

**REQUEST FOR PROPOSAL FOR
IMPLEMENTATION OF
STREET LIGHT POLES UNDER
“PROJECT JYOTI-PHASE II”
SCHEME**

**ON
DESIGN, BUILD, OPERATE AND
MAINTAIN BASIS IN GUWAHATI**



**Guwahati Smart City Limited,
Guwahati, Assam**

Volume II: Technical Specifications & Drawings

Tender Notice No. SPV/GSCL/DEV/184/2021/11 dated 04-08-2021

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1.0 SCOPE OF WORK

- 1.1 The scope of works is as defined in Clause No. 4 of the Vol I of the RFP Instruction to the CONTRACTORS.
- 1.2 Refer following Drawings for technical scope and requirements for this project.
- (a) Drawing no. TCE. 10477A-EL-4026-GL-40003 – Design of Street Light Pole for Project Jyoti Phase-II.
 - (b) Drawing no. TCE. 10477A-EL-4026-GL-40004 – Reinforcement details of Street Light Pole Foundation for Project Jyoti Phase-II.
 - (c) Drawing no. TCE. 10477A-EL-4026-GL-40015 – Electrical Connection details of Light Pole for Project Jyoti Phase-II.

2.0 GENERAL INSTRUCTION TO CONTRACTORS

- 2.1 This specification is the minimum requirement and should be read in conjunction with relevant latest specifications, drawings, other requirements, rules and regulations etc. as mandated by Local Authorities. Any additional requirements if required as per Local Authorities shall be offered by CONTRACTOR. The same shall be indicated in the Technical Proposal and a separate Bill of Quantities (BOQ) for additional or modified items shall be submitted.
- 2.2 All SAFETY considerations as per good engineering practices, local safety norms and standards in design and manufacturing for safe operation & maintenance and safe practices during installation at site shall be in the scope of the CONTRACTOR. Cost towards accomplishing the same shall be included in the BID price and no extra claim shall be entertained later.
- 2.3 Equipments furnished/ supplied under this scope of works shall be complete in every respect with all mountings, fittings, fixtures, and standard accessories normally provided with such equipment and / or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specification unless included in the list of exclusions. Materials and component not specifically stated in the specification but which are necessary for commissioning and satisfactory operation unless specifically excluded shall be deemed to be included in the scope of specification and shall be supplied without any extra cost. All similar standard components/ parts of similar standard equipment provided shall be inter-changeable with one another.
- 2.4 The CONTRACTOR shall be responsible for the selection and design of appropriate equipment to provide the best co-ordinated performance of the entire system. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.
- 2.5 The Battery Limit of CONTRACTOR starts from the outgoing of Tariff meter and extends till the Light Pole. It includes Junction box with control gears, laying of power cable in DWC HDPE pipe laid buried/ dressed through wall/ laid in air with support wire, Light pole with foundation & Earth electrode, and all relevant connection works as indicated in the enclosed drawing no. TCE.10477A- EL-4026-GL-40015.

- 2.6 The CONTRACTOR shall plan and carry out all supply, installation, testing and commissioning of the lighting pole conforming to the approved drawing, technical specification and good engineering practices.
- 2.7 The material supplied by the CONTRACTOR shall be subject to approval of GSCL. Samples of the Supply material under the scope of works shall be inspected by GSCL or their representatives either at site or at Manufacturer's works and approve them for supply or execution as the case may be. Notwithstanding any approval/ instruction given otherwise, if GSCL, during random inspection, finds any non-conformance with the quality of material supplied by the CONTRACTOR with respect to the technical specifications, GSCL shall have the Authority to reject the entire lot/ batch of that particular material and the same shall be replaced without any cost & time impact to GSCL.
- 2.8 During the construction at site, it shall be the CONTRACTOR'S responsibility to take care of the safety and security of its personnel and material at site. The CONTRACTOR shall be self-reliant with all the requirements including offices, resources, equipment, tools and tackles for digging, filling, unloading, shifting, cleaning, erecting, lifting, etc. and consumables required for construction like electricity and water at his own cost. The transportation/ Shifting of resources, equipment & materials from place of storage to the respective sites shall be in the scope of the CONTRACTOR.
- 2.9 The CONTRACTOR shall make provision for adequate no. of safety certified Self-Supporting metal Ladders of minimum 3 m height with anti-skid rubber pads at the bottom or any other better tool for working at height, required tools and instruments, duly calibrated from NABL Laboratory, for installation and maintenance to meet the deadlines and benchmarks specified.
- 2.10 The CONTRACTOR shall carryout the installations in a safe and responsible manner without any inconvenience or danger to owner and public in general. The CONTRACTOR shall also take care not to damage any public/ private property by mistake or by intention during the course of work with its actions and shall be well insured to compensate the owner in case any such incidence happens.
- 2.11 The CONTRACTOR shall be responsible for any Theft of component/ equipment from the Light Pole system till handing over of the pole to GSCL & respective Consumer.
- 2.12 All the cost towards liaison with Statutory Bodies for seeking all necessary statutory approvals and other activities involving Govt. Agencies viz., drawing approval, testing and commissioning etc. shall be borne by the CONTRACTOR.
- 2.13 All the statutory fees, if required to be paid, for any required approval shall be borne by GSCL. Such payments shall be reimbursed to the CONTRACTOR upon submission of stamped receipts to GSCL.
- 2.14 GSCL shall not be responsible for any untoward incidence arising out of faulty design or poor installations. The CONTRACTOR would be responsible for any civil/criminal proceedings arising out of such incidence and for damage caused to life and property thereof.
- 2.15 Upon completion of work in each plot, 15-days testing period will start to check the adequacy of the installed LED street lighting system. The issue of completion certificate to the CONTRACTOR is subject to successful testing and approval by GSCL.

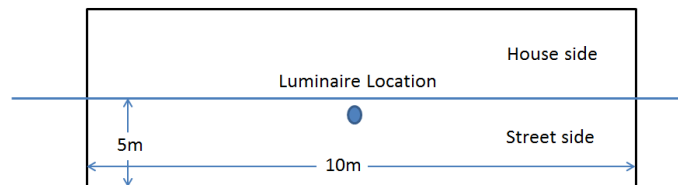
- 2.16 GSCL is free to draw samples (not more than 0.5% per lot) after the start of supplies from the supplied quantity and ask the CONTRACTOR to subject the same to test in a NABL Accredited Lab. CONTRACTOR shall bear the cost of such tests from sampling to testing and back to site. The decision of GSCL on the same shall be binding on the CONTRACTOR. In case of Failure of the sample, the whole lot shall be rejected. Repeated cases of such failure will cause termination of contract.
- 2.17 NIL.
- 2.18 The Light pole drawing/ detail specification enclosed herewith are for reference only. CONTRACTOR can offer better optimised designs which shall conform to the requirements of the specifications.
- 2.19 Protection shall be provided against any type of mischief/ pilferage attempts on any component. It shall be responsibility of the CONTRACTOR to find solution to such attempts during the operation period.

3.0 APPLICABLE CODES AND STANDARDS

- 3.1 All the equipment and systems shall conform to the latest applicable National and International standards.
- 3.2 The design, manufacture, installation, testing, commissioning and performance of all the equipment and system shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the CONTRACTOR of his responsibility.

