EXTERNAL LIGHTING DESIGN REPORT

BRACKNELL DATA CENTRE

23 FEBRUARY 2021

20305B-CON-XX-XX-RP-E-9735

Document Information

Title and Number

Document Title	
External Lighting Design Report	

Revision History

Revision	Author(s)	Reason for Changes	Date
A	JH	Planning Submission	FEB 2021

Approvals

Name	Signature	Title	Date
RP		Manager, Design Engineering	

Contents

PART 1 - GENERAL

1.1 INTRODUCTION

This report has been prepared to support the planning application for the redevelopment of an existing business park on land at Cain Road in Bracknell. The external lighting design report is one of a suite of technical reports forming part of the application for the data centre and associated infrastructure.

This application seeks consent for a Data Centre building (containing data halls, associated electrical and AHU Plant Rooms, loading bay, maintenance and storage space, office administration areas and plant at roof level), emergency generators and emission stacks, diesel tanks and filling area, electrical switchroom, a water sprinkler pump room and storage tank, a gate house / security building, site access, internal access roads, drainage infrastructure and hard and soft landscaping.

This document is to be read in conjunction with the planning documentation, as submitted.

1.2 DESIGN STANDARDS

The proposed External Lighting scheme is based on best practice and National & International Industry Standards, incorporating the following;

- BS EN 12464-2 (2014) 'Lighting for Work Places. Outdoor Work Places'
- BS EN 13201-2 (2015) 'Road Lighting. Performance Requirements'
- BS 7671 (2018) +A1 (2020) 'Requirements for Electrical Installations. IET Wiring Regulations'
- BS 5489-1 (2013) 'Code of Practice for the Design of Road Lighting – Part 1: Lighting Roads and Public Amenity Areas'
- GN 01/20 (2020) 'Guidance Notes for the Reduction of Obtrusive Light' Institution of Lighting Professionals.
- CIE 150 (2017) 'Guide on the limitation of the effects of obtrusive light from outdoor lighting installations'
- GN 08/18 (2018) 'Bats and Artificial Lighting in the UK'. Institution of Lighting Professionals.
- LG06/16 (2016) CIBSE Lighting Guide 06. 'The Exterior Environment'. CIBSE
- Building Regulations

All external lighting equipment shall be specified in accordance with the latest edition and amendments of all applicable standards, codes, laws and regulations listed below.

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- CE Marking Directive 93/68/EEC
- RoHS Directive: 2011/65/EC

Note: All electrical equipment and systems supplied shall conform to the appropriate EU Directive and shall carry the appropriate CE Marking.

1.3 KEY ELEMENTS OF PROPOSED LIGHTING SCHEME

To ensure the safe movement around the proposed development and to aid site surveillance, lighting is proposed along the fence lines and serving the access areas and pedestrian routes, as set out on the Master Site Plan (ref 20305B-RPS-00-XX-DR-A-9501). The Application Site extends to a total of 9.9 Ha and is made up of 2 distinct sections. The Main site (7.5 Ha) (hereafter called the Site) and an area of land (2.4 Ha) to the south on the opposite side of Beehive Road (the 'Former Recreation Site'). As seen on the External Lighting Design Layout Plan (ref 20305D-CON-XX-XX-RP-E-9735) enclosed at Appendix A, lighting is proposed in relation to the main site only. No lighting is proposed on the Former Recreation Site and the report focusses on the main site.

The key elements of the external perimeter lighting are set out below with excerpts of key performance specifications at Figure 1:

- 45 watt, 4000K, LED Column Mounted Luminaires on 6 metre poles - ("Type X2", refer to Appendix B for locations)
- 95 watt, 4000K, LED Column Mounted Luminaires on 8 metre poles - ("Type X4", refer to Appendix B for locations)
- 80 watt, 4000K, LED Column Mounted Luminaires on 8 metre poles - ("Type X6", refer to Appendix B for locations)

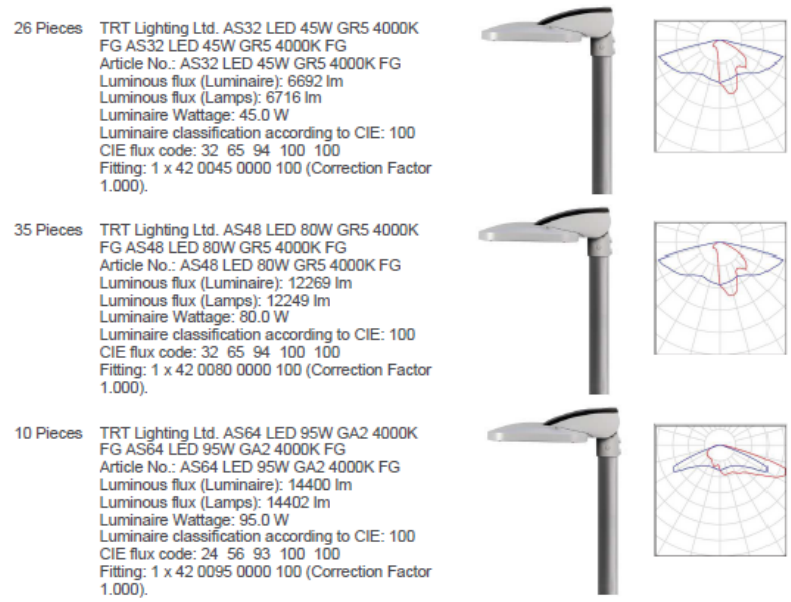


Figure 1: Lighting Specifications

The external perimeter lighting is required during hours of darkness (dusk till dawn) and is controlled via timeclock and photocell arrangement.

The lighting design is optimised for the site to ensure no obtrusive glare, light spillage or other light nuisance on neighbouring uses. Further technical details of the proposed lighting can be found in Section 2.

PART 2 - SITE LIGHTING BASIS OF DESIGN

2.1 LIGHT POLLUTION - OVERVIEW

Obtrusive light from floodlighting within the site boundary onto adjacent roads / landscaped areas shall be minimized taking into consideration the following; (a) sky glow (direct upward waste light), (b) intrusive light and light into windows/windscreens), over illumination, and glare (viewed source intensity) - refer to Figure 2 below.

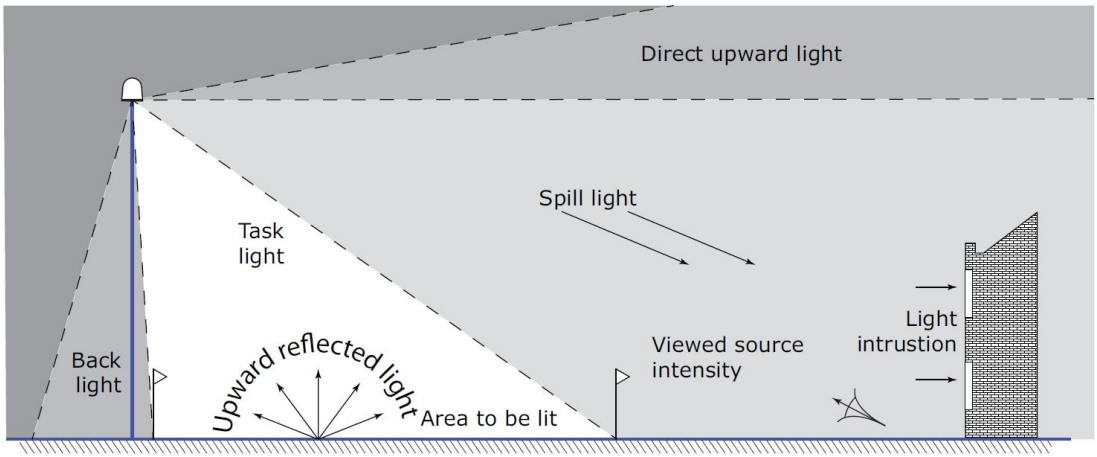


Figure 2: Light Pollution

2.2 ENVIRONMENTAL CLASSIFICATION

Predictive modeling has been undertaken to study, identify and reduce potential light pollution from the proposed site to achieve compliance with ILP GN 01/20 *Guidance Notes for the Reduction of Obtrusive Light* with reference to CIE 150 and BS EN 12464-2 Table 2, for Environmental Zone E3 – refer to Figure 3 below for excerpt from BS EN 12464-2.

Environmental Zone E3 is defined in BS EN 12464-2 Clause 4.5 as “medium district brightness areas, such as industrial or residential suburbs”.

