going more deep in wall.

- After concealed of all SB, MCBDB, Point box in wall it shall be in line level. Agency has to fill rich cement mortar around board, box, MCBDB etc. & shall be fixed in wall.
- Then after zari work of pipes shall be done & pipes shall be matched with SB, point box, MCBDB as per requirement & drawing.
- Zari work of pipes shall be done with proper depth & no pipes shall be visible on wall after zari work. All pipe laid in zari shall be bounded with binding wires & screw in wall so the pipes shall not be come out from zari.
- If 2 or more pipes are laid in zari, agency has to maintain min. 5 mm distance to achieve quality work of plaster. Also chicken mesh shall be provided where 2 or more pipes zari work done In wall
- Before doing plaster in wall all zari shall be filled with rich cement mortar & has to make thread crossing lines on it to achieve strength of plaster work.
- All SB, MCBDB, point boxes shall be covered to avoid going mortar inside it as per instructions given by EIC.
- Agency has to prepare one sample house for RB and one room for NRB of zari work. After Zari work completed civil agency has to take certificate from associated electrical agency's engineer & submit to GSPHC. After that agency has to checked & verified by AE(Elc.) agency can start the plaster work.
- Agency has to following colours for point wiring
 - Phase Wire - Red - Light point half wire - Yellow
 - Neutral Wire - Black - Fan point/Ex. Fan half wire - Blue
 - Earth Wire - Green - 2 way point wire - Grey
 - Bell point - Grey
- In all lighting SB there shall be separate pipes for mains wire & point's wires.
- Neutral & earthing wires for the points, which are operated from one switch board, laid & connected with switch board & Looped with each other.
- Earthing wire shall be connected to all GI boxes of light points, fan points, fan boxes, switch board etc.
- All light point boxes shall be at same distance from ceiling. As per drawing & given dimensions. If any changes required at any location agency has to inform concern A.E.(Elc.)/ DEE(Elc.) & has to do work on site as per instructions given by EIC.
- In ele. Work accessories should be fixed as per below given table fastener bolt size.

Fastener bolt-Screw size chart for Ele. Work

Sr. No.	Name of material to be erect on site	Require size of rod of drill machine for hole	Grip	Require size of screw	Require size of anchor fastener bolt	Remarks
1	Tube light	6 mm	white colour pvc	35 mm long, 8 mm Top	-	Buffer 3-4 mm
2	Ceiling fan clamp	10 mm	-	-	10 mm thick, 65 mm long	-
3	Open piping work	6 mm	white colour pvc	35 mm long, 8 mm thick	-	-
4	Angle iron frame for backelite sheet	10 mm	-	-	10 mm thick, 65 mm long	-

5	GEB service wire clamp	10 mm	-	-	10 mm thick, 65 mm long	-
6	Wall mount electric panel	10 mm	-	-	10 mm thick, 65 mm long	-
7	Support clamp for cable tray	10 mm	-	-	10 mm thick, 65 mm long	-
8	Wall bracket for streetlight fitting	10 mm	-	-	10 mm thick, 65 mm long	-
9	Bollard light foundation	10 mm	-	-	10 mm thick, 65 mm long	-

➤ **Point Wiring**

❖ **Requirement of Detail specification:**

- (1) CLEAR MARKING ON WIRE AS PER BIS REQUIREMENT.
- (2) ISI mark MMS white colour 20/25/32 mm dia. embossed rigid PVC pipe with ISI mark bend, elbow, tee and junction box of same company/make.
- (3) 20 G. G.I. company fabricated metallic box similar as per modular accessories make only with min. 50 micron.
- (4) 75 mm deep junction box used for slab where required.
- (5) Two modules hum free EME five step type electronic fan regulator with ISI mark.
- (6) Modular type ceiling rose, button/angle holder, modular blank plate and fan box plate should be match with modular accessories, made from premium material, heavy duty and from reputed manufacturer. Sample must be prior approved by EIC.
- (7) Agency has to apply anti rusting primer and colour paint if found metal box rusted at the time of erection of modular accessories.

❖ **Mode of measurement & payment.**

- (1) Payment shall be done after performance & acceptance level. The rate shall be for a unit of point (Numbers).
- (2) For point wiring payment must be done as per tender item description. For each point power wire must be separate from individual switch in switch board. Then and then individual point must be calculated.
- (3) If point occurs long more than 10 mtr. Only power wire will be calculated for long point and its measurement should be given in one wire measurement as per tender item.

❖ **Performance and acceptance level:**

- (1) All GI box should be clean & free from rusting.
- (2) Modular ceiling rose, button/ angle holder, junction blank plate, fan plate. All items must be heavy duty & made from virgin poly carbonate material and same colour match with switch/ socket plate. Panama / vihan/ Anchor/ model / sample approved by EIC.
- (3) All GI box must have box cutting plaster in line & level with proper finishing.
- (4) All modular accessories at a prescribed height in line & level.
- (5) All MCBDB must be in line & level and frame should be properly & equally flushed with wall.
- (6) All modular accessories should be erected as per given sequence.

- (7) All GI box / metal box must be properly earthed.
- (8) Modular plate should be properly locked.
- (9) 6 & 16 Amp plug socket for geyser, washing machine, AC, refrigerator, oven, mixer, RO plant, exhaust fan, TV, etc must be as per plumbing drawing & considering size & equipment & height of installation, operation etc. For that civil & elect agency & GSPHCL eng. has to prepare detail drawing & detail the location of drop and location of switch box at very early stage. Also considered height of wall tiles. It should be as per CPWD guide line as per below.

Note:- No wiring work shall be carried out on site, till all boxes are cleaned and box cutting plaster work done for all boxes, MCBDB, fan boxes etc.

➤ **Earthing**

❖ **Requirement of Detail specification:**

- (1) Earthing electric rod must be made from Corrosion free Hot dip galvanizing pipes having as per IS:3043.
- (2) Earthing Electrode Outer Pipe:- 88 mm O.D., Outer Pipe wall thickness :- 2.6 mm minimum, Inner pipe:- 42 mm O.D., Pipe thickness:- as per B-class ISI pipe, Terminal Size:- 70 mm X 100 mm length, Zinc coating (Hot dip galvanizing):- 75-100 micron, Nut bolt:- 2 no. with washer suitable for 14 mm dia., total minimum Weight (approx) of earth electrode with inside conductive material 26 kg.
- (3) Inner chemical (CCM Compound)- Resistivity:- 0.2 ohm/meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphar content:- < 2%
- (4) Back fill Compound: - Earthing compound should be capable to retain moisture for long time min.1 year & weight (approx.) of earth electrode with inside conductive material is 25 Kg.
- (5) OEM has to submit details and sample for approval before supplying or dispatching.
- (6) Welding shall be avoided for preventing rusting.
- (7) Pipe make: TATA, APOLLO, JINDAL, SURYAPRAKASH, ASIAN (B Class ISI mark)
- (8) Nut & bolt shall be made of stainless steel to prevent rusting.

❖ **Workmanship and erection work procedure:**

- (1) Providing & Erecting pipe-in-pipe type earthing by making minimum bore of 150 mm dia. and required depth in soft / semi hard / hard rock soil with a suitable drilling/ boring equipment.
- (2) All the earthing installation and testing procedure should be done in presence of EIC and necessary certificate from EIC should be received by agency. in soft soil Suitable for doing pipe-in-pipe technology earthing
- (3) Water must be poured in bore before starting earthing. Earthing value must be measured with earth tester.
- (4) Agency shall be drilled bore as per earth rod.
- (5) Earthing wire shall be connected rust free nut, bolt & washer using lug with earth stud.
- (6) RCC / Masonry chamber must be prepared and flushed with final finished level of floor/Paver block/road/plinth with necessary CI /RCC cover.
- (7) Earthing chamber must be whitewash and Marked with earth symbol.

❖ **Performance and acceptance level:**

- (1) Agency has to bring the earth resistance to at least 02 ohms & voltage between neutral & Earthing up to 02 volt. Agency has to maintain earthing & its value during defect liability. If required.
- (2) If do not get above result agency shall add pour water into earthing.
- (3) Shall be follow IS:3043-1987
- (4) Chambers should be properly flushed and in line & level.
- (5) Necessary test report must be submitted.
 1. Short circuit test by ERDA/ CPRI for 25KA
 2. Resistivity test of conducting material from NABL accredited lab.
 3. Hot dip galvanized / zinc coating micro test from reputed laboratory.
 4. General test report from OEM regarding specification of earthing.

❖ **Mode of measurement & payment**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number.

➤ **Light Fixture**

❖ **Workmanship and erection work procedure:**

- 1) Light fixture as per approved make and tender specifications shall be installed at site. If any problem regarding Light fixture prior take approval from EIC.
- 2) All materials QAP, TDS and test certificates must be submitted at GSPHCL.
- 3) All metal or metal enclosed parts of the housing shall be bonded and connected to the earth terminal so as to ensure satisfactory earth continuity throughout the fixture.
- 4) All surfaces of the fittings shall be thoroughly cleaned and degreased and the fittings shall be free from scale, rust, sharp-edges and burns. Light fittings shall be fitted using suitable size of screw with role plug.
- 5) All lights must be installed as per approved drawing provided by GSPHCL and as per site requirement. Also sample of one light fitting should be approved first.
- 6) Light fitting shall be fitted using 3 terminal modular type ceiling rose in wall / ceiling.
- 7) Light fitting shall be fitted using 3 terminal modular type ceiling rose / HD connector in beam as per site requirement and instruction of EIC.
- 8) PVC buffer must be used to erect tube light on wall / ceiling.
- 9) Tube light must be connected with ceiling rose / HD connector using 3 core 1.0 sq.mm. white wire as per site requirement and as per approved make in tender.
- 10) Use 35 x 8 wooden screw of the standard make. Use 35 x 8 pvc roll plug. Drill size should be 5mm.

❖ **Performance and acceptance level:**

- 1) Powder coated base used for corrosion free long life of material
- 2) For energy saving power factor must be 0.9
- 3) Lamp should be replaced easily
- 4) 4 kv surge protection gives Protection against the effects of surge over-voltages in LED lighting systems
- 5) Lower THD means higher power factor, lower peak currents and higher efficiency
- 6) CRI > 80, LED lights gives much more natural, accurate output of light
- 7) Should be comply with LM79 and LM80 standards.
- 8) Light fixture should be as per tender specification.
- 9) It is necessary to provide testing report / certificate of light fixture.
- 10) Company name, wattage, lux level, THD, P.F. etc should be market on tube rod.

- 11) Light fixture should be installed in proper line & level.
- 12) No colour stain on fitting.
- 13) Light fixture's electrical testing performance should be proper as per testing parameters.
- 14) Free replacement guarantee for defect liability period on Rs.300 stamp paper from Manufacturer as per draft.

❖ **Mode of measurement & payment**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number.

➤ **Ceiling Fan**

❖ **Workmanship and erection work procedure:**

- 1) Ceiling fan as per approved make and tender specifications shall be installed at site. If any problem regarding ceiling fan take prior approval from EIC.
- 2) All materials QAP, TDS and test certificates must be submitted at GSPHCL.
- 3) All metal or metal enclosed parts of the ceiling fan shall be bonded and connected to the earth terminal so as to ensure satisfactory earth continuity throughout the fixture.
- 4) All surfaces of the ceiling fan shall be thoroughly cleaned and degreased and shall be free from scale, rust, sharp-edges and burns.
- 5) All ceiling fans must be installed as per approved drawing provided by GSPHCL and as per site requirement. Also sample of one ceiling fan should be approved first.
- 6) Down rod must be selected as per site requirement and thickness of down rod must be same as manufacturer provided with ceiling fan. It is necessary to get approval of sample prior to order.
- 7) Safety wire must be erected with ceiling fan.
- 8) Ceiling fan must be erected at min. 7.5 feet above finished floor level.
- 9) All nut bolts must be tighten using proper spanner at ceiling hook and fan body.
- 10) Rubber bush must be provided to hook the ceiling fan with fan hook.
- 11) Ceiling fan must be connected with HD connector using 3 core 1.0 sq.mm. white wire as per site requirement and as per approved make in tender.
- 12) Top canopy of ceiling fan shall be centered of modular fan plate. Company name & model.
- 13) Wattage air delivery, ISI mark, star label on fan body manufacturing month & year.

❖ **Performance and acceptance level:**

- 1) Air delivery determines better efficiency of ceiling fan.
- 2) Aluminium die cast body and aluminium fan blades used for corrosion free long life.
- 3) For energy saving power factor must be 0.9
- 4) Two ball bearing is used for reduce vibration and noise.
- 5) Should be comply with IS: 374/1979 standards.
- 6) Ceiling fan shall not be made noise or vibrations while its operation at full speed.
- 7) Ceiling fan rod canopy shall not be moved while changing the speed of fan and operation at full speed.
- 8) The height shall be maintaining same considering type of fan hook used.

❖ **Mode of measurement & payment**

- (1) Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number.

➤ **Exhaust fan:**

❖ **Workman ship & erection work procedure.**

- 1) Exhaust fan should be as per tender specification and also suitable for room size, height to be installed and as per erection space requirement so GSPHCL & elect agency has to discuss it and finalize the fan size and type it. If is to be changed it should be approved as on extra item / reduce rate etc.
- 2) Exhaust fan should be installed nearer side of elect. point and elect point should be done nearer to ventilation as must as possible to reduce extra wiring.
- 3) Civil agency has to prepare aluminum section ventilation as per size of exhaust fan. For that one sample of ex.fan must be given to aluminum section work shop. For proper ventilation, a cut out of block size must be kept in glass louvers & exhaust fan must be erected on aluminum section. Aluminum section must be erected in such a way that exhaust fan blade & body must be well flushed with inside wall to maintain as the tic view and safety purpose safety grill made of steel should be fitted outside of ventilation and if it is to be required to be fitted inside then necessary opening must be kept to remove the fan for maintenance purpose. Performance & acceptance level.
 - (1) No noise & vibration during operation.
 - (2) In line & level inside the ventilation space.
 - (3) As per above standard procedure erection.
- 4) EIECT. AGENCY HAS TO PREPARE THE ERECTION DRAWING FOR EXHAUST fan as per site situation ventilation design & location & as per EIC instruction & get the approved of it.
- 5) For bungalow & NRB buildings necessary chhajja, weather shad or border patti must be provided by civil agency to prevent rain water inside it. unless & Until not shown in drawing.
- 6) Necessary mess shall be erected for industrial Ex.fan to prevent entry of birds for safety.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number.

➤ **Street Light Fitting and cable:**

❖ **Workmanship and erection work procedure:**

- 1) Streetlight pole foundation is related to civil work. The level of the road or the final surface of the paver block will be decided by civil agency / department and electrical agency has to make foundation in such a way that the upper surface of the foundation should be match with the surrounding paver block or road surface.
- 2) Street light foundation concrete quality, curing and workman-ship should be monitor and supervise by civil agency.
- 3) Height of the terminal Box from finish surface should be equal as per drawing.
- 4) Cable trench for underground cable shall be digged 90cm deep.
- 5) Casting of the foundation must be done with required size of metal farma and arrangement of jute bag for better curing.
- 6) Cable trench should be fill-up with soil and water for better compactness.
- 7) If any damage occurs to the existing underground service like cable and pipe while digging the cable trench, it will have to be repaired / replaced by agency without any Extra payment.
- 8) If required, light fixture manufacturer has to provide lux level design as per input given by GSPHCL.

- 9) Conceptual drawing for pole erection is provided by GSPHC. Detail drawing for street light pole, cable route, road crossing pipe should be prepared by electrical agency as per guidance given by GSPHCL.
- 10) Gromet must be fixed at pole box in empty holes.
- 11) Poles, brackets, GI entry pipes, earthing wire, binding clamp and cable must be painted with 3 Mango Asian make silver colour.
- 12) One pole has to be erected in presence of GSPHCL Engineer as a sample and erect remaining pole after getting approval of sample pole..
- 13) Coil earthing work shall be done outside foundation of pole and it shall be entered from GI entry pipe to earth terminal of pole also connected using G.I. nut and bolts with washer.
- 14) Lugs must be used for cable connection and earth terminal as per cable and conductor size.
- 15) The Pole boxes must be fixed with 2 clamp of sufficient size for proper fixing of terminal box.
- 16) GI pipe for cable entry must be straight and in line level with fabricating box as per dimension given in drawing.
- 17) Cable must be IR tested before laying in trench/wall.
- 18) Cable must be erected on wall using heavy duty clamp at the interval of 18 inch.
- 19) All cables erection outside or inside the building shall be erected before starting colour and primer work. On terrace/Wall / building Street light bracket design to approved by EIC. Bracket shall be fitted with fastener (2.5 inch length x 10 mm dia) on building wall/terrace.
- 20) Agency must be submitted TDS, QAP and all necessary certificate of material like Pole, street light fitting, Cable, DWC Pipe, 3Core x 1.5 sq.mm wire.
- 21) Company name, model on body & wattage, lux, surge in KV, Pf, THD wiring diagram etc must be mention on driver.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number for street light & meter for cable

➤ **DWC pipe**

❖ **Workmanship and erection work procedure:**

- 1) Get approval of pipe before ordering.
- 2) Company testing as per EIC instruction before dispatch.
- 3) Store at safe place avoid damage.
- 4) Erected under 90 CM ground.
- 5) Use company coupler to join the pipe.
- 6) Open end should be closed by end cap.
- 7) Don't use this pipe on wall.
- 8) NP2 /DWC pipe should be used for road crossing.
- 9) Test certificate submit in running bill.
- 10) Payment will be done subject to above condition.
- 11) Company name, pressure in kg/cm², diameter, ISI mark CML number etc. should be clearly mention on pipe.
- 12) No pipe Shall be dammged.

❖ **Performance and acceptance level:**

- 1) LED Street Light Luminaries with single piece die cast aluminum housing used for corrosion free, anti dust and lower weight body & for better thermal management.
- 2) For energy saving power factor must be 0.95

- 3) IP 66 protection Class with polycarbonate / toughened glass to cover the fixture for protection from dust, water and insects which increases the efficiency and life of the light fixture.
- 4) 10 kv surge protection gives Protection against the effects of surge over-voltages in LED lighting systems.
- 5) Lower THD reduces the harmonic effect which can be harmful to other equipment or device.
- 6) CRI > 65, LED lights helps to identify the object in its natural colour.
- 7) Should be comply with LM79 and LM80 standards, Street light Luminaires IS 10322 (Part 5/ Sec 3) : 2012
- 8) Cable should be 90cm buried in ground with DWC pipe & proper coupler.
- 9) Excavated land for cable laying should be surfaced properly as per original & compacted with water.
- 10) Cable erection / installation on wall surface should be in line & level with proper clamping / saddling on cable at prescribed height and location and it should be coloured with same colour of wall or surface.
- 11) Sharp banding of cable while cable laying / erection will not be acceptable / allowed.
- 12) Necessary test certificate and invoice of cable must be submitted.
- 13) Gland erection should be proper as per specification and cable size. Gland erection should be done by proper plate cutting by hole saw cutter only. Cable insulation should not be coming out from gland while pulling.
- 14) Cable should be pass in field test.
- 15) Cable should be as per tender specification & make.
- 16) Foundation should be well finished & perfect in round shape. For checking strength of foundation hammer test will be performed. Street light pole location should be in the centre of the round shape foundation.
- 17) Angle and length of bracket shall be decide as per road width, pole distance. If required one sample test will be conducted at site at night.
- 18) Payment shall be done after fulfil the above condition.
- 19) Measurement of cable must be recorded as per mtr. marking on cable & submit sheet with drawings.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of meter (for DWC pipe) cost of coupler end locking etc included in item rates. DWC pipe shall be erected only underground. It should not be erected on wall. The payment shall be given for underground pipe only.

➤ **Cable Tray:**

❖ **Requirement of Detail specification:**

- 1) GRP/FRP Perforated type Cable Tray.
- 2) Material – Corrosion Resistant Polyester Flame Retardant U.V. Stabilized Resin System.
- 3) Manufactured from Pultruded Sections- Polyester Resin System.
- 4) Glass Content : 55 – 60 %.
- 5) Standard Length : 3000 mm.
- 6) Support Span – 1500 mm.
- 7) Deflection L/200 Specification followed NEMA FG1 1993.
- 8) UV Resistant - Flame Retardant – IS 6746.
- 9) Appendix K/UL 94

- 10) Very Low Flammability - Specification Followed NEMA FG1 1993.
- 11) Oxygen Index – Minimum 30% as per ASTM D 2863.
- 12) Flame Spread (Extent of Burning) – 20 mm as per Standard ASTM D 635.
- 13) Tensile Strength – 4000 – 8000 Kg/Cm² as per Standard ASTM D 638
- 14) Flexural Strength – 2500 – 10000 Kg/Cm² as per Standard ASTM D 790
- 15) Izod Impact Strength – 130 Kg/Cm² as per Standard ASTM D 256.
- 16) Compressive Strength – 2500 – 5000 Kg/Cm² as per Standard ASTM D 695
- 17) Barcol Hardness – 50 – 65
- 18) Pultruded “C” Channel.
- 19) Thickness – 3-4 mm as per specification in description.

❖ **Workmanship and erection work procedure:**

- 1) Cable tray must be erected with hot deep galvanized clamp support.
- 2) The support behind cable tray must be erected at 90 cm. Interval level in duct.
- 3) The support clamp must be G.I. of size 25 x 3 mm thickness. According to drawing approved by EIC.
- 4) All supports used for cable tray clamp must be fastener size (6 mm x 75 mm) for erection each side as per requirement.
- 5) Use top and bottom cover as per requirement and instructions of EIC.
- 6) Use company accessories (same of cable tray make) like couplers, joints etc.
- 7) Use clamp / saddles to fix pipes in cable tray.
- 8) The cable tray must be erected straight and in line level and tightly fixed with clamps.
- 9) The joint supports are fixed with GI nut bolts.
- 10) Agency has to approved the cable clamp sample made from GI sheet /strip of approved thickness including necessary nut-bolt, washer, threaded hanging rode,etc before purchasing.
- 11) agency has to calculate the weight of cable tray and wire and cable and pvc pipe etc to be erected on cable tray and accordingly design the size of cable tray clamp and spacing between cable clamp and hanging road and get the approval of EIC.
- 12) agency has to prepare five meter long sample for cable tray installation and get the approval from GSPHC and after that execute the remaining work
- 13) for 90 degree bend, T, Sauer, 45 degree bend, slop, coupler, end cap etc. all accessories must be purchased from cable tray manufacturer as per stander practice
- 14) If cable tray is required to cover by blank cover same specification cover must be provided by agency for that additional payment shall be given by GSPHC.
- 15) Cable tray must be installed at appropriate height as per site situation, panel height, cable size & nos. etc, so that cable can be erected easily without any tension and sharp bend and cable gland can be perfectly erected .
- 16) Necessary safety belt & scaffolding must be provided to craft man by electrical agency & this work shall be executed before colour work.

❖ **Performance and acceptance level:**

- 1) No any lose nut bolts found to fix cable tray with clamps.
- 2) Also joint supports must be on both sides of cable tray.
- 3) Cable tray sides should not be cut.
- 4) Submit the test report of all material and testing Performa prepared by GSPHCL.

❖ **Mode of measurement & payment**

- 1.) This include cost of erection required all accessories, nuts, bolts, fixing hard work and labour charges and core cutting in wall workmanship.
- 2.) Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for cable tray).

➤ **Pumping Machinery:**

❖ **Requirement of Detail specification:**

- 1) Open well type Horizontal mono block pump set with cast iron body having submersible motor (Rotor having copper stamping & stator having copper winding)
- 2) Operating on 230/415 V,
- 3) Frequency 50 Hz.
- 4) 10 mtr. necessary Size 3 Core Flat copper flexible cable.
- 5) Body: Cast iron for reduce corrosion effect and increase the overall life of pump.
- 6) Stator Winding: Copper for reducing winding resistance and increases efficiency of the motor and reduce temperature.
- 7) Rotor : Copper , same as above
- 8) Shaft : SS 304 for reducing corrosion effect and increases life of the shaft.
- 9) Material test certificate from manufacture shall be submitted

❖ **Workmanship and erection work procedure:**

- 1) Plumbing work must be executed by licenced and experience plumber to maintain the quality of the plumbing and leakage of water from tee, elbow, nipple, valve etc.
- 2) Plumbing and wiring shall be in line & level and as per operational height. For that electrical agency have to prepare plumbing and panel lay-out as per guidance given by GSPHCL and get approval of the same.
- 3) Pump should be installed on level surface to avoid vibration & noise while operation.
- 4) Agency must use proper size of gasket, nuts & bolts etc.to prevent water leakage.
- 5) Core cutting in RCC slab for pipe installation. Extra cost will not given by GSPHCL.
- 6) Prepare pump commissioning & testing report as per standard format.
- 7) Motor shall be installed in sump nearer to manhole.
- 8) Pump, Pipe, valves, panel must be earthed with proper size of earth wire.
- 9) Agency must be arranged of chain pulley set while required to lift motor for repairing during defect liability period.
- 10) Head and discharge of motor shall be decided by GSPHCL engineer.as per actual daily water consumption, sump capacity, building height, distance of line . Agency has to give purchase order as per head & discharge decided by GSPHCL.
- 11) Cable shall be erected on cable tray on floor (Vertically/ Horizontal)
- 12) Necessary ladder / step must be given for erection & maintenance of pump/ foot valve as per EIC elect unless & until not mention in drawings.
- 13) Necessary size of manhole chamber 2.5 ft x 2.5 ft for water pump & 3.0 ft x 3.0 ft for fire hydrant submersible pump must be given as per pump location & instruction given by EIC elect unless & until not shown in drawings.

❖ **Performance and acceptance level:**

- 1) Vibration & Noise should not be found during testing at full load of motor & pump. Silent operation should be required during testing at full load.
- 2) No leakages of water from plumbing.
- 5) Actual pump discharge should be match with name plate discharge.
- 6) All the core cutting and opening should be well finished.

- 7) Marking on panel for easy operation & maintenance.
- 8) Company name, pump, model, wattage, HP current, Voltage, P.F discharge, Head sr.no, class of insulation efficient etc. should be mention on nameplate. Manufacturing year & month.
- 9) Submit the test report of all material and testing Performa prepared by GSPHCL.

❖ **Mode of measurement & payment**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number for pumps, valves etc. & meter for cable, MS pipes etc.

➤ **Lighting Protection system:-**

❖ **Workmanship and erection work procedure:**

- 1) Agency has to start and complete the down conductor erection work before primer and colour work of external wall.
- 2) Agency has to use zulla or hydra for erecting down conductor clamp to maintain the workman ship.
- 3) Agency has to depute well experience person for erection of down & horizontal conductor to maintain workmanship.
- 4) The all erection procedure shall be supervised by experience supervisor and maintain utility, technical and aesthetic point of view.
- 5) Agency has to prepare one sample of horizontal and down conductor and get written approval of DEE and after that complete the remaining work.
- 6) If agency fails to maintain workmanship & quality of erection 20% reduce rate shall be proposed for final payment.
- 7) Agency has to utilize good quality of SS screw having 38mm length & 8mm diameter to maintain proper strength after long time and weather effects.
- 8) Lightning arrester shall be erected as per company guidelines and drawings & design.
- 9) Agency shall have to provide architect drawing of building to LPS manufacturer and get colour autocad drawing as per latest IEC code and design calculation to decide no. of arrester down conductor, earthing etc.
- 10) Agency has to get the stability certificate & satisfactory completion certificate from OEM and assistant engineer (ele) and submit to GSPHCL.
- 11) Agency, EM and DEE has to do joint visit well in advance decide location of arrester and earthing pit as per site situation and route of down alluminium conductor in such a way that outside elevation of the building may not be effected.
- 12) At the time of completion of defect liability period agency has to check the whole system joint with GSPHCL and get certificate from them. After that SD shall be released.
- 13) Agency has to submit also test certificate as per latest IEC code of lightning protection system.
- 14) Agency has to get the stamp & sign of OEM on schedule- 'B' & description.
- 15) Lighting arrester must be erected in such a way that it should be covered all the terrace area.
- 16) Lighting arrester must be erected with proper foundation bolts nuts etc. So it may not be easily dismantled.
- 17) Lighting arrester must be supported with GI pipe or angle iron. So it cannot be bend easily.
- 18) Conductor clamps must be erected at every two feet and at six inch at joint/ bend, Tee etc.

