

**ATTACHMENT 6**  
**SPECIAL LIGHTING GUIDELINES**

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## **1 INTRODUCTION**

Aiming at enhancing and embellishing through the lighting of monuments and public and urban spaces such as bridges, buildings, squares, parks, monuments, facades and works of art of historical value, the CONCESSIONAIRE must provide SPECIAL LIGHTING services in the MUNICIPALITY.

This ATTACHMENT presents the scope and minimum guidelines necessary for the execution of the SPECIAL LIGHTING in specific locations of the MUNICIPALITY, which must be detailed and presented in the Special Lighting Program (PIE) according to the provisions expressed in ATTACHMENT 5 (SERVICES SPECIFICATIONS).

## **2 SCOPE OF SPECIAL LIGHTING SERVICES**

With regard to the scope of SERVICES associated to the SPECIAL LIGHTING of the MUNICIPALITY, the CONCESSIONAIRE shall:

- Prepare SPECIAL LIGHTING executive projects, differentiated from the conventional standard for vehicle and pedestrian traffic adopted, for the valorization of places;
- Modernize the existing points of SPECIAL LIGHTING with conventional technology for the technology specified in ATTACHMENT 5 (SERVICES SPECIFICATIONS) and in the guidelines contained herein;
- Carry out works to implement SPECIAL LIGHTING at predefined locations in the MUNICIPALITY;
- Guarantee throughout the CONCESSION TERM the maintenance of all equipment and devices intended for SPECIAL LIGHTING, acting in a predictive, preventive and corrective manner;
- Ensure the replacement of SPECIAL LIGHTING points as well as other related equipment when the end of its operating life is verified.

### **2.1 MANDATORY SPECIAL LIGHTING LOCATIONS**

Under this CONCESSION, the CONCESSIONAIRE is responsible for implementing SPECIAL LIGHTING projects at the following locations:

- Centro Cultural de Aracaju;
- Museu da Gente Sergipana;
- Catedral Metropolitana;
- Museu Olímpio Campos;
- Colina Santo Antônio;
- Arcos da Orla de Italaia;
- Monumento aos formadores da nação;
- Mundo Maravilhoso da Criança;
- Oceanário;
- Largo da Gente Sergipana;
- Praça dos Mercados;
- Farol da Unit;
- Igreja de Capuchinos - Bairro América;
- Orla do Bairro Industrial;
- Ponte do Imperador;
- Ponte Godofredo Diniz.

### 3 BASIC GUIDELINES FOR SPECIAL LIGHTING PROJECTS

The following table shows the locations of the MUNICIPALITY that will be contemplated with the basic guidelines of the SPECIAL LIGHTING projects.

*Table 1 - Basic guidelines for Special Lighting projects*

<b>1 – Centro Cultural de Aracaju</b>	
	<p><b>Project Concept:</b> Project for installation of lighting equipment around the building of the Centro Cultural de Aracaju, as well as of the Praça General Valadão located in front of the Cultural Center and its components: statue and bicycle rack.</p>
<b>2 – Museu da Gente Sergipana</b>	
	<p><b>Project Concept:</b> Project for installation of lighting equipment to illuminate the entire space of the square, including minimally prominent elements such as coconut trees, vertical plant walls and the bandstand.</p>
<b>3 – Catedral Metropolitana</b>	
	<p><b>Project Concept:</b> Project for installation of lighting equipment to illuminate the entire space of the square, the surroundings and facades of the Cathedral, including minimally special lighting elements on the statue in the center of the square.</p>
<b>4 – Museu Olímpio Campos</b>	
	<p><b>Project Concept:</b> Project for the installation of lighting equipment in the Museu Olímpio Campos building, including minimally special lighting elements on the facade and around the building and on the masts located in front of the building.</p>

## 5 – Colina de Santo Antônio



**Project Concept:** Project for installation of lighting equipment to illuminate the entire space of the square, surroundings and facades of Colina de Santo Antônio, including minimally special lighting elements on the statue in the center of the square, the image of the saint, the cross on the side of the church and the lookout at the highest part of the hill.

## 6 – Arcos da Orla de Atalaia



**Project Concept:** Project for installation of special lighting equipment of the monument itself and its surroundings. The CONCESSIONAIRE must include colored projectors in the project, allowing thematic campaigns to be carried out by the municipality, such as: Pink October, Blue November and Yellow December.

