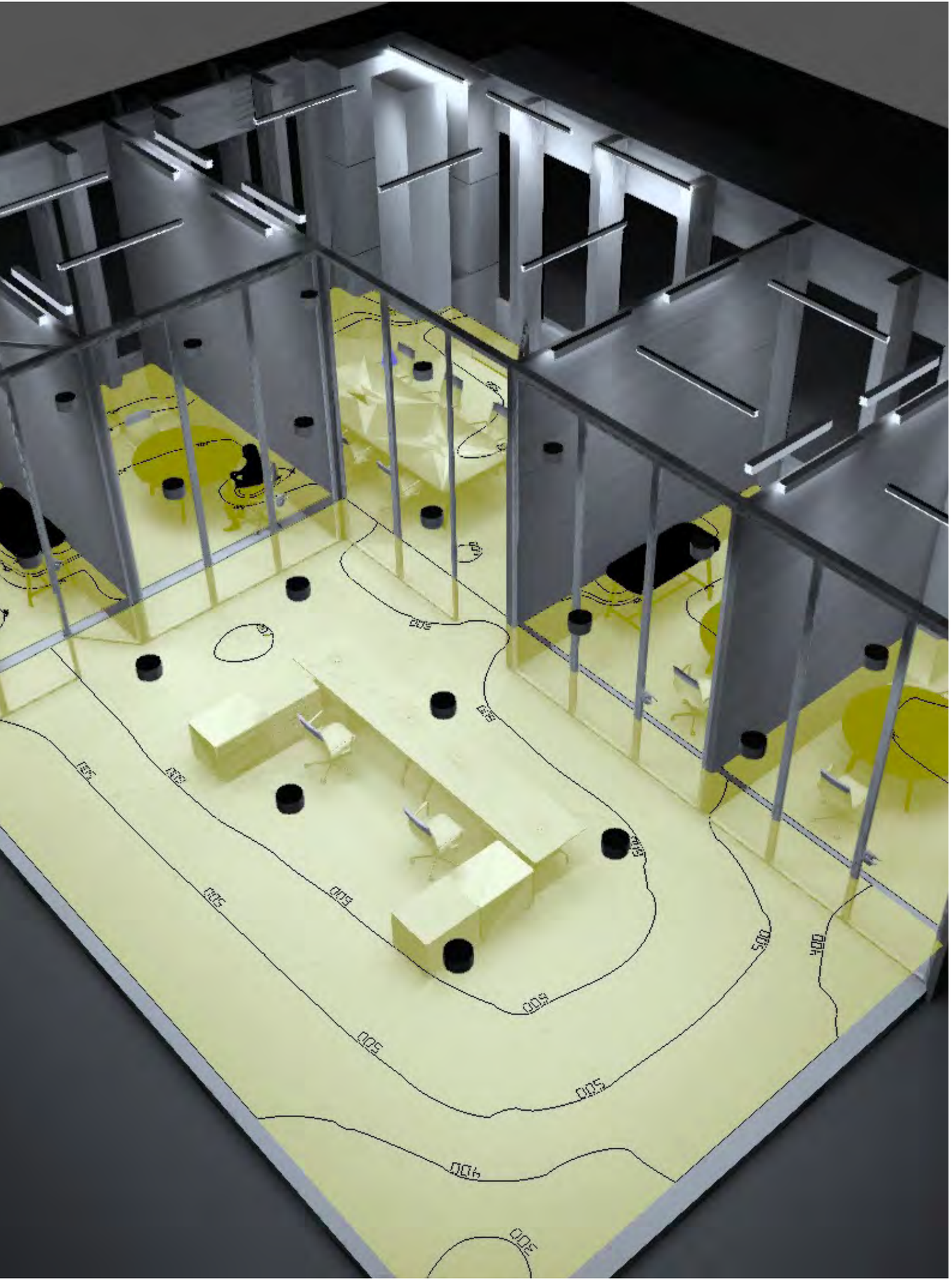

Daylighting and Electric Lighting Report

Daylight Simulation VELUX Software

Daylight Simulation DIALux Software

Savita Chunthatikul (Tang-O)
Student ID: 6538117025
Email: Savita.c@cuinda.com

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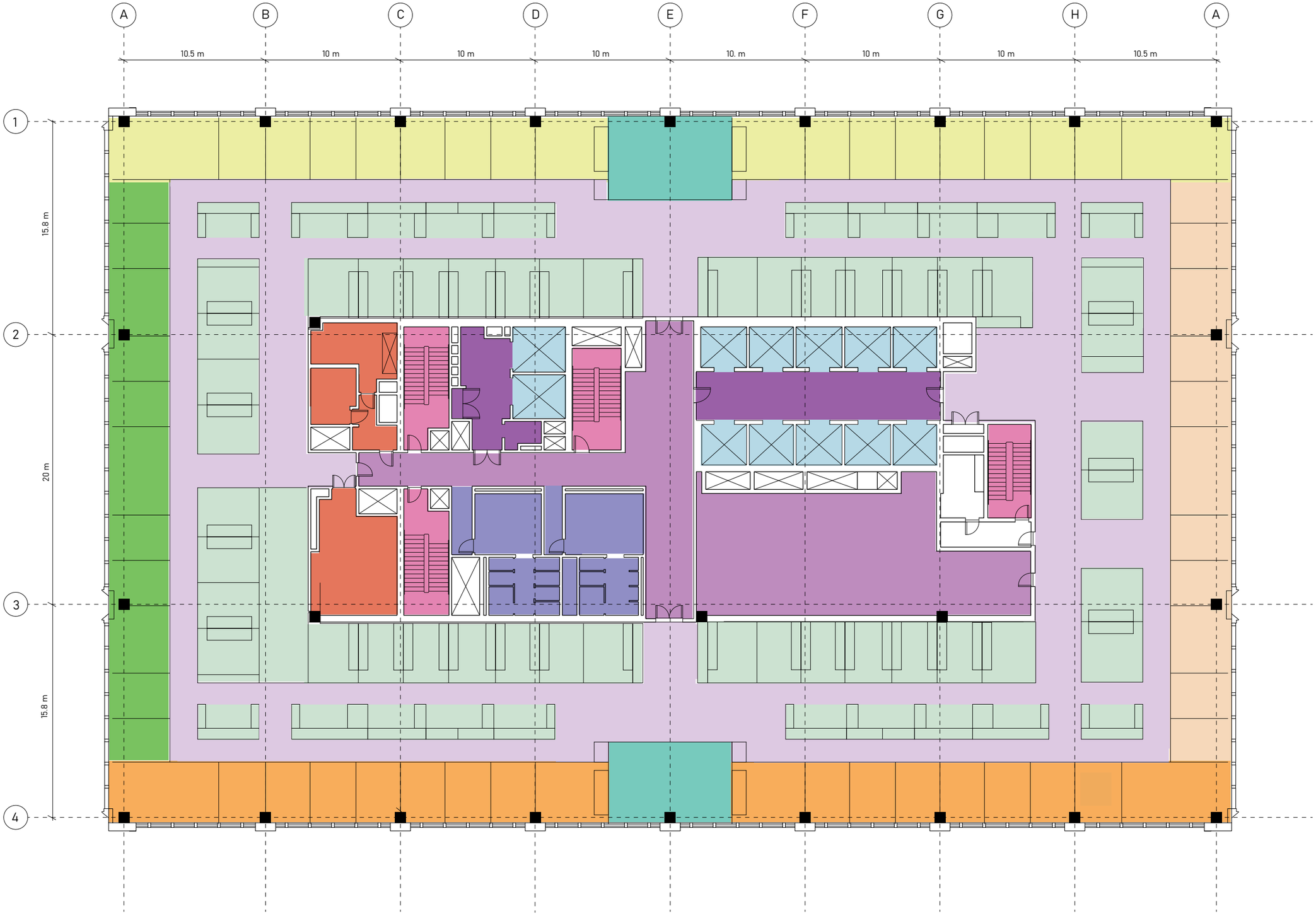


