

# Surrey County Council

## Developer Street Lighting Notes and Specifications

### Section 38 and 278 Works for Adoption

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#### 1. General Considerations

All 'off site' (S278) works are to be carried out by the Authority. The Developer may sub-contract on site (S38) works.

Unless otherwise stated, the Highway Authority will require the developer to provide street lighting system for roads, verges, paths, cycle tracks, parking areas and all areas to be adopted as highway maintained at the public expense.

The street lighting system must be an integral part of the estate design with implications for security as well as Highway safety taken into account.

It is important that the equipment used on any installation should be compatible with the rest of the County for ease of maintenance.

In conservation areas, or very close to them and in other environmentally sensitive areas special design apparatus may, at the complete discretion of the Authority, be required.

The level and type of lighting will vary with the type and use of the carriageway, footway, cycle track, parking area or area to be adopted as highway maintained at the public expense.

The positioning of the equipment will be in accordance with BS EN 13201-2:2015 Road Lighting Design. Due consideration is to be given to passive lighting, trees and their growth, traffic calming, parking and pedestrians.

It will be the developer's responsibility to ensure that prospective residents are fully aware of the locations of all street lighting points and any relocation of equipment will be at the developer's expense prior to handover and must be within the design parameters or included in a complete re-design.

Within certain criteria the developer may be charged for alterations to existing street lighting where, at the Authority's discretions, it is deemed necessary. Early consultation with Milestone Infrastructure is essential. Where the development forms a new junction with an existing highway the provision of lighting for the new development will be deemed to include the new junction and its approaches.

The phasing of a new development must take into consideration the need to light, within the development, all carriageways, footways, cycle tracks, parking areas or areas to be adopted as highway maintained at the public expense, which are required to access occupied properties.

No adoptable lighting shall be installed onto buildings unless agreed with the Authority in writing prior to installation and shall only be adopted upon submission of relevant wayleaves allowing the Authority the right, in perpetuity, to provide power, across said private property if required, install, operate, maintain, remove, affix signs, displays and notices, and provide sub-feed to adjacent equipment, across said private property as and if required.

All adoptable lighting shall be within the area of adoptable highway or within a service strip. Where this can be shown as not possible the developer must arrange appropriate covenants or agreements with the landowners or property owners and any such covenants or agreements shall be binding on the successors in title. The covenants or agreements will apply to an area of one square metre around the installation and allow the Authority the right, in perpetuity, to provide power, across said private property if required, install, operate, maintain, remove, affix signs, displays and notices, and to provide sub-feeds to adjacent equipment, across said private property as and if required.

All equipment shall be supplied in new and unused condition. The developer shall ensure that the equipment supplied is compatible with all other equipment with which it is associated.

All lighting designs are required to meet the adoptable standards for the County. The design shall minimise light spill off the highway, and utilise column locations on property boundaries or building lines.

The developer shall bear the costs for any and all works required in the removal, replacement or re-positioning of any and all existing lighting equipment made necessary by the site works.

No existing lighting shall be switched off, dismantled or removed without prior written approval of the Authority. This approval will not normally be granted unless temporary lighting or the commissioning of the new permanent system is in place and working.

The developer shall be responsible for the complete installation and commissioning of each unit. It is required that actual installation is carried out by a specialist contractor who is a member of HEA (Highway Electrical Association) and that their operatives are suitably qualified under the sector scheme.

All Connections shall be made to the DNO network except with the expressed written permission of the Local Authority

All private (non-DNO) cable networks are to be ducted in 100 mm orange duct with ducts to be provided with draw cords and a minimum depth of cover of 450 millimetres within grass or footways and 600 millimetres depth of cover under crossovers, parking areas and roads. All private (non-DNO) cable networks are to be run in steel wire armoured cable.

The Authority shall be notified when the installation is complete and ready for an adoption inspection. This inspection will attract a fee. This notification shall include a schedule confirming the technical details, equipment details, as built drawing, location details and electrical test certificates.

The inspector shall check that the work is been undertaken in accordance with the check list, method statements, designs and specifications in compliance with Good Industry Practice and the requirement of Surrey County Council.

→ Please see Annex 1(Check List)

The developer will remain liable for any defect or damage until the road has been adopted. Adoption of the lighting will incur the developer an accrual fee and a Commuted Sum maintenance payment.