## 7 – Monumento aos Formadores da Nação



**Project Concept:** Project for installation of equipment for lighting the monument itself and also the surrounding space, including minimally special lighting elements for the sign "Monumento dos Formadores da Nação" and the garden in the area.

## 8 – Mundo Maravilhoso da Criança



**Project Concept:** Project for installation of lighting equipment in the area of the Mundo Maravilhoso da Criança, including minimally special lighting elements in the lollipops and in the garden surrounding the playground, as well as the main toys in the park, such as the carousel.

## 9 - Oceanário



**Project Concept:** Project for the installation of lighting equipment in the Oceanário area, including minimally special lighting elements on the signs that identify the project, at the Turtle monument and in the boardwalk around the area.

## 10 – Largo da Gente Sergipana



**Project Concept:** Project for installation of special lighting equipment for the monument itself and also the surrounding space, including minimally special lighting elements in each of the pillars that support the sculptures.

## 11 – Praça dos Mercados



**Project Concept:** Project for installation of lighting equipment for the open area of Praça dos Mercados, including minimally special lighting elements at the facade of Mercado Antônio Lemos.

## 12 – Farol da Unit



**Project Concept:** Project for installation of special lighting equipment of the Lighthouse and the square around the monument. The CONCESSIONAIRE must include colored projectors in the project, allowing thematic campaigns to be carried out by the municipality, such as: Pink October, Blue November and Yellow May.

### 13 – Igreja de Capuchinhos



**Project Concept:** Project for installation of special lighting equipment for the monument itself and also the surrounding space, including minimally special lighting elements in each of the pillars that support the sculptures.

### 14 – Orla do Bairro Industrial



**Project Concept:** Project for the installation of lighting equipment at Orla do Bairro industrial, contemplating the implementation of lighting components evenly distributed throughout the square and lighting points in the sports court and on the deck.

### 15 – Ponte do Imperador



**Project Concept:** Project for installation of lighting equipment on the Ponte do Imperador, contemplating the lighting of the covered area, the entrance and the statues on the sides of the bridge.

### 16 – Ponte Godofredo Diniz



**Project Concept:** Project for the installation of lighting equipment on Ponte Godofredo Diniz, with minimal elements of special lighting on the pilasters and the front view of the bridge arches.



The CONCESSIONAIRE must carry out all SPECIAL LIGHTING projects, contemplating in minimum detail the quantities per type of equipment, as detailed in Table 2, including the installation of all equipment. The distribution of the total equipment among the SPECIAL LIGHTING projects must be proposed by the CONCESSIONAIRE and validated by the CONCESSION AUTHORITY.

If, by determination of the CONCESSION AUTHORITY, the quantities in Table 2 are exceeded, the economic and financial balance of the CONCESSION will be restored.

*Table 2 - Special Lighting Components of Aracaju*

<b>Equipment</b>	<b>Quantity</b>
Beacon	38
Solar Beacon	20
Linear LUMINAIRE RED RGB	570
Decorative LED LUMINAIRE	350
Conventional LED LUMINAIRE	354
Spot LED LUMINAIRE	86
Standard Post	5
Photovoltaic Pedestrian Pole	4
Standard Photovoltaic Pole	2
Sports LED Spotlight	14
Standard LED Spotlight up to 200W	109
Standard LED Spotlight over 200W	6
RGB LED Spotlight	9
<b>Total</b>	<b>1,567</b>

The SPECIAL LIGHTING components specified above must have at least the following technical characteristics:

- Beacon: Decorative urban LED LUMINAIRE used for landscape lighting of parks and gardens with a minimum color rendering index (IRC) of 75 and minimum equivalent protection index IP66 and IK08.
- Solar Beacon: Decorative urban LED LUMINAIRE used for landscape lighting, with photosensitive sensors that light automatically at dusk and equivalent minimum protection index IP65. This component must have technology for self-generation of electric power and battery for storage so that it is operational without the need for connection to the DISTRIBUTION COMPANY's electric power network;

