

PROJECT | ROYAL BERKSHIRE HOSPITAL

UROLOGY

EXTERNAL LIGHTING STATEMENT

DSSR Document Reference	Version
P24-0002-DSSR-XX-XX-RP-E-0001	P02

This Version

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Version History

Version	Date	Status and Purpose	Changes Overview
P01	13/06/2024	First Issue	
P02	09/10/2024	Second Issue	Dextra lighting luminaires introduced add & obtrusive lighting calculation results shown.

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1 INTRODUCTION

This report is prepared to support the planning application at Royal Berkshire Hospital in support the new modular Urology department project.

This External Lighting Statement has been prepared on behalf of the Royal Berkshire Hospital NHS Foundation Trust (the Trust), in support of a new modular, 2 storey extension at Royal Berkshire Hospital. This statement accompanies an application for full planning permission.

The external lighting will be designed in accordance with Approved Document L 2021, the NHS HTM & HBN standards, British Standards and CIBSE Guidance.

The external lighting will be designed to ensure the scheme is as unobtrusive as possible, complies with guidelines for the reduction of light pollution and satisfies local planning requirements.

The external lighting scheme will be designed to create a safe external environment by providing artificial lighting in the hours of darkness, only whilst motion is detected, and ensuring the lighting is unobtrusive to the environment and neighbouring properties.

A desktop study utilising Relux software, a professionally recognised computer-generated lighting calculation software application, has been completed to assess the proposed lighting scheme conformity with recognised guideline requirements.

Definitions

- Lux (lx) - this is the unit in which light is measured on a surface from a source. Unit used to define illumination. 1 lux is equal to 1 lumen falling on an area of 1 square meter.
- Average Lux (Eav) - this is the maintained average illuminance.
- Minimum Lux (Emin) - this is the maintained minimum illuminance.
- Maximum Lux (Emax) - this is the maintained maximum illuminance.
- Upward Light Ratio (ULR) - this is the maximum permitted percentage of luminaire flux that goes directly into the sky.
- Sky Glow - this is the illumination of the night sky caused by artificial light.
- Obtrusive light - this is the existing spilling of light beyond the boundary of the area being lit.
- Spill light - For the purpose of this document, spill light can be defined as the illumination that is produced by a light source or light sources at a point or surface on which the light is not intended or desirable
- **Glare** – This is the discomfort or impairment of vision experienced when the image is excessively bright compared to the general surroundings.
- **Environmental Zones** - these are permitted classifications for the environment in which lighting can be designed to recommended levels.

BREEAM Compliance

The Trust are targeting a BREEAM accreditation of 'excellent'. The external lighting scheme will be designed to achieve the 'Hea01 Visual Comfort, external lighting', 'Ene03, external lighting' and 'Pol04, reduction of night time light pollution' credits.

The requirements set out in the BREEAM assessment matrix for external lighting states that "All external lighting located within the construction zone is designed to provide illuminance levels that

enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. To demonstrate this, external lighting provided is specified in accordance with BS EN 13201 series Road Lighting and BS EN 12464- 2:2014 Light and lighting - Lighting of workplaces - Part 2: Outdoor workplace”.

2 DESIGN GUIDES & INDUSTRY STANDARDS

The proposed external lighting scheme has been designed in accordance with good practice guidance documents and National & international Industry Standards, incorporating the following:

- BS EN 12464-2: Lighting of Workplaces – Outdoor Works Places
- BS EN 13201-2: Road Lighting – Performance Requirements
- Institute of Lighting Professionals (ILP) – Guidance Notes for the Reduction of Obtrusive Light
- CIE 126 Guidelines for Minimising Sky Glow
- CIE 150 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations

The Institute of Lighting Professionals ‘Guidance Notes for the Reduction of Obtrusive Light’ provides the basis for the comparative analysis when defining whether an installation will be obtrusive to the environment and neighbouring properties. It assists in quantifying and providing acceptable maximum threshold recommendations for light spill, sky glow and glare. Good lighting design also includes luminaires that have been selected to minimise light intrusion and glare to pedestrians and drivers. This is the primary document used by most local councils and planning departments to categorise the provision of external lighting, in accordance with best practice.

3 METHODOLOGY

A desktop review of the site and surrounding area has been undertaken to identify potential light sensitive receptors and to establish the appropriate Environmental Zone classification for the site as defined by the International Commission on Illumination Guidance Notes for Obtrusive Light.

Modelling was undertaken using Relux software, an independent lighting model that can calculate daylight and artificial lighting scenes in interior and exterior scenarios. The model incorporates BS EN 12464-2 calculation methodologies and is commonly used for lighting impact assessment.

Institute of Lighting Professionals Environmental Zone Classification CIE 150 tables Environmental Zones for exterior lighting based on the existing external ambient lighting levels in the area. The guidance note classifies environmental zones into five categories.

Zone	Lighting Environment	Examples
E0	Intrinsically dark	UNESCO Starlight Reserves, IDA Dark Sky Parks, Major optical observatories
E1	Dark	Relatively uninhabited rural areas
E2	Low district brightness	Sparsely inhabited rural areas
E3	Medium district brightness	Well inhabited rural and urban settlements
E4	High district brightness	Town and city centres and other commercial areas

Figure 1 – Environmental Zone Classification (Source CIE 150)

A category Environmental Zone E3 is defined in EN 12464-2 Clause 4.5 (Table 2) as ‘medium district brightness areas, such as industrial or residential suburbs’ and in CIE 150 as ‘medium district brightness areas such as well inhabited rural and urban settlements. This site would comply with both the definitions provided for a category E3 scheme.

The CIE Environmental Zone classification determines the appropriate exterior lighting limitations for that area. The specification of the limitations for each Environmental Zone are set out in the below figure extracted from CIE 150.

Light Technical Parameter	Application Conditions	Environmental Zones				
		E0	E1	E2	E3	E4
Illuminance in vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	< 0,1 lx*	1 lx	2 lx	5 lx
* If the installation is for public (road) lighting then this value may be up to 1 lx.						

Figure 2 – Maximum values of vertical illuminance on properties (Source CIE 150)

Light Technical Parameter	Environmental Zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2,5	5	15

Figure 3 – Maximum values of upward light ratio of luminaires (Source CIE 150)

In accordance with Environmental Zone classification E3, medium district guidance, is to have a maximum sky glow (URL) limit of 5%, maximum light trespass of between 10 to 2 lux (pre and post curfew). As the proposed site is for a healthcare facility that will operate 24/7, the ‘pre-curfew’ values noted in CIE figure 2 have been ignored. The more onerous ‘post-curfew’ value of 2 Lux is to be applied to the design methodology (maximum trespass / spill lighting).

The software modelling design was carried out, aimed at limiting the following

- Average upward light ratio of the luminaires, to restrict sky glow
- Illuminance at nearby properties for which light trespass might be an issue with emphasis on the buildings closest to the new project premises which are :
 1. South Block Building
 2. Royal Berks Charity Building
 3. Bike Store Building
- Intensity of each light source in potentially obtrusive directions beyond the site boundaries.

The external lighting scheme of the site is illustrated with supported design calculations results in the Appendix showing compliance with the requirements for an E3 zone .

4 BEST PRACTICE DESIGN

As well as ensuring the external lighting for the new scheme meets the statutory design standards outlined in the above sections, and to also enhance the 'Energy Standard Performance' in the building. the external lighting design has sought to meet a number of criteria to ensure that the environmental effects of artificial lighting are managed to a high standard. These criteria are:

- All light fittings selected for the design are all low energy LED light fittings
- The area will be lit in accordance with the minimum requirements set out in EN 12464-2
- For the building, wall mounted LED luminaires are deployed to the perimeter and exit doors.
- For the car park / footpaths a mixture of LED lamp posts (with forward throw distribution, asymmetrical) and low level bollards (shielded light source, symmetrical) has been used.
- The covered walkway has canopy mounted LED luminaires.
- All luminaires will be mounted at 0° tilt to minimise upward light.
- Light intrusion has been reduced as far as possible into the surrounding areas
- All new luminaires will be fitted with flat glass to aid 0% upward light discharge
- All lighting equipment will be controlled by photocell and /Time Clock controls to prevent operation during daylight hours, and enable reduced levels of lighting in low traffic areas during hours of darkness.