4.0 DESIGN CRITERIA

- 4.1 For illumination the design should be considered for 10mX5m grid size as shown below;



- 4.2 Average LUX level should not be less than **4 LUX** as per IS 1944 standard and NLC 2010. The Uniformity Ratio shall not be below 0.3
- 4.3 Maintenance factor should be considered as 0.8 while doing design calculation.
- 4.4 Lighting design shall be performed using latest version of DiaLux Software (The DiaLux report and DiaLux design file for design calculation shall be submitted for verification along with the Technical Bid. Failing which the Bid may be considered as Non-Responsive.
- 4.5 **POLE DESIGN**
- 4.5.1 The GI Swaged tubular Poles shall be designed as per relevant latest Standards and shall withstand the maximum wind speed of 180 kmph as per IS 875. The top loading

i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BS EN 40-3-3:2013.

4.6 **CIVIL DESIGN**

- 4.6.1 All the civil foundation design shall be suitable for the Seismic requirement of Guwahati as per latest IS as the city of Guwahati falls in the Seismic Zone-V.
- 4.6.2 The design shall also consider the maximum wind speed of 180 kmph as per IS 875.
- 4.6.3 Grade of concrete to be used shall be M20 and grade of reinforcement steel shall be Fe 500.

5.0 **PROJECT WORK SYSTEM**

- 5.1 The Light Pole to be installed under Project Jyoti shall consist of a Civil Foundation, Galvanized Iron swaged Tubular Pole with Light mounting arm, LED Luminaire, CRCA/ UV Resistant Polycarbonate (PC) Junction Box with 24 hr time switch and DP ELMCB, Connecting flexible power cable with dressing accessories/ Supports/ DWC HDPE pipe laid buried/ Saddling/ support wire, Pipe type earthing for Pole including earthing wire, hardware and other accessories as required.
- 5.2 The Steel tubular Pole with civil foundation and LED Luminaire shall be located at the approach gate of the plot premises of the Owner connected after the Consumer Tariff meter from DISCOM.
- 5.3 The connection for the street light shall be tapped directly from the outgoing of the DISCOM Tariff meter or from the main incomer to the Distribution Board (DB) after the meter at the Consumer's premise through a Junction Box with flexible cable of 1.1 kV grade, PVC insulated **three core 2.5 sq.mm** stranded copper conductor.
- 5.4 The Junction Box (JB) shall metallic/ non-metallic, made of CRCA/ Polycarbonate (PC) material consisting of a 6A, 30mA sensitivity, 10 kA Double Pole (DP) ELMCB along with a 24 Hr manual Time Switch having a contact rating of 5A. The door of the JB shall have locking and sealing arrangement to enable the CONTRACTOR to seal the JB after setting the time in the time switch. The junction box shall be located as close as to the Owner's DISCOM tariff meter/ Main Distribution Board.
- 5.5 The JB shall be provided with Padlock arrangement. Master key system shall be provided for all the Padlocks. Four (4) sets of such keys shall be handed over to GSCL after complete commissioning of the project. Supply of such Padlock shall be under the scope of the CONTRACTOR.
- 5.6 The Pole and the junction box shall be earthed with 8 SWG GI Wire and connected to the dedicated 1.5m long GI earth electrode located near the Pole. The wire can be laid and dressed along with the power cable.
- 5.7 LED Luminaire shall be earthed with the third core of the 3 Core power cable connected directly at the JB earthing.
- 5.8 The connecting cable between pole and the JB shall be routed either on the wall, ceiling, compound wall etc. duly dressed with GI saddle spacers/ PVC cable Clip at every 500mm or laid in the 20mm DWC HDPE pipe buried 500mm below the ground level.

Wherever the cable is laid buried, proper marking shall be provided to identify the route and to avoid accidental digging of the cable.

- 5.9 One DWC HDPE flexible pipe of suitable length (min 1m) shall be provided through the foundation into a hollow pole for entry of power cable into the pole. The cable shall either be laid inside the pole or through a HDPE pipe laid and dressed along the whole length of the pole.
- 5.10 In case the cable is to be taken overhead or through Air up to the pole, proper supporting arrangement with minimum two numbers GI wire support shall be provided to prevent sagging of the cable and to support it in case of heavy wind.
- 5.11 Average length of the power cable shall be 15m.
- 5.12 All the materials/ equipment/ accessories of the above components of the Project Jyoti shall conform to the relevant IS standard with its latest amendments.
- 5.13 The design, manufacture, installation, testing, commissioning and performance of all the equipment and system shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. For all items or components, not covered by the present version of such Indian Standards, the CONTRACTOR shall produce sufficient technical information so as to enable GSCL to have a technical evaluation through competent agencies.

6.0 TECHNICAL SPECIFICATION ON LED LUMINAIRE

6.1 Applicable Standards

TABLE 1: LIST OF STANDARDS FOR LED LUMINAIRES

<u>S. No.</u>	<u>Brief Title</u>	<u>IS/IEC Code</u>
1.	Testing procedure of photometric testing for LED Luminaires	LM 79
2.	Testing procedure on the lifespan of LED Luminaires	LM 80
3.	National Lighting Code	SP72
4.	Method of Measurement of Lumen Maintenance of Solid State Light (LED) Sources	IS:16105 – based on IES-LM-80-2008
5.	Method of Electrical and Photometric Measurements of Solid-State Lighting (LED) Products	IS:16106 – based on IES-LM-79-2008
6.	Limits of Harmonic Current Emissions	IS 14700-3-2
7.	DC or AC supplied electronic control gear for LED modules - Performance requirements	IEC 62384

8.	Lamp control gear: Particular requirements for DC or AC supplied electronic control gear for LED modules	IEC 61347-2-13
9.	Environmental Testing: Tests – Test Db: Damp heat, Cyclic (12h+12h cycle)	IEC 60068-2-38
10.	Electro Magnetic compatibility (EMC)- Limits for Harmonic current emission-- (equipment input current \leq 16 A per phase)	IEC 61000-3-2
11.	Equipment for general lighting purposes - EMC Immunity requirements	IEC 61547
12.	LED Modules for General Lighting-Safety Specifications	IEC 62031
13.	Degrees of Protection provided by enclosures (IP Code)	IEC 60529
14.	Particular Requirements- Fixed general-purpose Luminaires/ Specification for Luminaires	IEC 60598-2-1/ IS10322
15.	General Lighting - LEDs and LED modules – Terms and Definitions/ General lighting – Light emitting diode (LED) products and related equipment –Terms and definitions	IS:16101 / IEC TS 62504
16.	LED Modules for General Lighting - Safety Requirements	IS:16103(Part1)
17.	LED Modules for General Lighting - Performance Requirements	IS:16103(Part2)
18.	Safety of Lamp Control Gear- Particular Requirements of D.C. or A.C. Supplied Electronic Control gear for LED Modules	IS:15885(Part2/ Sec13)
19.	Luminaire Performance – Particular Requirements – LED Luminaire	IS 16107-2-1

6.2 Environmental Conditions

The average atmospheric condition during the year is mentioned below. The equipment shall be designed to work in such environmental conditions:

