

HCC Property Services
Electrical Engineering Services

E05077 Battle Street Development
Information for Planning – External Lighting Strategy

September 2022
Issue – For Planning

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Document:	Electrical Engineering Services – External Lighting – Information for Planning
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Revision History			
Issue number	Description	Author(s)	Date
1	Initial issue	HA	Sep 2022

1 Executive Summary

The following information outlines the strategy at Planning stage for the proposed external lighting at Battle Street Development, Reading. An appropriate lighting strategy for the site has been developed and assessment made of effects on the surrounding environment and neighboring properties.

The lighting scheme in this report is a lighting design strategy rather than a detailed design solution. It is recommended that the lighting strategy outlined in this report is adopted including criteria, luminaries, switching methods, lamp types etc. and developed into a more detailed design when undertaking the full external lighting design of the site.

An adequate and safe level of lighting will be provided for site tasks, residents and community activities, amenity and security, whilst maintaining a minimal impact on the site surroundings, environment and neighboring properties.

This lighting strategy considers building-mounted external lighting, pathway lighting, street lighting, car park lighting and lighting to the courtyard.

These proposals have been prepared with due note of the recommendations made within ILP Guidance Note 01: 2020 – Guidance notes for the reduction of obtrusive light.

2 Introduction

2.1 Scope of External Lighting Report

This report outlines the external lighting strategy for the new development and considers the potential effects of the proposed development's lighting installation on the surrounding areas. The report accompanies the planning application for the proposed Battle Street Development.

2.2 Site Location & Description

Battle Street Development is a 10-minute walk to the town centre, doctors, dentists, parks, shopping centres, etc. are all within easy walking distance. The development proposals seek permission for a full planning application.

The redevelopment of the site will result in the clearance and taking up of existing hardstanding and structures from the site; erection of seven buildings, up to four storeys in height, containing 49 affordable dwellings (Class C3 use), 13 supported

living flats (Class C2 residential institution use), and older persons day centre (Class E(f)); and associated roadways, car parking, open space and other infrastructure.

2.3 Objectives

The general objective of this report is to provide details of the proposed external lighting and assess the likely impact of the lighting scheme for the proposed Battle Street Development on the environment and surrounding areas.

The specific objectives of the proposed lighting scheme, when fully designed, will be able:

- To limit light pollution and sky glow
- To limit obtrusive light, spill light / trespass light and glare to neighboring land and properties
- To provide an external lighting strategy and level of illuminance that addresses site security and complies with the police initiative 'Secured by Design' approach
- To provide a safe and adequate level of illuminance for the proposed exterior areas, consisting of entrances/ exits, access routes for cars and lorries, pedestrian and cycle paths, loading bays and lay down areas, car parks and cycle parks, and to allow the site to receive deliveries notionally Mon-Fri 0700-1700, to be confirmed and agreed with the school
- To provide a safe level of illuminance for movement of vehicles, goods and persons

3 Assessment methodology

An appropriate initial lighting scheme for the site has been assessed using Relux standard industry software. Any stated lighting outputs have been calculated with all the luminaires switched on.

From these initial calculations, lighting plots illustrating the illuminance levels throughout the site and at the boundary have been produced so that the lighting scheme's impact can be assessed. Refer to accompanying lighting information for details.

3.1 Lighting Design Criteria

Relevant legislation, key guidance documents and design standards will be indicated as part of this lighting report, which will form the basis of the detailed lighting design.

3.2 Legislation

3.2.1 Clean Neighbourhoods and Environment Act

- The Clean Neighbourhoods and Environment Act 2005 (CNEA) amended Section 79 of the Environmental Protection Act 1990
- Since 6th April 2006, artificial light can be considered a statutory nuisance unless it is from exempt premises.
- If a light nuisance is considered by a local authority to exist, the local authority must serve a notice on the person responsible requiring the abatement of the nuisance, and/or restricting or prohibiting its recurrence.

3.3 National Policy

3.3.1 National Planning Policy Framework

- The National Planning Policy Framework (NPPF) was revised on the 24th of July 2018 and subsequently updated on 19th February 2019 and 19th June 2019. This supersedes the existing policy within the previous NPPF (March 2012). The revised NPPF includes several references to the need to consider the effects of artificial lighting.

3.4 Local Policy

3.4.1 Reading Borough Local Plan (2019)

- The Reading Borough Local Plan was adopted in November 2019 and guides development in Reading up to 2036.
- CC7: Design and the Public Realm: The development will be of high design quality that maintains and enhances the character and appearance of the area of Reading in which it is located.
- CC8: Safeguarding Amenity: The Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of Artificial lighting.
- EN16: Pollution and Water Resources: The Development will only be permitted where it would not be damaging the environment and sensitive receptors through land, noise, or light pollution.

3.5 Standards

- BS EN 13201-1:2014 Road Lighting, Part 1 Guidelines on selection of lighting classes: specifies the lighting classes set out in EN 13201-2 and gives guidelines on the selection of the most appropriate class for a given situation.
- BS EN 13201-2:2015 Road lighting - Performance requirements: Defines performance requirements which are specified as lighting classes for road lighting aiming at the visual needs of road users, and it considers environmental aspects of road lighting.
- BS EN 5489-1:2013 Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas: This document provides specific guidance on selecting lighting classes that will help design more energy efficient road lighting schemes. It gives the most up-to-date recommendations for general principles of road lighting including aesthetic, technical aspects, operation and maintenance.
- BS EN 12464-2:2014 Light and lighting - Lighting of workplaces Part 2: Outdoor work: This document outlines requirements for lighting outdoor work places, focusing primarily on visual comfort and performance.
- CIBSE (2016) Lighting Guide LG6 – The Outdoor Environment: presents lighting solutions to basic visual problems and individual characteristics of outdoor lighting applications.

3.6 Lighting Requirements

All external lighting will be designed in accordance with the following lighting standards and guidance, as a minimum.

- BS EN 12464-2:2014; Light and lighting – Lighting of workplaces Part 2: Outdoor work.
- BS EN 5489-1:2013; Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas.
- BS EN 13201-1:2015 Road Lighting, Part 1 Guidelines on selection of lighting classes.
- BS EN 13201-2:2015 Road Lighting, Part 2 Performance Requirements.
- CIBSE (2016) Lighting Guide LG6 – The Outdoor Environment.

4 The Proposed Lighting Scheme

The lighting scheme detailed in this report is a lighting design strategy rather than a detailed design solution.

4.1 Recommended Lighting Level Values

Lighting levels will be in accordance with SLL Code for Lighting and ILP Guidance Note 01-2020 – Guidance note for the reduction of obtrusive light.

4.2 Strategy for Minimizing Obtrusive Light and Visual Impact of Lighting Schemes

Careful consideration will be given to reducing obtrusive light during the night and the visual impact of the lighting scheme during the day, whilst maintaining an adequate level of illuminance for its application on the site. Particular attention will be paid to minimizing any intrusion, glare or sky glow produced by the scheme.

The proposed columns have been chosen to be as inconspicuous as possible. The luminaire, arm bracket and column shall generally be galvanized steel or grey colored. All the luminaires will have 0% upward light ratio, and all necessary measures to reduce the visibility of the light source.

Wherever possible luminaires are to be orientated towards the site, away from the land outside the site to make them less intrusive. Luminaires have been selected to have good light control and cut off angles to reduce light spillage. All the luminaires are directed at the ground to minimize glare.

Building mounted luminaires have been proposed to illuminate final exits and pathways around the building, which have a flat glass to reduce visibility of the light source and have 0% upward light component.

Consideration has been given to reducing the extent of illuminance falling on the building façade to reduce the visual impact of the buildings from a distance, whilst maintaining safe light levels for pedestrian circulation during the hours of darkness, and for security.

4.3 Strategy for Luminaire Types

The site shall be lit using LED luminaries throughout. These will be column- mounted in the car park area, and building mounted LED luminaires will be utilized around the building for amenity and security purposes.

LED luminaires will be utilized throughout, which will provide good colour rendering to improve visibility and provide a safer environment in line with a 'secured by design' approach. Using LED luminaires will provide an energy efficient solution, and Part L and BREEAM compliance. The proposed luminaries, or equal and approved, have

been selected as they have been designed to be anti-light pollution and low glare with good levels of efficiency and low upward light ratio.

4.4 Lighting Strategy and Luminaire Controls

Lighting controls will be utilized to ensure energy saving and minimized impact on the surrounding areas.

The street lighting and car park lighting will be timeclock controlled, with individual switches for each lighting column, which will be located in a control cubicle in a suitable location, with consideration given to a duplicate set of switch controls located within the building. Time periods will be set to facilitate community use for the required days/times.

Override facility will be installed should car park lighting outside normal time periods be required.

Building mounted lighting for amenity and security, at the public areas, will have timeclock and photocell control, with lights coming on at dusk for amenity and security use, and going off at a pre-determined time, which will be agreed.

Building mounted lighting and balcony lighting for the individual flats, will have their individual own light switch at the control of the tenant.

Photocells are to be used as a primary control on all amenity and car park lighting so that no luminaries will be left on during daylight hours. In addition, several programmable 7-day time clocks will be wired into the control system so that the amenity lighting circuits can be programmed to turn on/off as and when they are needed to suit the development activities.

4.5 Lighting for Car Park Pedestrian Pathways

For EL-1 column-mounted, dark sky compliant luminaries, utilizing 20W LED luminaires as per Thorn Alumet Control Direct LED architectural lighting columns. These luminaries also have controlled directional light with zero upward light output to reduce light pollution, light spill and discomfort glare. The lighting columns will be positioned to keep light spill beyond the site boundary to a minimum.

4.6 Building mounted luminaires

Building-mounted luminaires are proposed for amenity and security outside and around the buildings, which are proposed by CLS:

- For EL-2 luminaire PRO35SR-1 (by Complete Lighting Services - CLS)
- For EL-3 luminaire ENOLA (by Complete Lighting Services - CLS)
- For EL-4 luminaire Bollard (by Complete Lighting Services - CLS)
- For EL-5 luminaire ESKINA FRAME (by Complete Lighting Services - CLS)

5 Assessment of the impact of the overall lighting scheme

Drawings:

- E05077 HCC 00 00 DR E 8104
- E05077 HCC 00 00 DR E 8105
- E05077 HCC 00 00 DR E 8106
- E05077 HCC 00 00 DR E 8107

And the accompanying manufacturer's calculations and data sheets, show the lighting scheme for the:

- Car park and pedestrian pathway
- The rest of the site

With the illuminance levels shown throughout the site and at the boundaries. The calculation model was prepared using industry standard software, Relux. It shows that adequate levels of lighting have been achieved on the site with minimal effect on the surrounding area, as required by the various standards.

6 Conclusions

By adopting the lighting strategy including criteria, luminaires, control and switching methods etc. outlined in this report it can be concluded that:

- Lighting levels at the site boundary will be as regulated by the current standards.
- The proposed luminaires and the provided lighting levels should not cause excessive glare to neighboring properties.
- The majority of the luminaires will not be directly visible to neighboring properties.
- The effect on the night sky should be minimal inside the site and zero outside the site.
- The lighting scheme will be energy efficient utilizing luminaires with high efficiency LED light sources, combined with efficient lighting controls.
- An adequate and safe level of lighting can be provided for site tasks, amenity

and security, whilst maintaining a minimal impact on the site surroundings, environment and neighboring properties.

