

ATTACHMENT 5
SERVICES SPECIFICATIONS

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1 INTRODUCTION

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

2 NORMATIVE REFERENCES

The services and engineering works described in this ATTACHMENT are based on the recommendations of the standards published by ABNT, IESNA (*Illuminating Engineering Society of North America*), CIE (*International Commission on Illumination*), as well as current legislation and Regulatory Standards 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 DISTRIBUTION COMPANY, holder of the electricity distribution assets, and by the municipal public lighting master plan, in case it is prepared in the future.

The CONCESSIONAIRE must observe the best market practices and the rules indicated below (and others that may replace and/or update them):

- i. Brazilian technical standards:
 - a. ABNT NBR 5101 - Public Lighting - Procedure;
 - b. ABNT NBR 5181 - Tunnel Lighting Systems - Requirements;
 - c. ABNT NBR 15129 - LUMINAIRES for public lighting - Particular requirements;
 - d. ABNT NBR IEC 60598-1 - LUMINAIRES Part 1: General requirements and tests;
 - e. ABNT NBR IEC 60529 - Degrees of protection provided by enclosures (IP Codes);
 - f. ABNT NBR IEC 62262 - Degrees of protection ensured by the enclosures of electrical equipment against external mechanical impacts (IK code);
 - g. ABNT NBR 6323 - Hot dip galvanizing of steel and cast iron products - Specification;

- h. ABNT NBR 14744 - Steel posts for lighting;
- i. ABNT NBR 8451 - Reinforced and prestressed concrete posts for electricity distribution and transmission networks;
- j. ABNT NBR 5410 - Low Voltage Electrical Installations;
- k. ABNT NBR 16026 Electronic Control Device d.c. or a.c. for LED module - Performance Requirements;
- l. ABNT NBR IEC 61347-2-13 - Lamp control device Part 2-13: Particular requirements for electronic control devices powered by d.c. or a.c. for the LED modules;
- m. ABNT NBR 13593 - Reactor and ignitor for high pressure sodium vapor lamp - Specification and tests;
- n. ABNT NBR-5125 - Reactor for high pressure mercury vapor lamp;
- o. ABNT NBR 15688 - Overhead power distribution networks with bare conductors;
- p. ABNT NBR NM 247-3 - Polyvinyl chloride (PVC) insulated cables for nominal voltages up to 450/750V, inclusive - Part 3: Insulated conductors (without cover) for fixed installations (IEC 60227-3, MOD);
- q. ABNT NBR 9117 - Conductors, flexible or not, insulated with polyvinyl chloride (PVC/EB), for 105 °C and voltages up to 750 V, used in internal connections of electrical devices;
- r. 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;
- s. ABNT NBR 8182 - Self-supporting multiplexed power cables with extruded PE or XLPE insulation, for voltages up to 0.6/1 kV - Performance requirements;
- t. ABNT NBR 7290 - Control cables with extruded XLPE, EPR or HEPR insulation for voltages up to 1 kV - Performance requirements;

- u. ABNT NBR 15715 - Polyethylene (PE) corrugated duct systems for energy and telecommunications cable infrastructure - Requirements;
 - v. ABNT NBR 5111 - Bare copper wires, circular in section, for electrical purposes;
 - w. ABNT NBR IEC 60439-1-2-3 - Low voltage switchgear and control sets - Part 1, 2 and 3;
 - x. ABNT NBR 5419 - Protection against lightning strikes;
 - y. ABNT NBR 15749 - Measurement of grounding resistance and potentials at the soil surface in grounding systems.
- ii. Technical norms and standards of the DISTRIBUTION COMPANY:
 - a. DISTRIBUTION COMPANY Standard
- iii. INMETRO and Procel Norms:
 - a. INMETRO Ordinance No. 20;
 - b. Procel energy saving stamp.

3 LIST OF CHARGES

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

- i. Preparation of the BASE REGISTRY and permanent updating of the REGISTRY;
- ii. Preparation of the OPERATION AND MAINTENANCE PLAN (POM), the MODERNIZATION PLAN (PM) and the OPERATIONAL DEMOBILIZATION PLAN (PDO);
- iii. MODERNIZATION AND STREAMLINING ENERGY of the PUBLIC LIGHTING POINTS contained in the BASE REGISTRY;
- iv. Implementation of the TELEMAGEMENT SYSTEM;
- v. Implementation and maintenance of SPECIAL LIGHTING in the goods defined in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- vi. Implementation and Operationalization of the OPERATIONAL CONTROL CENTER (CCO);
- vii. Execution of maintenance SERVICES for the MUNICIPAL PUBLIC LIGHTING NETWORK;
- viii. Operational and Organizational Structure;
- ix. Execution of COMPLEMENTARY SERVICES;
- x. Periodic training of the CONCESSION AUTHORITY team, through courses and workshops on themes related to the CONCESSION;
- xi. Disclosure of the main information and documents related to the CONCESSION;

4 REGISTRY OF THE MUNICIPAL PUBLIC LIGHTING NETWORK

Within the deadlines established in the CONTRACT, the CONCESSIONAIRE shall prepare the BASE REGISTRY, by carrying out a physical inventory, based on the guidelines of this ATTACHMENT and ATTACHMENT 4 - PUBLIC LIGHTING NETWORK REGISTRY, which must be evaluated, in accordance with the detailed procedure in item 14.1 of this ATTACHMENT.

Likewise, the CONCESSIONAIRE must keep the REGISTRY permanently updated throughout the CONCESSION TERM, according to the guidelines of this ATTACHMENT and ATTACHMENT 4 - PUBLIC LIGHTING NETWORK REGISTRY.

5 PLANS OF THE MUNICIPAL PUBLIC LIGHTING NETWORK

The CONCESSIONAIRE shall prepare the plans detailed below:

- i. 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 PUBLIC LIGHTING POINTS of the MUNICIPAL PUBLIC LIGHTING NETWORK over the CONCESSION TERM.
- ii. MODERNIZATION PLAN (PM), which shall present the description, operational procedure and planning of all activities related to Modernization and Streamlining Energy, Implementation of the Telemangement and Special Lighting System, over the CONCESSION TERM.
- iii. OPERATIONAL DEMOBILIZATION PLAN (PDO), which must detail the procedure for reversing the REVERSIBLE ASSETS and the operational transition at the advent 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, with its strict compliance and implementation, under penalty of enforcement of the applicable sanctions and penalties.

In all the plans, the CONCESSIONAIRE shall include operating manuals and scripts, the “Standard Operating Procedures - POPs” for each type of SERVICE, considering the minimum requirements of the activity to be performed in sufficient quantity, form and quality to guarantee its functionality and the availability of the MUNICIPAL PUBLIC LIGHTING NETWORK.

5.1 OPERATION AND MAINTENANCE PLAN (POM)

The OPERATION AND MAINTENANCE PLAN (POM) aims to plan and structure all the CONCESSIONAIRE'S SERVICES, guaranteeing the operation and maintenance process of the MUNICIPAL PUBLIC LIGHTING NETWORK.

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

- i. CCO Operationalization Program (POC);
- ii. Maintenance Program (PMAN);
- iii. Social and Environmental Management Programs (PGS);
- iv. Service Execution Report Template.

It must be noted that, while MODERNIZATION AND STREAMLINING ENERGY does not occur in PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall establish the operation and maintenance of the INITIAL PUBLIC LIGHTING MUNICIPAL NETWORK with the provision of control and monitoring services, through a CCO and with intensification of patrol activities, urgency in the capture and solution of requests from citizens or the CONCESSION AUTHORITY. The operation and management of all works must occur 24-7, without interruption, based on a computerized system for the registration of interventions, with data collectors in the field.

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

- i. Process diagnosis and analysis;
- ii. Process modeling;
- iii. Implementation planning.

The POM may be updated and revised throughout the CONCESSION, upon request by the CONCESSION AUTHORITY or on the initiative of the CONCESSIONAIRE, whenever deemed appropriate, and any changes must be submitted to the CONCESSION AUTHORITY's prior approval.

5.1.1 CCO Operationalization Program (POC)

In order for the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed related to the operation of the CCO, the CONCESSIONAIRE must prepare the Operationalization Program of the CCO - POC.

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

- i. CCO implementation schedule, covering:
 - a. Installation and adjustments of the civil infrastructure, if necessary;
 - b. Implementation of information technology equipment;
 - c. Implementation of information technology systems and solutions.
- ii. Dimensioning and detailing of the positions of the CCO operating team;
- iii. Information security program, ensuring the implementation of actions by:
 - a. Integrity: protection to changes and/or improper information exclusions;
 - b. Confidentiality: limiting access to authorized users only;
 - c. Compliance: compliance with associated rules and laws;
 - d. Availability: guarantee of access always available to users who have authorization.
- iv. Alternative contingency plan for CCO operation in case of any failure in the implemented systems;
- v. Training plan for the CCO operation team;
- vi. The design of the operation, including the processes for carrying out the CCO procedures, including manuals with all involved POPs.

5.1.2 Maintenance Program (PMAN)

In order for the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed related to CORRECTIVE and EMERGENCY MAINTENANCE (emergency services), PREDICTIVE MAINTENANCE and PREVENTIVE MAINTENANCE, the CONCESSIONAIRE must prepare the Maintenance Program - PMAN. In it, the CONCESSIONAIRE shall include the detailed strategy for service, the scope and defined deadlines related to maintenance services.

The PMAN must contain, at a minimum:

- i. The design of the operation, including:
 - a. The processes for carrying out maintenance services to be performed by the CONCESSIONAIRE throughout the CONCESSION TERM;
 - b. The frequency of execution of the procedures.
- ii. The checklist model to be carried out by the CONCESSIONAIRE, containing the execution procedures for each of the maintenance services;
- iii. Proposal for a standard form to be filled out in the event of accidents caused by third parties in the PUBLIC LIGHTING POINTS;
- iv. The basic structure of human, technical and operational resources for carrying out maintenance services;
- v. Training plan for maintenance teams;
- vi. Manuals for detailing all POPs involved in maintenance activities.

5.1.3 Social and Environmental Management Programs (PGS)

In order for the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed related to socioenvironmental management, the CONCESSIONAIRE must prepare the Social and Environmental Management Programs (PGS), based on the guidelines of this ATTACHMENT and ATTACHMENT 7 - MINIMUM ENVIRONMENTAL GUIDELINES.

5.1.4 Service Execution Report Template

The Service Execution Report must be submitted monthly to the CONCESSION AUTHORITY, and, for each type of SERVICE, it must include fields for filling out of, at least, the following information:

- i. Type of SERVICE;
- ii. Service Order Number;
- iii. Number of projects carried out in the period;
- iv. Dates of preparation and submission of each project;
- v. Number of service orders demanded and attended to for maintenance of PUBLIC 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 execution of the SERVICES and energization.

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 STREAMLINING ENERGY, implementation of the TELEMANAGEMENT SYSTEM, implementation of SPECIAL LIGHTING and execution of COMPLEMENTARY SERVICES.
- iii. Current status of the CREDIT BANK, informing the forecast volume of credits, volume of credits consumed in the month, available credit balance for the current year;
- iv. Evolution of the activities related to the execution of the actions foreseen in the Social and Environmental Management Programs (PGS).

5.2 MODERNIZATION PLAN (PM)

The PM aims to plan and structure all the SERVICES related to MODERNIZATION AND STREAMLINING ENERGY, implantation of the TELEMAGEMENT SYSTEM and implantation of SPECIAL LIGHTING throughout the CONCESSION TERM.

The PM, in accordance with the obligations of the CONTRACT and of the present ATTACHMENT, shall be composed, at least, by the following programs:

- i. Modernization and Streamlining Energy Program (PME);
- ii. Telemagement System Implementation Program (PIST);
- iii. Special Lighting Program (PIE).

In addition to these programs, the CONCESSIONAIRE must provide, every five (5) years, a brief description of the interventions planned for the five (5) subsequent years, presenting images, reports, documents and diagrams necessary for their comprehension, indicating the reference estimates of costs for each of its actions.

The PM may be updated and revised throughout the CONCESSION TERM, upon request by the CONCESSION AUTHORITY or at the initiative of the CONCESSIONAIRE, whenever deemed appropriate, and any change must be submitted to the CONCESSION AUTHORITY's prior approval.

5.2.1 Modernization and Streamlining Energy Program (PME)

In order for the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed in the modernization and streamlining energy of the PUBLIC LIGHTING POINTS contained in the BASE REGISTRY, the CONCESSIONAIRE shall prepare a Modernization and Streamlining Energy Program - PME. In it, the CONCESSIONAIRE shall include the detailed strategy for compliance with the CONCESSION MILESTONES and the guidelines described in item 6.6 of the present ATTACHMENT.

The PME must contain, at least, the following requirements:

- i. Detailed schedule for MODERNIZATION AND STREAMLINING ENERGY of PUBLIC LIGHTING POINTS contained in the BASE REGISTRY, demonstrating how the CONCESSION MILESTONES

defined in item 6 of this ATTACHMENT shall be met and following the prioritization defined in item 5.2.1.1 of this ATTACHMENT, indicating intermediate stages of inspections by the INDEPENDENT VERIFIER for obtention of the ACCEPTANCE TERMS;

- ii. Detailed schedule for the execution of COMPLEMENTARY SERVICES eventually requested by the CONCESSION AUTHORITY, in line with the minimum requirements established in item 6.6, indicating intermediate stages of inspection by the CONCESSION AUTHORITY, for obtention of the ACCEPTANCE TERMS;
- iii. The model of the lighting simulations to be carried out to adapt the PUBLIC LIGHTING POINTS to the minimum parameters required according to item 6.6.1;
- iv. Classification of the existing public places according to the guidelines established in ATTACHMENT 13 - CLASSIFICATION OF THE MUNICIPALITY ROADS;
- v. Technologies/systems to be implemented to save energy and the technical characteristics of the equipment to be utilized;
- vi. Potential to reduce electricity consumption in PUBLIC LIGHTING POINTS to be modernized with the implementation of the selected technologies;
- vii. Basic structure of technical and operational resources for the execution of MODERNIZATION AND STREAMLINING ENERGY SERVICES of the MUNICIPAL PUBLIC LIGHTING NETWORK.

The PME may be updated and revised throughout the MODERNIZATION AND STREAMLINING ENERGY period, upon request from the CONCESSION AUTHORITY or request from the CONCESSIONAIRE, subject to any change for approval by the CONCESSION AUTHORITY.

5.2.1.1 Prioritization for MODERNIZATION AND STREAMLINING ENERGY

The CONCESSIONAIRE shall modernize and make efficient in each MILESTONE the quantity of PUBLIC LIGHTING POINTS according to the requirements specified in topic 6 (six) of this ATTACHMENT.

To prepare the detailed schedule for MODERNIZATION AND STREAMLINING ENERGY of PUBLIC LIGHTING POINTS to be presented by the CONCESSIONAIRE in the MODERNIZATION PLAN, prioritization must be followed according to the list below. During the approval of the

MODERNIZATION PLAN (PM) the CONCESSION AUTHORITY may request adjustments in the prioritization provided for below.

The locations not covered in the table below and which are in the CONCESSION AREA, must be modernized and made efficient following the locations shown in this list. The prioritization order must be proposed by the CONCESSIONAIRE and validated by the CONCESSION AUTHORITY.

Table 6 - Order of prioritization for MODERNIZATION AND STREAMLINING ENERGY

Prioritization Order	Location Type	Location
1 st	Road	Beira Mar
2 nd	Road	General Euclides Figueiredo
3 rd	Road	Presidente José Sarney
4 th	Road	Poeta Mário Jorge Menezes Vieira
5 th	Road	Santos Dumont
6 th	Road	Alexandre Alcino
7 th	Road	Augusto Franco
8 th	Road	General Calazans
9 th	Road	Ivo do Prado
10 th	Road	Doutor Jose Tomaz D'avila Nabuco
11 th	Neighborhood	Santa Maria
12 th	Neighborhood	Santos Dumont
13 th	Neighborhood	Cidade Nova
14 th	Neighborhood	Expansion Zone
15 th	Neighborhood	Porto Dantas
16 th	Neighborhood	Centro
17 th	Neighborhood	Industrial
18 th	Neighborhood	Atalaia
19 th	Neighborhood	Farolândia
20 th	Neighborhood	Siqueira Campos
21 st	Neighborhood	Coroa do Meio
22 nd	Neighborhood	Capucho
23 rd	Neighborhood	Olaria
24 th	Neighborhood	Japãozinho
25 th	Neighborhood	Lamarão
26 th	Neighborhood	Soledade
27 th	Neighborhood	Jardim Centenário
28 th	Neighborhood	América
29 th	Neighborhood	Bugio
30 th	Neighborhood	Palestina
31 st	Neighborhood	Novo Paraíso

Prioritization Order	Location Type	Location
32 nd	Neighborhood	18 do Forte
33 rd	Neighborhood	José Conrado de Araújo
34 th	Neighborhood	São Conrado
35 th	Neighborhood	Getúlio Vargas
36 th	Neighborhood	Santo Antônio
37 th	Neighborhood	Aeroporto
38 th	Neighborhood	Ponto Novo
39 th	Neighborhood	Cirurgia
40 th	Neighborhood	Jabotiana
41 st	Neighborhood	Pereira Lobo
42 nd	Neighborhood	Inácio Barbosa
43 rd	Neighborhood	Luzia
44 th	Neighborhood	Suissa
45 th	Neighborhood	São José
46 th	Neighborhood	Grageru
47 th	Neighborhood	Salgado Filho
48 th	Neighborhood	13 de Julho
49 th	Neighborhood	Jardins
50 th	Neighborhood	17 de Março

5.2.2 Telemangement System Implementation Program (PIST)

In order for the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed in relation to the TELEMANAGEMENT SYSTEM, it shall be up to the CONCESSIONAIRE to prepare a Program for the Implementation of the TELEMANAGEMENT SYSTEM - PIST. The PIST must contemplate the planning for the implantation of the TELEMANAGEMENT SYSTEM in the PUBLIC LIGHTING POINTS installed in ROADS WITH TELEMANAGEMENT, containing, at least:

- i. Detailed schedule for the implantation of the TELEMANAGEMENT SYSTEM, indicating intermediate stages of inspections by the INDEPENDENT VERIFIER, for obtention of the ACCEPTANCE TERMS;
- ii. Technologies/systems to be implemented and the technical characteristics of the equipment to be used, detailing at least:
 - a. Software/platform to control the TELEMANAGEMENT SYSTEM;

- b. Connectivity network;
 - c. Telemangement server;
 - d. Control devices;
 - e. Network structure;
 - f. ANATEL certification;
 - g. INMETRO certification, if any;
 - h. Information security certification.
- iii. Light intensity reduction strategy (dimming) at special times, when applicable.

