RELUX
light simulation tools

# Installation :

| | | |
|---|---|---|
| Project number | : | 2121 - 160 WHITEHORSE ROAD, BLACKBURN |
| Customer | : | |
| Processed by | : | |
| Date | : | 11.12.2018 |



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.

# 1 Luminaire data

## 1.1 Nimbus Lighting,, DOT9938P/40/A50-01 (!DOT9938P/40/A50-01)

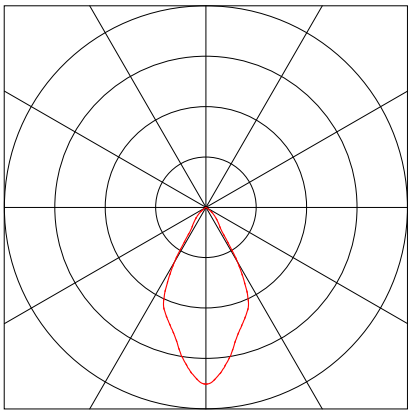
### 1.1.1 Data sheet

**Manufacturer: Nimbus Lighting,**

**!DOT9938P/40/A50-01** **DOT9938P/40/A50-01**

**Luminaire data**

| | | |
|---|---|---|
| Absolute Photometry | | |
| Luminaire efficacy | : | 127.38 lm/W |
| Classification | : | A70 ↓100.0% ↑0.0% |
| CIE Flux Codes | : | 92 100 100 100 100 |
| UGR 4H 8H | : | 15.0 / 15.0 |
| Power | : | 13 W |
| Luminous flux | : | 1656 lm |
| Dimensions | : | Ø150 mm x 1 mm |

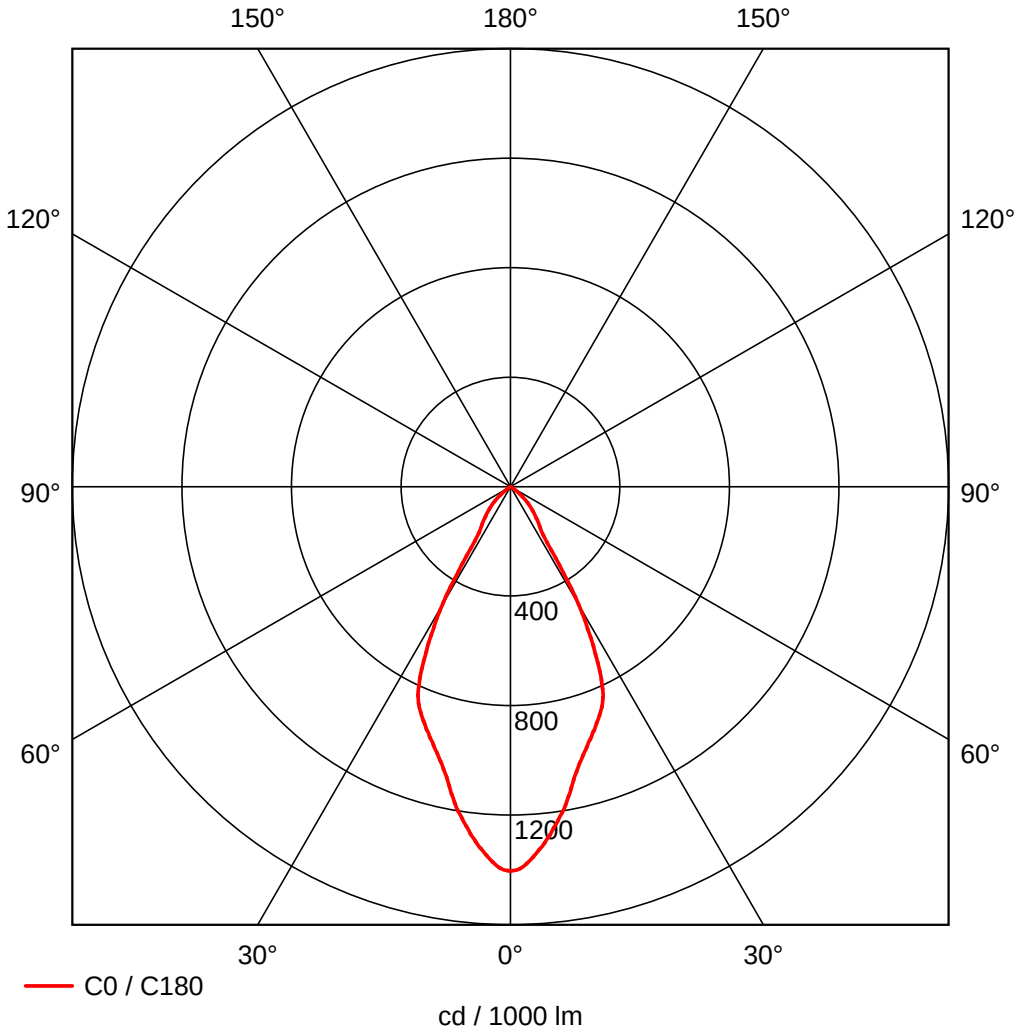


**Equipped with**

| | | |
|---|---|---|
| Quantity | : | 1 |
| Designation | : | |
| Colour | : | |

## 1.1 Nimbus Lighting,, DOT9938P/40/A50-01 (!DOT9938P/40/A50-01)

### 1.1.2 LDC




| | C0 | C90 | C180 |
|---|---|---|---|
| 0° | 1403 | 1403 | 1403 |
| 5° | 1320 | 1320 | 1320 |
| 10° | 1174 | 1174 | 1174 |
| 15° | 1019 | 1019 | 1019 |
| 20° | 920 | 920 | 920 |
| 25° | 789 | 789 | 789 |
| 30° | 501 | 501 | 501 |
| 35° | 195 | 195 | 195 |
| 40° | 144 | 144 | 144 |
| 45° | 100 | 100 | 100 |
| 50° | 54 | 54 | 54 |
| 55° | 17 | 17 | 17 |
| 60° | 3 | 3 | 3 |
| 65° | 1 | 1 | 1 |
| 70° | 1 | 1 | 1 |
| 75° | 1 | 1 | 1 |
| 80° | 1 | 1 | 1 |
| 85° | 1 | 1 | 1 |
| 90° | 0 | 0 | 0 |

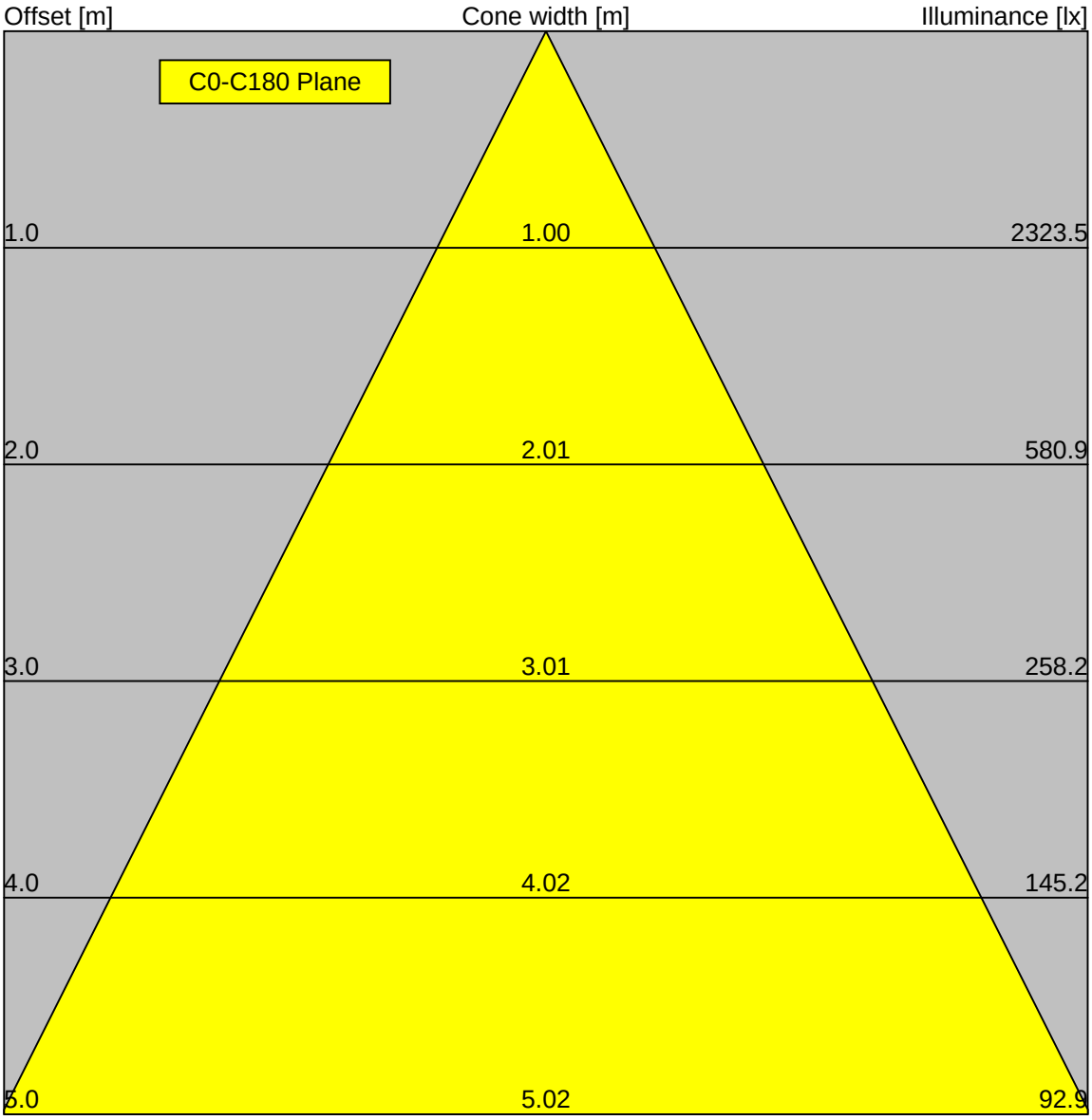
cd / 1000 lm

| | |
|---|---|
| Manufacturer | : Nimbus Lighting, |
| Order number | : !DOT9938P/40/A50-01 |
| Luminaire name | : DOT9938P/40/A50-01 |
| Equipment | : 1 x 13 W / 1656 lm |
| Dimensions | : D 150 mm x H 1 mm |
| File name | : rlx_20181211170015.ldt |

| | |
|---|---|
| Luminaire efficacy | : 127.38 lm/W (A70) |
| Light distribution | : rotationally symmetric |
| Beam Angle | : 53.3° C0-C180 |

