

PT NR: 4/2018

TENDER SPECIFICATIONS

1. Name of the Project: **Smart Urban Services Through Homogenous Quality Standard in Public Infrastructures for Higher Energy Efficiency - RORS36**
2. Location : **Territorial Administrative Unit Recaş**
3. Project phase: **PT-DE**
4. Beneficiary: **U A T Recaş**
5. Investor:

Specialty Designer: TIMIS COUNTY ENERGY MANAGEMENT ASSOCIATION

6. Generalitati:

This project aims to improve the efficiency of the electricity consumption of public lighting facility in UAT Recaş by replacing all existing lighting fixtures and bringing public lighting system to the national standards and International as well as managing as efficiently as possible with the lighting system maintenance. The main beneficiaries of the project are directly the inhabitants of the city of Recas, to which are added the persons in transit and, last but not least, all the inhabitants of the country because through the reduction of the energy consumption there are also reduced the fuel consumption for the production of that electricity.

Terminology

CIE – International Commission on Lighting.;

Beneficiary of the public lighting service – the local community as a whole;

Public Lighting System – technological and functional assembly, placed in a logical arrangement in order to achieve a comfortable and/or functional and/or aesthetic light environment, able to ensure the optimal performance of an activity/show/port/movementan

aesthetic-architectural luminous effect and others, made up of specific constructions, installations and equipment, comprising:

- a) low voltage over or underground networks, intended for public lighting;
- b) supporting poles of the network with the related foundations, respectively of the lighting devices, intended exclusively for public lighting;
- c) transformer stations and overhead or underground distribution boxes, intended exclusively for public lighting;
- d) control, automation, measurement and control equipment;
- e) lighting equipment equipped with the appropriate light source, brackets and accessories.

Lighting apparatus / luminaire - Lighting apparatus for distributing, filtering and transmitting light produced from one or more lamps to the outside, comprising all the devices needed to fix and protect lamps, auxiliary circuits and electrical components for connection to the mains supply, which ensures stable priming and operation of light sources;

Technical characteristics –all data and technical elements;

Technical data sheet- all data and technical and luminescence data (photometry);

Luminous flux maintenance factor –the ratio between the light output of a lamp at a given time of its life and the initial luminous flux, the lamp operating;

Lighting (E) - the ratio of light received by a surface and area;

Average illumination (E_m) - Average value of horizontal illumination on the road surface;

Minimum illumination (E_{min}) - Average value of horizontal illumination on the road surface;

Blindness Threshold (TI) - Measuring the loss of visibility caused by physiological blindness / discomfort from the lighting devices of the public lighting installation;

Continuity Ratio (EIR) - ratio of average illumination to lanes outside the roadside boundaries and medium illumination on lanes within these margins;

LED lamps - Lamps that use light emitting diodes (LEDs) as a light source;

Luminant L - the ratio between the elementary intensity emitted to the observer's eye and the apparent emission surface [cd.m^{-2}];

Maximum luminance L_{max} - the highest value of luminance on the surface considered and in the direction of the road traffic;

Average luminance L_m - Average luminance value on the road surface;

Minimum luminance L_{min} - the lowest luminance value on the calculation surface;

Lighting level / luminance level - level selected for illumination / luminance value;

Uniform luminance U_0 [L] - the ratio between minimum luminance and mean luminance, both considered on the entire calculation surface;

Longitudinal uniformity (luminance of the surface of a road section) U_l [L] - the ratio between the minimum luminance and the maximum luminance, both considered in the lane of the computing zone and in the direction of the road traffic;

Overall uniformity of illumination U_0 [E] -port between lower value and mean value;

Ignition point [PA] - unitary physical unit which may contain, as appropriate, the connection / disconnection, protection, control, automation, measurement and control equipment, protected against accidental access to the public lighting system.

7. Execution of the construction and assembly works

8.1 Generalities:

The beneficiary and the construction-assembly unit are obliged to carry out the reception of the required pre-factory assemblies, machinery, installations and materials through quality controls that will track that the suppliers will ensure the deliveries at the prescribed quality parameters, with strict compliance of the rules, standards and requirements in force., specially for the electrical installations.

The execution of the installations will comply with the demands from the mandatory execution documentation, any change of the solution or deviation from it will be accepted only with the written permission of the designer and the project verifier authorized by MLPAT, in case of verification of the project according with the **Law 10/1995**.

In executing the installation works, only new appliances, equipment and materials approved and certified for the working environment conditions; exceptions are the situations when, at the written request of the beneficiart, recordet in writting, it is requested the re-use of existing elements in the installations, under the condition that it can be brought, through revisions and reconditioning, at the prescribed parameters for the new, homologated products.

The building-assembly unit it is obliged to use for the execution of the installations only personel with the proper quallification for the works they carry out.

The program for the quality control of the works executed on site, contained in the execution documentation, completed in all the sections, will be included in the building's (installation) book.

When commissioning the installation there will be respected all the prescriptions of the equipment and electrical equipment suppliers, as well as the way of deployment for the commissioning recommended in the project.

8.2.1 Valid laws, norms and standards

For the implementation of the public lighting projects and works, the following specific norms, standards and regulations shall be respected:

Norms and legislative requirements:

- Regulation regarding the connection of users of electrical networks of public interest, approved by G.D. (Government Decision) no. 867/2003;
- Fire Prevention and Extinguishing Norms for the Electrical Energy Branch, indicative NTE 001/03/00.
- Normative for the design and execution of electrical wiring networks, indicative NTE 007/08/00;
- Normative for the construction of low voltage LEA (aerial electrical line), indicative PE 106/2003;
- Normative for the design of the public electric distribution networks , indicative PE 132/2003;
- Normative for testing and measurement for electrical equipments and installations, indicative NTE 002/03/00;
- Normative on limitation of unbalanced and deforming regime in electrical networks, indicative PE 143/94;
- Routing of design and execution of earthing installations, indicative 1RE-Ip30-04;
- Instructions on reactive power compensation in electrical networks, iindicative PE 120/94;
- Standards for prevention and fire fighting for the electric energy branch, indicative PE 009 /

93;

- Normative for design, execution, verification and operation of electrical installations in areas with explosion hazard, indicative NP 099-04.
- NSSM 54 – Specific Work Safety Standards;

Standards:

- SR 234/2008: Electrical connections. General requirements for design and execution.
- SR – EN 13201: Public Lighting Standard, Part II. Performance requirements.
- SR EN 61140/2002 – Protection against electric shocks in electrical installations and equipment.
- Standards and norms regarding the build quality of lighting appliances.
 - CEI EN 61000-3-2 – 2007/04 (CEI 110-31 IV ed.)
 - CEI EN 61000-3-3/A1 – 2002/05 (CEI 110-28; IV)
 - CEI EN 61000-3-3 – 1997/06 (CEI 110-28 I ed.)
 - CEI EN 60598-1 – 2005/05 (CEI 34-21 VII ed.)
 - CEI EN 60598-2-1 – 1997/10 (CEI 34-23 II ed.)
 - CEI EN 60598-2-3 – 2003/10 (CEI 34-33 II ed.)
 - CEI EN 55015 – 2008/04 (CEI 110-2 VI ed.)
 - CEI EN 61547/A1 – 2001/08 (CEI 34-75; VI)
 - CEI EN 61547 – 1996/04 (CEI 34-75)
- CE Norm 115/95(SR 13433/99-Standard RO) for lighting systems.
- Directives 2006/95/CE – Low Voltage, 2002/95/CE_RoHS and 2002/96/CE – DEEE;
- SR HD 60364-4-41/2007 – Low voltage electric installations Protection against electric shocks;
- SR HD 60364-5-54/2007 – Low voltage electrical installations. Earthing systems, protective conductors.
- SR EN 62305 – Lightning protection;
- SR EN 60439-1/ – Prefabricated assemblies of low voltage equipment.
- Law nr. 90/2006 regarding general norms for work safety;
- Law 333/2003 regarding the protection of the objectives, goods, values and protection of persons;
- Law nr.13/2007 regarding electric energy;
- Government Emergency Ordinance 195/2005. 137/1995 regarding environmental protection;
- Law nr. 107/1996-Water Law (amended and supplemented by Law 310/2004) and Law 112/2006);
- Law nr.665/2001-Atmosphere protection (approved Government Emergency Ordinance 243/2000);
- Law 426/2001-Waste regime (approved GEO 78/2000, modified and supplemented GEO 61/2006 and Law 27/2007);

- Law 265/2006 for the approval of GEO 195/2005 regarding Environmental Protection, modified and supplemented by GEO 57/2007, GEO 154/2008, GEO 164/2008, GEO 114/2014;
- Law 319/2006 on safety and health at work;
- Government Decision 1146/2006 – on minimum safety and health requirements for the use of equipment by workers in the workplace;
- G.D. 1425/2006 – the methodological norms for the application of the Law on Security and Health at Work no.318/2006;
- G.D.1048/2006- on minimum safety and health requirements for the use of equipment by workers in the workplace;
- G.D.1051/2006- minimum health and safety requirements for manual handling of masses the pose a risk for workers with dorsolumbar affections.