For the application of the dimming function in PUBLIC LIGHTING POINTS, the CONCESSIONAIRE must prove that, during the period of execution of the dimming service, the reduction in the vehicle and pedestrian traffic volume is evidenced, allowing the reduction of the luminous flux to the minimum lighting requirements established in this ATTACHMENT and according to the project requirements presented in item 6.6 of this ATTACHMENT.

Additionally, the CONCESSIONAIRE must present or prove to the CONCESSION AUTHORITY:

- i. the reduction in the vehicle and pedestrian traffic volume, during the period of execution of the dimming service;
- ii. the time bands and the percentage of light intensity reduction (dimming) of the LUMINAIRES;
- iii. the energy gain provided;
- iv. the technical project which certifies the use of the dimming functionality of PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM, as provided for in art. 26 of ANEEL Resolution No. 414;
- v. the approval of the equipment through an official and competent authority;
- vi. the approval of the project by the DISTRIBUTION COMPANY, in case the TELEMAGEMENT SYSTEM impacts the energy consumption in PUBLIC LIGHTING POINTS with the estimated consumption.

5.2.3 Special Lighting Program (PIE)

For the CONCESSION AUTHORITY to have greater control over the procedures and main characteristics of the services which shall be performed in relation to Special Lighting, it shall be up to the CONCESSIONAIRE to develop a Special Lighting Program - PIE. The PIE must include details of all SPECIAL LIGHTING projects for the locations defined in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES. Projects must observe the proposals for interventions, technical specifications, concepts and guidelines provided for in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES. The PIE must contain, at least:

- i. The detailed implementation schedule, as well as the adaptation of existing facilities for the execution of the SPECIAL LIGHTING services, indicating the intermediate stages of inspections by the INDEPENDENT VERIFIER, for obtention of the ACCEPTANCE TERMS;
- ii. The technical specifications of all equipment and, as appropriate, systems to be installed;
- iii. The characteristics of the light sources to be implanted:
 - a. Power [W];
 - b. Color Reproduction Index (IRC);
 - c. Correlated Color Temperature [k];
 - d. Luminous flux;
 - e. Useful life;
 - f. Light flux depreciation factor;
 - g. Energy efficiency;
 - h. Protection Index;
 - i. 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 must prepare prior to the implementation of the SPECIAL LIGHTING implementation, the electrical and lighting projects at the executive level for SPECIAL LIGHTING, illustrated with three-dimensional images in accordance with the guidelines, procedures and specifications expressed in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES.

The CONCESSIONAIRE must send the executive projects for approval by the CONCESSION AUTHORITY. The CONCESSION AUTHORITY shall have a period of sixty (60) days to approve the projects.

The CONCESSIONAIRE must deliver in the Special Lighting Program the electrical and lighting projects at the executive level of the locations which shall be covered by SPECIAL LIGHTING until the end of MILESTONE I. The executive projects for the other SPECIAL LIGHTING locations must be delivered by the CONCESSIONAIRE with at least one hundred and twenty (120) days in advance of the deadline for the beginning of implementation of each SPECIAL LIGHTING project.

5.3 OPERATIONAL DEMOBILIZATION PLAN (PDO)

The CONCESSIONAIRE shall submit an Operational Demobilization Plan for the CONCESSION, which shall contain, at least:

- i. The form of reversal of REVERSIBLE ASSETS according to ATTACHMENT 15 - REVERSIBLE ASSETS;
- ii. The form of withdrawal of all non-REVERSIBLE ASSETS;
- iii. The inventory of all REVERSIBLE ASSETS, including date of installation, manufacturer, location, physical and technical characteristics and state of conservation;
- iv. The list of all existing guarantees;
- v. The estimated useful life of REVERSIBLE ASSETS, following the methodology and requirements defined in item 14.6 of this ATTACHMENT;
- vi. The list of all technical projects and plants (at least in digital CAD format);
- vii. The database (digital format) of information about the REVERSIBLE ASSETS;

- viii. Provision of information requested by the CONCESSION AUTHORITY or INDEPENDENT VERIFIER, to carry out the procedures provided for in item 14.6.

6 MODERNIZATION AND STREAMLINING ENERGY

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

It must be noted that the goals for compliance with the CONCESSION MILESTONES are cumulative, that is, at the end of each of the CONCESSION MILESTONES, all the modernized, efficient and equipped PUBLIC LIGHTING POINTS must be evaluated, in addition to SPECIAL LIGHTING installed.

The ENERGY EFFICIENCY TARGET is sixty-one integers and sixteen hundredths percent (61.16%).

The CONCESSIONAIRE shall implement the TELEMAGEMENT SYSTEM in the PUBLIC LIGHTING POINTS located in the streets with Vehicle LIGHTING CLASS equal to V1 or V2.

The proof of compliance with the CONCESSION MILESTONES shall obey the provisions below and in item 14.2 of this ATTACHMENT.

6.1 CONCESSION MILESTONE I

Within up to one hundred and eighty (180) days counted from the beginning of Phase II, the CONCESSIONAIRE shall be responsible for proving, for compliance with CONCESSION MILESTONE I:

- i. Modernization Percentage, calculated in the form of item 6.4, of at least thirty-three percent (33%);
- ii. Streamlining Energy Percentage, calculated in the form of item 6.4, of at least thirty-three percent (33%) of the ENERGY EFFICIENCY TARGET;
- iii. Implementation of SPECIAL LIGHTING in at least thirty-three percent (33%) of the locations in the MUNICIPALITY, as foreseen in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- iv. Implementation of the TELEMAGEMENT SYSTEM in all PUBLIC LIGHTING POINTS already modernized and streamlined energy, located on ROADS WITH TELEMAGEMENT

6.2 CONCESSION MILESTONE II

Within up to three hundred and sixty (360) days counted from the beginning of Phase II, the CONCESSIONAIRE shall be responsible for proving, for compliance with CONCESSION MILESTONE II:

- i. Modernization Percentage, calculated in the form of item 6.4, of at least sixty-six percent (66%);
- ii. Streamlining Energy Percentage, calculated in the form of item 6.4, of at least sixty-six percent (66%) of the ENERGY EFFICIENCY TARGET;
- iii. Implementation of SPECIAL LIGHTING in at least sixty-six percent (66%) of the locations in the MUNICIPALITY, as foreseen in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- iv. Implementation of the TELEMAGEMENT SYSTEM in all PUBLIC LIGHTING POINTS already modernized and streamlined energy, located on ROADS WITH TELEMAGEMENT

6.3 CONCESSION MILESTONE III

Within up to five hundred and forty (540) days counted from the beginning of Phase II, the CONCESSIONAIRE shall be responsible for proving, for compliance with CONCESSION MILESTONE III:

- i. Modernization Percentage, calculated in the form of item 6.4, of at least one hundred percent (100%);
- ii. Streamlining Energy Percentage, calculated in the form of item 6.4, of at least ninety-five percent (95%) of the ENERGY EFFICIENCY TARGET;
- iii. Implementation of SPECIAL LIGHTING in at least 100% of the locations, as foreseen in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- iv. Implementation of the TELEMAGEMENT SYSTEM in all PUBLIC LIGHTING POINTS already modernized and streamlined energy, located on ROADS WITH TELEMAGEMENT

6.4 CALCULATION OF MODERNIZATION AND STREAMLINING ENERGY PERCENTAGES

The MODERNIZATION AND STREAMLINING ENERGY percentages must be calculated as follows:

i. Modernization Percentage (PercM):

$$PercM = \frac{QPIP_{mod}}{QPIP_{initial}} \cdot 100\%$$

Where:

$QPIP_{mod}$ – Total number of PUBLIC LIGHTING POINTS contained in the BASE REGISTRY which have been modernized to comply with the assessed MILESTONE and previous MILESTONES, cumulatively;

$QPIP_{initial}$ - Corresponds to the total number of PUBLIC LIGHTING POINTS contained in the BASE REGISTRY.

ii. Streamlining Energy Percentage (PercE):

$$PercE = \left(1 - \frac{CI_t}{CI_{initial}} \right)$$

$$CI_{initial} = (QPIP_{initial} \times 215.85)$$

Where:

$QPIP_{initial}$ – Corresponds to the quantity of PUBLIC LIGHTING POINTS registered in the BASE REGISTRY. For calculation of the quantity of PUBLIC LIGHTING POINTS, the PUBLIC LIGHTING POINTS located in the places which shall receive SPECIAL LIGHTING projects must not be considered;

$CI_{initial}$ – Corresponds to the multiplication of the quantity of PUBLIC LIGHTING POINTS registered in the BASE REGISTRY by 215.85 watts;

CI_t – Corresponds to the total installed load of PUBLIC LIGHTING POINTS, registered in the REGISTRY, including the load and losses of auxiliary equipment. For calculation of the installed load, the PUBLIC LIGHTING POINTS located in the places which shall receive SPECIAL LIGHTING projects and new PUBLIC LIGHTING POINTS resulting from the execution of COMPLEMENTARY SERVICES must not be considered.

6.5 CONSEQUENCE OF DELAY IN THE OBTENTION OF LICENSES, AUTHORIZATIONS AND PERMITS FOR SPECIAL LIGHTING BY EXCLUSIVE FAULT OF THE CONCESSION AUTHORITY AND/OR PUBLIC ADMINISTRATION

In compliance with the provisions of Clause 9 of the CONTRACT, if the CONCESSIONAIRE fails to meet the deadline for compliance with the CONCESSION MILESTONE addressed in sub-items of item 6 exclusively due to delays in obtaining licenses, authorizations and permits for the implementation of SPECIAL LIGHTING, attributable exclusively to the CONCESSION AUTHORITY and/or the public administration, the following rules shall apply:

- i. For the purposes of calculating the MAXIMUM MONTHLY PAYMENT – PORTION A set out in ATTACHMENT 9 - PAYMENT MECHANISM, SPECIAL LIGHTING has been implemented within the period provided for the respective CONCESSION MILESTONE and, therefore, as long as the other pertinent conditions have been fulfilled, the CONCESSION MILESTONE has been reached;
- ii. After obtaining the necessary licenses, authorizations or permits, the CONCESSIONAIRE shall have the term provided for in the basic project approved by the CONCESSION AUTHORITY to complete the implementation of the SPECIAL LIGHTING referring to the respective CONCESSION MILESTONE (“Additional Term”);
- iii. In case the CONCESSIONAIRE fails to implement the SPECIAL LIGHTING referring to the respective CONCESSION MILESTONE until the end of the Additional Term, (i) the MAXIMUM MONTHLY PAYMENT – PORTION A shall be recalculated to reflect, in the payments due from the EFFECTIVE MONTHLY CONSIDERATION, the non-compliance with the respective CONCESSION MILESTONE by the CONCESSIONAIRE and (ii) the daily fine provided for in the CONTRACT shall be applied until the SPECIAL LIGHTING implementation required in the respective CONCESSION MILESTONE is confirmed;
- iv. The rule provided for in item iii shall be applied until the CONCESSIONAIRE proves the implementation of the SPECIAL LIGHTING referring to the respective CONCESSION MILESTONE.

6.6 Guidelines for MODERNIZATION AND STREAMLINING ENERGY OF THE MUNICIPAL PUBLIC LIGHTING NETWORK

During the MODERNIZATION AND STREAMLINING ENERGY period of PUBLIC LIGHTING POINTS, the CONCESSIONAIRE must observe the guidelines set out below, also considering them in the elaboration of the MODERNIZATION PLAN:

- i. Ensure that the installation of PUBLIC LIGHTING POINTS is based on the project guidelines established in this ATTACHMENT;
- ii. Ensure that the installation of PUBLIC LIGHTING POINTS meets all technical specifications of the equipment and materials set out in this ATTACHMENT.

6.6.1 Project Guidelines for MODERNIZATION OF THE MUNICIPAL PUBLIC LIGHTING NETWORK

In addition to promoting MODERNIZATION AND STREAMLINING ENERGY of PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall ensure that the PUBLIC LIGHTING SERVICE is in line with the CONCESSION'S lighting and efficiency requirements provided for in this ATTACHMENT. Accordingly, the CONCESSIONAIRE shall develop MODERNIZATION AND STREAMLINING ENERGY projects for the existing public places in accordance with the guidelines established in this ATTACHMENT.

For the MODERNIZATION AND STREAMLINING ENERGY executive projects of PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall:

- i. Identify and include in the REGISTRY the classification of the MUNICIPALITY roads according to the provisions expressed in ATTACHMENT 13 - CLASSIFICATION OF THE MUNICIPALITY ROADS;
- ii. Establish PUBLIC LIGHTING SERVICE which avoids high levels of glare and light pollution. The lighting levels obtained in the lighting project must not exceed twice the demanded lighting requirements;
- iii. Consider, when making lighting projects for existing public places, the maintenance factor which incorporates the natural depreciation of lighting equipment and the degradation of the luminous flux due to urban pollution;

- iv. Consider information about afforestation in the making of the aforementioned projects, in order to promote compatibility between vegetation and PUBLIC LIGHTING;
- v. Present the lighting projects for approval by the CONCESSION AUTHORITY in accordance with the guidelines, specifications and lighting requirements established in this ATTACHMENT, as well as the relevant legislation;
- vi. Present ART (Annotation of Technical Responsibility) of electrical and lighting projects;
- vii. Submit homologation and technical specifications of PUBLIC LIGHTING arms/supports and metal posts, in case of replacement or implantation of the referred structures;
- viii. Implement the PUBLIC LIGHTING POINTS observing the following correlated color temperature (TCC) ranges by type of street:
 - a. V1, V2 and V3: 4,000 K TCC;
 - b. V4 and V5: 3,000 K TCC;
 - c. Squares and Parks: 3,000 K TCC;
 - d. Sports courts and fields: 5,000 K TCC.
- ix. The CONCESSION AUTHORITY, during a validation of the MODERNIZATION PLAN (PM), will be able to request changes about the color temperature (TCC), provided above, following these limits:
 - a. V1, V2 and V3: up to 50% (fifty percent) of the PUBLIC LIGHTING POINTS for these LIGHTING CLASSES, the color temperature (TCC) may be adjusted for 5,000 K;
 - b. V4 and V5: up to 10% (ten percent) of the PUBLIC LIGHTING POINTS for these LIGHTING CLASSES, the color temperature (TCC) may be adjusted for 4,000 K.

For the execution of MODERNIZATION AND STREAMLINING ENERGY SERVICES of PUBLIC LIGHTING POINTS installed on vehicles and pedestrian roads, the CONCESSIONAIRE shall:

- i. Elaborate lighting projects developed for each street to be modernized, complying with the guidelines and specifications established in item 6.6, including the proposal to install any new PUBLIC LIGHTING POINTS to meet the lighting requirements set out in this ATTACHMENT. The lighting project must be designed in such a way as to dismiss any need to relocate

electricity utility posts to meet the requirements set out in this ATTACHMENT. When there is a need to install new streetlights for the purposes of meeting the requirements of this ATTACHMENT, the investment shall be borne by the CONCESSIONAIRE without consumption by the CREDIT BANK. The lighting projects must be developed in specific software compatible with those used by the CONCESSION AUTHORITY, using the technical specifications of LUMINAIRES in accordance with the data from type tests and their certifications. The lighting projects for lighting tunnels and underpasses must consider the minimum lighting requirements according to ABNT NBR 5181. The projects must contain:

- a. LIGHTING CLASS in accordance with the guidelines establishes in ATTACHMENT 13 - CLASSIFICATION OF THE MUNICIPALITY ROADS;
- b. Road width;
- c. Distance between posts;
- d. Distance between the base of the post and the vehicle traffic lane;
- e. Post height;
- f. Type and horizontal projection of the support arm;
- g. Mounting height of the LUMINAIRE;
- h. Number of LUMINAIRES per post;
- i. Degree of inclination of LUMINAIRE installation;
- j. Type of transverse and longitudinal distribution of the luminous flux;
- k. Color temperature [K];
- l. 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;
- m. Light Dispersion (BUG Index);
- n. Existence of arboreal elements or other elements which may impact the road lighting.

- ii. Meet the minimum levels of average illuminance and uniformity for all LIGHTING CLASSES provided for in ABNT NBR 5101 Standard, or another one which may replace it, as shown in the table below:

Table 1 – Average illuminance requirements and illuminance uniformity factor

Lighting Class	Minimum average illuminance $E_{MED, MIN}$ [lux]	Minimum uniformity factor U_{MIN} (E_{MIN} / E_{MED})
V1	30	0.40
V2	20	0.30
V3	15	0.20
V4	10	0.20
V5	5	0.20

- iii. Meet the minimum levels of average illuminance and uniformity for all LIGHTING CLASSES provided for in ABNT NBR 5101 Standard, or another one which may replace it, as shown in the table below:

Table 2 – Minimum lighting requirements by type of pedestrian walkway

Lighting Class	Minimum average illuminance $E_{MED, MIN}$ [lux]	Minimum uniformity factor U_{MIN} (E_{MIN} / E_{MED})
P1	20	0.30
P2	10	0.25
P3	5	0.20
P4	3	0.20

- iv. Meet the minimum lighting levels in tunnels and underpasses covered by ABNT NBR 5181;
- v. For PUBLIC LIGHTING POINTS classified as a TERMINAL PUBLIC LIGHTING POINT in the REGISTRY, the measurement of average illuminance and uniformity must be performed only in a gap adjacent to the PUBLIC LIGHTING POINT in the direction of the post, less than ninety (90) meters away in the same road. The lighting levels provided in Table 1 e Table 2 must be met, according to the LIGHTING CLASSES of the road.
- vi. For PUBLIC LIGHTING POINTS classified as ISOLATED PUBLIC LIGHTING POINTS in the REGISTRY, the calculation of average illuminance and uniformity must be performed considering a measurement grid at 17.5 meters from the point for each direction of the road. In this case, 50% of the lighting levels provided for in Table 1 e Table 2 must be met, according to the LIGHTING CLASSES of the road.