- Linear LUMINAIRE RED RGB: Linear RGB LED LUMINAIRE used for outdoor lighting, minimum protection index equivalent to IP66 and IK09 and minimum size of 30cm;
- Decorative LED LUMINAIRE Urban decorative LED LUMINAIRE with classic inspiration used for public lighting of avenues, sidewalks, squares, parks and installation on poles up to 10 meters. Minimum color rendering index (IRC) of 70 and equivalent minimum protection index IP66 and IK10;
- Conventional LED LUMINAIRE: LED LUMINAIRE used for public lighting of avenues, sidewalks, squares and parks, in the same model used in public street lighting. Minimum color rendering index (IRC) of 70 and equivalent minimum protection index IP66 and IK10;
- Spot LED LUMINAIRE: Built-in LED LUMINAIRE used for landscape lighting with a minimum luminous flux of 2,000 lumens, a minimum color rendering index (IRC) of 70 and a minimum protection index equivalent to IP67 and IK10;
- Standard Post: Post with a height of 10 meters or more;
- Photovoltaic Pedestrian Pole: Photovoltaic lighting system, consisting of solar panel, LED LUMINAIRE, arm, battery, charge controller, housing for the battery and a 5 meter high pole. This component must have technology for self-generation of energy and battery for storage so that it is operational without the need for connection to the electric power network;
- Standard Photovoltaic Pole: Photovoltaic lighting system, consisting of solar panel, LED LUMINAIRE, arm, battery, charge controller, housing for the battery and a 9 meter high pole. This component must have technology for self-generation of electric power and battery for storage so that it is operational without the need for connection to the DISTRIBUTION COMPANY's electric power network;
- Sports LED Spotlight: Specific LED projector for lighting sports practice places with a minimum power of 400W and a minimum protection index equivalent to IP66 and IK08.
- Standard LED Spotlight up to 200W LED projector used to illuminate facades, signs, statues, monuments and other external general lighting applications, with a minimum color rendering index (IRC) of 70 and a minimum protection index equivalent to IP65 and IK08;
- Standard LED Spotlight over 200W LED projector used to illuminate facades, signs, statues, monuments and other external general lighting applications, with a minimum color rendering index (IRC) of 70 and a minimum protection index equivalent to IP65 and IK08;

- RGB LED Spotlight: RGB LED projector that offers sufficient light to illuminate and color large facades, with a minimum protection index equivalent to IP66 and IK07, and a minimum luminous flux of 10,000 lumens;

#### **4 GENERAL AND SPECIFIC GUIDELINES FOR SPECIAL LIGHTING**

The SPECIAL LIGHTING of the premises must consider the architectural, technical, constructive, artistic and historical characteristics that give it special value. Thus, the original conception of the asset should be respected, with regard to its technical and plastic characteristics, with the aim of guaranteeing its physical integrity.

CONCESSIONAIRE shall carry out the SPECIAL LIGHTING interventions in the MUNICIPALITY locations, observing, for each location, the following aspects:

- Preliminary historical and stylistic study, which guides designers in relation to the fundamental points to be highlighted;
- Appreciation of the cultural asset in all existing sights of the monument;
- Minimization of daytime and/or nighttime interference of SPECIAL LIGHTING equipment in the cultural property. The use of equipment in the structure of the asset should be thought of in order to ensure that physical damage is not caused by its fixation and that they are properly concealed, not drawing undue attention to itself. The cultural asset should be valued by light and not be a mere support for highlighting lighting equipment. The same applies to equipment provided for its close surroundings, as for equipment installed on poles where the same care must be observed.

Any proposal for SPECIAL LIGHTING must be prepared considering the characteristics of PUBLIC LIGHTING in its surroundings, with regard to the level of illumination, the color temperature, the color reproduction and the possible impacts of its emanated light or shading focusing on the cultural asset. If there is no PUBLIC LIGHTING in the vicinity of the cultural asset, the CONCESSIONAIRE must adapt the environment, in order to bring safety and convenience to the USER.

The SPECIAL LIGHTING project must be prepared based on the PUBLIC LIGHTING project, taking into account the impacts that will be produced, their interaction or mutual influence, ensuring that cultural assets do not suffer undue interference from PUBLIC LIGHTING, either by the incidence of light or by the shading generated. The harmony between the lighting levels and the chosen color temperatures should guarantee the success of the lighting proposals and the balance between PUBLIC LIGHTING and SPECIAL LIGHTING.

SPECIAL LIGHTING proposals must consider the presence of tree obstacles and their interface with the proposed light sources. The CONCESSIONAIRE must be made aware of the urban vegetation management procedures by the agency or company responsible for this service, in order to enable a better positioning of the lighting equipment during the executive projects phase.