→ Please see Annex 2 (Specified Equipment)

## **2. Design Requirements**

The lighting scheme can, at the request of the developer, be carried out by Milestone Infrastructure for a design fee. For a fee Milestone Infrastructure will also manage the installation programme, inspect and certificate thus permit immediate adoption and transfer of responsibility and energy to the Authority.

All lighting designs shall be undertaken in line with the requirements of BS5489-1:2020 and BS EN13201:2015 unless by prior written arrangement with the county council  
The developer may be required to present information regarding expected traffic flows for traffic routes affected by the development

The lighting layout shall be on an A1 plan to scale of not less than 1:500. This shall include all lighting points' locations old and new together with the surrounding area. The lighting layout shall also include a schedule of DNO connections, disconnections and transfer, together with details of any private cables and their feeds. Also included shall be a schedule of equipment, and parameters used in the design, including lighting class and maintenance factors. All designs submitted for approval shall be accompanied by a computer aided design calculations indicating the surround ratio, maximum, average and minimum levels of luminance or illuminance as appropriate, along with the achieved uniformity factor. The calculations shall utilise Lighting Reality software or other approved software. The calculations shall clearly demonstrate compliance with the required lighting levels. Isometric diagrams containing contour containing contour lines are also required.

All designs must consider passive safety requirements as necessary and dictated by Passive Safety Risk Assessment.

All Passive Safety electrical disconnection equipment specified must be above ground. The use of equipment mounted below ground level shall be prohibited.

All designs shall use manufacturers certified photometry for Surrey County Council Street Lighting PFI.

The developer will also be required to demonstrate that the proposed design minimises whole life costs of the complete installation.

Calculation shall be based on a maintenance factor determined by an appropriate pollution factor and the manufactures lumen output specification. Choice of light source shall be Light Emitting Diode (LED).

In addition a full risk assessment for the proposed design shall be submitted including Health and Safety hazards in installation, maintenance and demolition risks. The risk assessment shall also indicate mitigation measures undertaken as part of the design process, and residual risks, together with measures to be undertaken by others to further manage the risks.

All design equipment specification and installation work shall comply with the standards indicated below:

- a) European and British Standards for road lighting using the classes set out in this Annex 1:
  - BS EN 13201-2: 2015 Road Lighting – Part 2: Performance requirements
  - BS EN 13201-3: 2015 Road Lighting – Part 3: Calculation of Performance
  - BS EN 13201-4: 2015 Road Lighting – Part 4: Methods of measuring lighting performance
  - BS 5489-1:2020 Code of practice for the design of road lighting - Part 1: Lighting of roads and public amenity areas
- b) BS 7671 for the requirements of electrical installations
- c) BS EN 40-3-1:2013 for lighting columns:

Lighting Columns of 5, 6 and 8 Metres shall be designed to meet the requirements of a Terrain Category III and 10m and 12m Lighting Columns shall be designed to meet the requirements of a Terrain Category II.

All Lighting Columns shall be designed to have a 10 minute mean wind velocity of 22.58m/s adjusted for a mean return period of 50 years and further adjusted for an altitude above sea level of 250m.

Design of Lighting Columns to facilitate Attachments shall be as specified in paragraph 1.3.2 of this Annex 1.

- BS EN 40-3-2: 2013 – Part 3-2: Design and verification – Verification by testing
- BS EN 40-3-3: 2013 – Part 3-3: Design and verification – Verification by calculation

Except that:

Fatigue calculations shall be in accordance with EN-40 instead of informative Annex A of BSEN 40-3-3 shall be applied to columns over 8m in height and the design life shall be taken as 50 years for the purposes of this calculation.

- BS EN 40-5: 2002 – Part 5: Requirements for steel lighting columns
- BS EN 40-6: 2002 – Part 6: Requirements for aluminium lighting columns
- BS EN 40-7: 2002 – Part 7: Requirements for fibre reinforced polymer composite lighting columns

- d) For luminaires:
  - BS EN 60598-1: 2021 – Part 1 – Luminaires - General requirements and tests
  - BS EN 60598-2-3: 2003+A1:2011 – Part 2-3 – Luminaires - Particular requirements for luminaires for road and street lighting
- e) For ingress protection BS EN 60529: 1992 – Specification for degrees of protection provided by enclosures (IP code)
  - Class IP 65 (minimum) for the optical compartment of Street Lighting Luminaires and floodlights.
- f) BS EN 12767:2019 – Passive Safety of Support Structures for road equipment
- g) All other relevant British or European Standards

### **3. Steel Columns and Brackets**

The lighting column manufacturer shall be registered with and certified by either 'BSI Quality Assurance Services' or 'Lloyds Registered Quality Assurance Limited' for the manufacture, supply and verification of lighting columns under BS EN ISO 9002.