- vii. In the development of the lighting project, 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.

For execution of the MODERNIZATION AND STREAMLINING ENERGY SERVICES of the PUBLIC 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 stretches of pedestrian circulation and leisure areas, the minimum levels of average illuminance and uniformity according to LIGHTING CLASS P2, presented in Table 2, are met;
- ii. Ensure in public squares and parks that PUBLIC LIGHTING allows at least guidance, 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. The lighting for squares and parks must give special attention to the lighting of stairs and ramps for pedestrian access, in particular ensuring that level changes are clearly visible;
- iv. Distribute the PUBLIC LIGHTING structures so as not to obstruct the access of emergency, delivery or maintenance vehicles, nor to compete with the local architecture;
- v. Consider applying differentiated design criteria to different areas such as gardens, playgrounds, table games and courts, using LUMINAIRE arrangements, decorative lighting or projectors;
- vi. Consider the adequate lighting of statues, bandstands and other special points in squares and parks, preferably with highlighted lighting.

For execution of the MODERNIZATION AND STREAMLINING ENERGY projects for bikeways and bike lanes in the MUNICIPALITY, the CONCESSIONAIRE shall:

- i. Develop a lighting project which meets the minimum lighting requirements expressed below:

Table 3 - Minimum lighting requirements for bikeways and bike lanes

Nature of the bikeway	Lighting Class	Average illuminance (lux)	Uniformity Factor
Stretches that cross vehicle lanes.	C1	15	0.20
Lanes adjacent to vehicle traffic lanes	C2	10	0.20
Lanes not adjacent to vehicle traffic lanes or crowded on central beds or sidewalks	C3	5	0.20

The deadline for MODERNIZATION AND STREAMLINING ENERGY of PUBLIC LIGHTING POINTS in other types of public places corresponds to the same deadline for street lighting in the MUNICIPALITY.

6.6.2 Equipment and Material Specifications

The CONCESSIONAIRE may only install, in the MUNICIPAL PUBLIC LIGHTING NETWORK, LUMINAIRES certified by INMETRO, in accordance with Ordinance No. 20 or another which may replace it. The technology used in the MUNICIPAL PUBLIC LIGHTING NETWORK must obligatorily meet the technical parameters, tests, among other requirements present in the regulations presented in the item of regulatory references, as well as the following minimum technical specifications.

- i. **Energy efficiency (EE):** LUMINAIRE with minimum energy efficiency according to class A of INMETRO Ordinance No. 20. In the calculation of this efficiency, auxiliary equipment of the LUMINAIRE must be considered;
- ii. **Protection index (IP):** the LUMINAIRE enclosure must ensure the degree of protection against the penetration of dust, solid objects and moisture, with a minimum degree of protection IP-66. The degree of protection must be certified by tests based on ABNT NBR IEC 60529;
- iii. **Protection against external mechanical impacts:** LUMINAIRES must have resistance to external mechanical impacts corresponding, at least, to the degree of protection IK-08 according to ABNT NBR IEC 62262;

- iv. **Electrical requirements:** The electrical and optical characteristics must meet the standards 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. The 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 voltage surge protection device connected in series to the electrical supply of the LED LUMINAIRE.
- v. **Surge Protection Device:** The LUMINAIRES must be equipped with a voltage surge protection device with electrical installation in the LUMINAIRE according to ABNT NBR 5410;
- vi. **Adherence to telemanagement systems:** LUMINAIRES must present technology compatible with all the functionality of the TELEMANAGEMENT SYSTEM and connection point for the installation of telemanagement equipment;
- vii. **Photometry:** LUMINAIRES must be classified according to criteria in the ABNT NBR 5101 Standard for longitudinal distribution (Short, Medium and Long), transversal distribution (Type I, II and III) and light intensity distribution control (full cut-off, cut -off and semi cut-off);
- viii. **Finishing:** all non-energized metal parts of the LUMINAIRES must receive anti-corrosion treatment;
- ix. **Electronic driver:** The driver must have constant current in the output, meeting standards NBR IEC 605981, NBR 15129, NBR IEC 60529, IEC 61347-1, NBR IEC61347-2-13, IEC 61547, NBR 16026, IEC61000-3-2 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:
- x. **INMETRO Certification:** the CONCESSIONAIRE must present the LED LUMINAIRE certification issued by INMETRO regarding Ordinance No. 20, or another which may replace it. In the event of revocation or suspension of INMETRO Ordinance No. 20, the following items must be presented at least:
 - a. **Certification:** The LUMINAIRES must present the certificates required in INMETRO Ordinance No. 20.

b. Laboratory tests: The CONCESSIONAIRE must submit sample laboratory tests and tests that minimally analyze the following parameters:

- Supply voltage of the light source (V);
- Light source power (W);
- Supply current of the light source (A);
- Power factor;
- Total luminous efficacy;
- Color temperature;
- Color rendering index;
- Insulation resistance;
- Dielectric strength;
- Total harmonic distortion (THD);
- Input current of the lamps or LED modules (if applicable) of the LUMINAIRE (I_{cc});
- Input voltage of the lamps or LED modules (if applicable) of the LUMINAIRE (V_{cc});
- Luminous flux of the LUMINAIRE (I_m);
- Nominal voltage of the lamps or LUMINAIRES (V);
- Nominal current of lamps or LUMINAIRES (mA);
- Maximum junction temperature (°C);
- Lamp manufacturer/LUMINAIRES.

Regarding the laboratory tests and tests referred to above, the CONCESSIONAIRE shall:

- i. Record all tests performed, including at least:

- a. Recognition of each of the elements of PUBLIC LIGHTING evaluated in the sample, with a note of their identification of the REGISTRY;
 - b. Conduction date;
 - c. Obtained results.
- ii. Ensure the performance of tests in laboratories accredited by INMETRO or competent authorities approved by the CONCESSION AUTHORITY (the tests must demonstrate compliance with INMETRO Ordinance No. 20 - Technical Quality Regulation for LUMINAIRES for Public Street Lighting, or any subsequent ordinance);
 - iii. Submit the results obtained in the tests to the CONCESSION AUTHORITY;
 - iv. Submit any requests for disregarding items to the CONCESSION AUTHORITY, as long as duly justified;
 - v. Replace the PUBLIC LIGHTING equipment that has insufficient quality and performance according to the parameters established in this ATTACHMENT;
 - vi. Bear all costs related to changes, tests, verification and analysis of the facilities;
 - vii. Provide new tests, if requested by the CONCESSION AUTHORITY.

6.6.3 Procedures for the Execution of MODERNIZATION AND STREAMLINING ENERGY Services

For the MODERNIZATION AND STREAMLINING ENERGY SERVICES to be properly executed by the CONCESSIONAIRE and, after its conclusion, accepted by the CONCESSION AUTHORITY for the purpose of proving compliance with the CONCESSION MILESTONES, in accordance with the provisions in this ATTACHMENT, the following obligations and responsibilities must be followed:

The CONCESSIONAIRE must:

- i. Prepare and submit to the CONCESSION AUTHORITY and, if required by the DISTRIBUTION COMPANY, to the DISTRIBUTION COMPANY, observing all the current regulations and the terms entered between the CONCESSION AUTHORITY and the DISTRIBUTION COMPANY, the projects related to the MODERNIZATION AND STREAMLINING ENERGY services and implementation of PUBLIC LIGHTING POINTS and the TELEMAGEMENT SYSTEM, provided

for in the period, in accordance with the Modernization and Streamlining Energy Program (PME), the TELEMAGEMENT SYSTEM Implementation Program and this ATTACHMENT. In them, the following must be presented:

- a. Complete implementation plan, containing:
 - Detailed schedule of execution and conclusion of services;
 - Quantitative of the materials to be used.
- b. Lighting projects according to the guidelines established in item 6.6.1.
- c. Electrical projects;
- d. Structural projects;
- e. Details of the PUBLIC LIGHTING POINTS involved, duly georeferenced, present in the REGISTRY;
- f. List of materials included in the projects;
- g. Complete technical specifications of the utilized materials;
- h. Complete technical specifications of the technologies to be implemented in the PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM, including, minimally: Software/Platform to control the TELEMAGEMENT SYSTEM; Connectivity network and the control devices of the TELEMAGEMENT SYSTEM;
- i. Electrical assembly diagrams;
- j. Calculation memory of the loads involved to be removed and installed;
- k. Existing and future electrical loads;
- l. Signatures of the responsible engineers, accompanied by the CREA number, the respective ART was collected and annotated, according to current regulations.

- ii. Provide the CONCESSION AUTHORITY with, together with the MODERNIZATION AND STREAMLINING ENERGY projects, at least:
 - a. Physical samples of the TELEMAGEMENT SYSTEM technological solutions selected by him for the PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM;
 - b. Physical samples of the technological lighting solutions selected by it;
 - c. Certificates from laboratories accredited by INMETRO or the competent authority, for approval of the technology used for lighting in accordance with Ordinance No. 20, which regulates the minimum technical requirements that attest 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 compliance identification seal;
 - e. Certificates from laboratories accredited by INMETRO or the competent agency, if any, for approval of the technology used for telemanagement;
- iii. Ensure that the projects developed meet the following requirements:
 - a. Compliance with the equipment and material specifications in item 6.6.2;
 - b. Utilization, preferably, of one single model of LUMINAIRE for PUBLIC LIGHTING POINTS located on the same road, except for cases where the urban project requires more than one model and in cases where the existing model is not able to meet the requirements foreseen in this ATTACHMENT;
 - c. Review and/or replacement, if necessary, of connections to the power grid;
 - d. Inclusion of exclusive circuit, if necessary;
- iv. Perform the necessary changes to the projects, if requested by the CONCESSION AUTHORITY to review them, within the deadline provided for in the CONTRACT. In this case, the CONCESSIONAIRE must begin the MODERNIZATION AND STREAMLINING ENERGY services intended only after the approval of the revised projects, except as provided in the CONTRACT;

- v. Formally communicate to the CONCESSION AUTHORITY, upon completion of MODERNIZATION AND STREAMLINING ENERGY SERVICES, accompanied by the “as built” of each project. The “as built” must be accompanied by the list of materials used and the date of energization, as well as the results of the lighting requirements referred to in item 6.6. For PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM, proof of the telemanagement capacity of these points, so that their operation complies with the functionalities established in item 7 of this ATTACHMENT, and such elements are to be delivered as follows:
 - a. Structural (civil work), electrical and lighting projects, in digital format: AUTOCAD and public lighting software and PDF;
 - b. Itemized list of materials, of public places, with the respective amounts of PUBLIC LIGHTING POINTS, containing the data and registration information, according to ATTACHMENT 4 - PUBLIC LIGHTING NETWORK REGISTRY, in digital medium.
 - c. Printed copies of items a and b, on paper may be requested at the discretion of the CONCESSION AUTHORITY.
- vi. Submit certifications and the results of laboratory tests, regarding the quality of the equipment installed in the execution of MODERNIZATION AND STREAMLINING ENERGY SERVICES, under the conditions established in item 6.6.2 of the present ATTACHMENT;
- vii. Redo the complete SERVICE, or part of it, bearing all the related expenses, when the CONCESSION AUTHORITY and the INDEPENDENT VERIFIER do not approve;
- viii. Update the REGISTRY after executing the MODERNIZATION AND STREAMLINING ENERGY SERVICES; including at least:
 - a. The identification of all modernized PUBLIC LIGHTING POINTS;
 - b. The registration of the conducted MODERNIZATION AND STREAMLINING ENERGY activity.
- ix. Submit to the CONCESSION AUTHORITY and to the DISTRIBUTION COMPANY the proof of updating the REGISTRY, within the term established in the CONTRACT.

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

- i. Submit changes to the MODERNIZATION AND STREAMLINING ENERGY projects, if requested by the CONCESSION AUTHORITY, within the period established in the CONTRACT, counted from the date of the CONCESSION AUTHORITY's request for review;
- ii. Make the necessary modifications to the performed MODERNIZATION AND STREAMLINING ENERGY SERVICES, within the period indicated by the CONCESSION AUTHORITY, counted from the date of disapproval by the CONCESSION AUTHORITY and the INDEPENDENT VERIFIER of the performed SERVICES.

6.6.4 Installation of new PUBLIC LIGHTING POINTS for correction of dark areas

MODERNIZATION AND STREAMLINING ENERGY OF THE MUNICIPAL PUBLIC LIGHTING NETWORK must occur in all existing public places, and in some cases may need new POINTS OF PUBLIC LIGHTING in places denominated as dark areas: roads that already have lighting currently but do not have the parameters that enable them meeting the requirements for illuminance and uniformity provided for in this ATTACHMENT.

It must be noted that it is the CONCESSIONAIRE's obligation to adapt the PUBLIC LIGHTING infrastructure both of the INITIAL PUBLIC LIGHTING MUNICIPAL NETWORK and that resulting from the expansion of the MUNICIPAL PUBLIC LIGHTING NETWORK, in order to meet the parameters of the PERFORMANCE MEASUREMENT SYSTEM.

The installation of new PUBLIC LIGHTING POINTS to correct dark areas shall not be considered as a COMPLEMENTARY SERVICE and shall not be computed for the purposes of utilization of the CREDIT BANK, if the distance between the PUBLIC LIGHTING POINTS in the same street is up to ninety (90) meters.

6.6.5 Adequacy of the MUNICIPAL PUBLIC LIGHTING NETWORK

The CONCESSIONAIRE must ensure that the lighting projects to be prepared prior to the MODERNIZATION AND STREAMLINING ENERGY action meet the requirements established in this ATTACHMENT and ensure the service throughout the CONCESSION TERM.

The CONCESSIONAIRE shall be responsible for the adjustments to the MUNICIPAL PUBLIC LIGHTING NETWORK which are necessary to fully meet the lighting and efficiency requirements of the CONCESSION provided for in this ATTACHMENT.

In cases where there is a need to replace arms or supports for adequacy, the CONCESSIONAIRE must develop a prior technical study regarding the mechanical effort of the PUBLIC LIGHTING pole, in such a way that the replacement of the arm and/or support by a new structure that ensures compliance with the CONCESSION lighting and efficiency requirements set out in this ATTACHMENT.

The CONCESSIONAIRE may reuse the arms, posts and supports replaced for the purpose of adequacy or for finding in the PREVENTIVE MAINTENANCE of the MUNICIPAL PUBLIC LIGHTING NETWORK structures that compromise the safety of the USERS and/or show signs of accentuated oxidation. The CONCESSIONAIRE is responsible for investigating the mechanical conditions of arms and/or supports, before reuse, in order to ensure the safety of its new installation.

In cases where it is necessary to install a new pole and/or PUBLIC LIGHTING LUMINAIRE in an aerial or underground distribution network for adaptation, the CONCESSIONAIRE shall prepare an electrical and structural project respecting the normative references and submit it for approval by the CONCESSION AUTHORITY. All adaptation costs, such as the installation of a new pole and/or LUMINAIRE, are the responsibility of the CONCESSIONAIRE, in spans between two PUBLIC LIGHTING POINTS with a distance of up to ninety (90) meters in the same street. The aforementioned adequacy costs do not consume the CREDIT BANK.

In cases where it is necessary to replace and/or install a new arm, the CONCESSIONAIRE must seek to maintain the arm pattern of the other PUBLIC LIGHTING POINTS of the same street. It is understood that the pattern of the arms of the same street is uniform in cases where all the arms have in common the same constructive design characteristics: (i) horizontal projection; (ii) vertical projection; (iii) diameter; (iv) angle of inclination of the arm; and (v) angle of inclination of the head of the arm.

In cases where it is necessary to replace and/or install new poles, the CONCESSIONAIRE must seek to maintain the standard of poles of the other PUBLIC LIGHTING POINTS of the same street. It is understood that the pattern of the poles in the same street is uniform in cases where all the poles share the same construction design characteristics: (i) type of material; (ii) useful height; (iii) diameter.

6.7 Implementation of the SPECIAL LIGHTING

Within the deadlines established in the CONTRACT and in item 6 of this ATTACHMENT, the CONCESSIONAIRE shall carry out the works related to the implementation of SPECIAL LIGHTING in the pre-stipulated places, and modernization of the existing SPECIAL LIGHTING points, according to the guidelines and specifications set out in ATTACHMENT 6 - GUIDELINES FOR SPECIAL LIGHTING. It must be noted that the CONCESSIONAIRE shall be responsible for the maintenance and operation of these points, as highlighted in item 5.2.3 of this ATTACHMENT.

7 Implementation of the TELEMAGEMENT SYSTEM

The CONCESSIONAIRE shall implement the TELEMAGEMENT SYSTEM at PUBLIC LIGHTING POINTS located in the streets with Vehicle LIGHTING CLASS equal to V1 or V2, according to the provisions and guidelines of ATTACHMENT 13 - CLASSIFICATION OF THE MUNICIPALITY ROADS.

The TELEMAGEMENT SYSTEM must include a computing, storage, security, connectivity, graphical user interface and field devices solution (“online” or “offline”) to manage, monitor, control and receive operational data from the PUBLIC LIGHTING POINTS at the locations with TELEMAGEMENT SYSTEM.

The TELEMAGEMENT SYSTEM must support open communication protocols when necessary (for example, TCP/IP, 802.15.4, 6LoWPAN, Bluetooth Low Energy - BLE) and must be scalable, reliable and fast. The TELEMAGEMENT SYSTEM must have a control application, implemented at the CCO, with a dynamic user interface to manage a high volume of devices, reports and other functions without the need for physical installation of any specific management software, which may be viewed at from any device with a common browser and must support control protocols (for example, HTTP, XML, REST, SOAP), allowing integration with different technologies.