Environmental zone	Light on properties		Luminaire intensity		Upward light ratio	Luminance	
	E_v lx		I cd		R_{UL} %	L_b cd·m^{-2}	L_s cd·m^{-2}
	Pre-curfew[a]	Post-curfew	Pre-curfew	Post-curfew		Building facade	Signs
E1	2	0	2 500	0	0	0	50
E2	5	1	7 500	500	5	5	400
E3	10	2	10 000	1 000	15	10	800
E4	25	5	25 000	2 500	25	25	1 000

Figure 3: BS EN 12464-2 Maximum obtrusive light for exterior lighting installations

2.3 OBTRUSIVE LIGHT LEVELS

In accordance with the Figure 3 above, the Environmental Zone will be designed to Classification E3, i.e. medium district brightness, with a maximum sky glow (Upward Light Ratio) of 5%, maximum intrusive light (onto windows of adjoining properties) of between 2 to 10 lux (pre and post curfew). There is no lighting curfew policy that identifies a need for the exterior lighting of this site to meet the stricter post-curfew

obtrusive lighting requirements as outlined in the table above. However, as the proposed building shall operate as a 24/7 facility, values noted in BS EN 12464-2 Table 2 are ignored, and the more onerous “pre-curfew” values are applied to the design methodology (i.e. maximum trespass lighting level of 2 lux).

Potential problems from glare and over-illumination have been evaluated and addressed in the proposal. Luminaires with high quality optics have been selected and these shall with installed with aiming and commissioning to mitigate against potential light spill and sky glow issues.

The illumination spill calculations shall not take into consideration landscaping proposals which are intended to provide visual screening between adjacent properties and areas of illumination. Landscaping screening (trees) will further reduce light trespass below the required levels.

2.4 DESIGN LIGHTING LEVELS

The site lighting design is based on “P1” requirements, as stipulated in BS EN 13201-2:2015, Clause 6 which is intended for “for pedestrians and pedal cyclists on footways, cycleways, emergency lanes and other road areas lying separately or along the carriageway of a traffic route, and for residential roads, pedestrian streets, parking places, schoolyards etc”.

Minimum maintained illuminance levels shall be designed to achieve between 5 and 15 lux, measured at road level.

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Figure 4: BS EN 13201-2:2015 Table 3, P Lighting Classes

PART 3 - DETAILED DESIGN

3.1 DESIGN CALCULATIONS

The external lighting design and has been calculated in accordance with BS EN 12464-2 Environmental zone E3 requirements using Dialux lighting design software. The calculation results are included at Appendix B of this report.

3.2 SUMMARY OF CALCULATIONS

The calculations show that the maximum permissible Upward Light Ratio (ULR) of 5% has not been exceeded. The lighting design calculations demonstrate that the proposed lighting installation achieves an upward light ration of 0%, thus the design is compliant with BS EN 12464-2 Environmental zone E3 requirements.

The maximum intrusive light (lux) of 2 lux on the vertical plan has not been exceeded. The lighting calculations demonstrate that the proposed lighting installation achieves a value of less than 0.1 lux, thus the design is compliant with BS EN 12464-2 Environmental zone E3 requirements. In addition, the Class of Road Lighting design is based on P1 requirements, as per BS EN 13201-2:2015.

The proposed lighting scheme is specifically designed as the worst case scenario, and where possible all recommended limitations on obtrusive light stipulated in the above mentioned standards are adhered to. It is also important to note that the minimal illumination spill onto adjacent roads does not take into consideration proposed landscaping (screening), this screening will further reduce light trespass onto these roads.

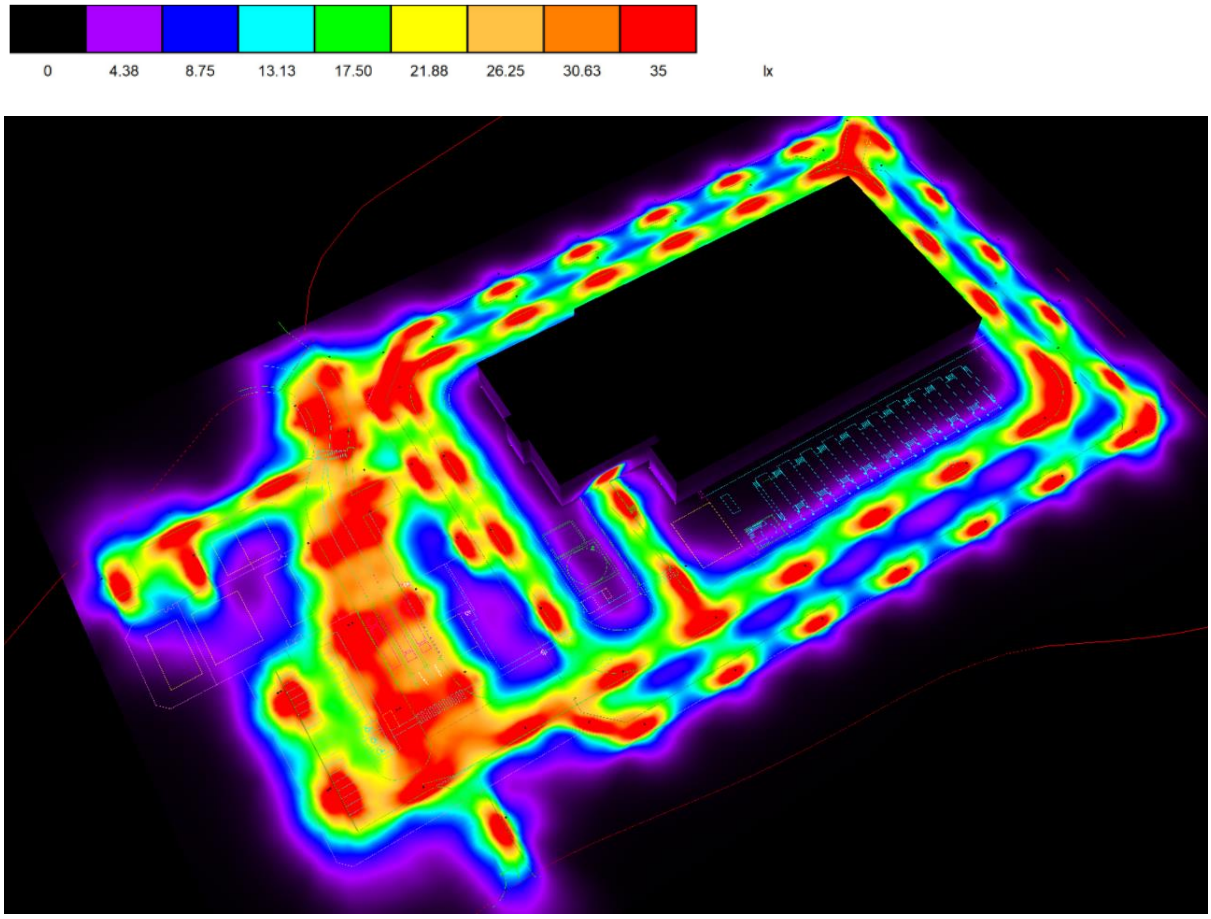
External lighting circuits shall be controlled by presence detectors, combined presence detectors and daylight sensors, photocells and/or timeswitch as shown on the drawings.

3.3 DESIGN CONCLUSIONS

This analysis demonstrates that the external lighting design is in compliance with the standards noted within this report.

3.4 DESIGN CALCULATION IMAGES

Lighting design simulation results have been undertaken within Dialux software with full details included at Appendix B. Refer to Figure 5 below for excerpt of False Colour Rendering from the software.



