LIGHTING

Lighting Assessment Report

Project:	Camden– Proposed Advertising Screen
Project Ref:	0240
Client:	Wildstone Planning
Doc Ref:	0240.RPT.001
Revision No:	-
Date Created:	29.01.14

Revision No:	Date:	Revision Information:
-	-	-

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Project: Camden – Proposed Advertising Screen
Project Ref: 0240.RPT.001

INTRODUCTION

This report was commissioned by Wildstone Planning in respect of the proposed single sided advertising screen to the corner of Camden Road at the junction with St. Pancras Way to determine the potential impact of lighting onto the surrounding properties.

This report will cover our findings based on information provided as to the lighting output of the screens and location of existing properties.

BRIEF

The brief was to calculate the potential glare/luminance and illuminance created from a single sided 3m x 6m LED media screen mounted in portrait orientation mounted onto a ground plinth. The screens will be utilised for commercial during the day and night, until the agreed switch off time. Our calculation results will show the illuminance and luminance levels created at a single screen output at night time and at differing calculation points and surfaces over the adjacent properties.

CALCULATION CRITERIA

The following shows the information that our calculations have been based on:

- Night time maximum luminance: 300cd/sqm

For the purposes of our calculations, the luminaire photometry we have utilised is as follows:

- 200mm x 200mm Impact 12 LED panel with 100% Light Output Ratio. 1 x 450 panels used to create the full single sided 3m x 6m screen
- Full warm white colour temperature (3000K)
- 300 lumens per 1m sq*
- Approx. street lighting based on Thorn Civic 100W HIT mounted at 12m**

* - Based on the maximum brightness requirement from ILE TR 5 for advertising screens over 10m^2.
** - Second calculation includes for approx. street lighting positions taken from Google earth images of site.

Based upon the following task within section 8.0, we believe the Camden Road development falls within the Zone E4 criteria due to generally urban areas with mixed recreational and commercial land (high district brightness) with high night-time activity.

EXTRACT FROM THE INSTITUTION OF LIGHTING ENGINEERS –

TR 5 –BRIGHTNESS OF ILLUMINATED ADVERTISEMENTS (2001)

8. Recommendations

8.1 The uniformity of luminance shall be determined by the ratio of the maximum luminance to the minimum luminance, which shall not exceed 10:1 for any one colour for advertisements with an illuminated area in excess of 1.5m^2 and 6:1 for any advertisements with an illuminated area not exceeding 1.5m^2. Although these limits will prove effective on externally illuminated signs, they could result in unacceptable shadows if applied to the points on the surface of an internally illuminated advertisement above and between the light sources. In these instances, (i.e. over the central area of the advertisement) the luminance uniformity ratio should not exceed 1.5:1.

Table 1. Recommendations for Maximum Luminance (cd/m^2).

Illuminated Area (m^2)	Zone E1	Zone E2	Zone E3	Zone E4
Up to 10.00	100	600 *	800 *	1000 *
Over 10.00	n/a	300	600 *	600 *

* - Allows for much greater luminance levels than the Camden Road installation will achieve.

Note:

1. Local planning authorities may wish to impose additional controls by setting limits on the times when the illuminated advertisement may be lit.

2. The above recommendations for maximum luminance may not apply to recognised display centres, such as Piccadilly Circus, which must be considered as special cases. Recognised display centres usually exhibit the following features:

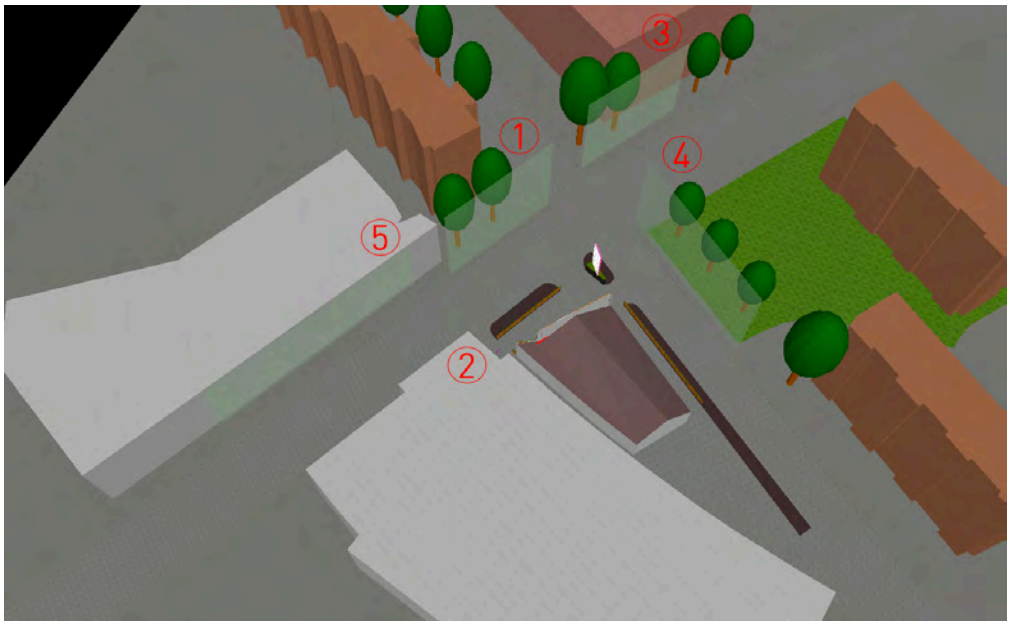
a) a concentration of illuminated advertisements, some of which do not relate to the business premises on which they are erected.
b) extensive use of animation.
c) mounting of illuminated advertisements well above the building frontage height.

In such instances an approach based on advertisements with an illuminated area greater than 10m^2 having a maximum luminance of 1000 cd/m^2 would be a reasonable starting point, depending on the precise nature and extent of the installation.

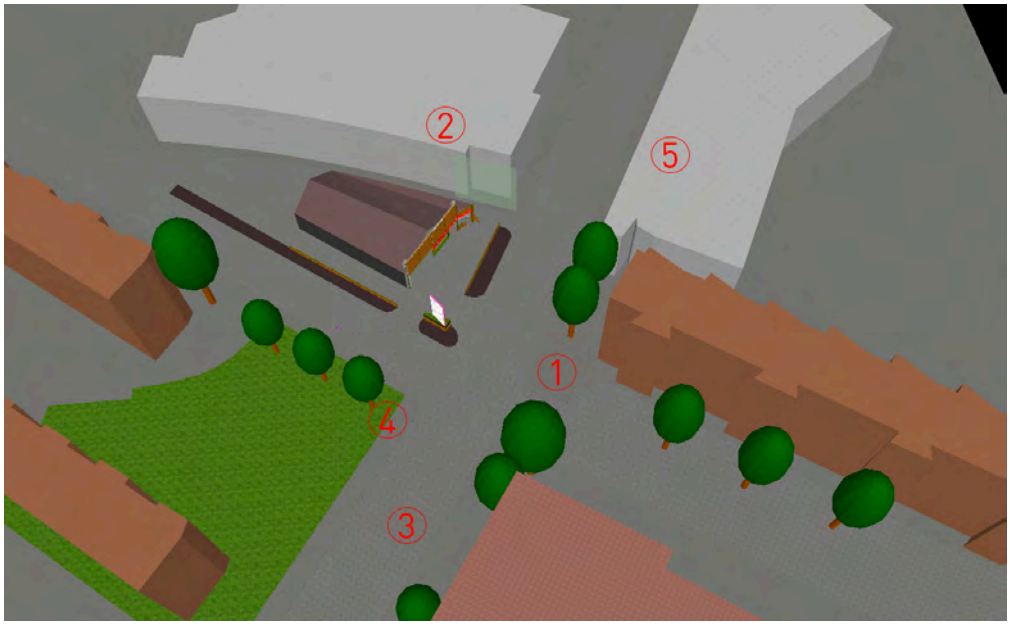
For the purposes of our lighting calculations, we have based the recommendations on a Zone E4 area. The description and example of which is:

E4 – Areas of 'high district brightness': generally urban areas with mixed recreational and commercial use with high night-time activity.

POSITION OF ILLUMINANCE/LUMINANCE CALCULATION SURFACES

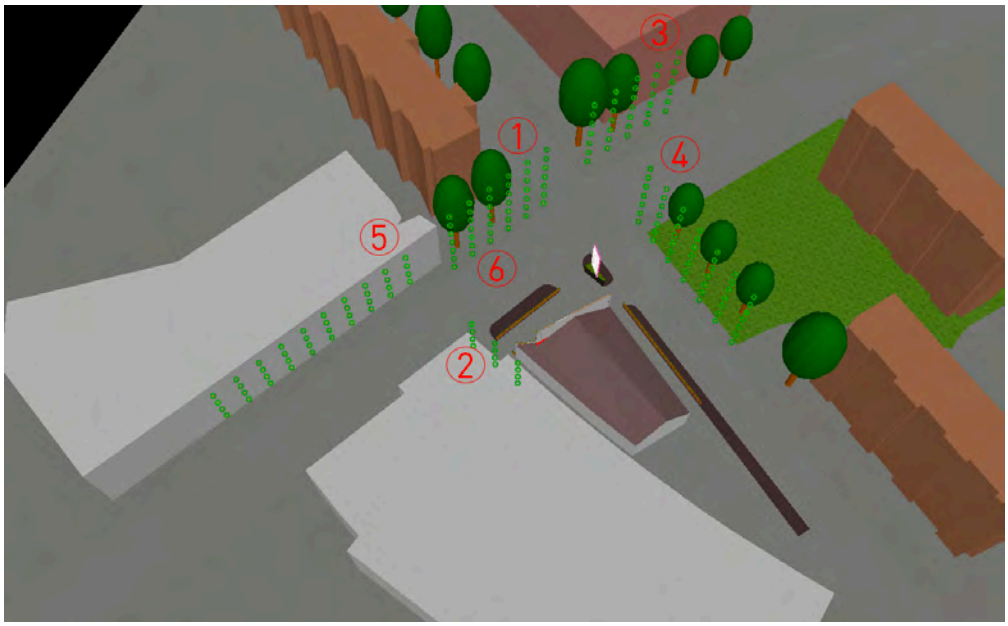


POSITION OF ILLUMINANCE/LUMINANCE CALCULATION SURFACES

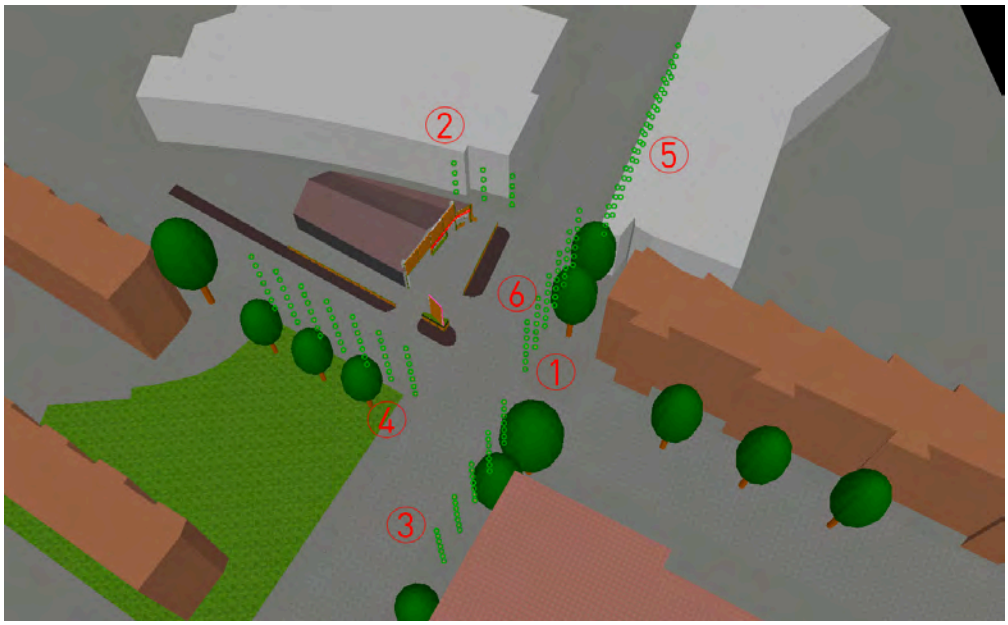


① = Calculation Surface 1
② = Calculation Surface 2
③ = Calculation Surface 3
④ = Calculation Surface 4
⑤ = Calculation Surface 5

POSITION OF GLARE RATIO OBSERVER CALCULATION POINTS



POSITION OF GLARE RATIO OBSERVER CALCULATION POINTS



① = Calculation Surface 1
② = Calculation Surface 2
③ = Calculation Surface 3
④ = Calculation Surface 4
⑤ = Calculation Surface 5
⑥ = GR Observer Point (Car)

CALCULATION RESULTS

CALCULATION 1 3D Representation	LC.001 (see Appendix A)

Maximum Luminance: 300cd/sqm

Luminaire Details:

- Individual Panel Size - 200mm x 200mm
- 300 lumens per 1m sq (5 x 5 individual panels)
- Light Output Ratio – 100%

RENDERED IMAGE 001

CALCULATION RESULTS

The following pages show the results from our lighting calculations. These are broken down into 3 separate calculations as follows:

Calculation 1 – Results from the proposed illuminated screen only and not accounting for any additional lighting.

Calculation 2 – Results from the approx. street lighting only and not accounting for any additional light from the proposed illuminated screen.

Calculation 3 – Results from the combination of the approx. street lighting and the proposed illuminated screen.

The results show the values in terms of lighting units related to the amount of light achieved on a surface and the amount of light from a surface. Please see below the definitions of these lighting units:

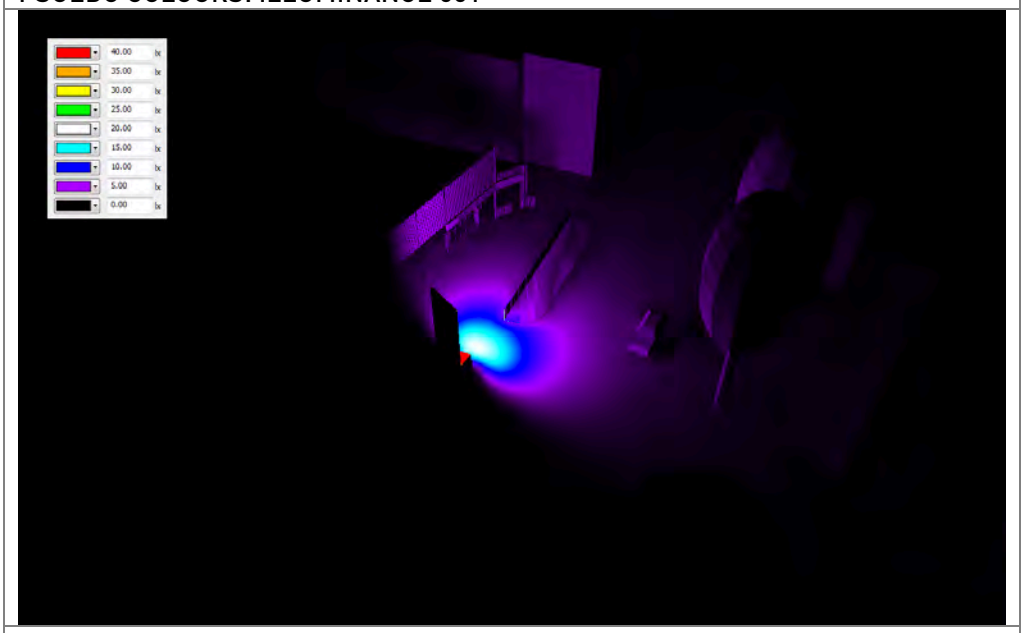
Luminance – This is defined as the luminous intensity in a specific direction from a surface of a light source, luminaire or lit surface, divided by the projected area.

Illuminance – This refers to the luminous flux that hits a specific surface. Definition: - Luminous flux per unit area (m2).

Glare - Is a visual impairment caused by the extreme contrast or inappropriate distribution of luminance levels. Glare is normally subdivided into: -discomfort glare UGR/NB - disability glare TI/GR.

CALCULATION RESULTS

CALCULATION 1 With Screen only	LC.001 (see Appendix A)
PSUEDO COLOURS: ILLUMINANCE 001	



CALCULATION 1 With Screen only	LC.001 (see Appendix A)
PSUEDO COLOURS: LUMINANCE 001	

CALCULATION RESULTS – CALCULATION 1

Results Overview:

Illuminance Surfaces	Average E	Minimum E	Maximum E
Calculation Surface 1	2.13 lux	0.15 lux	3.82 lux
Calculation Surface 2	1.84 lux	0.58 lux	2.53 lux
Calculation Surface 3	0.02 lux	0.01 lux	0.04 lux
Calculation Surface 4	0.07 lux	0.01 lux	0.13 lux
Calculation Surface 5	0.36 lux	0.13 lux	0.92 lux

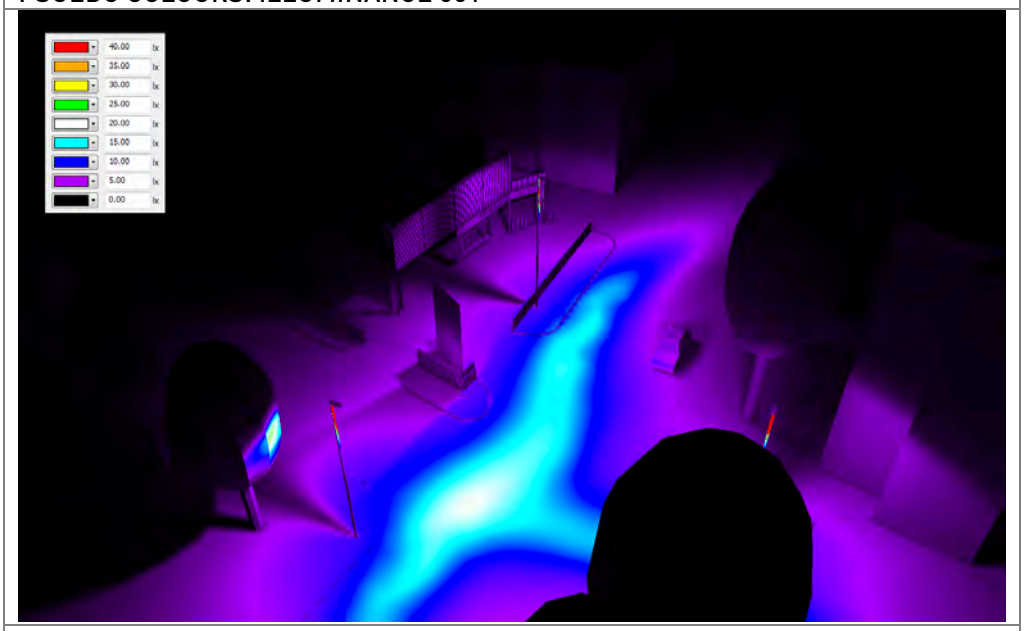
Min. Glare Ratio = ＜10 @ GR Observer
Max. Glare Ratio = ＞90 @ GR Observer

GR Observer Point – Oncoming Car (at 1.2m height)

Glare: Min = 61, Max = ＞90
Veil Luminance: Min = 0.00 cd/m², Max = 0.31 cd/m²

CALCULATION RESULTS

CALCULATION 2 With Street Lights only	LC.001 (see Appendix A)
PSUEDO COLOURS: ILLUMINANCE 001	



CALCULATION 2 With Street Lights only	LC.001 (see Appendix A)
PSUEDO COLOURS: LUMINANCE 001	

CALCULATION RESULTS – CALCULATION 2

Results Overview:

Illuminance Surfaces	Average E	Minimum E	Maximum E
Calculation Surface 1	1.32 lux	0.37 lux	3.53 lux
Calculation Surface 2	1.30 lux	0.15 lux	4.32 lux
Calculation Surface 3	0.82 lux	0.23 lux	2.57 lux
Calculation Surface 4	0.52 lux	0.08 lux	5.12 lux
Calculation Surface 5	0.17 lux	0.02 lux	1.02 lux

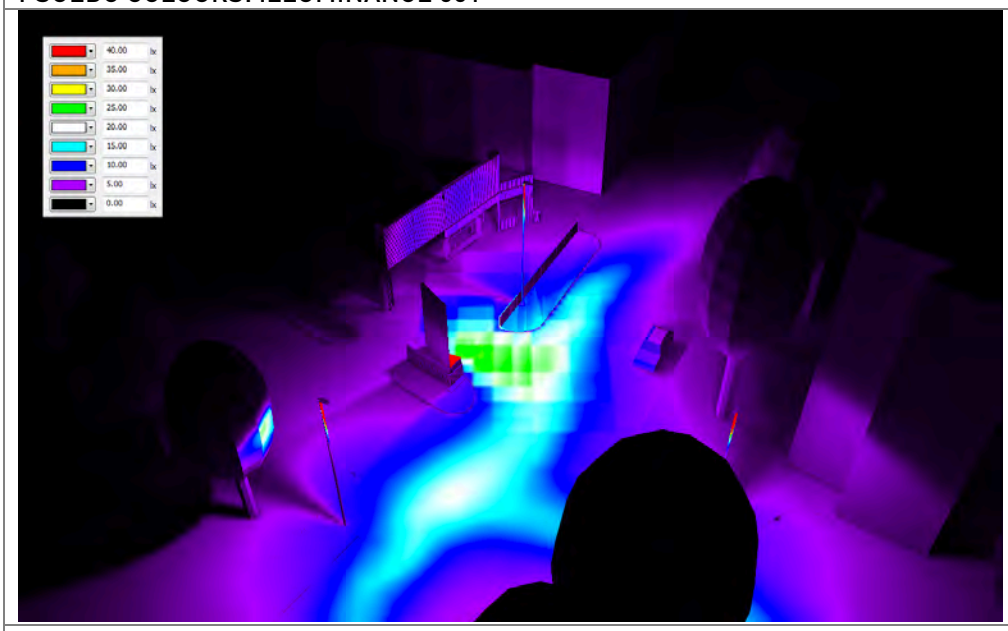
Min. Glare Ratio = < 10 @ GR Observer
Max. Glare Ratio = 73 @ GR Observer

GR Observer Point – Oncoming Car (at 1.2m height)

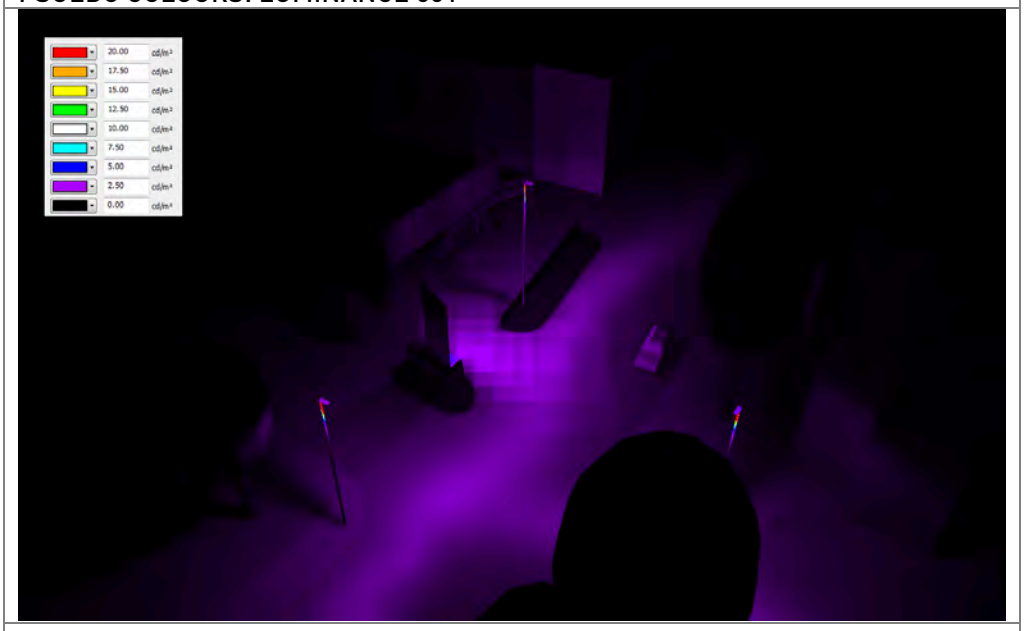
Glare: Min = 36, Max = 57
Veil Luminance: Min = 0.00 cd/m², Max = 0.06 cd/m²

CALCULATION RESULTS

CALCULATION 3 With Street Lights + Screen	LC.001 (see Appendix A)
PSUEDO COLOURS: ILLUMINANCE 001	



CALCULATION 3 With Street Lights + Screen	LC.001 (see Appendix A)
PSUEDO COLOURS: LUMINANCE 001	



CALCULATION RESULTS – CALCULATION 3

Results Overview:

Illuminance Surfaces	Average E	Minimum E	Maximum E
Calculation Surface 1	3.39 lux	0.83 lux	6.47 lux
Calculation Surface 2	2.89 lux	1.05 lux	6.07 lux
Calculation Surface 3	0.84 lux	0.25 lux	2.45 lux
Calculation Surface 4	0.59 lux	0.09 lux	5.20 lux
Calculation Surface 5	0.51 lux	0.17 lux	1.61 lux

Min. Glare Ratio = ＜10 @ GR Observer
Max. Glare Ratio = ＞90 @ GR Observer

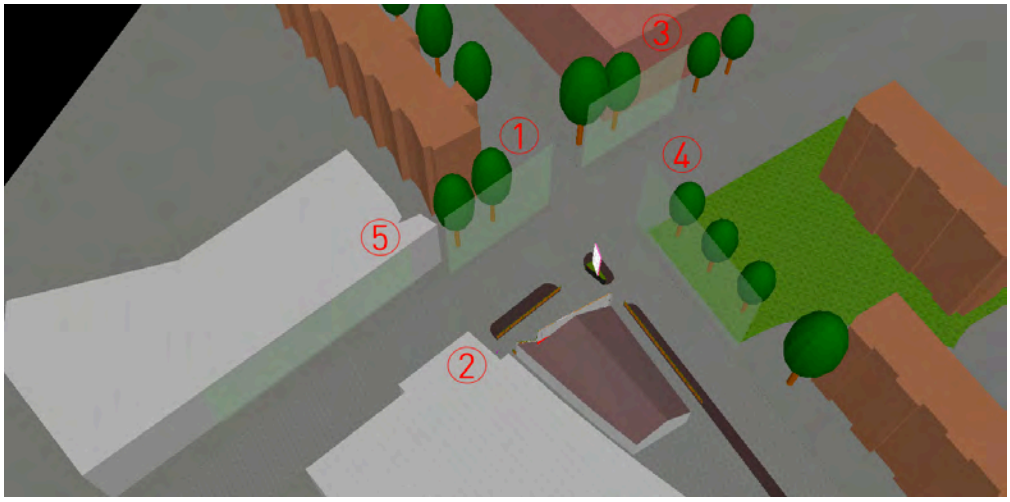
GR Observer Point – Oncoming Car (at 1.2m height)

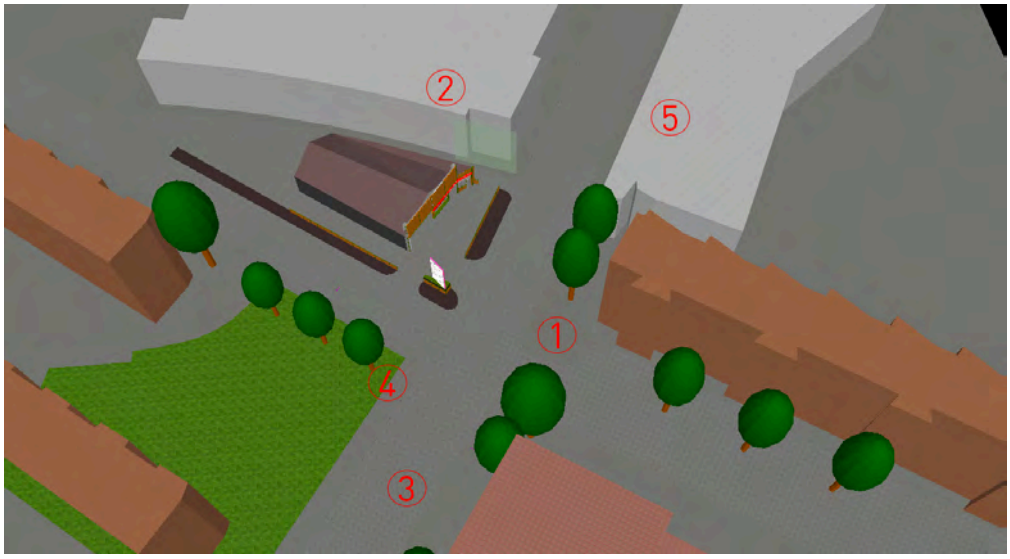
Glare: Min = 35, Max = 75
Veil Luminance: Min = 0.00 cd/m², Max = 0.37 cd/m²

FINDINGS AND CONCULSIONS

The luminance calculated at night (the requested output setting: 300cd/m^2) on the existing adjacent properties are well within the ILE recommendations for an E4 Zone (High District Brightness – generally urban areas with mixed recreational and commercial land use with high night-time activity).

