



PREFEITURA DE ITANHAÉM

ESTÂNCIA BALNEÁRIA | ESTADO DE SÃO PAULO

ANNEX 5 TECHNICAL SPECIFICATIONS



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1 INTRODUCTION

This ANNEX objectively details the CONCESSIONAIRE's responsibilities, specifying performance demands, activities scope, minimum requirements, associated deadlines, among other elements for SERVICES execution throughout the CONCESSION TERM.

2 NORMATIVE REFERENCES

The SERVICES and engineering works described in this ANNEX are based on the recommendations of the standards published by the Brazilian Association of Technical Standards (ABNT), by the Illuminating Engineering Society of North America (IESNA), by the International Commission on Illumination (CIE), as well as such as the current legislation and Regulatory Norms of the Ministry of Labor, the National Electric Energy Agency (ANEEL) and the National Institute of Metrology, Quality and Technology (Inmetro).

The CONCESSIONAIRE must also respect the norms and standards established by the DISTRIBUTOR COMPANY, which owns the electricity distribution assets, and by the MUNICIPALITY STREET LIGHTING master plan, in case it is prepared in the future.

The CONCESSIONAIRE shall observe the best market practices and the rules indicated below, in a non-exhaustive manner, and others that may replace and/or update them:

- i. Brazilian technical standards:
 - ABNT NBR 5101:2018– Street Lighting – Procedure;
 - ABNT NBR 5111 – Bare copper wires, of circular section, for electrical purposes;



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- ABNT NBR 5125 – Reactor for high pressure mercury vapor lamp;
- ABNT NBR 5181 – Tunnel Lighting Systems – Requirements;
- ABNT NBR 5410 – Low Voltage Electrical Installations;
- ABNT NBR 5419 – Protection against lightning;
- ABNT NBR 6323 – Hot dip galvanizing of steel and cast iron products – Specification;
- ABNT NBR 7290 – Control cables with extruded insulation made of XLPE, EPR or HEPR for voltages up to 1 kV - Performance requirements;
- ABNT NBR 8182 – Self-supporting multiplexed power cables with extruded PE or XLPE insulation, for voltages up to 0.6/1 kV — Performance requirements;
- ABNT NBR 8451 – Reinforced and pre-stressed concrete posts for electricity distribution and transmission networks;
- ABNT NBR 9117 – Flexible conductors or not, insulated with polyvinyl chloride (PVC/EB), for 105° C and voltages up to 750 V, used in internal connections of electrical appliances;
- ABNT NBR 13593 – Reactor and ignitor for high pressure sodium vapor lamp – Specification and tests;
- ABNT NBR 14744 – Steel poles for lighting;
- ABNT NBR 15129 – Luminaires for street lighting – Particular requirements;
- ABNT NBR 15688 – Overhead electricity distribution networks with bare conductors;



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- ABNT NBR 15715 – Polyethylene (PE) corrugated duct systems for energy and telecommunications cable infrastructure – Requirements;
- ABNT NBR 15749 – Measurement of grounding resistance and ground surface potentials in grounding systems;
- ABNT NBR 16026 Electronic Control Device cc or ac for LED module – Performance Requirements;
- ABNT NBR IEC 60439-1-2-3 – Low voltage switchgear and control sets – Part 1, 2 and 3;
- ABNT NBR IEC 60529 – Degrees of protection provided by enclosures (IP Codes);
- ABNT NBR IEC 60598-1 – Luminaires Part 1: General requirements and tests;
- ABNT NBR IEC 61347-2-13 – Lamp Control Device Part 2-13: Particular requirements for DC or AC powered electronic control devices for LED modules;
- ABNT NBR IEC 61643-1 – Low Voltage Surge Protection Devices – Part 1: Protection devices connected to low voltage power distribution systems - Performance requirements and test methods;
- ABNT NBR IEC 62262 – Degrees of protection provided by electrical equipment enclosures against external mechanical impacts (IK code);
- ABNT NBR NM 247-3 – Insulated cables with polyvinyl chloride (PVC) for rated voltages up to 450/750V, inclusive - Part 3: Insulated conductors (without covering) for fixed installations (IEC 60227-3, MOD);
- ABNT NBR ISO 9001 – Quality management systems – Requirements;



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- ABNT NBR ISO 14001 – Environmental management systems — Requirements with guidelines for use;
 - ABNT NBR ISO/IEC 27001 – Information technology — Security techniques — Information security management systems — Requirements.
- ii. International technical standards:
- *EN 13201 -1,2,3,4,5 - Way Lighting;*
 - *IES RP-8 - Way Lighting;*
 - *IES LM-79- Electrical and Photometric Measurements of Solid-State Lighting Products;*
 - *IES TM-21 – Projecting Long Term Lumen Maintenance of LED Light Sources;*
 - *CIE 132 - Design Methods for Lighting of Ways + Disk;*
 - *CIE 144 - Way Surface and Road Marking Reflection Features.*
- iii. Technical norms and standards of the DISTRIBUTOR COMPANY:
- Connections - Criteria for performing electrical connection services (DIS-NOR-012);
 - Energy Supply - Electricity for Street Lighting Technical rules and recommendations for street lighting in Municipalities, implemented by Municipalities (DIS-NOR-012);
 - Multiplexed aerial network aluminum cables – Specification of aluminum cable diameter and current carrying capacity (DIS-NOR-012);



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- Spacing among poles – Description of the spans among IP poles (NOR.DISTRIBU-ENGE-0025);
- Standardized poles –Types and heights of poles used in IP (DIS-ETE-011);
- Brackets for Street Lighting – Typology of brackets used in street lighting (NOR.DISTRIBU-ENGE-0025);
- Types of structures –Typology of structures used in IP (NOR.DISTRIBU-ENGE-0025);
- Conductor dimension –Specification of IP area network conductors (DIS-NOR-012);
- Underground Distribution Network - Basic features of the structures that must be used in special projects of Underground Distribution Network up to class 15kV (NOR.DISTRIBU-ENGE-0158);
- Grounding criteria - Specifications for grounding transformers and end of networks (DIS-NOR-012);
- Duct bank – Specification of duct banks (NOR.DISTRIBU-ENGE-0158);
- Transformers - Transformer specification (ESP.DISTRIBU-ENGE-0019).

iv. Regulatory Norms of the Ministry of Labor:

- NR 6 – Individual (EPI) and collective (EPC) protective equipment;
- NR 9 – Environmental risk prevention program;
- NR 10 – Safety in electricity installations and services;
- NR 11 – Transport, movement, storage and handling of materials;
- NR 12 – Safety at work in machines and equipment;



- NR 21 – Work in the open;
- NR 24 – Sanitary and comfort conditions in the workplace;
- NR 35 – Work at heights.
- v. INMETRO and Procel standards:
 - Ordinance No. 20 INMETRO;
 - Energy saving Procel seal.
- vi. ANEEL standards
 - Normative Resolution No. 1000/2021;

3 MODERNIZATION AND EFFICIENCY

The CONCESSIONAIRE shall carry out, as of the start date of PHASE II, the activities necessary to comply with the CONCESSION MILESTONE detailed below.

It must be noted that at the end of the CONCESSION MILESTONE, all modernized, upgraded and equipped with a REMOTE MANAGEMENT SYSTEM, in addition to the SPECIAL LIGHTING installed, must be assessed to comply with the CONCESSION MILESTONE. The EFFICIENCY GOAL is 61,46% (sixty-one integers and forty-six hundredths' percent).

The CONCESSIONAIRE shall implement the REMOTE MANAGEMENT SYSTEM at STREET LIGHTING POINTS located in public areas with Vehicle LIGHTING CLASS equal to V2 and V3.

3.1 Concession Milestone I

In up to 180 (one hundred and eighty) days counted from the beginning of PHASE II,



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it shall be up to the CONCESSIONAIRE to prove, in order to comply with the CONCESSION MILESTONE:

- (i) Modernization Percentage, calculated in the form of the item 3.4, of at least 33% (thirty three percent);
- (ii) Efficiency Percentage, calculated in the form of the item 3.4, of at least 33% (thirty three percent) of the EFFICIENCY GOAL;
- (iii) Implementation of SPECIAL LIGHTING in at least 33% (thirty three percent) of the MUNICIPALITY's locations, as provided for in ANNEX 16-GUIDELINES FOR SPECIAL LIGHTING provided for PHASE II;
- (iv) Implementation of a REMOTE MANAGEMENT SYSTEM in all modernized STREET LIGHTING POINTS, located on ways classified as V2 and V3

3.2 Concession Milestone II

In up to 360 (three hundred and sixty) days counted from the beginning of PHASE II, it shall be up to the CONCESSIONAIRE to prove, in order to comply with the CONCESSION MILESTONE II:

- (i) Modernization Percentage, calculated in the form of the item 3.4, of at least 66% (sixty six percent);
- (ii) Efficiency Percentage, calculated in the form of the item 3.4, of at least 66% (sixty six percent) of the EFFICIENCY GOAL;
- (iii) Implementation of SPECIAL LIGHTING in at least 66% (sixty six percent) of the MUNICIPALITY's locations, as provided for in ANNEX 16 -GUIDELINES FOR SPECIAL LIGHTING provided for PHASE II;
- (iv) Implementation of a REMOTE MANAGEMENT SYSTEM in all modernized STREET LIGHTING POINTS, located on ways classified as V2 and V3.



3.3 Concession Milestone III

In up to 540 (five hundred and forty) days counted from the beginning of PHASE II, it shall be up to the CONCESSIONAIRE to prove, in order to comply with the CONCESSION MILESTONE III:

- (i) Modernization Percentage, calculated in the form of the item 3.4, at least 100% (one hundred percent) of STREET LIGHTING POINTS;
- (ii) Efficiency Percentage, calculated in the form of the item 3.4, of at least 100% (one hundred percent) of the EFFICIENCY GOAL ;
- (iii) Implementation of SPECIAL LIGHTING in 100% (one hundred percent) of the MUNICIPALITY's locations, as provided for in ANNEX 16 -GUIDELINES FOR SPECIAL LIGHTING provided for PHASE II;
- (iv) Implementation of a REMOTE MANAGEMENT SYSTEM in all STREET LIGHTING POINTS, located on ways classified as V2 and V3.

3.4 Calculation Of Modernization and Efficiency Percentages

The MODERNIZATION AND EFFICIENCY percentages referred to in item 3.1 to 3.3 must be calculated as follows:

a) Modernization Percentage (PM):

$$PM = \frac{QPIP_{mod}}{QPIP_{initial}}$$

On what:



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$QPIP_{mod}$ – Total number of STREET LIGHTING POINTS included in the BASE REGISTRATION that were modernized to comply with the assessed CONCESSION MILESTONE;

$QPIP_{initial}$ – Corresponds to the total amount of STREET LIGHTING POINTS contained in the BASE REGISTRATION.

a. Efficiency Percentage (PE):

$$PEF = \left(1 - \frac{Clm_p}{Clm_i} \right)$$

$$Clm_i = (QPIP_{initial} \times 158,46)$$

On what:

Clm_i – Corresponds to the total installed load of STREET LIGHTING POINTS, recorded in the BASE REGISTRATION, including load and losses of auxiliary equipment.

158,46 W – Initial load per STREET LIGHT POINT before modernization.

i – Start of PHASE II;

Clm_p – Corresponds to the total installed load of STREET LIGHTING POINTS, recorded in the REGISTRATION, including load and losses of auxiliary equipment. To calculate the installed load, it must not be considered, the STREET LIGHTING POINTS located in the places that shall receive SPECIAL LIGHTING projects and new STREET LIGHTING POINTS resulting from COMPLEMENTARY SERVICES execution



3.5 Delay in obtaining authorizations and permits for SPECIAL LIGHTING

In compliance with the provisions of Clause 9 of the CONTRACT, if the CONCESSIONAIRE fails to meet the deadline for complying with the CONCESSION MILESTONE exclusively due to delays in obtaining licenses, authorizations and permits for the implementation of SPECIAL LIGHTING, exclusively attributable to the GRANTOR and/or the public administration, the following rules shall apply:

- (a) It shall be considered, for the purposes of calculating the MODERNIZATION AND EFFICIENCY FACTOR - FME provided for in ANNEX 8 - PAYMENT MECHANISM, that the SPECIAL LIGHTING was implemented within the deadline set for the CONCESSION MILESTONE and that, therefore, provided that the other relevant conditions, the CONCESSION MILESTONE has been reached;
- (b) After obtaining the necessary licenses, authorizations or permits, the CONCESSIONAIRE shall have the period provided for in the executive project approved by the GRANTOR to complete the implementation of the SPECIAL LIGHTING referring to the CONCESSION MILESTONE;
- (c) If the CONCESSIONAIRE fails to implement the SPECIAL LIGHTING referring to the CONCESSION MILESTONE until the end of the Additional Term, (i) the MODERNIZATION AND EFFICIENCY FACTOR - FME shall be recalculated to reflect, in the outstanding payments of the EFFECTIVE MONTHLY CONSIDERATION, the non-compliance with the CONCESSION MILESTONE by the CONCESSIONAIRE and (ii) the daily fine provided for in the CONTRACT shall be applied, until proof of the implementation of the SPECIAL LIGHTING required in the CONCESSION MILESTONE;
- (d) The rule provided for in item(c) shall be applied until the CONCESSIONAIRE proves the implantation of SPECIAL LIGHTING



referring to the CONCESSION MILESTONE.

4 PLANS OF THE MUNICIPAL STREET LIGHTING NETWORK

The CONCESSIONAIRE shall prepare the plans listed below:

- vii. OPERATION AND MAINTENANCE PLAN (POM), which shall present the description, operational procedure and planning of all activities related to the planning and structuring necessary for the operation and maintenance of STREET LIGHTING POINTS of the MUNICIPAL STREET LIGHTING NETWORK throughout the CONCESSION TERM.
- viii. MODERNIZATION PLAN (PM), which shall present the description, operational procedure and planning of all activities related to MODERNIZATION AND EFFICIENCY, implementation of the REMOTE MANAGEMENT SYSTEM and SPECIAL LIGHTING, throughout the CONCESSION TERM.
- ix. OPERATIONAL DEMOBILIZATION PLAN (PDO), which shall detail the procedure for reversing the REVERSIBLE ASSETS and the operational transition at the end of the contractual term.

The plans must be prepared in accordance with the rules, regulations and other guidelines of the legislation applicable to the activities carried out by the CONCESSIONAIRE, and the obligations defined in the CONTRACT must also be observed.

The plans shall bind the CONCESSIONAIRE for all legal purposes, and it shall be responsible for their strict compliance and implementation, under penalty of applying the applicable sanctions and penalties.

In all plans, the CONCESSIONAIRE shall include operating manuals and scripts, the



"Standard Operational Procedures - SOPs" for each type of SERVICE, considering the minimum requirements of the activity to be performed in enough quantity, form and quality to guarantee its functionality and the availability of the MUNICIPAL STREET LIGHTING NETWORK.

4.1 Operation and Maintenance Plan (POM)

The OPERATION AND MAINTENANCE PLAN (POM) aims at planning and structuring all the CONCESSIONAIRE'S SERVICES, ensuring the operation and maintenance process of the MUNICIPAL STREET LIGHTING NETWORK.

POM, in accordance with the obligations of the CONTRACT and of this ANNEX, shall be composed, at least, of the following programs:

- Materials Treatment and Disposal Program (PTDM);
- OCC Operationalization Program (POC);
- Maintenance Program (PM);
- Model of SERVICE Execution Report.

It must be noted that while the MODERNIZATION AND EFFICIENCY at the STREET LIGHTING POINTS do not occur, the CONCESSIONAIRE shall establish the operation and maintenance of the INITIAL MUNICIPAL STREET LIGHTING NETWORK with control and monitoring services provision, through OCC and with intensification of patrol activities, urgency in capturing and solving the request of the citizen or the GRANTOR. The operation and management of all works must take place 24 (twenty-four) hours a day and 7 (seven) days a week, without interruption, based on a computerized system for recording interventions, with data collectors in the field.

Therefore, in addition to the aforementioned programs, for the preparation of POM, the CONCESSIONAIRE must map, define and design all the necessary processes for the beginning of operation and maintenance of the INITIAL MUNICIPAL STREET



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LIGHTING NETWORK, covering:

- a. Diagnosis and analysis of processes;
- b. Process modelling;
- c. Deployment planning.

POM may be updated and revised throughout the CONCESSION, upon GRANTOR'S request or at the CONCESSIONAIRE'S initiative, whenever deemed appropriate, and any change must be submitted for GRANTOR'S prior approval.

a. Materials Treatment and Disposal Program (PTDM)

As the GRANTOR to have greater control over the procedures and main features of the services that shall be performed related to the destination of materials, the CONCESSIONAIRE shall prepare the Materials Treatment and Disposal Program - PTDM. PTDM shall contain the treatment and disposal strategies of materials taken from the INITIAL MUNICIPAL STREET LIGHTING NETWORK and the MODERNIZATION AND EFFICIENCY of the MUNICIPAL STREET LIGHTING NETWORK, based on ANNEX 6 - ENVIRONMENTAL GUIDELINES, being that:

- i. All material or equipment removed from the MUNICIPAL STREET LIGHTING NETWORK, as a result of SERVICES execution, must be sorted and classified by the CONCESSIONAIRE, and subsequently reused or discarded, as the case maybe, under monitoring and inspection by the GRANTOR;
- ii. Specific procedures must be detailed, according to the type of material, highlighting among them contaminating wastes that pose risks to public health and the environment and require special treatment and disposal due to their features of flammability, corrosivity, reactivity and contamination;
- iii. The storage, transport, decontamination and disposal of contaminating waste must be carried out by a specialized company that meets all legal requirements



of current environmental legislation.

b. OCC Operationalization Program (POC)

As the GRANTOR must have greater control over the procedures and main features of the SERVICES that shall be performed related to the operation of OCC, the CONCESSIONAIRE must prepare OCC Operational Program - POC.

In it, the CONCESSIONAIRE shall address the OCC installation and operation strategy, including at least:

a) OCC implementation schedule, covering:

- Installation and adaptation of civil infrastructure, if necessary;
- Implementation of information technology equipment;
- Implementation of information technology systems and solutions.

b) Dimensioning and detailing of OCC operation team positions;

c) Information security program, ensuring the implementation of actions of:

- Integrity: protection against undue changes and/or deletion of information;
- Confidentiality: limiting Access to authorized users only;
- Compliance: compliance with associated rules and laws;
- Availability: guarantee of always available access to authorized users Technical specifications, at least, of the following OCC systems and equipment:

d) Alternative contingency plan for OCC operation in the event of any failure in the implemented systems;

e) Training plan for OCC operation team;



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f) The operation design, including the processes for executing OCC procedures, including manuals with all SOPs involved.

g) Maintenance Program (PM)

As the GRANTOR must have greater control over the procedures and main features of the SERVICES that shall be performed related to CORRECTIVE and EMERGENCY MAINTENANCE (emergency service), PREDICTIVE MAINTENANCE and PREVENTIVE MAINTENANCE, the CONCESSIONAIRE shall prepare the Maintenance Program - PMAN. In it, the CONCESSIONAIRE shall include the detailed strategy for service, the scope and defined deadlines related to the maintenance SERVICES.