8.2.2 Obligations of the beneficiary:

According to the **G.D. 60/97**, section 6, art. 19 (2), the beneficiary has the obligation to fully comply with the provisions from pct. “a” up to “m” of which we mention:

- to obtain the opinions and approvals of the competent bodies with tasks of preventing and extinguishing fires;
- to draw up fire-fighting instructions and to determine the tasks of the employees at each workstation;
- to provide the appropriate technical means and the necessary staff in case of intervention.

8.2.3 Labor protection:

During the execution, checking, adjustment, proofing and commissioning and also during the operation and maintenance of the installation, the building-assembly unit, respectively the beneficiary, is obliged to strictly respect all the provisions of the norms, standards and instructions for labor protection in force, as well as the requirements of the project regarding the labor protection.

The installation will be commissioned only after:

- performing all the tests, checks and measurements provided in the instructions in force for electrical installations;
- training and examination of operating and maintenance personnel;
- preparing written instructions for the exploitation of electrical installations and preparing the technical documentation necessary for the exploitation;
- displaying in visible places the operating instructions and work safety;

The building-assembly unit and the beneficiary are directly responsible for organizing the first aid in case of injury, by strictly applying the measures provided by the legislation in force; The work on existing installations will be carried out with unplugged installations.

8.2.4. Measures to protect the installations:

Protection against indirect touches:

For the protection of the personnel against indirect contact in low voltage grounded networks (**T**), the protection system will be used by connecting to the protection conductor (**PE**), making a scheme (**TN-C**) which ensures the triggering in case of defect in less than 3 seconds, in which the neutral and protection functions are combined into a single conductor for the entire scheme (**PEN**).

It is foreseen an additional measure for protection, grounding.

In 400/230V aerial electrical networks, with trunked conductors, it involves the coupling of the null bearer to ground sockets, terminal posts, branches and other poles along the line (**1. Lj – Ip8 – 76**). The lower ground terminal of the pole will be connected to the grounding socket.

In the case of the poles on the line path where the null grounding is required, a link will be made between the null carrier and the pole tie.

If the pylons are not fitted with grounding terminals, the null bearer will be connected to the grounding socket via a 16mm² conductor.

8.2.5. Making electromagnetic compatibility:

(Protection against electromagnetic disturbances)

This is not the case, the works do not increase the electromagnetic influences on the installation.

8.2.6 Safety distances according to NTE007 standard:

The safety distances of the energy equipment and networks to be designed compared to other utilities are specified in the following table:

Nr. cr t.	Name of network, construction or object		Safety distance, m		Observations
			in plan horizontal (appropriate)	in plan vertical (intersection)	
0	1		2	3	4
1	LE	≤1kV	0,5	-	The distance is measured from the edge of the pillar or foundation.

2	A	1÷20kV	Neutral isolated or treated	1,0	-	The distance is measured from the extreme conductor of the LEA (horizontal protection). For the secondary and teleconducting circuits as well as for adopting shorter distances, influence calculations will be carried out., precum si pentru adoptarea unor distante mai reduse se vor face calcule de influenta.	
3		110÷400kV	Neutral ground	5,0	-		
4	Roads			0,5 ^{*)}	1 ^{**)}	^{*)} Measured from the curb to the pavement (in the localities) or from the edge to the protection zone (outside the localities).	^{**)} Measured in the axle of the road; the protective tube will overcome the headboard and the aperture by about 0.5m. -Minimum crossing angle 60°(recomendat 75° -90°)
5	Electrical cables (including urban traction and telecommunication)			0,5 ^{**)*)}		^{*)} See the Table 4	^{**)} Reduction up to 0.25 m is allowed if it is provided mechanical protection of the crossed cable over distance of 0.5 m of both sides of the

					crossing
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8.3. Commissioning and reception:

The commissioning and reception of the installations by the beneficiary will be carried out only after:

- carrying out the quality control of the works based on the “Quality control of the works executed on site”;
- verifying the full compliance with the legal provisions on labor protection;
- verifying the full respect of the legal provisions on the prevention and combating of fires and explosions;
- verification of the full realization of the project requirements regarding the technological conditions of operation, blockages, signaling, command, etc.;
- Preparation by the beneficiary of a schedule of maintenance works, also targeted by the designer, including a detailed list of the maintenance works, the time periods for the intervention, the nominated maintenance person and the nominated person responsible for checking the compliance with the chart.

9. Checks:

9.1.Generalities:

9.1.1. The electrical installation must be checked to ensure proper operation and to prevent the occurrence of accidents or fires.

Checks will be carried out:

- before putting the electrical system in operation;
- after changes in distribution;
- at regular intervals (periodic).

Periodic verification is carried out by qualified personnel who have in-depth knowledge of work safety and the prevention of electrical shock risks.

9.1.2 Verification of electrical installations is done by visual inspection and measurements
(tests).



**9.2. Verification by review:**

9.2.1. Examination checks are carried out before the measurements or with the electrical installation removed from voltage.

9.2.2. When examining by examination the electrical materials, which in normal operation are permanently under voltage, it is to be determined whether they meet the following conditions:

- are in compliance with the safety and product rules (marking, certification);
- are correctly selected and installed, according to the provisions of regulation I.7, to the manufacturer's instructions, with other specific rules;

- it does not display any visible defects that could affect the proper functioning and security of goods and persons.

9.2.3. Verification by examination should take into account as far as possible:

- protective measures against electric shocks;
- correct choice of conductors;
- the presence and correct location of the interrupt and command devices;
- the choice of equipment, materials and protective measures appropriate to external influences;
- Correct conductor connections;
- Ensuring accessibility for maintenance.

9.3. Testing – measurement::

9.3.1. The tests to which the electrical installations are subjected are carried out in the following order:

- Continuity of protective conductors and the main and additional equipotential bonding;- rezistența de izolație a instalațiilor electrice ;

9.3.2. Verification of conductor continuity:

The test is considered satisfactory if the device used for this gives a correct and stable





indication.

9.3.3. Checking the insulation resistance of the installation:

Measurements are carried out with the power-off installation and the related devices disconnected.

Insulation resistance measured between each active conductor and ground (phase conductors and neutral conductors can be connected together), consumers being disconnected

Measurements are carried out in DC.

9.4. Functional tests:

Functional tests for equipment not assembled by the manufacturer are made with the technologist or design specialist on the basis of the manufacturer's instructions.

10. List of the main normative acts to be observed in the execution of construction works - installation, commissioning, operation and maintenance of the distribution facilities:

- Technical norms for establishing the protection and safety zones of the energy capacities, approved by the Decision no. 61 of 1.11.1999 of the President of ANRE, published in the Official Gazette of Romania Part I, no. 15 of 18.01.2000;
- NTE 001/03/00 - Norm for insulation selection, insulation coordination and protection of overvoltage power plants, approved by Order no. 2 of 7.02.2003 of the President of ANRE (former PE 109);
- F.T. - 4/82 - Tests, checks and measurements made on cables;
- DECREE 237/78 - Decree for setting the norms regarding the systematization, location, construction, repair of electric lines passing through forests and agricultural lands;
- Law 13/2007 – Law for electrical energy;
- Law 213/98 – The Law on public property and its legal regime;
- Emergency Ordinance 195/2005 – Emergency Ordinance on Environmental Protection;
- Government Decision 918/2002- Establishment of the framework procedure for environmental impact assessment and approval of the list of public or private projects subject to this procedure;
- Order M.A.P.M. nr. 860/2002 – Approval of the Environmental Impact Assessment and Environmental Agreement Procedure.;
- Order M.A.P.M. nr. 863/2002 – Approval of the methodological guidelines applicable to the phases of the environmental impact assessment framework procedure;



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- Order M.M.S.S. nr. 508/2002 M.S.F. nr. 933/2002 – general norms for labor protection;
- Order M.M.S.S. nr. 275/2002 – specific norms for labor protection in transport and distribution of electrical energy.
- The Law of security and health in work nr.**319/2006** ;
- Normative for the design and execution of electrical installations with voltages up to 1000V ac. and 1500c.c. - NP - I7- 2011;
- Guide for electrical installations with voltages up to 1000V ca. and 1500V c.c. - GP 052 - 2000;
- Norm for the design and execution of electrical wiring networks - NTE 007;
- Standards: SR 8591/1997;
- Design and execution guide on earth grounding installations 1RE– Ip30–04;
- Nomenclature of checks, tests and demonstrations on the installation, commissioning and putting into service of power plants - PE 003/79;

This list does not have a limiting character, the building-assembly unit and the beneficiary must comply with all the normative acts in force regarding the execution, operation and maintenance of the installations in terms of labor protection, fire protection and observance of all operating parameters.