## 1.1 Nimbus Lighting,, DOT9938P/40/A50-01 (!DOT9938P/40/A50-01)

### 1.1.4 Cone diagram



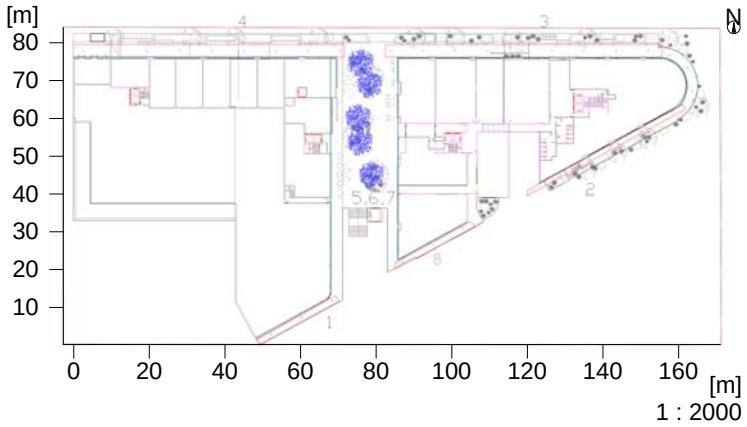

Note: The illuminance is calculated with I(gamma=0)!

| | | | |
|---|---|---|---|
| Manufacturer | : Nimbus Lighting, | Luminaire efficacy | : 127.38 lm/W (A70) |
| Order number | : !DOT9938P/40/A50-01 | Light distribution | : rotationally symmetric |
| Luminaire name | : DOT9938P/40/A50-01 | Beam Angle | : 53.3° C0-C180 |
| Equipment | : 1 x 13 W / 1656 lm | | |
| Dimensions | : D 150 mm x H 1 mm | | |
| File name | : rlx_20181211170015.ldt | | |

# 2 Exterior 1

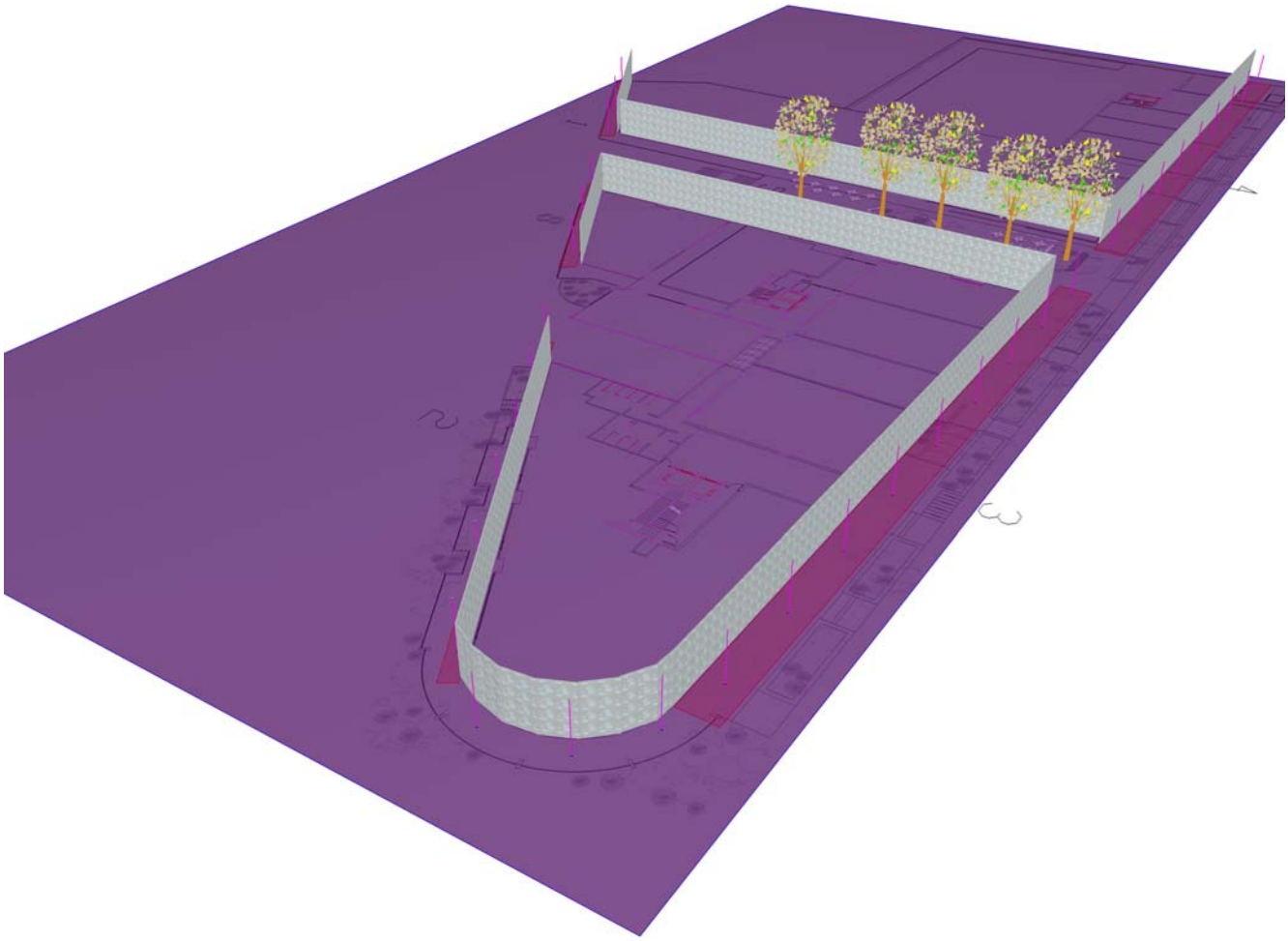
## 2.1 Description, Exterior 1

### 2.1.1 Floor plan



## 2.1 Description, Exterior 1

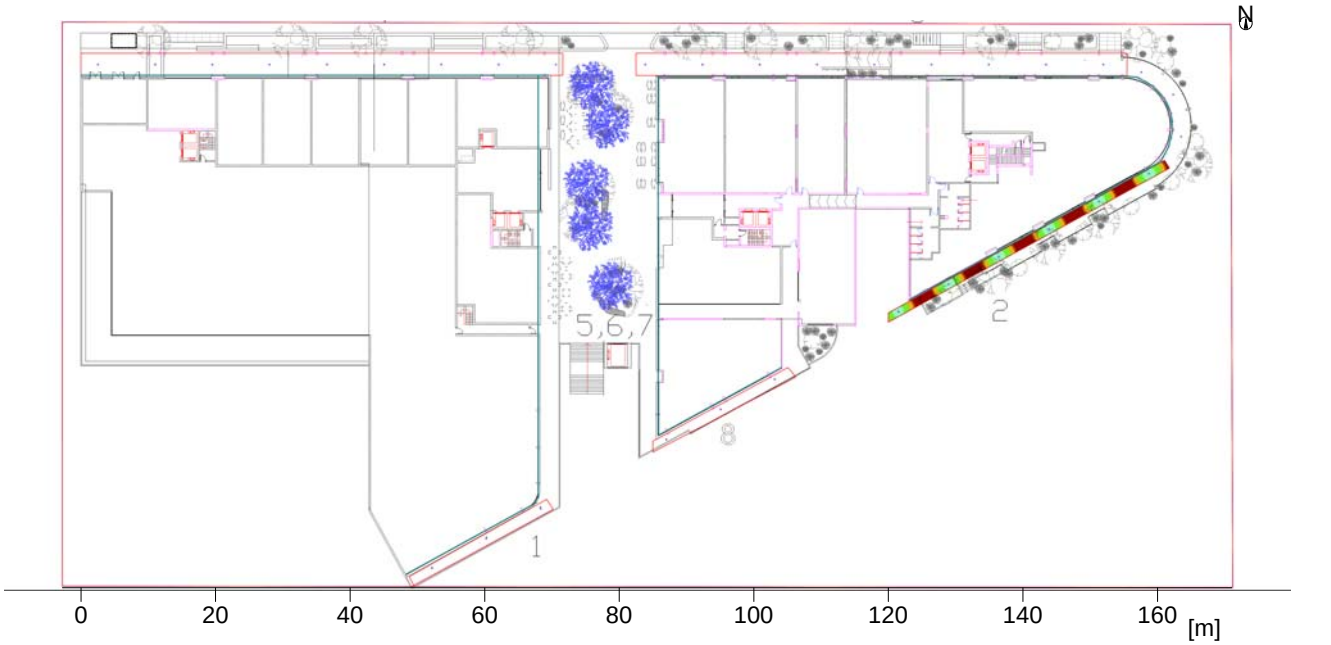
### 2.1.2 3D view, View 1

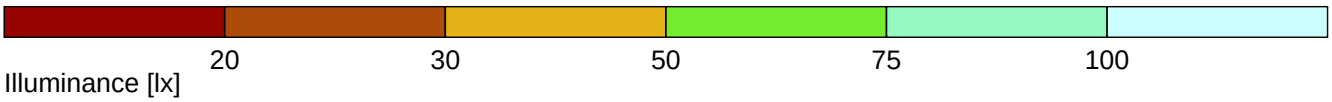


# 2 Exterior 1

## 2.2 Summary, Exterior 1

### 2.2.1 Result overview, Area 2




Illuminance [lx]