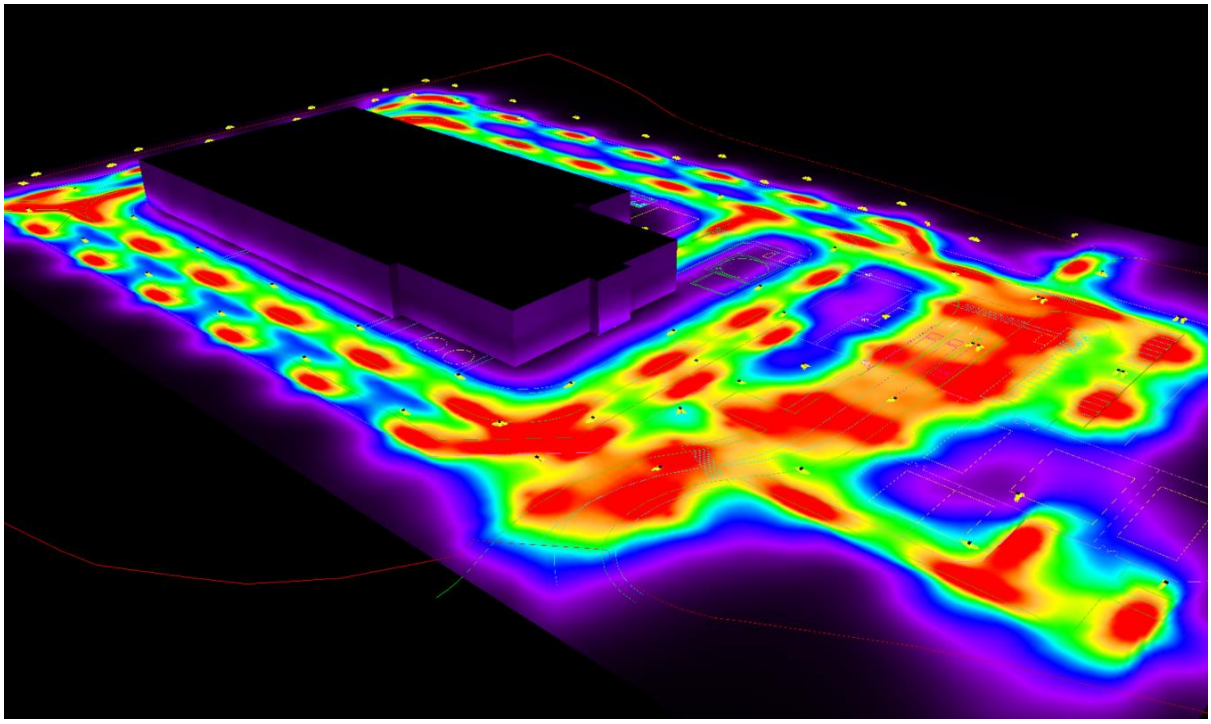


Figure 5: False Colour Rendering

PART 4 - APPENDICES

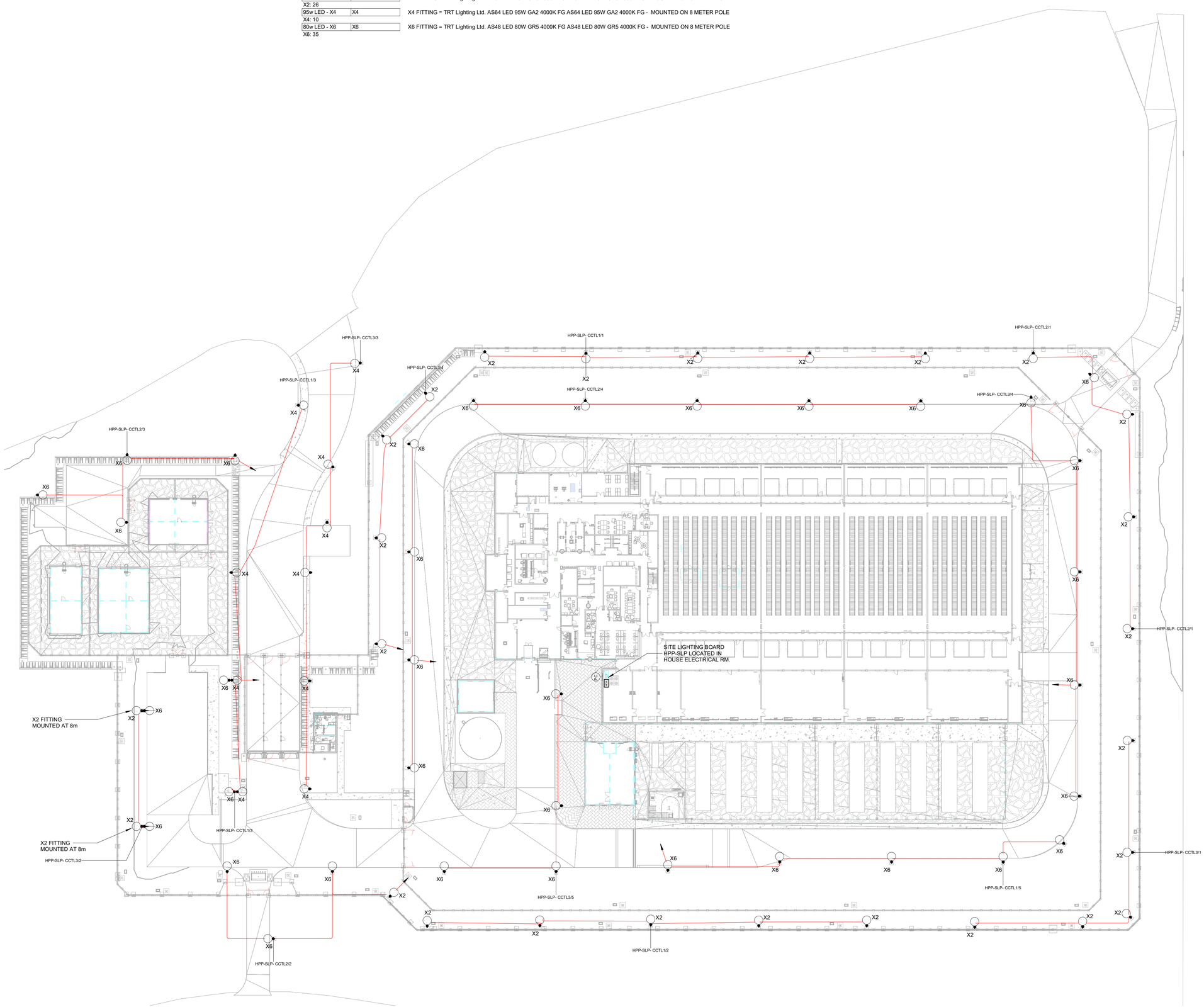
4.1 APPENDIX A – EXTERNAL LIGHTING DESIGN LAYOUT PLAN

Lighting Fixture Schedule	
Type	Type Mark
45w LED - X2	X2
X2: 26	
95w LED - X4	X4
X4: 10	
80w LED - X6	X6
X6: 35	

