

Land to Rear of 24 Stone Street, Gravesend, Kent External Lighting – Lux Calculation

01/03/2024 Revision: 02

Outline

MWL has been requested by the client to provide information for the discharge of planning conditions from Gravesham Borough Council, for a new development located at the rear of 24 Stone Street in Gravesend.

Prior to the commencement of development details of all proposed external lighting, including location, type, and luminosity, shall be submitted to, and approved by the Local Planning Authority.

External light fittings are distributed equally of luminosity on site plan as well as without disturbance and detrimental of opposite residential properties.

About the development

The new development is a 6-storey building, with the lower ground floor and upper ground floor to be utilised as commercial units and/or office spaces. First to fourth floor will be residential apartments, consist of 3 No. 1-bedroom flat and 11 no. 2-bedroom flat. The external lighting shall be provided to light up the perimeter of the building.

Initial Design Proposal

The proposed external lighting shall comply The Society of Light and Lighting as well as with the aid of dialux software to validate the average lux level sufficiency.

The perimeter of the building is to be supplied by LED light fitting with external lighting system that is controlled by an independent dusk and dawn switch to save energy.

The lighting lux calculation had been carried out based on the above design proposal.

Light Shielding and Technical Data Sheet

The light shield is an easy and excellent way to block the rays of outdoor LED Parking Lot light or led wall light from trespassing. It is a partial shield that stops the direction of outdoor light in one or more directions. It can be used to block the rays to travel upwards to comply with dark sky rules or sideways to help out a neighbour.

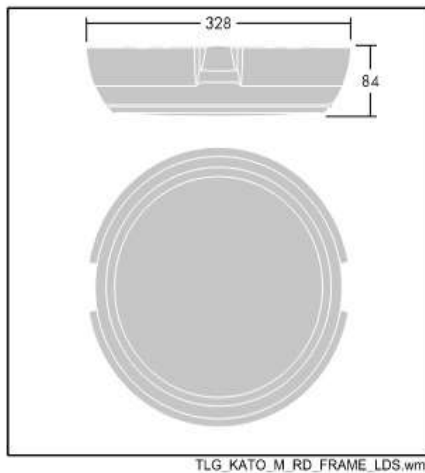
The technical data sheet below is to identify the Upward Light Output Ratio (ULOR) and Downward Light Output Ratio (DLOR):

Document Ref:	2967-ZZ-TN-63-01
Document Description:	External Lighting – Lux Calculation
Revision No:	02
Issue Date:	01/03/2024
Page No:	1 of 4

Katona

A round functional LED luminaire with deep body for side entry wiring capability, can be used with up to Ø20mm surface mounted conduit. Fixed output LED driver. Body: polycarbonate. Diffuser: opal polycarbonate. Class II electrical, IP66, IK10. Complete with 3000K LED. Suitable for direct mounting to wall or ceiling. Loop-in, loop-out is possible for cables up to 2.5mm². BESA compatible.

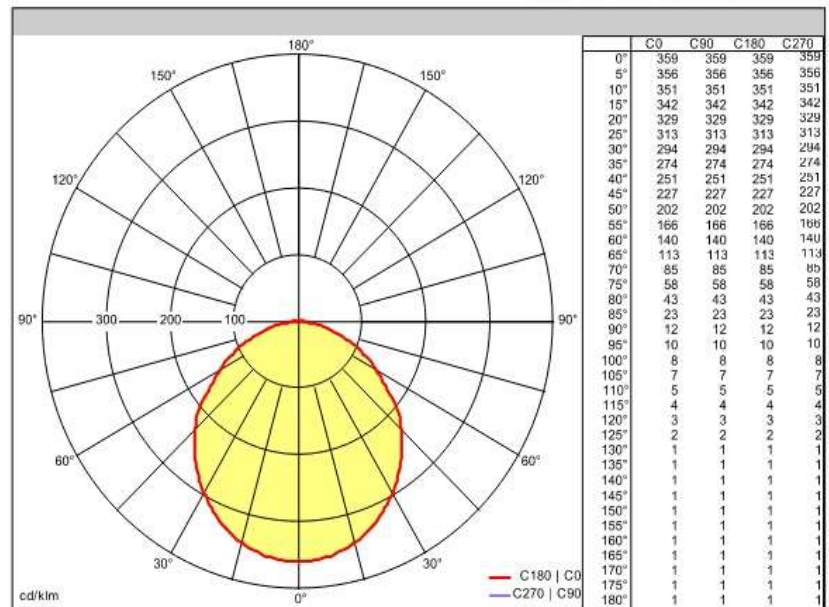
Dimensions: Ø328 x 84 mm
Luminaire input power: 11.7 W
Luminaire luminous flux: 1200 lm
Luminaire efficacy: 103 lm/W
Weight: 1.47 kg



Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 1200 lm
Luminaire efficacy*: 103 lm/W
Colour Rendering Index min.: 80
Ballast: 1 x 87500577 LC 10W 350mA fix C SNC
LOR: 1,00 ULOR: 0,03 DLOR: 0,97

This product contains a light source of energy efficiency class D.

UPWARD LIGHT OUTPUT RATIO (ULOR)
DOWNWARD LIGHT OUTPUT RATIO (DLOR)



Light output ratio		Glare Evaluation		Classification	
LOR	100 %	X = 4 H, Y = 8 H	S = 1.00 H	LITG	A41
ULOR	3 %	Reflection factors	70/50/20	EN	
DLOR	97 %	UGR transversal	<22	BZ	BZ4
FFR	0.03 (3.97)	UGR axial	<22	UTE	0.97 D + 0.03 T
BLF	1.00			CIE Flux Codes	48 79 95 97 100

UPWARD LIGHT OUTPUT RATIO (ULOR)
DOWNWARD LIGHT OUTPUT RATIO (DLOR)

Lighting Lux Calculation

The lux used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface.

The recommended light output refers to the minimum number of lux that should be present at the immediate workplace such as exterior and as shown in the table:

Document Ref:	2967-ZZ-TN-63-01
Document Description:	External Lighting – Lux Calculation
Revision No:	02
Issue Date:	01/03/2024
Page No:	2 of 4

Table 3.2 Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light	Luminance	
	E_v		I		ULR	L_b	L_s
	lx		cd		%	cd·m ⁻²	cd·m ⁻²
	Pre curfew ^(a)	Post curfew	Pre curfew	Post curfew		Building	Signs
E1	2	0 ^(b)	2500	0	0	0	50
E2	5	1	7500	500	0.05	5	400
E3	10	2	10 000	1000	0.15	10	800
E4	25	5	25 000	2500	0.25	25	1000

^(a) In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

^(b) If the luminaire is for public (road) lighting, then this value may be up to 1 lx.

Where:

E1 represents intrinsically dark areas, such as national parks or protected sites

E2 represents low district brightness areas, such as industrial or residential rural areas

E3 represents medium district brightness areas, such as industrial or residential suburbs

E4 represents high district brightness areas, such as town centres and commercial areas

E_v is the maximum value of vertical illuminance on properties in lx

I is the light intensity of each source in the potentially obtrusive direction in cd

