DBS-BUILDING 4

External Lighting
Impact Assessment
Report

Ref: P1773-NOV-E-RPT-001 Rev A

On Behalf of

David Brown Santasalo

NOVO

www.novo.eu.com

AMENDMENT HISTORY

REVISION	DESCRIPTION	DATE	AUTHOR	CHECKED
A	Preliminary Issue	June 2023	M.Houlding	G.Power

EXTERNAL LIGHTING REPORT

1.0 INTRODUCTION

This report has been prepared as requested by David Brown Santasalo to support in providing the necessary information and documents as requested by the local Council, as part of the planning conditions 17.0 associated with the external lighting proposals for the site as follows:

17. Prior to the installation of the external artificial lighting, an external lighting scheme for each phase of the development hereby permitted shall first be submitted to and approved in writing by the Local Planning Authority.
The Scheme should include the following information:

· The proposed hours of operation of the lighting

· The location and specification of all of the luminaires

· The proposed design level of maintained average horizontal illuminance for the areas that need to be illuminated

· The measures that will be taken to minimise or eliminate glare and stray light arising from the use of the lighting that is caused beyond the boundary of the site

· The methods of switching and controlling the lighting so that it is only operated at the permitted times and at times when it is required

No external artificial lighting shall be used on any phase of the development unless the lighting has been installed and operated in accordance with the approved scheme.

Please see the following brief overview of results in the following section 1.1

And further details within the full report in sections 2.0 to 5.0, with the following appendices 1 to 3 also included.

1.1 Executive Summary

Limitation of illumination on surrounding premises

Light intrusion / nuisance

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

* If the installation is for public (road) lighting then this may be up to 1 lx.

Therefore, target limits for E3 Light Intrusion (into windows)
(Max-lux) = Pre-curfew – **10lx** and post-curfew – **2lx**

Overview of lighting calculation and achieved compliance status:

Table 3 - Compliance				
Environmental zone		**E3**		
	Light Trespass into Windows (Lux)			
		Target	**Achieved**	**Status**
Nabcroft Lane				
House 60, 62	**Pre-Curfew**	**10**	**0.1**	**Pass**
	Post-Curfew	**2**	**0.1**	**Pass**
House 64, 66	**Pre-Curfew**	**10**	**0.3**	**Pass**
	Post-Curfew	**2**	**0.3**	**Pass**
House 68, 70	**Pre-Curfew**	**10**	**1.1**	**Pass**
	Post-Curfew	**2**	**1.1**	**Pass**
House 72, 74	**Pre-Curfew**	**10**	**0.6**	**Pass**
	Post-Curfew	**2**	**0.6**	**Pass**
House 76, 78	**Pre-Curfew**	**10**	**0.7**	**Pass**
	Post-Curfew	**2**	**0.7**	**Pass**
House 80, 82, 84, 86	**Pre-Curfew**	**10**	**1.6**	**Pass**
	Post-Curfew	**2**	**1.6**	**Pass**

So, the max lux level calculated on all the above property front window elevations falls below both curfew maxima limits.

2.0 PURPOSE OF THE REPORT

The purpose of this report is to demonstrate the proposed external lighting design will not impact on the surrounding areas adjacent to the site and to minimise horizontal and vertical obtrusive light pollution.

The content of the report is as follows:

- Assessment of Light Impact on the Surrounding Areas
- External Lighting Design Proposals
- External Lighting Calculations
- Lighting Control and Operation
- Layout plan showing the location of all external lighting columns, spread patterns of illuminated areas with specified lux levels.
- Date sheets and specifications of the luminaires proposed.
- Mitigation measures to remove, minimise any adverse impacts identified.

2.0 ASSESSMENT OF LIGHT IMPACT ON THE SURROUNDING AREAS

The surrounding areas of the site have been assessed prior to carrying out our lighting scheme and the following have been noted:

a. To the North, East and West of the site there is existing and developed industrial buildings and business units.

b. To the south of the site is the residential street, Nabcroft Lane.

Taking account of the above it can be concluded that the immediate surrounding areas are primarily of a commercial and industrial nature, with the exception of the residential properties immediately adjacent to the South of the site. By careful design and luminaire selection any proposed façade lighting scheme from the David Brown Santasalo new buildings is unlikely to cause any negative visual impact.

The proposed external lighting scheme design generally consists of the following luminaire types to accentuate and complement the overall building and site areas to provide a modern / industrial feel.

- Wall mounted black diecast LED lanterns to wall elevations to cover walkways.

Please refer to appendix 1 for luminaire data sheets and specifications

3.0 EXTERNAL LIGHTING DESIGN PROPOSALS

3.1 Standards And Guidance

The external lighting levels are to be designed in accordance with the following standards, guidance and recommendations:

British Standards

BS 5489-1:2020 Code of practice for the design of road lighting – Part 1 Lighting of roads and public amenity areas:
BS EN 13201-1:2014 Road lighting. Part 1: Guidelines on lighting classes
BS EN 13201-2:2015 Road lighting. Part 2: Performance requirements.
BS EN 13201-3:2015 Road lighting. Part 3: Calculation of performance.
BS EN 13201-4:2015 Road lighting. Part 4: Methods of measuring lighting performance.
BS EN 12464-2:2014 Lighting of work places. Outdoor work places.
PD CEN TR 13201-1:2014 Road lighting. Guidelines on selection of lighting classes.

ILP publications

ILP Guidance Note 01 for the reduction of obtrusive light 2021.

SLL/CIBSE Publications

LG0:2017 Introduction to light and lighting – Section 9.4 Light pollution

LG6:2016 The exterior environment.

LG21:2021 Protecting the night-time environment.

For this scheme the following maintained illuminances are proposed for the design:

External Walkway Illuminance - 5 Lux at 0.25 uniformity

Most importantly the design of the external lighting scheme is to provide a safe and secure environment for people, for access/egress including general circulation around and within the confines of the site.

3.2 Glare and Stray Light Control Measures (South of Site adjoining Nabcroft Lane)

The following measures have been taken in the design of the external lighting to control the potential for glare, obtrusive and stray light in particular to the west of the site adjoining the residential properties.

a. Selected wall mounted luminaires mounted at 3m, provided with control optics designed to limit the beam angle within less than 2% upward light components, to avoid glare and upward light distribution as recommended by GN01:2021.

c. The light source intensities have been limited to reduce the brightness perceived by observers as recommended by GN01:2021.

d. The wall mounted luminaires selected are designed for downward lighting against the wall, with control optics that are designed to provide an asymmetric light distribution to minimise the light overspill from the site as recommended by GN01:2021

3.3 Lighting Proposals

The proposal is to illuminate the external walkways areas via evenly spaced 8W LED wall mounted luminaires, mounted at 3m. The lantern is an Architectural luminaire in keeping with the modern, industrial feel and delivers outstanding optical performance, enabling optimum spacing and energy efficiency, and is easy to install and maintain.

Please refer to appendix 1 for the following luminaire types and specification details.

Type EXT1 Thorlux - Realta – Wall Mounted external bulkhead luminaire.

Please refer to appendix 2 for proposed external lighting layouts.

4.0 External Lighting Calculations

The external lighting calculations have been carried out on industry approved lighting design software called Relux.

Attached are tables taken from the ILP Guidance Notes for Obtrusive Light, for background information on relevant lighting categories, and target limits.

Extract taken from ILP. GN01-Table 2:

Table 2: Environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

(It is recommended that local planning authorities specify the above environmental zones for exterior lighting control within their development plans).

Looking at the categories, estimated this would fall under E3 Suburban.

Extract taken from ILP.GN01-Table 3:

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So, the max lux level calculated on all the above property front window elevations falls below both curfew maxima limits.

Please refer to appendix 3 which details the layouts with the point-by-point horizontal lux output data and illuminance contour layouts and demonstrate compliance with the ILP GN01:2021 for reduction in obtrusive light.

And as compiled and detailed in the attached tables, and results overview.

5.0 Lighting Control and Operation

The external lighting shall be controlled via a common timeclock and photocell arrangement, to avoid operation of the lighting when not required outside normal building opening hours.

When the timeclock is automatically activated at the pre-programmed time to turn the luminaires on the photocell (an electronic switch which turns on/off to suit natural lighting levels) will hold off switching of the luminaires until dusk. The timeclock will then automatically switch the luminaires off at the pre-programmed time.

The operational times for external lighting is set to suit the proposed occupation hours of the building tenants from a H & S perspective and is currently set to turn on pre curfew from dusk and off at 11pm.

APPENDIX

Appendix 1 - Luminaire Specification and Data Sheets

Appendix 2 - External Lighting Layout

Appendix 3 - External Lighting Calculations

Appendix 1 - Luminaire Specification and Data Sheets

REALTA

LEDbar

The patented LEDbar substitutes the conventional Realta lamp source with an 8W LED lamp package. The aluminium bar dissipates the heat generated by the LEDs for optimum performance.

< 2% Upward Light

Help reduce light pollution and protect the night sky by selecting < 2% upward light luminaires

WIDE DISTRIBUTION LED CHARACTERISTICS

CRI	**80**
COLOUR TEMPERATURE	**4000K**
RATED LIFE (HOURS)	**67K - L80/B10**
PROTECTION	**LUX GUARD**
DRIVER EFFICIENCY	**>80%**
REPLACEABLE	**YES**
POWER FACTOR	**>0.95**
LL/CW	**120.0**

AREA DISTRIBUTION LED CHARACTERISTICS

CRI	**70+**
COLOUR TEMPERATURE	**4000K**
RATED LIFE (HOURS)	**100K - L90/B10**
PROTECTION	**LED PROTECT**
DRIVER EFFICIENCY	**>85%**
REPLACEABLE	**YES**
POWER FACTOR	**>0.95**
LL/CW	**127.6**

For LED characteristics explanation see **www.thorlux.com/led-guide**

REALTA

Smart External version

Wide distribution

Realta Design Registration Number 3024955

HIGH PERFORMANCE LUMINAIRES DESIGNED TO MINIMISE LIGHT POLLUTION AND ENERGY CONSUMPTION

IP66 | IK11 / IK10 / IK06 | UKCA | CE | LED

SPECIFICATION

- Graphite full polyester powder finish. Silver option
- Strong high-pressure die-cast LM2 aluminium body
- High efficiency prismatic polycarbonate or borosilicate glass front refractor
- Wide distribution (8W) or area distribution (20W, 34W and 42W) options
- Highly specular, multi-faceted injection moulded vacuum metallised reflector on wide distribution versions
- Excellent distribution with less than 2% upward light component
- Optional photocell control
- Smart External versions with intelligent lighting control for use up to 8 metres mounting height
- SmartScan wireless technology removes the need for control cabling. Ideal for retro-fit
- Fitted with 4000K LEDs

RANGE

	LED	WIDE DISTRIBUTION	AREA DISTRIBUTION	APPROX. kg
SMART EXTERNAL	**IK10 Polycarbonate Cover**			
	8W	**RL 19069SS**		3.9
	20W		**RL 19110SS**	4.0
	34W		**RL 19111SS**	4.0
	42W		**RL 19112SS**	4.0
STANDARD	**IK11 Polycarbonate Cover**			
	8W	**RL 19071L**		3.8
	20W		**RL 19116L**	3.9
	34W		**RL 19117L**	3.9
	42W		**RL 19118L**	3.9
	IK06 Glass Cover			
	8W	**RL 19073L**		4.6

CIRCUIT TYPE -
SMART EXTERNAL **SS - SmartScan**
STANDARD **L - non-dimming (LED)**

SILVER OPTION - add suffix **SV3** e.g. **RL 19069SSSV3** etc.

EMERGENCY VERSION - prefix catalogue number with:
ERL - Emergency / TRL - AutoTest (Not available when selecting the **'SS'** suffix)
WRL - SmartScan
e.g. **WRL 19069SS** etc.
Add 0.4kg to weights listed

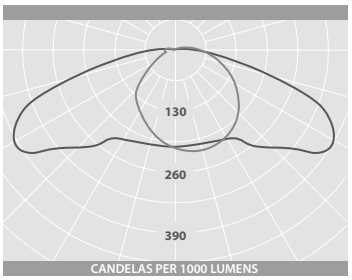
Photometrics, Accessories, Options and Dimensions pages **3** and **4**

SmartScan Configurations

Find out more at **www.thorlux.com/smartscan**

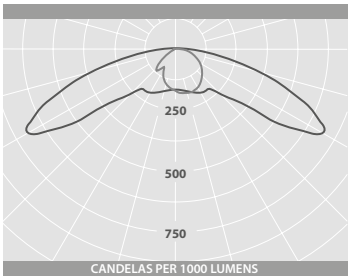
REALTA

PHOTOMETRIC GUIDE



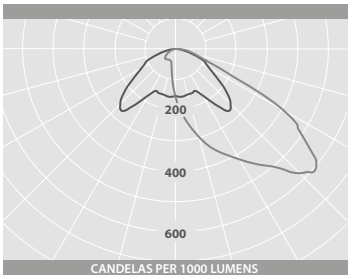
GLASS COVER (Wide Distribution)

Luminaire Lumen Output:
8W = 1175lm



POLYCARBONATE COVER (Wide Distribution)

Luminaire Lumen Output:
8W = 1320lm



POLYCARBONATE COVER (Area Distribution)

Luminaire Lumen Output:
20W = 2840lm
34W = 4850lm
42W = 5635lm

Single luminaire column mounting attachment

Twin luminaire column mounting attachment

ACCESSORIES

DESCRIPTION	CAT. No.	APPROX. kg
Single luminaire column mounting attachment *(for 60m dia. columns)*	**RL 13759**	1.6
Twin luminaire column mounting attachment *(for 60m dia. columns)*	**RL 14175**	2.6
76/60mm dia. spigot adaptor *(for retro-fit on 76mm dia. columns)*	**RL 11184**	0.8

OPTIONS

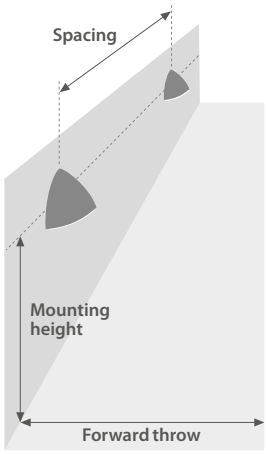
DESCRIPTION	SUFFIX	EXAMPLE
Photocell *(standard versions only)*	**PC**	**RL 19071LPC**

PERFORMANCE GUIDE - Wide Distribution

Photometric Performance -
8W LED with polycarbonate cover

SPACING	AVERAGE ILLUMINANCE	UNIFORMITY (min/av)
3m mounting height - 3m forward throw		
10m ctrs	22 lux	0.48
15m ctrs	15 lux	0.47
20m ctrs	11 lux	0.22
4m mounting height - 4m forward throw		
10m ctrs	17 lux	0.48
15m ctrs	11 lux	0.45
20m ctrs	8 lux	0.47
5m mounting height - 5m forward throw		
10m ctrs	13 lux	0.42
15m ctrs	9 lux	0.48
20m ctrs	7 lux	0.45

FIGURES ARE BASED ON INITIAL LUMENS

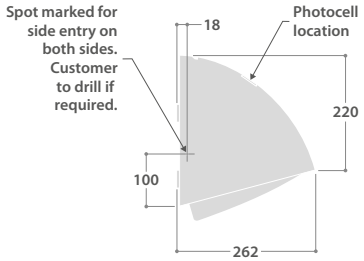


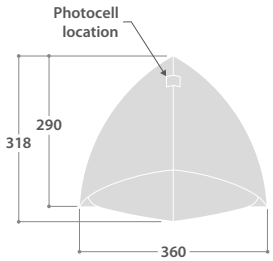
e.g. At 3m mounting height and 10m centres: 22 lux average horizontal illuminance at ground level

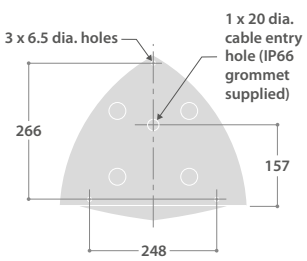
Area distribution

Wide distribution

DIMENSIONS







Appendix 2 - External Lighting Layout

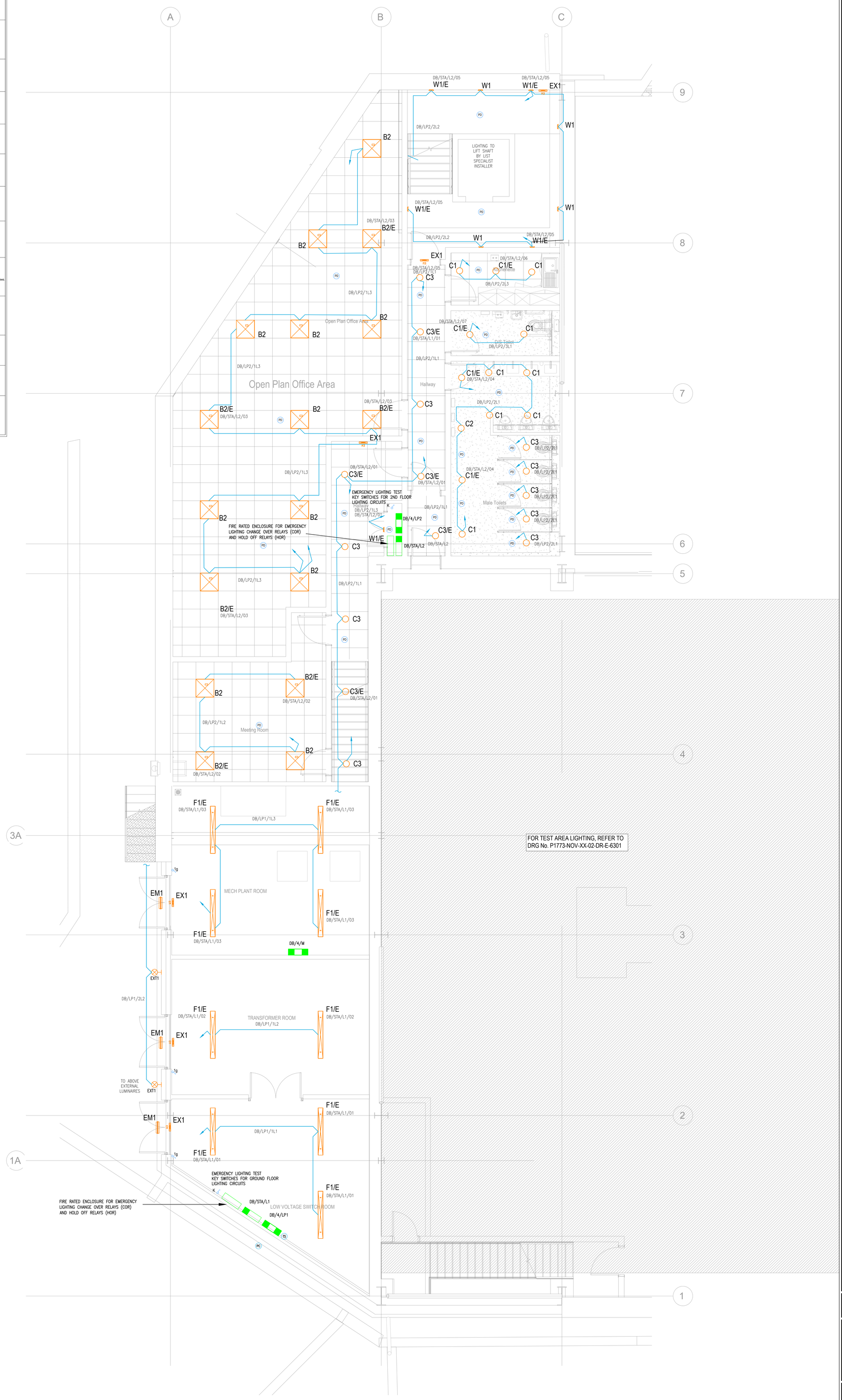
PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-00-DR-E-6301	T01

ARCHITECTURAL MODEL
2798_ACU_Detailed Revit Model
(Tender Stage)

STRUCTURAL MODEL
230222_DBS-AVE-00-XX-M3-S-001
_P00 Structural Revit Model

LIGHTING & EMERGENCY LIGHTING LEGEND

Image	Symbol	Reference
A1		**Thorlux Lighting- COMBOSEAL PLUS LED** **250W- 41100lm- 4000K, CRI 80+** Single point suspended LED high bay luminaire manufactured from cast aluminum full polyester powder coated RAL9006 silver. Smooth wipe clean surfaces with no dust traps, IP66. LED light engine providing 100,000-hour life. **/E- Denote's Luminaire supplied via Static Inverter**
B1/B1E		**Thorlux Lighting- XL-20 Recessed LED** **29W- 3705lm- 4000K – DALI Dimming** 600x600mm recessed LED luminaire manufactured from steel finished full polyester non-yellowing satin white RAL9016 with high performance low glare optic, IP40, LED light engine providing 95,000-hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. **/E- Denote's Luminaire supplied via Static Inverter**
B2/B2E		**Thorlux Lighting- XL-20 Recessed LED** **40W- 4835lm- 4000K – DALI Dimming** 600x600mm recessed LED luminaire manufactured from steel finished full polyester non-yellowing satin white RAL9016 with high performance low glare optic, IP40, LED light engine providing 95,000-hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. **/E- Denote's Luminaire supplied via Static Inverter**
C1/C1E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter IP65 Clear Glass** **16W- 2035lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
C2/C2E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter** **8W- 1215lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
C3/C3E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter IP65 Clear Glass** **8W- 1120lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
D1		**Thorlux Lighting- VISIO PRO** **113W- 16485lm- 4000K** 800mm - Suspended linear - silver aluminum body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
D2		**Thorlux Lighting- SOLOW LED** **122W- 19930lm- 4000K** 1400mm- Suspended linear- Silver aluminium body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
D3		**Thorlux Lighting- SOLOW LED** **228W- 33465lm- 4000K** 1400mm- Suspended linear- Silver aluminium body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
F1/F1E		**Thorlux Lighting- Thoroproof** **30W- 4900lm- 4000K** 1570mm- Suspended linear- High impact injection moulded polycarbonate body, IP65 **/E- Denote's Luminaire supplied via Static Inverter**
W1/W1E		**Thorlux Lighting- COBALT** **16W- 4000K- IP65** Circular surface impact-resistant luminaires. Satin polycarbonate cover secured via spun aluminium bezel using tamper-resistant pin Torx screws. **/E- Denote's Luminaire supplied via Static Inverter**
EX1		**Thorlux Lighting- LEXI 65- Emergency Exit Sign** Emergency exit luminaire ated at IP65 **Non Maintained Via Mains/Static Inverter**
EM1		**Thorlux Lighting- Eight 65 Bulkhead** Emergency bulkhead luminaire rated at IP65 **Non Maintained Via Mains/Static Inverter**
EXT1		**Thorlux Lighting- Realta** High performance wall mounted external bulkhead manufactured from strong diecast LM2 aluminium full polyester power coated graphite with silver option (RAL9006) and wide distribution. IP66. LED light engine providing 67,000-hour life, 400K CRI 80+ LUX guard LED PCB protection **Non Maintained Via Mains/Static Inverter Where Indicated**
EXT2		**Thorlux Lighting- Starguard** Floodlights with flat glass optic for full horizontal cut-off (meets the strictest UK national standards for the eradication of sky glow). High-elevation peak beam angle for outstanding area coverage. 140W, IP65, LED.



SWITCHING & CONTROLS LEGEND	
SYMBOL	REFERENCE
$X_{g/}$	ONE POLE ONE WAY SWITCH (X DENOTES NO. OF GANGES)
	ONE POLE TWO WAY SWITCH
$X_{g/CR}$	CENTRE RETRACTIVE SWITCH (X DENOTES NO. OF GANGS)
PD	MULTIFUNCTION AUTOMATIC LIGHTING CONTROL PRESENCE DETECTOR (360°)
AD	MULTIFUNCTION AUTOMATIC LIGHTING CONTROL ABSENCE DETECTOR (360°)
PC	PHOTO ELECTRIC SWITCH (PHOTOCELL)
TS	TIME SWITCH/CLOCK

DESIGNERS RISK ASSESSMENT
under section 11, 18 - Construction (Design and Management) Regulations 2015

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION
there are no significant, unusual or location specific risks which are not obvious to a competent contractor or likely to be difficult to manage

LIGHTING NOTES:

1. THE LIGHTING INSTALLATION SHALL BE INSTALLED IN ACCORDANCE WITH BS7671 IET WIRING REGULATIONS AND APPLICABLE BRITISH STANDARDS.