The TELEMAGEMENT SYSTEM shall consist of minimal operational functionalities, a platform for the control of the TELEMAGEMENT SYSTEM, connectivity and control devices to be installed in the PUBLIC LIGHTING POINTS.

7.1 Basic characteristics of the TELEMANAGEMENT SYSTEM platform

The TELEMANAGEMENT SYSTEM platform must be integrated with the operational SERVICES that comprise the OPERATIONAL CONTROL CENTER (CCO) and the Central Management System.

The CONCESSIONAIRE shall be responsible for implementing a platform to control the TELEMANAGEMENT SYSTEM at the OPERATIONAL CONTROL CENTER (CCO) which minimally guarantees:

- i. Simultaneous operation of multiple control screens in different locations, by any level of user at any time;
- ii. Reliable encryption technology with a high level of security for system operations;
- iii. Data integrity for a period of twelve (12) months;
- iv. Data storage, by redundancy, in at least two different locations, to ensure that regardless of natural adversities, the reliability of storage and the retrieval of information can be done at any time. The replication of data must be instantaneous and automatic, allowing instant access to them in case of any event or external anomaly.
- v. Remote and secure updates. Updates must be installed automatically and without disturbing the operation of the MUNICIPAL PUBLIC LIGHTING NETWORK. Upon completion of the installation of the new added features, a summary of these must be sent to the CONCESSION AUTHORITY;
- vi. Easy incorporation of existing open lighting technologies (including 0-10V technology, DALI, among others);
- vii. Communication of computers/servers with other internet systems in an open, standardized and documented manner. Utilizing Web platforms, the TELEMANAGEMENT SYSTEM control platform must:

- a. Present a friendly web interface, available in Portuguese, which can be viewed from any device with a common browser and must support open control protocols (for example, HTTP, XML, REST, SOAP) and allow integration with other systems;
 - b. Have 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 PUBLIC LIGHTING POINTS on a georeferenced cartographic basis, view the PUBLIC LIGHTING plan on a map or satellite photo.
 - c. Have specific icons for failures in existing equipment in the PUBLIC LIGHTING POINTS;
 - d. Ability to generate reports of unlimited historical data regarding failures, occurrences and measurements, which may be exported in files;
 - e. Have control commands, monitoring and consultation of the lighting network in real time and scheduled;
 - f. Have the ability to generate a complete event log (log) for each of the PUBLIC LIGHTING POINTS;
- viii. Grouping of LUMINAIRES in multiples of groups, allowing overlap and consultation of groups;
 - ix. Configuration of programs and routines for control, monitoring and consultation;
 - x. Configurable programming in case of failures, occurrences, alarms and warning notices (overvoltage and undervoltage at the driver input, driver overcurrent, power factor);
 - xi. Identification of the types of faults in the LUMINAIRES (such as off or on, outside the operating hours), being the visualization of such faults automatic and in real time;
 - xii. Measurement of energy consumption broken down by PUBLIC LIGHTING POINT and totaled according to the following billing procedures:
 - a. Standard: based on the time determined by ANEEL according to the current Resolution. It must be noted that this procedure must be changed by updating ANEEL's billing proposal;
 - b. Measured (actual consumption measured by internal meter);
 - c. Estimated (actual time on).
-

- xiii. Real-time measurement and monitoring (instantaneous and effective values) of voltage, current and active power, as well as instantaneous power factor values;
- xiv. Communication connection status of all elements, including storage and memory capacity;
- xv. Automatic records in the CCO of changes in the behavior of the LUMINAIRES;
- xvi. Registration of the moments of return to operation;
- xvii. Identification of the types of faults in the LUMINAIRES (blinking, off);
- xviii. Ability to register work order as well as closing it, indicating the USER's awareness;
- xix. Ability to group alerts and same faults issued for a set of LUMINAIRES or individualized LUMINAIRE in one single service order;
- xx. Registration of operating hours for each LUMINAIRE;
- xxi. Export of maps in KMZ format (Google Earth). In case the system does not have native functionality for export in this format, the CONCESSIONAIRE may supply the maps in KMZ format from other software, without any burden to the CONCESSION AUTHORITY;
- xxii. Exporting of results and information from the TELEMAGEMENT 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 PUBLIC LIGHTING POINTS, graphs and statements;
- xxiv. System information security mechanisms;
- xxv. Integration with the software which compose the CCO.

The servers utilized in the TELEMAGEMENT SYSTEM and/or in the CCO (either own or in the cloud) must preferably be located in Brazilian territory, requiring that at least the backup of all systems be located in Brazilian territory. In the case of hiring a cloud operator, the company must respond legally in Brazilian territory.

The TELEMAGEMENT SYSTEM control platform must also be integrated with the MUNICIPAL PUBLIC LIGHTING NETWORK operation and maintenance SERVICES, in order to corroborate in the execution of the corrective and predictive SERVICES, mainly, according to the guidelines expressed below:

- i. Corrective order: the TELEMAGEMENT SYSTEM must alert the CCO, in cases of identification of operational failures in the PUBLIC LIGHTING POINTS, through a service order with the necessary information for analysis;
- ii. Predictive order: among the functionalities of the TELEMAGEMENT SYSTEM is the real-time monitoring of the supply voltage of the LUMINAIRES. In the event of an increase in voltage above that determined by ANEEL's resolution, the TELEMAGEMENT SYSTEM must generate a report for predictive action at the point where there was a voltage violation.

7.2 Connectivity

The CONCESSIONAIRE shall provide connectivity, ensuring communication between the TELEMAGEMENT SYSTEM control devices installed in the PUBLIC LIGHTING POINTS, the TELEMAGEMENT SYSTEM control platform and the CCO. The connectivity shall establish two-way communication of information between PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM and the CCO, in order to allow the CCO to send command information to the PUBLIC LIGHTING POINTS and that the latter, through their control devices, are also able to send information regarding the operational status of the PUBLIC LIGHTING POINT.

The CONCESSIONAIRE shall be responsible for providing a connectivity network which minimally enables to:

- i. Ensure data coverage in all PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM;
- ii. Extend the limits of size and speed of data communication, if the application of the TELEMAGEMENT SYSTEM so requires;
- iii. Have Scalability;
- iv. Operate on an authorized frequency regulated by ANATEL for this nature of service;
- v. Operate in high availability and network redundancy, ensuring self-recovery mechanisms and automatic routing in case of failure;
- vi. Ensure network structure with support for open standards;

- vii. Operate autonomously without the need to connect to a hub or the internet, storing operational data for at least 7 days (in case of any connection failure).

7.3 Telemangement System Control Device

The control device of the TELEMAGEMENT SYSTEM available in PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM is presented as a key part in the implementation of the TELEMAGEMENT SYSTEM when establishing the communication between the PUBLIC LIGHTING POINT and the platform for controlling the TELEMAGEMENT SYSTEM installed in the OPERATIONAL CONTROL CENTER (CCO).

The control devices of the TELEMAGEMENT SYSTEM, minimally, must comply with the specifications established below.

- i. Allow receiving individual or group control for messages and commands on/off, dimming, operation calendars and time signal. Each control device must receive its own astronomical clock (solar chart), depending on its georeferenced position and the dimming schedule allocated to the device;
- ii. Field devices must be controlled through the same environment as the telemangement platform, regardless of the technology adopted in the field;
- iii. Updating of systems and internal parameter settings remotely - Over The Air (OTA);
- iv. Ability to automatically reconnect to the application server (watchdog) for monitoring its operating system services and connectivity tests;
- v. ANATEL certification;
- vi. Availability of a high-precision photometer for external illuminance control in order to remotely monitor or program the instantaneous activation of LED LUMINAIRES.
- vii. Real-time communication between the PUBLIC LIGHTING POINT and the CCO;
- viii. Dimming capacity between one percent (1%) to one hundred percent (100%);
- ix. Ability (soft real-time) to turn the LUMINAIRE on or off remotely and through scheduled or direct programming;

- x. Monitoring and data collection, including:
 - a. LUMINAIRE status reading (on/off/% dimming)
 - b. Accumulated duration of the LUMINAIRE operating time;
 - c. Number of switches accumulated by the LUMINAIRE.
- xi. Ability to check the operation mode of the LUMINAIRE (direct/programmed);
- xii. Fault identification of LUMINAIREs, driver and power/power factor
- xiii. Ability to perform control and dimming through the status of the photometers and/or assisted by a timer and a real-time clock according to the annual sunrise and sunset calendar, even in the absence of communication with the CCO;
- xiv. Be compatible with open lighting technologies such as 0-10V, DALI, among others;
- xv. Ability to store programming parameters recorded in non-volatile memory;
- xvi. Submission of messages and automatic alerts as soon as the LUMINAIRE status changes (transition between LUMINAIRE on, flashing or off);
- xvii. Programmable time to send information related to the LUMINAIRE to the OPERATIONAL CONTROL CENTER;
- xviii. The control devices may require the installation of communication concentrators/gateways. This way, the location and number of such equipment must be defined according to the adopted technology. The control devices, however, must continue the pre-programmed lighting operation in the event of failure of these concentrators/gateways.

The CONCESSIONAIRE shall implement the TELEMANAGEMENT SYSTEM which meets the features and specifications expressed below.

7.3.1 Dimming

The TELEMANAGEMENT SYSTEM shall guarantee the remote adjustment of the luminous control in real time for each LUMINAIRE that has a TELEMANAGEMENT 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 the luminous flux in the PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM must follow relevant legal and normative aspects (especially the ABNT NBR 5101 Standard) and can only be carried out with authorization from the CONCESSION AUTHORITY and compliance with the requirements set forth in item 5.2.2.

7.3.2 Monitoring

The TELEMAGEMENT SYSTEM shall guarantee uninterrupted remote monitoring of PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM, so that failures and actions which require maintenance are identified. Thus, for this SERVICE to be effective, the system must monitor:

- i. Operational failure of the LUMINAIRES;
- ii. Communication failure;
- iii. Electricity quality (power factor, voltage level, power and current);
- iv. Geographical position of the LUMINAIRES;
- v. Number of switches accumulated by the LUMINAIRE;
- vi. Accumulated duration of the LUMINAIRE operating time;
- vii. In real time (soft real-time), the status of the LUMINAIRES (on or off) and changes to these states directly or programmed (soft real-time).

7.3.3 Measurement

The TELEMAGEMENT SYSTEM must measure in real time (soft real-time) electrical and environmental quantities associated with the PUBLIC LIGHTING POINT. Minimally measured:

- i. Operation time of PUBLIC LIGHTING POINTS;
- ii. Instant power in Watts;

- iii. Apparent power;
- iv. Accumulated monthly energy consumption per PUBLIC LIGHTING POINT;
- v. Power factor;
- vi. Voltage;
- vii. Current;
- viii. Accumulated operating time of the LUMINAIRE.

8 IMPLEMENTATION AND OPERATIONALIZATION OF THE OPERATIONAL CONTROL CENTER (CCO)

The OPERATIONAL CONTROL CENTER - CCO, to be implemented and operated by the CONCESSIONAIRE, shall guarantee the integrated management and control of the services related to the operation and maintenance and MODERNIZATION AND STREAMLINING ENERGY of the PUBLIC LIGHTING POINTS, SPECIAL LIGHTING, TELEMAGEMENT SYSTEM and COMPLEMENTARY SERVICES.

For such purpose, the CCO must have the Central Management System and other software related to:

- i. Call center - Service Desk:
 - a. Call management;
 - b. Remote Management and Monitoring of PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM.
- ii. Lighting Asset Management;
- iii. Operation Management (PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCE);
- iv. Performance Management;
- v. Project Management;
- vi. Electric Power Consumption Management.

The CONCESSIONAIRE must:

- i. Provide a location for the installation of the CCO (own or rented);
- ii. Install support environments for the CCO, contemplating the execution of civil, electrical, logical and refrigeration adjustments which may be necessary, in addition to the provision and installation of the entire Information Technology infrastructure;
- iii. Provide all materials, systems, equipment, as well as labor, duly trained by the CONCESSIONAIRE, necessary for the development of the CCO's routine operating activities;

- iv. Meet all the calls for CORRECTIVE MAINTENANCE, coming from citizens or the CONCESSION AUTHORITY, through the operation of the CONCESSIONAIRE's Call Center and provision of the service channels provided for in this ATTACHMENT. The CONCESSIONAIRE may choose to subcontract the call center operation service, provided that it ensures compliance with all the rules and requirements set out in this ATTACHMENT;
- v. Implement in the CCO Information Technology solutions, which minimally enable to:
 - a. Provide full and real-time access to the CONCESSION AUTHORITY, the INDEPENDENT VERIFIER and other municipal authorities authorized by the CONCESSION AUTHORITY, to the CCO data, through access to the system and the issuance of dynamic reports and on thematic maps, for monitoring and control of the performed SERVICES;
 - b. Have access control and restrictions, to guarantee the standardization and validation of data and to have a full range of consultation and reporting options, in order to enable the total monitoring of the activities contracted by the CONCESSION AUTHORITY;
 - c. Utilize software platforms, file types and applications widely used in the market and properly licensed, with the capacity for georeferenced processing;
 - d. Allow data export to commercial document production applications (Word/Excel) and other databases (Access/SQL Server/Oracle) and, when applicable, to CAD and/or GIS applications;
 - e. Provide an interface in Portuguese and, as one of its functions, the possibility of data interface with other Information Technology solutions;
 - f. View all PUBLIC LIGHTING POINTS registered on maps of the municipality, neighborhoods, public places, correlating the location and the identification number;
 - g. Monitor, in real time, the momentary/real situation of PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM;

- h. Monitor, in real time, vehicles and field teams throughout the road until they arrive at the operational base.
- vi. Ensure the continuity of the operation, through the installation of an uninterrupted power supply system, in the event of a lack of electricity supply at the CCO facilities, ensuring full operation of the equipment and systems of the Call Center, operation management and SYSTEM management TELEMAGEMENT;
- vii. Guarantee the confidentiality of all information received at the CCO, which cannot be copied, reproduced, published, disseminated in any way or means, except for the CONCESSION AUTHORITY and for the exclusive needs of the CONCESSIONAIRE's work, detailed in this ATTACHMENT;
- viii. Update, continuously, during the CONCESSION period, all equipment, systems and physical structure of the CCO, considering the profile of the useful life of each technology, considering the obsolescence period and the availability index for the use of each equipment (including equipment redundancy whenever necessary);
- ix. Register, in the CCO database, the information listed below, regarding the SERVICES performed to maintain the MUNICIPAL PUBLIC LIGHTING NETWORK, not limited to:
 - a. Location/reference:
 - Request addresses and the location of the occurrence (type and name of the street, zip code, neighborhood, number in the street, place references);
 - Call (self-service, patrol, call center, ombudsman, request from the CONCESSION AUTHORITY, identification of the CONCESSIONAIRE, registration, receipt and response dates);
 - Requestor's data.
 - b. CORRECTIVE/EMERGENCY MAINTENANCE interventions:
 - Team (type and identification of the vehicle, person in charge, date and time of beginning and end of the SERVICE);

- Reason for the request and problem found, emergency attention situations must be identified;
 - Complete identification of PUBLIC LIGHTING POINTS, circuit or equipment of the MUNICIPAL PUBLIC LIGHTING NETWORK (reference number in the REGISTRY, type and other specific characteristics);
 - Activities performed (code, description, quantity);
 - Materials involved (code, description, manufacturer, quantity: removed, installed, disappeared, or provided by the CONCESSION AUTHORITY);
 - Reason for non-fulfillment and pending situations;
 - Police reports (theft, vandalism).
- c. PREVENTIVE MAINTENANCE:
- Team (responsible, scheduled and execution dates);
 - Road (places, extension, number of PUBLIC LIGHTING POINTS checked);
 - Problems detected and calls generated.
- x. Store, throughout the CONCESSION, all databases, information and documentation associated with the operation of the CCO, which must be transferred to the CONCESSION AUTHORITY, at any time, when requested by the CONCESSION AUTHORITY and, in full, at the end of the CONTRACT.

8.1 Call center - Service Desk

Regarding the operation of the Service Desk, the CONCESSIONAIRE shall:

- i. Meet all requests related to the assets of the MUNICIPAL PUBLIC LIGHTING NETWORK, coming from citizens or CONCESSION AUTHORITY, through the operation of the CONCESSIONAIRE's call center;

- ii. Monitor in real time all the communication networks of the CCO and the TELEMANAGEMENT SYSTEM, through the operation of the OPERATIONAL CONTROL CENTER.

8.1.1 Call Center

The call center under the responsibility of the CONCESSIONAIRE shall be supported by the Call Management System, operating 24 (twenty-four) hours a day, 7 (seven) days a week, operating in real time and in an integrated manner with the other systems implemented by the CONCESSIONAIRE. In the call center, the calls related to the PUBLIC LIGHTING POINTS requested by the CONCESSION AUTHORITY or by the citizens must be registered, enabling:

- i. Opening of calls for CORRECTIVE MAINTENANCE and EMERGENCY MAINTENANCE in the MUNICIPAL PUBLIC LIGHTING NETWORK;
- ii. Registration of service complaints;
- iii. Request for information.

The CONCESSIONAIRE shall provide a direct service channel for the CONCESSION AUTHORITY, thus facilitating the capture and distribution of the data necessary for the execution of the SERVICES under the CONCESSIONAIRE's responsibility, as well as the fulfillment and adaptation to the requirements demanded by the CONCESSION AUTHORITY regarding the SERVICES and computerized systems.

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

In addition to the call center, aiming to ensure high quality and service level in meeting requests involving PUBLIC LIGHTING assets, it shall be up to the CONCESSIONAIRE to provide three other channels of service to citizens and to the CONCESSION AUTHORITY:

- i. Online self-service portal;
- ii. Mobile application (smartphones or tablets);
- iii. On-site service, operating only during business hours.

