ANNEX 16 - GUIDELINES FOR SPECIAL LIGHTING

SUMMARY

TABELAS

1 INTRODUCTION

This ANNEX presents the scope and minimum guidelines necessary for the execution of SPECIAL LIGHTING SERVICES in specific locations in the MUNICIPALITY, which must be detailed and presented in accordance with the provisions expressed in the Engineering Report.

Aiming at the valorization and embellishment through the lighting of monuments and public and urban spaces such as bridges, buildings, squares, parks, monuments, facades and art works of historical value, SPECIAL LIGHTING services in the MUNICIPALITY must be carried out by the CONCESSIONAIRE.

2 SCOPE OF SERVICES FOR SPECIAL LIGHTING

The minimum technical specifications for the lighting sources of the STREET LIGHTING POINTS intended for the SPECIAL LIGHTING of the municipality's assets must present innovative and ecological technologies, and meet the following requirements:

- Develop executive projects for SPECIAL LIGHTING, different from the conventional standard for vehicular and pedestrian traffic adopted, for the valorization of the places;
- Modernize the existing SPECIAL LIGHTING points with conventional technology by LED technology or more advanced;
- Carry out SPECIAL LIGHTING implementation works in pre-defined locations in the MUNICIPALITY;
- Ensure 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 confirmed.

2.1 Mandatory places of special lighting

The assets of interest with the greatest representation in the municipal historical context were selected based on the methodology established in 5.2 of the Technical Operational Diagnosis. The assets are indicated by the Secretariats responsible for the topic are:

- Nossa Senhora da Conceição Monastery;
- Narciso de Andrade Square and architectural ensemble with Matriz de Sant'Anna Church and Conceição de Itanhaem Museum;
- Nossa Senhora do Sion Church;
- Emídio de Souza Avenue;
- Anchieta Walkway

The CONCESSIONAIRE shall carry out all SPECIAL LIGHTING projects, minimally contemplating the quantities per type of equipment, as detailed in the Engineering Report, including the installation of all equipment. The distribution of the total equipment among the SPECIAL LIGHTING projects was proposed in this study, but it must be evaluated and studied by the The CONCESSIONAIRE and validated by the GRANTOR.

Below is a list of the lighting proposal made to base the Engineering study and guide CAPEX and OPEX:

- Annex A - Nossa Senhora da Conceição Monastery;
- Annex B - Narciso de Andrade Square and architectural ensemble with Matriz de Sant'Anna Church and Conceição de Itanhaem Museum;
- Annex C - Nossa Senhora do Sion Church;
- Annex D - Emídio de Souza Avenue;
- Annex E - Anchieta Walkway.

2.2 Conceptual Projects

The Table 1. presents the locations in the MUNICIPALITY that will be covered with the basic guidelines of the SPECIAL LIGHTING projects.

Table 1 - Conceptualization of special lighting locations

Nossa Senhora da Conceição Monastery	
Light from the bottom up with 4000K neutral white spotlights installed at ground level without the use of poles impacting the facade, four spotlights placed two by two on the side with diagonal beams.	
Narciso de Andrade Square	
	Considering the existence of monuments inside the square and the need to illuminate them protecting the lighting devices from vandalism as much as possible, since the square is not fenced, it is a viable option to install them on the poles at a safe distance. The conciliation between poles and afforestation, and a better distribution of poles and luminaires than in the previous model is one of the prerogatives of the project.

Nossa Senhora do Sion Church

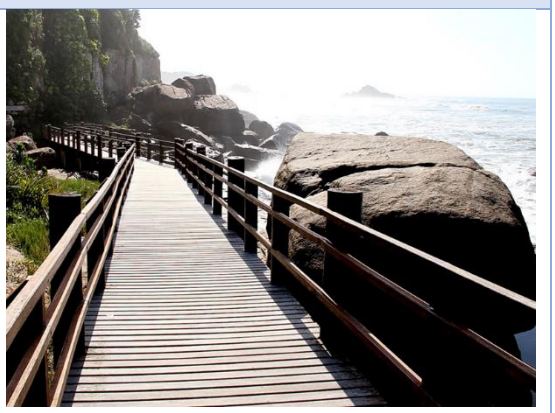
Spotlight the elements and integrate them by means of a neutral general light. The chromatic variations elevate the religious feeling from the surface to the sky. So, from bottom to top, the color temperature ranges from neutral 4000K to 5000K. It is essential to highlight the volumetry of the monument by making a general light on the facades that base the church in neutral white.