All columns and brackets are to be galvanised and have further root protection with Plascoat PPA 571 coating complete with a factory finish in the appropriate colour BS 4800 12B25 Spruce Green.

All columns and brackets are to be tagged to allow for an audit trail back to manufacturing batch.

Types and sizes of columns and brackets will be supplied to provide a mounting height for the lantern above the carriageway as specified.

Where vehicular access for maintenance is not possible raising and lowering columns shall be installed. The Authority and/or Milestone Infrastructure may require the developer to install raising and lowering columns in other specified areas.

All columns and brackets shall conform to BS EN 40 and have a design life of 50 years. The warranty of the columns and bracket shall be for a period of 30 years from the recorded date of manufacture covering the structural integrity, thermoplastic coating and aesthetic colour. Any defective areas due to loss of coating caused during the warranty period will be restored to meet the original warranty period.

All new lighting columns and brackets shall be finished in BS 12B 25 spruce green. Black equipment may be required in town centres and conservation areas if specified by the Authority in advance for specific schemes.

→ Please see Annex 2 (Specified Equipment)

#### **3.1. Numbering**

All Equipment shall be numbered consecutively using the SCC standard numbering template (Annex 3).

Until formal adoption has been completed all references to SCC on the number plate must be covered.

#### **4. LED Luminaires**

All LED luminaires shall have a coloured factory finish to match the columns on which it is to be mounted.

The luminaires and wiring shall comply with all relevant British and European Standards and be CE marked (Product Conformity within the European Economic Area).

The LED luminaire, shall have an Elexon/UMSUG (Electricity Balancing and Settlement Code (BSC) approved charge code.

LED Luminaire weight should not exceed – at 5/6m MH 7.8KG, at 8/10m MH 11.5KG and at 12m MH 18.1KG.

LED Luminaires colour shall be Spruce Green to BS12B25 for functional Luminaires and Black for Heritage style Luminaires.

The manufacturer to warrant replacement of faulty LED equipment on a one for one basis for 18 years, the warranty to be novated to the Authority or the Contractor during the adoption process.

Any pre-wired Luminaires shall be fitted with 1.5mm<sup>2</sup> flexible cable of an insulation category suitable for exterior applications.

Chapter 18 compliant ZHAGA receptacles must be fitted.

Tool free access to the photometric engine and driver compartment.

Compatible with major CMS (Central Management Systems) suppliers such as Urban Control, Telensa, Mayflower, Telematics etc.

The optical compartment shall be no less than IP 66 or an equal LED IP protection system that can be positively demonstrated, the Driver compartment shall have a degree of protection of no less than IP 66 to BS EN 60529 or equivalent.

Each Luminaire must include a facility to provide Dimming via either the CMS or a pre-programmable Driver.

Electrical equipment shall be installed so that levels of radio interference given in BS EN 55014-1 or equivalent are not exceeded.

All LED life extrapolations must be based upon LM-80 (LED measure of Lumen Depreciation) provided by the LED source manufacturer.

Photometric data must be based on test results from a verified testing lab using absolute photometry in accordance with methods and conditions detailed within LM-80.

Have lighting footprint that is not affected in the event of failure of individual LED's.

Have an impact rating for any optical protectors of IK08 minimum in accordance with BS EN 62262:2002 or equivalent.

Have options to fit or retrofit proprietary front and/or rear shields, which shall reduce unwanted light spill.

Mounting suitable for all mounting options installed in the UK, typically but not exclusively they will be side-entry fitting from 34mm to 42mm integral column spigots and post-top mounting from 60mm to 76mm column spigots.

Have integral and incorporated mounting facility for 34mm to 42mm side entry and 60mm to 76mm post top mounting without additional elements.