11. Environmental protection according to the legislation in the field:

- ☐ **Emergency Ordinance** 195/2005- regarding environmental protection, updated by Law 265/2006, Law 167/2010 and Emergency Ordinance 58/2012-regarding amendment of normative acts on environmental and forestry protection;
- ☐ **Ordinance** 78/2000, repealed by art.68 from the Law 211/ 28.11. 2011;
- ☐ **Government Decision** 349/2005, modified by Government Decision 210 / 2007 si Government Decision 1292/2010;
- ☐ **Law** 465/2001
- ☐ **Government Decision** 856/2002- on waste management and on the approval of the list of wastes, including hazardous waste, modified by Government Decision 210 / 2007;
- ☐ **Emergency Ordinance** 16/2001 on the management of recyclable industrial waste, repealed by art. 68 of the Law 211/ 28.11.2011;
- ☐ **Government Decision** 1518 / 2009-for amending and completing the Government Decision 448/2005 on waste electrical and electronic equipment and the Government Decision 992/2005 on the limitation of the use of certain hazardous substances in electrical and electronic equipment.
- ☐ **Government Decision** 1037 / 2010 repeal Decision 448 from 19.05.2005 on waste





electrical and electronic equipment.

- **Order MTCT 2.133 / 2005**- for the approval of the Regulations for the certification of the registration of road vehicles registered in the technical norms regarding road safety, environmental protection and in the category of use according to the destination, by the periodical technical inspection -RNTR 1, modified by Order 42 / 2012 and Order 1107 / 2012.
- **Order MAPM 462 / 1993** – for the approval of technical conditions regarding atmospheric protection and Meteorological Norms regarding the determination of the emissions of air pollutants produced by stationary sources, repealed by art. 86 of the Law 104/28 July 2011.

In addition to the legal acts mentioned above, the following will be taken into account:

- a) Criteria applicable from 11th of June 2013 to determine the conditions under which glass waste ceases to be waste under **Regulation (EU) No. 1179/2012** of 10th of December 2012 laying down the criteria for determining the conditions under which glass crates ceases to be waste, pursuant to Directive 2008/98/EC of the European Parliament and of European Council;
- b) Applicable criteria for determining the conditions under which certain metal scrap is no longer waste, **COMMISSION REGULATION NO. 333/2011** 31st of March 2011 laying down the criteria for determining the conditions under which types of scrap metal are no longer waste pursuant to Directive 2008/98/EC of the European Parliament and the European Council.
- c) New **EU Directive 2012/19/UE** on Waste Electrical and Electronic Equipment WEEE – Preparing companies and institutions to implement the Directive with regard to separate collection, treatment, collection rate and recovery targets;
- d) **Regulation 423/2012** – preparing recyclers to achieve recycling efficiency levels in recycling processes for battery and accumulator waste according to regulation 493/2012 – link to the waste minimization program requirement 211/2011.
- e) **Electronic recording of information** specific to the evidence, monitoring and ecological elimination of PCB-contaminated electrical equipment in Romania;
- f) **Ordin 3838/09-11-2012** for the amendment of the Water Management Order 95/2005, regarding the establishment of the acceptance criteria and of the acceptance procedures of the waste for storage procedures of the waste for storage and the national list of accepted waste in each waste disposal class;
- g) User Guide for the **Integrated Waste Management System**. PCB for recording claims for





PCB waste reporting;

h) Waste Prevention and Reduction Program - enforced by the end of 2013 - **Law 211/2011**.

According to **Law 137/1995** and **Law 195/2005**, the executor has the following obligations:

-Ensure their own system of surveillance of the technological installations and processes for environmental protection;

-To identify all the relevant environmental factors, in order not to degrade the natural or manmade environment through uncontrolled waste disposal of any kind;

-To determine how these impacts can be diminished and controlled to become environmentally acceptable;

The necessary measures will be taken to bring the environment to the conditions imposed by the environmental legislation in force.

11.1. Protection the water quality:

The technological process, specific to the works, has no impact on the water.

11.2. Air protection:

Air pollutants during the execution are: dust, exhaust gases.

Exhaust gases result from machinery and equipment during execution.

Throughout the course of the works, measures will be taken to minimize the dust, both by watering it and by carefully handling the used equipment.

Pollution of the "air" environmental factor is of short duration, limited in time (execution period).

11.3. Protection against noise and vibration:

Sources of noise and vibration are produced during the execution period, generated by the machines and the vehicles traffic.

Protection against noise and vibration is achieved by using tools and machines with a high degree of silence, provided with vibration attenuators. The noise level at the source is approx. 85÷95 dBA, in some cases 110 dBA. The character of the noise is low frequency and the duration is approx.. 8 hours/day. The total noise level does not exceed 70 dBA at the built-up perimeter limit and 50 dBA at the nearest protected receptor.

Electromagnetic influences do not cause disturbances in the vicinity.

11.4. Radiation protection:

Works in this documentation do not produce radiation.

The proposed work do not produce or use radiation in the technological process, so they do not require protection measures.

11.5. Soil and subsoil protection:

The proposed works do not affect the soil and the subsoil.



**11.6. Protection of terrestrial and aquatic ecosystems:**

The present works have a minimal impact on the terrestrial ecosystem, especially since after laying the cables the area is brought to the level of the initial situation. The aquatic ecosystem does not exist in the work area, so it is not affected.

11.7. Protection of human settlements and other public interest objectives:

Considering that the works of the present documentation will be carried out in the peripheral area of Recas, measures will be taken to minimize the effects on the adjacent populated areas.

11.8. Waste management:

Evidence of waste management generated during the development of the works, their collection, transport and temporary or final disposal shall be done according to the provisions of Government **Decision No. 856 of 16.08.2012** and **Law 211/2011**.

According to the service contract concluded with the beneficiary, the waste resulting from the works executed are collected from the place of production, transported and handed over to the beneficiary's landfill or to the waste pile by the contractor.

Ferrous and non-ferrous metal waste are temporarily stored on concrete platforms or labeled containers. This kind of waste will be sorted and recycled.

The recovery is generally done by selling these wastes to licensed units.

11.9. The management of toxic and dangerous substances:

It is not the case for the documentation contained in the documentation.

11.10. Ecological reconstruction works:

The works included in this project do not require ecological reconstruction because they do not affect the environment.

11.11. Provisions for environmental monitoring:

The works to be executed according to the documentation do not require environmental provisions.

The works in this documentation do not affect other installations or buildings, they are in accordance with **PE 106/2003** and **NTE/007/08/00** and do not produce polluting agents for ground, air or groundwater for the exploitation period, and by the measures taken accidents occur only the case of natural disasters.

According to the provisions of "**SR EN ISO 14001/2005**" and **GEO 195/2005 - "Emergency ordinance on environmental protection"**, the provisions regarding the protection of human settlements, soil protection, atmospheric protection shall be observed during the execution of the works in this documentation.

12. EQUIPMENT, MATERIALS, CATEGORIES OF WORKS, EXECUTION WORKS OF MODERNIZATION, PUBLIC LIGHTING SYSTEM



Electrical materials and equipment with “**CE**” marking will be used for the execution of electrical installations.

When installing the equipment, the drawings of the project will be respected.

The choice of electrical equipment shall take account of the minimum degree of protection required for the intended purpose and the environment in which they are installed.

The materials and equipment used will be of very good quality, produced by companies established in the field.

12.1 Designed public lighting system

TECHNICAL SPECIFICATIONS

- The specification is an integral part of the documentation for the preparation and submission of tenders.
- The bidders will analyze the technical specifications in this specification, the technical specifications that represent the minimum conditions that the products / solutions offered in the present procedure have to fulfill.
- Technical specifications are requirements, prescriptions, technical characteristics that allow each product to be objectively described in such a way as to meet the needs of the contracting authority.
- The bidders have the obligation to present the elements of the technical proposal, detailed and complete, in correlation with the minimum technical specifications requested by the purchaser, so as to allow the evaluation committee, the easy identification of their correspondence with the offered ones.
- The tenderers are required to submit the technical proposal in accordance with all the technical specifications contained in the tender dossier and to present all the documents provided by it.