Emidio de Souza Avenue

The proximity to the sea suggests the choice of an element that dialogues with the seascape, the “sextant” model pole suits this characteristic. It must be deployed along the entire lane. The straight column of the set will have a height limited to 7m due to the low voltage electrical network existing along the wall, which limits the sea and the avenue

Walkway and Anchieta's Bed

Lighting should be done in three stages. The first will serve the region where the walkway begins. The project proposes the implementation of a fiber pole with 12m and two luminaires. In sequence during the second stage follows the lighting of the walkway. 3.50m fiberglass poles are suggested. In the third stage it should be similar to the first and a 12m fiber pole can be implanted.



The CONCESSIONAIRE shall carry out all SPECIAL LIGHTING projects, considering at least the amounts 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 GRANTOR. If, by determination of the GRANTOR, the amounts in Table 2 are exceeded, the economic and financial balance of the CONCESSION will be restored.

Table 2 - List of Material - Special Lighting								
Item	**Description**	**Quant.**	**Unity**	**Nossa Senhora da Conceição Monastery**	**Narciso de Andrade Square + Church and Museum**	**Nossa Senhora do Sion Church**	**Emídio de Souza Avenue**	**Anchieta Walkway**
1	Poste de Fibra, altura de 3,5m, Com Sapata	30	**Unity**					30
2	Poste de Fibra, altura de 12m, Com Sapata	2	**Unity**					2
3	Poste Decorativo, altura de 10m, Com Braço Simples	15	**Unity**		15			
4	Poste Decorativo, altura de 10m, Com Braço Duplo	13	**Unity**		13			
5	Poste de Aço Reto, altura de 4,5m, com Sapata	15	**Unity**		8	7		
6	Poste de Aço Reto, altura de 7,0m, com Sapata	23	**Unity**				23	
7	Fuste Ornamental para Pole	38	**Unity**		8	7	23	
8	Núcleo Simples	31	**Unity**					31
9	Núcleo Duplo	1	**Unity**					1
10	Braço Suplementar Reto 0,20m	8	**Unity**		8			
11	Núcleo Sextante para 2 luminárias	23	**Unity**				23	
12	Fundação para Poles	68	**Unity**		36	7	23	2
13	Luminária Pública 20W 4.000ºK	11	**Unity**		8	3		
14	Luminária Pública 20W 3.000ºK 50V	30	**Unity**					30
15	Luminária Pública 60W 5.000ºK	87	**Unity**		41		46	
16	Luminária Pública 150W 4.000ºK	3	**Unity**					3
17	Projetor LED Linear 30W / 50cm / 12º / 4.000ºK	125	**Unity**	65	48	12		
18	Projetor LED Linear 30W / 50cm / 12º / RGB	184	**Unity**			184		
19	Projetor LED 30W / 10º / 4.000ºK	14	**Unity**	4	2	8		
20	Projetor LED 30W / 10º / 5.000ºK	28	**Unity**			28		
21	Projetor LED 50W / 25º / 4.000ºK	2	**Unity**		2			
22	Projetor LED 50W / 25º / 3.000ºK	2	**Unity**	2				
23	Projetor LED 75W / 25º / 3.000ºK	2	**Unity**	2				