- (a) Maximum ambient air temperature: 45° C
- (b) Minimum ambient air temperature: 5° C
- (c) Max. Relative humidity: 90%

- (d) Atmosphere: Dusty and Humid
 - (e) Rainfall data: 1600 mm
 - (f) The equipment shall be suitable to sustain and work in the humid and dusty atmosphere.
- 6.3 The luminaire shall work on single phase three wire system (phase, neutral & earth).
- 6.4 The luminaire light output (lumen) shall be constant and shall be able to withstand allowable supply source voltage variations/ fluctuations, spikes and harmonics as specified in the Annexure 01 - Data sheet.
- 6.5 The Luminaries shall have a sturdy and corrosion resistant high pressure Die cast Aluminium alloy housing with weatherproof gasket, with separate Driver compartment and control gear accessories. The housing shall be Epoxy coated, without any cracks or thorough holes, made in a single piece of die-cast LM6 Aluminium alloy. The luminaries shall be totally enclosed, dust tight and water proof with minimum ingress protection of IP 66 and above.
- 6.6 The dimensions of luminaries shall be optimum and adequate to permit sufficient heat dissipation, through the body itself, so as to prevent abnormal temperature rise inside the lantern and consequential damage to the cover and gasket materials, LEDs, lenses and electronic drivers. Heat sink must be thermally connected to MCPCB/ LED light source.
- 6.7 The Luminaire housing shall have single entry suitable for termination of 3C X 2.5 sqmm copper conductor PVC insulated flexible Cable with Flexible Cable Glands.
- 6.8 The optical system shall consist of individual **Poly Carbonate Lenses** on LEDs designed & tested to achieve street lighting distribution from the LED lantern. These lenses provided for individual LEDs are to be fixed on lens plate in order to have consistent light distribution from luminaires. Luminaires should conform to the photometric Distribution / requirements of Cut-Off / Semi Cut – off light distribution and optics as classified in IS 1944 and NLC 2010.
- 6.9 Suitable number of LED shall be used in the luminaries. **The manufacturer shall submit the proof of procurement of LEDs from OEMs at the time of testing along with lens test report.**
- 6.10 The Luminaries shall be provided with distortion free, clear, high tensile, heat resistant, toughened glass of minimum 0.8mm thickness or UV resistant polycarbonate cover with required degree of protection. All hardware shall be corrosion free/ stainless Steel.
- 6.11 An extruded silicon loop gasket shall be provided in the lantern body to ensure a weather proof seal between the cover and the metal housing to exclude the entry of dust, water, insects, etc. Luminaire should conform to degree of protection of IP 66 or above. Felt gasket will not be accepted. The test report from Third party NABL accredited laboratory shall be submitted along with the technical proposal/ Bid.
- 6.12 Luminaire shall be enclosed in an **aesthetically designed** housing with corrosion resistant polyester powder Coating after phosphor-chromate treatment.

- 6.13 Project Jyoti, Name of the CLIENT, Year of Manufacture, Batch No., Serial Number or Identification No. Luminaire Manufacturer's Name / Logo, Wattage and Frequency should be embossed on the housing.
- 6.14 All Luminaires shall conform to **BIS certification. All the test reports from Third Party NABL accredited laboratory shall be submitted along with the technical proposal/ Bid. Drivers used in the luminaires should be having individual BIS CRS number and the same shall be referred in the Luminaire BIS certificate. BIS certificate shall be submitted along with the BID in the compliance.**
- 6.15 Luminaries should conform to the IS 16107 / International standards for Safety & Performance and test certificates as per relevant standards shall be provided by the manufacturer. In case of luminaries are imported, the CONTRACTOR shall conform to test parameters as per UL or equivalent standards. However, Luminaire should be registered under BIS CRS for IS 10322 part 5 Sec 3 which covers all safety and protection criteria since it has been made compulsory by BIS. BIDDER shall submit the BIS registration number of Luminaires including the Driver or both if separately registered proposed for the project in the technical Proposal and not only one of the two.
- 6.16 The electrical component of the LED and LED driver must be suitably enclosed in separate sealed unit to function in environment conditions mentioned above.
- 6.17 All the connecting wires inside the Luminaries shall be Low Smoke Halogen Free, fire retardant cable or as per IS 10322 part 5 Sec 3 whichever is stringent.
- 6.18 Adequate protection against Overloading, Short Circuit, Over Voltage, Over temperature, Under Voltage, String Open shall be provided within the Luminaires. Drivers shall have inbuilt protection system to operate safely, automatically isolate during abnormal conditions & restart as soon as the system normalizes. Third party Test certificates from NABL accredited Lab shall be submitted along with the BID for all the above. Drivers shall be capable of withstanding the voltage stress of 440V. Test certificates shall be submitted to justify the same.
- 6.19 Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.
- 6.20 All the material used in the luminaries shall not contain any toxic material/ metal like mercury; shall be halogen free and fire retardant confirming to relevant standards.
- 6.21 The control gear shall comply with the provisions of IEC 61347-2-13:2014, IEC 62031:2018 and IEC 62384:2006 as appropriate or equivalent BIS standards IS 15885 Part-2 Section 13. BIS certificate shall be submitted along with the BID in the compliance.
- 6.22 The switching surges are expected in the power supply system. Appropriate surge protection shall be provided by the CONTRACTOR for all the Luminaires offered by it as well as external arrangements shall be provided for the existing fittings if they do not have such protections inbuilt. Such protections can either be provided centrally at the Feeder Pillar or at each individual luminaire level or a combination of both, as may be decided by the CONTRACTOR. No claim for failure of Luminaires, on account of surges will be considered.

6.23 The Luminaires shall be suitable for operation within the input supply voltage range specified. The driver of the Luminaires should be able to sense and cut-off power to the light in case of phase-to-phase/ 440 V fault. No claim in this regard shall be considered.

6.24 The lighting fixtures offered shall comply with the data sheet attached in Annexure 1.

6.25 **The complete luminaire assembly including all the components shall have a warranty period of 3 years.**

6.26 **Testing Of Luminaire**

6.26.1 The Routine test on each of the offered Luminaries shall be carried out by the CONTRACTOR before dispatch. Following tests shall be carried out as Routine tests by the CONTRACTOR for the offered Luminaries;

- (a) Visual and Dimensional check
- (b) Checking of documents of purchase of LED
- (c) Insulation resistance test
- (d) HV test
- (e) Reverse polarity

6.26.2 The Acceptance test shall be carried out by GSCL or GSCL's Representative on a sample of the lot offered for Acceptance. The Lot shall be different from the lot from which the Type test samples have been drawn. The cost of the testing shall be borne by the CONTRACTOR. Following tests shall be carried out as Acceptance tests by the CONTRACTOR for the offered Luminaries;

- (a) Visual and Dimensional check
- (b) Checking of documents of purchase of LED
- (c) Insulation resistance test
- (d) HV test
- (e) Over voltage protection
- (f) Surge protection
- (g) Reverse polarity
- (h) Test for IP 66 protection

6.26.3 Following Type tests reports shall be provided by the CONTRACTOR for the offered Luminaries from Third Party NABL Accredited Laboratory along with the BID;