The existing vegetation can be used in order to conceal the PUBLIC LIGHTING POINTS (poles, ancillary equipment, projectors, etc.), so the presence of tree elements in or around the cultural asset is an opportunity to create the insertion of lighting equipment in a discreet way. It is essential that the maintenance cycle of the plant elements be observed, because, depending on the positioning of the lighting equipment, the vegetation may quickly become an obstacle to lighting, and the CONCESSIONAIRE must consider in the projects the natural growth of the vegetation and the period necessary to carry out pruning services.

If the existing vegetation in the surroundings is used as an element to be valued by light, with the function of setting or contextualizing, special care should be dedicated to the existing fauna and flora, in order to avoid environmental damage caused by lighting with regard to the emissions of electromagnetic radiation, as well as the levels of lighting incident, both in vegetation and in the animal species that inhabit there.

The CONCESSIONAIRE must present technical documentation containing a complete assessment of the lighting design and technical premises observed in the preparation of the calculations and sizing, and must start from a written study of its technical, historical and artistic characteristics, in order to guide the intervention. The documentary formalization should allow the technicians in charge, the CONCESSION AUTHORITY and the preservation authorities, in the case of assets with municipal, state and/or federal protection, to approve the project, in order to check if it compliant with the respective authorities's guidelines.

After the approval of the technical proposal, the descriptive memorandum should be developed, which should support the adopted lighting concept, observing that the preliminary study of the characteristics may be inserted in the descriptive memorandum. The descriptive memorandum shall clarify the concepts used and other technical aspects that justify the proposal under analysis, covering considerations on the lighting levels adopted, any measurements made, choice of equipment, color temperatures adopted, among others.

In order to confirm the considerations contained in the descriptive memorandum, the calculation report attached to the documents to be provided for verification and approval must be presented. Calculation memory may be dismissed, at the discretion of the CONCESSION AUTHORITY, with the

justification, for example, of any concrete impossibility of its elaboration due to the difficulty of obtaining all the necessary technical data. If the dismissal occurs, lighting tests can be carried out in place of the calculation memory.

The general guidelines are intended to guide interventions aimed at the implementation of SPECIAL LIGHTING projects and should be applied to all locations and cultural assets covered by SPECIAL LIGHTING. Due to the great diversity of typologies of these goods, it is necessary, for a better study of the interventions, to group them in sets, considering similar characteristics. With this arrangement, the guidelines for correct technical performance should be complemented through the establishment of specific detailed guidelines. The following are the minimum guidelines common to a certain typology, without compromising the freedom of design.

#### **4.1 Religious Monuments**

These monuments have a different typology, in particular, due to the significant presence of architectural, historical, symbolic and artistic decorative elements - towers, vaults, bell towers, cruises, pinnacles, among others. They are monuments where, in general, the presence of incorporated artistic elements is noted, and the architecture marks its work in time.

Stylistic studies should be further developed, including analysis in relation to the religious order or brotherhood to which they are linked. Architectural elements should be valued, even if they are not physically interconnected to the structure, as well as elements that have a symbolic link with the buildings that are in their surroundings, such as sculptures and devotional chapels.

#### **4.2 Parks, Squares and Gardens**

Although the SPECIAL LIGHTING of these spaces is more related to PUBLIC LIGHTING, it is necessary to highlight specific issues of this type of cultural asset. These places have always been the subject of lighting aimed at their enjoyment and contemplation. Therefore, the lighting levels must be guided by maintaining the bucolic character of the spaces, as well as the lighting equipment inserted in them that have adequate plasticity and proportion. Thus, by safeguarding the current needs of lighting levels, aiming to meet questions related to the safety of individuals, care must be taken to avoid blinding lighting of these spaces, breaking their harmony.

The conception of an executive project for SPECIAL LIGHTING in squares, parks and gardens should adopt standardization of equipment and structures for PUBLIC LIGHTING in order to avoid visual disorder with different models of equipment and structures for PUBLIC LIGHTING. If it is necessary to

remove or change the location of lighting equipment listed by the government, the appropriate authorizations must be requested from the CONCESSION AUTHORITY and/or respective authorities.

### **4.3 Sculptural Monuments**

For sculptural assets, their color and texture should be evaluated, in order to ensure that the details present in the work of art are properly visible. Since the sculptures are usually located in places that are widely accessible to the public, special care must be taken in relation to acts of vandalism directed at lighting equipment intended for their highlight.