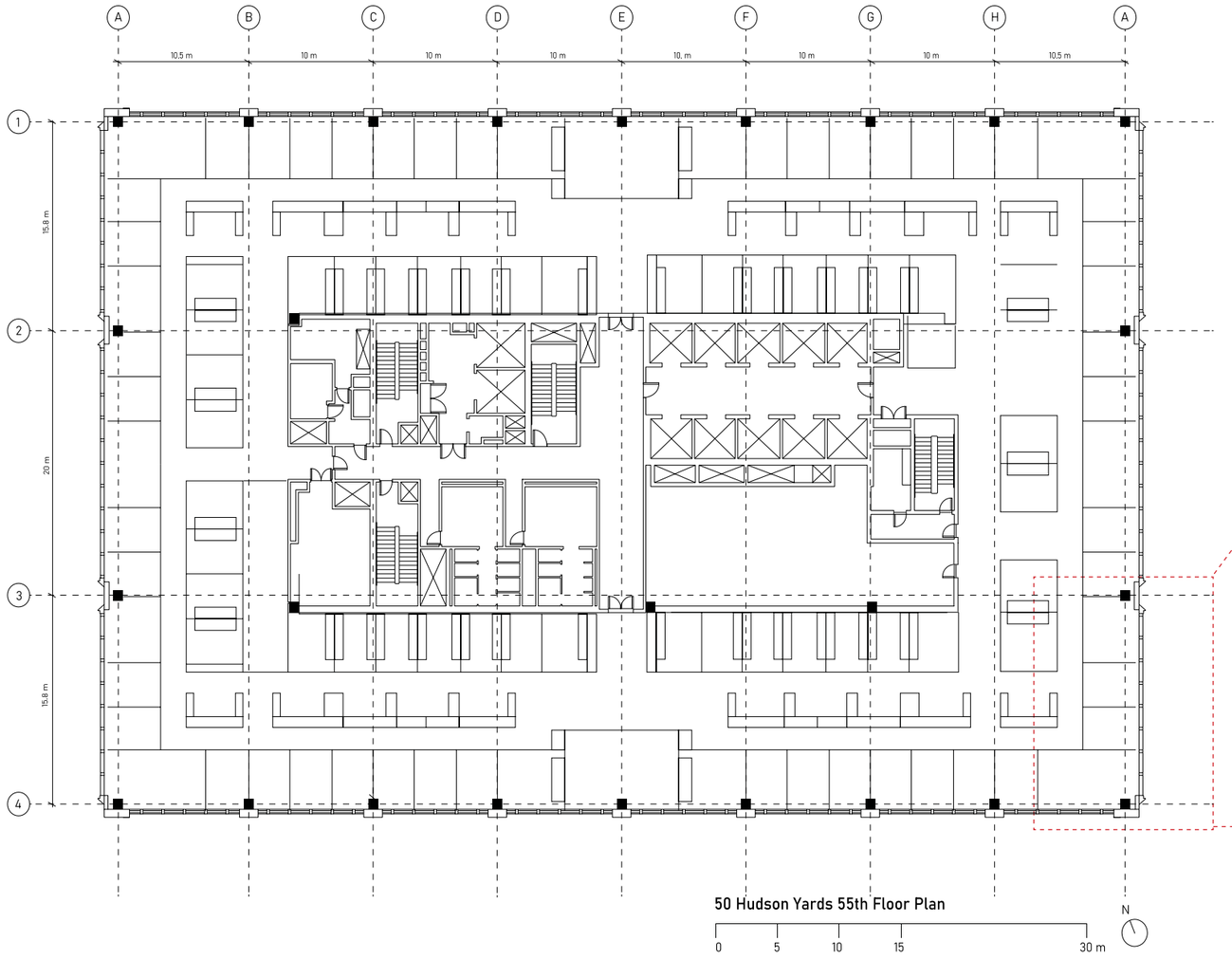
50 Hudson Yards 55th Thermal Zoning Floor Plan

0 5 10 15 30 m

Area Selected (East and South Room)

50 Hudson Yard office zone

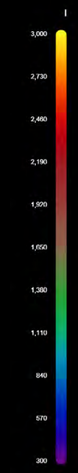
https://newyorkoffices.com/listing/furnished-hudson-yards-office/

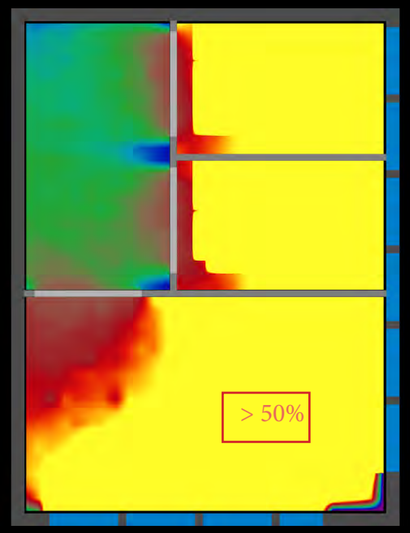


This diagram highlights the zone of focus for my Daylight Simulation. The selected area, located on the east and south side of the 55th floor of 50 Hudson Yards, is outlined in red. The goal of this simulation is to evaluate daylight access and quality across different spatial conditions during the equinox.

Exsiting Facade Daylight Study

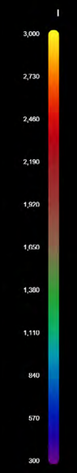
21 March

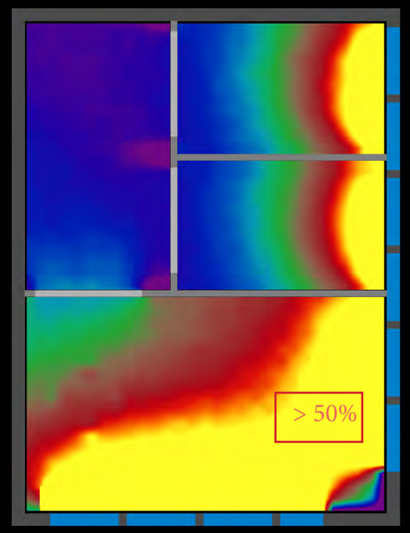




09.00 am

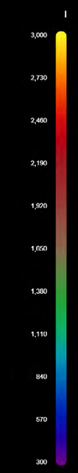
At 9:00 AM, more than 50% of the floor area is exposed to high daylight levels, indicated by the yellow region dominating the right side and lower central area of the space. The southern and eastern zones receive intense early morning sunlight.