**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| Height of evaluation surface | 0.00 m |
| photometric centre height. [m]: | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429 W |
| Total power per area (14520.38 m²) | 0.03 W/m² |

**Illuminance**

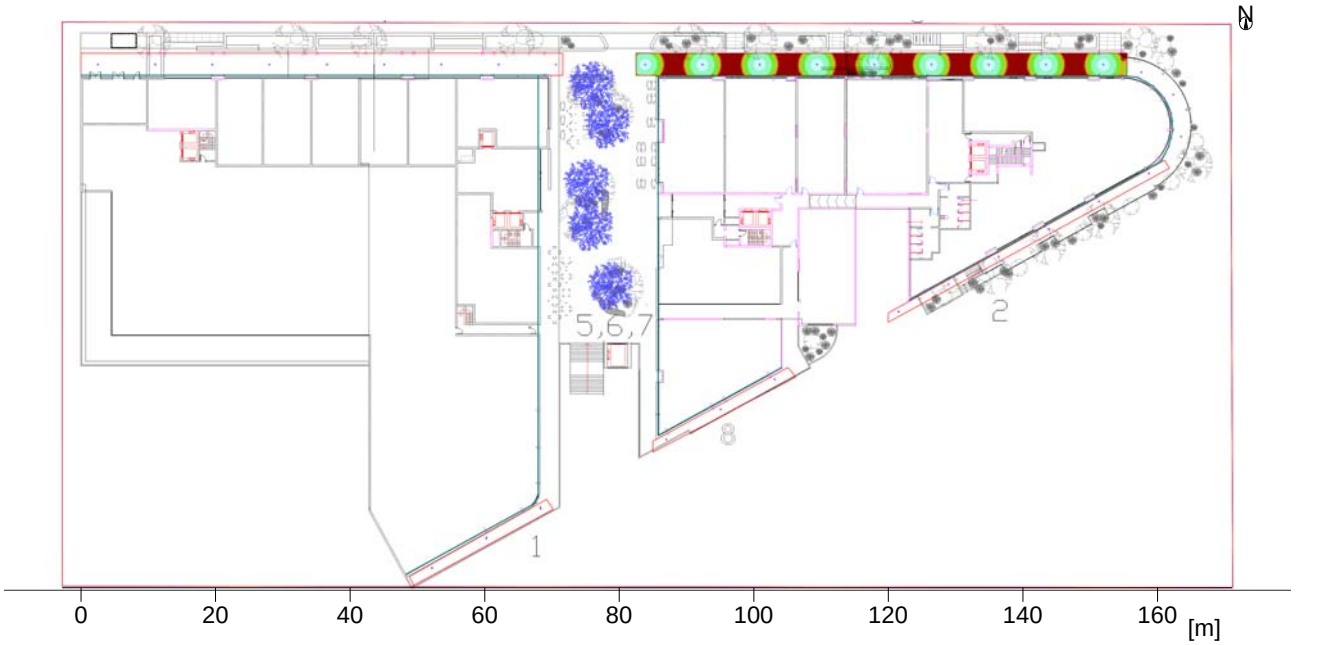
| | | |
|---|---|---|
| Average illuminance | Eav | 42.3 lx |
| Minimum illuminance | Emin | 5.8 lx |
| Maximum illuminance | Emax | 96.5 lx |
| Uniformity Uo | Emin/Em | 1:7.35 (0.14) |
| Diversity Ud | Emin/Emax | 1:16.8 (0.06) |

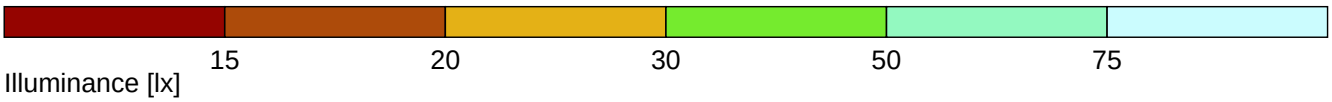
**Type No.\Make**

| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

## 2.2 Summary, Exterior 1

### 2.2.2 Result overview, Area 3




Illuminance [lx]

**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| photometric centre height. [m]: | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429 W |
| Total power per area (14520.38 m²) | 0.03 W/m² |

**Illuminance**

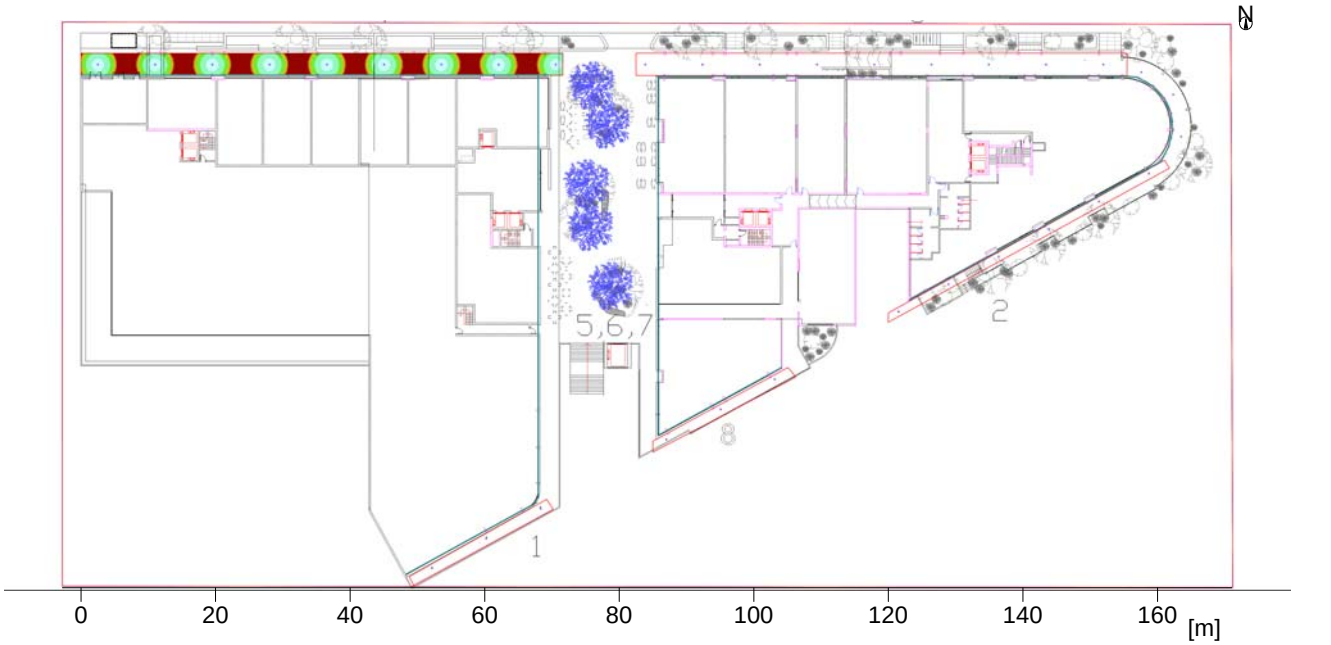
| | | |
|---|---|---|
| Average illuminance | Eav | 35.4 lx |
| Minimum illuminance | Emin | 5.1 lx |
| Maximum illuminance | Emax | 94.4 lx |
| Uniformity Uo | Emin/Em | 1:6.96 (0.14) |
| Diversity Ud | Emin/Emax | 1:18.6 (0.05) |

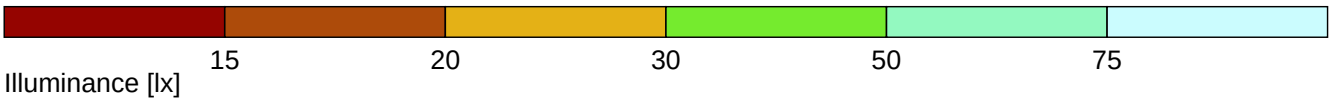
**Type No.\Make**

| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

## 2.2 Summary, Exterior 1

### 2.2.3 Result overview, Area 4




Illuminance [lx]

**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| photometric centre height. [m]: | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429 W |
| Total power per area (14520.38 m²) | 0.03 W/m² |