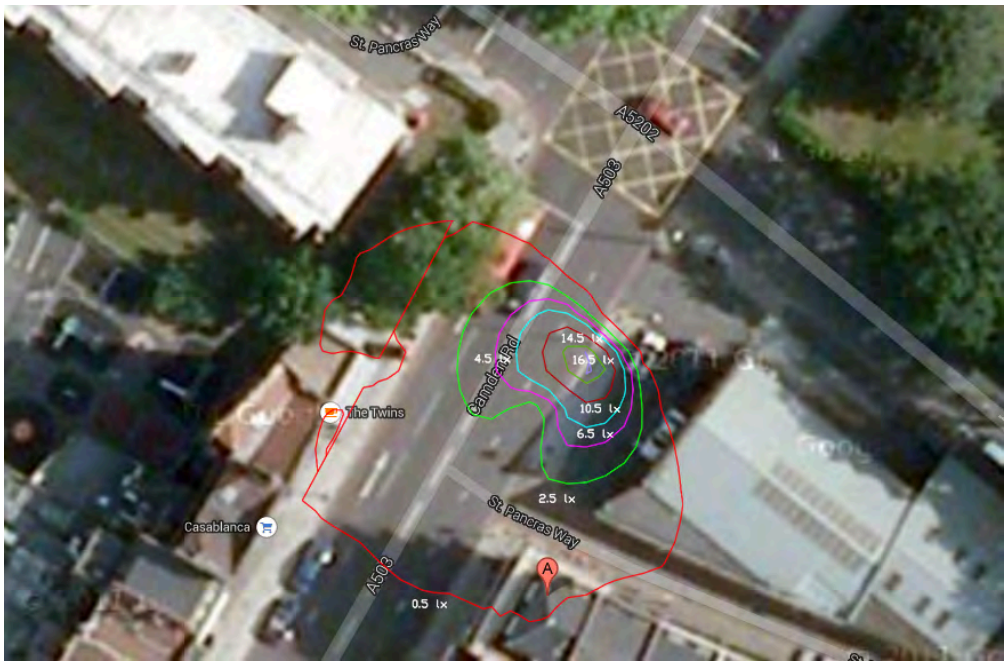
Please see below a graphical representation of the calculation surfaces in relation to the surrounding properties:





Note: The calculated luminance values are below the recommendations for an E4 zone, and the intensity of the screen and the height and position of the proposed location does not provide undue glare at the control output in the position calculated for.

FINDINGS AND CONCULSIONS



The above shows the Illuminance isoline values produced by the screen only.

GLOSSARY

Luminance – This is defined as the luminous intensity in a specific direction from a surface of a light source, luminaire or lit surface, divided by the projected area.

Illuminance – This refers to the luminous flux that hits a specific surface. Definition: - Luminous flux per unit area (m2).

Glare - Is a visual impairment caused by the extreme contrast or inappropriate distribution of luminance levels. Glare is normally subdivided into: -discomfort glare UGR/NB - disability glare TI/GR.

APPENDICES

- Appendix A – Full calculation results based on 300cd/sqm output.

NOTES

- Our calculations have been created by a lighting calculation program called DIALux.
- Our calculations are based on locations for the media screens provided by Wildstone Planning.
- Each Glare Rating calculation point has been positioned to represent a location at several floor levels across the existing properties and also the position of an oncoming motorist to junction.
- All Luminance results are taken from the surfaces of the buildings representing the existing properties.
- All Glare Rating calculations points have been placed onto the adjacent office building and the residence building closest to the proposed media facades.
- All calculations results are based on the light output of the photometry used to represent the media screens. Approx. street lighting output and positions have been taken from photos of the surrounding area.

Appendix A

Camden Proposed Advertising Screens

Lighting Calculation - 300 Lumens

Luminaire Size: 6m x 3m

LC.001

Project No.: 0240

Contact: Ben Kelly
Client: Wildstone Planning

Date: 29.01.2014
Operator: Daniel Gray

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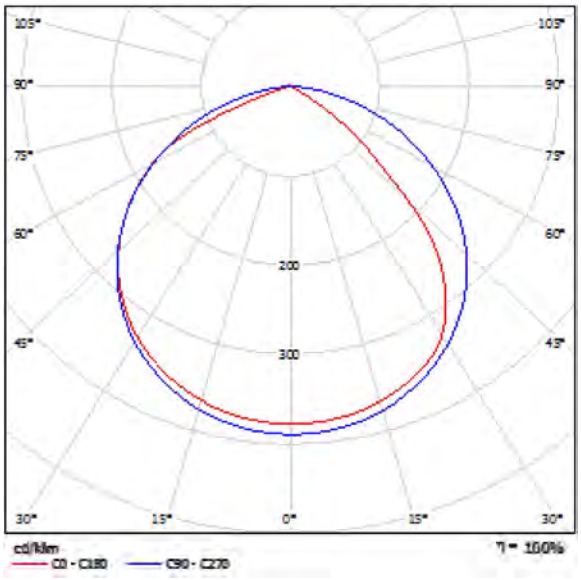
Light Engine - Light Engine - / Luminaire Data Sheet

See our luminaire catalog for an image of the luminaire.

Luminous emittance 1:



Luminaire classification according to CIE: 100
CIE flux code: 53 86 99 100 100

Due to missing symmetry properties, no UGR table can be displayed for this luminaire.

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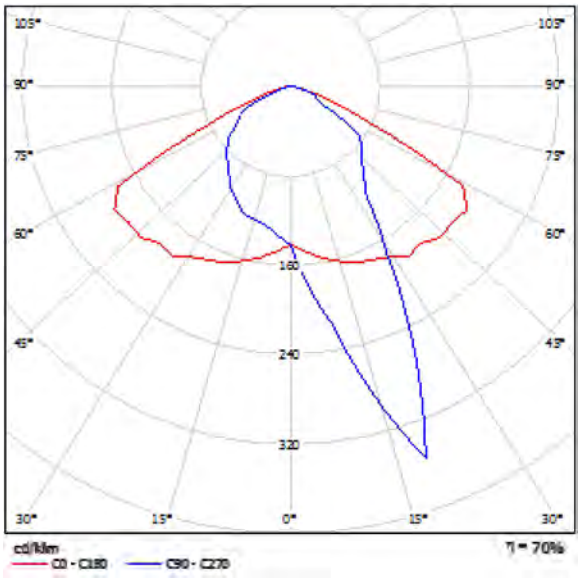
Thorn 96259430 CIVIC 1 100W HIT 240V CL1 EFL PN/L [V4L4] / Luminaire Data Sheet

Luminous emittance 1:



Luminaire classification according to CIE: 100
CIE flux code: 45 84 100 97 70

Due to missing symmetry properties, no UGR table can be displayed for this luminaire.

A road lighting lantern with IP66 optical and gear compartment, SC1 class. die-cast aluminium body with Flat Glass enclosure. Luminaire to be lateral (Ø34 mm to Ø60 mm) or post top (Ø60 mm or Ø76 mm) mounted. Fixed and secured by two screws with locknuts. Road lighting distribution aluminium - bright anodised reflector with a 100 HIT-CE lamp and adjustable lampholder associated to a magnetic ballast in order to ensure high streetlighting performance. Equipped with NEMA socket. Complete with lamp(s)..
Dimensions: 645 x 280 x 180 mm
Weight: 7.6 kg

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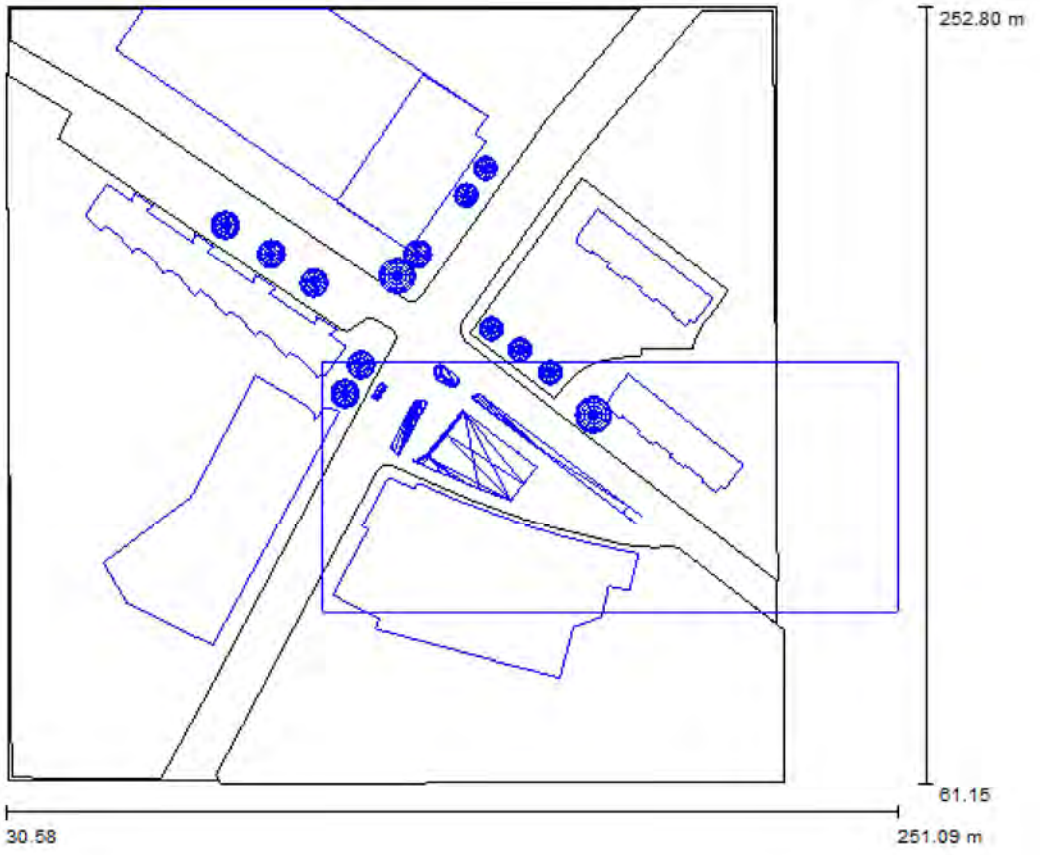
Calculation 1: Signage Lighting only. / Planning data



Light loss factor: 0.80, ULR (Upward Light Ratio): 25.5%

Scale 1:1777

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	450	Light Engine - Light Engine - (Type 1)* (1.000)	12	12	53.2
*Modified Technical Specifications			Total: 5400	Total: 5400	23940.0

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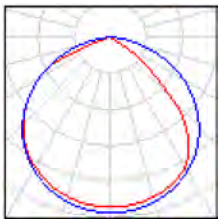
Calculation 1: Signage Lighting only. / Luminaire parts list

450 Pieces Light Engine - Light Engine - (Type 1)
Article No.: -
Luminous flux (Luminaire): 12 lm
Luminous flux (Lamps): 12 lm
Luminaire Wattage: 53.2 W
Luminaire classification according to CIE: 100
CIE flux code: 53 86 99 100 100
Fitting: 1 x User defined (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



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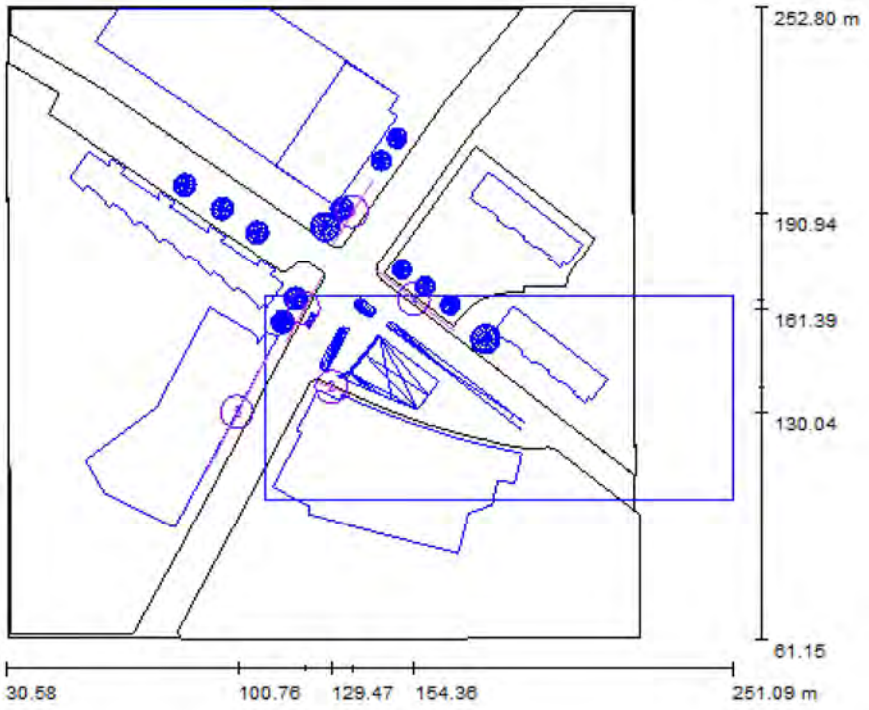
Calculation 1: Signage Lighting only. / Calculation surfaces (results overview)



Scale 1 : 2181

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	perpendicular	64 x 64	2.13	0.15	3.82	0.071	0.040
2	Calculation Surface 2	perpendicular	32 x 32	1.84	0.58	2.53	0.313	0.228
3	Calculation Surface 3	perpendicular	32 x 32	0.02	0.01	0.04	0.268	0.115
4	Calculation Surface 4	perpendicular	16 x 16	0.07	0.01	0.13	0.184	0.098
5	Calculation Surface 5	perpendicular	32 x 16	0.36	0.13	0.92	0.379	0.147

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E_{min} / E_{max}
perpendicular	5	0.68	0.01	3.82	0.01	0.00

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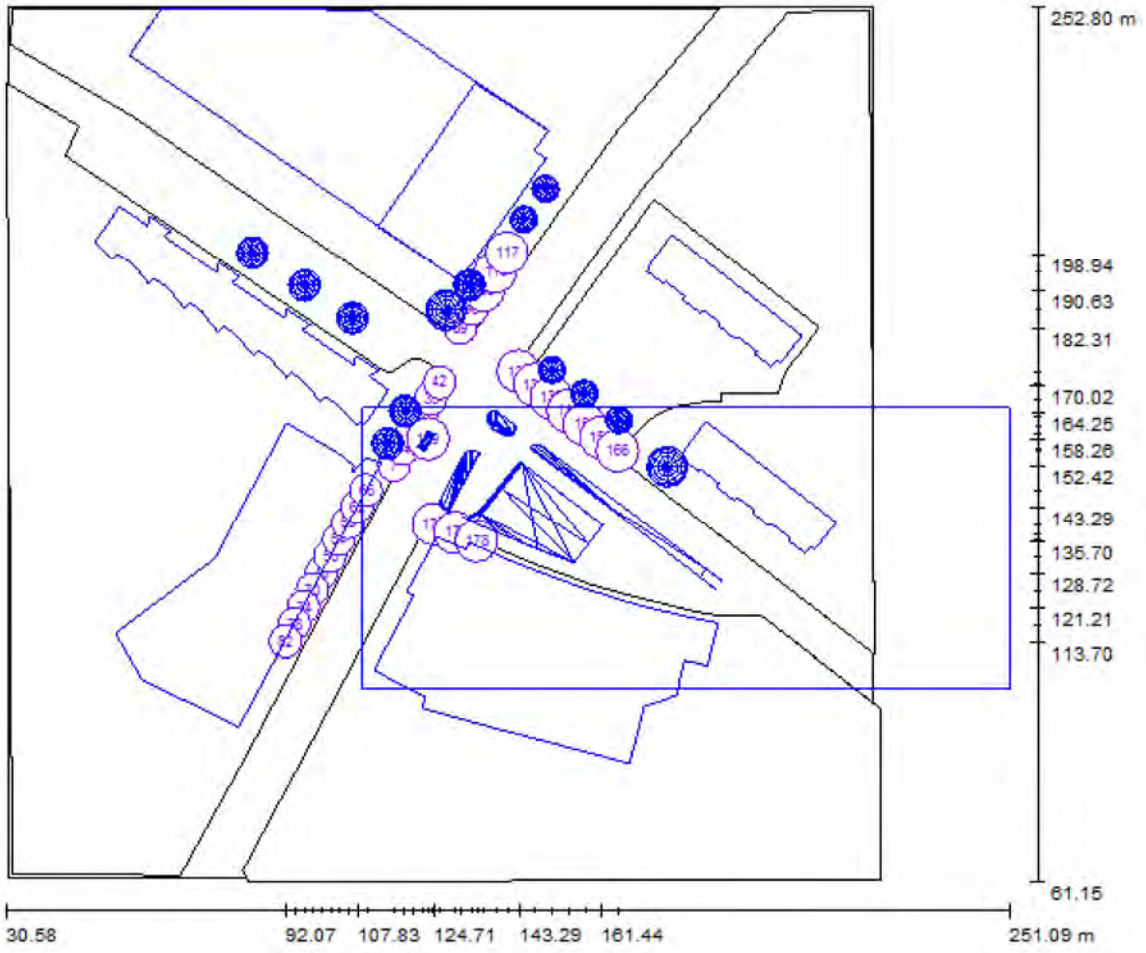
Calculation 1: Signage Lighting only. / GR Observer (Results Overview)



Scale 1 : 1577

GR Observerlist

No.	Designation	Position [m] X	Y	Z	Viewing sector [°] Start	End	Increment	Slope angle	Max
1	GR Observer 1	115.937	152.418	1.500	0.0	360.0	30.0	-2.0	86 2)
2	GR Observer 2	115.937	152.418	4.200	0.0	360.0	30.0	-2.0	>90 2)
3	GR Observer 3	115.937	152.418	6.900	0.0	360.0	30.0	-2.0	>90 2)
4	GR Observer 4	115.937	152.418	9.600	0.0	360.0	30.0	-2.0	87 2)

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Calculation 1: Signage Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
5	GR Observer 5	115.937	152.418	12.300	0.0	360.0	30.0	-2.0	81 2)
6	GR Observer 6	115.937	152.418	14.800	0.0	360.0	30.0	-2.0	75 2)
7	GR Observer 7	115.937	152.418	17.300	0.0	360.0	30.0	-2.0	69 2)
8	GR Observer 8	117.946	156.035	1.500	0.0	360.0	30.0	-2.0	86 2)
9	GR Observer 9	117.946	156.035	4.200	0.0	360.0	30.0	-2.0	>90 2)
10	GR Observer 10	117.946	156.035	6.900	0.0	360.0	30.0	-2.0	>90 2)
11	GR Observer 11	117.946	156.035	9.600	0.0	360.0	30.0	-2.0	87 2)
12	GR Observer 12	117.946	156.035	12.300	0.0	360.0	30.0	-2.0	80 2)
13	GR Observer 13	117.946	156.035	14.800	0.0	360.0	30.0	-2.0	74 2)
14	GR Observer 14	117.946	156.035	17.300	0.0	360.0	30.0	-2.0	68 2)
15	GR Observer 15	119.954	159.652	1.500	0.0	360.0	30.0	-2.0	>90 2)
16	GR Observer 16	119.954	159.652	4.200	0.0	360.0	30.0	-2.0	>90 2)
17	GR Observer 17	119.954	159.652	6.900	0.0	360.0	30.0	-2.0	>90 2)
18	GR Observer 18	119.954	159.652	9.600	0.0	360.0	30.0	-2.0	>90 2)
19	GR Observer 19	119.954	159.652	12.300	0.0	360.0	30.0	-2.0	84 2)
20	GR Observer 20	119.954	159.652	14.800	0.0	360.0	30.0	-2.0	75 2)
21	GR Observer 21	119.954	159.652	17.300	0.0	360.0	30.0	-2.0	67 2)
22	GR Observer 22	121.963	163.270	1.500	0.0	360.0	30.0	-2.0	90 2)
23	GR Observer 23	121.963	163.270	4.200	0.0	360.0	30.0	-2.0	>90 2)
24	GR Observer 24	121.963	163.270	6.900	0.0	360.0	30.0	-2.0	>90 2)
25	GR Observer 25	121.963	163.270	9.600	0.0	360.0	30.0	-2.0	89 2)
26	GR Observer 26	121.963	163.270	12.300	0.0	360.0	30.0	-2.0	79 2)
27	GR Observer 27	121.963	163.270	14.800	0.0	360.0	30.0	-2.0	70 2)
28	GR Observer 28	121.963	163.270	17.300	0.0	360.0	30.0	-2.0	61 2)
29	GR Observer 29	123.971	166.887	1.500	0.0	360.0	30.0	-2.0	89 2)
30	GR Observer 30	123.971	166.887	4.200	0.0	360.0	30.0	-2.0	>90 2)
31	GR Observer 31	123.971	166.887	6.900	0.0	360.0	30.0	-2.0	>90 2)
32	GR Observer 32	123.971	166.887	9.600	0.0	360.0	30.0	-2.0	88 2)
33	GR Observer 33	123.971	166.887	12.300	0.0	360.0	30.0	-2.0	74 2)
34	GR Observer 34	123.971	166.887	14.800	0.0	360.0	30.0	-2.0	62 2)
35	GR Observer 35	123.971	166.887	17.300	0.0	360.0	30.0	-2.0	49 2)
36	GR Observer 36	125.980	170.504	1.500	0.0	360.0	30.0	-2.0	79 2)
37	GR Observer 37	125.980	170.504	4.200	0.0	360.0	30.0	-2.0	87 2)
38	GR Observer 38	125.980	170.504	6.900	0.0	360.0	30.0	-2.0	86 2)
39	GR Observer 39	125.980	170.504	9.600	0.0	360.0	30.0	-2.0	76 2)
40	GR Observer 40	125.980	170.504	12.300	0.0	360.0	30.0	-2.0	56 2)