The PM must contain, as a minimum:

- i. The design of the operation, including:
- ii. The processes for performing the maintenance SERVICES to be performed by the CONCESSIONAIRE throughout the CONCESSION TERM;
- iii. The frequency of procedures execution.
- iv. The checklist model that shall be carried out by the CONCESSIONAIRE, containing the procedures for performing each of the maintenance SERVICES;
- v. Proposal for a standard form to be filled in in case of accidents caused by third parties at STREET LIGHTING POINTS;
- vi. The basic structure of human, technical and operational resources for the execution of maintenance SERVICES;
- vii. Maintenance team training plan;
- viii. Manuals for detailing all SOPs involved in maintenance activities.

h) Model of SERVICE Execution Report

The SERVICE Execution Report must be submitted monthly to the GRANTOR and the



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INDEPENDENT VERIFIER, and, for each type of SERVICE, there must be fields for filling in, at least, the following information:

- i. Type of service;
- ii. SERVICE ORDER number;
- iii. Number of projects executed in the period;
- iv. Dates of preparation and submission of each project;
- v. Number of SERVICE ORDER demanded and met for maintenance of STREET LIGHTING POINTS;
- vi. Dates of demand and execution of SERVICE ORDERS;
- vii. Identification of public places covering type, name and region;
- viii. Number of points per model and technology used;
- ix. Date of SERVICES execution and power-up.

Additionally, the SERVICE Execution Report must include:

- i. Development stages of activities of the same type carried out in the previous month;
- ii. Evolution of activities related to the execution of MODERNIZATION AND EFFICIENCY, implementation of the REMOTE MANAGEMENT SYSTEM, implementation of SPECIAL LIGHTING and COMPLEMENTARY SERVICES execution;

4.2 Modernization and Efficiency Plan (PM)

The PM aims at planning and structure all SERVICES related to MODERNIZATION AND EFFICIENCY, implementation of the REMOTE MANAGEMENT SYSTEM and implementation of SPECIAL LIGHTING throughout the CONCESSION TERM.

The PM, in accordance with CONTRACT obligations and of this ANNEX, it shall be



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composed, at least, of the following programs:

- MODERNIZATION AND EFFICIENCY Program (PME);
- REMOTE MANAGEMENT SYSTEM Implementation Program (PIST);
- SPECIAL LIGHTING Program (PIE).

In addition to these programs, the CONCESSIONAIRE shall provide, every 5 (five) years, a description of the interventions planned for the 5 (five) subsequent years or for the remaining years of the CONCESSION, presenting images, reports, documents and diagrams necessary for their understanding, indicating the reference cost estimates for each of its actions.

The MODERNIZATION PLAN may be updated and revised throughout the CONCESSION TERM, upon GRANTOR'S request or at the CONCESSIONAIRE'S initiative, whenever deemed appropriate, and any change must be submitted for GRANTOR'S prior approval.

4.3 Modernization and Efficiency Program (PME)

As the GRANTOR to have greater control over the procedures and main features of the SERVICES that shall be performed in the MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS contained in the BASE REGISTRATION, the CONCESSIONAIRE must prepare a MODERNIZATION AND EFFICIENCY Program - PME. In it, the CONCESSIONAIRE shall include the detailed strategy for compliance with the CONCESSION MILESTONE and the guidelines described in item 3 of this ANNEX.

The PME must contain, at a minimum, the following requirements:

- i. Detailed schedule of MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS contained in the BASE REGISTRATION, demonstrating how the CONCESSION MILESTONE defined in this ANNEX and following the



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prioritization defined in item 5.6 of this ANNEX, indicating stages of inspections by the INDEPENDENT VERIFIER to obtain the TERMS OF ACCEPTANCE;

- ii. Detailed schedule for COMPLEMENTARY SERVICES execution eventually requested by the GRANTOR, in accordance with the minimum requirements established in item 5.6, indicating intermediate stages of inspection by the GRANTOR, to obtain the TERMS OF ACCEPTANCE;
- iii. The model of the lighting simulations to be carried out to adapt the STREET LIGHTING POINTS to the minimum parameters required in this ANNEX and on ABNT 5101:2018;
- iv. Classification of existing public places according to guidelines established in ANNEX 17 – CLASSIFICATION OF MUNICIPALITY ROADS;
- v. Technologies/systems to be implemented to save energy and the technical features of the equipment to be used;
- vi. Potential to reduce electricity consumption of STREET LIGHTING POINTS to be modernized with the implementation of selected technologies;
- vii. Basic structure of technical and operational resources for MODERNIZATION AND EFFICIENCY SERVICES execution of the MUNICIPAL STREET LIGHTING NETWORK.

PME may be updated and revised throughout the MODERNIZATION AND EFFICIENCY period, upon request from the GRANTOR or request from the CONCESSIONAIRE, subject to any changes being approved by the GRANTOR.

4.3.1 Remote Management System Implementation Program (PIST)

As the GRANTOR to have greater control over the procedures and main features of the SERVICES that shall be performed in relation to the REMOTE MANAGEMENT



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SYSTEM, the CONCESSIONAIRE shall prepare a REMOTE MANAGEMENT SYSTEM Implementation Program - PIST. PIST must contemplate the planning for the implementation of the REMOTE MANAGEMENT SYSTEM in the STREET LIGHTING POINTS installed on ROADS WITH REMOTE MANAGEMENT, containing, at least:

- a. Detailed schedule for the implementation of the REMOTE MANAGEMENT SYSTEM, indicating intermediate stages of inspections by the INDEPENDENT VERIFIER to obtain the TERMS OF ACCEPTANCE;
- b. Technologies/systems to be implemented and the technical features of the equipment to be used, detailing at a minimum:
 - a. *software*/platform to control the REMOTE MANAGEMENT SYSTEM;
 - b. Connectivity network;
 - c. Remote management server;
 - d. Control devices;
 - e. Network structure;
 - f. ANATEL certification;
 - g. INMETRO certification, if any;
 - h. Information security certification.
- c. Strategy for reducing light intensity (dimming) at special times, when applicable.

For the application of the dimerization function in STREET LIGHTING POINTS, the CONCESSIONAIRE must prove that, during the period of execution of the dimming service, there is evidence of a reduction in the volume of vehicle and/or pedestrian traffic, allowing the reduction of the luminous flux to the minimum lighting requirements established in this ANNEX and according to the design requirements presented in item 5.6 of this ANNEX.

Additionally, the CONCESSIONAIRE must present or prove to the GRANTOR:

- i. The reduction of the volume of vehicle and pedestrian traffic, during the period



of dimming service execution.

- ii. the time bands and the percentage of light intensity reduction (dimming) of the LUMINAIRES;
- iii. the energy gain provided;
- iv. the technical project that certifies the use of the dimming functionality of STREET LIGHTING POINTS equipped with a REMOTE MANAGEMENT SYSTEM, as provided for in ANEEL Resolution No. 1000;
- v. approval of the equipment by an official and competent organ;
- vi. the approval of the project by the DISTRIBUTOR COMPANY, if the REMOTE MANAGEMENT SYSTEM impacts energy consumption at STREET LIGHTING POINTS with the estimated consumption.

ROADS WITH REMOTE MANAGEMENT shall be considered as ways with LIGHTING CLASS equal to V2 and V3.

4.3.2 Special Lighting Program (PIE)

In order for the GRANTOR to have greater control over the procedures and main features of the SERVICES that shall be performed in relation to SPECIAL LIGHTING, the CONCESSIONAIRE shall be responsible for preparing a SPECIAL LIGHTING Program - PIE. PIE shall include the details of all SPECIAL LIGHTING projects for the locations defined in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING. Projects must observe the intervention proposals, technical specifications, concepts and guidelines provided for in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING. PIE must contain, as a minimum:

- i. The detailed implementation schedule, as well as the adequacy of existing facilities for SPECIAL LIGHTING SERVICES execution, indicating the intermediate stages of inspections by the INDEPENDENT VERIFIER, to



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obtain the ACCEPTANCE TERMS;

- ii. The technical specifications of all equipment and, as appropriate, systems to be installed;
- iii. The features of the light sources to be implanted:
 - i. Power [W];
 - j. Color Rendering Index (CRI);
 - k. Correlated Color Temperature [K];
 - l. Luminous flux;
 - m. Life span;
 - n. Luminous flux depreciation factor;
 - o. Energy efficiency;
 - p. Protection Index;
 - q. Degree of protection against external mechanical impacts.
- iv. The quantity of all equipment, systems and light sources;
- v. The PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCE programs for SPECIAL LIGHTING.

The CONCESSIONAIRE shall prepare, prior to the execution of the SPECIAL LIGHTING implementation, the electrical and lighting projects at the executive level, illustrated with three-dimensional images according to guidelines, procedures and specifications expressed in the ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING.

The executive projects shall be certified by an Accreditation Entity - OIA based on INMETRO 367/2007 previously to approval submission.

The executive projects must be delivered by the CONCESSIONAIRE to the GRANTOR for approval at least 60 (sixty) days in advance of the deadline set for the start of implementation.



The SPECIAL LIGHTING Program (PIE) must be delivered by the CONCESSIONAIRE to the GRANTOR for approval before the end of MILESTONE I. The GRANTOR shall have a period of 60 (sixty) days to approve the projects. The CONCESSIONAIRE shall implement SPECIAL LIGHTING in the defined locations, respecting the deadlines for complying with the CONCESSION MILESTONE.

4.4 Operational Demobilization Plan (PDO)

The CONCESSIONAIRE must present an OPERATIONAL DEMOBILIZATION PLAN of the CONCESSION that must contain, at least:

- a. The form of reversal of REVERSIBLE ASSETS according to ANNEX 9 - LIST OF EXISTING ASSETS;
- b. The form of withdrawal of all non-reversible assets;
- c. The inventory of all REVERSIBLE ASSETS, including date of installation, manufacturer, location, physical and technical features and state of conservation;
- d. A list of all current guarantees;
- e. The estimated lifespan of the REVERSIBLE ASSETS, following the methodology and requirements defined in item 7.6 of this ANNEX;
- f. The list of all technical projects and plans (at least in digital CAD format);
- g. The database (digital format) of information on REVERSIBLE ASSETS.
- h. Provision of information requested by the GRANTOR or INDEPENDENT VERIFIER, to perform the procedures provided for in item 7.6 of this ANNEX;
- i. A TRAINING plan for the GRANTOR'S public servers and/or the employees of the new CONCESSIONAIRE for the operation of the MUNICIPAL STREET LIGHTING NETWORK.



5 LIST OF CHARGES

The scope considered for this CONCESSION covers the SERVICES listed below, which shall be detailed in the sub-items that follow.

- a. Preparation of the BASE REGISTRATION and permanent REGISTRATION updating;
- b. Implementation and Operationalization of the OPERATIONAL CONTROL CENTER (OCC);
- c. SERVICES Execution of maintenance of the MUNICIPAL STREET LIGHTING NETWORK;
- d. SERVICES Execution of operation of the MUNICIPAL STREET LIGHTING NETWORK;
- e. Implementation and maintenance of SPECIAL LIGHTING in the assets defined in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING;
- f. MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS included in the BASE REGISTRATION;
- g. Operational and Organizational Structure;
- h. Implementation of the REMOTE MANAGEMENT SYSTEM on roads classified as V2 and V3;
- i. Periodic TRAINING of the GRANTOR'S team, through courses and workshops on topics related to the CONCESSION;
- j. COMPLEMENTARY SERVICES Execution;

5.1 Registration of the Municipal Street Lighting Network

Within the terms established in the CONTRACT, the CONCESSIONAIRE shall prepare, validate and update the BASE REGISTRATION, by carrying out a physical inventory, based on the guidelines of this ANNEX and ANNEX 15 - REGISTRATION



of the STREET LIGHTING NETWORK, and submit for INDEPENDENT VERIFIER approval, in accordance with the procedure detailed in item 7.1 of this ANNEX.

Likewise, the CONCESSIONAIRE shall keep the REGISTRATION permanently updated throughout the CONCESSION TERM, according to the guidelines of this ANNEX and ANNEX 15 - REGISTRATION of the STREET LIGHTING NETWORK.

5.2 Implementation And Operationalization of the OCC

The OPERATIONAL CONTROL CENTER - OCC, to be implemented in the MUNICIPALITY and operated by the CONCESSIONAIRE, shall guarantee the integrated management and control of the SERVICES related to the operation and maintenance and MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS, SPECIAL LIGHTING, the REMOTE MANAGEMENT SYSTEM and COMPLEMENTARY SERVICES.

For this, the Central Management System and other software related to:

- i. Call Center - Service Desk:
 - o Call management;
 - o Remote Management and Monitoring of STREET LIGHTING POINTS equipped with a REMOTE MANAGEMENT SYSTEM.
- ii. Lighting Asset Management;
- iii. Operation Management (PREDICTIVE, PREVENTIVE AND CORRECTIVE MAINTENANCE);
- iv. Performance Management;
- v. Project management;
- vi. Management of Electric Energy Consumption.



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The CONCESSIONAIRE shall:

- i. Provide a location for the installation of OCC (owned or rented);
- ii. Install OCC support environments, including the execution of necessary civil, electrical, logical and cooling adaptations, in addition to the supply and installation of the entire Information Technology infrastructure;
- iii. Make available all materials, systems, equipment, as well as labor, duly trained by the CONCESSIONAIRE, necessary for the development of OCC routine operating activities;
- iv. Respond to all CORRECTIVE MAINTENANCE calls, arising from citizens or the GRANTOR, through the operation of the CONCESSIONAIRE's Call Center and providing of the service channels provided for in this ANNEX. The CONCESSIONAIRE may choose to subcontract the Service of Call Center operation, provided that it ensures compliance with all the rules and requirements set forth in this ANNEX;
- v. Implement Information Technology solutions at OCC, which allow at least:
 - a) Provide full and real-time access to the GRANTOR, the INDEPENDENT VERIFIER and other municipal organs authorized by the GRANTOR, to OCC data, through access to the system and the issuance of dynamic reports and on thematic maps, for monitoring and controlling the SERVICES;
 - b) Possess access control and restrictions, ensure data standardization and validation and have a full range of query and reporting options, in order to allow full monitoring of the activities contracted by the GRANTOR;
 - c) Use properly licensed software platforms, file types and applications, capable of geo-referenced processing;
 - d) Allow data export to commercial document production applications (Word/Excel) and other databases (Access/SQL Server/Oracle) and,



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where applicable, to CAD and/or GIS applications;

- e) Provide an interface in Portuguese and, as one of its functions, the possibility of interfacing data with other Information Technologiesolutions;
 - f) View all STREET LIGHTING POINTS registered on city maps, neighborhoods, streets, correlating the location and identification number
 - g) Monitor, in real time, all STREET LIGHTING POINTS equipped with REMOTE MANagementsystem devices;
 - h) Monitor, in real time, vehicles and field teams along the way until they arrive at the operational base.
- vi. Ensure the continuity of operation, through the installation of an uninterrupted power supply system, when there is a lack of electricity supply at OCC facilities, ensuring full operation of the Call Center equipment and systems, operation management and REMOTE MANAGEMENT SYSTEM;
 - vii. Ensure confidentiality of all information received at OCC, which may not be copied, reproduced, published or disclosed in anyway, except for the GRANTOR, the INDEPENDENT VERIFIER and the exclusive needs of the CONCESSIONAIRE's work, detailed in this ANNEX;
 - viii. Continuously update, during the CONCESSION period, all equipment, systems and physical structure of OCC, considering the profile of the lifespan of each technology, considering the period of obsolescence and the index of availability for use of each equipment (including equipment redundancy whenever necessary);
 - ix. Register on OCC database the information listed below, regarding SERVICES performed for the maintenance of the MUNICIPAL STREET LIGHTING NETWORK, not limited to these:
 - a. Location / reference:
 - Request addresses and the location of the occurrence (type and name



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of the street, zip code, neighborhood, street number, location references);

- Point identification plate number/code;
- Call (self-service, round, call center, ombudsman, request from the GRANTOR, identification of the CONCESSIONAIRE, dates of registration, receipt and response);
- Applicant data.

b. CORRECTIVE/EMERGENCY MAINTENANCE Interventions:

- Team (type and identification of the vehicle, person in charge, start and end date and time of the SERVICE);
- Reason for the request and problem found, and emergency situations must be identified;
- Complete identification of STREET LIGHTING POINTS, circuit or equipment of the MUNICIPAL STREET LIGHTING NETWORK (reference number in the REGISTRATION, type and other specific features);
- Activities performed (code, description, quantity);
- Materials involved (code, description, manufacturer, quantity: removed, installed, disappeared, or provided by the GRANTOR);
- Reason for non-attendance and pending situations;
- Reports of incidents (theft, vandalism).

c. PREVENTIVE MAINTENANCE:

- Team (responsible, scheduled and execution dates);



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- Route (addresses, length, number of STREET LIGHTING POINTS verified);
 - Problems detected and tickets generated.
- x. To store, during the entire period of validity of the CONCESSION, all databases, information and documentation associated with OCC operation, which must be passed on to the GRANTOR, at any time, when requested by the GRANTOR and, in full, at the end of the CONTRACT.

5.2.1 Central Management System – Service Desk

Regarding the Service Desk operation, the CONCESSIONAIRE shall:

- i. Respond to all requests related to the assets of the MUNICIPAL STREET LIGHTING NETWORK, arising from citizens or the GRANTOR, through the operation of the call center – the CONCESSIONAIRE's call center;
- ii. Monitor in real time all communication networks of OCC and the REMOTE MANAGEMENT SYSTEM, through the operation of the OPERATIONAL CONTROL CENTER.

Call Center (Service Center)

The call center under the CONCESSIONAIRE'S responsibility must be supported by the Call Management System, operating from 7:00 am (seven) until at least 10:00 pm (ten), 7 (seven) days a week, working in real time and integrated with the other systems implemented by the CONCESSIONAIRE. Calls related to STREET LIGHTING POINTS requested by the GRANTOR or citizens must be registered at the call center, enabling:



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- Opening of CORRECTIVE MAINTENANCE and EMERGENCY MAINTENANCE calls in the MUNICIPAL STREET LIGHTING NETWORK;
- Service complaints registration;
- Information request.

The CONCESSIONAIRE shall provide a direct service channel for the GRANTOR, thus facilitating the capture and distribution of the data necessary for SERVICES execution under the CONCESSIONAIRE'S responsibility, as well as the fulfilment and adequacy of the requirements requested by the GRANTOR regarding the SERVICES and computerized systems.

In order to guarantee the registration and forwarding of all requests received to the maintenance teams, all materials and systems must be made available in the call center, as well as duly trained labor, in appropriate quantity, according to the shift and day of the week (following the relevant legislation regarding the number of service positions).

In addition to the call center, the CONCESSIONAIRE shall provide three other service channels for citizens and the GRANTOR:

- Online self-service portal;
- Mobile application (smart phones or tablets);
- Face-to-face service with a unit located in the central region of the MUNICIPALITY, operating only during business hours.

With respect to the call center, the CONCESSIONAIRE shall:

- Ensure a service position and the operation of the call center during 24 (twenty four) hours every day, through the provision of a specific service channel, guaranteeing the provision a toll- free number (0800 or a direct extension) from



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fixed and mobile telephony and an online self-service portal;

- Make available the work force to occupy the service stations, in an enough number to meet the CONCESSION's call demand;
- Keep the log history of calls from the opening to the closing of the call, with a description of the activities developed during the process;
- Develop Standard Operational Procedures (SOPs) for the most frequent calls;
- Propose and execute an alternative plan for call center operation in case of any system failure;
- Manage and keep record of deadlines for complete resolution of calls;
- Make available all materials and systems, as well as duly trained labor, in adequate quantity, according to the shift and day of the week, in order to guarantee the registration and forwarding to the maintenance teams of all requests received;
- Provide a direct service channel for the Municipal GRANTOR organs, thus facilitating the capture and distribution of the data necessary for SERVICES execution under the CONCESSIONAIRE'S responsibility, as well as the fulfilment and adequacy of the requirements requested by the GRANTOR regarding the SERVICES and computerized systems;



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Network Operations Center - NOC

The Network Operations Center (NOC) must centralize and manage all communication networks of OCC and REMOTE MANAGEMENT SYSTEM. From this environment and from computer programs that monitor the network, operators must monitor in real time the situation of each asset belonging to the MUNICIPAL STREET LIGHTING NETWORK equipped with a REMOTE MANAGEMENT SYSTEM.