Regarding the call center, the CONCESSIONAIRE shall:

- i. Ensure the operation of the call center twenty-four (24) hours a day, through the availability of a specific service channel, ensuring the provision of a number whose call is free (0800 or a direct extension) and a portal online self-service;
- ii. Make the workforce available to occupy the service stations, in a sufficient number to meet the CONCESSION demand for calls;
- iii. Maintain service position for 24-7, uninterruptedly;
- iv. Maintain the call record history from the opening to the closing of the call, with a description of the activities developed during the process;
- v. Develop Service Scripts for the most frequent calls;
- vi. Propose and execute an alternative plan for the operation of the call center in case of any system failure;
- vii. Manage and keep record of deadlines for complete resolution of calls;
- viii. Provide all the materials and systems, as well as duly trained labor, in an adequate quantity, according to the shift and day of the week, in order to guarantee the registration and submission of all the received requests to the maintenance teams.

8.1.2 Central Management System

The Central Management System shall centralize and manage all communication networks of the CCO and the TELEMAGEMENT SYSTEM. From this environment and computer programs which monitor the network, the operators must monitor in real time the situation of each asset belonging to the MUNICIPAL PUBLIC LIGHTING NETWORK equipped with a TELEMAGEMENT SYSTEM.

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

In the Central Management System, solutions shall be implemented for real-time management of services and monitoring of PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM, with exact data control and allowing:

- i. Provide the operator with an overview of the network with telemanagement, with the ability to monitor, measure and control in real time, 24-7;
- ii. Act on a scheduled basis, individually or together, at the LIGHTING POINTS with TELEMAGEMENT SYSTEM;
- iii. Minimally execute the following remote commands:
 - a. Switch a LUMINAIRE on and off;
 - b. Switch a set of LUMINAIRES on and off at the same time;
 - c. Lighting dimming, when applicable.
- iv. Monitor the status (on or off) in real time;
- v. Measure and store information about actual energy consumption;
- vi. Monitor at least the following items:
 - a. Lamp failure;
 - b. Flashing lamp;
 - c. Lamp on during the day;
 - d. Lamp off at night;
 - e. List of events;
 - f. Immediate measurement of voltage, current and instantaneous and average network power.

- vii. Register component behavior changes, centralizing them in real time at the OPERATIONAL CONTROL CENTER (CCO);
- viii. Enable the activation of field teams to correct incidents and problems identified via the system, updating the CCO on the status of the service;
- ix. Record the exact moment of return to operation, controlling all levels of attendance and service efficiency, in an integrated manner with the CCO.

8.2 Lighting Asset Management

The asset management must be carried out at the CCO with a view to preserving and updating the data collected and registered in the REGISTRY during the entire CONCESSION TERM. The system must include a geo-referenced GIS (Geographic Information System) database of all assets under the CONCESSIONAIRE's responsibility, which must be used as an information base for the other solutions of the system and the CCO.

The asset management must be executed upon:

- i. Collection and registration of BASE REGISTRY data;
- ii. Alteration of the physical characteristics (ex: alteration of the type of lamp, arm, LUMINAIRE, installed power) or location, of the MUNICIPAL PUBLIC LIGHTING NETWORK;
- iii. Installation of new assets in the MUNICIPAL PUBLIC LIGHTING NETWORK;
- iv. Provisional or permanent withdrawal of assets from the MUNICIPAL PUBLIC LIGHTING NETWORK;
- v. Reinstallation of assets temporarily removed from the MUNICIPAL PUBLIC LIGHTING NETWORK.

The CONCESSIONAIRE's obligation and responsibility are:

- i. Providing the REGISTRY in the GIS database;
- ii. Updating the REGISTRY during the CONCESSION TERM, as described in ATTACHMENT 4 - PUBLIC LIGHTING NETWORK REGISTRY;

- iii. Ensuring the automation of the management and provision of information for the REGISTRY
- iv. Performing maintenance of the database and the current status of the REGISTRY
- v. Recording at least the following information in the asset management system:
 - a. The REGISTRY;
 - b. Theme images, documents, attachments and research;
 - c. Data which enable the determination of the assets useful life;
 - d. Components subject to PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE.
- vi. Minimally allowing to, in addition to the requirements defined earlier in this topic, for PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM:
 - a. Execute and store queries about field devices and their main properties;
 - b. Generate and export reports related to the conducted consultations;
 - c. Configure specific data for each field device, according to the use of the TELEMAGEMENT SYSTEM.

8.3 Operation Management

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

The field teams must have access to the system through mobile devices with access to the data network, allowing the viewing of the intervention history of the PUBLIC LIGHTING POINTS listed in the SERVICE request. The system must enable the control of materials utilized by each team. The planning

of the patrol inspection routes must be provided by the Central Management System, which must control the inspection teams of all PUBLIC LIGHTING POINTS and ensure that the complete inspection of the MUNICIPAL PUBLIC LIGHTING NETWORK is carried out within the deadline.

The CONCESSIONAIRE's obligations and responsibilities are:

- i. Prioritization and allocation of so-called CORRECTIVE MAINTENANCE and, mainly, EMERGENCY;
- ii. Management of the workload of each team;
- iii. Support for the generation of billing documents for the energy bill;
- iv. Inventory management;
- v. Route planning;
- vi. Configuration of execution processes for PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE;
- vii. Documentation of performed maintenance activities;
- viii. Update of failure data in the PUBLIC LIGHTING POINTS;
- ix. Printing of maintenance reports directly from the map;
- x. Monitoring in real time, uninterrupted, 24-7, of:
 - a. Number of teams available;
 - b. Type of vehicle and/or equipment available;
 - c. Team composition;
 - d. Volume of SERVICES pending, in execution and executed by the team;
 - e. Geographic position of the teams;
 - f. Beginning of displacement;

- g. SERVICE location;
 - h. Date and time of the SERVICE execution;
 - i. SERVICE execution time;
 - j. Performed SERVICES and quantity.
-
- xi. Optimized planning of the tasks of the field teams, checking if the work was completed within the defined deadlines;
 - xii. Provision of mobile devices, equipped with GPS and data communication network, where the field teams must point out the information for reestablishment of the defective PUBLIC LIGHTING POINTS;
 - xiii. Integration with the call management system implemented in the CCO, providing the necessary information for registration in the system operated in the CCO, minimally, of the moment of occurrence of failures in the PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM and measurement of the time for execution of the CORRECTIVE MAINTENANCE SERVICES at these points;
 - xiv. Registration of defect occurrences in the MUNICIPAL PUBLIC LIGHTING NETWORK which may originate (i) by the call center, (ii) by the field identification of the technicians responsible for maintenance and (iii) by the indication of the TELEMAGEMENT SYSTEM;
 - xv. The addressing of pending issues in the execution of the SERVICES or services required by other public agencies or other public service utility companies that provide services in the CONCESSION AREA must be registered in the occurrences;
 - xvi. Information of scheduled shutdowns from the DISTRIBUTION COMPANY must also be recorded and used as a parameter for complaint sorting;
 - xvii. In the event of any incident involving an asset owned by the DISTRIBUTION COMPANY, which impacts the functioning of the PUBLIC LIGHTING services, the CONCESSIONAIRE must notify the DISTRIBUTION COMPANY, so that it takes the necessary actions and communicates the CONCESSION AUTHORITY;

- xviii. In cases of verification of the existence of arboreal elements interfering with the quality of the PUBLIC LIGHTING, the CONCESSIONAIRE must communicate the CONCESSION AUTHORITY or other authority appointed by it, for the necessary actions to be taken.

8.4 Performance Management

The Central Management System must present a PERFORMANCE MEASUREMENT SYSTEM which shall measure the operational and managerial aspects of the execution of the CONTRACT. The PERFORMANCE MEASUREMENT SYSTEM must enable the monitoring of the CONCESSIONAIRE's performance, with the data being made available to the CONCESSION AUTHORITY and the INDEPENDENT VERIFIER.

The CONCESSIONAIRE shall be responsible for, during the CONCESSION TERM, managing and monitoring all the SERVICES. For such purpose, through the use of the computerized systems implanted in the CCO, reports must be generated to monitor the performance indexes.

The CONCESSIONAIRE's obligations are:

- i. Recording in the computerized system of the CCO, in addition to the data necessary to measure performance indices, at least:
 - a. Call stages by expiration date;
 - b. Recurrence of complaint;
 - c. Daily number of calls;
 - d. Failure rate by type of material;
 - e. Monthly evolution of energy consumption;
 - f. Commissioning of works, if applicable.
- ii. Providing, on a monthly basis, the 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.

8.5 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 viewed in correspondence with maps and cartographic data from the GIS database and the PUBLIC LIGHTING asset management system. The system must:

- i. Have access to the REGISTRY data;
- ii. Perform the information interface between 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 CONCESSION AUTHORITY.

The SPECIAL LIGHTING, MODERNIZATION AND STREAMLINING ENERGY projects and those related to COMPLEMENTARY SERVICES must be managed with a platform that allows the elaboration of executive projects, graphically, with CAD resources and using the GIS base.

The project system to be implemented by the CONCESSIONAIRE at the CCO must use standardized structures for budgeting the networks and allow the generation of plans for the execution of works, which may be printed or recorded in digital format. These projects, when applicable, must be adapted to the standards of the DISTRIBUTION COMPANY.

The CONCESSIONAIRE's obligations are:

- i. Ensuring the integration of the project system with the CCO resource planning system, to meet the needs of PUBLIC LIGHTING projects that require works in the MUNICIPAL PUBLIC LIGHTING NETWORK;
- ii. Ensuring the consistency of technical and registration information for all projects developed;
- iii. Enabling the integration of the project system with REGISTRY for its update at the end of the execution of each project.

8.6 Electric Power Consumption Management

The Central Management System shall process all data from the LUMINAIRE's remote monitoring control for the purpose of managing the use of electric power.

The CONCESSIONAIRE's obligations are:

- i. Managing the electricity consumption of the MUNICIPAL PUBLIC LIGHTING NETWORK, seeking, throughout the CONCESSION TERM, to achieve the energy consumption streamlining targets, as set out in this ATTACHMENT.
- ii. Determining the estimated energy consumption based on the installed load of the PUBLIC LIGHTING POINTS and the operating time provided for in ANEEL's current Resolution. At points equipped with TELEMAGEMENT SYSTEM, it must be possible to make a comparison between the estimated consumption and the consumption measured by the TELEMAGEMENT SYSTEM;
- iii. Monitoring, verifying, controlling and monthly checking the electric power bills exclusive to the MUNICIPAL PUBLIC LIGHTING NETWORK;
- iv. Assisting the CONCESSION AUTHORITY in the negotiation of all energy supply contracts;
- v. Meeting the requests of the CONCESSION AUTHORITY regarding the information on the registration changes which are necessary to update the electricity billing with the DISTRIBUTION COMPANY;
- vi. Implementing a computerized system at the CCO which enables to:
 - a. Simulate the municipality's monthly energy bill based on the number of points registered;
 - b. Issue reports of energy consumed [kWh] and energy expenditure [R\$] by neighborhood and street;
 - c. Simulate the energy consumption of the MUNICIPAL PUBLIC LIGHTING NETWORK for different operating regimes (points off according to a schedule defined on certain days, points off at certain times, shorter nights and longer nights depending on the seasons and simulation of different energy efficiency measures);

- d. Make comparisons between the estimated electricity consumption, measured in PUBLIC LIGHTING POINTS equipped with TELEMAGEMENT SYSTEM and the invoiced. The estimated energy consumption must be based on the power of the lamps registered in the georeferenced database, considering the losses in auxiliary equipment, and the operating time previously registered for each POINT OF PUBLIC LIGHTING and SPECIAL LIGHTING equipped with such technology;
- e. Measure the load levels of the transformers themselves, when applicable, and voltage drop of the PUBLIC LIGHTING circuits, ensuring an efficient management of the PUBLIC LIGHTING POINTS, indicating possible maintenance or improvement needs. The data must be stored for the creation of a historical series for the entire CONCESSION period;
- f. Store a database and historical information on electricity consumption, measured by the TELEMAGEMENT SYSTEM;
- g. Generate reports of consumption and failure of energy supply by the DISTRIBUTION COMPANY at PUBLIC LIGHTING POINTS endowed with TELEMAGEMENT SYSTEM using spatial information, such as regional, neighborhoods and public places.

8.7 Information Security

The CONCESSIONAIRE shall contract the third party solutions which may be deemed necessary, 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 managed by the CONCESSIONAIRE are protected against unauthorized access, invasions and/or attacks of any kind.

The security measures must be applied to the CCO systems, to the software and equipment of the TELEMAGEMENT SYSTEM, in the exploration of new services and technologies, 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 up-to-date and safe and whether they have known vulnerabilities.

Whenever requested by the CONCESSION AUTHORITY, the CONCESSIONAIRE must provide all documentation related to the information security processes, establishing its conditions of zeal and confidentiality.

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

The CONCESSIONAIRE shall bear the losses resulting from information security incidents, in all its extent, under the terms of the applicable legislation.

8.7.1 Incident reporting

The CONCESSIONAIRE shall report to the CONCESSION AUTHORITY any incident involving information security, such as data loss, access and/or improper data collection, digital attacks, virus detection or vulnerability identification in any utilized software or equipment.

8.7.2 Data record

The CONCESSIONAIRE shall store copies (backups) of the system's databases, in open standards or in a wide and easy to use manner, 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 data loss, whether due to failures or digital attacks, in case the copies are not available properly.

8.7.3 Personal Information

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

The personal information collected within the scope of the CONCESSION must be collected only for the specific purposes of improvement and provision of PUBLIC LIGHTING SERVICES, taking into account the principles of purpose, adequacy, need, free access by holders, data quality, transparency, security, prevention, non-discrimination, responsibility and accountability.

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

8.7.4 Confidential data

The CONCESSIONAIRE shall treat confidentially all the information received and/or generated, which cannot be copied, reproduced, published, disclosed in any way or means, except to the CONCESSION AUTHORITY and for the exclusive needs of the CONCESSIONAIRE's work, contained herein, except in the case of legal claims.

8.7.5 Dedicated network

The CONCESSIONAIRE shall maintain a dedicated communication network for the CCO and TELEMAGEMENT SYSTEM. The communication channels must be exclusive and must not be shared with the internal or external corporate network (corporate internet).

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

8.8 The CONCESSIONAIRE's Resource Planning

The CONCESSIONAIRE shall have a resource planning system to support business processes. The fulfilled processes and functionalities must be, at least, the following:

- i. Project management:
 - a. Control of project requests;
 - b. Monitoring and verification of service terms;
 - c. Cost management;
 - d. Integration with projects.

- ii. Material management:
 - a. Registration of materials, suppliers and SERVICES;
 - b. Administration of material purchases and contracting of services, as well as control of the respective terms and guarantees;
 - c. Material supply management;
 - d. Physical inventory - stock (annual, rotating, sample);
 - e. Materials forecasting and planning;
 - f. Consolidation of needs via MRP (Material Requirement Planning);
 - g. Centralized inventory and deposit management.

- iii. Supplier quality management:
 - a. Registration and quality management of suppliers, materials and services;
 - b. Supplier performance evaluation;
 - c. Management of problem notifications to suppliers;
 - d. Results of inspection of receipt and registration of defects.

- iv. Controllership:
 - a. Cost management;
 - b. Cost allocation;
 - c. Expense budget.

- v. Investment management:
 - a. Investment budget management;
 - b. Monitoring of budget realization.

- vi. Accounting:
 - a. Balance sheet;
 - b. Income statement for the financial year;
 - c. Management of accounting assets.

- vii. Financial:
 - a. Accounts payable;
 - b. Accounts receivable;
 - c. Cash management;
 - d. Financial flow;
 - e. Budget flow.

- viii. Vehicle fleet management.

9 EXECUTION OF THE MAINTENANCE SERVICES

The CONCESSIONAIRE shall be responsible for maintaining the MUNICIPAL PUBLIC LIGHTING NETWORK, guaranteeing the execution of PREDICTIVE, PREVENTIVE, CORRECTIVE and EMERGENCY MAINTENANCE, aiming at enabling the MUNICIPAL PUBLIC LIGHTING NETWORK to perform its function and operate in normal, standardized conditions, and safe from Phase I. The maintenance SERVICES shall ensure:

- i. The reduction of the failure rate: reduction of the number of corrective interventions in the MUNICIPAL PUBLIC LIGHTING NETWORK, thus obtaining savings in the varied operational costs and guaranteeing full functioning of the MUNICIPAL PUBLIC LIGHTING NETWORK;
- ii. The continuity of the PUBLIC LIGHTING service: execution of the CORRECTIVE MAINTENANCE SERVICES with speed in order to quickly reestablish the lighting level compatible with the lighting and efficiency requirements of the CONCESSION provided for in this ATTACHMENT;
- iii. The safety of installations 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 must follow the safety rules for the maintenance services of the MUNICIPAL PUBLIC LIGHTING NETWORK as presented in item 2 of this ATTACHMENT.

The CONCESSIONAIRE shall register all maintenance and updating operations of the REGISTRY, the executed activities, the vehicle routes, the applied labor data, the removed, replaced and installed materials and equipment.

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

The CONCESSIONAIRE is also responsible for ensuring, during the MODERNIZATION AND STREAMLINING ENERGY period, the proper functioning of the current and not modernized PUBLIC LIGHTING POINTS and, for all MODERNIZED PUBLIC LIGHTING POINTS, for ensuring, continuously, the compliance with the lighting and efficiency requirements of the CONCESSION provided for in this ATTACHMENT.

Until the completion of MODERNIZATION AND STREAMLINING ENERGY, whenever there is a need for maintenance in PUBLIC LIGHTING POINTS not yet modernized, the use of materials and equipment removed from the existing network in areas already modernized and in good condition shall be allowed. It must be pointed out that the power of the reused lamps should be equal to that of the replaced lamp.

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

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

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

9.1 PREDICTIVE MAINTENANCE

The PREDICTIVE MAINTENANCE activities must be started after the end of Phase II and aim to determine the optimum point for the execution of maintenance/replacement SERVICES in the equipment of the MUNICIPAL PUBLIC LIGHTING NETWORK.