APPENDIX

Relux Calculation Report

External Lighting Calculations

Installation :

Project number : P24-0002- Royal Berkshire Hosp Urology
Customer : NHS
Processed by : Sandeep Mony
Date : 10.10.2024

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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3 RBH Urology Exterior

3.1 Description, RBH Urology Exterior

3.1.1 Floor plan



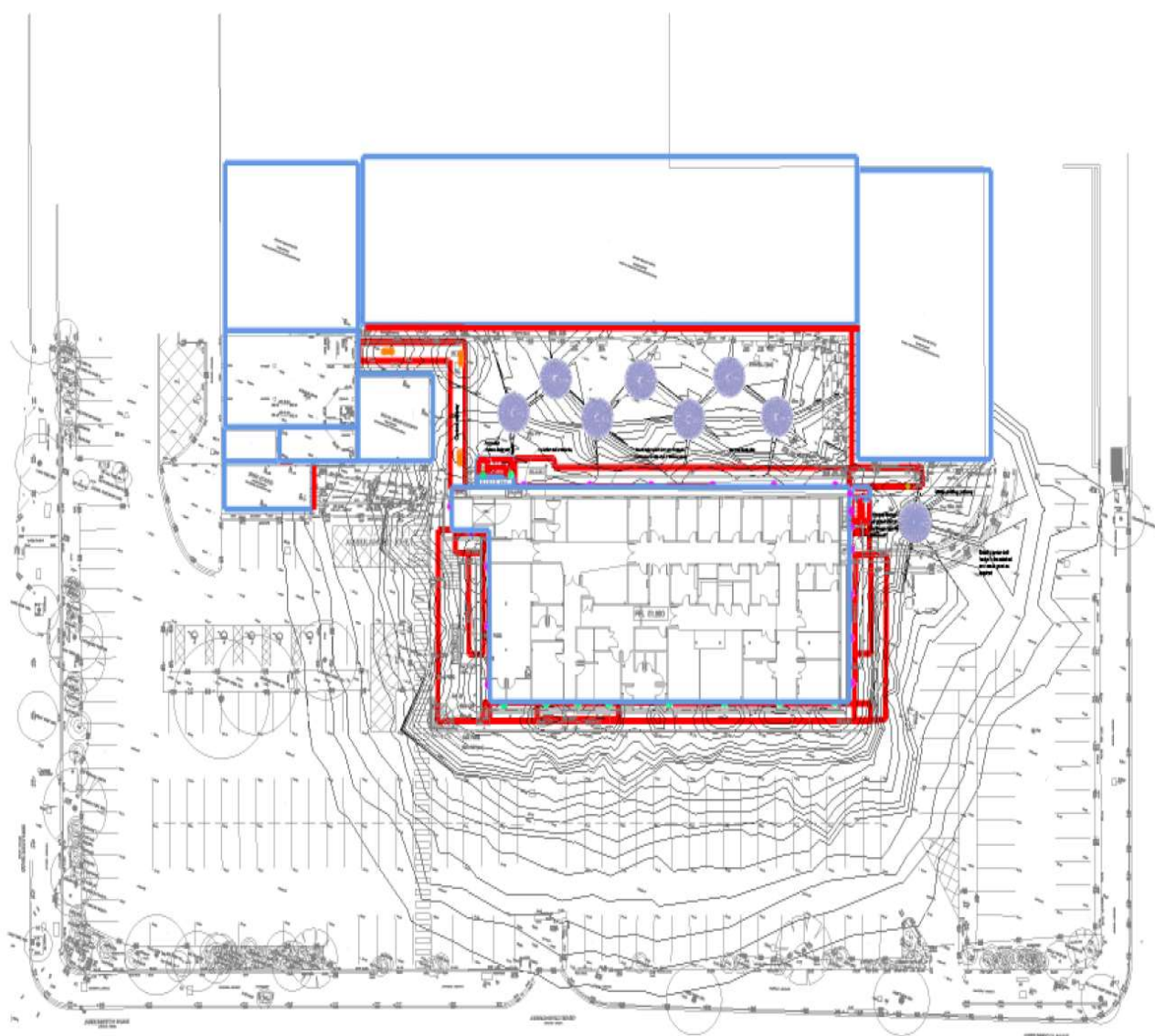
Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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RBH Urology External

Calculation results, RBH Urology External

Pseudo colours, Reference plane 1.1 (E)



Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4 RBH Urology External

4.2 Calculation results, RBH Urology External

4.2.1 Summary obtrusive light

General

Standard : EN 12464-2:2014 Outdoor (Glare:I simple)
Time period : Post-curfew
Initial values related to
Maintenance factor : 0.80
Calculation algorithm used : Average indirect fraction

Total luminous flux : 68162 lm
Total power : 534.8 W

Light pollution

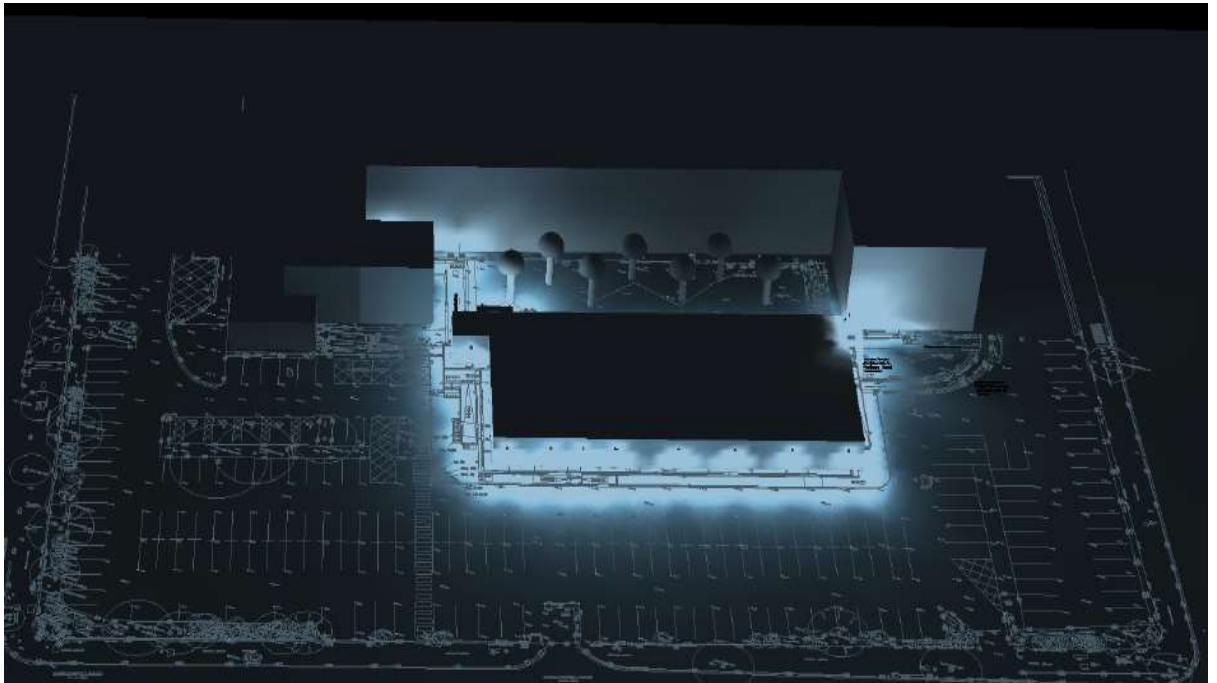
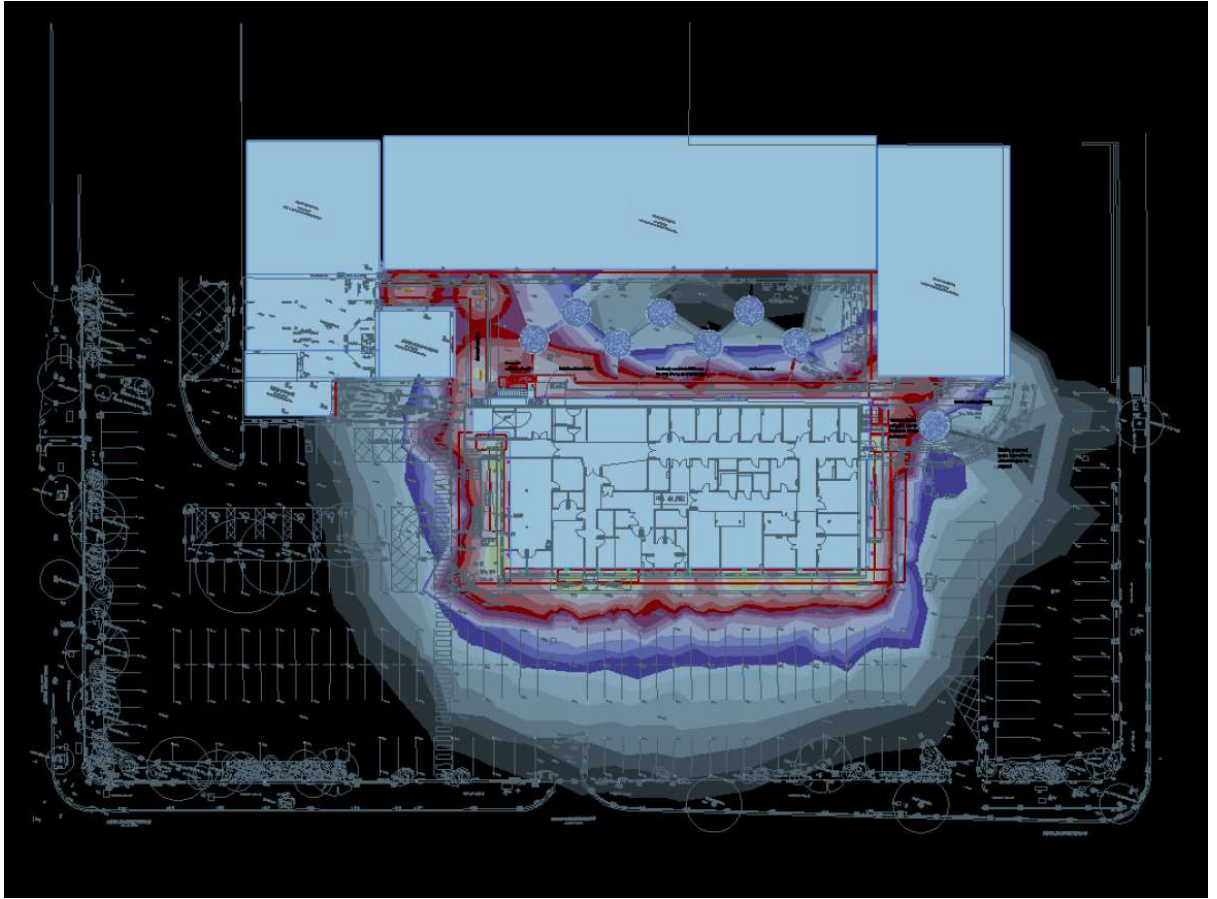
Maximum vertical illuminance