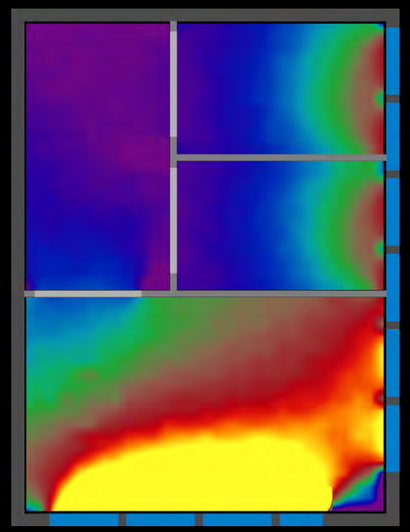




12.00 pm

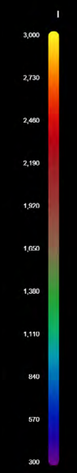
By noon, daylight penetrates deeper into the space, especially in the lower rooms. The yellow region, again covering over 50% of the area, shifts further westward. Glare potential increases in these zones, especially along the lower right part of the layout.

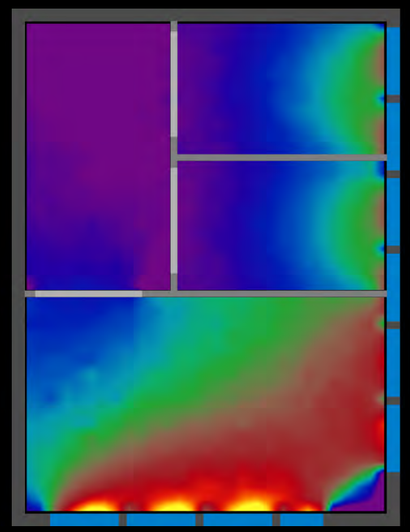




03.00 pm

In the afternoon, the yellow region is concentrated toward the southern and southwestern parts of the space, still occupying more than 50% of the area. The gradient shows daylight intensity fading toward the upper left.



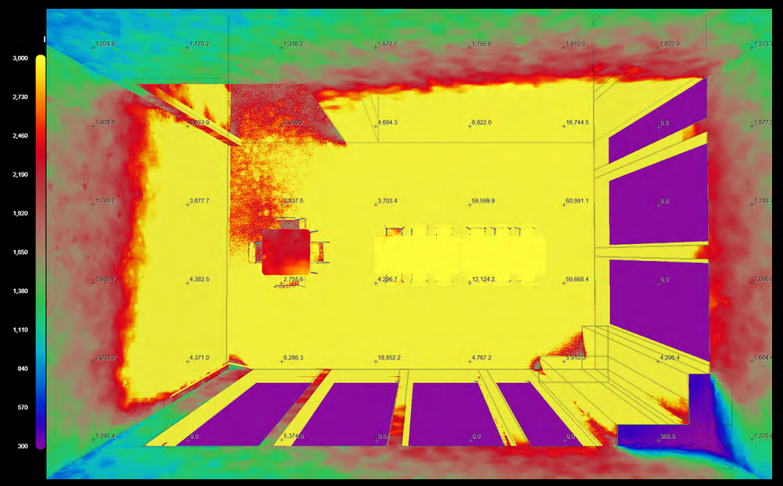


05.00 pm

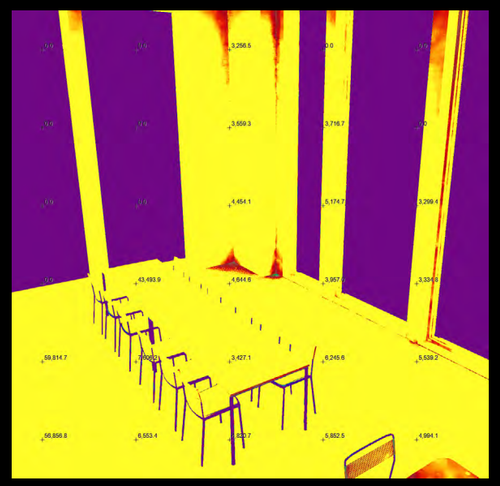
At 5:00 PM, while daylight levels are generally lower, the remaining sunlight is focused along the bottom and east-facing areas. The yellow areas become smaller but still cluster along the lower façade openings, showing brief moments of high intensity that still cross the 50% threshold in specific rooms.