The CONCESSIONAIRE must perform, at least, the following PREDICTIVE MAINTENANCE SERVICES:

- i. PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM where occurrences of significant voltage variation outside the limits provided by ANEEL have been recorded.
- ii. PUBLIC LIGHTING POINTS where the CONCESSIONAIRE identified depreciation of the luminous flux above the specifications provided by the manufacturer, as detailed below.

The CONCESSIONAIRE must use the monthly measurements, performed by the INDEPENDENT VERIFIER, of the level of illuminance of the samples of the MUNICIPAL PUBLIC LIGHTING NETWORK to verify if the depreciation of the luminous flux is in accordance with the manufacturer's indication.

The CONCESSIONAIRE must verify, for PUBLIC LIGHTING POINTS without interference by arboreal individuals, if the measured average illuminance level is in accordance with the expected average illuminance level. The expected average illuminance level must be verified considering the date of installation of the PUBLIC LIGHTING POINT and the depreciation of the annual luminous flux as indicated by the manufacturer in the technical specification sheet of the PUBLIC LIGHTING POINT.

The CONCESSIONAIRE shall evaluate the replacement of the PUBLIC LIGHTING POINTS which, according to the analysis of the luminous flux, may present levels of illuminance below that required in this ATTACHMENT for the lighting class of the road within up to 12 months.

9.2 PREVENTIVE MAINTENANCE

PREVENTIVE MAINTENANCE activities include programmed, periodic, systematic and well-defined actions/interventions in order to increase the likelihood that PUBLIC LIGHTING POINTS shall operate within the expected useful life and avoid system failures, equipment wear, USERS complaints or requests from the CONCESSION AUTHORITY. Preventive actions are based on pre-determined time intervals and/or pre-established operating conditions which may be inadequate.

With regard to PREVENTIVE MAINTENANCE SERVICES, the CONCESSIONAIRE shall:

- i. Define and present in the Maintenance Program (PMAN) the detailed strategy, also including the appropriate periodicity, for PREVENTIVE MAINTENANCE operations in the equipment of the MUNICIPAL PUBLIC LIGHTING NETWORK;

- ii. Record the PREVENTIVE MAINTENANCE SERVICES and update the REGISTRY, including at least:
 - a. Components (materials, parts, etc.) used and/or replaced;
 - b. The registration of the maintenance activity.

The following are the minimum criteria for PREVENTIVE MAINTENANCE operations in the equipment of the MUNICIPAL PUBLIC LIGHTING NETWORK.

9.2.1 Verification of general conditions in the MUNICIPAL PUBLIC LIGHTING NETWORK

The verification must be carried out periodically, in the total extension of the MUNICIPAL PUBLIC LIGHTING NETWORK and at the SPECIAL LIGHTING points, aiming to detect failures and the state of conservation of the PUBLIC LIGHTING POINTS.

Regarding the verification of the general conditions of the MUNICIPAL PUBLIC LIGHTING NETWORK, the CONCESSIONAIRE shall:

- i. Define and present in the Maintenance Program the frequency and the form in which the verification services shall be carried out (ex: motorized patrols, TELEMAGEMENT SYSTEM):
 - a. Regarding the verification service via Motorized Watch, the following must be provided at least: visual inspection in all PUBLIC LIGHTING POINTS not covered by the TELEMAGEMENT SYSTEM, with a periodicity not exceeding 15 days, in order to detect the visible equipment failures and the park state of conservation.
- ii. Observe and record, upon the verification of each of the PUBLIC LIGHTING POINTS and SPECIAL LIGHTING points, at least the following items:
 - a. Number of lamps extinguished, improperly lit or with flaws;
 - b. Existence of trees interfering with the quality of lighting;
 - c. Unit out of plumb, rammed, missing;
 - d. Missing LUMINAIRE or open compartment;

- e. Arm or support out of position;
 - f. Passage box with broken or missing lid;
 - g. Inadequate lighting conditions;
 - h. Need to clean the optical assembly;
 - i. Irregularities which may jeopardize the security of USERS and employees who operate on the networks.
- iii. Perform the correction of irregularities and failures at the moment of their identification, if possible;
 - iv. Request, through a specific system of calls, the CORRECTIVE MAINTENANCE services of irregularities and failures not resolved at the time of identification.

9.2.2 Components of the MUNICIPAL PUBLIC LIGHTING NETWORK

The PREVENTIVE MAINTENANCE described below must be applied in the MUNICIPAL PUBLIC LIGHTING NETWORK under the responsibility of the CONCESSIONAIRE.

- i. Monitor, through the system, from the beginning of the TELEMAGEMENT SYSTEM implementation, the state of functioning of the PUBLIC LIGHTING POINTS and field devices and equipment of the TELEMAGEMENT SYSTEM, guaranteeing the opening of calls when irregularities are identified and enabling to:
 - a. Check the connectivity of all PUBLIC LIGHTING POINTS applicable to the TELEMAGEMENT SYSTEM, through the system;
 - b. Check the availability of the TELEMAGEMENT SYSTEM software, maintaining it online full time, 24-7.
- ii. Perform the cleaning, painting and sanding of exclusive PUBLIC LIGHTING posts, arms and LUMINAIRES, minimally including:
 - a. Withdrawal of materials glued to the PUBLIC LIGHTING equipment;
 - b. Application of a final coat of paint and sanding or external cleaning of the LUMINAIRES, when necessary to ensure excellence in the visual and aesthetic aspect.
- iii. Carry out, for the exclusive PUBLIC LIGHTING network, the following services:

- a. Maintenance of the underground network:
 - Check and adequate the connections in the passage boxes and the box voltage;
 - Visually inspect the physical state of the cover.
- b. Inspection on the exclusive transformers:
 - Visually inspect the terminals, insulators, surge arresters and connections;
 - Measure the ground resistance of the neutral and the phase-to-phase and phase-to-neutral voltages.
- c. Maintenance of low voltage control panels:
 - Visually inspect the circuit breakers, contactors and fuses, control keys, settings and functions of the astronomical clock and the status of the cabinets (doors, interiors and padlock);
 - Measure the ground resistance;
 - Clean the entire control panel;
 - Measure the voltage of the main supply bus.

9.3 CORRECTIVE MAINTENANCE

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

The CORRECTIVE MAINTENANCE shall be performed by:

- i. Identification of irregularities, when checking the general conditions of the MUNICIPAL PUBLIC LIGHTING NETWORK carried out by the CONCESSIONAIRE;
- ii. Request from USERS and the CONCESSION AUTHORITY, through the Call Center service operated by the CONCESSIONAIRE;
- iii. Identification of irregularities in PUBLIC LIGHTING POINTS through the TELEMAGEMENT SYSTEM.

The CORRECTIVE MAINTENANCE must include all components and equipment of the MUNICIPAL PUBLIC LIGHTING NETWORK, located in aerial and underground networks, in tunnels, bridges,

walkways and underground passages and in the SPECIAL LIGHTING of the MUNICIPALITY. The CORRECTIVE MAINTENANCE actions which must be performed by the CONCESSIONAIRE are, at least:

- i. Placement of the cover in junction box;
- ii. Cleaning of junction box and adjustment of its connections;
- iii. Correction of fixation of reactor and ignitor of conventional LUMINAIRES;
- iv. Correction of the position of arms and/or LUMINAIRES;
- v. Identification of clandestine electrical charges in networks exclusive to PUBLIC LIGHTING, notification to the CONCESSION AUTHORITY and, upon its authorization, their elimination when applicable;
- vi. LUMINAIRE closing with open glass cover;
- vii. Replacement of the glass cover in LUMINAIRES with broken cover;
- viii. Installation of missing units;
- ix. Transformer protection (primary key) and power supply circuit exclusive to the MUNICIPAL PUBLIC LIGHTING NETWORK;
- x. Replacement of magnetic key or command protection;
- xi. Replacement of connectors;
- xii. Replacement of auxiliary equipment;
- xiii. Replacement of light source;
- xiv. Replacement of protection against voltage surges;
- xv. Replacement of components;
- xvi. Replacement of optical assemblies;
- xvii. Replacement of the PUBLIC LIGHTING POINT nameplate;
- xviii. Replacement of the LUMINAIRE power label;

- xix. Suppression, removal and replacement of units, equipment and other materials belonging to the MUNICIPAL PUBLIC LIGHTING NETWORK;
- xx. Clearing the MUNICIPAL PUBLIC LIGHTING NETWORK and its components of foreign objects, whenever found, except in the need to prune tree elements;
- xxi. Performing other corrective services on equipment, devices and structures exclusive to PUBLIC LIGHTING.

The CONCESSIONAIRE shall register, through the system, and update the REGISTRY, all the CORRECTIVE MAINTENANCE services performed, including at least:

- i. The equipment removed, replaced and installed;
- ii. The registration of the maintenance activity.

9.3.1 EMERGENCY MAINTENANCE - Emergency Service

The CONCESSIONAIRE shall perform EMERGENCY MAINTENANCE actions when the physical integrity of the USERS or the MUNICIPALITY's assets are at risk. These actions must be attended to immediately, that is, they are corrective actions for emergency care. Examples of situations which generate emergency services are:

- i. Collisions;
- ii. Quantity greater than 3 (three) sequential LIGHTING POINTS connected in the same network and deleted
- iii. Diverse impacts;
- iv. Atmospheric phenomena;
- v. Fires/broken circuits;
- vi. Arms and LUMINAIRES in imminent fall;
- vii. Junction boxes without covers;

viii. Roads or sidewalks obstructed with damaged components of the PUBLIC LIGHTING POINTS.

The CONCESSIONAIRE shall prioritize emergency services, immediately after receiving the service order, moving the vehicle and staff closer to the place of occurrence, regardless of the road, working hours and services scheduled for the day.

In situations which 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 resolve or eliminate the risk, the appropriate maintenance team must be requested, keeping an employee on standby waiting for the specialized team.

The CONCESSIONAIRE shall inform the CONCESSION AUTHORITY about 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 performance assured 24-7, without interruption, and the CONCESSIONAIRE must, therefore, have minimum teams to meet the existing demands and the defined service terms, provided exclusive communication channels and operating in real time.

The CONCESSIONAIRE shall also define and present in the PMAN the operational procedures for the execution of EMERGENCY MAINTENANCE services.

The CONCESSIONAIRE shall register, via the system, and update the REGISTRY, all EMERGENCY MAINTENANCE services performed, including at least:

- i. The equipment removed, replaced and installed;
- ii. The registration of the maintenance activity.

9.3.2 Deadlines for the execution of the CORRECTIVE and EMERGENCY MAINTENANCE services

The deadlines for addressing the CORRECTIVE and EMERGENCY MAINTENANCE services were defined in order to guarantee a high level of service, as shown below:

Table 4 - Call service times

Service Type	Time for service
Answering calls on ROADS WITH TELEMAGEMENT	Within up to 24 hours
Answering calls in special areas	Within up to 24 hours
Answering calls on other roads and streets	Within up to 48 hours
Special Lighting	Within up to 48 hours
Emergency Maintenance	Within up to 06 hours

Aspects considered in relation to the service deadlines:

- i. Special areas are roads where there are public units (hospital, health clinic, school, etc.) operating at night and roads with a higher crime rate. These roads shall be included in the Operation and Maintenance Plan (POM), after identification by the CONCESSIONAIRE during the execution of the BASE REGISTRY and validated by the CONCESSION AUTHORITY.
- ii. In order to comply with the service times defined for the execution of the CORRECTIVE and EMERGENCY MAINTENANCE services at PUBLIC LIGHTING POINTS, the period shall be counted from the moment the call is received by the call center, identification by the TELEMAGEMENT SYSTEM or appointment by the motorized patrol. The deadline shall be counted until the conclusion of the CORRECTIVE or EMERGENCY MAINTENANCE services.
- iii. In cases where a prior release by the MUNICIPAL TRAFFIC AUTHORITY or the DISTRIBUTION COMPANY is required, the period between the notification of the CONCESSIONAIRE to the responsible entity (MUNICIPAL TRAFFIC AUTHORITY or DISTRIBUTION COMPANY) and the receipt of authorization for action by the non-CONCESSIONAIRE shall be accounted for.
- iv. When the performance of any maintenance services depends on the shares of the DISTRIBUTION COMPANY, the CONCESSIONAIRE shall (i) identify the shares that depend on the DISTRIBUTION COMPANY; (ii) trigger it; and (iii) monitor the deadlines for carrying out corrections and keep the CONCESSION AUTHORITY informed of changes in any status of this process. Minimally, they are understood as necessary actions by the DISTRIBUTION COMPANY, which interfere in the execution deadlines:
 - a. Restoration of the supply of electricity to the secondary distribution networks;
 - b. Temporary shutdown of medium voltage distribution networks which are close to PUBLIC LIGHTING POINTS;
 - c. Replacement of posts owned by the DISTRIBUTION COMPANY rammed.

10 OPERATIONAL AND ORGANIZATIONAL STRUCTURE

The CONCESSIONAIRE shall perform the operational SERVICES in accordance with the OPERATION AND MAINTENANCE PLAN (POM) and the MODERNIZATION PLAN (PM).

The SERVICES shall meet the minimum quality requirements required for the MUNICIPAL PUBLIC LIGHTING NETWORK in accordance with the provisions, specifications and guidelines provided for in this ATTACHMENT. The POM and PM plans must guarantee good practices and methodologies, through innovative and optimized approaches for operation of the PUBLIC LIGHTING.

Aiming at optimizing the operation of the MUNICIPAL PUBLIC LIGHTING NETWORK, the actions must be centralized at the OPERATIONAL CONTROL CENTER, in which operations and maintenance actions must be directed through the Central Management System.

The technical specifications of the materials and equipment necessary for the exercise of the operation and maintenance SERVICES, as well as their evolution due to the natural development of technologies, must be added to the CONCESSIONAIRE's technical and physical collection on its own initiative, at the request of the CONCESSION AUTHORITY or by legal and normative 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 integrate current mutual accreditation agreements with INMETRO, as long as proven and with sworn translation. The specifications must be signed by the responsible engineers, accompanied by the CREA number, collected and noted the respective ARTs. If requested by the CONCESSION AUTHORITY, the CONCESSIONAIRE must submit all technical specifications, including certifications and laboratory tests.

10.1 Teams

The CONCESSIONAIRE shall be responsible for establishing sufficient teams for the execution of the operational SERVICES required for the MUNICIPAL PUBLIC LIGHTING NETWORK, as well as for dimensioning the professional staff necessary to meet the quality requirements and deadlines required, which must have the qualifications, qualifications and technical qualifications necessary for the practice of their professional activities.

The CONCESSIONAIRE shall provide all the necessary equipment and tools to the teams, in order to provide SERVICES in an efficient, correct and safe manner, in compliance with the relevant safety rules. Among these tools, there are mobile devices, which must contain an integrated Central Management System module and direct communication with the OPERATIONAL CONTROL CENTER operators.

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

10.2 Fleet Management

10.2.1 Vehicles

The CONCESSIONAIRE shall guarantee vehicles available to its operation teams for the rapid execution of SERVICES demanded by the MUNICIPAL PUBLIC LIGHTING NETWORK. Sufficient vehicles must be provided, so that eventual needs for concurrent actions do not have their execution deadlines affected. In addition, this fleet must also allow the execution of the SERVICES in the event of vehicle unavailability due to overhauls, mechanical defects, among others.

The vehicles must be kept in good conditions of use, with frequent overhauls and maintenance being guaranteed. The CONCESSIONAIRE shall be responsible for conducting:

- i. Fleet Preventive Maintenance: It must be performed periodically, according to previously defined parameters (time and/or mileage). In addition to the aforementioned process, service orders with the list of maintenance services performed on the vehicles must also be issued, whether from the CONCESSIONAIRE's own workshop or third parties;
- ii. Corrective Fleet Maintenance: Maintenance services due to accidents or mechanical failures shall be performed on demand in the vehicles that make up the CONCESSIONAIRE's fleet, information which must be documented through the preparation of opinions on recklessness and/or malpractice, in addition to issuing order of services performed.

In addition, vehicles must comply with current legislation, with minimum safety requirements for drivers, passengers and third parties. All vehicles must have at least insurance against damage to third parties.

The vehicles of the CONCESSIONAIRE's fleet must be adapted to the nature of the SERVICES required in the fields.

The CONCESSIONAIRE shall be responsible for maintaining the vehicles of exclusive use for the execution of the contracted SERVICES properly identified, according to the vehicle signaling pattern indicated by the CONCESSION AUTHORITY.

The CONCESSIONAIRE must install tracking equipment in all vehicles, duly tampered with tamper proof and equipped with a continuous track record feature.

The CONCESSIONAIRE shall guarantee vehicles for the promotion of periodic rounds in the MUNICIPAL PUBLIC LIGHTING NETWORK in all PUBLIC LIGHTING POINTS, with the exception of those which are endowed with TELEMAGEMENT SYSTEM. When the TELEMAGEMENT SYSTEM is inoperative, the CONCESSIONAIRE must guarantee a contingent of vehicles for the execution of patrol services at PUBLIC LIGHTING POINTS where the TELEMAGEMENT SYSTEM is not operating properly.

The CONCESSIONAIRE shall provide a report, whenever requested by the CONCESSION AUTHORITY, informing the road 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 comply with current legislation.

10.2.2 Drivers

The processes related to the management of drivers aim to ensure that the CONCESSIONAIRE's workforce, responsible for driving the fleet's vehicles, has the necessary qualifications for the execution of the services, at the established quality levels:

- i. Control of Infringement Notices: Execute on demand, when there is communication from the traffic authorities, data collection for driver identification and protocol with DETRAN for recognition of the person responsible for the infraction;
- ii. Control of Driver's License: The data of the drivers registered in the system must be updated routinely, as needed, allowing the driver to control the need to renew the document (CNH).

10.3 Operational Unit

The CONCESSIONAIRE must present an operational unit with a sufficient number of teams to meet the deadlines and performance indices, which must be equipped with the necessary equipment to perform in the MUNICIPAL PUBLIC LIGHTING NETWORK.

Other facilities necessary for the fulfillment of operating SERVICES, such as warehouses, warehouses, depots, inventories, among others, must be included in the unit. It is not essential 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 the execution of the SERVICES is not compromised.