X2 FITTING = TRT Lighting Ltd. AS32 LED 45W GR5 4000K FG AS32 LED 45W GR5 4000K FG - MOUNTED ON 6 METER POLE

X4 FITTING = TRT Lighting Ltd. AS64 LED 95W GA2 4000K FG AS64 LED 95W GA2 4000K FG - MOUNTED ON 8 METER POLE

X6 FITTING = TRT Lighting Ltd. AS48 LED 80W GR5 4000K FG AS48 LED 80W GR5 4000K FG - MOUNTED ON 8 METER POLE



NOTES

1. EXTERNAL LIGHTING COLUMN INSTALLATION SHALL BE WIRED WITH 3 CORE XLPE/SWA/PVC 16mm² CABLES IN UNDERGROUND PVC CONDUITS. INSTALLED BY GENERAL CONTRACTOR. WIRING TO FIRST LUMINAIRE IN SLEEVE, WIRING BETWEEN LUMINAIRES IN GROUND AT 600mm BFGL.
2. ALL LIGHTING DRAWINGS SHALL BE READ IN CONJUNCTION WITH LUMINAIRE SCHEDULES.
3. SETTING OUT OF ALL EXTERNAL LIGHT FITTINGS, SENSORS AND SWITCHES SHALL BE APPROVED BY THE ARCHITECT, LANSCAPE ARCHITECT AND BUILDING USERS, 4 WEEKS BEFORE INSTALLATION COMMENCEMENT.
4. CONTRACTOR SHALL ENSURE THAT LIGHTING LOADS ARE WELL BALANCED ACROSS PHASES ON HPP PANELS.
5. CABLES INSTALLED WITHIN THE MAIN BUILDING SHALL BE INSTALLED ON CABLE RACKS, TRAYS ETC.
6. WALL MOUNTED EQUIPMENT SHALL BE WIRED THROUGH THE BUILDING WITH TERMINAL BOX INSIDE BUILDING AND FLEXIBLE CABLE WIRED THROUGH CONDUIT SLEEVE AND GLAND TO LUMINAIRES OUTSIDE.
7. SUPPLY AND INSTALL 1No. PHOTOCELL LOCATED OUTSIDE THE HOUSE ELECTRICAL ROOM. SITE LIGHTING SHALL BE WIRED FROM HPP-SLP LOCATED IN THE HOUSE ELECTRICAL ROOM.
8. WIRING OF "ON BUILDING" EQUIPMENT INSIDE BUILDING SHALL BE XLPE/SWA/LSZH CABLE ON TRAY OR IN CONDUIT. WIRING OF "OFF BUILDING" LUMINAIRES SHALL BE WITHIN U/G DUCTS SHALL BE XLPE/SWA/PVC.
9. TERMINAL BOXES SHALL BE PROVIDED WITH DIN RAIL MOUNTED TERMINALS.
10. 24-7 DIGITAL TIME-SWITCH/PHOTOCELL AND HAND/OFF/AUTO CONTROL (TO OVERIDE PHOTOCELL/TIMECLOCK CONTROL) SHALL BE PROVIDED IN THE RELEVANT HPPs WITH REMOTE H/O/A SWITCHES LOCATED IN THE SECURITY OFFICE. A 12Vdc EXTERNAL LIGHTING INTERFACE RELAY SHALL BE INSTALLED WITHIN THE EXTERNAL LIGHTING DISTRIBUTION BOARD, TO INTERFACE SITE LIGHTING WITH SECURITY SYSTEMS INSTALLATIONS.
11. ALL CIRCUITS MUST BE PROVIDED WITH LOCAL ISOLATION IN ACCORDANCE WITH LOCAL UTILITY REGULATIONS.
12. FENCE MOUNTED LUMINAIRES SHALL BE CIRCUITED IN MAXIMUM GROUPES OF 7No. FENCE LINE CIRCUITS AND SHALL BE WIRED AS PER CIRCUIT CHART SHOWN.
13. WIRING TO EACH FENCE MOUNTED LUMINAIRE SHALL BE FORM THE UNDERGROUND DUCTS CONNECTED TO THE FENCE.
14. EACH EXTERNAL LIGHT FITTING SHALL BE PROVIDED WITH A LOCAL DNO CUT-OUT UNIT (IP65) AND INCLUDE A 6A C-TYPE MCB WHICH ALLOWES THE TERMINATION OF MAIN EXTERNAL LIGHTING SUPPLY CABLE OF 16mm² TO LOOP IN AND OUT.
15. THE LABELLING OF ELECTRICAL CIRCUIT REFERENCE SHALL BE PROVIDED AS PER AWS LABELLING STANDARD.
16. LIGHTING CONTROL WILL CONSIST OF RELAYS CORRESPONDING TO EXTERNAL LUMINAIRES CONNECTED TO HOA SWITCH. LIGHTS ARE ON IN MODE H, OFF IN MODE O AND AUTO IN MODE A.
17. FOR AUTO MODE: AN ENERGISED RELYA CONNECTED DIRECTLY TO SUPPLY ALLOWS FOR TIMER CONTROL. A MANUAL OVERRIDE WILL BE INSTALLED IN SECURITY OFFICE THAT ALLOWS FOR MANUL SWITCHING.
18. CONTRACTOR TO ALLOW FOR SUITABLE SECONDARY CONTAINMENT, EARTHING, MOUNTING AND FIXING FOR INSTALLING ALL EXTERNAL EQUIPMENT.
19. SECURITY POWER SUPPLIES SHALL BE WIRED WITH 3 CORE XLPE/SWA/PVC 10mm² CABLES IN UNDERGROUND PVC CONDUITS, INSTALLED BY GENERAL CONTRACTOR.
20. DRAWING TO BE READ IN CONJUNCTION WITH AWS SECURITY DRAWINGS.
21. SETTING OUT OF ALL EXTERNAL SECURITY EQUIPMENT SHALL BE APPROVED BY THE AWS SECURITY SPECIALIST, 4 WEEKS BEFORE INSTALLATION COMMENCEMENT.
22. WIRING TO SECURITY EQUIPMENT MOUNTED ADJACENT TO THE PERIMETER FENCE SHALL BE FROM THE UNDERGROUND DUCTS CONNECTED TO THE FENCE.
23. CPMP DENOTES SUPPLY FOR CCTV MINI-PILLAR.
24. EFMP DENOTES SUPPLY FOR ELECTRIC FENCE MINI-PILLAR.
25. ACMP DENOTES SUPPLY FOR ASTRA COMPOUND MINI-PILLAR.
26. EACH MINI-PILLAR CPMP, EFMP, ACMP TO INCLUDE 20Amp ISOLATOR WITH SURGE PROTECTION. SUPPLIED AND FITTED BY GENERAL CONTRACTOR.

REV.	DATE	DESCRIPTION	DRWN	ENGR	CHK	APP'D
E	12FEB2021	PLANNING APPLICATION	DC	JH		

ARCHITECT, CIVIL & STRUCTURAL ENG:

rps

AGILE No.:

PROJECT:
BRACKNELL DATA CENTRE

TITLE:
SITE LIGHTING AND ELECTRICAL SERVICES LAYOUT

SCALE:	DRAWING NO.:	REV:
A1 1 : 500	20535B-CON-00-XX-RP-E-9735	E

4.2 APPENDIX B –EXTERNAL LIGHTING DESIGN CALCULATIONS

EXTERNAL LIGHTING DESIGN CALCULATIONS

BRACKNELL DATA CENTRE

23 FEBRUARY 2021

20305B-CON-XX-XX-RP-E-9735

061-R1

Date: 23.02.2021
Operator: Janko Aschenbrenner

Thorlux Lighting Ireland
Solite Europe Ltd | TRT Lighting Ltd
Unit G6 Riverview Business Park, Nangor Road, Dublin 12

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Table of contents

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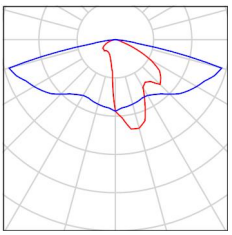
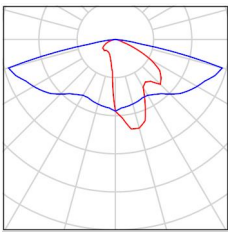
EXT / Luminaire parts list

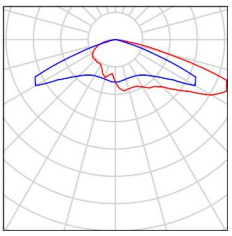
26 Pieces TRT Lighting Ltd. AS32 LED 45W GR5 4000K FG AS32 LED 45W GR5 4000K FG
Article No.: AS32 LED 45W GR5 4000K FG
Luminous flux (Luminaire): 6692 lm
Luminous flux (Lamps): 6716 lm
Luminaire Wattage: 45.0 W
Luminaire classification according to CIE: 100
CIE flux code: 32 65 94 100 100
Fitting: 1 x 42 0045 0000 100 (Correction Factor 1.000).



35 Pieces TRT Lighting Ltd. AS48 LED 80W GR5 4000K FG AS48 LED 80W GR5 4000K FG
Article No.: AS48 LED 80W GR5 4000K FG
Luminous flux (Luminaire): 12269 lm
Luminous flux (Lamps): 12249 lm
Luminaire Wattage: 80.0 W
Luminaire classification according to CIE: 100
CIE flux code: 32 65 94 100 100
Fitting: 1 x 42 0080 0000 100 (Correction Factor 1.000).



10 Pieces TRT Lighting Ltd. AS64 LED 95W GA2 4000K FG AS64 LED 95W GA2 4000K FG
Article No.: AS64 LED 95W GA2 4000K FG
Luminous flux (Luminaire): 14400 lm
Luminous flux (Lamps): 14402 lm
Luminaire Wattage: 95.0 W
Luminaire classification according to CIE: 100
CIE flux code: 24 56 93 100 100
Fitting: 1 x 42 0095 0000 100 (Correction Factor 1.000).