96274743 ALUMET CD 24L25-730 WSC-A CL LRT CL2 G4

LED 20W ALUL_24L25WSC3KCL	ISO 9223 C3	IP66	IK10							Ta25
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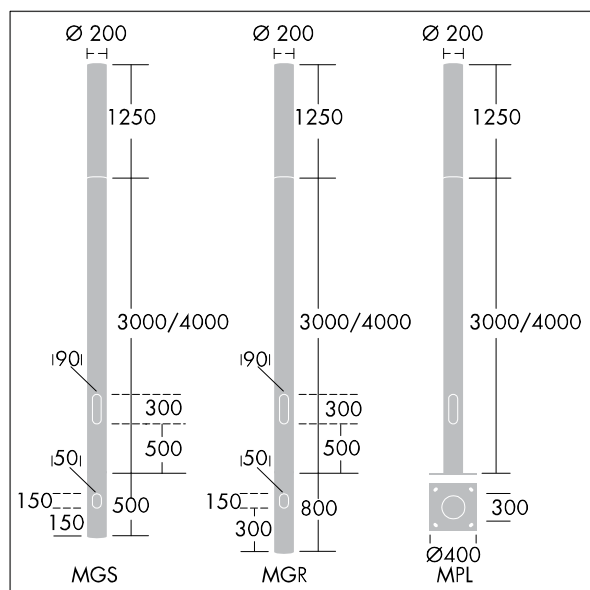
Alumet Control Direct

An architectural lighting column head with 24 LEDs driven at 250mA with a Wide Street & Comfort, asymmetric distribution and clear optic, configured for power reduction, controlled by an additional switched phase cable. ON = 100%, OFF = 50%, Top cap: die-cast aluminium. Diffuser: clear UV stabilised polycarbonate treated with anti graffiti varnish. Top cap and column: powder coated textured silver grey (close to RAL 9006), other RAL colours on request. Class II electrical, IK10, IP66. To be mounted on an Alumet column. Surge protection: 10kV single pulse common mode and 8kV multipulse common mode and 6kV multipulse differential mode. If permanent DALI system is connected, 6kV multipulse common and differential mode. Complete with 3000K LED

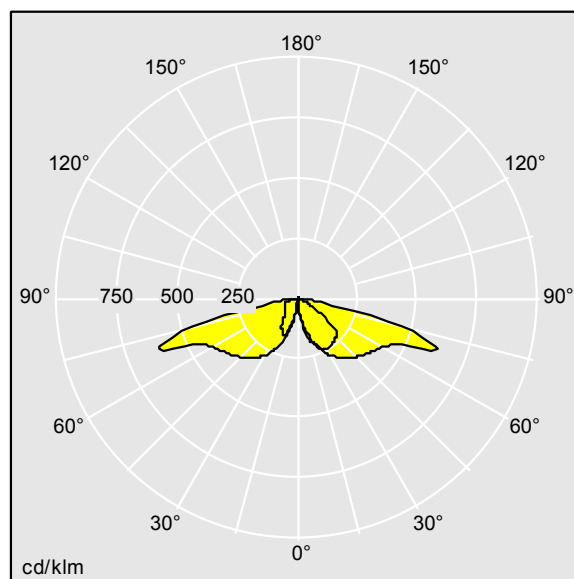
Dimensions: Ø200 x 1250 mm
Luminaire input power: 20 W
Luminaire luminous flux: 2069 lm
Luminaire efficacy: 103 lm/W
Weight: 9.8 kg
Sx: 0.079 m²



TLG ALUM F DIR LED24 LGY.jpg



TLG ALUM M 2LD1.wmf



TLLA ALCD24L25WSC3KG33 DC.Idt

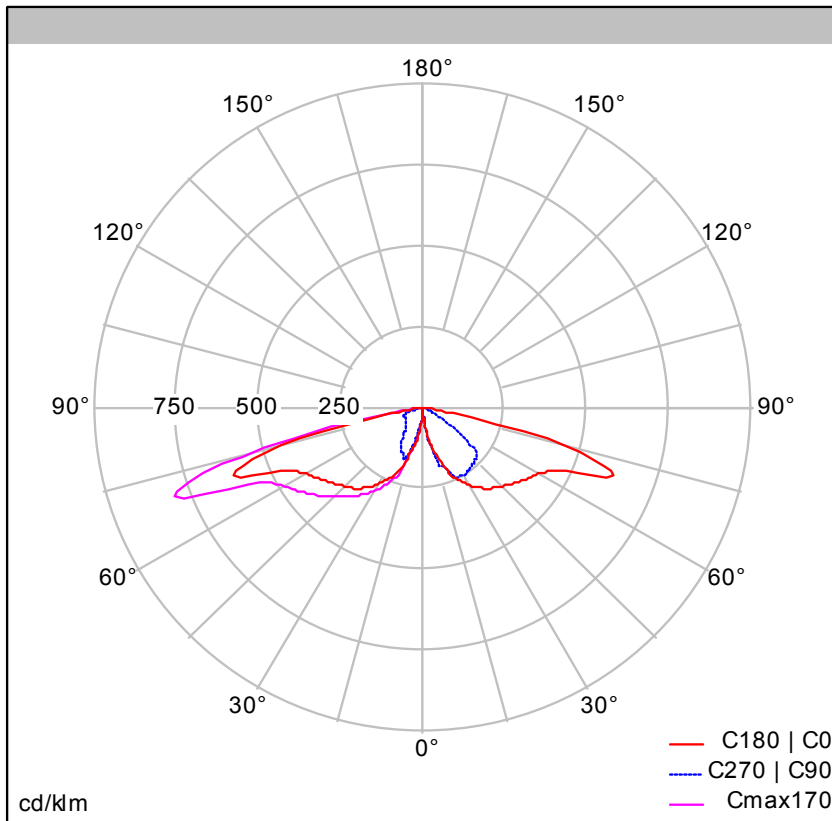
Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 2069 lm
Luminaire efficacy*: 103 lm/W
Colour Rendering Index min.: 70
Ballast: 1 x 96271178 DRV OS OT 60W 1.05A 115V
D #1A0 4DIM1 T2

Correlated colour temperature: 3000 Kelvin
Chromaticity tolerance (initial MacAdam): 5
Rated useful life (B10)*:
L80 100000h at 25°C
Luminaire input power*: 20 W Power factor = 0.95
Dimming: SETLRT dimmable to 10%
LOR: 1.00 ULOR: 0.00 DLOR: 1.00

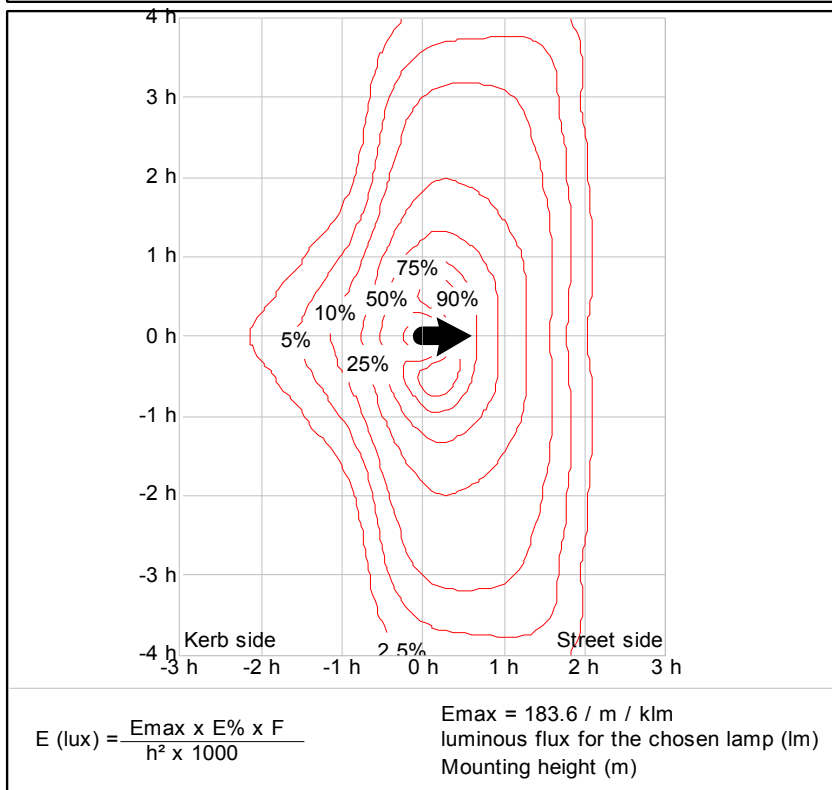
Alumet Control Direct

96274743 ALUMET CD 24L25-730 WSC-A CL LRT CL2 G4

THORN

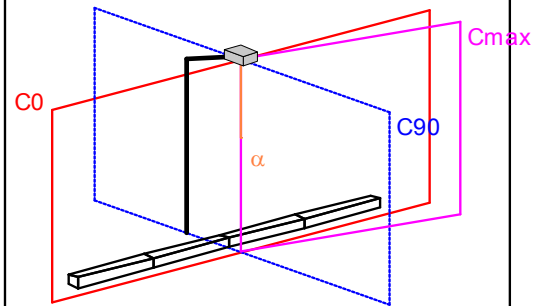


Measurement	ALCD24L25WSC3KG33
Catalogue number	Alumet CD 24L25 WSC 730
Lamps	1 x LED
Lamp adjustment	
IP	



Luminaire design attitude

Tilt: $\alpha = 0.0^\circ$



Maximum intensity

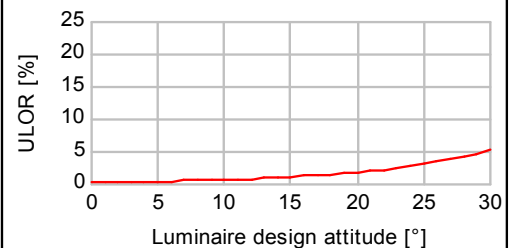
I_{max}	804 cd/klm
C_{max}	170 °
γ_{max}	70 °

Light Output Ratio

Luminaire design attitude	0.0 °
LOR	100.00
ULOR	0.00
DLOR	100.00

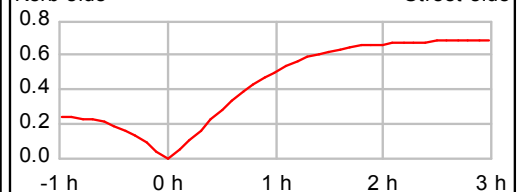
Upward light output ratio

3% for a tilt = 25°	5% for a tilt = 30°
10% for a tilt = 36°	15% for a tilt = 41°
20% for a tilt = 45°	25% for a tilt = 50°



Utilization Factors

0.5H = 0.28 1H = 0.50 2H = 0.67
Kerb side Street side



Glare restriction Obtrusive light

Luminous intensity class G2

γ	Meas. Data I_{max} in cd/klm	Specified in EN 13201-2
70 °	804	
80 °	135	150
90 °	9	30
>95 °	3	

Photometric data file: TLLA_ALCD24L25WSC3KG33_DC.ltd

Recessed PRO Black - 50 x 35

PRO35SR - XXX



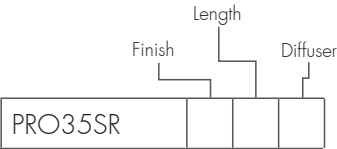
PRO



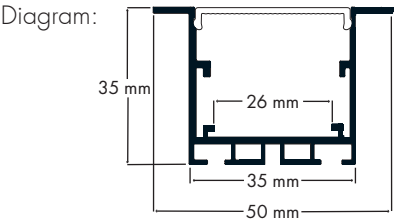
IP20

5 Year

Product Reference:



PRO35SR	Finish	Length	Diffuser	Accessories
	1 Black	1m 1 meter 2m 2 meter	O Opal C Clear	PRO-90D Corner Coupler PRO-180D Straight Coupler



* Each meter of Foss Profile comes with 2 Clips + End Caps as standard; for extra packs please quote code PRO35SR-1AC

Client

Date

Project Ref

Product Ref

Quantity

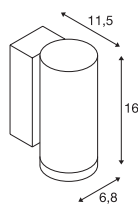
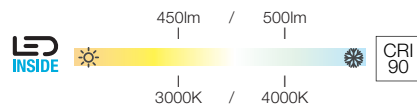




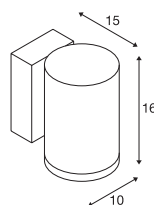
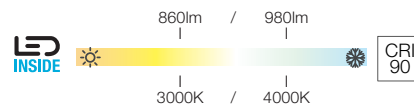
1003423 + 1005206 611 + 617

1003423 + 1005207 611 + 617

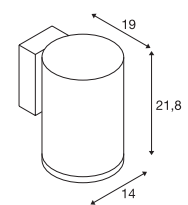
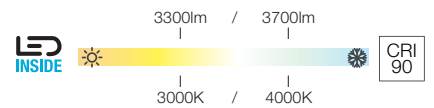