- (a) Resistance to humidity
- (b) Insulation resistance test

- (c) HV test
- (d) Over voltage protection
- (e) Surge protection
- (f) Reverse polarity
- (g) Temperature rise Test
- (h) Colour Rendering Index measurement test
- (i) Fire retardant Test
- (j) Test for IP 66 protection
- (k) Endurance Test,
- (l) Life Test
- (m) Photometric Measurements Test Report (IES LM 79)
- (n) LED Lumen Maintenance Test Report (IES LM 80)
- (o) Vibration test as per ANSI
- (p) Drop Test

7.0 TECHNICAL SPECIFICATION OF LED DRIVER

- 7.1 IC (Integrated circuit) shall be of industrial grade or above.
- 7.2 Metallic film / Paper / Polyester Capacitor shall be rated for a sustained operating at temperature of 105 Degree C.
- 7.3 The resistors shall be preferably made of metal film of adequate rating. The actual rating versus loading shall be by a factor of 3.
- 7.4 The junction temperature of the Switching devices such as transistors and MOSFETs etc. shall not exceed as specified in the Data Sheet.
- 7.5 The protective cum adhesive coating used on PCBs should be clear and transparent and should not affect colour code of electronic components or the product code of the company.
- 7.6 **The driver shall be BIS certified. BIS certificate shall be submitted along with the BID in the compliance.**
- 7.7 The LED driver offered shall comply with the data sheet attached in Annexure 2.

8.0 TECHNICAL SPECIFICATION OF LIGHT POLE

- 8.1 The Product should be designed for the specific climatic and environmental conditions of the region to ensure full durability and safety throughout its designed life.

- 8.2 The GI swaged lighting pole shall be tubular type as indicated in the enclosed drawing and material of steel tube shall confirm to IS 1161. The lighting pole and brackets shall be of GI (medium gauge) material. The Pole shaft shall confirm to Yst 240 as per IS 1161. The material should be of adequate thickness and durable.
- 8.3 The pole shall be of 5 m height above the ground with 1m tubular brackets for fixing the LED street lights. **The bracket shall be welded after installation at site to restrict the BENEFICIARY to re-orient the direction of the luminaire.**
- 8.4 The poles shall be hot dip galvanized with seven tank process as per IS 2629:1985 / IS 2633:1986 / IS 4759:1996 standards with average coating thickness of 65 micron. The galvanizing shall be done in single dipping. The zinc Ingot raw material shall be 99.99% pure and procured from reliable sources with Quality Test Certificates.
- 8.5 The pole manufacturing & galvanizing unit shall be ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.
- 8.6 All the Poles shall be designed to withstand the maximum wind speed of 180 kmph as per IS 875. The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BS EN 40-3-3:2013.
- 8.7 The pole shall be designed to withstand the earthquake as per the provisions of the relevant BIS/other standards related to the urban location in the State of Assam.
- 8.8 The pole shaft shall be provided with the rigid flange plate of suitable thickness as indicated in the drawing with provision for fixing foundation bolts. This base plate shall be fillet welded to the pole shaft at two locations i.e. from inside and outside.
- 8.9 The welding shall be carried out conforming to approved procedures. The welding shall be done as per qualified process approved by Third Party Inspection agency.
- 8.10 The Poles shall be bolted on a pre-cast foundation with a set of foundation bolts for greater rigidity.
- 8.11 Earthing of each pole and electrical components shall be in accordance with the latest edition of IS 3043 and CEA regulations. Two nos. Earth Boss shall be provided at the bottom of the pole (diagonally opposite) suitable for connecting min 8 SWG GI earth wire for earthing of the poles.
- 8.12 All the material/equipment/accessories shall be supplied with manufacturer's test certificates.
- 8.13 Detailed pole structure will be as per tender drawing.
- 9.0 TECHNICAL SPECIFICATION OF JUNCTION BOX**
- 9.1 Junction Box (JB) shall be metallic/ nonmetallic type and made of CRCA/ Polycarbonate (PC) material.
- 9.2 The JB Shall be suitable for outdoor use with minimum IP-55 and IK-07 protection. Test reports confirming to the same, from Third Party NABL accredited laboratory shall be submitted at the time of approval.

- 9.3 JB shall comprise of 6A, 30mA sensitivity, 10 kA Double Pole (DP) ELMCB along with a 24-hr. manual Time Switch (15min dial) having a contact rating of minimum 5A.
- 9.4 The JB shall be provided with Padlock arrangement. Master key system shall be provided for all the Padlocks. Four (4) sets of such keys shall be handed over to GSCL after complete commissioning of the project.
- 9.5 The Polycarbonate JB shall be UV resistant and shall have minimum life of 10 years. Test reports confirming to the same, from Third Party NABL accredited laboratory shall be submitted at the time of approval.

10.0 TECHNICAL SPECIFICATION OF EARTHING

- 10.1 The safety earthing and lightning protection system shall be based on the latest version of the following codes and standard including all amendments.

TABLE 2: STANDARD AND GUIDELINES FOR EARTHING

a)	IS 3043- 2018,	Code of practice for Safety Earthing
b)	CEA Regulations 2010	Measures related to safety & electric supply.
c)	CPWD Specifications – latest version	General Specifications for Electrical Works Part I – Internal

- 10.2 GI Pipe earthing shall be provided to each Light pole and shall conform to IS 3043.
- 10.3 Earth electrode shall be 1.5 m long made of GI material. 8 SWG GI wire shall be used as earth connectivity conductor.
- 10.4 The Pole shall be earthed with 8 SWG GI Wire and shall be connected to the GI earth electrode.
- 10.5 All connection of Earthing shall be providing with nuts & bolts, no intermediate joint shall be allowed.
- 10.6 Before making any connection surface of GI & earth terminal part shall be properly cleaned with the help of sandpaper.

11.0 TECHNICAL SPECIFICATION OF CIVIL POLE FOUNDATION

- 11.1 The structure should be designed for the specific climatic and environmental conditions of the region to ensure full durability and safety throughout its designed life.
- 11.2 In the design of the structure, the relevant BIS/other standards relating to seismic forces must be followed as in the seismic zone-V.
- 11.3 The structural design should be considered all other loads including severe most expected wind load (Not less than 180kmph).
- 11.4 **Structural Certificate from structural engineer/ firm over the proposed design will be necessary before installation of the structure.**

- 11.5 Minimum requirement for Civil Foundations for the Lighting Pole are as follows;
- (a) Depth of the foundation considered is 1200 mm minimum.
 - (b) Plan dimensions of footing considered is 900mm x 900mm having depth D=200 mm Minimum.
 - (c) Steel in foundation base in both directions considered is T 10 @ 150 mm c/c.
 - (d) Size of base plate considered is 250 mm X 250 mm having thickness 12 mm.
 - (e) Four anchor bolts of 16mm dia and 700 mm total length.
 - (f) Grade of concrete to be used considered is M20 (1:1.5:3) and grade of reinforcement steel considered is Fe 500.
 - (g) Main vertical reinforcement in 300 mm x 300 mm size pedestal are considered with 4 nos. bars of 12mm dia bars and shear reinforcement (stirrups) shall be 8 mm dia bars at 200 mm c/c.
 - (h) 20NB Flexible HDPE Pipe of 1m length shall be embedded to draw the cable.
 - (i) This foundation design of pole will be applicable for all types of soils i.e. soft soil, medium soil and hard soil.