- 19) L.A system must be as per latest NBC guide line.
- 20) Necessary test certificate of each components and final stability certificate must be received from OEM of lighting arrester.
- 21) Mode of measurement & payment.
- 22) Necessary safety belt & scaffolding must be provided to craft man by electrical agency & this work shall be executed before colour work.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for Lighting Arrester including required Accessories as per tender item & specification).

➤ **Computer rack:**

❖ **Workmanship and erection work procedure:**

- 1) Computer rack must be erected such a way that it can be maintain & operated easily and all electrical plug points & cat-6 cable must be concealed in wall/ inside the rack.
 - 2) Marking for data & voice node with name of room.
 - 3) LAN testing must be done.
- Made from minimum 18G CRCA sheet with powder coating.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for computer rack).

➤ **TV antenna co-axial cable:**

❖ **Workmanship and erection work procedure:**

- 1) Co-axial cable sample must be approved by EIC. (Finolex, Polycab, RRkabel)
- 2) No joints shall be accepted all. Agency has to measure the cable length at cut accordingly.
- 3) No elbow shall be accepted in pipe 90° bend (company manufactured) must be erected.
- 4) All the bend, coupler must be fixed with PVC adhesive.
- 5) Individual cable must be erected in individual 20mm PVC pipe.
- 6) Pipe shall be erected in appropriate size of cable tray.
- 7) Quarters no shall be marked on terrace.
- 8) Cable shall be erected in such a way that dish may not be obstacle with machine room/ tank.
- 9) Continues & D.B test shall be conducted with multimeter & D.B. meter

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of meter (Cable).

➤ **Fire Alarm Panel:**

❖ **Technical Specification**

- **Operating voltage** : 110-230V AC/ 24 DC 50Hz ± 10%

- **Standby Power** : Resettable 24 V DC with inbuilt in charger
- **Operating Temperature** : 32 to 120 F
- **Fuse rating** : 2 Amp / 250V Ac
- **Display Unit** : 16 X 2 Character
- **Hooter Output** : 24 v DC /2 (max)
- **Panel ON /OFF Switch Must be inside the Panel**
- **DC Source** – SMPS with heavy duty lithium ion battery (Exide, Amaron, Tata)
- **Facility of Brass Link to Connect MCP Negative and Hooter Negative**
- **Detection (zone) Line** - 19 to 23.5 V dc
- **Enclosure** : Enclosure covered main keypad i.e. Double door type CRCA Sheet 18 SWG/16 AWG thick inner and outer enclosure with rubber gasket with side louver for better thermal management
- **Enclosure Dimension** - Minimum (Length - 17 Inch X Width - 14 Inch X Depth - 5 Inch)
- **Panel Colour** – Red

❖ **Features**

Panel Must have following Light Indication –

1. LCD Display and Fire and Fault blinking indication
 2. Zone number indication with Fire ,Open and Short alarm
 3. Mains ON,
 4. Stand By ON,
 5. Charger ON, Trickle Charge,
 6. Battery Reverse,
 7. Charge Fuse Blown,
 8. Battery Low with audible tone,
 9. Earth Fault,
 - 10.AC low voltage cut off and Fuse Blown,
 - 11.DC Fuse Blown
- **Button** – Reset, Lamp Test, Alarm Acknowledge, Evacuate
 - Auto Resettable fuse
 - Surge Protection for all input & outputs
 - Battery Polarity Reversible protection
 - Lamp test facility
 - RS-485 Communication facility(Optional)
 - **Reset and Silence facility must be outside the panel**
 - Must be erected at front & easily visual 5 feet from FFL.
 - No power & control cable should be seen open all the wiring must be concealed.

Note: Necessary Test Certificate must submit with running /final bill. All the Item like MCP, Hooter and Fire alarm Panel must be of same manufacturer

❖ **Mode of measurement & payment**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for Fire alarm panel).

➤ **Hooter (ABS type)**

❖ **Technical Specification**

- Cabinet- ABS type
- Paint- PO red
- Operating voltage-24v DC
- Current consumption 200-250mA/ 24v DC
- Sound output-80-100 DB
- Operating temperature- 32 to 120°F
- IS:2189-1988
- Testing as per ERTL.

❖ **Mode of measurement & payment**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for Fire alarm panel).

➤ **MCP(ABS)**

❖ **Technical Specification**

- Cabinet- ABS type
- Paint- PO red
- Operating voltage-24v DC
- Current consumption 200-250mA/ 24v DC
- Operating temperature- 32 to 120°F

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for Fire alarm panel).

➤ **Fire Extinguisher**

❖ **Workmanship and erection work procedure:**

- 1.) Fire extinguisher clamps shall be erected at min 5 feet height from finish floor level.
- 2.) Clamps & hard ware must be suitable to sustain the weight of fire extinguisher.
- 3.) Necessary self glow sign board shall be erected for operation guide line.
- 4.) Necessary identification shall be marked on fire extinguisher like block no & floor Nos.
- 5.) One practical training demo will be performed during handing over the building to beneficiaries.
- 6.) Fire extinguisher shall be erected in such a way that it should be easily visible accessible & not affect the look of building & obstacle.
- 7.) Fire extinguisher bottle must be new brand with red colour. No rusting & screeches on it.
- 8.) Date of fixing Co2/ powder must be marked on bottle & date of expiry also mention on fire extinguisher.
- 9.) Pressure must be as per requirement on pressure gauge during defect liability. If not refilling the bottle.
- 10.) Mode of payment. Rate shall be for unit of number.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. The rate shall be for a unit of Number (for Fire Extinguisher).

➤ **Fire Fighting pump & Panel**

❖ **Workmanship and erection work procedure:**

- 1) Fire main pump & jockey pump must be installed as per OEM guideline & drawings given with pump set & as per standard practice.
- 2) All the cable & earth wire on cable tray vertically & horizontally from motor to panel.
- 3) Provision of priming the suction line, wash out provision and motor pump testing facilities should be given in plumbing for that necessary plumbing with NRV and butterfly valve must be provided. Agency has to prepared drawings for that and get approval from elect wing GSPHCL.
- 4) Agency has to prepare actual GFC drawings & layout showing pump panel etc on the architect drawing of pump room. Agency has to prepared drawings for that and get approval from elect wing GSPHCL.
- 5) Civil agency has to constructed the sump & pump room as per local site situation and requirement like total storage capacity for domestic water and fire requirements. Necessary manhole chamber with climbing steps should be provided considering motor pump size and plumber access in sump room easily and location of pump.
- 6) Necessary partition in sump & pump room shall be provided in such a way that the water pump & fire pump can be erected in side pump room. No plumbing panel and valve should be outside the pump room.
- 7) DG set shall be erected on pump room area where pump room is not constructed. So, necessary beam and slab thickness shall be kept. For that structure & architect drawing shall be demanded sump/ pump room should not erected at a very early stage without any structure architect and elect drawings.
- 8) Location of pump & sump room & dg set location drawing must be obtained from head office architect/ structure / electrical/ civil wing so it must not obstacle in future construction and unnecessary length of supply & delivery pipe & cable can be avoided.

❖ **Mode of measurement & payment.**

Payment shall be done after performance & acceptance level. (Measurement & payment shall be done as per tender item unit)

❖ **Sub: - Amendment in General Specifications for Electrical Works Part-1 Internal 2013:**

Amendment No. 3

The following amendments are hereby made in CPWD General Specifications For Electrical Works Part-I Internal 2013 with the approval of DG, CPWD:

PARA NO	EXISTING PROVISION	AMENDED PROVISION
Para 3.11	Socket outlets (vi) 5A/6A and 15A/16A socket outlets shall be installed at the following position unless	Socket outlets (vi) 5A/6A and 15A/16A socket outlets shall be installed at the following position unless

	<p>otherwise specified.</p> <p>a. Non residential building -23 CM above floor level</p> <p>b. Kitchen:- 23 CM above working platform and away from the likely position of stove and sink</p> <p>c. Bathroom –No socket outlet is permitted for connecting a portable appliances, thereto MCB/IC switch may be provided above 2 mtr. for fixed appliances and at last 1m away from shower.</p> <p>d. Rooms in residence 23 cm above floor level, or any other level in special cases as desired cases as desired by the engineer in charge.</p>	<p>otherwise specified.</p> <p>a. Non residential building -110 CM above floor level</p> <p>b. Kitchen pantry:- 23 CM above working platform and away from the likely position of stove and sink</p> <p>c. Bathroom:– (i) 5A/6A socket outlet for portable appliances like hair dryer. shaver etc to be provided adjacent to wash basin/mirror at 110cm height above floor level.</p> <p>d. Rooms in residence 110 cm above floor level, or any other level in special cases as desired cases as desired by the engineer in charge.</p> <p>e. Bedroom in residence : 70 cm above floor level on bed side(s)</p> <p>(vi) (B) 5A/6A and 15A/16A socket outlets shall be installed at the following position unless otherwise specified.</p> <p>a. NON residential building -23cm/110 CM above floor level.</p> <p>b. Kitchen / pantry:- 23 CM above working platform and away from the likely position of stove and sink</p> <p>c. Bathroom: (i) For Geyser : 16A MCB in modular switch box arrangement be provided in bathroom at 110 cm height. Adjacent to switchboard (for light and exhaust fan) with socket outlet at minimum 2mt. height from floor level and at</p>
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		<p>least 60 cm. away from shower head adjacent to geyser (within 30 cm).</p> <p>OR</p> <p>16A MCB in modular switch box arrangement be provided in bathroom at 110 cm height at suitable location near door, with socket outlet at minimum 2mt. height from floor level and at least 60 cm. away from shower head adjacent to geyser (within 30 cm).</p> <p>d. Rooms in residence :- 23 cm/110 cm above floor level, or any other level in special cases as desired cases as desired by the engineer in charge.</p>
Para 3.15	<p>(a) Conduit wiring system</p> <p>(iii) The switch box/ regulator box shall normally be mounted with their bottom 1.25 mt from level, unless otherwise directed by Engineer'-in-charge.</p>	<p>(a) Conduit wiring system</p> <p>(iii) The switch box/ regulator box shall normally be mounted with their bottom 110 cm from level, unless otherwise directed by Engineer'-in-charge.</p>

Drawings & Material Approval Procedure

- (1) Agency has to prepare GA drawing of HT substation & LT panel as per site situation and IS standard & gets approval from GSPHCL. This time includes in original time limit.
- (2) Agency has to submit GA drawing of panel as per tender make- model list, specification and as per relevant IS code & get approval of it.
- (3) Agency has to submit quality assurance plan, guaranteed technical parameter, GA drawing with dimension, acceptance type test certificate of each item which is duly sign & stamp by OEM.
- (4) After getting written permission. Agency has to give written P.O to OEM/ dealer.
- (5) Agency has to submit confirmation sheet for each material complies with IS code & given tender specification.

➤ The scope of work & responsibility of site

Agency has to Depute minimum 1 No. Electrical Engineer as a Project Manager of similar work has Experience of similar work)

The scope of work and responsibilities are as under :

(A) ELECTRICAL ENGINEER (Project Manager)

- (1) Get temporary power connection & distribute as per site requirement with all safety norms for conduction of building. If any obstacle like all type underground cable, water supply & drainage pipe line, tree cutting etc. is required to be shifted, Project manager(Civil/ Electrical) has to take necessary action so that progress of project may not hamper.
- (2) Study electrical drawing given by consultant, if any query comes to notice to be rectified in coordination with GSPHC & consultant.
- (3) Maintain quality of material & workmen ship & work as per drawing and site situation.
- (4) Procurement of material as per tender as per specification requirement after approval of competent authority at site. Store all material in proper way.
- (5) Remain present with all project document at site during execution of work & site visit of police department officers, third party engineer and police housing engineers.
- (6) Take measurement of all work as per mode of measurement and prepare computerized detail measurement sheet & get verified with police housing engineer.
- (7) Take photograph of all hidden & concealed item & also Main Items which is to be submitted in running & Final Bill.
- (8) Preparation Of all document which is required for running / Final Bill Like Test certificate of Each materials and as per RA/ Final Bill Check List.
- (9) Make check list and testing Performa and filled at every stage of work.
- (10) Maintain colour code & size of wire as per load of equipment & tender item.
- (11) Pay proper attention in the installation of PVC pipe to avoid pipe choke up and avoid crack in wall due to pipe. Use spring or fish wire for checking of pipe is through or not give certificate for that.
- (12) No joint in wiring allowed & proper planning of cutting of wire to avoid joint in wiring & cabling.
- (13) Check zari work as per pipe dia. and fill it with proper way and curing before plaster photograph of that will be sent on WhatsApp.
- (14) Make sample Room having Each & every items erected & get approval for this.
- (15) GI metal box, MCBDB line level must be maintain. During plaster smooth box cutting to be done by meson so proper fixing of switch board can be possible & No touching work at the time of fixing plate. Close supervision by site Engineer.
- (16) Avoid over lapping of pipe and for maintenance purpose fix proper junction box as per site requirement.
- (17) Give guidance for electrical work to wireman to maintain quality of work check the experience & skill of wireman for that particular work at site. To deploy sufficient man power to maintain progress and quality.
- (18) Maintain site register for quality of work. every instruction given by him must be note down in register & rectify accordingly.
- (19) Study drawing prepared by consultant of panel builder & get done the work according.
- (20) Liasoning with electrical inspector for getting NOC of sub station equipment/ electrical Installation electric connection. Including preparing drawing & documents required by them.
- (21) Cleaning of all electrical switch board, MCBDB board, Point wiring box after plastering cleaning of switch board plat, fan, light fitting after colour work.
- (22) Maintain guarantee card, maintenance & operation manual, test certificate given by OEM etc. of each item.
- (23) Cleaning of electrical wastage of pipe wire cable packing material etc in proper way.
- (24) Any instruction given by police housing engineer to maintain quality & progress of work.
- (25) Electrical engineer must have through knowledge of IS/IEC code. Indian electricity rules and follow in the work.
- (26) Project Manager will have to prepared detail handing over memo as per actual execution at site & get verified with corporation Engineer & Police Department Officer.
- (27) Rectify all the query given by police housing Engineers, TAQA Engineers , Project consultant & Police department & Replay in a written.

(28) For quality of material workmen ship, work as per drawing and necessary Co-ordination with civil & other agency & progress of the work measurement of work commissioning & testing. Project manager will be responsible.

(B) Agency has to Depute I.T ENGINEER-01 no. minimum (Information & Technology) As a Site supervisor B.E (I.T)/ B.E(Computer)/ B.E. (Electronics) having Experience of LAN wiring, Telephone wiring, ELV work, Fire alarm system & Other related work.

The scope of work and responsibilities are as under:

- (1) Study tender specification & drawing given by consultant. If any changes are required get approval of PHC & consultant.
- (2) Supervise work of floor race way, PVC pipe junction box etc as per tender specification and drawings.
- (3) After getting consent from IT engineer, plaster, flooring and false ceiling & falls flooring work can be executed.
- (4) check all material quality & quantities wise before installation.
- (5) Testing & commissioning of all data voice, PA system, C.C.T.V system, Audio video & other I.T related work as per general guide line & Standard.
- (6) Co-ordination with other work agency for maintaining progress of project.
- (7) Computer, CPU & other instruments will be provided by police department. So IT engineer has to test all computer, telephone, C.C.T.V system before CP office start practically working.
- (8) IT engineer has to give quality assurance plan to agency & PHC.
- (9) IT engineer has to guide for outside services like Telephone connection, Net connection, Cable connection, GSWAN connectivity, Wireless connectivity & Any other communication related connectivity. For that do provision like erection of PVC pipe, Chamber, Race way, duct, core cutting etc. in advance.
- (10) Suggest remedy for Protection of All electronics equipment from Rat, termite, insect, moisture, Fire etc.& also take care of during execution time.
- (11) Testing of Lan connection, Telephone wiring, CCTV system, PA system, Fire alarm system, Audio Video etc. as per standard norms & prepare documents.
- (12) Give Proper training & Demonstration to corporation engineer & police department.

(C) Agency has to Depute Fire system / Mechanical Engineer - 01 no. as a Site supervisor having Experience of Fire hydrant system, Fire alarm system, Water leakage detection system & Other related work.

The scope of work and responsibilities are as under:

- (1) Study tender specification & drawing given by consultant. If any changes are required get approval of GSPHC & consultant.
- (2) Supervise work of Fire suppression system as per tender specification and drawings.
- (3) After getting consent from engineer, Fire suppression system, fire alarm system, water leakage detection system & Rodent control system work can be executed.
- (4) check all material quality & quantities wise before installation.
- (5) Testing & commissioning of Fire suppression system, fire alarm system, water leakage detection system & Rodent control system work & other all related works as per general guide line & Standard.
- (6) Co-ordination with other work agency for maintaining progress of project.
- (7) Fire system engineer has to give quality assurance plan to agency & GSPHC.
- (8) Engineer should Suggest remedy for Protection of All equipment and installed tender item from Rat, termite, insect, moisture, Fire etc.& also take care of during execution time.
- (9) Give Proper training & Demonstration to corporation engineer & police department.

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SPECIFICATION FOR LT PANEL SWITCH BOARD

Qualification Criteria & Technical Specification for LT Panel (IEC 61439-TTA)

- (1) Company must be engaged in manufacturing of Panel since minimum last Ten years.
- (2) Company must have supplied this type of panel during last Ten years.
- (3) Company turn over should be minimum 5crore per year for last 5 Years.
- (4) Company should have ISO 9000-2000, ISO 14001-2004, ISO 18001-2007 certificate.
- (5) Company should have to prepare panel fabrication in house CNC machine like cutting, Bending, Punching, fabrication for quality work and speed.
- (6) Company must have in house 9 tank powder coating facilities.
- (7) Company should have testing facilities for temperature rise test, full load current testing facilities, Primary Injection Testing all routine & Acceptance test.
- (8) Company will have to submit all relevant documents for proof of PQ criteria and GSPHC will visit factory for verification.
- (9) Company will have to submit all company test certificate for material used to manufacturing panel, like switchgear, MCCB, MCB, metering, CRCA sheet, copper busbar, powder coating material etc.
- (10) Company will have to give inspection at three stage before dispatching panel.
- (11) Company must have latest CPRI approved Type test Report for Short Circuit withstanding capacity 70KA & Enclosure Protection Minimum IP-55 (For indoor), IP-65 (For outdoor), Temperature rise test. Company must have latest IEC 61439 certificate from CPRI/ ERDA.
- (12) After completing of fabrication work to verify thickness of CRCA sheet & quality of fabrication. Make of CRCA sheet & checking of thickness & dimension.
 - During power coating process 9 tank powder coating process must be carried out in presence of corporation engineer as per standard procedure.
 - After completion of panel and before dispatch, following testing shall be given to EIC.
 1. Powder coating thickness.
 2. Physical measurement of panel.
 3. H.V testing at 2 KV
 4. Megger testing.
 5. Tripping test of main switch gear.
 6. Full load current test to main busbar.
 7. Temperature rise testing.
 8. Primary Injection Test.
 9. Any other test demand by EIC.

➤ **Cubical Construction:**

1. The switchboard shall be totally of enclosed type, dust and vermin proof. It shall comprise of gas metal arc welded (**MIG Welding**) structure frame enclosed completely be metal sheet of 2.0 mm for switchboard structure, doors, gland Plates and 1.6 for switchboard partitions. The switchboard shall confirm to IP-55 for outdoor application and IP-42 for indoor application.

2. The sheet steel used in the fabrication of the switchgear housing shall be cold rolled thick & levelled and finished smooth in such a manner that the complete structure shall be rigid, self supporting. All the steel panels enclosing a switchgear unit, hinged doors, partitions and detachable gland plates shall be provided with stiffeners to minimize flexing and vibration.
3. Essar/Tata/AMNS make CRCA Sheet shall be used for Switchboard.
4. Structures, buses and control wiring troughs shall be so designed and arranged as to make future extensions readily feasible.
5. Instruments shall be mounted on hinged type front doors. All doors shall have Self Adhesive gaskets and All Hinge Doors shall have screw driver type key Lock. Locks & hinges shall be required as per follow on each hinge door.
 - a. 250 mm Height Door shall have 1 No Lock and 2 No Hinges.
 - b. 300- 600 mm Height Door shall have 2 No Lock and 2 No Hinges.
 - c. 700- 1000 mm Height Door shall have 3 No Lock and 3 No Hinges.
 - d. 1100- 1500 mm Height Door shall have 4 No Lock and 4 No Hinges.
6. Panels shall be supported by strong hinges and braced in such a manner as to ensure freedom from sagging, bending and general distortion of panel or hinged parts.
7. All the live parts which are accessible after opening of front cover/cable alley cover/back cover shall be properly insulated or provided with insulating barrier to prevent accidental contact.
8. Suitable clamping arrangements shall be provided for cables and cable termination.
9. The Switchboard shall have following minimum compartment size for MCCB.
 - a. 100 Amp MCCB compartment size: 300 mm Height x 300 mm Width
 - b. 125 to 250 Amp MCCB compartment size: 350 mm Height x 400 mm Width
 - c. 300 to 630 Amp MCCB compartment size: 400 mm Height x 600 mm Width

➤ **Main Bus-Bar:**

1. The bus-bars shall be for three phase and neutral. The main bus-bars and connections shall be made of high conducting electrolytic copper with minimum purity of 99.9% and current density of copper shall be 1 Sq. mm = 1.6 Amp
2. The horizontal bus-bars shall be insulated with heat shrinkable PVC sleeves of reputed make to protect against approach to live parts. The vertical bus-bars shall be sleeved or shrouded . Which can withstand 120 deg. C. Maxwell, Power mat, Siddhi vinayak make as per GTP.
3. The bus-bars shall be amply sized to carry the rated continuous current under the specified ambient temperature without exceeding temperature limits. The thermal rating of the bus-bars shall be designed to withstand the system fault current for 1 second without exceeding the temperature limits.
4. The bus-bars shall be arranged and color coded.

5. The bus-bars shall be rigidly supported at equal intervals to withstand maximum short circuit stresses. The supports shall be of molded construction with built-in anti-tracking barriers. The support materials shall be of DMC or fiber-glass reinforced thermosetting plastic (FRP).
6. A minimum of two bolts shall be used in bus-bar joints. Only high tensile electric bolts, nuts and washers shall be used.
7. The bus-bar shall be arranged such that minimum clearances between the busbar are maintained as per below.
 - a. Between phases: 27 mm min.
 - b. Between phases and neutral: 25 mm min.
 - c. Between phases and earth: 25 mm min.
 - d. Between neutral and earth: 23 mm min.

➤ **Neutral Bus-Bar:**

For neutral bus-bar shall be made of same material as the phase bus. The size shall be same the size of the main conductor with suitable PVC shrinkable insulation sleeve. It shall be suitably braced/supported to withstand the mechanical stresses.

➤ **Ground Bus:**

The ground bus shall be electrolytic copper, continuous throughout the switchgear cubicles and shall be bolted on each cubicle frame by bolts and spring washers.

➤ **Internal Wiring:**

1. Wiring shall be carried out with 1100V grade, FRLS-PVC insulated, wires.
2. Wires shall be provided with printed numbered ferrules at both ends bearing the same numbers.
3. Proper color coding should be followed to differentiate between the CT, control and metering circuits.
4. The copper conductor used for internal wiring be as follows:
All circuits except instrument transformer circuit of 1.5 Sq. mm and CT circuit - 2.5 Sq. mm
5. All Control wiring shall be enclosed in plastic channels or neatly bunched and cleated. Wiring between terminals of various devices shall be 'point to point' (no wire splitting or tee connections) with wires neatly trucked along the back of the panels, adequately supported to prevent sagging or damage due to vibration in transit and operation.

➤ **Terminal Block:**

Each Terminal shall be Power / Busbar terminal block having 150 Amp rated current and 1000 V rated voltage with Nut Bolt Connection wire termination technology, 2 No of Connection, Din Rail Mounted, Polyamide 66 Insulation Material, 50 Sq. mm Conductor Cross Section. Terminal shall connect well, Wago, Elmax DBBB 50 make .

➤ **Load Manager:**

Flush mount 96 x 96 mm load manager type Schneider EM 6400 NG or equivalent meter of accuracy class 1 as per IS 13779 shall be provided. The meter shall be accurate on distorted waveforms; simultaneous sampling of voltage and amperes shall be done. It shall have low burden on PT and CT shall have bright display, shall view 3 parameters together shall have auto scaling

from kilo to mega to giga units, shall have programmable CT, PT ratios with built in phase analyser. Auto scrolling shall be programmable as per user choice and communication with PC, PLC DCS shall be possible through RS 485 serial port. It shall be dust proof, tamper proof with data import export option and 10 years back up of integrated data. Parameters to be monitored shall be Frequency, Line to line and average and line to neutral and average voltage, phase wise and average current, phase wise and total KVA, KW and P.F. reading and KWH monitoring.

➤ **Ammeter:**

Flush Mount 96 x 96 mm Digital Ammeter, type Schneider DM1110 or equivalent meter of accuracy class 0.5 shall be provided.

➤ **Voltmeter:**

Flush Mount 96 x 96 mm Digital 0-500 V Voltmeter, type Schneider DM1210 or equivalent meter shall be provided.

➤ **Current Transformer:**

CT's shall provide for current measuring. Each phase shall be provided with separate CT of class 0.5 accuracy, Tape Wound Ring Type and VA burden as per for operation of associated metering and controls.

➤ **Space Heaters:**

The Switchboard shall be equipped with space heaters of adequate capacity to maintain the internal temperature above the dew point to prevent moisture condensation within the enclosure. Space heater shall be rated for 240 volts, single phase, 50 Hz A.C. supply. Differential thermostats shall automatically control the space heaters. ON/OFF and protection should be through adequate rating of MCB for each space heater.

➤ **Illumination:**

The Switchboard shall be provided with 10W LED lamps, provided with MCB of suitable rating operating on 240 volts, 1 phase 50 Hz AC supply.

➤ **Module/Panel Identifications:**

1. Engraved metal nameplates shall be provided on the door of the module/compartiment. Identification plate shall depict panel number, compartment number, description of feeder, and feeder rating. Each component fixed in the module shall have identification mark as per the single line diagram by means of engrave metal sticker properly fixed.
2. The nameplates on each module shall also furnish the following information by minimum letter size of 12 mm: - Compartment number - KW / Amp rating - Description of the feeder

➤ **Metal Treatment and Paint Finish:**

All sheet steel material shall undergo 9-tank process after all the necessary shearing and other mechanical works are completed. After the Nine-tank process powder coating treatment shall be adopted using powder of Imperial (New Siemens Grey STR-IC66203 or suggested by EIC) or equivalent make with following powder specification.