ENOLA ROUND S
WL, single

100-240V ~50/60Hz | 500mA
Total wattage: 6W
Material: aluminium/glass

ENOLA ROUND M
WL, single

220-240V ~50/60Hz | 500mA
Total wattage: 11W
Material: aluminium/glass

ENOLA ROUND L
WL, single

220-240V ~50/60Hz | 900mA
Total wattage: 36W
Material: aluminium/glass

Complete Lighting Services Limited
Rooksdown House, Southern Road, Basingstoke, Hants, RG21 3DZ
Tele: 01256 811600 Fax: 01256 811601 email: reception@completelighting.co.uk



		A → G
1003422	450/500lm 3000/4000K	A ↑ G ↓ E



■ Spacers	
Prod. no. 1002853	
■ Reflector, 60°	
Prod. no. 1005262	

Options	Prod. no.
450/500lm 3000/4000K CRI90	
■ anthracite	1003422



		A → G
1003423	860/980lm 3000/4000K	A ↑ G ↓ E



■ Spacers	
Prod. no. 1002853	
■ Lens, 19°	
Prod. no. 1005205	
■ Asymmetrical lens	
Prod. no. 1005206	
■ Reflector, 60°	
Prod. no. 1005207	

Options	Prod. no.
860/980lm 3000/4000K CRI90	
■ anthracite	1003423



		A → G
1003440	3300/3700lm 3000/4000K	A ↑ G ↓ E



■ Spacers	
Prod. no. 1002853	
■ Reflector, 60°	
Prod. no. 1005263	

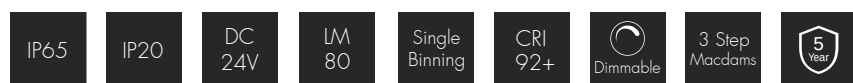
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3300/3700lm 3000/4000K CRI90	
■ anthracite	1003440

Single Colour - 20W Per Metre

FLS6 - XXXXX



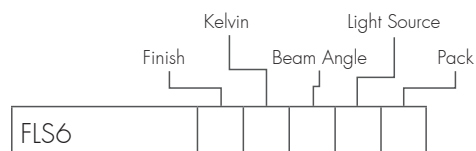
ECO



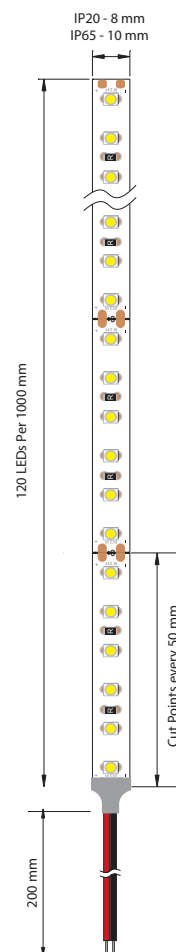
Our ECO SERIES 20W per metre LED Strip features branded high efficiency 2835 SMD LEDs on a 2oz PCB board for a durable finish.

Easy mounting thanks to added strength (3M 300LSE) self adhesive and backed up by a 3 year standard and 5 year Extended Manufacturer's Warranty.

Product Reference:



FLS6	Finish	Kelvin	Beam Angle	Light Source - Per Metre	Pack
	0 IP20	G 2700K	1 120°	S6 1620 - 1800 lm/20w	1 5 metre Reel
	5 IP65	C 3000K			2 10 metre Reel
		N 4000K			



Client

Date

Project Ref

Product Ref

Quantity





1004748 631

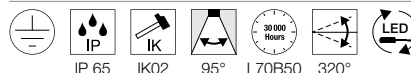
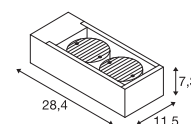
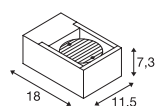
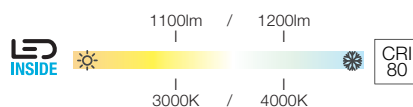


1004748 631

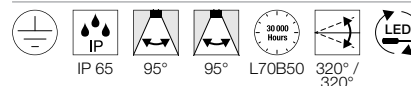
ESKINA FRAME WL



ESKINA FRAME WL, double



220-240V ~50/60Hz | 350mA
Total wattage: 15W
Material: aluminium



220-240V ~50/60Hz | 700mA
Total wattage: 27W
Material: aluminium

Complete Lighting Services Limited

Rooksdown House, Southern Road, Basingstoke, Hants, RG21 3DZ

Tele: 01256 811600 Fax: 01256 811601 email: reception@completelighting.co.uk



1004747	1100/1200lm 3000/4000K	A → G D
---------	---------------------------	------------

Options

Prod. no.

1100/1200lm | 3000/4000K | CRI80
■ anthracite **1004747**



Spot1/Spot2	1100/1200lm 3000/4000K	A → G D
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Options

Prod. no.

Spot 1: 1100/1200lm | 3000/4000K | CRI80
Spot 2: 1100/1200lm | 3000/4000K | CRI80
■ anthracite **1004748**



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Min/Avg	Min/Max
01 Battle Street Road - Blue	Illuminance	Lux	6.92	14.0	1.6	0.23	0.11
02 Battle Street Path - Green	Illuminance	Lux	7.14	12.4	1.8	0.25	0.15
Pill Light - Black	Illuminance	Lux	0.88	12.0	0.0	0.00	0.00

Bedford Road

Ref	Date	Revision
No.		
		
Project Title: Balle Street New Road Lighting		
Area:		
Client:		
Scale: 1:200 @ A0	Project Number: 0002250588	
Date: 15/09/22	Rev Number: R1	
Drawn By: SJ		Checked By:
Drawing Number: 0002250588 EXT R1 150922		
Drawing Status: For Approval		
ZG Lighting (UK) Ltd, Durhamgate, Spangley, Co. Durham, DL16 6HJ, Tel: 01388 420042		



Exterior3 - Main Building - Llighting

Installation : Battle Street reading

Project number : P0922007

Customer :

Processed by :

Date : 16.09.2022

Project description:

Luminaire height - Various

Working Plane: 0m.

Maintenance Factor: 0.8

Reflection Factors: 50% Walls, 20% Floor

The calculations predict illuminance levels based on the correct luminaire being installed as shown in this document. Any deviation to the product type or lamp type will render the calculations void. This similarly applies to changes of mounting height, reflection factors or maintenance factor.

Ensure that the design parameters meet the client specification

The following values are based on exact calculations on calibrated lamps, luminaires and their arrangement. In practice, gradual divergences can occur.

Guarantee claims for luminaire data are excluded.

Relux and the luminaire manufacturers accept no liability for consequential damage and damage which is occasioned to the user or to third parties.

Object : Exterior3 - Main Building - Llighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



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Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



1 Luminaire data

1.1 Complete Lighting Services Limited, ENOLA (1003423)

1.1.1 Data sheet

Manufacturer: Complete Lighting Services Limited

1003423 ENOLA

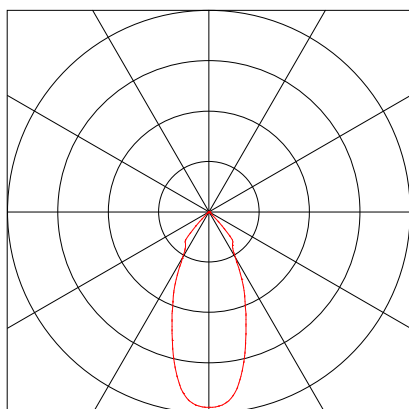
Luminaire data

Luminaire efficiency : 103.667%
Luminaire efficacy : 92.55 lm/W
Classification : A70 ↓100.0% ↑0.0%
CIE Flux Codes : 94 99 100 100 104
UGR 4H 8H : <10.0 / <10.0
Power : 11 W
Luminous flux : 1018 lm

Equipped with

Quantity : 1
Designation : LED
Colour :
Luminous flux : 982 lm

Dimensions : Ø100 mm x 160 mm



Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



1 Luminaire data

1.2 Complete Lighting Services Limited, COB Round 20W LED Bollard ... (B1C34X5U41K)

1.2.1 Data sheet

Manufacturer: Complete Lighting Services Limited

B1C34X5U41K **COB Round 20W LED Bollard 968mm high**

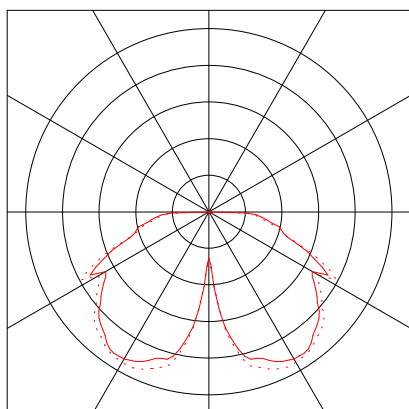
Luminaire data

Absolute Photometry
Luminaire efficacy : 87.43 lm/W
Classification : A30 ↓100.0% ↑0.0%
CIE Flux Codes : 35 68 90 100 100
UGR 4H 8H : 26.1 / 26.0
Power : 26.1 W
Luminous flux : 2282.1 lm

Equipped with

Quantity : 1
Designation : QSSI C3 5W
180MA COB
4PCS
Colour :

Dimensions : Ø234 mm x 100 mm



Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



1 Luminaire data

1.3 Complete Lighting Services Limited, Extruded enclosure wit... (FLS5-5N IP65 4000K)

1.3.1 Data sheet

Manufacturer: Complete Lighting Services Limited

FLS5-5N IP65 4000K

Extruded enclosure with 15W LED tape IP65 4000K

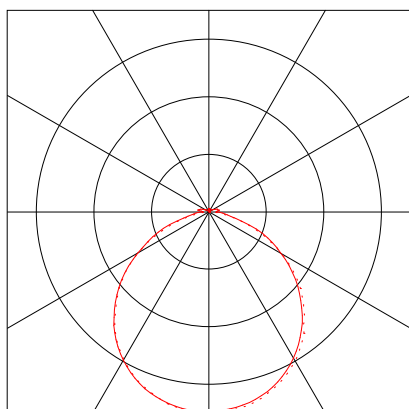
Luminaire data

Absolute Photometry
Luminaire efficacy : 90 lm/W
Classification : A41 ↓96.6% ↑3.4%
CIE Flux Codes : 49 81 96 97 100
UGR 4H 8H : 32.8 / 32.0
Power : 15 W
Luminous flux : 1350 lm