E3		<= 2 lx			
No.	Measuring surface	Grid		$\bar{E}_i$	
24	South Block Facade 1	58 x 10		0.74 lx	✓
25	South Block Facade 2	11 x 9		0.36 lx	✓
26	Bike Store Facade	8 x 7		1.51 lx	✓
27	Royal Berks Charity Facade	37 x 8		0.03 lx	✓
28	Royal Berks Charity Window	6 x 5		0 lx	✓

Maximum vertical luminance

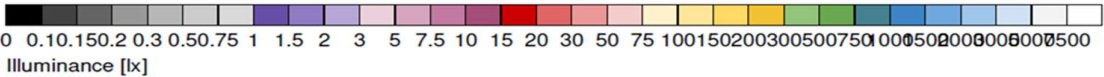
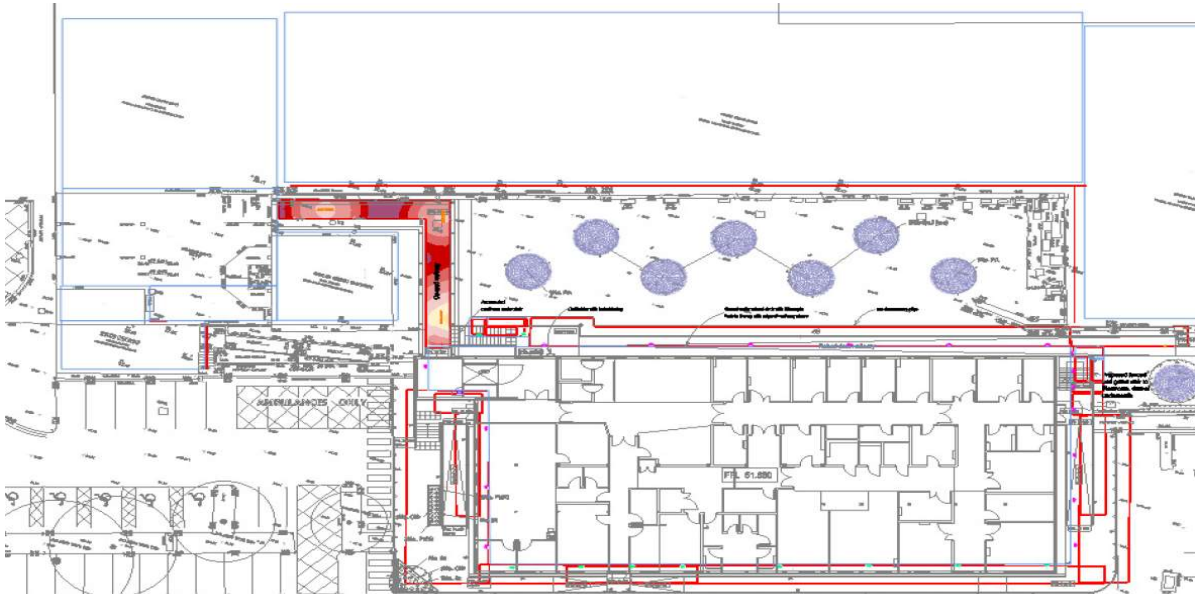
E3		<= 10 cd/m²			
No.	Measuring surface	Grid	Rho [%]	$L_{i,max}$	
24	South Block Facade 1	58 x 10	5 %	0.2 cd/m²	✓
25	South Block Facade 2	11 x 9	5 %	0.1 cd/m²	✓
26	Bike Store Facade	8 x 7	5 %	0 cd/m²	✓
27	Royal Berks Charity Facade	37 x 8	5 %	0 cd/m²	✓
28	Royal Berks Charity Window	6 x 5	5 %	0 cd/m²	✓

Glare rating obtrusive light



Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

4.2 Summary, RBH Urology External
4.2.2 Result overview, Covered walkway



General
Calculation algorithm used
Height of evaluation surface
Maintenance factor
Average indirect fraction
0.00 m
0.80
Total luminous flux
Total power
Total power per area (44792.25 m²)
68162 lm
534.8 W
0.01 W/m²

Illuminance
Average illuminance
Minimum illuminance
Maximum illuminance
Uniformity U₀
Diversity U_d
E_m
E_{min}
E_{max}
E_{min}/E_m
E_{min}/E_{max}
36.4 lx
11.2 lx
104 lx
1:3.24 (0.31)
1:9.27 (0.11)

Type No. Make

14 3x Order No. : TYP L26 PC 4S
Luminaire name : TYPHON
Equipment : 1 x Dextra 16.4 W / 2236 lm
Emergency : 423 lm (18.9 %)

Manufacturer: Dextra Group PLC



TYP L26 PC 4S ceiling mounted luminaire TYPHON

Typhon - 1200mm Single, IP65

Surface mounted moisture resistant luminaire. GRP body, polycarbonate diffuser. Complete with tooled access.
Stainless steel diffuser retaining clips.

Options:

LE3 - Lithium Emergency (423 lumen output)

LS3 - Lithium Selftest

LA3 - Lithium Autotest

S - Switch Dimming

D - Digital Dimming (DSI)

A - Digital Addressable Lighting Interface (DALI)

C - Bi-Level Dimming (Corridor Function)

H - High Frequency Dimming (Analogue 1-10v)