When post top or side-entry mounted, be capable of being set at both positive and negative adjustable inclinations with a maximum of 10° .

Luminaire body/frame and canopy shall be made of high-quality die-cast aluminium (LM6), chromadid and polyester powder coating.

Be maintenance friendly to minimising traffic disruption.

Be recyclable in accordance with WEEE requirements.

Have maximum upward light output ratio to suit the environmental classes.

Tested in accordance with British and European Standards or equivalent to ensure compatibility with the various LED/Driver/optic combinations and specifically in respect of heat dissipation.

Have an anti-condensation feature whilst maintaining IP rating.

Have a maximum Glare classification of G1 for P classes and G3 for M classes in accordance with BS5489-1 & EN 13201.

Include surge protection 10kV by means of a transient voltage suppression chip or equivalent.

### **Light Emitting Diodes (LED):**

All LED modules shall comply with the following requirements:

- Shall be tested in accordance with the standards within LM-80 or equivalent.
- The LED source manufacturer must use a valid method for projecting LM 80, or equivalent, test results to L80 based on recommended operating conditions.
- Shall be compatible with the Luminaires and Driver.
- Shall be suitable for outdoor lighting.
- Shall comply with BS EN 62035.

### **LED Drivers:**

LED Drivers shall comply with the following requirements:

- Compliance with EN61000-3-2:2000, EN61347-2-13-2006, EN61000-3-3:2001, BS EN 61347-1, BS EN 61347-2-1, BS EN 61347-2-8, BS EN 61347-2-9 and BS EN 60921 or BS EN 60923 or equivalent and as appropriate and be suitable for the specified operating voltage of the network.
- Shall be capable of constant light output (CLO) for the stated lifetime.
- Shall use DALI protocol and compatible with any specified CMS system.
- Shall have plug and socket connection facility.
- Shall be compatible with all other components including the LED, shall ensure optimum LED output and minimise energy consumption.
- Should be manufactured as a one piece unit with a power factor  $\geq 0.95$ .
- Have stable power consumption over full operating voltage range.
- The Driver shall be Philips SR Drivers.

### **Luminaire Performance (LED)**

The minimum performance requirements, based on L80 B10 at 100,000 hours data and an ambient temperature of 25°C, are as follows:

- The minimum Lumen Depreciation rate is Cat 1 > 80% of initial for both the LED and the Luminaire.
- The minimum length of Luminaire Life L(x) is 100,000 hours – where x is the percentage of L80 at the declared life - the length of time it takes for the proposed Luminaire to reach 80% of its initial light output.

- Failure Fraction  $F(x)$  where  $x$  is the percentage of failures at  $L(x)$  should be less than 10% based on testing of the Luminaire up to 6000 hours
- Colour Temperature category should be 3000k for both Residential Roads and Trafficked Roads with the exception of LED lanterns mounted on Belisha Beacons, they should have a colour temperature of 4000 kelvin.
- The preferred measure of CRI is 70Ra.
- Constant Light Output (CLO) enabled for energy savings and dependable light through the lifetime of the luminaire.
- Smart City Sensors ready.

## Evaluation

The DW Windsor Kirium range of LED Luminaires are currently the Authority and Milestone Infrastructure preferred choice. The LED products, utilise the very latest technology and has been developed around the use of the Phillips SR Driver and LUXEON TX LED modules.

→ Please see Annex 2 (Specified Equipment)

## 5. Central Management System

The developer shall provide the Urban Control CMS. Urban Control are a sister company to British luminaires manufacturer DW Windsor.

Urban Control CMS is based on the Itron Network solution which is a Mesh Network.

Itron are a member of the TALQ Consortium who aims to define a globally accepted smart city protocol for central management software to configure, control, command and monitor heterogeneous smart city device networks.

Individual Mesh nodes can communicate over 100m line of sight, and hop through up to 15 devices before reaching an access point several kilometre away. Network designs typically average 10 hops to ensure there is a huge amount of path redundancy in the event of individual device failure, or localised power outages.

The system comprise the following:

### Urban Master

Urban master is the user interface for the CMS which is web hosted by Urban Control available through a modern compliant web browser on PC, MAC and Smart Phones and capable of interfacing with 3rd party systems.