For SERVICES execution, as foreseen in this study, all the materials and professionals necessary to work in each area of intervention must be made available at NOC, using as a reference the best practices of Information Technology applied in the market.

NOC shall implement solutions for real-time SERVICES management and STREET LIGHTING POINTS monitoring with remote management, with exact data control and allowing:

- Providing the operator with an overview of the network with remote management, with the ability to supervise, measure and control in real time, uninterruptedly, 24 hours a day, 7 days a week;
- Acting on a scheduled basis, individually or jointly, in the components of the STREET LIGHTING infrastructure with remote management;
- Executing, at least, the following remote controls:
 - Turning a LUMINAIRE on and off;
 - Turning on and off at the same time a set of LUMINAIRE;
 - Dimming of lighting, when applicable;
- Monitoring status (on or off and active/inactive dimming) in real time;
- Measuring and storing information about actual energy consumption;



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- Monitoring at least the following items:
 - Lamp failure;
 - Flashing lamp;
 - Lamp on during the day;
 - Lamp off at night;
 - Events list;
 - Real-time measurement of voltage, current and instantaneous and average power of the network.
- Recording component behavior changes, centralizing them in real time in the OPERATIONAL CONTROL CENTER (OCC);
- Enabling the activation of field teams to correct incidents and problems identified via the system, updating OCC on the status of service;
- Recording the exact moment of return to operation, controlling all service rates and efficiency of the service, in an integrated way with the OCC.

5.2.2 Management of Lighting Assets

Asset management must be carried out at OCC aiming at the conservation and updating, throughout the term of the CONCESSION, of the data collected and recorded in the REGISTRATION. The system must include a georeferenced GIS (Geographic Information System) database of all assets under the responsibility of the CONCESSIONAIRE, which must be used as an information base for the other solutions of the system and OCC.

The assets management must be carried out through:



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- Collection and recording of data from the initial IP network assets;
- Change in physical features (i.e., change in the type of lamp, bracket, LUMINAIRE, installed power) or location of already registered IP assets;
- Installation of new assets in the STREET LIGHTING network;
- Temporary or definitive withdrawal of assets from the STREET LIGHTING network;
- Reinstallation of temporarily withdrawn assets in the STREET LIGHTING network.

The CONCESSIONAIRE'S obligation and responsibility are:

- i. Making the REGISTRATION available on GIS base;
- ii. Updating the REGISTRATION during the CONCESSION TERM, as described in ANNEX 15 - REGISTRATION of the STREET LIGHTING NETWORK;
- iii. Ensuring the automation of the management and provision of information for the REGISTRATION
- iv. Carrying out the maintenance of the database and the current status of the REGISTRATION
- v. At a minimum, record the following information in the asset management system:
 - a. The REGISTRATION;
 - b. Images, documents, ANNEXES and thematic research;
 - c. Data that allow the determination of the lifespan of the assets;



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- d. Components subject to PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE.
- vi. Allowing minimally, in addition to the requirements defined earlier in this topic, for STREET LIGHTING POINTS equipped with a REMOTE MANAGEMENT SYSTEM:
 - a. Executing and storing queries about field devices and their main properties;
 - b. Generating and exporting reports regarding the queries made;
 - c. Configuring specific data for each field device, according to REMOTE MANAGEMENT SYSTEM use.

Operation Management

The management of the operation must be guaranteed through a system that guarantees the control of the maintenance and operation process of the MUNICIPAL STREET LIGHTING NETWORK. The system must integrate the maintenance and operation protocols of works and the control data of the fleet and of the teams in the field to monitor each SERVICE execution, as well as the location of the responsible team. It must generate, control and distribute SERVICE ORDERS to the teams, through open calls in web access systems, applications for mobile systems and call center. It must also update the REGISTRATION data according to the information sent by the field teams.

Field teams must have access to the system through mobile devices with access to the data network, allowing the visualization of the intervention history of the STREET LIGHTING POINTS listed in the service request. The system must allow controlling of materials used by each team. The planning of inspection routes for the rounds must be provided by the Central Management System, which must control the inspection



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teams of all STREET LIGHTING POINTS and ensure that the complete inspection of the MUNICIPAL STREET LIGHTING NETWORK is carried out within the established deadline.

The CONCESSIONAIRE'S obligations and responsibilities are:

- i. Prioritization and allocation of CORRECTIVE MAINTENANCE and, mainly, EMERGENCY MAINTENANCE calls;
- ii. Management of the work load of each team;
- iii. Support the generation of energy bill billing documents;
- iv. Inventory management;
- v. Route planning;
- vi. Configuration of execution processes for PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE;
- vii. Documentation of maintenance activities performed;
- viii. Update of failure data in STREET LIGHTING POINTS;
- ix. Printing maintenance reports directly from the map;
- x. Real-time, uninterrupted, 24 (twenty-four) hours a day, 7 (seven) days a week monitoring of:
 - a. Number of teams available;
 - b. Type of vehicle and/or equipment available;
 - c. Team composition;
 - d. Volume of pending, running and executed SERVICES by the team;
 - e. Geographical position of the teams;
 - f. Start of displacement;



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- g. SERVICE Location;
- h. Date and time of SERVICE execution;
- i. SERVICE execution time;
- j. SERVICES performed and the amount.
- xi. Optimized planning of field teams' tasks, verifying that the work was completed within the defined deadlines;
- xii. Providing mobile devices, equipped with GPS and data communication network, where field teams must point out the information to restore defective STREET LIGHTING POINTS;
- xiii. Integration with the call management system implemented at OCC, providing the necessary information for recording in the system operated at OCC, at least, from the moment of failures in the STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM and measurement of the time to perform the CORRECTIVE MAINTENANCE SERVICES at these points;
- xiv. Record of occurrences of defects in the MUNICIPAL STREET LIGHTING NETWORK that may originate (i) by the call center, (ii) by the identification in the field of the technicians responsible for maintenance and (iii) by the indication of the REMOTE MANAGEMENT SYSTEM;
- xv. The treatment of pending issues in SERVICES execution or SERVICES required by other public organs or other public service concessionaires that provide services in the CONCESSION AREA must be registered in the occurrences;
- xvi. Information on scheduled shutdowns from the DISTRIBUTOR COMPANY must also be recorded and used as a parameter for



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screening complaints;

- xvii. In the event of any incident involving an asset owned by the DISTRIBUTOR COMPANY, which impacts STREET LIGHTING SERVICES operation, the CONCESSIONAIRE must notify the DISTRIBUTOR COMPANY immediately so that necessary actions can be taken and notify the GRANTOR;
- xviii. In cases of verification of the existence of tree elements interfering with the quality of the STREET LIGHTING, the CONCESSIONAIRE shall notify the GRANTOR or organ indicated by it so that it takes the necessary actions.

Performance Management

The Central Management System must present a PERFORMANCE MEASUREMENT SYSTEM that shall assess the operational and managerial aspects of the CONTRACT execution. the PERFORMANCE MEASUREMENT SYSTEM shall allow the monitoring of the CONCESSIONAIRE'S performance, with the data made available to the GRANTOR and the INDEPENDENT VERIFIER.

The CONCESSIONAIRE shall, during the CONCESSION TERM, manage and monitor all SERVICES. For this, through the use of computerized systems implemented in OCC, reports must be generated to monitor the performance indexes.

The CONCESSIONAIRE'S obligations are:

- i. Registering in OCC computerized system, in addition to the data necessary to measure the performance indexes, at least:
 - a. Call stages by due date;



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- b. Recurrence of complaint;
 - c. Daily number of calls;
 - d. Failure rate by material type;
 - e. Monthly evolution of energy consumption;
 - f. Commissioning of works, if applicable.
- ii. Providing monthly reports of the systems managed by the CONCESSIONAIRE with the necessary information for performance measurement. Additionally, the INDEPENDENT VERIFIER must have unrestricted access to the CONCESSIONAIRE'S systems.

Project management

This system must allow the management of projects related to the SERVICES, including, among others, the analysis of the schedule, costs and necessary resources. All projects must be visualized in correspondence with maps and cartographic data from GIS database and the STREET LIGHTING asset management system. The system must:

- i. Have Access to REGISTRATION data;
- ii. Perform the information interface among projects, SERVICES and their respective places of execution;
- iii. Monitor the progress of each project, costs and resources employed;
- iv. Generate management reports on the progress of projects that allow monitoring by the CONCESSIONAIRE and the GRANTOR.

SPECIAL LIGHTING, MODERNIZATION AND EFFICIENCY projects and those

related to COMPLEMENTARY SERVICES must be managed with a platform



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that allows the elaboration of executive projects, graphically, with CAD resources and using GIS base.

The project system to be implemented by the CONCESSIONAIRE in OCC must use standardized structures for the budget of the networks and allow the generation of plans for works execution, which can be printed or recorded in digital format. These projects, when applicable, must conform to the standards of the DISTRIBUTOR COMPANY.

The CONCESSIONAIRE'S obligations are:

- i. Ensuring the integration of the project system to OCC'S ERP, to meet the needs of STREET LIGHTING projects that require works in the MUNICIPAL STREET LIGHTING NETWORK;
- ii. Ensuring the consistency of technical and registration information of all projects developed;
- iii. Enabling the integration of the project system with the REGISTRATION of the MUNICIPAL STREET LIGHTING NETWORK for its updating at the end of each project execution.

Management of Electric Energy Consumption

The Central Management System shall process all data from the remote monitoring control of the LUMINAIRES for the purpose of managing the use of electric energy.

The CONCESSIONAIRE'S obligations are:

- i. Managing the electricity consumption of the MUNICIPAL STREET LIGHTING NETWORK, seeking, throughout the CONCESSION TERM, to achieve the EFFICIENCY GOALS of energy consumption, as set out in this ANNEX.



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- ii. Determining the estimated energy consumption based on the installed load of the STREET LIGHTING POINTS and the operating time provided for in ANEEL Resolution 1000. At points equipped with a REMOTE MANAGEMENT SYSTEM, it must be possible to make a comparison between the estimated consumption and the consumption measured by the REMOTE MANAGEMENT SYSTEM;
- iii. Carrying out the monitoring, verification, control and monthly conference of electricity bills exclusive to the MUNICIPAL STREET LIGHTING NETWORK;
- iv. Assisting the GRANTOR in the negotiation of all POWER SUPPLY CONTRACTS;
- v. Meeting the requests of the GRANTOR with regard to information on the registration changes that may be necessary to update the electricity billing with the DISTRIBUTOR COMPANY;
- vi. Implementing a computerized system in OCC that allows:
 - a. Simulating the city's monthly energy bill based on the number of registered points;
 - b. Issuing reports on energy consumed [kWh] and energy expenditure [R\$] by neighborhood and street;
 - c. Simulating the energy consumption of the MUNICIPAL STREET LIGHTING NETWORK for different operating regimes (points off according to a defined schedule on certain days, points off at certain times, shorter nights and longer nights depending on the seasons and energy efficiency simulation);
 - d. Comparing the estimated electricity consumption, measured in STREET LIGHTING POINTS equipped with a REMOTE



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MANAGEMENT SYSTEM and the billed. The estimated energy consumption must be based on the wattage of the lamps registered in the georeferenced database, considering the losses in auxiliary equipment, and the operating time previously registered for each STREET LIGHTING POINT and SPECIAL LIGHTING equipped with such technology;

- e. Measuring the load levels of the own transformers, when applicable, and the voltage drop of the STREET LIGHTING circuits, ensuring an efficient management of STREET LIGHTING POINTS, indicating possible maintenance or improvement needs. The data must be stored for the creation of a historical series for the entire CONCESSION term;
- f. Storing a database and historical information on electricity consumption, measured by REMOTE MANAGEMENT SYSTEM;
- g. Generating reports of consumption and power supply failure by the DISTRIBUTOR COMPANY at STREET LIGHTING POINTS equipped with a REMOTE MANAGEMENT SYSTEM using spatial information, such as regional, neighborhoods, etc.

CONCESSIONAIRE Resource Planning

The CONCESSIONAIRE shall have an ERP resource planning system to support business processes. The processes covered and functionalities must be, at a minimum, the following:

- i. Project management:
 - a. Control of Project requests;
 - b. Monitoring and determination of service deadlines;



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- c. Cost management;
 - d. Integration with projects.
- ii. Materials management:
 - a. Registration of materials, suppliers and services;
 - b. Management of purchases of materials and contracting of works and services, as well as control of the respective deadlines and guarantees;
 - c. Material supply management;
 - d. Physical inventory (annual, rotating, sample);
 - e. Material forecasting and planning;
 - f. Consolidation of needs via MRP (Material Requirement Planning);
 - g. Centralized inventory management and warehouses.
- iii. Supplier quality management:
 - a. Management of registration and quality of suppliers, materials and services;
 - b. Supplier performance assessment;
 - c. Management of problem notifications to suppliers;
 - d. Results of receiving inspections and defect recording.
- iv. Controllershship:
 - a. Costs management;
 - b. Cost allocation;
 - c. Expense budget.



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- v. Investment management:
 - a. Investment budget management;
 - b. Monitoring of budget execution.
- vi. Accounting:
 - a. Balance sheet;
 - b. Income statement for the year;
 - c. Management of accounting assets.
- vii. Financial:
 - a. Bills to pay;
 - b. Bills to receive;
 - c. Cash management;
 - d. Financial flow;
 - e. Budget flow.
- viii. Vehicle fleet management.

5.3 Performance of Maintenance Services

The CONCESSIONAIRE shall be responsible for maintaining the MUNICIPAL STREET LIGHTING NETWORK, guaranteeing PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE SERVICES execution – Emergency Care, aiming at the MUNICIPAL STREET LIGHTING NETWORK to perform its function and operate in normal, standardized condition and safe from PHASE I. Maintenance SERVICES shall guarantee:

- i. Reduction in the failure rate: reduction in the number of corrective interventions in the MUNICIPAL STREET LIGHTING NETWORK, thus



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obtaining savings in the various operating costs and ensuring full functioning of the MUNICIPAL STREET LIGHTING NETWORK;

- ii. The continuity of the STREET LIGHTING SERVICE: CORRECTIVE MAINTENANCE SERVICES execution quickly in order to quickly restore the lighting level compatible with the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX;
- iii. The safety of facilities and people: prevention through regular monitoring of the state and quality of all equipment that make up the lighting system, eliminating mechanical and electrical risks.

The CONCESSIONAIRE shall follow the safety standards for the maintenance SERVICES of the MUNICIPAL STREET LIGHTING NETWORK as presented in item 2 of this ANNEX.

The CONCESSIONAIRE shall record all maintenance and update operations of the REGISTRATION, activities performed, vehicle route, labor data applied, materials and equipment removed, replaced and installed.

The CONCESSIONAIRE shall provide all components and supplies necessary for the complete performance of the activities, including, but not limited to, labor, expenses with Personal Protective Equipment (PPE), Collective Protection Equipment (EPC), materials and other equipment as needed.

The CONCESSIONAIRE is also responsible for guaranteeing, during the MODERNIZATION AND EFFICIENCY period, the proper functioning of the current and non-modernized STREET LIGHTING POINTS and, for all modernized STREET LIGHTING POINTS, ensuring, without interruption, that the lighting and efficiency requirements are met of the CONCESSION provided for in this ANNEX.

Until the completion of MODERNIZATION AND EFFICIENCY, whenever there is a need for maintenance in STREET LIGHTING POINTS not yet modernized,



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the use of materials and equipment taken from the existing network in areas already modernized and that are in good condition shall be allowed. It must be noted that the power and technology of the reused lamps must be equal to that of the replaced lamp.

The CONCESSIONAIRE shall carry out the operation and maintenance of the STREET LIGHTING POINTS in accordance with the result obligations regarding:

- i. Operation guarantee;
- ii. Assurance of the level of uniformity and illuminance;
- iii. Guarantee of excellence in the visual and aesthetic aspect;
- iv. Ensuring energy consumption / efficiency level;

The GRANTOR has the right to intervene in the maintenance procedures, establish corrective measures and penalties for the CONCESSIONAIRE, as well as impose conduct adjustments whenever the performance indexes are not reaching the minimum required values.

5.3.1 Predictive Maintenance

The PREDICTIVE MAINTENANCE activities must be started after the end of PHASE II and aim at determining the optimal point for performing maintenance/replacement SERVICES on the equipment of the MUNICIPAL STREET LIGHTING NETWORK.

The CONCESSIONAIRE shall perform, as a minimum, the following PREDICTIVE MAINTENANCE SERVICES:

- i. STREET LIGHTING POINTS with REMOTE MANAGEMENT SYSTEM where occurrences of non-compliance with electrical energy



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quality levels have been recorded in accordance with the criteria established by module 8 of PRODIST, prepared by ANEEL.

- ii. STREET LIGHTING POINTS where the CONCESSIONAIRE identified luminous flux depreciation above the specifications provided by the manufacturer, as detailed in the following topic.

The CONCESSIONAIRE shall use the necessary measurements for the Lighting Suitability Index (IAL), carried out by the INDEPENDENT VERIFIER, of the illuminance level of the samples from the MUNICIPAL STREET LIGHTING NETWORK to check that the luminous flux depreciation is in accordance with the manufacturer's indication.

The CONCESSIONAIRE must verify, for STREET LIGHTING POINTS without interference from trees and other external light sources, if the measured average illuminance level complies with the expected average illuminance level. The expected average illuminance level must be checked considering the installation date of the STREET LIGHTING POINT and the annual luminous flux depreciation as indicated by the manufacturer in the technical specification sheet of the STREET LIGHTING POINT.

The CONCESSIONAIRE shall assess the replacement of STREET LIGHTING POINTS which, according to the analysis of the luminous flux, may present illuminance levels below that required in this ANNEX for the LIGHTING CLASS of the way within up to 12 months.

5.3.2 Preventive Maintenance

PREVENTIVE MAINTENANCE activities comprise scheduled, periodic, systematic and well-defined actions/interventions aiming at increasing the probability of STREET LIGHTING POINTS operating within the expected lifespan and avoiding system failures, equipment wear, USER complaints or requests from the GRANTOR. Preventive actions are based on pre-



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determined time intervals and/or pre-established operating conditions that may be inappropriate.

All components of the MUNICIPAL STREET LIGHTING NETWORK must have regular PREVENTIVE MAINTENANCE actions programmed for them since the EFFECTIVE DATE. These actions must be registered in the PREVENTIVE MAINTENANCE Program, through the Central Management System, and may be indicated from the results of the PREDICTIVE MAINTENANCE.

Regarding PREVENTIVE MAINTENANCE SERVICES, the CONCESSIONAIRE shall:

- i. Prepare a Maintenance Program (PM) containing the detailed strategy, including the appropriate frequency, for PREVENTIVE MAINTENANCE actions on the MUNICIPAL STREET LIGHTING NETWORK equipment;
- ii. Register the PREVENTIVE MAINTENANCE SERVICES and update the REGISTRATION, including at least:
 - a. Components (materials, parts etc.) used and/or replaced;
 - b. Maintenance activity record.