Existing Facade Daylight Study

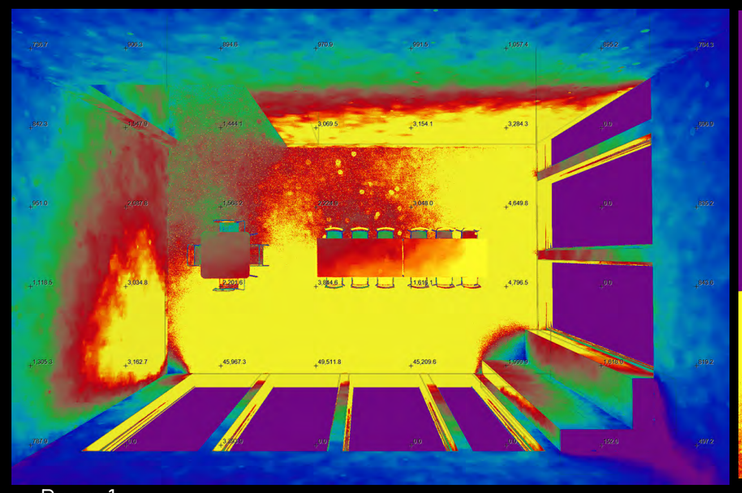
21 March



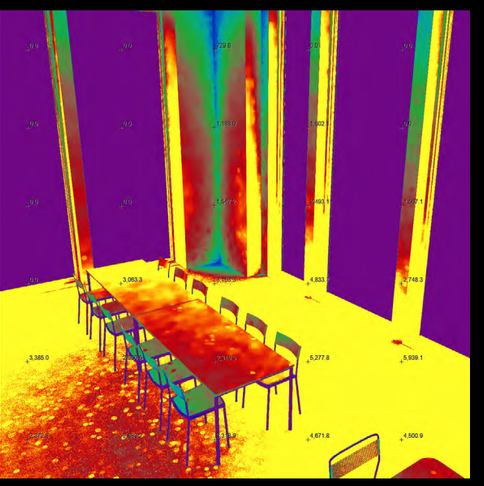
Room 1



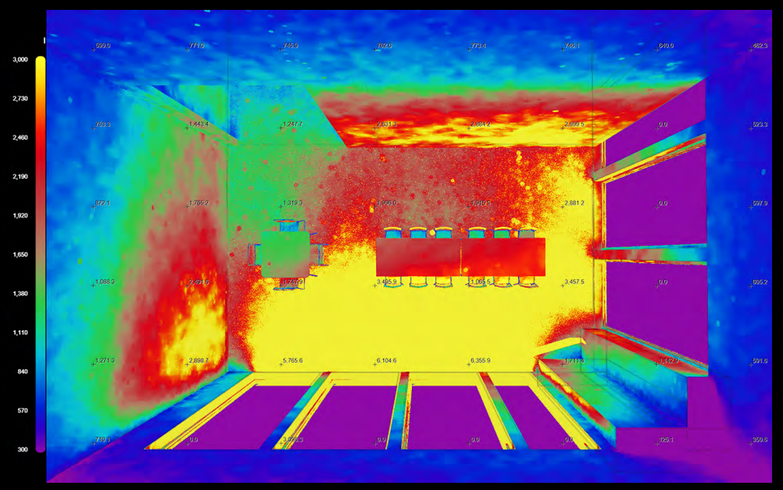
09.00 am



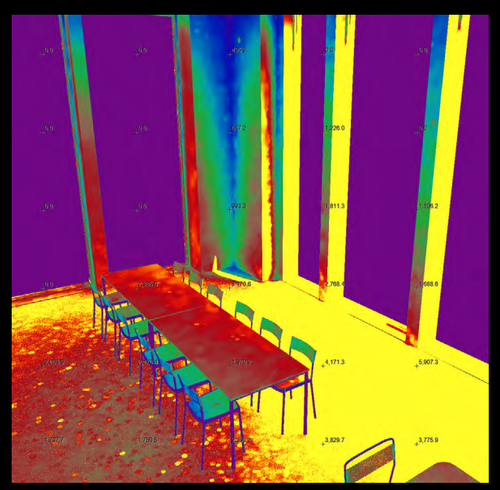
Room 1



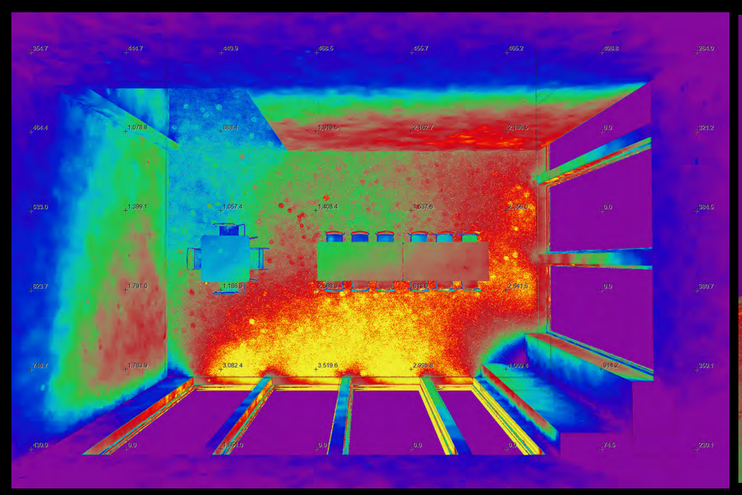
12.00 pm



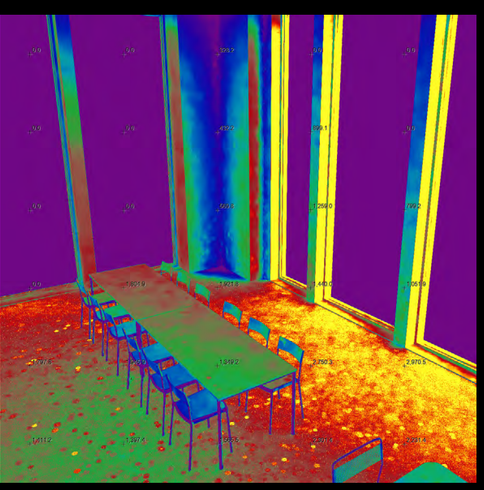
Room 1



03.00 pm



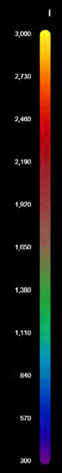
Room 1

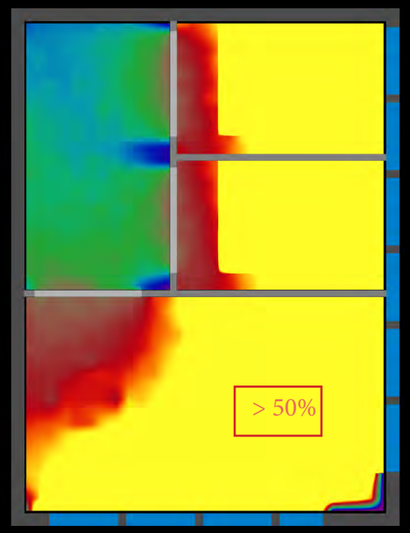


05.00 pm

Exsiting Facade Daylight Study

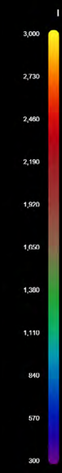
21 September

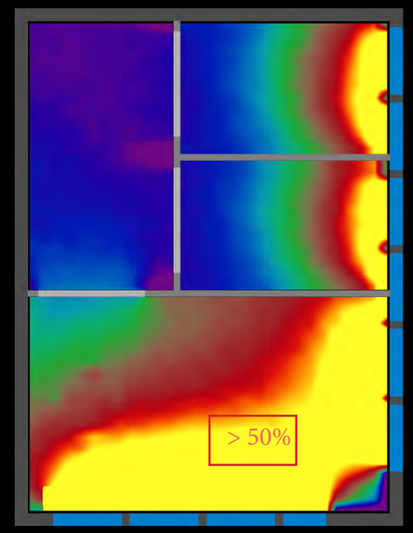




09.00 am

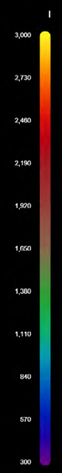
Morning sunlight enters directly through the east-facing facade, creating a large overlit zone in the lower and right sections. This can cause glare and discomfort, especially in work or living areas.

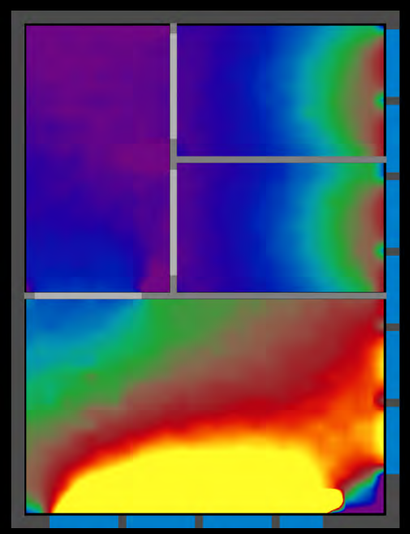




12.00 pm

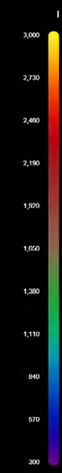
Daylight penetrates deeper into the space, with concentrated brightness near the facade. While the overlit area is smaller, it still poses glare potential in the lower zone.

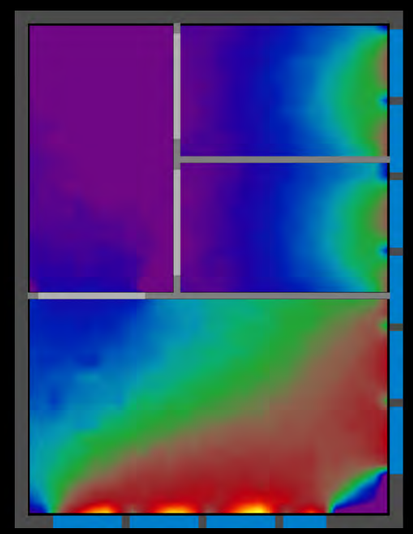




03.00 pm

The light becomes more balanced in the afternoon. Most areas receive moderate daylight, and no intense overlit zones are present, resulting in better visual comfort.