2. THE LIGHTING FINAL CIRCUIT CABLING SHALL BE INSTALLED IN LSF/Cu SINGLES CABLES INSTALLED WITHIN GALVANISED STEEL TRUNKING/CONDUIT.

3. ALL LIGHTING ACCESSORIES/OUTLETS TO ALL OFFICE/INDUSTRIAL AREAS, STORAGE AREAS, TO BE WHITE PVC FLUSH MOUNTED UNLESS DETAILED OTHERWISE. ALL SWITCH ROOMS, PLANT ROOMS, RISERS AND EXTERNALS WHICH SHALL BE OF THE METAL CLAD TYPE. A SAMPLE BOARD IS TO BE PROVIDED TO OBTAIN CLIENT & ARCHITECT SIGN OFF FOR THE RESPECTIVE ACCESSORIES/OUTLETS.

4. FINAL LOCATIONS AND HEIGHTS OF ACCESSORIES AND OUTLETS ARE TO BE AGREED WITH THE ARCHITECT AND CLIENT PRIOR TO INSTALLATION. REFERENCE SHOULD BE MADE TO THE RESPECTIVE ELEVATIONAL DETAILED DRAWINGS.

5. PLEASE REFER TO THE LUMINAIRE SCHEDULES FOR THE PROPOSED LUMINAIRE SELECTIONS AND TYPES THROUGHOUT THE PROJECT. SAMPLES TO BE PROVIDED FOR CLIENT AND ARCHITECT SIGN OFF PRIOR TO INSTALLATION.

6. EXACT LUMINAIRE CUT OUT DIMENSIONS TO BE PROVIDED TO THE CONTRACTOR TO ENABLE HOLES TO BE FORMED WITHIN CEILINGS. ADDITIONAL CEILING FIXING SUPPORT AND NOGGINS TO BE PROVIDED AS REQUIRED, TO PROVIDE THE NECESSARY SUPPORT WITHIN THE CEILING FOR THE INSTALLED LUMINAIRES.

7. ANY REMOTE CONTROL GEAR FOR LUMINAIRES SHALL BE INDEPENDENTLY SUPPORTED FROM THE STRUCTURE AND SHALL NOT BE LAID ON THE BACK OF ANY CEILING SYSTEMS.

8. ALL MULTIFUNCTIONAL AUTOMATIC LIGHTING CONTROL DETECTORS I.E. PASSIVE, ABSENCE AND MICROWAVE ARE TO BE CORRECTLY SELECTED TO ENSURE FULL COVERAGE AND TO AVOID DEAD SPOTS. DETECTORS TO HAVE ADJUSTABLE TIME CONTROL WHICH SHALL BE SET TO 15 MINUTES. DETECTORS TO BE SELECTED TO SUIT AS INSTALLED MOUNTING HEIGHTS TO ENSURE OPTIMUM COVERAGE IS PROVIDED IN ACCORDANCE WITH THE SPECIFIC MANUFACTURERS RECOMMENDATIONS.

9. UNLESS STATED OTHERWISE EMERGENCY LIGHTING SHALL BE SUPPLIED VIA STATIC INVERTER & CHANGE OVER RELAY. TESTING SHALL BE PROVIDED VIA TEST KEY SWITCHES ENGRAVED "EMERGENCY LIGHTING TEST ". TEST KEY SWITCHES TO BE TERMINATED SO AS NOT TO EXTINGUISH THE GENERAL LIGHTING DURING TEST PURPOSES FOR COMPLIANCE WITH BS5266.

10. PLEASE REFER TO THE ACCOMPANYING CIRCUIT CHARTS FOR ALL LIGHTING FINAL CIRCUIT CABLE SIZES/TYPES AND CIRCUIT PROTECTIVE DEVICE SIZES/RATINGS.

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4
Technical Design

S03	T01	TENDER ISSUE	MH	GP	10.03.23
STA	REV	DESCRIPTION	DES	CHD	DATE

SUITABILITY STATUS
FOR REVIEW & COMMENT

NOVO Integration Ltd
7 Feast Field, Horsforth, Leeds,
West Yorkshire, LS18 4TJ
t: +44(0)113 2577300 e: novocad@novo.eu.com

CLIENT
Santasalo
David Brown Santasalo

ARCHITECT
ACUMEN Designers & Architects

PROJECT
BUILDING 4

TITLE
ELECTRICAL SERVICES
GROUND FLOOR - MAIN OFFICE AREA
LIGHTING & EMERGENCY LIGHTING

SCALE	ORIGINAL SIZE	DATE
1:50	A0	MAR '23
DRAWN	DESIGNED	CHECKED
EG	MH	GP

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-00-DR-E-6301	T01

LIGHTING & EMERGENCY LIGHTING

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-00-DR-E-6302	T01

ARCHITECTURAL MODEL	STRUCTURAL MODEL
2798_ACU_Detailed Revit Model (Tender Stage)	230222_DBS-AVE-00-XX-M3-S-001 _P00 Structural Revit Model

LIGHTING & EMERGENCY LIGHTING LEGEND

Image	Symbol	Reference
A1		**Thorlux Lighting- COMBOSEAL PLUS LED** **250W- 41100lm- 4000K, CRI 80+** Single point suspended LED high bay luminaire manufactured from cast aluminum full polyester powder coated RAL9006 silver. Smooth wipe clean surfaces with no dust traps, IP66. LED light engine providing 100,000-hour life. **/E- Denote's Luminaire supplied via Static Inverter**
B1/B1E		**Thorlux Lighting- XL-20 Recessed LED** **29W- 3705lm- 4000K – DALI Dimming** 600x600mm recessed LED luminaire manufactured from steel finished full polyester non-yellowing satin white RAL9016 with high performance low glare optic, IP40, LED light engine providing 95,000-hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. **/E- Denote's Luminaire supplied via Static Inverter**
B2/B2E		**Thorlux Lighting- XL-20 Recessed LED** **40W- 4835lm- 4000K – DALI Dimming** 600x600mm recessed LED luminaire manufactured from steel finished full polyester non-yellowing satin white RAL9016 with high performance low glare optic, IP40, LED light engine providing 95,000-hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. **/E- Denote's Luminaire supplied via Static Inverter**
C1/C1E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter IP65 Clear Glass** **16W- 2035lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
C2/C2E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter** **8W- 1215lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
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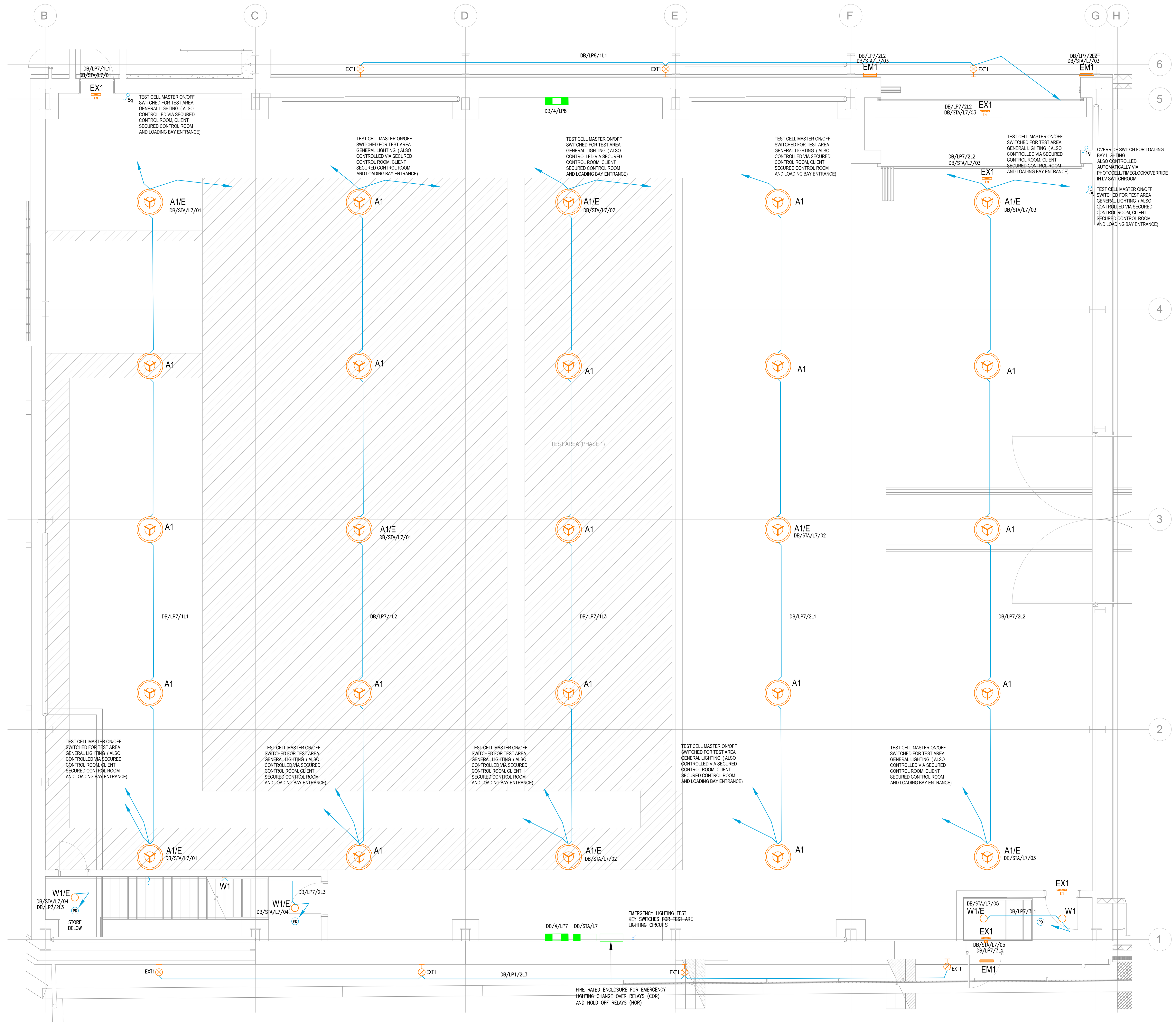

DESIGNERS RISK ASSESSMENT
under section 11, 18 - Construction (Design and Management) Regulations 2015

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION
there are no significant, unusual or location specific risks which are not obvious to a competent contractor or likely to be difficult to manage

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SWITCHING & CONTROLS LEGEND

SYMBOL	REFERENCE
Xg	ONE POLE ONE WAY SWITCH (X DENOTES NO. OF GANGES)
	ONE POLE TWO WAY SWITCH
Xg CR	CENTRE RETRACTIVE SWITCH (X DENOTES NO. OF GANGS)
PD	MULTIFUNCTION AUTOMATIC LIGHTING CONTROL PRESENCE DETECTOR (360°)
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TS	TIME SWITCH/CLOCK

4 Technical Design

STA	REV	DESCRIPTION	DES	CHD	DATE
S03	T01	TENDER ISSUE	MH	GP	10.03.23

SUITABILITY STATUS
FOR REVIEW & COMMENT

NOVO Integration Ltd
7 Feast Field, Horsforth, Leeds, West Yorkshire, LS18 4TJ
t: +44(0)113 2577300 e: novocad@novo.eu.com

CLIENT: Santasalo — David Brown Santasalo

ARCHITECT: ACUMEN Designers & Architects

PROJECT: BUILDING 4

TITLE: ELECTRICAL SERVICES
GROUND FLOOR - TEST AREA
LIGHTING & EMERGENCY LIGHTING

SCALE	ORIGINAL SIZE	DATE
1:50	A0	MAR '23
DRAWN	DESIGNED	CHECKED
JV	MH	GP

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-00-DR-E-6302	T01

LIGHTING & EMERGENCY LIGHTING

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-01-DR-E-6301	T01

ARCHITECTURAL MODEL
2798_ACU_Detailed Revit Model (Tender Stage)

STRUCTURAL MODEL
230222_DBS-AVE-00-XX-M3-S-001 _P00 Structural Revit Model

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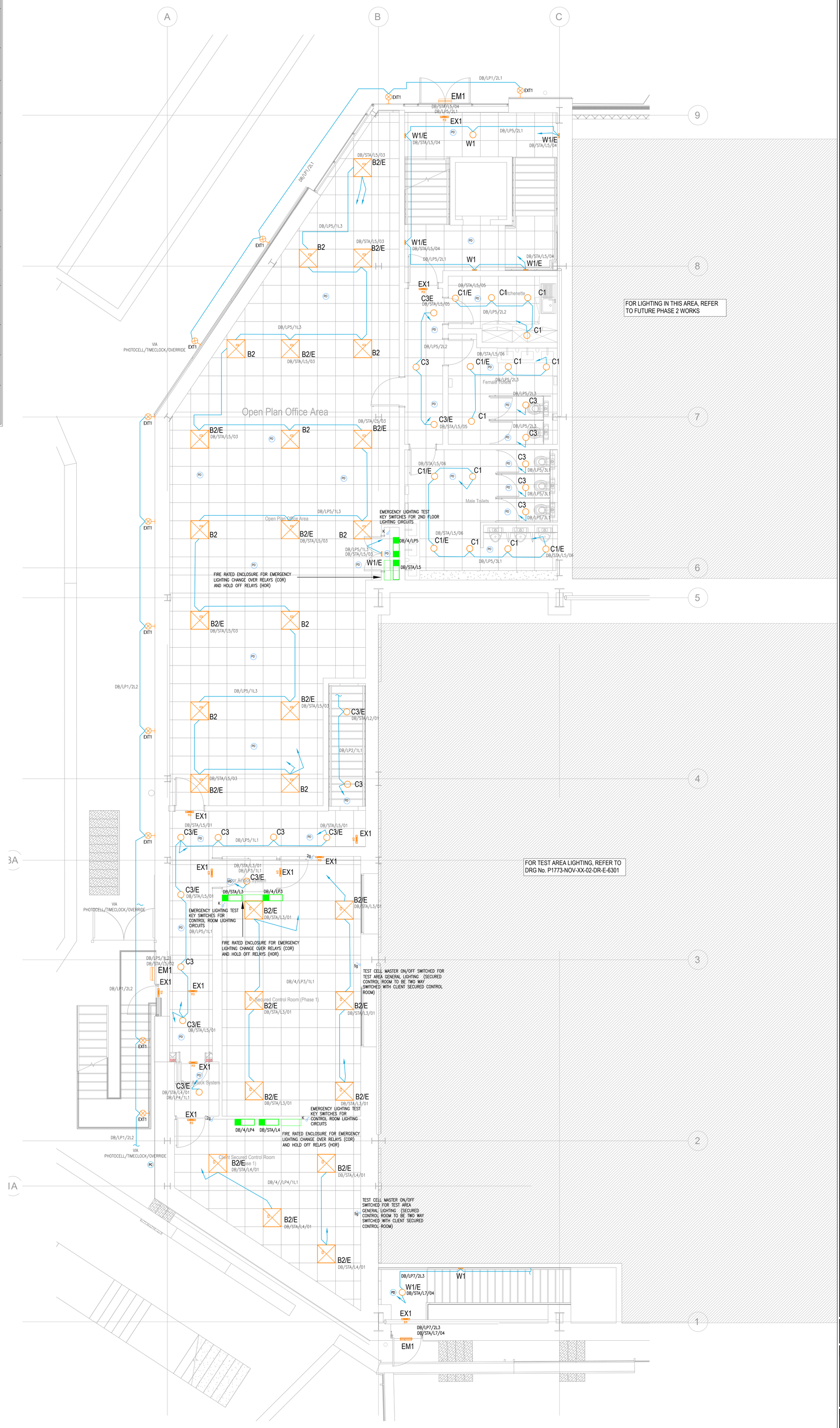

0 1 2 3 4 5m
1:50 SCALE

SWITCHING & CONTROLS LEGEND	
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4 Technical Design

S03	T01	TENDER ISSUE	MH	GP	10.03.23
STA	REV	DESCRIPTION	DES	CHD	DATE

SUITABILITY STATUS
FOR REVIEW & COMMENT

NOVO Integration Ltd
7 Feast Field, Horsforth, Leeds,
West Yorkshire, LS18 4TJ
t: +44(0)113 2577300 e: novocad@novo.eu.com

CLIENT
Santasalo
David Brown Santasalo

ARCHITECT
ACUMEN Designers & Architects

PROJECT
BUILDING 4

TITLE
ELECTRICAL SERVICES
FIRST FLOOR - MAIN OFFICE AREA
LIGHTING & EMERGENCY LIGHTING

SCALE	ORIGINAL SIZE	DATE
1:50	A0	MAR '23
DRAWN	DESIGNED	CHECKED
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PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-01-DR-E-6301	T01

LIGHTING & EMERGENCY LIGHTING

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER	REVISION
P1773-NOV-XX-02-DR-E-6301	T01

ARCHITECTURAL MODEL
2798_ACU_Detailed Revit Model (Tender Stage)

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230222_DBS-AVE-00-XX-M3-S-001 _P00 Structural Revit Model

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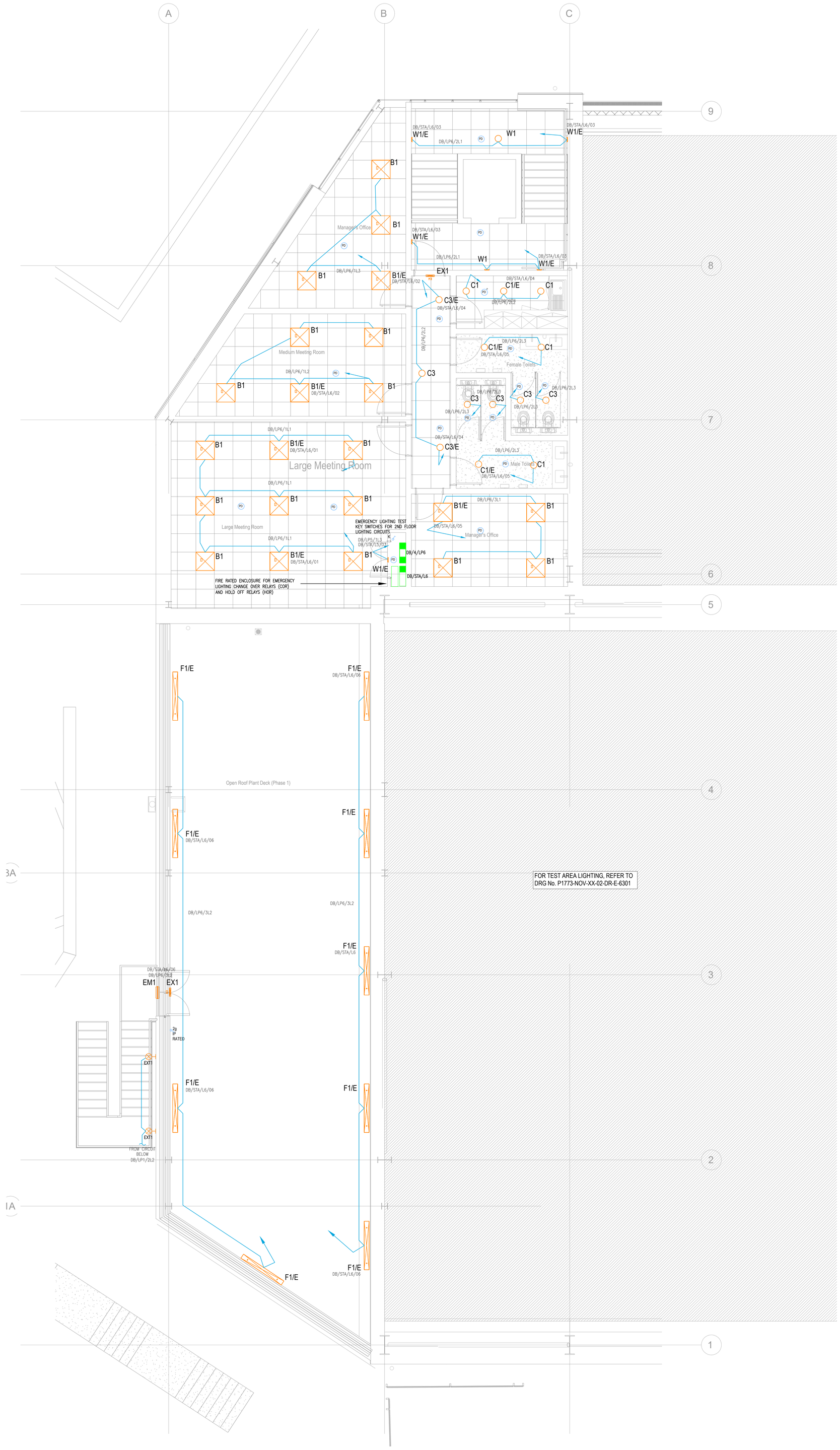
B2/B2E		**Thorlux Lighting- XL-20 Recessed LED** **40W- 4835lm- 4000K – DALI Dimming** 600x600mm recessed LED luminaire manufactured from steel finished full polyester non-yellowing satin white RAL9016 with high performance low glare optic, IP40, LED light engine providing 95,000-hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. **/E- Denote's Luminaire supplied via Static Inverter**
C1/C1E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter IP65 Clear Glass** **16W- 2035lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
C2/C2E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter** **8W- 1215lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
C3/C3E		**Thorlux Lighting- G3 Circular LED Recessed Downlighter IP65 Clear Glass** **8W- 1120lm- 4000K** Recessed luminaires with injection moulded reflector finished white. Open, louvre. **/E- Denote's Luminaire supplied via Static Inverter**
D1		**Thorlux Lighting- VISIO PRO** **113W- 16485lm- 4000K** 800mm - Suspended linear - silver aluminum body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
D2		**Thorlux Lighting- SOLOW LED** **122W- 19930lm- 4000K** 1400mm- Suspended linear- Silver aluminium body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
D3		**Thorlux Lighting- SOLOW LED** **228W- 33465lm- 4000K** 1400mm- Suspended linear- Silver aluminium body, high quality control gear, 100,000-hour LED life expectancy, IP66 **/E- Denote's Luminaire supplied via Static Inverter**
F1/F1E		**Thorlux Lighting- Thorproof** **30W- 4900lm- 4000K** 1570mm- Suspended linear- High impact injection moulded polycarbonate body, IP65 **/E- Denote's Luminaire supplied via Static Inverter**
W1/W1E		**Thorlux Lighting- COBALT** **16W- 4000K- IP65** Circular surface impact-resistant luminaires. Satin polycarbonate cover secured via spun aluminium bezel using tamper-resistant pin Torx screws. **/E- Denote's Luminaire supplied via Static Inverter**
EX1		**Thorlux Lighting- LEXI 65- Emergency Exit Sign** Emergency exit luminaire ated at IP65 **Non Maintained Via Mains/Static Inverter**
EM1		**Thorlux Lighting- Eight 65 Bulkhead** Emergency bulkhead luminaire rated at IP65 **Non Maintained Via Mains/Static Inverter**
EXT1		**Thorlux Lighting- Realta** High performance wall mounted external bulkhead manufactured from strong diecast LM2 aluminium full polyester power coated graphite with silver option (RAL9006) and wide distribution. IP66. LED light engine providing 67,000-hour life, 400K CRI 80+ LUX guard LED PCB protection **Non Maintained Via Mains/Static Inverter Where Indicated**
EXT2		**Thorlux Lighting- Starguard** Floodlights with flat glass optic for full horizontal cut-off (meets the strictest UK national standards for the eradication of sky glow). High elevation peak beam angle for outstanding area coverage. 140W, IP65, LED.



0 1 2 3 4 5m
1:50 SCALE

DESIGNERS RISK ASSESSMENT
under section 11, 18 - Construction (Design and Management) Regulations 2015

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION
there are no significant, unusual or location specific risks which are not obvious to a competent contractor or likely to be difficult to manage

LIGHTING NOTES:

1. THE LIGHTING INSTALLATION SHALL BE INSTALLED IN ACCORDANCE WITH BS7671 IET WIRING REGULATIONS AND APPLICABLE BRITISH STANDARDS.

2. THE LIGHTING FINAL CIRCUIT CABLING SHALL BE INSTALLED IN LSF/Cu SINGLES CABLES INSTALLED WITHIN GALVANISED STEEL TRUNKING/CONDUIT.