SR. No.	DESCRIPTION	SPECIFICATION
1.	Shade/Colour	Siemens Grey (7032) or As suggested by EIC
2.	Finish	Structure
3.	Coating Thickness	Minimum 80 Micron Microns
4.	Gloss	-
5.	Bend Test (4 mm Rod Dia)	No Cracks In The Coating Film
6.	Impact (Kg – Cm) Direct Indirect	55 (Minimum) 55 (Minimum)
7.	Scratch Hardness Kg. (IS – 101)	>2.5
8.	Specific Gravity	1.6 +/- 0.2
9.	Self Life At Room Temperature	12Months
10.	Salt Spray Test At 35+ / -3.C For 300 – 400 Hrs. 5% Sodium Chloride Solution ASTM B - 117	No Blister Formation Rust Creepage From The Scratch, 3 mm Maximum
11.	Stoving Schedule Effective Metal Temperature	200 °C For 30 Minutes
12.	Theoretical Coverage – Min. 80 Micron Thickness And 100% Application Of Powder.	65 – 75 Sq.ft./Kg.

The following procedure shall be followed for the panel 9-tank Chemical procedure in the given sequence only:

1. Degreasing

- Chemical – Phosphoric Acid base solution Or Hot Alkaline solution
- Time Duration – 15 to 20 Min.
- Temperature – Ambient Temperature
- Pointage – 14 to 16 ml

In this process the M.S. sheets shall be effectively cleaned by dipping in hot alkaline or cold acidic degreasing solution for a period of about 15-20 minute.

2. Water Rinsing

- Water PH – 5 to 7
- Time – minimum 2 Min.
- Temperature – Ambient Temperature

After degreasing process the M.S. sheets shall be rinsed into the water for a period of about min. 2 minutes to remove the loosened oil, grease and adhering alkali from the surface.

3. De-rusting

- Chemical – sulphuric or phosphoric acid solution
- Time – Minimum 20 Min.
- Temperature – Ambient Temperature
- Pointage – 18 to 20 ml

In this process the M.S. sheets shall be dipped in to the dilute sulphuric or phosphoric acid for a period of minimum 20 minutes to remove oxide scales and rust from the surface.

4. Water Rinsing

- Water PH – 5 to 7
- Time – minimum 2 Min.
- Temperature – Ambient Temperature

After the de-rusting process the M.S. sheets shall be rinsed in water for the period of about min. 2 minutes to remove the traces of acidic solution from the surface.

5. Phosphating

- Chemical – zinc phosphate solution or Mixture of Phosphoric Acid, Zinc oxide & Nitric Acid.
- Time – 15 to 20 Min.
- Temperature – Ambient Temperature
- Pointage – 28 to 30 ml

In this process the M.S. sheets shall be dipped in to the zinc phosphate solution or Mixture of Phosphoric Acid, Zinc oxide & Nitric Acid for the period of about min. 20 minutes to facilitate durable coating of the paint on the metal surface.

6. Water Rinsing

- Water PH – 5 to 7
- Time – minimum 2 Min.
- Temperature – Ambient Temperature

After the phosphating process the M.S. sheets shall be rinsed in to the water for the period of about min. 2 minutes to remove the traces of phosphate solution from the surface.

7. Passivation

Chemical – Chrome base chromic Acid or passivation solution

PH – 3 to 5

Time – Minimum 2 Min.

Temperature – Ambient Temperature

In this process the M.S. sheets shall be dipped in to the de-oxalate solution or Chrome base chromic Acid or passivation solution for the period of about 1 minute to retain and augment the effects of phosphating on the surface. At completion of 7-tank process a fine grained, smooth and compact coating of iron/zinc phosphate shall be applied, this is an excellent base for paint and provides film protection against corrosion.

8. Drying

After the above pre treatment chemical process, the M.S. sheets shall be dried either by means of hot air circulation oven or by means of blast of compressed air (air drying).

9. Paint Finish

The final finishing shall be epoxy paint of RAL-7032 or suggested by EIC, matt finish powder coated. Paint thickness shall not be of less than 80 micron. After spreading paint on Job, Job will be cure in oven with approximate 200 degree C temperature for min. 30 minutes.

➤ Danger Boards and Caution Boards:

The Switchboard shall have standard danger boards of appropriate size complete with system voltage, skull mark, etc. with letter in English, Gujarati and Hindi. Danger boards and caution boards shall be fixed in the front and rear of the panels. Caution boards with appropriate size shall be provided to prevent wrong operation wherever required.

➤ List Of Material

(1) Fresh CRCA sheet : Tata, AMNS, Essar.

(2) Powder coating : 9 tank Power coating as per strand practice: Good quality, 80 micron on Above (Vijay COAT, ASIAN, BERGER make only) (Picture & Video must be attached)

(3) Busbar : As per SLD, Test certificate of well-known laboratory

(4) Wire ISI mark : RRCAB/FINOLEX/POLYCAB (FRLS Type)

Note:- Agency has to supplied panel in proper packing & vehicle to avoid harm to panel & powder coating. Loading & Unloading of Panel by Experience labour & equipment.

1. SCOPE

- This Specification covers the design, engineering, manufacture, testing at manufacturer's works before dispatch, packing, forwarding and delivery, supervision of erection, testing at site and commissioning of cubicle type indoor, floor mounted, dust and vermin proof main free standing 415V LT distribution panel panels as per the rating and configuration stated in BOQ complete with all accessories such as protection relays, control wiring, auxiliary contacts, indicating lamps etc.

2. STANDARDS

- In general, the equipment shall conform to all relevant IS/IEC standards. In case of any contradiction between the IS/IEC and this specification, the more stringent of the two shall apply.

STANDARD	DESCRIPTION
• IEC 61439	• Low-voltage switchgear and control gear assemblies
• IEC 60228	• Conductors of insulated cables
• IEC 60255	• Measuring relays and protection equipment
• IEC 60529	• Degrees of protection provided by enclosures (IP Code)
• IEC 60831	• Shunt power capacitors of the self-healing type for AC systems having a rated voltage up to and including 1000 V
• IEC 60871	• Shunt capacitors for AC power systems having a rated voltage above 1000 V
• IEC 60898	• Electrical accessories – Circuit-breakers for over current protection for household and similar installations

• IEC 60947-6-1/EN 60947-6-1	• low-voltage and control gear Multiple function equipment. Automatic transfer switching equipment.
• IEC 60947-2/EN 60947-2	• Specification for low-voltage switchgear and control gear circuit breakers
• IEC 60947-1	• Specification for low-voltage switchgear and control gear. Contactors and motor- starters. Electromechanical contactors and motor-starters.
• IEC 61008	• Residual current operated circuit-breakers without integral over current protection for household and similar uses (RCCBs)
• IEC 62262	• Degrees of protection provided by enclosures for electrical equipment against mechanical impacts(IK code)
• IEC 61641	• Enclosed low-voltage switchgear and control gear assemblies - Guide for testing under conditions of arcing due to internal fault.
• IEC 61869/BSEN 61869	• Instrument transformers
• IS 13779	• ac Static Watt-hour Meters, Class 1 and 2
• IS 13947-5-2	• Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 2: Proximity Switches
• IS 13947-5-1	• Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 1: • Electromechanical Control Circuit
• IS 13947-4-1	• Low-Voltage Switchgear and Control gear : Part 4 - Contractors and Motor-Starters
• IS 13947-3	• Low voltage switchgear and control gear, part 3: switches, disconnectors, switch-disconnectors and fuse combination units
• IS 13947-2	• Low-Voltage Switchgear and Control gear, Part 2: Circuit Breakers
• IS 13947-1	• Low-voltage switchgear and control gear, • Part 1: General rules
• IS 5553	• Reactors – Specification

3. **SITE CONDITIONS**

1. The LV panel will be located indoors and shall be designed to operate satisfactorily at rated load under the service conditions. This equipment will be subject to the ambient temperature conditions at the site as specified in the Project Requirements
2. Location - Indoor
3. Altitude above main sea level - < 2000M above sea level.

4. Design Ambient Temperature - 40 Deg. C
5. Temperature rise - As per IEC 61439
6. Relative Humidity Max - 95%
7. Relative Humidity Min - 10%
8. Pollution - Up to Degree of pollution-3
9. Application - Indoor

4. DESIGN AND PERFORMANCE REQUIREMENT

1. All the 415V AC, devices/equipment like bus support insulators, circuit breakers, VTs, etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions:
2. Variation in supply voltage: 5%
3. Variation in supply frequency: 3%

5. SWITCHBOARD CONSTRUCTIONAL FEATURES

1. The switchboards shall be based on IEC 61439 OEM certified design supplied by OEM authorized franchises.
2. The enclosures shall be designed to take care of normal stress as well as abnormal electro-mechanical stress due to short circuit conditions.
3. The Switchboards shall be metal clad totally enclosed, floor mounted freestanding, fully compartmentalized bolted type of modular extensible design suitable for indoor mounting.
4. Switchboards shall be made up of requisite vertical sections, which when coupled together, shall form continuous dead front switchboards.
5. All covers and doors provided shall offer adequate safety to operating persons and provide ingress protection as per BOQ.
6. Ventilating openings and vent outlets, if provided, shall be arranged such that same ingress protection is retained.
7. Switchboard panels and cubicles shall be fabricated with CRCA Sheet Steel of thickness not less than 2.0 mm in general and load bearing members with 2 mm and shall be folded and braced as necessary to provide a rigid support for all components. The doors and covers shall be fabricated from CRCA sheet steel of thickness not less than 2.0 mm.
8. Switchboard shall be readily extendible on both sides by addition of vertical sections after removal of the end covers.
9. Sheet steel barriers shall be provided between two adjacent vertical panels running to the full height of the switchboard, except for the horizontal busbar compartment. Each shipping section shall have full metal sheets at both ends for transport and storage.
10. All equipments associated with a single circuit except MCB circuits shall be housed in a separate compartment of the vertical section. The Compartment shall be sheet steel enclosed on all sides. The front of the compartment shall be provided with the hinged door, with locking facilities.
11. All doors and covers shall also be fully gasketed with D-type gaskets to prevent any ingress of dust and vermin.
12. The enclosure protection shall not be less than IP42 unless other specified in BOQ and IP2X on opening of the doors.
13. There should be generous availability of space for ease of installation and maintenance with adequate safety for working in one vertical section without coming into contact with any live parts.
14. The temperature rise limits of horizontal & vertical bus bars when carrying rated current along its full run shall be as per type tested design of OEM.
15. All identical circuit breakers and module chassis of same test size shall be fully interchangeable without having to carry out modifications.

16. The MCCBs shall be arranged in multi-tier formation whereas the Air Circuit Breakers shall be arranged in Single or Double tier formation only to facilitate operation and maintenance.
17. Wherever two breaker compartments are provided in the same vertical section, insulating barriers and shrouds shall be provided in the rear cable compartment to avoid accidental touch with the live parts of one circuit when working on the other circuit.
18. The Switchboard shall be configured with Air Circuit Breakers, MCCBs, and other equipment as called for in the schedule of quantities.
19. The LV switchboards shall be minimum of Form 3B separation, except MCB feeders.

6. SWITCHBOARD DIMENSIONAL LIMITATIONS

1. A base channel 75 mmX40mm x 6 mm thick shall be provided at the bottom.
2. The overall height of the switchboard shall be limited to 2200 mm.
3. The height of the operating handle, push buttons etc. shall be restricted between 250 mm to 1800 mm from finished floor level.

7. SWITCHBOARD COMPARTMENTALIZATION

1. For compartmentalized switchboards, separate totally enclosed compartments shall be provided for horizontal bus bars, vertical bus bars, ACBs, MCCBs and cable alleys.
2. Hinged lockable doors for each separate compartment shall be provided and duly interlocked with the breaker in "ON" and "OFF" position.
3. For all Circuit Breakers separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contactors and control MCB etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bars and connections.
4. Each switchgear cubicles shall be fitted with label in front and back identifying the circuit, switchgear type, rating and duty. All operating device shall be located in front of switchgear only. Minimum height from floor level for any device mounted on panel cover shall be 300 mm.
5. Cable compartments shall be of adequate size for easy termination of all incoming and outgoing cables entering from bottom or top.

8. SWITCHBOARD BUS BARS

1. Bus bars shall be made of high conductivity, high strength aluminium alloy, complying with requirements of grade E 91E of IS 5082 – 1981 with minimum conductivity of 55% IACS. Bus bars shall be of rectangular cross sections suitable for full load current for phase bus bars and neutral bus bars or as stipulated in schedule of quantities. Bus-bar shall be suitable to withstand the stresses of fault level as specified in schedule of quantities.
2. The ratings and configuration of bus bars shall be as per type tested design of OEM.
3. The bus bars shall be extensible on either side of the switchboard.
4. The bus bars shall be supported on non-breakable, non-hygroscopic SMC insulated supports at regular intervals, to withstand the forces arising from a fault level as stipulated in schedule of quantities. They should have minimum Comparative Tracking Index (CTI) of 600V.
5. All bus bars shall be color-coded.
6. The components critical for robustness of the switchboards like bus-bar supports, hinges etc. should be supplied by the OEM.
7. Minimum clearances between phases / live parts shall be 25mm and phases/ live parts/ neutral to ground shall be 19mm except on the equipment terminals.

9. EARTHING

1. One earthing terminal shall be provided on each side of switchboard.

2. An earth bar size must be at least 1: 6 x 50 sq mm Aluminium
3. The earth bar shall be electrically continuous and shall run the full extent of each board. This earth shall be on the same side as the cable entry.
4. Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts which are not intended to be alive.
5. Suitable holes with bolts and nuts shall be provided at each end of earth bar of switchgear for connection to a main earthing grid.
6. The earth bar shall be accessible in each cable entering compartment either directly or through a branch extension to ground the cable armour and shields.
7. Door earthing shall be provided for all doors by multi-strand copper wires.

10. INSTRUMENT ACCOMODATION

1. Instruments and indicating lamps shall not be mounted on the Air Circuit Breaker Compartment door. A separate and adequate compartment shall be provided and the instrumentation shall be accessible for testing and maintenance without danger of accidental contact with live parts of the Switchboard.
2. For MCCBs, instruments and indicating lamps can be provided on the compartment doors.
3. The current transformers for metering and for protection shall be mounted on the solid aluminium bus bars with proper supports.

11. WIRING

1. All wiring for relays and meters shall be with PVC insulated copper conductor wires.
2. The wiring shall be coded and labelled with approved ferrules for identification.
3. The minimum size of copper conductor control wires shall be 2.5 sq. mm.
4. Runs of wires shall be neatly bunched and suitably supported and clamped.
5. Means shall be provided for easy identification of wires.
6. Identification ferrules shall use at both end of wires.
7. All control wires meant for external connections are to be brought out on a terminal board.

12. CABLE TERMINATION

1. Knockout holes of appropriate size and number shall be provided in the Switchboard in conformity with the location of incoming and outgoing conduits/cables.
2. The cable terminations of the Circuit Breakers shall be brought out to terminal cable sockets suitably located.
3. The cable terminations for the MCCB's shall be brought out to the rear in the case of rear access switchboards.
4. Removable gland plates shall be provided for power and control cables. The gland plates shall be 3 mm thick and for single core cables shall be of non-magnetic material.

13. PAINTING AND FINISHING

1. Sheet steel used in the fabrication of switchboards shall undergo a rigorous cleaning and surface treatment seven tank process comprising of alkaline degreasing, descaling in dilute sulphuric acid and a recognised phosphating process after which a coat of primer paint with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating, of minimum 50 micron thickness shall then be provided.

14. NAME PLATES AND LABLES

1. Suitable engraved white on black nameplates and identification labels of metal for all Switchboards and Circuits shall be provided. These shall indicate the feeder number and feeder designation.

15. TESTING AND INSPECTION

1. The switchgear shall be completely assembled, wired, adjusted and all routine tests as specified by the applicable standard code shall be conducted.
2. Visual Inspection and Dimensional Check.
3. Verification of Bill of Material.
4. Check of conformity with wiring diagrams and plans.
5. Mechanical operation tests, and checking of interlocks.
6. Testing of the interchange ability of moving parts.
7. HV test on power and control wiring / bus bars.
8. Functional test for control circuits.
9. Millivolt drop test on joints/terminations.
10. Tightness of screwed/bolted connections.
11. Electrical & mechanical operational checks.
12. For equipment bought from other sub suppliers, certified test reports of tests carried out at the manufacturer's works shall be submitted. Normally, all routine tests as specified in the relevant standards shall be conducted by the sub supplier at his works.
13. Each equipment should inspect and witness by client & consultant.
14. The Switchboard shall be inspected and checked as per inspection manual of Switchboard manufacturer.
15. Various electrical components and accessories of the Switchboard shall be checked as per drawing for the respective Switchboard.
16. The Switchboard shall be checked for rigid mounting, earthing connections, proper rating and size of components, internal wiring, etc.
17. All mechanical fasteners and electrical connections shall be checked and tightened before installation

➤ TESTING AT SITE

Pre-commissioning tests as required and as per manufacturers recommendations shall be carried out on each switchboard at site before energizing the switchboards including but not restricted to the following:

- i. Physical checking of the switchboards including checking alignment of panels, interconnection of Bus bars, tightness of bolts/connections and evidence of damage/cracks in any components.
- ii. Physical checking and inspections of Inter panel wiring
- iii. Checking free movement of ACBs/MCCBs/SFUs
- iv. Checking of operation of breakers
- v. Insulation tests of bus bar supports and control wiring etc. with 1.1 kV megger.
- vi. Primary & secondary injection tests of relays and CTs.
- vii. Checking of Interlocking function.

➤ Test Certificate / Report:

Following Test Certificate / Report shall be require.

1. CPRI 70 kA Verification Short Circuit withstand Strength Test, Current Rated 3200 Amp & above as per IS 8623
2. CPRI Temperature Rise Limit Test, Current Rated 3200 Amp and above as per IS 8623

➤ **Routine Test:**

Prior to dispatch of the Switchboard following tests shall be carried out.

1. Electrical & Mechanical On -Off Operation Test of ACB's, MCCB's, MCBs shall be carried out.
2. Insulation test, High voltage test shall be carried out.
3. Temperature Rise test.

➤ **Drawing & Document for Submission:**

Drawings/Documents to be furnished by the contractor on receiving of the Purchase Order. The following drawings shall be submitted for approval within 2 weeks after receipt of Purchase Order. Contractor will accord approval at the earliest. Manufacturer shall start manufacturing of the panels only after receiving the final approval of all the drawings and the QA plan. Any work carried out before the approval shall be totally at supplier's risk.

1. The design of layout and general arrangement along with complete dimensions shall be submitted. All drawing having switchgear assembly should be sign & Stamp by OEM of Switch Gear.
2. Complete assembly drawings of the switchgear showing plan, elevation and typical sectional view.
3. Complete wiring diagram including terminal wiring designations.
4. Schematic control diagram for both AC and DC controls for the breaker, interlocks, relays, instruments, space heaters etc.
5. Complete terminal block details, showing ferrule numbers wire destinations.
6. Master bill of material
7. Quality action plan

➤ **Loading, Unloading, Packaging &Transport:**

1. All Switchboard shall be loading & unloading by suitable cranes, skill and experience Technician at panel manufacturer works and at site.
2. All Switchboard shall be suitably packed for transport, carriage at site.
3. The contractor shall be responsible for any damage to the equipment during transit due to improper and inadequate packing.
4. The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols. The contents of each package shall bear marking that can be readily identified.
5. Wherever necessary proper arrangement for attaching slings for lifting shall be provided and all packages clearly marked with signs showing 'UP' and 'DOWN' sides of boxes, contents of each package.

❖ **SURGE PROTECTION DEVICES (SPD'S)**

a) SYSTEM

Surge Protection Devices (SPD'S) shall be provided at main LT Panel incoming feeders (Stage I/ Class B) & Distribution Boards (Stage II/ Class C) for the protection of Building electrical and Electronics system from the effect of Lightning discharges, line induced transient surge voltage or switching surges as per the details mentioned in the Schedule of Quantity.

b) CODES & STANDARDS

The following standards in addition to local relevant codes & publications as referred in the various parts of this Specification shall apply.

IEC-61643-1 edition 1.1:2000, IEC-61643-12:2002

IEC 60 364 – 5 – 5 53

IEC 62 305 – 4–1. General Principle

2. Risk assessment
3. Physical Damage
4. Electrical and Electronic system within the structure

c) PRODUCT SPECIFICATIONS

➤ **Surge Protector at Stage I / Class B (LT Panel Protector)**

The Surge Protection Device (SPD) manufacturer shall offer a complete line of Surge Protection Devices to support the requirements for Main LT Panel Incoming feeders. The surge protector at this stage shall be provided to protect the downstream electrical and electronics against any lightning discharges surges that may enter into the system through Mains panel.

The Protection unit shall be based on single arc spark gap technology and shall be able to withstand 10/350 microsecond surge currents associated with external lightning discharges.

- **Protection Network Configuration:** The work required under this section consists of furnishing, installing and connecting SPD device as specified and as asked for in BOQ. The SPD device shall be installed in a NETWORK configuration, consisting of one set of SPD panel device at the service entrance of switchboard.

All SPD devices in this network configuration shall be of same manufacturer. All SPD device shall be modular, mountable on 35 mm DIN rail.

- i. Unit status indicator shall be provided to indicate the status of complete Protection unit.
- ii. Protection shall be manufactured for the specific type and voltage of the electrical Service and shall provide clamping for both normal (L-N) and common (N-G) mode operation.
- iii. Protection shall be manufactured to withstand a maximum continuous operating voltage of not less than 115% of normal RMS Line voltage of 240 V.
- iv. The Protection shall be provided with safety MCB's to be connected in series between Line/s to neutral & neutral to earth as per the TNS configuration of wiring. It shall be testable on line for routine maintenance, module failure and in order to prevent catastrophic failure modes.
- v. Protection shall be a fail-safe type device, shall have a follow through current quenching capacity upto 25 KA r.m.s., shall have repeated surge capability state, shall be self restoring and be fully automatic in all mode of operation.
- vi. Protection shall comply with IEC 61643 and shall be approved for the location in which they are listed.
- vii. Protection shall have an operating temperature ranges from -20°C to 60°C

• **Protection Criteria**

- a. The maximum continuous operating voltage (Rated Voltage) for SPD devices connected to phase-neutral shall not be less than the values shown in table:

Nominal Voltage Rating per phase	Maximum Continuous Operating Voltage
(V rms)	(V rms)
240	320

- b. Listing
c. The surge protective device and associated hardware must comply with IEC 61643-11.
d. The Protection voltage of the complete rail mount surge protective device shall be type test to the figures as indicated in table below, which must not exceed the values shown.

Service Voltage / per phase	Protection Voltage @ In (Nominal discharge current) / Protection Level
240 V	< 2.5 k V (between Line to Neutral) 1.5 kV (between Neutral to Earth)

- e. Surge protective device application at Low Voltage AC main LT Panel incoming feeder surge impulse current withstanding capacity as shown in table below.

Application Panel Location	Max. Single Withstand Surge Current (of 10/350 μs Impulse)
Service Entrance (Main LT Panel)	25 KA, 10/350 μ s (between Line to Neutral) 100 KA, 10/350 (between neutral to Earth)

- f. Compliance to this specification must be provided in the form of a certificate from an independent testing laboratory.
g. Response time of stage-I class –B arrester should not be < 100 ns.
h. Follow current extinguishing capability $I_{fi} \geq 7\text{KA}$
i. TOV voltage U_t (L-N / N-G) (5s / 200ms) = 400/1200 V
j. Max. back up fuse gG/gL of 125A should available.
k. Visual indicator shall be available

➤ **Surge protector at Stage II / Class C (Final Distribution Board Protector)**

The surge Protection manufacturer shall offer a complete line of surge Protection product to support the requirements for the Distribution Board. The surge protector at this stage shall be provided to protect the downstream electrical and electronics against any induced switching surges that may be passed on to the downstream electrical & electronic system.

The Protection unit shall be based on Single High Capacity Metal Oxide Varistors (MOV), capable of handling 8/20 μ s surges and shall be able to give an indication in the event module failure and be pluggable to facilitate the in-service replacement without distributing the lines. One extra set of replacement module shall be furnished to the job site.

• **Protection Network Configuration.** The work required under this section consists of furnishing, installing and connecting SPD device as specified and as shown in the drawings. The SPD device shall be installed in a NETWORK configuration, consist of one set of SPD panel device at the service entrance of switchboard. All SPD device in this network configuration shall be of same manufacturer. All SPD device shall be modular, mountable on 35 mm DIN rail and be field replaceable without interruption of electrical distribution circuit.

- a. Unit status indicator shall be provided to indicate the status of complete Protection unit on the product as well as provision for remote indication must be provided.
- b. Protection shall be manufactured for the specific type and voltage of the electrical Service and shall provide clamping for both normal (L-N) and common (N-G) mode operation.
- c. Protection shall be manufactured to withstand a maximum continuous operating voltage of not less than 115% of normal RMS Line voltage of 240 VAC.
- d. The Protection shall be provided with internal safety fusing if required, to be connected in parallel between Line/s to neutral & neutral to earth as per the TNS configuration of wiring. It shall be testable on line for routine maintenance, module failure and in order to prevent catastrophic failure modes.
- e. Protection shall be a fail-safe type device, shall have no follow through current shall have repeated surge capability, shall be solid state, shall be self restoring and be fully automatic in all mode of operation. It shall have thermal disconnection and indication against overloading of the device.

Protection shall comply with IEC 61643 standards.

Protection shall have an operating temperature ranges from -20°C to + 60°C.

• **Protection Criteria**

The maximum continuous operating voltage (Rated voltage) for SPD devices connected to phase-neutral shall not be less than the values as shown in table below:

Nominal Voltage Rating per phase (V rms)	Maximum Continuous Operating Voltage (V rms)
120	150
240	320
350	440
480	600

Listing

The surge protective device and associated hardware must comply with IEC 61643-11.

The Protection voltage of the complete rail mount surge protective device shall be type test to the figures as indicated in table below, which must not exceed the values shown.

Service Voltage / per phase	Protection Voltage @ In (Nominal discharge current) / Protection Level
240 V	1500 V

Nominal Withstand Surge Current.

Surge Protective device (including all fusing and over current protection) for application at sub-Distribution Panels shall have a Nominal surge current withstand capacity as shown in table below. The failure or operation of any fuse / over – current device during the test is not permissible.

Application Panel Location	Max. Single Withstand Surge Current Of 8/20 μs Impulse)
Sub-Distribution Panel	10KA for 8 / 20 μ s (between Line to Neutral)
Final Distribution Board	25 KA for 10/350 μ s (between Neutral to Earth)

- Compliance to this specification must be provided in the form of a certificate from an independent testing laboratory.
- Response time of Class C arrester should not be <25 ns.
- The unit shall be pluggable

Confirmation for panel manufacture for service
(On Rs.300 stamp paper)

ANNEXURE-P

Name of Work / Project :-

Name of Electrical Agency :-

Detail of Panel Supplied

(Panel serial No/Product code with Date):-

We have supplied above serial No. Electrical panel to M/s._____ on Date:-
_____ for above project. We have utilized all the genuine material as
per Technical specification, Make & model and whole panel has been tested as per standard
practice / IS code_____.

We have provided all the protection like earth leakage protection, short circuit protection,
over load protection & surge protection in the panel. We are giving onsite repair/ replacement
guarantee of any defected parts / items including powder coating for defect liability period. We
have provided panel with proper seven tank powder coating process as per tender specification.
We are agree to provide emergency & breakdown services immediately in case of any fault or
breakdown.