**Illuminance**

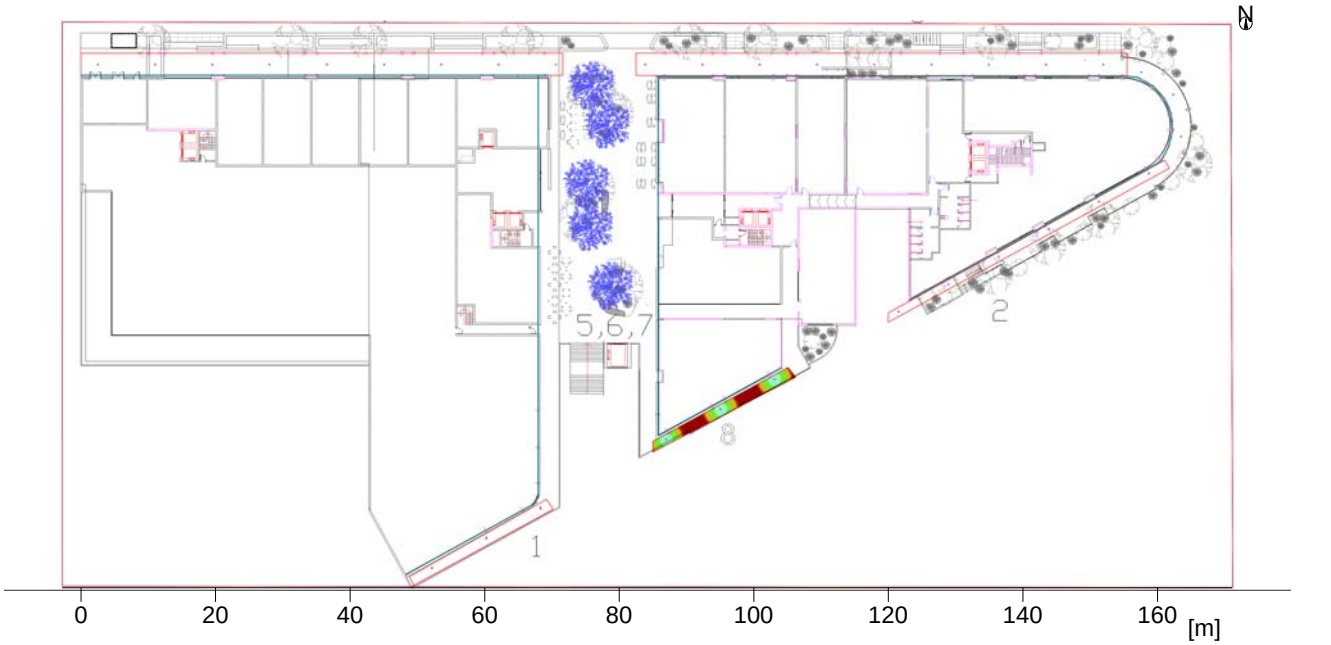
| | | |
|---|---|---|
| Average illuminance | Eav | 35.3 lx |
| Minimum illuminance | Emin | 5 lx |
| Maximum illuminance | Emax | 92.9 lx |
| Uniformity Uo | Emin/Em | 1:7.13 (0.14) |
| Diversity Ud | Emin/Emax | 1:18.7 (0.05) |

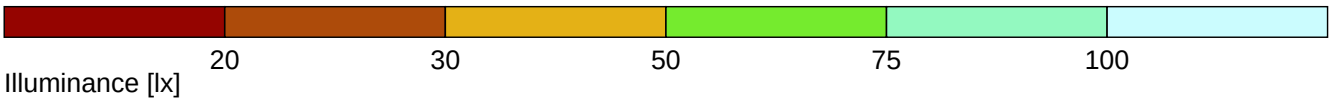
**Type No.\Make**

| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

## 2.2 Summary, Exterior 1

### 2.2.4 Result overview, Area 8




Illuminance [lx]

**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| Height of evaluation surface | 0.00 m |
| photometric centre height. [m]: | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429 W |
| Total power per area (14520.38 m²) | 0.03 W/m² |

**Illuminance**

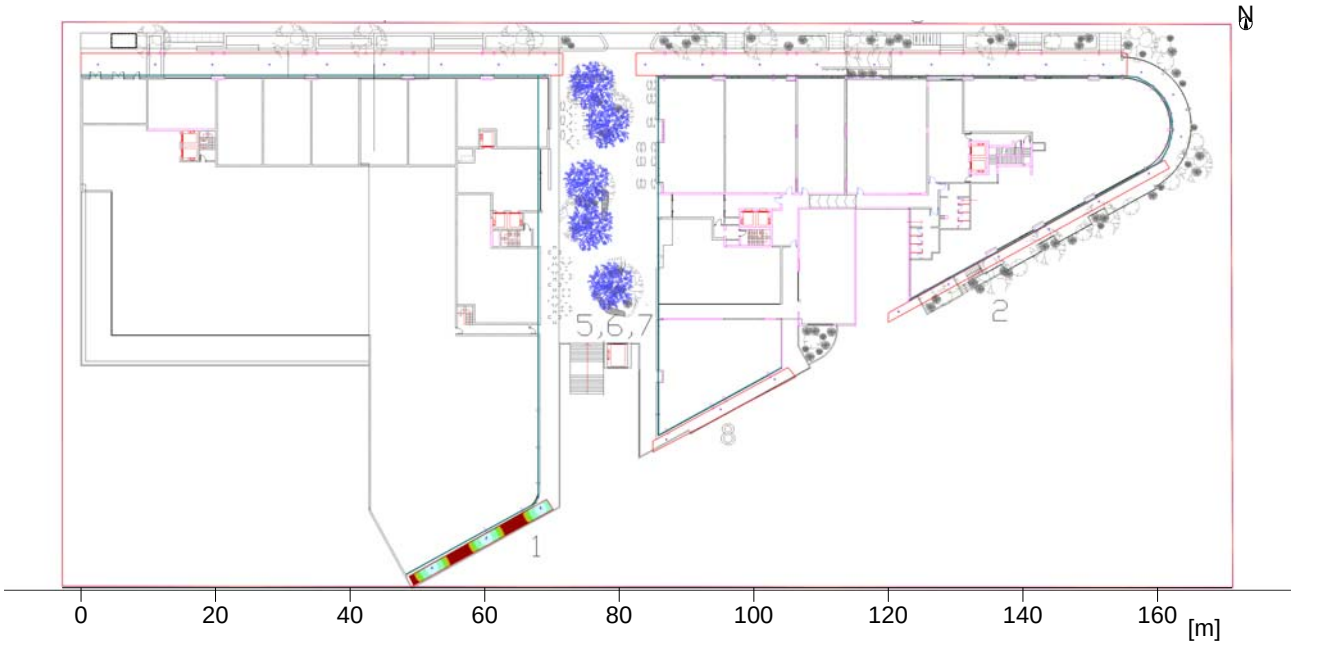
| | | |
|---|---|---|
| Average illuminance | Eav | 40.9 lx |
| Minimum illuminance | Emin | 4.5 lx |
| Maximum illuminance | Emax | 96.2 lx |
| Uniformity Uo | Emin/Em | 1:9.15 (0.11) |
| Diversity Ud | Emin/Emax | 1:21.5 (0.05) |

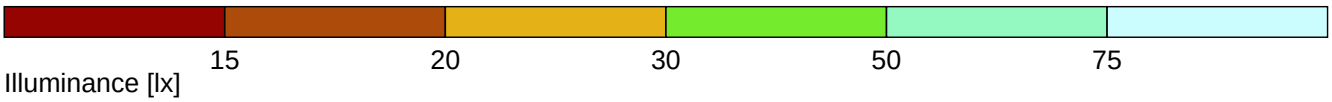
**Type No.\Make**

| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

## 2.2 Summary, Exterior 1

### 2.2.5 Result overview, Area 1




Illuminance [lx]

**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| Height of evaluation surface | 0.00 m |
| photometric centre height. [m]: | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429 W |
| Total power per area (14520.38 m²) | 0.03 W/m² |

**Illuminance**

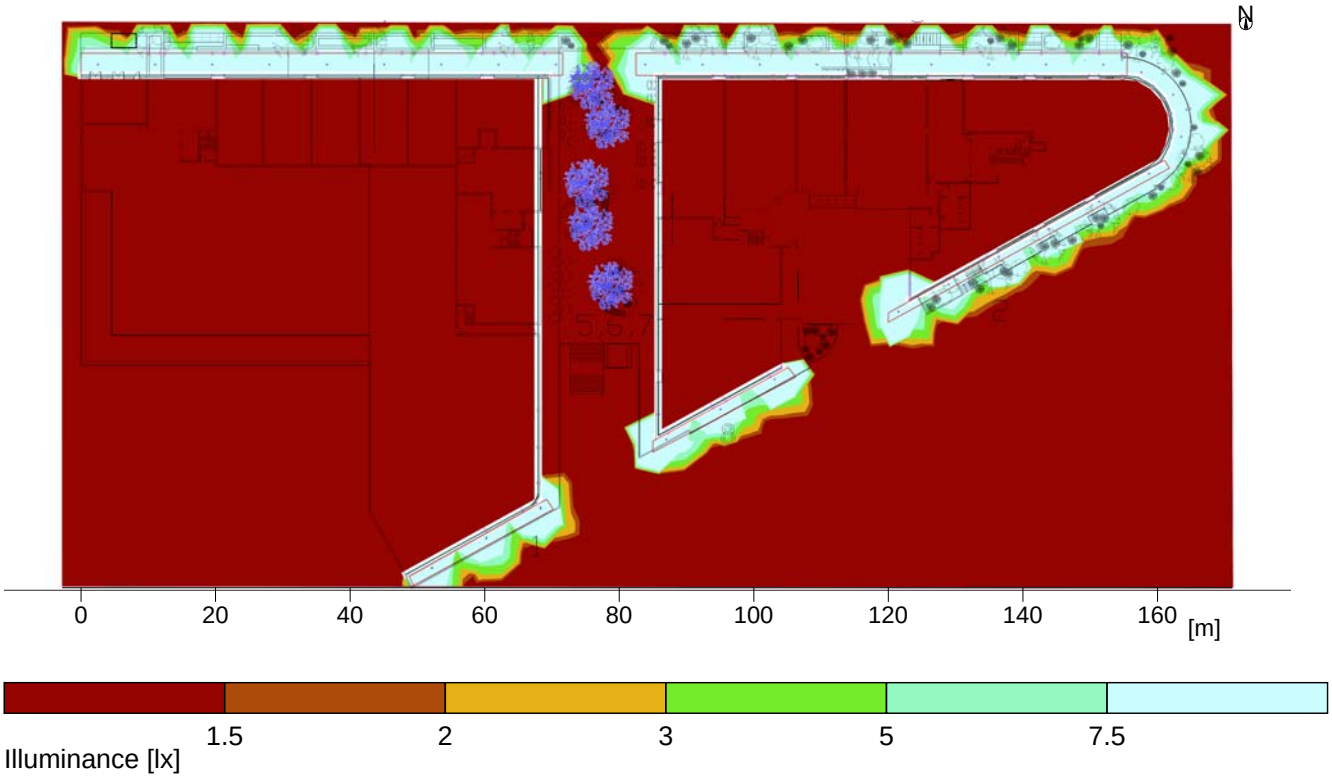
| | | |
|---|---|---|
| Average illuminance | Eav | 39.3 lx |
| Minimum illuminance | Emin | 4.2 lx |
| Maximum illuminance | Emax | 95.4 lx |
| Uniformity Uo | Emin/Em | 1:9.36 (0.11) |
| Diversity Ud | Emin/Emax | 1:22.7 (0.04) |