Luminaire data

Absolute Photometry

Luminaire efficacy : 136.34 lm/W

Classification : B31 ↓89.4% ↑10.6%

CIE Flux Codes : 40 70 89 89 100

UGR 4H 8H : 21.7 / 19.3

Control gear : electronic ballast

Power : 16.4 W

Luminous flux : 2236 lm

Equipped with

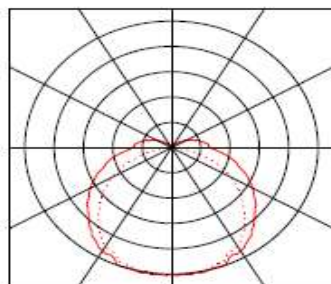
Quantity : 1

Designation : Dextra

Colour : 4000K

Colour reproduction : 1B

Dimensions : 1267 mm x 108 mm x 105 mm

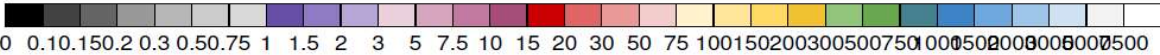
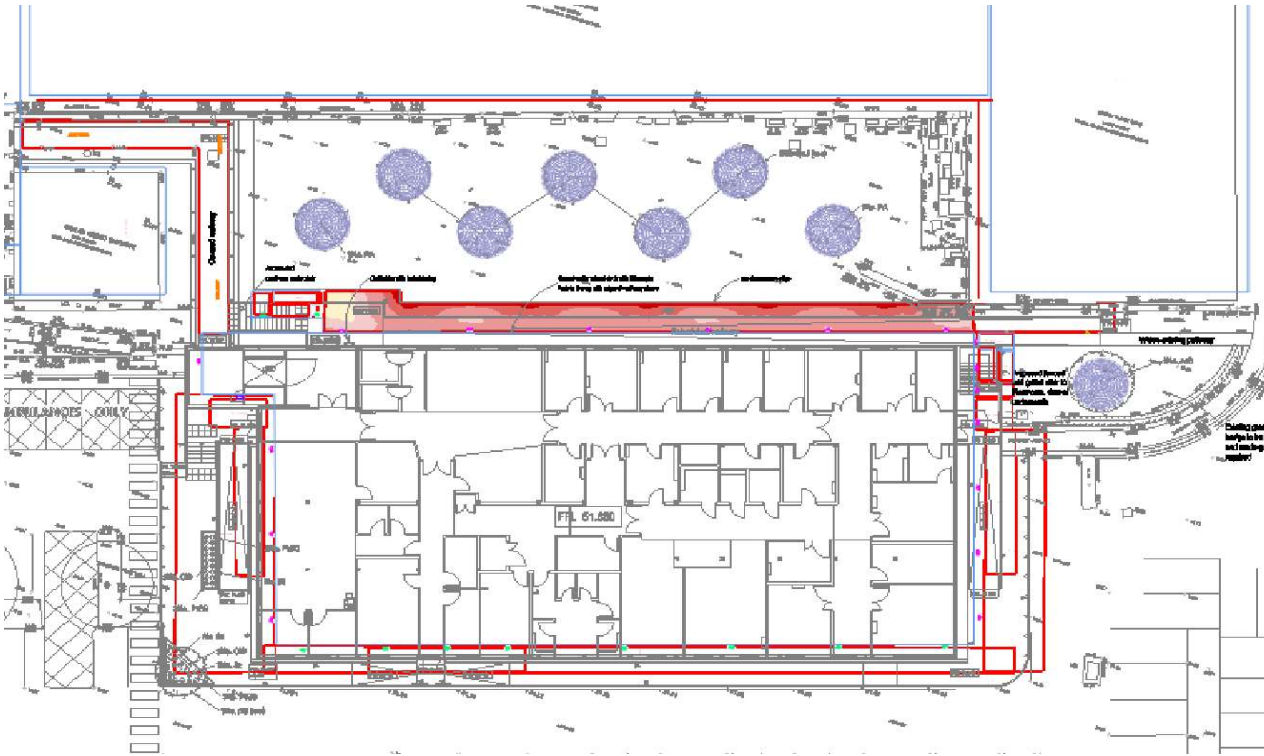


Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External

4.2.3 Result overview, Walkway



Illuminance [lx]

General

Calculation algorithm used
Height of evaluation surface
Maintenance factor

Average indirect fraction
0.00 m
0.80

Total luminous flux
Total power
Total power per area (44792.25 m²)

68162 lm
534.8 W
0.01 W/m²

Illuminance

Average illuminance
Minimum illuminance
Maximum illuminance
Uniformity U₀
Diversity U_d

E_m
E_{min}
E_{max}
E_{min}/E_m
E_{min}/E_{max}

39.2 lx
16.3 lx
84.4 lx
1:2.41 (0.42)
1:5.18 (0.19)

Type No. \Make

8 14 x
Dextra Group PLC
Order No. : OPUWP L15 AS
Luminaire name : OPUS WALLPACK
Equipment : 1 x Dextra 10.8 W / 1213 lm
Emergency : 647 lm (53.3 %)

Manufacturer: Dextra Group PLC



OPUWP L15 AS wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

Luminaire data

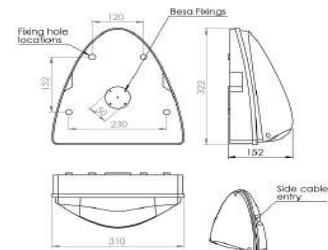
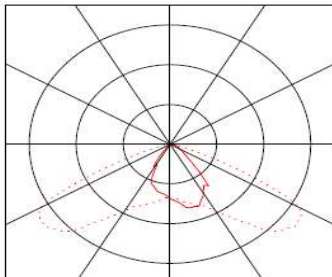
Absolute Photometry

Luminaire efficacy : 112.31 lm/W
Classification : A50 ↓98.5% ↑1.5%
CIE Flux Codes : 47 87 99 98 100
UGR 4H 8H : 22.8 / 31.3
Control gear : electronic ballast
Power : 10.8 W
Luminous flux : 1213 lm

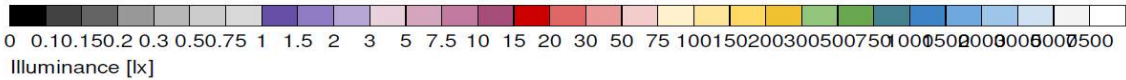
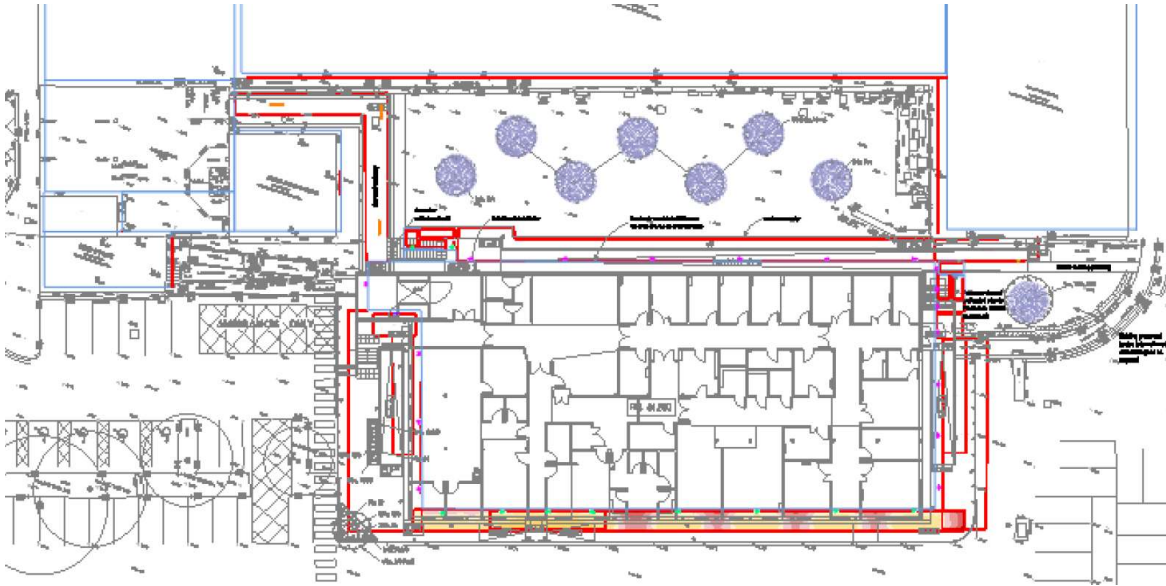
Equipped with

Quantity : 1
Designation : Dextra
Colour : 4000K
Colour reproduction : 2

Dimensions : 310 mm x 65 mm x 325 mm



4.2 Summary, RBH Urology External
4.2.4 Result overview, Staff Entrance Walkway



General	
Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	68162 lm
Total power	534.8 W
Total power per area (44792.25 m²)	0.01 W/m²

Illuminance	
Average illuminance	Em 99.8 lx
Minimum illuminance	Emin 17.8 lx
Maximum illuminance	Emax 198 lx
Uniformity Uo	Emin/Em 1:5.6 (0.18)
Diversity Ud	Emin/Emax 1:11.1 (0.09)

Type No. Make

10	15 x	Order No.	: OPUWP L40 OA
		Luminaire name	: OPUS WALLPACK
		Equipment	: 1 x Dextra 24 W / 3325 lm
		Emergency	: 633 lm (19.0 %)

Manufacturer: Dextra Group PLC



OPUWP L40 OA wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

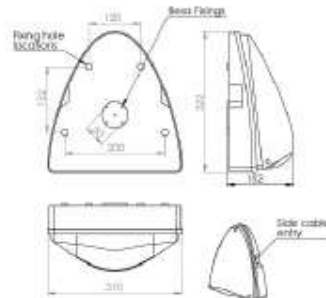
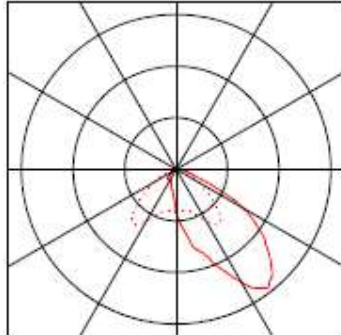
Luminaire data

Absolute Photometry	
Luminaire efficacy	: 138.54 lm/W
Classification	: A30 ↓98.1% ↑1.9%
CIE Flux Codes	: 40 80 97 98 100
UGR 4H 8H	: 36.7 / 31.5
Control gear	: electronic ballast
Power	: 24 W
Luminous flux	: 3325 lm