Tendered solutions must ensure that the following objectives are met:

- Ensuring the lighting levels that have values equal to or higher than those prescribed in the standard SR EN 13201/2015. We refer here to the levels of illumination and luminance, general uniformity, longitudinal and transverse for both illumination and luminance, the threshold of blindness, etc.
- Ensure a minimum level of electricity consumption, provided that all requirements are met, by the following means:
 - High-efficiency lighting and low cost maintenance, with a high degree of protection and outstanding optical features equipped with an LED source.
- Components of the lighting system will be manufactured in accordance with the standards in force and will have certificates of conformity.
- Lighting for pedestrian crossings shall be carried out in accordance with SR EN 13201. For pedestrian crossings in the city of Recas, it is proposed to install 12 lighting devices for 6 pedestrian crossings.

A particularly important aspect in order to appreciate the proposed technical solution will be





the installed electrical power of the lighting appliances used for modernization.

Presentation of the Offer

For the preparation of the technical and commercial offer, the bidder will consider the following activities:

- Luminotechnical calculation for control circle configurations (Allocation table Recas);
- Calculation of installed power and power consumption for 940 lighting units and control system components;
- Removing existing lighting fixtures, clamping arms, power cord and connecting clamps;
- Acquisition and installation of 940 luminaires, clamps, power cable and related clamps;
- Acquisition and implementation of a centralized wireless monitoring and control system for 940 lighting units;
- The bidder will ensure the communication of the telemanagement components for a minimum of 5 years.

THE CONTENT OF THE TECHNICAL OFFER:

- Presentation of light-tech calculations and description of the resulting solution for each profile attached to this documentation
- Lighting calculations shall be made in accordance with the requirements of **SR-EN 13201/2015**.
- The calculations will be done with a neutral, recognized program by the CIE (**International Commission on Illumination**) or with a calculation program certified by an international or national accredited CIE.
- The tenderers have the obligation to present the light-tech calculations in the listed version as well as in a format allowing their resumption and verification in order to allow the contracting authority to check the light-technical calculations and the correspondence between the input data requested by the specification, the technical offer, the requirements of **SR-EN 13201/2015** and the results of the light-tech calculations.

To calculate the pedestrian crossings, consider the following dimensions Lxl: 9.6mx6.35m. The required level is minimum 90lx for Horizontal Illumination and 50lx for Vertical Illumination. Pedestrian crossings are located on highway M3 class.





The bidders will present a technical memorandum detailing the proposed technical solutions and will present the lighting parameters obtained on each type profile following the modernization of the lighting system, mentioning the quantitative and qualitative aspects.

Also, tenderers have the obligation to make lighting projects for dimming situations in which they will prove to be in the required lighting classes.

Reference system class	k_{red} [%]	The class of lighting in which the first step is reduced
M3	0,75	M4
M4	0,67	M5
M5	0,6	M6
M6	0,75	P5

For pedestrian areas that are part of the street configuration, the operating mode is defined as follows:

Reference system class	k_{red} [%]	The class of lighting in which the first step is reduced
P2	0,75	P3

Where k_{red} = dimming coefficient (reduction of luminous flux)

If a light-tech parameter of a situation is not met, the bid will be technically disqualified. If tenderers do not transmit the calculations in a format that can be resumed for verification, the bid will be declared technically non-compliant.

Failure to comply with the presentation of the lighting calculations described above results in the offer being declared inappropriate.

Failure to comply with all lighting requirements specific to the required lighting classes results in the non-conforming supply being declared.

Failure to comply exactly with the road profiles found in the Appendix Table results in the non-conforming bid being declared.



**1. Presentation of the control system:**

Bidders have the obligation to submit a brief technical memo detailing the implementation model of the control system, a memorandum containing:

- The implementation mode, with the description of the progressive incorporation of the luminaires as they are mounted, thus showing how the control system is implemented as the installation of the luminaires is independent of the degree to complete the installation of lighting apparatus;
- Description of hardware and software components;
- Detailed description of the operation of the control system, indicating how the required functional requirements are met;

2. Completed technical sheets – F5 Form for the lighting and control system

Bidders are required to submit the F5 forms filled in with detailed answers to each technical requirement in these charts. No "YES", "CONFORM" gender responses are accepted. Tenders that do not detail the proposed solution, including the manufacturer's name, for each of the requirements of this Tender Specifications and Technical Data Sheet will be declared non-compliant.

The features of the offered equipment must meet the requirements or be superior to the technical requirements.

Forms F5 will be accompanied by the following documents demonstrating the conformity of the offered lighting appliances:

- **Technical specifications of the manufacturer (technical data sheets) - Each type of bidet shall be accompanied by the technical data sheet showing at least the following technical characteristics:**
 - **total installed power (lighting apparatus and telegraphy mode);**
 - **system light flow;**
 - **system's luminous efficiency;**
 - **color temperature;**
 - **lifetime;**
 - **color rendering index;**
 - **casing material and lens material;**





- **degree of impact resistance (IK);**
- **optical compartment protection and electrical accessories compartment (IP);**
- **Declaration of conformity of the products with the essential requirements provided by European Union directives (CE mark): LVD, EMC and RoHS;**
- **Instructions for installation of lighting devices to show:**
 - **how to open and power the appliance;**
 - **adjustable and reversible fixing system / pole;**
 - **the "open" positioning system;**
- **Certificates issued by conformity assessment bodies, ENEC or equivalent, or test reports issued by accredited laboratories (in which case also proof of laboratory accreditation), confirming:**
 - compliance with standards **EN 60598-1: 2015; 60598-2-3: 2003 + A1: 2011;**
 - compliance with standards **EN 62733-1: 2016, 62722-2-2: 2016;**
 - degree of impact resistance **(IK);**
 - protection degree for the optical compartment and electrical accessories compartment **(IP);**
 - polar light intensity diagram for each type of proposed luminaire;

Form F5 will be accompanied by the following documents demonstrating the compliance of the offending control system:

- Technical specifications of the manufacturer (technical data sheets);
- Declaration of conformity of the product with the essential requirements provided by European Union directives (CE mark);

3. Assessing the energy efficiency of the proposed solution for the whole quantity

The energy assessment will be made by calculating the following indicators:

- **Installed power;**
- **Specific Energy (De).**

The calculation formula for installed power is the following:

$$P_i \text{ [kW]} = N \cdot P_{\text{device type}}$$





Pi device type= (P installed on the device+ P installed on the telemanagement module)

The installed power calculated for the 940 luminaires should not exceed 43,88 kW.

The calculation formula for the Specific Energy Indicator (De) is the following:

$$De = \frac{\sum_{j=1}^n \frac{P_j \cdot t_j}{A}}{A} \quad [\text{kW} \cdot \text{h} \cdot \text{m}^{-2}]$$

where:

P_j = the power of the installation associated with the time period j (SR-EN 13201-2), in [W];

t_j = the length of time in the year in which the power is used P_j in (h)

A = the area of the illuminated surface, m²

n = the number of combinations between power and time intervals

For unilateral layout

$$P_j = \frac{2 \times P_{\text{unit}}}{2}$$

For bilateral layout

$$P_j = \frac{4 \times P_{\text{unit}}}{2}$$

For street and pedestrian crossing

$$P_j = \frac{4 \times (P_{\text{unitara stradala}} + P_{\text{unitara pietonala}})}{2}$$

P unit = P lighting apparatus + P control system/appliance

The number of combinations between power and time intervals have been set:

tfull = annual operating duration for 100% operation, in hours; tfull = 1.995h

tred = annual reduced service duration, tred1=2300h;

Calculations for the Specific Energy Indicator will be made without taking into account the effect of the CLO system.

The area for each type profile is found in the Attachement – Allocation Table Recas.

In order to allow easy verification of the results, calculations for installed power, energy consumption and Energy Specific Indicator, will be transmitted in



**“Excel” format.**

12.2 Technical conditions for installation

The main materials used in the modernization of the street public lighting system will be described. Descriptions are made for information and are references to products found on the Romanian market.

The materials purchased must keep at the minimum the technical and quality conditions of the products described to avoid the introduction into the public lighting system of UAT Recaş of counterfeit products or of inferior quality and that cause problems in the correct functioning for a long time of the system of public lighting.

For upgrading the public lighting system in UAT Recas, street lighting fixtures will be installed (numbered in the design with T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, depending on the power consumption and the produced luminous flow).