### Access Point

Urban Control Access Points provide the central link between endpoint devices such as Nodes, sensors etc. delivering secure communications over an IPv6 network. The Access Point is mounted easily on existing columns and supports connection to up to 15,000 endpoints. However Access Points are typically deployed on 1:10,000 ratio in order to provide resilience.

## Urban Node

The Urban Node is a wireless module that plugs into ZHAGA receptacle. The Node is mounted on top of the LED luminaires. The DC Node consume less energy than AC Nodes and is Philips SR Driver compliant and Sensor Ready for Smart City application. With the on-board communication card, it provides a robust and secure two-way wireless communications in the secure IPv6 Urban Control Network.

Once installed the system will have the following capabilities:

### CMS system functionality

Item	Functionality	Operating Parameters
1	Equivalent Metering	Through the ELEXON approved Equivalent Meter and Meter Administrator
2	Two Way Communication	System performs daily connectivity self-test
3	Notify Component Failure	Automatically reports LED module and driver failure
		Provide audit trail for service restoration
		Provide data to identify "No Supply" faults
4	Electrical Switching	Remote switching by authorised user
		Automatic switching at pre-defined times
		Automatic switching to ambient light levels
		Trim on/off times to suit LED and Drivers types
5	Variable Light Levels	Dim to pre-defined stepped levels
		Continuously variable dimming at pre-defined times
		Continuously variable dimming by web-based access
6	Night Scouting	Daily Monitoring of lights in light

The developer shall ensure that upon installation and prior to adoption all equipment shall be fully operational in line with the above. For the avoidance of doubt this will include the Urban Control CMS.

The developer may contact Milestone Infrastructure who can facilitate for the Nodes to be connected to the existing Access Point Network and provide hosting and maintenance for a fee prior to adoption.

→ Please see Annex 2 (Specified Equipment)

## 6. Isolators

All lighting points shall have secondary isolation with fuse discrimination and composite double pole units to take multiple fuse ways if required.

→ Please see Annex 2 (Specified Equipment)

## **7. Wiring, Earthing and Bonding**

All installations shall conform to the IEE Wiring Regulations. All wiring within the lighting units shall be with 3 core 2.5mm flex. Bonding to columns from the earth marshalling point shall be with 6mm twisted multi strand single core cable. No redundant colour schemes for cabling are to be used.

## **8. Energy**

The developer will liaise with the local district network operator (DNO) to ensure all energy charges are covered and paid for until the adoption has been completed and the asset has been transferred to SCC.

## **9. Attachments**

The developer must ensure any attachments applied to installed equipment are designed to be able to accommodate such equipment in relation to weight, size and windage. Any attachments shall have a 2.1metre clearance.

## **10. Acceptance Process**

The developer shall not offer the scheme for inspection to the Authority and until he is confident that all works have been completed satisfactory and as specified by the Authority and in accordance with this document.

The developer will notify the Authority in writing that the equipment is ready for inspection and this notification shall be accompanied by the following documents:

- Copy of original design data (drawings, calculations and if relevant third-party design approval certificate)
- As built drawings to include all network connections DNO or Private cable network. (revised design data if applicable)
- Electrical Test Certificates
- Column design and Check Certificates (for each column type)
- Column paint system data sheet
- Warranties
- Data sets as per Well – Lit – Highways ( Annex 4)
- Relevant Risk Assessments

The Authority will only arrange for the final inspection to take place when all of the above information has been provided and the inspection fee has been paid.

Where lighting units fail the inspection and require re-inspection at a later date a further inspection fee will be payable.

Only when the Authority and/or Milestone Infrastructure are satisfied that all equipment has been satisfactory installed will the street lighting system is accepted for adoption.

➔ Please see Annex 1(Check List)

## **11. Fees**

All fees will be discussed and agreed between Milestone Infrastructure and the Developer prior to any services being undertaken.

### **Design Checks**

Quotes will be issued as per the requirements of the submitted design.

### **Designs**

Quotes will be issued as per the requirements of the required works

### **Hosting and Maintenance Fees Prior to Adoption**

Quotes will be issued as per the scope of the required works

### **Inspections**

Inspection Fees will be agreed at the time of inspection and will be based on the total assets being put forward for adoption.

### **Adoption Fees**

Adoption Fees/Commuted Sums will be payable to Surrey County Council prior to any road / lighting being adopted (Annex 5 – adoption calculator)