Below are the minimum criteria for PREVENTIVE MAINTENANCE actions on the MUNICIPAL STREET LIGHTING NETWORK equipment.

5.3.3 Verification of general conditions of Street Lighting Network

The verification must be carried out periodically, in the full extent of the MUNICIPAL STREET LIGHTING NETWORK and in the SPECIAL LIGHTING points, in order to detect breakdowns and the state of conservation of the STREET LIGHTING POINTS.

In relation to the verification of the general conditions of the MUNICIPAL



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STREETLIGHTING NETWORK, the CONCESSIONAIRE must:

- i. Define and present in the Maintenance Program the frequency and way in which the verification SERVICES shall be performed (i.e. motorized patrols, REMOTE MANAGEMENT SYSTEM);
 - In relation to the verification SERVICE via Motorized Patrol, provision must be made, as a minimum: visual inspection of all STREET LIGHTING POINTS not covered by the REMOTE MANAGEMENT SYSTEM, with a periodicity not exceeding 15 days, in order to detect visible breakdowns of the equipment and the state of conservation of the MUNICIPAL STREET LIGHTING NETWORK.
- ii. Observe and record, when checking each of the STREET LIGHTING POINTS and SPECIAL LIGHTING points, at least the following items:
 - a. Number of lamps off, improperly on or with failures;
 - b. Existence of trees interfering with the quality of lighting;
 - c. Unit out of plumb, rammed, missing;
 - d. Missing LUMINAIRE or open compartment;
 - e. Bracket or support out of position;
 - f. Junction box with broken or missing cover;
 - g. Inappropriate lighting conditions;
 - h. Necessity of cleaning the optical assembly;
 - i. Irregularities that may put the security of USERS and employees operating on the networks at risk.
- iii. Perform the correction of irregularities and breakdowns at the time of their identification, if possible;



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- iv. Request, via a specific call system, the CORRECTIVE MAINTENANCE SERVICES of irregularities and unresolved breakdowns at the time of identification.

5.3.4 Components of the Municipal Street Lighting Network

The PREVENTIVE MAINTENANCE SERVICES described below must be applied to the MUNICIPAL STREET LIGHTING NETWORK under the CONCESSIONAIRE'S responsibility.

- I. Monitor via system, from the beginning of the implementation of the REMOTE MANAGEMENT SYSTEM, the operating state of the STREET LIGHTING POINTS and field devices and equipment of the REMOTE MANAGEMENT SYSTEM, ensuring the opening of calls when irregularities are identified and allowing:
 - Checking the connectivity of all STREET LIGHTING POINTS applicable to the REMOTE MANAGEMENT SYSTEM, via the system;
 - Checking the availability of the REMOTE MANAGEMENT SYSTEM software, keeping it online full time, 24 (twenty-four) hours a day, 7 (seven) days a week;
- II. Maintenance of exclusive STREET LIGHTING and SPECIAL LIGHTING poles, brackets and LUMINAIRES, including at least:
 - Cleaning, painting and sanding;
 - Removal of materials stuck to the STREET LIGHTING equipment;
 - Application of a final coat of paint and sanding or external cleaning of LUMINAIRES, when necessary to ensure excellence in the visual and aesthetic aspect.
- III. Perform, for the exclusive LUMINAIRE network, the following



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SERVICES:

- Underground network maintenance:
 - Check the connections in the junction boxes physically and with a thermal imager;
 - Visually inspect the Power cables;
 - Visually inspect the physical condition of the box and lid.
- Inspection on exclusive transformers:
 - Visually inspect terminals, insulators, surge arresters, connections and leaks;
 - Inspect all connections with a thermal imager;
 - Visually inspect the power cables;
 - Measure the ground resistance of the neutral and the phase- to-phase and phase-to-neutral voltages;
 - Measurement of the equipment's oil level and performance of physical-chemical tests and chromatographic analysis of gases dissolved in the insulating oil.
- Maintenance of low voltage control panels:
 - Visually inspect the circuit breakers, contactors and fuses, command switches, settings and functions of the astronomical clock and the state of the cabinets (doors, interiors and padlock);
 - Inspect all connections with a thermal imager;
 - Verification of the DR (Residual Differential Device);
 - SPD Checking (Surge Protection Device);
 - Measure earth resistance;
 - Clean the entire control panel;
 - Measure the voltage of the main Power rail;
 - Verification of the need to carry out painting service of control panels with application of a protective layer against rust.



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5.3.5 Corrective Maintenance

The CONCESSIONAIRE shall prepare and execute the Maintenance Program (PMAN), which shall determine the procedures for restoring the SERVICES to the desired, standardized and safety levels and conditions of the MUNICIPAL STREET LIGHTING NETWORK due to failures, accidents, theft, vandalism, poor performance, among others.

CORRECTIVE MAINTENANCE shall be carried out by:

- i. Identification of irregularities, when verifying the general conditions of the MUNICIPAL STREET LIGHTING NETWORK carried out by the CONCESSIONAIRE;
- ii. Request from USERS and the GRANTOR, via Call Center service operated by the CONCESSIONAIRE;
- iii. Identification of irregularities in STREET LIGHTING POINTS through the REMOTE MANAGEMENT SYSTEM.

The CONCESSIONAIRE shall define and present in the CORRECTIVE MAINTENANCE PROGRAM the operational procedures for CORRECTIVE MAINTENANCE SERVICES execution.

CORRECTIVE MAINTENANCE SERVICES shall include all components and equipment of the MUNICIPAL STREET LIGHTING NETWORK, located in overhead and underground networks, in tunnels, bridges, under passes and under passes and in the SPECIAL LIGHTING of the MUNICIPALITY locations. The CORRECTIVE MAINTENANCE actions that must be performed by the CONCESSIONAIRE are, at a minimum:

- i. Placement of cover in junction box;



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- ii. Cleaning the junction box and adequacy of its connections;
- iii. Correction of ballast and ignitor fixing of conventional LUMINAIRES;
- iv. Correction of position of brackets and/or LUMINAIRES;
- v. Identification of clandestine electrical loads in exclusive STREET LIGHTING networks, notification to the GRANTOR and, with its authorization, their elimination when applicable;
- vi. Closing of LUMINAIRES with open glass cover;
- vii. Replacement of glass cover in LUMINAIRES with broken cover;
- viii. Installation of missing units;
- ix. Transformer protection maneuver (primary switch) and power circuit exclusively to the MUNICIPAL STREET LIGHTING NETWORK;
- x. Replacement of magnetic or command protection switch;
- xi. Replacement of connectors;
- xii. Replacement of auxiliary equipment;
- xiii. Replacement of light source;
- xiv. Replacement of surge voltage protection;
- xv. Component replacement;
- xvi. Replacement of optical sets;
- xvii. Replacement of the STREET LIGHTING POINT identification plate;
- xviii. Replacement of the Power label of the LUMINAIRES;
- xix. Suppression, removal and replacement of units, equipment and other materials belonging to the MUNICIPAL STREET LIGHTING NETWORK;



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- xx. Clearance of the MUNICIPAL STREET LIGHTING NETWORK and its components from foreign objects, whenever found, except in the need for pruning of tree elements;
- xxi. Carrying out other SERVICES of a corrective nature in exclusive STREET LIGHTING equipment, appliances and structures.

The CONCESSIONAIRE shall register, via the system, and update the REGISTRATION, all CORRECTIVE MAINTENANCE SERVICES performed, including at least:

- Equipment removed, replaced and installed;
 - The registration of the maintenance activity;
- 5.3.6 Emergency Maintenance - Emergency Service

The CONCESSIONAIRE shall carry out EMERGENCY MAINTENANCE actions when USERS' physical integrity or MUNICIPALITY'S assets are at risk. These actions must be solved immediately, that is, they constitute corrective actions for prompt care. Examples of situations that generate emergency service SERVICES are:

- Collisions;
- Quantity greater than 10 (ten) sequential LIGHTING POINTS connected to the same network and turned off;
- Various impacts;
- Atmospheric phenomena;
- Fires/broken circuits;
- Brackets and LUMINAIRES imminent to fall;
- Junction boxes without lids;
- Roads or walkways obstructed with damaged components of



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STREETLIGHTING POINTS.

The CONCESSIONAIRE shall prioritize the emergency service, immediately after receiving the SERVICE ORDER, moving the vehicle and team closer to the place of occurrence, regardless of the route, workday and SERVICES scheduled for the day.

In situations that demand emergency SERVICES, the CONCESSIONAIRE must signal and isolate the risk location. In cases where the team deployed to perform the SERVICE is unable to solve or eliminate the risk, the appropriate maintenance team must be requested, keeping an employee on-site waiting for the specialized team.

The CONCESSIONAIRE shall notify the GRANTOR of the execution of the emergency service immediately, through exclusive communication channels, and launch the conclusion of the occurrence through the Central Management System. It must have its benefit guaranteed for 24 (twenty-four) hours a day, 7 (seven) days a week, uninterruptedly, and the CONCESSIONAIRE must therefore have a minimum team to meet existing demands and defined service deadlines, equipped with exclusive communication channels that operate in real time.

THE CONCESSIONAIRE shall also define and present in PM the operational procedures for EMERGENCY MAINTENANCE SERVICES execution.

5.3.7 Deadlines for services execution

The aforementioned CORRECTIVE MAINTENANCE and EMERGENCY MAINTENANCE actions have stipulated deadlines, counting from SERVICE ORDER opening by OCC, whose start is established from the moment the call to perform the maintenance SERVICE is registered in the Service Desk. The CONCESSIONAIRE shall perform the CORRECTIVE AND EMERGENCY



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MAINTENANCE SERVICES

according to the following provisions and deadlines:

The following table summarizes the deadlines described above.

Table 1 - Call attendance times

Type of Service	time for service
Attending calls on ROADS WITH REMOTE MANAGEMENT	In up to 24 hours
Attending calls in special areas	In up to 24 hours
Attending calls on other roads and places	In up to 48 hours
SPECIAL LIGHTING	In up to 48 hours
EMERGENCY MAINTENANCE	In up to 06 hours
Rural Area of the MUNICIPALITY	In up to 72 hours

Special areas are roads where there are public units (hospital, health center, school, etc.) that operate at night and roads with a higher crime rate. These routes will be defined by the GOVERNMENT during PHASE 0 (beginning of the Concession) upon validation of the Operation and Maintenance Plan (POM) and identified by the CONCESSIONAIRE during the execution of the BASE REGISTRATION.

Rural areas are areas located outside the URBAN zone and outside the districts headquarters

In order to comply with the service times defined for CORRECTIVE and EMERGENCY MAINTENANCE services execution at STREET LIGHTING POINTS, the period shall be counted from the moment of the call received by the call center, identification by the REMOTE MANAGEMENT SYSTEM or



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appointment by the motorized tour. The period shall be counted until the conclusion of the CORRECTIVE or EMERGENCY MAINTENANCE services.

In case of MUNICIPAL or DISTRIBUITOR authorization to service execution, the period from this request and the authorization shall not be considered.

5.4 Operational and Organizational Structure

The CONCESSIONAIRE shall perform the operational SERVICES according to the OPERATION AND MAINTENANCE PLAN (POM) and the MODERNIZATION PLAN (PM).

The SERVICES must meet the minimum quality requirements required for the MUNICIPAL STREET LIGHTING NETWORK according to the provisions, specifications and guidelines provided for in this ANNEX. The POM and PM plans must guarantee good practices and methodologies, through innovative and optimized approaches for STREET LIGHTING operation.

In order to optimize the MUNICIPAL STREET LIGHTING NETWORK operation, the actions must be centralized in the OPERATIONAL CONTROL CENTER, in which operation and maintenance actions must be directed through the Central Management System.

The technical specifications of the materials and equipment necessary for the performance of the operation and maintenance SERVICES, as well as their evolution according to the natural development of technologies, must be added to the CONCESSIONAIRE'S technical and physical collection on its own initiative, at the GRANTOR'S request or by legal and regulatory determinations. The specifications must be based on national and international standards, with provision for all items to be tested in laboratories accredited directly by INMETRO or by international laboratories that are part of current mutual accreditation agreements with INMETRO, provided they are proven and



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with sworn translation. The specifications must be signed by engineers in charge, accompanied by CREA number, collected and recorded in the respective ARTs.

5.5 Teams

The CONCESSIONAIRE shall be responsible for establishing enough teams to perform the required operational SERVICES for the MUNICIPAL STREET LIGHTING NETWORK, as well as for sizing the team of professionals necessary to meet the quality requirements and deadlines required, who must be qualified and have training and technical qualifications necessary for the practice of their professional activities.

The CONCESSIONAIRE shall make available all the equipment and tools necessary to the teams, to provide SERVICES efficiently, correctly and safely, meeting the relevant safety standards. Among these tools are mobile devices, which must contain an integrated Central Management System module and direct communication with OPERATIONAL CONTROL CENTER operators.

All actions by field teams must be carried out with a compliance guarantee with environmental, quality and safety standards.

5.5.1 Fleet management

Vehicles

The CONCESSIONAIRE shall ensure vehicles available to its operating teams for quick SERVICES execution required by the MUNICIPAL STREET LIGHTING NETWORK. Enough vehicles must be provided, so that any needs for concomitant actions do not have their execution deadlines affected. Additionally, this fleet must also allow the of SERVICES execution in the event



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of unavailability of vehicles due to overhauls, mechanical defects, among others.

Vehicles must be kept in good use conditions, with frequent inspections and maintenance guaranteed. The CONCESSIONAIRE shall be in charge:

- **Fleet PREVENTIVE MAINTENANCE:** It must be carried out periodically, according to parameters (time and/or mileage) previously defined. In addition to the aforementioned process, SERVICE ORDERS must also be issued with the list of maintenance SERVICES performed on the vehicles, either at the CONCESSIONAIRE'S own workshop or third parties;
- **Fleet CORRECTIVE MAINTENANCE:** It shall be performed on demand in the vehicles that make up the CONCESSIONAIRE'S fleet, maintenance SERVICES due to accidents or mechanical failures, information that must be documented through the preparation of opinions on recklessness and/or malpractice, in addition to SERVICES ORDER issuance performed.

Additionally, vehicles must comply with current legislation, presenting minimum safety requirements for the driver, passengers and third parties. All vehicles must have, at a minimum, insurance against third-party damage.

The CONCESSIONAIRE's fleet vehicles must be suitable for the SERVICES nature of the requested fields.

The CONCESSIONAIRE shall be responsible for maintaining the vehicles for exclusive use for CONTRACTED SERVICES execution duly identified, according to the vehicle signaling standard indicated by the GRANTOR.

The CONCESSIONAIRE shall install tracking equipment in all vehicles, duly sealed for proof of violations and equipped with a continuous route record feature.



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The CONCESSIONAIRE shall guarantee vehicles for the promotion of periodic rounds in the MUNICIPAL STREET LIGHTING NETWORK at all STREET LIGHTING POINTS, except for those equipped with a REMOTE MANAGEMENT SYSTEM. When the REMOTE MANAGEMENT SYSTEM is inoperative, the CONCESSIONAIRE shall guarantee a contingent of vehicles to perform the patrol SERVICES at STREET LIGHTING POINTS where the REMOTE MANAGEMENT SYSTEM is not operating properly.

The CONCESSIONAIRE shall provide a report, whenever requested by the GRANTOR, informing the route of the vehicles used for the SERVICES and inspection, duly identified by vehicle and activity.

Vehicles must be in perfect working order, presentation, cleanliness, safety, as well as complying with current legislation.

Conductors

The processes related to driver management aim to ensure that the CONCESSIONAIRE'S workforce, responsible for driving the vehicles in the fleet, presents the necessary qualifications to perform the services, at the established quality levels:

- Control of Infraction Notices: Execute on demand, when there are communications by the transit agencies, the collection of data for identification of the driver and protocol with the DETRAN for recognition of the person responsible for the infraction;
- Driver's License Control: Driver data registered in the system must be updated routinely, as needed, allowing the driver to control the driver's need to renew the document (CNH).



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5.5.2 Operating Unit

The CONCESSIONAIRE must present an operational unit located in the MUNICIPALITY with enough number of teams to meet the deadlines and performance indexes, which must be equipped with the necessary equipment for operations in the MUNICIPAL STREET LIGHTING NETWORK.

The other facilities necessary for the fulfilment of operating SERVICES, such as warehouses, workshops, inventories, among others, must be included in the unit. It is not critical that such additional facilities be located in the same environments as the operating unit, although it is highly recommended. Good logistics must be guaranteed, so that the agility in SERVICES execution is not compromised.

Materials Management

For the management of STREET LIGHTING materials and equipment, the CONCESSIONAIRE shall be responsible for controlling acquisitions, new materials and those removed from the network.

The materials used in SERVICES execution must be acquired by the CONCESSIONAIRE in accordance with the technical specifications of defined materials and the relevant standards. All materials necessary for SERVICES execution must be provided by the CONCESSIONAIRE.

The CONCESSIONAIRE shall prepare the technical specifications of all materials used in the MUNICIPAL STREET LIGHTING NETWORK, establishing and maintaining the technical procedure to guarantee the quality of materials, manufacturers and suppliers, as well as control of the warranty period. The materials must have a durable, legible and indelible identification with the CONCESSIONAIRE'S name, containing a unique identification number or code defined at the CONCESSIONAIRE'S discretion and duly



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approved by the GRANTOR.

The materials can be inspected at any time by the GRANTOR, either in the CONCESSIONAIRE'S warehouses or in the field.

The GRANTOR shall have free access, at any time, to all documentation requested in the material acquisition stages, from the issuance order to its receiving. The CONCESSIONAIRE shall maintain all the necessary procedures to ensure full traceability and quality control of the materials.

Inventory Management

The CONCESSIONAIRE shall define the stock policies, as well as the supply policies for the basic items that shall be adopted throughout the CONCESSION. For this, inventory management must be performed, covering the segmentation of STREET LIGHTING material families to be stored in the CONCESSIONAIRE'S warehouse, definition of minimum stock, safety stock, maximum stock and resupply points to support the operation and maintenance of STREET LIGHTING POINTS, during the term of the CONTRACT.

The CONCESSIONAIRE shall have an exclusive warehouse with an independent area, to meet the demand for replacement of materials and equipment, as well as guarantee the storage of stock and materials removed from the MUNICIPAL STREET LIGHTING NETWORK as a result of SERVICES execution.

The sizing is the CONCESSIONAIRE'S responsibility, which must consider the volume occupied by the estimated operational stock and the return of materials removed from the MUNICIPAL STREET LIGHTING NETWORK. In addition, the warehouse must have a covered area, a place for use by the GRANTOR's inspection and space exclusively for the temporary storage of materials and/or waste classified as environmental crimes defined by law.



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The CONCESSIONAIRE shall:

- a) Have equipment that guarantees the proper packaging and movement of materials, with shelves, pallets, cabinets, forklift, pallet cart, scales, benches for testing components of STREET LIGHTING POINTS;
- b) Provide manpower for handling services;
- c) Have an inventory control system and material movement;
- d) Have computer equipment, telephone line and qualified employees to operate the inventory control system and material movement in its possession;
- e) Store properly and separately, in order to ensure the integrity, conservation and control of all new or removed materials from the MUNICIPAL STREET LIGHTING NETWORK;
- f) Guarantee free access to the GRANTOR, at any time, to the CONCESSIONAIRE'S material deposits to control the requirements necessary in this ANNEX and monitor extraordinary and routine activities;
- g) Ensure procedures execution related to sorting, treatment, reuse, disposal, among others, as specified in the Materials Treatment and Disposal Program -PTDM.