ULR is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude, and given in %

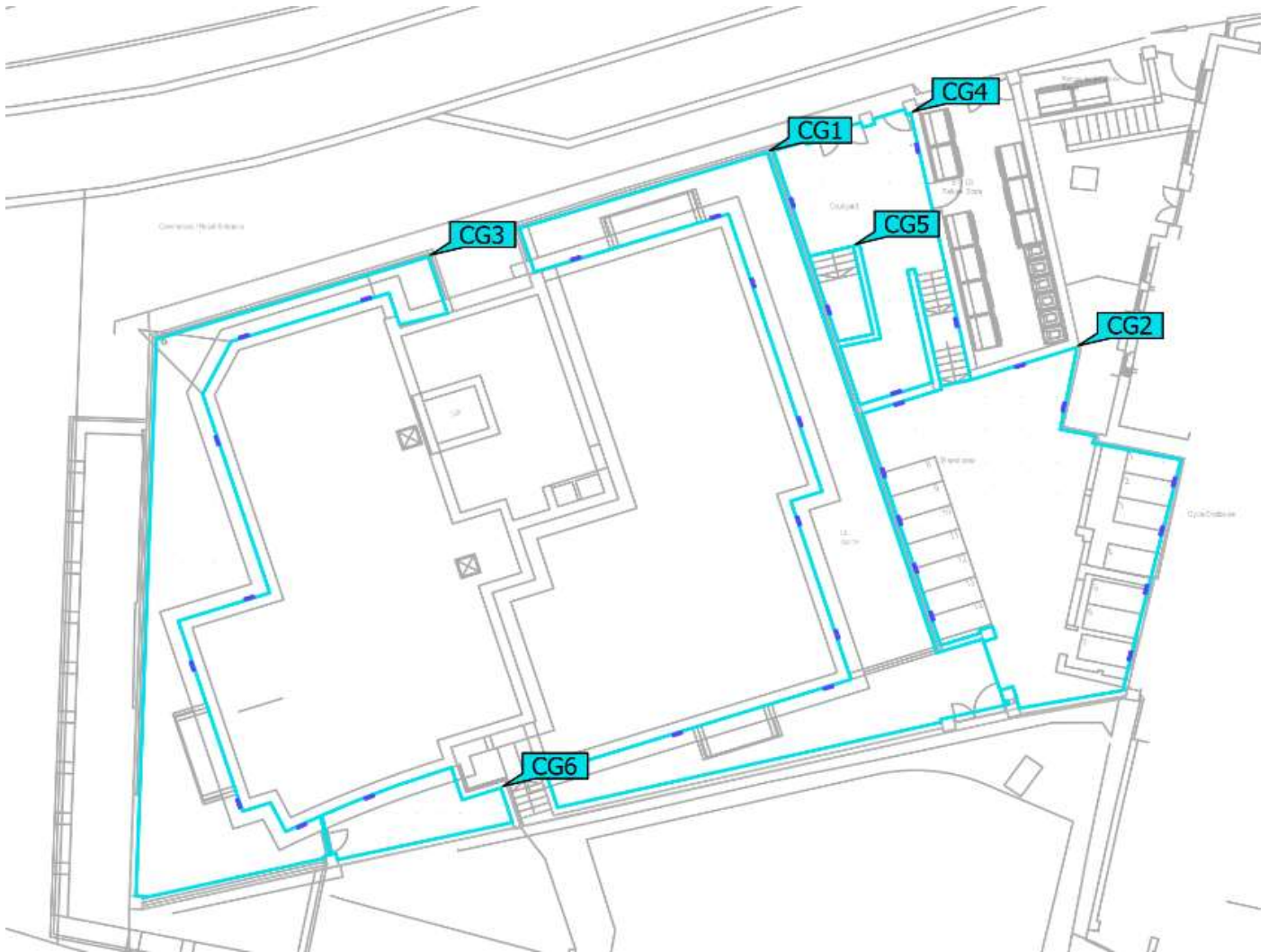
L_b is the maximum average luminance of the facade of a building in cd·m⁻²

L_s is the maximum average luminance of signs in cd·m⁻².

The average lux level for the building perimeter will be 11.6 lux, 44.6 lux, 13 lux, 30.7 lux, 48.5 lux and 11.9 lux respectively and within the range of recommended The Society of Light and Lighting lux level as well as calculation objects per area as shown below.

Properties	$\bar{E}$	E_{min}	E_{max}	g_1	g_2	Index
Calculation surface 2 Perpendicular illuminance: Height: 4.050 m	11.6 lx	2.85 lx	20.1 lx	0.25	0.14	CG1
Calculation surface 5 Perpendicular illuminance: Height: 4.050 m	44.6 lx	0.000 lx	109 lx	0.00	0.00	CG2
Calculation surface 12 Perpendicular illuminance: Height: 4.050 m	13.0 lx	1.39 lx	24.2 lx	0.11	0.057	CG3
Calculation surface 13 Perpendicular illuminance: Height: 0.808 m	30.7 lx	0.044 lx	53.7 lx	0.001	0.001	CG4
Calculation surface 14 Perpendicular illuminance: Height: 0.500 m	48.5 lx	0.002 lx	103 lx	0.000	0.000	CG5
Calculation surface 15 Perpendicular illuminance: Height: 4.050 m	11.9 lx	2.46 lx	29.9 lx	0.21	0.082	CG6

Document Ref:	2967-ZZ-TN-63-01
Document Description:	External Lighting – Lux Calculation
Revision No:	02
Issue Date:	01/03/2024
Page No:	3 of 4



Therefore, the calculated average lux level can assure vision from dusk until dawn and MWL's external lux calculations are subject for approval by the Local Planning Authority.

Document Ref:	2967-ZZ-TN-63-01
Document Description:	External Lighting – Lux Calculation
Revision No:	02
Issue Date:	01/03/2024
Page No:	4 of 4