All lighting devices will be of the same family / product range and will have a design adapted to LED technology, regardless of shape. If the light-technic calculations show that there is a need for different installed power and / or a different luminous flux, different types of the same luminaire may be accepted but must be of the same family. A unitary solution is required. Bids that do not meet this requirement will be declared as non-compliant.

In order to obtain a reliable and efficient lighting system, the bidders must meet the following requirements:

- The luminaire will be integrated into a wireless control system that allows remote control;
- Power supply: 230V/50Hz ;
- Protection Degree for the Optical Compartment (minimum): IP66;
- Protection Degree for electrical components compartment (minimum): IP66;
- Impact Resistance (minimum): IK09;
- Electrical Insulation Class: Class I or II;
- The housing is made of pressurized aluminum or extruded aluminum and has no external striations (external radiator) to avoid dust and leaves accumulation;
- The diffuser of the luminaire is made of thermally treated glass, secured, flat;





- **Light distribution will be street type and will not be influenced by defects on some of the LEDs; each of the LEDs will have the same type of specific lens that reproduces the full light distribution of the luminaire;**
- **The total light output of the luminaire will be determined by the number of LEDs and / or the current applied to the LED terminals;**
- **The electrical accessory compartment and the optical compartment will be separate enclosures to prevent dust / dirt from entering the optical compartment when intervening in the electrical accessory compartment for repair;**
- **The optical compartment must allow its opening for maintenance operations, even if using tools. To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire; no luminaires for which the loudspeaker is attached to the housing are not acceptable;**
- **The electrical accessories package should allow its opening for maintenance operations .To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire;**
- **The electrical accessories compartment will be provided with a device for keeping the cover in the "OPEN" position during the interventions;**
- **The LED board will be removable (can be replaced) to facilitate maintenance and to enable it to be changed easily in the event of a defect after the warranty period has expired;**
- **The LED board will be attached directly to the luminaire housing to allow rapid heat extraction from the LED sources, so the housing will also act as a radiator;**
- **The LED board will consist of a minimum of 6 LEDs, regardless of the LED manufacturing technology, to prevent the loss of more than 20% of the light output emitted by the device, if an LED will be damaged;**
- **The luminaire will be provided with a NEMA or ZHAGA-type additional motion sensor connector, and with power from the device driver;**
- **The mounting system will allow adjustable boom and adjustable inclination;**
- **Color temperature: $T_c = 3000\text{ K} \pm 10\%$;**
- **Color rendering index: $R_a \geq 80$;**
- **The luminaire is provided with in-built protection against atmospheric discharge, short-circuit protection and bayonet connector or other type of connector allowing rapid power outage when opening the casing;**
- **The electronic ballast is programmable, compatible with the type of light source used, and will have the following minimum functions:**
 - ensuring operation with a power factor $> 0,92$, for operation at 100%;
 - allows communication with the control components of the control systems, at least through DALI or 1-10V communication protocols;
 - allows to reduce the light flux by at least 75% of the nominal flow value, in steps of at least 1%;
- **The device allows for the constant maintenance of the LED light source through the electronic driver and control system;**
- **The luminaire will allow the light output not to depreciate by more than 20% (L80B10) for 100,000 hours of operation;**



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- Devices will be equipped with a Constant Lumen Output (CLO) system that allows the light to be constantly maintained throughout the lifetime of the luminaire;
- The luminaire will be equipped with an integrated photocell, allowing its operation in relation to a level of illumination with at least 3 values; Through the control system interface, the device can be programmed for start-stop according to the level of natural lighting, astronomical clock and the presence of energy in the network;
- The device will be equipped with GPS location and data transmission system;
- Operation at $T_a = -20 \sim +35\text{ }^{\circ}\text{C}$;
- The device has built-in protection against overloads and atmospheric surges of up to 10kV for all electronic components integrated into the luminaire;
- The device can be delivered in any RAL color at the customer's request at the time of purchase;

Control system

The control system has the role of remotely monitoring, controlling and controlling the luminaires in order to allow for prompt interventions in the event of a fault, as well as to reduce the costs of electricity consumption and maintenance the public lighting system. Lighting devices can be individually incorporated into the control system. The implementation of the control system will be done simultaneously with the installation of the lighting equipment.

The control system must meet the following mandatory characteristics:

- Ensure individual control and monitoring of each lighting appliance (so that each luminaire can be switched on / off or set its brightness automatically, according to predefined programs and / or sensors as well as in manual mode) or to allow the adjustment of the light flow on groups of luminaires;
- Allow interconnection with a third-party platform through an Application Programming Interface (API);
- Only use **ANCOM** licensed communication systems for both lighting and ignition devices;
- The operator used to ensure communication, will be declared in the technical proposal and will have to prove the **ISO / IEC 27001** certification of information security certification;
- Use the point-to-point technical solution for communication from a single communications operator and it will ensure coverage of the network over the entire area on which the control / monitoring system is implemented;
- An unlimited number of interrogations will be guaranteed with each lighting / ignition point;
- Unlimited data traffic will be guaranteed for interrogation with each light / ignition point;
- The prioritization of communication in the data network used for the lighting points / ignition points enrolled in the management platform (to prevent situations where there is congestion or interference in the technology used for communication) will be guaranteed;



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- The type of communication used to be integrated into the luminaire / ignition point to ensure physical security of disconnecting the communication system from the light point;
- The system will manage in a common interface:
 - connected lighting luminaires
 - non-connected luminaires - information about them will be automatically imported into the system by uploading an excel document and will include a minimum of: geolocation (which the system will interpret and position on the map of the interface), machine type, column type, console type, power apparatus, camera components, photos;
- The control of the luminaires will not depend on a command from the ignition point;
- The system will self-locate and auto-charge the network the characteristics of the installed luminaires (Name, installed power, etc.) and will be able to send commands to the lighting devices from the motion sensors and the presence;
- Data security will be ensured by storing data on multiple servers CLOUD located in different geographic areas;
 - data storage will be redundant, on multiple servers located in different geographic areas;
- The communication platform / interface must integrate the following features:
 - remote control for the lighting system;
 - be able to connect and monitor individually any type of lighting device, regardless of technology, of any manufacturer;
 - be able to individually connect, monitor and control any type of LED lighting device, irrespective of the manufacturer (as long as the device is equipped with a DALI protocol system);
 - integrates through visual display and information content, lighting devices connected to the system, non-connected lighting devices by superimposing GPS coordinates over a map or an ortho-photo-plan of the locality;
 - allows you to manually enter information about the system assembly for each lamp (name, location, column details, console details, mounting height, etc.). Any of this information entered into the system will be viewable, categorized and exported in excel format;
 - the possibility of programming / dimming / extinguishing and lighting of individual and point-to-point luminaires, as well as zones, depending on the time schedules, calendar set by the beneficiary, etc.
 - the possibility of programming at least 5 dimming levels per cycle on / off;
 - possibility of grouping the appliances on street, area, neighborhood, etc. These groups can be named by the user and can be assigned common dimming programs;





- in case of lack of communication, the luminaires will function normally, based on the latest programming;
- different dimming calendars will be set for the user to have enough flexibility to create scenarios based on days, hollydays , seasons, local events etc;
- the possibility to issue real-time reports on consumption, defects, system / lighting devices / ignition points;
- generated reports will be available and will be accessible at least 5 years after the date of the query;
- measurement of energy at the lighting point shall be made according to **EN 50470-1** and **EN 50470-3** with an accuracy of $\pm 1\%$;
- the ability to export reports on consumption, defects, system / lighting / ignition points;

The ability to query each device with the minimum of the following data:

- **The dimming level at the time of the query**
- **The dimming level programmed at the time of the query**
- **The total energy consumed by the appliance, from the moment of installation, throughout the service life**
- **Voltage level at the moment of interrogation (V)**
- **Current value at the moment of interrogation (mA)**
- **Value of the consumed power at the moment of interrogation (W)**
- **Frequency level at the interrogation moment (Hz)**
- **Value of the natural illumination at the moment of interrogation (lx)**
- **External temperature at the interrogation time (°C)**
- **The GPS coordinates of the luminaire at the moment of query (long/lat)**
- **The illumination value at the which the photocell is programmed to turn on the light (lx)**
- **The illumination value at which the photocell is programmed to turn off the luminaire (lx)**
- **Local date and time**
- **Scheduled switching mode (photocell, astronomical clock or power supply).**

- Possibility to issue / manage work orders for intervention teams in the case of scheduled maintenance works or in case of faults in the lighting network. The work orders will provide complete information: the lighting apparatus / assembly to which the intervention is to be




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carried out, the description of the intervention or the component to be repaired / replaced, the registration of more working teams in the system and the possibility of associating the work orders of any team, the reporting by the working teams of the intervention and the description of this by detailing the performed work, the enumeration and the name of the replaced components, the loading of the photographs in electronic format for the demonstration of the intervention, the possibility to check in real time whether and intervention works according to the order

- Free assurance of an Android or IOS app that allows field teams to receive work orders and record the type of work done to resolve the malfunctions (including incident uploading);

- the interface must be open through the API for communication with other types of interfaces used in SMART solutions (video surveillance, traffic control, emergency systems, etc.);

The server access interface / platform will be in Romanian.