12.0 APPROACH & METHODOLOGY

- 12.1 The CONTRACTOR shall carry out the preliminary field investigation of BENEFICIARY Applicant's premises upon the receipt of applications from GSCL/ GSCL representative to check its eligibility in compliance with the Project Jyoti requirements including the following but not limited to following:
- 12.1.1 CONTRACTOR representative shall visit the site as per the address provided in the BENEFICIARY application and verify the address & location of the installation of the Light pole in accordance with Project Jyoti requirements at the entrance of the premises. CONTRACTOR representative shall verify the details provided by the Owner with the Original documents and confirm whether they are as per the application & undertaking (Aadhar, Voter ID).
 - 12.1.2 CONTRACTOR representative shall verify if the Applicant is a Consumer of APDCL and have its own consumer meter provided by APDCL. If the above is in order then the CONTRACTOR shall verify the supply arrangement, location for installing JB and suitable route for connecting it with the source as well as with the Light pole.
 - 12.1.3 CONTRACTOR shall take the coordinates of the Premise at the Light pole location, Photograph of the premises and approach road where Light pole is to be located.
 - 12.1.4 CONTRACTOR may verify other aspects if any from installation point of view for benefit of expediting the work like access to vehicle and material, any obstruction etc. to plan their activities.
- 12.2 Upon the completion of preliminary field investigation, CONTRACTOR shall submit the following verification details along with coordinates and photographs where the Light

Pole to be located to the GSCL/ GSCL representative for approval with their remarks in the format as tabulated below;

TABLE 3: BENEFICIARY DETAILS

1.	Asset ID	
2.	Ward No	
3.	BENEFICIARY Name	
4.	BENEFICIARY Address	
5.	BENEFICIARY APDCL Consumer No	
6.	Latitude (GPS Coordinates)	
7.	Longitude (GPS Coordinates)	
8.	Mapping of above Geographic data (Coordinates) on Keyhole Markup Language (KML) File and Submission of the same to GSCL	
11.	Date & Time of Photographs	
11.	Photograph (JPG Image) of the Location near the Gate of the Premises and approach road to where Light pole is to be located (Minimum 3 Nos. of Photographs)	
12.	Remarks	

- 12.3 Upon the approval from GSCL/ GSCL representative, CONTRACTOR shall proceed with civil & other installation works as per the specification.
- 12.4 If CONTRACTOR observes any ambiguity/ deviation during preliminary field investigation, the same shall be brought into the notice of GSCL/ GSCL representative. GSCL have rights to reject the BENEFICIARY application based on the preliminary field investigation report.
- 12.5 CONTRACTOR shall submit the following details to GSCL/ GSCL representative as mentioned in prescribed format after the completion of construction of Pole foundation and successful installation, testing and commissioning of Street light pole including mapping of the coordinates on KML file and generation of Beneficiary ID in consultation with GSCL/ GSCL representative.

TABLE 4: WORK COMPLETION DETAILS

1.	BENEFICIARY ID	
2.	Commissioning Date	
2.	Earth Resistance Certificate	
3.	Lux Level Measurement Certificate	
4.	IR Value Measurement Certificate	
5.	BENEFICIARY APDCL Consumer No	
6.	Latitude (GPS Coordinates)	
7.	Longitude (GPS Coordinates)	
8.	Printing of Asset ID and Complaint Number on Pole (To be visible from a distance of 3 meter)	
9.	Date and Time of Photographs	
10.	Completion Photograph (JPG Image) of the followings: a) Pole b) Route and Laying of Cable	

	<ul style="list-style-type: none"> c) Junction Box (Including Timer Setting and Sealing Arrangement) d) Earth Pit e) Pole Foundation f) Supply Point <p>Note- The above photographs shall display Date, Time and Coordinates of the Location on image.</p>	
11.	Mapping of above Geographic data (Coordinates) on Keyhole Markup Language (KML) File and Submission of the same to GSCL.	

13.0 OPERATION & MAINTENANCE

- 13.1 The CONTRACTOR shall be responsible for maintaining/ repair/ replacement, of all the Light Poles along with the accessories, Junction Box with Control and Switch gear, Cabling, Earthing etc. Complete installation Comprehensively during the tenure of the contract.
- 13.2 O&M shall be initiated for a set of Poles from the next day of the issue of the completion certificate by GSCL for that particular set of Poles after due inspection and testing.
- 13.3 During the Operation and Maintenance period, if any hardware or software needs to be replaced, the same will be replaced with same or better OEM and with same or higher configuration free of cost.
- 13.4 The CONTRACTOR shall install a Help Desk minimum 30 days in advance before the first set of Poles is completed.
- 13.5 The payment for the O&M shall be as agreed in the Contract for the entire tenure per pole.
- 13.6 The Manpower and accessories required for O&M shall be provided by the CONTRACTOR during relevant contract period.
- 13.7 The CONTRACTOR shall provide experienced Managerial, Technical, Supervisory, Administrative and Non-technical personnel and labour necessary to operate and maintain the Street light facility properly, safely and efficiently on a continuous basis for the full term of the O & M Contract period.
- 13.8 Adequate number of teams consisting of One Electrician having minimum 6 years experience and one assistant helper shall be provided initially right at the beginning of the contract and the same shall be augmented during the course of the contract to maintain the service level benchmarks. The maintenance team shall work in two shift i.e. 7 am to 3 pm and 3 pm to 11 pm. The maintenance works will be managed & supervised by Supervisor. Replacement for the teams shall be well planned during the scheduled offs and leaves. CONTRACTOR shall make the necessary arrangement for transportation of maintenance staff and material at site.
- 13.9 The qualifications and capabilities of the CONTRACTOR's personnel shall be appropriate for the task they are assigned to perform. The staff provided shall be fully trained in the operation of the street light facility before being given responsibility for operating any part

of the street light networks. If in the opinion of the Engineer, any member of the CONTRACTORs staff is considered to be insufficiently skilled or otherwise inappropriate for the task he is required to perform, he shall be replaced by the CONTRACTOR with a person with the appropriate skills and experience for the task, to the approval of the Engineer. The CONTRACTOR will be required to submit to the Employer the Schedule of 'Manpower' and 'Organization Chart'.

13.10 Daily/weekly/monthly/routine entry/update/record of the street light system should be kept updated in register/computer/online/mobile application report as per instruction of engineer in-charge. CONTRACTOR shall have their own PC with necessary software at office. All the data related to complaint, maintenance, daily stock details material consumption details etc. shall be entered in the software/forms provided by CONTRACTOR on that PC. CONTRACTOR must take daily/weekly back up of the complete data and submit the same on monthly basis to GSCL.