**Type No.\Make**

| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

## 2.2 Summary, Exterior 1

### 2.2.6 Result overview, Evaluation area 1




**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| photometric centre height. | 4.50 m |
| Maintenance factor | 0.80 |
| | |
| Total luminous flux of all lamps | 54648 lm |
| Total power | 429.0 W |
| Total power per area (14520.38 m²) | 0.03 W/m² (1.17 W/m²/100lx) |

| **Evaluation area 1** | **Area All** |
|---|---|
| | Horizontal |
| Em | 2.52 lx |
| Emin | 0 lx |
| Emin/Eav (Uo) | --- |
| Emin/Emax (Ud) | --- |
| Position | 0.00 m |

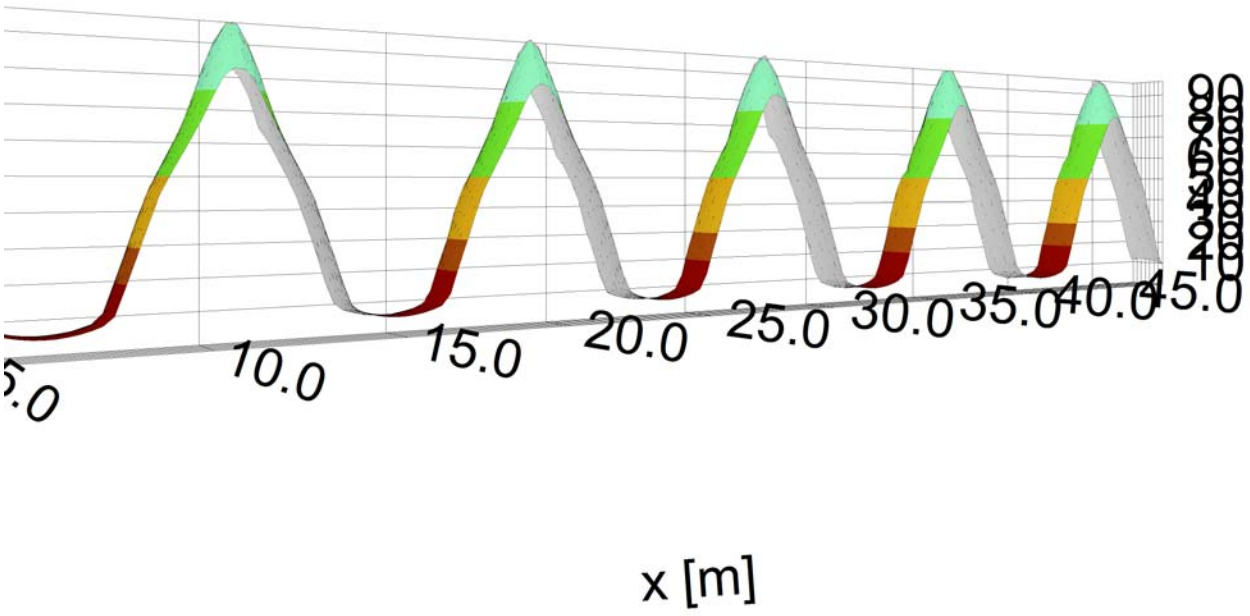
**Type No.\Make**

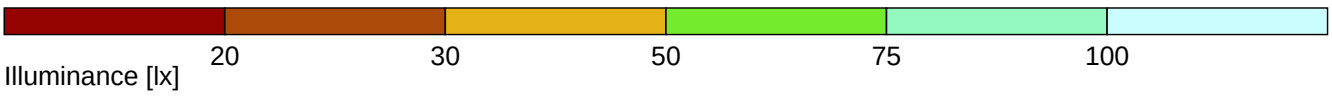
| | | | |
|---|---|---|---|
| | | **Nimbus Lighting,** | |
| 1 | 33 | Order No. | : !DOT9938P/40/A50-01 |
| | | Luminaire name | : DOT9938P/40/A50-01 |
| | | Equipment | : 1 x 13 W / 1656 lm |

# 2 Exterior 1

## 2.3 Calculation results, Exterior 1

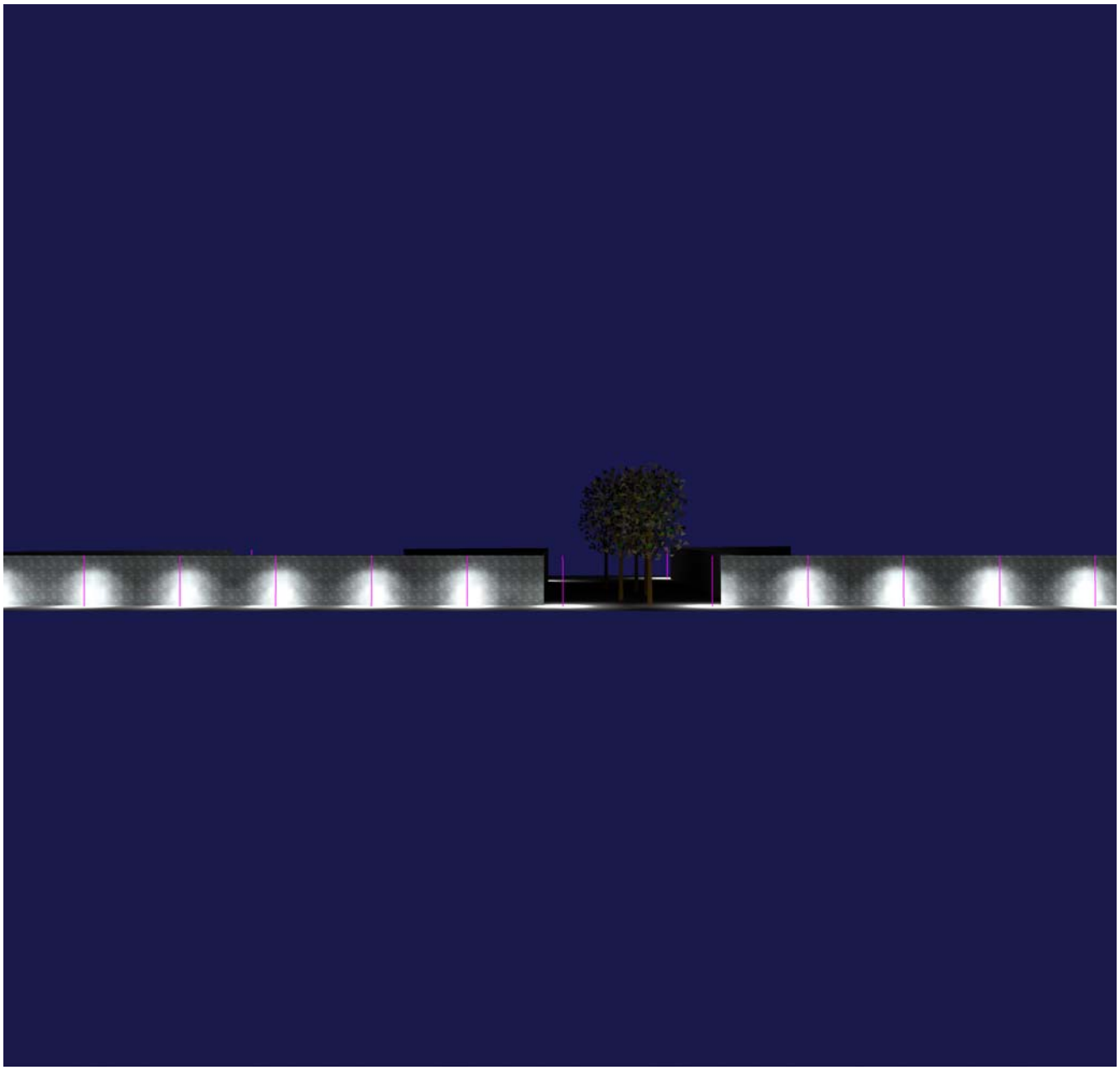
### 2.3.1 3D mountain plot, Area 2 (E)