Equipped with

Quantity	: 1
Designation	: Dextra
Colour	: 4000K
Colour reproduction	: 2

Dimensions : 310 mm x 45 mm x 325 mm

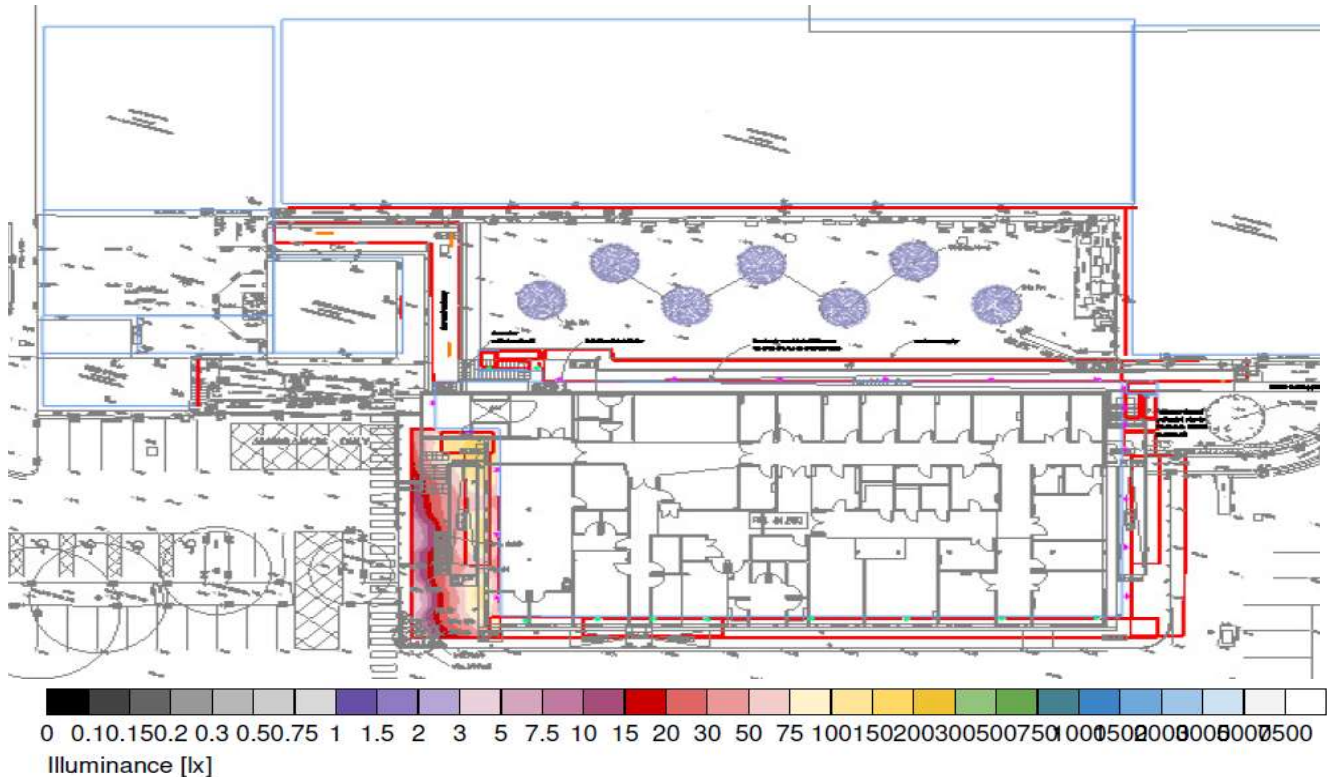


Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External

4.2.5 Result overview, Ramp 1 Area



General

Calculation algorithm used
Height of evaluation surface
Maintenance factor

Average indirect fraction
0.00 m
0.80

Total luminous flux
Total power
Total power per area (44792.25 m²)

68162 lm
534.8 W
0.01 W/m²

Illuminance

Average illuminance
Minimum illuminance
Maximum illuminance
Uniformity U₀
Diversity U_d

$\bar{E}_m$	56.3 lx
E_{min}	3.82 lx
E_{max}	172 lx
$E_{min}/\bar{E}_m$	1:14.7 (0.07)
E_{min}/E_{max}	1:45.1 (0.02)

Type No.\Make

13	3 x	Order No.	: OPUWP L30 OA
		Luminaire name	: OPUS WALLPACK
		Equipment	: 1 x Dextra 17.8 W / 2494 lm
		Emergency	: 633 lm (25.4 %)

Manufacturer: Dextra Group PLC



OPUWP L30 OA wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

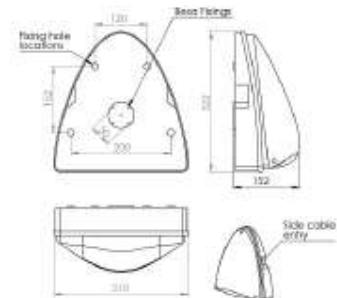
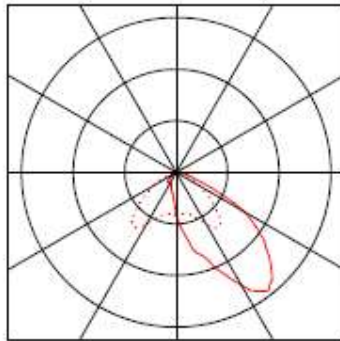
Luminaire data

Absolute Photometry	
Luminaire efficacy	: 140.11 lm/W
Classification	: A30 ↓98.1% ↑1.9%
CIE Flux Codes	: 40 80 97 98 100
UGR 4H 8H	: 35.7 / 30.5
Control gear	: electronic ballast
Power	: 17.8 W
Luminous flux	: 2494 lm

Equipped with

Quantity	: 1
Designation	: Dextra
Colour	: 4000K
Colour reproduction	: 2

Dimensions : 310 mm x 45 mm x 325 mm

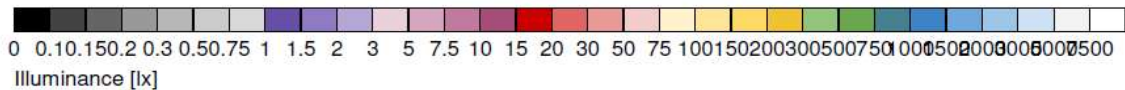
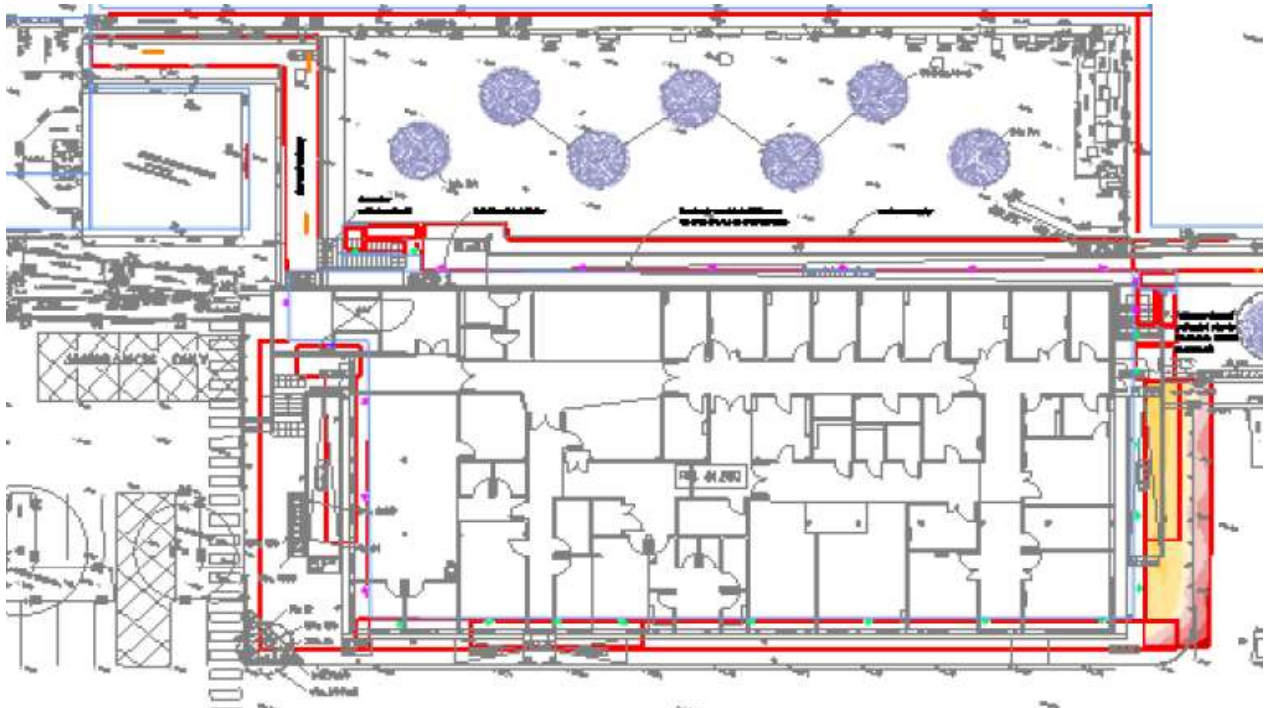


Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External

4.2.6 Result overview, Ramp 2 Area



General

Calculation algorithm used
Maintenance factor

Average indirect fraction
0.80

Total luminous flux
Total power
Total power per area (44792.25 m²)

78722 lm
600.8 W
0.01 W/m²

Illuminance

Average illuminance
Minimum illuminance
Maximum illuminance
Uniformity U₀
Diversity U_d

$\bar{E}_m$
 E_{min}
 E_{max}
 $E_{min}/\bar{E}_m$
 E_{min}/E_{max}

102 lx
17 lx
201 lx
1:5.97 (0.17)
1:11.8 (0.08)

Type No. Make



Order No.
Luminaire name
Equipment
Emergency

: OPUWP L40 OA
: OPUS WALLPACK
: 1 x Dextra 24 W / 3325 lm
: 633 lm (19.0 %)

Manufacturer: Dextra Group PLC



OPUWP L40 OA wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

Luminaire data

Absolute Photometry

Luminaire efficacy : 138.54 lm/W

Classification : A30 ↓98.1% ↑1.9%

CIE Flux Codes : 40 80 97 98 100

UGR 4H 8H : 36.7 / 31.5

Control gear : electronic ballast

Power : 24 W

Luminous flux : 3325 lm

Equipped with

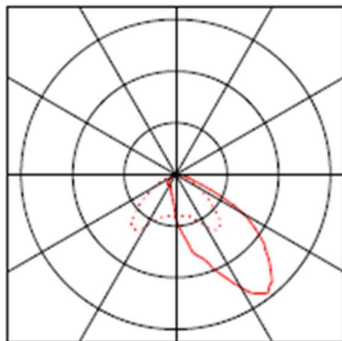
Quantity : 1

Designation : Dextra

Colour : 4000K

Colour reproduction : 2

Dimensions : 310 mm x 45 mm x 325 mm

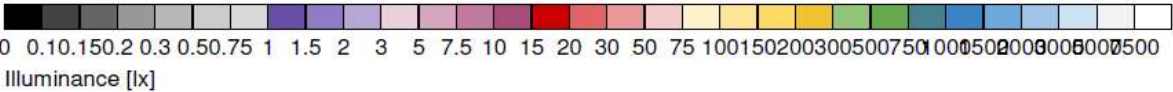
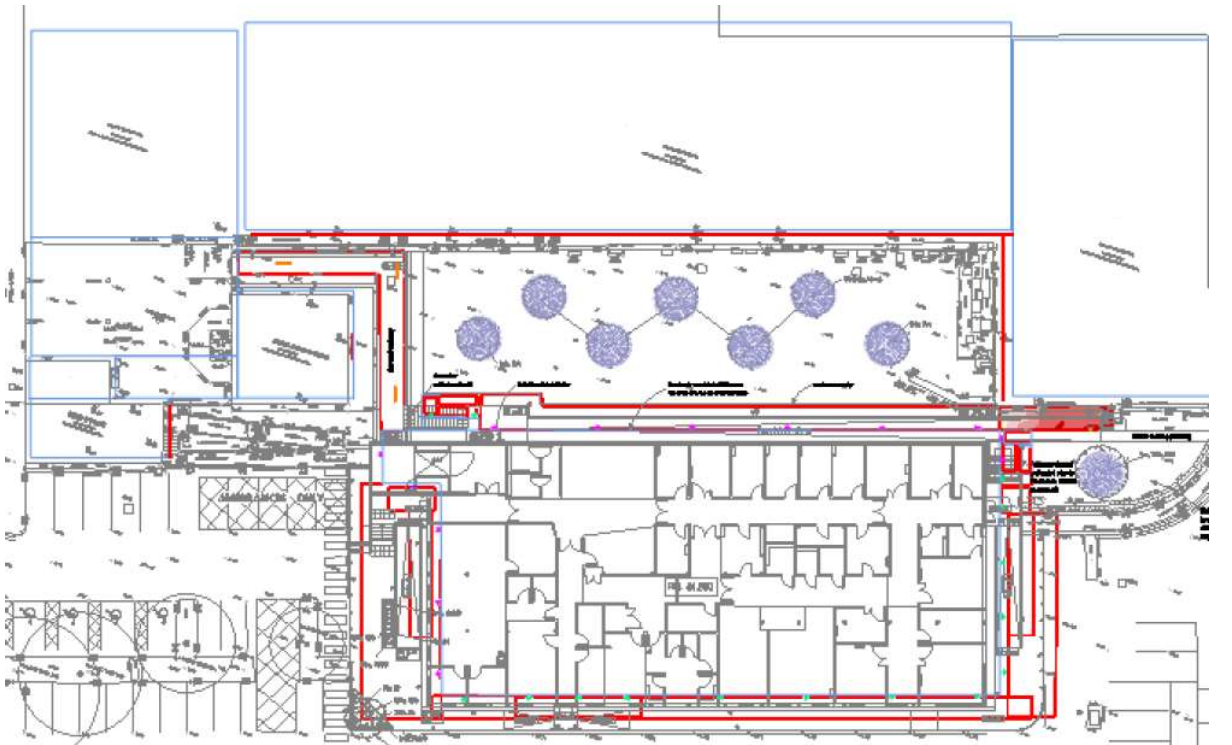


Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External

4.2.7 Result overview, Extended walkway



General

Calculation algorithm used
Height of evaluation surface
Maintenance factor

Average indirect fraction
0.00 m
0.80

Total luminous flux
Total power
Total power per area (44792.25 m²)

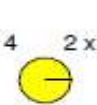
78722 lm
600.8 W
0.01 W/m²

Illuminance

Average illuminance
Minimum illuminance
Maximum illuminance
Uniformity U₀
Diversity U_d

$\bar{E}_m$	34.2 lx
E_{min}	12.5 lx
E_{max}	86.1 lx
$E_{min}/\bar{E}_m$	1:2.73 (0.37)
E_{min}/E_{max}	1:6.87 (0.15)

Type No.\Make



Thorlux Lighting

Order No. : PW19910/PATH
Luminaire name : Passway
Equipment : 1 x 5 W / 450 lm

Manufacturer: Thorlux Lighting

PW19910/PATH Passway

The Passway is a lighting bollard designed to protect itself and those around it. A contemporary, highly robust and optically refined LED bollard with an abundance of unique features

Contained within the IP66, IK10 head unit, custom designed, high performance optics direct the light exactly where it is needed. A dedicated lens for each LED ensures the most efficient distribution of light resulting in highly impressive luminaire spacings whilst still maintaining uniformity.

A choice of two distribution options are available. The area distribution provides 360° light output whilst the pathway distribution gives 180°. All versions have less than 2% upward light component making Passway suitable for rural as well as urban environments.

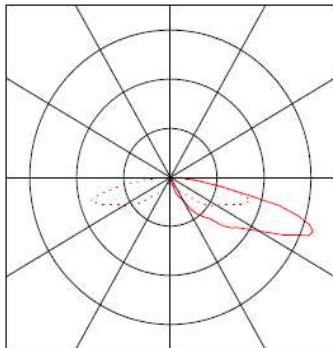
Luminaire data

Luminaire efficiency	: 100%
Luminaire efficacy	: 50 lm/W
Classification	: A10 ↓98.6% ↑1.4%
CIE Flux Codes	: 9 34 79 99 100
UGR 4H 8H	: 33.0 / 30.6
Power	: 9 W
Luminous flux	: 450 lm

Equipped with

Quantity	: 1
Designation	:
Power	: 5 W
Colour	: 4000
Luminous flux	: 450 lm
Socket	: ---