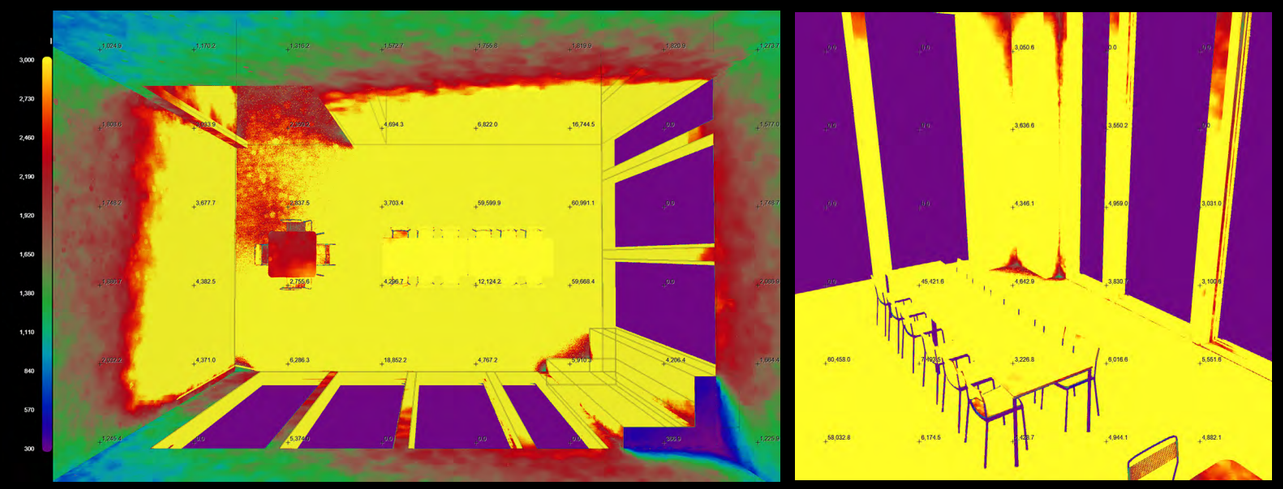


05.00 pm

Late afternoon light is soft and diffused. Only slight brightness appears along the bottom edge, with most of the space remaining visually comfortable and free from glare.