24	Projetor LED 75W / 25º / 4.000ºK	4	**Unity**	2	2			
25	Projetor LED 30W / 25º / 5.000ºK	6	**Unity**	4	2			
26	Projetor LED 30W / 25º / 4.000ºK	8	**Unity**			8		
27	Projetor LED 30W / 60º / 4.000ºK	10	**Unity**		3	7		
28	Projetor LED 50W / 60º / 4.000ºK	6	**Unity**		6			
29	Projetor LED 50W / 60º / 3.000ºK	14	**Unity**		6	8		
30	Projetor LED 75W / 60º / 4.000ºK	8	**Unity**	3	3	2		
31	Projetor LED 30W / 120º / 4.000ºK	8	**Unity**			8		
32	Projetor LED 50W / 120º / 4.000ºK	10	**Unity**		4	6		
33	Projetor LED 75W / 120º / 4.000ºK	5	**Unity**		4			1
34	Controlador RGB - DMX 512	1	**Unity**			1		
35	Rede Subterrânea	1450	m	100	800	150	350	50
36	Rede para Infraestrutura	950	m	200	100	350		300
37	Cabeamento Subterrâneo	1450	m	100	800	150	350	50
38	Conexão Aérea	334	**Unity**	210	65	47	6	6
39	Conexão Subterrânea	362	**Unity**	12	112	39	85	114
40	Comando de Acionamento em Grupo	6	**Unity**	1	1	2	1	1
41	Transformador Trifásico 10kVA 220/50V	1	**Unity**					1

3 CONCEPTUAL GUIDELINES FOR SPECIAL LIGHTING

The concessionaire will be responsible for observing the maintenance and adequacy of the MUNICIPAL STREET LIGHTING NETWORK to prevent injuries, mischaracterizations, visual alterations, mimicry, impacts or damage to buildings and monuments declared as historical or cultural heritage, as well as for obtaining licenses and authorizations, with the historical heritage protection agencies, whether municipal, state or federal (IPHAN), when necessary for the implementation of SPECIAL LIGHTING.

As it is a proposal in an area of heritage and historical interest, the Heritage Letters are adopted to guide the definition of guidelines that reconcile the interventions with the principles of conservation and protection of the assets to be acquired and their surroundings.

The Athens Charter of 1931 and the Venice Charter of 1964 recommend the use of monuments as a way of ensuring the continuity of life and the conservation of buildings, safeguarding their integrity, maintenance and enhancement.

The technical aspect of the chromatic composition of the cultural asset must be analyzed by carrying out prospecting work, in order to know the colors used at the time of the creation of the cultural asset.

Of an exceptional nature, all restoration work carried out in a professional manner has as one of its fundamental requirements the recovery of the composition of the original colors adopted by the architect, builder or artist. Thus, the objective is not to tamper with its understanding and original purpose, the lighting should provide, at night, a correct enjoyment of this original composition. The adoption of colors for cultural goods requires a careful and relevant conceptual foundation. In this way, the restoration work must ensure that it is carried out without injuries, de-characterizations, visual alterations, mimicry, impacts or damage to the material property. The CONCESSIONAIRE shall consider, for each asset of interest, the following points:

- Preliminary historical and stylistic study that guides designers in relation to the fundamental points to be highlighted in the work;
- Appreciation of the asset of interest in all existing views of the monument, which can be appreciated by citizens and visitors;

- Minimization of day and/or night interference of ACCENT LIGHTING equipment in the asset of interest. The use of equipment in the structure of the property itself must be considered in such a way as to ensure that no physical damage is caused resulting from its fixation and that it is properly mimicked, not attracting undue attention. The asset of interest must be valued by light and not be a mere support for ACCENT LIGHTING equipment. The same applies to equipment planned for its immediate surroundings, such as equipment installed on poles, where the same care must be observed.

All guidelines for the elaboration of an ACCENT LIGHTING project must be elaborated considering features of STREET LIGHTING in its surroundings, with regard to the level of illumination, color temperature, color reproduction and any impacts of its emanating light or shading, incident in the asset of interest. If it is found that the lack of STREET LIGHTING in the surroundings of the asset of interest, the CONCESSIONAIRE must make the adequation of the environment, in order to bring safety and convenience to the passers-by.

The ACCENT LIGHTING project must be elaborated based on the STREET LIGHTING project, taking into account the impacts that shall be produced, their interaction or mutual influence, making the assets of interest do not suffer undue interference from STREET LIGHTING, either by the incidence of light or by the shading generated. The harmony between the lighting levels and the chosen color temperatures must ensure the success of the lighting proposals and the balance between STREET LIGHTING and ACCENT LIGHTING.