Replacements System

The LUMINAIRES replacement must be carried out in a safe and efficient manner, by means of a team trained to perform the SERVICE and provided with adequate equipment and must be organized to generate the least possible inconvenience in USERS' daily life.

Lamps and other components removed from STREET LIGHTING POINTS,



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which are in good working order, may be stored in stock.

Regardless of the lighting technologies used in the aforementioned replacements, constant and immediate updates must be carried out in the REGISTRATION.

Final Destination

The CONCESSIONAIRE shall observe the rules set forth in ANNEX 6 - ENVIRONMENTAL GUIDELINES in relation to materials removed from the MUNICIPAL STREET LIGHTING NETWORK.

Basic Guidelines for Safety and Work Execution

Below are the basic guidelines in relation to safety engineering and occupational medicine procedures, intended to instruct the CONCESSIONAIRE in SERVICES provision.

Field teams must have all the tools for individual and collective use for the proper SERVICES execution with safety at work, including Personal Protective Equipment - PPE and Collective Protection Equipment - CPE.

The CONCESSIONAIRE shall comply, in the CONTRACT execution, with the Regulatory Standards - NR – of Chapter V, Title II, of the Consolidation of Labor Laws, relating to Occupational Safety and Medicine of MTB Ordinance No. 3,214 of 06/08/78, as well as all other Regulatory Norms pertinent to each activity.

The CONCESSIONAIRE shall adopt the necessary measures aimed at minimizing the probabilities of accidents involving people, property or assets, of the CONCESSIONAIRE'S, the GRANTOR'S or third parties', complying with the requirements of work instructions to be prepared by the CONCESSIONAIRE.

In the development of its activities, the CONCESSIONAIRE shall:



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- i. Possess and keep up to date a complete Work Safety program, which may be requested by the GRANTOR for analysis and proposition of recommendations and improvements;
- ii. Bear the costs related to the inspection of specialized entities indicated by the GRANTOR, with the purpose of verifying, in loco, compliance with established safety determinations;
- iii. Keep all its employees fit and prepared to carry out their duties, through theoretical and practical training for first aid provision, as well as the correct use of fire extinguishing agents and individual and collective protection equipment;
- iv. Meet the requirements and best practices regarding work safety and related legislation, especially the provisions of Regulatory Norms nº 4 and 5 of Ordinance 3,214 of 06/08/78 of the Ministry of Labor, maintaining a specialized service in safety engineering, as well as an Internal Accident Prevention Commission – CIPA;
- v. Maintain strict work safety control over loading, unloading and transport operations of any nature, material or personnel;
- vi. Maintain, when applicable, SERVICES sites with sanitary facilities, potable water and comfort conditions for employees in accordance with current legislation, in addition to keeping accommodation, changing rooms, cafeterias and other facilities in adequate hygiene conditions.

In case of accidents, the CONCESSIONAIRE must immediately notify the GRANTOR through a traffic accident report (CAT). The information provision on accidents to mass dissemination organs is exclusive to the GRANTOR.

The GRANTOR reserves the right to make other demands on the CONCESSIONAIRE, through reasoned decisions, with respect to work safety, including considering any contractual changes, whenever it deems necessary



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for people's, property's and assets' protection.

5.5.3 Organizational structure

The CONCESSIONAIRE shall establish enough organizational structure to provide the SERVICES. This structure shall include executive, administrative, financial, operational and logistical aspects, as well as being responsible for the processes of providing STREET LIGHTING SERVICES by the CONCESSIONAIRE.

Logistics services, human resources and other functionalities, regarding MUNICIPAL STREET LIGHTING NETWORK operation, must also compose the structure by the CONCESSIONAIRE

5.6 Implementation of Special Lighting

Within the deadlines established in the CONTRACT and in the item 3 of this ANNEX, the CONCESSIONAIRE shall carry out the works related to the implementation of SPECIAL LIGHTING in the pre-stipulated locations, and modernization of the existing

SPECIAL LIGHTING points, according to the guidelines and specifications set out in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING. It must be noted that the CONCESSIONAIRE shall be responsible for the maintenance and operation of these points.

5.7 Guidelines for Modernization and Efficiency of Street Lighting Network

During the period of MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS, the CONCESSIONAIRE shall observe the guidelines set



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out below, also considering them in the preparation of the MODERNIZATION PLAN:

- i. Guarantee, at the end of the MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS, the achievement of the EFFICIENCY GOAL;
- ii. Ensure that the installation of STREET LIGHTING POINTS is based on the project guidelines established in this ANNEX;
- iii. Ensure that the installation of STREET LIGHTING POINTS meets all technical specifications of equipment and materials established in this ANNEX.

5.6.1 Installation of New Street Lighting Points to Correct Dark Areas

MODERNIZATION AND EFFICIENCY of the MUNICIPAL STREET LIGHTING NETWORK must occur in all existing public places and, in some cases, it may require new STREET LIGHTING POINTS in places called dark areas: ways that currently have lighting, but do not have the parameters that enable compliance with the illuminance and uniformity requirements set forth in this ANNEX.

It must be noted that the CONCESSIONAIRE is obliged to adapt the STREET LIGHTING infrastructure of both INITIAL MUNICIPAL STREET LIGHTING NETWORK and that resulting from the expansion of the MUNICIPAL STREET LIGHTING NETWORK, aiming at meeting the parameters of the PERFORMANCE MEASUREMENT SYSTEM.

The installation of new STREET LIGHTING POINTS to correct dark areas shall not be considered a COMPLEMENTARY SERVICE and shall not be computed for the purposes of using the CREDITS BANK.



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5.6.2 Design Guidelines for Modernizing the Municipal Street Lighting Network

In addition to promoting the MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS, the CONCESSIONAIRE shall ensure that the STREET LIGHTING SERVICE is in line with the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX. In this sense, the CONCESSIONAIRE shall develop MODERNIZATION AND EFFICIENCY projects for the existing public spaces in accordance with the guidelines established in this ANNEX.

For executive projects for MODERNIZATION AND EFFICIENCY of STREET LIGHTING POINTS, the CONCESSIONAIRE shall:

- I. Identify and include in the REGISTRATION the classification of the MUNICIPALITY's ways according to the provisions expressed in ANNEX 17 -CLASSIFICATION OF THE MUNICIPALITY ROADS;
- II. Establish STREET LIGHTING SERVICE that avoids high levels of glare and light pollution. The lighting levels obtained in the lighting project must not exceed twice the lighting requirements required in this ANNEX;
- III. Define energy-efficient lighting solution for existing public spaces based on the lighting project and, consequently, compliance with the lighting requirements expressed in this ANNEX;
- IV. Consider, in the preparation of lighting projects for existing public spaces, the maintenance factor that incorporates the natural depreciation of lighting equipment and the degradation of the luminous flux due to urban pollution;
- V. Consider information about afforestation in the preparation of the aforementioned projects for structural adequacy, in order to promote compatibility between vegetation and STREET LIGHTING;



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- VI. Present the lighting projects for approval by the GRANTOR in accordance with the guidelines, specifications and lighting requirements established in this ANNEX, as well as relevant legislation;
- VII. Present ART (Technical Responsibility Note) of electrical and lighting projects;
- VIII. Submit approval and technical specifications of metal STREET LIGHTING brackets/supports and poles, in the event of replacement or implementation of said structures;
- IX. Implement STREET LIGHTING POINTS observing the following correlated color temperature (CCT) ranges by type of PUBLIC:
 - a. Public roads classified as Rapid Transit, Collector and Arterial: TCC up to 4,000 K;
 - b. Public roads classified as Places and Squares, Cemeteries and Parks: TCC up to 3,000 K;
 - c. Sports courts and fields: TCC up to 5,000 K.

In order to perform the MODERNIZATION AND EFFICIENCY SERVICES of STREET LIGHTING POINTS installed on vehicle and pedestrian paths, the CONCESSIONAIRE shall:

- i. Develop lighting projects developed for each street to be modernized, complying with the guidelines and specifications established in the item 3, including the proposal to install any new STREET LIGHTING POINTS to meet the lighting requirements set out in this ANNEX. The lighting project must be prepared in such a way as to dispense with any need to relocate the electric energy distributor's poles to meet the requirements established in this ANNEX. When there is a need to install new STREET LIGHTING poles in order to meet the requirements of this ANNEX, the investment shall be borne by the CONCESSIONAIRE



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without consumption by the CREDIT BANK. The lighting projects must be developed in specific software compatible with those used by the GRANTOR, using the technical specifications of LUMINAIRES in accordance with data from type tests and their certifications.

- a. LIGHTING CLASS according to the guidelines established in ANNEX 17 - CLASSIFICATION OF MUNICIPALITY ROADS;
- b. Width of roads;
- c. Number and width of the Rolling lanes;
- d. Type of roadway paving, according to CIE 132-1999 and CIE 144-2001 or IES RP-8 standards;
- e. Distance among STREET LIGHTING POINTS;
- f. Pole height;
- g. Type and horizontal projection of the support bracket
- h. LUMINAIRE mounting height;
- i. Quantity of LUMINAIRES per pole;
- j. Degree of installation inclination of the LUMINAIRES;
- k. Type of transverse and longitudinal distribution of the luminous flux;
- l. Color temperature [K];
- m. Maintenance Factor determined based on the gradual depreciation of the luminous flux determined in the type tests and among other factors associated with cleaning and maintenance services;
- n. Light Scatter (BUG Index);
- o. Assessment of the existence of tree elements or other elements that may impact the lighting of the road



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- ii. Meet the minimum levels of average illuminance, uniformity factor, average luminance, global uniformity and longitudinal uniformity for the respective lighting classes, as provided for on ABNT NBR 5101:2018 Standard, or another that may replace it, according to the following table:

Table 2 – Average illuminance requirements and illuminance uniformity factor - ABNT NBR 5101:2018

Class of Lighting	Minimum average illuminance EMED, MIN [lux]	Minimum Uniformity Factor UMIN
V2	20	30%
V3	15	20%
V4	10	20%

- iii. Meet the minimum levels of average illuminance and uniformity factor for pedestrian paths provided for on ABNT NBR 5101:2018 Standard, or another that replaces it, according to the table below:

Table 3 – Minimum lighting requirements by type of pedestrian traffic lane - ABNT NBR 5101:2018

Class of Lighting	Minimum average illuminance EMED, MIN [lux]	Minimum Uniformity Factor UMIN
P1	20	30%
P2	10	25%
P3	5	20%

- iv. Meet the minimum lighting levels in tunnels and under passes covered



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by ABNT NBR 5181;

- v. For STREET LIGHTING POINTS classified as a TERMINAL STREET LIGHTING POINT in the REGISTRATION, the lighting requirements provided for in this ANNEX must be observed only in a span adjacent to the point towards the pole less than 100 meters on the same way. levels must be met lighting minimums provided for on ABNT NBR 5101:2018 Standard.
- vi. For STREET LIGHTING POINTS classified as ISOLATED STREET LIGHTING POINT in REGISTRATION, the lighting requirements provided for in this ANNEX must be observed, considering a measurement grid at 17,5 meters from the point for each direction of the way. In this case, 50% of the levels provided for the road must be met, according to its classification Norm ABNT NBR 5101.
- vii. In the development of the lighting design, consider reducing light pollution and reducing the level of glare caused by the angle of inclination of the LUMINAIRE, the curve and the type of distribution.

To perform the MODERNIZATION AND EFFICIENCY SERVICES of STREET

LIGHTING POINTS installed in squares and parks, the CONCESSIONAIRE shall:

- i. Develop lighting projects for the public space destined for squares and parks in such a way that in the sections of pedestrian circulation and leisure areas the minimum levels of average illuminance and uniformity are met according to LIGHTING CLASS P2, recommended for squares and parks, presented in Table 2. It must be noted that projects for squares and parks may have an average illuminance level of up to 20 lux, depending on their use, features and public safety. In this sense, the CONCESSIONAIRE shall determine the need for greater luminous



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flux intended for squares and parks, while the GRANTOR may demand from the CONCESSIONAIRE said lighting level to the CONCESSIONAIRE through the technical foundation;

- ii. Ensure STREET LIGHTING in squares and parks that at least allows for orientation, mutual recognition between people, safety for pedestrian traffic and the correct identification of obstacles, as well as ensuring, at a safe distance, sufficient visual information about the movement of passers-by;
- iii. Distribute the STREET LIGHTING structures so as neither to obstruct the access of emergency, delivery or maintenance vehicles, nor to compete with the local architecture;
- iv. Lighting for squares and parks must pay special attention to lighting stairs and pedestrian access ramps, in particular ensuring that changes in levels are clearly visible with a level of at least 1 lux;
- v. Consider applying differentiated design criteria for different areas such as gardens, toys, table games and courts, using arrangements of LUMINAIRES, decorative lighting or projectors;
- vi. Consider adequate lighting for statues, band stands and other special spots in squares and parks.

To carry out the MODERNIZATION AND EFFICIENCY projects for the MUNICIPALITY'S bike paths and ways, the CONCESSIONAIRE shall:

- i. Develop a lighting Project that meets the minimum lighting requirements expressed below:

Table 4 – Minimum lighting requirements for cycle paths and cycle paths



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Nature of the bike path	Lighting class	Average illuminance (lx)	Uniformity Factor
Ways that cross vehicle ways.	C1	15	0.20
Ways adjacent to vehicle traffic ways	C2	10	0.20
Ways not adjacent to vehicle traffic ways or crowded in medians or sidewalks	C3	5	0.20

- ii. The deadline for MODERNIZATION AND EFICIENTIZATION of STREET LIGHTING POINTS in other types of public places corresponds to the same deadline for street lighting in the MUNICIPALITY.

5.6.3 Equipment and Material Specifications

The CONCESSIONAIRE may only install, in the MUNICIPAL STREET LIGHTING NETWORK, LUMINAIRES certified and registered by INMETRO, in accordance with Ordinance No. 20 or another that may replace it. The technology used in the MUNICIPAL STREET LIGHTING NETWORK must comply with the technical parameters, tests, among other requirements present in the regulations presented in the normative references item, as well as the following minimum technical specifications.

- **Energy Efficiency (EE):** LUMINAIRE with minimum ENERGY EFFICIENCY according to class A of Ordinance No. 20 of INMETRO. In the calculation of this efficiency, auxiliary equipment of the LUMINAIRE must be considered;
- **Maintenance of the luminous flux:** minimum 70% after 60,000 h of use for maximum environment temperature 35 °C according to IES LM-80 and TM-21;



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- **Protection index (IP):** the LUMINAIRE housing must ensure the degree of protection against the penetration of dust, solid objects and moisture (minimum IP-66), according to the classification of the LUMINAIRE and the IP code marked on the LUMINAIRE. The degree of protection must be certified by tests based on ABNT NBR IEC 60529;
- **Protection against external mechanical impacts:** LUMINAIRES must have a resistance to external mechanical impacts corresponding, at least, to the degree of protection IK-08 according to ABNT NBR IEC 62262;
- **Electrical requirements:** The electrical and optical features must comply with IESNA LM-79, ANSI/IEEE C.62.41-1991 – Cat. C2/C3, IEC PAS 62717, IEC PAS 62722-2-1, IEC 61643-11, IEC 62504, IEC 62031, NBR IEC 60598-1, NBR IEC 60529, NBR 15129, NBR NM 247-3, NBR 9117. LUMINAIRES must have a minimum limit of inductive or capacitive power factor, according to rules established by ANEEL at the time of installation. Presence of a protection device against voltage surges connected in series to the electrical supply of the LED LUMINAIRE.
- **Surge Protection Device:** The LUMINAIRES must be equipped with a protection device against voltage surges with electrical installation in the LUMINAIRES according to ABNT NBR 5410;
- **Adherence to REMOTE MANAGEMENT SYSTEMS:** LUMINAIRES must have technology compatible with all the functions of the REMOTE MANAGEMENT SYSTEM and a connection point for installing remote management equipment;
- **Photometry:** LUMINAIRES must be classified according to criteria contained in ABNT NBR 5101:2018 Standard for longitudinal distribution (Short, Medium and Long), transversal distribution (Type I,



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II and III) and control of light intensity distribution (full cut-off, cut -off and semicut-off);

- **Finishing:** all non-energized metal parts of LUMINAIRES must receive anti- corrosion treatment;
- **Electronic driver:** The driver must meet the standards NBR IEC 605981, NBR15129, NBR IEC 60529, IEC 61347-1, NBR IEC61347-2-13, IEC 61547, NBR 16026, IEC 61000-3-2 C, IEC 61000-4-2/3/4/5/6/8/11, IEC 61000-3-3, EN 55015, CISPR 15/22 and FCC Title 47 CFR part15/18 Non-Consumer-Class A and the following items:
- **INMETRO certification:** the CONCESSIONAIRE must present the certification of the LED LUMINAIRE issued by INMETRO referring to Ordinance no. 20, or another to replace it. In case of revocation or suspensionof Ordinance no. 20 of INMETRO must be presented, at least, the following items:
 - **Certification:** LUMINAIRES must present the certificates required byINMETRO Ordinance No. 20.
 - **Laboratory tests:** The CONCESSIONAIRE shall present sample laboratory tests and tests that analyze, at least, the following parameters:
 - Light source supply voltage (V);
 - Light source power (W);
 - Light source supply current (A);
 - Power factor;
 - Total luminous efficacy;
 - Color temperature;



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- Color rendering index;
- Insulation resistance;
- Dielectric strength;
- Total harmonic distortion (THD);
- Input current of the lamps or LED modules (if applicable) of the LUMINAIRE (Icc);
- Input voltage of the lamps or LED modules (if applicable) of the LUMINAIRE (Vdc);
- luminous flux of LUMINAIRE (lm);
- Rated voltage of lamps or LUMINAIRES (V);
- Rated current of the lamps or LUMINAIRES (bad);
- Maximum junction temperature (°C);
- Lamp/LUMINAIRE manufacturer.

With respect to the tests and laboratory tests referred to above, the CONCESSIONAIRE shall:

- I. Record all tests performed, including at least:
 - a. Recognition of each of the STREET LIGHTING elements assessed in the sample, with an indication of their identification from the REGISTRATION;
 - b. Date of realization;
 - c. Results obtained.
- I. To guarantee the performance of tests in laboratories accredited by INMETRO or competent organs approved by the GRANTOR (the tests must demonstrate compliance with INMETRO Ordinance No. 20 – Technical Quality Regulation for LUMINAIRES for STREET LIGHTING, or succeeding



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ordinance);

- II. Forward the results obtained in the tests to the GRANTOR;
- III. Submit to the GRANTOR any requests for disregarding items, provided that they are duly justified;
- IV. Replacement of STREET LIGHTING equipment that presents insufficient quality and performance according to the parameters established in this ANNEX;
- V. Bear all costs related to the exchanges, tests, verification and analysis of the facilities;
- VI. Provide new tests, if requested by the GRANTOR.