(Panel OEM Sign & stamp)

Date:-

Place:-

LIST OF APPLICABLE INDIAN STANDARDS FOR ELECTRIFICATION WORK

<u>Sr. No.</u>	<u>STANDARDS</u>	<u>TITLE</u>
1	IS:732 - 1989	Code of practice for electrical wiring installations.
2	IS: 4648 - 1968	Guide for electrical layout in residential buildings.
3	IS:8061 - 1976	Code of practice for design, installation and maintenance of service lines upto and including 650V
4	IS: 8884 - 1978	Code of practice for installation of system.
5	IS: 5578 - 1985	Guide for marking of insulated conductor.
6	IS: 11353- 1985	Guide for uniform system of marking and identification of conductors and apparatus terminals.
7	IS: 5728 - 1970	Guide for short-circuit calculations.
8	IS: 7752(Part-1)-1975	Guide for improvement of power factor in consumer installation: Low and medium supply voltages.
9	IS: 3646(Part-1)-1966	Code of practice for interior illumination: Principles for good lighting and aspects of design.
10	IS: 3646(Part-2)-1966	Code of practice for interior illumination: Schedule of illumination and glare index.
11	IS: 2672 - 1966	Code of practice for library lighting.
12	IS:10118(Part-1)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear: General.
13	IS: 10118(Part-2)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear.
14	IS: 10118(Part-3)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear: Installation.
15	IS: 10118(Part-4)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear: Maintenance
16	IS : 2309 – 1989	Code of practice for the protection and allied structures against lightning
17	IS: 3043 - 1987	Code of practice for earthing.
18	IS: 5216(Part-1)-1982	Guide for safety procedures and practices in electrical work: General.
19	IS:4237 - 1983	General requirements for switchgear and control gear for voltages not exceeding 1000 V AC or 1200 V DC
20	IS: 6875(Part-1)-1973	Control switches (switching devices for control and auxiliary circuits including contractor relays) for voltages upto and including 1000 V AC and 1200 DC: General requirements and tests.
21	IS:4064(Part-1)-1978	Air break switches, air break dis-connectors, air-break Switch disconnectors and fuse-combination units for voltages not exceeding 1000 V AC or 1200 DC : General requirements.
22	IS: 8828 - 1978	Miniature air break circuit breakers for voltages not exceeding 1000 volt.
23	IS:13032 - 1991	Miniature circuit breaker boards for voltages upto and including 1000 volts AC.
24	IS:12640 - 1988	Residual current operated circuit breakers.

25	IS:2959 - 1985	Contactors for voltages not exceeding 1000 V AC or 1200 V DC
26	IS:8623(Part-1)-1977	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V DC: General requirements.
27	IS:8623(Part-2)-1980	Factory assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V DC: Particular requirements for bus-bar trunking system (bus-ways).
28	IS:694 - 1990	PVC Insulated cables for working voltages up to and including 1100 V.
29	IS:1554(Part-1)-1988	PVC insulated (heavy duty) electric cables :For working voltages up to and including 1100 V.
30	IS:3961 (Part-5)-1968	Recommended current ratings for cables: PVC insulated light duty cables.
31	IS:9537(Part-1)-1980	Conduits for electrical installations: General requirements.
32	IS:9537(Part-2)-1981	Conduits for electrical installations Rigid steel conduits.
33	IS:3480 - 1966	Flexible steel conduits for electrical wiring.
34	IS:2667 - 1988	Fittings for rigid steel conduits for electrical wiring.
35	IS:3837 - 1976	Accessories for rigid steel conduits for electrical wiring.
36	IS: 5133(Part-1)-1969	Boxes for enclosure of electrical accessories: Steel and cast iron boxes.
37	IS: 371 - 1979	Ceiling roses.
38	IS: 3854 - 1988	Switches for domestic and similar purposes.
39	IS: 4615 - 1968	Switch socket outlets (non-interlocking type).
40	IS: 4160 - 1967	Interlocking switch socket outlet.
41	IS:1293 - 1988	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes.

Index serial no:- 32

Important instructions to Bidders for Octagonal pole work

1. Test certificate as per IS will be given by manufacturer at the time of Final / RA bill.
2. Galvanizing micron certificate & testing at manufacturer factory before dispatch of pole.
3. 10 years replacement guarantee for galvanized also for coastal area.
4. Provide galvanized spray at site for touching damages (portion) during transportation loading, unloading, erection etc with free of cost.
5. Proper packing to avoid damage to finish product.
6. Manufacturer has to provide J bolt, nuts & washers with hot deep galvanized.
7. Manufacturer has to provide G.I. pipe bracket as per design & site requirement & tender specification.

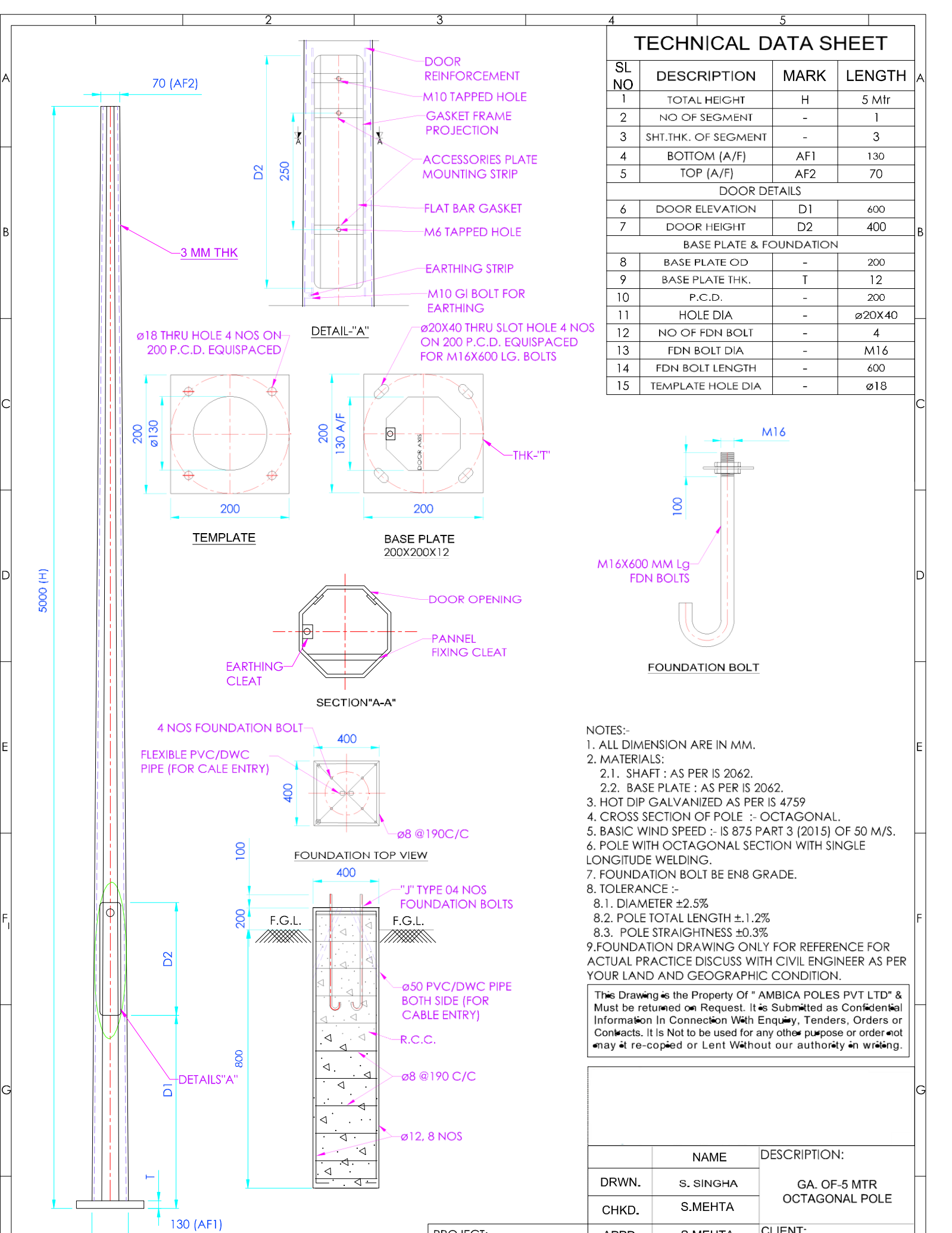
We are agree to fulfill all above requirement.

Date:

Place:

Main agency sign and stamp

Pole manufacturer sign &



Index serial no:- 33

Important instruction for floor Junction box

Specially for Non-residential Building, Floor junction box, race-way, PVC pipe are to be erected below flooring as per furniture lay-out approved by GSPHCL. For that agency has to clean the Slab surface properly to avoid unnecessary bedding. Generally the height of junction box is nearly 60 mm. Agency has to fill gap between floor tiles & junction box with rich mortar properly to avoid sand entering in to it and avoiding breaking of tiles. Agency has to cut the tiles as per size of floor junction box with experience person for better finishing. Civil & Electrical Agency has to jointly erect the floor junction box & raceway in such a way that all the floor junction must be as per furniture drawing & line and level.

No extra payment will be given to agency for extra bedding for flooring work due to height of junction box so please ensure the same and calculate the costing while quoting the rate.

Agency Sign and Stamp

Index serial no:- 48

BOM & SPECIFICATION OF FIRE MOTOR PANEL

Selection of HP for Panel will be decided as per Pump HP and its amperes. Also rating of all the switch gears and metering & relay should be selected accordingly.

Annexure – AB

BOM & Specification FOR Fire Motor Panel				
Sr. No	Description	Qty.	Unit	Make
	Incomer			
1	4P MCCB 36 KA with TM based release	1	No	
1.1	Spreader Link	2	No	
1.2	Extended Rotary Handle	1	No	
	Metering Section			
1	Digital Ammeter	1	No	
2	ammeter Selector Switch	1	No	
3	CT Coil, Class 1, Tape Wound,	3	No	
4	Digital Voltmeter	1	No	
5	Volt meter Selector switch	1	No	
6	RYB Phase Indicating Lamp	3	No	
7	Control Fuse	3	No	
	Bus-bar			
	4 Strip Copper Bus-bar	1	set	
	Outgoing			
1	Star Delta Starter Consisting Following			
1.1	3P MCCB 25 KA With TM Based Release	1	No	
1.2	3P Power Contactor, 240 V AC	2	No	
1.3	3P Power Contactor, 240 V AC	1	No	
1.4	Add on Block 2 No + 2 Nc	3	No	
1.5	Over load Relay	1	No	
1.6	Star Delta Starter	1	No	
1.7	SPP	1	No	
1.8	Start-Stop Push Button	2	No	
1.9	On Trip Indicating Lamp	2	No	
1.10	Digital ammeter	1	No	
1.11	ammeter Selector Switch	1	No	
1.12	CT, Class 1, Tape Wound	3	No	
1.13	1P MCB 10 KA C Curve	1	No	
1.14	Auto /Manual Rotary Switch	1	No	
2	DOL Starter Consisting Following			
2.1	3P MCCB 25 KA With TM Based Release	1	No	

2.2	3P Power Contactor , 240 A Ac	1	No	
2.3	Add on Block 2 No + 2 Nc	1	No	
2.4	Over Load Relay	1	No	
2.5	SPP	1	No	
2.6	Start-Stop Push Button	2	No	
2.7	On Trip Indicating Lamp	2	No	
2.8	Digital Ammeter	1	No	
2.9	ammeter Selector Switch	1	No	
2.10	CT , Class 1 Tape Wound	1	No	
2.11	1P MCB 10 KA C Curve	1	No	
2.12	Auto/Manual Rotary Switch	1	No	
	Panel Design	1	JO b	
	Panel type: Indoor Floor Mounted			
	Base Stand: 300 mm Height Stand (35x35x5 mm Angle)			
	Sheet: Panel Structure, Gland Plate, Doors from 2.0 mm CRCA Sheet and Partitions from 1.6 mm CRCA Sheet			
	Cable Entry: Bottom/Top			
	Painting: Siemens Grey Powder Coated			
	Earthing: 25 X 3 mm GI Strip			
	Dimension: Size must be approved by EIC strictly as per specification and requirement on site and capacity of fire pumps			

Note: Agency has to fill the above technical data sheet for Fire panel before execution and as per capacitor and MCCB rating required for panel. For that agency has to take approval from concern DEE (Ele.) & EE (Ele.) before design panel and as per instructions given by EIC.

Annexure-I for Fire extinguisher (6 Kg. ABC and 4.5 Kg. CO2 type)

[Clauses 12.2.1 and 12.2.2 (g)]

SCHEDULE FOR HYDRAULIC PRESSURE TESTING OF FIRE EXTINGUISHERS

E-1. Every extinguisher installed in premises shall be hydraulically pressure tested as per the schedule given below. There shall not be any leakage or visible distortion. Extinguisher which falls in this requirement shall be replaced.

E-2. The carbon dioxide type and clear agent type fire extinguisher shall be pressure tested every time when the cylinder are sent for recharging (after periodic discharge test or otherwise) to the pressure specified in the relevant Indian standard specification.

Note:- Extinguisher's should be hydraulically tested with cap.

Sr. No	Type of Extinguisher	Test Interval Year	Test Pressure Kg/cm²	Pressure Maintained for min
i	Water type (gas cartridge) (IS 940)	3	35	2.5
ii	Water type (stored pressure) (IS 6234)	3	35	2.5
iii	Water type (gas cartridge) (IS 13385)	3	35	2.5
iv	Mechanical foam type (gas cartridge) (IS 10204)	3	35	2.5
v	Mechanical foam type (stored pressure) (IS 15397)	3	35	2.5
vi	Mechanical foam type (gas cartridge) (IS 13386)	3	35	2.5
vii	Mechanical foam type (gas cartridge) 135 litre (IS 14951)	3	35	2.5
viii	Dry powder (pressure) (IS 13849)	3	35	2.5
ix	Carbon dioxide IS 2878	3	35	2.5
x	Clean agent (IS 15683)	3	35	2.5
xi	Dry powder (gas cartridge) (IS 2171, IS 10658 and IS 11833)	3	35	2.5

Annexure- F

(Clauses 12.2.1)

LIST OF FIRE EXTINGUISHERS

Sr. No	Type of Extinguisher	Life time year
i	Water type	10
ii	Foam type	10
iii	Powder type	10
iv	Carbon dioxide	15
v	Clean agent	10

Note:- (1) Life of extinguisher shall be considered from date of manufacture of Extinguisher.

(2) In case of failure in hydraulic pressure testing, extinguisher shall be rejected immediately before the life time given above.

Note:-

The bidder must indicate in the quotation, which make has been considered for each item. Client/ consultant reserve the right to insist for any of the above make during tendering and bidder will have to comply. Use of "Approved equivalent" make will be allowed only if the specified makes are not available and such deviation shall be strictly subject to prior, written approval from the client/ consultant.

Duty & Responsibilities of fire hydrant agency for proper & quality work.

Erection of Fire Alarm system

- (1) Erect the fire alarm panel at front entry wall at a height of 65 inch from finish floor level.
- (2) The fire alarm panel must be erected below dust so unnecessary open wiring are not seen on wall. For better look fire/ elect agency may erect concealed pipe before plastering.
- (3) 50/65 dia. white pipe with heavy duty pipe clamp of GI must be erected at way 2 feet vertically and 3 core x 1.5 sq.mm PVC FRLS flexible cable must be erected in pipe. The no. of the cable run should be one cable for one floor.
- (4) On-off push button cable 3 x 1.5 sq.mm. XLPE / PVC armoured cable shall be erected for every floor separately to avoid crossing of fire alarm DC power cable.
- (5) For ON-Off push button cable from fire pump room panel to for every block. Junction box at every block parking should be used to reduce length of cable used.
- (6) MCP, hooter and on-off push button shall be erected at operating height and in horizontally & vertically line in level and reduce the open PVC wiring.
- (7) In pump room core cutting shall be required when fire pipeline work on sump slab.

TESTING PERFORAMA FOR FIRE HYDRANT SYSTEM & FIRE ALARM PANEL

1. Name of Work- _____

2. Name of Agency- _____

3. Fire Hydrant System Equipments and Setting

A. Fire Panel Make - _____

B. Fire Pump –

B1. As per tender - Make - _____, HP - _____,

Head - _____mtr, LPM-_____

B2. As per calculation and design parameter done by fire agency and pressure requirement by Fire Chief officer

Make - _____, HP - _____,

Head - _____mtr, LPM-_____

C. Jokey Pump –

C1. As per tender

Make - _____, HP - _____,

Head - _____mtr, LPM-_____

C2. As per calculation and design parameter done by fire agency and pressure requirement by Fire Chief officer

Make - _____, HP - _____,

Head - _____mtr, LPM-_____

D. Pressure Switch- Make - _____, Range - _____

E. For Fire Pump -Pressure switch Cut in Pressure - _____& Cut Out Pressure- _____

F. For Jockey Pump -Pressure switch Cut in Pressure - _____& Cut Out Pressure- _____

G. Fire Alarm Panel – make - _____

H. MCP – Make- _____

I. Hooter – Make _____

J. Pressure Gauge – Make - _____ Range - _____

4. Manual Operation of Jockey Pump and Fire Pump

A. Put Auto Manual Switch of Jockey Pump on Manual. Open one or two hydrant valve and Press start Button. It work satisfactory or not ? Yes /No

Note –

Voltage – RY- _____ YB _____ BR- _____

Current – R- _____ Y - _____ B- _____

- B. Put Auto Manual Switch of Fire Pump on Manual. Open Three or Four hydrant valve and Press start Button. It work satisfactory or not ? Yes /No

Voltage – RY- _____ YB _____ BR- _____

Current – R- _____ Y - _____ B- _____

5. Auto Operation of Jockey Pump and Fire Pump

- A. Put Auto Manual Switch of Jockey Pump on Auto. Open one or two hydrant valve. Pump start automatically or not? Yes /No

Note pressure at which it will start- _____ kg/cm²

- B. Put Auto Manual Switch of Fire Pump on Auto. Open three or four hydrant valve. Pump start automatically or not? Yes /No

Note pressure at which it will start- _____ kg/cm²

And Jockey pump stopped or not – Yes /No

- C. Put Auto Manual Switch of Fire Pump on Manual and Press Stop PB. Jockey Pump started. Close valve one by one.

Note Pressure at which Jockey Pump Off - _____ kg/Cm²

6. Remote Operation of Fire Pump

- A. Put Auto Manual Switch of Fire Pump on Manual. Open three or four hydrant valve. Press Start PB placed in fire duct at any Flow. Pump start or not? Yes /No

7. Any abnormal noise or vibration of motor or tripping observed during manual and auto operation – Yes /No

8. Any physical overheating/Contactor stuck Up in panel is observed or Not? Yes/No

9. Testing of Fire Hydrant System

- (1) Testing of fire hydrant system at terrace to get min. 3.5 Kg/cm² pressure for 5 minutes above testing will be done by three ways.
 - By remote on-off push button.
 - By auto-pressure switch.
 - By manual at pump room push button
- (2) For auto pressure switch must be operated as per requirement for main & jockey pump.
- (3) No water leakage from pump flange & pipe joints. For checking of it. Pressure at header in pump room should not be reduced than required pressure after 24 hrs.
- (4) Voltage current must be as per name plate.
- (5) Above test will be carried out by GEB & DG set power supply.
- (6) Sprinkler test will be given practically.
- (7) Terrace tank water test shall be given for sprinkler and hose.....

10. Fire Alarm Panel Testing

- A. Switch ON Fire Alarm Panel.
- B. Testing of MCP at every floor.
- C. Check location in panel. Whether it is per floor name or not? Yes /No
- D. Check whether all floor hooter operated when MCP glass Brocken? Yes /No
- E. On-Off push button testing at ground & top floor for all blocks.
- F. Testing at fire alarm panel for each floor.

ANNEXURE II
Scope of AMC work for Fire Hydrant System & Fire Alarm System

Sr. No	ITEMS	2 monthly inspection & maintenance details
1.	Main electric motor operated fire pump/ submersible pump	<ul style="list-style-type: none"> • Operating fire pump • Checking vibration/ noise if any • Checking Electrical connection & panel inspection • Checking current consumption & power supply • Checking motor over-heating if any • Coupling & bearings lubrication • Checking gland leakage if any • Checking redundancy of power supply • Checking motor insulation resistance by Megger test
2.	Stand by diesel fire pump	<ul style="list-style-type: none"> • Checking fuel tank level • Checking Fire pump operation • Checking vibration/ noise if any • Coupling, bearings & parts lubrication • Checking battery charging, battery water level and trickle charger workability and battery connections • Checking gland leakage if any • Checking coolant level and pipe connections • Checking engine oil level • Checking diesel and oil filter condition • Checking starter workability
3	Jockey pump	<ul style="list-style-type: none"> • Jockey pump operation • Checking Vibration/ noise if any • Checking electrical connection and panel inspection • Checking current consumption & power supply • Checking motor over-heating if any • Coupling & bearing lubrication • Checking gland leakage if any

Sr. No	ITEMS	2 monthly inspection & maintenance details
4	Fire hydrant valves	<ul style="list-style-type: none"> • Checking accessibility to fire hydrant valve • Checking operation of fire hydrant valve • Lug lubrication • Coupling washer checking • Checking operating wheel condition & lubrication • Checking leakage if any • Checking of all components of hydrant valve • Checking hose fixing and its operation
5	Hose box (single) & delivery hoses	<ul style="list-style-type: none"> • Checking condition of hose box and cleaning • Hose removal & its lap changing • Lubrication of coupling • Coupling, washer checking • Coupling fixing with hydrant/ hose • Checking hose leakage • Polishing of all couplings
6	Hose box (double) & delivery hoses	<ul style="list-style-type: none"> • Checking condition of hose box and cleaning • Hose removal & its lap changing • Lubrication of coupling • Coupling, washer checking • Coupling fixing with hydrant/ hose • Checking hose leakage • Polishing of all couplings
7	Branch pipe with nozzle	<ul style="list-style-type: none"> • Checking condition of branch pipe • Polishing of branch pipe • Checking fixing of branch pipe with hose coupling
8	Hose reel	<ul style="list-style-type: none"> • Checking condition of hose reel & accessibility • Cleaning of hose & hose reel drum • Checking operation of hose reel & its leakage • Lubrication of all rotating parts • Checking operation of shut off nozzle & its polishing • Checking operation ball valve • Checking water discharge through hose reel • Checking hose pipe clamps

Sr. No	ITEMS	2 monthly inspection & maintenance details
9	Fire alarm system	<ul style="list-style-type: none"> • Checking power supply and workability of battery of fire alarm panel • Checking approach to panel & its manning • Checking hooter sound • Checking actuation of MCP & its communication • Checking and cleaning smoke detectors
10	Sluice valve/ Butterfly valve	<ul style="list-style-type: none"> • Checking operation • Checking gland packing • Checking gasket • Lubrication of moving parts
11	Non-return valve	<ul style="list-style-type: none"> • Checking operation • Checking gasket • Lubrication of moving parts
12	Foot valve	<ul style="list-style-type: none"> • Checking operation & leakage
13	Pressure gauge	<ul style="list-style-type: none"> • Checking operation
14	Pressure Switch	<ul style="list-style-type: none"> • Checking operation
15	FBI (Fire Brigade Inlet 2 way)	<ul style="list-style-type: none"> • Checking operation • Checking gasket • Checking accessibility • Lubrication of parts • Checking leakage if any • Checking hose fixing and its operation
16	FBI (Fire Brigade Inlet 4 way)	<ul style="list-style-type: none"> • Checking operation • Checking gasket • Checking accessibility • Lubrication of parts • Checking leakage if any • Checking hose fixing and its operation

Technical specification checklist for ELV (Data + Networking) System**1. 6/24 Core Fiber Optic Cable**

Sr. No.	Minimum Specifications	Meets Spec [Y/N]	Deviations, if any
1.	Make		
2.	Model no:-		
3.	Optical Fiber cable should be ISO/IEC- 11801 , Outer sheath FRLSZH		
4.	Shall be 9μ, 24-core Single mode OS2 steel armoured cable as per ISO/IEC- 11801		
5.	Shall be able to meet Gigabit & 10 Gigabit Ethernet performance requirement specified by IEEE 802.3z (1000 Base-X) & IEEE 802.3ae (10G Base-X)		
6.	Shall be suitable for using in the building shaft and outdoor laying		
7.	Shall be jelly filled with loose tube construction		
8.	Shall have water blocked construction to prevent water absorption and consequent damages. Water blocking with flooding Gel and water blocking yarn		
9.	Optical Parameters – SM , Attenuation @ 1310nm(max) ≤ 0.34 dB/Km Attenuation @ 1550nm(max) ≤ 0.22 dB/Km		
10.	Optical Fibers should be in Uni tube type of cables		
11.	Fiber cable shall be RoHS Compliant.		
12.	shall comply for IEC 60332-3 for flame retardant, IEC 61034- 2 for low smoke & IEC 60754-2 for toxicity & acidity.		
13.	The cable type shall be suitable for indoor/outdoor applications		
14.	Tensile load should be 2700 Newton or higher and crush resistance should be 3000 Newton or higher		

2. 48 PORT LIU

Sr. No.	Minimum Specifications / Functionalities / Capabilities	Specification Offered / Details	Make, OEM Model/ OEM Part No.	Meets Spec [Y/N]	Deviations, if any
	Fiber Optic LC style fully loaded Patch Panel (FOPP), 19" Rack Mount with 48 nos. of OS2 9/125µ Pigtailed.				
1.0	Minimum Specifications				
1.1	Shall have 48 nos. of ISO/IEC-11801-OS2 Pigtailed with LC Type Connectors				
1.2	Shall have all accessories including coupler plates pre loaded with duplex LC couplers (OS2), pigtailed for terminating fibers on the FOPP				
1.3	Pigtail Attenuation $\leq 0.3\text{dB}$ measured against reference connector ,				
1.4	Return Loss $\geq 45\text{dB}$, in mated condition				
1.5	Pigtail Cable Information – Outer Jacket Diameter – 0.9mm, Outer jacket colour – white , Outer Jacket Material – LSZH				
1.6	Shall be Front Patching Type, 1U high and rack mountable on standard 19" rack with mounting arrangements				
1.7	Shall be supplied with fusion splicing kit for termination of fiber.				
1.8	Shall be made of powder coated steel				
1.9	Shall be slide-out type drawer enclosure for Easy access to splicing tray, Easy access to back side of the connector and have labels for better identification				
1.10	Shall have trays with hinges(book type) which allows facilitates easy Fiber management and greater access during installation and rework				
1.11	Shall have all necessary accessories for fiber management inside such as Fiber guides, radius controls & secure tie				

	downs within the FOPP				

3. LC-LC Patch Cord

Sr. No.	Minimum Specifications / Functionalities / Capabilities	Specification Offered / Details	Make, OEM Model/ OEM Part No.	Meets Spec [Y/N]	Deviations, if any
	Fiber Optic Patch Cable (LC-LC), 3Mtrs. Long, ISO/IEC-11801-OS2 9μ Duplex, LSZH				
1	Minimum Specifications				
1.1	Length shall be 3 meters				
1.2	All patch cords shall conform to EIA/TIA-568C.3 and ISO/IEC-11801				
1.3	Shall be Duplex Multi Mode Fiber Optic Patch Cords OS2 9μ				
1.4	Shall support network line speeds up to 10 Gbps				
1.5	Shall have LC Connector jacks at both the ends				
1.6	All patch cords shall be factory terminated and packed.				
1.7	Shall be RoHS Compliant				
1.8	Shall be Low-Smoke & Zero-Halogen				