3. ALL LIGHTING ACCESSORIES/OUTLETS TO ALL OFFICE/INDUSTRIAL AREAS, STORAGE AREAS, TO BE WHITE PVC FLUSH MOUNTED UNLESS DETAILED OTHERWISE. ALL SWITCH ROOMS, PLANT ROOMS, RISERS AND EXTERNALS WHICH SHALL BE OF THE METAL CLAD TYPE. A SAMPLE BOARD IS TO BE PROVIDED TO OBTAIN CLIENT & ARCHITECT SIGN OFF FOR THE RESPECTIVE ACCESSORIES/OUTLETS.

4. FINAL LOCATIONS AND HEIGHTS OF ACCESSORIES AND OUTLETS ARE TO BE AGREED WITH THE ARCHITECT AND CLIENT PRIOR TO INSTALLATION. REFERENCE SHOULD BE MADE TO THE RESPECTIVE ELEVATIONAL DETAILED DRAWINGS.

5. PLEASE REFER TO THE LUMINAIRE SCHEDULES FOR THE PROPOSED LUMINAIRE SELECTIONS AND TYPES THROUGHOUT THE PROJECT. SAMPLES TO BE PROVIDED FOR CLIENT AND ARCHITECT SIGN OFF PRIOR TO INSTALLATION.

6. EXACT LUMINAIRE CUT OUT DIMENSIONS TO BE PROVIDED TO THE CONTRACTOR TO ENABLE HOLES TO BE FORMED WITHIN CEILINGS. ADDITIONAL CEILING FIXING SUPPORT AND NOGGINS TO BE PROVIDED AS REQUIRED, TO PROVIDE THE NECESSARY SUPPORT WITHIN THE CEILING FOR THE INSTALLED LUMINAIRES.

7. ANY REMOTE CONTROL GEAR FOR LUMINAIRES SHALL BE INDEPENDENTLY SUPPORTED FROM THE STRUCTURE AND SHALL NOT BE LAID ON THE BACK OF ANY CEILING SYSTEMS.

8. ALL MULTIFUNCTIONAL AUTOMATIC LIGHTING CONTROL DETECTORS I.E. PASSIVE, ABSENCE AND MICROWAVE ARE TO BE CORRECTLY SELECTED TO ENSURE FULL COVERAGE AND TO AVOID DEAD SPOTS. DETECTORS TO HAVE ADJUSTABLE TIME CONTROL WHICH SHALL BE SET TO 15 MINUTES. DETECTORS TO BE SELECTED TO SUIT AS INSTALLED MOUNTING HEIGHTS TO ENSURE OPTIMUM COVERAGE IS PROVIDED IN ACCORDANCE WITH THE SPECIFIC MANUFACTURERS RECOMMENDATIONS.

9. UNLESS STATED OTHERWISE EMERGENCY LIGHTING SHALL BE SUPPLIED VIA STATIC INVERTER & CHANGE OVER RELAY. TESTING SHALL BE PROVIDED VIA TEST KEY SWITCHES ENGRAVED "EMERGENCY LIGHTING TEST ". TEST KEY SWITCHES TO BE TERMINATED SO AS NOT TO EXTINGUISH THE GENERAL LIGHTING DURING TEST PURPOSES FOR COMPLIANCE WITH BS5266.

10. PLEASE REFER TO THE ACCOMPANYING CIRCUIT CHARTS FOR ALL LIGHTING FINAL CIRCUIT CABLE SIZES/TYPES AND CIRCUIT PROTECTIVE DEVICE SIZES/RATINGS.

11. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ACCOMPANYING M & E SERVICES GENERAL ARRANGEMENT LAYOUTS.

12. WHERE LUMINAIRES ARE SUSPENDED FROM THE CEILING THEN BUILDING CONTRACTOR IS TO PROVIDE THE APPROPRIATE CEILING SUPPORTS, TO ENABLE A SECURE FIXING TO BE MADE FOR THE PROPRIETARY WIRE SUSPENSIONS. THESE SUSPENSION POINTS SHALL BE STRATEGICALLY POSITIONED TO SUIT THE MANUFACTURERS RECOMMENDATIONS.

13. WHERE ACCESSIBLE CEILINGS ARE PRESENT THEN CONNECTIONS TO LUMINAIRES SHALL BE TERMINATED INTO PLUG IN CEILING ROSES FOR GENERAL LUMINAIRES AND RED FIRE RESISTANT CEILING ROSES FOR EMERGENCY LUMINAIRES (ENSURING FIRE RATING IS MAINTAINED), AND SUITABLE RATED FOR THE CONNECTED LOAD CURRENT.

14. EXTERNAL LIGHTING CONTROLLED VIA TIME CLOCK & PHOTOCELL ARRANGEMENT.

15. ALLOW FOR FIXING OF WALL MOUNTED CUBICLES/ENCLOSURES TO HEAVY DUTY UNISTRUT. UNISTRUT SHALL BE SECURELY FASTENED TO INTERNAL CLADDING RAILS/CROSS BRACES AND INTERNAL STRUCTURAL ELEMENTS OF THE BUILDING.

16. LIGHTING CONTROLS VIA CP ELECTRONICS AS SPECIFIED BELOW TO INTERNAL AREAS:
-OFFICE LIGHTING TO BE CONTROLLED VIA PRESENCE DETECTORS (NO DAYLIGHT)
-STAIRWELL LIGHTING TO BE CONTROLLED VIA PRESENCE DETECTORS C/W PHOTOCELL
WHERE DAYLIGHT PRESENT TO HOLD OFF LUMINAIRES IF ADEQUATE NATURAL DAYLIGHT FOR ENERGY CONSERVATION.
-CIRCULATION AREAS, WC'S, TEA POINTS TO BE VIA PRESENCE DETECTION.
-TEST AREAS, CONTROL ROOMS, PLANT ROOMS TO BE VIA MANUAL SWITCHING.

SWITCHING & CONTROLS LEGEND

SYMBOL	REFERENCE
Xg	ONE POLE ONE WAY SWITCH (X DENOTES NO. OF GANGES)
	ONE POLE TWO WAY SWITCH
Xg/CR	CENTRE RETRACTIVE SWITCH (X DENOTES NO. OF GANGS)
PD	MULTIFUNCTION AUTOMATIC LIGHTING CONTROL PRESENCE DETECTOR (360°)
AD	MULTIFUNCTION AUTOMATIC LIGHTING CONTROL ABSENCE DETECTOR (360°)
PC	PHOTO ELECTRIC SWITCH (PHOTOCELL)
TS	TIME SWITCH/CLOCK

4 Technical Design

S03	T01	TENDER ISSUE	MH	GP	10.03.23
STA	REV	DESCRIPTION	DES	CHD	DATE

SUITABILITY STATUS
FOR REVIEW & COMMENT

NOVO Integration Ltd
7 Feast Field, Horsforth, Leeds,
West Yorkshire, LS18 4TJ
t: +44(0)113 2577300 e: novocad@novo.eu.com

CLIENT: Santasalo / David Brown Santasalo

ARCHITECT: ACUMEN Designers & Architects

PROJECT: BUILDING 4

TITLE: ELECTRICAL SERVICES
FIRST FLOOR - MAIN OFFICE AREA
LIGHTING & EMERGENCY LIGHTING

SCALE	ORIGINAL SIZE	DATE
1:50	A0	MAR '23
DRAWN	DESIGNED	CHECKED
EG	MH	GP

PROJECT I ORIGINATOR I ZONE I LEVEL I TYPE I ROLE I CLASS I NUMBER: P1773-NOV-XX-02-DR-E-6301
REVISION: T01

LIGHTING & EMERGENCY LIGHTING

Appendix 3 - External Lighting Calculations

Installation : Marine Assembly 4-DBS

Project number	:	P1773
Customer	:	David Brown Santasalo
Processed by	:	Michael Houlding
Date	:	08.06.2023

Project description:
Phase 1 _2 for Marine Assembly 4-DBS, External Lighting

1 Luminaire data

1.1 Thorlux Lighting, Realta (RL19071)

1.1.1 Data sheet

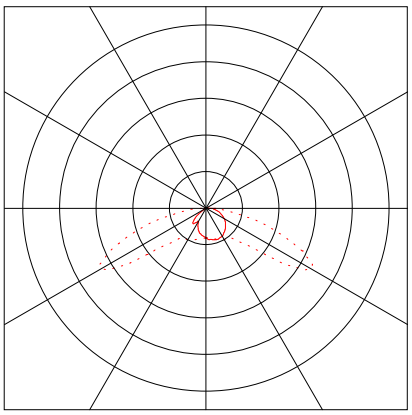
Manufacturer: Thorlux Lighting

RL19071 Realta

Luminaire data		
Luminaire efficiency	:	100%
Luminaire efficacy	:	120 lm/W
Classification	:	A30 ↓98.3% ↑1.7%
CIE Flux Codes	:	26 60 91 98 100
UGR 4H 8H	:	24.3 / 33.5
Power	:	11 W
Luminous flux	:	1320 lm

Equipped with		
Quantity	:	1
Designation	:	Realta LED - 8W - Wide Distribution -
Colour	:	4000
Luminous flux	:	1320 lm
Colour reproduction	:	80

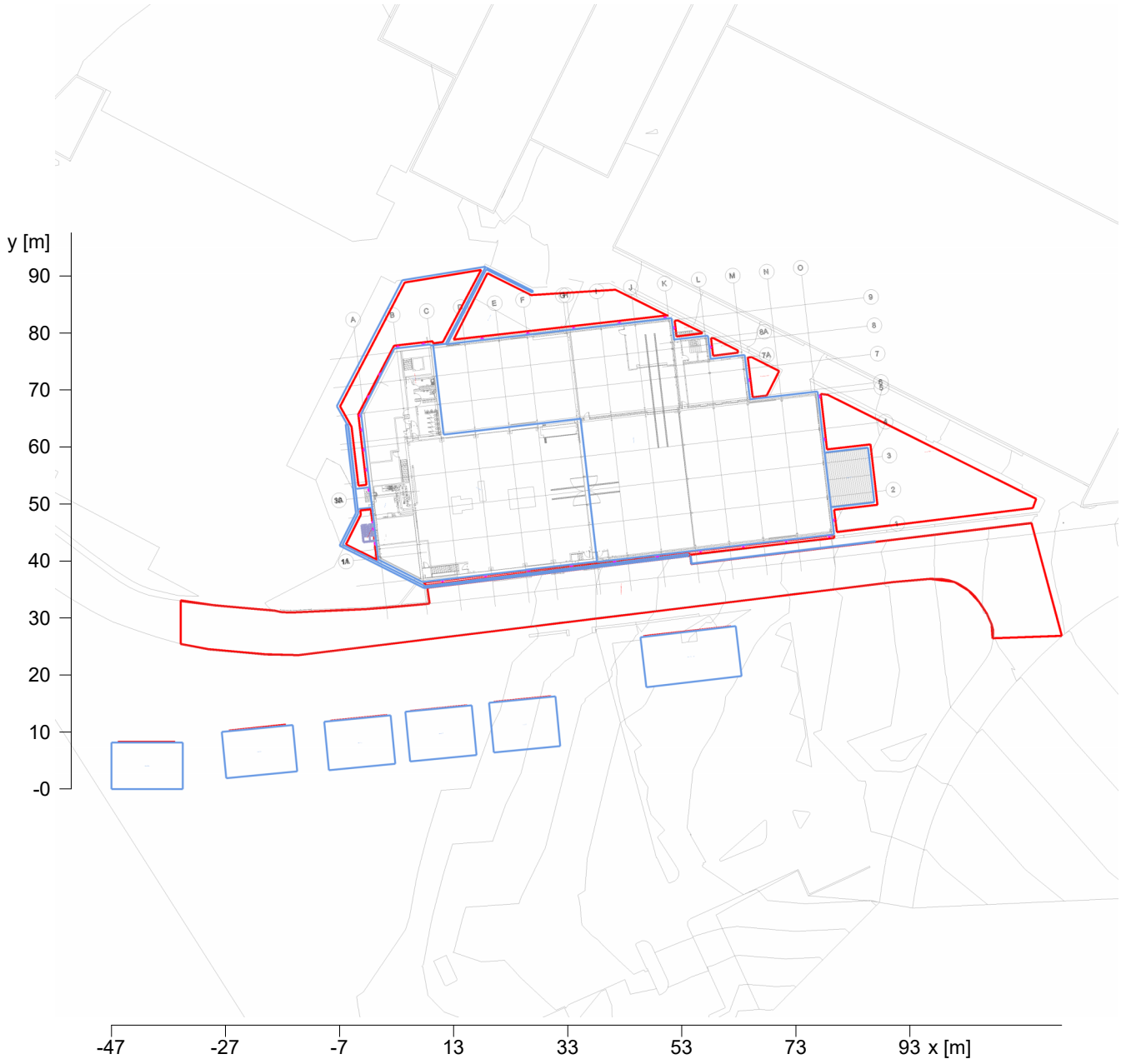
Dimensions : 360 mm x 260 mm x 330 mm



2 Exterior 1

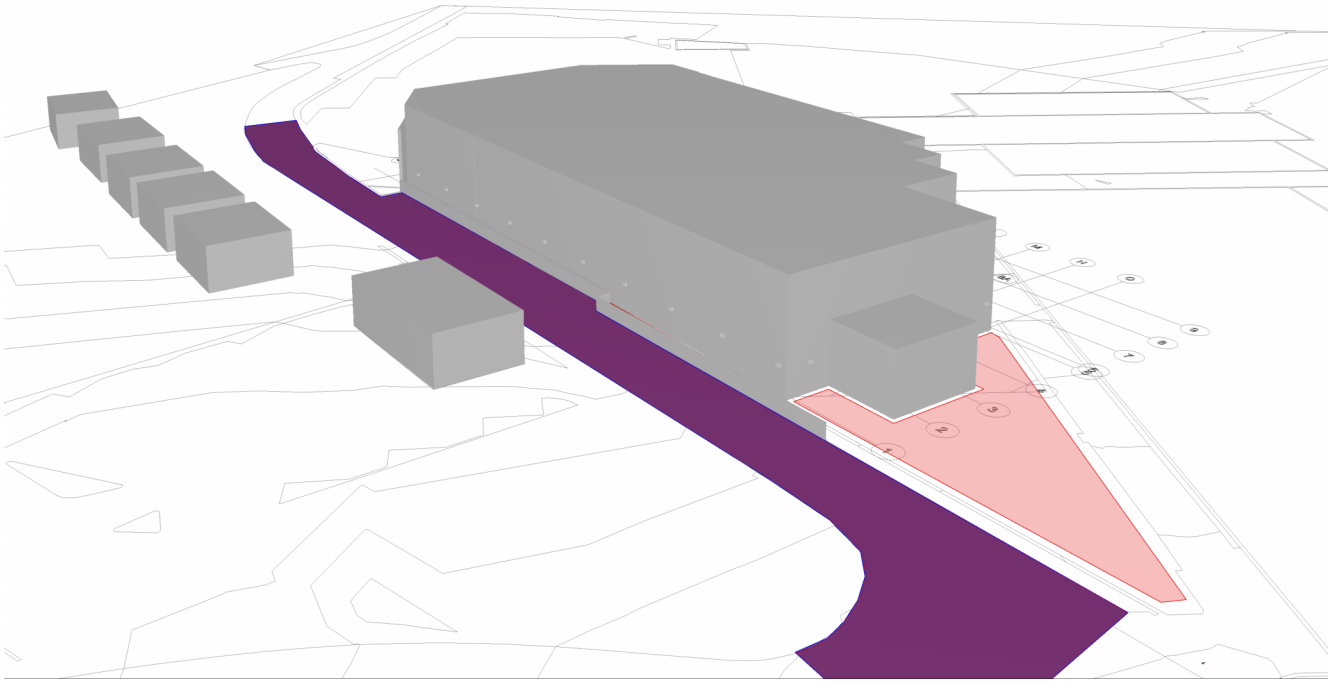
2.1 Description, Exterior 1

2.1.1 Floor plan



2.1 Description, Exterior 1

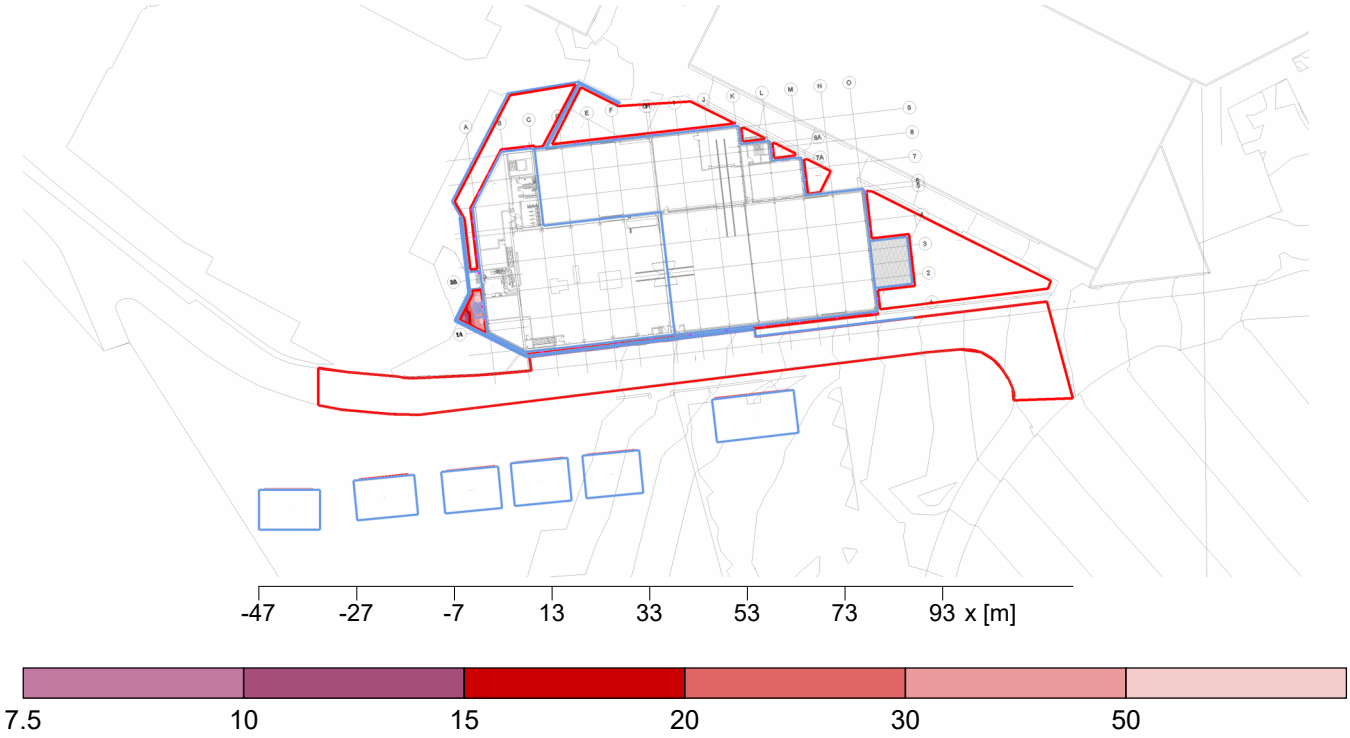
2.1.2 3D view, View 1



2 Exterior 1

2.2 Summary, Exterior 1

2.2.1 Result overview, West Side Grd. (Outside Pantrooms)



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	38.1 lx
Minimum illuminance	E_{min}	8.89 lx
Maximum illuminance	E_{max}	58.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:4.28 (0.23)
Diversity U_d	E_{min}/E_{max}	1:6.62 (0.15)

Type No.\Make

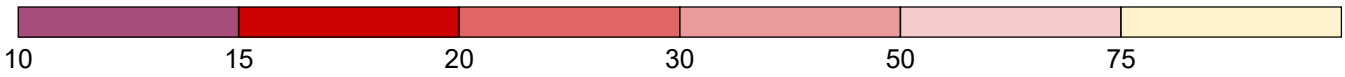
2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.2 Result overview, West Side 1st Floor Level



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	3.50 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	51.4 lx
Minimum illuminance	E_{min}	14.7 lx
Maximum illuminance	E_{max}	80.6 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:3.5 (0.29)
Diversity U_d	E_{min}/E_{max}	1:5.5 (0.18)

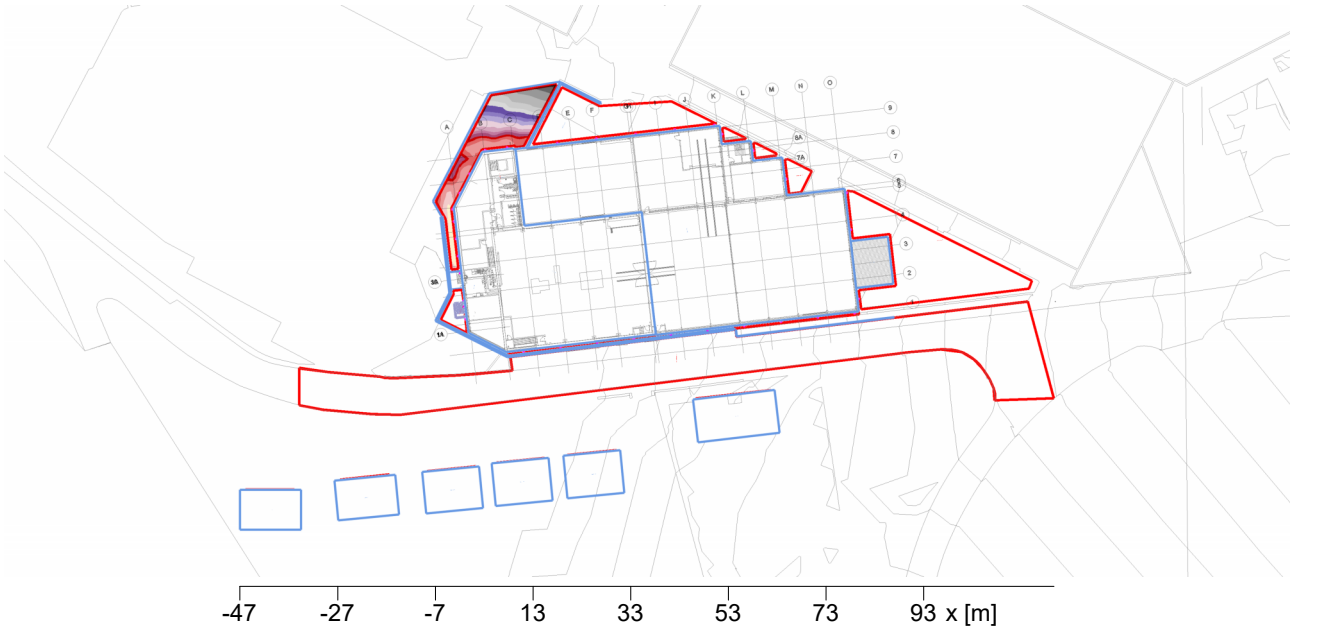
Type No.\Make

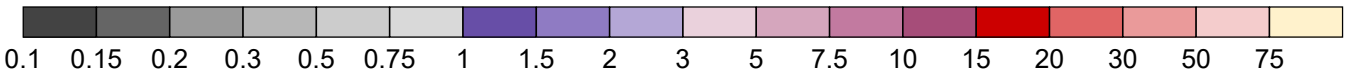
2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.3 Result overview, West Side / North Raised level





Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	2.40 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	19.8 lx
Minimum illuminance	E_{min}	0.14 lx
Maximum illuminance	E_{max}	95.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:141 (0.01)
Diversity U_d	E_{min}/E_{max}	1:680 (0)

Type No.\Make

2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.4 Result overview, South Side, Phase 1 Path

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	32.1 lx
Minimum illuminance	E_{min}	15.5 lx
Maximum illuminance	E_{max}	44.4 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:2.07 (0.48)
Diversity U_d	E_{min}/E_{max}	1:2.86 (0.35)

Type No.\Make

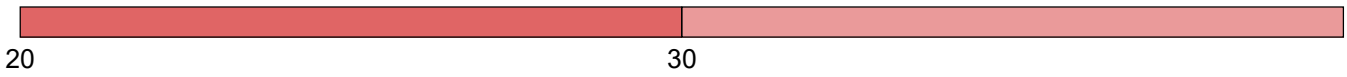
2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.5 Result overview, South Side, Phase 2 Path