13.11 Safety rules & regulations and instruction from client shall be followed while carrying out any type of maintenance work. All the personnel /man power employed must be provided with all the necessary safety equipment/apparatus/ safety gears required for carrying out the work. If any accident occurs due to lack of safety measures, all the liabilities, court matter/fees if any occur due to that shall be to CONTRACTOR's account. List of Safety equipment as given below:

TABLE 5: LIST OF SAFETY EQUIPMENT

Sl. No.	Name of Personal	Hand Gloves	Safety Helmet	Screw Driver	Piler	Tester	Multimeter	Megger	Torch
1									
2									

13.12 Any complaint for failure of luminaire due to lack of earthing, SPD, connector and loose connections shall be to CONTRACTOR's Account.

13.13 The CONTRACTOR shall take adequate insurance to cover themselves for the cost of O&M during the tenure of the contract.

13.14 Any replacement required owing to case of theft shall be to Consumer's account.

13.15 The CONTRACTOR shall make provision for adequate number of minimum 3m high Self Supporting Ladder with anti skid pads at the footings along with sets of all the required tools and instruments, duly calibrated from NABL Accredited Laboratory, to meet the maintenance requirements as per service benchmark.

13.16 All the electrical parameters and illuminance level of the sample Light Poles shall be monitored with calibrated Multimeter/ Tong tester and Lux meter and documented for records and analysis. Samples shall represent all the Lots appropriately.

13.16.1 All the necessary modifications that are required to be carried out for the efficient working of the system including network and Luminaires and minimise the breakdowns and issues shall be carried out by CONTRACTOR from time to time at its own cost.

13.17 The maintenance work shall be carried out without disturbing the Neighbors and obstructing the surrounding area of the Consumer and with proper consent to work from Consumer.

13.18 CONTRACTOR shall use below checklist while addressing maintenance/ preventive maintenance/ complaint issues.

TABLE 6: MAINTENANCE ACTIVITY CHECKLIST

Routine/ Preventive Maintenance Checklist					
Asset No.				Scheduled Date:	
Zone/Ward/ Address				Maintenance Date:	
Sl. No.	Item	Checked	Cleared	Repaired	Remarks
1	ELMCB				
2	Time Switch				
3	Cable				
4	Cable Joints				
5	Cable Gland				
6	DB Lock/Seal				
7	LED Luminaire				
8	Lux Level				
9	IR Value Check/ Earthing Status				
10	Bracket facing towards road				
Comments:					
Tested by:			Confirmed by:		

13.19 **Routine Inspection**

Routine street lighting maintenance shall be undertaken at evening once every two (2) months and filled up check list shall be submitted to GSCL. The lux level needs to be mentioned in the checklist.

13.20 **Preventive Maintenance**

Preventive maintenance of street lights under Project Jyoti Ph-2 shall be performed once a year for testing correct operation during normal hours shall include but not limited to the following:

- (a) Check operation of ELMCB
- (b) Reset timers
- (c) Check for high resistance joints

- (d) Check earthing connectivity
- (e) Luminaire cleaning and inspection
- (f) Inspect for any sign of vermin damage in the cabinet
- (g) Remove any unauthorized Graffiti on cabinet/ pole
- (h) Trim all trees that interfere with light output of luminaires
- (i) Check all support structures for their integrities

14.0 HELPDESK SETUP

The CONTRACTOR shall set up a centralized helpdesk to address the O&M for the project for entire Contract period with the following;

- (a) A web based **Complaint Management System (CMS)** shall be installed which should enable users to log complaints and monitor its status & closure. The CMS shall be updated regularly with new updates/ patches to improve the performance during the contract period.
- (b) A **Toll Free Complaint Number, a Mobile no. for receiving SMS and an E-mail ID** exclusively for the Project Jyoti shall be finalized in consultation with GSCL. Language Capabilities: Assamese, Hindi and English;
- (c) The help desk shall **operate from 9 am to 10 pm on all days of the week** to assist and guide the users or as may be instructed by GSCL.
- (d) The help desk shall handle user queries and issues relating to implemented solution
- (e) The helpdesk shall also ensure that users can log calls and complaints for any technical issues they face through web interface like email and on the portal of GSCL.
- (f) The helpdesk shall have Interactive Voice Response (IVR) system for first level of call segregation;
- (g) A Standard Operating Procedures (SOP) for O&M process shall be created by the CONTRACTOR from logging of request to closure of the request. The SOP shall address call prioritization guidelines, problem security codes and escalation procedures etc. in consultation with GSCL.
- (h) All the complaints and work carried out by the CONTRACTOR shall be logged in the system with a unique service request.
- (i) The application shall be accessible to all users through GSCL portal for logging Service Requests;
- (j) The CONTRACTOR shall allocate Customer ID and Serial No to the Pole- Lamp combination and maintain records of each one of them during the Contract period.

- (k) A Report containing the operational Status of all the Light Poles, complaints received and resolved; Preventive maintenance schedule and status, Stock of spares, man power update, etc shall be submitted to GSCL on a weekly or monthly basis as decided by GSCL.
- (l) The call statistics will be analyzed every quarter after Go-Live and the number of Customer Care Executives may be ramped up or down accordingly on a week's notice

14.1 **Service Level Benchmark**

A service Level Benchmark for evaluating the performance of the CONTRACTOR shall consist of the following;

- (a) **Resources** – The CONTRACTOR shall maintain O&M team, tools and calibrated measuring and verification instruments as specified above from the day one of the contract. In case the required resources are not deployed on time, a penalty of **Rs.5000/- per day** shall be imposed **for the first week** and the same shall be doubled in the subsequent weeks till adequate resources are deployed.
- (b) **System Uptime** – The CONTRACTOR shall maintain sufficient resources and **achieve minimum uptime of 95% on yearly basis** for the entire system. The Uptime percentage shall be calculated based on the following formula;

$$\text{Uptime \%} = (1 - \text{Downtime Hrs} / \text{Total Operational Hrs}) * 100$$

Total Operational Hrs is calculated based on lamp Burning Hrs per day - 12 Hrs.

Downtime Hrs = No. of Operational Hrs. the Lamp is unavailable for operation beyond the allowable time for complaint resolution after logging of the complaint by Consumer till the Request is closed in the system by the CONTRACTOR. Allowable time for complaint resolution shall be 24 working hours from the time of logging of the complaint by the consumer.

- (c) **Lux Level** – CONTRACTOR shall **guarantee the Lux level based on Design output and offered Luminaire for each pole**. There shall not be any reduction of the Lux level during the entire Contract period. Illuminance of all pole shall be monitored regularly and reported to GSCL by measuring the Lux Levels of the Sample LED Luminaires from all the LOTs / Batches at least once a year. Any reduction in the lux level shall be immediately investigated and corrective action shall be taken with information to GSCL.
- (d) In case a reduction in the Lux levels are established, all the Luminaires of the same LOT/ Batch offered in the project shall be investigated and rectified/ replaced if found faulty by the CONTRACTOR at its own cost within a period of time as may be agreed by GSCL.
- (e) **Complaint Resolution** - All the complaints shall be redressed within 24 working hrs from logging in of the complaint by consumer. In case the service provider fails to comply with the same a penalty of Rs. 100/- per day per complaint shall be imposed for a period of 7 days after which the amount will be doubled for the next subsequent weeks till the complaint is resolved to the satisfaction of the owner.