5.6.4 Procedures for MODERNIZATION AND EFFICIENCY SERVICES execution

So that the SERVICES MODERNIZATION AND EFFICIENCY are duly executed by the CONCESSIONAIRE and, after their conclusion, accepted by the GRANTOR for the purpose of proving compliance with the CONCESSION MILESTONE, the following obligations and responsibilities must be followed:

THE CONCESSIONAIRE shall:

- I. Prepare and forward to the GRANTOR the projects related to the MODERNIZATION AND EFFICIENCY and implementation of STREET LIGHTING POINTS and the REMOTE MANAGEMENT SYSTEM, provided for in the period, in accordance with the MODERNIZATION AND EFFICIENCY Program (PME), the REMOTE MANAGEMENT SYSTEM Implementation Program and this ANNEX. If the project increases the installed load up to the limit value established in the technical standard of the DISTRIBUTOR COMPANY, the project must be submitted for approval to the DISTRIBUTOR COMPANY. They must contain, at a minimum:
 - a. Complete implementation plan, containing:
 - Detailed schedule for SERVICES execution and completion;
 - Quantity of materials to be used.



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- b. Lighting projects according to the guidelines established in the item 5.6
 - c. Electric projects;
 - d. Structural projects;
 - e. Detailing of the STREET LIGHTING POINTS involved, duly georeferenced, present in the REGISTRATION;
 - f. List of materials contained in the projects;
 - g. Complete technical specifications of the materials used;
 - h. Complete technical specifications of the technologies to be implemented in STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM, including, at a minimum:
Software/platform to control the REMOTE MANAGEMENT SYSTEM; Connectivity network and REMOTE MANAGEMENT SYSTEM control devices;
 - i. Assembly electrical diagrams;
 - j. Calculation memory of the loads involved to be removed and installed;
 - k. Existing and future electrical loads, for possible changes in the features of transformer stations;
 - l. Signatures of the responsible engineers, accompanied by CREA number, collected and noted down the respective ART, in accordance with current regulations.
- II. Make available to the GRANTOR, together with the MODERNIZATION AND EFFICIENCY, minimally:
- a. Physical samples of the REMOTE MANAGEMENT SYSTEM technological solutions selected by him for the STREET LIGHTING POINTS equipped with the REMOTE MANAGEMENT



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SYSTEM;

- b. Physical samples of the lighting technological solutions selected by the GRANTOR;
 - c. Certificates from laboratories accredited by INMETRO or competent organ, for approval of the technology used for lighting according to Ordinance No. 20 that regulates the minimum technical requirements that attest to the quality of the material in class A - INMETRO;
 - d. Registration with INMETRO that authorizes the marketing of a product or service and the use of the conformity identification seal;
 - e. Certificates from laboratories accredited by INMETRO or the competent organ, if any, for the approval of the technology used for remote management;
- iii. Ensure that the projects developed meet the following requirements:
- a. Compliance with item equipment and material specifications 5.6 ;
 - b. Use, preferably, of a single LUMINAIRE model for STREET LIGHTING POINTS located on the same street, with the exception of cases in which the urban design requires more than one model and in cases where the existing model is not capable of meeting the requirements set forth in this ANNEX;
 - c. Review and/or replacement, if necessary, of connections to the electrical network;
 - d. Inclusion of exclusive circuit, IF necessary;
- iv. Make the necessary changes to the projects, if requested by the GRANTOR to review them, within the period provided for in the



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CONTRACT. In this case, the CONCESSIONAIRE shall start the intended MODERNIZATION AND EFFICIENCY SERVICES only after the approval of the revised projects, except as provided in the CONTRACT;

- v. Formally communicate to the GRANTOR, upon completion of MODERNIZATION AND EFFICIENCY SERVICES, accompanied by the “as built” of each project. The “as built” must be accompanied by the lists of materials used and the date of energization, as well as the results of the lighting requirements referenced in item 5.6. For STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM, proof of the remote management capacity of these points, so that their operation complies with the functionalities established in item 5.8 of this ANNEX, elements to be delivered as follows:
 - a. Structural (civil), electrical and lighting projects, in digital format: AUTOCAD and STREET LIGHTING software and PDF;
 - b. Detailed list of materials, of public places, with the respective amounts of STREET LIGHTING POINTS, containing the data and registration information, according to ANNEX 15 - REGISTRATION of the STREET LIGHTING NETWORK, in digital media.
 - c. Printed copies of items a. and b., on paper, may be requested at GRANTOR'S discretion.
- vi. Carry out jointly with the GOVERNMENT, after completion of the MODERNIZATION AND EFFICIENCY SERVICES, the measurements of the minimum average illuminance “EMED, MIN”, of the minimum uniformity factor “U” as indicated in item 5.6 of this ANNEX for each lighting class, in accordance with the inspection guidelines of the ABNT NBR 5101 Standard, and the measurement of



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the TCC by means of instruments approved by INMETRO, as well as proof of compliance with all the conditions established in the project. For the STREET LIGHTING POINTS that are covered by the REMOTE MANAGEMENT SYSTEM, it will also be verified if they have all the field devices provided for in the PIST and in the projects previously delivered by the CONCESSIONAIRE and if the REMOTE MANAGEMENT SYSTEM is in full operation and in compliance with the guidelines, specifications and functionalities expressed in item 5.8. The measurement will be carried out through on-site sample verification. The sample of modernized STREET LIGHTING POINTS must have a minimum size as established in the ABNT NBR 5426 Standard, general inspection level 2 (two) and a normal simple sampling plan. The modernized STREET LIGHTING POINTS to be inspected must be randomly defined by the INDEPENDENT VERIFIER and/or GRANTOR. The measurements must be carried out by the CONCESSIONAIRE and may be monitored and/or audited by the INDEPENDENT VERIFIER and/or GRANTOR;

- vii. Forward certifications and the results of laboratory tests, regarding the quality of the equipment installed in MODERNIZATION AND EFFICIENCY SERVICES execution, under the conditions established in item 5.6 of this ANNEX;
- viii. Redo the complete SERVICE, or part of it, bearing all related expenses, in case the GRANTOR does not approve;
- ix. Update the REGISTRATION after performing MODERNIZATION AND EFFICIENCY SERVICES; including at least:
 - a. The identification of all modernized STREET LIGHTING POINTS;
 - b. REGISTRATION of the activity of MODERNIZATION AND EFFICIENCY carried out;



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- x. Forward to the GRANTOR and the DISTRIBUTOR COMPANY the proof of the update of the REGISTRATION, within the period established in the CONTRACT.

Regarding the deadlines related to the procedures for MODERNIZATION AND EFFICIENCY SERVICES execution and approval, the CONCESSIONAIRE shall:

- i. Forward changes to projects MODERNIZATION AND EFFICIENCY, if requested by the GRANTOR, within the period established in the CONTRACT, counted from the date of request for review by the GRANTOR;
- ii. Make the necessary changes to MODERNIZATION AND EFFICIENCY SERVICES executed, within the period indicated by the GRANTOR, counted from the date of disapproval by the GRANTOR and the INDEPENDENT VERIFIER of the SERVICES performed.

5.7 Adequacy of the Municipal Street Lighting Network

The CONCESSIONAIRE shall ensure that the lighting projects to be prepared prior to the MODERNIZATION AND EFFICIENCY action meet the requirements established in this ANNEX and ensure compliance throughout the CONCESSION TERM.

The CONCESSIONAIRE shall be responsible for the adjustments to the MUNICIPAL STREET LIGHTING NETWORK that may be necessary to fully meet the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX.

When cases that aim at fully meeting the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX occur, the operating expenses of these SERVICES must be borne by the CONCESSIONAIRE.



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In cases where there is a need to replace brackets or supports for adaptation, the CONCESSIONAIRE shall develop a prior technical study regarding the mechanical effort of the STREET LIGHTING pole, in such a way that the replacement of the bracket and/or support by a new structure that assures the attendance of the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX.

The CONCESSIONAIRE may reuse the replaced brackets, poles and supports for the purpose of adaptation or for finding structures in the PREVENTIVE MAINTENANCE SERVICES of the MUNICIPAL STREET LIGHTING NETWORK that compromise USERS' safety and/or show signs of marked oxidation. The CONCESSIONAIRE is responsible for verifying the mechanical conditions of brackets and/or supports, before their reuse, in order to ensure the safety of their new installation.

In cases where there is a need to install a new pole and/or STREET LIGHTING LUMINAIRE in an aerial or underground distribution network for adequacy, the CONCESSIONAIRE shall prepare an electrical and structural project respecting the normative references and submit it for approval by the GRANTOR. All adjustment costs, such as the installation of a new pole and/or LUMINAIRE, are the responsibility of the CONCESSIONAIRE, in gaps between two STREET LIGHTING POINTS with a distance of up to 90 (ninety) meters on the same way. The aforementioned adjustment costs do not consume the CREDITS BANK.

5.8 Implementation of The Remote Management System

The CONCESSIONAIRE shall implement a REMOTE MANAGEMENT SYSTEM on ROADS WITH REMOTE MANAGEMENT, according to the provisions and guidelines of ANNEX 17 - CLASSIFICATION OF MUNICIPALITY ROADS.

The REMOTE EMANAGEMENT SYSTEM shall include a computing, storage,



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security, connectivity, graphical user interface and field devices (“online” or “offline”) solution to manage, monitor, control and receive operational data from STREET LIGHTING POINTS at the locations with REMOTE MANAGEMENT SYSTEM.

The REMOTE MANAGEMENT SYSTEM shall support open communication protocols when necessary (i.e. TCP/IP, 802.15.4, 6LoWPAN, Bluetooth Low Energy - BLE) and shall be scalable, reliable and fast. The REMOTE MANAGEMENT SYSTEM must have a control application, implemented in OCC, with a dynamic user interface to manage a high volume of devices, reports and other functions without the need to physically install any specific management software, and from any device with a common browser and must support control protocols (i.e. HTTP, XML, REST, SOAP), allowing integration with different technologies.

The REMOTE MANAGEMENT SYSTEM must consist of minimum operational functionalities, a platform for controlling the REMOTE MANAGEMENT SYSTEM, connectivity and control devices to be installed at the STREET LIGHTING POINTS.

5.8.1 Remote Management System Schedule

The CONCESSIONAIRE shall implement a REMOTE MANAGEMENT SYSTEM at STREET LIGHTING POINTS according to the schedule established in item 3 of this ANNEX. To implement the REMOTE SYSTEM, you must design the network architecture of the REMOTE SYSTEM, considering the topology of the MUNICIPAL STREET LIGHTING NETWORK and the defined technology.



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5.8.2 Basic features of the Remote Management System platform

The REMOTE MANAGEMENT SYSTEM platform must be integrated with the operational SERVICES that make up the OPERATIONAL CONTROL CENTER (OCC) and the Central Management System.

It shall be up to the CONCESSIONAIRE to implement a platform to control the REMOTE MANAGEMENT SYSTEM in the OPERATIONAL CONTROL CENTER (OCC) that guarantees minimally:

- i. Simultaneous operation of multiple control screens in different locations, by any user level at any time;
- ii. Reliable encryption technology with a high level of security for system operations. The operation must be safe and protected against any type of external anomalies, ensuring safety in an international certification body;
- iii. Data integrity for the duration of the entire CONCESSION;
- iv. Data storage, by redundancy, in at least two different locations, to ensure that regardless of natural adversities, storage reliability and information retrieval can be done at any time. Data replication must be instantaneous and automatic, allowing instant access to data in the event of any external event or anomaly. The server infrastructure must comply with ISO 27.001 and have availability, to be measured by the software itself, of 99.80% (ninety-nine integers and eighty hundredths) (percentage of time in operation);
- v. Updates remotely and securely. Updates must be installed considering a safe methodology with test steps so that it does not promote disturbances to the operation of the MUNICIPAL STREET LIGHTING NETWORK. The installation of the new added features must be



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informed to the GRANTOR prior to execution and after completion of the update with a summary of what shall beand has been done;

- vi. Easy incorporation of existing open lighting technologies (including 0-10V technology, DALI and others);
- vii. Communication of computers/servers with other internet systems in an open, standardized and documented manner. Using Web platforms, the platform forcontrolling the REMOTE MANAGEMENT SYSTEM must:
 - a. Present a friendly web interface, available in Portuguese, which can beviewed from any device with a common browser and must support open control protocols (i.e. HTTP, XML, REST, SOAP) and allow integration with other systems;
 - b. Possess the ability to manage a high volume of devices, reports and other functions without the need to physically install any specific management software. It must display the STREET LIGHTING POINTSon a georeferenced cartographic base, view the STREET LIGHTING plant on a map or satellite photo.
 - c. Have specifications for failures in existing equipment at STREET LIGHTING POINTS;
 - d. Possess the ability to generate reports of unlimited historical data regarding failures, occurrences and measurements, which can be exported into files;
 - e. Possess real-time and scheduled control, monitoring and consultation ofthe lighting network;
 - f. Possess the ability to generate a complete event log (log) for each of theSTREET LIGHTING POINTS.



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- viii. Grouping of LUMINAIRES in multiples of groups, allowing overlapping and consultation of groups;
- ix. Configuration of programs and routines for control, monitoring and consultation;
- x. Configurable schedules in case of faults, occurrences, alarms and warnings (over voltage and under voltage at the driver input, driver over current, powerfactor);
- xi. Identification of the types of failures in the LUMINAIRE (such as off or on, outside operating hours), with the visualization of such failures being automatic and in real time;
- xii. Measurement of energy consumption broken down by STREET LIGHTING POINT and totaled according to the following billing procedures:
 - a. Standard: based on the time determined by ANEEL in accordance with Resolution 1000. It is worth mentioning that this procedure must be changed by updating ANEEL's billing proposal;
 - b. Measured (actual consumption measured by internal meter);
 - c. Estimated (real time on).
- xiii. Measurement and monitoring (instant and effective values) in real time of voltage, current and active power, as well as instantaneous values of power factor;
- xiv. Connection status of the communication of all elements, including storage and memory capacity;
- xv. Automatic records in OCC of changes in the behavior of LUMINAIRES;



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- xvi. Recording the moments of return to operation;
- xvii. Identification of the types of faults in the LUMINAIRES (flashing, off);
- xviii. Ability to register a SERVICE ORDER as well as its closing, indicating knowledge to the USER;
- xix. Ability to group the same alerts and faults issued for a set of LUMINAIRES or individualized LUMINAIRE in a single SERVICE ORDER;
- xx. Record of operating hours for each LUMINAIRE;
- xxi. Export maps in KMZ (Google Earth) format natively. If the system does not have native functionality for exporting in this format, the CONCESSIONAIRE may provide maps in KMZ format using other software, without any burden to the GRANTOR;
- xxii. Export of results and information from the REMOTE MANAGEMENT SYSTEM in CSV and XML format in a native and interactive way, without customization through source code;
- xxiii. Generation of management reports that allow visualization of digital maps with georeferenced visualization of STREET LIGHTING POINTS, graphs and statements;
- xxiv. System information security mechanisms;
- xxv. Integration with the software that make up OCC.

The servers used in the REMOTE MANAGEMENT SYSTEM and/or in OCC (either their own or a cloud solution) must preferably be located in Brazilian territory, and at least the backup of all systems must be located in Brazilian territory. In the case of contracting a cloud operator, the company must respond legally in Brazilian territory.



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The platform for controlling the REMOTE MANAGEMENT SYSTEM must also be integrated with the SERVICES of operation and maintenance of the MUNICIPAL STREET LIGHTING NETWORK, in order to support SERVICES execution of a corrective and predictive nature, mainly, according to the guidelines expressed below:

- i. Corrective order: the REMOTE MANAGEMENT SYSTEM must alert OCC, in cases of identification of operational failures in STREET LIGHTING POINTS, through a SERVICE ORDER with the necessary information for analysis;
- ii. Predictive order: among the features of the REMOTE MANAGEMENT SYSTEM is the real-time monitoring of the power supply voltage of the LUMINAIRES. If a voltage rise above that determined by ANEEL resolution is verified, the REMOTE MANAGEMENT SYSTEM must generate a report for predictive action at the point where there was a voltage violation.

5.8.3 Connectivity

The CONCESSIONAIRE shall provide connectivity, ensuring communication between the REMOTE MANAGEMENT SYSTEM control devices installed at the STREET LIGHTING POINTS, the REMOTE MANAGEMENT SYSTEM control platform and OCC. Connectivity must establish bidirectional communication of information between the STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM and OCC, in order to allow OCC to send command information to the STREET LIGHTING POINTS and that, through their control devices, they send information regarding the operational status of the STREET LIGHTING POINT.

The CONCESSIONAIRE shall be responsible for providing a connectivity network that allows at least:



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- i. Ensuring data coverage at all STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM, according to the way classification detailed in ANNEX 17 – CLASSIFICATION OF MUNICIPALITY ROADS;
- ii. Extending the limits on the size and speed of data communication, if the application of the REMOTE MANAGEMENT SYSTEM so requires;
- iii. Having scalability;
- iv. Operating on an authorized frequency regulated by ANATEL for this type of service;
- v. Operating in high availability and network redundancy, ensuring self-recovery and automatic routing mechanisms in case of failure;
- vi. Ensure network structure with support for open standards;
- vii. Operating autonomously without the need to connect to a hub or to the internet, storing operational data for at least 7 days (in case of any connection failure).

5.8.4 Remote Management System Control Device

The REMOTE MANAGEMENT SYSTEM control device available at STREET LIGHTING POINTS with REMOTE MANAGEMENT SYSTEM presents itself as a key part in the implementation of the REMOTE MANAGEMENT SYSTEM by establishing communication between the STREET LIGHTING POINT and the installed REMOTE MANAGEMENT SYSTEM control platform at the OPERATIONAL CONTROL CENTER (OCC).

The control devices of the REMOTE MANAGEMENT SYSTEM, at a minimum, must comply with the specifications set out below.



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- i. Allow the receipt of individual or group control for messages and commands on/off, dimming, operating calendars and time signal. Each control device must receive its own astronomical clock (solar chart), depending on its georeferenced position and the dimming calendar located to the device;
- ii. Field devices must be controlled through the same environment as the remote management platform, regardless of the technology adopted in the field;
- iii. Updating systems and internal parameter settings remotely – Over The Air (OTA);
- iv. Ability to automatically reconnect with the application server (watchdog) for monitoring its operating system services and connectivity tests;
- v. ANATEL certification;
- vi. Provision of a high precision photometer for external illuminance control in order to remotely monitor or program the moment of activation of the LUMINAIRE;
- vii. Real-time communication between the STREET LIGHTING POINT and OCC;
- viii. Dimerization capacity between 1% (one percent) to 100% (one hundred percent);
- ix. Ability (soft real-time) to turn on or off the LUMINAIRE remotely and through scheduled or direct programming;
- x. Monitoring and data collection, including:
 - a. LUMINAIRE status reading (on / off / % dimerization);



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- b. Cumulative duration of the LUMINAIRE operating time;
- c. Number of switches accumulated by the LUMINAIRE .
- xi. Ability to check the LUMINAIRE operating mode (direct / programmed);
- xii. Fault identification of LUMINAIRES, driver and power/power factor;
- xiii. automatic georeferencing mechanism
- xiv. Ability to perform control and dimerization through the status of the photometers and/or aided by a timer and a real-time clock according to the annual sunrise and sunset calendar, even in the absence of communication with OCC;
- xv. Being compatible with open lighting technologies such as 0-10V, DALI, among others;
- xvi. Ability to store recorded programming parameters in non-volatile memory;
- xvii. Sending messages and automatic alerts as soon as there is a change in the status of the LUMINAIRE (transition between LUMINAIRE on, flickering or off);
- xviii. Programmable time for sending information related to the LUMINAIRE to the OPERATIONAL CONTROL CENTER;
- xix. Controlling devices may require the installation of communication hubs/gateways. Thus, the location and amount of equipment of this type must be defined according to the technology adopted. Control devices, however, must continue to operate pre-programmed lighting in the event of failure of these hubs/gateways;

The CONCESSIONAIRE shall implement the REMOTE MANAGEMENT SYSTEM that meets the functionalities and specifications expressed below.