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Calculation 1: Signage Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
41	GR Observer 41	125.980	170.504	14.800	0.0	360.0	30.0	-2.0	35 2)
42	GR Observer 42	125.980	170.504	17.300	0.0	360.0	30.0	-2.0	11 2)
43	GR Observer 1	100.034	128.716	1.500	0.0	360.0	30.0	-2.0	78 2)
44	GR Observer 2	100.034	128.716	4.200	0.0	360.0	30.0	-2.0	80 2)
45	GR Observer 3	100.034	128.716	6.900	0.0	360.0	30.0	-2.0	81 2)
46	GR Observer 4	100.034	128.716	9.600	0.0	360.0	30.0	-2.0	80 2)
47	GR Observer 8	101.855	132.357	1.500	0.0	360.0	30.0	-2.0	83 2)
48	GR Observer 9	101.855	132.357	4.200	0.0	360.0	30.0	-2.0	87 2)
49	GR Observer 10	101.855	132.357	6.900	0.0	360.0	30.0	-2.0	88 2)
50	GR Observer 11	101.855	132.357	9.600	0.0	360.0	30.0	-2.0	86 2)
51	GR Observer 15	103.813	136.051	1.500	0.0	360.0	30.0	-2.0	89 2)
52	GR Observer 16	103.813	136.051	4.200	0.0	360.0	30.0	-2.0	>90 2)
53	GR Observer 17	103.813	136.051	6.900	0.0	360.0	30.0	-2.0	>90 2)
54	GR Observer 18	103.813	136.051	9.600	0.0	360.0	30.0	-2.0	>90 2)
55	GR Observer 22	105.821	139.669	1.500	0.0	360.0	30.0	-2.0	>90 2)
56	GR Observer 23	105.821	139.669	4.200	0.0	360.0	30.0	-2.0	>90 2)
57	GR Observer 24	105.821	139.669	6.900	0.0	360.0	30.0	-2.0	>90 2)
58	GR Observer 25	105.821	139.669	9.600	0.0	360.0	30.0	-2.0	>90 2)
59	GR Observer 29	107.830	143.286	1.500	0.0	360.0	30.0	-2.0	>90 2)
60	GR Observer 30	107.830	143.286	4.200	0.0	360.0	30.0	-2.0	>90 2)
61	GR Observer 31	107.830	143.286	6.900	0.0	360.0	30.0	-2.0	>90 2)
62	GR Observer 32	107.830	143.286	9.600	0.0	360.0	30.0	-2.0	>90 2)
63	GR Observer 36	109.839	146.903	1.500	0.0	360.0	30.0	-2.0	>90 2)
64	GR Observer 37	109.839	146.903	4.200	0.0	360.0	30.0	-2.0	>90 2)
65	GR Observer 38	109.839	146.903	6.900	0.0	360.0	30.0	-2.0	>90 2)
66	GR Observer 39	109.839	146.903	9.600	0.0	360.0	30.0	-2.0	>90 2)
67	GR Observer 1	98.043	124.961	1.500	0.0	360.0	30.0	-2.0	73 2)
68	GR Observer 2	98.043	124.961	4.200	0.0	360.0	30.0	-2.0	75 2)
69	GR Observer 3	98.043	124.961	6.900	0.0	360.0	30.0	-2.0	76 2)
70	GR Observer 4	98.043	124.961	9.600	0.0	360.0	30.0	-2.0	75 2)
71	GR Observer 1	96.052	121.206	1.500	0.0	360.0	30.0	-2.0	70 2)
72	GR Observer 2	96.052	121.206	4.200	0.0	360.0	30.0	-2.0	71 2)
73	GR Observer 3	96.052	121.206	6.900	0.0	360.0	30.0	-2.0	71 2)
74	GR Observer 4	96.052	121.206	9.600	0.0	360.0	30.0	-2.0	71 2)
75	GR Observer 1	94.060	117.451	1.500	0.0	360.0	30.0	-2.0	67 2)
76	GR Observer 2	94.060	117.451	4.200	0.0	360.0	30.0	-2.0	68 2)

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Calculation 1: Signage Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
77	GR Observer 3	94.060	117.451	6.900	0.0	360.0	30.0	-2.0	68 2)
78	GR Observer 4	94.060	117.451	9.600	0.0	360.0	30.0	-2.0	67 2)
79	GR Observer 1	92.069	113.696	1.500	0.0	360.0	30.0	-2.0	64 2)
80	GR Observer 2	92.069	113.696	4.200	0.0	360.0	30.0	-2.0	65 2)
81	GR Observer 3	92.069	113.696	6.900	0.0	360.0	30.0	-2.0	65 2)
82	GR Observer 4	92.069	113.696	9.600	0.0	360.0	30.0	-2.0	64 2)
83	GR Observer 36	130.483	182.309	1.500	0.0	360.0	30.0	-2.0	<10 2)
84	GR Observer 37	130.483	182.309	4.200	0.0	360.0	30.0	-2.0	<10 2)
85	GR Observer 38	130.483	182.309	6.900	0.0	360.0	30.0	-2.0	<10 2)
86	GR Observer 39	130.483	182.309	9.600	0.0	360.0	30.0	-2.0	<10 2)
87	GR Observer 40	130.483	182.309	12.300	0.0	360.0	30.0	-2.0	<10 2)
88	GR Observer 41	130.483	182.309	14.800	0.0	360.0	30.0	-2.0	<10 2)
89	GR Observer 42	130.483	182.309	17.300	0.0	360.0	30.0	-2.0	<10 2)
90	GR Observer 36	133.054	186.467	1.500	0.0	360.0	30.0	-2.0	<10 2)
91	GR Observer 37	133.054	186.467	4.200	0.0	360.0	30.0	-2.0	<10 2)
92	GR Observer 38	133.054	186.467	6.900	0.0	360.0	30.0	-2.0	<10 2)
93	GR Observer 39	133.054	186.467	9.600	0.0	360.0	30.0	-2.0	<10 2)
94	GR Observer 40	133.054	186.467	12.300	0.0	360.0	30.0	-2.0	<10 2)
95	GR Observer 41	133.054	186.467	14.800	0.0	360.0	30.0	-2.0	<10 2)
96	GR Observer 42	133.054	186.467	17.300	0.0	360.0	30.0	-2.0	<10 2)
97	GR Observer 36	135.626	190.625	1.500	0.0	360.0	30.0	-2.0	<10 2)
98	GR Observer 37	135.626	190.625	4.200	0.0	360.0	30.0	-2.0	<10 2)
99	GR Observer 38	135.626	190.625	6.900	0.0	360.0	30.0	-2.0	<10 2)
100	GR Observer 39	135.626	190.625	9.600	0.0	360.0	30.0	-2.0	<10 2)
101	GR Observer 40	135.626	190.625	12.300	0.0	360.0	30.0	-2.0	<10 2)
102	GR Observer 41	135.626	190.625	14.800	0.0	360.0	30.0	-2.0	<10 2)
103	GR Observer 42	135.626	190.625	17.300	0.0	360.0	30.0	-2.0	<10 2)
104	GR Observer 36	138.197	194.783	1.500	0.0	360.0	30.0	-2.0	<10 2)
105	GR Observer 37	138.197	194.783	4.200	0.0	360.0	30.0	-2.0	11 2)
106	GR Observer 38	138.197	194.783	6.900	0.0	360.0	30.0	-2.0	13 2)
107	GR Observer 39	138.197	194.783	9.600	0.0	360.0	30.0	-2.0	<10 2)
108	GR Observer 40	138.197	194.783	12.300	0.0	360.0	30.0	-2.0	<10 2)
109	GR Observer 41	138.197	194.783	14.800	0.0	360.0	30.0	-2.0	<10 2)
110	GR Observer 42	138.197	194.783	17.300	0.0	360.0	30.0	-2.0	<10 2)
111	GR Observer 36	140.768	198.941	1.500	0.0	360.0	30.0	-2.0	<10 2)
112	GR Observer 37	140.768	198.941	4.200	0.0	360.0	30.0	-2.0	<10 2)

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Calculation 1: Signage Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
113	GR Observer 38	140.768	198.941	6.900	0.0	360.0	30.0	-2.0	<10 2)
114	GR Observer 39	140.768	198.941	9.600	0.0	360.0	30.0	-2.0	<10 2)
115	GR Observer 40	140.768	198.941	12.300	0.0	360.0	30.0	-2.0	<10 2)
116	GR Observer 41	140.768	198.941	14.800	0.0	360.0	30.0	-2.0	<10 2)
117	GR Observer 42	140.768	198.941	17.300	0.0	360.0	30.0	-2.0	<10 2)
118	GR Observer 36	143.290	172.909	1.500	0.0	360.0	30.0	-2.0	<10 2)
119	GR Observer 37	143.290	172.909	4.200	0.0	360.0	30.0	-2.0	15 2)
120	GR Observer 38	143.290	172.909	6.900	0.0	360.0	30.0	-2.0	13 2)
121	GR Observer 39	143.290	172.909	9.600	0.0	360.0	30.0	-2.0	<10 2)
122	GR Observer 40	143.290	172.909	12.300	0.0	360.0	30.0	-2.0	<10 2)
123	GR Observer 41	143.290	172.909	14.800	0.0	360.0	30.0	-2.0	<10 2)
124	GR Observer 42	143.290	172.909	17.300	0.0	360.0	30.0	-2.0	<10 2)
125	GR Observer 36	146.921	170.024	1.500	0.0	360.0	30.0	-2.0	13 2)
126	GR Observer 37	146.921	170.024	4.200	0.0	360.0	30.0	-2.0	16 2)
127	GR Observer 38	146.921	170.024	6.900	0.0	360.0	30.0	-2.0	11 2)
128	GR Observer 39	146.921	170.024	9.600	0.0	360.0	30.0	-2.0	<10 2)
129	GR Observer 40	146.921	170.024	12.300	0.0	360.0	30.0	-2.0	<10 2)
130	GR Observer 41	146.921	170.024	14.800	0.0	360.0	30.0	-2.0	<10 2)
131	GR Observer 42	146.921	170.024	17.300	0.0	360.0	30.0	-2.0	<10 2)
132	GR Observer 36	150.551	167.139	1.500	0.0	360.0	30.0	-2.0	28 2)
133	GR Observer 37	150.551	167.139	4.200	0.0	360.0	30.0	-2.0	44 2)
134	GR Observer 38	150.551	167.139	6.900	0.0	360.0	30.0	-2.0	43 2)
135	GR Observer 39	150.551	167.139	9.600	0.0	360.0	30.0	-2.0	21 2)
136	GR Observer 40	150.551	167.139	12.300	0.0	360.0	30.0	-2.0	<10 2)
137	GR Observer 41	150.551	167.139	14.800	0.0	360.0	30.0	-2.0	<10 2)
138	GR Observer 42	150.551	167.139	17.300	0.0	360.0	30.0	-2.0	<10 2)
139	GR Observer 36	154.182	164.255	1.500	0.0	360.0	30.0	-2.0	<10 2)
140	GR Observer 37	154.182	164.255	4.200	0.0	360.0	30.0	-2.0	<10 2)
141	GR Observer 38	154.182	164.255	6.900	0.0	360.0	30.0	-2.0	<10 2)
142	GR Observer 39	154.182	164.255	9.600	0.0	360.0	30.0	-2.0	<10 2)
143	GR Observer 40	154.182	164.255	12.300	0.0	360.0	30.0	-2.0	<10 2)
144	GR Observer 41	154.182	164.255	14.800	0.0	360.0	30.0	-2.0	<10 2)
145	GR Observer 42	154.182	164.255	17.300	0.0	360.0	30.0	-2.0	<10 2)
146	GR Observer 36	157.813	161.370	1.500	0.0	360.0	30.0	-2.0	<10 2)
147	GR Observer 37	157.813	161.370	4.200	0.0	360.0	30.0	-2.0	16 2)
148	GR Observer 38	157.813	161.370	6.900	0.0	360.0	30.0	-2.0	14 2)

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Calculation 1: Signage Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
149	GR Observer 39	157.813	161.370	9.600	0.0	360.0	30.0	-2.0	<10 2)
150	GR Observer 40	157.813	161.370	12.300	0.0	360.0	30.0	-2.0	<10 2)
151	GR Observer 41	157.813	161.370	14.800	0.0	360.0	30.0	-2.0	<10 2)
152	GR Observer 42	157.813	161.370	17.300	0.0	360.0	30.0	-2.0	<10 2)
153	GR Observer 36	161.443	158.485	1.500	0.0	360.0	30.0	-2.0	<10 2)
154	GR Observer 37	161.443	158.485	4.200	0.0	360.0	30.0	-2.0	<10 2)
155	GR Observer 38	161.443	158.485	6.900	0.0	360.0	30.0	-2.0	<10 2)
156	GR Observer 39	161.443	158.485	9.600	0.0	360.0	30.0	-2.0	<10 2)
157	GR Observer 40	161.443	158.485	12.300	0.0	360.0	30.0	-2.0	<10 2)
158	GR Observer 41	161.443	158.485	14.800	0.0	360.0	30.0	-2.0	<10 2)
159	GR Observer 42	161.443	158.485	17.300	0.0	360.0	30.0	-2.0	<10 2)
160	GR Observer 36	165.074	155.600	1.500	0.0	360.0	30.0	-2.0	<10 2)
161	GR Observer 37	165.074	155.600	4.200	0.0	360.0	30.0	-2.0	<10 2)
162	GR Observer 38	165.074	155.600	6.900	0.0	360.0	30.0	-2.0	<10 2)
163	GR Observer 39	165.074	155.600	9.600	0.0	360.0	30.0	-2.0	<10 2)
164	GR Observer 40	165.074	155.600	12.300	0.0	360.0	30.0	-2.0	<10 2)
165	GR Observer 41	165.074	155.600	14.800	0.0	360.0	30.0	-2.0	<10 2)
166	GR Observer 42	165.074	155.600	17.300	0.0	360.0	30.0	-2.0	<10 2)
167	GR Observer 36	124.708	139.384	1.500	0.0	360.0	30.0	-2.0	>90 2)
168	GR Observer 37	124.708	139.384	4.200	0.0	360.0	30.0	-2.0	>90 2)
169	GR Observer 38	124.708	139.384	6.900	0.0	360.0	30.0	-2.0	>90 2)
170	GR Observer 39	124.708	139.384	9.600	0.0	360.0	30.0	-2.0	>90 2)
171	GR Observer 36	129.383	137.544	1.500	0.0	360.0	30.0	-2.0	>90 2)
172	GR Observer 37	129.383	137.544	4.200	0.0	360.0	30.0	-2.0	>90 2)
173	GR Observer 38	129.383	137.544	6.900	0.0	360.0	30.0	-2.0	>90 2)
174	GR Observer 39	129.383	137.544	9.600	0.0	360.0	30.0	-2.0	>90 2)
175	GR Observer 36	134.058	135.704	1.500	0.0	360.0	30.0	-2.0	82 2)
176	GR Observer 37	134.058	135.704	4.200	0.0	360.0	30.0	-2.0	21 2)
177	GR Observer 38	134.058	135.704	6.900	0.0	360.0	30.0	-2.0	<10 2)
178	GR Observer 39	134.058	135.704	9.600	0.0	360.0	30.0	-2.0	78 2)
179	GR Observer Oncoming Car	123.459	158.261	1.200	0.0	360.0	30.0	-2.0	>90 2)

2) The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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Calculation 1: Signage Lighting only. / 3D Rendering

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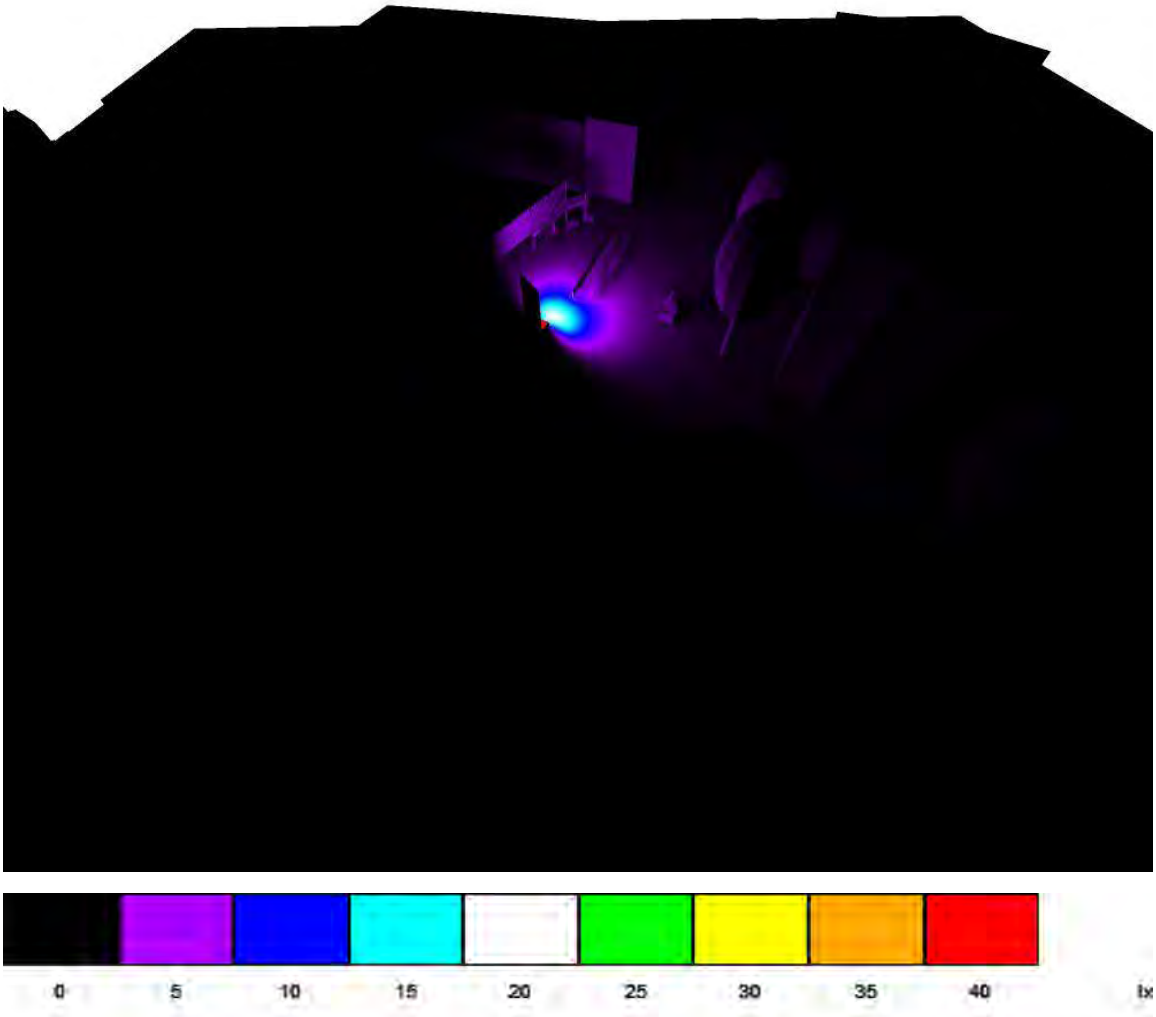
Calculation 1: Signage Lighting only. / False Color Rendering



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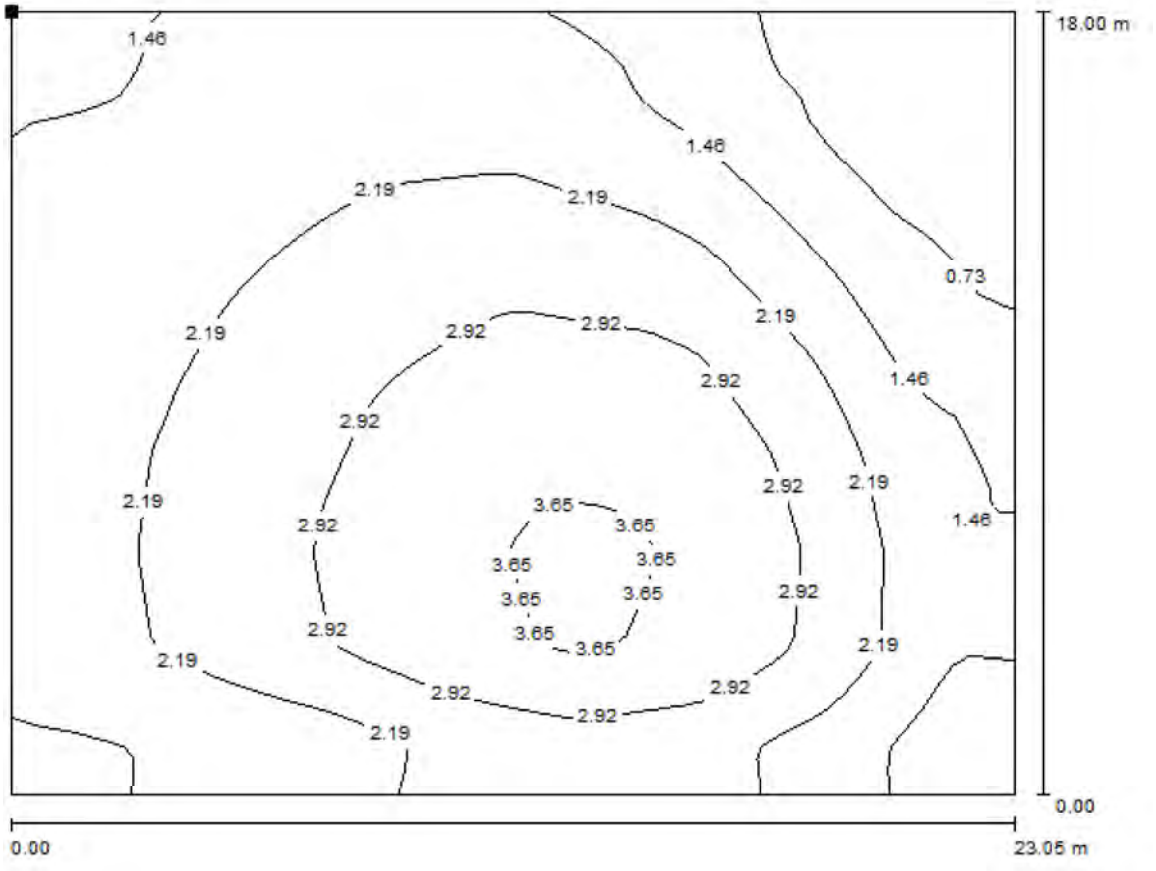
Calculation 1: Signage Lighting only. / Calculation Surface 1 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(115.338 m, 151.311 m, 18.010 m)

Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
2.13	0.15	3.82	0.071	0.040

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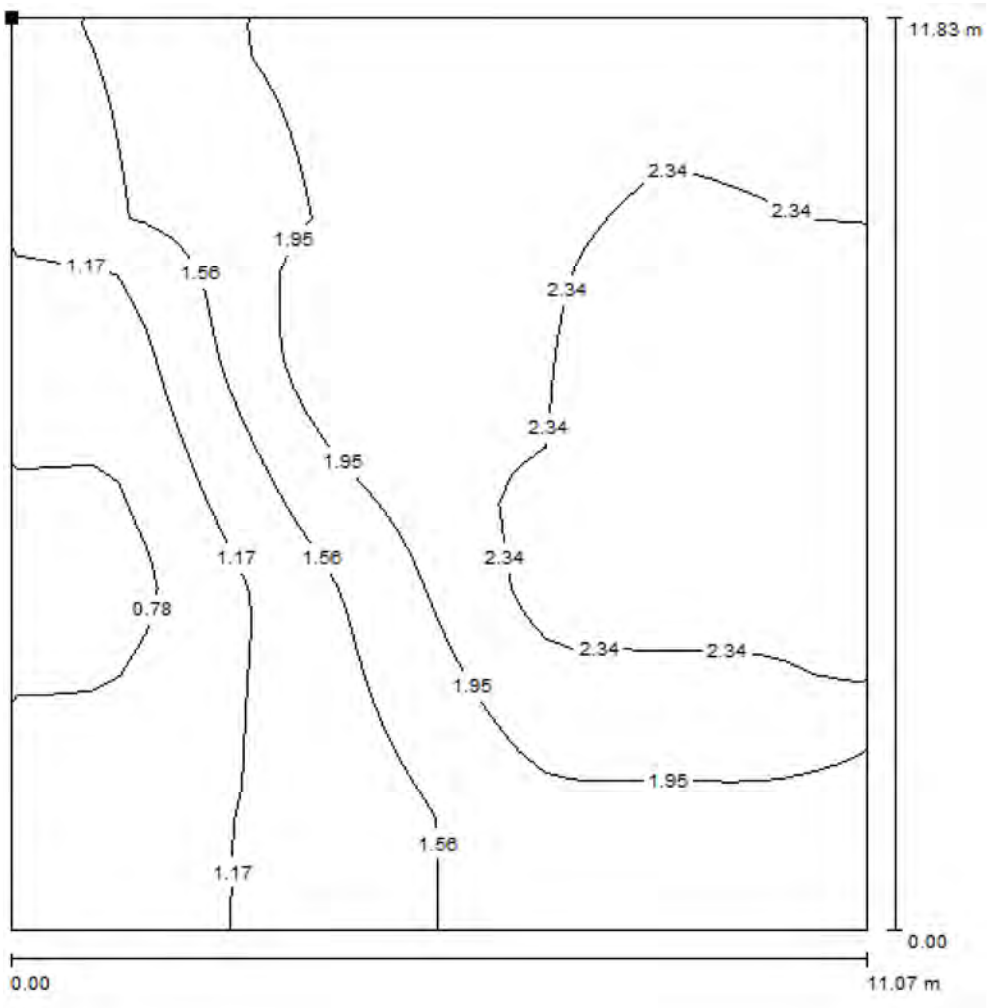
Calculation 1: Signage Lighting only. / Calculation Surface 2 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 93

Position of surface in external scene:
Marked point:
(134.598 m, 135.418 m, 11.825 m)

Grid: 32 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1.84	0.58	2.53	0.313	0.228