Equipped with

Quantity : 1
Designation : LED
Colour : 4000K
Colour reproduction : 92

Dimensions : 1000 mm x 10 mm x 4 mm



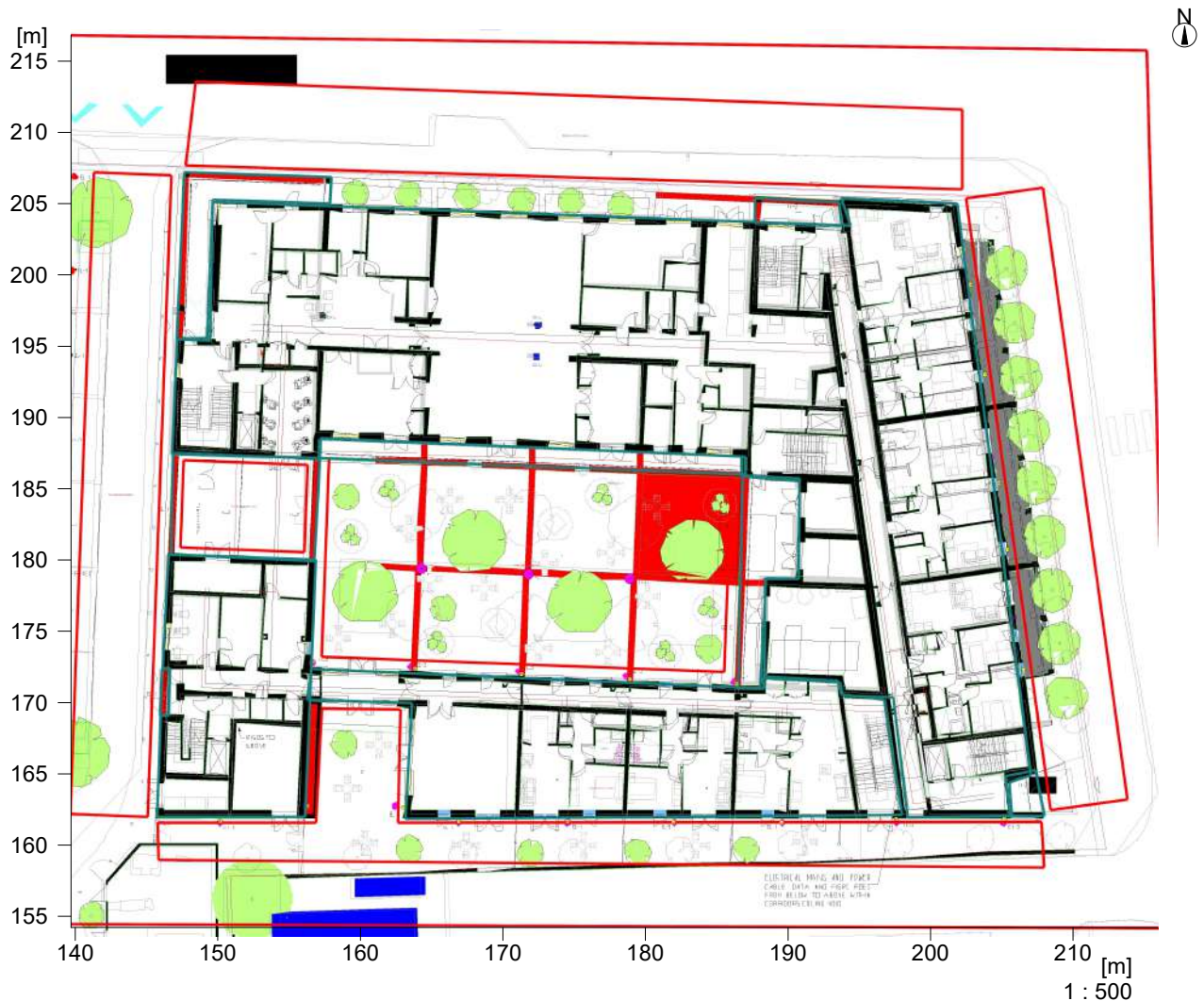
Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2 Exterior 3

2.1 Description, Exterior 3

2.1.1 Floor plan

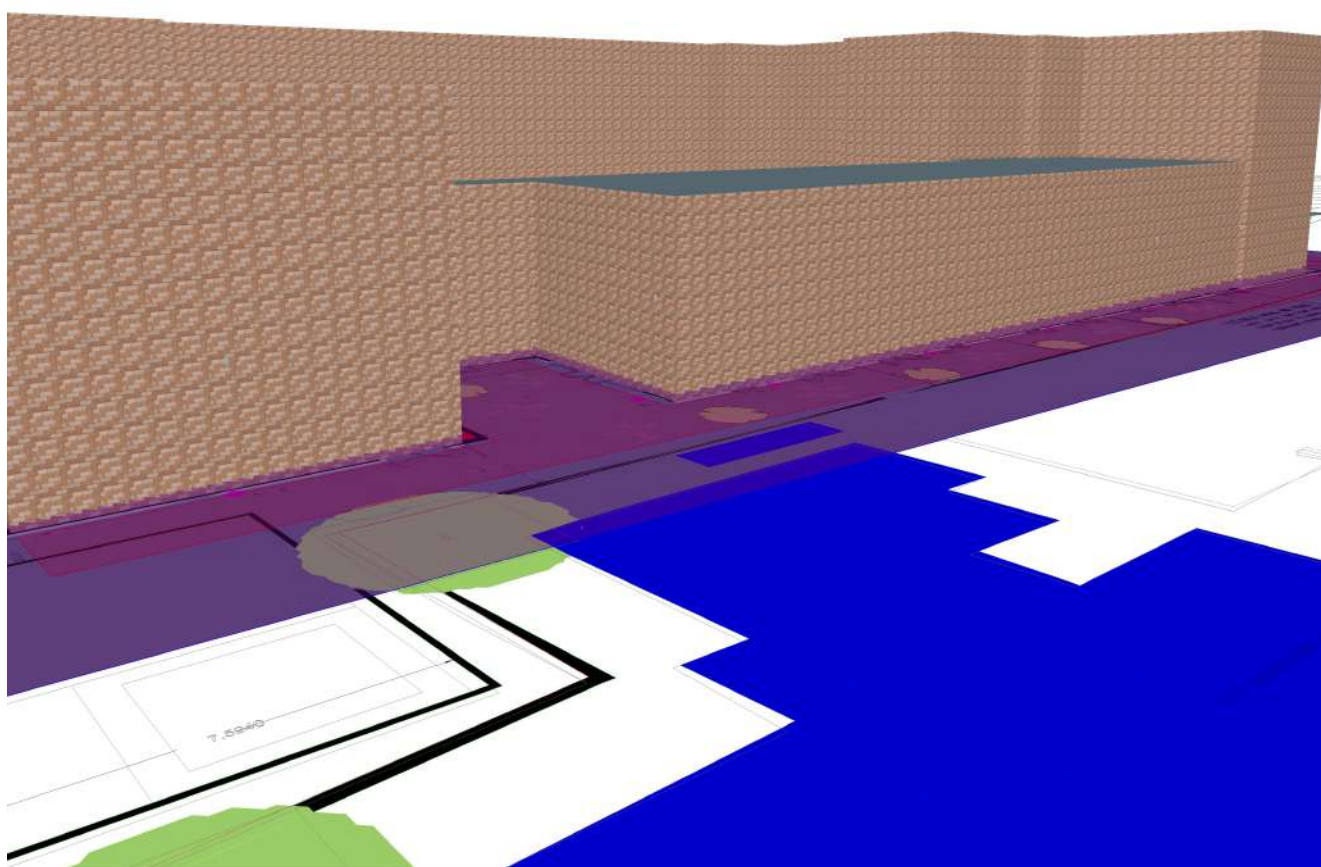


Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.1 Description, Exterior 3

2.1.2 3D view, View 1



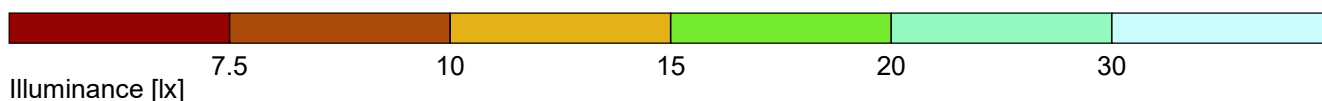
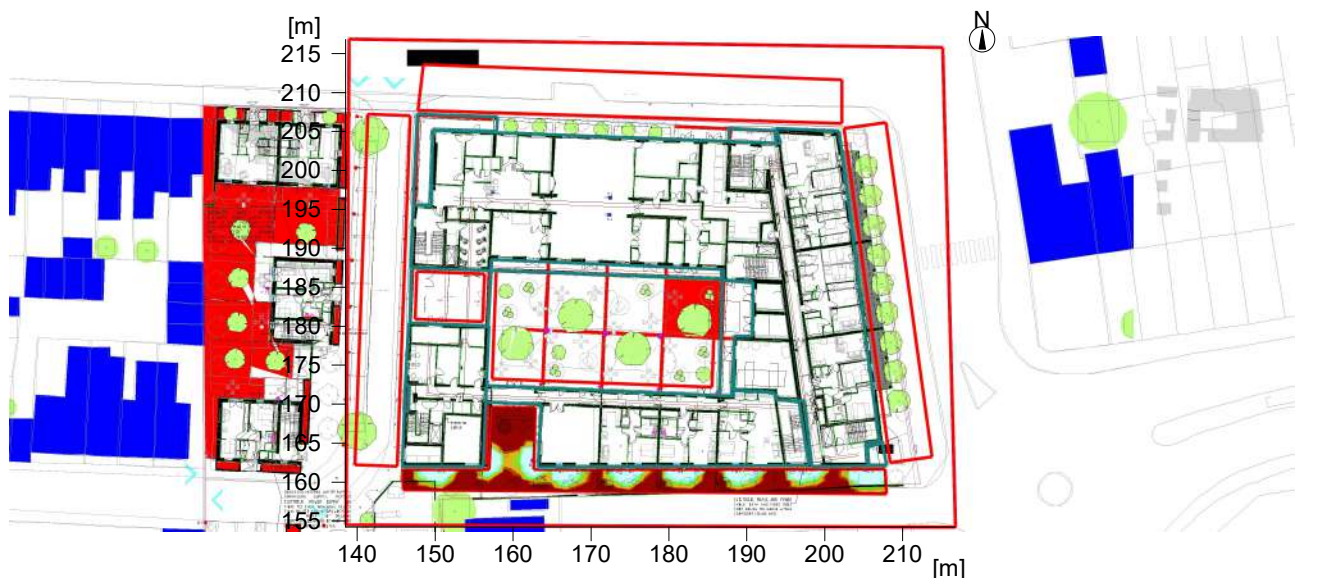
Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2 Exterior 3

2.2 Summary, Exterior 3

2.2.1 Result overview, South Ground Floor Illuminance



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80

Total luminous flux of all lamps	152404.203 lm
Total power	1697.3 W
Total power per area (4777.69 m²)	0.36 W/m²

Illuminance

Average illuminance	Eav	16 lx
Minimum illuminance	Emin	0 lx
Maximum illuminance	Emax	124 lx
Uniformity Uo	Emin/Em	1:91.8 (0.01)
Diversity Ud	Emin/Emax	1:711 (0)

Type No.\Make

Complete Lighting Services Limited	
1	19
	Order No. : 1003423
	Luminaire name : ENOLA
	Equipment : 1 x LED 11 W / 982 lm
2	3
	Order No. : B1C34X5U41K
	Luminaire name : COB Round 20W LED Bollard 968mm high
	Equipment : 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2 Exterior 3

2.2 Summary, Exterior 3

2.2.1 Result overview, South Ground Floor Illuminance

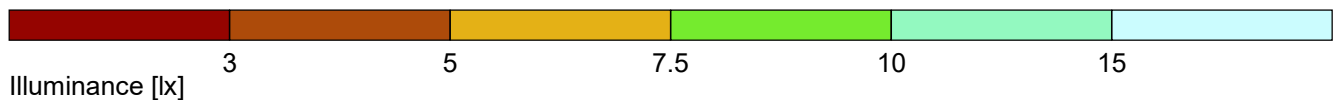
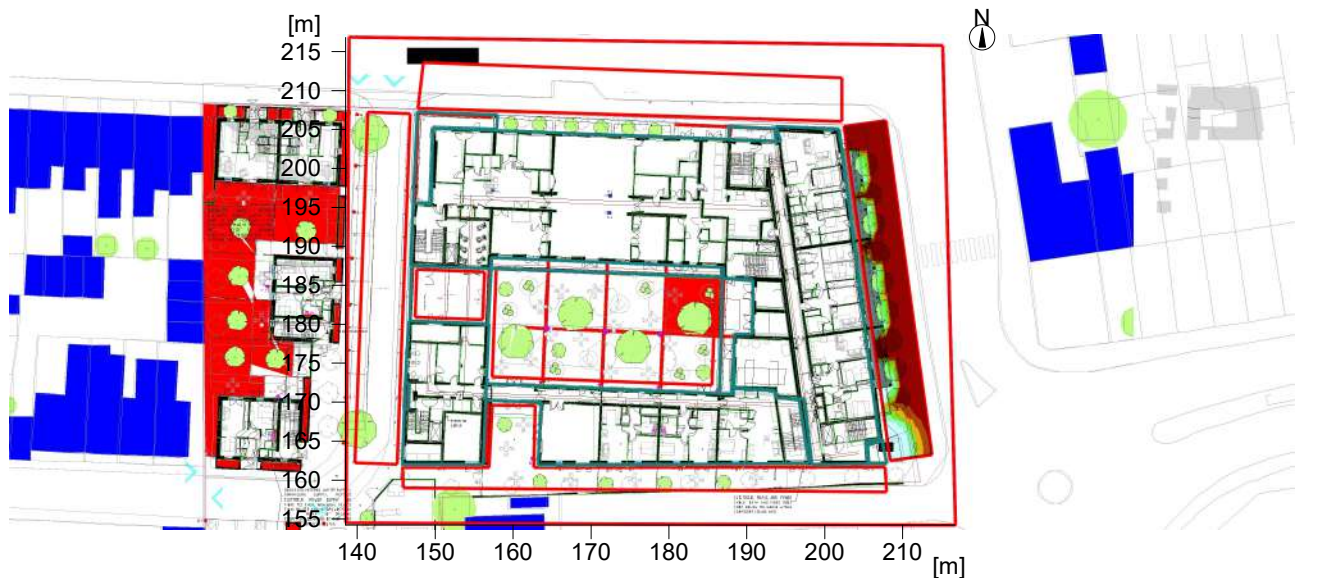
3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.2 Result overview, East Ground Floor Illuminance