The proposals of ACCENT LIGHTING must take into account the presence of tree obstacles and their interface with the proposed light sources, as well as take into account the procedures of management of urban vegetation by the agency or company responsible for this SERVICE, in order to enable a better positioning of lighting equipment in the phase of executive projects.

The existing vegetation can be used in order to mimic the street lighting facilities (poles, auxiliary equipment, projectors, etc.). The presence of tree elements in the surroundings or in the surroundings of the asset of interest constitutes an opportunity to perform the insertion of lighting equipment discreetly, being essential to observe the maintenance cycle of plant elements at the risk of them constituting an obstacle to

lighting. Thus, the natural growth of vegetation and the period necessary for pruning services must be considered.

With regard to the existing vegetation in the surroundings, it is also important to mention that, if it is to be used as an element to be valued by light, with the function of setting or contextualizing the asset of interest, special care must be dedicated to the existing fauna and flora. This consideration focuses on preventing the impact caused by lighting, with regard to electromagnetic radiation emissions or in relation to the levels of incident illumination, both in vegetation and in the animal species that inhabit there, from causing environmental damage.

A technical documentation containing a complete evaluation of the lighting conception and technical premises observed in the elaboration of calculations and dimensions must be presented, starting from a written study of its technical, historical and artistic features, in order to support the intervention. In order, primarily, to ensure that the proposal of light for this asset does not prevent, distort or hinder the understanding of the original proposal of the author, specifically during the night time. The ACCENT LIGHTING must contribute to its full understanding.

The documentary formalization must allow the technicians in charge, the GRANTOR and the preservation agencies, in the case of assets with municipal, state and/ or federal protection, the approval of the technical proposal, ascertaining whether the CONCESSIONAIRE is aware of the special features of the property.

After approval of the technical proposal, the descriptive memorial must be developed. The descriptive memorial must be clarifying the concepts used and other technical aspects that justify the proposal under analysis, including considerations about the levels of illumination adopted, possible measurements taken, choice of equipment, color temperatures adopted, among others.

In order to prove the considerations contained in the descriptive memorial, the calculation memory attached to the documents to be provided for verification and approval must be presented. The calculation memory may be dispensed, at the discretion of the GRANTOR, based on the justification, for example, of any concrete impossibility of its elaboration due to the difficulty of getting all the necessary technical data. In the event of the dispensation, lighting tests may be performed in place, replacing the calculation memory.

The general guidelines are intended to guide interventions aimed at the implementation of ACCENT LIGHTING projects and must be applied to all assets of interest. Because of the great diversity of typologies of these assets, it is necessary, for a better study of the interventions, to group together those of similar features. With this arrangement, the guidelines for a correct technical performance must be complemented by the establishment of detailed specific guidelines. For this, added general guidelines for ACCENT LIGHTING, the assets of interest in the MUNICIPALITY contemplated with ACCENT LIGHTING must be aligned with the specific guidelines by typology. The following are the minimum guidelines common to a certain typology, without compromising the freedom of design.

3.1 Religious Buildings

These buildings have differentiated typology, in particular, due to the significant presence of architectural, symbolic and artistic decorative elements - towers, vaults, bells, cruises, pinnacles, among others. They are buildings where, in general, the presence of embedded artistic elements and the architecture temporally demarcated more clearly its bill are more strongly noted. Therefore, the stylistic studies must deepen and consider the religious order or brotherhood to which they bind. Architectural elements must be valued even though they are not physically interconnected to the structure, but that, however, they meet them in its surroundings and have connection with the architectural ensemble. The elements that maintain a symbolic link with the building, such as sculptures and devotional chapels must be properly illuminated, following the concepts already recommended.

3.2 Parks, Squares and Gardens

Although the SPECIAL LIGHTING of these spaces is more related to STREET LIGHTING, it is necessary to point out specific issues of this type of cultural asset. These places have always been the object of lighting aimed at their enjoyment and contemplation. Therefore, the lighting levels must be guided by maintaining the bucolic nature of the spaces, as well as the lighting equipment inserted in them that have

adequate plasticity and proportion. In this way, safeguarding the current needs of lighting levels, aiming to meet questions related to the safety of individuals, care must be taken not to fairy light these spaces, breaking their harmony.