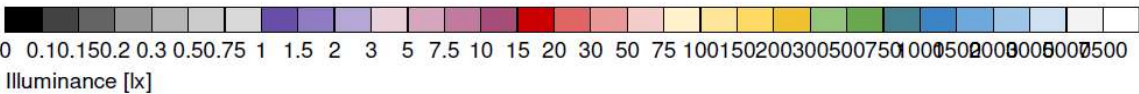
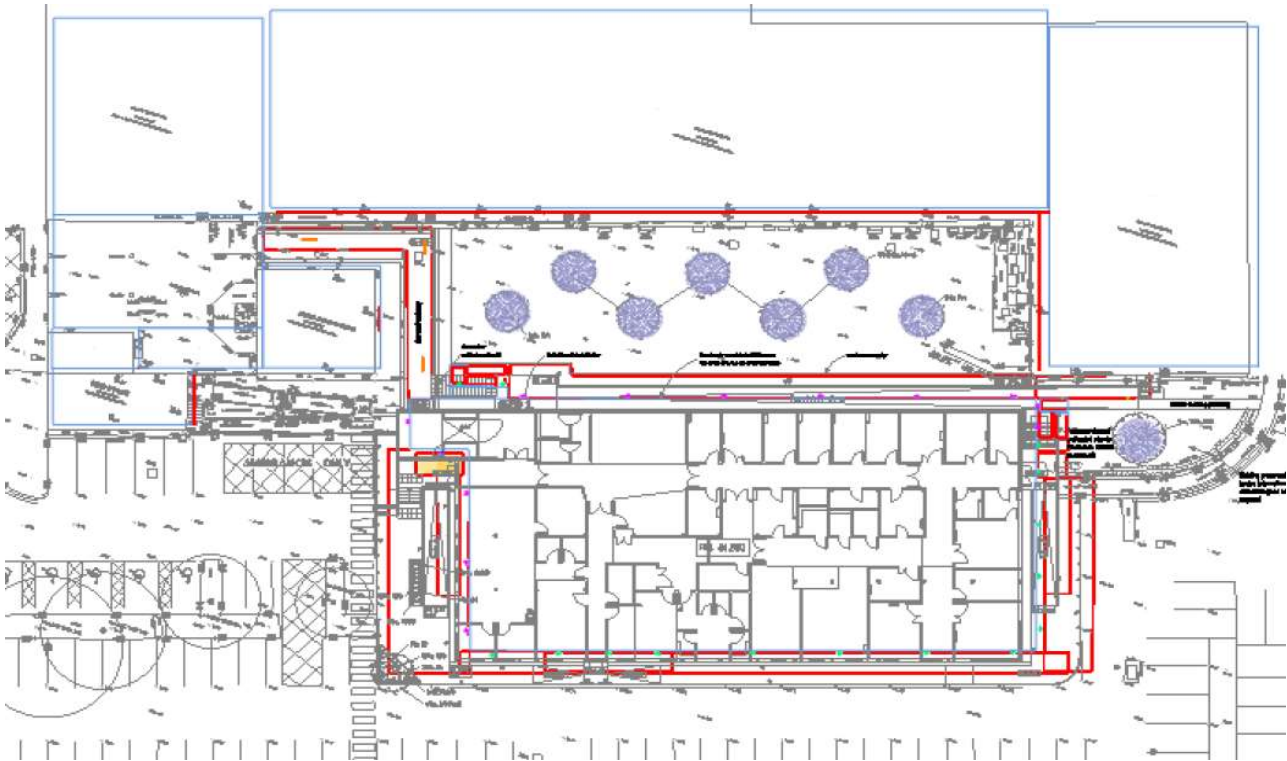
Dimensions : Ø165 mm x 1100 mm



Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024



4.2 Summary, RBH Urology External
4.2.8 Result overview, Ramp Entrance 1



General	
Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	81700 lm
Total power	620.4 W
Total power per area (44792.25 m²)	0.01 W/m²

Illuminance		
Average illuminance	E_m	171 lx
Minimum illuminance	E_{min}	104 lx
Maximum illuminance	E_{max}	243 lx
Uniformity U_0	E_{min}/E_m	1:1.65 (0.61)
Diversity U_d	E_{min}/E_{max}	1:2.34 (0.43)

Type No. Make

10	19 x	Order No.	: OPUWP L40 OA
		Luminaire name	: OPUS WALLPACK
		Equipment	: 1 x Dextra 24 W / 3325 lm
		Emergency	: 633 lm (19.0 %)

Manufacturer: Dextra Group PLC



OPUWP L40 OA wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

Luminaire data

Absolute Photometry

Luminaire efficacy : 138.54 lm/W

Classification : A30 ↓98.1% ↑1.9%

CIE Flux Codes : 40 80 97 98 100

UGR 4H 8H : 36.7 / 31.5

Control gear : electronic ballast

Power : 24 W

Luminous flux : 3325 lm

Equipped with

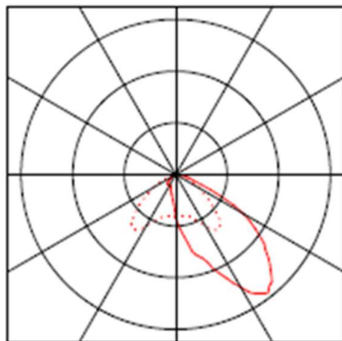
Quantity : 1

Designation : Dextra

Colour : 4000K

Colour reproduction : 2

Dimensions : 310 mm x 45 mm x 325 mm

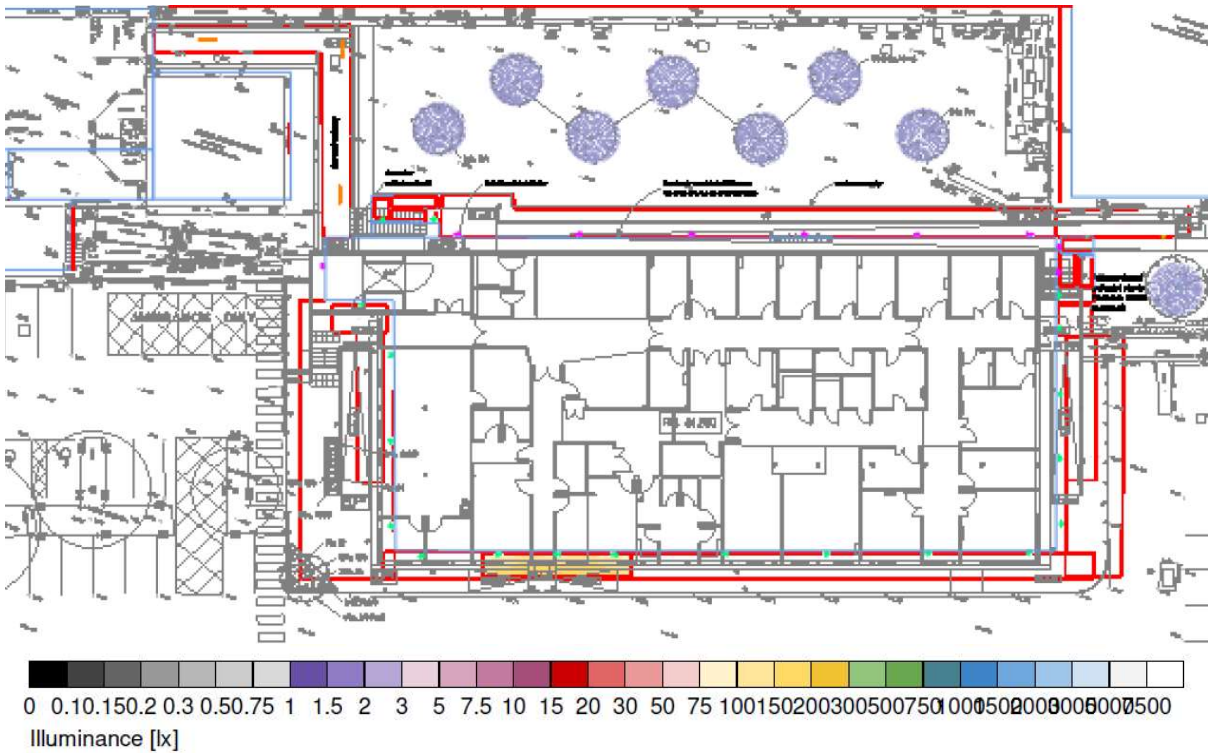




Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External
4.2.19 Result overview, Staff Entrance and ramp



General	
Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	81700 lm
Total power	620.4 W
Total power per area (44792.25 m²)	0.01 W/m²

Illuminance	
Average illuminance	$\bar{E}_m$ 145 lx
Minimum illuminance	E_{min} 75.7 lx
Maximum illuminance	E_{max} 200 lx
Uniformity U_0	$E_{min}/\bar{E}_m$ 1:1.92 (0.52)
Diversity U_d	E_{min}/E_{max} 1:2.64 (0.38)

Type No. Make

10	19 x	Order No.	: OPUWP L40 OA
		Luminaire name	: OPUS WALLPACK
		Equipment	: 1 x Dextra 24 W / 3325 lm
		Emergency	: 633 lm (19.0 %)

Manufacturer: Dextra Group PLC



OPUWP L40 OA wall-mounted luminaire OPUS WALLPACK

OPUS Wallpack - IP65, IK10

Wall mounted exterior luminaire, diecast aluminium body with grey paint, salt spray tested finish and polycarbonate diffuser.

Options:

E3 - Emergency control gear (647 lumens output)

ST3 - Emergency Selftest

AT3 - Emergency Autotest

R25E - Reacta 25, On / Off High Frequency

R25C - Reacta 25, Corridor Mode*

R25W - Reacta-Wave Wireless sensor DALI

R25WE - Reacta-Wave Wireless sensor On/Off

*Bi-Level Dimming. Will only dim the luminaire to 10% during absence and brightout, it will not turn the luminaire off.