4. 6 U RACK

<u>Sr. No.</u>	<u>Description</u>	<u>Compliance (Yes/No)</u>	<u>Remark Deviation</u>
1	The rack shall be Wall + Pole + Floor mount minimum 6U, IP55Complantrack.		
2	Rack shall be with Bottom lockable Steel door with Filter and IPHood.		
3	It shall be Minimum 600mm width and Minimum 500mm depth with one Cantilever tray 250mm,1pkt of Mounting Hardware.		
4	19"Mounting angles shall be provided at a pair at front and a pair At rear.		
5	It shall be made out of steel.		
6	Air inlet provision with external IP hood & washable filter arrangement shall be provided on the door.		
7	One horizontal cable manager with PVC Loops shall be provided for cable management		
8	Two 90 cfm, 230 VAC fan shall be provided on top cover for hot air exhaust.		
9	1 U PDU Horizontal Power Distribution unit with 6 nos of 5Amp sockets with 16 Amp MCB & 3 Mtr main cord .		
10	Enclosures shall be provided with Pure Polyester powder coating finishing for longer life.		
11	It shall confirm DIN 41494 rack standards.		
12	ISO 9001-2000, ISO 14001-2004/OHSAS 18001:2007 Certification		
13	It shall be in compliance with ROHS standards.		
14	The cabinet shall be of approved make - APW President / Schneider / Panduit		

5. 9 U RACK

Sr. No.	Description	Compliance (Yes/No)	Remark Deviation
1	The rack shall be Wall + Pole + Floor mount minimum 9U, IP55Compliantrack.		
2	Rack shall be with Bottom lockable Steel door with Filter and IP Hood.		
3	It shall be Minimum 600mm width and Minimum 500mm depth with one Cantilever tray 250mm, 1pkt of Mounting Hardware.		
4	19" Mounting angles shall be provide data pair at front and a pair at rear.		
5	It shall be made out of steel.		
6	Air inlet provision with external IP hood & washable filter arrangement shall be provided on the door.		
7	One horizontal cable manager with PVC Loops shall be provided for cable management		
8	Two 90 cfm, 230 VAC fan shall be provided on top cover for hot air exhaust.		
9	1 U PDU Horizontal Power Distribution unit with 6 nos of 5Amp sockets with 16 Amp MCB & 3 Mtr main cord .		
10	Enclosures shall be provided with Pure Polyester powder coating finishing for longer life.		
11	It shall confirm DIN 41494 rack standards.		
12	ISO 9001-2000, ISO 14001-2004/OHSAS 18001:2007 Certification		
13	It shall be in compliance with ROHS standards.		
14	The cabinet shall be of approved make - APW President / Schneider / Panduit		

6. 12U to 19 U RACK

Sr. No.	Description	Compliance (Yes/No)	Remark Deviation
1	Confirms to DIN 41494.		
2	Bolted Construction.		
3	Supplied in CKD for ease to handle		
4	Easy to assemble at sites.		
5	Top and bottom cable entry facility		
6	Quick release, Front toughened Glass door and lock		
7	Maximum load rating of 40kgs		
8	Each box supplied with its own assembly tool and instruction with assembly hardware		
9	Width 550mm		
10	Depth 500mm		
11	Cabinet should be as per DIN 41494 standards.		
12	Bolted construction. Can be provided in Flat pack condition and also easy to assemble at site.		
13	CRCA Should be "IS 513 GrD" standard.		
14	Fully adjustable 19" equipment mounting angles.		
15	Front Glass toughened, with easy detachable hinges.		
16	Nano Technology process with "Zirconium Coating".		
17	Powder Coating min 80 Microns with scratch resistance properties.		
18	Product to be ROHS Complaint.		
19	Manufacturing should be as ISO Company.		
	Rack to be powder coated with Nano ceramic pre-treatment		

20	process using zirconium coat		
21	The Powder coating process should be ROHS compliant		
22	Powdercoatingthicknessshallbe80to100microns		

7. 32 U RACK

Sr. No.	Description	Compliance (Yes/No)	Remark Deviation
1	Confirms to DIN 41494.		
2	Bolted Construction.		
3	Supplied in CKD for ease to handle		
4	Easy to assemble at sites.		
5	Top and bottom cable entry facility		
6	Quick release, Front toughened Glass door and lock		
7	Maximum load ratingof40kgs		
8	Each box supplied with its own assembly tool and instruction with assembly hardware		
9	Width 800mm		
10	Depth 1000mm		
11	Cabinet should be as per DIN 41494 standards.		
12	Bolted construction. Can be provided in Flat pack condition and also easy to assemble at site.		
13	CRCA Should be“IS513 GrD” standard.		
14	Fully adjustable19”equipment mounting angles.		
15	Front Glass toughened, with as y detachable hinges.		
16	Nano Technology process with“ Zirconium Coating”.		
	Powder Coating min 80 Microns with scratch resistance properties.		

17			
18	Product to be ROHS Complaint.		
19	Manufacturing should be as ISO Company.		
20	Rack to be powder coated with Nano ceramic pre-treatment process using zirconium coat		
21	The Powder coating process should be ROHS compliant		
22	Powdercoatingthicknessshallbe80to100microns		

8. 42 U RACK

Sr. No.	Description		Compliance (Yes/No)	Remark Deviation
1	Size	Height42Uusable Width800mm Depth overall: 1000mm & Depth Usable:920mm Heightoverall:1976.5mm& Height Usable:1866.9i.e.42U		
2	Standards	DIN41494orEIA 310D		
3	Frame Construction	Seven folds vertical profiles + CRCA Steel End Frames (Welded picture frame to provide stability.)		
4	Load Carrying Capacity	700Kgs		
5	Powder coating requirements	Nano ceramic pre-treatment process using a zirconium coat(Thickness 70to80 Microns)		
6	Material	CRCA Steel Used isIS513GrD		

7	Doors & Side panel	<p>Front & Rear perforated door with hexagonal perforation with minimum 70% opening for better air movement across the Rack.</p> <p>Side panels should have slam latches & indents for improved strengths & aesthetics</p>		
8	Environment Friendly	ROHS Compliant		
9	ISO Certification	ISO9001-2000, ISO14001-2004		
10	19" Angles in the Rack	<p>Fully recessible 19" mounting angles at front and rear</p> <p>The 19" angles should have "U" marking for easy location of equipment in the designated slots.</p>		
11	Power Management	1 * PDU SOCKET 10 X 5/15 AMP WITH 32 AMP MCB AND INDICATOR WITH 3MTR CABLE AND 3 pin plug		
12	Equipment Tray	1 * EQUIPMENT SHELF		
13	Floor Placement	Castors - 2nos. with foot brakes and 2nos without brake and Leveling legs		
14	Thermal Management	4* Fan 90 CFM 230V		
15	Equipment Mounting Hardware	5* Hardware Pkt of 20		
16	Earthing Provision	Earth Continuity kit		

9. 24 PORT POE SWITCH

Sr. No	Specification Required	Compliance Yes / No	Remarks
1.0	Product details - Please specify		
1.1	Please mention Make, Model No. and Part Code.		
2.0	Architecture & Port Density		
2.1	The Switch should be configured with 24 x 10M/100M/1G RJ45 POE+ ports, Stacking Ports/Module and 2 x 1G/10G SFP+ Slots for Uplinks from Day 1.		
2.2	The Switch should support Virtual Switching System (VSS) or Virtual Chassis (VC) or equivalent Switch Clustering/Stacking feature, where the Switch Clustering feature should combine multiple switches into a single network element.		
2.3	All components required for stacking should be provided along with the switch, to ensure 40Gbps of stacking bandwidth per switch.		
3.0	Performance		
3.1	Switching Bandwidth: The Switch should provide Switch Fabric Bandwidth Capacity of 128 Gbps or more.		
3.2	Forwarding Capacity: The Switch should provide Packet Forwarding Capacity of 95 Mbps or more.		
4.0	Layer 2 features		
4.1	Should support up to 16K MAC addresses or more.		
4.2	Should support Jumbo Frames (up to 9K bytes).		
4.3	Should support 4K Active VLANs, with the following features. Port based VLANs and VLAN Groups Simultaneous tagged and untagged VLAN on a port		

	Dual-Mode VLANs MAC-based VLANs Dynamic MAC-based VLAN Activation Dynamic Voice VLAN Assignment Dynamic VLAN Assignment VLAN mapping or VLAN Translation to translate CVLANs to SVLANs		
4.4	Should support Spanning Tree Protocols, with the following features. 802.1D Spanning Tree 802.1W Rapid Spanning Tree Protocol (RSTP) 802.1s Multiple Spanning Tree 802.1s Multiple Spanning Tree enhancement (MSTP+) Fast Port Span, Fast Uplink Span, and Single-instance Span Compatibility with PVST/PVST+, PVRST+ and PVST+ BPDU Guard Root Guard for STP & MSTP Port Loop Detection Spanning Tree path cost method changes MSTP path-cost configuration		
4.5	Should support Link Aggregation Groups (LAG), with the following features. Static LAG 802.3ad Link Aggregation Control Protocol (Dynamic LAG) Dynamic insertion and removal of ports Support for LAG between different default port speeds		
4.6	Should support 802.1q Tunneling, with the following features.		

	802.1ad (Q-in-Q) tagging Q-in-Q BPDU tunneling Selective Q-in-Q		
4.7	Should support Private VLANs, with the following features. PVLANS with dual mode support PVLAN with LAG		
4.8	Should support VLAN Registration Protocol, with the following features. Multiple VLAN Registration Protocol (MVRP) MVRP with Per-VLAN STP and Per-VLAN RSTP		
4.9	Should support the following Layer 2 Switching Features. Remote Fault Notification (RFN) Link Fault Signaling (LFS) Uni-Directional Link Detection (UDLD) on Tagged and Untagged Ports		
5.0	Layer 3 features		
5.1	Should support up to 1K IPv4 routes or more.		
5.2	Should support the following Basic IPv4 and IPv6 Layer 3 Routing features. IPv4 and IPv6 Static Routes RIP v1/v2, RIPng ECMP Port-based Access Control Lists Layer 3/Layer 4 ACLs Host routes Virtual Interfaces Routed Interfaces		

	Route-only Support Routing Between Directly Connected Subnets		
5.3	Should support the following Advanced IPv4 and IPv6 Layer 3 Routing features. IPv4 and IPv6 Dynamic Routes OSPF v2, OSPF v3 (IPv6) PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) Policy Based Routing (PBR) Virtual Route Redundancy Protocol VRRP v2 (IPv4) Virtual Route Redundancy Protocol VRRP v3 (IPv6) Non-Stop Routing (NSR) GRE IPv6 over IPv4 tunnels Multi VRF (IPv4 and IPv6) with Inter-VRF route leaking using static routes DHCP Server (IPv4 & IPv6) MSDP		
6.0	Quality of Service (QoS) & Traffic Management		
6.1	Should support the following Quality of Service (QoS) features. ACL Mapping and Marking of ToS/DSCP (CoS) ACL Mapping and Marking of 802.1p ACL Mapping to Priority Queue Classifying and Limiting Flows Based on TCP Flags DiffServ Support Honoring DSCP and 802.1p (CoS) MAC Address Mapping to Priority Queue Dynamic Buffer Allocation for QoS Priorities		

	<p>Separate QoS Queuing for Uni cast and Multicast</p> <p>Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP</p>		
6.2	<p>Should support the following Traffic Management features.</p> <p>ACL-based Inbound Rate Limiting and Traffic Policies</p> <p>Broadcast, Multicast, and Unknown Unicast Rate Limiting</p> <p>Inbound Rate Limiting per Port</p> <p>Outbound Rate Limiting per Port and per Queue</p>		
7.0	Software Defined Networking (SDN)		
7.1	<p>Should support the following SDN features and functionality.</p> <p>Open Flow v1.0</p> <p>Open Flow v1.3</p> <p>Hybrid Switch Mode (Open Flow enabled on per-port basis)</p> <p>Hybrid Port Mode with Layer 2 Mode, Layer 3 Mode, and Simultaneous Layer 2/Layer 3 Mode</p> <p>Support for Multiple Controllers</p>		
8.0	Security		
8.1	<p>Should support the following Security features</p> <p>MACsec (with Additional License)</p> <p>Layer 3 ACLs (IPv4 & IPv6)</p> <p>Layer 2 ACLs (MAC)</p> <p>Binding IPv4, IPv6, and MAC ACLs to VLAN</p> <p>802.1X Authentication and Accounting</p> <p>MAC Authentication and Accounting</p> <p>Web Authentication</p>		

	<p>DHCP Snooping</p> <p>Dynamic ARP Inspection</p> <p>Neighbor Discovery (ND) Inspection</p> <p>Protection against Denial of Service (DoS) Attacks</p> <p>Authentication, Authorization, and Accounting (AAA)</p> <p>Port Security with Secure MAC Address Limiting</p> <p>Advanced Encryption Standard (AES) with SSHv2</p> <p>RADIUS/TACACS/TACACS+</p> <p>Secure Copy (SCP)</p> <p>Secure Shell (SSHv2)</p> <p>Change of Authorization (CoA) RFC 5176</p> <p>Trusted Platform Module</p> <p>Protected Ports</p> <p>IPv6 RA Guard</p> <p>RADSEC (RFC 6614)</p> <p>Encrypted Syslog (RFC 5425)</p>		
8.2	<p>The Switch should support the following Flexible Authentication features.</p> <p>802.1x with Dynamic ACL Assignment</p> <p>802.1x with Dynamic VLAN Assignment</p> <p>802.1x and MAC Authentication on the same port</p> <p>Flexible Authentication together with Dynamic ARP Inspection (IPv4 and IPv6) with Dynamic ACLs</p> <p>Flexible authentication together with DHCPv4 and DHCPv6 Snooping with Dynamic ACLs</p> <p>802.1x Authentication together with IP Source Guard Protection</p> <p>MAC Authentication together with IP Source Guard Protection</p> <p>MAC Authentication together with Dynamic VLAN Assignment</p>		

	MAC Authentication together with Dynamic ACLs MAC Authentication together with 802.1x 802.1x together with Denial of Service (DoS) Attack Protection Periodic Re authentication for MAC Authentication Periodic Re authentication for 802.1x		
8.3	The Switch should support Cisco ISE, Aruba Clear Pass, and Ruckus Cloud path for 802.1X Authentication, MAC Authentication, Dynamic VLAN Assignment, Dynamic ACL Assignment, External Web Authentication and Change of Authorization (CoA).		
8.4	Should support IPv4 and IPv6 ACLs with up to 2K Rules per ACL and a minimum of 8K Rules per System.		
9.0	Monitoring & Manageability		
9.1	Should support manageability using Network Management Software with Web based Graphical User Interface (GUI).		
9.2	The Switch should support the following Monitoring & Management features. ERSPAN RSPAN Virtual Cable Tester (VCT) PTP Transparent Clock LEDs On/Off Command Cisco Discovery Protocol (CDP) for IPv4 and IPv6 Traffic Automation with Ansible REST API Switch Cloud Management SNMP v1, v2, and v3 Mirroring based on ACL, MAC ACL and VLAN Analytics Streaming Interface		

	Configuration Archive, Replace & Roll back IP DHCP binding scalability of up to 2500 Devices Software Defined Video-over-Ethernet (SDVoE) compliance		
9.3	Should support Integrated Standard based Command Line Interface (CLI), Telnet, TFTP, HTTP access to switch management/monitoring.		
9.4	Should support Net Flow or s Flow or equivalent.		
10.0	Physical Attributes, Memory, PoE, Power Supply and Fans		
10.1	The Switch should have minimum 2MB Packet Buffer, 1GB Main Memory and 2GB Flash Memory.		
11.0	Mandatory Compliance :		
11.1	All categories of Switches, Transceivers & Switch OS should be from same OEM		
11.2	The Switch OS should be EAL/NDPP Certified. The Latest Updated Maintenance Common Criteria Report (Evaluation and Validation) should be submitted.		
11.3	The Switch should have an MTBF of more than 397,000 hours		
12.0	Warranty		
12.1	The Switch should be quoted with Three (3) Years of TAC Support and Lifetime (Till End of Support) for Hardware Warranty with NBD Hardware Replacement.		

10. ACCESS POINT

Specification / Requirement	Compliance (Yes/No)
The APs should support the IEEE 802/11a/b/g/n/ac/ax with dual radio capabilities conforming to Wi-Fi 6 standard.	
The AP should support 2x2:2 MIMO on 2.4 GHz and 5 GHz both. It should support minimum 1200 Mbps data rates on 5 GHz and minimum 570 Mbps data rates on 2.4GHz.	
The AP shall have one 1Gbps Ethernet port. The AP should have integrated BLE/Zigbee. Additionally, it should also have an USB port for hosting additional	

Internet-of-Things (IoT) devices such as Bluetooth Low Energy (BLE).	
The access points should have capacity to work as controller itself for a network of upto 128 AP. It should also manage up to 8 network switches of the same brand as AP. Both AP and Switches should be managed from a single console.	
The access point should be able to operate in full MIMO mode and the necessary power POE/POE+ should be provided.	
The Solution should support 2000 concurrent clients.	
<p>The Solution should support the below encryption/authentication options:</p> <p>Web Authentication.</p> <p>MAC authentication.</p> <p>802.1X.</p> <p>WPA2- AES</p> <p>WPA2-PSK.</p> <p>The Solution should have the capability to provide unique PSK for each client.</p>	
The AP should have an option to be powered up through DC power in addition to POE.	
The Solution should support creating L2 and L3 ACL	
<p>The Solution should support application recognition and control, application based rate limiting and QOS traffic shaping. The following details should be available:</p> <p>Top 10 clients by application</p> <p>Top 10 applications used in the networks</p> <p>Top 10 applications used by each client</p>	
The Solution should support Wi-Fi Calling to improve handling and overall quality of Wi-Fi Calling voice calls in the network	
The Solution should support Client Fingerprinting and Device Access Policies	
The Solution should support Guest and Hotspot WLANs, HTTP based captive portal and HTTP/HTTPS redirect. It should support Self service guest access where guests can come on to the network without much IT intervention. The solution should also support login of guest users through social media credentials	

(Facebook, Google, LinkedIn, and Microsoft)	
The solution should have troubleshooting tool for speed testing and client connectivity.	
The solution should have the capability to monitor the entire network through a mobile APP that can be installed on android and apple devices.	
The AP should have a receive sensitivity of -97dBm on both the bands	
The AP should provide an antenna gain of minimum 3dBi on both the bands.	
The AP should support 20, 40, 80 MHz channelization.	
The access point should be able to detect clients that have dual band capability and automatically steer those client to use the 5GHz band instead of the 2.4GHz band.	
The AP should provide minimum Tx Power of 25 dBm on both the bands	
The access point should support 802.1q VLAN tagging	
The access point should support WPA-PSK, WPA-TKIP, WPA2 AES, WPA3, 802.11i security.	
The Access Point should provide for concurrent support for high definition IP Video, Voice and Data application without needing any configuration change. This feature should be demonstrable.	
The Access Point should support WMM, Power Save, Tx Beam forming, LDPC, STBC, 802.11r/k/v.	
The AP should have the capability to support Multiple-BSSID Set	
Should support 500 or more clients per AP.	
Should support IPv6 dual stack from day one	
The solution should support zero touch mesh in which non root AP get connected to the mesh network by powering on first time and without connecting to the wired network.	
Operating Temperature: 0 deg C to 50 degree C. Operating Humidity: up to 95% non-condensing.	
Should be plenum rated and comply to RoHS.	
Should be WiFi certified and WPC approved.	

The AP should have hidden latching mechanism.

11. SFP MODULE

Access and Fibre Switch:

Switch should support physical stacking of up to 12 switches supporting 10Km distances.

Optics Specifications:

Should support 802.3ae IEEE standard.

Should support wave length of 1310nm.

Should support Single Mode Fiber.

Should support Digital Optical Monitoring.

Should support distances of 10Km.

Should support EN 60825-1, EN 60950-1

Should support Domestic safety standards FDA 21CFR 1040.10 Class 1, CSA 60950- 1-03/ UL 60950-1

Should support RoHS 5 and 6 compliant

12. MEDIA CONVERTER

Model	
Description	10/100/1000 Base-T to 1000 Base-LX
Fibre wavelength	1310nm
max distance	10Km
Ports	One RJ - 45 and One Fiber port (Duplex SC type connector)
Mode	Single – mode
Used with	Standalone only

➤ INSTALLATION OF UTP CABLE

Cables should be dressed and terminated in accordance with the manufacturer's recommendations and/or best industry practices.

Pair untwist at the termination should not exceed one-half an inch.

Bend radius of the cable in the termination area should not be less than 4 times the outside diameter of the cable.

The cable jacket should be maintained as close as possible to the termination point.

Cables should be neatly bundled and dressed to their respective panels or blocks. Each panel or block should be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

The distance between UTP data cable and any power cable should be more than 4 inches.

Each cable should be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view should not be acceptable.

Cables should be installed in continuous lengths from origin to destination (no splices).

Horizontal distribution cables should be bundled into groups of not greater than 40 cables.

Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle.

Cables should not be attached to ceiling grid or lighting support wires.

Any cable damaged or exceeding recommended installation parameters during installation should be replaced by the contractor prior to final acceptance at no cost.

A self-adhesive label or PVC marker ferrules should identify the Cables. A cable label should be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. Similar label or marker ferrules should also be placed on a section of the cable near to the patch panel termination.

Pulling tension on 4-pair UTP cables should not exceed 25-pounds for a single cable or cable bundle. The pathway should be adequately sized so as not to exceed the 80% cross-section fill of cables. The pathway should be securely installed in the facility.

Care should be taken when pulling cables into trucking to avoid damage due to snagging.

Trucking partitions should be used to separate the data cables from power, and bridges should be used where data cables have to cross the mains.

➤ **Instruction of OFC cable**

Proper cable preparation is essential for splicing and installation. The following points outline some special precautions which are specific to fiber optic cable installation and therefore need to be noted.

Fiber Stress: The fibers in the cable should not be subject to any undue stress. This means that if the cable is to be pulled into a long direct route then the specialized equipment and procedures should be used. As well, if the cable runs vertically for a significant length (more than 10m) then loop should be provided every 10m.

Bend Radius: The cable manufacturer's minimum bend radius should be observed. i.e. there should be no bends tighter than specified either during installation or once cable has been seen fixed.

Cable Ties: If cable ties are used, then it is very important that they are not over tightened, thereby causing localized bending and fiber stress.

Spare Cable: At least 5m of cable should be left at each end to allow testing, positioning of enclosures, spare fiber for repairs etc. Where appropriate, spare loop of cable should be included along the cable run to assist repair in case of accidental damage.

Labeling: All cables and cable end should be labeled clearly.

Cable End Protection: Where cable ends are to be left exposed then it should be sealed with heat shrink caps to prevent ingress of dirt or moisture.

Earthing: In many circumstances completely non-metallic fiber optic cables can be used to eliminate all earthing problems. If metallic elements are present then they should be earthed in accordance with the installation

➤ **Light guide Interconnect Unit (LIU)**

It should be installed for terminating the OFC cables. It shall provide minimum bending radius and the splice trays shall function as a splice cover for pigtail splicing. It shall be of complete aluminum fully powder coated. Cable glands shall be provided for secure anchoring the incoming cables. Rubber grommets shall be provided at the cable entry point for tight sealing. The splice tray shall also be of aluminum powder coated with splice holder. Cable spools shall of flame retardant.

➤ **OFC Connectors**

It shall be single mode SC type with push-pull mechanism. Fully in compliance with latest industry standard. It shall be possible for selection of wide range of ferrule hole diameter selection.

➤ **OFC Adaptors**

It shall be suitable for single mode SC type fiber cable connectors. Fully in compliance with latest industry standard. It shall be with snap / latch mechanism.

➤ **OFC Patch Cords**

It shall be suitable for single mode SC type fiber cable connectors with plastic moulded plug type connectors. Standard 2.5 mm ceramic ferrules shall be used. It shall be compact and easy to connect.

➤ **Power Wiring System**

Rigid PVC (heavy duty) Conduit Wiring System as per IS: 9537.

➤ **Materials : Conduits**

All rigid conduit pipes shall be of FRLS PVC and be ISI marked. The wall thickness shall be not less than 1.6 mm for conduit upto 32 mm dia and less than 2 mm for conduits above 32 mm dia.

The maximum number of PVC insulated cables conforming to ISI: 694-1990 that can be drawn in one conduit as per standard norms. Conduit sizes shall be selected accordingly in each room.

No conduit less than 20 mm in diameter shall be used.

All flexible conduits used in the system should be Halogen free, flame retardant and self-extinguishing polyamide conduits.

➤ **Conduit Accessories**

The conduit wiring system shall be complete in all respects, including their accessories.

All conduit accessories shall be of solvent cement plastering type and under no circumstances pin grip type of clamp grip type accessories shall be used. Bends, couplers, etc. shall be solid type in recessed type of works and may be solid or inspection type as required. Saddles for surface conduit work on wall shall not be less than 0.55 mm (24 gauge) for conduit up to 25 mm dia. and not less than 0.9 mm (20 gauge) for larger diameter. The minimum width and the thickness of clips used for fixing conduit to steel joints, and clamps shall be per standard norms.

➤ **Outlets**

The switch box or regulator box shall be made of metal on all sides, except on the front. In case of cast boxes. The wall thickness shall be at least 2 mm and in case of welded mild steel sheet boxes, the wall thickness shall not less than 1.2 mm (18 gauge) for boxes upto a size of 20 cm x 30 cm, and above this size 1.6 mm (16 gauge) thick MS boxes shall be used. He metallic boxes shall be duly painted with anticorrosive paint before erection.

An earth terminal with stud and 2 metal washers shall be provided in each MS box for termination of protective conductors and for connection to socket outlet/metallic body of fan regular etc.

Clear depth of the box shall not be less than 60 mm, and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern.

The fan regulators can also be mounted on the switch box covers, if so stipulated in the tender specifications, or if so directed by the Engineer-in-charge.

Except where otherwise stated, 3 mm thick phenolic laminated sheets as per clause shall be fixed on the front with brass or cadmium plated iron screws as approved by the Engineer-in-charge.

➤ **Wires**

Wires shall comply the following features:

PVC insulated with a rating of 105 deg. C bright annealed electrotpe grade (99.9% pure) copper standard conductors multi drawn simultaneously (Unilay, twisted conductors) for uniformity of resistance, dimension and flexibility.

Color coded as below:

Phase – R	-	Red
Phase – Y	-	Yellow
Phase – B	-	Blue
Neutral	-	Black
Earth	-	Green

➤ **Installation**

Common aspects for recessed and surface conduit works

➤ **Conduit joints**

The conduit work of each circuit or section shall be completed before the cables are drawn in. Conduit pipes shall be joined by means of couplers and accessories only. Cut ends of

conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of conductors while pulling through such pipes.

➤ **Bends in conduit**

All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with a bending radius of not less than 7.5 cm, or alternatively by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.

No length of conduit shall have more than four bends from outlet to outlet.

Additional requirements for recessed conduit work.

- **Making**

The chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.

In the case of buildings under construction, the conduit shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.

In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

- **Fixing conduits in chase**

The conduit pipe shall be fixed by means of staples hooks or by means of saddles, not more than 60 cm part, or any other approved means of fixing.

All joints of conduits pipes shall be treated with some approved preservative compound to secure protection.

- **Fixing conduits in RCC work**

The conduit pipe shall be laid in position and fixed to the steel reinforcement bard by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to hesteel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

Fixing of standard bends or elbow shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors.

Location of inspection / junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

- **Fixing inspection boxes**

Suitable inspection boxes o he minimum requirement shall be provided to permit inspection, and to facilitates replacement of wires, if necessary.