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	32.1 lx
Minimum illuminance	E_{min}	24.9 lx
Maximum illuminance	E_{max}	43.6 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.29 (0.77)
Diversity U_d	E_{min}/E_{max}	1:1.75 (0.57)

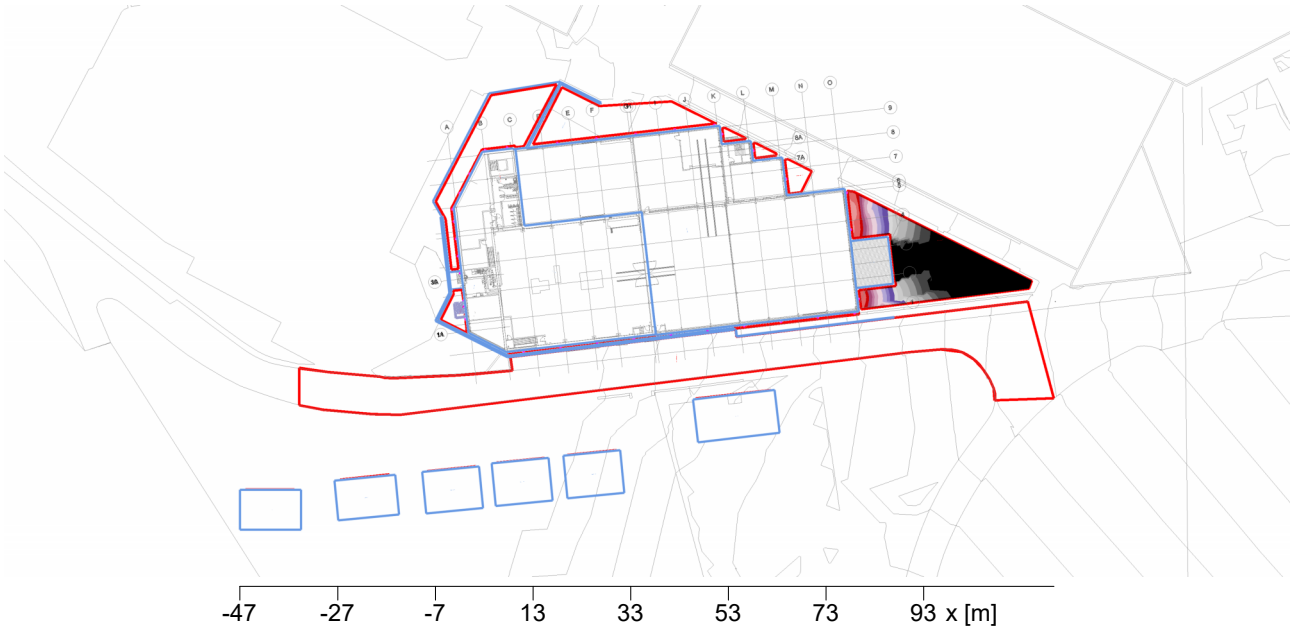
Type No.\Make

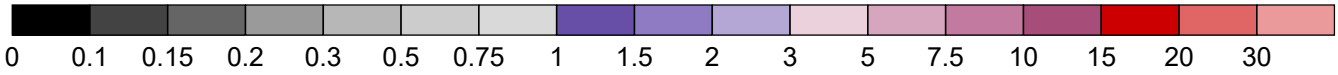
2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.6 Result overview, East Side, Phase 2, No. 1





Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	-0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	2.72 lx
Minimum illuminance	E_{min}	0.01 lx
Maximum illuminance	E_{max}	43.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:326 (0)
Diversity U_d	E_{min}/E_{max}	1:5260 (0)

Type No.\Make

2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.7 Result overview, East Side, Phase 2, No. 2

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	13.7 lx
Minimum illuminance	E_{min}	2.23 lx
Maximum illuminance	E_{max}	26 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:6.14 (0.16)
Diversity U_d	E_{min}/E_{max}	1:11.7 (0.09)

Type No.\Make

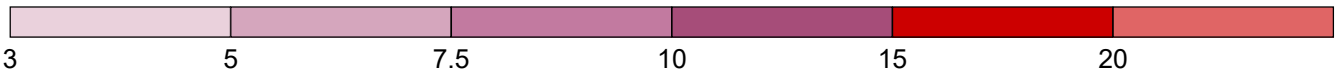
2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.8 Result overview, East Side, Phase 2, No. 3



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	-0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	17 lx
Minimum illuminance	E_{min}	3.42 lx
Maximum illuminance	E_{max}	28.2 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:4.97 (0.2)
Diversity U_d	E_{min}/E_{max}	1:8.25 (0.12)

Type No.\Make

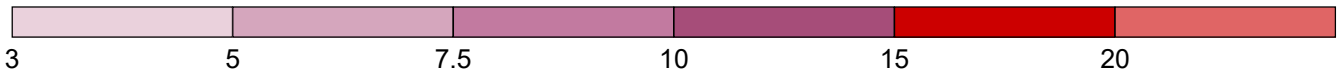
2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.9 Result overview, East Side, Phase 2, No.4



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	-0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	17.6 lx
Minimum illuminance	E_{min}	3.21 lx
Maximum illuminance	E_{max}	28.4 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:5.47 (0.18)
Diversity U_d	E_{min}/E_{max}	1:8.85 (0.11)

Type No.\Make

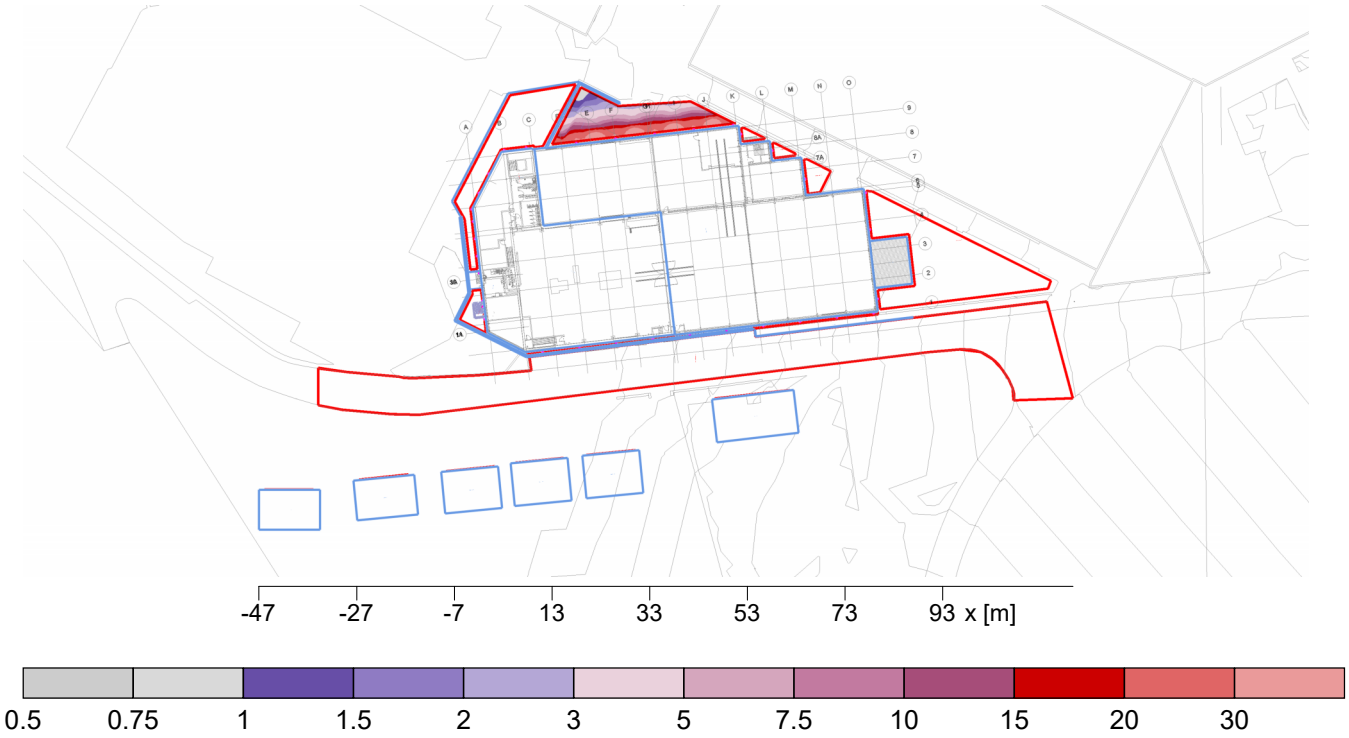
2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.10 Result overview, North Side, Phase 2



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	13.5 lx
Minimum illuminance	E_{min}	0.73 lx
Maximum illuminance	E_{max}	45 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:18.4 (0.05)
Diversity U_d	E_{min}/E_{max}	1:61.4 (0.02)

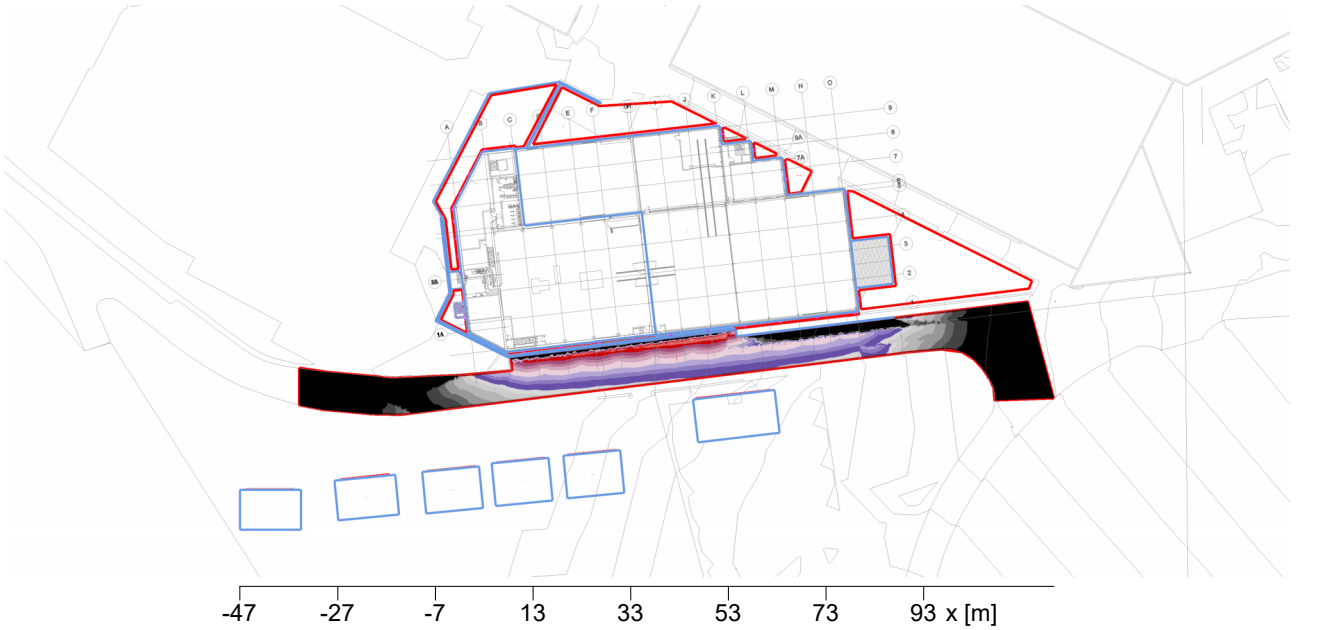
Type No.\Make

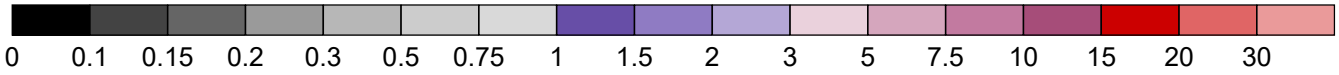
2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.11 Result overview, South Side Road - Nabcroft Lane





Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	2 lx
Minimum illuminance	E_{min}	0 lx
Maximum illuminance	E_{max}	32.9 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:--- (---)
Diversity U_d	E_{min}/E_{max}	1:--- (---)

Type No.\Make

2 36 x

Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.12 Result overview, House 60, 62 front elevation

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	0.09 lx
Minimum illuminance	E_{min}	0.07 lx
Maximum illuminance	E_{max}	0.11 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.3 (0.77)
Diversity U_d	E_{min}/E_{max}	1:1.68 (0.6)

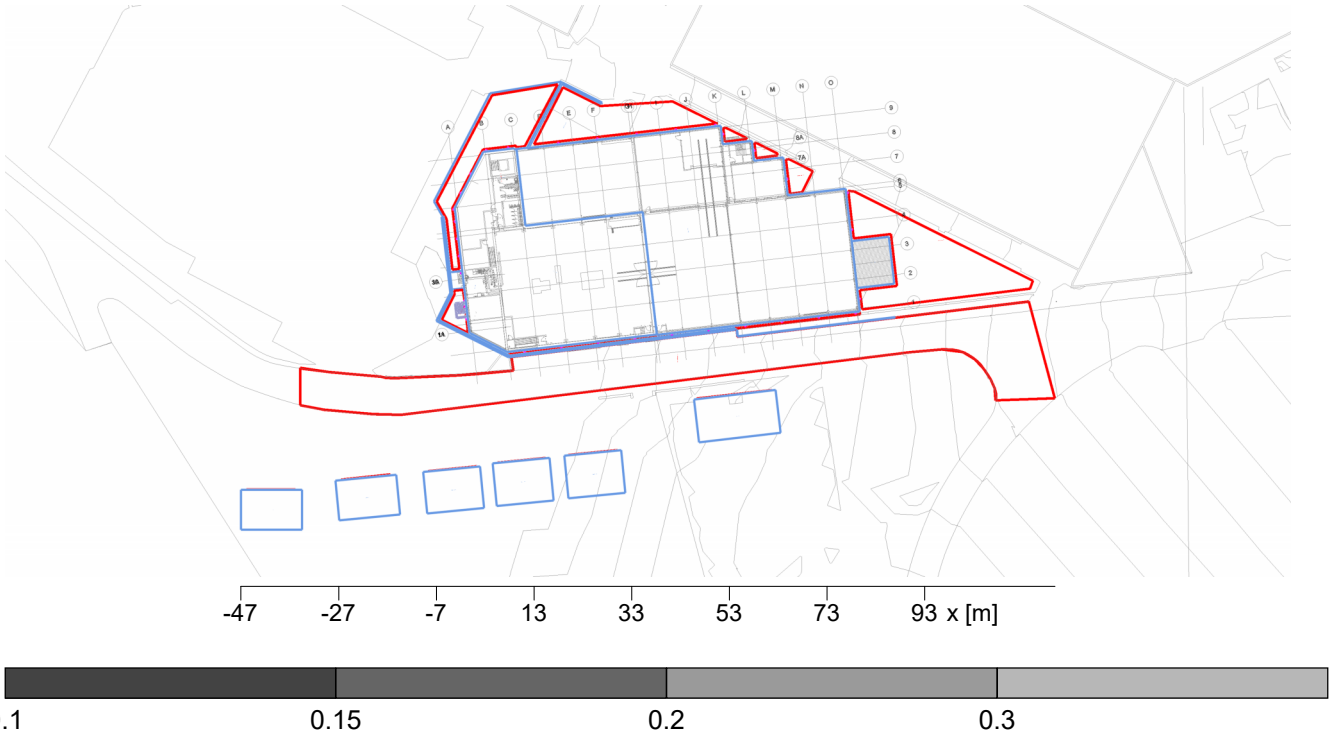
Type No.\Make

2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.13 Result overview, House 64, 66 front elevation



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	0.2 lx
Minimum illuminance	E_{min}	0.14 lx
Maximum illuminance	E_{max}	0.32 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.46 (0.69)
Diversity U_d	E_{min}/E_{max}	1:2.32 (0.43)

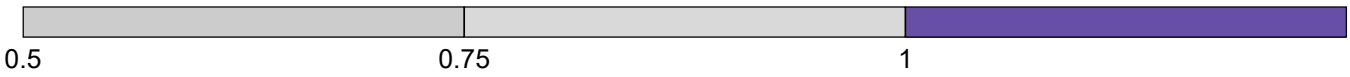
Type No.\Make

2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.14 Result overview, House 68, 70 front elevation



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	0.81 lx
Minimum illuminance	E_{min}	0.57 lx
Maximum illuminance	E_{max}	1.08 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.42 (0.7)
Diversity U_d	E_{min}/E_{max}	1:1.9 (0.53)

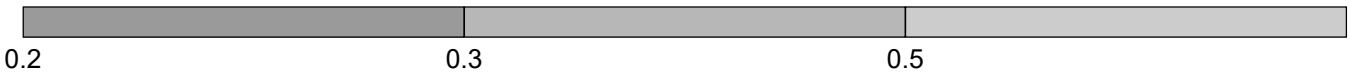
Type No.\Make

2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.15 Result overview, House 72, 74 front elevation



Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	0.41 lx
Minimum illuminance	E_{min}	0.29 lx
Maximum illuminance	E_{max}	0.57 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.44 (0.69)
Diversity U_d	E_{min}/E_{max}	1:1.98 (0.51)

Type No.\Make

2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.16 Result overview, House 76, 78 front elevation

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	0.63 lx
Minimum illuminance	E_{min}	0.52 lx
Maximum illuminance	E_{max}	0.74 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.2 (0.83)
Diversity U_d	E_{min}/E_{max}	1:1.42 (0.7)

Type No.\Make

2 36 x

Thorlux Lighting
Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2.2 Summary, Exterior 1

2.2.17 Result overview, House 80, 82, 84, 86 front elevation

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Maintenance factor	see luminaires / maintenance plan
Total luminous flux	47520 lm
Total power	396 W
Total power per area (1344.04 m²)	0.29 W/m²

Illuminance

Average illuminance	$\bar{E}_m$	1.36 lx
Minimum illuminance	E_{min}	1.08 lx
Maximum illuminance	E_{max}	1.65 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1.26 (0.79)
Diversity U_d	E_{min}/E_{max}	1:1.52 (0.66)

Type No.\Make

2 36 x

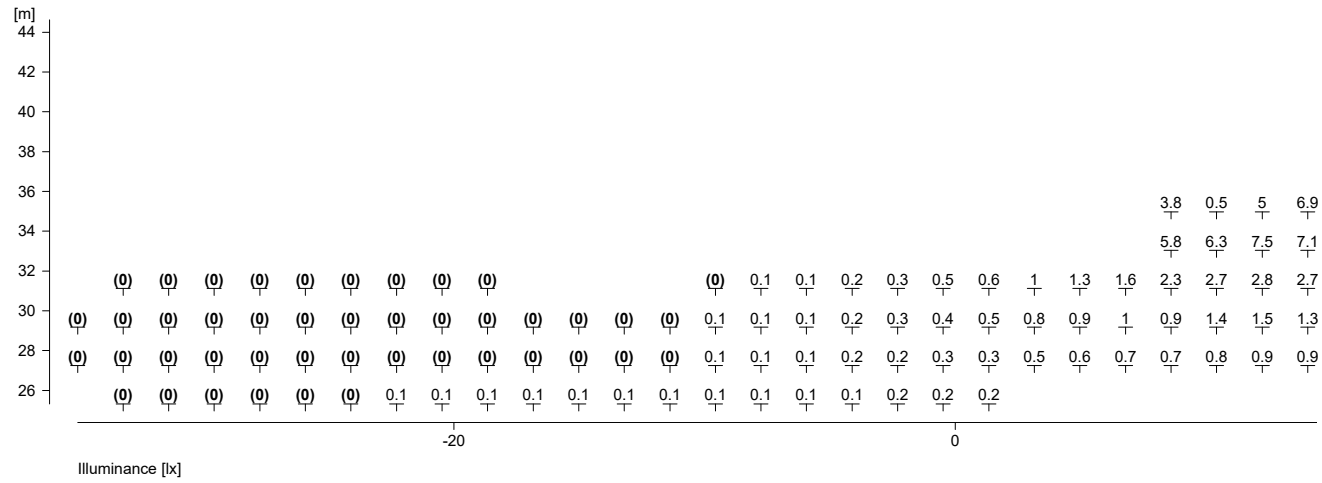
Thorlux Lighting

Order No. : RL19071
Luminaire name : Realta
Equipment : 1 x Realta LED - 8W - Wide Distribution - Polycarbonate Cover - 4000K 8 11 W / 1320 lm
Maintenance factor: 0.87

2 Exterior 1

2.3 Calculation results, Exterior 1

2.3.1 Table, Road (E)



Part1

Average illuminance	$\bar{E}_m$	: 1.8 lx
Minimum illuminance	E_{min}	: 0 lx
Maximum illuminance	E_{max}	: 20.9 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 312.85 (0.00)
Diversity U_d	E_{min}/E_{max}	: 1 : 3602.24 (0.00)

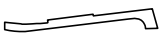
2 Exterior 1

2.3 Calculation results, Exterior 1

2.3.1 Table, Road (E)

																				16.5								(0)
												7.4	9	4.8	10.8	14.4	**[20.9]**	17.4	14	7.8	3.6	1.6	0.6	0.5	0.6	0.7	0.7
				3.3	4.9	4.2	5.3	5.5	8.2	9.4	12.7	10.3	10.4	11.6	11.6	9	8.1	9.1	6.9	5.3	4.1	3.2	2	1.2	1.1	1.3	1.4	1.4
2.5	9.8	12.1	10.4	13.1	12	10.3	9.7	7.6	8.2	7.1	6.6	4.7	4.7	4.7	4.1	3.4	3.6	3.5	3	2.7	2.4	2.3	1.8	1.4	1.5	1.5	1.5	1.5
6.4	8.2	8.4	4.6	4	4.4	4.1	3.4	3.2	3.2	2.6	3	2.4	2.2	2.3	1.9	1.9	1.8	1.8	1.7	1.5	1.6	1.6	1.2	1.3	1.3	1.2		
2.5	3.1	2.4	2.2	2	2	1.9	1.8	1.7	1.8	1.9	1.5	1.5	1.5	1.6	1.3	1.3	1.2	1.1										
1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.1	1.1	1.2																			
0.9																												

20 40 60

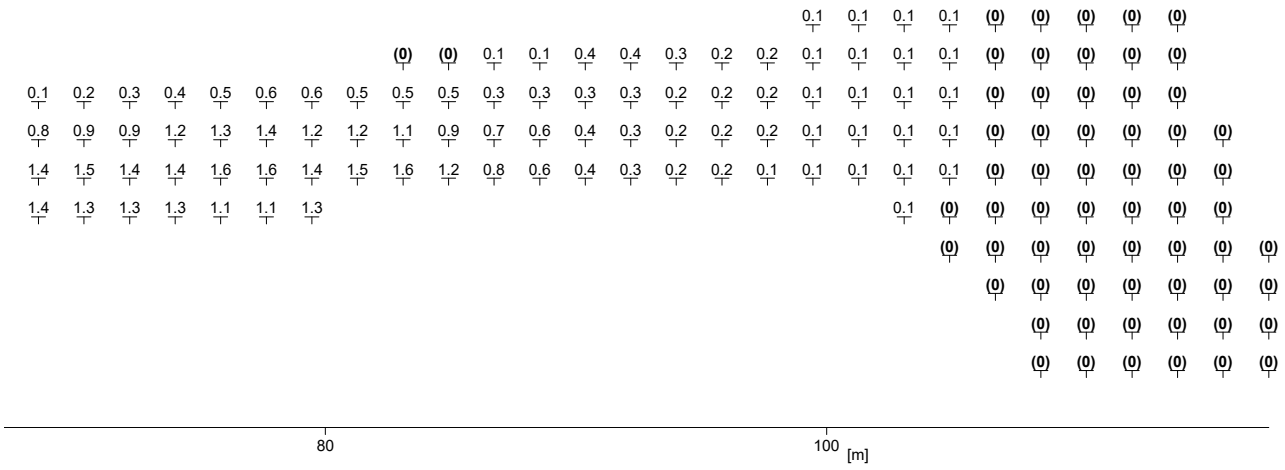


Part2

2 Exterior 1

2.3 Calculation results, Exterior 1

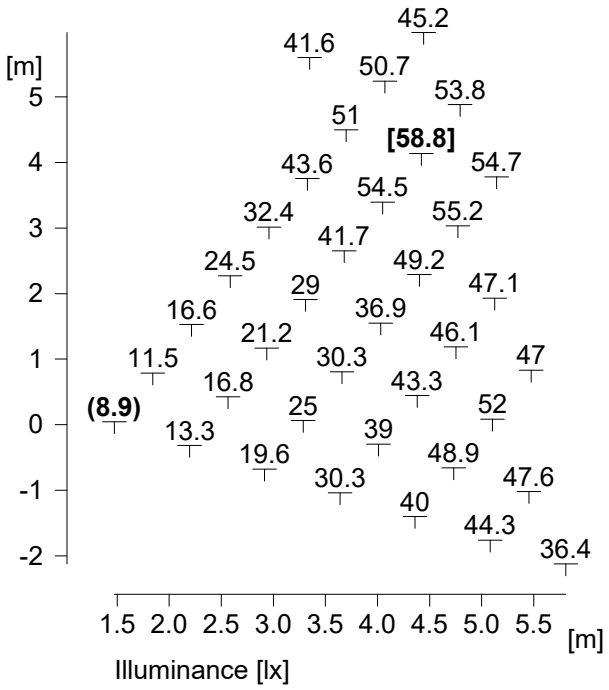
2.3.1 Table, Road (E)



