

REQUEST FOR PROPOSAL FOR
IMPLEMENTATION OF
STREET LIGHT POLES
UNDER
“PROJECT JYOTI”
SCHEME
ON
DESIGN, BUILD AND OPERATE BASIS



*Guwahati Smart City Limited,
Guwahati, Assam*

Tender Notice No.

Dated:/...../.....

Volume II: Technical Specifications & Drawings

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1.0 SCOPE OF WORK

- 1.1 The scope of works is as defined in 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
 - (b) Drawing no. TCE. 10477A-EL-4026-GL-40004 – Reinforcement details of Street Light Pole Foundation for Project Jyoti
 - (c) Drawing no. TCE. 10477A-EL-4026-GL-40015 – Electrical Connection details of Light Pole for Project Jyoti

2.0 GENERAL INSTRUCTION TO CONTRACTORS

- 2.1 This specification is the minimum requirement and should be read in conjunction with relevant latest specifications, requirements, rules and regulations of the Local Authority. Any additional requirements as per Local Authority shall be offered by CONTRACTOR as per specifications, requirements, rules and regulations of the Local Authority. 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 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 till the Light Pole including civil foundation, dressing of power cable on wall/ column or lay it

buried in HDPE pipe from the Connection point to the pole 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 the designated Authorities 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 and execution. Notwithstanding any approval/ instruction given otherwise, if GSCL, during random check up, 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 be replaced without any cost 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 person and material at site. The CONTRACTOR shall be self reliant with all the requirements including tools and tackles for digging, filling, erecting, lifting, etc. and consumables required for construction like electricity and water at his own cost.
- 2.9 The CONTRACTOR shall make provision for adequate no of Self Supporting 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, 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 public. 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 not be responsible for any Theft of component/ equipment from the Light Pole system within the Consumer premises after handover.
- 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.

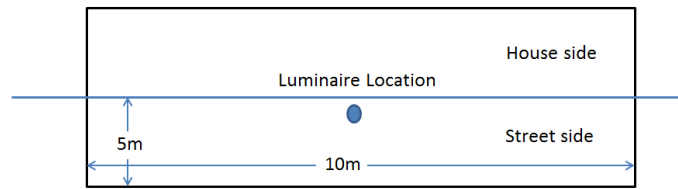
- 2.15 Upon completion of work in each plot, 15-days testing period will start to check the adequacy of the installed LED street lighting system. The issue of completion certificate to the CONTRACTOR is subject to successful testing and approval of GSCL.
- 2.16 GSCL is free to draw samples (not more 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 test 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. will. 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 an 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.

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 (Version 4.12)/ Original Equipment Manufacturer (OEM) validated software. The Validation Report validated from Accredited Authority shall be submitted along with the BID.

4.5 POLE DESIGN

4.5.1 The GI Swaged tubular 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.

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 (1:1.5:3) and grade of reinforcement steel shall be Fe 500 or Fe415.

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, Advertisement Kiosk, CRCA Junction Box with 24 hr time switch and ELMCB, Connecting flexible cable with dressing accessories/ Supports/ HDPE pipe laid buried, 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 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 CRCA Junction Box (JB) shall consist 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 Pole and the junction box shall be earthed with 8 SWG GI Wire and connected to the earthing point at the tariff meter or the Incoming Distribution Board of the premises. The wire can be laid and dressed along with the power cable.
- 5.6 LED shall be earthed with the third core of the 3 Core power cable connected directly at the JB earthing.
- 5.7 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 HDPE pipe buried 500mm below the ground level. Wherever the cable is laid buried, proper marker shall be provided to identify the route and to avoid accidental digging of the cable.
- 5.8 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.
- 5.9 In case the cable is to be taken overhead up to the pole, proper supporting arrangement with minimum two numbers GI support shall be provided to prevent sagging of the cable and to support it in case of heavy wind.
- 5.10 Average length of the power cable and the earthing wires shall be 15m. The cables shall not hang overhead.
- 5.11 All the materials/ equipment/ accessories of the above components of the Project Jyoti shall conform to the relevant IS standard with its latest amendments.
- 5.12 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.
- 5.13 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 NO: 1- List Of Standards**

<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 ≤ 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.