In these spaces, the structure of PUBLIC LIGHTING to be installed for SPECIAL LIGHTING of the referred cultural asset should be evaluated, which can occur through poles or light sources up lights. The assessment should include analysis of the imminence of acts of vandalism in the PUBLIC LIGHTING equipment and possible glare in the nighttime in its surroundings.

In cases of definition for an "up lights" solution for lighting of sculptural monuments, the CONCESSIONAIRE must develop a study demonstrating the technical feasibility of installations of conduits and conductors on the ground and guaranteeing a protection index (IP) and a protection index against mechanical impacts (IK) suitable for the installation of PUBLIC LIGHTING equipment.

### **4.4 Fountains**

In these assets, the biggest concern regards interference caused by the use of equipment in its own structure, or immediate surroundings. This type of installation negatively impacts the appreciation of its artistic elements, due to its shape and dimensions. Currently, there is lighting equipment with excellent levels of sealing against the entry of water, so that the best option for the realization of light effects lies in underwater systems. In particular, in this type of cultural asset, due to the frequent need for internal lighting of water mirrors or water jets, it shall demand the use of equipment on its inside. Special attention should be paid to the descriptive memorial and to the details of the routings provided for the electrical interconnection of this equipment. A technical assessment must be made regarding the possible damage caused to the artistic and architectural elements of value for the cultural asset as a result of the ducts and cable route, for approval or refusal of the intervention.

The common use of colors in this type of lighting should avoid the undesirable effect of distortion in the appreciation of artistic and architectural elements, whether due to their chromatic composition or shapes.

#### **4.5 Bridges**

Due to the importance of these structures for the urban development of the MUNICIPALITY and their remarkable presence in the urban scenario, it is essential to design SPECIAL LIGHTING that allows the valuation of the referred property and establishes adequate harmony with the MUNICIPALITY's road network. The guidelines in this situation concern the necessary precautions to avoid glare, especially on the rolling lanes, and that the installation considers any acts of vandalism, made possible by the excessive exposure of the equipment to the public.



## 5 GUIDELINES FOR THE PREPARATION OF SPECIAL LIGHTING PROJECTS

The CONCESSIONAIRE shall develop the SPECIAL LIGHTING projects considering the basic, general and specific guidelines expressed herein, as well as the project guidelines established below:

- **Preparation of lighting projects**: The CONCESSIONAIRE shall prepare lighting projects and studies of the locations. The studies to be prepared must be composed by a descriptive memorandum, with the objective and conceptualization of the lighting proposal, as well as referring to the electrical installations that will feed this system. The calculations that support the proposal must be presented, and possible 3D graphic simulations should be based on real data and results and accompanied by photos, details and georeferencing of each SPECIAL LIGHTING unit. The photometric test reports of each type and model of LUMINAIRE used must also be part of the descriptive memorandum, containing the distribution of luminous intensities in digital format, standard IES file. The files containing the point grids, indicating the calculated values of the illuminances, using appropriate software, must be compatible with the type of project considered and must include, at least:
  - Graphical representation of the location with visualization of the SPECIAL LIGHTING proposal;
  - Illuminance levels considered;
  - Depreciation factor of the luminous flux of the PUBLIC LIGHTING equipment;
  - Illuminance and uniformity of the surrounding area.

The list of materials contained in the projects and complete technical specifications of the materials to be used shall be part of the aforementioned memorial. The CONCESSIONAIRE must ensure that the projects meet the guidelines set out herein and must submit it for approval by the CONCESSION AUTHORITY.

- **Elaboration of electrical projects**: The electrical projects must contain, at least, the load analysis, identification of the supply points and details of the power distribution, electrical assembly diagrams, calculation memory of the loads involved to be removed and installed, list of materials contained in the projects and complete technical specifications of the materials to be used.
- **Technical Responsibility**: The lighting and related electrical installations plans must be signed by duly qualified professionals, accompanied by the CREA number and the respective

Technical Responsibility Note (ART) collected and annotated, according to the current regulations.