-The SIP scenario and the hourly consumption / light reduction will be recorded in each luminaire. The proper functioning of SIP will not depend on continuous communication with its server or other lighthouse;

- Platform and system / component software will be updated automatically without the need for user intervention (hardware or software).

Description of the main materials are found in the F5 froms below:

TECHNICAL DATA SHEET NO. 1
Brackets and gripping brackets lighting

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tehnder specifications documentation	Producer
0	Technical and functional parameters:		
	1.1. General characteristics		
1	Gripping arm for the luminaire		
1.1	Gripping arm made of hot-dip galvanizes steel according to SR EN ISO 1464 , with minimum external diameter: Ø48-60 mm		
1.2	The bracket will be curved, without		





	welding points		
1.3	Dimenions: the maximum length of the arm on the horizontal will not exceed $\frac{1}{4}$ of the mounting height.		
1.4	Angle of inclination: for aesthetic reasons, the angle of inclination of the clamping arm will be between 0° - 15° to the horizontal plane		
1.5	Material		
1.6	The gripping of the carriages on the poles will be done with a pair of galvanized plated bracelets width of 40 mm and a thickness of 4 mm, and the bracemnts will be tightened with screws, nuts and dimensioned washers.		
2	Performance and safety specifications in service		
2.1	Technical specifications of the producer (technical data sheets)		
3	Warranty and Post Warranty Terms		
3.1	Warranty for the clamping bracet for at least 24 months		

TECHNICAL DATA SHEET NO. 2

CYY (-F) type power cable:

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tehnder specifications documentation	Producer
0	Technical and functional parameters:		
	1.1. General characteristics		
1	CYY(-F) type power cable		





1.1	Cable with single /multi-conductor copper conductor with PVC insulation		
1.2	Rated voltage:0.6/1kV		
1.3	PVC jacket black/green		
1.4	Minimum ambient temperature: -+5°C at installation; -+33°C in operation		
1.5	Maximum permissible temperature on the conductor under normal conditions:+70°C		
1.6	Test voltage: 3.5kV, 50Hz, for 5 minutes.		
1.7	Bending radius:-15xCable diameter with 1 conductor, 12xCable diameter with multiple conductors.		
2	Performance and safety specifications in service		
2.1	Technical specifications of the producer (technical data sheets)		
3	Warranty and Post Warranty Terms		
3.1	Warranty for energy cable – minimum 24 months		

TECHNICAL DATA SHEET NO.. 3

LED Street Lighting Device

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tehnder specifications documentation	Producer
0	Technical and functional parameters:		
1	LED Street Lighting Device		
1.1	The luminaire will be integrated into a wireless control system that allows remote control		
1.2	Power Supply: 230V/50Hz.		
1.3	Max. Power:		
	T1: 17W		





	T2: 28W		
	T3: 37W		
	T4: 47W		
	T5: 58W		
	T6: 67W		
	T7: 78W		
	T8: 84W		
	T9: 127W		
	T10: 152W		
1.4	Protection Degree for the optical compartment(minimum) IP66		
1.5	Protection Degree for the electrical components compartment (minimum) IP66		
1.6	Impact Resistance (minimum) IK09		
1.7	Electrical insulation class: Class I or II		
1.8	Dimensions of luminaire LxH: not required		
1.9	Weight: not required		
1.10	Lighting device with the following components:		
	<input type="checkbox"/> housing made of pressurized aluminum or extruded aluminum		
	<input type="checkbox"/> casing with external striations (external radiator) to avoid dust and leaves accumulation		
	<input type="checkbox"/> tempered, secured, flat-faced glass diffuser;		
	<input type="checkbox"/> light distribution will be street type and will not be affected by defects on some of the LEDs; each of the LEDs will have the same type of specific lens that reproduces the full light distribution of the luminaire;		
	<input type="checkbox"/> fluxul the total light output of the luminaire will be determined by the number of LEDs and/or the current applied to the LED terminals;		



	<p><input type="checkbox"/> the electrical accessory compartment and the optical compartment will be separate enclosures to avoid dust/dirt entering the optical compartment when intervening in the electrical accessory compartment for repair;</p>		
	<ul style="list-style-type: none"> the optical compartment must allow its opening for maintenance, even if using tools. To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire; no luminaires for which the loudspeaker is attached to the housing are not acceptable; 		
	<ul style="list-style-type: none"> The electrical accessory compartment should allow it to be opened for maintenance without the use of tools. To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire; 		
	<ul style="list-style-type: none"> The electrical accessories compartment will be provided with a device for keeping the cover in an open position during the interventions; 		
	<ul style="list-style-type: none"> the LED board will be removable to facilitate maintenance and to enable it to be changed easily in the event of a fault after the warranty period has expired; 		



	<ul style="list-style-type: none"> the LED plate will be fixed directly to the luminaire housing to allow quick extraction of the heat from the LEDs, so the housing will also act as a radiator; 		
	<ul style="list-style-type: none"> The LED board will be composed of at least 6 LEDs, regardless of the LED manufacturing technology, to prevent the loss of more than 20% of the light output emitted by the device if an LED is damaged; 		
	<ul style="list-style-type: none"> The LED plate will be equipped with a thermal sensor, which, together with the type of driver used, allows for the reduction of the light flux if the temperature on the LEDs exceeds the preset critical threshold. This measure is necessary to avoid reducing the life of LEDs in this case; 		
	<ul style="list-style-type: none"> The appliance will be provided with an additional connector for NEMA or ZHAGA-type motion sensor connectors and power supply from the device driver 		
	<ul style="list-style-type: none"> The mounting system will allow mounting on both the arm and the head and adjustable incline at least in the range of: 0 °, 5 °, 10 °, 15 °, 20 ° for pole head mounting and -20 °, 15 °, -10 °, -5 °, 0 ° for mounting on the console. 		
1.11	High Power LED Lighting Equipment (specify model and manufacturer)		
	<input type="checkbox"/> color temperature $T_c = 3000 \pm 10\%$;		
	<input type="checkbox"/> color rendering index $R_a \geq 80$.		



1.12	Provided internally with protection against atmospheric discharge, short-circuit protection and bayonet connector or other type of connector allowing rapid power outage when opening the casing		
1.13	The programmable electronic ballast, compatible with the type of light source used, will have the following minimum functions:		
	-Fielding operation with power factor > 0.92, for operation at 100%;		
	-power communication with Control Control Command components, at least through DALI or 1-10V communication protocols;		
	Allows the light flux to be reduced by at least 75% of the nominal flow value in steps of at least 1%		
1.14	The device allows the LED light to be constantly maintained over time by means of the electronic driver and control system.		
1.15	The luminaire will allow the light output not to depreciate by more than 20% for 100,000 hours of operation. The devices will be equipped with a Constant Lumen Output (CLO) system that allows constant luminous flux to be maintained over the lifetime.		