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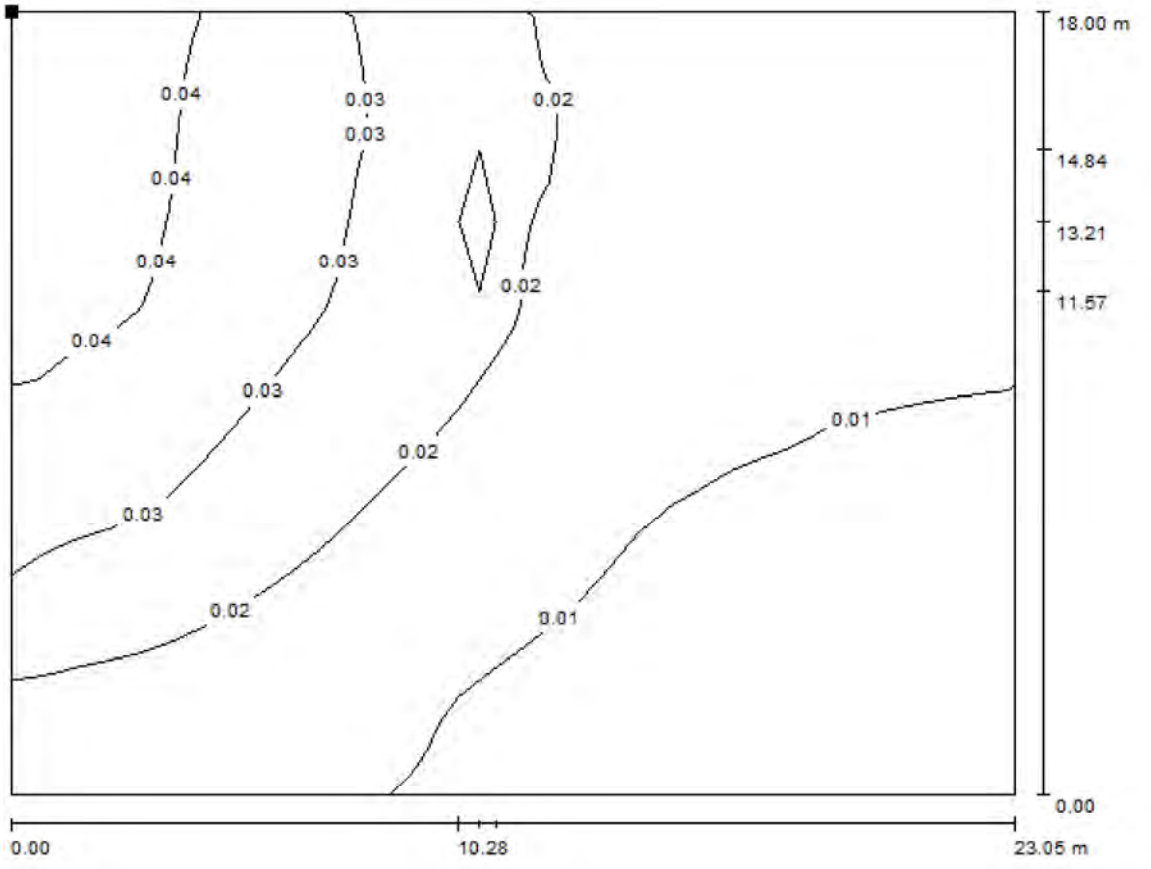
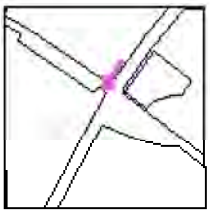
Calculation 1: Signage Lighting only. / Calculation Surface 3 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(129.561 m, 181.166 m, 18.010 m)



Grid: 32 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.02	0.01	0.04	0.268	0.115

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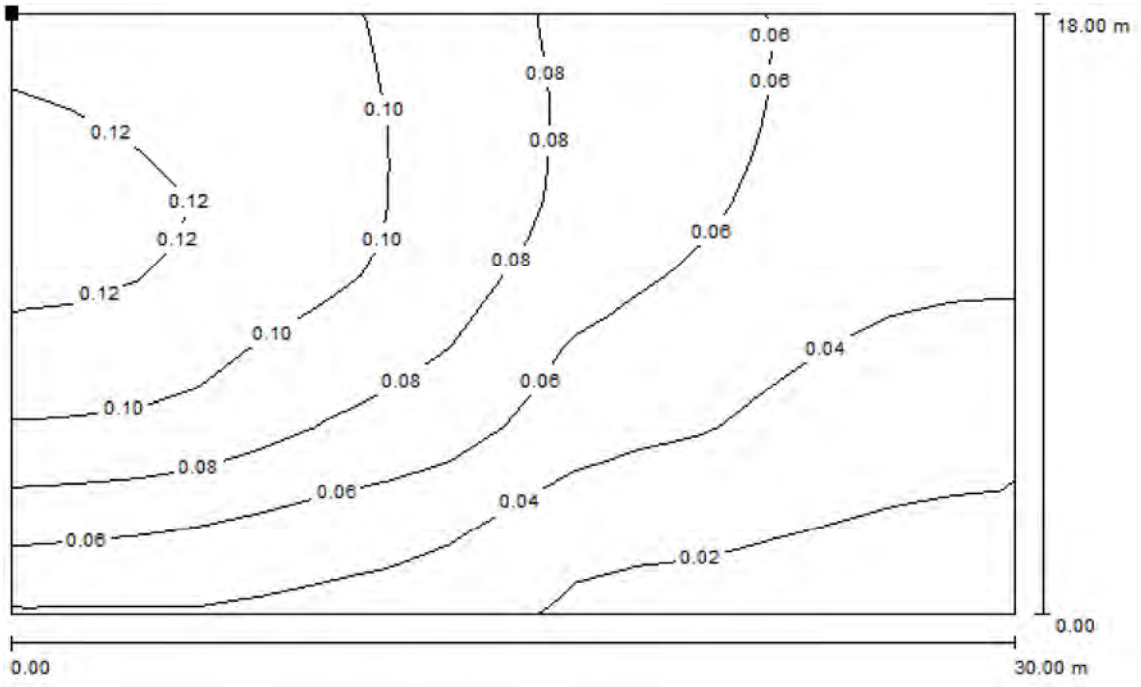
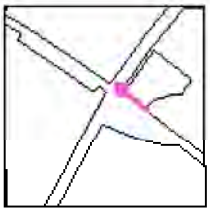
Calculation 1: Signage Lighting only. / Calculation Surface 4 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 215

Position of surface in external scene:
Marked point:
(142.540 m, 173.370 m, 18.010 m)



Grid: 16 x 16 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.07	0.01	0.13	0.184	0.098

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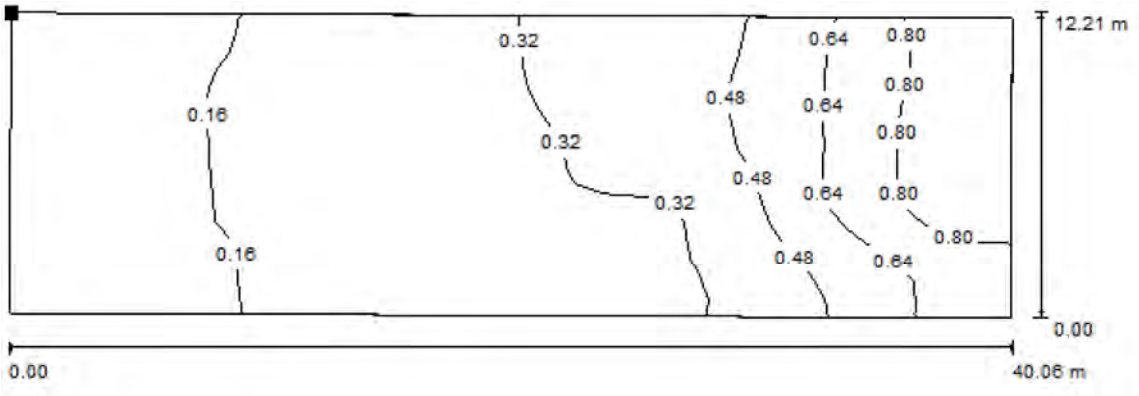
Calculation 1: Signage Lighting only. / Calculation Surface 5 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 287

Position of surface in external scene:
Marked point:
(91.386 m, 112.406 m, 12.105 m)

Grid: 32 x 16 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.36	0.13	0.92	0.379	0.147

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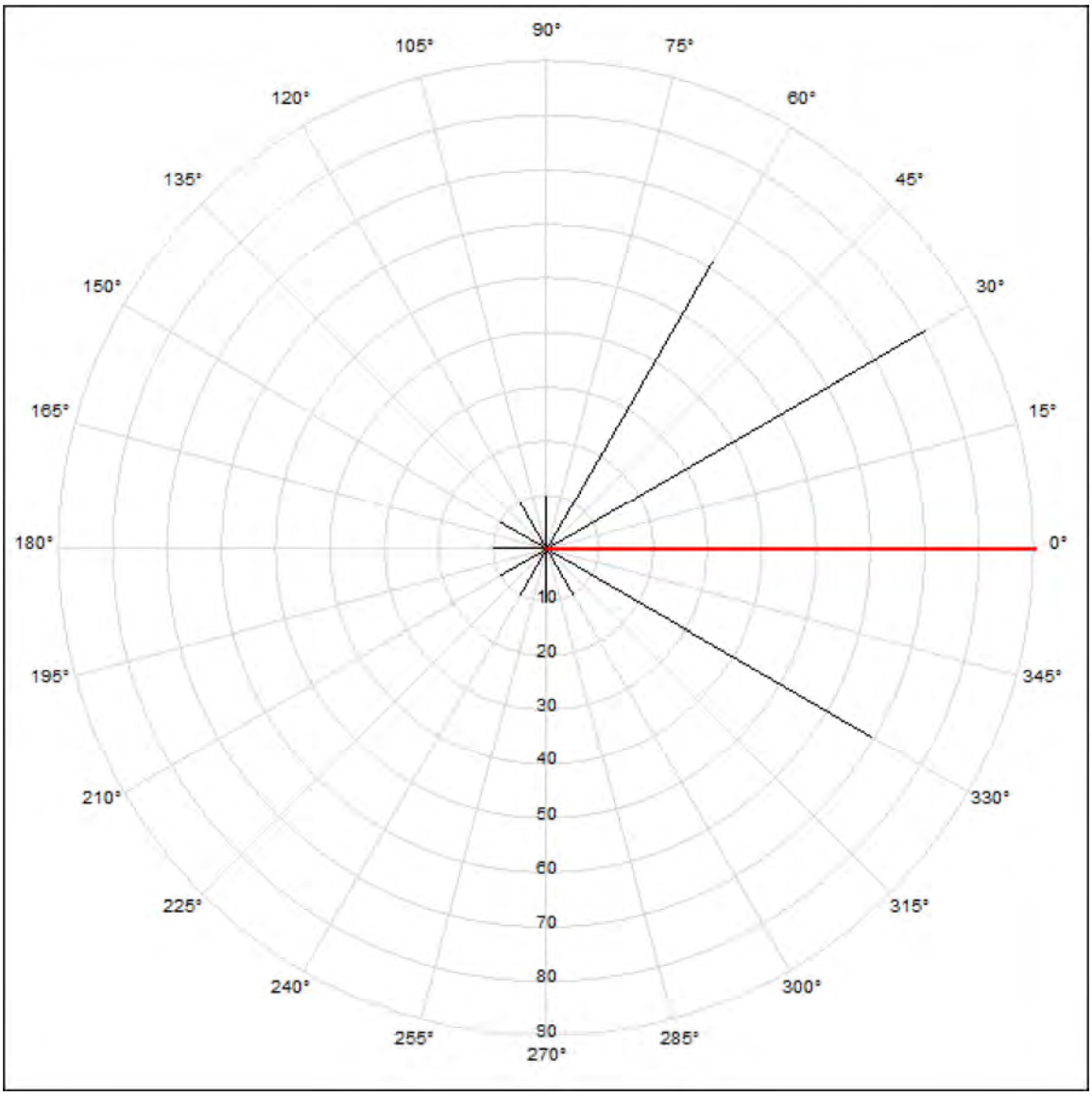
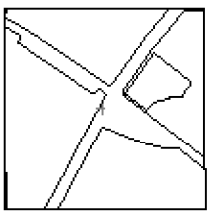
Calculation 1: Signage Lighting only. / GR Observer Oncoming Car / Summary



Position of observer in external scene:



Position: (123.459 m, 158.261 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Glare: Min: 61, Max: >90
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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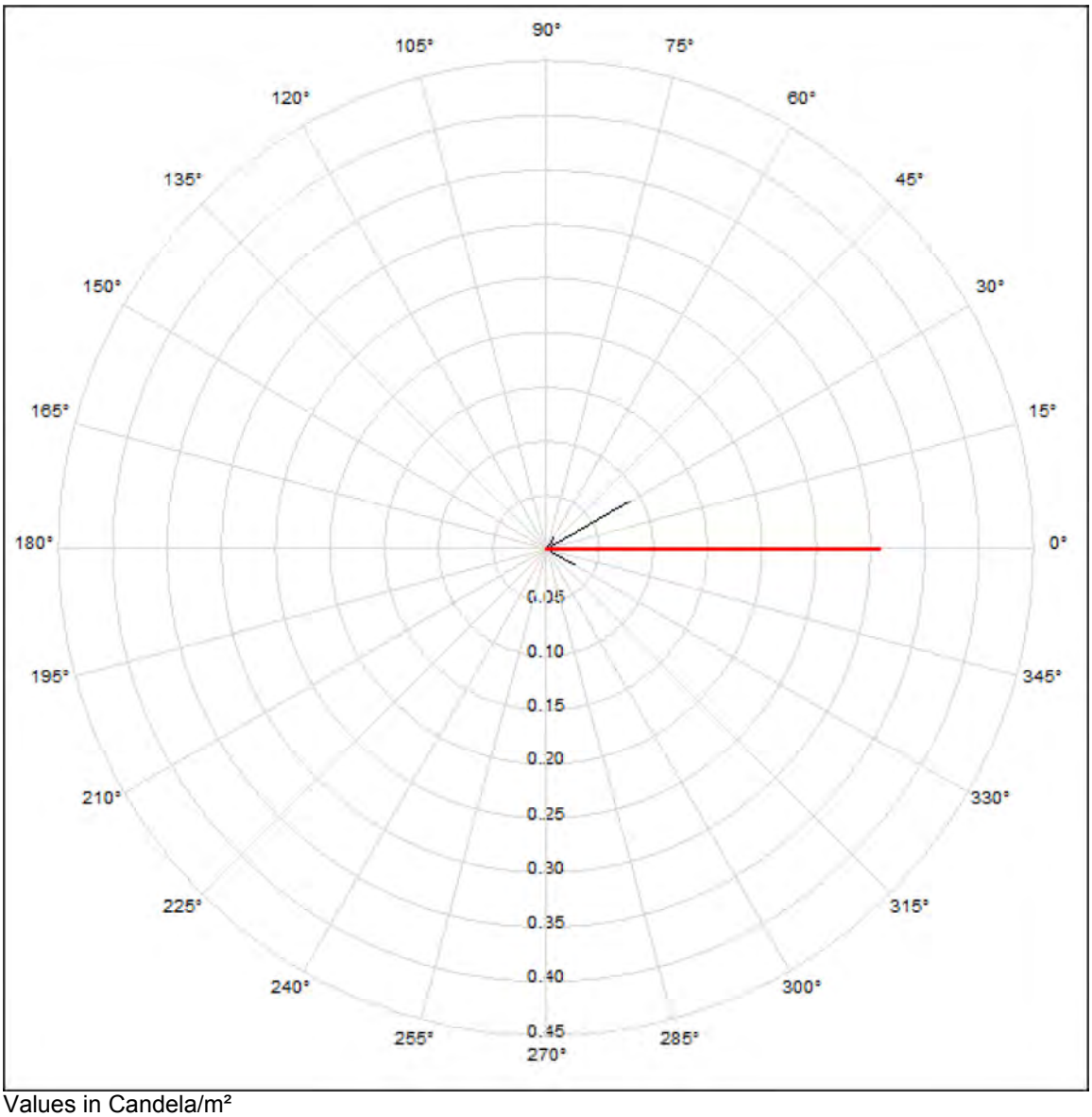
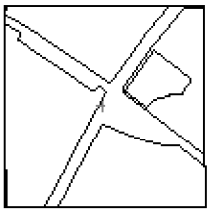
Calculation 1: Signage Lighting only. / GR Observer Oncoming Car / Veil Luminances



Values in Candela/m²

Position of observer in external scene:



Position: (123.459 m, 158.261 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Veil Luminance: Min: 0.00 cd/m², Max: 0.31 cd/m²
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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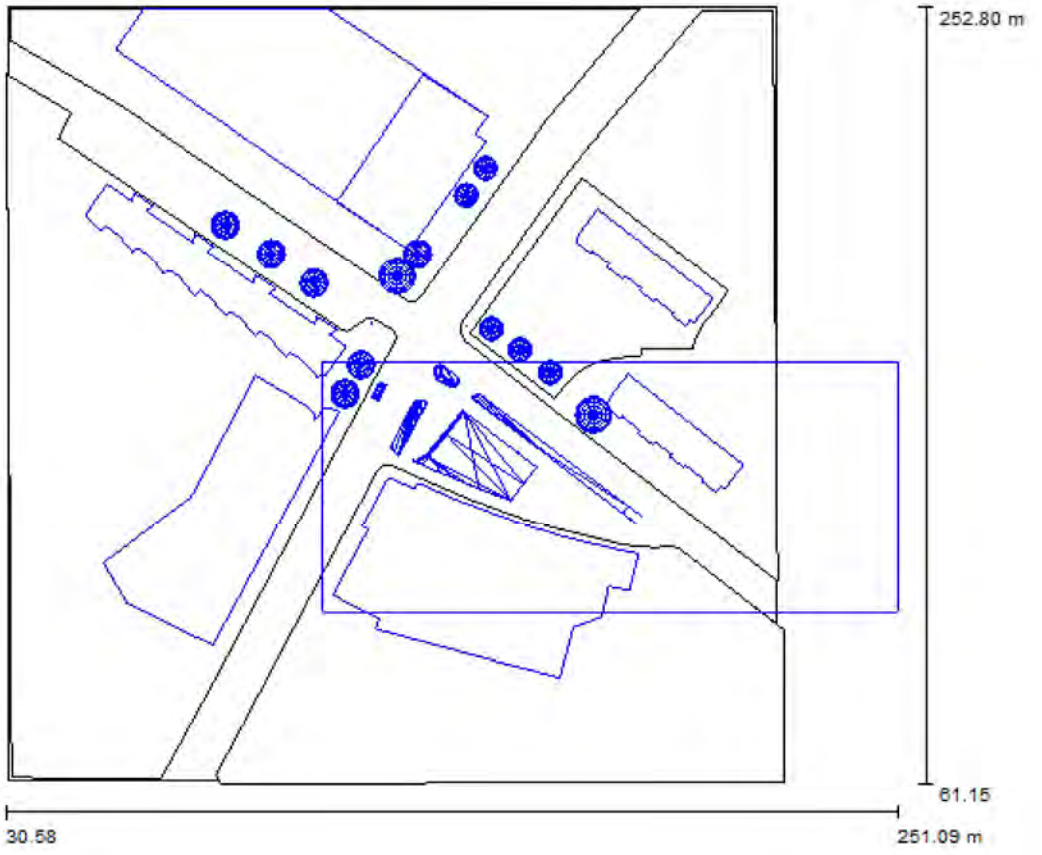
Calculation 2: Street Lighting only. / Planning data



Light loss factor: 0.80, ULR (Upward Light Ratio): 0.0%

Scale 1:1777

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Thorn 96259430 CIVIC 1 100W HIT 240V CL1 EFL PN/L [V4L4] (1.000)	6151	8800	117.0
			Total: 18454	Total: 26400	351.0

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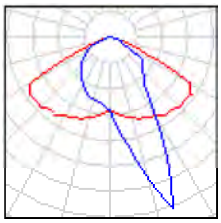
Calculation 2: Street Lighting only. / Luminaire parts list

3 Pieces Thorn 96259430 CIVIC 1 100W HIT 240V CL1 EFL PN/L [V4L4]
Article No.: 96259430
Luminous flux (Luminaire): 6151 lm
Luminous flux (Lamps): 8800 lm
Luminaire Wattage: 117.0 W
Luminaire classification according to CIE: 100
CIE flux code: 45 84 100 97 70
Fitting: 1 x MT 100 W (Correction Factor 1.000).



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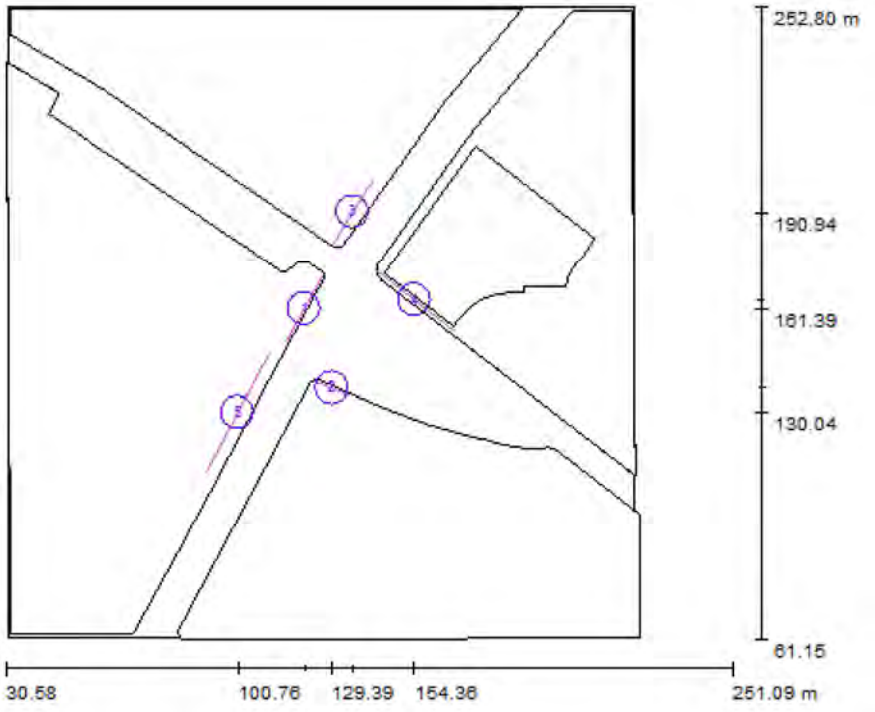
Calculation 2: Street Lighting only. / Calculation surfaces (results overview)



Scale 1 : 2181

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	perpendicular	64 x 64	1.31	0.37	3.53	0.281	0.104
2	Calculation Surface 2	perpendicular	64 x 64	1.30	0.15	4.32	0.115	0.035
3	Calculation Surface 3	perpendicular	64 x 64	0.82	0.23	2.57	0.283	0.090
4	Calculation Surface 4	perpendicular	128 x 128	0.52	0.08	5.12	0.147	0.015
5	Calculation Surface 5	perpendicular	128 x 64	0.17	0.02	1.02	0.093	0.016

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E_{min} / E_{max}
perpendicular	5	0.72	0.02	5.12	0.02	0.00

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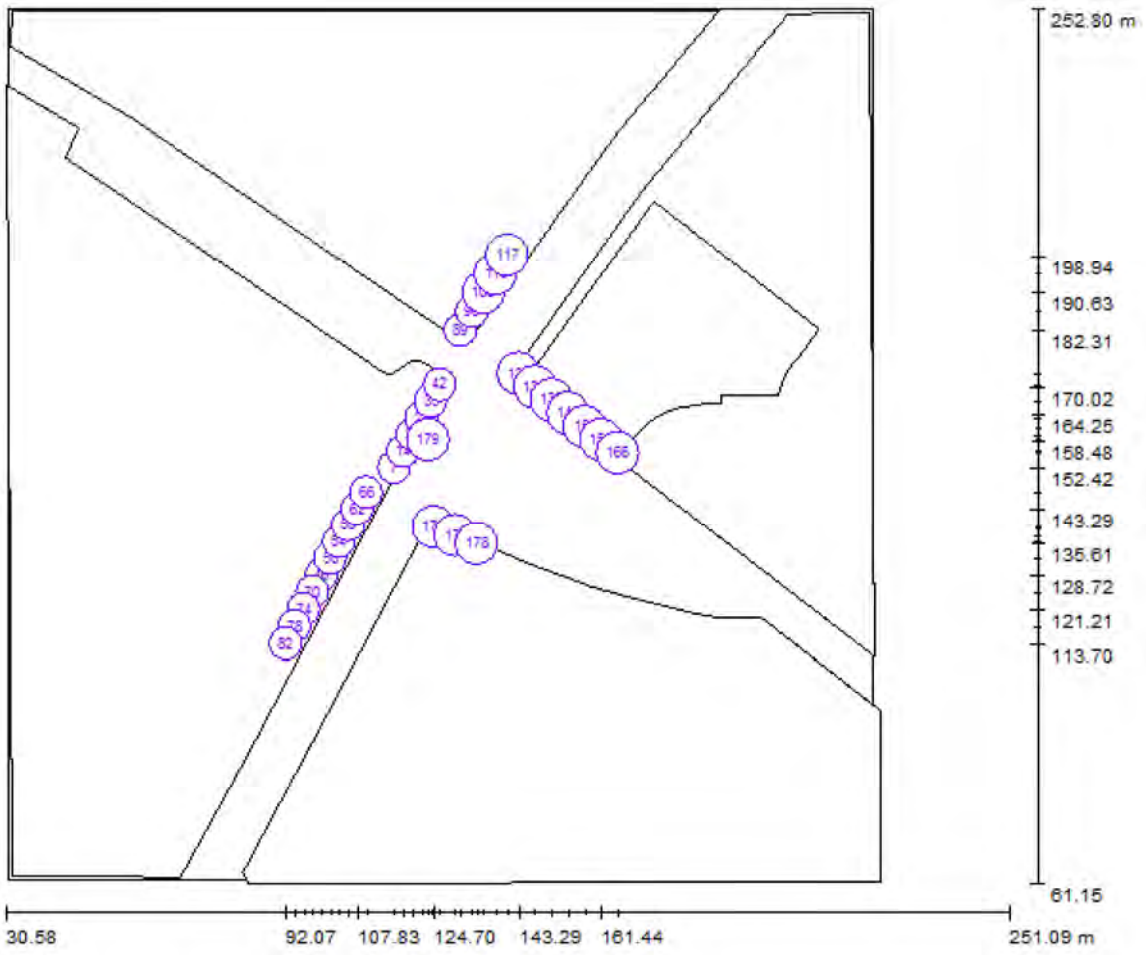
Calculation 2: Street Lighting only. / GR Observer (Results Overview)



Scale 1 : 1577

GR Observerlist

No.	Designation	Position [m] X	Y	Z	Viewing sector [°] Start	End	Increment	Slope angle	Max
1	GR Observer 1	115.937	152.418	1.500	0.0	360.0	30.0	-2.0	49 2)
2	GR Observer 2	115.937	152.418	4.200	0.0	360.0	30.0	-2.0	49 2)
3	GR Observer 3	115.937	152.418	6.900	0.0	360.0	30.0	-2.0	52 2)
4	GR Observer 4	115.937	152.418	9.600	0.0	360.0	30.0	-2.0	15 2)