Dimerization



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The REMOTE MANAGEMENT SYSTEM must guarantee the remote adjustment of the light control in real time of each LUMINAIRE that has a REMOTE MANAGEMENT SYSTEM, the possibility of reducing energy consumption, prolonging the life of the LUMINAIRE and avoiding starting peaks that favor the wear of the source light and system components.

The adjustment of luminous flux in STREET LIGHTING POINTS with REMOTE MANAGEMENT SYSTEM must follow relevant legal and normative aspects (especially ABNT NBR 5101:2018 Standard) and can only be carried out with authorization from the GRANTOR and compliance with the requirements set out in item 4.2.2.

Monitoring

The REMOTE MANAGEMENT SYSTEM shall guarantee uninterrupted remote monitoring of STREET LIGHTING POINTS with REMOTE MANAGEMENT SYSTEM,

so that failures and actions that require maintenance are identified. Thus, for the effectiveness of this service, the system must monitor:

- Operational failure of LED modules;
- Communication failure;
- Quality of electrical energy (power factor, voltage level, power and current);
- Number of switches accumulated by the LUMINAIRE;
- Cumulative duration of the LUMINAIRE operating time;
- In real time (soft real-time), the status of the LUMINAIRE (on or off) and changes in these states directly or programmed (soft real-time).

Measurement



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The REMOTE MANAGEMENT SYSTEM shall measure in real time (soft real-time) electrical and environmental quantities associated with the STREET LIGHTING POINT. Being measured minimally:

- Operating time of STREET LIGHTING POINTS;
- Instant power;
- Apparent power;
- Monthly accumulated energy consumption per point;
- Power factor;
- Voltage;
- Chain;
- Accumulated operating time of the LUMINAIRE.

5.9 Training of the Grantor Team

The CONCESSIONAIRE shall carry out courses and workshops, called TRAINING, based on the following criteria:

- i. The GRANTOR must indicate the programmatic content of the TRAINING, and may make use of recommendations from both the CONCESSIONAIRE and the INDEPENDENT VERIFIER;
- ii. The CONCESSIONAIRE shall provide all the physical infrastructure, furniture, equipment and materials necessary for TRAINING execution. TRAINING must occur in a place inside the MUNICIPALITY area;
- iii. The CONCESSIONAIRE shall be responsible for providing TRAINING, being able to carry out this activity either with its own team



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or by hiring a specialized company;

- iv. The CONCESSIONAIRE shall prepare all content and teaching materials to carry out TRAINING in accordance with best market practices. The content presented in the TRAINING and complementary materials must be delivered in digital format by the CONCESSIONAIRE to each participant of the TRAINING;
- v. TRAINING must be carried out by the CONCESSIONAIRE every 12 (twelve) months, totalizing a workload of 80 (eighty) hours. The workload may be divided into more than one TRAINING, within a 12 (twelve) month period, at the GRANTOR'S discretion;
- vi. The cost of TRAINING must correspond to values practiced in the market, with a ceiling of R\$ 80,000.00 (eighty thousand reais) being fixed annually by IPCA- A;
- vii. The GRANTOR shall designate the team that shall receive the TRAINING, with the limit of 20 (twenty) people;
- viii. At the end of each TRAINING, the CONCESSIONAIRE must carry out a satisfaction survey with all participants. If the research result shows that the TRAINING was not considered satisfactory by the participants, the GRANTOR shall have the right to request a new TRAINING for the workload used.

5.10 Complementary Services

Below are the GRANTOR'S and the CONCESSIONAIRE'S guidelines, specifications and obligations of with regarding SUPPLEMENTARY SERVICES, which shall be requested upon issuance of a SERVICE ORDER by the GRANTOR and use of the CREDITS BANK balance.



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The MUNICIPAL STREET LIGHTING NETWORK expanded through COMPLEMENTARY SERVICES execution must follow the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX, including, in the case of ADDITIONAL STREET LIGHTING POINTS installed on ROADS WITH REMOTE MANAGEMENT, the specifications and functionalities of the REMOTE MANAGEMENT SYSTEM.

5.10.1 Types of Complementary Services

COMPLEMENTARY SERVICES are those listed below:

5.10.1.1 *Additional Street Lighting Points Installation*

It comprises the need to install ADDITIONAL STREET LIGHTING POINTS, except the provision in item 5.6.1, upon GRANTOR'S request. For these ADDITIONAL STREET LIGHTING POINTS, the CONCESSIONAIRE shall be responsible for both installation, operation and maintenance during the CONCESSION TERM.

5.10.1.2 *Operation and Maintenance of Additional Street Lighting Points*

After the transfer to the GRANTOR of the ADDITIONAL STREET LIGHTING POINTS implemented by ENTREPRENEURS, the GRANTOR shall issue a SERVICE ORDER so that the CONCESSIONAIRE assumes full responsibility for the operation and maintenance of the ADDITIONAL STREET LIGHTING POINTS.

Therefore, immediately after the GRANTOR issues SERVICE ORDER and during the entire remaining term of the CONCESSION, each ADDITIONAL STREET LIGHTING POINT installed by ENTREPRENEURS shall be considered by the CONCESSIONAIRE as part of the MUNICIPAL STREET LIGHTING NETWORK, and



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the CONCESSIONAIRE shall meet all the parameters and requirements of the CONTRACT and its ANNEXES.

Regarding the operation and maintenance of ADDITIONAL STREET LIGHTING POINTS, the CONCESSIONAIRE shall:

- I. Ensure, after receiving SERVICE ORDER, pursuant to the CONTRACT, the operation and maintenance of ADDITIONAL STREET LIGHTING POINTS by the CONCESSIONAIRE in accordance with the guidelines and requirements detailed in this ANNEX, throughout the CONCESSION TERM;
- II. Define the procedures for transferring the operation and maintenance of ADDITIONAL STREET LIGHTING POINTS implemented by ENTREPRENEURS, presenting them for GRANTOR'S approval;
- III. Structure a document in a guide format to guide the structuring of STREET LIGHTING in ENTREPRENEURS INSTALLATION PROJECTS based on the guidelines of ABNT NBR 5101:2018 Standard.
- IV. Analyze and approve ENTREPRENEURS INSTALLATION PROJECTS, when presented by the GRANTOR to the CONCESSIONAIRE, and indicate any adjustments that are necessary to meet the lighting and efficiency requirements of the CONCESSION provided for in this ANNEX;
- V. Carry out the assessment of the ADDITIONAL STREET LIGHTING POINTS implemented by ENTREPRENEURS that shall be transferred to the GRANTOR, communicating the general conditions as well as any need to adapt the ADDITIONAL STREET LIGHTING POINTS to the lighting and efficiency



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requirements provided for in this ANNEX;

- VI. Ensure, after receipt of the SERVICE ORDER, in the form of the CONTRACT, the insertion and identification in the REGISTRATION of all ADDITIONAL STREET LIGHTING POINTS and the beginning of their operation and maintenance, in accordance with the lighting and efficiency requirements provided for in this ANNEX.
- VII. Guarantee at the end of the CONCESSION TERM the return to the GRANTOR of ADDITIONAL STREET LIGHTING POINTS transferred by ENTREPRENEURS in accordance with all the requirements of the topic 14.6 of this ANNEX.

5.10.2 Technical Guidelines for Complementary Services Execution

Projects to meet ADDITIONAL STREET LIGHTING POINTS arising from COMPLEMENTARY SERVICES must follow the guidelines, specifications and procedures defined in item 5.6 of this ANNEX, ensuring compliance with the lighting and efficiency requirements provided for in this ANNEX.

In the projects, the information of the street to be illuminated must be collected, according to the guidelines for the elaboration of projects mentioned in the item 5.6. In addition to the guidelines expressed in this ANNEX, it is noted:

- The projects must be prepared in software compatible with the GRANTOR and must contain a descriptive memorial, a list of materials with an elaborated budget and the project itself.
- LUMINAIRES used in COMPLEMENTARY SERVICES execution must have a minimum efficiency of 120 lumens/watt.
- The projects to be elaborated must consider the interference of arboreal vegetation, determining the viable technical alternatives that do not compromise the quality of the STREET LIGHTING service and meet the



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lighting and efficiency requirements provided for in this ANNEX. In the absence of technical alternatives, the CONCESSIONAIRE shall assess the implementation of second level lighting on existing poles, or even install exclusive poles in order to comply with the indexes established in this ANNEX. Conflict areas such as pedestrian crossings, level crossings, interchanges and tunnels must be treated in accordance with the particular conditions established in ABNT NBR 5101:2018 Standard or in their respective specific standards. The projects must be prepared according to normative references,

- The term of execution of the projects must be agreed between the PARTIES.



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6 CREDITS BANK

The CREDITS BANK represents a balance of requests available to the GRANTOR, measured in credits, for COMPLEMENTARY SERVICES execution.

At the beginning of Phase I of the CONTRACT, the CREDITS BANK shall begin with 214 (two hundred and fourteen) credits. Every 12 (twelve) months, after the beginning of Phase II, they shall be added according to the following table. The credits contained in the bank do not expire, being, therefore, cumulative throughout the CONCESSION TERM.

For the purposes of accounting for the credits of the CREDITS BANK, the Table 5. For all foreseen situations, the credit shall be consumed only once. For example, the installation of 1 new ADDITIONAL STREET LIGHTING POINT of bracket structure on V4 shall consume its respective amount of credits only once, that is, it does not consume the same credits in each year of the CONCESSION.

Table 5 – Accounting for the CREDITS BANK		
Item	V2 e V3	V4
Installation of 1 non-exclusive LIGHTING POINT	1,24	1,00
Installation of 1 exclusive LIGHTING POINT	3,80	3,44
Receiving of 1 additional LIGHTING POINT for O&M	0,39	0,39

- i. Installation of 1 ADDITIONAL STREET LIGHTING POINT at the end of the bracket, non-exclusive: Includes the installation (materials and



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labor) of an ADDITIONAL STREET LIGHTING POINT with all its components: LUMINAIRE, bracket, relay, REMOTE MANAGEMENT SYSTEM (if installed on ROADS WITH REMOTE MANAGEMENT), among others necessary, excluding the lighting pole and distribution conductors. In addition to installation, it includes the operation and subsequent maintenance of the new point during the CONCESSIONAIRE TERM.

- ii. Installation of 1 ADDITIONAL STREET LIGHTING POINT with overhead distribution network, exclusive: Includes the installation (materials, civil works and labor) of an ADDITIONAL STREET LIGHTING POINT with all its components: LUMINAIRE, bracket, relay, REMOTE MANAGEMENT SYSTEM (in case of implementation on ROADS WITH REMOTE MANAGEMENT), among others necessary, including the lighting pole and overhead distribution conductors. The CONCESSIONAIRE shall be responsible for both the installation of the pole and the implementation of the electric power network to connect the poles, which must be aerial. In addition to installation, it includes the operation and subsequent maintenance of the new point during the CONCESSION TERM. The CONCESSIONAIRE shall also be responsible for expanding the electricity network for connection at the DISTRIBUTOR COMPANY's delivery point;
- iii. Receipt of 1 ADDITIONAL STREET LIGHTING POINT for O&M: Includes the receipt to an ADDITIONAL STREET LIGHTING POINT deployed by ENTREPRENEURS for operation and maintenance, provided that the ADDITIONAL STREET LIGHTING POINT has been assessed and approved by the CONCESSIONAIRE. For ADDITIONAL STREET LIGHTING POINTS located on ROADS WITH REMOTE MANAGEMENT, the CONCESSIONAIRE is responsible for the maintenance and operation of the ROADS WITH REMOTE MANAGEMENT.



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7 ACCEPTANCE AND VERIFICATION TERMS PROCEDURES

The procedures for issuing the TERM OF ACCEPTANCE by the GRANTOR are presented below. In cases in which the GRANTOR determines that specifications, guidelines, activities or other requirements expressed in this ANNEX were not met by the CONCESSIONAIRE, the INDEPENDENT VERIFIER or the GRANTOR shall notify the CONCESSIONAIRE about the items not met, presenting documents that justify the non-issuance of the ACCEPTANCE TERM. In this case, the CONCESSIONAIRE, within the term established by the GRANTOR and INDEPENDENT VERIFIER, must assess and adjust the issues raised, and then start again the procedure for obtaining the TERM OF ACCEPTANCE.

In the absence of INDEPENDENT VERIFIER, the measurement may be carried out by the CONCESSIONAIRE, provided that it is authorized by the GRANTOR prior to carrying out the inspection, and the GRANTOR may monitor and inspect the measurements.

The INDEPENDENT VERIFIER shall inform the GRANTOR about the schedule of field inspections for the issuance of each TERM OF ACCEPTANCE. The GRANTOR, at its discretion, may accompany the field work.

7.1 Assessment of the Quality of the Base Registration

The BASE REGISTRATION quality assessment activity consists of the process of analyzing the data collection of the equipment and components installed in the STREET LIGHTING POINTS. For this, the data from the BASE REGISTRATION shall be compared, in relation to the on-site verification, detailed below.

The on-site verification activity must be carried out by the INDEPENDENT



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VERIFIER following the guidelines set out in ANNEX 7 - PERFORMANCE MEASUREMENT SYSTEM for the Location Compliance Sub-Indicator (SCL) and the Total Power Compliance Sub-Indicator (SCP). To calculate the grade, the guidelines in ANNEX 7 - PERFORMANCE MEASUREMENT SYSTEM must be followed but considering a weight of 1.0 for SCL. The CONCESSIONAIRE must obtain a grade greater than 98% (ninety-eight percent) to accept the BASE REGISTRATION. In this measurement and calculation, the Compliance Sub-Indicator of Other REGISTRATION information (SCIC) shall not be considered.

The survey sample must have a minimum size as established in ABNT NBR 5426, general inspection level II. The STREET LIGHTING POINTS to be assessed must be randomly defined by the INDEPENDENT VERIFIER.

The CONCESSIONAIRE shall proceed with the correction of the BASE REGISTRATION for all divergences found.

In the event of disapproval of the BASE REGISTRATION, a new sample must be drawn for on-site verification, in accordance with the procedures previously applied in the first verification.

7.2 Compliance with the Concession Milestone

The CONCESSIONAIRE shall notify the GRANTOR of the CONCESSION MILESTONE conclusion, with the documents proving compliance with the conditions set forth in this ANNEX to obtain the TERM OF ACCEPTANCE.

Upon receipt of the notification, the GRANTOR must schedule an inspection of the facilities and equipment, observing the deadlines and criteria provided for in the CONTRACT and its ANNEXES.

Each CONCESSION MILESTONE will only be considered fulfilled if the CONCESSIONAIRE does not have a GENERAL PERFORMANCE INDEX (IDG), as detailed in ANNEX 7 - PERFORMANCE MEASUREMENT SYSTEM, lower than 0.80 (eighty hundredths) calculated in the most recent



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QUARTERLY INDICATOR REPORT . If the GENERAL PERFORMANCE INDEX (IDG) has not reached the required performance, the milestone can be re-evaluated based on the IDG of the subsequent period.

In order to prove and accept compliance with the CONCESSION MILESTONE, on-site verifications must also be carried out, adopting the same procedures based on NBR 5426, general inspection level II (two) and normal simple sampling plan, with an AQL (Acceptable Quality Level) of 1 (one), in samples of STREET LIGHTING POINTS provided as modernized and without indication of obstruction of lighting by arboreal individuals in the REGISTRATION, in compliance with MODERNIZATION PLAN (PM) provisions approved by the GRANTOR. The STREET LIGHTING POINTS that shall be assessed must be randomly defined and measured by the INDEPENDENT VERIFIER.

The INDEPENDENT VERIFIER shall also assess the indication of existence of tree elements that cause obstruction of the luminous flux indicated by the CONCESSIONAIRE. If the VI identifies that there is no obstruction of lighting by arboreal individuals, even if the REGISTRATION indicates the obstruction, the INDEPENDENT VERIFIER shall formally inform the CONCESSIONAIRE to update the REGISTRATION and carry out the measurement normally.

Additionally, in order to comply with the CONCESSION MILESTONE, the CONCESSIONAIRE must present documents proving the validity of the certification From STREET LIGHTING POINTS according to INMETRO Ordinance 20 or another one to replace it.

The CONCESSIONAIRE must submit the following for the issuance of the ACCEPTANCE TERM:

- Photometric data:
 - Diagrams with horizontal lighting isocandela lines, as well as indication of maximum intensity and 50% of maximum intensity;



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- Polar graph for the angles of maximum light intensity;
- Digital file of photometric data for each LAMP and specified light distribution;
- BUG Index (Backlight, Uplight, and Glare), according to IES TM 15;
- Photometric code;
- Photometric distribution curve.
- Nominal technical information:
 - LUMINAIRE:
 - Power [W];
 - Input voltage [V];
 - Input current [A];
 - Input voltage of electronic modules (Vdc);
 - Input current of electronic modules (Icc);
 - LUMINAIRE luminous flux [lm];
 - Efficiency [lm/W] of the LUMINAIRE;
 - Degree of protection IK and IP;
 - Type of refractor material;
 - Drive type;
 - Manufacturer;
 - Color rendering index [%];
 - Color temperature of emitted light [K];
 - Maximum junction temperature [°C];



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- DRIVER:
 - Input voltage [V];
 - Input current [A];
 - Output voltage (Vdc);
 - Maximum output current (Icc);
 - Maximum loss for 220 V [W] supply.

7.3 OCC Operation

The acceptance of OCC operation shall be obtained by the CONCESSIONAIRE upon proof of compliance with all specifications, functionalities, guidelines, operating infrastructure and the guarantee of security of the system information as presented in the item 8.

In order to issue the TERM OF ACCEPTANCE, the INDEPENDENT VERIFIER shall assess the supporting documents and locally inspect the OCC functionalities and infrastructure.

7.4 Execution of Special Lighting Services

The acceptance of the SPECIAL LIGHTING projects to be implemented in the predetermined locations shall depend on the issuance of the TERM OF ACCEPTANCE by the INDEPENDENT VERIFIER and in its absence by the GRANTOR based on the following guidelines:

- Compliance with executive projects implementation approved by the GRANTOR through on-site verification;
- Licenses and authorizations for SPECIAL LIGHTING implementation, when applicable;



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- Compliance with all equipment and material specifications established in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING;
- Compliance with all technical guidelines established in ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING;
- Presentation of certifications and tests of equipment and materials to be implemented for SPECIAL LIGHTING.

7.5 Operation of the Remote Management System

The acceptance procedure by the INDEPENDENT VERIFIER regarding the operation of the REMOTE MANAGEMENT SYSTEM shall be based on:

- i. On-site verification of a sample of STREET LIGHTING POINTS with a REMOTE MANAGEMENT SYSTEM installed according to the procedures and guidelines established by ABNT NBR 5426, general inspection level (two) and normal simple sampling plan with AQL (Acceptable Quality Level) of 1 (one). The verification must check the fulfilment of all the functionalities foreseen in the item 7;
- ii. Assessment of the certifications of equipment and components of the REMOTE MANAGEMENT SYSTEM by the competent inspection organ;
- iii. Assessment of the REMOTE MANAGEMENT SYSTEM connectivity network in order to determine the bidirectional communication between the OCC and the REMOTE MANAGEMENT SYSTEM control device at the STREET LIGHTING POINT.