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80

Total luminous flux of all lamps	152404.203 lm
Total power	1697.3 W
Total power per area (4777.69 m²)	0.36 W/m²

Illuminance

Average illuminance	Eav	7.9 lx
Minimum illuminance	Emin	0.1 lx
Maximum illuminance	Emax	62.5 lx
Uniformity Uo	Emin/Em	1:60.4 (0.02)
Diversity Ud	Emin/Emax	1:476 (0)

Type No.\Make

Complete Lighting Services Limited			
1	19	Order No.	: 1003423
		Luminaire name	: ENOLA
		Equipment	: 1 x LED 11 W / 982 lm
2	3	Order No.	: B1C34X5U41K
		Luminaire name	: COB Round 20W LED Bollard 968mm high
		Equipment	: 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm

Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.2 Result overview, East Ground Floor Illuminance

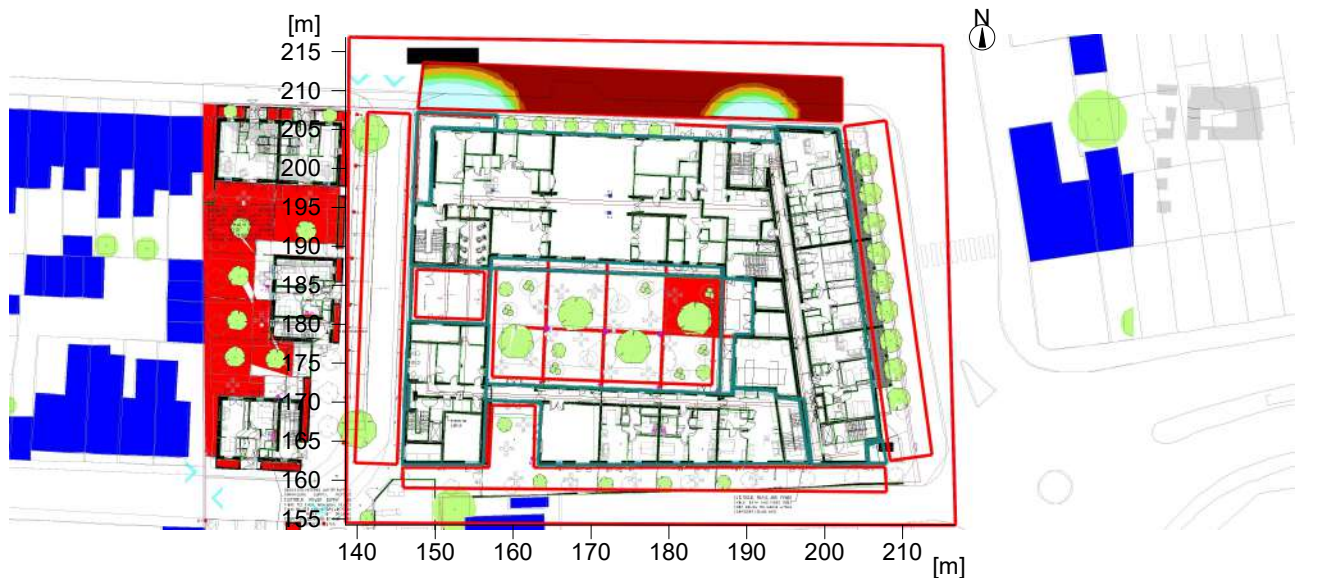
3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.3 Result overview, Nortyh Ground Floor Illuminance



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80

Total luminous flux of all lamps	152404.203 lm
Total power	1697.3 W
Total power per area (4777.69 m ²)	0.36 W/m ²

Illuminance

Average illuminance	Eav	13 lx
Minimum illuminance	Emin	0 lx
Maximum illuminance	Emax	129 lx
Uniformity U ₀	Emin/Em	1:81.3 (0.01)
Diversity U _d	Emin/Emax	1:788 (0)

Type No.\Make

Complete Lighting Services Limited			
1	19	Order No.	: 1003423
		Luminaire name	: ENOLA
		Equipment	: 1 x LED 11 W / 982 lm
2	3	Order No.	: B1C34X5U41K
		Luminaire name	: COB Round 20W LED Bollard 968mm high
		Equipment	: 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.3 Result overview, Nortyh Ground Floor Illuminance

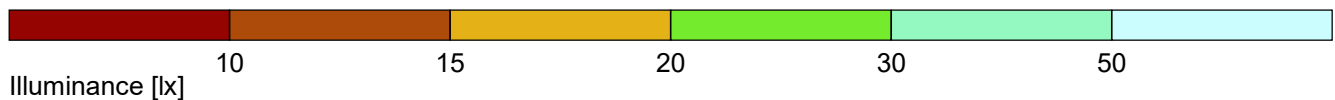
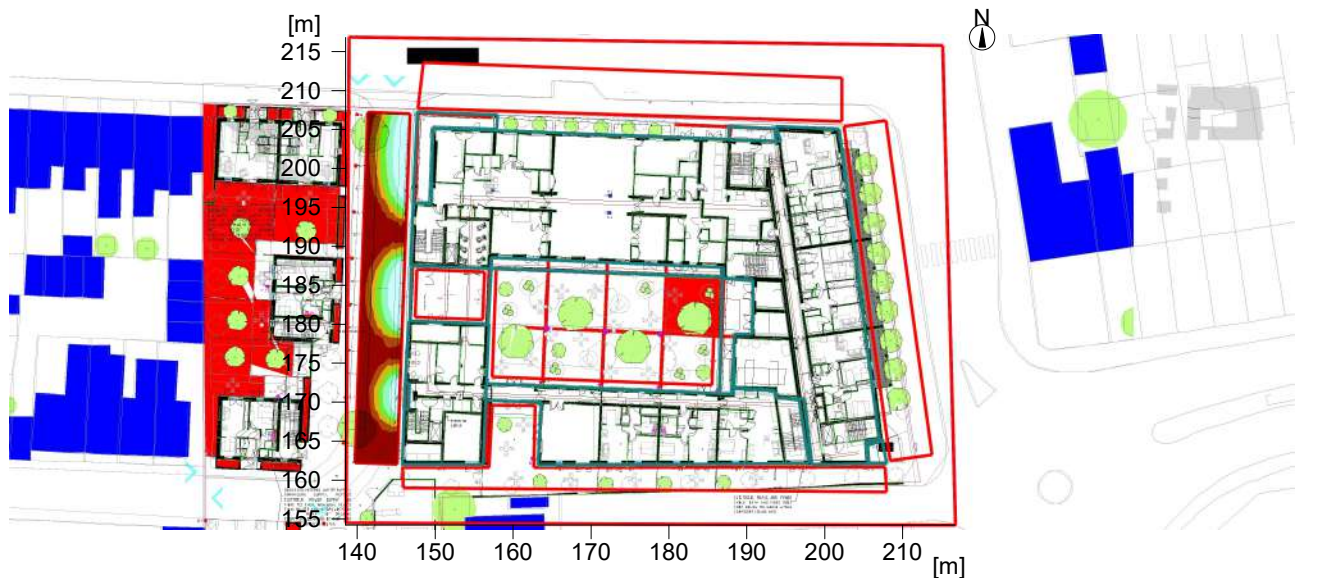
3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.4 Result overview, West Ground Floor Illuminance



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80

Total luminous flux of all lamps	152404.203 lm
Total power	1697.3 W
Total power per area (4777.69 m ²)	0.36 W/m ²

Illuminance

Average illuminance	Eav	23 lx
Minimum illuminance	Emin	1 lx
Maximum illuminance	Emax	110 lx
Uniformity U _o	Emin/Em	1:32.3 (0.03)
Diversity U _d	Emin/Emax	1:153 (0.01)

Type No.\Make

Complete Lighting Services Limited		
1	19	Order No. : 1003423
		Luminaire name : ENOLA
		Equipment : 1 x LED 11 W / 982 lm
2	3	Order No. : B1C34X5U41K
		Luminaire name : COB Round 20W LED Bollard 968mm high
		Equipment : 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.4 Result overview, West Ground Floor Illuminance

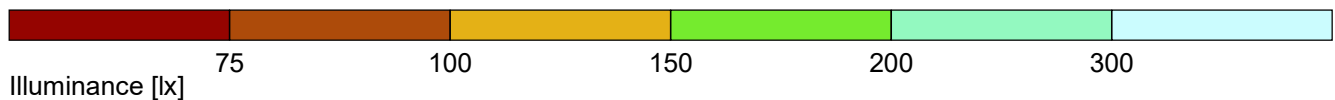
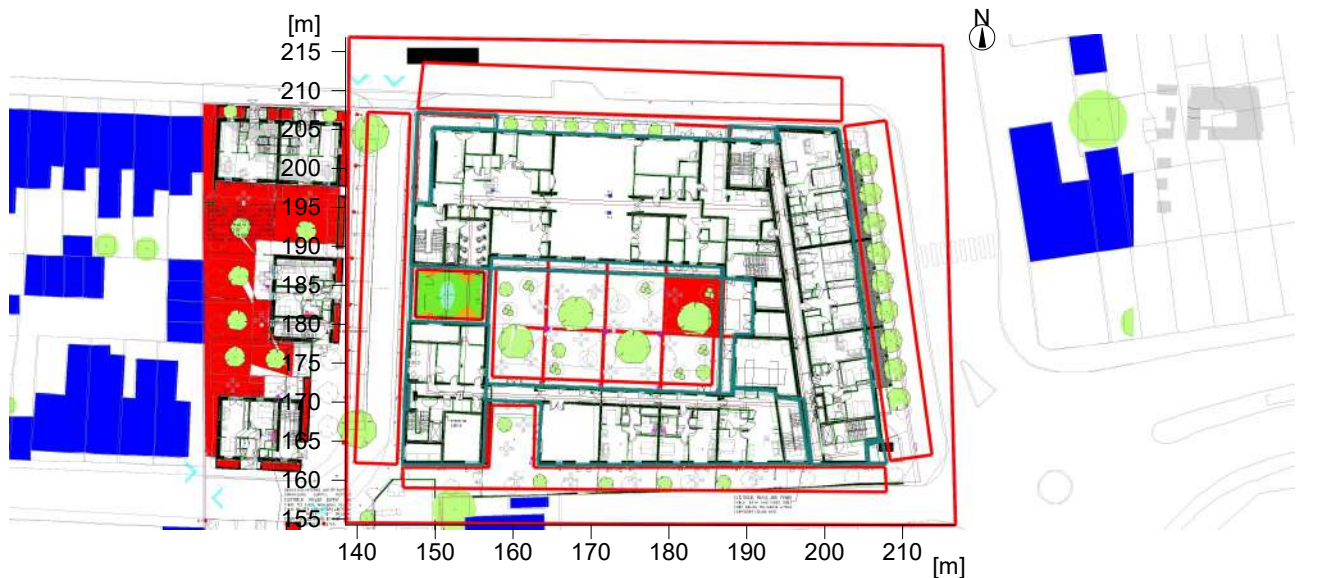
3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.5 Result overview, Under Building Floor Illuminance



General

Calculation algorithm used
 Height of evaluation surface
 Maintenance factor

Average indirect fraction
 0.00 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (4777.69 m²)

152404.203 lm
 1697.3 W
 0.36 W/m²

Illuminance

Average illuminance	Eav	164 lx
Minimum illuminance	Emin	117 lx
Maximum illuminance	Emax	209 lx
Uniformity U _o	Emin/Em	1:1.4 (0.71)
Diversity U _d	Emin/Emax	1:1.79 (0.56)