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Calculation 2: Street Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
5	GR Observer 5	115.937	152.418	12.300	0.0	360.0	30.0	-2.0	<10 2)
6	GR Observer 6	115.937	152.418	14.800	0.0	360.0	30.0	-2.0	<10 2)
7	GR Observer 7	115.937	152.418	17.300	0.0	360.0	30.0	-2.0	<10 2)
8	GR Observer 8	117.946	156.035	1.500	0.0	360.0	30.0	-2.0	51 2)
9	GR Observer 9	117.946	156.035	4.200	0.0	360.0	30.0	-2.0	44 2)
10	GR Observer 10	117.946	156.035	6.900	0.0	360.0	30.0	-2.0	42 2)
11	GR Observer 11	117.946	156.035	9.600	0.0	360.0	30.0	-2.0	15 2)
12	GR Observer 12	117.946	156.035	12.300	0.0	360.0	30.0	-2.0	<10 2)
13	GR Observer 13	117.946	156.035	14.800	0.0	360.0	30.0	-2.0	<10 2)
14	GR Observer 14	117.946	156.035	17.300	0.0	360.0	30.0	-2.0	<10 2)
15	GR Observer 15	119.954	159.652	1.500	0.0	360.0	30.0	-2.0	49 2)
16	GR Observer 16	119.954	159.652	4.200	0.0	360.0	30.0	-2.0	47 2)
17	GR Observer 17	119.954	159.652	6.900	0.0	360.0	30.0	-2.0	45 2)
18	GR Observer 18	119.954	159.652	9.600	0.0	360.0	30.0	-2.0	25 2)
19	GR Observer 19	119.954	159.652	12.300	0.0	360.0	30.0	-2.0	<10 2)
20	GR Observer 20	119.954	159.652	14.800	0.0	360.0	30.0	-2.0	<10 2)
21	GR Observer 21	119.954	159.652	17.300	0.0	360.0	30.0	-2.0	<10 2)
22	GR Observer 22	121.963	163.270	1.500	0.0	360.0	30.0	-2.0	51 2)
23	GR Observer 23	121.963	163.270	4.200	0.0	360.0	30.0	-2.0	50 2)
24	GR Observer 24	121.963	163.270	6.900	0.0	360.0	30.0	-2.0	50 2)
25	GR Observer 25	121.963	163.270	9.600	0.0	360.0	30.0	-2.0	31 2)
26	GR Observer 26	121.963	163.270	12.300	0.0	360.0	30.0	-2.0	<10 2)
27	GR Observer 27	121.963	163.270	14.800	0.0	360.0	30.0	-2.0	<10 2)
28	GR Observer 28	121.963	163.270	17.300	0.0	360.0	30.0	-2.0	<10 2)
29	GR Observer 29	123.971	166.887	1.500	0.0	360.0	30.0	-2.0	46 2)
30	GR Observer 30	123.971	166.887	4.200	0.0	360.0	30.0	-2.0	51 2)
31	GR Observer 31	123.971	166.887	6.900	0.0	360.0	30.0	-2.0	59 2)
32	GR Observer 32	123.971	166.887	9.600	0.0	360.0	30.0	-2.0	43 2)
33	GR Observer 33	123.971	166.887	12.300	0.0	360.0	30.0	-2.0	<10 2)
34	GR Observer 34	123.971	166.887	14.800	0.0	360.0	30.0	-2.0	<10 2)
35	GR Observer 35	123.971	166.887	17.300	0.0	360.0	30.0	-2.0	<10 2)
36	GR Observer 36	125.980	170.504	1.500	0.0	360.0	30.0	-2.0	44 2)
37	GR Observer 37	125.980	170.504	4.200	0.0	360.0	30.0	-2.0	50 2)
38	GR Observer 38	125.980	170.504	6.900	0.0	360.0	30.0	-2.0	62 2)
39	GR Observer 39	125.980	170.504	9.600	0.0	360.0	30.0	-2.0	57 2)
40	GR Observer 40	125.980	170.504	12.300	0.0	360.0	30.0	-2.0	<10 2)

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Calculation 2: Street Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
41	GR Observer 41	125.980	170.504	14.800	0.0	360.0	30.0	-2.0	<10 2)
42	GR Observer 42	125.980	170.504	17.300	0.0	360.0	30.0	-2.0	<10 2)
43	GR Observer 1	100.034	128.716	1.500	0.0	360.0	30.0	-2.0	40 2)
44	GR Observer 2	100.034	128.716	4.200	0.0	360.0	30.0	-2.0	31 2)
45	GR Observer 3	100.034	128.716	6.900	0.0	360.0	30.0	-2.0	12 2)
46	GR Observer 4	100.034	128.716	9.600	0.0	360.0	30.0	-2.0	<10 2)
47	GR Observer 8	101.855	132.357	1.500	0.0	360.0	30.0	-2.0	42 2)
48	GR Observer 9	101.855	132.357	4.200	0.0	360.0	30.0	-2.0	34 2)
49	GR Observer 10	101.855	132.357	6.900	0.0	360.0	30.0	-2.0	18 2)
50	GR Observer 11	101.855	132.357	9.600	0.0	360.0	30.0	-2.0	<10 2)
51	GR Observer 15	103.813	136.051	1.500	0.0	360.0	30.0	-2.0	42 2)
52	GR Observer 16	103.813	136.051	4.200	0.0	360.0	30.0	-2.0	34 2)
53	GR Observer 17	103.813	136.051	6.900	0.0	360.0	30.0	-2.0	23 2)
54	GR Observer 18	103.813	136.051	9.600	0.0	360.0	30.0	-2.0	<10 2)
55	GR Observer 22	105.821	139.669	1.500	0.0	360.0	30.0	-2.0	44 2)
56	GR Observer 23	105.821	139.669	4.200	0.0	360.0	30.0	-2.0	32 2)
57	GR Observer 24	105.821	139.669	6.900	0.0	360.0	30.0	-2.0	22 2)
58	GR Observer 25	105.821	139.669	9.600	0.0	360.0	30.0	-2.0	<10 2)
59	GR Observer 29	107.830	143.286	1.500	0.0	360.0	30.0	-2.0	45 2)
60	GR Observer 30	107.830	143.286	4.200	0.0	360.0	30.0	-2.0	34 2)
61	GR Observer 31	107.830	143.286	6.900	0.0	360.0	30.0	-2.0	21 2)
62	GR Observer 32	107.830	143.286	9.600	0.0	360.0	30.0	-2.0	<10 2)
63	GR Observer 36	109.839	146.903	1.500	0.0	360.0	30.0	-2.0	46 2)
64	GR Observer 37	109.839	146.903	4.200	0.0	360.0	30.0	-2.0	40 2)
65	GR Observer 38	109.839	146.903	6.900	0.0	360.0	30.0	-2.0	19 2)
66	GR Observer 39	109.839	146.903	9.600	0.0	360.0	30.0	-2.0	<10 2)
67	GR Observer 1	98.043	124.961	1.500	0.0	360.0	30.0	-2.0	36 2)
68	GR Observer 2	98.043	124.961	4.200	0.0	360.0	30.0	-2.0	25 2)
69	GR Observer 3	98.043	124.961	6.900	0.0	360.0	30.0	-2.0	<10 2)
70	GR Observer 4	98.043	124.961	9.600	0.0	360.0	30.0	-2.0	<10 2)
71	GR Observer 1	96.052	121.206	1.500	0.0	360.0	30.0	-2.0	31 2)
72	GR Observer 2	96.052	121.206	4.200	0.0	360.0	30.0	-2.0	21 2)
73	GR Observer 3	96.052	121.206	6.900	0.0	360.0	30.0	-2.0	<10 2)
74	GR Observer 4	96.052	121.206	9.600	0.0	360.0	30.0	-2.0	<10 2)
75	GR Observer 1	94.060	117.451	1.500	0.0	360.0	30.0	-2.0	26 2)
76	GR Observer 2	94.060	117.451	4.200	0.0	360.0	30.0	-2.0	15 2)

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Calculation 2: Street Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
77	GR Observer 3	94.060	117.451	6.900	0.0	360.0	30.0	-2.0	<10 2)
78	GR Observer 4	94.060	117.451	9.600	0.0	360.0	30.0	-2.0	<10 2)
79	GR Observer 1	92.069	113.696	1.500	0.0	360.0	30.0	-2.0	20 2)
80	GR Observer 2	92.069	113.696	4.200	0.0	360.0	30.0	-2.0	<10 2)
81	GR Observer 3	92.069	113.696	6.900	0.0	360.0	30.0	-2.0	<10 2)
82	GR Observer 4	92.069	113.696	9.600	0.0	360.0	30.0	-2.0	<10 2)
83	GR Observer 36	130.483	182.309	1.500	0.0	360.0	30.0	-2.0	46 2)
84	GR Observer 37	130.483	182.309	4.200	0.0	360.0	30.0	-2.0	47 2)
85	GR Observer 38	130.483	182.309	6.900	0.0	360.0	30.0	-2.0	46 2)
86	GR Observer 39	130.483	182.309	9.600	0.0	360.0	30.0	-2.0	29 2)
87	GR Observer 40	130.483	182.309	12.300	0.0	360.0	30.0	-2.0	<10 2)
88	GR Observer 41	130.483	182.309	14.800	0.0	360.0	30.0	-2.0	<10 2)
89	GR Observer 42	130.483	182.309	17.300	0.0	360.0	30.0	-2.0	<10 2)
90	GR Observer 36	133.054	186.467	1.500	0.0	360.0	30.0	-2.0	49 2)
91	GR Observer 37	133.054	186.467	4.200	0.0	360.0	30.0	-2.0	43 2)
92	GR Observer 38	133.054	186.467	6.900	0.0	360.0	30.0	-2.0	42 2)
93	GR Observer 39	133.054	186.467	9.600	0.0	360.0	30.0	-2.0	<10 2)
94	GR Observer 40	133.054	186.467	12.300	0.0	360.0	30.0	-2.0	<10 2)
95	GR Observer 41	133.054	186.467	14.800	0.0	360.0	30.0	-2.0	<10 2)
96	GR Observer 42	133.054	186.467	17.300	0.0	360.0	30.0	-2.0	<10 2)
97	GR Observer 36	135.626	190.625	1.500	0.0	360.0	30.0	-2.0	49 2)
98	GR Observer 37	135.626	190.625	4.200	0.0	360.0	30.0	-2.0	49 2)
99	GR Observer 38	135.626	190.625	6.900	0.0	360.0	30.0	-2.0	43 2)
100	GR Observer 39	135.626	190.625	9.600	0.0	360.0	30.0	-2.0	<10 2)
101	GR Observer 40	135.626	190.625	12.300	0.0	360.0	30.0	-2.0	<10 2)
102	GR Observer 41	135.626	190.625	14.800	0.0	360.0	30.0	-2.0	<10 2)
103	GR Observer 42	135.626	190.625	17.300	0.0	360.0	30.0	-2.0	<10 2)
104	GR Observer 36	138.197	194.783	1.500	0.0	360.0	30.0	-2.0	49 2)
105	GR Observer 37	138.197	194.783	4.200	0.0	360.0	30.0	-2.0	45 2)
106	GR Observer 38	138.197	194.783	6.900	0.0	360.0	30.0	-2.0	25 2)
107	GR Observer 39	138.197	194.783	9.600	0.0	360.0	30.0	-2.0	<10 2)
108	GR Observer 40	138.197	194.783	12.300	0.0	360.0	30.0	-2.0	<10 2)
109	GR Observer 41	138.197	194.783	14.800	0.0	360.0	30.0	-2.0	<10 2)
110	GR Observer 42	138.197	194.783	17.300	0.0	360.0	30.0	-2.0	<10 2)
111	GR Observer 36	140.768	198.941	1.500	0.0	360.0	30.0	-2.0	51 2)
112	GR Observer 37	140.768	198.941	4.200	0.0	360.0	30.0	-2.0	40 2)

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Calculation 2: Street Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
113	GR Observer 38	140.768	198.941	6.900	0.0	360.0	30.0	-2.0	28 2)
114	GR Observer 39	140.768	198.941	9.600	0.0	360.0	30.0	-2.0	<10 2)
115	GR Observer 40	140.768	198.941	12.300	0.0	360.0	30.0	-2.0	<10 2)
116	GR Observer 41	140.768	198.941	14.800	0.0	360.0	30.0	-2.0	<10 2)
117	GR Observer 42	140.768	198.941	17.300	0.0	360.0	30.0	-2.0	<10 2)
118	GR Observer 36	143.290	172.909	1.500	0.0	360.0	30.0	-2.0	56 2)
119	GR Observer 37	143.290	172.909	4.200	0.0	360.0	30.0	-2.0	51 2)
120	GR Observer 38	143.290	172.909	6.900	0.0	360.0	30.0	-2.0	39 2)
121	GR Observer 39	143.290	172.909	9.600	0.0	360.0	30.0	-2.0	73 2)
122	GR Observer 40	143.290	172.909	12.300	0.0	360.0	30.0	-2.0	<10 2)
123	GR Observer 41	143.290	172.909	14.800	0.0	360.0	30.0	-2.0	<10 2)
124	GR Observer 42	143.290	172.909	17.300	0.0	360.0	30.0	-2.0	<10 2)
125	GR Observer 36	146.921	170.024	1.500	0.0	360.0	30.0	-2.0	55 2)
126	GR Observer 37	146.921	170.024	4.200	0.0	360.0	30.0	-2.0	50 2)
127	GR Observer 38	146.921	170.024	6.900	0.0	360.0	30.0	-2.0	57 2)
128	GR Observer 39	146.921	170.024	9.600	0.0	360.0	30.0	-2.0	66 2)
129	GR Observer 40	146.921	170.024	12.300	0.0	360.0	30.0	-2.0	<10 2)
130	GR Observer 41	146.921	170.024	14.800	0.0	360.0	30.0	-2.0	<10 2)
131	GR Observer 42	146.921	170.024	17.300	0.0	360.0	30.0	-2.0	<10 2)
132	GR Observer 36	150.551	167.139	1.500	0.0	360.0	30.0	-2.0	52 2)
133	GR Observer 37	150.551	167.139	4.200	0.0	360.0	30.0	-2.0	51 2)
134	GR Observer 38	150.551	167.139	6.900	0.0	360.0	30.0	-2.0	52 2)
135	GR Observer 39	150.551	167.139	9.600	0.0	360.0	30.0	-2.0	37 2)
136	GR Observer 40	150.551	167.139	12.300	0.0	360.0	30.0	-2.0	<10 2)
137	GR Observer 41	150.551	167.139	14.800	0.0	360.0	30.0	-2.0	<10 2)
138	GR Observer 42	150.551	167.139	17.300	0.0	360.0	30.0	-2.0	<10 2)
139	GR Observer 36	154.182	164.255	1.500	0.0	360.0	30.0	-2.0	50 2)
140	GR Observer 37	154.182	164.255	4.200	0.0	360.0	30.0	-2.0	48 2)
141	GR Observer 38	154.182	164.255	6.900	0.0	360.0	30.0	-2.0	39 2)
142	GR Observer 39	154.182	164.255	9.600	0.0	360.0	30.0	-2.0	20 2)
143	GR Observer 40	154.182	164.255	12.300	0.0	360.0	30.0	-2.0	<10 2)
144	GR Observer 41	154.182	164.255	14.800	0.0	360.0	30.0	-2.0	<10 2)
145	GR Observer 42	154.182	164.255	17.300	0.0	360.0	30.0	-2.0	<10 2)
146	GR Observer 36	157.813	161.370	1.500	0.0	360.0	30.0	-2.0	46 2)
147	GR Observer 37	157.813	161.370	4.200	0.0	360.0	30.0	-2.0	43 2)
148	GR Observer 38	157.813	161.370	6.900	0.0	360.0	30.0	-2.0	30 2)

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Calculation 2: Street Lighting only. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
149	GR Observer 39	157.813	161.370	9.600	0.0	360.0	30.0	-2.0	12 2)
150	GR Observer 40	157.813	161.370	12.300	0.0	360.0	30.0	-2.0	<10 2)
151	GR Observer 41	157.813	161.370	14.800	0.0	360.0	30.0	-2.0	<10 2)
152	GR Observer 42	157.813	161.370	17.300	0.0	360.0	30.0	-2.0	<10 2)
153	GR Observer 36	161.443	158.485	1.500	0.0	360.0	30.0	-2.0	43 2)
154	GR Observer 37	161.443	158.485	4.200	0.0	360.0	30.0	-2.0	35 2)
155	GR Observer 38	161.443	158.485	6.900	0.0	360.0	30.0	-2.0	24 2)
156	GR Observer 39	161.443	158.485	9.600	0.0	360.0	30.0	-2.0	<10 2)
157	GR Observer 40	161.443	158.485	12.300	0.0	360.0	30.0	-2.0	<10 2)
158	GR Observer 41	161.443	158.485	14.800	0.0	360.0	30.0	-2.0	<10 2)
159	GR Observer 42	161.443	158.485	17.300	0.0	360.0	30.0	-2.0	<10 2)
160	GR Observer 36	165.074	155.600	1.500	0.0	360.0	30.0	-2.0	36 2)
161	GR Observer 37	165.074	155.600	4.200	0.0	360.0	30.0	-2.0	30 2)
162	GR Observer 38	165.074	155.600	6.900	0.0	360.0	30.0	-2.0	18 2)
163	GR Observer 39	165.074	155.600	9.600	0.0	360.0	30.0	-2.0	<10 2)
164	GR Observer 40	165.074	155.600	12.300	0.0	360.0	30.0	-2.0	<10 2)
165	GR Observer 41	165.074	155.600	14.800	0.0	360.0	30.0	-2.0	<10 2)
166	GR Observer 42	165.074	155.600	17.300	0.0	360.0	30.0	-2.0	<10 2)
167	GR Observer 36	124.698	139.288	1.500	0.0	360.0	30.0	-2.0	51 2)
168	GR Observer 37	124.698	139.288	4.200	0.0	360.0	30.0	-2.0	53 2)
169	GR Observer 38	124.698	139.288	6.900	0.0	360.0	30.0	-2.0	48 2)
170	GR Observer 39	124.698	139.288	9.600	0.0	360.0	30.0	-2.0	38 2)
171	GR Observer 36	129.373	137.448	1.500	0.0	360.0	30.0	-2.0	47 2)
172	GR Observer 37	129.373	137.448	4.200	0.0	360.0	30.0	-2.0	48 2)
173	GR Observer 38	129.373	137.448	6.900	0.0	360.0	30.0	-2.0	38 2)
174	GR Observer 39	129.373	137.448	9.600	0.0	360.0	30.0	-2.0	26 2)
175	GR Observer 36	134.048	135.608	1.500	0.0	360.0	30.0	-2.0	<10 2)
176	GR Observer 37	134.048	135.608	4.200	0.0	360.0	30.0	-2.0	41 2)
177	GR Observer 38	134.048	135.608	6.900	0.0	360.0	30.0	-2.0	32 2)
178	GR Observer 39	134.048	135.608	9.600	0.0	360.0	30.0	-2.0	24 2)
179	GR Observer Oncoming Car	123.432	158.510	1.200	0.0	360.0	30.0	-2.0	57 2)

2) The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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Calculation 2: Street Lighting only. / 3D Rendering

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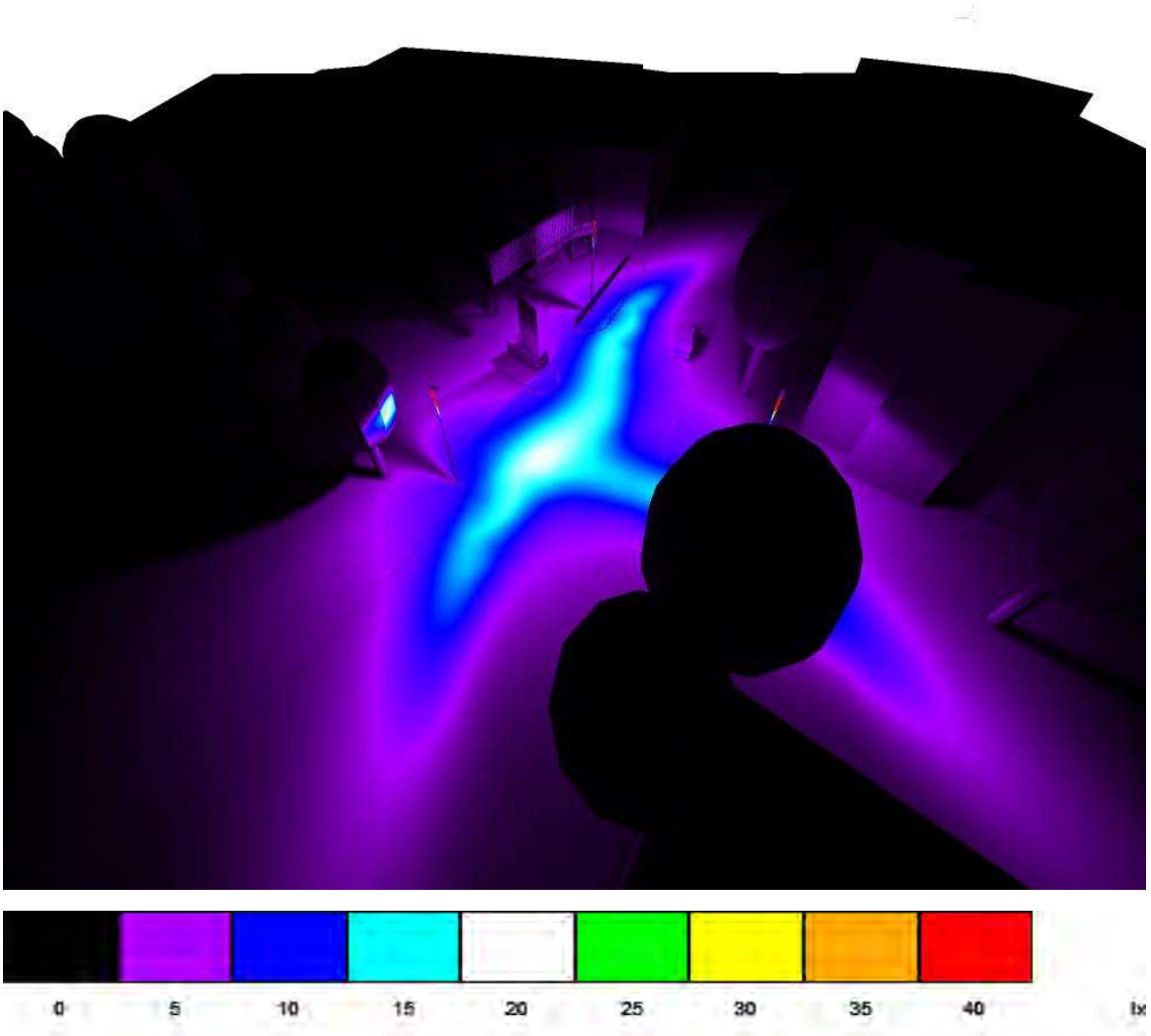
Calculation 2: Street Lighting only. / False Color Rendering



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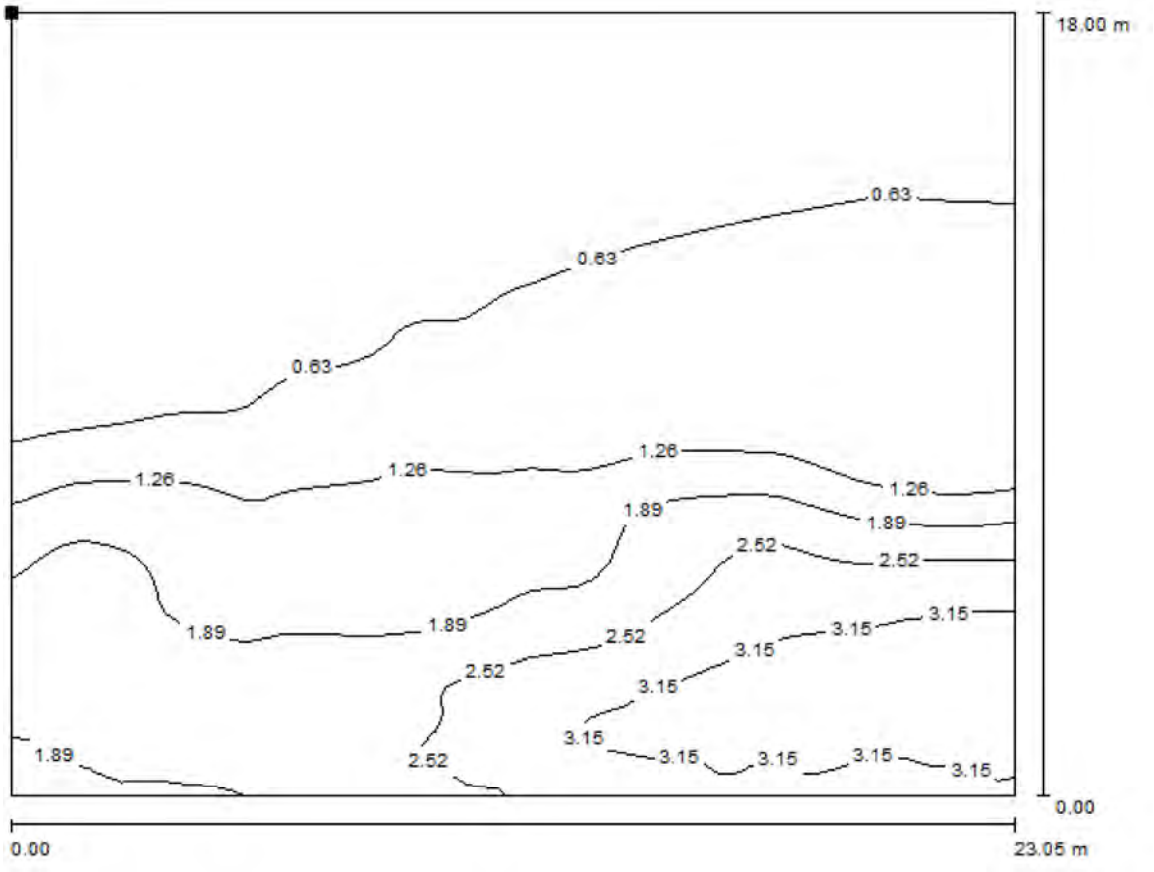
Calculation 2: Street Lighting only. / Calculation Surface 1 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(115.338 m, 151.311 m, 18.010 m)

Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1.31	0.37	3.53	0.281	0.104

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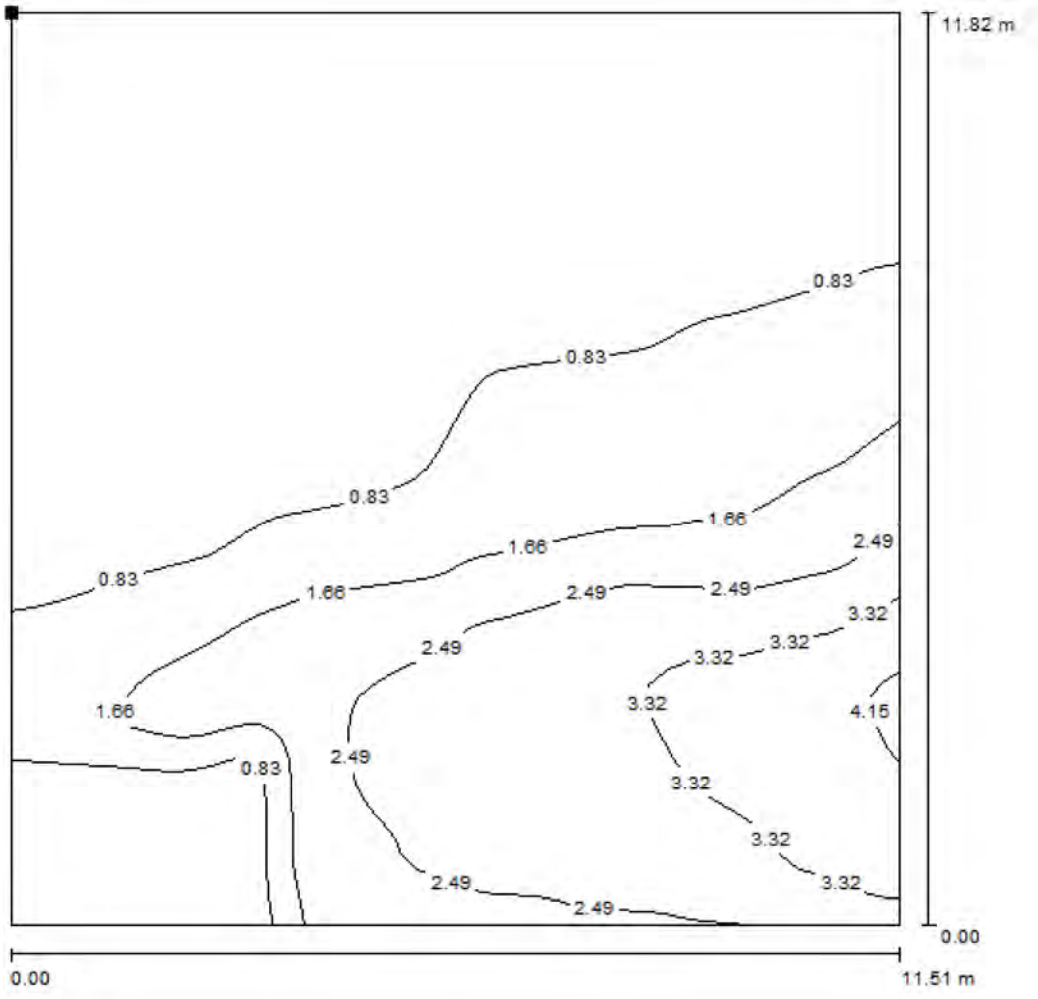
Calculation 2: Street Lighting only. / Calculation Surface 2 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 93

Position of surface in external scene:
Marked point:
(134.727 m, 135.259 m, 11.822 m)

Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1.30	0.15	4.32	0.115	0.035

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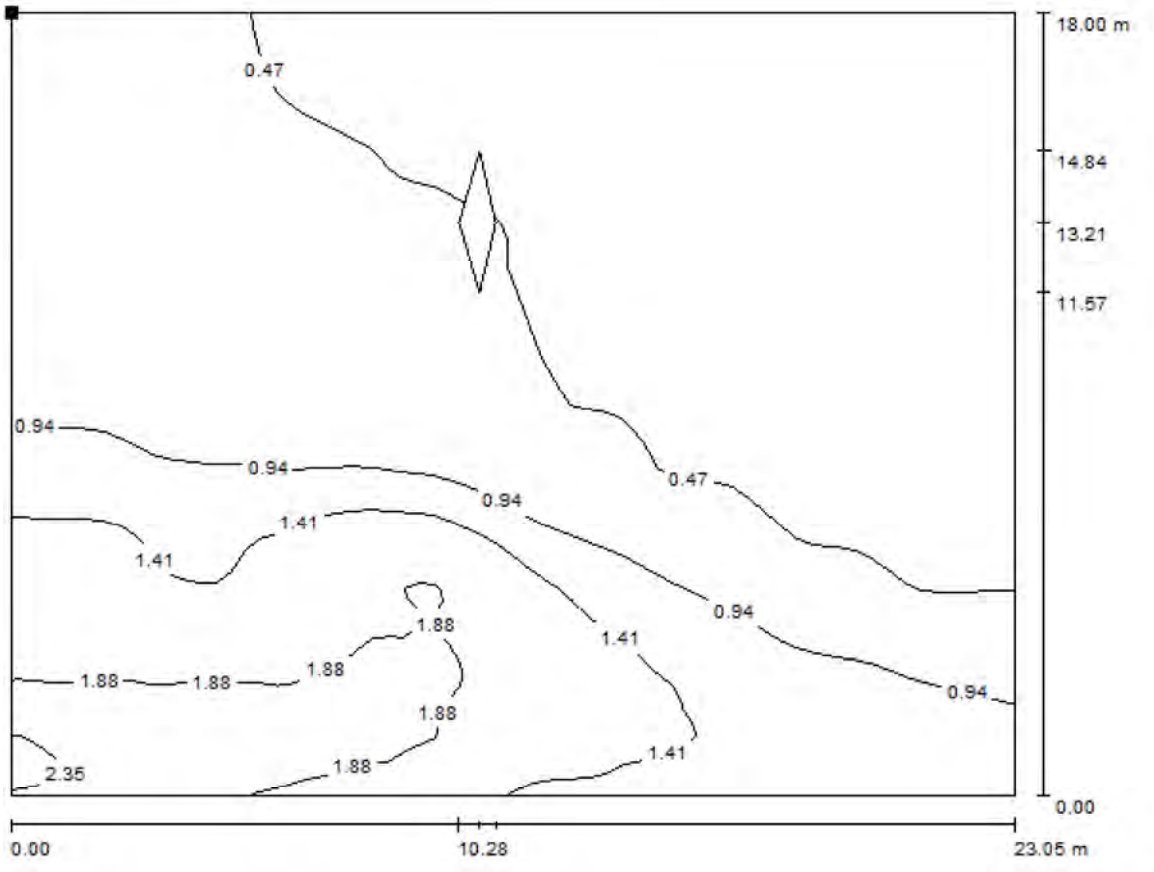
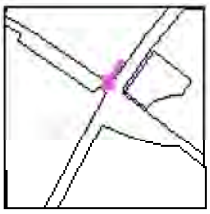
Calculation 2: Street Lighting only. / Calculation Surface 3 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(129.561 m, 181.166 m, 18.010 m)



Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.82	0.23	2.57	0.283	0.090

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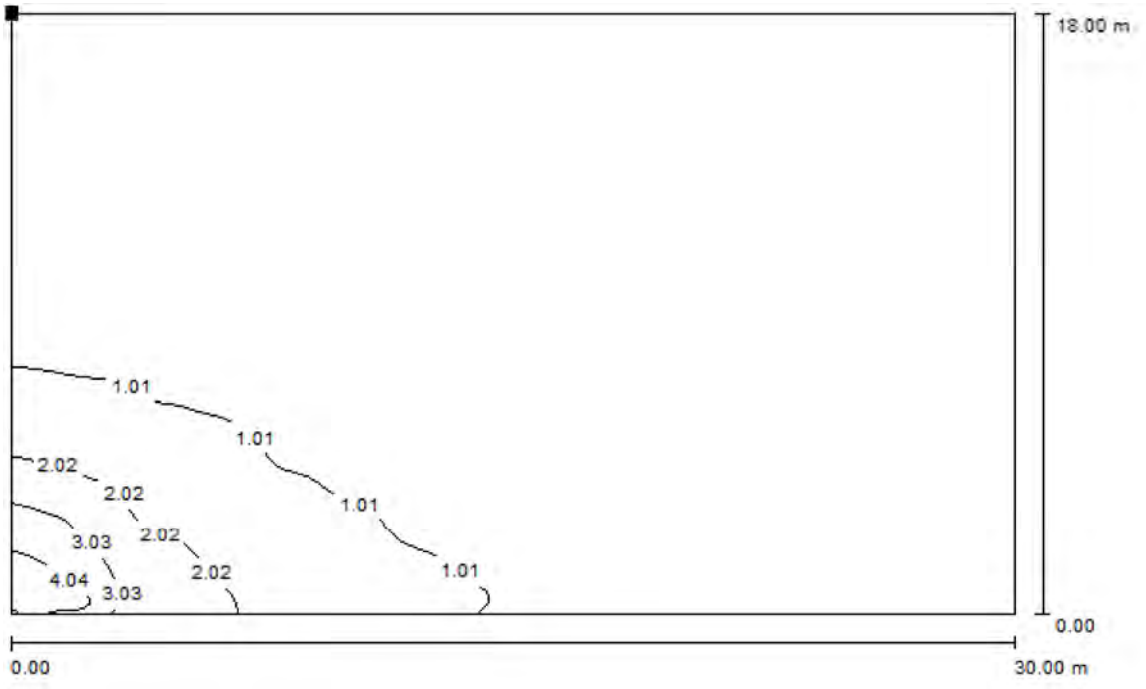
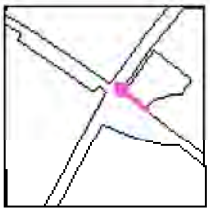
Calculation 2: Street Lighting only. / Calculation Surface 4 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 215

Position of surface in external scene:
Marked point:
(142.540 m, 173.370 m, 18.010 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.52	0.08	5.12	0.147	0.015

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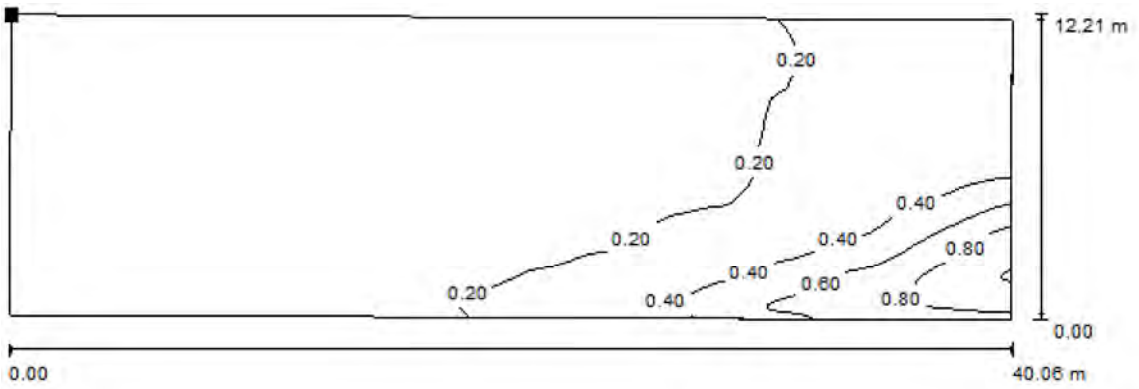
Calculation 2: Street Lighting only. / Calculation Surface 5 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 287

Position of surface in external scene:
Marked point:
(91.386 m, 112.406 m, 12.105 m)

Grid: 128 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.17	0.02	1.02	0.093	0.016

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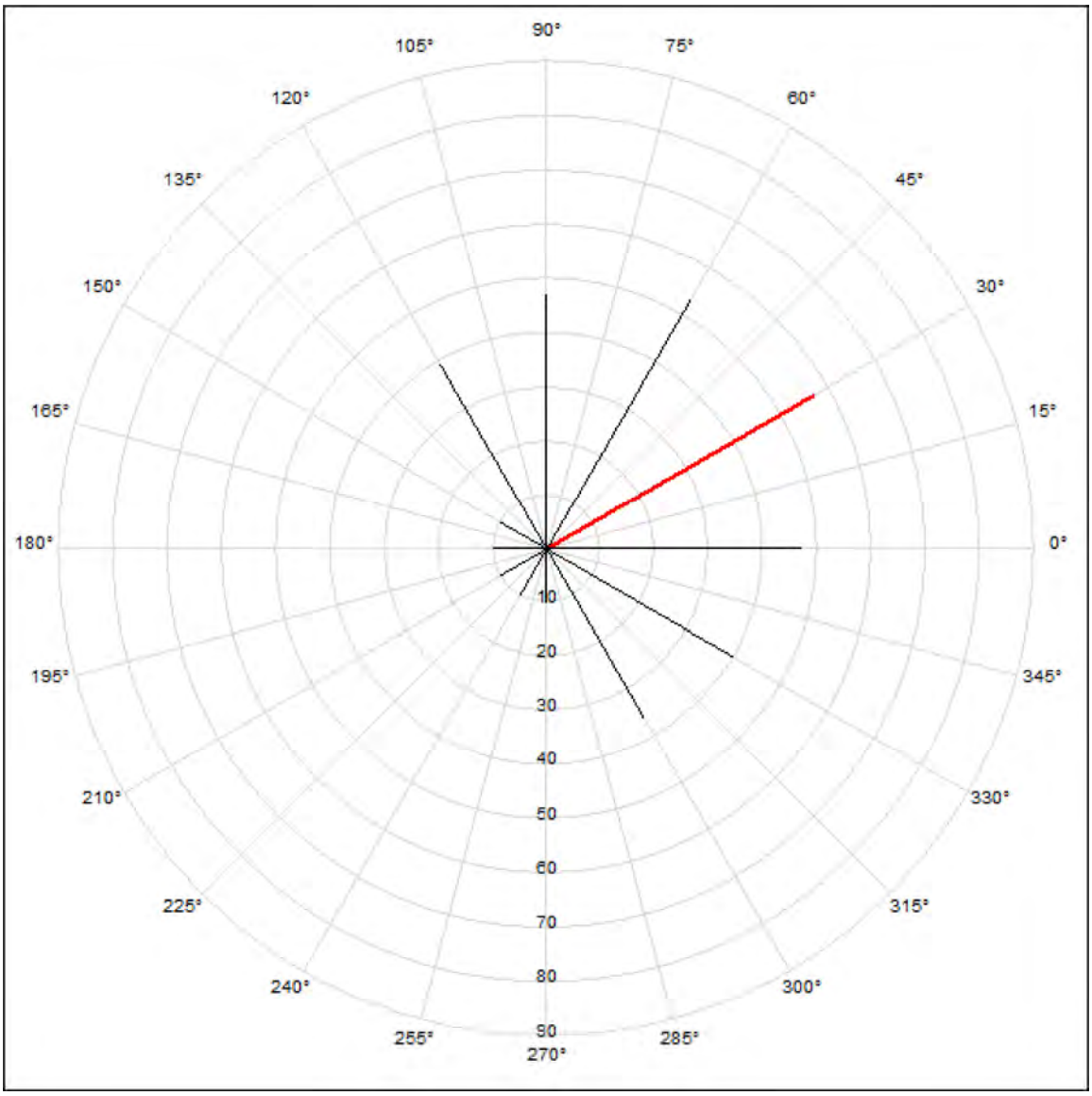
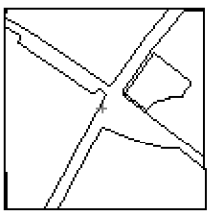
Calculation 2: Street Lighting only. / GR Observer Oncoming Car / Summary



Position of observer in external scene:



Position: (123.432 m, 158.510 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Glare: Min: 36, Max: 57
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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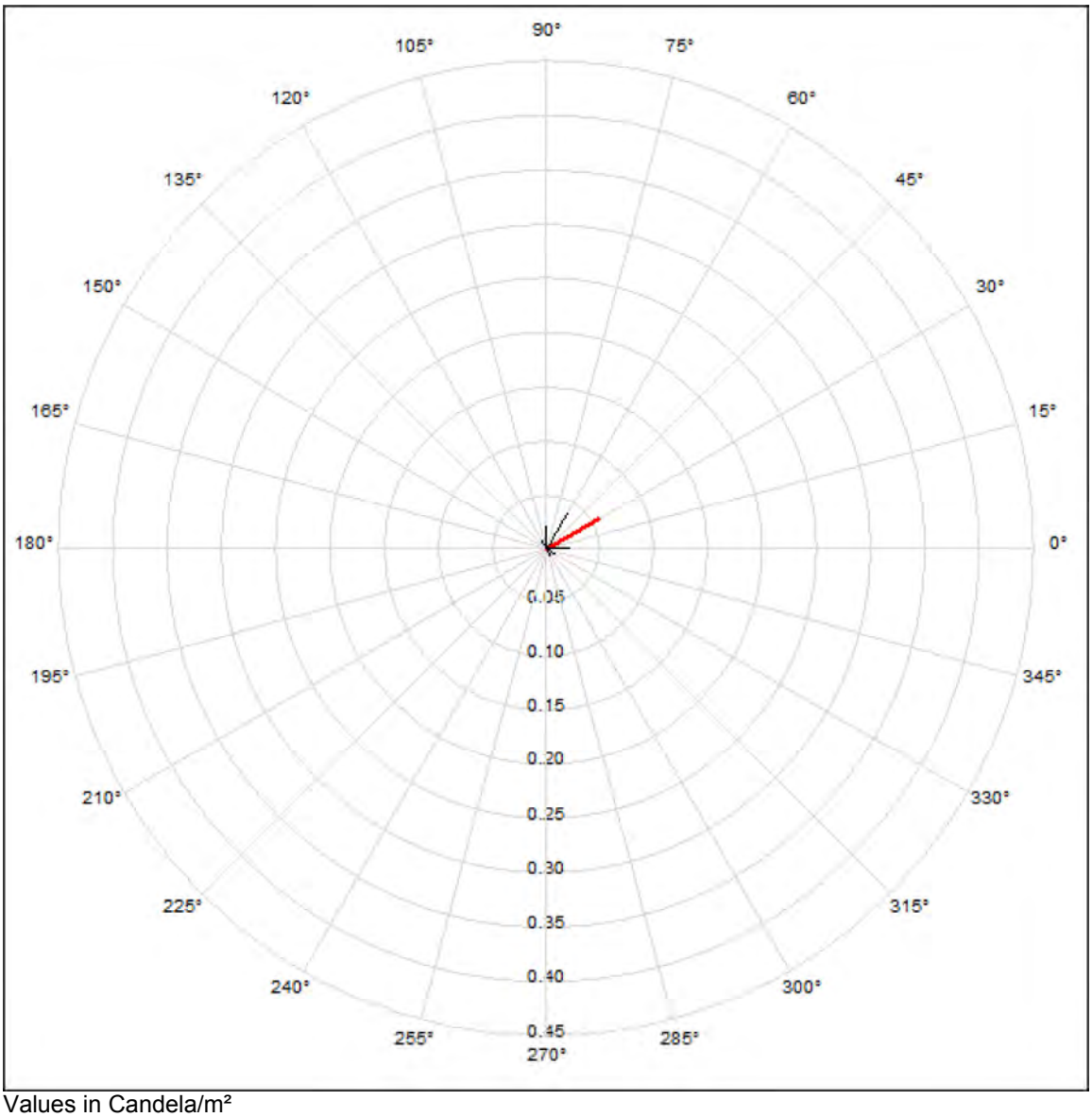
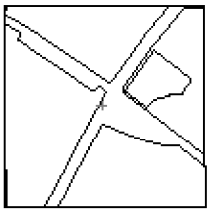
Calculation 2: Street Lighting only. / GR Observer Oncoming Car / Veil Luminances



Values in Candela/m²

Position of observer in external scene:



Position: (123.432 m, 158.510 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Veil Luminance: Min: 0.00 cd/m², Max: 0.06 cd/m²
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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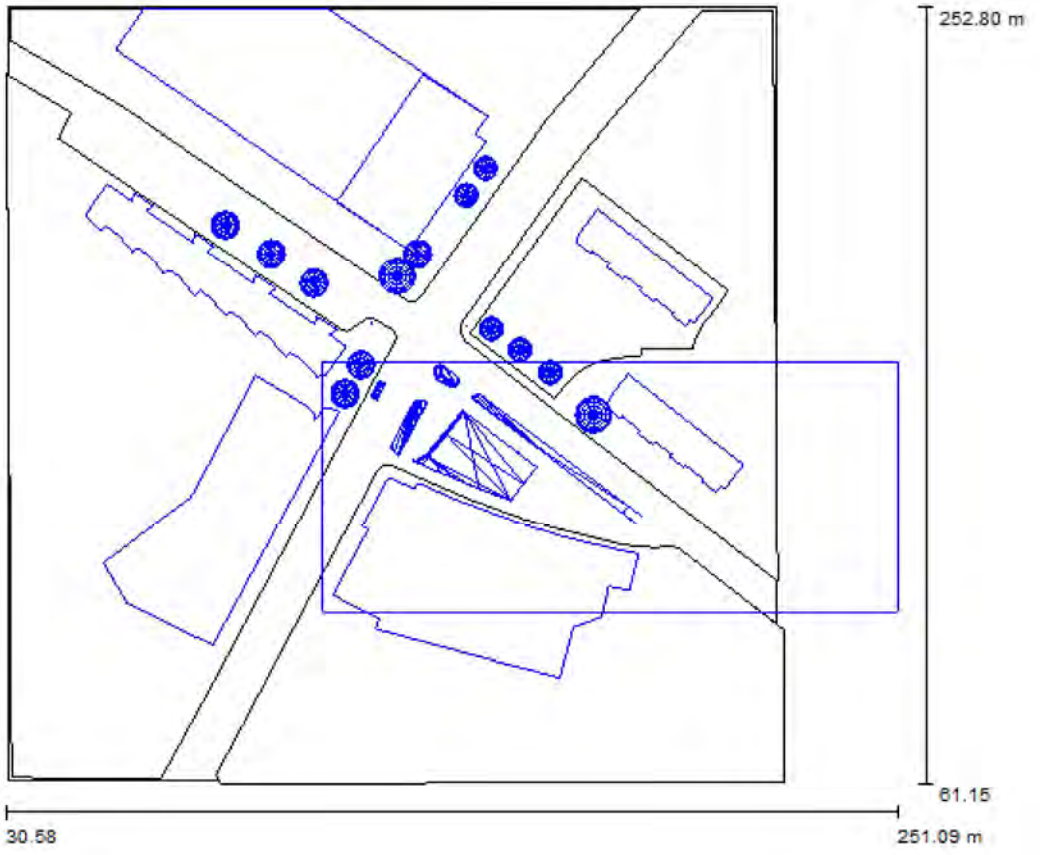
Calculation 3: Street and Signage Lighting. / Planning data



Light loss factor: 0.80, ULR (Upward Light Ratio): 5.5%

Scale 1:1777

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	450	Light Engine - Light Engine - (Type 1)* (1.000)	12	12	53.2
2	3	Thorn 96259430 CIVIC 1 100W HIT 240V CL1 EFL PN/L [V4L4] (1.000)	6151	8800	117.0
			Total: 23853	Total: 31800	24291.0

*Modified Technical Specifications

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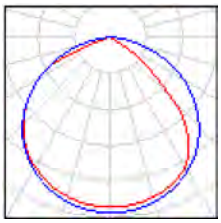
Calculation 3: Street and Signage Lighting. / Luminaire parts list

450 Pieces

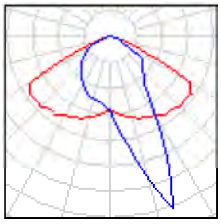
Light Engine - Light Engine - (Type 1)
Article No.: -
Luminous flux (Luminaire): 12 lm
Luminous flux (Lamps): 12 lm
Luminaire Wattage: 53.2 W
Luminaire classification according to CIE: 100
CIE flux code: 53 86 99 100 100
Fitting: 1 x User defined (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



3 Pieces

Thorn 96259430 CIVIC 1 100W HIT 240V CL1 EFL PN/L [V4L4]
Article No.: 96259430
Luminous flux (Luminaire): 6151 lm
Luminous flux (Lamps): 8800 lm
Luminaire Wattage: 117.0 W
Luminaire classification according to CIE: 100
CIE flux code: 45 84 100 97 70
Fitting: 1 x MT 100 W (Correction Factor 1.000).