These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be as per IS:2667 – 1977.

- **Fixing switch boxes and accessories**

Switch boxes shall be mounted flush with the wall. All outlets such as switches socket outlets, etc. shall be flush mounting type, unless otherwise specified in the Additional Specifications.

Bunching of cables

Cables shall be always be bunched so that the outgoing and return cables are drawn into the same conduit.

In case of three phase loads, separate conduits shall be run for each phase from the distribution boards to the load points, or outlets as the case may be.

➤ **The product should be coded AS PER BS:7846 , BS:6387 SLM as follows :-**

Aluminium Conductor	: A	
XLPE Insulation		: 2X
Steel round wire armour	: W	
Steel strip armour	: F	
Steel Double round wire armour	: WW	
Steel Double strip armour	: FF	
Non-magnetic (Al.) round wire armour	: WA	
Non-magnetic (Al.) strip armour	: FA	
PVC outer sheath	: Y	

Inspection

All cables shall be inspected by the contractor upon receipt at site and checked for any damage during transit.

➤ **Joints in Cables**

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoid cable jointing. This apportioning shall be got approved by the Owner's site representative before the cables are cut to lengths. Where joints are unavoidable heat shrinkable type joints shall be made. The location of such joints shall be got approved from the Owner's site representative and shall be identified through a marker.

➤ **Jointing Boxes for Cables**

Cable joint boxes shall be installed with heat shrinkable sleeve and of appropriate size, suitable for XLPE armoured cables of particular voltage rating.

➤ **Jointing of Cables**

All cable joints shall be made in suitable, approved cable joint boxes and the filling in of compound shall be done in accordance with manufactures' instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resin. All cables shall be joined colour to colour and tested for continuity and insulation resistance before jointing commence. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient

protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders of approved size and pattern. The joints shall be completely topped up with epoxy compound so as to ensure that the box is properly filled.

➤ **Cable End Terminations**

Cable end termination shall be done in cable terminal box using crimping sockets and proper size of glands of double compression type

➤ **Bonding of Cables**

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armour clamp and gland. The clamps must grip the armouring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors.

➤ **Cable Installation**

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks.

➤ **Laying of Cables on Cable Trays**

The relative position of the cables, laid on the cable tray shall be preserved and the cables shall not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius as recommended by the manufacturers. All cables shall be laid with minimum one diameter gap and shall be clamped at every meter to the cable tray. Cables shall be tagged for identification with aluminum tag and clamped properly at every 20M. Tags shall be provided at both ends and all changes in directions both sides of wall and floor crossings. All cable shall be identified by embossing on the tag the size of the cable, place of origin and termination.

All cables passing through holes in floor or walls shall be sealed with fire retardant Sealant and shall be painted with fire retardant paint up to one meter on all joints, terminations and both sides of the wall crossings

➤ **Cables inside Building**

Cables inside buildings shall be laid on the cable trays. All cables passing through walls shall run through GI Pipes sleeves of adequate diameter 50 mm apart maintaining the relative position over the entire length.

➤ **Cable Trays**

Supply and fixing of perforated type cable trays of the following sizes of pre-galvanized iron.

- i. 600 x 40 x 40 x 2 mm thick
- ii. 450 x 40 x 40 x 2 mm thick
- iii. 300 x 40 x 40 x 2 mm thick
- iv. 150 x 40 x 40 x 2 mm thick

Note : Suitable length of 10 mm dia GI rod suspenders at 1800 mm interval shall be included in the item for perforated type cable tray.

➤ **Testing of Cables**

Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team.

- Insulation Resistance Test.
- Continuity test.
- Sheathing continuity test
- Earth test.(in armoured cables)
- Hi Pot Test.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Owner's site representative.

- Insulation Resistance Test (Sectional and overall)
- Continuity test.
- Sheathing continuity test
- Earth test.

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Owner's site representative, results will be noted and signed by all present and record be maintained.

Index serial no:- 59

Annexure-AV

(CIVIL AGENCY& ELV+FIRE ALARM AGENCY HAS TO SUBMIT BOND BEFORE FINAL BILL)

Declaration of Prime agency for ELV+FIRE ALARM system comprehensive service & maintenance contract during defect liability period

UNDERTAKING FOR ELV+FIRE ALARM WORK MAINTENANCE

(On Rs.300 stamp paper)

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

Name of Main Agency:-

Name of ELV Agency:-

We are agree to provide regular and enough service periodically required as per company norms & working hours of ELV+FIRE ALARM+ Audio-Video during defect liability period of above project as per tender clause. We also provide breakdown or any emergency service related to ELV+FIRE ALARM immediately. We agree to provide service and maintenance record during defect liability period.

After at the stage of defect liability period we will handed over the ELV+FIRE ALARM in satisfactorily working condition and provide certificate from relative department to this effect. We give guarantee of availability of spare parts during 10 years. If we fail to do so GSPHCL can execute the AMC of ELV+FIRE ALARM from our security deposit at our risk and cost. The terms & condition are as per attached.

Sign & Stamp of ELV agency

Sign & Stamp of Main Agency

Place:-

ELV+FIRE ALARM WORK

Comprehensive Maintenance & routine / periodic maintenance.

Following activities shall be done at every Two months during defect liability period. All material cost & labour including in maintenance

1.0 ELV System (Data/Voice/Wi-fi system)

Network maintenance basically means you have to do what it takes in order to keep a network up and running and it includes a number of tasks:

- Troubleshooting network problems.
- Hardware and software installation/configuration.
- Monitoring and improving network performance.
- Planning for future network growth.
- Creating network documentation and keeping it up-to-date.
- Ensuring compliance with company policies.
- Ensuring compliance with legal regulations.
- Securing the network against all kind of threats.

Of course this list could be different for each network you work on and perhaps you are only responsible for a number of these tasks. All these tasks can be performed in the following way:

- 1. Structured tasks.**
- 2. Interrupt-driven tasks.**

Structured means you have a pre-defined plan for network maintenance that will make sure that problems are solved before they occur. As a network engineer this will also make your life a whole lot easier. Interrupt-driven means you just wait for trouble to occur and then fix it as fast as you can. Interrupt-driven is more like the “fireman” approach you wait for trouble to happen and then you try to fix the problem as fast as you can. A structured approach where you have a network maintenance strategy and plan reduces downtime and it’s more cost effective.

Of course you can never completely get rid of interrupt-driven tasks because sometimes things “just go wrong” but with a good plan we can reduce the number of interrupt-driven tasks for sure.

You don’t have to think of a complete network maintenance model yourself; there are a number of well-known network maintenance models that we use. It’s best to use one of the models that is best suited for your organization and adjustments if needed.

Choosing which network maintenance model you will use depends on your network and the business. You can also use them as a template to create your own network maintenance model.

To give you an idea what a network maintenance model is about and what it looks like, here’s an example for FCAPS:

- **Fault management:** we will configure our network devices (routers, switches, firewalls, servers, etc.) to capture logging messages and send them to an external server. Whenever an interface goes down or the CPU goes above 80% we want to receive an e-mail so we can see what is going on.

- Configuration management: Any changes made to the network have to be logged. We will use a change management so relevant personnel will be notified of planned network changes. Changes to network devices have to be reported and acknowledged before they are implemented.
- Performance management: Network performance will be monitored on all LAN and WAN links so we know when things go wrong. QoS (Quality of Service) will be configured on the appropriate interfaces.
- Security management: We will create a security policy and implement it by using firewalls, VPNs, intrusion prevention systems and use AAA (Authorization, Authentication and Accounting) servers to validate user credentials. Network breaches have to be logged and an appropriate response has to be made.

2.0 CCTV System

Inspect cables and connectors and cable protection between pole and pan/tilt unit or camera enclosure for abrasions, cracks or deterioration.

Inspect metal poles for hairline cracks wider than 1mm and metal poles for any cracks, mechanical damage or corrosion.

Verify operation of pan/tilt, zoom and focus using appropriate tool or via RESCU control room operators. Ensure cables do not interfere with camera movement.

1. Clean lens and enclosure glass plate.
2. Remove dirt, moisture or other foreign substances.
3. Clean camera enclosure filter.
4. Clean enclosure fan assembly.
5. Confirm operation of enclosure fan and heater.
6. Check for damage inside the enclosure, including insect damage, lightning damage, or other mechanical failure.
7. Check enclosure grounds are securely connected.
8. Report any visible damage.
9. Checking the recording system at the time of service
10. attended the break down services same day & rectify it quickly so security surveillance may not effected.
11. To give regular training to local police staff for operation & taking backup of recording and how to check camera.

3. FIRE ALARM System

The scope of work includes maintaining the system in proper operating conditions by regular and systematic examining, and repair or replacement of faulty components.

Checking of battery (which includes measurement of voltage with total discharge followed by fully recharging) and main control panel; this works to be carried out at least twice in a year.

3. Checking of addressable detectors will be carried out every month on a rotation basis; this work includes servicing & cleaning of faulty smoke detectors including replacement of any addressable Detectors, which are found to be beyond repair/ Replace .

4. Any programming error shall be rectified using laptop and required software.
5. Entire job shall be carried out by OEM trained mechanics using OEM Tools Etc.
6. Servicing, repairing/replacement and checking of the system as it is, will be carried out with the Knowledge of Officer-in-charge and their signature will be obtained as per the Work carried out.

7. Checking OF Fire Alarm Panel to confirm that indicated Normal operation and to ensure that the system is capable operating under fire/smoke condition.
8. In each visit all zone / loop need to be checked by activating few Smoke / heat / laser detector in each zone / loop for fire detection & alarm. to ensure that they are in good service able condition.
9. The Trial of SDs shall be taken upon random basis, but with prior work permit from authorized authorities. An entry will be made in service report of the alarm event.
10. Inspection, checking throughout cleaning servicing of Main Panel.
11. Identification & Rectification of the fault observed in Main Panel, Repeater Panel, Smoke Detectors ,MCP, Hooters, all zone circuit and cable terminal checking.
12. Cleaning to remove dust or dirt and testing /Examination of visible & easily approachable smoke detectors for correct operation, on the false Ceiling and MCP as per standard Procedure.
13. In case of any alarm circuit has been disconnected then to ensure that they are instated after proper corrective actions as soon as possible.
14. If any Device/Zone is isolated, to check which device /Zone is Isolated, ensure that is restored after proper corrective action as soon as possible.
15. Testing of remote Annunciation Panel.
16. Monitoring all the required parameters on panel. Inspection & Checking of electrical connection & fittings of smoke detectors & MCP Should be examined for correct operation by using appropriate test meters.
17. During Inspection, Checking, Testing & Maintenance work any component damaged in electronic cards, if possible to repaired on site. In case, PCB, SD, MCP or any component is not repairable to be replaced
18. To check for any breaks in cables and wires, check for correct connections and test for short circuits, ground faults, continuity AC Mains, 24 V DC Power supply & Battery Voltage and insulation condition of cable, clean the panel with a duster cloth.
19. Check presence and audibility of tone at all alarm / hooter notification devices.
20. To check all MCP / ISO-X, Modules etc in good working conditions.
21. Check operation of all smoke detectors during a walk test.

4.0 Audio Video System

1. Audio- video system in auditorium is very important. So, regular preventive, routine & comprehensive maintenance is very much required to keep the whole system up to date at any time.
2. Agency has to check & service all the equipment during service visit at auditorium. Give proper training for do & don't to local police staff and give live demo & training every time to local police staff.
3. Attend the breakdown service or building & important event as per police staff instruction. Stick the operation & minor maintenance instruction, charts, picture, phone no etc at every equipment.
4. Take preventive measure for restructly entry of rate/ termite/ insect to auditorium. So, damage to equipment / wiring can be prevented.
5. The scope of work include any damage rectification due to rate / insects.

Projectors

- Remove & Clean projector filters
- Reset Filter Meters

- Check Projector Performance
- Check Mounting Bracket & Fixings
- Check all signal cables
- Check all AV Connectors
- Check & test all AV terminations
- Check Picture alignment & Calibration where necessary
- Check Software & Firmware updates
- Check remaining Lamp life

Cables & Termination Boxes

- Check all cables, connectors & plates
- Repair / replace any faulty items

Software

- Install/up grade Software updates

Interactive Whiteboards/ LED TV

- Full system commissioning
- Check all cables & Connectors
- Check Software & Firmware updates
- Check Picture alignment & Calibration

Mic/Amplifier/ Mixer/ Speaker systems etc.

- Check all cables & Connectors
- Check Volume Setting
- Replace battery

Annexure-SD

Gujarat State Police Housing Corporation Ltd.

: Proposal for Refund of First Security Deposit :

1. Name of work :
2. Agreement No. :
3. Name of contractor :
4. Date of work order
to commence the work :
5. Stipulated date of completion :
6. Actual certified date of
completion :
7. Amount of security deposit :
(1) Bank Guarantee Rs. _____
(2) F.D.R Rs _____
(3) R.A Bill Rs. _____
8. Date of payment of final bill :
9. Date on which security
deposit become refundable :
10. Whether any due are
outstanding against the
contractor/ Agency :
11. Deputy executive Engineer's
Recommendation for refund of
deposit :
12. Ex. Engineer
Recommendation for refund of
deposit :
13. Date of Inspection by Dy. Ex.
Enggr's :
14. Date of Inspection by Ex.
Enggr's :

15. Defect's Notice if Any :

16. Necessary Certificates as per :
below from Beneficiary or
undersigned/ authorized
department as per tender
condition enclosed & annexure
'C', whichever is applicable

- (1) MAIN CIVIL WORK
- (2) MAIN ELECTRICAL
WORK
- (3) FIRE HYDRANT
SYSTEM
- (4) D.G. set. & ALL
ELECTRICAL PANELS
- (5) ALL BLOCK LIFT
- (6) HVAC SYASTEM
- (7) ELV SYSTEM.

Dy. Exe. Engineer(Civil)
GSPHCL

Dy. Executive Engineer(Ele)
G. S. P. H. C. Ltd.

Exe. Engigeer (Civil)
GSPHCL

Executive Engineer(Ele)
G. S. P. H. C. Ltd.

Annexure-C

**No Defect and Satisfactory maintenance Certificate for Civil/ Electrical/ Fire hydrant/
~~DG set/ Air Conditioning/CCTV/ Data-Voice work~~**

To,
The Managing Director,
Gujarat State Police Housing Corporation Limited
Gandhinagar.

This is to certify that, for the following works / system M/s _____ has given training of operation & working demonstration for proper performance of the system. System found satisfactory in working condition. No defects are noticed. The details with documents are attached here with as per tender clause.

- (1) MAIN CIVIL WORK
- (2) MAIN ELECTRICAL WORK, STREET LIGHT, PUMPING MACHINERY
- (3) FIRE HYDRANT SYSTEM
- (4) D.G set.& ALL ELECTRICAL PANELS
- (5) ALL BLOCK LIFT
- (6) HVAC SYASTEM
- (7) ELV SYSTEM

Date:-

Place:-

Signature of the Concerned Police / Jail Officers with seal

COMPLETION CERTIFICATE
(Application Draft)

To,
Executive Engineer (Ele.),
G. S. P. H. C. Ltd.,

Sub:- Regarding Completion Certificate (form 3A) for work of

We have done supply, installation, testing & commissioning the above work. We have submitted our official test report to vij company & get the power connection. We have given service contract (if any) to ELV/ DG set/ Lift/ HVAC etc. We have received the high rise permission, vij connection, DG set NOC etc. It is our responsibility to attend any complaint during defect liability period.

We have submitted TDS certificate for above work, test report to vij company copy, copy of NOC as per tender copy of service contract as per tender copy of MOU, copy of completion certificate with complete information and sign & stamp of main agency & mine.

You are requested to issue completion certificate for above work.

Enclose:-

1. TDS certificate
2. M.O.U copy
3. Required N.O.C copy
4. Service / Maintenance contract of copy
5. Completion certificate with main agency stamp & sign

Sign & Stamp of nominated agency

Date:-

Place:-

COMPLETION CERTIFICATE

(For Composite Work)

1	Name of Contractor(Civil Agency)	:-	
2	Name of Associated (Electrical Agency)	:-	
3	Name of Main Project	:-	
4	Name of Electric work/ HVAC/ELV	:-	
5	Tendered Amount(Civil+ Electrical)	:-	
6	Tendered Amount(Electrical) /HVAC	:-	
7	Date of Starting of work as per work order	:-	
8	Date of completion of the work (As per work order)	:-	
9	Extended time limit Up to (If any)	:-	
10	Actual date of the completion of the work as per final bill	:-	
11	Amount of work done up to final bill	:-	
	Amount of Internal E.I. work	:-	
Civil Contractor Signature		Electrical Contractor Signature	
Date:-		Date:-	

• This is to certify that above information are true as per my best knowledge & it is as per final bill information.

12	State whether the details as above given by the contractor are correct if not, state as to what is the correct information.	:-	
13	State whether the contractor has executed the “work-in-progress” satisfactorily as per specifications/ has completed the work satisfactorily as per specifications. if Not give the correct position of the work	:-	
14	Any other Remarks	:-	

Dy. Executive Engineer (Ele)(SP)
G.S.P.H.C.L RAJKOT

Date:-

Executive
Engineer(Ele)(SP)
G.S.P.H.C.L RAJKOT

Date:-

Index serial no:- 62

Annexure B-1

Certificate for Demonstration, Minor maintenance and operation of Fire HYDRANT system at site

(1) After Completion of work at the time of testing

(2) After completion the work at the time of handing over of project

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

Name of CIVIL Agency

Name of Responsible person, Mobile no & email ID

Details of Fire Hydrant Agency

Name of Responsible person, Mobile no & email ID

As mentioned above project, Installed Fire Hydrant system live demo and operation, Training given to Police Department / Beneficiary as per local municipal corporation/authority fire department rules on Dt._____. Training and demonstration photographs and testing Performa are attached here with.

Fire Hydrant Agency

Police Dept. Officer

Officer, GSPHCL

Index serial no:- 67

Annexure B-6

Certificate for Demonstration, Minor maintenance and operation of ELV & relevant items at site

- (1) After Completion of work at the time of testing for final bill.
- (2) At the time of handing over of project to beneficiaries.
- (3) After completion of defect Liability Period.

Name of CIVIL Agency

Name of Responsible person, Mobile no & email ID

Details of ELV agency

Name of Responsible person, Mobile no & email ID

For above project, testing of ELV & relevant items, Automatic and Manual operation, Minor maintenance, training & demonstration has been given to Police Department / Beneficiary as per tender clause on dated_____. Training, demonstration photographs and testing Performa are attached here with.

ELV agency

Police Dept. Officer

GSPHCL, Officer

Annexure-D3

**AGENCY WILL HAVE TO SUBMIT FOLLOWING CERTIFICATE WITH FINAL SECURITY
DEPOSIT PROPOSAL.
STABILITY & SAFETY CERTIFICATE FOR FIRE HYDRANT SYSTEM**

We are pleased to certify that we have carried out annual equipment survey on _____ and conducted safety test/ audit towards your Fire hydrant system installed at _____ and the Fire hydrant system is/are found to be in working condition and it has been subjected to systematic evolution for compliance to the standards. All safety devices and mechanisms too are fully operating/ in place and working satisfactorily and, to our best of knowledge and belief the Fire hydrant system is absolutely in working condition at the time of auditing. Also, it is in our annual maintenance contract period from _____ to _____. The service & maintenance report is attached here with.

In order to prolong the equipment's life, minimize breakdowns and to sustain good performance it is imperative & advisable that the annual maintenance contract is renewed with the original Fire hydrant agency to upkeep the condition of the Fire hydrant system and to further improve the services being rendered to you, we seek your kind cooperation.

We are committed to our task on ensuring safety and to improvise on quality and services. Our ultimate goal is "customer Satisfaction".

Thank you very much and assuring our best of services at all times.

Thanking you,

Fire hydrant agency OEM stamp & Sign

Date:-

Place:-

Annexure-D6

**AGENCY WILL HAVE TO SUBMIT FOLLOWING CERTIFICATE WITH FINAL SECURITY
DEPOSIT PROPOSAL.
STABILITY & SAFETY CERTIFICATE FOR ELV + FIRE ALARM SYSTEM**

We are pleased to certify that we have carried out annual equipment survey on _____ and conducted safety test/ audit towards your ELV + FIRE ALARM system installed at _____ and the ELV + FIRE ALARM system is/are found to be in working condition and it has been subjected to systematic evolution for compliance to the standards. All safety devices and mechanisms too are fully operating/ in place and working satisfactorily and, to our best of knowledge and belief the ELV + FIRE ALARM system is absolutely in working condition at the time of auditing. Also, it is in our annual maintenance contract period from _____ to _____. The service & maintenance report is attached here with.

In order to prolong the equipment's life, minimize breakdowns and to sustain good performance it is imperative & advisable that the annual maintenance contract is renewed with the original ELV + CCTV agency to upkeep the condition of the ELV + CCTV system and to further improve the services being rendered to you, we seek your kind cooperation.

We are committed to our task on ensuring safety and to improvise on quality and services. Our ultimate goal is "customer Satisfaction".

Thank you very much and assuring our best of services at all times.

Thanking you,

ELV SYSTEM agency / OEM stamp & Sign

Date:-

Place:-

Index serial no:- 76

Draft for Earthing Details

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

- **Manufacturer has to mention all details with earthing material supply to customer**
- **Earthing details for Pipe-In-Pipe technology as per IS: 3043-1987**

1. Hot deep G.I. Pipe : Length of pipe _____ mtr.
Dia. Of pipe _____ mm
2. Outer pipe dia. : _____ mm having _____ micron
3. Inner pipe dia. : _____ mm having _____ micron
4. 12 mm dia. Hole and same size hot deep nuts, bolts and washers (2 nos.)
5. Total weight of earth electrode : _____ Kg.
6. Weight of outer pipe : _____ Kg.
7. Weight of Inner pipe : _____ Kg.
8. Weight of conductive material : _____ Kg.
9. Back filling compound : _____ nos. bags of _____ Kg.

**Sign & seal of
Material manufacturer / supplier**

**Sign & seal of
Main / Electrical Agency**

Rojkam for Hidden items at site during work

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

A. Earthing work

1. Earthing is done as per tender specification strictly in presence of GSPHC engineer
2. The value of earthing is checked in presence of GSPHC engineer by proper earth meter instrument
3. Earth resistance value:

(i) _____	Ohm
(ii) _____	Ohm
(iii) _____	Ohm

Note: If earth resistance value is not satisfactory, part payment of this item given upto 50%.

B. Pole, D.G. Set, High mast tower etc. foundation work

1. The foundation of octagonal pole, D.G. Set, High mast tower etc. done as per manufacturer's foundation detail drawing.
2. The grade of steel used in foundation at site found as per manufacturer's foundation detail drawing.
3. Grade of RCC used in foundation is as per drawing and tender specification.
4. J bolts used in foundation as per manufacturer's foundation detail drawing and tender specification.
5. Shuttering farma used in pole foundation.

C. DWC Pipe, Underground cable, Mains (2.5 sq.mm, 4.0 sq.mm, 6.0 sq.mm)

1. Above items work is done as per tender specification strictly in presence of GSPHC engineer

D. Openwell, Submersible pumping work

1. Above items work is done as per tender specification strictly in presence of GSPHC engineer

**Note: (1) Photographs for all above hidden items must be submitted in RA / Final bill
(2) If above mentioned hidden items work not done in presence of GSPHCL engineer as per tender specification, agency must have to do it as rework in presence of GSPHCL engineer and no extra payment will be given by GSPHCL for that.**

Sign of Main/Ele. Agency

**Sign of Engineer (Ele.)
Agency**

**Sign of Asst. Engineer (Ele.)
G.S.P.H.C.L.**

FACTORY ACCEPTANCE TEST FOR ALL BOUGHT OUT ITEMS

Client, his consultant and their authorized representative shall have the right to inspect and test or get inspected and tested the goods at the works of the Seller or its sub suppliers any time during manufacture and prior to dispatch and to inspect within a reasonable time after arrival of goods at the ultimate destination and during and after erection, testing and commissioning. The goods shall not be deemed accepted until after the said inspection, testing and commissioning and signing of the Acceptance Certificate. Failure to make any inspection of or payment for or acceptance of goods shall in no way impair client right to reject non-conforming goods or to avail itself of any other remedies to which client may be entitled, notwithstanding client knowledge of the nonconformity, its substantiality in the case of its discovery. In the event of failure of Seller to remove the rejected goods within the time allowed, client shall have the right to dispose of the same at the seller's risk and cost. During the time the rejected goods lie with client awaiting removal by the seller, they will so lie at the seller's risk. All goods rejected by client after receipt at the destination shall be removed by the seller within a reasonable time allowed by client, not exceeding 30 (thirty) days at seller's expense and risk.

The Seller will permit client Inspectors, Consultant and their authorized representatives free access during normal working hours to his works, godown, storage or loading spot etc. and will give them all necessary assistance to perform their task including free use of all accessories, testing and control instruments. The seller shall ensure that the same facilities are granted by his sub-suppliers.

Unless specifically stated to the contrary in the order, all expenses relevant to the preparation and performance of testing, inspection and preparation of any test reports or certificates shall be borne by the Seller EXCEPT for the salaries, fees, traveling, lodging and boarding expense of the Consultant's / client's representatives. However, if the visit duration of UCJ / client's representatives is extended for the reasons not attributable to UCJ / client, the cost of the extended period of visit shall be borne by the seller.

The sellers shall carry out tests related to performance tests as described in the specifications and specified in the order. All such performance tests shall be at supplier costs. Supplier shall also provide all the tests certificates and documents as demanded by the Inspector for his satisfaction that the order has been executed as per PO specifications. All such certificates, documents in original shall be submitted to the Client before dispatch of material. The goods shall be dispatched from suppliers shop only after written confirmation from clients / or its authorized representative.

Note:- Models of items of all fixtures should be got approved from the engineer in charge will before placing any order to the OEM/Authorized dealer. The contractor/agency is required to submit all relevant test certificates, documents along with proposal. The model along with sample should be approved by Engineer-in-charge before placing any order and supply of same to the site. The decision of Engineer-in-charge is binding in this regard and no variation is acceptable

If the make of any item to be used in execution is not in the list of approved make, agency has to submit the make of approval from Engineer-in-charge. The decision of the Engineer-in-charge in this respect shall be final and binding to the agency.

THE ADDITIONAL RESPONSIBILITY:

Additionally the contractor shall arrange the inspection of all the major electrical equipments at the supplier's shop floor itself. Contractor itself will arrange the air tickets for client and consultant, Three persons, from concern GSPHCL office to the destination point, their lodging, boarding, transportation up to the manufacturer works, etc. All major equipments will be inspected like VCB Panel, Compact Substation, D. G. set, Panel boards , Cables, Light Fitting , DWC pipe, HVAC, Wire, Fire alarm, CCTV, Pump, High mast etc. at the shop floor.

SAFETY INSTRUCTION TO BE FOLLOWED BY CONTRACTOR

INTRODUCTION

Safety in Construction Management deserves utmost attention especially in the hydrocarbon industry, such as Exploration, Refineries, Pipelines and Marketing installations, Gas Processing units etc. Construction is widely recognized as one of the accident prone activities. Most of the accidents are caused by inadequate planning, failure during the construction process and/or because of design deficiencies. Besides property loss, accidents also result in injuries and fatalities to the personnel same needs to be prevented.

The reasons for accidents during construction activities are related to unique nature of the industry, human behavior, difficult work-site conditions, extended odd duty hours, lack of training & awareness and inadequate safety management. Unsafe working methods, equipment failure and improper housekeeping also tend to increase the accident rate in construction.