Part3

2.3 Calculation results, Exterior 1

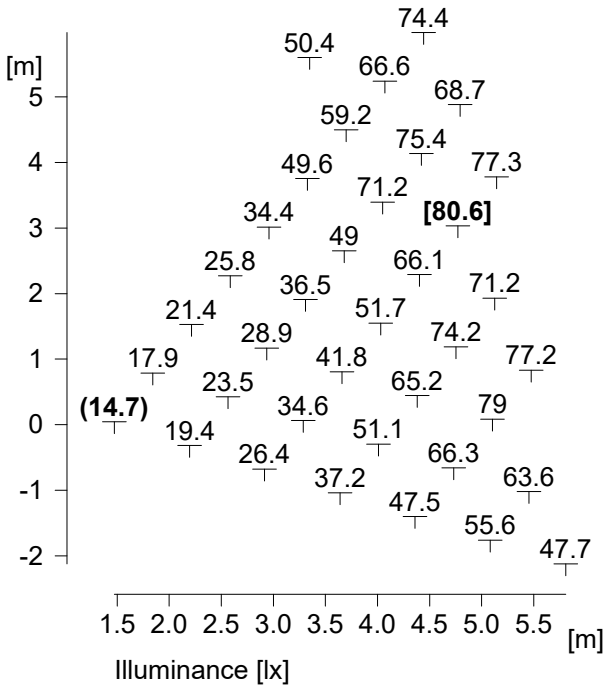
2.3.2 Table, West Side Grd. (Outside Pantrooms) (E)



Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 38.1 lx
Minimum illuminance	E_{min}	: 8.9 lx
Maximum illuminance	E_{max}	: 58.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 4.28 (0.23)
Diversity U_d	E_{min}/E_{max}	: 1 : 6.62 (0.15)

2.3 Calculation results, Exterior 1

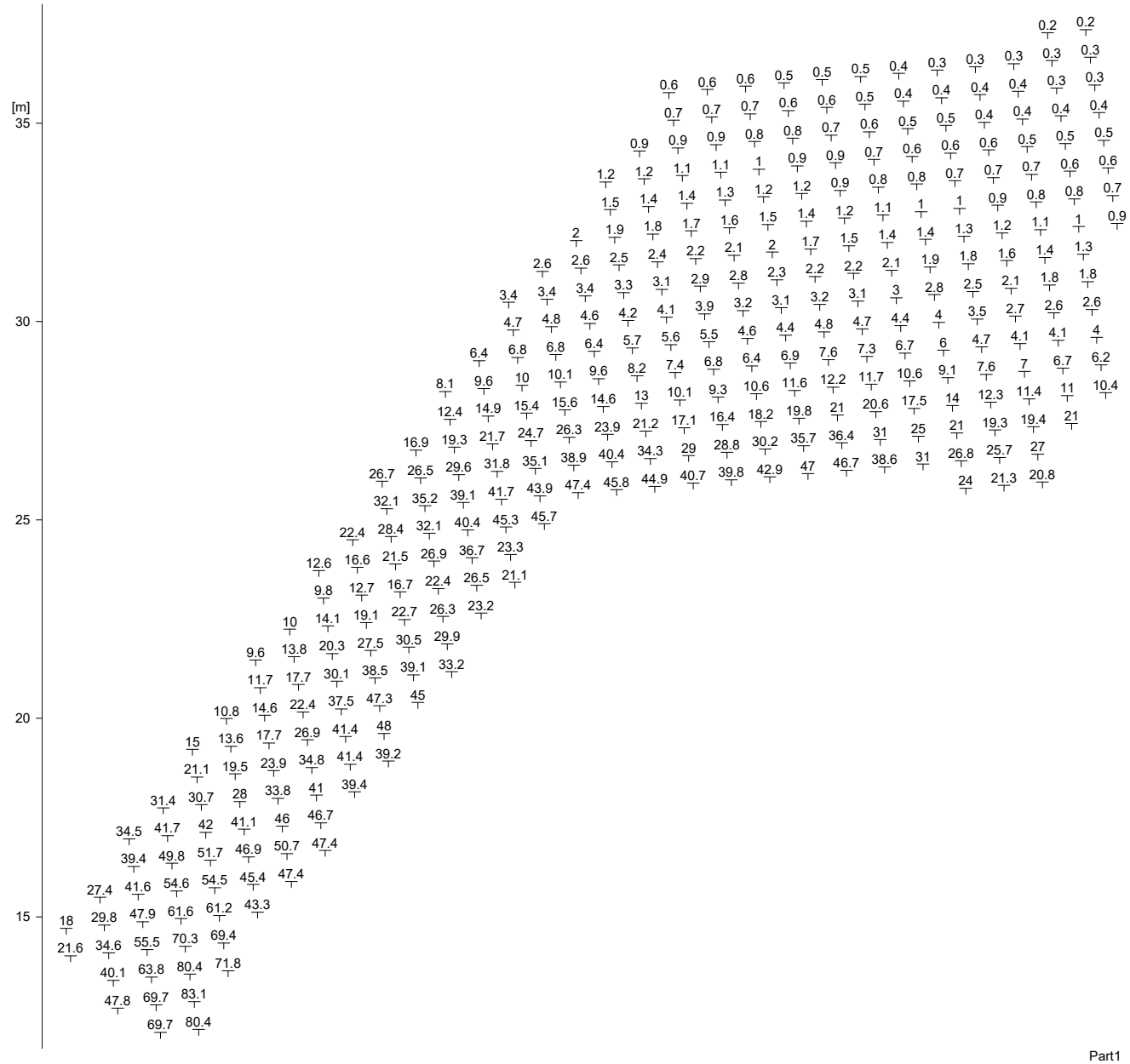
2.3.3 Table, West Side 1st Floor Level (E)



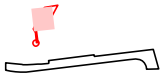
Height reference plane		: 3.50 m
Average illuminance	$\bar{E}_m$	: 51.4 lx
Minimum illuminance	E_{min}	: 14.7 lx
Maximum illuminance	E_{max}	: 80.6 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 3.50 (0.29)
Diversity U_d	E_{min}/E_{max}	: 1 : 5.50 (0.18)

2.3 Calculation results, Exterior 1

2.3.4 Table, West Side / North Raised level (E)

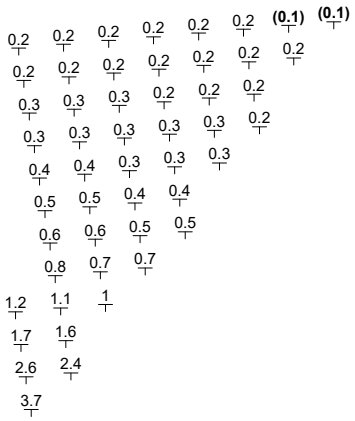


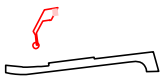
Height reference plane		: 2.40 m
Average illuminance	$\bar{E}_m$	: 19.8 lx
Minimum illuminance	E_{min}	: 0.1 lx
Maximum illuminance	E_{max}	: 95.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 140.73 (0.01)
Diversity U_d	E_{min}/E_{max}	: 1 : 679.68 (0.00)



2.3 Calculation results, Exterior 1

2.3.4 Table, West Side / North Raised level (E)

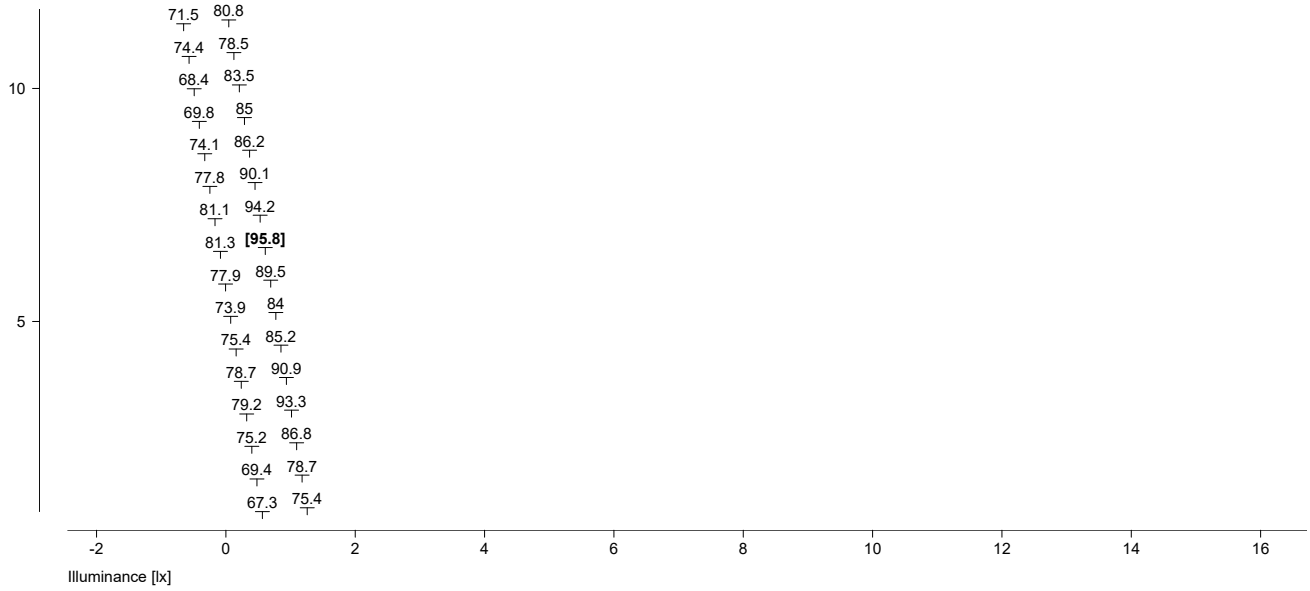


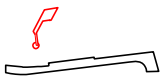


Part2

2.3 Calculation results, Exterior 1

2.3.4 Table, West Side / North Raised level (E)

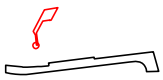




Part3

2.3 Calculation results, Exterior 1

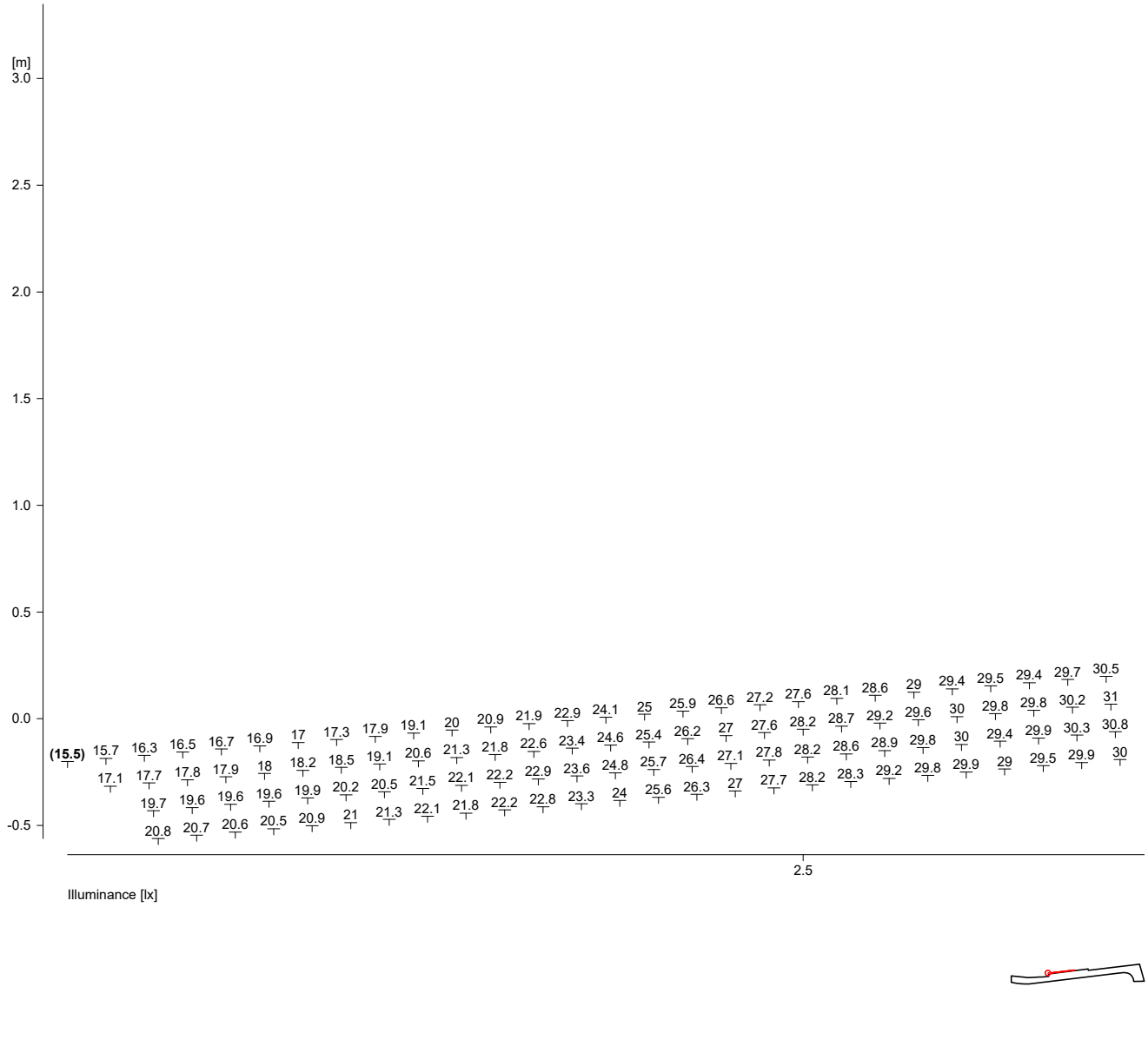
2.3.4 Table, West Side / North Raised level (E)



Part4

2.3 Calculation results, Exterior 1

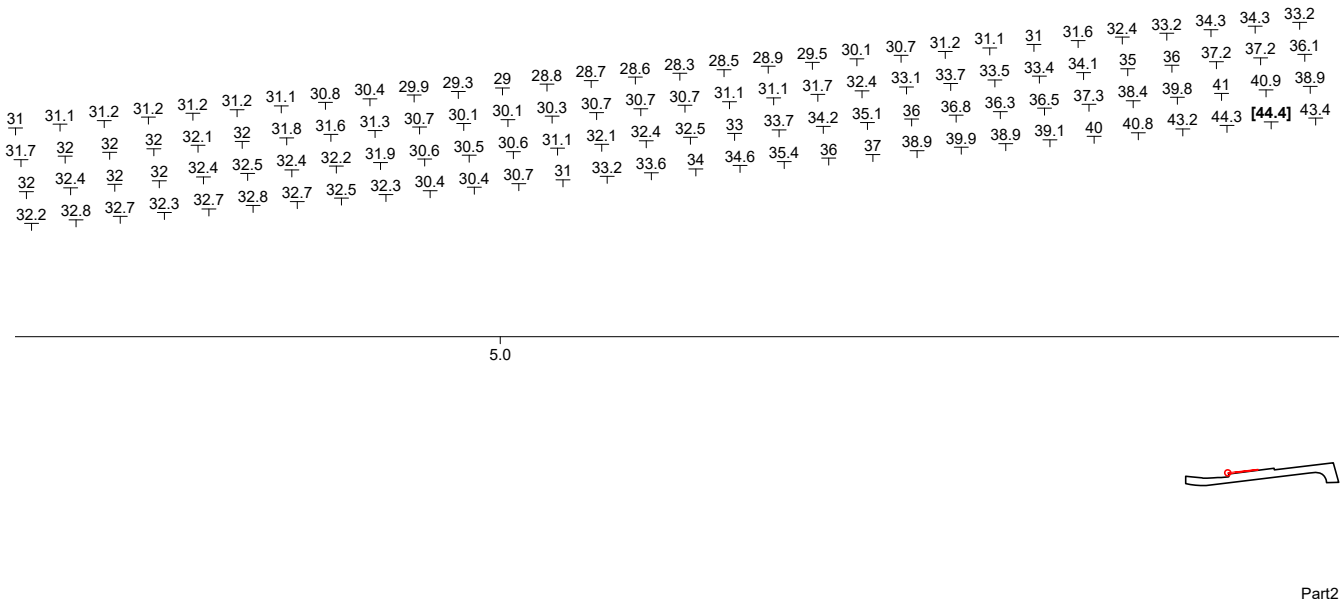
2.3.5 Table, South Side, Phase 1 Path (E)



Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 32.1 lx
Minimum illuminance	E_{min}	: 15.5 lx
Maximum illuminance	E_{max}	: 44.4 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 2.07 (0.48)
Diversity U_d	E_{min}/E_{max}	: 1 : 2.86 (0.35)

2.3 Calculation results, Exterior 1

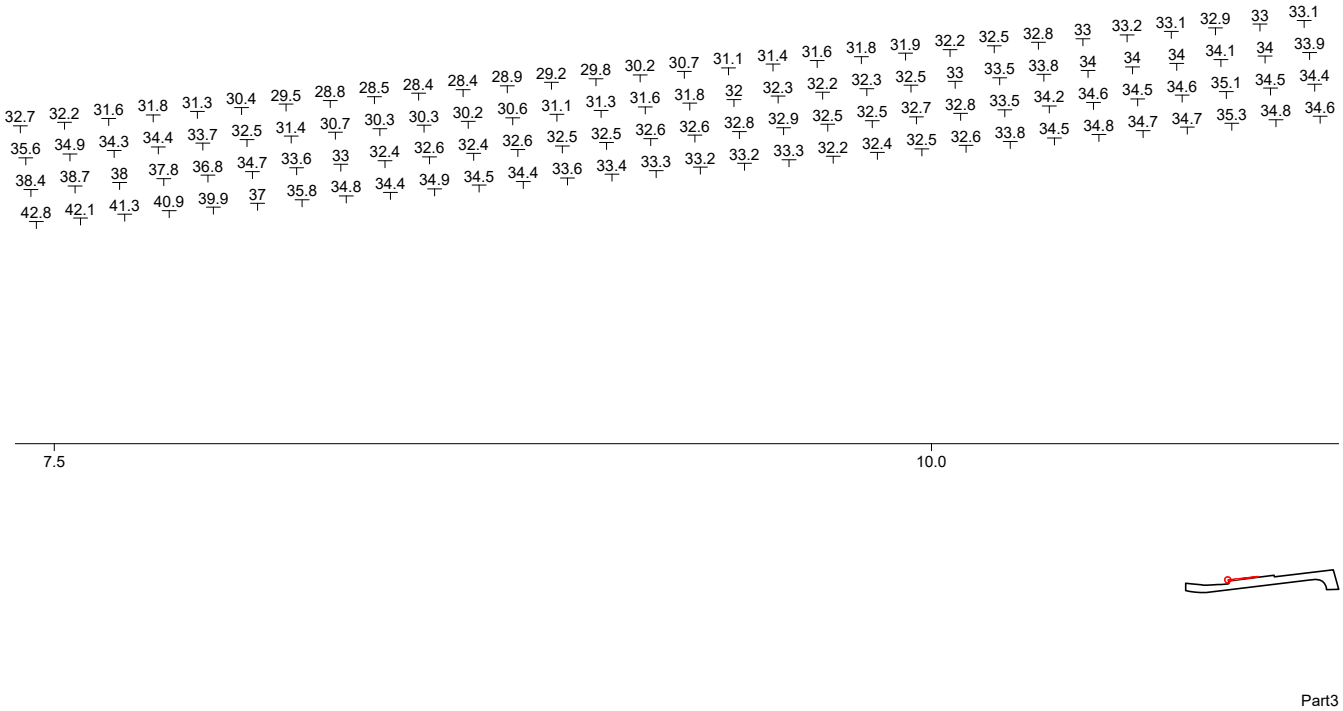
2.3.5 Table, South Side, Phase 1 Path (E)



Part2

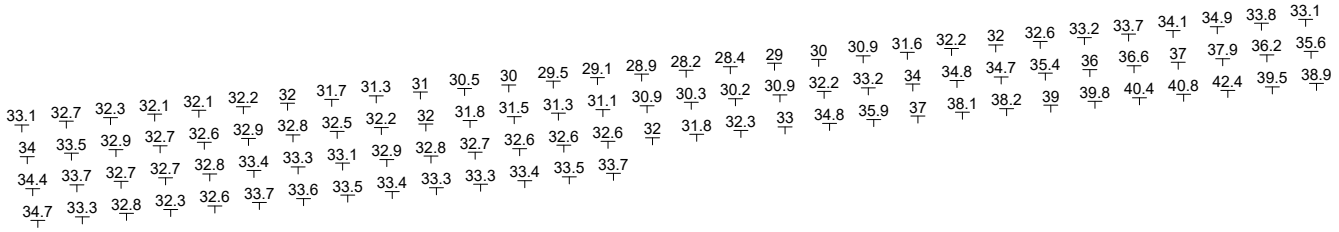
2.3 Calculation results, Exterior 1

2.3.5 Table, South Side, Phase 1 Path (E)



2.3 Calculation results, Exterior 1

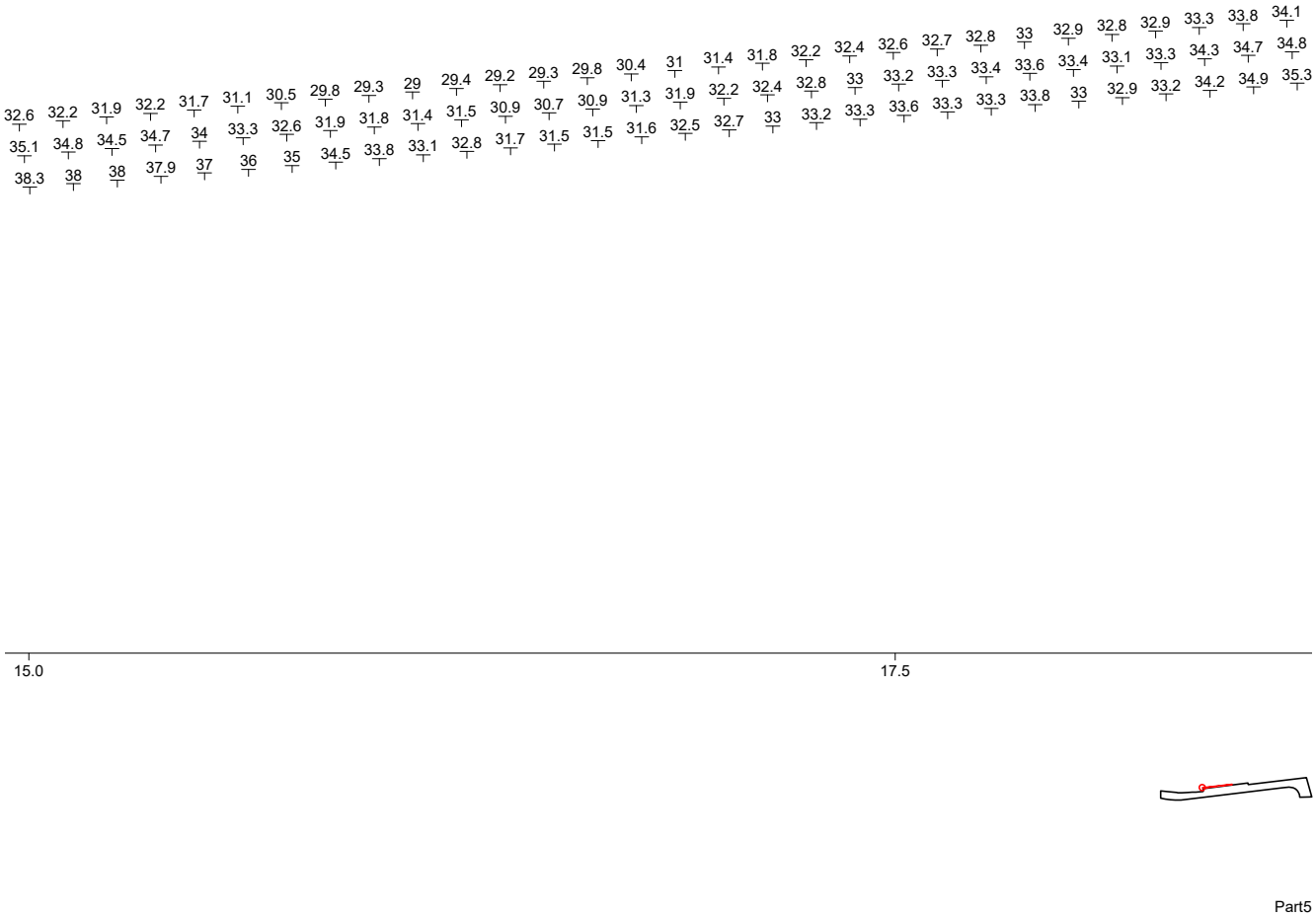
2.3.5 Table, South Side, Phase 1 Path (E)