The STREET LIGHTING POINTS that shall be assessed must be randomly defined and measured by the INDEPENDENT VERIFIER and, in its absence, by the CONCESSIONAIRE for approval by the GRANTOR prior to carrying out the inspection.



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The procedure for accepting the REMOTE MANAGEMENT SYSTEM operation must occur after the end of the CONCESSION MILESTONE.

7.6 Operational Demobilization

In order to carry out the analysis of STREET LIGHTING POINTS, quantities must be defined for sample inspection in accordance with ABNT NBR 5426 standard.

The INDEPENDENT VERIFIER shall, through sample analysis with three different samples:

- ☐ Check the accuracy of the information on the STREET LIGHTING POINTS in the REGISTRATION of the MUNICIPAL STREET LIGHTING NETWORK;
- ☐ Check the lifespan of the LUMINAIRES of at least 25 (twenty-five) months from the expected date of the advent of the contractual term;
- ☐ Check the level of compliance with the ABNT NBR 5101:2018 Standard of at least 95% of the points.

The LUMINAIRES definition for the composition of the samples must be carried out randomly by the INDEPENDENT VERIFIER, and must comply with the following conditions:

- contain STREET LIGHTING POINTS installed in different years, including at least one STREET LIGHTING POINT installed in each year of the CONCESSION;
- The sample must also have STREET LIGHTING POINTS of different classes of vehicle and pedestrian lighting in its composition;
- Include in the sample LUMINAIRES of different models, powers and luminous fluxes.

The assessments must be carried out by the INDEPENDENT VERIFIER 6 (six)



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months before the expected date of the advent of the contractual term. All settings and adjustments to be made by the CONCESSIONAIRE, in cases of disapproval, must be carried out within the CONCESSION TERM.

7.6.1 Compliance of Street Lighting Points Information in Registration

The INDEPENDENT VERIFIER shall check the accuracy of the information recorded in the REGISTRATION of the MUNICIPAL STREET LIGHTING NETWORK by means of proof through data collected in loco.

To carry out this analysis in loco, a quantity must be defined for sample inspection in accordance with ABNT NBR 5426, general inspection level 3 (three), normal double sampling plan and with an AQL (Acceptable Quality Level) of 250 (two hundred and fifty) considering the total of STREET LIGHTING POINTS.

The information to be checked for each of the STREET LIGHTING POINTS in the sample is:

- (i) LUMINAIRE model;
- (ii) Power;
- (iii) Public place;
- (iv) Installation height of the LUMINAIRE;
- (v) Horizontal projection of the LUMINAIRE.

The conformity assessment of each STREET LIGHTING POINT is binary, that is, if all 5 (five) information assessed are in accordance with the REGISTRATION, it is assumed to be in accordance with the STREET LIGHTING POINT. The accuracy of the information must correspond to the reported AQL (Acceptable Quality Level). If the result is less than the minimum stipulated of 95% (ninety five percent), the CONCESSIONAIRE must carry out



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a new REGISTRATION of the MUNICIPAL STREET LIGHTING NETWORK according to ANNEX 15 - REGISTRATION OF THE MUNICIPAL STREET LIGHTING NETWORK.

If it is necessary to carry out a new REGISTRATION of the MUNICIPAL STREET LIGHTING NETWORK, it must be analyzed by the INDEPENDENT VERIFIER through sample analysis. To carry out this analysis in loco, a quantity must be defined for sample inspection in accordance with ABNT NBR 5426, general inspection level 3 (three), normal double sampling plan and with an AQL (Acceptable Quality Level) of 250 (two hundred and fifty) considering the total of STREET LIGHTING POINTS. The accuracy of this new REGISTRATION must correspond to the AQL informed, in relation to the information collected in loco.

7.6.2 Verification of the Remaining Lifespan of Street Lighting Points

The INDEPENDENT VERIFIER must prove the remaining lifespan of the STREET LIGHTING POINTS. The proof must be carried out through document analysis of the technical specifications of the STREET LIGHTING POINTS.

The INDEPENDENT VERIFIER, based on the analysis of the STREET LIGHTING POINTS installed in the MUNICIPAL STREET LIGHTING NETWORK, shall indicate the percentage of LUMINAIRES that had a remaining lifespan shorter than expected according to their certification.

If LUMINAIRES are found to have a remaining lifespan shorter than the required one, the CONCESSIONAIRE shall proceed with the replacement of such LUMINAIRES in the MUNICIPAL STREET LIGHTING NETWORK. The CONCESSIONAIRE shall

present a plan to replace the LUMINAIRES for approval by the GRANTOR in order to deliver, at the end of the CONTRACT, LUMINAIRES with a minimum



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remaining lifespan of at least 25 (twenty five) months.

7.6.3 Level of Compliance with ABNT NBR 5101: 2018 Standard

Proof of compliance with Standard ABNT NBR 5101:2018 of at least 95% of the points must be carried out by the INDEPENDENT VERIFIER through the collection of minimum average illuminance measurements “EMED,MIN”, and minimum uniformity factor “U”.

In order to carry out the analyzes of the STREET LIGHTING POINTS, in relation to the level of compliance with the standard, a quantity must be defined for sample inspection in accordance with ABNT NBR 5426, general inspection level 3 (three), normal double sampling plan and with AQL (Acceptable Quality Level) of 250 (two hundred and fifty) considering the total of STREET LIGHTING POINTS. The collection of information must be performed for all STREET LIGHTING POINTS in the sample considering the space between it and the adjacent STREET LIGHTING POINTS on both sides.

To verify the level of compliance with the standard, all requirements for minimum average illuminance parameters “EMED,MIN” and minimum uniformity factor “U” as established by ABNT NBR 5101:2018 standard. The level of compliance with the standard must be at least 95% of the points.

If it is found in the sample that the level of compliance with the standard is less than 95% of the points, the CONCESSIONAIRE must present a plan to readjust the MUNICIPAL STREET LIGHTING NETWORK to guarantee a minimum level of service of 95% of the points.

8 OTHER CONCESSIONAIRE’S OBLIGATIONS

In addition to the obligations defined in the CONTRACT and in the ANNEXES,



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the CONCESSIONAIRE shall observe the determinations set out below, but not limited to these, which shall be valid for the entire CONCESSION TERM, fundamental for the CONTRACT execution.

8.1 General Obligations:

- a. Sending the labor documentation, when requested by the GRANTOR, regarding the employees and employees hired to perform the CONTRACT objective;
- b. Keeping the licenses updated with the responsible organs;
- c. Obtain within a maximum period of 24 (twenty-four) months, counted from the EFFECTIVE DATE, ISO 14.001 certification;
- d. Presenting a detailed SERVICE Execution Report to the GRANTOR on a monthly basis, prepared in accordance with what is specified in this ANNEX;
- e. Providing access to the GRANTOR and the INDEPENDENT VERIFIER to the technical specifications of materials, equipment, software and their evolution as a function of the natural development of technologies. The specifications must be based on national standards with provision for all items that must be tested in laboratories accredited by INMETRO or competent organs approved by the GRANTOR;
- f. Presenting all certificates, or certified copies, carried out in laboratories accredited by INMETRO or competent organs approved by the GRANTOR, of the tests for the reactor / LIGHT / lamp / relays and LED lighting or new technologies, and the separate tests;
- g. Presenting and submitting for the GRANTOR'S approval, the projects related to MODERNIZATION AND EFFICIENCY SERVICES and COMPLEMENTARY SERVICES, according to the minimum requirements presented in this ANNEX;
- h. Maintaining physical and electronic control of municipal STREET LIGHTING assets, updating their registration data in the



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REGISTRATION, immediately after each intervention, of any nature;

- i. Promoting the management of third parties, in order to release, isolate, protect areas, circuits and interference where the SERVICES are being executed. Examples of third parties are: public agencies (military and civil police), public service concessionaires and private companies (traffic, electricity, water and sewage, gas, telephony, cable TV, etc.);
- j. Seeking, throughout the CONCESSION TERM, to adapt the facilities received by it, in accordance with the CONTRACT and its ANNEXES;
- k. Complying with the procedures established with the DISTRIBUTOR COMPANY, for interventions execution in the electricity supply network;
- l. Observing, as applicable, the terms of the CONTRACT OF POWER SUPPLY and operating agreement entered into between the GRANTOR and the DISTRIBUTOR COMPANY;
- m. Promoting, in operation and maintenance process of the facilities, the replacement of materials and equipment to eliminate all degradations and partial and/or complete deterioration of STREET LIGHTING POINTS, which third parties, identified or not, may cause, with direct or indirect, acts of vandalism and others;
- n. Keeping all equipment and utensils necessary for SERVICES execution in perfect conditions of use;
- o. Acquiring all consumables and sparing parts to be used in the SERVICES execution;
- p. Instructing its employees on the need to comply with the GRANTOR's guidelines, including compliance with internal and occupational safety and medicine rules;
- q. Bearing all expenses for forms, forms, electricity, water, gas, telephone, among others, used in the operational structures necessary for SERVICES execution;
- r. Keeping planning alternative work schemes and contingency plans for emergency situations in OCC and operational structures, such as: lack



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- of water, electricity, gas, equipment breakdown, strikes and others, permanently ensuring SERVICES provision of the CONTRACT object;
- s. Meeting the requirements, recommendations or observations made by the GRANTOR, according to the deadlines set in each case;
 - t. Complying with labor, social security, safety and occupational medicine legislation, regarding its employees;
 - u. Complying with environmental legislation and applicable regulations, at the federal, state and municipal levels;
 - v. Promoting educational, informative and operational campaigns to its employees for the proper fulfilment of the obligations assumed in this CONTRACT;
 - w. Identifying the equipment owned by it not to be confused with similar equipment owned by the GRANTOR or third parties;
 - x. Providing and maintaining, at the work sites related to SERVICES execution, signs, identification easels and other types of appropriate signage, with dimensions, sayings and logos in the GRANTOR's standard;
 - y. Recomposing, at the end of all SERVICES, the original conditions of the place, complying with the standards established by the GRANTOR, of the sidewalks, carriage beds and other public places damaged as a result of the work carried out by the CONCESSIONAIRE.
 - z. Guaranteeing the usability, performance and the original functional and quality features of all STREET LIGHTING POINTS equipment and systems, throughout the CONCESSION TERM, making the replacements and reinvestments that become necessary for this;
 - aa. Ensuring the STREET LIGHTING POINTS delivery to the GRANTOR at the end of the CONCESSION term in technical conditions of inappropriate operation, considering a plan for continuous technological updating in the exchange of equipment, improving light and energy efficiency requirements, operational indexes and durability.



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8.2 Oversight

Clarifying and seeking to remedy the claims, requirements or observations made by the GRANTOR, according to the deadlines set in each case;
Making the information available by electronic means accessible remotely by both the GRANTOR and the INDEPENDENT VERIFIER.

8.3 Information and Transparency

- a. Giving immediate knowledge of any fact that alters the CONTRACT execution and compliance with the obligations established therein;
- b. Presenting additional or complementary information to those that may be requested
- c. Providing the clarifications that are requested and promptly respond to complaints about its SERVICES, solving them in the shortest possible time.

8.3.1 Information Security

The CONCESSIONAIRE shall contract the necessary third-party solutions and maintain the best market practices to ensure that all systems, subsystems, databases, equipment and other assets or configuration items and direct or indirect components of the solution under the CONCESSIONAIRE'S administration are protected against undue access, invasions and/or attacks of any kind.

The CONCESSIONAIRE shall keep updated and comply with the rules on digital security, in particular the digital security of infrastructure and utilities, in order to protect the continuity of operations, the quality of operations, the confidentiality and privacy of data, including ISO standards and ABNT applicable in relation to digital security in STREET LIGHTING and Smart Cities.

The security measures must be applied to OCC systems, remote management



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software and equipment, the ERP system, in the new services and technologies exploration, as well as any other digital/electronic system used in the CONCESSION.

The CONCESSIONAIRE shall continually assess whether the products and services purchased from its suppliers are updated and safe and if they do not present known vulnerabilities.

Whenever requested by the GRANTOR, the CONCESSIONAIRE shall make available all documentation related to information security processes, establishing its conditions of care and confidentiality.

The CONCESSIONAIRE shall ensure that all operations and collection of information within the CONCESSION scope generate automatic recording of log file(s) and errors on the system and store them on the database, which must be delivered to the GRANTOR by the end of the CONCESSION, if there is a request in this regard.

The CONCESSIONAIRE shall bear the losses arising from information security incidents, in all their fullness and scope, in accordance with the applicable legislation.

Incidents reporting

The CONCESSIONAIRE shall notify the GRANTOR of any incident involving information security, such as loss of data, improper access and/or collection of data, digital attacks, virus detection or identification of vulnerabilities in any software or equipment used.

Data record

The CONCESSIONAIRE shall store a copy (backups) of the system



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databases, in open standards or broad and easy use, in a redundant and physically isolated form in relation to the operation and the servers/cloud system used in production.

The CONCESSIONAIRE is responsible for any loss of data, whether due to failures or digital attacks, if copies are not properly available.

Personal data

The CONCESSIONAIRE shall adopt specific technical and organizational measures for the protection of personal data.

Personal data collected under the CONCESSION shall be collected only for the specific purposes of improving and providing STREET LIGHTING SERVICES, meeting the principles of purpose, adequacy, necessity, free access by the holders, data quality, transparency, security, prevention, non-discrimination, accountability and rendering of accounts.

The GRANTOR and the CONCESSIONAIRE must comply with all applicable personal data protection legislation.

Confidential data

The CONCESSIONAIRE shall treat confidentially all information received and/or generated, which may not be copied, reproduced, published, disclosed in any form or means, except for the GRANTOR and for the exclusive needs of the CONCESSIONAIRE'S works, contained in the present, except in the case of legal claims.

Dedicated network

The CONCESSIONAIRE must maintain a dedicated communication network



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for OCCand REMOTE MANAGEMENT SYSTEM. Communication channels must be exclusive and must not be shared with the internal or external corporate network (corporate internet).

For points of contact between the networks that are strictly necessary, the CONCESSIONAIRE shall use technologies that guarantee the necessary protection and isolation between the networks, such as, for example, firewalls.

8.3.2 Human Resources

The CONCESSIONAIRE undertakes before the GRANTOR regarding personnel to:

- i. Insure personnel against the risk of accidents at work;
- ii. Supervise personal hygiene and cleaning of staff uniforms;
- iii. Ensure that its team selected to provide the SERVICES object of the CONTRACT meets the requirements:
 - a. Qualification required for the role;
 - b. Compliance with legal requirements (licenses, certificates, legal authorizations, etc.), for the performance of the function;
 - c. Enough knowledge for the correct SERVICES provision.

The aspects of identifying employees and third parties, frequency, strike, safety, health and prevention of labor risks are described in the following items.

Identification of employees and contracted third parties

All personnel involved in SERVICES provision CONTRACT object must be properly uniformed, demonstrating care with personal presentation, cleanliness and hygiene, carrying, at all times, an identification badge with a



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recent photo.

Submitting the standards for uniforms and identification badges for GRANTOR'S approval.

It is the CONCESSIONAIRE's obligation to provide uniforms, badges and other appropriate complements for SERVICES development, at no cost to the employee.

Frequency

The CONCESSIONAIRE shall keep the frequency control of all employees involved in SERVICES provision updated, immediately replacing them in the event of any absence.

Strike

In the event of a strike that affects SERVICES provision, the CONCESSIONAIRE must offer solutions that guarantee the essential minimum SERVICES determined by the GRANTOR.

For all purposes contemplated in this document, the responsibility derived from subcontracted works is of the CONCESSIONAIRE, as well as the costs, when the strike refers to any claim of the personnel responsible for providing SERVICES. In the event of any damage occurring during demonstrations and strikes by its personnel or subcontractors, the CONCESSIONAIRE shall bear the resulting costs.

Safety, health and prevention of occupational risks

The CONCESSIONAIRE shall provide the medical examinations, required by current regulations, every 12 (twelve) months or for shorter periods in cases provided for in specific legislation for a particular professional category.



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The CONCESSIONAIRE is responsible for monitoring the health status of the personnel responsible for providing the SERVICES and must provide immediate replacement in case of illness incompatible with the function performed.

“Operational protocols for risk prevention” must be established sufficiently in advance for the beginning of the SERVICES. Protocols must incorporate instructions for the use of protective equipment appropriate to the activity to be performed. The CONCESSIONAIRE is responsible for the acquisition and use of such equipment, being also responsible for the training of personnel regarding the use of first aid equipment, evacuation systems, fire protection systems, etc. The CONCESSIONAIRE shall present, when requested, a copy of the Occupational Health Medical Control Program - PCMSO and Environmental Risk Prevention Program - PPRA, containing, at least, the items contained in the regulatory standards nos. 7 and 9, respectively, of Ordinance No. 3,214, of 06/08/78, of the Ministry of Labor and Social Security, as determined by Federal Law No. 6,514, of 12/22/77.

The CONCESSIONAIRE shall keep a file of admission, periodic, dismissal exams, changes in function and return to work, as recommended by NR 7, which comprises Ordinance no. 3,214 of 06/08/78 and its amendments, the GRANTOR may request access to these files.

The CONCESSIONAIRE shall maintain an occupational health and safety record, as recommended by NR 32 of the Ministry of Labor and Employment, which comprises Ordinance No. 3,214 of 06/08/78 and its amendments.

The CONCESSIONAIRE shall be responsible for establishing and implementing an "Emergency/Contingency Plan" in the event of possible non-conformities, such as: in the supply of energy, gas, steam, equipment breakdown, strikes and others, ensuring SERVICES maintenance.

The Emergency/Contingency Plan shall include, among others:



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- Fire evacuation plan, with the performance of evacuation simulations, and subsequent assessment that must measure the adequacy of the level of training of the team and the knowledge of the measures that must be taken;
- Alternative work schemes, with a view to ensuring the correct continuity of the SERVICES provided. The Emergency/Contingency Plan must be updated annually, adapting to the obligations and guidelines imposed by current regulations, changes in the GRANTOR'S guidelines, new technologies, among others.

The CONCESSIONAIRE shall consult the authorities of City Hall, Police, Fire Department, Civil Defense, among others, to define its strategies regarding work safety, especially regarding the preparation of the Emergency/Contingency

8.3.3 PPP Transparency Process

The CONCESSIONAIRE shall make available, manage and maintain, throughout the CONCESSION term, an online portal for sharing information, news and documents directly related to the CONCESSION to the general public. All documents made available must be openly available for download without prior register or registration. The content of the information to be shared must be previously authorized by the GRANTOR.

The CONCESSIONAIRE shall disclose on the online portal, at least the following documents:

- a. OPERATION AND MAINTENANCE PLAN;
- b. MODERNIZATION PLAN;
- c. Quarterly Performance Report;



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- d. TERMS OF ACCEPTANCE issued by the INDEPENDENT VERIFIER and/or GRANTOR;
- e. CONCESSION CONTRACT;
- f. Addendum to the CONCESSION AGREEMENT;
- g. RELATED ACTIVITIES Agreement;
- h. Financial/Accounting Statements of the CONCESSIONAIRE.

Documents in preliminary versions that shall still undergo an analysis and/or validation process by the GRANTOR, CONCESSIONAIRE, INDEPENDENT VERIFIER or other organs shall not be disclosed. Reports and plans can be published in a summarized version, containing only the most relevant points and applied guidelines.