1.16	The luminaire will be equipped with an integrated photocell, which allows its operation in relation to a level of illumination with at least 3 preset values that can be modified from the telegraphy application. Through the control system interface, the device can be programmed for start-stop depending on the level of natural lighting, astronomical clock, and power on the network.		
1.17	The device will be equipped with GPS location and data transmission. The data transmission and reception system will be integrated into the luminaire		
1.18	Operation at $T_a = -20 \sim +35 \text{ }^{\circ}\text{C}$		
1.19	Built-in protection for discharges and atmospheric overvoltages up to 10kV for all electronic components integrated into the luminaire.		
1.20	The device can be delivered in any RAL color at the customer's request at the time of purchase		
2	Performance and safety specifications in service		
2.1	Technical specifications of the producer (technical data sheets)		
3	Conditions for compliance with relevant standards		
3.1	An EC declaration of conformity will be submitted		
3.2	An ENEC (or similar) certification will be submitted		
3.3	RoHS certificate will be submitted		
3.4	An IK09 Impact Resistance Test Report will be presented		
3.5	A test report for the degree of leak proofness IP66 will be provided		
4	Warranty and Post Warranty conditions		
4.1	Warranty: 5 years		




TECHNICAL DATA SHEET NO. 4
Street Lighting Device – pedestrian passage

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tender specifications documentation	Producer
0	Technical and functional parameters:		
1	LED Street Lighting Device		
1.1	The luminaire will be integrated into a wireless control system that allows remote control		
1.2	Power supply: 230V/50Hz.		
1.3	Max. power: T11: 79W		
1.4	Protection Degree optical compartment (minimum) IP66		
1.5	Protection Degree for the electrical components compartment (minimum) IP66		
1.6	Impact Resistance (minimum) IK09		
1.7	Electrical insulation class: Class I or II		
1.8	Dimensions of luminaire LxH: not required		
1.9	Weight: not required		
1.10	Lighting device with the following components:		
	<input type="checkbox"/> housing made of pressurized aluminum or extruded aluminum		
	<input type="checkbox"/> casing with external striations (external radiator) to avoid dust and leaves accumulation		
	<input type="checkbox"/> tempered, secured, flat-faced glass diffuser;		



<ul style="list-style-type: none"> the light distribution will be left / right asymmetric type specific to pedestrian crossings and will not be influenced by defects on some of the LEDs, each of the LEDs will have the same type of specific lens that reproduces the distribution; 		
<ul style="list-style-type: none"> the total light output of the luminaire will be determined by the number of LEDs and / or the current applied to the LED terminals; 		
<ul style="list-style-type: none"> the electrical accessory compartment and the optical compartment will be separate enclosures to avoid dust / dirt entering the optical compartment when intervening in the electrical accessory compartment for repair; 		
<ul style="list-style-type: none"> the optical compartment must allow its opening for maintenance, even if using tools. To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire; no luminaires for which the loudspeaker is attached to the housing are not acceptable; 		
<ul style="list-style-type: none"> The electrical accessory compartment should allow it to be opened for maintenance without the use of tools. To facilitate maintenance, it must be able to be opened in a short time without damage to the components of the luminaire; 		
<ul style="list-style-type: none"> the electrical accessories compartment will be provided with a device for keeping the cover in an open position during the 		



interventions;		
<ul style="list-style-type: none"> the LED board will be removable to facilitate maintenance and to enable it to be changed easily in the event of a fault after the warranty period has expired; 		
<ul style="list-style-type: none"> the LED plate will be fixed directly to the luminaire housing to allow quick extraction of the heat from the LEDs, so the housing will also act as a radiator; 		
<ul style="list-style-type: none"> The LED board will be composed of at least 6 LEDs, regardless of the LED manufacturing technology, to prevent the loss of more than 20% of the light output emitted by the device if an LED is damaged; 		
<ul style="list-style-type: none"> The LED plate will be equipped with a thermal sensor, which, together with the type of driver used, allows for the reduction of the light flux if the temperature on the LEDs exceeds the preset critical threshold. This measure is necessary to avoid reducing the life of LEDs in this case; 		
<ul style="list-style-type: none"> The appliance will be provided with an additional connector for NEMA or ZHAGA-type motion sensor connectors and power supply from the device driver 		



	<ul style="list-style-type: none"> The mounting system will allow mounting on both the arm and the head and adjustable incline at least in the range of: 0 °, 5 °, 10 °, 15 °, 20 ° for pole head mounting and -20 °, 15 °, -10 °, -5 °, 0 ° for mounting on the console. 		
1.11	<p>High Power LED Lighting Equipment (model and manufacturer will be specified)</p> <p><input type="checkbox"/> color temperature $T_c = 4000 \pm 10\%$;</p> <p><input type="checkbox"/> color rendering index $R_a \geq 70$.</p>		
1.12	<p>Provided internally with protection against atmospheric discharge, short-circuit protection and bayonet connector or other type of connector allowing rapid power outage when opening the casing</p>		
1.13	<p>The programmable electronic ballast, compatible with the type of light source used, will have the following minimum functions:</p> <ul style="list-style-type: none"> -Fielding operation with power factor > 0.92, for operation at 100%; -power communication with Control Command components, at least through DALI or 1-10V communication protocols; Allows the light flux to be reduced by at least 75% of the nominal flow value in steps of at least 1% 		
1.14	<p>The device allows the LED light to be constantly maintained over time by means of the electronic driver and control system.</p>		



1.15	The luminaire will allow the light output not to depreciate by more than 20% for 100,000 hours of operation. The devices will be equipped with a Constant Lumen Output (CLO) system that allows constant luminous flux to be maintained over the lifetime.		
1.16	The luminaire will be equipped with an integrated photocell, which allows its operation in relation to a level of illumination with at least 3 preset values that can be modified from the telegraphy application. Through the control system interface, the device can be programmed for start-stop depending on the level of natural lighting, astronomical clock, and power on the network.		
1.17	The device will be equipped with GPS location and data transmission. The data transmission and reception system will be integrated into the luminaire		
1.18	Operating at $T_a = -20 \sim +35 \text{ }^{\circ}\text{C}$		
1.19	Built-in protection for discharges and atmospheric overvoltages up to 10kV for all electronic components integrated into the luminaire.		
1.20	The device can be delivered in any RAL color at the customer's request at the time of purchase		
2	Performance and safety specifications in service		
2.1	Technical specifications of the producer (technical data sheets)		
3	Conditions for compliance with relevant standards		
3.1	An EC declaration of conformity will be submitted		
3.2	An ENEC certificate (or similar) will be submitted		





3.3	RoHS will be submitted		
3.4	An IK09 Impact Resistance Test Report will be presented		
3.5	A test report for the degree of leak proofness IP66 will be provided		
4	Warranty and Post Warranty conditions		
4.1	Warranty 5 years		

TECHNICAL DATA SHEET NO. 5
Control system – lighting devices

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tender specifications documentation	Producer
0	Technical and functional parameters:		
1	Monitoring and control system of the lighting devices		
1.1	Functions: <ul style="list-style-type: none"> allows measurement of the energy consumed at the ignition point. The energy consumed will be visualized in the telemanagement system interface. the system will manage in a common interface: <ul style="list-style-type: none"> - connected lighting appliances - connected ignition points - unlisted lighting equipment. <p>The information about them will be automatically imported into the system by uploading an excel document and will include at least the following: Geolocation - which the</p>		



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system will interpret and position on the interface map, device type, pole type, console type, power device, device components, photos

- Lighting control will not depend on a command from the ignition point
- will self-locate and auto-load into the network the characteristics of the installed luminaires (name, installed power, etc.)
- ☐ vit will be able to send commands to the lighting devices from motion and presence sensors
- will individually connect and monitor any type of luminaire regardless of the technology of any manufacturer
- will be able to connect, monitor and control individually any type of LED illuminator regardless of the manufacturer (as long as the device is equipped with a DALI protocol control system);
- Integrates into the same interface (through visual display and information content), the lighting system connected to the system, the connected ignition points, the non-connected lighting devices



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- allows you to manually enter information about the system assembly for each luminaire (name, location, column details, console details, mounting height, etc.). Any of this information entered into the system will be viewable, categorized and exported in excel format.
- The possibility of programming / dimming / extinguishing and lighting of individual and point-to-point luminaires as well as zones, according to the hourly schedules, calendar set by the beneficiary, etc. an ability to program at least 10 dimming levels on a on / off cycle
- The possibility of grouping the appliances on street, area, neighborhood, etc. These groups can be named by the user and can be assigned shared dimming programs
- A minimum of 50 dimming calendars can be set for the user to have enough flexibility to create scenarios based on days, holidays, etc.
- possibility to generate real time reports on consumption, defects, system / lighting devices / ignition points
- the ability to issue real-time reports on consumption, defects, operating system / lighting apparatus / ignition points
- Measurement of energy consumption at the lighting point will be done according to **EN50470-1** and **EN50470-3** with an accuracy of $\pm 1\%$ - providing proofs will be presented





- the ability to export reports on consumption, defects, system / lighting / ignition points;

- the possibility of querying each lighting device with the minimum of the following data:

- The dimming level at the time of the query
- The dimming level programmed at the time of the query
- The total energy consumed by the appliance, from the moment of installation, throughout the service life
- Voltage level at the moment of interrogation (V)
- Current value at interrogation time (mA)
- Value of power consumed at the time of the query (W)
- Frequency at interrogation time (Hz)
- The value of natural illumination at the moment of interrogation (lx)
- Outside temperature at query time (°C)
- The GPS coordinates of the light at the time of the query (long / lat)
- The illumination value at which the photocell is programmed to turn on the luminaire (lx)
- The value of the illumination at which the photocell is programmed to turn off the luminaire (lx)
- Local time and date
- Scheduled switching mode (photocell, astronomical clock or power supply