## 2.3 Calculation results, Exterior 1

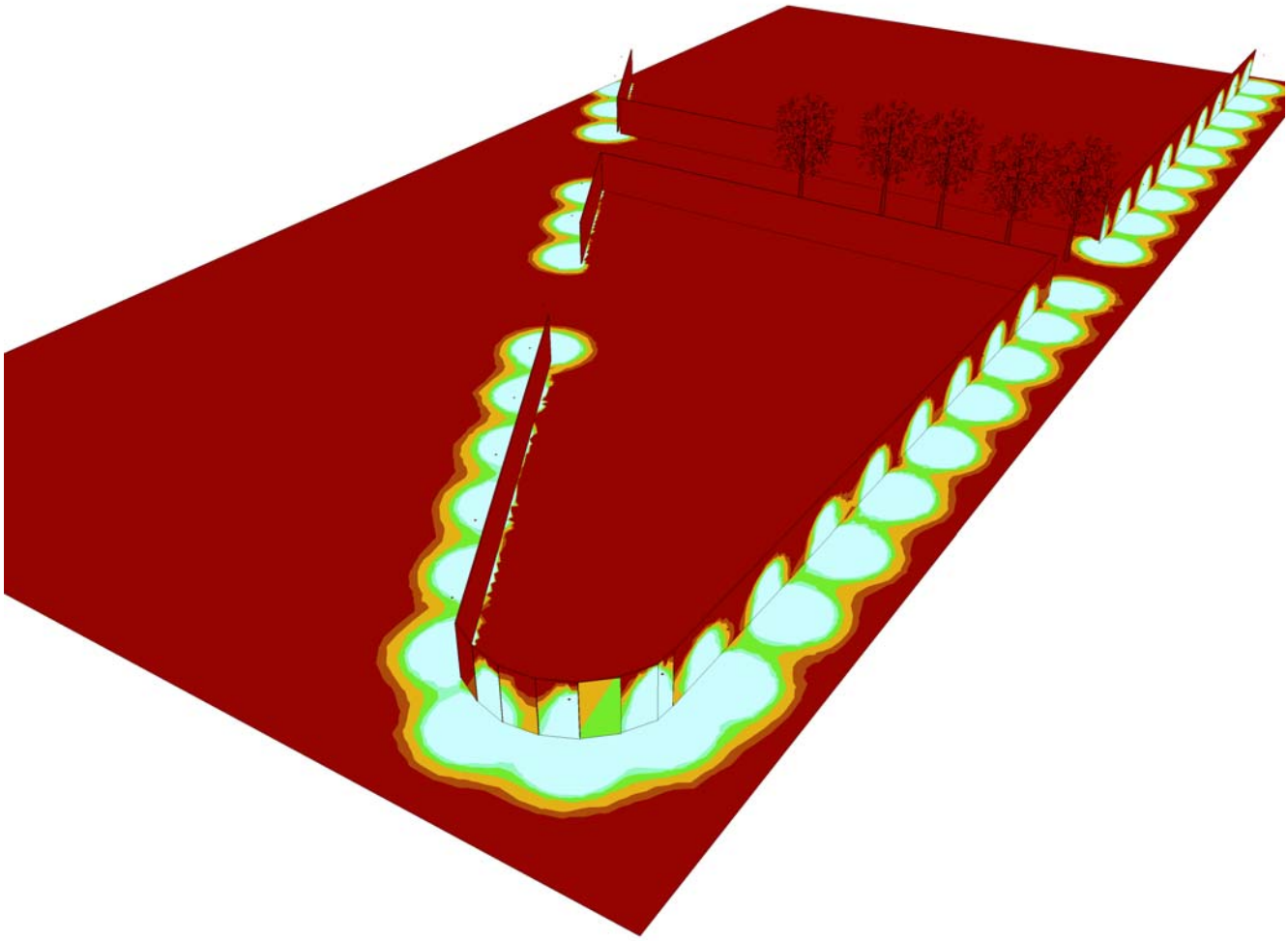
### 2.3.2 3D luminance, View from the back



Luminance in the scene
Minimum: : 0 cd/m²
Maximum: : 26.9 cd/m²

## 2.3 Calculation results, Exterior 1

### 2.3.3 3D pseudo colours, View 1 (E)




Illuminance [lx]

## TABLE 2.6

## VALUES OF LIGHT TECHNICAL PARAMETERS AND PERMISSIBLE LUMINAIRE TYPES FOR ROADS IN LOCAL AREAS AND FOR PATHWAYS

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **Lighting subcategory** | **Light technical parameters** | | | | **Permissible luminaire type (see Table 2.10)** |
| | **Average horizontal illuminance**[a,b] ($\overline{E}_h$) **lux** | **Point horizontal illuminance** [a,b] ($E_{Ph}$) **lux** | **Illuminance (horizontal) uniformity**[c] **Cat. P** ($U_{E2}$) | **Point vertical illuminance** [a,b] ($E_{Pv}$) **lux** | |
| P1 | 7 | 2 | 10 | 2 | Type 4 where part of a road reserve or Types 2, 3, 4 or 6 elsewhere |
| P2 | 3.5 | 0.7 | 10 | 0.7 | |
| P3[e] | 1.75 | 0.3 | 10 | 0.3[d] | |
| P4[e] | 0.85 | 0.14 | 10 | N/A | |
| P5[e] | 0.5 | 0.07 | 10 | N/A | |

a) These values are maintained.

b) Compliance is achieved by being greater than or equal to the applicable table value.

c) Compliance is achieved by being less than or equal to the applicable table value.

d) The vertical illuminance requirement only applies when subcategory P3 is selected for application to pathways, i.e. it does not apply for local roads.

e) In New Zealand, when the luminaires are to be supported on existing reticulation poles the subcategories P3R and P4R may be designated and the following reduced levels applied:

| Subcategory | $\overline{E}_h$ | $E_{Ph}$ |
|---|---|---|
| P3R | 1.25 | 0.15 |
| P4R | 0.7 | 0.07 |

Subcategory P5 lighting shall not be chosen for this situation.

NOTES:

1 Validation of the values in Columns 2 to 5 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, 3 and 5, which will typically be difficult to validate by field measurements.

2 See Section 3 for the design methods and requirements for use in assessing compliance with the specified light technical parameters.

## TABLE 2.2

## LIGHTING CATEGORIES FOR PATHWAYS (INCLUDING CYCLEWAYS)

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **Type of pathway** | | **Selection criteria[a,b)]** | | | **Applicable lighting subcategory** |
| **General description** | **Basic operating characteristics** | **Pedestrian/ cycle activity** | **Risk of crime[f)]** | **Need to enhance prestige** | |
| Pedestrian or cycle orientated pathway, e.g. footpaths, including those along local roads[d)] and arterial roads[e)], walkways, lanes, park paths, cycleways | Pedestrian/cycle traffic only | N/A | High | N/A | P1[c)] |
| | | High | Medium | High | P2 [c)] |
| | | Medium | Low | Medium | P3 |
| | | Low | Low | N/A | P4 |

a) The selection criteria of Columns 3 to 5 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the pathway will determine the applicable lighting subcategory.

b) Refer to Appendix C for guidance on choosing the applicable level of each selection criteria for the environment and purpose of a lighting scheme.

c) Where there are vertical surfaces of high reflectance (e.g. light coloured walls bordering on an alleyway) alongside the pathway, the next lower lighting subcategory may be selected.

d) Where the footpath is along a local road and subcategory P1 or P2 is selected, the light technical parameters for that subcategory only apply to the formed footpath. Where subcategory P3 or P4 is selected, the light technical parameters apply to the whole road reserve width, including the footpath.

e) Footpaths associated with arterial roads are deemed not to require separate lighting provided that—

(i) the road is lit to at least the applicable level of Category V lighting complying with AS/NZS 1158.1.1; and

(ii) the footpath is unshaded, e.g. there are no substantially continuous building awnings, and the footpath is contiguous with the roadway.

If the footpath is shaded, or is separated from the roadway by an extensive nature strip or a service road, it shall be provided with lighting to at least subcategory P4.

f) The risk levels ‘High’, ‘Medium’ and ‘Low’ correspond to the classifications of the same names in HB 436.

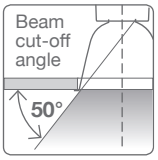
DOT LED

# DOT 9900SMP LED
SURFACE MOUNTED
PERFORMANCE SERIES

PERFORMANCE

DOT 9900SM Series
194mm dia. o/a
350mA-1050mA

CREE CXB
CRI: ≥83
MacAdam 3







## MODELS (Reflector Options)

/4 Narrow Beam – 29° Beam Angle

/8 Wide Beam – 55° Beam Angle

## White Ceiling Plate A50/01 fitted to downlight as standard.

| | | |
|---|---|---|
| Total Energy Consumption $P_L$(W) – Refer LED Performance Guide | | |
| Weight | Luminaire Body | 2000 gms |
| IEC 60598 - parts 1 and 2 | | Complies |
| AS/NZS60598 - parts 1 and 2 | | Complies |
| IP Rating | | Refer Accessory |

| | |
|---|---|
| Dimming Options Available | |
| - Analogue dimming 1-10 volt | AD |
| - DALI dimming | DALI |

## ORDERING CODE FORMAT

Example: DOT 99 3 8 SMP /IP6X /40 /DALI /A50

- Model Series Number (99)
- Driver Code (Refer table below)
- Beam Angle (4-Narrow or 8-Wide)
- Series Code (SM-Surface Mount, P-Performance)
- IP65 Option (if required: 4-Narrow or 8-Wide)
- LED engine colour (/30-830 or /40-840)
- Dimming option if required (/AD or /DALI)
- Accessory Code