The design of an executive project for SPECIAL LIGHTING in squares, parks and gardens should adopt standardization of STREET LIGHTING equipment and structures in order to avoid visual clutter with different models of STREET LIGHTING equipment and structures. If it is necessary to remove or relocate lighting equipment listed by the government, the appropriate authorizations must be requested from the GRANTOR and/or competent bodies.

3.3 Sculptural Monuments

For sculptural assets, usually located in squares, it is first highlighted that their coloration and texture are essential elements to be studied, in order to ensure that the details present in the art work are properly visible. Since the sculptures are generally located in places of wide access by the public, special care must be observed in relation to acts of vandalism directed to lighting equipment intended for their prominence.

In these spaces, the STREET LIGHTING structure to be installed for the SPECIAL LIGHTING of said cultural asset must be evaluated, which may occur through poles or “up lights” light sources. The assessment should include an analysis of the possibility of acts of vandalism in the STREET LIGHTING equipment and possible glare at night in its surroundings.

In cases of definition by solution of "up lights" for lighting sculptural monuments, the CONCESSIONAIRE shall develop a study demonstrating the technical feasibility of installing conduits and conductors on the ground and ensuring protection index (IP) and protection index against mechanical impacts (IK) suitable for installing STREET LIGHTING equipment.

3.4 Fontains

In these assets, the biggest concern is the interference caused by the use of equipment in their own structure, or immediate surroundings. This type of installation

has a negative impact on the appreciation of its artistic elements, due to its format and dimensions. Currently, there are lighting equipment with excellent levels of sealing against the ingress of water, so that the best option for the realization of light effects is underwater systems. In particular, in this type of cultural asset, due to the frequent need for internal lighting of the mirrors or water jets, it should require the use of equipment inside. SPECIAL attention should be given to the descriptive memorandum and to the details of the routes provided for the electrical interconnection of these equipment.

The technical assessment must present GUARANTEES related to any damage caused to artistic and architectural elements of value of the cultural asset as a result of the path of ducts and cables, 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 GUIDELINES FOR DEVELOPING SPECIAL LIGHTING PROJECTS

The CONCESSIONAIRE must develop the SPECIAL LIGHTING projects considering the project guidelines established below.

- Elaboration of lighting projects: the CONCESSIONAIRE must develop projects and lighting studies of each site. The studies to be elaborated must be composed of descriptive memorial, with the objective and conceptualization of the lighting proposal, as well as referring to the electrical installations that shall feed this system. The calculations supporting the proposal must be submitted and eventual graphic simulations, in 3D, must be based on data and real results and accompanied by photos, details and georeferencing of each SPECIAL LIGHTING unit. Also, the descriptive memorial must be the photometric test relators of each type and model of LUMINAIRE used, containing the distribution of light intensities in digital format, IES standard file. The files containing the grids of points indicating the calculated values of illuminances and illuminations, with the *use of appropriate software*, shall be compatible with the type of project considered and shall include at least:

- Graphic representation of the asset of interest with visualization of the proposal of ACCENT LIGHTING;
- illuminances and luminances at the level of the areas considered;
- Luminous flux depreciation factor of the STREET LIGHTING equipment;
- Illuminance, and uniformity of the surroundings of the asset of interest, according to ABNT NBR 5101.

The list of materials contained in the projects and the complete technical specifications of the materials to be used must be part of the said memorial. The CONCESSIONAIRE shall ensure that the projects comply with the guidelines set out in this ANNEX and shall submit them for approval by the GRANTOR.