- (f) At any given time, the CONTRACTOR shall maintain spares equivalent to minimum 1% of the total number of lights installed. Failing to maintain spares and causing delay in resolution of the complaint shall be penalized as indicated above.

15.0 CLEANING OF THE LUMINAIRE COVER, MEASUREMENT OF LUX LEVEL, EARTHING RESISTANCE AND IR VALUE OF THE CABLE SHALL BE TAKEN UP ANNUALLY AND RECORD SHALL BE MAINTAINED AND REPORTED TO GSCL. IN CASE THE SERVICE PROVIDER FAILS TO COMPLY WITH THE SAME A PENALTY OF RS. 500/- PER POLE PER ANNUM.QUALITY CONTROL PLANS

15.1 The Quality Control Plan shall list and define in sequential order all process control activities, inspection and tests proposed to be performed on the equipment/ material starting from component procurement and from testing stages to product dispatch. The Quality Control Plan shall indicate and identify the applicable standards, detailed description with diagram the procedure, acceptance criteria, extent of check and record to be generated.

15.2 The CONTRACTOR shall within Fifteen (15) days of placement of order submit the following information to GSCL.

- (a) Descriptive list of the raw material as well as bought out accessories and the names of sub suppliers selected from those furnished along with the Specification.
- (b) Type test certificates of the raw material and bought out accessories.
- (c) Quality Assurance Plan (QAP) with holds points for GSCL's inspection. The QAP and hold points shall be discussed between GSCL and the CONTRACTOR before the QAP is finalized.

16.0 INSPECTION

16.1 The inspection may be carried out by GSCL or his representative at any stage of manufacturing. The CONTRACTOR shall grant free access to GSCL/ its representative/s at a reasonable notice when the work is in progress. Inspection and acceptance of any equipment under this specification by GSCL shall not relieve the CONTRACTOR of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

16.2 The CONTRACTOR shall keep GSCL informed in advance regarding the time of starting and progress of manufacture of all the equipment in its various stages so that arrangements could be made for stage inspection, if desired by GSCL.

16.3 No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested and approved by GSCL.

16.4 The CONTRACTOR shall, during inspection/ at any stage as sought by GSCL, will furnish test certificates for all equipment including bought out items as included in this BID. However, GSCL reserves the right to insist for witnessing the acceptance/routine testing of bought out items.

- 16.5 The CONTRACTOR shall communicate to GSCL the details of all testing programme at least Three (3) weeks in advance. GSCL reserves the right to waive the inspection at any stage.
- 16.6 The CONTRACTOR shall keep all his testing instruments duly calibrated against Standard Meters at designated Accredited Laboratory not earlier than 12 months from the date of test of the equipment, covered under this specification. Calibration certificates shall be made available during inspection. The calibrating instruments used as standard shall be traceable to National/ International standards.
- 16.7 For Lighting Pole installations, a joint inspection by GSCL Authorities; Technical Officer, Project Manager and team of the CONTRACTOR; along with the Consumer shall be carried out before certification and commencing for operation.
- 16.8 The completion certificate shall include minimum the following;
- (a) Photograph of the complete installation from Foundation to LED; cable dressing and supports; JB with time switch and ELMCB.
 - (b) Test Certificate of LED Luminaire
- 16.9 Following Field Test shall be carried out on the system
- (a) Visual Inspection
 - (b) Insulation resistance of the system
 - (c) Power consumption of individual Luminaire.
 - (d) The lux level and Earth resistance in accordance with standard.
- 17.0 HAND-OVER OF THE SYSTEM AT THE END OF CONTRACTUAL PERIOD**
- 17.1 The CONTRACTOR shall supply to the GSCL the following before the expiry of the contract:
- (a) Information relating to the current services rendered and data relating to the performance of the services; Entire documentation relating to various components of the Project, any other data and confidential information related to the Project;
 - (b) All other information (including but not limited to documents, records and agreements) related to the products & services concerned with the project to enable GSCL and its nominated agencies, or it's replacing CONTRACTOR to carry out due diligence in order to have transition of the Project Services.
 - (c) The CONTRACTOR shall not retain any data, security codes, and other confidential documents including any type of customer survey data with them.
- 18.0 SYSTEM DOCUMENTS, USER DOCUMENTS**
- 18.1 The CONTRACTOR will provide all project related documents. This documentation should be submitted as the Project undergoes at various stages of implementation. Indicative list of documents include:

- (a) Project Commencement Documentation: Project Plan in giving out micro level activities with milestones & deadlines.
- (b) Design calculations
- (c) Location drawings for poles
- (d) Equipment Manuals: Original Manuals from OEMs.
- (e) Training Material: Training Material will include the presentations used for trainings and also the required relevant documents for the topics being covered. Training registers should be submitted for same.
- (f) User Manuals: For all the application software modules, required for operationalization of the system.
- (g) Standard Operational Procedure (SOP) Manual: The CONTRACTOR shall be responsible for preparing SOP Manual relating to operation and maintenance of each and every service as mentioned in the RFP. The draft process (SOP) document shall be formally signed off by GSCL before completion of Final Acceptance Test. This SOP manual will be finalized by the CONTRACTOR within 2 months of operationalization, in consultation with GSCL and formally signed off by GSCL.

18.2 The CONTRACTOR will ensure upkeep & update all documentation and manuals during the Contract period. The ownership of all documents, supplied by the CONTRACTOR, will be with GSCL. Documents shall be submitted in two copies each in printed (duly hard bound) & in softcopy formats.

19.0 DOCUMENTS REQUIRED TO BE SUBMITTED BY BIDDER DURING TECHNICAL BID

19.1 The Dialux design report for the Luminaire offered & installation drawing of the street light along with pole including its 3D view and full technical specification.

19.2 The Type test reports of LED Luminaire shall include the following test reports not older than Five (5) years from recognized Third party NABL accredited lab.

- (i) IES-LM-79 Reports
- (ii) IES-LM-80 Report for LED Chip
- (iii) BIS/CRS Registration Certificate for IS 10322 (Part 5 Sec 3) for Driver and Luminaire separately.
- (iv) Resistance to humidity, Dust and Moisture
- (v) Insulation resistance test/ electrical strength
- (vi) HV test
- (vii) Over voltage protection
- (viii) Surge protection
- (ix) Reverse polarity
- (x) Temperature rise Test

- (xi) Colour Rendering Index measurement test
- (xii) Heat resistant test
- (xiii) Fire retardant Test (Including Wiring)
- (xiv) Test for IP 66 protection
- (xv) Test report confirming to Impact resistance
- (xvi) Endurance Test
- (xvii) Life Test
- (xviii) Photometric Measurements Test Report (IES LM 79)
- (xix) LED Lumen Maintenance Test Report (IES LM 80) (As provided by LED manufacturer)
- (xx) Vibration test as per ANSI
- (xxi) Drop Test

19.3 Driver/ Control gear Data sheet, Third party NABL accredited Lab type test reports of the driver as follows;

- (i) Over voltage protection
- (ii) Open circuit protection
- (iii) Short circuit protection
- (iv) Surge protection
- (v) Over temperature protection

19.4 Undertaking with LED Luminaire OEM whose product is being offered by the BIDDER for the project, Experience Certificates for Supply of Luminaire to Smart City projects, Inhouse NABL accredited laboratory certificate and APWD approval certificate.