- 6.5 The Luminaire shall have a sturdy and corrosion resistant high pressure Die cast Aluminium alloy housing with weatherproof gasket for lamp and control gear accessories. The Housing shall be Epoxy coated, without any cracks or through holes, made in a single piece of die-cast LM6 aluminium alloy. The luminaire shall be totally enclosed, dust tight and water proof.
- 6.6 Heat sink used should be aluminium extrusion having high conductivity. The dimensions of luminaires 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 consists of individual poly carbonate lenses on high power 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.
- 6.9 Suitable number of LED shall be used in the luminaires. 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 Luminaires shall be provided with high tensile heat resistant toughened glass of minimum 0.8mm thickness or UV resistant polycarbonate cover fixed with stainless Steel screws.
- 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 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 RoHS/CE/ERTL/ERDI requirements.
- 6.15 LED luminaires, should conform to the various National / International standards for safety & performance. Manufacturer should provide test reports as per LM 79 & LM80. The test report from NABL accredited laboratory shall be submitted along with the technical proposal/ Bid for LED as well as Luminaires.

- 6.16 Luminaires should conform to the IS standards for Safety & Performance and test certificates as per IS 16107 should be provided by the manufacturer.
- 6.17 The electrical component of the LED and LED driver must be suitably enclosed in separate sealed unit to function in environment conditions mentioned above.
- 6.18 All the connecting wires inside the Luminaire shall be low smoke halogen free, fire retardant cable.
- 6.19 Adequate protection against Overloading, Short Circuit, Over Voltage, Over temperature, Under Voltage, String Open shall be provided within the Luminaires.
- 6.20 Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.
- 6.21 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.
- 6.22 The control gear shall comply with the provisions of IEC 61347-2-13, IEC 62031 and IEC 62384 as appropriate.
- 6.23 Surge protection: The CONTRACTOR shall provide surge protection arrangement to protect the luminaire from switching surges which are expected/ prevalent in supply networks. External arrangements in weather proof (IP66) enclosure shall be provided if the Luminaires donot have such protections inbuilt. No extra charge will be payable to the Contractor for this work. No claim for failure of Luminaires, on account of voltage surges will be considered.
- 6.24 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.
- 6.25 The lighting fixtures offered shall comply with the data sheet attached in Annexure 1.
- 6.26 The luminaire shall have a warranty period of 2 years and additional years of AMC period as decided.
- 6.27 **Testing Of Luminaire**
- 6.27.1 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

6.27.2 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) Lux measurement
- (i) Test for IP 66 protection

6.27.3 Following Type tests reports shall be provided by the CONTRACTOR for the offered Luminaries 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) Ra (Colour Rendering Index) measurement test
- (i) Lux measurement
- (j) Fire retardant Test

- (k) Test for IP 66 protection
- (l) Endurance Test,
- (m) Life Test
- (n) Photometric Measurements Test Report (IES LM 79)
- (o) LED Lumen Maintenance Test Report (IES LM 80)
- (p) Vibration test as per ANSI
- (q) Drop Test

7.0 TECHNICAL SPECIFICATION ON 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.

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 lighting pole shall be swaged type tubular type as indicated in the enclosed drawing and IS 2713:1980. The lighting pole and brackets shall be of GI (medium gauge) material. 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
- 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 Guidelines. 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 drawing.

9.0 TECHNICAL SPECIFICATION ON CIVIL POLE FOUNDATION

- 9.1 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.
- 9.2 In the design of the structure, the relevant BIS/other standards relating to seismic forces must be followed as in the seismic zone-V.
- 9.3 The structural design should be considered all other loads including severe most expected wind load (Not less than 180kmph).
- 9.4 **Structural Certificate from structural engineer/ firm over the proposed design will be necessary before installation of the structure.**
- 9.5 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 or Fe415.
 - (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.

- (j) 20mm Flexible DWC/ HDPE Pipe of 1m length shall be embedded to draw the cable from the power cable.