- Elaboration of electrical projects: electrical projects must contain at least the analysis of loads, the identification of feeding points and the detailing of the power distribution, electrical assembly diagrams, the calculation memory of the loads involved to be removed and installed, the relationship of materials contained in the projects and the complete technical specifications of the materials to be used.
- Technical Responsibility: the lighting plants and related electrical installations must be signed by duly qualified professionals, accompanied by CREA number and collected and annotated the respective ART, according to current regulations.
- The minimum technical specifications for the lighting sources of the STREET LIGHTING POINTS intended for the SPECIAL LIGHTING of the municipality's assets must present innovative and ecological technologies, and meet the following requirements::
  - LUMINAIRE enclosure that ensures 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 housing of vital parts (secondary optical system and controller) shall have at least ip-66 protection. If the controller is IP-65 or higher, the controller housing in the LUMINAIRE can be at least IP-44;
  - LUMINAIRES must have a resistance to external mechanical impacts corresponding to at least the degree of protection IK08 for polycarbonate and IK10 lenses for glass lenses, according to ABNT NBR IEC 62262;

- Power factor according to Normative Resolution No. 1000/2021 - ANEEL;
- The harmonics of the power supply current must comply with IEC 61000-3-2;
- Electromagnetic compatibility in accordance with EN55015 or CISPR 15;
- Thermoplastic components subject to time exposure must be subjected to weather resistance tests based on ASTM G154. After the test, the parts must not present degradation that compromises the operational performance of LUMINAIRES;
- Having a voltage surge protection device (DPS);
- Lighting sources must have IRC (Color Reproduction Index) ≥ 70.
- Minimum operating life of 30,000 hours, with 5 year warranty;
- Present a control and automation solution that allows controlling and defining the color spectrum of the luminous flux;
- Complying with ABNT NBR IEC 60598-1.

The CONCESSIONAIRE shall issue a technical report of each LUMINAIRE used in the project, having at least the following information:

- Type of LUMINAIRE, installation, angulation and beam angle;
- Color Temperatures [K] of each LUMINAIRE;
- Luminous Efficiency [lm/W] of each LUMINAIRE;
- IRC of each LUMINAIRE;
- Other features of LUMINAIRES.

- Minimum Technical Specifications for Lighting Sources: The electrical projects of the structures to be used for SPECIAL LIGHTING must comply with the standards and norms established by the body responsible for STREET LIGHTING in the MUNICIPALITY, and by the DISTRIBUTOR COMPANY, when using electricity distribution poles;
- Chromatism of LUMINAIRES: the installation of projectors, reflectors or LUMINAIRES with RGB color technology for lighting facades in the assets of interest must be provided. Such specification must allow the greatest dynamism of ACCENT LIGHTING, when one wishes to design colors characteristic of regional events, national or other sporadic events;

- Installation safety: In the case of use of the building structure, or of protected asset in the vicinity, as a support for fixing lighting equipment or auxiliaries, the structural and electrical conditions of the asset of interest that shall receive the intervention must be checked, aiming to ensure its safety. Authorization must be requested from the GRANTOR prior to any intervention;
- Adequacy to architectural features: the lighting proposal must consider its adaptation to the architectural and artistic features of the building;
- Analysis of the interference of the STREET LIGHTING: Before the formulation of the lighting proposal for any asset of interest alone, the interference resulting from the STREET LIGHTING must be verified at night and make the necessary corrections or compatibility;
- Non-physical commitment of the monument: the CONCESSIONAIRE must prioritize lighting technologies characterized by simplified electrical and physical installation. Such prioritization must ensure that there is no aesthetic commitment in the appreciation of the asset of interest, in the daytime, resulting from the equipment intended to produce its night lighting;
- Reversibility of the intervention: attention must be paid to the possibility of easy reversibility of the intervention, as well as to the level of physical damage caused to the structure, and its surroundings, by the installation of equipment;
- Analysis of positioning in the face of vandalism: The CONCESSIONAIRE shall pay attention when proposing equipment for the risks inherent to vandalismo;
- Less aesthetic interference: Ensuring that there is no aesthetic interference with the cultural property is one of the main objectives of any intervention. Thus, the CONCESSIONAIRE must ensure that the lighting equipment has the smallest possible dimensions, as well as be mimicked in relation to the structure in which they are installed;
- Visibility of the asset of interest: ensure that the assets of interest object of night highlight by lighting are visible on all facades that allow the enjoyment of the observer and not only the main facade;
- Consideration for techniques of filling architectural features and minimization of obfuscation effects: lighting techniques must seek to promote the perception of the volume of assets of interest and make their dimensions visible. In this way, they

must avoid excessive levels of illumination on facades, as they can prevent, for example, the proper perception of important architectural elements, such as roofs;