- **Minimum technical specifications for light sources:** PUBLIC LIGHTING POINTS for SPECIAL LIGHTING must meet the following requirements:
  - The LUMINAIRE casing must ensure the degree of protection against the penetration of dust, solid objects and moisture, according to the LUMINAIRE classification and the IP code marked on the LUMINAIRE, according to ABNT NBR IEC 60598-1. The housings of the vital parts (secondary optical system and controller) must have, at least, degree of protection IP-66. If the controller is IP-65 or higher, the controller housing in the LUMINAIRE must be at least IP-44;
  - The LUMINAIRES must have a resistance to external mechanical impacts corresponding, at least, to the degree of protection IK08 for polycarbonate lenses and IK10 for glass lenses, according to ABNT NBR IEC 62262;
  - Power factor according to Normative Resolution No. 414 - ANEEL;
  - The harmonics of the supply current must comply with the IEC 61000-3-2 standard;
  - Electromagnetic compatibility in accordance with EN55015 or CISPR 15 standards;
  - The thermoplastic components subject to weather exposure should undergo resistance tests to the elements based on standard ASTM G154. After the test the pieces must not show degradation which endangers the operating performance of the LUMINAIRES.
  - They must have a surge protection device (DPS);
  - Light sources must have IRC (Color Rendering Index)  $\geq 70$ ;
  - Minimum operating life of 30,000 hours, with a 5-year warranty;
  - Present a control and automation solution that allows controlling and defining the color spectrum of the luminous flux;
  - Comply with ABNT NBR IEC 60598-1;

A technical report of each LUMINAIRE used in the project must be submitted, with at least the following information:

- Type of LUMINAIRE, installation, angle and beam;
- Color temperatures (K) of each LUMINAIRE;
- Luminous Efficiency (lm/W) of each LUMINAIRE;
- IRC of each LUMINAIRE;
- Other characteristics of LUMINAIRES.

- **Minimum Technical Specifications for PUBLIC LIGHTING infrastructure:** The electrical projects of the structures to be used for SPECIAL LIGHTING must comply with the standards and norms established by the agency responsible for the PUBLIC LIGHTING of the MUNICIPALITY, and by the DISTRIBUTION COMPANY, when using the electricity distribution poles;
- **LUMINAIRES Chromaticism:** Where applicable, the installation of projectors, reflectors or LUMINAIRES with RGB color technology for lighting should be provided. Such specification should allow the greatest dynamism of SPECIAL LIGHTING when it is desired to project colors characteristic of regional, national or other sporadic events;
- **Installation security:** In the case of using the building's structure, or the structure of a protected asset in the surroundings, as a support for fixing lighting or ancillary equipment, the structural and electrical conditions of the cultural asset that will receive the intervention should be checked, in order to ensure its safety. Authorization must be requested from the CONCESSION AUTHORITY before any intervention;
- **Adaptation to architectural features:** The lighting proposal should consider its adequacy to the architectural and artistic characteristics of the building;
- **Analysis of PUBLIC LIGHTING interference:** Before the formulation of the lighting proposal for any cultural asset separately protected, the interference in the night due to PUBLIC LIGHTING must be checked and the necessary corrections or compatibility made;
- **No physical impairment of the monument:** The CONCESSIONAIRE shall prioritize lighting technologies characterized by simplified electrical and physical installation. Such prioritization should ensure that there is no aesthetic compromise in the appreciation of the cultural asset, during the day, due to the equipment designed to produce its night lighting;
- **Reversibility of the intervention:** Attention should be given to the possibility of easy reversibility of the intervention, as well as the level of physical damage caused to the structure, and its surroundings, by the fixation of equipment;
- **Analysis of the position before vandalism actions:** The CONCESSIONAIRE must pay attention when proposing equipment for the risks inherent to vandalism actions;
- **Lesser aesthetic interference:** Ensuring the least possible aesthetic interference in the cultural asset is one of the main objectives of any intervention. Thus, the CONCESSIONAIRE

shall ensure that the lighting equipment has the smallest possible dimensions, as well as being concealed in relation to the structure in which they are installed;