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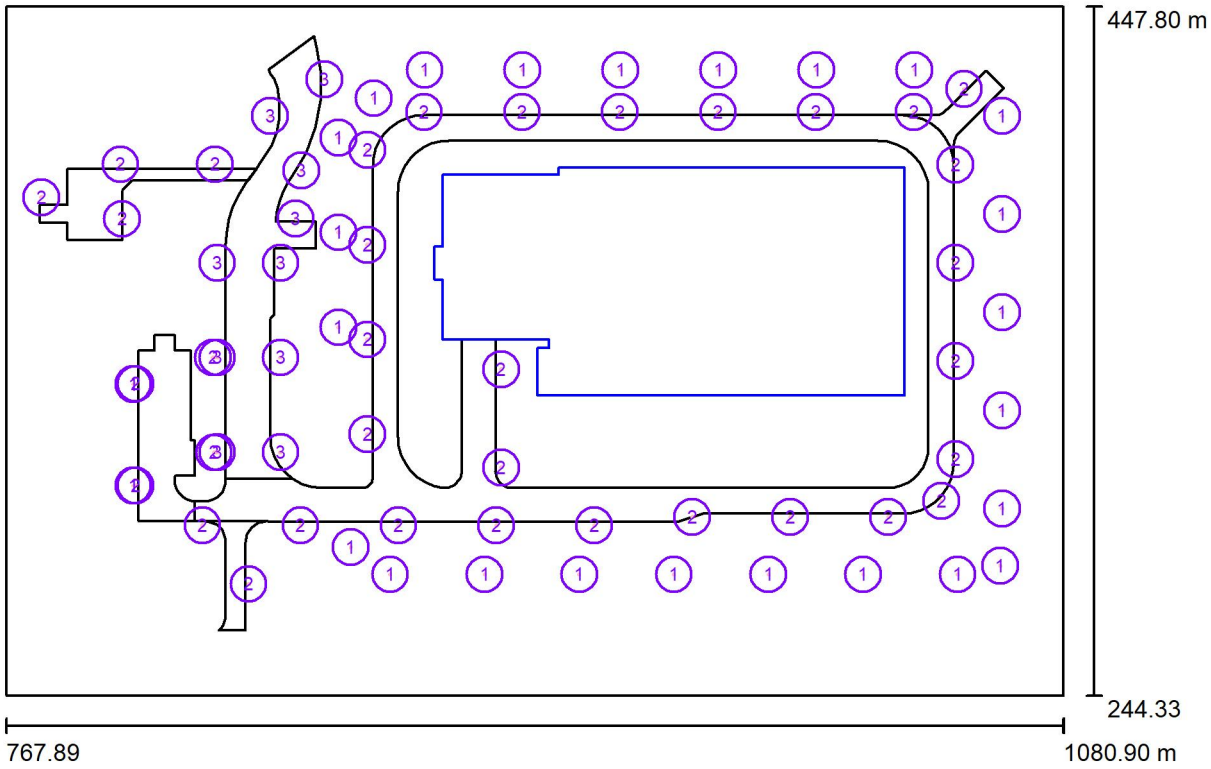
Exterior Scene 1 / Planning data



Maintenance factor: 0.82, ULR (Upward Light Ratio): 0.0%

Scale 1:2238

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	26	TRT Lighting Ltd. AS32 LED 45W GR5 4000K FG AS32 LED 45W GR5 4000K FG (1.000)	6692	6716	45.0
2	35	TRT Lighting Ltd. AS48 LED 80W GR5 4000K FG AS48 LED 80W GR5 4000K FG (1.000)	12269	12249	80.0
3	10	TRT Lighting Ltd. AS64 LED 95W GA2 4000K FG AS64 LED 95W GA2 4000K FG (1.000)	14400	14402	95.0
		Total:	747430	Total: 747351	4920.0

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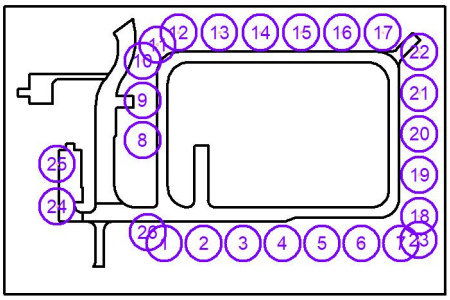
Exterior Scene 1 / Luminaires (coordinates list)

TRT Lighting Ltd. AS32 LED 45W GR5 4000K FG AS32 LED 45W GR5 4000K FG

6692 lm, 45.0 W, 1 x 1 x 42 0045 0000 100 (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	881.567	280.107	6.000	0.0	0.0	90.0
2	909.567	280.107	6.000	0.0	0.0	90.0
3	937.567	280.107	6.000	0.0	0.0	90.0
4	965.567	280.107	6.000	0.0	0.0	90.0
5	993.567	280.107	6.000	0.0	0.0	90.0
6	1021.567	280.107	6.000	0.0	0.0	90.0
7	1049.567	280.107	6.000	0.0	0.0	90.0
8	866.255	353.150	6.000	0.0	0.0	0.0
9	866.255	381.150	6.000	0.0	0.0	0.0
10	866.255	409.150	6.000	0.0	0.0	0.0
11	876.767	420.763	6.000	0.0	0.0	-43.1
12	891.768	429.158	6.000	0.0	0.0	-90.0
13	920.768	429.158	6.000	0.0	0.0	-90.0
14	949.768	429.158	6.000	0.0	0.0	-90.0
15	978.768	429.158	6.000	0.0	0.0	-90.0
16	1007.768	429.158	6.000	0.0	0.0	-90.0
17	1036.768	429.158	6.000	0.0	0.0	-90.0
18	1062.659	299.591	6.000	0.0	0.0	180.0
19	1062.659	328.591	6.000	0.0	0.0	180.0
20	1062.659	357.591	6.000	0.0	0.0	180.0
21	1062.659	386.591	6.000	0.0	0.0	180.0
22	1062.659	415.591	6.000	0.0	0.0	180.0
23	1062.107	282.692	6.000	0.0	0.0	135.6
24	805.532	306.345	8.000	0.0	0.0	180.0
25	805.532	336.345	8.000	0.0	0.0	180.0
26	869.905	288.171	6.000	0.0	0.0	45.6

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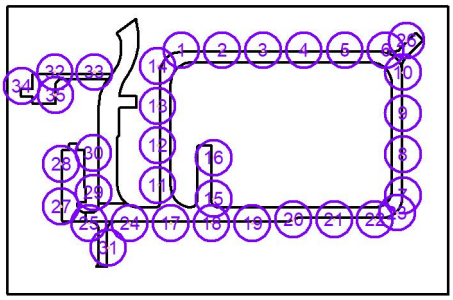
Exterior Scene 1 / Luminaires (coordinates list)

TRT Lighting Ltd. AS48 LED 80W GR5 4000K FG AS48 LED 80W GR5 4000K FG

12269 lm, 80.0 W, 1 x 1 x 42 0080 0000 100 (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	891.592	416.754	8.000	0.0	0.0	-90.0
2	920.592	416.754	8.000	0.0	0.0	-90.0
3	949.592	416.754	8.000	0.0	0.0	-90.0
4	978.592	416.754	8.000	0.0	0.0	-90.0
5	1007.592	416.754	8.000	0.0	0.0	-90.0
6	1036.592	416.754	8.000	0.0	0.0	-90.0
7	1048.876	314.164	8.000	0.0	0.0	180.0
8	1048.876	343.164	8.000	0.0	0.0	180.0
9	1048.876	372.164	8.000	0.0	0.0	180.0
10	1048.876	401.164	8.000	0.0	0.0	180.0
11	874.840	321.509	8.000	0.0	-5.0	0.0
12	874.840	349.509	8.000	0.0	-5.0	0.0
13	874.840	377.509	8.000	0.0	-5.0	0.0
14	874.840	405.509	8.000	0.0	-5.0	0.0
15	914.432	311.700	8.000	0.0	0.0	180.0
16	914.432	340.700	8.000	0.0	0.0	180.0
17	884.000	294.660	8.000	0.0	-5.0	90.0
18	913.000	294.660	8.000	0.0	-5.0	90.0
19	942.000	294.660	8.000	0.0	-5.0	90.0
20	971.000	297.125	8.000	0.0	-5.0	90.0
21	1000.000	297.125	8.000	0.0	-5.0	90.0
22	1029.000	297.125	8.000	0.0	-5.0	90.0
23	1044.725	301.887	8.000	0.0	0.0	138.1
24	855.000	294.660	8.000	0.0	-5.0	90.0
25	826.000	294.660	8.000	0.0	-5.0	90.0
26	1051.431	423.544	8.000	0.0	0.0	-46.9
27	806.267	306.396	8.000	0.0	-5.0	0.0
28	806.267	336.396	8.000	0.0	-5.0	0.0

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Exterior Scene 1 / Luminaires (coordinates list)

No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
29	829.426	316.144	8.000	0.0	0.0	180.0
30	829.198	344.159	8.000	0.0	0.0	180.0
31	839.711	277.225	8.000	0.0	-5.0	180.0
32	801.757	401.270	8.000	0.0	-5.0	-90.0
33	829.757	401.270	8.000	0.0	-5.0	-90.0
34	778.348	391.572	8.000	0.0	-5.0	0.0
35	802.240	385.159	8.000	0.0	-5.0	180.0

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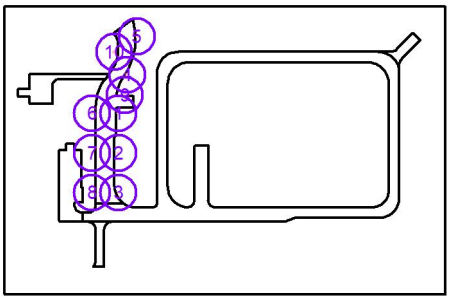
Exterior Scene 1 / Luminaires (coordinates list)