Type No.\Make

- | | |
|---|---|
| Complete Lighting Services Limited | |
| 1 | 19 |
|  | Order No. : 1003423
Luminaire name : ENOLA
Equipment : 1 x LED 11 W / 982 lm |
| 2 | 3 |
|  | Order No. : B1C34X5U41K
Luminaire name : COB Round 20W LED Bollard 968mm high
Equipment : 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm |

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.5 Result overview, Under Building Floor Illuminance

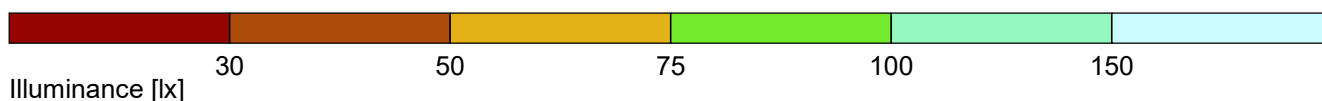
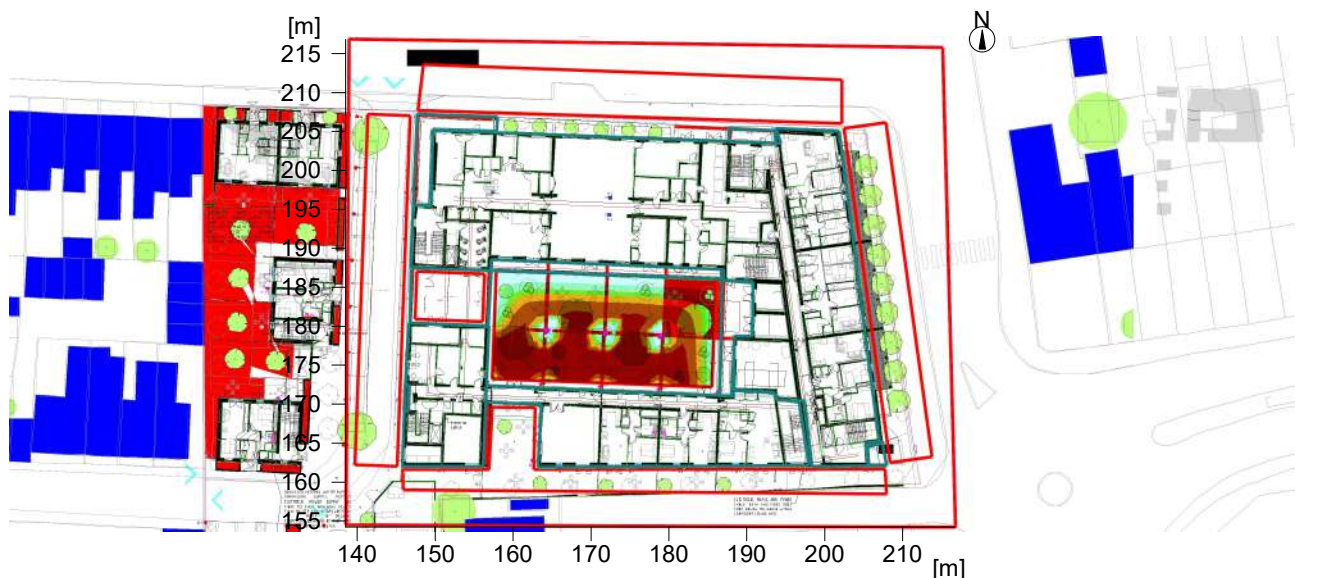
3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.6 Result overview, Central Building Floor Illuminance



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	152404.203 lm
Total power	1697.3 W
Total power per area (4777.69 m²)	0.36 W/m²

Illuminance

Average illuminance	Eav	63 lx
Minimum illuminance	Emin	4 lx
Maximum illuminance	Emax	296 lx
Uniformity Uo	Emin/Em	1:14.9 (0.07)
Diversity Ud	Emin/Emax	1:69.9 (0.01)

Type No.\Make

Complete Lighting Services Limited			
1	19	Order No.	: 1003423
		Luminaire name	: ENOLA
		Equipment	: 1 x LED 11 W / 982 lm
2	3	Order No.	: B1C34X5U41K
		Luminaire name	: COB Round 20W LED Bollard 968mm high
		Equipment	: 1 x QSSI C3 5W 180MA COB 4PCS 26.1 W / 2282.05 lm

Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.2 Summary, Exterior 3

2.2.6 Result overview, Central Building Floor Illuminance

3	94	Order No.	: FLS5-5N IP65 4000K
		Luminaire name	: Extruded enclosure with 15W LED tape IP65 4000K
		Equipment	: 1 x LED 15 W / 1350 lm

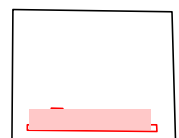
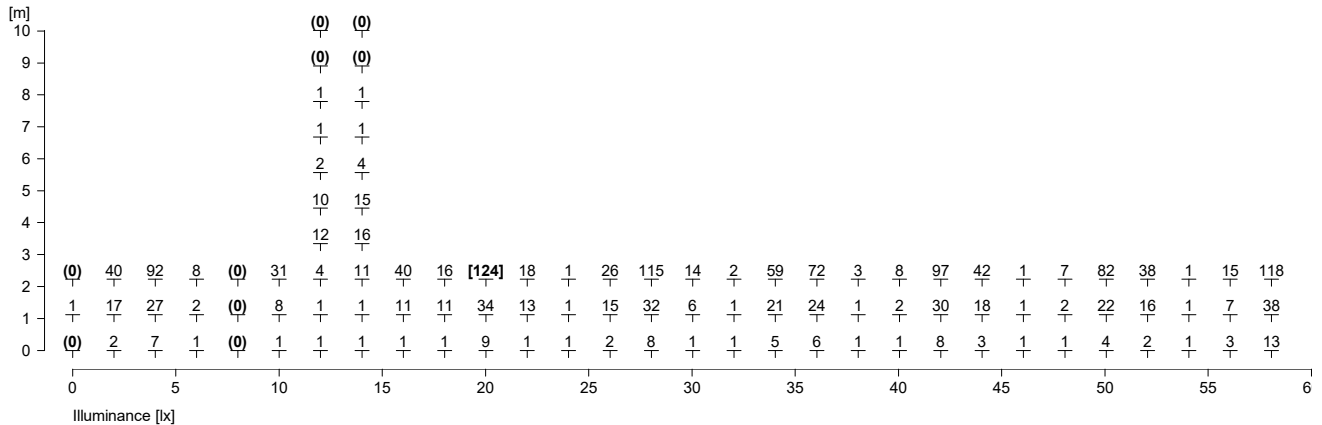
Object : Exterior3 - Main Building - Llighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2 Exterior 3

2.3 Calculation results, Exterior 3

2.3.1 Table, South Ground Floor Illuminance (E)



Part1

Height of the reference plane

Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 0 lx
Maximum illuminance	Emax	: 124 lx
Uniformity Uo	Emin/Eav	: 1 : 91.80 (0.01)
Diversity Ud	Emin/Emax	: 1 : 710.69 (0.00)

Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2 Exterior 3

2.3 Calculation results, Exterior 3

2.3.1 Table, South Ground Floor Illuminance (E)

68
+
35
+
12
+
0 [m]



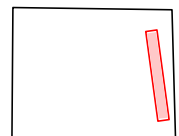
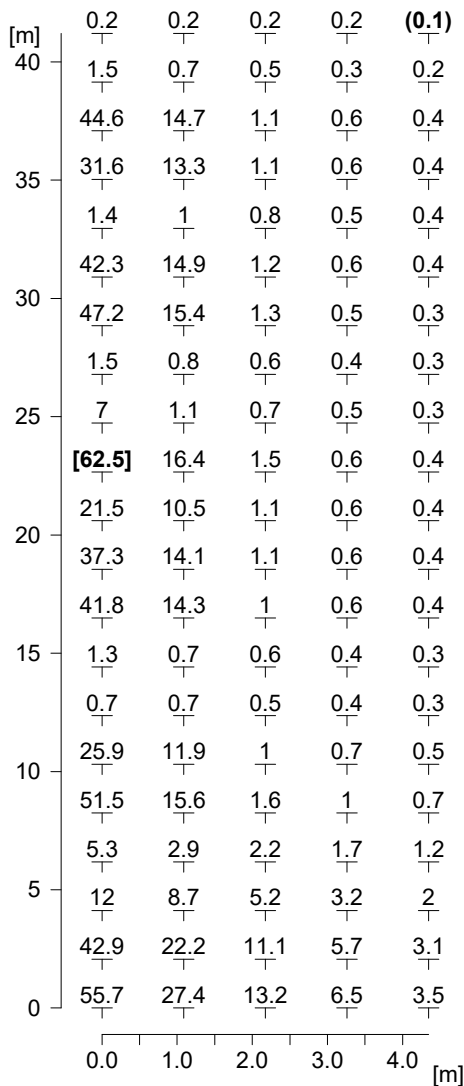
Part2

Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.2 Table, East Ground Floor Illuminance (E)



Height of the reference plane

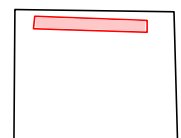
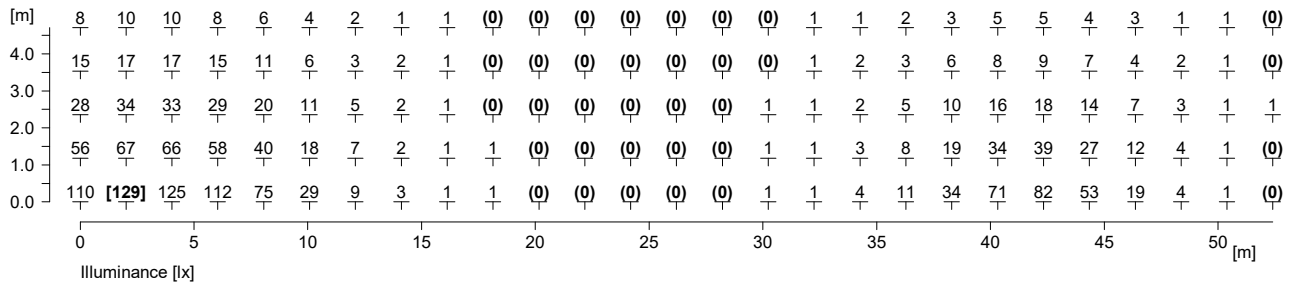
Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 7.9 lx
Maximum illuminance	Emax	: 0.1 lx
Uniformity Uo	Emin/Eav	: 62.5 lx
Diversity Ud	Emin/Emax	: 1 : 60.37 (0.02)
		: 1 : 475.63 (0.00)

Object : Exterior3 - Main Building - Llighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.3 Table, Nortyh Ground Floor Illuminance (E)



Height of the reference plane

Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 0 lx
Maximum illuminance	Emax	: 129 lx
Uniformity Uo	Emin/Eav	: 1 : 81.25 (0.01)
Diversity Ud	Emin/Emax	: 1 : 788.45 (0.00)

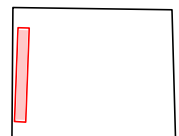
Object : Exterior3 - Main Building - Lighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.4 Table, West Ground Floor Illuminance (E)

	8	14	26	48	92
[m]	10	17	31	58	107
40	10	17	31	59	107
	9	16	29	54	101
35	7	12	22	41	75
	5	8	12	20	32
30	4	5	6	8	10
	4	5	6	7	6
25	6	8	12	19	24
	8	13	24	45	83
20	10	17	31	59	[110]
	9	16	29	55	103
15	7	11	19	34	58
	5	6	9	12	12
10	4	5	6	7	7
	5	7	12	19	24
5	6	10	20	39	73
	5	9	18	35	65
0	4	6	9	15	18
	2	3	3	4	3
	(1)	(1)	(1)	(1)	(1)
	0.0	1.0	2.0	3.0	4.0
	...	.	..	...	