10.3.1 Material Management

For the management of PUBLIC LIGHTING materials and equipment, the CONCESSIONAIRE shall be in charge of controlling purchases, new materials and those removed from the network.

The materials utilized in the execution of the SERVICES must be purchased by the CONCESSIONAIRE in accordance with the technical specifications of defined materials and the relevant standards. All materials necessary for the execution of the SERVICES must be made available by the CONCESSIONAIRE.

The CONCESSIONAIRE shall prepare the technical specifications of all materials applied in the MUNICIPAL PUBLIC LIGHTING NETWORK, establishing and maintaining the technical procedure to guarantee the quality of the materials, manufacturers and suppliers, as well as the control of the warranty period. The materials must have a durable, legible and indelible identification with the name

of the CONCESSIONAIRE, containing a unique identification number or code defined at the discretion of the CONCESSIONAIRE and duly approved by the CONCESSION AUTHORITY.

The materials may be inspected at any time by the CONCESSION AUTHORITY, either in the CONCESSIONAIRE's warehouses or on site.

The CONCESSION AUTHORITY must have free access, at any time, to all documentation requested in the material acquisition stages, from the issuance of the order to its receipt. The CONCESSIONAIRE must maintain all necessary procedures to guarantee full traceability and quality control of the materials.

10.3.2 Inventory Management

The CONCESSIONAIRE shall define the inventory policies, as well as resupply policies for the basic items which shall be adopted throughout the CONCESSION. For this, inventory management must be performed, covering the segmentation of the families of PUBLIC LIGHTING materials 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 the PUBLIC LIGHTING POINTS, during the CONTRACT term.

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 PUBLIC LIGHTING NETWORK as a result of the execution of the SERVICES.

The dimensioning is the responsibility of the CONCESSIONAIRE, who must consider the volume occupied by the estimated operational stock and the return of the materials removed from the MUNICIPAL PUBLIC LIGHTING NETWORK. In addition, the warehouse must have a covered area, a place for use by the CONCESSION AUTHORITY inspection and space destined exclusively for the temporary deposit of materials and or waste classified as environmental crimes typified by laws.

The CONCESSIONAIRE must:

- i. Have equipment that ensures proper packaging and handling of materials, with shelves, pallets, cabinets, forklift, pallet rack, scales, benchtops for testing the components of the PUBLIC LIGHTING POINTS;
- ii. Have manpower for handling services;
- iii. Have a stock control and material handling system;
- iv. Have computer equipment, telephone line and employees qualified to operate the system for stock control and handling of materials in their possession;
- v. Store, properly and separately, in order to guarantee the integrity, conservation and control of all new or removed materials from the MUNICIPAL PUBLIC LIGHTING NETWORK;
- vi. Ensure free access to the CONCESSION AUTHORITY, at any time, to the CONCESSIONAIRE's material deposits to control the requirements required in this ATTACHMENT and monitor extraordinary and routine activities;
- vii. Ensure the execution of procedures related to sorting, treatment, reuse, disposal, among others, as specified in the Social and Environmental Management Programs (PGS).

10.3.3 Replacement System

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

The lamps and other components removed from the PUBLIC LIGHTING POINTS, which are in good working order can be stored in stock.

The CONCESSIONAIRE shall observe the rules provided for in ATTACHMENT 7 - MINIMUM ENVIRONMENTAL GUIDELINES in relation to the materials taken from the MUNICIPAL PUBLIC LIGHTING NETWORK.

10.4 Organizational Structure

The CONCESSIONAIRE shall establish an organizational structure sufficient for the rendering of the SERVICES. This structure must include executive, administrative, financial, operational and logistical aspects, as well as be responsible for the processes of provision of PUBLIC LIGHTING SERVICES by the CONCESSIONAIRE.

Logistics services, human resources and other functionalities, with regard to the operation of the MUNICIPAL PUBLIC LIGHTING NETWORK, must also compose the structure on the part of the CONCESSIONAIRE.

10.5 Human Resources

The CONCESSIONAIRE undertakes before the CONCESSION AUTHORITY as to the personnel to:

- i. Insure personnel against the risks of accidents at work;
- ii. Supervise personal hygiene and cleanliness of its personnel's uniforms;
- iii. Ensure that its team selected for the service rendering subject matter of the CONTRACT meets the following requirements:
 - a. Qualification required for the function;
 - b. Compliance with legal requirements (licenses, certificates, legal authorizations, etc.), for the performance of the function;
 - c. Sufficient knowledge for the correct rendering of the SERVICES.

10.5.1 Identification of employees and contracted third parties

All personnel involved in the rendering of the SERVICES subject matter of the CONTRACT must be properly uniformed, showing care with personal presentation, cleanliness and hygiene, carrying, at all times, an identification badge with a recent photo.

It is the CONCESSIONAIRE's obligation to supply uniforms, badges and other complements appropriate to the development of the service rendering, at no cost to the employee.

10.5.2 Attendance

The CONCESSIONAIRE shall keep attendance control of all employees involved in the provision of the SERVICES updated, making the replacement, immediately, in the event of any absence.

10.5.3 Strike

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

For all purposes contemplated in this document, the CONCESSIONAIRE is responsible for the subcontracted work, as well as the costs, when the strike refers to any claim by the personnel responsible for providing the SERVICES.

In the event of any damage occurring during demonstrations and strikes by its staff or its subcontractors, the CONCESSIONAIRE shall bear the resulting costs.

11 COMPLEMENTARY SERVICES

The following are the guidelines, specifications and obligations of the CONCESSION AUTHORITY and the CONCESSIONAIRE with respect to COMPLEMENTARY SERVICES, which shall be requested upon the issuance of a service order by the CONCESSION AUTHORITY and utilization of the CREDIT BANK balance.

The MUNICIPAL PUBLIC LIGHTING NETWORK expanded through the execution of COMPLEMENTARY SERVICES must follow the lighting and efficiency requirements of the CONCESSION set out in this ATTACHMENT, including, in the case of ADDITIONAL PUBLIC LIGHTING POINTS installed on ROADS WITH TELEMAGEMENT, the SYSTEM specifications and features of the TELEMAGEMENT SYSTEM.

11.1 Types of COMPLEMENTARY SERVICES

COMPLEMENTARY SERVICES are those listed below:

11.1.1 Installation of ADDITIONAL PUBLIC LIGHTING POINTS

Comprises the need to install ADDITIONAL PUBLIC LIGHTING POINTS, except for the provision in topic 6.6.4, upon request by the CONCESSION AUTHORITY. For these ADDITIONAL PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall be responsible for both installation, operation and maintenance during the CONCESSION TERM.

11.1.2 Operation and Maintenance of ADDITIONAL PUBLIC LIGHTING POINTS

After transference of ADDITIONAL PUBLIC LIGHTING POINTS implanted by ENTREPRENEURS to the CONCESSION AUTHORITY, it shall be up to the CONCESSION AUTHORITY to issue a service order so that the CONCESSIONAIRE takes full responsibility for the operation and maintenance of the ADDITIONAL PUBLIC LIGHTING POINTS.

Therefore, right after the issuance of the service order by the CONCESSION AUTHORITY and for the entire remaining period of the CONCESSION, each ADDITIONAL PUBLIC LIGHTING POINT installed by ENTREPRENEURS shall be considered by the CONCESSIONAIRE as part of the MUNICIPAL PUBLIC LIGHTING NETWORK, the CONCESSIONAIRE being responsible for meeting all the parameters and requirements of the CONTRACT and its ATTACHMENTS.

With regard to the operation and maintenance of ADDITIONAL PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall:

- i. Ensure, after receipt of the service order, in the form of the CONTRACT, the operation and maintenance of the ADDITIONAL PUBLIC LIGHTING POINTS by the CONCESSIONAIRE in accordance with the guidelines and requirements detailed in this ATTACHMENT, throughout the CONCESSION TERM;
- ii. Define the procedures for transferring the operation and maintenance of the ADDITIONAL PUBLIC LIGHTING POINTS implemented by ENTREPRENEURS, submitting them to the CONCESSION AUTHORITY's approval;

- iii. Structure a document in the form of a manual to guide the structuring of public lighting in PROJECTS FOR INSTALLING ENTREPRENEURS based on the guidelines of ABNT Standard NBR 5101.
- iv. Analyze and approve the PROJECTS FOR INSTALLING ENTREPRENEURS, when submitted by the CONCESSION AUTHORITY to the CONCESSIONAIRE, and justify any adjustments which may be necessary to meet the lighting and efficiency requirements of the CONCESSION provided for in this ATTACHMENT;
- v. Carry out the evaluation of the ADDITIONAL PUBLIC LIGHTING POINTS implanted by ENTREPRENEURS who shall be transferred to the CONCESSION AUTHORITY, communicating the general conditions as well as any need to adapt the ADDITIONAL PUBLIC LIGHTING POINTS to the lighting and efficiency requirements provided for in this ATTACHMENT;
- vi. Ensure, upon receipt of the service order, pursuant to the CONTRACT, the insertion and identification in the REGISTRY of all ADDITIONAL PUBLIC LIGHTING POINTS and the beginning of its operation and maintenance, in accordance with the lighting and efficiency requirements set out in this ATTACHMENT.
- vii. Ensure, at the end of the CONCESSION TERM, the return to the CONCESSION AUTHORITY of the ADDITIONAL PUBLIC LIGHTING POINTS transferred by ENTREPRENEURS in accordance with all the requirements of topic 14.6.

11.1.3 Reallocation of PUBLIC LIGHTING POINTS

The reallocation of the PUBLIC LIGHTING POINTS corresponds to the service of repositioning the infrastructure of the PUBLIC LIGHTING POINTS composed of materials and equipment such as post, arm, LUMINAIRES, conductors and control devices.

The PUBLIC LIGHTING POINTS relocation services shall be performed upon request by the CONCESSION AUTHORITY. Such services include the provision of labor, equipment and materials, for the removal of PUBLIC LIGHTING POINTS, disassembly, identification of components, transport and temporary storage, for subsequent reinstallation, in the same location or in another one to be defined by the CONCESSION AUTHORITY.

11.1.4 Technical Guidelines of Projects for the execution of COMPLEMENTARY SERVICES

The projects to meet the ADDITIONAL PUBLIC LIGHTING POINTS originating from COMPLEMENTARY SERVICES must follow the guidelines, specifications and procedures defined in item 6.6, ensuring compliance with the lighting and efficiency requirements provided for in this ATTACHMENT.

In the projects, the information of the street to be illuminated should be collected, according to the municipal master plan.

In addition to the guidelines expressed in 6.6.1, we highlight:

- i. The projects must be developed in software compatible with the CONCESSION AUTHORITY and must contain a descriptive memorial, a list of materials with an elaborated budget and the project itself.
- ii. The LUMINAIRES used in the execution of COMPLEMENTARY SERVICES must have a minimum efficiency of 120 lumens/watt.
- iii. The projects to be elaborated must consider the interference of the tree vegetation, investigating the feasible technical alternatives which do not compromise the quality of the PUBLIC LIGHTING service and meet the lighting and efficiency requirements provided for in this ATTACHMENT. In the absence of technical alternatives, the CONCESSIONAIRE must evaluate the implementation of second-level lighting on the existing posts, or, still, install exclusive poles in order to comply with the indices established in this ATTACHMENT. Conflict areas such as pedestrian crossing, level crossings, interchanges and tunnels must be treated in accordance with the particular conditions established in ABNT NBR 5101 or in their respective specific rules. The projects must be prepared according to normative references, the standards (if any) of the competent municipal authority and the DISTRIBUTION COMPANY.
- iv. The execution period of the projects must be agreed between the PARTIES.

11.2 CREDIT BANK

The CREDIT BANK represents a balance of requests at the disposal of the CONCESSION AUTHORITY, measured in credits, for the execution of COMPLEMENTARY SERVICES.

At the beginning of Phase II of the CONTRACT, the CREDIT BANK shall start with seven hundred and thirty-nine (739) credits. At every twelve months (12) after the beginning of Phase II, an additional seven hundred and thirty-nine (739) credits shall be added to the CREDIT BANK. The credits in the bank do not expire and are therefore cumulative throughout the CONCESSION TERM.

Table 5 - Number of credits per year during the CONCESSION

t	Beginning of the Period (t)	Previous Balance (SA _t)	Credits added in the Period (CA _t)	Credits consumed in the Period (CC _t)	Balance for the next Period (SF _t)
1	Beginning Phase II	0	739	CC ₁	SF ₁ = SA ₁ + CA ₁ - CC ₁
2	12 months after the previous period	SF ₁	739	CC ₂	SF ₂ = SA ₂ + CA ₂ - CC ₂
3	12 months after the previous period	SF ₂	739	CC ₃	SF ₃ = SA ₃ + CA ₃ - CC ₃
4	12 months after the previous period	SF ₃	739	CC ₄	SF ₄ = SA ₄ + CA ₄ - CC ₄
5	12 months after the previous period	SF ₄	739	CC ₅	SF ₅ = SA ₅ + CA ₅ - CC ₅
6	12 months after the previous period	SF ₅	739	CC ₆	SF ₆ = SA ₆ + CA ₆ - CC ₆
7	12 months after the previous period	SF ₆	739	CC ₇	SF ₇ = SA ₇ + CA ₇ - CC ₇
8	12 months after the previous period	SF ₇	739	CC ₈	SF ₈ = SA ₈ + CA ₈ - CC ₈
9	12 months after the previous period	SF ₈	739	CC ₉	SF ₉ = SA ₉ + CA ₉ - CC ₉
10	12 months after the previous period	SF ₉	739	CC ₁₀	SF ₁₀ = SA ₁₀ + CA ₁₀ - CC ₁₀

t	Beginning of the Period (t)	Previous Balance (SA _t)	Credits added in the Period (CA _t)	Credits consumed in the Period (CC _t)	Balance for the next Period (SF _t)
11	12 months after the previous period	SF ₁₀	739	CC ₁₁	SF ₁₁ = SA ₁₁ + CA ₁₁ - CC ₁₁
12	12 months after the previous period	SF ₁₁	739	CC ₁₂	SF ₁₂ = SA ₁₂ + CA ₁₂ - CC ₁₂
13	12 months after the previous period	SF ₁₂	739	CC ₁₃	SF ₁₃ = SA ₁₃ + CA ₁₃ - CC ₁₃

For the purposes of accounting of the CREDIT BANK credits, the following table is considered. For all situations provided below, the credit shall be consumed only once. For example, the installation of 1 new non-exclusive PUBLIC LIGHTING POINT shall consume only one (1) credit, that is, it does not consume one (1) credit in each year of the CONCESSION.

Table 6 - CREDIT BANK Accounting

Type	Roads V1 / Roads V3 / V2	Squares, Parks, General Areas	Sports areas (Courts and Fields)
Installation of 1 non-exclusive ADDITIONAL PUBLIC LIGHTING POINT	1.71	1.15	1.61
Installation of 1 exclusive ADDITIONAL PUBLIC LIGHTING POINT	5.50	4.94	5.39
Receipt of 1 ADDITIONAL PUBLIC LIGHTING POINT for O&M	0.13	0.08	0.11
Reallocation of 1 non-exclusive PUBLIC LIGHTING POINT	0.12	0.24	0.24
Reallocation of 1 exclusive PUBLIC LIGHTING POINT	1.29	1.47	1.47

- i. **Installation of 1 non-exclusive ADDITIONAL PUBLIC LIGHTING POINT:** Includes the installation (materials and labor) of an ADDITIONAL PUBLIC LIGHTING POINT with all its components: LUMINAIRE, arm, relay, TELEMAGEMENT SYSTEM (in case of implementation in ROADS WITH TELEMAGEMENT), among others necessary, excluding the lamp post. In addition to the installation, it includes the operation and subsequent maintenance of the new point during the CONCESSION TERM.

- ii. **Installation of 1 exclusive ADDITIONAL PUBLIC LIGHTING POINT:** Includes the installation (materials, civil work and labor) of an exclusive ADDITIONAL PUBLIC LIGHTING POINT with all its components: LUMINAIRE, arm, relay, TELEMAGEMENT SYSTEM (in case of implementation in ROADS WITH TELEMAGEMENT), among others necessary, excluding the lamp post. The CONCESSIONAIRE shall be responsible for both the installation of the post and the implementation of the electric power network for connection between the posts, which must be underground. At the discretion of the CONCESSION AUTHORITY, the electric power network may be aerial. In addition to the installation, it includes the operation and subsequent maintenance of the new point during the CONCESSION TERM. The CONCESSIONAIRE shall also be responsible for the expansion of the electric power network for connection at the delivery point of the DISTRIBUTION COMPANY, over distances of up to ninety (90) meters.
- iii. **Receipt of 1 ADDITIONAL PUBLIC LIGHTING POINT for O&M:** Includes the receipt of an ADDITIONAL PUBLIC LIGHTING POINT implanted by ENTREPRENEURS for operation and maintenance, provided that they have had the ENTREPRENEURS INSTALLATION PROJECT previously presented and approved by the CONCESSIONAIRE. For ADDITIONAL PUBLIC LIGHTING POINT located on ROADS WITH TELEMAGEMENT, the CONCESSIONAIRE is responsible for the maintenance and operation of the TELEMAGEMENT SYSTEM.
- iv. **Reallocation of 1 PUBLIC LIGHTING POINT:** Includes the provision of labor, equipment and materials both for removing the point of PUBLIC LIGHTING on the pole, as well as connections, grounding or any material and equipment belonging to the MUNICIPAL PUBLIC LIGHTING NETWORK which may be deemed necessary. In the reallocation services, the CONCESSIONAIRE must remove the PUBLIC LIGHTING POINTS, disassemble them, identifying each of its components in loco, transporting them and temporarily storing them in its warehouse, for later reinstallation, in the same place or in another to be defined by the CONCESSION AUTHORITY. For the exclusive PUBLIC LIGHTING POINTS, the CONCESSIONAIRE shall also be responsible for the removal and subsequent implantation of the electric power network for connection between the posts.
- v. **Installation of ADDITIONAL PUBLIC LIGHTING POINT in squares, parks and general areas:** Includes all facilities and materials previously cited for "Installation of 1 ADDITIONAL PUBLIC LIGHTING POINT", exclusive or non-exclusive, as requested by the CONCESSION AUTHORITY.