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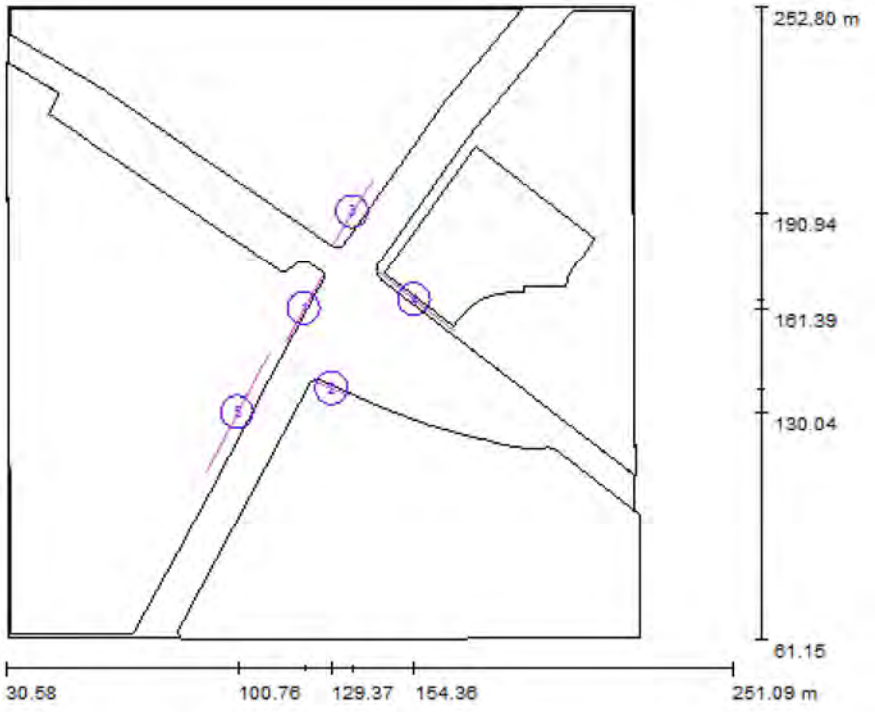
Calculation 3: Street and Signage Lighting. / Calculation surfaces (results overview)



Scale 1 : 2181

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	perpendicular	64 x 64	3.39	0.83	6.47	0.246	0.129
2	Calculation Surface 2	perpendicular	64 x 64	2.89	1.05	6.07	0.364	0.174
3	Calculation Surface 3	perpendicular	64 x 64	0.84	0.25	2.45	0.300	0.103
4	Calculation Surface 4	perpendicular	128 x 128	0.59	0.09	5.20	0.158	0.018
5	Calculation Surface 5	perpendicular	128 x 64	0.51	0.17	1.61	0.343	0.108

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E_{min} / E_{max}
perpendicular	5	1.37	0.09	6.47	0.07	0.01

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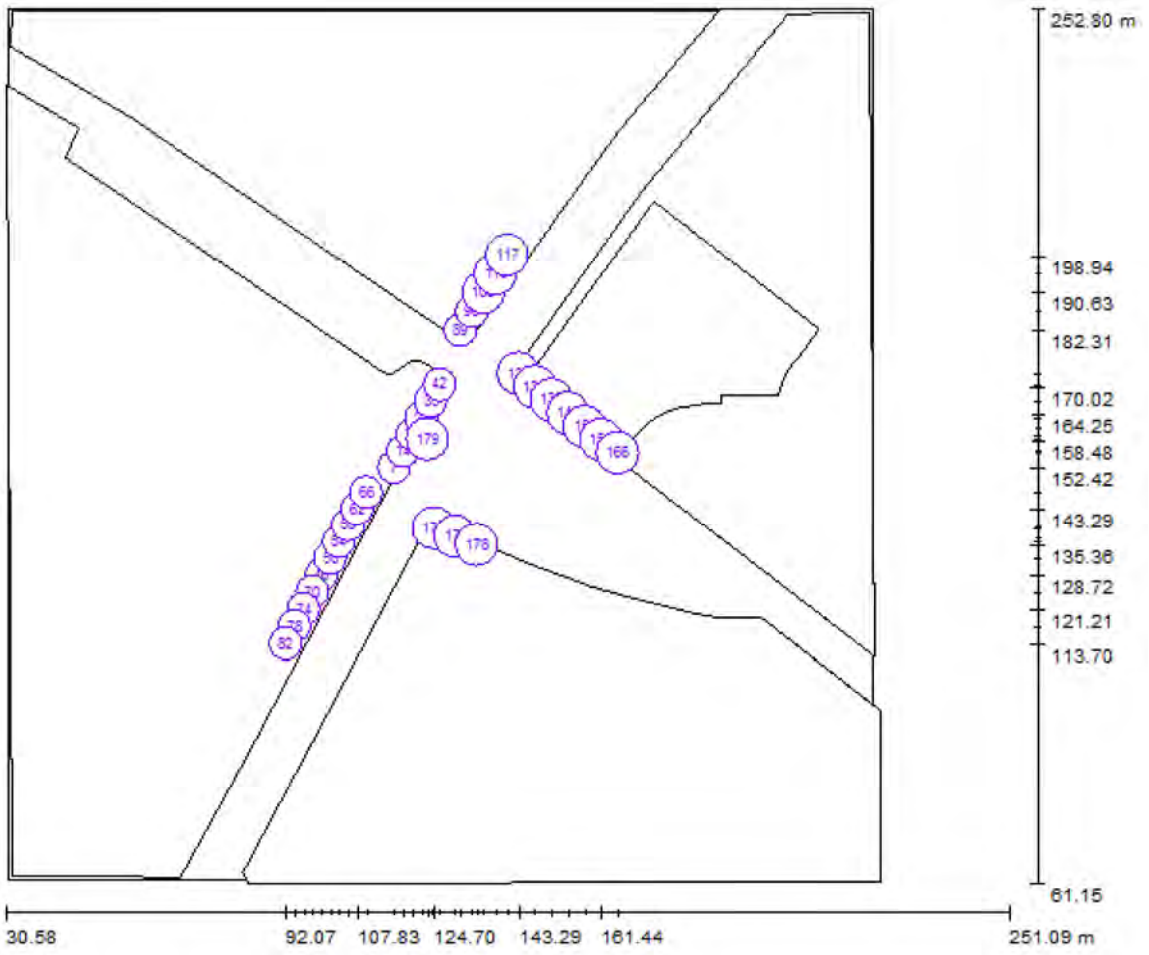
Calculation 3: Street and Signage Lighting. / GR Observer (Results Overview)



Scale 1 : 1577

GR Observerlist

No.	Designation	Position [m] X	Y	Z	Viewing sector [°] Start	End	Increment	Slope angle	Max
1	GR Observer 1	115.937	152.418	1.500	0.0	360.0	30.0	-2.0	68 2)
2	GR Observer 2	115.937	152.418	4.200	0.0	360.0	30.0	-2.0	72 2)
3	GR Observer 3	115.937	152.418	6.900	0.0	360.0	30.0	-2.0	72 2)
4	GR Observer 4	115.937	152.418	9.600	0.0	360.0	30.0	-2.0	68 2)

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Calculation 3: Street and Signage Lighting. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
5	GR Observer 5	115.937	152.418	12.300	0.0	360.0	30.0	-2.0	61 2)
6	GR Observer 6	115.937	152.418	14.800	0.0	360.0	30.0	-2.0	55 2)
7	GR Observer 7	115.937	152.418	17.300	0.0	360.0	30.0	-2.0	50 2)
8	GR Observer 8	117.946	156.035	1.500	0.0	360.0	30.0	-2.0	68 2)
9	GR Observer 9	117.946	156.035	4.200	0.0	360.0	30.0	-2.0	72 2)
10	GR Observer 10	117.946	156.035	6.900	0.0	360.0	30.0	-2.0	72 2)
11	GR Observer 11	117.946	156.035	9.600	0.0	360.0	30.0	-2.0	67 2)
12	GR Observer 12	117.946	156.035	12.300	0.0	360.0	30.0	-2.0	60 2)
13	GR Observer 13	117.946	156.035	14.800	0.0	360.0	30.0	-2.0	54 2)
14	GR Observer 14	117.946	156.035	17.300	0.0	360.0	30.0	-2.0	48 2)
15	GR Observer 15	119.954	159.652	1.500	0.0	360.0	30.0	-2.0	80 2)
16	GR Observer 16	119.954	159.652	4.200	0.0	360.0	30.0	-2.0	>90 2)
17	GR Observer 17	119.954	159.652	6.900	0.0	360.0	30.0	-2.0	>90 2)
18	GR Observer 18	119.954	159.652	9.600	0.0	360.0	30.0	-2.0	80 2)
19	GR Observer 19	119.954	159.652	12.300	0.0	360.0	30.0	-2.0	64 2)
20	GR Observer 20	119.954	159.652	14.800	0.0	360.0	30.0	-2.0	55 2)
21	GR Observer 21	119.954	159.652	17.300	0.0	360.0	30.0	-2.0	47 2)
22	GR Observer 22	121.963	163.270	1.500	0.0	360.0	30.0	-2.0	71 2)
23	GR Observer 23	121.963	163.270	4.200	0.0	360.0	30.0	-2.0	78 2)
24	GR Observer 24	121.963	163.270	6.900	0.0	360.0	30.0	-2.0	77 2)
25	GR Observer 25	121.963	163.270	9.600	0.0	360.0	30.0	-2.0	69 2)
26	GR Observer 26	121.963	163.270	12.300	0.0	360.0	30.0	-2.0	59 2)
27	GR Observer 27	121.963	163.270	14.800	0.0	360.0	30.0	-2.0	50 2)
28	GR Observer 28	121.963	163.270	17.300	0.0	360.0	30.0	-2.0	41 2)
29	GR Observer 29	123.971	166.887	1.500	0.0	360.0	30.0	-2.0	69 2)
30	GR Observer 30	123.971	166.887	4.200	0.0	360.0	30.0	-2.0	79 2)
31	GR Observer 31	123.971	166.887	6.900	0.0	360.0	30.0	-2.0	78 2)
32	GR Observer 32	123.971	166.887	9.600	0.0	360.0	30.0	-2.0	68 2)
33	GR Observer 33	123.971	166.887	12.300	0.0	360.0	30.0	-2.0	55 2)
34	GR Observer 34	123.971	166.887	14.800	0.0	360.0	30.0	-2.0	43 2)
35	GR Observer 35	123.971	166.887	17.300	0.0	360.0	30.0	-2.0	29 2)
36	GR Observer 36	125.980	170.504	1.500	0.0	360.0	30.0	-2.0	60 2)
37	GR Observer 37	125.980	170.504	4.200	0.0	360.0	30.0	-2.0	68 2)
38	GR Observer 38	125.980	170.504	6.900	0.0	360.0	30.0	-2.0	67 2)
39	GR Observer 39	125.980	170.504	9.600	0.0	360.0	30.0	-2.0	56 2)
40	GR Observer 40	125.980	170.504	12.300	0.0	360.0	30.0	-2.0	37 2)

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Calculation 3: Street and Signage Lighting. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
41	GR Observer 41	125.980	170.504	14.800	0.0	360.0	30.0	-2.0	15 2)
42	GR Observer 42	125.980	170.504	17.300	0.0	360.0	30.0	-2.0	<10 2)
43	GR Observer 1	100.034	128.716	1.500	0.0	360.0	30.0	-2.0	59 2)
44	GR Observer 2	100.034	128.716	4.200	0.0	360.0	30.0	-2.0	61 2)
45	GR Observer 3	100.034	128.716	6.900	0.0	360.0	30.0	-2.0	61 2)
46	GR Observer 4	100.034	128.716	9.600	0.0	360.0	30.0	-2.0	60 2)
47	GR Observer 8	101.855	132.357	1.500	0.0	360.0	30.0	-2.0	64 2)
48	GR Observer 9	101.855	132.357	4.200	0.0	360.0	30.0	-2.0	67 2)
49	GR Observer 10	101.855	132.357	6.900	0.0	360.0	30.0	-2.0	68 2)
50	GR Observer 11	101.855	132.357	9.600	0.0	360.0	30.0	-2.0	66 2)
51	GR Observer 15	103.813	136.051	1.500	0.0	360.0	30.0	-2.0	69 2)
52	GR Observer 16	103.813	136.051	4.200	0.0	360.0	30.0	-2.0	76 2)
53	GR Observer 17	103.813	136.051	6.900	0.0	360.0	30.0	-2.0	78 2)
54	GR Observer 18	103.813	136.051	9.600	0.0	360.0	30.0	-2.0	74 2)
55	GR Observer 22	105.821	139.669	1.500	0.0	360.0	30.0	-2.0	75 2)
56	GR Observer 23	105.821	139.669	4.200	0.0	360.0	30.0	-2.0	86 2)
57	GR Observer 24	105.821	139.669	6.900	0.0	360.0	30.0	-2.0	89 2)
58	GR Observer 25	105.821	139.669	9.600	0.0	360.0	30.0	-2.0	83 2)
59	GR Observer 29	107.830	143.286	1.500	0.0	360.0	30.0	-2.0	77 2)
60	GR Observer 30	107.830	143.286	4.200	0.0	360.0	30.0	-2.0	89 2)
61	GR Observer 31	107.830	143.286	6.900	0.0	360.0	30.0	-2.0	>90 2)
62	GR Observer 32	107.830	143.286	9.600	0.0	360.0	30.0	-2.0	84 2)
63	GR Observer 36	109.839	146.903	1.500	0.0	360.0	30.0	-2.0	72 2)
64	GR Observer 37	109.839	146.903	4.200	0.0	360.0	30.0	-2.0	81 2)
65	GR Observer 38	109.839	146.903	6.900	0.0	360.0	30.0	-2.0	82 2)
66	GR Observer 39	109.839	146.903	9.600	0.0	360.0	30.0	-2.0	76 2)
67	GR Observer 1	98.043	124.961	1.500	0.0	360.0	30.0	-2.0	55 2)
68	GR Observer 2	98.043	124.961	4.200	0.0	360.0	30.0	-2.0	56 2)
69	GR Observer 3	98.043	124.961	6.900	0.0	360.0	30.0	-2.0	56 2)
70	GR Observer 4	98.043	124.961	9.600	0.0	360.0	30.0	-2.0	55 2)
71	GR Observer 1	96.052	121.206	1.500	0.0	360.0	30.0	-2.0	51 2)
72	GR Observer 2	96.052	121.206	4.200	0.0	360.0	30.0	-2.0	52 2)
73	GR Observer 3	96.052	121.206	6.900	0.0	360.0	30.0	-2.0	52 2)
74	GR Observer 4	96.052	121.206	9.600	0.0	360.0	30.0	-2.0	51 2)
75	GR Observer 1	94.060	117.451	1.500	0.0	360.0	30.0	-2.0	47 2)
76	GR Observer 2	94.060	117.451	4.200	0.0	360.0	30.0	-2.0	47 2)

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Calculation 3: Street and Signage Lighting. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
77	GR Observer 3	94.060	117.451	6.900	0.0	360.0	30.0	-2.0	47 2)
78	GR Observer 4	94.060	117.451	9.600	0.0	360.0	30.0	-2.0	47 2)
79	GR Observer 1	92.069	113.696	1.500	0.0	360.0	30.0	-2.0	44 2)
80	GR Observer 2	92.069	113.696	4.200	0.0	360.0	30.0	-2.0	44 2)
81	GR Observer 3	92.069	113.696	6.900	0.0	360.0	30.0	-2.0	44 2)
82	GR Observer 4	92.069	113.696	9.600	0.0	360.0	30.0	-2.0	44 2)
83	GR Observer 36	130.483	182.309	1.500	0.0	360.0	30.0	-2.0	44 2)
84	GR Observer 37	130.483	182.309	4.200	0.0	360.0	30.0	-2.0	46 2)
85	GR Observer 38	130.483	182.309	6.900	0.0	360.0	30.0	-2.0	45 2)
86	GR Observer 39	130.483	182.309	9.600	0.0	360.0	30.0	-2.0	28 2)
87	GR Observer 40	130.483	182.309	12.300	0.0	360.0	30.0	-2.0	<10 2)
88	GR Observer 41	130.483	182.309	14.800	0.0	360.0	30.0	-2.0	<10 2)
89	GR Observer 42	130.483	182.309	17.300	0.0	360.0	30.0	-2.0	<10 2)
90	GR Observer 36	133.054	186.467	1.500	0.0	360.0	30.0	-2.0	48 2)
91	GR Observer 37	133.054	186.467	4.200	0.0	360.0	30.0	-2.0	42 2)
92	GR Observer 38	133.054	186.467	6.900	0.0	360.0	30.0	-2.0	41 2)
93	GR Observer 39	133.054	186.467	9.600	0.0	360.0	30.0	-2.0	<10 2)
94	GR Observer 40	133.054	186.467	12.300	0.0	360.0	30.0	-2.0	<10 2)
95	GR Observer 41	133.054	186.467	14.800	0.0	360.0	30.0	-2.0	<10 2)
96	GR Observer 42	133.054	186.467	17.300	0.0	360.0	30.0	-2.0	<10 2)
97	GR Observer 36	135.626	190.625	1.500	0.0	360.0	30.0	-2.0	47 2)
98	GR Observer 37	135.626	190.625	4.200	0.0	360.0	30.0	-2.0	48 2)
99	GR Observer 38	135.626	190.625	6.900	0.0	360.0	30.0	-2.0	42 2)
100	GR Observer 39	135.626	190.625	9.600	0.0	360.0	30.0	-2.0	<10 2)
101	GR Observer 40	135.626	190.625	12.300	0.0	360.0	30.0	-2.0	<10 2)
102	GR Observer 41	135.626	190.625	14.800	0.0	360.0	30.0	-2.0	<10 2)
103	GR Observer 42	135.626	190.625	17.300	0.0	360.0	30.0	-2.0	<10 2)
104	GR Observer 36	138.197	194.783	1.500	0.0	360.0	30.0	-2.0	48 2)
105	GR Observer 37	138.197	194.783	4.200	0.0	360.0	30.0	-2.0	43 2)
106	GR Observer 38	138.197	194.783	6.900	0.0	360.0	30.0	-2.0	24 2)
107	GR Observer 39	138.197	194.783	9.600	0.0	360.0	30.0	-2.0	<10 2)
108	GR Observer 40	138.197	194.783	12.300	0.0	360.0	30.0	-2.0	<10 2)
109	GR Observer 41	138.197	194.783	14.800	0.0	360.0	30.0	-2.0	<10 2)
110	GR Observer 42	138.197	194.783	17.300	0.0	360.0	30.0	-2.0	<10 2)
111	GR Observer 36	140.768	198.941	1.500	0.0	360.0	30.0	-2.0	50 2)
112	GR Observer 37	140.768	198.941	4.200	0.0	360.0	30.0	-2.0	39 2)

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Calculation 3: Street and Signage Lighting. / GR Observer (Results Overview)

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
113	GR Observer 38	140.768	198.941	6.900	0.0	360.0	30.0	-2.0	27 2)
114	GR Observer 39	140.768	198.941	9.600	0.0	360.0	30.0	-2.0	<10 2)
115	GR Observer 40	140.768	198.941	12.300	0.0	360.0	30.0	-2.0	<10 2)
116	GR Observer 41	140.768	198.941	14.800	0.0	360.0	30.0	-2.0	<10 2)
117	GR Observer 42	140.768	198.941	17.300	0.0	360.0	30.0	-2.0	<10 2)
118	GR Observer 36	143.290	172.909	1.500	0.0	360.0	30.0	-2.0	55 2)
119	GR Observer 37	143.290	172.909	4.200	0.0	360.0	30.0	-2.0	50 2)
120	GR Observer 38	143.290	172.909	6.900	0.0	360.0	30.0	-2.0	38 2)
121	GR Observer 39	143.290	172.909	9.600	0.0	360.0	30.0	-2.0	72 2)
122	GR Observer 40	143.290	172.909	12.300	0.0	360.0	30.0	-2.0	<10 2)
123	GR Observer 41	143.290	172.909	14.800	0.0	360.0	30.0	-2.0	<10 2)
124	GR Observer 42	143.290	172.909	17.300	0.0	360.0	30.0	-2.0	<10 2)
125	GR Observer 36	146.921	170.024	1.500	0.0	360.0	30.0	-2.0	54 2)
126	GR Observer 37	146.921	170.024	4.200	0.0	360.0	30.0	-2.0	48 2)
127	GR Observer 38	146.921	170.024	6.900	0.0	360.0	30.0	-2.0	55 2)
128	GR Observer 39	146.921	170.024	9.600	0.0	360.0	30.0	-2.0	65 2)
129	GR Observer 40	146.921	170.024	12.300	0.0	360.0	30.0	-2.0	<10 2)
130	GR Observer 41	146.921	170.024	14.800	0.0	360.0	30.0	-2.0	<10 2)
131	GR Observer 42	146.921	170.024	17.300	0.0	360.0	30.0	-2.0	<10 2)
132	GR Observer 36	150.551	167.139	1.500	0.0	360.0	30.0	-2.0	51 2)
133	GR Observer 37	150.551	167.139	4.200	0.0	360.0	30.0	-2.0	49 2)
134	GR Observer 38	150.551	167.139	6.900	0.0	360.0	30.0	-2.0	51 2)
135	GR Observer 39	150.551	167.139	9.600	0.0	360.0	30.0	-2.0	36 2)
136	GR Observer 40	150.551	167.139	12.300	0.0	360.0	30.0	-2.0	<10 2)
137	GR Observer 41	150.551	167.139	14.800	0.0	360.0	30.0	-2.0	<10 2)
138	GR Observer 42	150.551	167.139	17.300	0.0	360.0	30.0	-2.0	<10 2)
139	GR Observer 36	154.182	164.255	1.500	0.0	360.0	30.0	-2.0	48 2)
140	GR Observer 37	154.182	164.255	4.200	0.0	360.0	30.0	-2.0	46 2)
141	GR Observer 38	154.182	164.255	6.900	0.0	360.0	30.0	-2.0	38 2)
142	GR Observer 39	154.182	164.255	9.600	0.0	360.0	30.0	-2.0	19 2)
143	GR Observer 40	154.182	164.255	12.300	0.0	360.0	30.0	-2.0	<10 2)
144	GR Observer 41	154.182	164.255	14.800	0.0	360.0	30.0	-2.0	<10 2)
145	GR Observer 42	154.182	164.255	17.300	0.0	360.0	30.0	-2.0	<10 2)
146	GR Observer 36	157.813	161.370	1.500	0.0	360.0	30.0	-2.0	45 2)
147	GR Observer 37	157.813	161.370	4.200	0.0	360.0	30.0	-2.0	41 2)
148	GR Observer 38	157.813	161.370	6.900	0.0	360.0	30.0	-2.0	29 2)

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GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
149	GR Observer 39	157.813	161.370	9.600	0.0	360.0	30.0	-2.0	11 2)
150	GR Observer 40	157.813	161.370	12.300	0.0	360.0	30.0	-2.0	<10 2)
151	GR Observer 41	157.813	161.370	14.800	0.0	360.0	30.0	-2.0	<10 2)
152	GR Observer 42	157.813	161.370	17.300	0.0	360.0	30.0	-2.0	<10 2)
153	GR Observer 36	161.443	158.485	1.500	0.0	360.0	30.0	-2.0	41 2)
154	GR Observer 37	161.443	158.485	4.200	0.0	360.0	30.0	-2.0	34 2)
155	GR Observer 38	161.443	158.485	6.900	0.0	360.0	30.0	-2.0	23 2)
156	GR Observer 39	161.443	158.485	9.600	0.0	360.0	30.0	-2.0	<10 2)
157	GR Observer 40	161.443	158.485	12.300	0.0	360.0	30.0	-2.0	<10 2)
158	GR Observer 41	161.443	158.485	14.800	0.0	360.0	30.0	-2.0	<10 2)
159	GR Observer 42	161.443	158.485	17.300	0.0	360.0	30.0	-2.0	<10 2)
160	GR Observer 36	165.074	155.600	1.500	0.0	360.0	30.0	-2.0	35 2)
161	GR Observer 37	165.074	155.600	4.200	0.0	360.0	30.0	-2.0	28 2)
162	GR Observer 38	165.074	155.600	6.900	0.0	360.0	30.0	-2.0	17 2)
163	GR Observer 39	165.074	155.600	9.600	0.0	360.0	30.0	-2.0	<10 2)
164	GR Observer 40	165.074	155.600	12.300	0.0	360.0	30.0	-2.0	<10 2)
165	GR Observer 41	165.074	155.600	14.800	0.0	360.0	30.0	-2.0	<10 2)
166	GR Observer 42	165.074	155.600	17.300	0.0	360.0	30.0	-2.0	<10 2)
167	GR Observer 36	124.704	139.038	1.500	0.0	360.0	30.0	-2.0	77 2)
168	GR Observer 37	124.704	139.038	4.200	0.0	360.0	30.0	-2.0	89 2)
169	GR Observer 38	124.704	139.038	6.900	0.0	360.0	30.0	-2.0	90 2)
170	GR Observer 39	124.704	139.038	9.600	0.0	360.0	30.0	-2.0	80 2)
171	GR Observer 36	129.379	137.198	1.500	0.0	360.0	30.0	-2.0	71 2)
172	GR Observer 37	129.379	137.198	4.200	0.0	360.0	30.0	-2.0	77 2)
173	GR Observer 38	129.379	137.198	6.900	0.0	360.0	30.0	-2.0	77 2)
174	GR Observer 39	129.379	137.198	9.600	0.0	360.0	30.0	-2.0	71 2)
175	GR Observer 36	134.054	135.358	1.500	0.0	360.0	30.0	-2.0	61 2)
176	GR Observer 37	134.054	135.358	4.200	0.0	360.0	30.0	-2.0	40 2)
177	GR Observer 38	134.054	135.358	6.900	0.0	360.0	30.0	-2.0	30 2)
178	GR Observer 39	134.054	135.358	9.600	0.0	360.0	30.0	-2.0	58 2)
179	GR Observer Oncoming Car	123.292	158.651	1.200	0.0	360.0	30.0	-2.0	75 2)

2) The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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Calculation 3: Street and Signage Lighting. / 3D Rendering