10.0 OPERATION & MAINTENANCE

- 10.1 The CONTRACTOR shall be responsible for maintaining/ repair/ replacement, **Comprehensively**, of all the Light Poles and its accessories installed by it in the allocated area during the tenure of the contract.
- 10.2 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.
- 10.3 The CONTRACTOR shall install a Help Desk minimum 30 days in advance before the first set of Poles is completed.
- 10.4 The payment for the O&M shall be as per agreed in the Contract for the entire tenure per pole.
- 10.5 The Manpower and accessories required for O&M shall be provided by the CONTRACTOR during relevant contract period.
- 10.6 Adequate number of teams consisting of One Electrical technician having minimum 6 years experience and one assistant 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. Replacement for the teams shall be well planned during the scheduled offs and leaves.
- 10.7 Any complaint for failure of luminaire due to lack of earthing, SPD, connector and loose connections shall be to CONTRACTOR's Account.
- 10.8 The CONTRACTOR shall take adequate insurance to cover themselves for the cost of O&M during the tenure of the contract.
- 10.9 Any replacement required owing to case of theft shall be to Consumer's account.
- 10.10 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.
- 10.11 All the electrical parameters and illuminance level of the sample Light Poles shall be monitored with calibrated Power Analyzer and Lux meter and documented for records and analysis. Samples shall represent all the Lots appropriately.
- 10.11.1 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.

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

10.13 **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 Complain 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 8 am to 8 pm on all days of the week** to assist and guide the users.
- (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

10.14 **Service Level Benchmark**

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

- (f) **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.
- (g) **System Uptime** – The CONTRACTOR shall maintain sufficient resources and **achieve minimum uptime of 95% on yearly basis** (year period to be decided by GSCL) for the entire system, excluding the period of non-availability of power supply. 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 from the time of Logging the Request by the consumer till the Request is closed in the system by the CONTRACTOR.

In Case the CONTRACTOR is not able to maintain the Uptime of the Light Poles for Two Consecutive years, GSCL may consider termination of the Contract and replacing the

- (h) **Energy Consumption** – The energy consumed by the lamp shall not exceed more than as committed in the design report. CONTRACTOR shall **guarantee the total energy consumption** of the system for all the poles with respect to its design offered. The same shall be monitored and reported on regular basis as decided by GSCL. **Any excess energy charges more than the guaranteed consumption shall be recovered from the CONTRACTOR.** Any action required for mitigating the excess energy consumption may be immediately be taken up by the CONTRACTOR with the information to GSCL.

The Energy consumption of all the poles can be ascertained based on the energy measurements carried on the samples from each LOTs of LED Luminaires supplied on Half yearly basis

- (i) **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 tenure of the contract period beyond the allowable depreciation curve. 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 atleast once a year. Any reduction in the lux level shall be immediately investigated and corrective action shall be taken with information to GSCL.

- (j) 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.
- (k) **Complaint Resolution** - All the complaints shall be redressed within 24 working hrs. 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.
- (l) 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.
- (m) Cleaning of the luminiare cover shall be taken up once in every quarter and record shall be maintained and reported to GSCL.

11.0 QUALITY CONTROL PLANS

- 11.1 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.
- 11.2 The CONTRACTOR shall within Fifteen (15) days of placement of order submit the following information to GSCL.
 - (n) 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.
 - (o) Type test certificates of the raw material and bought out accessories.
 - (p) 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.

12.0 INSPECTION

- 12.1 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.
- 12.2 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.
- 12.3 No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested and approved by GSCL.
- 12.4 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.
- 12.5 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.
- 12.6 The CONTRACTOR shall keep all his testing instruments duly calibrated against Standard Meters at designated Accredited Laboratory not earlier than 6 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.
- 12.7 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.
- 12.8 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
- 12.9 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 and the System for a particular road.
- (d) The lux level in accordance with NLC.

13.0 HAND-OVER OF THE SYSTEM AT THE END OF CONTRACTUAL PERIOD

13.1 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.

14.0 SYSTEM DOCUMENTS, USER DOCUMENTS

14.1 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.

14.2 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.

15.0 ANNEXURE- 1

TABLE NO: 1 - LUMINAIRE DATA SHEET

Sr. No.	Parameters	Requirements / Value
1.	Type	LED Luminaries complete with all accessories including driver, internal wiring with LSHF wires, etc., for Street Lighting
2.	LED chip make	Nichia, Philip lumiled, Osram, CREE
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 ± 3%
6.	LED system wattage	≤ 16 watt (inclusive of all losses)
7.	Driver Type	Constant Current based Electronic Driver
8.	System Power Efficiency	≥ 90%
9.	Operating Temperature Range	-20 Deg C to + 50 Deg C