For squares, parks and general areas, decorative LUMINAIRES must be installed according to the location.

- vi. **Installation of ADDITIONAL PUBLIC LIGHTING POINT in sports areas (courts and fields):**
Includes all facilities and materials previously cited for "Installation of 1 ADDITIONAL PUBLIC LIGHTING POINT", exclusive or non-exclusive, as requested by the CONCESSION AUTHORITY. For sports areas (courts and fields), projectors/reflectors must be installed for application in sports practice areas.

After the issuance of the service order by the CONCESSION AUTHORITY, the CONCESSIONAIRE shall be responsible for executing the COMPLEMENTARY SERVICES, contemplating the availability of manpower, equipment and materials which may be necessary.

12 TRAINING OF THE CONCESSION AUTHORITY'S TEAM

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

- i. The CONCESSION AUTHORITY must indicate the programmatic content of the TRAINING, being able to use recommendations from both the CONCESSIONAIRE and the INDEPENDENT VERIFIER;
- ii. The CONCESSIONAIRE will hire a Specialized Company and provide all the physical infrastructure, furniture, equipment and materials necessary for the execution of the TRAINING. The TRAINING must take place in a location within the area of the MUNICIPALITY;
- iii. The Specialized Company will be responsible for providing the TRAINING;
- iv. The Specialized Company must prepare all the content and teaching materials to carry out the TRAINING according to the best market practices. The content presented in the TRAINING and complementary materials must be delivered in a printed version by the CONCESSIONAIRE for each participant in the TRAINING;
- v. At every twelve (12) months, TRAINING must be carried out by the CONCESSIONAIRE, totaling eighty (80) hours. The training hours may be divided into more than one TRAINING, within the period of twelve (12) months, at the discretion of the CONCESSION AUTHORITY;
- vi. The cost of the training must correspond to values practiced in the market, the ceiling of eighty thousand reais (R\$ 80,000.00) being henceforth established, annually adjusted by the IPCA-A;
- vii. The CONCESSION AUTHORITY shall designate the team which will receive the TRAINING, with the limited number of twenty (20) people being henceforth established;
- viii. At the end of each TRAINING, the CONCESSIONAIRE must carry out a satisfaction survey with all participants. If the result of the research shows that the TRAINING was not considered satisfactory by the participants, the CONCESSION AUTHORITY shall have the right to request a new TRAINING for the utilized hours.

13 PPP TRANSPARENCY PROCESS

The CONCESSIONAIRE shall provide, manage and maintain active, throughout the CONCESSION period, an online portal for sharing information, news and documents directly related to the CONCESSION to the general public. All available documents must be openly available for download without the need for enrollment or prior registration.

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

- i. Operation and Maintenance Plan;
- ii. Modernization Plan;
- iii. Quarterly Performance Report;
- iv. ACCEPTANCE TERMS issued by the INDEPENDENT VERIFIER and/or CONCESSION AUTHORITY;
- v. CONCESSION contract;
- vi. Amendment to the CONCESSION Contract;
- vii. RELATED ACTIVITY Contracts;
- viii. The CONCESSIONAIRE'S Financial/Accounting Statements.

Preliminary versions of documents which shall still go through a process of analysis and/or validation by the CONCESSION AUTHORITY, CONCESSIONAIRE, INDEPENDENT VERIFIER or other authorities shall not be released. The reports and plans can be published in a summarized version, containing only the most relevant points and the applied guidelines.

14 ACCEPTANCE AND VERIFICATION TERMS PROCEDURES

Below are the procedures for issuance of the ACCEPTANCE TERMS. In cases where the INDEPENDENT VERIFIER or CONCESSION AUTHORITY ascertains that specifications, guidelines, activities or other requirements expressed in this ATTACHMENT have not been met by the CONCESSIONAIRE, the INDEPENDENT VERIFIER or CONCESSION AUTHORITY must notify the CONCESSIONAIRE about the items not met, presenting documents which substantiate the non-issuance of the ACCEPTANCE TERM. In this case, the CONCESSIONAIRE, within the period agreed with the CONCESSION AUTHORITY and INDEPENDENT VERIFIER, must evaluate and adapt the issues raised, and then start the procedure to obtain the ACCEPTANCE TERMS again.

In the absence of the INDEPENDENT VERIFIER, the assessment may be made by the CONCESSIONAIRE, provided that it is authorized by the CONCESSION AUTHORITY prior to the inspection.

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

14.1 Assessment of the quality of BASE REGISTRY

The activity of measuring the quality of BASE REGISTRY consists of the process of analyzing the data survey of the equipment and components installed in the PUBLIC LIGHTING POINTS. For such purpose, the BASE REGISTRY data shall be compared with the on-site verification, detailed below.

The on-site verification activity must be performed by the INDEPENDENT VERIFIER following the guidelines provided in ATTACHMENT 8 - PERFORMANCE MEASUREMENT SYSTEM for the Location Characterization Compliance Indicator (ICL) and Total Power Compliance Indicator (ICP). To calculate the grade, the guidelines in ATTACHMENT 8 - PERFORMANCE MEASUREMENT SYSTEM must be followed, but considering weight 0.2 for ICL and 0.8 for ICP. The CONCESSIONAIRE must obtain a grade higher than ninety-eight percent (98%) for acceptance of the BASE REGISTRY. In this measurement and calculation, the Compliance Indicator of Other Registry Information (ICIC) shall not be considered. The sample of surveys must be of a minimum size as established in ABNT NBR 5426, with general inspection level two (2). The PUBLIC LIGHTING POINTS to be evaluated must be defined at random by the INDEPENDENT VERIFIER.

The CONCESSIONAIRE must proceed with the adjustments of the BASE REGISTRY for all the discrepancies found.

In the event of failure of BASE REGISTRY, a new sample must be drawn for on-the-spot verification along the lines of procedures previously applied in the first verification.

14.2 COMPLIANCE WITH THE CONCESSION MILESTONES

The CONCESSIONAIRE must notify the CONCESSION AUTHORITY and the INDEPENDENT VERIFIER of the conclusion of each CONCESSION MILESTONE, with the documents that prove the fulfillment of the conditions foreseen in this ATTACHMENT for obtention of the ACCEPTANCE TERM.

After receiving the notification, the INDEPENDENT VERIFIER must schedule an inspection of the facilities and equipment, observing the terms and criteria set forth in the CONTRACT and its ATTACHMENTS.

In order to prove and accept compliance with each of the CONCESSION MILESTONES, on-the-spot checks must also be carried out, adopting the same procedures based on NBR 5426, general inspection level two (2) and regular simple sampling plan with NQA (Acceptable Quality Level) of one (1), in samples of the PUBLIC LIGHTING POINTS foreseen as modernized, in the respective CONCESSION MILESTONE, in compliance with the established in the MODERNIZATION PLAN (PM) approved by the CONCESSION AUTHORITY. The PUBLIC LIGHTING POINTS which shall be evaluated must be defined at random and checked by the INDEPENDENT VERIFIER.

During the field assessment, measurements of illuminance and uniformity must be carried out according to ABNT NBR 5101 Standard, evaluating the fulfillment of these parameters according to the LIGHTING CLASSES of vehicles and pedestrians provided for in ATTACHMENT 13 and according to the levels of illuminance and uniformity of item 6.6.1 for the LIGHTING CLASSES of the road. The measurement in the field must also include the measurement of the Color Temperature indicator (TCC) to assess compliance with the parameters of item 6.6.1. It should also be checked if the parameters registered in the MODERNIZATION AND STREAMLINING ENERGY Executive Project are in accordance with the measurements in place, such as track width, sidewalk width, distance between the posts, among other information the CONCESSION AUTHORITY or the INDEPENDENT VERIFIER deems necessary.

Additionally, in order to comply with each of the CONCESSION MILESTONES, the CONCESSIONAIRE must present documents that prove the validity of the LUMINAIRE certification in accordance with INMETRO Ordinance 20 or another one which may replace it.

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

- i. Insurances:
 - a. Proof of contracting and/or complementing the insurance linked to the respective CONCESSION MILESTONE, pursuant to ATTACHMENT 10.
- ii. Photometric data:
 - a. Diagrams with isocandela lines of horizontal lighting, as well as indication of maximum intensity and 50% of maximum intensity;
 - b. Polar chart for the angles of maximum light intensity;
 - c. Digital file of photometric data for each LUMINAIRE and specified light distribution;
 - d. Photometric code;
 - e. Photometric distribution curve.
- iii. Nominal technical information:
 - a. LUMINAIRE:
 - Power [W];
 - Input voltage [V];
 - Input current [A];
 - Input voltage of the electronic modules (Vcc);
 - Input current of the electronic modules (Icc);
 - LUMINAIRE luminous flux [lm];
 - LUMINAIRE efficiency [lm/w];
 - Degree of protection IK and IP;
 - Type of refractory material;

- Activation type;
 - Manufacturer;
 - Color rendering index [%];
 - Color temperature of the emitted light [K];
- b. Driver:
- Input voltage [V];
 - Input current [A];
 - Output voltage (Vdc);
 - Maximum output current (Icc);
- c. Maximum loss for 220 V power supply [W].

14.3 Functioning of the CCO

Acceptance of the functioning of the CCO shall be obtained by the CONCESSIONAIRE upon proof of compliance with all specifications, features, guidelines, operating infrastructure and the guarantee of security of the system information as presented in item 8.

In order to issue the ACCEPTANCE TERM, the INDEPENDENT VERIFIER must evaluate the supporting documents and inspect the CCO's functionalities and infrastructure locally.

14.4 Execution of SPECIAL LIGHTING works

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

- i. Compliance with the implementation of executive projects approved by the CONCESSION AUTHORITY through on-site verification;
- ii. Licenses and authorizations for the implementation of SPECIAL LIGHTING, when applicable;

- iii. Compliance with all equipment and material specifications established in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- iv. Compliance with all technical guidelines established in ATTACHMENT 6 - SPECIAL LIGHTING GUIDELINES;
- v. Presentation of certifications and tests of equipment and materials to be implanted for SPECIAL LIGHTING.

14.5 FUNCTIONING OF THE TELEMAGEMENT SYSTEM

The procedure of ACCEPTANCE by the INDEPENDENT VERIFIER with respect to the functioning of the TELEMAGEMENT SYSTEM shall be based on:

- i. On-site verification of a sample of PUBLIC LIGHTING POINTS with TELEMAGEMENT SYSTEM installed according to the procedures and guidelines established by ABNT NBR 5426, general level of inspection two (2) and normal simple sampling plan with NQA (Acceptable Quality Level) of one (1). The verification must verify compliance with all the functionalities provided for in item 7;
- ii. Evaluation of the certifications of the TELEMAGEMENT SYSTEM equipment and components by a competent supervisory authority;
- iii. Evaluation of the TELEMAGEMENT SYSTEM connectivity network in order to ascertain the bidirectional communication between the CCO and the TELEMAGEMENT SYSTEM control device at the PUBLIC LIGHTING POINT.

The PUBLIC LIGHTING POINTS which shall be evaluated must be defined at random and checked by the INDEPENDENT VERIFIER.

The procedure for accepting the operation of the TELEMAGEMENT SYSTEM must occur in the intermediate stages of compliance with the CONCESSION MILESTONE as well as after the end of the last CONCESSION MILESTONE.

14.6 Operational demobilization

The INDEPENDENT VERIFIER shall, through sample analysis with two distinct samples:

- i. Verify the accuracy of the information in the PUBLIC LIGHTING POINTS in the REGISTRY;
- ii. Verify the useful life of the LUMINAIRES for at least twenty (20) months from the expected date of the advent of the contractual term.

The definition of the LUMINAIRES for the composition of the samples must be carried out at random by the INDEPENDENT VERIFIER, and must respect the following conditions:

- i. contain PUBLIC LIGHTING POINTS installed in different years, including at least one PUBLIC LIGHTING POINT installed in each year of the CONCESSION;
- ii. The sample must also have in its composition PUBLIC LIGHTING POINTS of different vehicle and pedestrian LIGHTING CLASSES;
- iii. LUMINAIRES of different models, powers and luminous fluxes appear in the sample.

The evaluations must be carried out by the INDEPENDENT VERIFIER six (6) months before the expected date of the advent of the contractual term. All adjustments and adjustments to be made by the CONCESSIONAIRE, in case of failure, must be performed within the CONCESSION TERM.

14.6.1 Compliance of the information of PUBLIC LIGHTING POINTS in the PUBLIC LIGHTING NETWORK REGISTRY

The INDEPENDENT VERIFIER shall verify the accuracy of the information registered in the REGISTRY by means of proof through data collected on site.

In order to carry out this on-site analysis, a quantitative for sample inspection must be defined in accordance with the ABNT NBR 5426 standard, general inspection level three (3), normal double sampling plan and with EQA (Acceptable Quality Level) of two hundred and fifty (250), considering the total of PUBLIC LIGHTING POINTS.

The information to be verified, for each of the PUBLIC LIGHTING POINTS in the sample are:

- i. LUMINAIRE model;
- ii. Power;
- iii. Address;

- iv. Height of the LUMINAIRE installation (divergence of up to five percent (5%) between the information in the REGISTRY and the on-site verification shall be considered as compliant);
- v. Horizontal LUMINAIRE projection (divergence of up to ten percent (10%) between the REGISTRY information and the on-site verification shall be considered as compliant).

The conformity assessment of each PUBLIC LIGHTING POINT is binary, that is, if all five (5) evaluated information are in accordance with the REGISTRY, it is assumed to be in accordance with the PUBLIC LIGHTING POINT.

If the information conformity assessment does not meet the NQA (Acceptable Quality Level) defined above, the CONCESSIONAIRE must make a new REGISTRY according to ATTACHMENT 4 - PUBLIC LIGHTING NETWORK REGISTRY.

If a new REGISTRY is necessary, it must be analyzed by the INDEPENDENT VERIFIER through sample analysis. In order to carry out this on-site analysis, a quantitative for sample inspection must be defined in accordance with the ABNT NBR 5426 standard, general inspection level three (3), normal double sampling plan and with EQA (Acceptable Quality Level) of two hundred and fifty (250), considering the total of PUBLIC LIGHTING POINTS.

14.6.2 Verification of the remaining useful life of each of the PUBLIC LIGHTING POINTS in the sample.

The INDEPENDENT VERIFIER shall assess the remaining useful life of each of the PUBLIC LIGHTING POINTS in the sample. The proof must be carried out through documentary analysis of the technical specifications of the PUBLIC LIGHTING POINTS, the analysis must be based on the information from the laboratory tests accredited by INMETRO when the LUMINAIRE certification, according to INMETRO Ordinance No 20, or another one which shall replace it.

For proof of the remaining useful life, a sample inspection quantity must be defined in accordance with the ABNT NBR 5426 standard, general inspection level three (3), normal double sampling plan and with NQA (Acceptable Quality Level) of sixty-five thousandths (0.065), considering the total of PUBLIC LIGHTING POINTS.

The INDEPENDENT VERIFIER, based on the analysis of PUBLIC LIGHTING POINTS installed in the MUNICIPAL PUBLIC LIGHTING NETWORK, must indicate the percentage of LUMINAIRES in the sample

which presented a remaining useful life below the expected according to their certification. In addition to that, it must present the average remaining useful life of each sample.

If found in the LUMINAIRE samples with a useful life remaining below the required, the CONCESSIONAIRE must proceed with the replacement of the models of the LUMINAIRES existing in the MUNICIPAL PUBLIC LIGHTING NETWORK in the same proportion of the sample in which LUMINAIRES with a useful life below the required. The CONCESSIONAIRE must present a plan to replace the LUMINAIRES for approval by the CONCESSION AUTHORITY in order to deliver, at the end of the CONTRACT, LUMINAIRES with a minimum remaining useful life of at least twenty (20) months.

15 OTHER OBLIGATIONS OF THE CONCESSIONAIRE

In addition to the obligations defined in the CONTRACT and in the ATTACHMENTS, the CONCESSIONAIRE must observe the determinations set out below, but not limited to those, which shall be valid for the entire CONCESSION TERM, which are fundamental for the execution of the CONTRACT.

- i. Obeying the procedures established with the DISTRIBUTION COMPANY, for the execution of interventions in the electricity supply network;
- ii. Observing, as applicable, the terms entered between the CONCESSION AUTHORITY and the DISTRIBUTION COMPANY;
- iii. Maintaining all equipment and utensils necessary for the execution of the SERVICES in perfect conditions of use;
- iv. Instruct its employees as to the need to comply with the CONCESSION AUTHORITY guidelines, including regarding compliance with internal rules and safety and occupational medicine;
- v. Bearing all expenses for printed matter, forms, electricity, water, gas, telephone, among others, used in the operational structures necessary for the execution of the SERVICES;
- vi. Maintaining planning of alternative work schemes and contingency plans for emergency situations in the CCO and operational structures, such as: lack of water, electricity, gas, equipment breakdowns, strikes and others, permanently ensuring the provision of the SERVICES subject matter of the CONTRACT;

- vii. Meeting the requirements, recommendations or observations made by the CONCESSION AUTHORITY, according to the deadlines established in each case;
- viii. Providing and maintaining, in the sites of the works related to the execution of the SERVICES, identification plates, easels and other types of appropriate signs, with dimensions, sayings and logos in the standard of the CONCESSION AUTHORITY;
- ix. Recomposing, at the end of all SERVICES, the original conditions of the place, obeying the standards established by the CONCESSION AUTHORITY, of the sidewalks, road surfaces and other public places damaged due to the work performed by the CONCESSIONAIRE.
- x. Immediately informing the CONCESSION AUTHORITY of any and all facts that alter the execution of the CONTRACT and compliance with the obligations established therein;
- xi. Presenting additional or complementary information to those which may be requested by the CONCESSION AUTHORITY or INDEPENDENT VERIFIER.