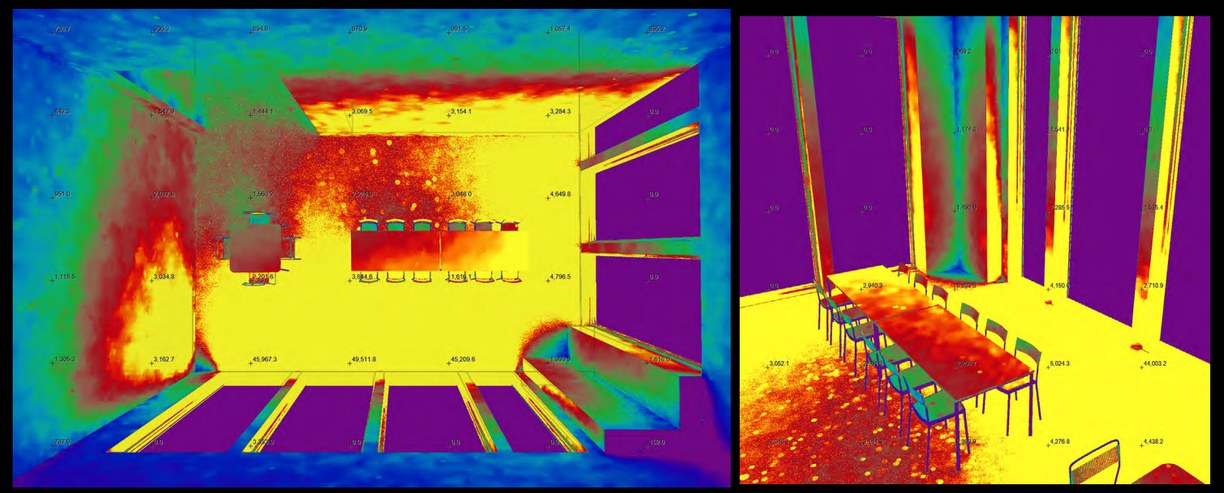
Existing Facade Daylight Study

21 September



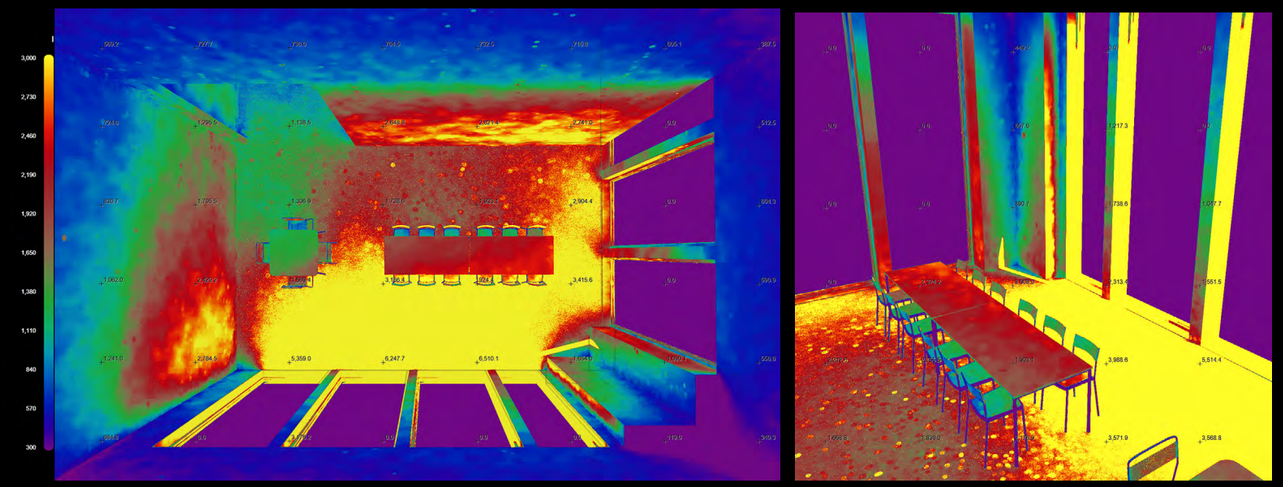
Room 1

09.00 am



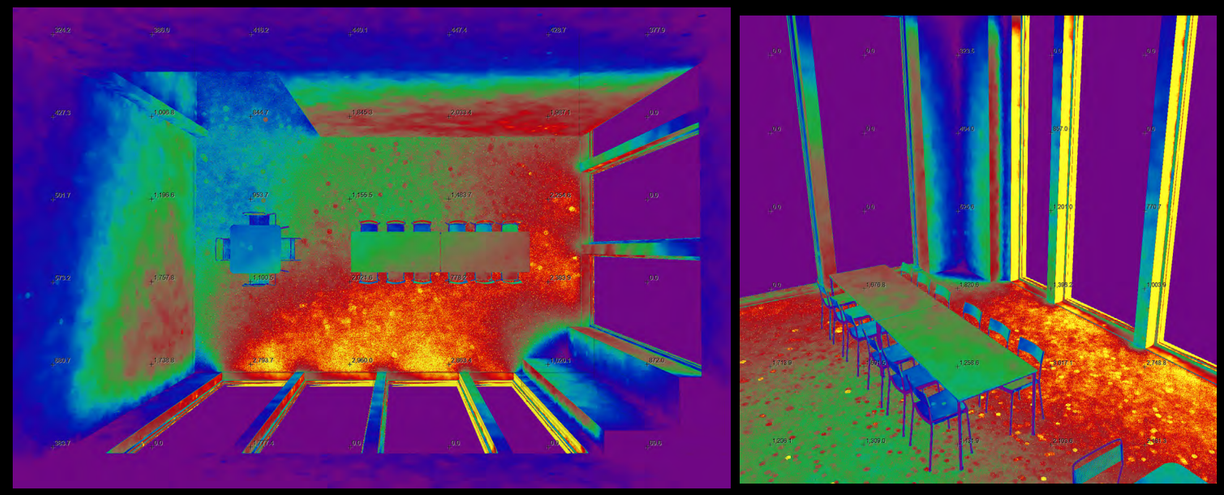
Room 1

12.00 pm



Room 1

03.00 pm

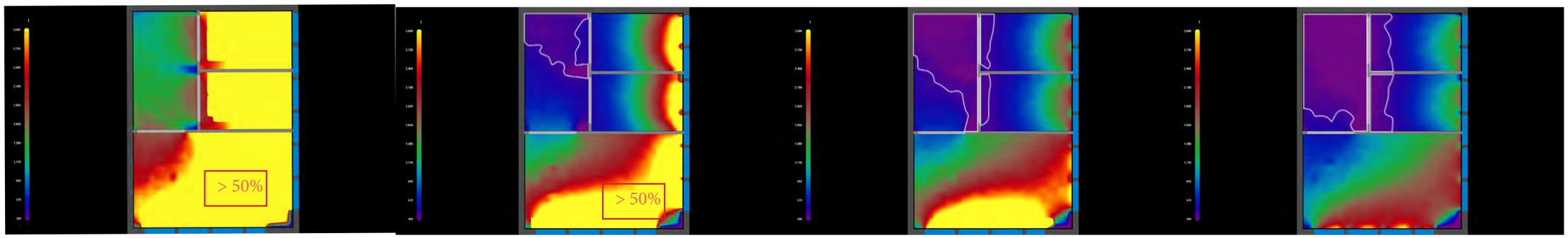


Room 1

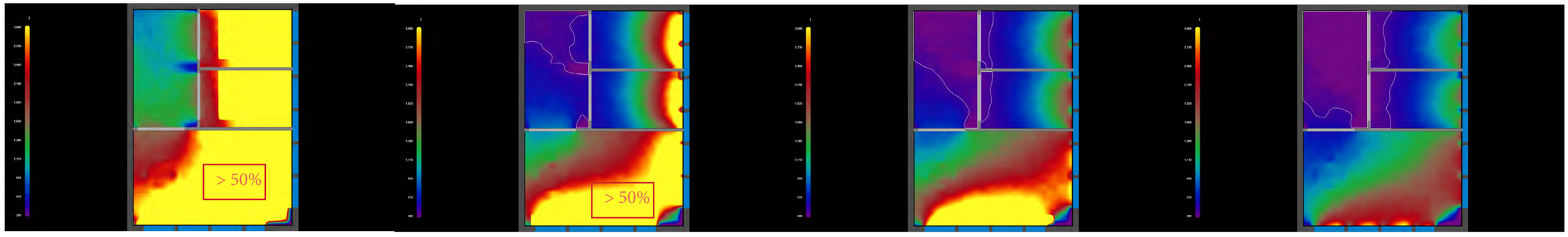
05.00 pm

Summary of existing daylight simulation and facade

21 March



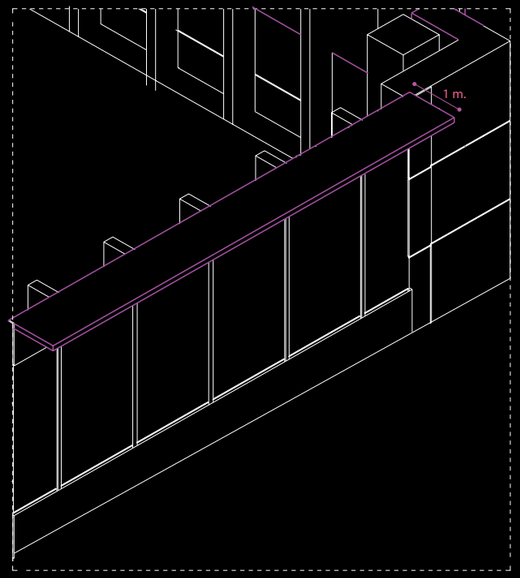
21 September



The daylight simulation results for both 21 March and 21 September reveal that multiple zones, particularly those adjacent to the south-facing glazing, experience illuminance levels exceeding 3000 lux, represented by the bright yellow areas. Such high daylight levels are not ideal for standard indoor activities and may lead to glare, visual discomfort, and potential overheating. These findings indicate a strong need for daylight control interventions, such as overhangs, vertical fins, adjustable blinds, or reduced glazing areas. Incorporating these strategies can help optimize visual comfort, reduce reliance on artificial lighting, and create a more balanced interior environment throughout the day.

New design Facade Daylight Strategies

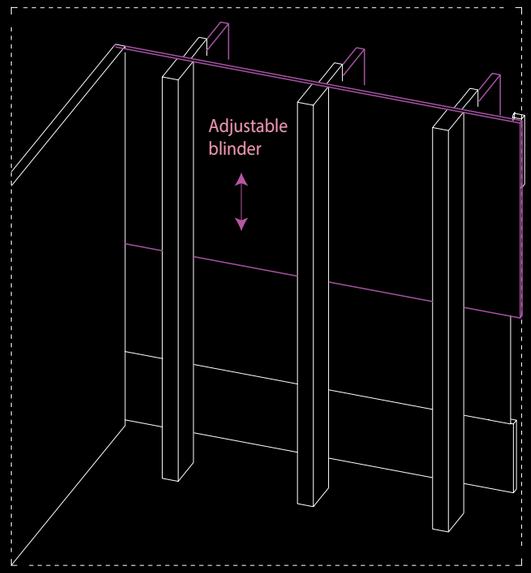
Overhange



https://www.terakkiyapi.com/en/products/solar-shading-systems

A horizontal shading element is installed above the window to block high-angle sunlight, particularly effective for south-facing facades. In this case, a 1 meter overhang is proposed to reduce solar heat gain while allowing diffused daylight into the room,.