10.	Operating Humidity	10% to 90% RH
11.	LED Efficacy	≥130 Lm/Watt
12.	System efficacy	≥100 Lm/Watt
13.	Colour Temperature	≥5500K.
14.	LED Drive Current	≥350 mA < 750 mA
15.	LED Wattage	1-3 W
16.	Total Lumen Output	≥1600 lumens
17.	LED Beam Angle	Fully Cut-Off
18.	Control Gear	Prewired with low smoke halogen free, fire retardant e beam cable up to terminal block. Fuse protection shall be provided inside.
19.	Operating Hours	Dusk to Dawn (max 12 Hrs.)
20.	Power Factor	>0.90
21.	Colour Rendering Index	>70
22.	Rated Minimum LED Life	50,000 Burning Hours (With only 30% Lumen Degradation or 70% Lumen maintenance)
23.	Driver Life	>20000 Burning Hours
24.	Luminaries body temperature after 12 hours of continuous	≤ 30 Deg C from ambient

	operation	
25.	Heat Sink Temperature	≤ 15 deg C from ambient
26.	Solder point temperature	< 70 Deg C
27.	Total Harmonics Distortion (THD)	<10%
28.	Construction	High power SMD and LED must be mounted on Copper MCPCB for high thermal conductivity and fastest heat transfer from the LED junction
29.	IP Protection	IP66 or more; no water stagnation anywhere
30.	Luminary Housing	Pressure Die Cast Aluminum (grade 5000 or similar) housing with corrosion resistant polyester powder coating & safety as per IEC 60598 / IS 10322. Mounting bracket with aiming & locking facilities. Large surface area with fins to dissipate the heat to ambient air
31.	Control Gear	Prewired with low smoke halogen free, fire retardant e beam cable up to terminal block. Fuse protection shall be provided inside.
32.	Wire	The connecting wires used inside the luminaries, shall be low smoke halogen free, fire retardant e-beam cable and fuse protection shall be provided in input side.
33.	Heat Sink	Well-designed thermal management system with defined heat sink - Aluminium extrusion
34.	Clip / Fastners	Corrosion free/ Stainless steel.

35.	Materials	Halogen free and fire retardant confirming to UL94.
36.	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.
37.	IK protection for Optic Cover	IK07
38.	Photometric measurements	LM-79/IS16105.
39.	Minimum Surge Protection	>10 kV
40.	Protection Required in Driver Module	
a.	Short Circuit	Yes; Constant current limit mode.
b.	Over Voltage	Yes;
c.	Over Temperature	Yes; Auto Shut Off.
d.	Under Voltage	Yes;
e.	String Open Protection	Yes;

16.0**APPROVED MAKES****TABLE NO: 2 – APPROVED MAKES**

Sr.No	Description	Approved Make
1.	Swaged Lighting Pole	BAJAJ/ PHILIPS/ VALMONT/ JINDAL POWER/ ASTER/ TRANSRAIL LTD.
2.	LED Chip	CREE, OSRAM, NICHIA, PHILIPS LUMILEDS
3.	Lighting Fixtures	PHILIPS/ WIPRO/ BAJAJ/ HAVELLS/ APPROVED BY A.P.W.D
4.	Cable	UNIVERSAL/RPG/CCI/POLYCAB/ FINOLEX
5.	Gland/Lugs	Dowells, Commet, Connectwell
6.	MCB, ELCB Distribution Board	Schneider, Siemens, ABB. L&T, MDS, Hager, Havells
7.	Time Switch	L&T GIC, Siemens, Theaben, Prottime, Schneider, Legrand, Hager, ABB
8.	HDPE Pipe	Rex, Gemini, Duraline
9.	Junction Box	Any Branded or local make duly Type tested

17.0**TENDER DRAWINGS**

- 17.1 DRAWING NO: TCE.10477A-EL-4026-GL-40003-P0 – DESIGN OF STREET LIGHT POLE FOR PROJECT JYOTI
- 17.2 DRAWING NO: TCE.10477A-EL-4026-GL-40004-P0 – REINFORCEMENT DETAILS OF STREET LIGHT POLE FOUNDATION FOR PROJECT JYOTI
- 17.3 DRAWING NO: TCE.10477A-EL-4026-GL-40015-P0 – ELECTRICAL CONNECTION DETAILS OF LIGHT POLE FOR PROJECT JYOTI