Height of the reference plane

Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 1 lx
Maximum illuminance	Emax	: 110 lx
Uniformity Uo	Emin/Eav	: 1 : 32.34 (0.03)
Diversity Ud	Emin/Emax	: 1 : 153.07 (0.01)

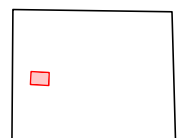
Object : Exterior3 - Main Building - Llighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.5 Table, Under Building Floor Illuminance (E)

[m]	147	133	128	140	158	161	145	125	120	138	173
5.0	169	152	146	161	182	186	166	143	136	154	186
4.5	183	164	159	174	197	201	180	154	146	162	192
4.0	189	171	165	181	204	208	186	158	149	165	193
3.5	189	171	165	182	205	[209]	186	158	148	163	190
3.0	189	171	165	182	205	[209]	186	158	148	163	190
2.5	189	171	165	182	205	[209]	186	158	148	163	190
2.0	189	171	165	182	205	[209]	186	158	148	163	190
1.5	184	166	161	177	200	203	180	152	142	156	182
1.0	171	154	150	165	187	190	168	142	132	145	168
0.5	171	154	150	165	187	190	168	142	132	145	168
0.0	150	136	132	146	165	167	148	125	(117)	128	147
	0	1	2	3	4	5	6	7	[m]		
Illuminance [lx]											



Height of the reference plane

Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 164 lx
Maximum illuminance	Emax	: 117 lx
Uniformity Uo	Emin/Eav	: 1 : 1.40 (0.71)
Diversity Ud	Emin/Emax	: 1 : 1.79 (0.56)

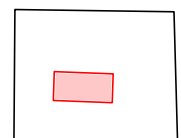
Object : Exterior3 - Main Building - Llighting
 Installation : Battle Street reading
 Project number : P0922007
 Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.6 Table, Central Building Floor Illuminance (E)

[m]	200	184	177	174	173	172	172	172	172	172	173	173	174	174	175	176	178	181	
12	156	111	94	88	87	86	85	85	85	86	86	86	87	88	89	93	103	134	
10	128	71	50	44	42	40	39	39	40	40	40	39	41	43	45	49	65	110	
8	104	51	33	37	43	28	22	23	34	36	25	22	28	42	35	34	52	102	
6	70	36	27	92	[296]	40	17	23	130	186	29	18	44	242	73	32	48	100	
4	30	20	19	60	132	30	12	18	93	136	23	14	37	183	62	28	45	99	
2	11	10	10	14	18	10	8	9	16	18	10	9	13	24	21	23	43	97	
0	7	6	6	8	9	6	5	6	8	8	6	6	8	11	13	19	39	92	
0	28	6	7	29	45	17	(4)	12	35	31	9	5	17	39	30	18	34	93	
	0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	[m]							
	Illuminance [lx]																		



Height of the reference plane

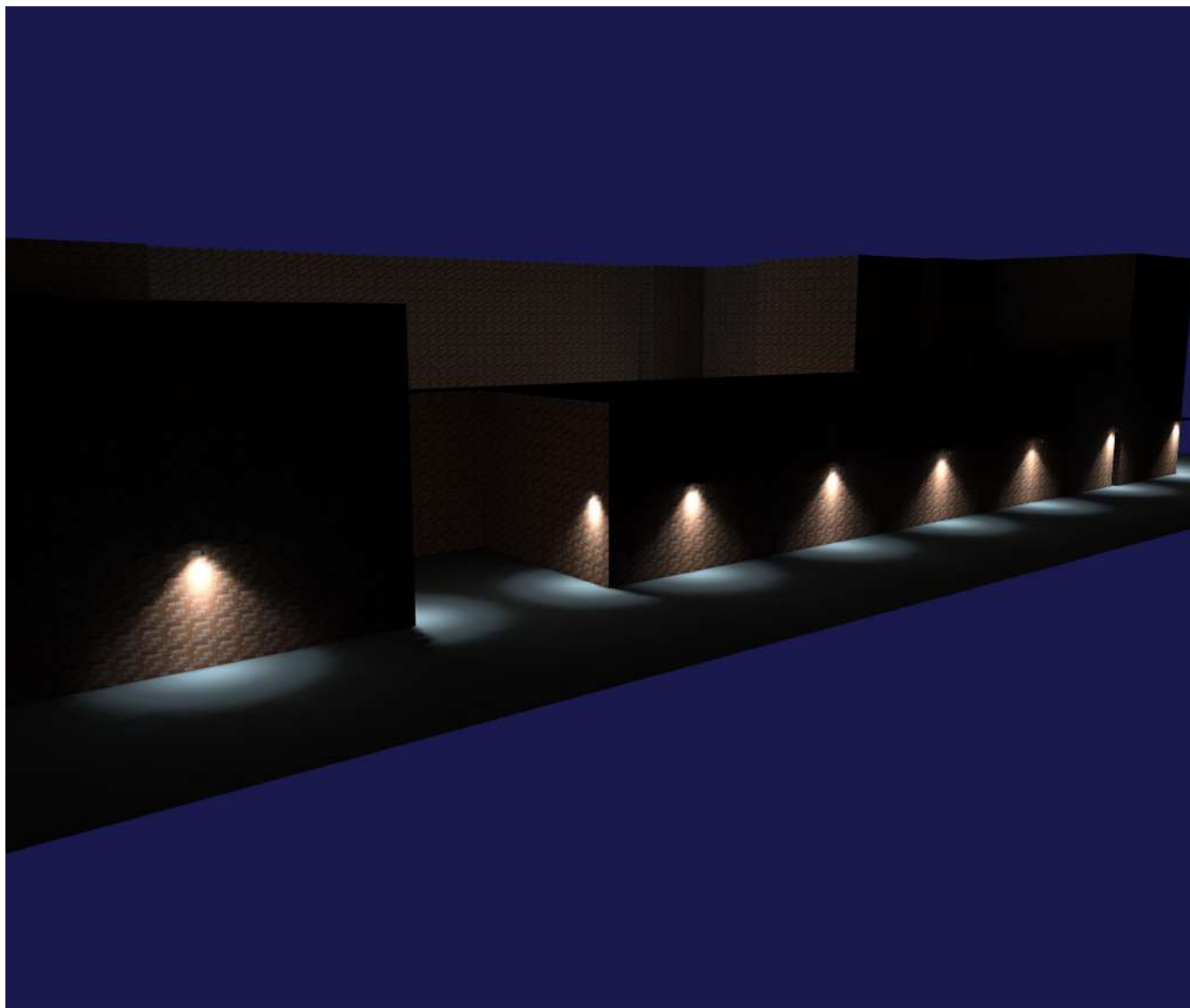
Average illuminance	Eav	: 0.00 m
Minimum illuminance	Emin	: 4 lx
Maximum illuminance	Emax	: 296 lx
Uniformity Uo	Emin/Eav	: 1 : 14.94 (0.07)
Diversity Ud	Emin/Emax	: 1 : 69.89 (0.01)