## LED GUIDE – DOT 9900SMP PERFORMANCE SERIES (Wide Beam Option)

| DOT Model No. /30 : 3000k /40 : 4000k | Driver current (mA) | Wattage (W) | Luminaire Output Lumens[B] | Luminaire efficacy (lm/W output) | Lifetime LED engine (Hours @ L90) |
|---|---|---|---|---|---|
| ~~DOT 9938SMP/30~~ [A] | ~~350mA (3)~~ | ~~13.5~~ | ~~**1557**~~ | ~~**115.8**~~ | ~~>100,000~~ |
| DOT 9938SMP/40 | 350mA (3) | 13.5 | **1656** | **122.7** | >100,000 |
| ~~DOT 9958SMP/30~~ [A] | ~~500mA (5)~~ | ~~19.0~~ | ~~**2160**~~ | ~~**113.7**~~ | ~~>100,000~~ |
| DOT 9958SMP/40 | 500mA (5) | 19.0 | **2298** | **120.9** | >100,000 |
| DOT 9978SMP/30 [A] | 700mA (7) | 27.1 | **2962** | **109.3** | >100,000 |
| DOT 9978SMP/40 | 700mA 7) | 27.1 | **3151** | **116.3** | >100,000 |
| DOT 9998SMP/30 [A] | 900mA 9) | 33.6 | **3799** | **113.1** | >100,000 |
| DOT 9998SMP/40 | 900mA (9) | 33.6 | **4042** | **120.3** | >100,000 |
| DOT 99108SMP/30 [A] | 1050mA (10) | 38.9 | **4243** | **109.1** | >100,000 |
| DOT 99108SMP/40 | 1050mA (10) | 38.9 | **4514** | **116.0** | >100,000 |

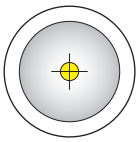
[A] Figures extrapolated / interpolated from data at other currents.

[B] Output Lumens : Delivered lumen output from downlight, including thermal, electrical and optic losses.

CREE LEDs

DOT **9900 SM** SERIES
SURFACE MOUNTED

# Accessories



194mm dia. o/a

EXCEL PERFORMANCE

DOT LED

## AX**LOCK** ACCESSORIES

Fitted to downlight ***after*** installation

Accessory trims available
White /01 or Silver /55 or Black /11

### A50
**Round Ceiling Plate**
IP20

Moulded polycarbonate
– 192mm dia. overall

### XL50
**Round Ceiling Plate with highlight**
IP20

Moulded polycarbonate
– 192mm dia. overall

### A52-CL
**Round Flush Clear Lens**
IP65 Below Ceiling

Moulded polycarbonate
– 192mm dia. overall

### XL52-CL
**Round Flush Clear Lens with highlight**
IP65 Below Ceiling

Moulded polycarbonate
– 192mm dia. overall

### A52-DL
**Round Soft Diffusion Lens**
IP54

Moulded polycarbonate
– 192mm dia. overall

### A12-FG
**Round Flush Glass**
IP54

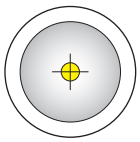
5mm thick toughened glass with sandblasted centre.
– 195mm dia. overall

### A12-DG
**Round Dropped Glass**
IP20

5mm thick toughened glass with sandblasted centre.
– 195mm dia. overall

DOT **9900 SM** SERIES
SURFACE MOUNTED

# Secured Access Accessories



194mm dia. o/a

EXCEL PERFORMANCE

DOT LED

## SECURED ACCESS ACCESSORIES

Fitted to downlight ***before*** installation

Accessory trims available
White /01 or Silver /55 or Black /11

TORX tamperproof fasteners

### A52-CL/SA
**Round Clear Lens**
IP65 Below Ceiling

Moulded polycarbonate – 192mm dia. overall

### XL52-CL/SA
**Round Clear Lens with highlight**
IP65 Below Ceiling

Moulded polycarbonate – 192mm dia. overall

### A52-DL/SA
**Round Soft Diffusion Lens**
IP54

Moulded polycarbonate – 192mm dia. overall

TORX tamperproof fasteners

## PRO**SPEC** OPTIONS

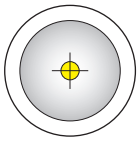
**Pro**ject **Spec**ific Accessory Options – Factory Fitted

Accessory trims available
White /01 or Silver /55 or Black /11

### EM Emergency
Self contained emergency unit – 3 hours. Features inverter and battery pack ≥550 lumens output in emergency mode. Available with most models.

DOT **9900SM** SERIES
SURFACE MOUNTED

# Photometric Data


194mm dia. o/a

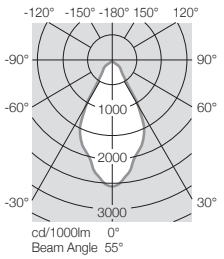
EXCEL PERFORMANCE

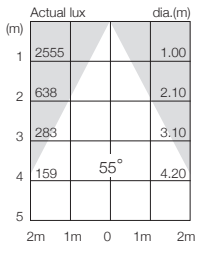
DOT LED

## DOT **9900SMXL** LED
EXCEL SERIES

500 mA
CREE CXB
LED


DOT 9958SMXL
/40 /A50-01



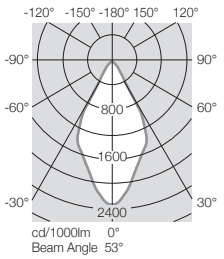



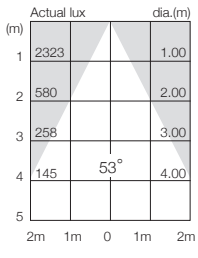

Total Energy Consumption $P_L$(W) 19.0W
Total Lumen Output 1915Lm (100.8 Lm/W)

## DOT **9900SMP** LED
PERFORMANCE SERIES

350 mA
CREE CXB
LED


DOT 9938SMP
/40 /A50-01

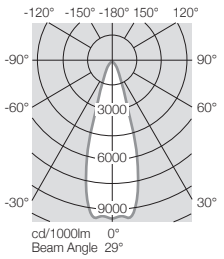


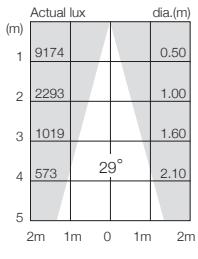




Total Energy Consumption $P_L$(W) 13.5W
Total Lumen Output 1656Lm (122.7 Lm/W)

500 mA
CREE CXB
LED

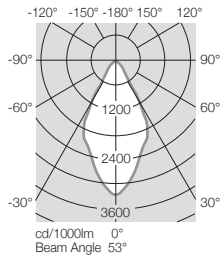

DOT 9954SMP
/40 /A50-01

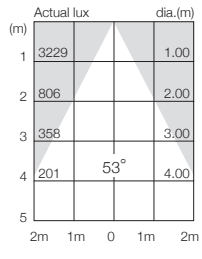



Total Energy Consumption $P_L$(W) 19.0W
Total Lumen Output 2407Lm (126.7 Lm/W)

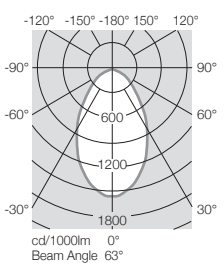

DOT 9958SMP
/40 /A50-01

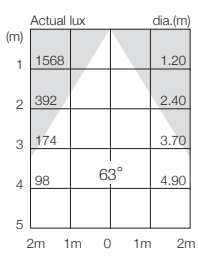



Total Energy Consumption $P_L$(W) 19.0W
Total Lumen Output 2298Lm (120.9 Lm/W)


DOT 9958SMP
/40 /A52-DL/01



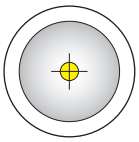




Total Energy Consumption $P_L$(W) 19.0W
Total Lumen Output 2194Lm (115.5 Lm/W)

CREE LEDs

DOT **9900SM** SERIES
SURFACE MOUNTED

# Photometric Data



194mm dia. o/a

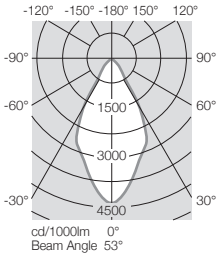
PERFORMANCE

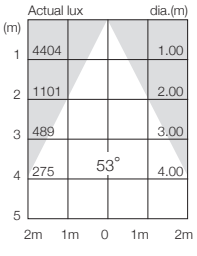
DOT LED

## DOT **9900SMP LED**
PERFORMANCE SERIES

700 mA
CREE CXB
LED

DOT 9978SMP
/40 /A50-01

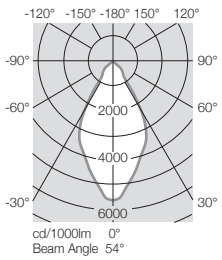


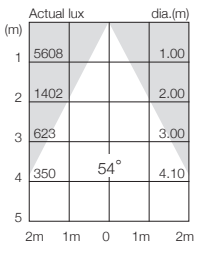




| | |
|---|---|
| Total Energy Consumption $P_L$(W) | 27.1W |
| Total Lumen Output | 3151Lm (116.3 Lm/W) |

900 mA
CREE CXB
LED

DOT 9998SMP
/40 /A50-01

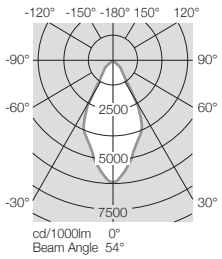


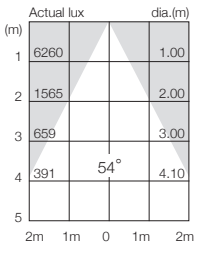




| | |
|---|---|
| Total Energy Consumption $P_L$(W) | 33.6W |
| Total Lumen Output | 4042Lm (120.3 Lm/W) |

1050 mA
CREE CXB
LED

DOT 99108SMP
/40 A50-01




| | |
|---|---|
| Total Energy Consumption $P_L$(W) | 38.9W |
| Total Lumen Output | 4514Lm (116.0 Lm/W) |

CREE LEDs

**WHY IS THIS IMPORTANT?**

Good lighting makes public places and paths visible and inviting at night. It also encourages their use and assists in natural surveillance. The more people who use public spaces at night, the safer and less threatening they become.