- **Visibility of the cultural asset:** It must ensure that the places that are highlighted at night by lighting are visible on all facades that allow the enjoyment of the observer;
- **Consideration for techniques for filling architectural features and minimization of glare effects:** Lighting techniques should aim to promote the perception of the volume of cultural assets and make their dimensions visible. Thus, they shall avoid excessive lighting levels on facades, as they can prevent, for example, the adequate perception of important architectural elements, such as roofs;
- **Conformity between posts and architectural scale of buildings:** In the lighting around the monuments, the posts and equipment used must be related to the architectural scale of the buildings and their architectural and artistic style;
- **Relationship between color temperature and existing architecture:** In protected urban areas, it is always important that PUBLIC LIGHTING aims to use artificial light sources where the color temperature is consistent with the existing architecture;
- **Approval of heritage preservation authorities:** The fixing of equipment on the facades of buildings belonging to protected urban complexes can only be carried out with the authorization from the respective preservation authorities, and, in accordance with the provisions of the municipal, state and federal legislation applicable to the MUNICIPAL cultural assets;
- **Analysis of the ideal positioning of the posts:** Attention must be observed when installing the posts intended for SPECIAL LIGHTING of the place, avoiding that its dimensions are incompatible with the boardwalk, causing inconvenience to passers-by;
- **Historical preliminary analysis of urban equipment:** Studies related to the history of cultural assets must precede the implementation of new systems, as well as the architectural and urban characteristics of protected urban complexes;
- **Guarantee of compliance with the Special Lighting Program:** The Special Lighting Program is part of the MODERNIZATION PLAN, approved by the CONCESSION AUTHORITY, and must be complied with regarding the implementation schedule and specifications provided for herein and in ATTACHMENT 5 (SERVICES SPECIFICATIONS);

- **Predictive, Preventive and Corrective Maintenances:** THE PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCES of all SPECIAL LIGHTING projects, must be carried out according to the procedures detailed in ATTACHMENT 5 (SERVICES SPECIFICATIONS) and item 6 hereof;
- **Samples and certificates of technological solutions:** Samples of the technological solutions adopted, and their laboratory certificates accredited by INMETRO or the competent agency, must be made available, at least, together with the SPECIAL LIGHTING projects, for homologation of the technology used;
- **Project requirements:** That all projects guarantee, at least, the due adequacy to the guidelines foreseen for each of the SPECIAL LIGHTING interventions detailed herein; the reuse only of materials and equipment in conditions of use and efficiency; review and/or replacement, if necessary, of connections to the power grid; the due changes in the SPECIAL LIGHTING projects, if requested by the CONCESSION AUTHORITY to be reviewed, within the term provided for in the AGREEMENT. In this case, the CONCESSIONAIRE must initiate the intended SPECIAL LIGHTING interventions only after the approval of the reviewed projects;
- **As Built:** Upon completion of the SPECIAL LIGHTING services, the "as built" of each project must be issued. The "as built" must be accompanied by the lists of the materials used and the date of energization, as well as the results of illuminance, uniformity and color rendering index - IRC, color temperature (K) and luminous efficiency, these elements to be delivered as follows; one original copy of the project (in digital format - DWG and printed), copies of each project at the discretion of the CONCESSION AUTHORITY and two copies (in paper and digital media) of the itemized list of materials, list of places with the respective installed quantities, types and powers of the light sources, types of arms and quantity of LUMINAIRES installed;
- **Conference of interventions:** Jointly with the INDEPENDENT VERIFIER, after the conclusion of each of the PUBLIC LIGHTING interventions, the necessary measurements must be performed to prove compliance with all the conditions established in the project. If any nonconformity or disapproval of the SERVICE performed is verified, by the INDEPENDENT VERIFIER or CONCESSION AUTHORITY, the CONCESSIONAIRE must redo the entire SERVICE, or part thereof, bearing all related expenses. The CONCESSION AUTHORITY may, at its discretion, monitor the verification works;

- **Update of the REGISTRY:** After formalization of the respective ACCEPTANCE TERM by the CONCESSION AUTHORITY of the SPECIAL LIGHTING SERVICES, the CONCESSIONAIRE shall perform the update of the REGISTRY, as provided in the AGREEMENT.

## **6 GUIDELINES FOR MAINTENANCE OF SPECIAL LIGHTING EQUIPMENT**

For the SPECIAL LIGHTING equipment installed in cultural assets, the CONCESSIONAIRE will be responsible for planning specific procedures for the execution of PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCE services.

In the Special Lighting Program (PIE), the PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCE plan should be detailed for each of the locations that have SPECIAL LIGHTING solutions. In these locations, the CONCESSIONAIRE must carry out periodic inspections, with a minimum monthly frequency, performing at least the following activities:

- Verification of the conditions of the equipment and installations;
- Projectors focusing;
- Cleaning of exclusive PUBLIC LIGHTING posts, projectors, light sources and other equipment and materials installed in SPECIAL LIGHTING projects;
- Repair and replacement of depredated items.