19.5 Technical Details & Data Sheets of the offered system including LED Luminaire and other components like pole, time switch, ELMCB, Junction Box, cable & cable laying, earthing arrangement, Civil Foundation etc.

19.6 A detailed Approach & Methodology write up on Project Execution, Project management and Operation & Maintenance during the contract period; deployment of resources, compliance to the Service Benchmarks; maintenance of Service team, spares, call centre set up, its operation, deployment of special tools to expedite implementation and reduce downtime during O&M, preventive maintenance, training and documentation, handing over procedure etc.

20.0 ANNEXURE- 1

TABLE 7: LUMINAIRE DATASHEET

Sr. No.	Parameters	Requirements / Value
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1.	Type	LED Luminaries complete with all accessories including driver, internal wiring and protections for Street Lighting
2.	LED chip make	Nichia, Philip Lumiled, Osram, CREE, Toyoda, Seoul
3.	Rated Voltage	230V
4.	Operating Voltage Range	140-280 volt AC. But luminaries shall be tested for 100V to 300 V AC
5.	Frequency	50Hz \pm 3%
6.	LED system wattage	\leq 16 watt (inclusive of all losses)
7.	Driver Type	Constant Current based Electronic Driver
8.	System Power Efficiency	\geq 90%
9.	Operating Temperature Range	-20 Deg C to + 50 Deg C
10.	Operating Humidity	10% to 90% RH
11.	LED Efficacy	\geq 130 Lm/Watt
12.	System efficacy	\geq 100 Lm/Watt
13.	Colour Temperature	\geq 5500K.
14.	LED Drive Current	\geq 350 mA < 750 mA
15.	LED Wattage	1-3 W
16.	Total Lumen Output	\geq 1600 lumens

17.	LED Beam Angle	Fully Cut-Off
18.	Operating Hours	Dusk to Dawn (max 12 Hrs.)
19.	Power Factor	>0.90
20.	Colour Rendering Index	>70
21.	Rated Minimum LED Life	50,000 Burning Hours (With only 30% Lumen Degradation or 70% Lumen maintenance)
22.	Driver Life	Same as LED Luminaire life
23.	Luminaries body temperature after 12 hours of continuous operation	≤ 30 Deg C from ambient
24.	Heat Sink Temperature	≤ 15 deg C from ambient
25.	Solder point temperature	< 70 Deg C
26.	Total Harmonics Distortion (THD)	<10%
27.	Construction	High power LED must be mounted on Copper MCPCB for high thermal conductivity and fastest heat transfer from the LED junction
28.	IP Protection	IP66 or more; no water stagnation anywhere
29.	Luminary Housing	Pressure Die Cast Aluminum (grade 5000 or similar) housing with corrosion resistant polyester powder coating & safety as per IEC 60598:2014 and 2017 / IS 10322, 1982 (Reaffirmed 2005).
30.	Wire	The connecting wires used inside the luminaries, shall be Low Smoke Halogen Free, fire retardant e-beam cable or as per IS 10322 part 5 sec 3

		which ever is stringent and fuse protection shall be provided in input side.
31.	Heat Sink	Well-designed thermal management system with defined heat sink.
32.	Clip / Fastners	Corrosion free/ Stainless steel.
33.	Materials	Halogen free and fire retardant confirming to UL94.
34.	Optics	Secondary lens array should be provided for optimized roadway photometric distribution. Lens material should be optical high grade PMMA with more than 90% light transmittance.
35.	IK protection for Optic Cover	>IK07
36.	Photometric measurements	LM-79/IS16105, 2012.
37.	Minimum in-built Surge Protection; Min Surge protection required for luminaires	4 kV; 10kV/10 kA

21.0

ANNEXURE- 2

TABLE 84: DRIVER DATASHEET

Sr. No.	Parameters	Requirements / Value
1.	Type	Constant Current based Electronic Driver (Non-dimmable, inbuilt in Luminaire housing)
2.	Driver Efficiency	>90%
3.	Driver Life	Minimum 50000 Hours or Same as LED Luminaire Life.

4.	Operating Voltage Range	100V to 300 V AC
5.	Frequency	50 Hz +/- 3%
6.	Power Factor	> 0.95
7.	Total Harmonic Distortion (THD)	<10%
8.	Protection Class	Class I
9.	Operating Temperature Range	-20 Deg C to + 50 Deg C
10.	Minimum in-built Surge Protection	4 kV
11.	IP Protection	IP65 or more
12.	Output Voltage Range	150 V DC – 215 V DC
13.	Short Circuit Protection	Yes; Constant current limit mode.
14.	Open Circuit Protection	Yes
15.	Over Voltage Protection	Yes; Auto Isolation
16.	Over Temperature Protection	Yes; Auto Shut Off.
17.	Under Voltage Protection	Yes
18.	String Open Protection	Yes
19.	EMI Compliant	Yes

22.0

APPROVED MAKES

TABLE 9: APPROVED MAKES

Sr.No	Description	Approved Make
1.	Tubular Lighting Pole	PHILIPS/ JINDAL POWER/ KESLEC/ ASTER/ SKIPPER/ TRANSRAIL LTD / NEZONE / UTKARSH, FIRMS COMPLETED SIMILAR PROJECTS IN OTHER SMART CITIES /APPROVED BY A.P.W.D.
2.	LED Chip	CREE, OSRAM, NICHIA, PHILIPS LUMILEDS, TOYODA, SEOUL
3.	Lighting Fixtures	PHILIPS (SIGNIFY)/ WIPRO/ BAJAJ/ KESLEC/ HAVELLS/ SURYA/ POLYCAB/ HPL/ SYSKA LED/ OSRAM/FIRMS COMPLETED SIMILAR PROJECTS IN OTHER SMART CITIES /APPROVED BY A.P.W.D
4.	Cable	UNIVERSAL/ RPG/ CCI/ KEI/ POLYCAB/ FINOLEX/ HAVELS/ FIRMS COMPLETED SIMILAR PROJECTS IN OTHER SMART CITIES /APPROVED BY A.P.W.D.
5.	Gland/Lugs	Dowells, Commet, Connectwell or equivalent.
6.	ELMCB	Schneider, Siemens, ABB, L&T, MDS, Hager, Havells.
7.	Time Switch	L&T GIC, Siemens, Prottime, Schneider, Legrand, Hager, ABB or equivalent.
8.	HDPE Pipe	Rex, Gemini, Duraline.
9.	Junction Box	Hensel/ Sintex / Rittal/ Any Branded or local make duly Type tested as approved by GSCL.

23.0 TENDER DRAWINGS

- 23.1 Drawing No: TCE.10477A-EL-4026-GL-40003-P0 – Design of street light pole for project Jyoti phase-II
- 23.2 Drawing No: TCE.10477A-EL-4026-GL-40004-P0 – Reinforcement details of street light pole foundation for project Jyoti phase-II
- 23.3 Drawing No: TCE.10477A-EL-4026-GL-40015-P0 – ELECTRICAL CONNECTION details of light pole for project Jyoti phase-II