Ensuring good quality of materials, equipment and competent supervision along with compliance of standard engineering practices shall go a long way to in built safety in the system.

The objective of this standard is to provide practical guidance on technical and educational framework for safety and health in construction with a view to :

- (a) Prevent accidents and harmful effects on the health of workers arising from employment in construction,
- (b) Ensure appropriate safety during implementation of construction;
- (c) Provide safety practice guidelines for appropriate measure of planning, control and enforcement.

GENERAL DUTIES

GENERAL DUTIES OF EXECUTION AGENCIES

Execution agency should :

- i) Provide means and organization to comply with the safety and health measures required at the workplace.
- ii) Provide and maintain work places, plant, equipment, tools and machinery and organize construction work so that there is no risk of accident or injury to health of workers. In particular, construction work should be planned, prepared and undertaken so that :
 - (a) dangers, liable to arise at the workplace, are prevented;
 - (b) excessively or unnecessarily strenuous work positions and movement are avoided;
 - (c) organization of work takes into account the safety and health of workers;
 - (d) materials and products used are suitable from a safety and health point of view;
 - (e) working methods are adopted to safeguards workers against the harmful effects of chemical, physical and biological agents.
- iii) establish committees with representatives of workers and management or make other arrangement for the participation of workers in ensuring safe working conditions.

- iv) arrange for periodic safety inspections by competent persons of all buildings, plant, equipment, tools, machinery, workplaces and review of systems of work, regulations, standards or codes of practice. The competent person should examine and ascertain the safety of construction machinery and equipment.
- v) provide such supervision to ensure that workers perform their work with due regard to safety and health of theirs as well as that of others.
- vi) employ only those workers who are qualified, trained and suited by their age physique, state of health and skill.
- vii) satisfy themselves that all workers are informed and instructed in the hazards connected with their work & environment and trained in the precautions necessary to avoid accidents and injury to health.
- viii) ensure that buildings, plant, equipment, tools, machinery to workplaces in which a dangerous defect has been found should not be used until the defect has been rectified.
- ix) organize for and remain always prepared to take immediate steps to stop the operation and evacuate workers as appropriate, where there is an imminent danger to the safety of workers.
- x) establish a checking system by which it can be ascertained that all the members of a shift, including operators of mobile equipment, have returned to the camp or base at the close of work on dispersed sites and where small group of workers operate in isolation.
- xi) educate workers about their right and the duty at any workplace to participate in ensuring safe working conditions to the extent of their control over the equipment and methods of work and to express views on working procedures adopted as may affect safety and health.
- xii) ensure that except in an emergency, workers, unless duly authorized, should not interfere with, remove, alter or displace any safety device or other appliance furnished for their protection or the protection of others, or interfere with any method or process adopted with a view to avoiding accidents any injury to health.
- xiii) ensure that workers do not sleep, rest or cook etc. in dangerous places such as scaffolds, railway tracks, garages, confined spaces or in the vicinity of fires, dangerous or toxic substances, running machines or vehicles and heavy equipment.
- xviii) should deploy a safety officer at site.

GENERAL DUTIES OF OWNERS

Owners should :

- i) co-ordinate or nominate a competent person to co-ordinate all activities relation to safety and health on their construction project;
- ii) inform all contractors on the project of special risks to health and safety ;
- iii) ensure that executing agency is aware of the owner's requirements and the executing agency's responsibilities with respect to safety practices before starting the job.

SAFETY PRACTICES AT WORK PLACES

GENERAL PROVISIONS

- All openings and other areas likely to pose danger to workers should be clearly indicated.

- Workers & Supervisors should use the safety helmet and other requisite Personal Protective Equipment according to job & site requirement. They should be trained to use personal protective equipment.
- Never use solvents, alkalis and other oils to clean the skin.
- Lift the load with back straight and knees bent as far as possible. Seek the help in case of heavy load.
- Ensure the usage of correct and tested tools & tackles. Don't allow the make shift tools & tackles.
- No loose clothing should be allowed while working near rotating equipment or working at heights.

MEANS OF ACCESS AND EGRESS

Adequate and safe means of access (at least two, differently located) to and egress from all workplaces should be provided. Same should be displayed and maintained.

HOUSEKEEPING

- Ensure :
- proper storage of materials and equipment;
- removal of scrap, inflammable material, waste and debris at appropriate intervals.
- Removal of loose materials, which are not required for use, to be ensured. Accumulation of these at the site can obstruct means of access to and egress from workplaces and passageways.
- Workplaces and passageways, that are slippery owing to oil, grease or other causes, should be cleaned up or strewn with sand, sawdust, ash, etc.

PRECAUTIONS AGAINST THE FALL OF MATERIALS & PERSONS AND COLLAPSE OF STRUCTURES.

- Precautions should be taken such as the provision of fencing, look-out men or barriers to protect any against injury by the fall materials or tools or equipment being raised or lowered.
- Where necessary to prevent danger, guys, stays or supports should be used or other effective precautions should be taken to prevent the collapse of structures or parts of structures that are being erected, maintained, repaired, dismantled or demolished.
- All openings through which workers are liable to fall should be kept effectively covered or fenced and displayed prominently.
- As far as practicable, guardrails and toe-boards should be provided to protect workers from falling from elevated work-places.

PREVENTION OF UNATHORISED ENTRY

- Construction sites located in built-up areas and alongside vehicular and pedestrian traffic routes should be fenced to prevent the entry of unauthorized persons.
- Visitors should not be allowed access to construction sites unless accompanied by or authorized by a competent person and provided with the appropriate protective equipment.

LIGHTING

- Where natural lighting is not adequate, working light fittings or portable hand-lamps should be provided at workplace on the construction site where a worker will do a job.
- Emergency lighting should be provided for personnel safety during night time to facilitate standby lighting source, if normal system fails.
- Artificial lighting should not produce glare or disturbing shadows.

- Lamps should be protected by guards against accidental breakage.
- The cables of portable electrical lighting equipment should be of adequate size & characteristics for the power requirements and of adequate mechanical strength to withstand severe conditions in construction operations.

ELECTRICAL TOOLS

- Low voltage portable electrical tools should generally be used.
- All electrical tools should be earthed, unless they 'all insulate' or 'double insulated' tools which do not require earthing.
- All electrical tools should get inspected and maintained on a regular basis by a competent electrician and complete records kept.

EXCAVATION

- All excavation work should be planned and the method of excavation and the type of support work required should be decided considering the following :
- the stability of the ground
- the excavation will not affect adjoining buildings, structures or roadways
- to prevent hazard, the gas, water, electrical and other public utilities should be shut off or disconnected, if necessary.
- presence of underground pipes, cable conductors, etc.
- the position of culvert/bridges, temporary roads and spoil heaps should be determined.
 - Before digging basing on site, all excavation work should be planned and the method of excavation and the type of support work required, decided.
 - All excavations work should be supervised.

Electrical :-

General Provisions

- Only persons having valid licenses should be allowed to work on electrical facilities.
 - No person should be allowed to work on live circuit. The same, if unavoidable, special care and authorization need to be taken.
 - Treat all circuit as "Live: unless ensured otherwise.
 - Electrical "Tag Out" procedure "MUST" be followed for carrying out maintenance jobs.
 - Display voltage ratings prominently with "Danger" signs.
 - Put caution / notice signs before starting the repair works.
 - All electrical equipment operating above 250v shall have two separate and distinct connections to earth grid.
 - Proper grounding to be ensured for all switch boards and equipment including portable ones prior to taking into service.
 - Make sure that electrical switch boards, portable tools, equipment (like grinding machine etc.) don't get wet during their usage. If it happens, stop the main supply, make the tools dry then only use them. Check proper earthing.
- All temporary switch boards / KIOSKS put up at work site should be suitably protected from rain and the level of same should be high enough to avoid with water due to water logging.
 - Don't work wet on electrical system.

- Don't overload the electrical system.
 - Use only proper rated HRC fuses.
- ELCB for all temporary connections must be provided. Use insulated 3 - pin plug tops.
- All power supply cables should be laid properly and neatly so that they don't cause hindrance to persons working and no physical damage also takes place to the cables during various construction activities.
- All power cables to be properly terminated using glands and lugs of proper size and adequately crimped.
- Use spark-proof/ flame proof type electrical fittings in Fire Hazards Zones as per area classification under OISD-STD-113.
- Check installation of steel plates/ pipes to protect underground cables at crossings.
- Don't lay unarmored cable directly on ground, wall, roof or trees. All temporary cables should be laid at least 750 mm below ground and cable markers should be provided. Proper sleeves should be provided at road crossings. In case temporary cables are to be laid on wooden poles/steel poles, the minimum cable heights should be 4.5 mtr.
- Maintain safe overhead distance of HT cables as per Indian Electricity Rules and relevant acts.
- Don't connect any earthing wire to the pipelines/structures.
- Don't make any unsafe temporary connections, naked joints/wiring etc.
- Ensure that temporary cables are free from cuts, damaged, insulation, kinks or improper insulated joint.
- Check at periodic intervals that pins of sockets and joints are not loose.
- Protect electrical wires/equipment from water and naked flames.
- Illuminate suitably all the work areas.
- All switchboards should be of MS structure only and incoming source should be marked.
- Hand lamps should not be of more than 24 V rating.
- Fire extinguisher (DOP/CO₂/Sand buckets) Should be kept near temporary switch boards being used for construction purposes. Don't use water for fighting electrical fires.
- Insulating mats shall be provided in the front and back end of switch board.
- All parts of electrical installations should be so constructed, installed and maintained as to prevent danger of electric shock, fire and eternal explosion.
 - Period checking / certification of electrical safety appliances such as gloves, insulating mats, hoods etc. to be done / witnessed along with maintaining a register at site signed by competent authority.
- A notice displaying following should be kept exhibited as suitable places :
 - Prohibiting unauthorized persons from entering electrical equipment room or from handling or interfering with electrical apparatus :
 - containing directions as to procedures in case of fire, rescue of person in contact with live conductors and the restoration of persons suffering from electric shock;
 - specifying the person to notified in case of electrical accident or dangerous occurrence, and indicating how to communicate with him.
- No other cables/pipes to be laid in trench used for electrical cables.
- Utmost care should be taken while excavation Earth from cable trench to avoid damage or any accident.
- Sub station floor cut-outs meant for switch board installations to be covered wherever installation is incomplete.

- During the execution of job temporary connections are to be provided by the contractor and he will render all possible assistance for the smooth operation of the depot. No. Extra payment shall be made on this account.
- All temporary connections are to be spark proof/fire proof and shall be got approved from Site Engineer.
- Test Report (if required for this job as decided by the engineer) duly approved by the local electricity department shall be submitted by the contractor after completion of the work. Any payment to electricity department needed shall be borne by contractor.
- The entire electrification work shall be carried out by the contractor under supervision of licensed Electrical Supervisor to the satisfaction of local Site Engineer.
- The entire electrification work shall be carried out as per I.E. rules/local electricity regulations.
- All metal covering which is used to project cables and apparatus shall be efficiently earthed. The metal covering used to carry the cables must be electrically continuous and this includes all the switch gear casing, if they are made of metal.
- The corporation may appoint a third party inspection agency for supervision/ Inspection of the work at factory premises/ site to ensure the quality and the scheduled progress of work. Such agencies duly appointed by Corporation shall be deemed to be authorized site engineer of GPHCL and all instructions given by such agencies shall be binding of the contract within the parameter of this contract.

Note : A Residual Current Operated Circuit Breaker (RCCB) or Earth Leakage Circuit Breaker (ELCB), when installed protects a human being to the widest extent. RCCB or ELCB should be provided as per Indian Electricity Rules.

REFERENCES

- i) Factory Act, 1948
- ii) Indian Electricity Rules
- iii) Safety & Health in Construction by ILO
- iv) The Building & Other Construction Workers (Regulation, Employment and Conditions of Service) Act, 1996.

Dy. Ex. Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Executive Engineer (Ele.)(SP)
G.S.P.H.C.Ltd., RAJKOT

Index serial no:- 80**Detail for stages of works done by civil & Electrical/HVAC/ELV/FIRE HYDRANT agency**

<u>Sr. No</u>	<u>Activity</u>	<u>Done by agency</u>	<u>Stage of Electrical work With reference to civil work.</u>
1	Casting of main slab	Electrical	After successful erection of pipe fan hook junction box as per elect, structure, architect drawing and instruction of EIC.
2	Cleaning of Ceiling fan hook box	Civil	Immediately after plastering. No mortar shall be salted inbox.
3	Cleaning of switch box	Civil	Immediately after plastering. No mortar shall be salted inbox.
4	Box cutting plaster touching around S/W box fan hook , MCBDB	Civil	During plaster or immediately after plaster and well before putty & paint.
5	Box cutting tiles	Civil	During tiles work.
6	One coat Coloring work on ceiling, wall inside		Before erection of modular accessories & MCBDB, Tube light & fan.
7	Final coat civil of inside paint	Civil	After erection of modular accessories with masking of accessories
8	Plastering on ceiling & wall	Civil	After checking & confirmation from elect. agency that all the pipe & box are erected as per drawings & EIC instruction & zari filled by mortar.
9	Plastering on external wall	Civil	After concealing pipe cable etc if any confirm with elect agency by project manager.
10	Putty & color on external wall, terrace etc	Civil	After erection of pipe cable strip etc.
11	Erection of ladder to machine room & color & flooring work of machine room	Civil	Before erection of lift equipment
12	Erection of guide rail lift car etc	Lift	After plastering & color in lift well
13	Erection of fire extinguisher	Fire Hydrant	After color on wall
14	Cladding at lift foyer	Civil	Simultaneous with lift car door & landing door frame to flush the granite.
15	Erection of fire alarm panel	Fire Hydrant	After at least one coat of paint
16	Erection of pump panel etc	Electrical	After completion of one coat of pain in pump room
17	Erection of earthing	Electrical	Simultaneous with paver block,

			road plinth protection etc.
18	Erection of underground cable	Electrical	Simultaneous with water supply drainage, gas pipe line
19	Erection of data rack	ELV	After one coat of paint in room
20	Erection of junction box plate	Electrical	Before lapi putty & color
21	Construction of road	Civil	After erection of road crossing pipe & shifting of existing pole etc.
22	Erection of pole	Civil	After marking & one layer of kapachi.
23	Erection of exhaust fan	Electrical	After preparing ventilation aluminum frame & safety grill as per exhaust fan erection.
24	Installation of submersible pump	Electrical	After getting bore well data & recommendation proposal sent by E.E to S.E & getting approval from them.
25	Providing drawing & guidance for elect wiring, lift, fire hydrant, HVAC, ELV etc.	Civil	After getting M.O.U as per tender condition & well in advance
26	Preparing of RA/ final bill (Combined with civil bill any)	Civil	After getting written application from main agency. Measurement sheet from elect agency & verification by D.E.E (Elect) & E.E (Elect)
27	After completion of all field test as per IER & tender documents by elect agency	Electrical	Submit required document as per tender/ After completing all check list point given by A.E/ D.E.E/ E.E
28	Handing over projects	Civil	After completion of all work getting all N.O.C & power supply & giving demonstration & training to police department.
29	Releasing Security deposit	Civil	After given written Application immediately completion of defect liability period.
30	After Defect liability period	Civil	Certificate from local beneficiaries as per tender clause & having necessary document, evidence supporting photo, video & training & demo to police department/ other department.
31	After Defect liability period		After getting recommendation from A.E/ D.E.E (Elect) Agency to release S.D immediately after completion of DLP. They have to do necessary rectification shown by police

			department / GSPHCL even after completion of Defect liability period.
32	Providing elect material at site	Elect/ Civil Agency	After getting written approval from EE/ DEE for make model drawings & inspection & testing at manufacturer laboratory & providing safety & dedicated storage at site.
33	After approval	Electrical	Agency has to provide elect items as per real stage of erection wiring civil work.
34	Erection of elect material	Electrical	After checking the all material as per tender specification make, model & approved by EIC. This is responsibility of elect agency.
35	Submitting test report to GEB	Elect Agency	Immediately after completion of Elect installation with earthing
36	Testing of Elect Installation	Elect Agency	Immediately getting temporary or permanently power in elect room
37	Making zari on wall erection of GI box	Electrical	Minimum two days after construction of wall
38	Checking of pipe continuity & visibility of junction box fan hook, switch box etc by fish wire	Elect Agency	Immediately after plaster work at slab & wall
39	Erection of MCBDB	Elect agency	Immediately after plaster work at slab & wall
40	Making sample house as per plumbing work	Elect Agency	Immediately after completion of plaster work.
41	Making sample house	Civil agency	Immediately after plaster flooring work in on flat with plumbing & drainage work.
42	Starting wiring in other flat	Elect agency	Only after getting approval of sample flat
43	Making sample of machine room with Elect/ Civil & lift work	Civil agency+ Elect agency + Lift agency	After completion of plaster floor + colour work & ladder work
44	Making sample of street light pole	Elect agency	Making of road
45	Making sample of elect room & after getting approval start other elect room	Elect agency	After completion plaster colour & floor work
46	Making sample of fire alarm, wiring, panel etc	Civil agency+ Elect agency + fire agency	-Piping work before colouring. - MCP, Hooter, fire panel after colour.
47	Making sample of fire extinguisher	Fire agency	After colour work
48	Making sample of lift cladding work at one floor & after getting approval other floors & block work should be	Civil + Lift agency	Smelting ousting with civil work & get approval

	started		
49	Erection of panel, elect meter in side elect room	Elect agency	Making marking at one elect room as per GA drawing & size & quantity of meter. After getting approval G.A drawing approval final panel must be prepare.
50	Erection of pump room panel/ pump timmer	Elect agency	

Duty & Responsibilities of civil agency for Electrical / HVAC / ELV / Vij Company Infrastructure work

- Civil agency (main bidder) has to give (handover) all the tender documents, specification, terms & condition for SITC of work and responsibility during defect liability period to nominated agency. So, techno commercial M.O.U can be executed.
- Civil agency & GSPHCL civil engineer has to provide two separate delivery water pipe for domestic water supply from sump room to overhead tank where more than four blocks (residential) in one campus and consulting elect agency and elect engineer GSPHCL before erecting delivery pipe.
- Civil agency has to prepare HT substation before at least six months from completion of projects so possession of the same can be given to torrent power. So, power connection can be gotten in time.
- Civil agency has to prepare elect room. elect meter space/lift machine room/ fire flooring pump room with flooring, kept & colour and necessary door & windows before starting elect work.
- Civil agency and executive engineer has to jointly decided the location of fire/ water supply pump room and get approval from architect before execution.
- Civil agency and executive engineer has to jointly decide the storage capacity of sump as per fire hydrant requirements and water supply for quarters/ NRB and finally prepare the drawings of sump room (LxBxH) as per sump depth available at site.
- Pump room size (LxBxH) and manhole chamber size & location, window ventilation, door location & size shall be jointly decided by civil + Elect. Agency, Dy. Executive engineer (Civil) & Dy. Executive engineer (Elect) as per fire hydrant pump + panel & water supply pump + panel and D.G set dimension.
- Partition for fire hydrant & domestic water supply in sump room shall be jointly decided by civil & elect. Dy. Executive engineer. So, both pumps shall be erected in pump room.
- Civil agency electrical agency and civil & elect engineer has to prepare electrical drawing for slab. For that architect, structure & Electrical drawing should be superimposed and location of fan hook light point. 15 Amp plug, MCBDB etc. should decided and drawing of PVC pipe drop in beam must be prepared with detail measurement. So drop must be in line with switch board and inside the wall. So no need to break the beam to find the pipe or adjust the pipe. This drawing must be approved by Dy. Exe. Eng (Elect)
- Civil agency has to give one full day for checking & rectify the slab pipe work.
- Civil agency has to clean all mortar inside the fan hook, switch box, MCBDB etc immediately after plastering to avoid rusting & damages to box.
- Civil agency has to fill the zari & pipe with rich mortar by skill kadia immediately after completion of pipe work & civil agency has to use chicken mess where more them two pipe to be filled up to avoid crack in plaster.
- Civil agency has to do curing on zari than do regular plaster to strength the zari.
- Civil agency has to do proper line & level plaster around the each & every box during regular plaster to avoid gap between modular plate & wall and also proper locking of plate. Electrical agency has to follow up the work and supervise the above work.
- GSPHCL has to do one sample procedure & send video for cleaning of box zari work, box cutting plastering, line & level of switch box by water pipe spirit level.
- Plumbing for water supply pump and fire hydrant pump shall be done by civil agency.

- Civil agency has to take necessary action for tree cutting or trimming if required for erection of vij company overhead line.
- For Erection of 200kva transformer civil agency has to construct foundation as per Vij company requirements.
- Civil agency shall be done plumbing as per site requirements and pumps head and discharge for water supply so water can be easily supply to all overhead tank at the same time. More than three high rise buildings nearby two separate supply pipe shall be erected to pumps for better performance.
- All the fire alarm system cabling shall be done in concealed, proper concealed pipe shall be erected by fire hydrant agency at required stage. All the drawing shall be submitted by fire hydrant agency as per tender specifications and fire department guidelines.
- Lift payment shall be done subject to following conditions
- Lift drawing shall be approved by gsphc and lift inspector.
- Erection permission should be taken from lift inspector before lift erection work start at site.
- All civil and electrical work related to lift well, machine room including metal door and stair case and lift pit shall be completed.
- Lift materials shall be store in proper place like machine room or lock and key room.
- Machine room and lift well and pit dimensions shall be verified by lift manufacturer and get sign of them before construction of same.
- Lift door should be open outside to avoid entering water in machine room, as per lift act if required drawing shall be corrected by architect.
- Drawing of Fabrication ladder for machine room shall be approved by lift manufacturer.
- Proper size of hook should be provided in machine room slab as per lift manufacturer requirements and lift act.
- Flooring of machine room should be completed before foundation of lift machine.
- Proper size of PVC pipe shall be erected in all round core cutting done for wire rope and cable to avoid water entering in lift car
- Machine room height should be minimum 2600 mm from finish floor level to finish slab level. Drawing shall be revised if required
- Proper size of chhajja should be erected above machine room door and ventilation, to prevent rain water entering inside machine room, if not mention in drawing shall be revised by civil engineer and architect of gsphcl.
- Wire mess shall be erected ventilation of machine room to prevent entry of Bird and insects
- All cables erection outside or inside the building shall be erected before starting colour and primer work.
- All junction box plate shall be erected before starting colour and putty work.
- Construction of substation room or plinth shall be done by civil agency as per vij company requirements.
- Road crossing pipe, cables trench and cable chamber shall be constructed by civil agency as per site requirements.
- Generator foundation, weather shed, other fabrication works shall be done by civil agency as per site requirements.
- Proper size of man hole should be kept in pump room with steps for erection and maintenance purpose of pump and foot valve. For that revised drawing as per fire hydrant and electrical agency required shall be approved by electrical engineer. floor layout for fire hydrant system and water pumps panel shall be prepared by concern agency and get approval of gsphcl electrical engineer.

- Tree plantation shall be done by considering electrical underground cables, street light pole foundation, vij company pole and transformer structure and over headline.
- Under ground water tank shall be properly clean before erection of pumps. Foundation of fire hydrant pumps shall be done as per pumps manufacturer drawing strictly.
- Height of generator foundation shall be kept as per main building finish floor level to avoid rainy water entering inside generator, civil agency shall give level to electrical agency.

Electrical Room

- 1) Size of electrical room must be sufficient to erect all panels & equipment for proper operation, maintenance & safety.
- 2) Size of door / ventilation must be as per panel size, cable tray requirement.
- 3) Necessary cable French cable chamber shall be provided.
- 4) Minimum head way should be 7 feet.(Small NRB)
- 5) Civil agency, elect agency and GSPHCL elect engineer sat together and verify existing elect room dimension & location and confirm that elect room is suitable for that building. If any rectification in construction required, write to architect & EE(Ele) for revision of drawings.
- 6) Layout having all elect equipment & panels shall be prepared by elect agency as per EIC instruction & get approval before erection.
- 7) Necessary marking, notice board, earthing terminal shall be provided as per IER & EIC instruction.
- 8) Necessary Additional fabrication civil work shall be done by civil agency as per EIC instruction.

External Street Light & G.E.B Infrastructure & Landscape Lighting.

- 1) Civil & elect agency and GSPHCL engineer has to prepare the final execution drawings for street light & GEB pole as per site requirements and considering underground items like elect cable, gas line, GEB cable, water supply & drainage pipe, telephone cable, water harvesting line & above ground things like water supply & drainage chamber, earthing chamber tree & its roots, bore well, existing GEB infrastructure, parking access etc.
- 2) Elect. agency has to prepare final execution drawing from conceptual drawings showing pole, cable route etc & submit for approval to GSPHCL prior to start the work.
- 3) Civil agency has to confirm the erection of road crossing pipe & preparation chamber, trench etc before constructing road, landscaping parking, paver block etc.
- 4) Civil agency has to execute the civil & fabrication related work, which is required to get the permanent power connection from Vij Company.

False Ceiling

- 1) Civil & electrical agency has to verify the drawing given by architect or civil engineer GSPHCL considering following items.
- 2) Ceiling fan, light fitting, HVAC indoor unit, size of beam smoke detector, wall mounted or ceiling mounted AC indoor units and its drainage copper pipe erection.

- 3) Elect & HVAC agency has to give the floor print of above equipment, location of each item as per furniture layout and space required for best performance once and for safety and easy operation & maintenance.
- 4) Finally (civil + elect) engineer GSPHCL & agency stack holder will decide final drawing of false ceiling and get approval of architect branch.

For civil agency activities in coordination with Elect agency & elect engineer GSPHCL.

- 1) Elect, ELV, HVAC, fire hydrant, duct must be opened at terrace if not shown in drawing contact civil engineer & architect and get revised the drawings. It is necessary to draw out TV cable, fire pipe, HVAC pipe for terrace installation.
- 2) Duct should be elevated from terrace floor to certain height and top of duct must be covered with FRP shed to prevent rain water, birds entry & kite, threads, waste spitting etc as per EIC. (Elect)
- 3) Necessary brick masonry cable trench arrangement must be done for carrying antenna cable on terrace, DG set cable to elect room, external cable to elect room, substation & pump room cables etc.

Masking & Painting & Cleaning of Paint spot.(Civil agency responsibilities)

1. To maintain the cleanliness masking is required before will, ceiling paintings, color agency has to mask all the civil & elect equipments proper so color spot can be prevented on fan, tube light, switch board, fire extinguisher, elect panel, lift equipment, DG set, pumps etc cable tray.
2. If any color spot found on above equipments, civil agency has to clean it immediately after coloring.
3. Civil agency has to paint the junction box for elect. maintenance inside & outside the wall or on ceiling, open PVC, DWC pipe, street light foundation, open cable in such a way that it should be match with color of wall or ceiling.
4. For above activities elect agency has to erect all item like open PVC pipe, cable, junction box, plate etc well before coloring start and supervise the work.