PH - Photocell (Dawn to Dusk switching photocell) - must be used for bright out functionality

BL - Black housing

Luminaire data

Absolute Photometry

Luminaire efficacy : 138.54 lm/W

Classification : A30 ↓98.1% ↑1.9%

CIE Flux Codes : 40 80 97 98 100

UGR 4H 8H : 36.7 / 31.5

Control gear : electronic ballast

Power : 24 W

Luminous flux : 3325 lm

Equipped with

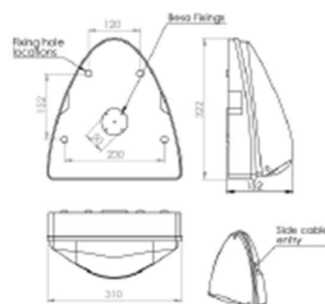
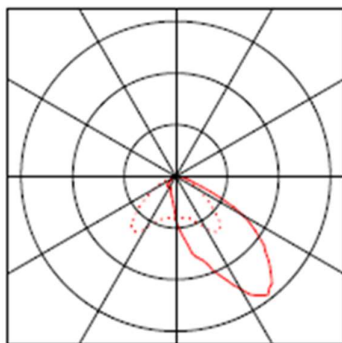
Quantity : 1

Designation : Dextra

Colour : 4000K

Colour reproduction : 2

Dimensions : 310 mm x 45 mm x 325 mm

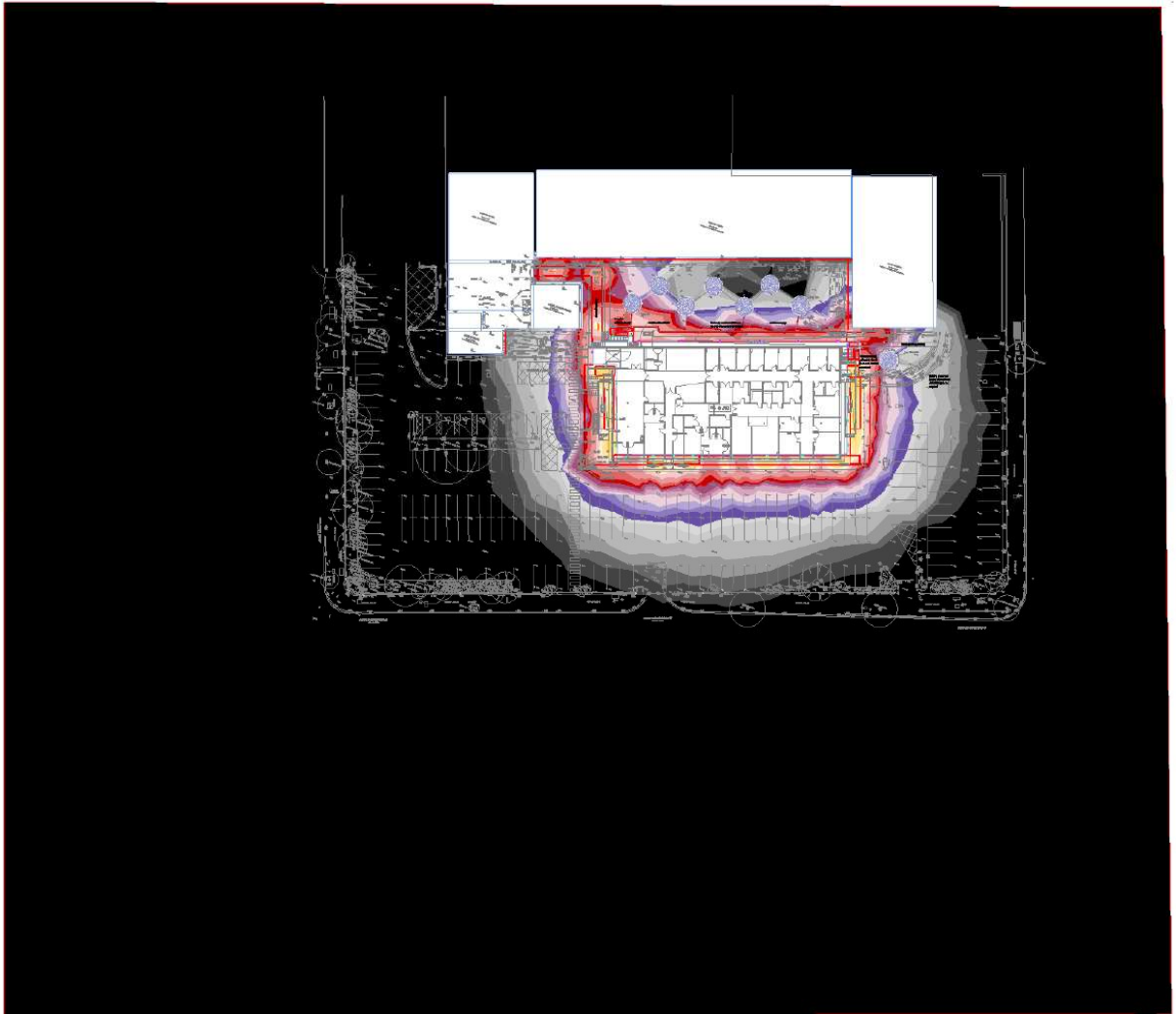


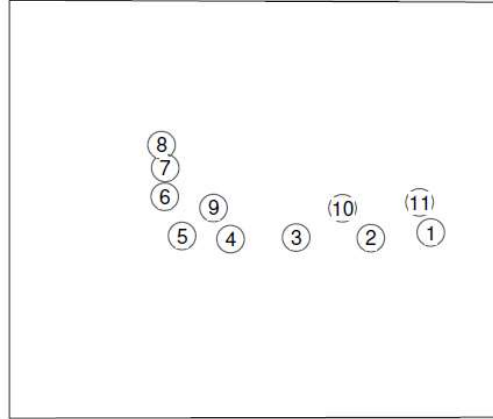
Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.2 Summary, RBH Urology External

4.2.23 Result overview, RBH Urology External





Horizontal illuminance

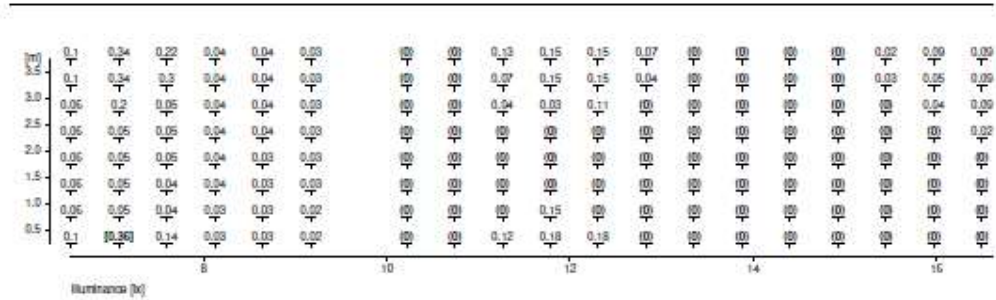
Measuring surface	X	Y	Z	E
E(p) 1	196.85 m	86.80 m	0.00 m	0.03 lx
E(p) 2	168.79 m	84.16 m	0.00 m	0.08 lx
E(p) 3	133.96 m	84.44 m	0.00 m	0.15 lx
E(p) 4	103.39 m	83.64 m	0.00 m	0.04 lx
E(p) 5	80.70 m	85.20 m	0.00 m	0.02 lx
E(p) 6	72.64 m	103.46 m	0.00 m	0.01 lx
E(p) 7	72.78 m	116.97 m	0.00 m	0.01 lx
E(p) 8	71.08 m	127.60 m	0.00 m	0.01 lx
E(p) 9	95.36 m	98.29 m	0.00 m	0.07 lx
E(p) 10	155.64 m	98.08 m	0.00 m	1.27 lx
E(p) 11	191.58 m	100.81 m	0.00 m	0.09 lx

Summary	Quantity	$\bar{E}_m$	E_{min}	E_{max}	U_o	U_d
Horizontal illuminance	11	0.16 lx	0.01 lx	1.27 lx	0.05	0.01

4 RBH Urology External

4.3 Calculation results, RBH Urology External

4.3.1 Table, Royal Berks Charity Facade (E)



Parti

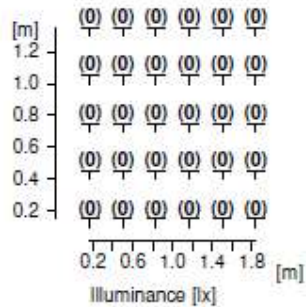
Average illuminance	E_m	: 0.03 lx
Minimum illuminance	E_{min}	: 0 lx
Maximum illuminance	E_{max}	: 0.36 lx
Uniformity U_o	E_{min}/E_m	: —

Object : External Lighting Calculations
Installation :
Project number : P24-0002- Royal Berkshire Hosp Urology
Date : 10.10.2024

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4.3 Calculation results, RBH Urology External

4.3.2 Table, Royal Berks Charity Window (E)



Average illuminance	E_m	: 0 lx
Minimum illuminance	E_{min}	: 0 lx
Maximum illuminance	E_{max}	: 0 lx
Uniformity U_0	E_{min}/E_m	: —