TRT Lighting Ltd. AS64 LED 95W GA2 4000K FG AS64 LED 95W GA2 4000K FG

14400 lm, 95.0 W, 1 x 1 x 42 0095 0000 100 (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	849.144	372.161	8.000	0.0	0.0	180.0
2	849.144	344.161	8.000	0.0	0.0	180.0
3	849.144	316.161	8.000	0.0	0.0	180.0
4	855.251	399.449	8.000	0.0	0.0	145.0
5	862.083	426.401	8.000	0.0	0.0	-175.0
6	830.372	372.161	8.000	0.0	0.0	0.0
7	830.372	344.161	8.000	0.0	0.0	0.0
8	830.372	316.161	8.000	0.0	0.0	0.0
9	853.609	385.190	8.000	0.0	0.0	-90.0
10	846.059	415.540	8.000	0.0	0.0	0.0

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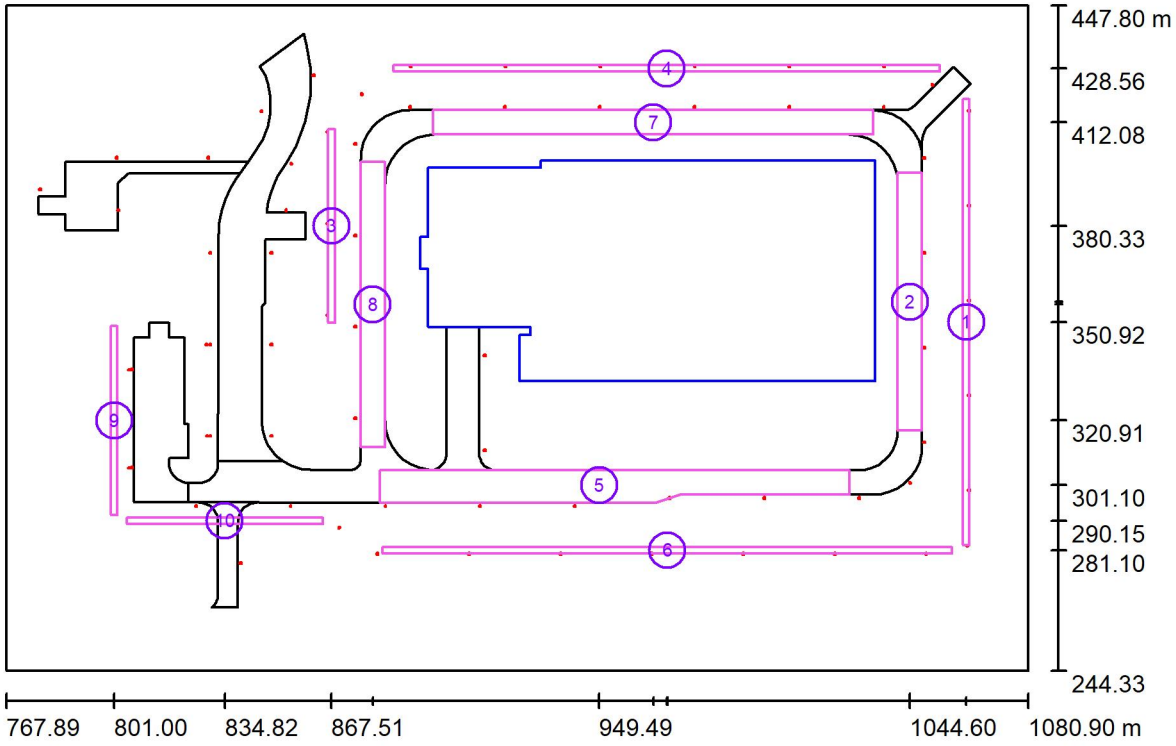
Exterior Scene 1 / Calculation surfaces (results overview)



Scale 1 : 2316

Calculation Surface List

No.	Designation	Type	Grid	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1	Calculation Surface 1	horizontal	4 x 128	27	8.98	70	0.335	0.128
2	Calculation Surface 2	horizontal	8 x 128	24	15	63	0.622	0.236
3	Calculation Surface 3	horizontal	8 x 128	35	15	78	0.424	0.191
4	Calculation Surface 4	horizontal	8 x 128	24	7.94	66	0.329	0.119
5	Calculation Surface 5	horizontal	8 x 128	23	11	68	0.464	0.160
6	Calculation Surface 6	horizontal	8 x 128	25	8.65	64	0.340	0.134
7	Calculation Surface 7	horizontal	8 x 128	23	14	63	0.592	0.216
8	Calculation Surface 8	horizontal	8 x 128	24	12	63	0.494	0.185
9	Calculation Surface 9	horizontal	8 x 128	16	8.12	28	0.511	0.292

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Exterior Scene 1 / Calculation surfaces (results overview)

Calculation Surface List

No.	Designation	Type	Grid	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
10	Calculation Surface 10	horizontal	8 x 128	10	5.30	17	0.510	0.315

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E_{min} / E_{max}
horizontal	10	24	5.30	78	0.22	0.07

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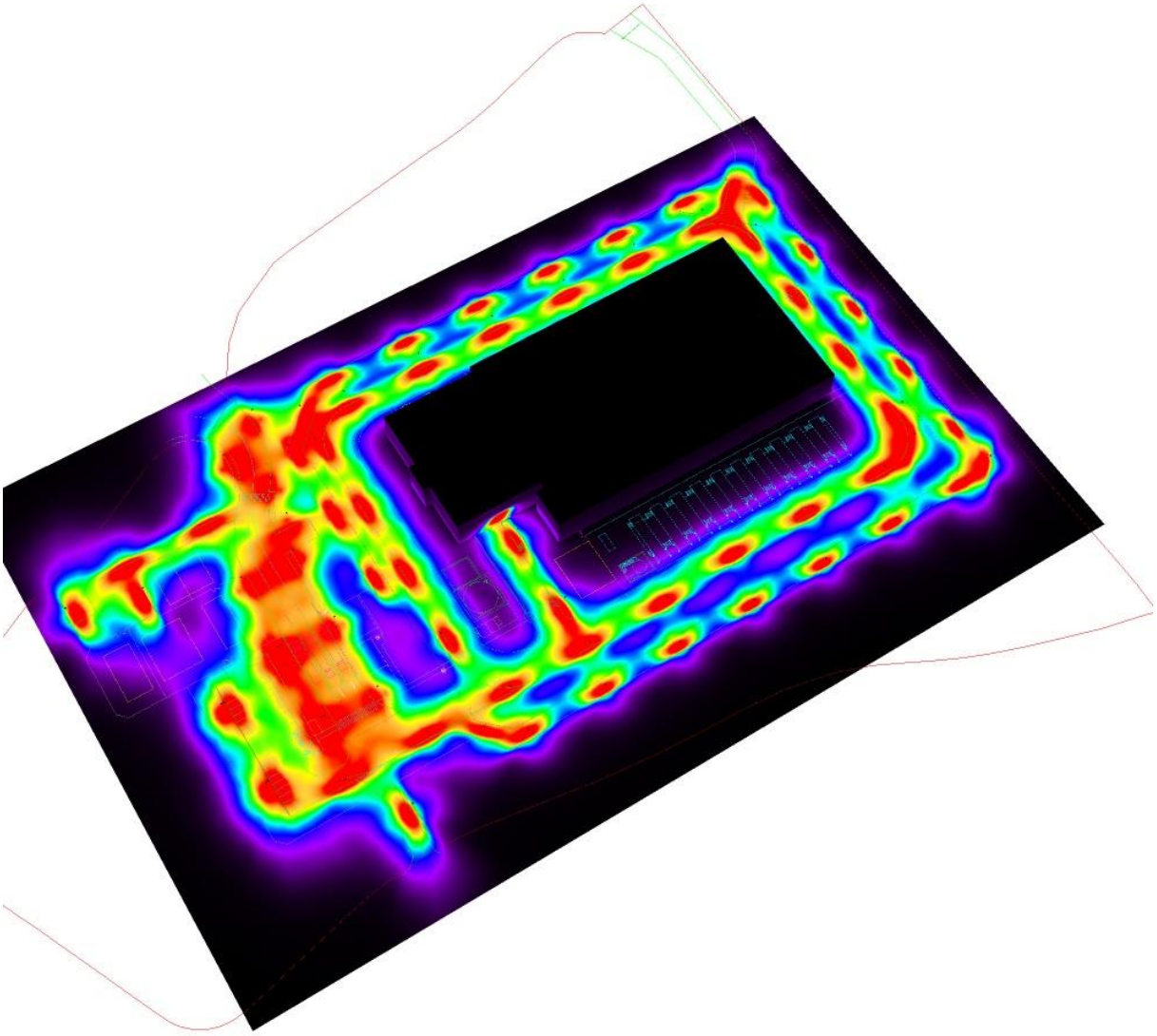
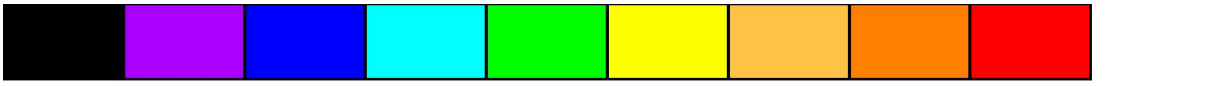
Exterior Scene 1 / False Colour Rendering