Part4

2.3 Calculation results, Exterior 1

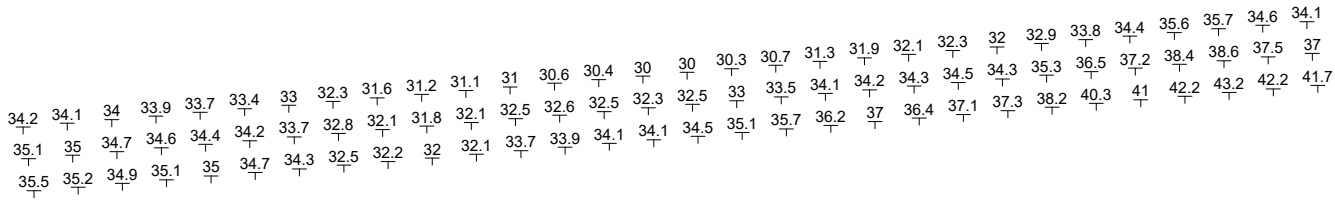
2.3.5 Table, South Side, Phase 1 Path (E)



Part5

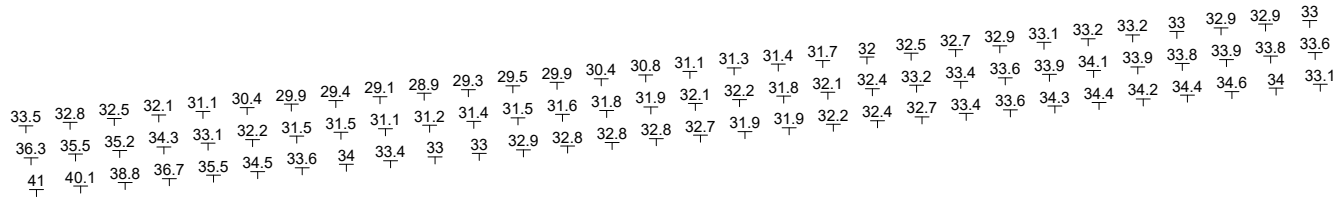
2.3 Calculation results, Exterior 1

2.3.5 Table, South Side, Phase 1 Path (E)



2.3 Calculation results, Exterior 1

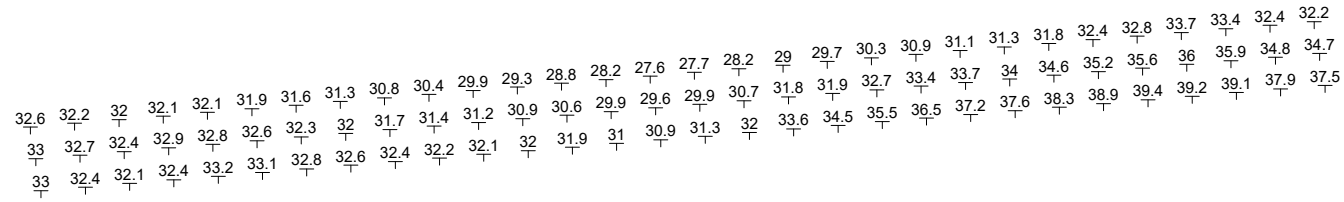
2.3.5 Table, South Side, Phase 1 Path (E)



Part7

2.3 Calculation results, Exterior 1

2.3.5 Table, South Side, Phase 1 Path (E)



Part8

2.3 Calculation results, Exterior 1

2.3.5 Table, South Side, Phase 1 Path (E)

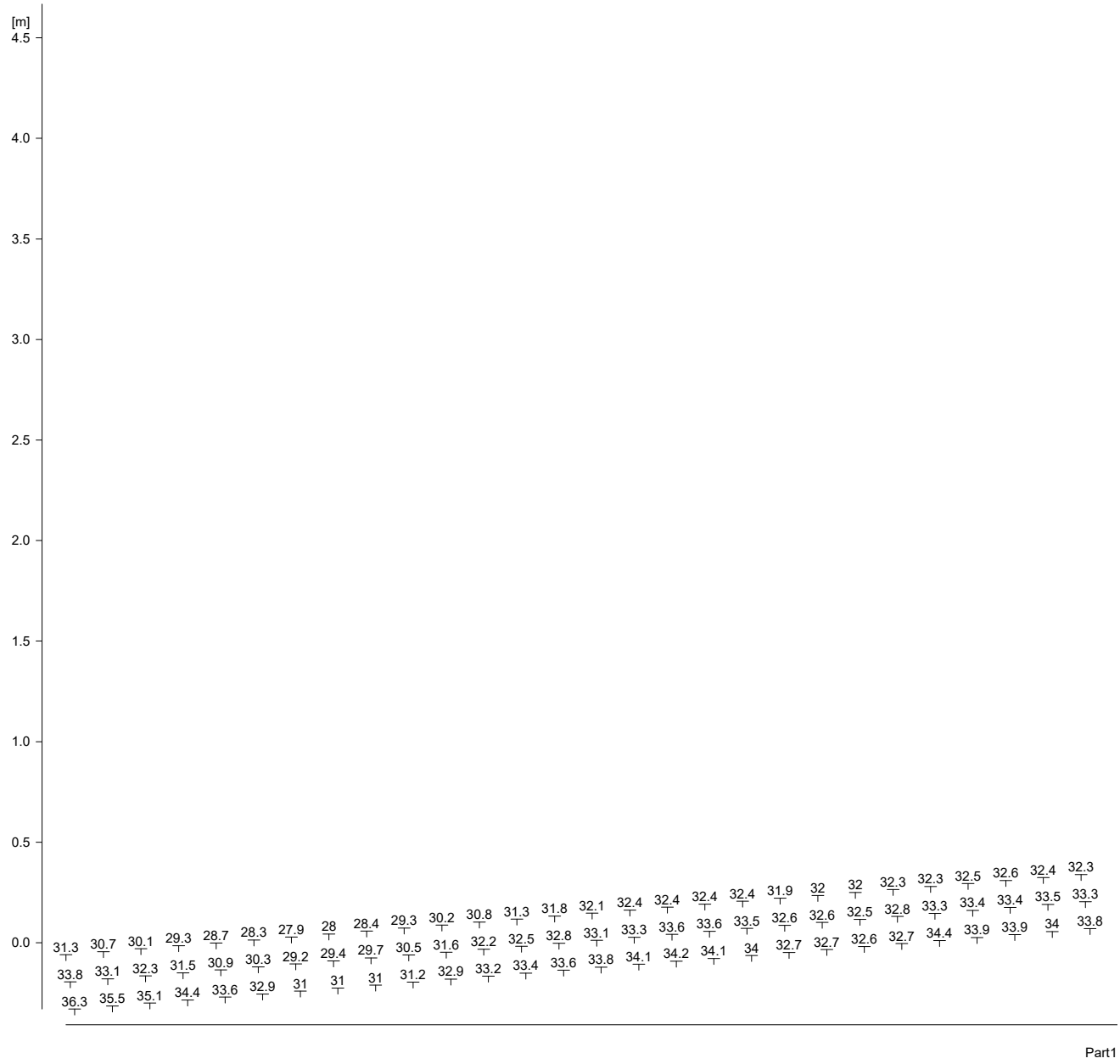
32 31.5 31.4
34.8 34.2 34
38.4 36.9 36.7

0 [m]

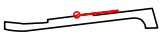
Part9

2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)

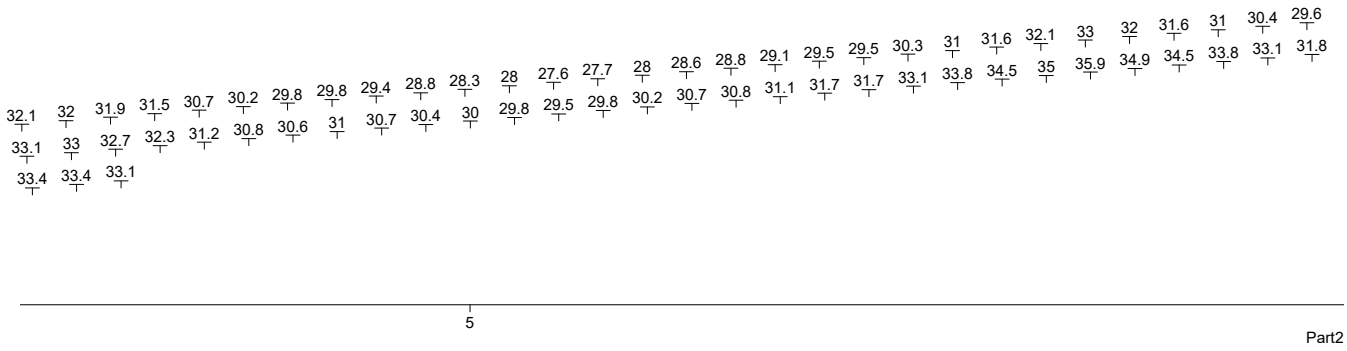


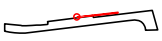
Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 32.1 lx
Minimum illuminance	E_{min}	: 24.9 lx
Maximum illuminance	E_{max}	: 43.6 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.29 (0.77)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.75 (0.57)



2.3 Calculation results, Exterior 1

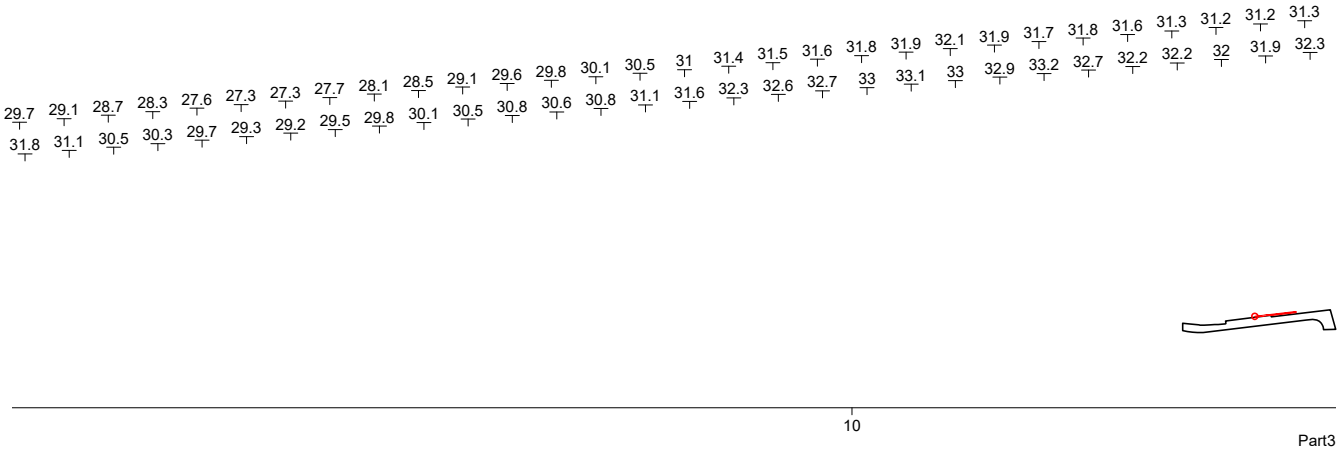
2.3.6 Table, South Side, Phase 2 Path (E)





2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)

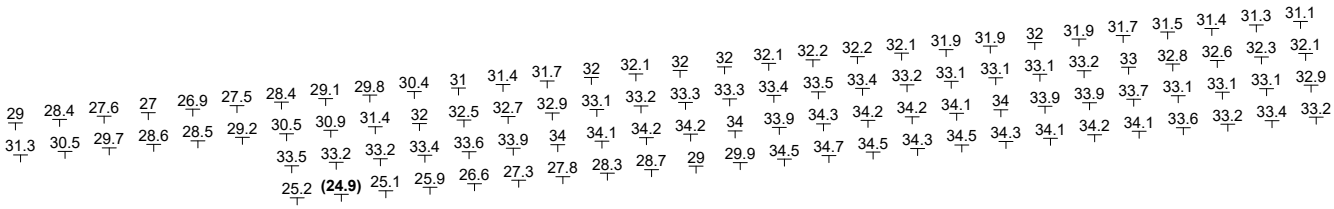


2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)

2.3 Calculation results, Exterior 1

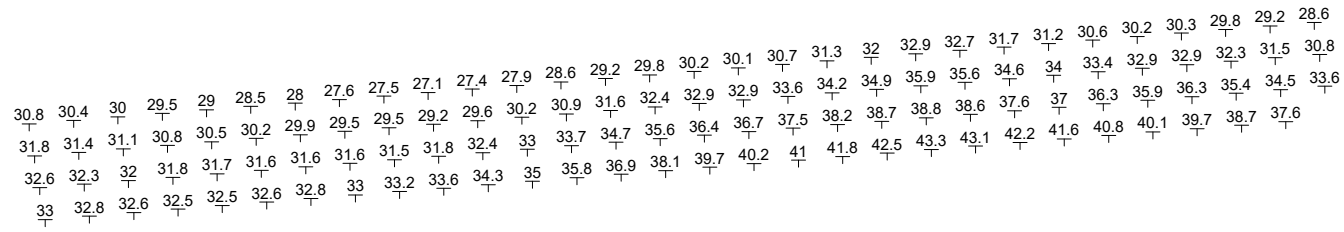
2.3.6 Table, South Side, Phase 2 Path (E)



Part5

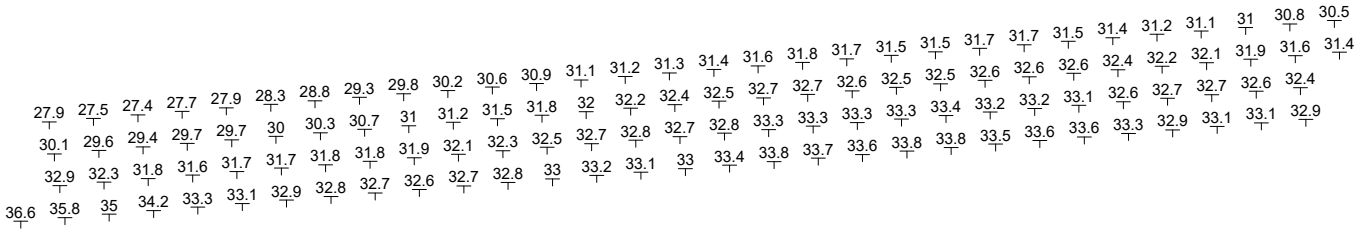
2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)



2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)



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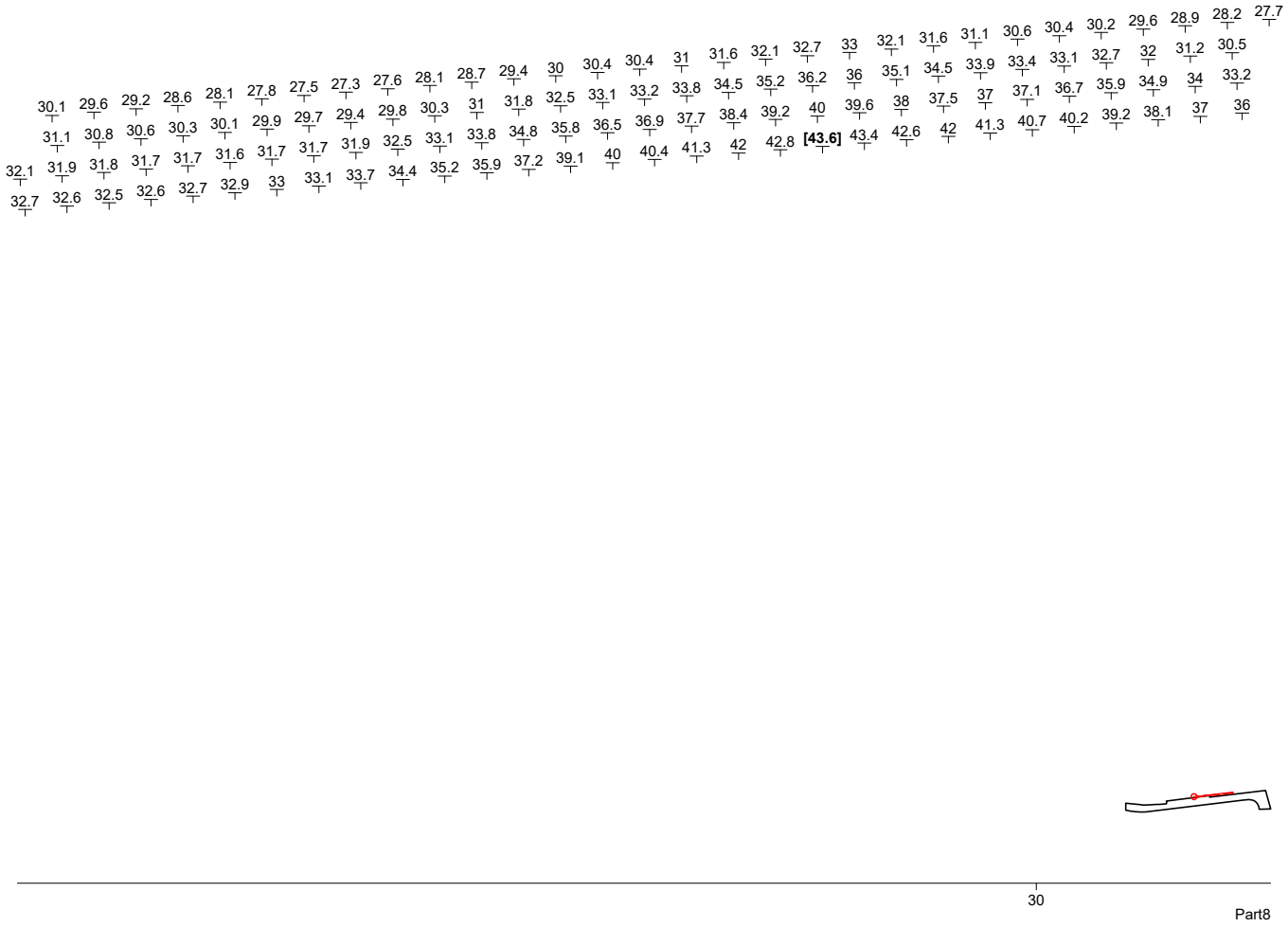
Part7

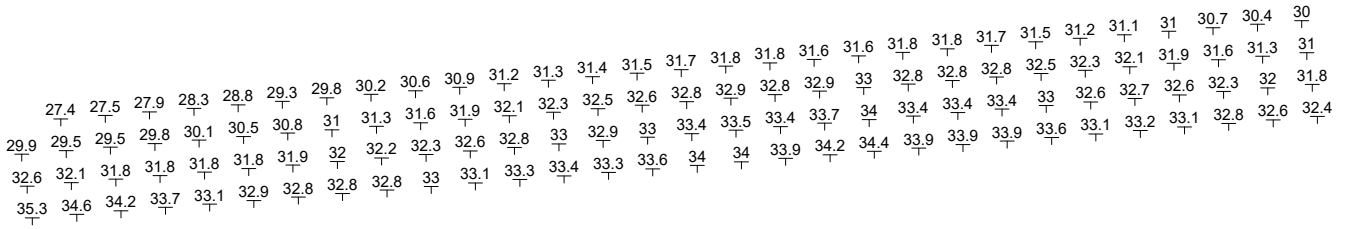
2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)



2.3 Calculation results, Exterior 1

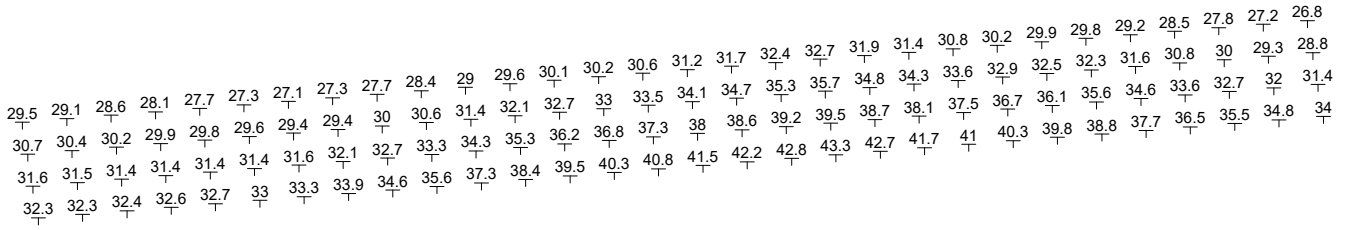
2.3.6 Table, South Side, Phase 2 Path (E)



Part9

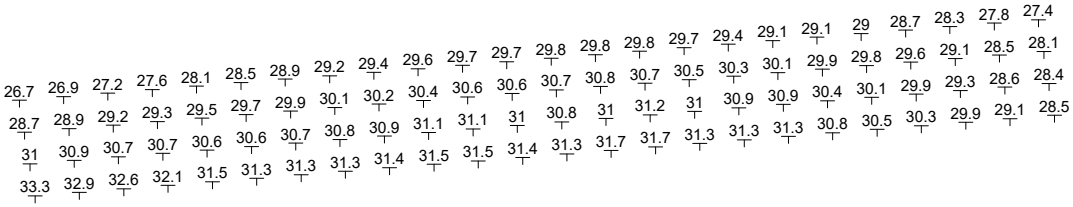
2.3 Calculation results, Exterior 1

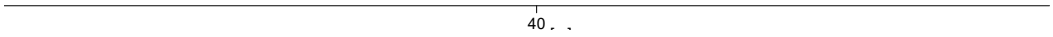
2.3.6 Table, South Side, Phase 2 Path (E)