	<ul style="list-style-type: none"> • The ability to issue / manage work orders for intervention teams in case of scheduled maintenance work or in case of faults in the lighting network. The work orders will provide complete information: <ul style="list-style-type: none"> - the lighting apparatus / assembly to which the intervention is to be made <ul style="list-style-type: none"> - description of the intervention or component to be repaired / replaced - registering multiple work teams in the system and the possibility of associating the work orders of any team - Establishment and transmission to the working teams of the term until which the intervention will take place - reporting by the working teams of the achievements of the intervention and its description by: description of the performed work, enumeration and name of the replaced components, uploading of photographs in electronic format for demonstration of the intervention - possibility to check in real time and remote if the interventions and the maintenance works were executed according to the order; • free assurance of an Android or IOS application that allows field teams to receive work orders and record the type of work done to repair the malfunctions (including incidents from the scene); 	
1.2	<p>Data transmittion and security:</p> <ul style="list-style-type: none"> • use only ANCOM licensed communication systems, both for lighting and for the ignition points; 	



- the operator used to provide the communication will be declared in the technical proposal and will have to prove the certification regarding the information security management, **ISO / CEI 27001**
- using the point-to-point technical solution for communication from a single communications operator, which will ensure coverage of the network over the entire area on which the control / monitoring system is implemented;
- An unlimited number of interrogations with each lighting / flash point will be guaranteed;
- Unlimited data traffic will be guaranteed for interrogation with each light / ignition point;
- Prioritize communication in the data network used for lighting points / ignition points enlisted in the management platform (to prevent situations where there is congestion or interference in the technology used for communication);
- the type of communication used to be integrated into the luminaire / ignition point to provide physical security for disconnecting the communication system from the luminous point;
- the system will ensure data security by:
 - encryption of transmissions between servers and lighting devices / flash points at minimum 128 bits.
 - encryption of server-to-server communication with a minimum of 256-bit user interface.





	<ul style="list-style-type: none"> - data storage will be redundant on multiple servers located in different geographic areas • In case of lack of communication, the luminaires will function normally based on the latest programming • The interface must be open through the API for communication with other types of interfaces used in SMART solutions (video surveillance, traffic control, emergency systems, etc.); 		
1.3	User Interface: <ul style="list-style-type: none"> <input type="checkbox"/> it will be in Romanian language <input type="checkbox"/> allows access for the minimum user by username and password • Allow multi-user registration. The "Administrator" user will be able to set user rights / levels for other users 		
2	Performance and safety specifications in service		
2.1	Technical specifications of the producer (technical data sheets)		
3	Conditions for compliance with relevant standards		
3.1	A CE certificate of conformity will be submitted		
3.2	The manufacturer will be certified according to: <ul style="list-style-type: none"> - BS EN ISO 9001, quality management - BS EN ISO 14001, environment The required ISO certifications will be presented		
4	Warranty conditions and		



	certifications		
4.1	Warranty 5 years		

TECHNICAL DATA SHEET NO. 6
Central Server

NR CRT	Technical specifications required by the tender specification documentation	The correspondence of the technical proposal with the technical specifications required by the tehnder specifications documentation	Producer
0	Technical and functional parameters:		
	1.1. General characteristics		
1	Sistem Desktop PC – HP, DELL, FUJITSU, ASUS or similar		
1.1	Procesor Intel Core I7 minim 4.0 GHz – or similar AMD		
1.2	Memory minimum 16 GN DDR4		
1.3	HDD – SSD minimum 256GB + 2TB HDD		
1.4	Licensed system Windows 10 Pro		
1.5	License Microsoft Office 2016 or similar		
1.6	Dedicated video card minimum 4GB, 400 MHz, resolution 5120 x 2880 pixeli, with 3D function		
1.7	Monitor 24,5” minimum, resolution 1920x 1080, maximum horizontal/vertical visibility angle 170/ 160 degree, vertical refresh rate 240 Hz		
	Integrated GSM modem		
2	Performance and safety specifications in service		
3	Conditions for compliance with relevant standards		
3.1	Conformity certificates form the		





	producer		
3.2	CE markings		
4	Warranty and Post Warranty conditions		
4.1	Warranty minimum 5 years		

WARRANTIES

The bidder have the obligation to comply with the following minimum guarantees required by the contracting authority:

- **construction-assembly works: 2 years;**
- **for fully equipped luminaire according to the specifications and associated equipment (clamp, connection clamps, power cable): 5 years;**
- **components of the control system: 5 years;**

SAMPLES AND FUNCTIONALITY - PRODUCTS OFFERED

The bidder placed first, after the financial evaluation of the bids, will be required to submit samples for the lighting and control system. The lighting equipment and the control system presented must fully meet the requirements required by the awarding documentation, including the functionality requirements, the performance of which will be tested by installing 3 (three) luminaires, verifying the following:

Nr.crt.	Functionality in the platform	Fulfilled/Unfulfilled
1.	Self-localization in the monitoring and control platform	
2.	On / off function - command from platform	
3.	Diming 10% - command from the platform	
4.	Diming 3 levels (depending on the street class) - command from the platform	
5.	Turn off power and check for inactivity reporting on the platform (both by manual query and by first	





	email or sms)	
6.	Issuing a work order to remedy the defect	
7.	Verify receipt of work order on a mobile application	
8.	Closing the order and reporting in the platform	
9.	Real-time functionality query:	
9.a.	Percentage of light output	
9.b.	Total consumption until the moment of the query	
9.c.	The total number of hours worked until the moment of the query	
9.d.	The tension at the moment of the query	
9.e.	Power at the query time	
9.f.	Frequency of electric current at interrogation	
9.g.	Power factor at interrogation moment	
9.h.	Ambient light level - in lux	
9.i.	Ambient temperature– in degrees C	
9.j.	GPS coordinates of the luminaire	
10.	Checking sunrise / sunset at the set day for the next day	
11.	Manual input of an unlinked luminaire	

Bidders have the obligation to support, by submitting samples and the functionality test, the characteristics on which the technical offers have been declared compliant.

Other provisions:

- The bidders are obliged to base on the basis of calculations and documents, all the information contained in their technical offer.
- The data and information included in the technical offer will be used in the preparation of the financial offer, which will be the basis for its substantiation.
- The bidders have the obligation to rigorously correlate the data and information included in the technical offer and the data and values in the financial offer.
- The organization of the information in the technical proposal will be structured so as to allow validation of the offer's compliance.
- The environmental, social and labor relations conditions will be respected throughout the duration of



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the works contract. A statement will be made under this responsibility; Detailed information on the regulations in force at national level concerning work conditions and occupational safety, health and safety at work can be obtained from the Labor Inspection or from the website: <http://www.inspectmun.ro/legislation/legislation.html>. In the case of an association, this statement will be presented on behalf of the association by the designated Lead Partner.

THE CONTENT OF THE FINANCIAL OFFER

The financial offer will be based on the centralization of the data from the technical offer and will include:

Total price;

It will be specified and splitted down the price for:

- Constructions and plumbing
- Organization of construction site
- Prepare the exploitation perimeter and technological samples (including light-tech measurements before the reception at the end of the works)
- Various and unexpected

For this purpose, the forms will be presented: General Estimate and F3 Forms

Each tenderer is free to add any position that he or she considers useful or necessary to carry out the work for carrying out the activities in accordance with the requirements of the specifications.

Execution schedule of investment works (physical and value graph);

7. CHECKS

7.1.Preliminary checks (checks made during the work):

- checking the functionality of the appliances and the conformity between their characteristics, the project and the provisions of the norms and standards in force;



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- checking the connections between the devices.
- verification of the way and the quality of fixation of the devices and the mounted devices;
- Check the admissible mounting heights, and admissible distances to the track elements.

7.2.Final check (before commissioning):

- Visual inspection;
- testing by tests, consisting of:
 - checking the conformity of the assembly with the schemes and technical data of the project;
 - checking the electrical continuity of the circuits;
 - checking the insulation resistance;
 - check the way and the quality of the fixation of the devices;
 - the existence of all attachment devices.

These checks make the project's provisions consistent with the functional characteristics of the systems. Checks are made visually and through quality tests.

All verifications will be made in accordance with the standards and standards in force, and verifications or measurement bulletins will be completed for the verifications carried out.

Verified,

Drafted by,