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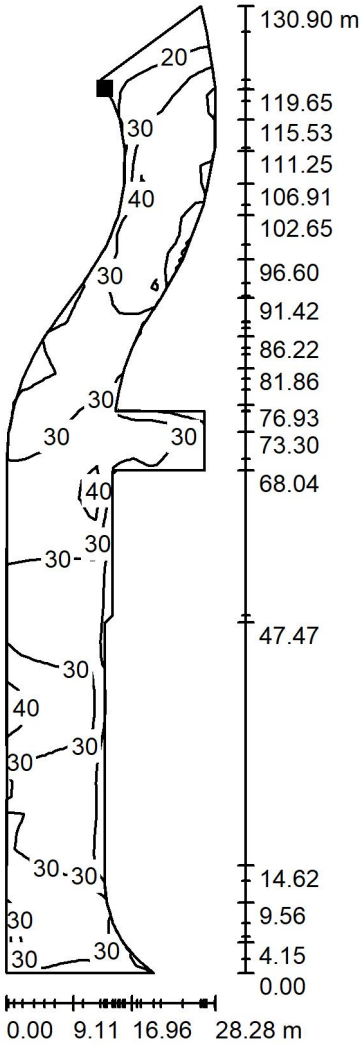
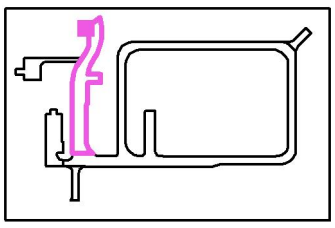
Exterior Scene 1 / Entrance / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 1024

Position of surface in external scene:
Marked point:
(846.166 m, 428.041 m, 0.000 m)



Grid: 55 x 11 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
31	11	47	0.362	0.239

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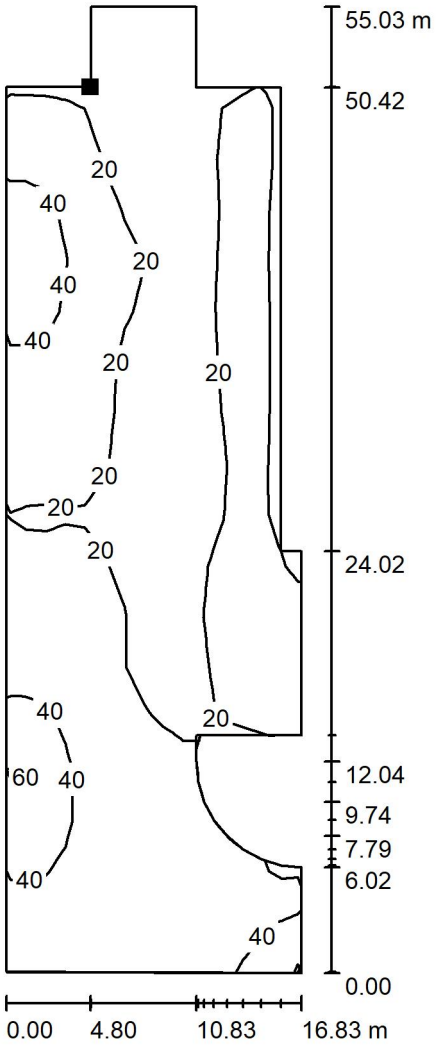
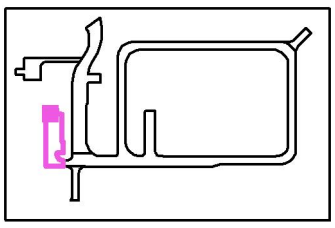
Exterior Scene 1 / Carpark / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 431

Position of surface in external scene:
Marked point:
(811.779 m, 346.240 m, 0.000 m)



Grid: 19 x 15 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
25	13	66	0.503	0.193

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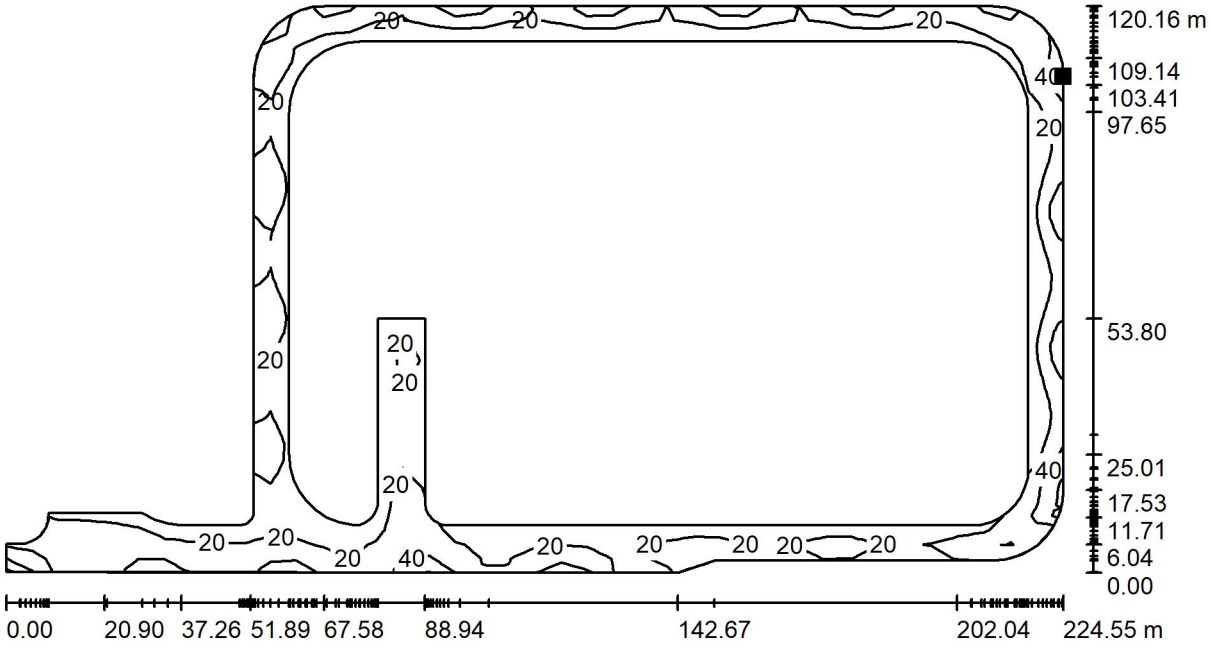
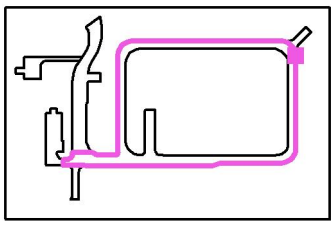
Exterior Scene 1 / Road A / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 1606

Position of surface in external scene:
Marked point:
(1048.336 m, 400.834 m, 0.000 m)



Grid: 40 x 40 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
26	8.31	66	0.320	0.125