2.3 Calculation results, Exterior 1

2.3.6 Table, South Side, Phase 2 Path (E)

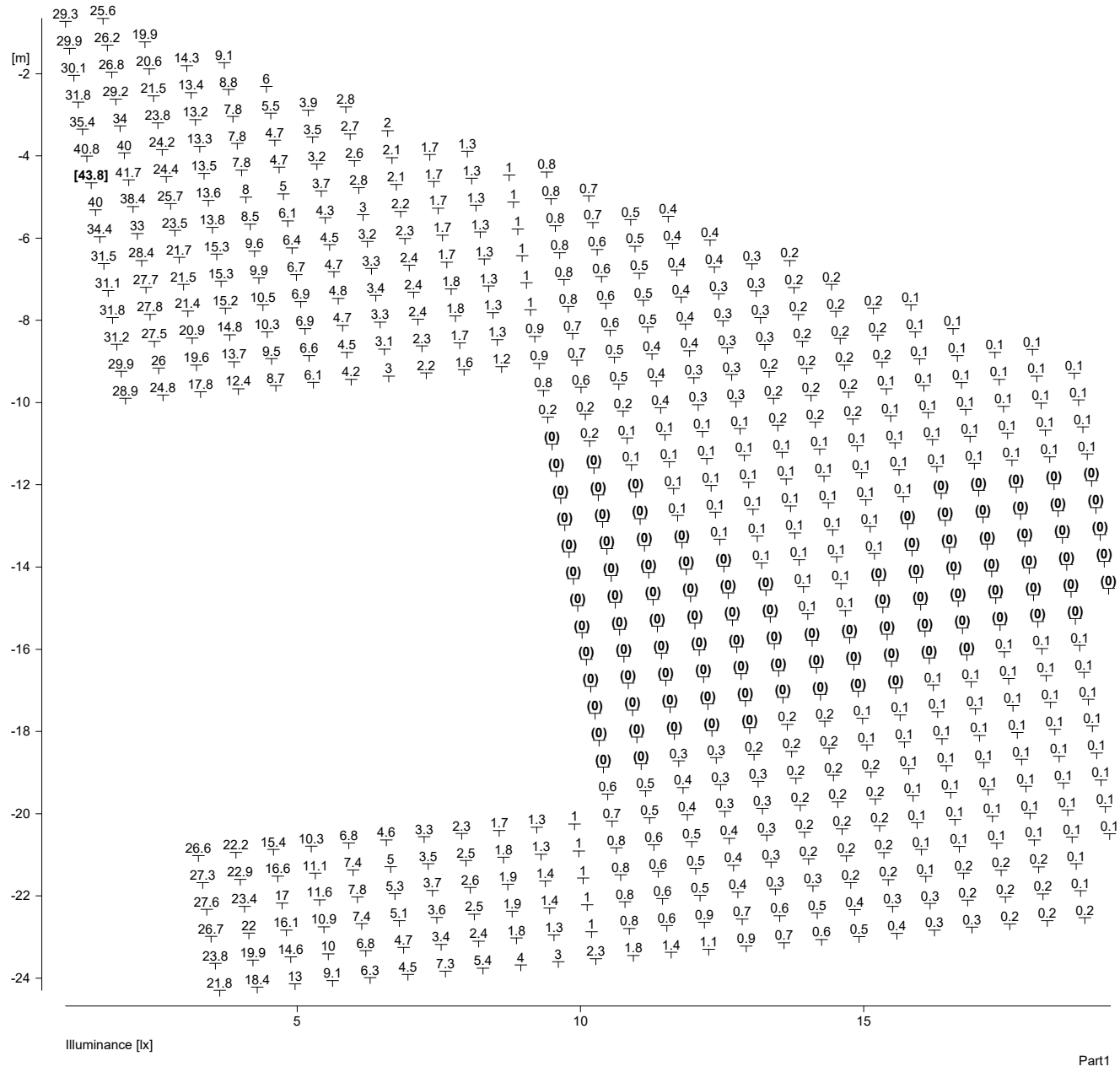




Part11

2.3 Calculation results, Exterior 1

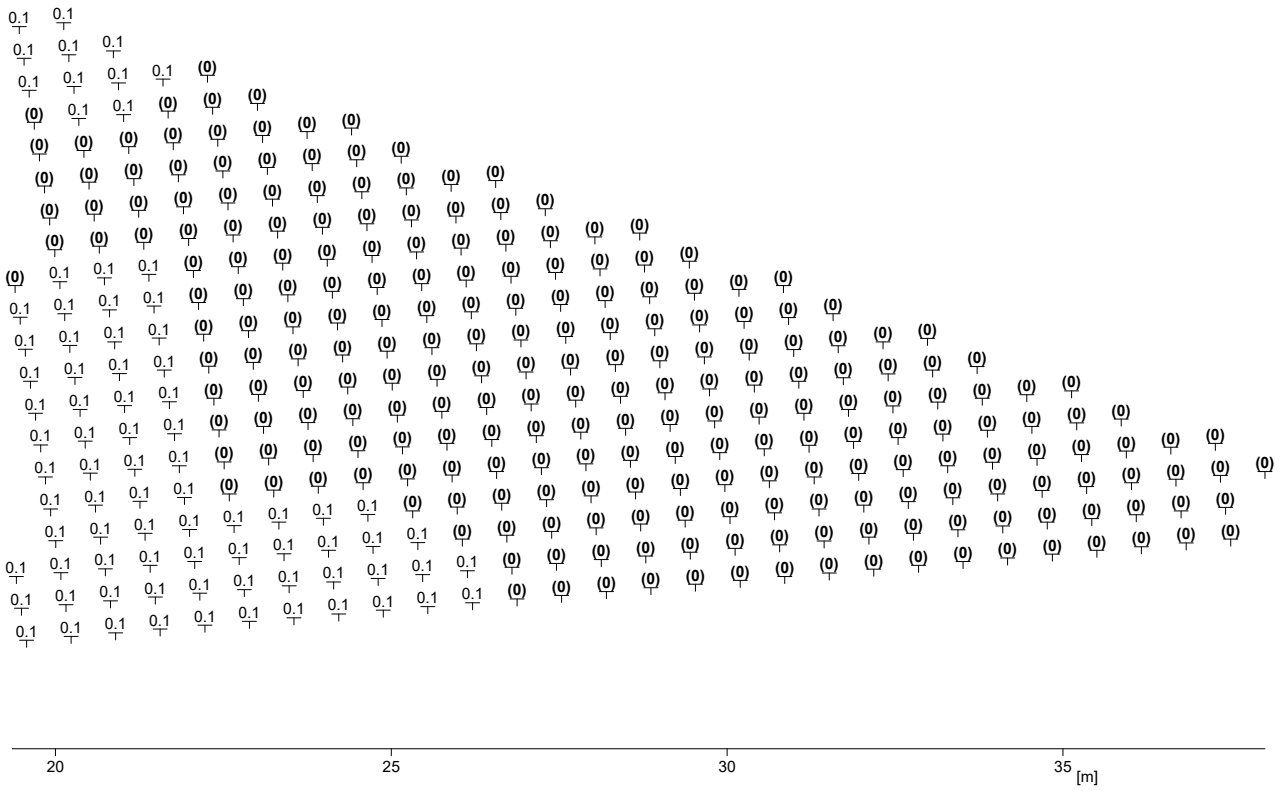
2.3.7 Table, East Side, Phase 2, No. 1 (E)



Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 2.7 lx
Minimum illuminance	E_{min}	: 0 lx
Maximum illuminance	E_{max}	: 43.8 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 326.17 (0.00)
Diversity U_d	E_{min}/E_{max}	: 1 : 5256.73 (0.00)

2.3 Calculation results, Exterior 1

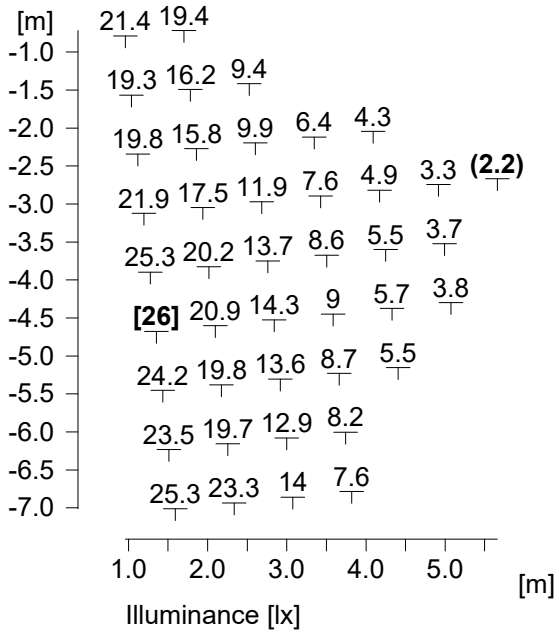
2.3.7 Table, East Side, Phase 2, No. 1 (E)



Part2

2.3 Calculation results, Exterior 1

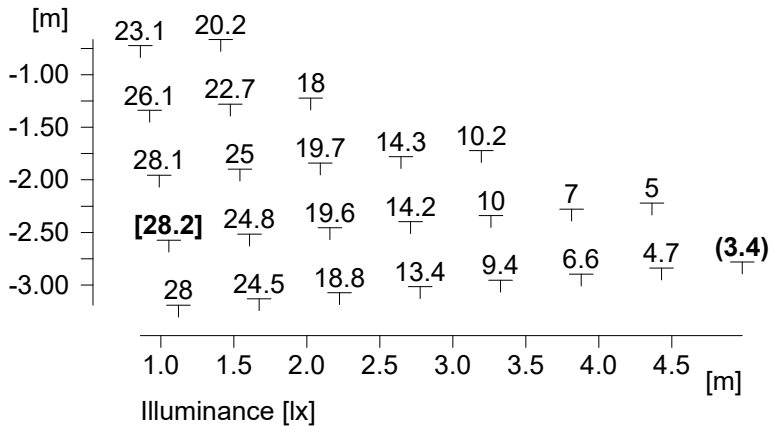
2.3.8 Table, East Side, Phase 2, No. 2 (E)

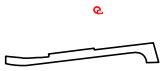


Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 13.7 lx
Minimum illuminance	E_{min}	: 2.2 lx
Maximum illuminance	E_{max}	: 26 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 6.14 (0.16)
Diversity U_d	E_{min}/E_{max}	: 1 : 11.67 (0.09)

2.3 Calculation results, Exterior 1

2.3.9 Table, East Side, Phase 2, No. 3 (E)

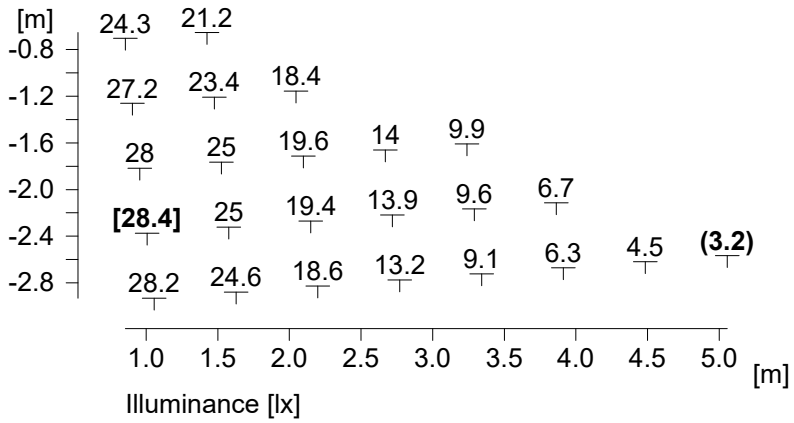




Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 17 lx
Minimum illuminance	E_{min}	: 3.4 lx
Maximum illuminance	E_{max}	: 28.2 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 4.97 (0.20)
Diversity U_d	E_{min}/E_{max}	: 1 : 8.25 (0.12)

2.3 Calculation results, Exterior 1

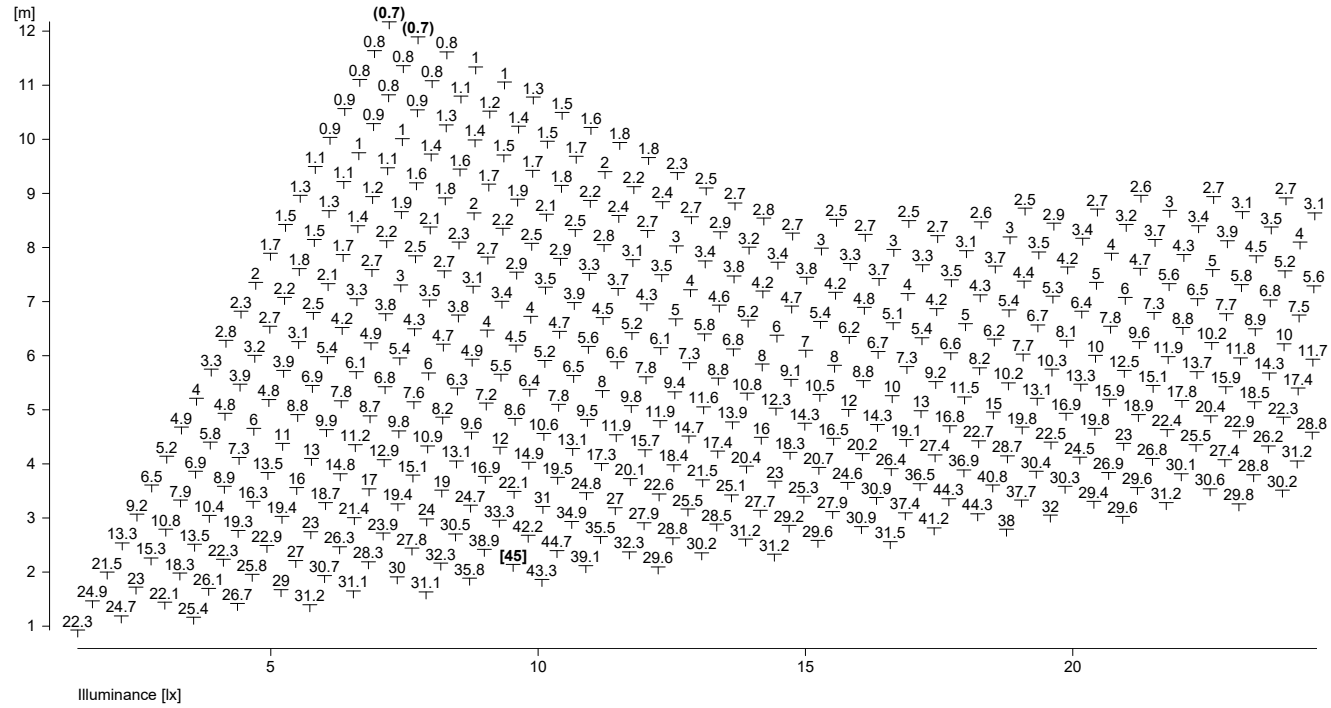
2.3.10 Table, East Side, Phase 2, No.4 (E)

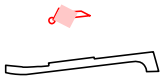


Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 17.6 lx
Minimum illuminance	E_{min}	: 3.2 lx
Maximum illuminance	E_{max}	: 28.4 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 5.47 (0.18)
Diversity U_d	E_{min}/E_{max}	: 1 : 8.85 (0.11)

2.3 Calculation results, Exterior 1

2.3.11 Table, North Side, Phase 2 (E)



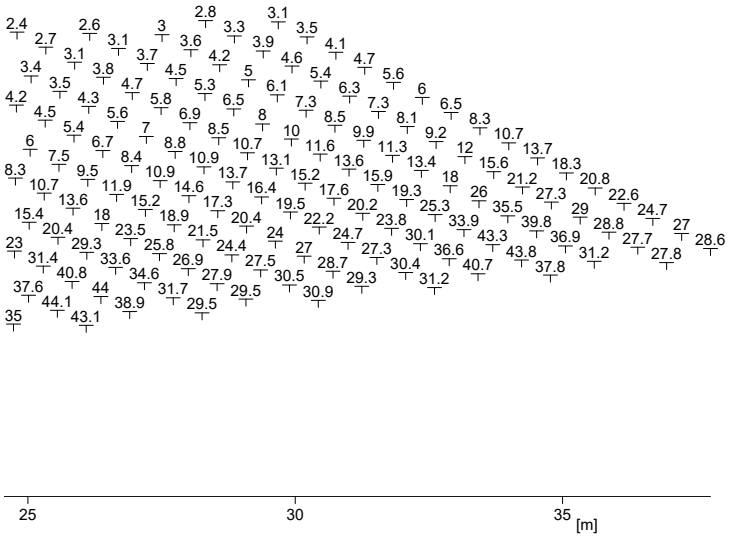


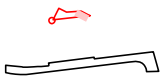
Part1

Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 13.5 lx
Minimum illuminance	E_{min}	: 0.7 lx
Maximum illuminance	E_{max}	: 45 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 18.37 (0.05)
Diversity U_d	E_{min}/E_{max}	: 1 : 61.39 (0.02)

2.3 Calculation results, Exterior 1

2.3.11 Table, North Side, Phase 2 (E)

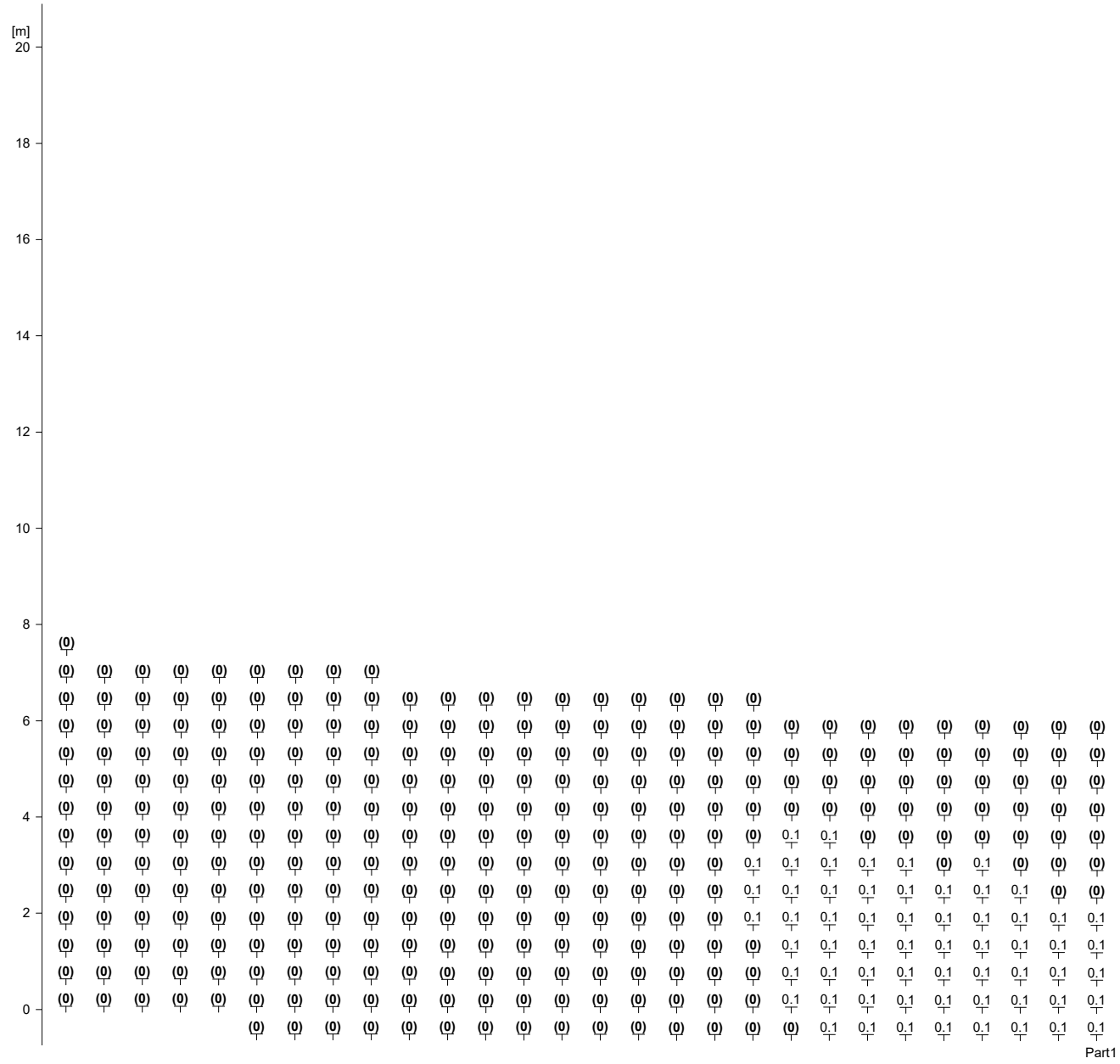




Part2

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)



Height reference plane		: 0.00 m
Average illuminance	$\bar{E}_m$	: 2 lx
Minimum illuminance	E_{min}	: 0 lx
Maximum illuminance	E_{max}	: 32.9 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: ---
Diversity U_d	E_{min}/E_{max}	: ---

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

(0)															(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.4
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
0.1	0.1	0.1	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
0.1	0.1	0.1	0.1	(0)	(0)	(0)	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.1	0.1	0.1	0.1	0.1	0.1	0.1	(0)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	

Part2

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

																								(0)	(0)	(0)	(0)	(0)	(0)
																		(0)	(0)	(0)	(0)	(0)	(0)	2.4	(0)	(0)	8.3	4.1	1.5
																		1.7	2	3.6	5.8	9.7	17.4	16.8	17	18	18.6	17.7	17
																			9.9	10.7	12.1	13.3	14.1	14	13.9	13.2	12	11.1	10.7
																			7.1	8.2	9	9.8	10.3	10.2	9.6	9.2	8.3	7.4	7
																			5.3	6.1	6.6	7.1	7.4	7.2	6.9	6.6	6.3	5.6	4.8
															3.6	3.4	3.3	3.4	4.2	4.6	4.8	5.1	5.3	5.3	5.1	4.9	4.7	4.3	3.8
			0.8	1	1.1	1.3	1.5	1.8	1.9	2.1	2.3	2.5	2.6	2.6	2.5	2.4	2.4	2.9	3.2	3.4	3.5	3.7	3.9	3.9	3.8	3.7	3.5	3.3	3.1
0.5	0.5	0.6	0.7	0.9	1	1.1	1.2	1.3	1.4	1.5	1.7	1.8	1.9	2	1.9	1.8	1.9	2.3	2.5	2.5	2.7	2.8	2.9	3	2.9	2.8	2.7	2.6	2.5
0.4	0.5	0.6	0.6	0.7	0.8	0.9	0.9	1	1.1	1.2	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.8	1.9	2	2.1	2.1	2.2	2.3	2.2	2.2	2.1	2	2
0.4	0.4	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1	1.1	1.1	1.2	1.2	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.8	1.7	1.7	1.6	1.6	1.6
0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.3	1.3	1.3	1.3
0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1	1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5							
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4															
0.1	0.2	0.2	0.2	0.2	0.2	0.2																							

Part3

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

																												(0)	(0)	(0)
																												5.8	0.1	5.3
												(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.8	0.3	2.5	4.2	9	24.1	13.5	21.1	23.3	21.6
		(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	9.9	0.1	4.6	14	3.7	19.3	21.7	15.4	20.6	14.7	20.1	19.1	18.3	17.7	16.5	15.5	14.8	13.9		
(0)	(0)	0.2	0.6	(0)	4.3	5.1	1.3	14.6	12.3	22.8	23	21.1	19.9	19.1	18	17.3	17.4	17.2	16.9	16.3	15.5	14.3	12.7	11.5	10.9	10.4	10	9.7		
13.7	8.4	19.1	17	19.6	19.1	18.7	16.2	17.5	16.7	14.8	14.5	13.3	13	12.1	11.9	12.3	12.5	12.7	12.7	12.2	11.1	10.3	9.5	8.3	7.4	7	6.9	7.4		
15.9	15.3	14.2	15.1	14.7	14.7	14.6	14.4	13.3	12.3	11	9.7	9.2	8.6	8.4	8.5	8.9	9.1	9.1	9.1	8.8	8.2	7.6	7.2	6.5	5.5	5.1	5.1	5.6		
10.4	9.8	9.9	10.7	10.8	10.9	10.9	10.3	9.7	8.9	8.1	7.2	6.3	5.9	5.8	6.4	6.8	6.7	6.6	6.6	6.4	6	5.7	5.3	5	4.4	4	4.1	4.3		
6.7	6.7	7.2	7.8	7.8	7.8	7.7	7.5	6.9	6.6	6.1	5.6	4.8	4.4	4.6	4.9	5.1	5	5	4.9	4.8	4.6	4.3	4.1	3.8	3.6	3.3	3.3	3.4		
4.6	4.9	5.5	5.6	5.7	5.6	5.7	5.6	5.2	4.9	4.6	4.3	3.9	3.6	3.6	3.7	3.8	3.8	3.8	3.7	3.6	3.5	3.4	3.2	3	2.8	2.8	2.7	2.6		
3.5	3.6	4	4.2	4.2	4.2	4.2	4.1	3.9	3.7	3.5	3.3	3.1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.2		
2.8	3	3.1	3.1	3.2	3.2	3.2	3.1	3	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2	1.9	1.9	1.9	1.8	1.8		
2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.4	2.3	2.2	2.1	2	2	2	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5		
2	2	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3		
1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1		
1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1	1	1	1	1	1	1	1	0.9	0.9	0.9		
1.1	1.1	1.1	1.1	1.1	1	1	1	1	1	1	1	1	1	1	1	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8						
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8														
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7																						
0.7																														