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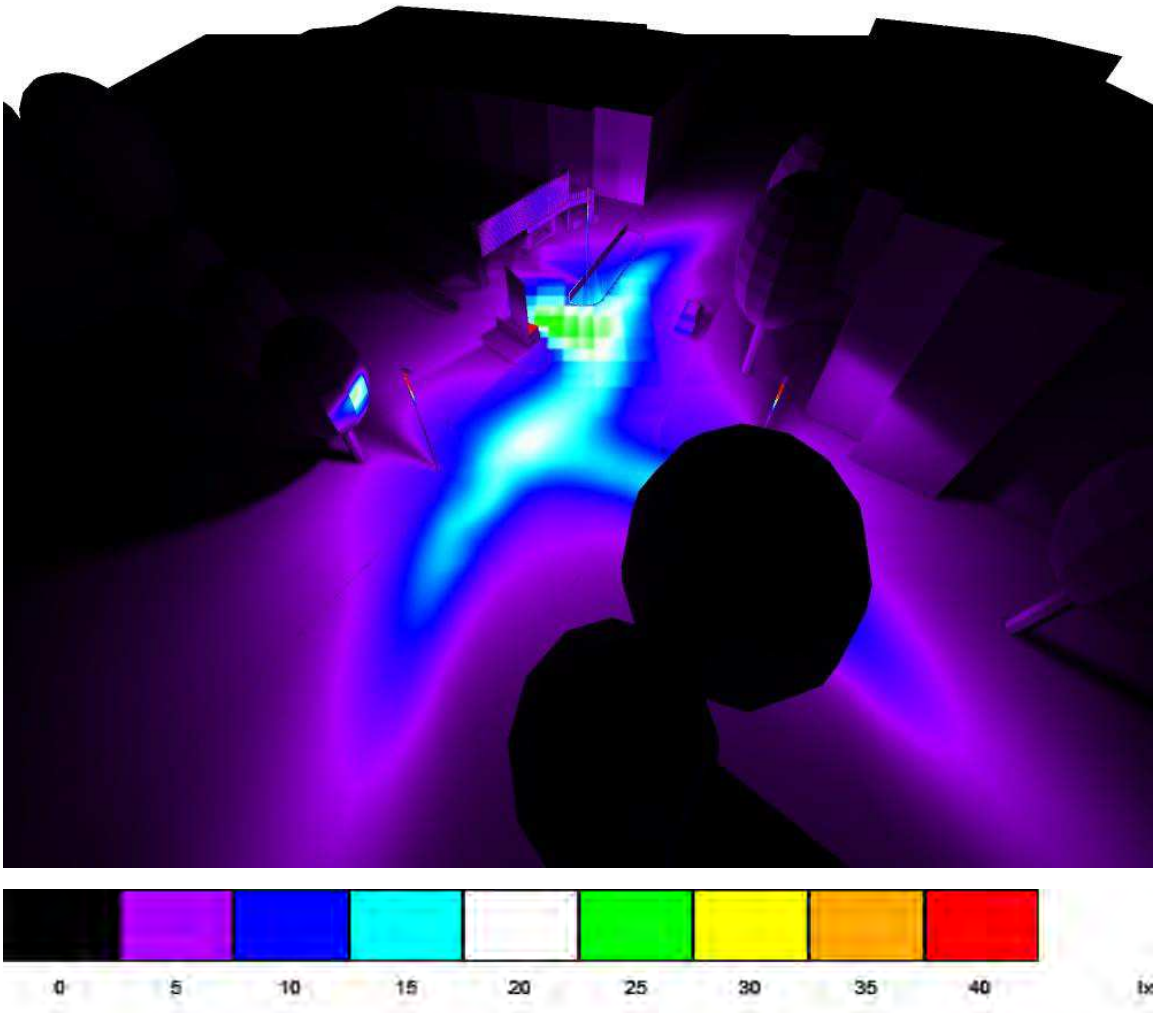
Calculation 3: Street and Signage Lighting. / False Color Rendering



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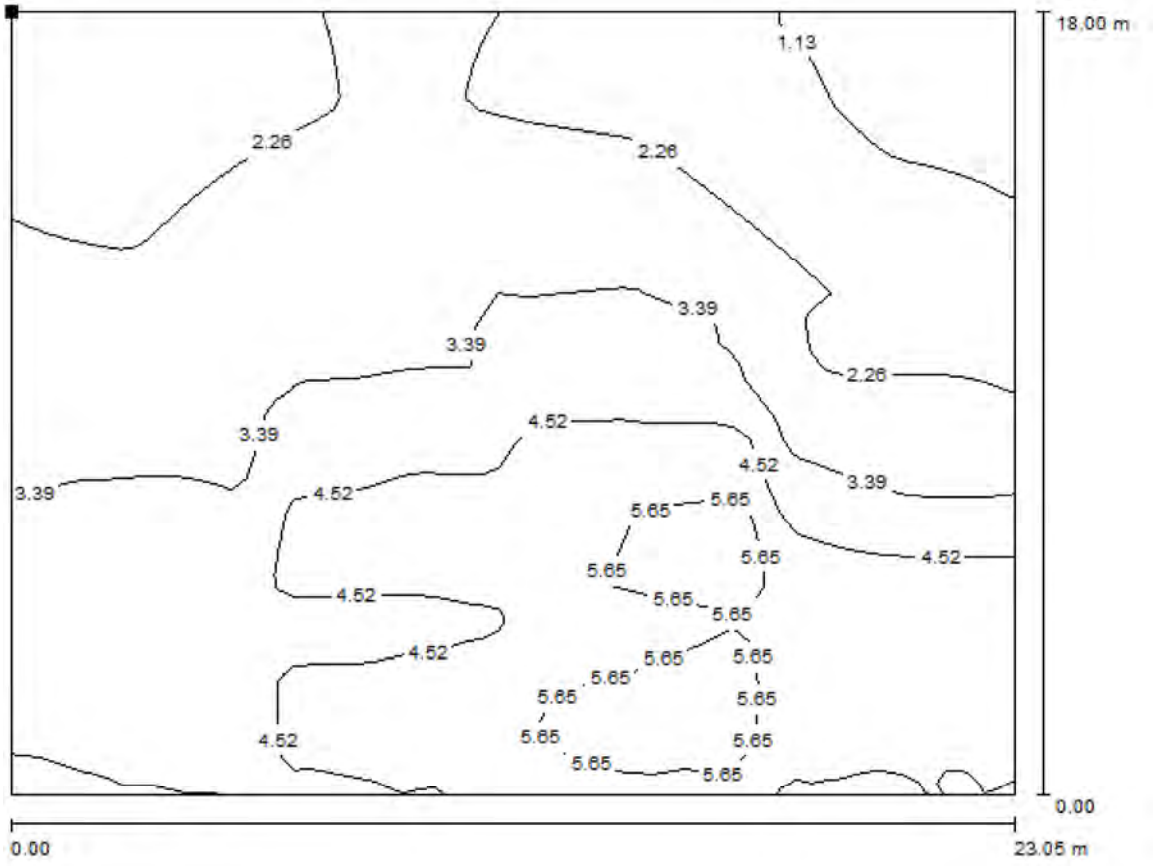
Calculation 3: Street and Signage Lighting. / Calculation Surface 1 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(115.338 m, 151.311 m, 18.010 m)

Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
3.39	0.83	6.47	0.246	0.129

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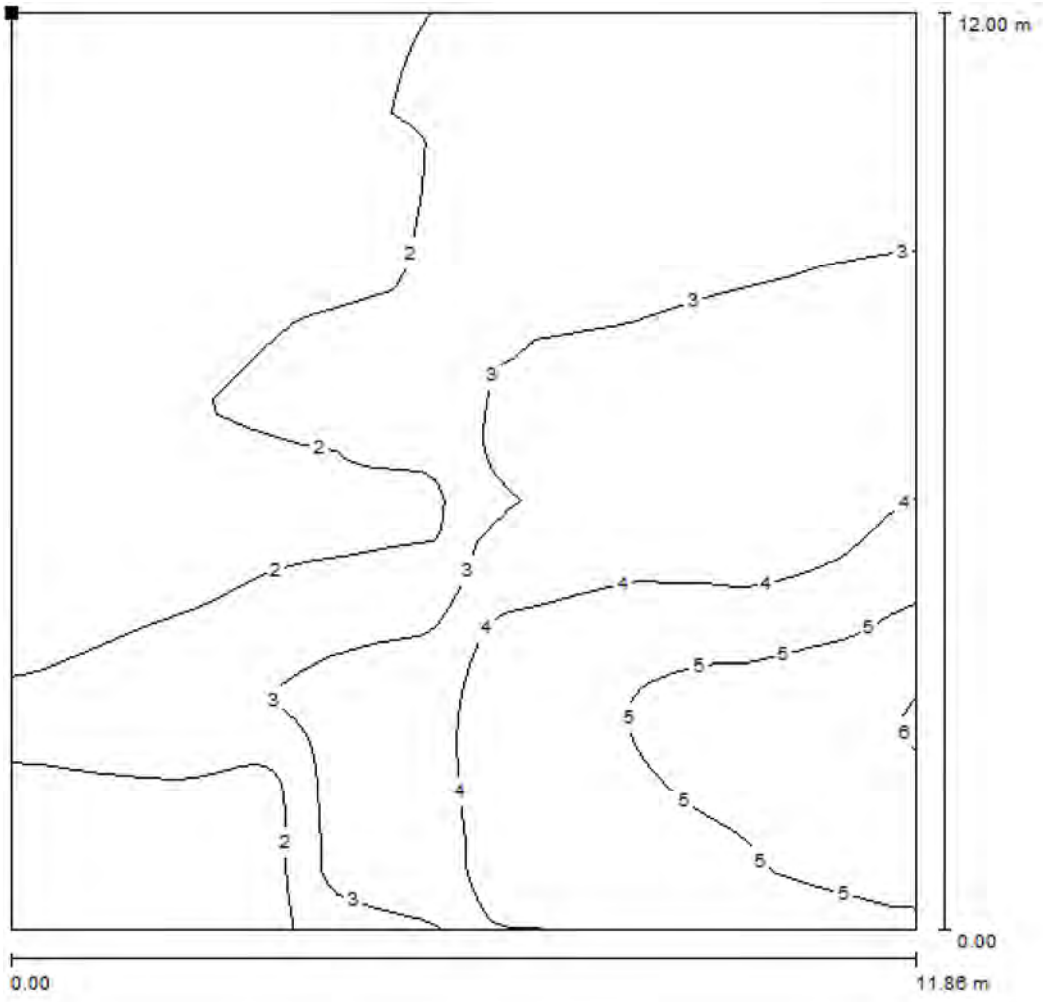
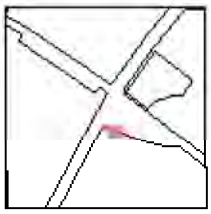
Calculation 3: Street and Signage Lighting. / Calculation Surface 2 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 94

Position of surface in external scene:
Marked point:
(134.867 m, 134.967 m, 12.000 m)



Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
2.89	1.05	6.07	0.364	0.174

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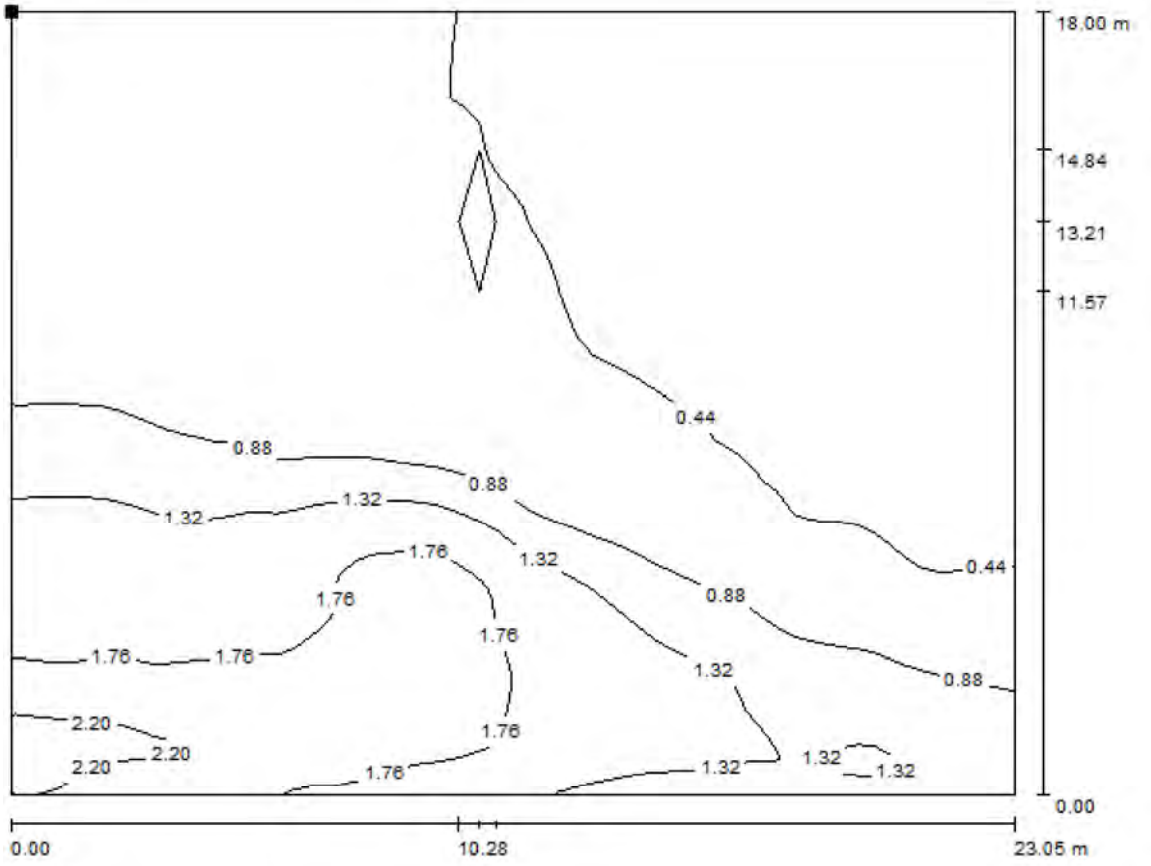
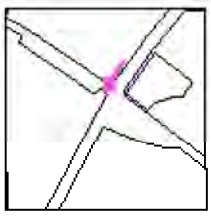
Calculation 3: Street and Signage Lighting. / Calculation Surface 3 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 165

Position of surface in external scene:
Marked point:
(129.561 m, 181.166 m, 18.010 m)



Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.84	0.25	2.45	0.300	0.103

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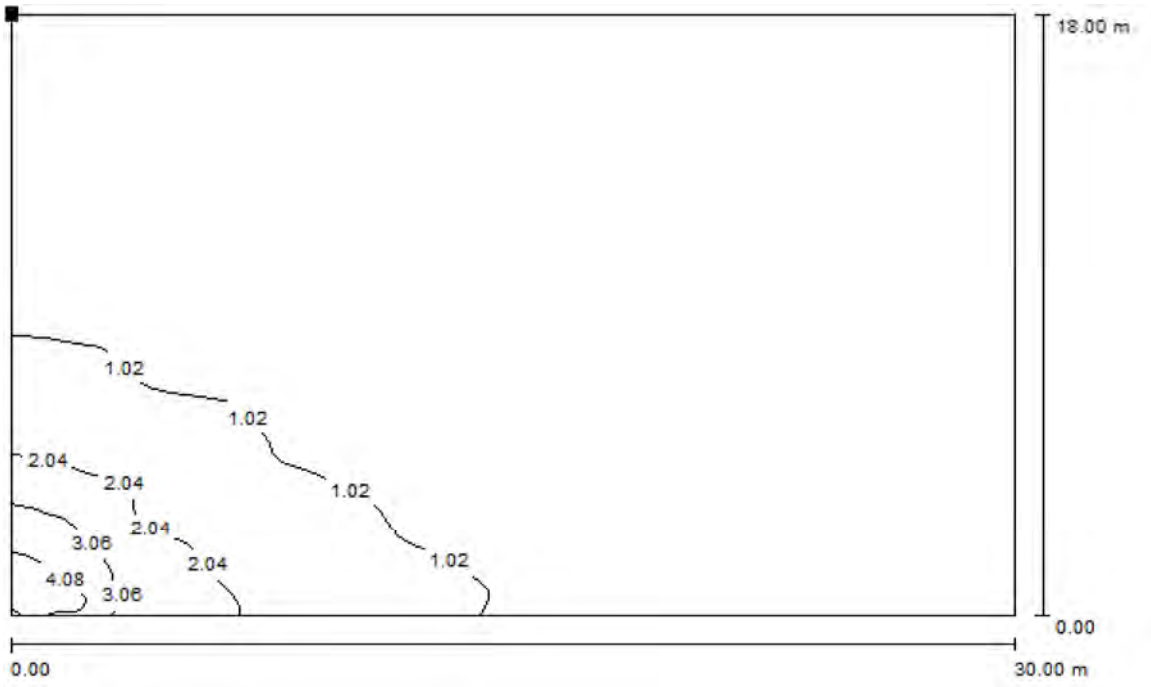
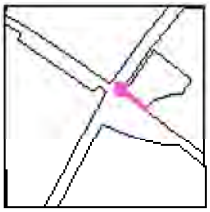
Calculation 3: Street and Signage Lighting. / Calculation Surface 4 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 215

Position of surface in external scene:
Marked point:
(142.540 m, 173.370 m, 18.010 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.59	0.09	5.20	0.158	0.018

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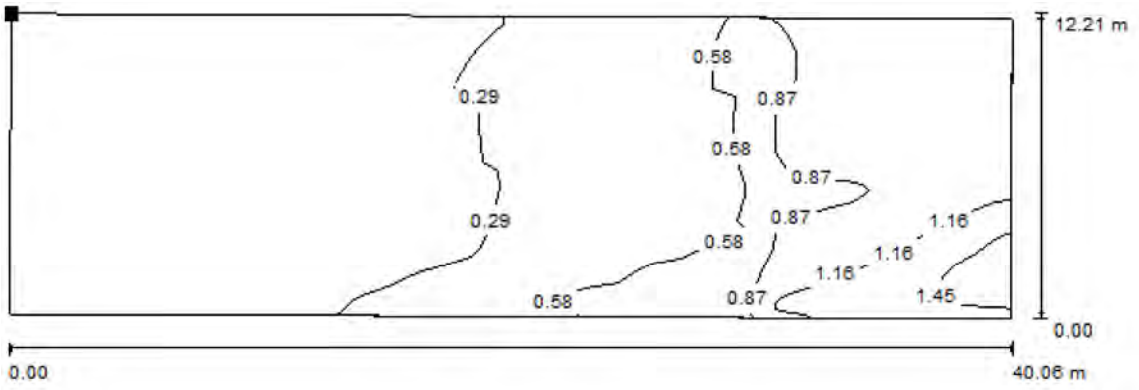
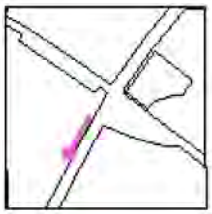
Calculation 3: Street and Signage Lighting. / Calculation Surface 5 / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 287

Position of surface in external scene:
Marked point:
(91.386 m, 112.406 m, 12.105 m)



Grid: 128 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
0.51	0.17	1.61	0.343	0.108

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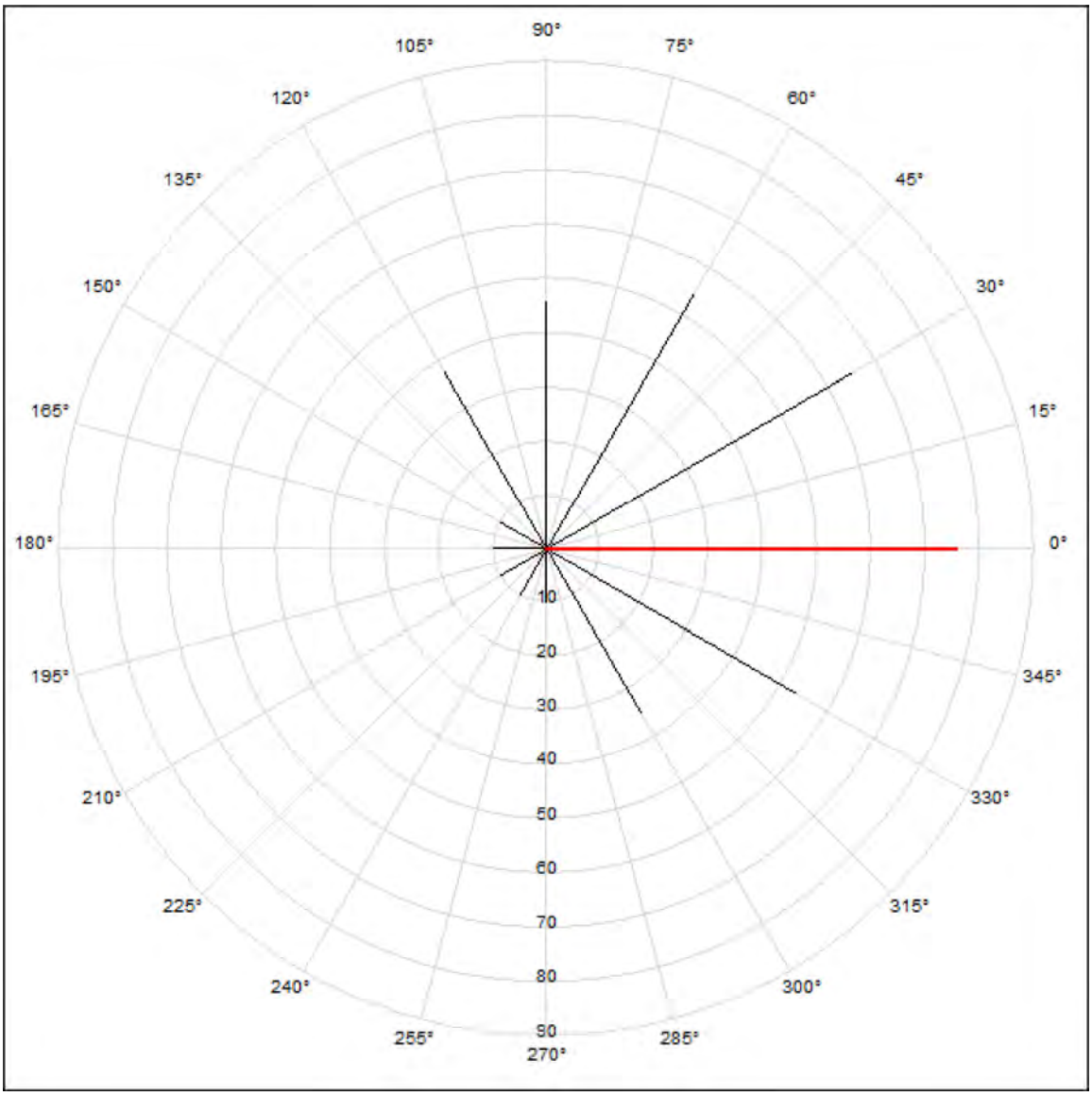
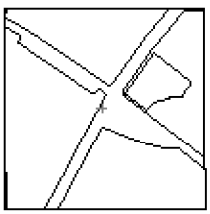
Calculation 3: Street and Signage Lighting. / GR Observer Oncoming Car / Summary



Position of observer in external scene:



Position: (123.292 m, 158.651 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Glare: Min: 35, Max: 75
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).

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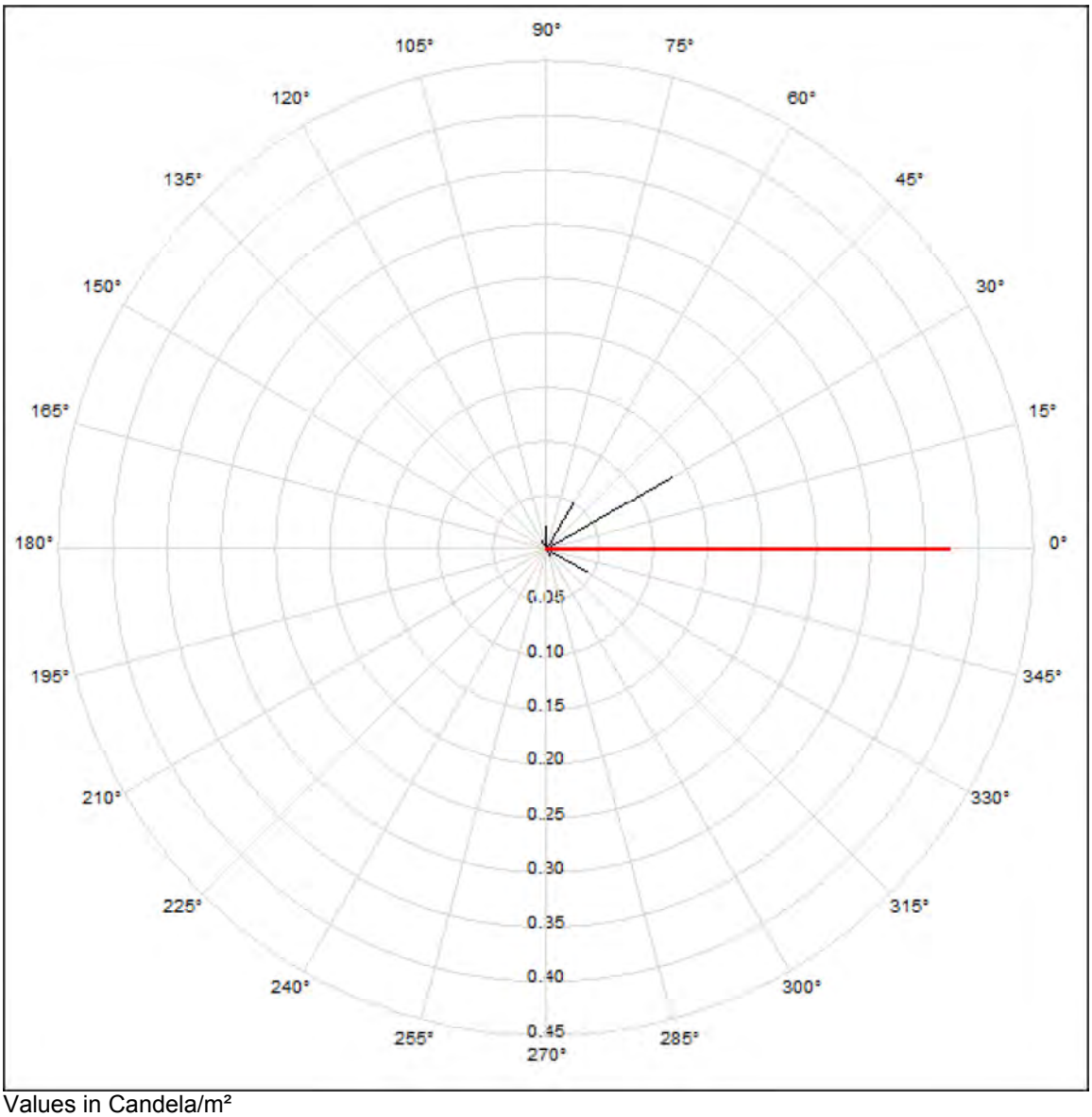
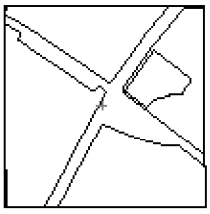
Calculation 3: Street and Signage Lighting. / GR Observer Oncoming Car / Veil Luminances



Values in Candela/m²

Position of observer in external scene:



Position: (123.292 m, 158.651 m, 1.200 m)
Viewing sector: 0.0 ° - 360.0 °, Increment: 30.0 °, Angle of inclination: -2.0 °
Veil Luminance: Min: 0.00 cd/m², Max: 0.37 cd/m²
The calculated equivalent veil luminance of the environment is based on the assumption of a complete diffuse reflection behavior of the environment (acc. EN 12464-2).