Duty & Responsibilities of elect agency for good workmanship

1. Elect agency has to erect all blank plate on junction box of elect data wiring on wall or ceiling before putty & color work. Civil agency has to confirm the junction box plate work and do color on it to maintain aesthetic view of wall ceiling.
 2. Elect agency has to erect all cable & conductor outside wall before coloring work. Civil agency has to confirm with elect agency & them start coloring work so aesthetic view of external wall can be maintain.
 3. This all are mandatory activity at a particular stage of work. No running bill will be given to agency if thing have not complete the above work.
 4. Decide the location and space for electrical room, server room, HVAC indoor out door unit at the very early stage like before foundation, beam column, construction of wall/ flooring etc. For that agency has to contact GSPHCL engineer (Ele) well in advance. So, that necessary changes in civil construction drawing can be done with architect branch.
 5. Decide location & route of underground the crossing pipe for road, paver block, earthing, power cable, chamber for cable etc. & make drawing for it.
 6. Decide location of vij company infrastructure considering existing 11 KV line, load demand, service cable, maintain beneficitation of building and campus other underground & over head things tree safety etc.
 - Location of HT / LT pole & line.
 - Location of transformer centre.
 - Location of cable clamp.
 - Location & route of service cable & cable tray.
 - Location of meter & other switchgear.
 - Supervise the vij company work which is must be as per our requirement and better workmanship.
1. Care of the Building:
- Care shall be taken by the contractor while handling and installing the various equipments and components of the work to avoid damage to the building. Agency shall be responsible for repairing all damages and restoring the same to the original finish at his own cost. He shall also remove all unwanted and waste materials at his own cost arising out for the installation from the site of work.

Duty of site engineer (Elect)

1. Preparing detail execution drawings for slab pipe/ fan hook erection with location of fan hook, junction box, pipe drop with measurement. This drawing must be prepared by super imposing architect, structure & electric drawings. Architect drawings structure drawing & zerox of tender shall be collected from civil agency. Electrical conceptual drawing shall be provided by GSPHCL elect. wing.
2. Checking & measurement of above work and co-ordination with civil project engineer of agency & electrical engineer GSPHCL for erection & checking & rectification work.
3. One sample of wiring, erection of MCBDB, fan, tube light, street light, pole fire alarm panel, earthing exhaust fan etc shall be approved by EIC (elect) and get done other work as per sample & instruction of EIC.
4. Provide measurement sheet require immediately after completion of particular work. Joint measurement will be taken and submit the Measurement sheet with sign of site engineer (elect agency) & assistant engineer (Elect) GSPHCL required for recording RA/ final bill.
5. To maintain the line & level finishing, good workmanship & quality of material & erection methodology.
6. To check each & every item at site before erection. It should be approved by EIC & as per tender specification.
7. Remain present during site visit of A.E/D.E.E/E.E/S.E.
8. Preparing as built drawings, final bill, RA bill document, testing perform as per tender.
9. Provide measuring & erecting testing equipment as per site requirement as per wiremen & EIC instruction requirement.
10. Handing over procedure.
11. Co-ordination with different agency/ technician/ engineer to maintain quality & progress of the work.
12. Preparing test report & get the power from vij company.

Index serial no:- 86

Ref :

Date :

The Dy. Ex. Engineer (Electrical),

Gujarat State Police Housing Corporation Ltd.,

Ahmedabad.

Dear Sir,

Sub: - Authorization for lightning protection System work Execution.

**Name of Work: - Construction of Home Guard Bhavan at Una, Dist.:- Gir Somnath.
[Including Electrical Work]**

With reference to above, this is to bring to you kind notice that in the event of order being placed on M/S..... All necessary technical support & necessary certificates regarding satisfactory completion of works like LPS system, erection of LPS system & testing & commissioning of LPS System will be provided by us. Work completion certificate of LPS. Set also provided by us as per IEC latest standard.

Thanking you and assuring you of our best services at all times.

O.E.M.

Name & Sign with stamp :-

Designation :-

Place :-

Date :-

Annexure-A(E)

Specifications for Surge Protection Device	
SPD according to IEC 61643-1	Class I
SPD according to EN 61643-11	Type 1
Technology	Glass discharge tube
circuit	Protective circuit with heavy-duty zinc oxide varistors in combination with the "Thermal Disconnecting Control"
LPZ	1->2
Nominal voltage (Un)	400 V
Max. continuous operating a.c. voltage (L-L/)	440 V
Max. continuous operating a.c. voltage (L-PE & L-N & N-PE)	255 V
Nominal discharge current (8/20 μ s)	25 kA
Maximum discharge current (8/20 μ s) (L/N)	60 kA
Total discharge current (8/20 μ s)	175 kA
Lightning impulse current (10/350 μ s)	25 kA & Total 100 kA
Specific c energy (N/PE)	100 KJ/ Ohm
Charge (N/PE)	10 As
Voltage protection level (up)	(L-N) 2 kV (N-PE) 2 kV
Short Circuit Withstand Icc	7 kA
Temporary overvoltage (TOV) (Ut)	(N-PE)1200V
Operating Indication (Flag) (visual indication)	Green-Ok/Red-Fault
Maximum backup fuse	160 AgL/gG
Short-circuit withstand capability of max. back-up fuse	IP 60 kArms

Operating temperature range	-40C to +80C
Degree of protection	IP 20
Mounting arrangement	35 mm DIN rail acc to EN 60715
Housing material	Polyamide PA6, UL 94 V-0
Integration and SLA management	SPD must be fully integrated and functional with All Electric & Electronic Equipment and must be integrated and part of SLA management system of help-desk software which is there for 5 years.
Scope and Warranty	Scope includes Supply, Installation, testing and Comprehensive AMC of SPD system at respective for 5 years at respective CCD. Also SPD must be connected with existing separate earthing at each CCD
Manufacturer Authorization	Specific MAF for this tender require with 5 years support to Bidder
Manufacturer Compliance	Compliance on OEM Letter head required
Approved Make	As per specification

Technical Specification for Universal Astro Timer

- Supply : 1 phase, 230 V, AC/phase, +/- 25% RYBN 2 wire supply system, 50 Hz (+/- 10%)
- Power consumption : 2 W (Standby) to 3 W (on full load)
- Controller : 8 bit micro controller
- Programming function : Switching ON-OFF with Longitude & Latitude base
- Real time clock : Accuracy of +/- 1 minute / month with inbuilt Battery with battery life of more than 8 years
- Parameter protection : With special device which hold the date for more than 10 years without any power and password protection
- Display : 16 characters 2 lines LCD Display with backlight
- Keyboard : 4 keys user friendly keyboard function
- Capacity : 20 Amp. Power output, 5 KVA Single phase
- Bypass : Provision to make bypass by the way of relay operation through auto-manual switch
- Operating temperature : 2 to 55° C & Humidity 90% non-condensing
- Dimension : 235 X 140 X 105 mm Approx.
Indoor type and can be installed in existing box
- Weight : 3 Kg. Approx.
- Material of construction : MS industrial powder coated with seven tank process

IMPORTANT INSTRUCTION FOR SOLAR ROOF TOP SYSTEM WORK

- (1) Solar agency has Authorisation from GEDA for supply, install & commission the roof top solar system.
- (2) Solar agency has to give written confirmation for minimum & average 4 units/Kw/day (panel) generation during year.
- (3) Solar agency has to collect the electricity bill from beneficiaries and give certificate that generation is more than 4 units /Kw/day.
- (4) Solar agency has to keep written report of generation during defect liability period and submitted to GSPHCL, if agency fails to do so the security deposit will not be released.
- (5) Agency has to do plumbing with UPVC pipe & other accessories of Ashirvad, Astral, Supreme, Dutron, Prince, Finolex brand.
- (6) Solar agency has to submit detail calculation of solar plant capacity & generation of each component.
- (7) Solar agency has to prepare AutoCAD colour drawing for solar panel and its foundation, with measurement and mark the location of leg of structure & panel foot print on terrace & also mark the route of cable, earthing etc & location of inverter ACDB, DCDB and earthing in drawing & at site & get approval of GSPHCL. Design should be suitable for easy operation & maintenance. Hence maximum generation can be obtained.
- (8) Solar agency to complete the work as per original project completion date. So start the liaisons work well in advance. Agency has to get the discom meter connection in given time limit.
- (9) Agency has to do all activities to get solar meter GEDA. Application fee, solar connectivity charges, meter connectivity charges meter testing charges will be paid by GSPHCL.

Important Standards for Solar Roof Top System Work

IEC: 61215/IS: 14286	Crystalline silicon terrestrial photovoltaic modules – Design qualification and type approval.
IEC: 61730	Part 1 Photovoltaic (PV) module safety qualification – Requirements for construction.
IEC: 61730	Part 2 Photovoltaic (PV) module safety qualification – Requirements for testing.
IEC: 61701/IS: 61701	Salt Mist Corrosion Testing of the module.
IEC: 62804	Test method for detection of Potential Induced Degradation of photovoltaic (PV) modules
INVERTERS IES Standards for Reference	
IEC/IS: 61683	Photovoltaic systems – Power Conditioners – Procedure for measuring efficiency
IEC 62093	Balance-of-system components for photovoltaic systems – Design qualification natural environments
IEC 60068	Environmental Testing
IEC 62116 / IEEE 1547/UL 1741/ equivalent IS standard	Islanding Prevention Measurement
IEC 61727 Relevant CEA/ CERC regulation and grid code (amended up to date)	Interfacing with utility grid
IEC 61000 series	EMC, harmonics, etc.
IEC 62109 (1&2), EN 50178 or equivalent	Electrical safety
Recommended practice for PV – Utility interconnections	IEEE standard 929 – 2000 or equivalent
IEC 62093 or equivalent	Reliability test standard

Technical Specifications of RoofTop Solar Panel System Components

❖ Solar Panel

- Mono Crystline PV Module (ALMM approved) with 72 Cells - 150 Cells or More, Frame Material : Anodized Aluminum alloy Frame With Twin Wall Profile, Front Cover : High Transmission Low-Iron Tempered Glass (AR Coated), High efficiency and positive power tolerance Pmax: 0/+5, Module Efficiency should be approx. 18%-21%, Normal operating temperature 45'C, Junction Box with Waterproof IP67 & MC4 Compatible and Enclosed with Bypass diodes 100% Electroluminescence test to ensure error free Modules, The temp. co-efficient of the PV module shall equal or better than -0.45%/degree C. Solar PV modules of minimum fill factor 75% to be used. Unit Production:- 4 to 5 Unit /kw /day (Actual)(1Year Avg) With 10 year Product warranty and 25 year Linear Power Warranty.
- For Module o/p Range: 520 - 545 watt, Maximum Power Voltage Vmpp: 41 - 42 V, Maximum Power Current Imp: 12.5 - 13 A

For Above Solar Panel (Make: Adani Solar, Goldi Solar, Waree Energies Ltd, TATA Power Solar)

❖ Solar Inverters

- Solar Inverter Grid Tied: MPPT Range: 80-1000 V, Max efficiency: 97.5% - 98.9%, O/p Frequency: 50/60Hz, Operating Altitude (m) ≤4000, O/p Power Factor: ~1, O/P THDi: <3%, Operating Temperature Range: -25~60°C, Anti-islanding Protection: Integrated, Input Reverse Polarity Protection Integrated, Insulation Resistor Detection Integrated, Residual Current Monitoring Unit Integrated, Output Over Current Protection Integrated, Output Short Circuit Protection Integrated, Output Over Voltage Protection Integrated, Protection Degree: IP65, User Interface LCD & APP, Datalogger & Communication: GPRS / Wi-Fi (Optional)
- **For Solar Inverter: 1 kW to 3 kW:** Max. input Current: 10A, Max DC i/p Power: 1300-3900W & Nominal o/p Power: 1000-3000W Nominal O/p Voltage: 220/230 V 1-Phase, Nominal O/p Current: 5-13.5A.
- **For Solar Inverter: More than 3 kW to 6 kW:** Max. input Current: 11A, Max DC i/p Power: 3900-7200W & Nominal o/p Power: 3000-6000W, Nominal O/p Voltage: 220/230 V 1-Phase, Nominal O/p Current: 13.6-27.3A.
- **For Solar Inverter: : More than 6 kW to 15 kW:** Max. input Current: 22 A, Max DC i/p Power: 7800-19500 W & Nominal o/p Power: 6000-16500 W, Nominal O/p Voltage: 400 V 3-Phase, Nominal O/p Current: 10-24A,
- **For Solar Inverter: : More than 15 kW to 25 kW:** Max. input Current: 27 A, Max DC i/p Power: 22100-32500W & Nominal o/p Power: 15000-25000W, Nominal O/p Voltage: 400 V 3-Phase, Nominal O/p Current: 25-37A.
- **For Solar Inverter: : More than 25 kW to 50 kW:** Max. input Current: 30 A, Max DC i/p Power: 22100-51500 W & Nominal o/p Power: 25000-50000W, Nominal O/p Voltage: 400 V 3-Phase, Nominal O/p Current: 37-80A.

- **For Solar Inverter: : More than 50 kW to 100 kW:** Max. input Current: 40 A, Max DC i/p Power: 66500-130500 W & Nominal o/p Power: 50000-100000 W, Nominal O/p Voltage: 400 V 3-Phase, Nominal O/p Current: 80-144 A.
- **For Solar Inverter: : More than 100 kW to 136 kW:** Max. input Current: 40 A, Max DC i/p Power: 130.5 -176.5 KW & Nominal o/p Power: 100-136 KW, Nominal O/p Voltage: 540 V 3-Phase, Nominal O/p Current: 144-145 A.
- **For Solar Inverter: : More than 136 kW to 200 kW:** Max. input Current: 40 A, Max DC i/p Power: 176.5-260KW & Nominal o/p Power: 136-200KW, Nominal O/p Voltage: 540 V 3-Phase, Nominal O/p Current: 144-145A.

Note: Maximum 10% Over load capacity can be considered if EIC can give written permission, for that agency has to written confirmation in Rs.300 Stamp Paper with Notarized from OEM.

(For Above Solar Inverters: Make: Havells, Solar Yaan, Sun Grow (india) Pvt Ltd, UTL Solar, Servo tech Power)

❖ **Seamless Box Pipe**

- Seamless Box Pipe of suitable size for rooftop solar installations with good stability against wind, Thickness 2 mm and 80 micron, Hot Dipped Galvanized steel coils. suitable arrangement for base plate for foundation , solar panel mounting, the structure should be suitable for carry the load of solar panel,wiring, sprinkler system etc. with necessary foundation work/wall mount, j bolt, anchor fastener etc. the nut bolt used for installation of structure should be (SS 304) quality.
- Box. pipe ref. size (A) 40 x 40 x 2mm, (B) 50 x 50 x 2mm, (C.) 60 x 40 x 2mm,(D) 72 x 72 x 2.5mm

(For Above Seamless Box Pipe: Make: JSW, TATA, Asian, Apollo)

❖ **'C' Channel**

- 'C' Channel of suitable size for rooftop solar installations with good stability against wind, Hot Dipped Galvanized steel coils. It have suitable arrangement for base plate for foundation Screw Arrangement , solar panel mounting, the structure should be suitable for carry the load of solar panel, wiring, sprinkler system etc. with necessary foundation work/wall mount, j bolt, anchor fastener etc. the nut bolt used for installation of structure should be (SS 304) quality.

(For Above 'C' Channel: Make: JSW, TATA, Asian, Apollo)

❖ **SS Nut Bolt**

- Stainless Steel Nut Bolt (SS 304) for Installation of Solar PV Module, Structures, and other related items with required size as engineer in charge demands for project Size, length upto 10 x 150 mm

❖ **DC Cable**

- Electron beam cross linked compound,UV, Ozone, Temperature & Hydrolysis resistant Flame Retardant, Low Smoke Excellent Encapsulation
- Very long / Service life > 25 Years
- Standards / Material Properties:
- Fire performance : IEC 60332-1-2
- Smoke emission : IEC 61034/ EN 50268-2
- Halogen Free: EN 50267-2-1/-2, IEC 60754-2
- Toxicity: EN 50305, ITC – Index <3
- Ozone Resistant : EN50396
- Weathering UV: HD 605/A1 or DIN 53367
- Approvals : EN 50618; H1Z2Z2-k
- With suitable sized of PVC pipe(ISI Mark) and Clamps,Shadels,Lugs.

DC Cables to be used:

- 1) 1 core 4 sq.mm copper DC cable Colour Red
- 2) 1 core 4 sq.mm copper DC cable Colour Black

(For Above DC Cable: Make: Finolex / RR Kabel / Polycab / KEI / Havells)

❖ **ACDB**

➤ **For Distribution board from AC Side, ACDB 1-Phase - 1 kW - 6 kW**

- AC MCB: 16-25A, 2POLE, C-CURVE, 10KA, AC SPD: 40KA, 1P+N, TERMINAL/END PLATE/END CLAMP: 6SQMM (KUT6) FOR OUTPUT, AC Interconnection with suitable size wire/cable, All switchgears and connection are enclosed with IP66 Enclosure which have transparent cover in front side to view and operate the MCB position

➤ **For Distribution board from AC Side ,ACDB 3-Phase - 6 kW - 10 kW**

- AC MCB 20-32A, 4POLE, C CURVE,10KA, AC SPD 40KA, 3P+N, TERMINAL / END PLATE / END CLAMP: 6 SQ.MM (KUT10) FOR OUTPUT, AC Interconnection with Suitable size wire/cable. All switchgears and connection are enclosed with IP66 Enclosure which have transparent cover in front side to view and operate the MCB position

➤ **For Distribution board from AC Side, ACDB 3-Phase - 11 kW - 20 kW**

- AC1 DUTY CONTRACTOR-40A 4P,100A MCCB 4P(Cat III), 3 PHASE SPD, VOLTAGE MONITORING RELAY,ELR WITH CBCT, PHASE INDICATING LAMP, POWER CABLE & OTHER ACCESSORIES, All switchgears and connection are enclosed with IP66 Enclosure and operate the MCB position.

➤ **For Distribution board from AC Side, ACDB 3-Phase - 21 kW - 50 kW**

- AC1 DUTY CONTRACTOR-80A 4P,100A MCCB 4P(Cat III), 3 PHASE SPD, VOLTAGE MONITORING RELAY,ELR WITH CBCT, PHASE INDICATING

LAMP, POWER CABLE & OTHER ACCESSORIES, All switchgears and connection are enclosed with IP66 Enclosure and operate the position.

➤ **For Distribution board from AC Side , ACDB 3-Phase - 51 kW - 100 kW**

- Which includes AC1 DUTY CONTRACTOR-200A4P, 200A MCCB 4P(Cat III) WITH SPREADER & SHUNT, 3 PHASE SPD,VOLTAGE MONITORING RELAY, ELR WITH CBCT, PHASE INDICATING LAMP, POWER CABLE & OTHER ACCESSORIES. All switchgears and connection are enclosed with IP66 Enclosure and operate the position.

➤ **For Distribution board from AC Side , ACDB 3-Phase - 101 kW - 200 kW**

- AC1 DUTY CONTRACTOR-300A 4P, 200 A MCCB 4P (Cat III)WITH SPREADER & SHUNT, 3 PHASE SPD,VOLTAGE MONITORING RELAY, ELR WITH CBCT, PHASEINDICATING LAMP, POWER CABLE & OTHER ACCESSORIES. All switchgears and connection are enclosed with IP66 Enclosure and operate the position.

(For Above ACDB: Make: Havells, LK(E&A), Legrand, Siemens

❖ **DCDB**

➤ **For Distribution System DC Side, DCDB 1-Phase - 1 kW - 3.5 kW (1in:1out)**

- DC MCB 500V, 16A, DC SPD 600V, TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM(KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 3.6 kW - 6 kW (2in:2out)**

- DC MCB 500V, 16A, DC SPD 600V,TYPE 2, TERMINAL/END PLATE / END CLAMP: 4 SQ.MM (KUT6), GREEN (KUT6), DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 6 kW - 10 kW (3in:3out)**

- DC MCB 500V, 16A, DC SPD 1000V, TYPE 2, TERMINAL/END PLATE / END CLAMP: 4 SQ.MM (KUT6), GREEN (KUT6), DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 10 kW - 20 kW (4in:4out)**

- Input MCB - 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 20 kW - 25 kW (5in:5out)**

- Input MCB- 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 35 kW - 40 kW (8in:8out)**

- Input MCB - 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 50 kW - 65 kW (12in:12out)**

- Input MCB - 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 60 kW - 80 kW (16in:16out)**

- Input MCB - 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

➤ **For Distribution System DC Side, DCDB - 80 kW - 300 kW (18in:18out)**

- Input MCB - 1000 V, 16 Amp,1000 V DC SPD TYPE 2, TERMINAL / END PLATE / END CLAMP: 4 SQ.MM (KUT6) FOR OUTPUT, DC CABLE With suitable size of interconnection.

(For Above DCDB: Make: Havells, LK(E&A), Legrand, Siemens)

❖ **Water Sprinkler System**

- Automatic solar panel cleaning system for solar power projects which includes necessary plumbing work (UPVC pipes and accessories) from source of water to project site (upto 30 meters),Suitable size of submersible/ open well motor, necessary wiring for motor and sprinkler system with safety, timer circuit for automatically on/off the sprinkler system, necessary size and number of nozzles/JET (minimum 1 Nozzle/Jet per module).

(Make: Surya Solar, Lobel Solar, Madhar Solar, Devine Solar, Som Energy)

GUJARAT STATE POLICE HOUSING CORPORATION LTD.
LIST OF APPROVED MAKES
ELECTRICAL WORKS

SR. NO	MATERIALS/ ITEM	MAKE/APPROVED BRAND	REMARKS
1	RIGID PVC PIPE	PRECISION, NIHIR, POLYCAB, ASTRAL, BLP (BHAGYALAXMI PLASTIC INDUSTRIES)	
2	WIRE AND CABLE	HAVELLS, POLYCAB, RR KABEL, FINOLEX, KEI, AVOCAB	
3	MODULAR SWITCH ACCESSORIES	HONEYWELL, ANCHOR-PANASONIC, HAVELLS, LEGRAND, SCHNEIDER	
4	CEILING FAN (1 STAR & ISI MARK)	CROMPTON, USHA, HAVELLS, ORIENT, BAJAJ	
5A	MCBDB, MCB, ELCB, MCCB	HAVELLS, SIMENS, LEGRAND, SCHNEIDER, LK(E&A), ABB, C&S ELECT Ltd.	
5B	VCB, ACB	CROMPTON, LK(E&A), ABB, SIEMENS, SCHNEIDER,	
6	LED LIGHT FITTING	PHILLIPS, HAVELLS, WIPRO, JAQOUR, LIGHTING TECHNOLOGY, HELONIX, PYROTECH TECHNOLOGY PVT LTD	
7A	PUMPING MACHINERY FOR HORIZONTAL MONOSET	KIRLOSKAR, KSB, WILLO, BATLIBOI, AMRUT, PRIMA	
7B	BORE VERTICAL SUBMERCIBLE	KSB, KIRLOSKAR, WILLO, AMRUT	
7C	FIRE PUMP & MOTOR (MAIN , JOCKEY,DIESEL)	KIRLOSKAR, LUBI, WILL, KSB	

8	HVAC SYSTEM (ROOM AIR CONDITIONER, VRF SYSTEM, DUCTABLE (Premium Model & Min. 3 star rated & approved by EIC)	OGENERAL, MITSUBISHI, BLUESTAR, DAIKIN, Toshiba	
9	DG SET	KIRLOSKAR, SUDHIR POWER (CUMMINS), MAHINDRA POWEROL, CATERPILLAR	
10	PANEL BUILDERS (only LT panel without TTA)	SHIVSHAKTI ENGINEER, SWATI SWITCHGEAR & CHANNEL PARTNER OF APPROVED COMPANY ONLY (CROMPTON, LK(E&A), ABB, SIEMENS, SCHNEIDER), C&S elect. Ltd	
11	DWC PIPE	ASTRAL, PRINCE, SUPREME, GEMINI, NOBLE	
12	FRP CABLE TRAY	SATYAM COMPOSITES, SUMIP COMPOSITES, ERCON COMPOSITES	
13	LIFT (CAT.III) & Strictly subject to tender Item description and detail specification.	<ol style="list-style-type: none"> 1. Orbis Elevator Co. Ltd. 2. Johnson Lifts Pvt. Ltd. 3. Fujitec Express Ltd. 4. TK Elevator India Pvt. Ltd. 5. Trio Elevators Co. (I) Pvt. Ltd. 6. Schindler India Pvt. Ltd. 7. Otis Elevator Company 8. Kone Elevator India Pvt. Ltd. 9. Omega Elevators 	

NOTE:

- 1) CAT.II MODULAR ACCESSORIES WILL BE USED IN ALL B TYPE RESIDENTIAL QUARTERS. IN ALL OTHER TYPE OF RESIDENTIAL QUARTERS & IN NRB CAT. III WILL BE USED
- 2) CAT. III TYPE LIFT WILL BE USED IN ALL RESIDENTIAL BUILDING & NRB IN RURAL /DISTRICT/ TALUKA PLACES. PREMIUM CATAGORY LIFT WILL BE USED IN NRB BUILDING LIKE CP OFFICE, SP OFFICE, PRESTIGIOUS BUILDING IN MAJOR CITIES OF GUJARAT LIKE AHMEDABAD, SURAT, RAJKOT, VADODARA, GANDHINAGAR AND & CAT. C, D, E, E1 TYPE HIGH RISE QUARTERS.
- 3) FROM ABOVE MAKE LIST FINAL APPROVAL OF ITEM MAKE & MODEL WILL BE DECIDED BY ENGINEER IN CHARGE.

4) THE MATERIAL SHALL CONFIRM TO THE TENDER SPECIFICATION.

SR NO	MATERIALS /ITEM	Make/ Brand
1	Air Circuit Breaker (ACB) (All 4 pole ACB shall have fully rated 100 % neutral & vertical bus bar only 3 Pole ACB shall have neutral CT)	LK(E&A)(Omega MTX 3.5), ABB (Email PR 123), Siemens (3WL ETU 76B), Schneider(NW 6.0P), Crompton(Model Approved by EIC) ,C & S Electric Ltd. (All ACB SHOULD BE ICS=ICU=ICW)
2	Moulded Case Circuit Breaker (MCCB)	LK(E&A) (D-SINE), ABB (T-max), Siemens(3VL), Schneider(NXS), Legrand(Model Approved by EIC), Havell's (MID),C & S Electric Ltd.
3	MCBDB/MCB/ELCB/ISOLATOR (CAT-III)(For All RB- NRB Building & Panel Board)	Legrand(Ekinox), Havell's (STDX), LK(E&A), ABB, Siemens, Schneider (Model approved by EIC as per tender specification)
4	MODULAR SWITCH , SOCKETS & Fan regulator with Accessories (ISI mark) CAT-II (For only B-type qtrs.)	Honeywell (EVO), ANCHOR – PANASONIC (Woods), Havell's (Verona), LEGRAND (Lyncus), Schneider (LIVIA)
5	MODULAR SWITCH , SOCKETS & Fan regulator with Accessories (ISI mark) CAT-III (All type RB and NRB buildings Except B-type)	Honeywell (ORNA), ANCHOR - PANASONIC(Vision), LEGRAND(Arteor), Schneider(Zencelo), Crabtree(Murano)
Consider Full Names of Lift OEM as per above approved make		
	Premium Category	Category-III
	<ol style="list-style-type: none"> 1. Mitsubishi Elevator India Pvt. Ltd. 2. Otis Elevator Company 3. Schindler India Pvt. Ltd. 4. TK Elevator India Pvt. Ltd. 	<ol style="list-style-type: none"> 1. Orbis Elevator Co. Ltd. 2. Johnson Lifts Pvt. Ltd. 3. Fujitec Express Ltd. 4. TK Elevator India Pvt. Ltd. 5. Trio Elevators Co. (I) Pvt. Ltd. 6. Schindler India Pvt. Ltd. 7. Otis Elevator Company 8. Kone Elevator India Pvt. Ltd. 9. Omega Elevators

WORKING DRAWINGS FOR WORK ON SITE

(1) General Plumbing Arrangement in Pump room for Pumping work