- Relation between color temperature and existing architecture: in urban complexes, it is always important that STREET LIGHTING seeks to use artificial sources of light in which the color temperature is in line with the existing architecture.
- Approval of heritage preservation agencies: the fixation of equipment on facades of buildings belonging to protected urban complexes can only be carried out with the authorization of the competent preservation agencies and in line with the provisions in municipal, state and federal laws, which protect the assets of interest of the MUNICIPALITY.
- Analysis of the ideal positioning of the poles: attention must be given in the installation of poles intended for the ACCENT LIGHTING of the asset of interest, avoiding that their dimensions are incompatible with the ride, causing inconvenience to passers-by;
- Preliminary historical analysis of urban equipment: studies related to the history of assets of interest must precede the implementation of new systems, as well as analyze the architectural and urban features of protected urban complexes;
- Ensuring compliance with the ACCENT LIGHTING guidelines: the ACCENT LIGHTING Guidelines is a constituent part of the SPECIAL LIGHTING program (PIE), approved by the GRANTOR, and must be complied with the implementation schedule, according to ANNEX 5 - TECHNICAL SPECIFICATIONS, adequacy to electrical and lighting projects and use of equipment, systems and materials presented in the document;
- Predictive, Preventive and Corrective Maintenance: The PREDICTIVE, PREVENTIVE and CORRECTIVE MAINTENANCE of all SPECIAL LIGHTING projects must be carried out in accordance with the detailed procedures to ANNEX 5 - TECHNICAL SPECIFICATIONS;
- Samples and certificates of technological solutions: Along with the SPECIAL LIGHTING projects, at least samples of the adopted technological solutions and their certificates from laboratories accredited by INMETRO or competent body, for approval of the technology used
- Project requirements: That all projects ensure, at a minimum, the due compliance with the guidelines provided for each of the SPECIAL LIGHTING interventions

detailed in this ANNEX; the reuse of materials and equipment only in conditions of use and efficiency; review and/or replacement, if necessary, of connections to the electrical network; the appropriate changes in the SPECIAL LIGHTING projects, if requested by the GRANTOR to review them, within the period provided for in the CONTRACT. In this case, the CONCESSIONAIRE shall start the intended SPECIAL LIGHTING interventions only after the approval of the revised 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 the color reproduction index - CRI, color temperature (K) and luminous efficiency, elements that must be be delivered as follows; an original copy of the project (in digital format - DWG and printed), copies of each project at the discretion of the GRANTOR and two copies (in paper and digital media) of the detailed list of materials, list of places with the respective installed quantities, types and power of light sources, types of arms and quantity of LIGHTING FIXTURES installed;
- Conference of interventions: After the completion of each of the STREET LIGHTING interventions, the necessary measurements must be carried out, together with the GRANTOR, to prove compliance with all the conditions established in the project. If any non-compliance or disapproval of the SERVICE performed by the GOVERNMENT is verified, the UTILITY COMPANY shall redo the complete SERVICE, or part of it, bearing all related expenses;
- Update of the REGISTRATION OF THE MUNICIPAL STREET LIGHTING NETWORK: After the formalization of the respective TERM OF ACCEPTANCE by the GRANTOR of the SPECIAL LIGHTING SERVICES, the CONCESSIONAIRE shall update the MUNICIPAL REGISTRY OF THE MUNICIPAL STREET LIGHTING NETWORK, as provided for in the CONTRACT.

5 IDENTIFICATION AND ANALYSIS OF PROJECT RISKS, INCLUDING DEMAND, TECHNOLOGICAL INNOVATION, ENVIRONMENT

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

In PIE, the PREVENTIVE and CORRECTIVE MAINTENANCE Plan must be detailed for each of the assets of interest that have ACCENT LIGHTING solutions. In these locations, the CONCESSIONAIRE must carry out periodic inspections, with minimum monthly frequency, performing at least the following activities:

- Verification of the mechanical conditions of equipment and facilities;
- Projectors focus;
- Cleaning of exclusive STREET LIGHTING poles, projectors, light sources and other equipment and materials installed in ACCENT LIGHTING Projects;
- Repair and replacement of damaged items.