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.7 3D luminance, View 1



Luminance in the scene

Minimum: : 0 cd/m²

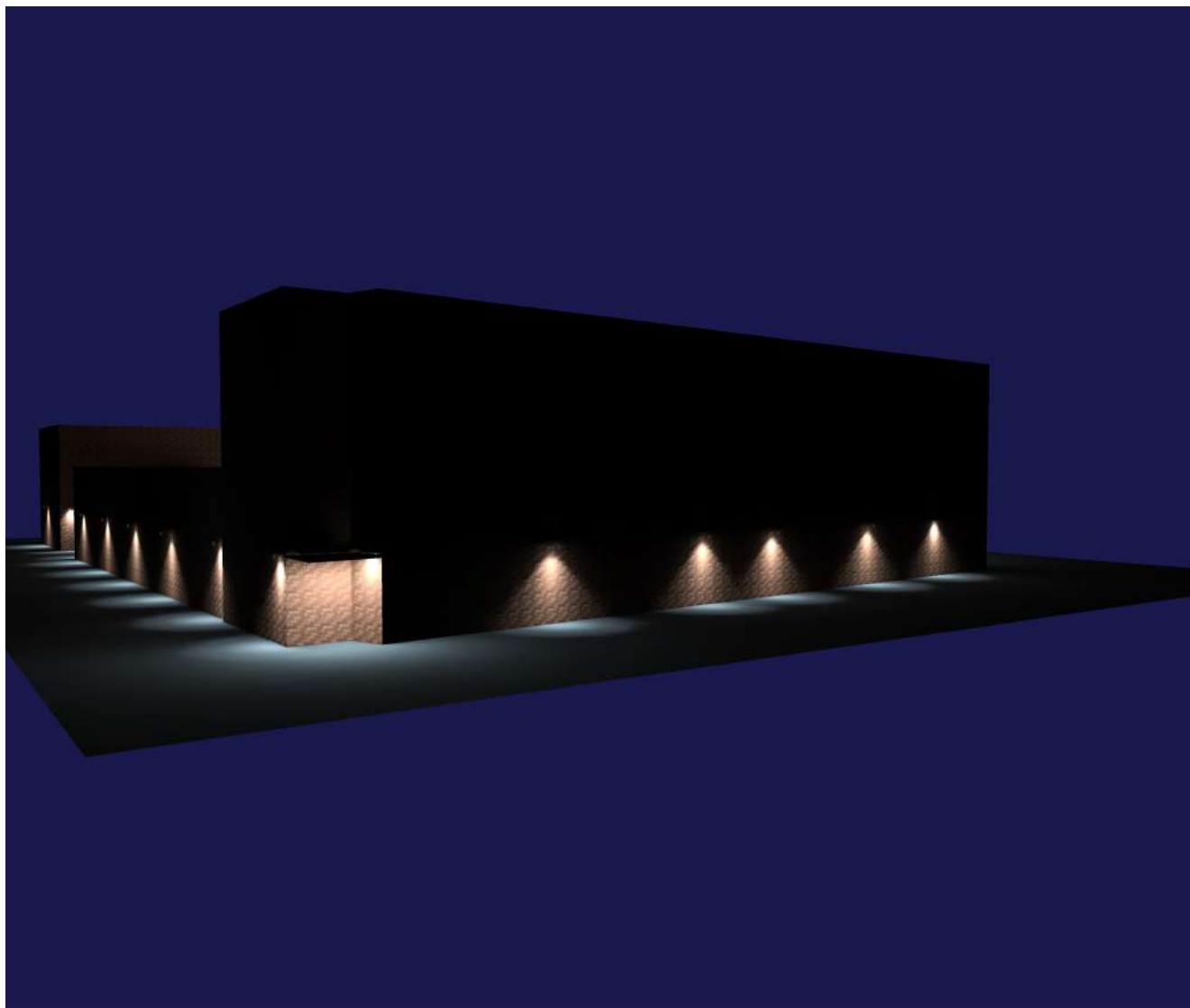
Maximum: : 234 cd/m²

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.8 3D luminance, View 2



Luminance in the scene

Minimum: : 0 cd/m²

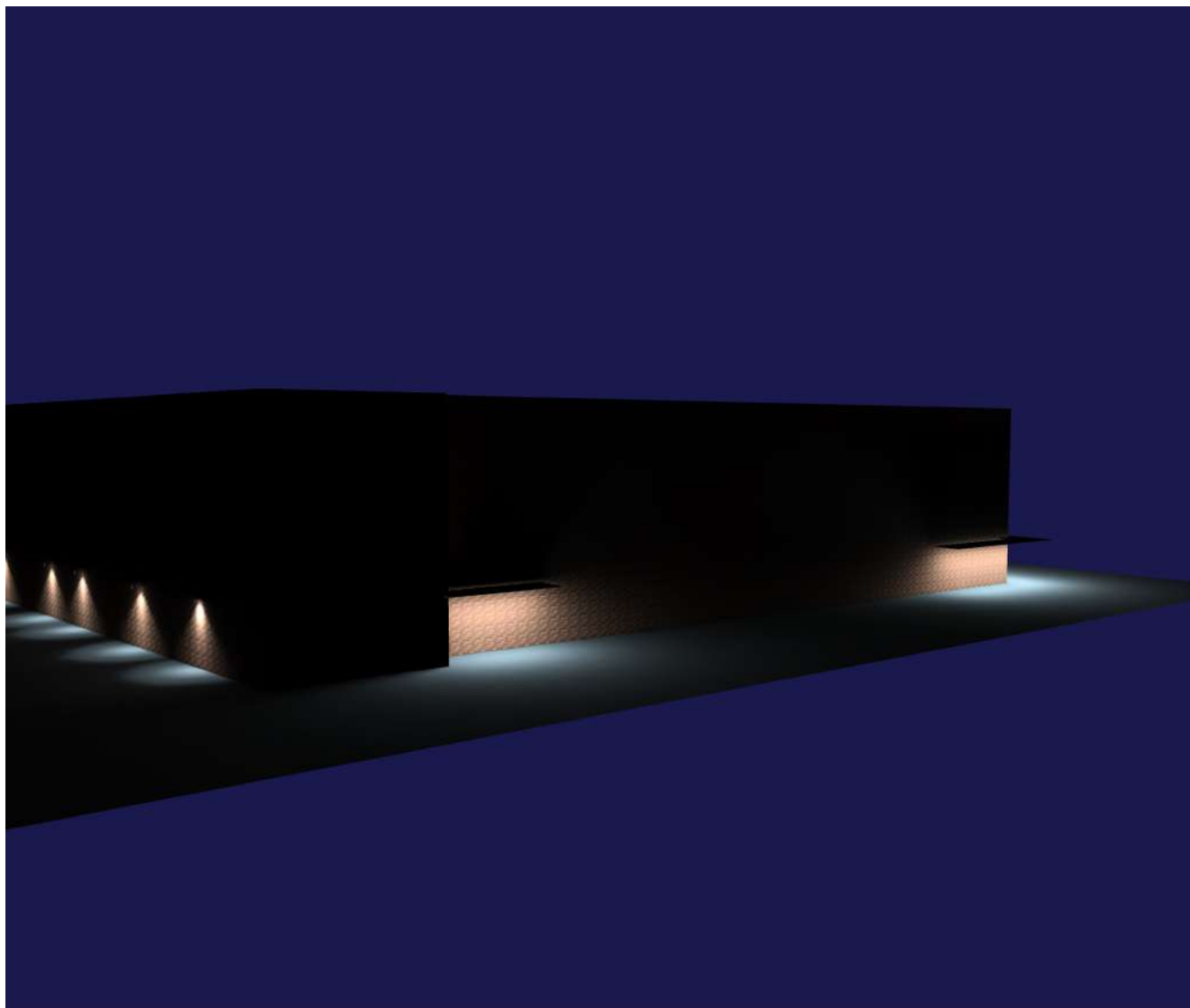
Maximum: : 234 cd/m²

Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.9 3D luminance, View 3



Luminance in the scene

Minimum: : 0 cd/m²

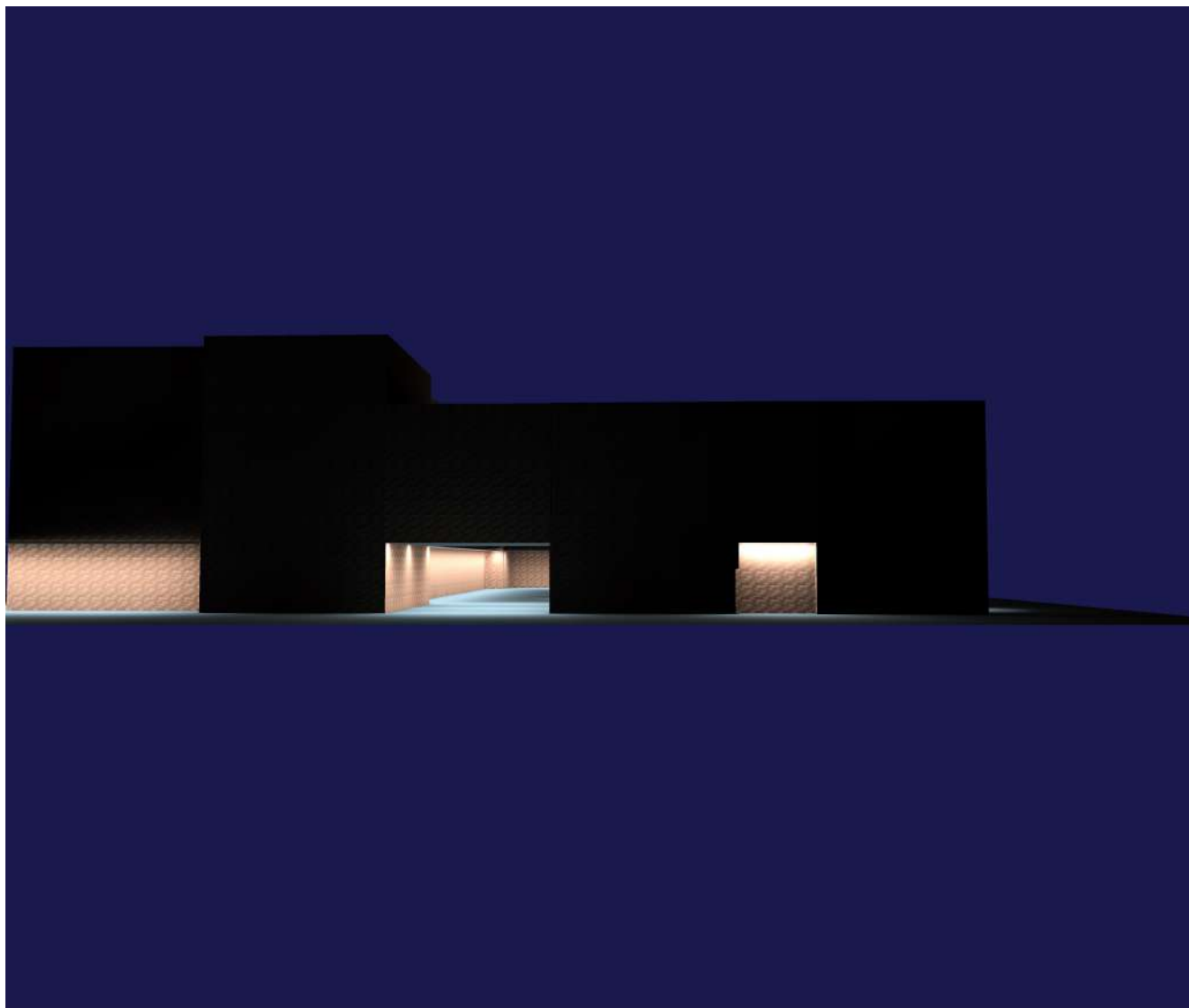
Maximum: : 234 cd/m²

Object : Exterior3 - Main Building - Lighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.10 3D luminance, View 4



Luminance in the scene

Minimum: : 0 cd/m²

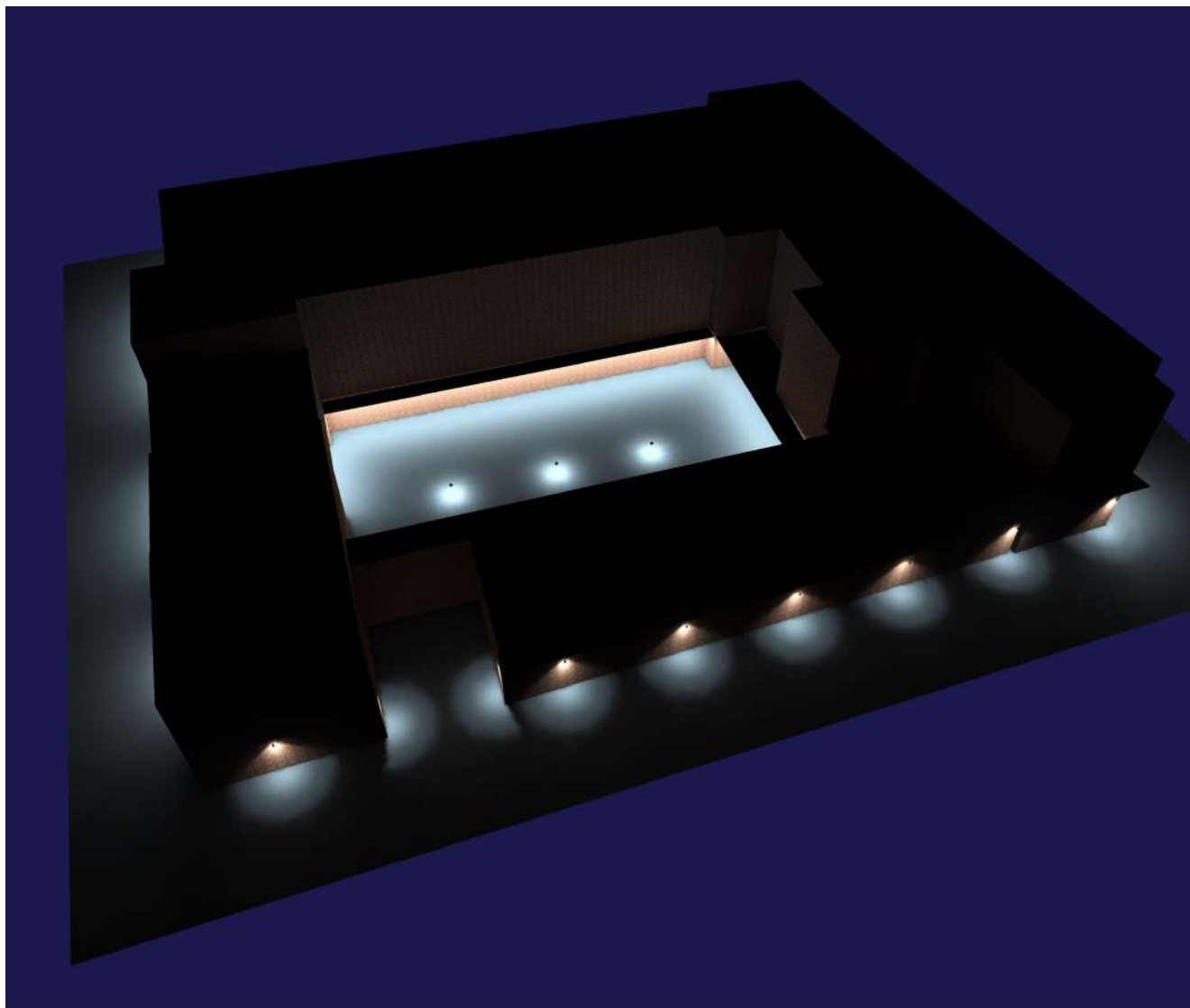
Maximum: : 234 cd/m²

Object : Exterior3 - Main Building - Llighting
Installation : Battle Street reading
Project number : P0922007
Date : 16.09.2022



2.3 Calculation results, Exterior 3

2.3.11 3D luminance, View 5



Luminance in the scene

Minimum: : 0 cd/m²

Maximum: : 234 cd/m²

Lighting Plan Ground Floor Plan

External Lighting Key:

- EL-1 Light Column
- EL-2 Recessed Linear Soffit Light
- EL-3 Wall Mounted Cylinder Down Light
- EL-4 Bollard Light
- EL-4 Brick Light
- EXL-Existing Lamp Posts



Lighting Plan

First Floor Plan

External Lighting Key:

- EL-1 Light Column
- EL-2 Recessed Linear Soffit Light
- EL-3 Wall Mounted Cylinder Down Light
- EL-4 Bollard Light
- EL-4 Brick Light
- EXL-Existing Lamp Posts



Lighting Plan Second Floor Plan

External Lighting Key:

- EL-1 Light Column
- EL-2 Recessed Linear Soffit Light
- EL-3 Wall Mounted Cylinder Down Light
- EL-4 Bollard Light
- EL-4 Brick Light
- EXL-Existing Lamp Posts



Lighting Plan Third Floor Plan

External Lighting Key:

- EL-1 Light Column
- EL-2 Recessed Linear Soffit Light
- EL-3 Wall Mounted Cylinder Down Light
- EL-4 Bollard Light
- EL-4 Brick Light
- EXL-Existing Lamp Posts





EL-1 Light Column
LED 4 meter Light Column



EL-2 Recessed Linear Entrance Soffit Light



EL-3 Wall Mounted Cylinder Downlights



EL-4 Bollard Light



EL-5 Brick Light – To 1st, 2nd, 3rd floor external terrace perimeter wall parapets