Part4

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

																														(0)
																					(0)	(0)	(0)	(0)	0.1	(0)	(0)	2.8	4.5
													(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	1.3	1.8	24.6	17.2	17.2	15	24	23.5	23.4
					(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.3	4.1	8.2	13.6	15.6	17.1	23.8	16.9	27.6	27.7	25.5	24.1	22.5	20.8	19.6	19	19.1
(0)	(0)	(0)	(0)	(0)	4.4	3.4	4.6	11.9	23.9	16.9	17.1	17.4	22.9	22.1	21.9	21.8	21.5	20.6	20	19.1	18.3	17.2	16	15.2	14.4	14.2	14.8	14.7	14.7
6.2	11	13.3	10.1	22	19.7	21.1	21.9	23	21.3	19.7	18.8	17.8	17.4	17.3	17.3	17.2	16.7	15.8	15	13.8	11.8	11	10.6	10	9.7	10.1	10.4	10.6	10.5
20	19.1	18.7	18.4	17.8	17.2	16.8	14.9	15	13.5	13.1	12.2	12.1	12	12.5	12.7	12.6	12.4	11.6	10.6	9.8	8.7	7.7	7.1	6.8	6.9	7.6	7.7	7.6	7.7
14.3	14.6	14.7	14.5	14.1	13.4	12.3	11.3	9.9	9	8.6	8.3	8.2	9	9.1	9.2	9	8.9	8.3	7.7	7.3	6.7	5.6	5.2	4.9	5.5	5.7	5.7	5.8	5.7
10.3	10.6	10.7	10.7	10.3	9.7	9.1	8.4	7.3	6.5	6	5.8	6.3	6.8	6.8	6.7	6.6	6.5	6.1	5.8	5.5	5.1	4.6	4.1	4	4.3	4.4	4.4	4.4	4.4
7.7	7.8	7.8	7.7	7.4	7	6.6	6.2	5.8	5.1	4.6	4.5	4.9	5	5	5	5	4.9	4.7	4.4	4.2	3.9	3.7	3.4	3.3	3.3	3.4	3.4	3.4	3.3
5.9	5.8	5.7	5.7	5.6	5.3	5	4.7	4.4	4	3.7	3.7	3.8	3.9	3.8	3.8	3.8	3.7	3.6	3.4	3.2	3.1	2.9	2.8	2.8	2.7	2.6	2.6	2.6	2.6
4.3	4.4	4.3	4.3	4.2	4	3.8	3.6	3.4	3.3	3	3	3	3	3	3	3	2.9	2.9	2.7	2.6	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1
3.3	3.4	3.3	3.3	3.3	3.1	3	2.8	2.7	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.1	2	2	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7
2.6	2.6	2.6	2.6	2.6	2.5	2.4	2.3	2.2	2.1	2.1	2	2	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4
2.1	2.1	2.1	2	2	2	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2
1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1
1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1	1	1	1	1	1	1	1	1	1		
1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	1	1	1	1	1	0.9	0.9	0.9	0.9										
1.1	1	1	1	1	0.9	0.9	0.9	0.9	0.9	0.9	0.9																		
0.9	0.9	0.9	0.8																										

Part5

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

							0.9	9.4	6.5																				(0)
0.1	0.1	0.1	0.1	0.2	0.3	21.2	11	3.6	8													(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
13.5	9.2	12.5	27.9	30.5	**[32.9]**	20.9	17.3	15.5	14.4			(0)	0.1	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
22.3	22	21.6	21.1	21.6	21	14	10	9.6	8.7	4.9	5.6	3.8	2	0.3	0.5	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
18.7	17.8	17.2	15.6	13.9	12.7	7.5	6.3	6.2	5.2	4.6	3.9	3.4	2.9	2.4	1.9	1	0.5	0.4	0.2	0.1	0.1	0.1	0.1	0.7	1.1	2.7	0.3	3.2	
14.2	13.2	12.3	10.9	9.3	8.4	5.6	4.4	4.1	3.7	3.2	2.8	2.5	2.1	1.8	1.6	1.4	1.2	1.3	2.2	2.4	3	4.2	3.4	5.2	4.1	5	5	4.8	
10.2	9.4	8.8	8	7.1	5.8	4.2	3	2.9	3.5	2.8	2.2	2.4	3.7	3.3	4.2	4.9	4.1	4	3.8	3.7	4	4.1	4.1	4.1	4.1	4	3.9	3.6	
7.4	6.8	6.6	6.1	5.5	4.8	3.9	3.9	3.6	4.7	4.6	4.6	4.6	4.5	4.3	4.1	3.9	3.6	3.4	3.2	3.1	3.1	3.1	3.1	3.2	3.1	3.1	3	2.8	
5.6	5.4	5.1	4.8	4.5	4	3.6	3.5	3.6	3.6	3.6	3.5	3.5	3.4	3.3	3.2	3	2.8	2.7	2.6	2.6	2.5	2.4	2.5	2.5	2.5	2.5	2.4	2.3	
4.3	4.1	3.9	3.7	3.4	3.2	3	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2	2	2	2	1.9	1.8	
3.3	3.2	3.1	2.9	2.7	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.1	2	2	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5	
2.6	2.5	2.4	2.3	2.2	2.1	2.1	2.1	2	2	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.3	1.2	
2.1	2	1.9	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1	
1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1	1	1	0.9	0.9	0.9	
1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1	1	1	1	1									
1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	1	1																	
1	1	1	1	1																									

Part6

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

																		(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
																	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
								(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.8	0.6	(0)	0.1	1.5	1.6	3.5	3.8	1.4	2.8	2.7	2.7
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.6	1.5	(0)	1.6	2.5	1.5	2.7	3.2	3.5	3.9	4	3.9	3.7	3.5	3.3	2.9	2.6	2.3	2.1
(0)	(0)	(0)	0.4	0.4	(0)	1.3	2.8	1.8	4.4	4.1	4.6	3.4	4.5	4.1	3.7	3.2	2.8	3	3	3	2.9	2.8	2.7	2.5	2.2	2	1.8	1.7
2.5	3.8	2.5	3.7	3.5	4.1	4.3	4.3	4.2	4.2	4.1	3.9	3.6	3.4	3.1	2.8	2.5	2.4	2.3	2.3	2.2	2.3	2.2	2.1	2	1.9	1.8	1.5	1.5
4.5	4.2	3.8	3.4	3.2	3.2	3.3	3.2	3.2	3.1	3.1	2.9	2.8	2.6	2.4	2.4	2.2	2.2	2.1	2	1.9	1.9	1.8	1.8	1.7	1.6	1.5	1.3	1.2
3.4	3.2	3	2.8	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.3	2.2	2.1	2	1.9	1.8	1.8	1.7	1.6	1.5	1.5	1.4	1.4	2.1	2.1	1.9	2.2
2.7	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2	2	2	1.9	1.8	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.5	1.8	1.8	1.9
2.2	2.1	2	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1	1	0.9	0.9	1.3	1.4	1.5	1.5
1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1	1	1	0.9	0.9	0.8	0.8	0.8	1.1	1.2	1.2	1.3
1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1	1	1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7						
1.2	1.2	1.1	1.1	1.1	1.1	1.1	1	1	0.9	0.9	0.9	0.9	0.8	0.8	0.8														
1	1	1	1	0.9	0.9	0.9	0.9																						

Part7

2.3 Calculation results, Exterior 1

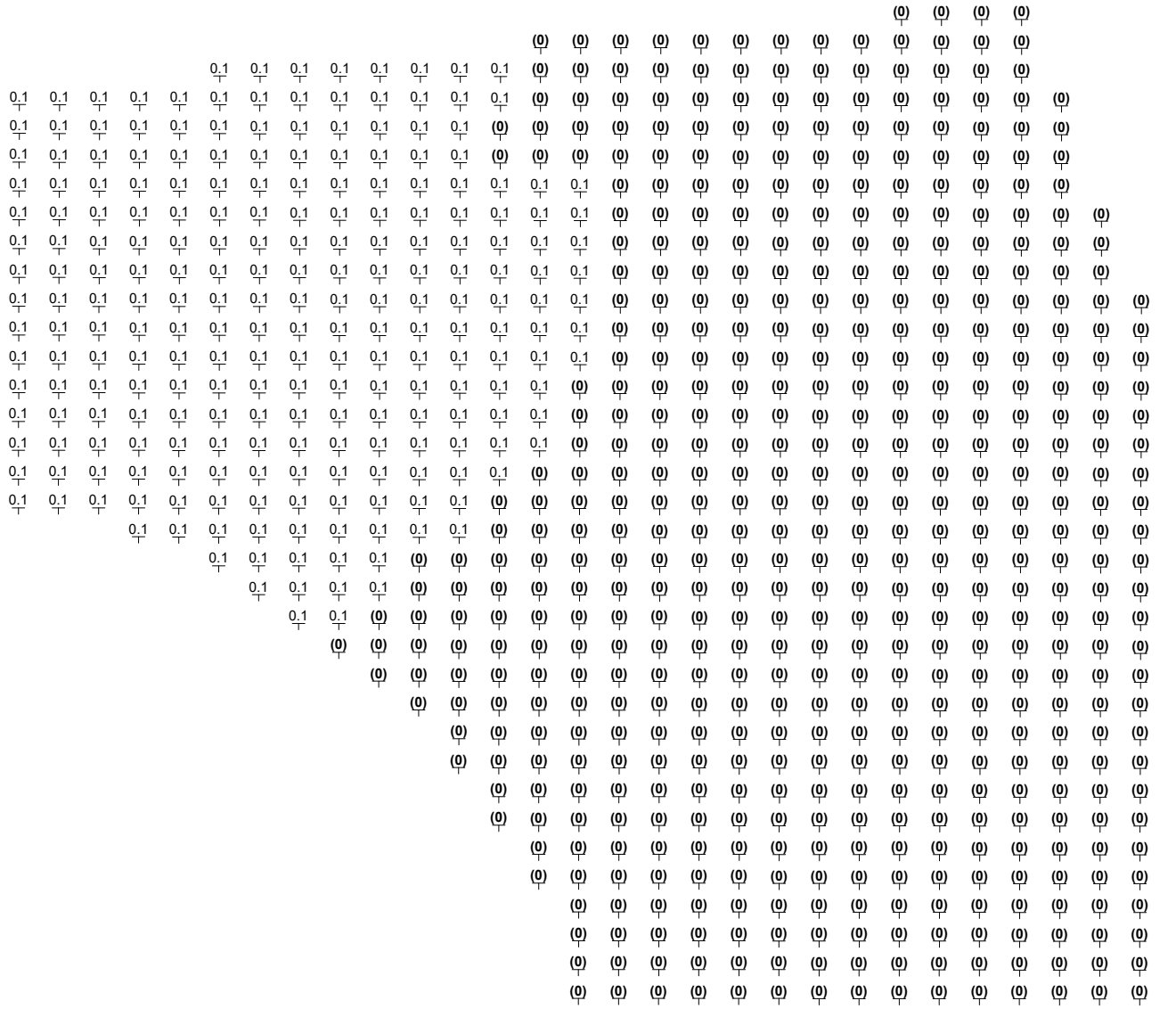
2.3.12 Table, South Side Road - Nabcroft Lane (E)

																										0.2	0.2	0.1
																			0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
												1.9	1.6	1.3	1.1	0.9	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1
			(0)	(0)	(0)	(0)	(0)	0.1	0.2	0.3	0.4	0.3	0.6	0.5	0.6	0.5	0.6	0.5	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
(0)	(0)	(0)	(0)	(0)	(0)	0.6	0.6	0.4	1	0.5	0.3	0.9	0.8	0.7	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
1.3	1	0.7	2	0.9	2	1.8	1.5	1.3	1.1	1	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
2.2	1.8	1.7	1.7	1.7	1.5	1.4	1.2	1	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
1.8	1.5	1.4	1.3	1.3	1.2	1.1	1	0.8	0.8	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1
1.5	1.4	1.2	1.1	1	1	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
1.3	1.2	1.1	0.9	0.9	0.8	0.7	0.7	0.7	0.6	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
1.1	1	1.5	1.5	1.3	0.9	1.1	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
2.3	1.9	1.9	1.7	1.5	1.3	1	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
1.9	1.8	1.6	1.5	1.3	1.1	0.9	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2										
1.5	1.5	1.4	1.3	1.1	1	0.8	0.7	0.6	0.5	0.4																				
1.3	1.2	1.1																												

Part8

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)



Part9

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

(0)
(0)
(0)
(0)
(0) (0)
(0) (0)
(0) (0)
(0) (0)
(0) (0) (0)
(0) (0) (0)
(0) (0) (0)
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(0) (0) (0) (0) (0)
(0) (0) (0) (0) (0)
(0) (0) (0) (0) (0) (0)
(0) (0) (0) (0) (0) (0)

Part10

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

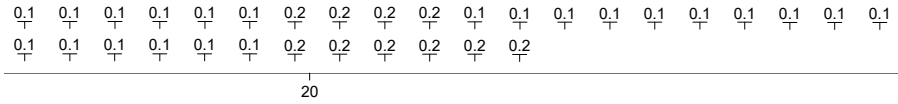
(0) (0) (0) (0) (0) (0) (0) (0) (0) 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1 0.1

Illuminance [lx]

Part11

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)



Part12

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

40

Part13

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

60

Part14

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

80

Part15

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

100

Part16

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

Part17

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

Part18

2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

Part19

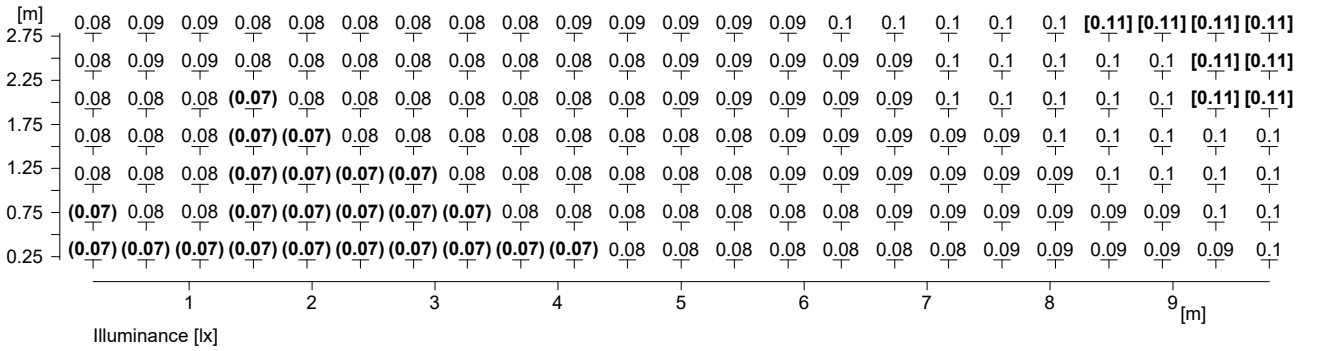
2.3 Calculation results, Exterior 1

2.3.12 Table, South Side Road - Nabcroft Lane (E)

Part20

2.3 Calculation results, Exterior 1

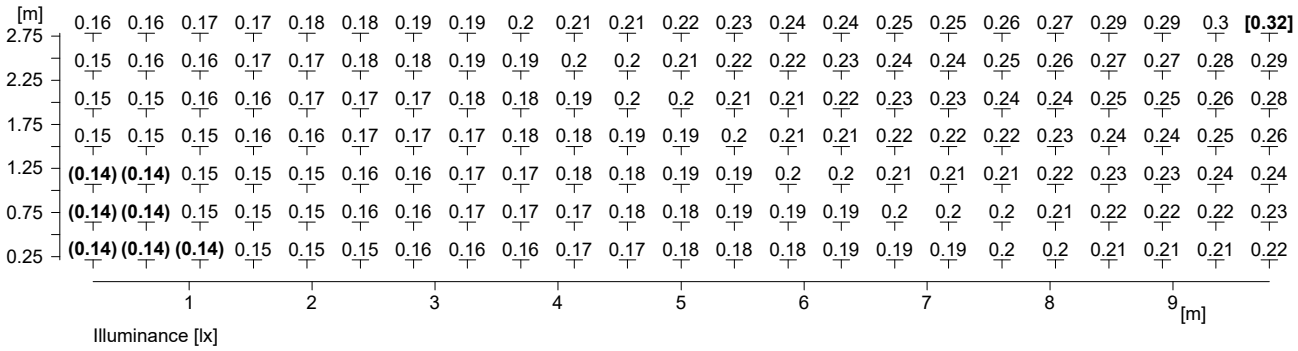
2.3.13 Table, House 60, 62 front elevation (E)



Average illuminance	$\bar{E}_m$	: 0.09 lx
Minimum illuminance	E_{min}	: 0.07 lx
Maximum illuminance	E_{max}	: 0.11 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.30 (0.77)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.68 (0.60)

2.3 Calculation results, Exterior 1

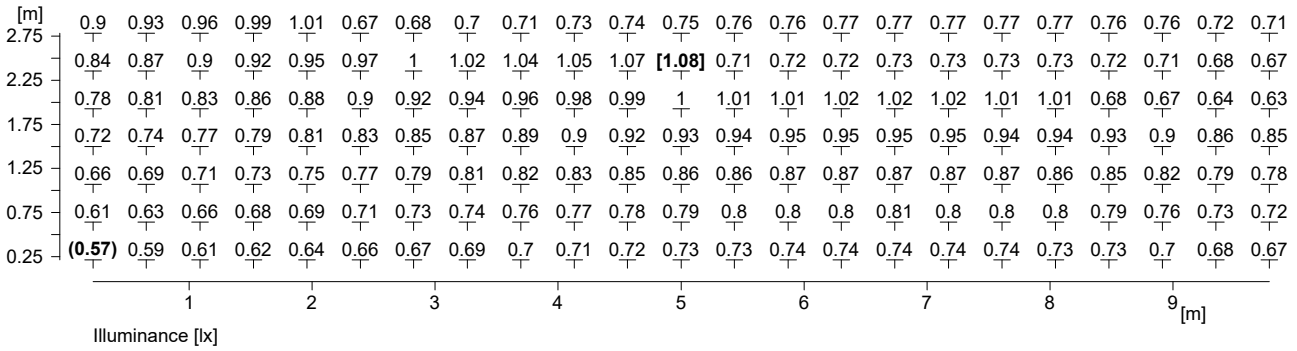
2.3.14 Table, House 64, 66 front elevation (E)



Average illuminance	$\bar{E}_m$	: 0.2 lx
Minimum illuminance	E_{min}	: 0.14 lx
Maximum illuminance	E_{max}	: 0.32 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.46 (0.69)
Diversity U_d	E_{min}/E_{max}	: 1 : 2.32 (0.43)

2.3 Calculation results, Exterior 1

2.3.15 Table, House 68, 70 front elevation (E)



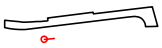
Average illuminance	$\bar{E}_m$	: 0.81 lx
Minimum illuminance	E_{min}	: 0.57 lx
Maximum illuminance	E_{max}	: 1.08 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.42 (0.70)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.90 (0.53)

2.3 Calculation results, Exterior 1

2.3.16 Table, House 72, 74 front elevation (E)

[m]																							
2.75	0.37	0.38	0.39	0.4	0.41	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	0.54	0.54	0.55	0.56	**[0.57]**
2.25	0.35	0.36	0.37	0.38	0.39	0.4	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.51	0.52	0.53	0.54	0.54
1.75	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.45	0.46	0.47	0.48	0.49	0.49	0.5	0.51	0.52
1.25	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.4	0.4	0.41	0.42	0.43	0.44	0.44	0.45	0.46	0.47	0.47	0.48	0.49	0.5
0.75	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.4	0.4	0.41	0.42	0.43	0.43	0.44	0.45	0.46	0.46	0.47	0.48
0.25	0.3	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.4	0.4	0.41	0.42	0.43	0.43	0.44	0.45	0.45	0.46
	(0.29)	**(0.29)**	0.3	0.31	0.32	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.38	0.39	0.4	0.4	0.41	0.42	0.43	0.43	0.44	0.45
		1		2		3		4		5		6		7		8		9	[m]				

Illuminance [lx]



Average illuminance	$\bar{E}_m$	: 0.41 lx
Minimum illuminance	E_{min}	: 0.29 lx
Maximum illuminance	E_{max}	: 0.57 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.44 (0.69)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.98 (0.51)

2.3 Calculation results, Exterior 1

2.3.17 Table, House 76, 78 front elevation (E)

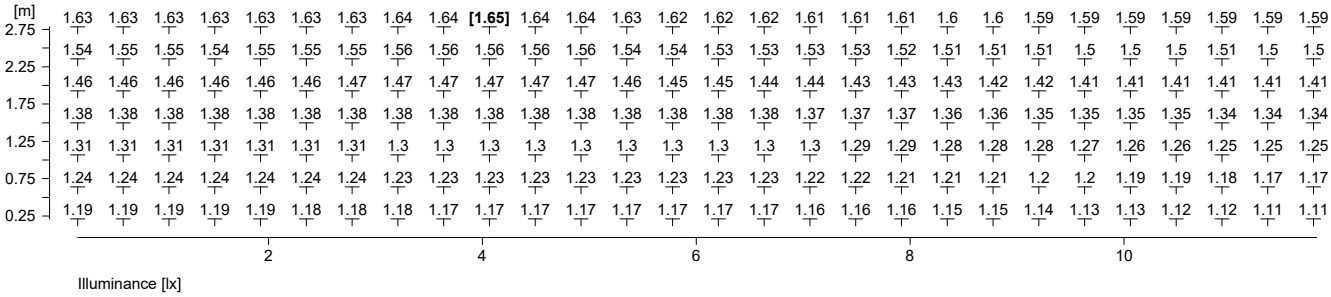
[m]																						
2.75	0.66	0.66	0.67	0.67	0.68	0.68	0.69	0.69	0.69	0.7	0.7	0.71	0.71	0.71	0.71	0.71	0.72	0.72	0.73	0.73	0.73	**[0.74]**	**[0.74]**
2.25	0.63	0.64	0.64	0.65	0.65	0.66	0.66	0.66	0.67	0.67	0.67	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.7	0.7	0.7	0.71	0.71
1.75	0.6	0.6	0.61	0.61	0.62	0.62	0.63	0.63	0.64	0.64	0.64	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.67	0.67	0.67	0.68
1.25	0.58	0.58	0.59	0.59	0.6	0.6	0.6	0.61	0.61	0.62	0.62	0.63	0.63	0.63	0.63	0.63	0.63	0.64	0.64	0.64	0.65	0.65	0.65
0.75	0.56	0.56	0.57	0.57	0.58	0.58	0.58	0.59	0.59	0.6	0.6	0.6	0.61	0.61	0.61	0.61	0.61	0.62	0.62	0.62	0.62	0.63	0.63
0.25	0.54	0.54	0.55	0.55	0.56	0.56	0.56	0.57	0.57	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.6	0.6	0.6	0.6	0.61	0.61
	(0.52)	0.53	0.53	0.53	0.54	0.54	0.55	0.55	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.58	0.58	0.58	0.58	0.59	0.59
	1		2		3		4		5		6		7		8		9	[m]				

Illuminance [lx]

Average illuminance	$\bar{E}_m$	: 0.63 lx
Minimum illuminance	E_{min}	: 0.52 lx
Maximum illuminance	E_{max}	: 0.74 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.20 (0.83)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.42 (0.70)

2.3 Calculation results, Exterior 1

2.3.18 Table, House 80, 82, 84, 86 front elevation (E)



Part1

Average illuminance	$\bar{E}_m$	: 1.36 lx
Minimum illuminance	E_{min}	: 1.08 lx
Maximum illuminance	E_{max}	: 1.65 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	: 1 : 1.26 (0.79)
Diversity U_d	E_{min}/E_{max}	: 1 : 1.52 (0.66)

2.3 Calculation results, Exterior 1

2.3.18 Table, House 80, 82, 84, 86 front elevation (E)

1.58	1.58	1.57	1.56	1.55	1.55	1.54	1.54
1.49	1.49	1.48	1.47	1.46	1.46	1.45	1.45
1.4	1.39	1.38	1.37	1.37	1.36	1.36	1.35
1.33	1.33	1.32	1.32	1.32	1.32	1.31	1.31
1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.22
1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15
1.1	1.1	1.1	1.09	1.09	1.09	**(1.08)**	**(1.08)**

12 14 [m]

Part2