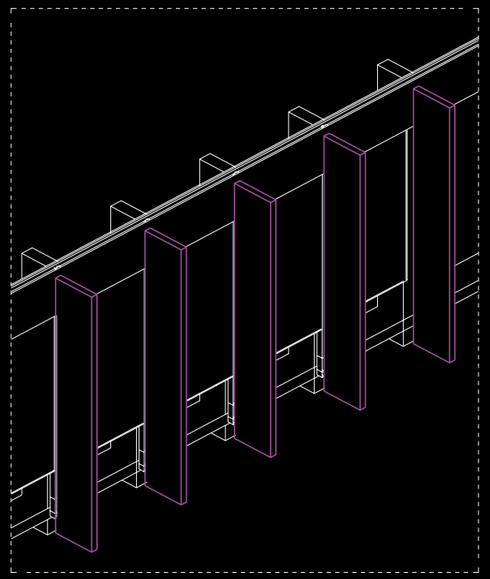
Blinder



https://motionshading.com/business-shades/conference-room/

A horizontal shading element is installed above the window to block high-angle sunlight, particularly effective for south-facing facades. In this case, a 1 meter overhang is proposed to reduce solar heat gain while allowing diffused daylight into the room.

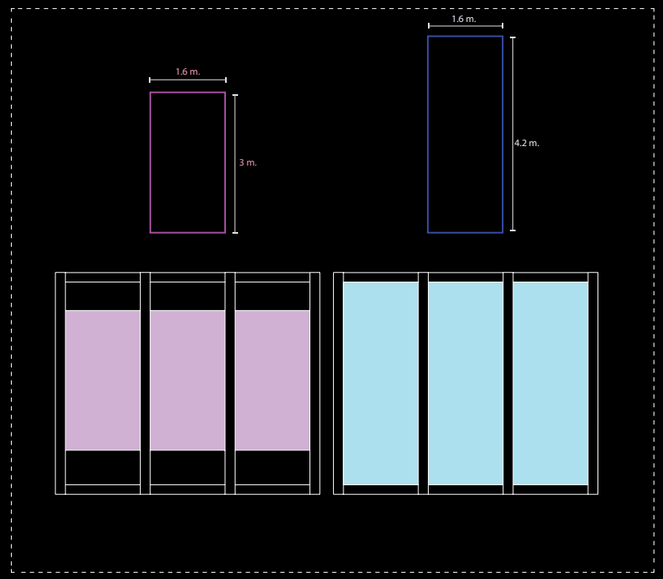
Vertical Fin



https://www.hok.com/projects/view/sacramentos-civic-showcase/

These fin are installed vertically along the facade to shade low-angle morning and afternoon sunlight, adding to east side and south. These fins also help reduce glare and control privacy while maintaining views and allowing daylight to enter from oblique angles.

Reduce Glass Wall Area

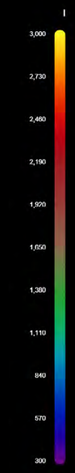


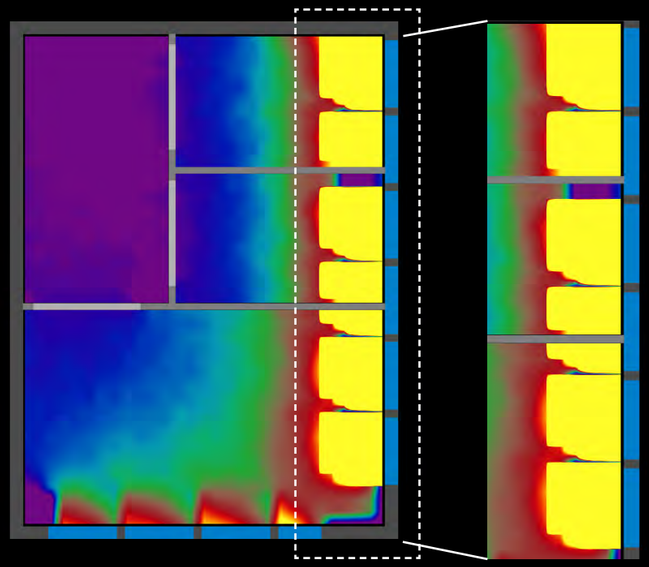
https://agc-glassasia.com/glass-types/spandrel-glass

This approach involves reducing the window-to-wall ratio to limit excessive solar exposure. Smaller glazing areas can help lower heat gain and glare, especially on high-exposure facades, while still maintaining a view and some daylight entry.

New design Facade Daylight Study

21 March

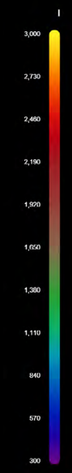


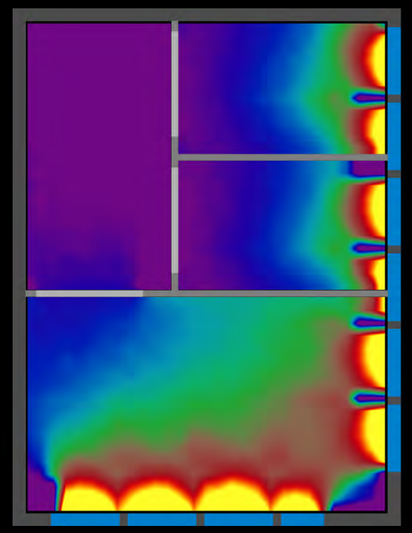


With Adjustable Blinder

High sunlight penetration is observed on the east side. An adjustable blinder was added here to reduce glare and control excess daylight.

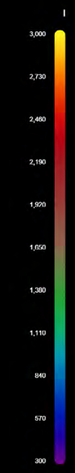
09.00 am

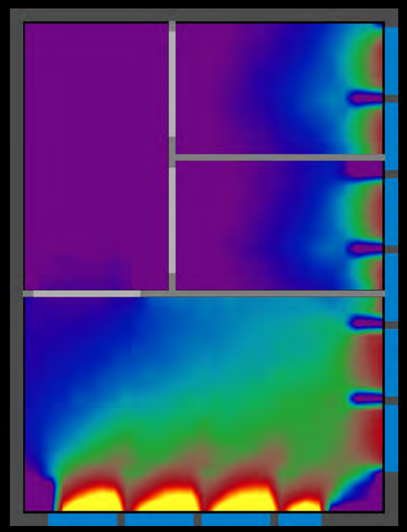




Strong direct sunlight enters from the south, especially into Room 1, creating bright zones near the glazing.

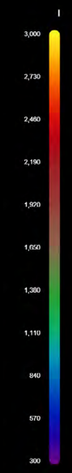
12.00 pm

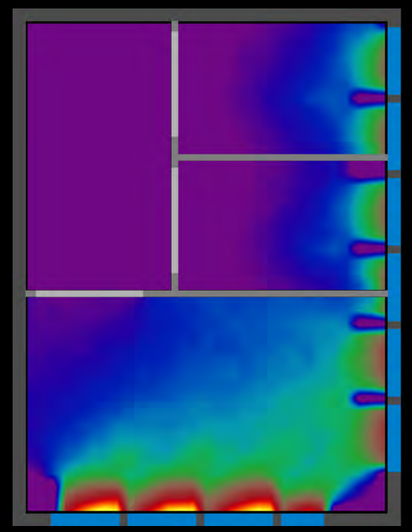




Daylight remains strong on the southern facade with deeper light penetration, while east-facing rooms receive diffused light.