**OBJECTIVE 9.1**
**To position lighting appropriately to improve visibility for pedestrians and cyclists and enhance natural surveillance opportunities.**

DESIGN SUGGESTION 9.1.1 – Lighting should be positioned along streets and paths, and at public transport stops and public facilities that are likely to be used at night. This will assist in providing safe routes for pedestrians, cyclists and vehicles.

DESIGN SUGGESTION 9.1.2 – Illuminate urban public space used at night, including building entrances, exits and other main pedestrian routes of travel.

DESIGN SUGGESTION 9.1.3 – Avoid placing bollards with integrated lighting close to pathways as it is difficult for pedestrians to see beyond them into the distance due to the blinding effect of low level lights.

DESIGN SUGGESTION 9.1.4 – Areas not intended for night-time use should not be lit and/or closed off.

DESIGN SUGGESTION 9.1.5 – Lighting should be well integrated with signage, landscaping and other public space elements in order to maximise safety.

**OBJECTIVE 9.2**
**To ensure lighting intensity and direction is appropriate and improves visibility and surveillance of the public environment at night.**

DESIGN SUGGESTION 9.2.1 – Path and street lighting should, as a minimum, meet Australian Standard 1158.1.

DESIGN SUGGESTION 9.2.2 – All lighting should be directed downwards to illuminate the immediate surrounds. Lights should not be placed at eye level because they prevent pedestrians and cyclists from seeing beyond the light source.

DESIGN SUGGESTION 9.2.3 – Areas intended for night-time use should provide adequate lighting levels so that people are able to recognise an approaching person's face 10 to 15 metres away.

DESIGN SUGGESTION 9.2.4 – Bulb strengths of no greater than 120 watts are recommended as stronger light sources produce deep shadows and can reduce local visibility and surveillance.

DESIGN SUGGESTION 9.2.5 – Avoid extreme contrasts between light and dark surfaces as the resulting glare reduces visibility.

DESIGN SUGGESTION 9.2.6 – Avoid over-lighting of an area as this creates the impression that adjacent places are under-lit. In isolated areas of high illumination, background surfaces appear darker which can reduce surveillance.

Interior lighting of public transport shelters should not be so bright as to reduce the ability to see into darker surrounding spaces.


AVOID PLACING BOLLARDS WITH INTEGRATED LIGHTING CLOSE TO PATHWAYS AS IT CAN CAUSE A BLINDING EFFECT FOR PEDESTRIANS AND CYCLISTS.

ILLUMINATE BULDING ENTRANCES TO IMPROVE VISIBILITY FOR PEDESTRIANS.

PROVIDE ADEQUATE LIGHTING FOR PEDESTRIAN COMFORT AND SAFETY - AVOID EXTREME CONTRASTS.

INSTALL LIGHTING THAT SUPPORTS VISIBILITY FOR PEDESTRIANS USING PUBLIC PLACES AS WELL AS ROADS.

ILLUMINATE URBAN PUBLIC SPACE USED AT NIGHT, AND ENSURE THAT ALL LIGHTING IS DIRECTED DOWNWARDS TO ILLUMINATE THE IMMEDIATE SURROUNDS.

DESIGN SUGGESTION 9.2.7 – In retail and commercial areas, lighting levels should be higher than surrounding areas. Consider the use of surveillance equipment in vulnerable areas where 'informal surveillance' is unlikely or not possible, such as service areas and loading bays.

DESIGN SUGGESTION 9.2.8 – Ensure paths and areas intended for night use are lit to the same level as surrounding streets, to indicate they are safe routes.

DESIGN SUGGESTION 9.2.9 – Parks and gardens attract less use after dark, which means that lower performing light sources are justified. Yellow lamps and old 'mercury vapour' lights should be replaced with new blue-white lamps that offer good rendition of greens and browns.

**OBJECTIVE 9.3**
**To ensure the quality of light enhances people's visibility to see at night and enhances public safety.**

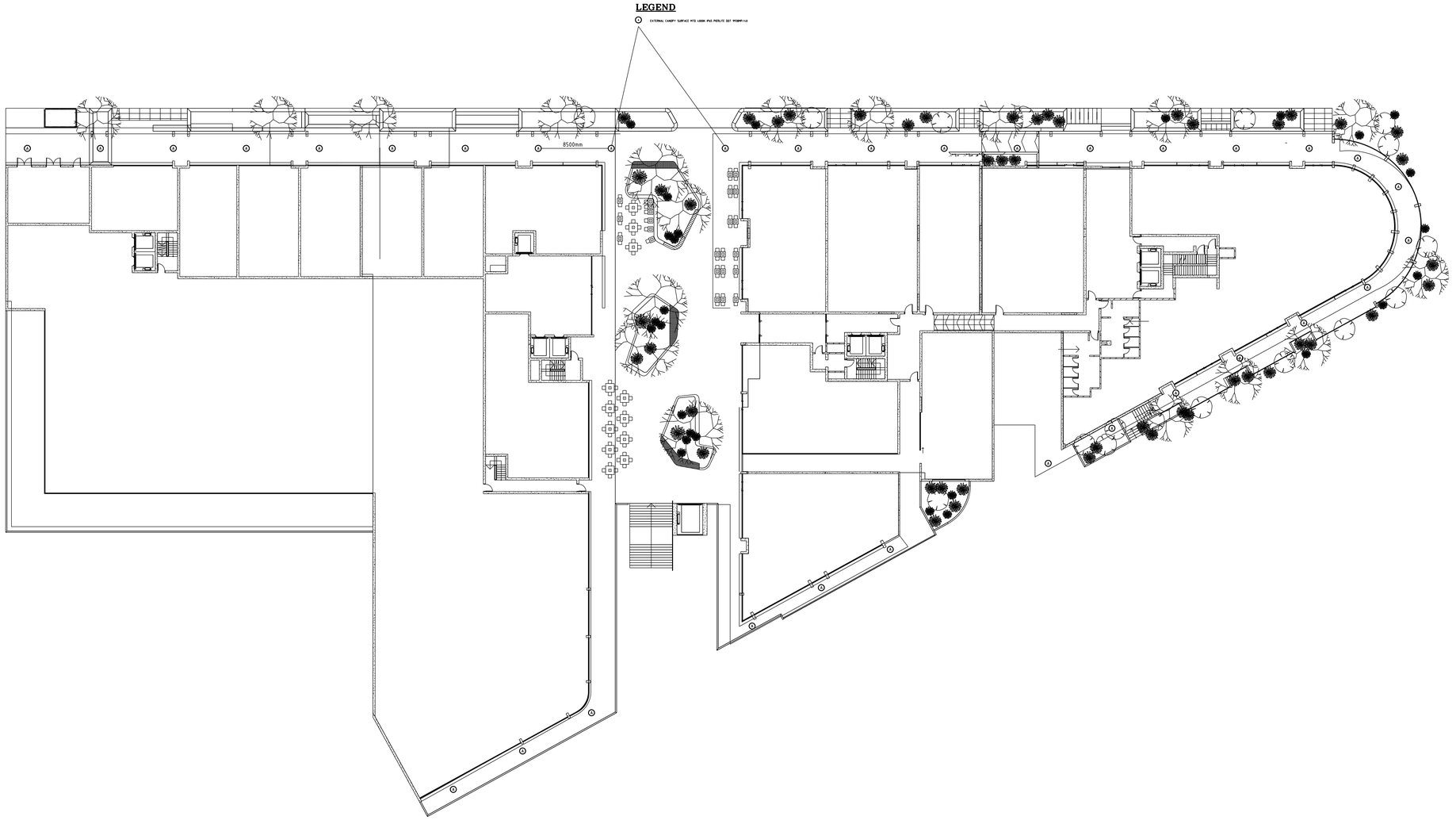
DESIGN SUGGESTION 9.3.1 – Use white light in areas with the greatest pedestrian activity. White light eliminates a distortion of the relative size of objects against their background which occurs when 'yellow' or sodium generated light is used. White light also gives good colour rendition at night by allowing the eye to register the true colour of an object. Both these qualities assist people's natural ability to see at night, assess their safety and act accordingly.

**OBJECTIVE 9.4**
**To ensure lighting is easily maintained and minimises potential for wilful damage.**

DESIGN SUGGESTION 9.4.1 – Lighting should be at a height that prevents vandalism. Where lighting is used at a lower level, vandal-proof fittings should be used.

**LEGEND**

EXTERNAL CANOPY SURFACE MTD UNDR IPAS PERLITE DOT PFBMP-L2




| issue | rev. | description | by | date |
|---|---|---|---|---|

**MacCORMACK ASSOCIATES CONSULTANTS Pty. Ltd.**
ABN 79 978 772 380

MECHANICAL, ELECTRICAL, HYDRAULIC AND FIRE SERVICES
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E-Mail: info@maccormack.com.au
Web: maccormack.com.au



project title
**160 WHITEHORSE ROAD BLACKBURN**

service
**ELECTRICAL SERVICES**

**CANOPY LIGHTING**

drawing title

| | |
|---|---|
| scale | 0 2 4 6 8m |
| designed | checked |
| drawn TDO | date 17.12.2018 |
| job number | 2121 |
| issue | A |
| drawing | 1 of 1 |

drawing number
**SKE1**