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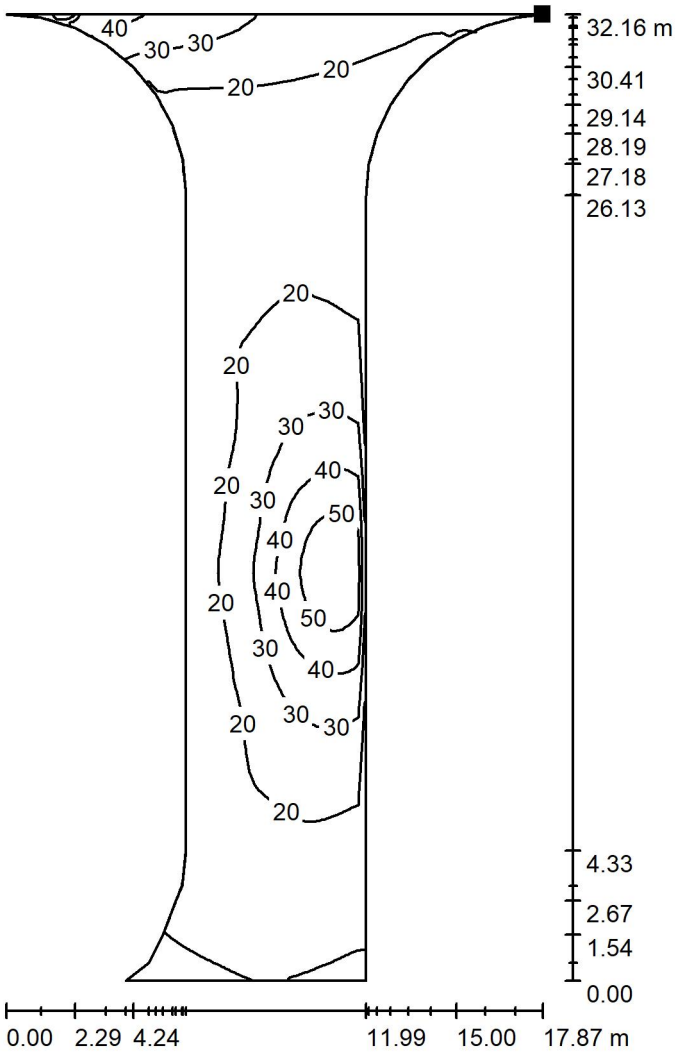
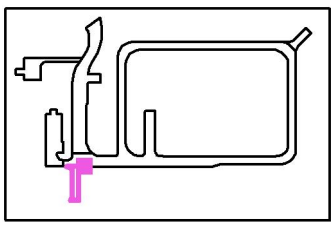
Exterior Scene 1 / Side Road / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 252

Position of surface in external scene:
Marked point:
(844.690 m, 295.801 m, 0.000 m)



Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
23	7.99	57	0.355	0.140

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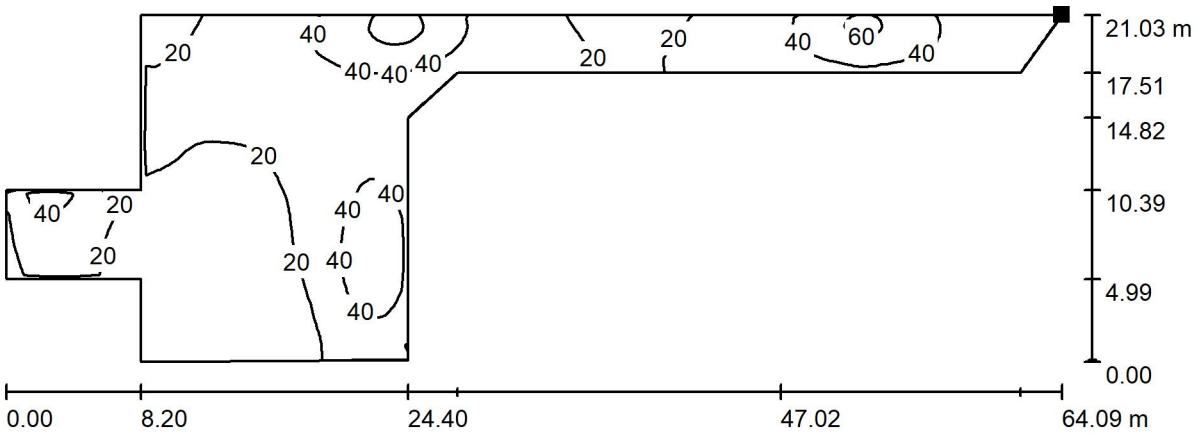
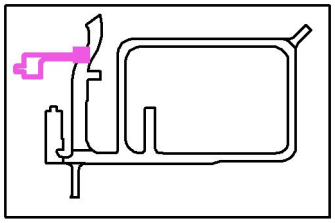
Exterior Scene 1 / Side Road / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 459

Position of surface in external scene:
Marked point:
(841.921 m, 399.989 m, 0.000 m)



Grid: 128 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
28	10	66	0.363	0.153

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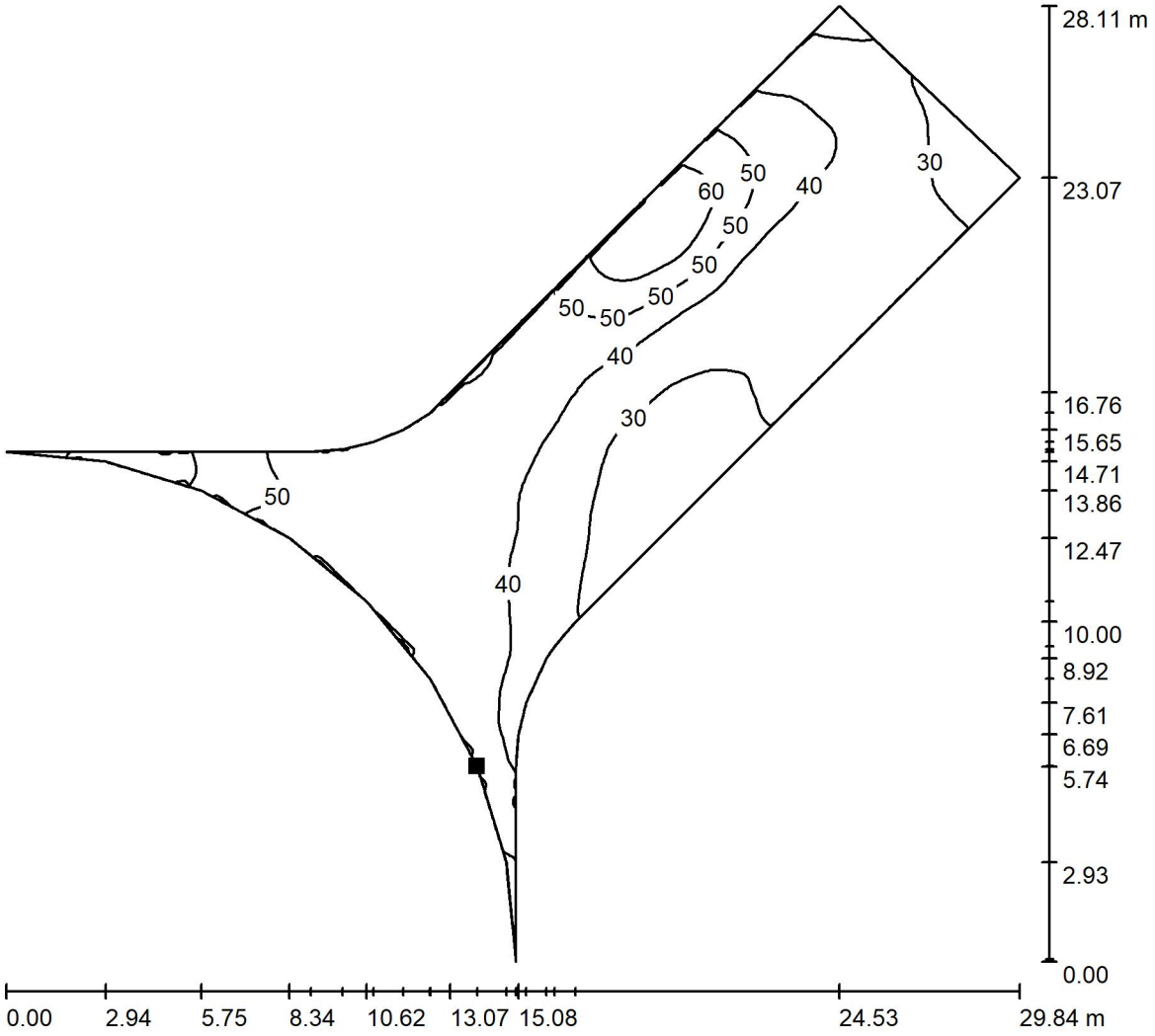
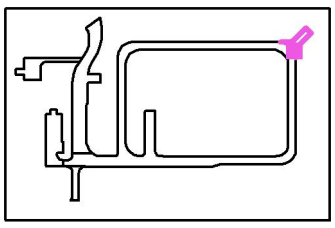
Exterior Scene 1 / Side Exit / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 220

Position of surface in external scene:
Marked point:
(1047.193 m, 406.574 m, 0.000 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
40	23	68	0.589	0.342