03.00 pm



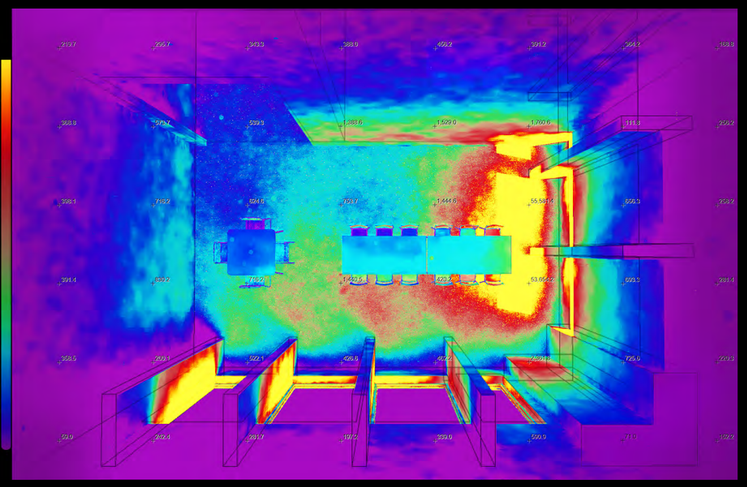


Sunlight weakens; most spaces show uniform, lower light levels, with slight highlights on the southeast corners.

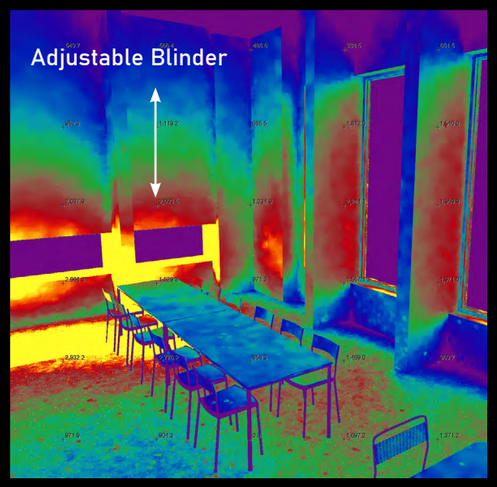
05.00 pm

New design Facade Daylight Study

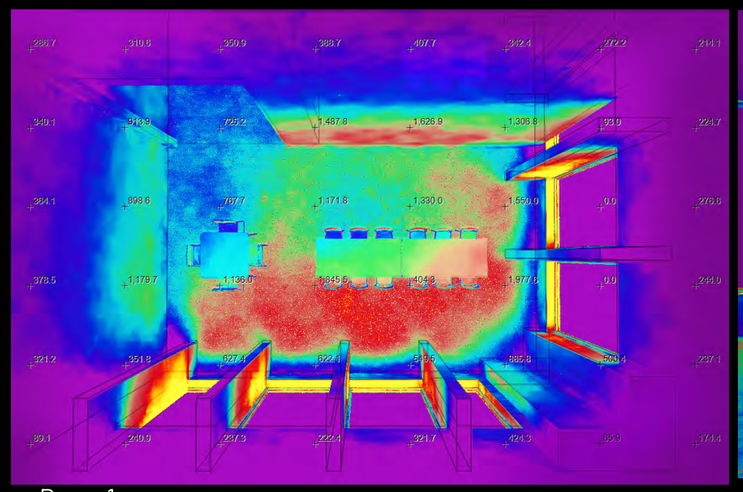
21 March



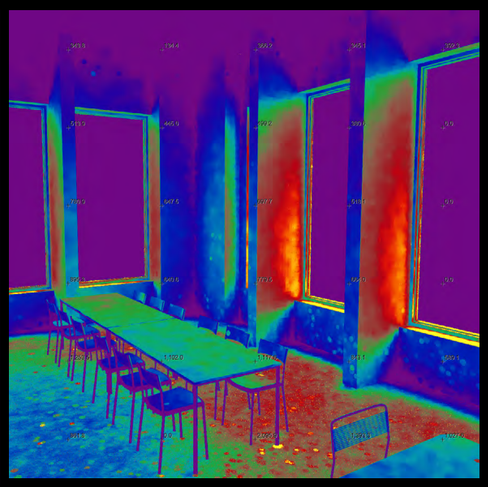
Room 1



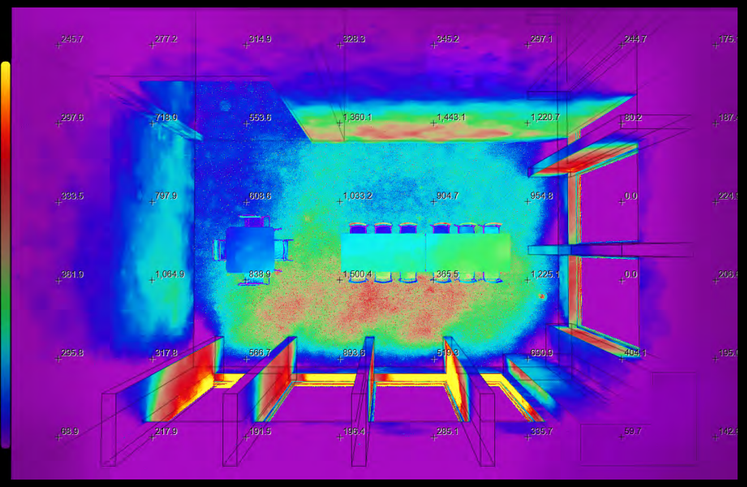
09.00 am



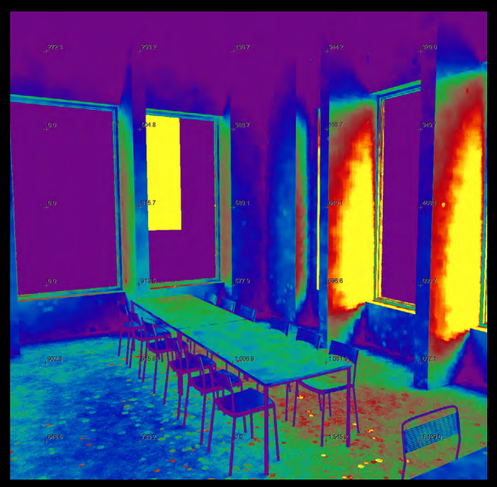
Room 1



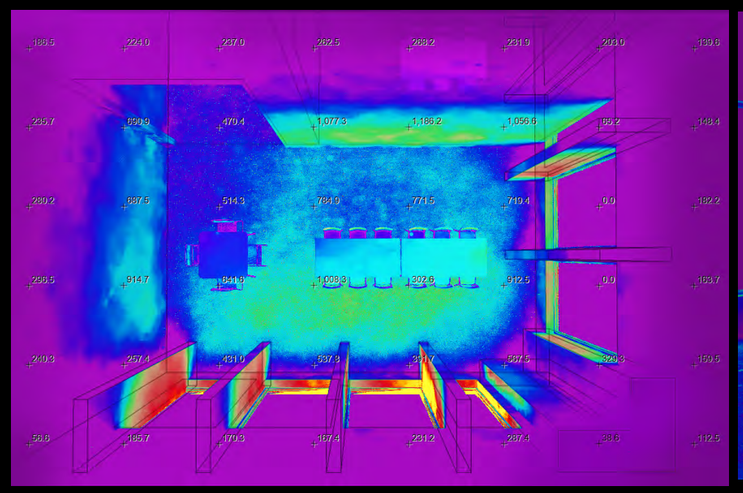
12.00 pm



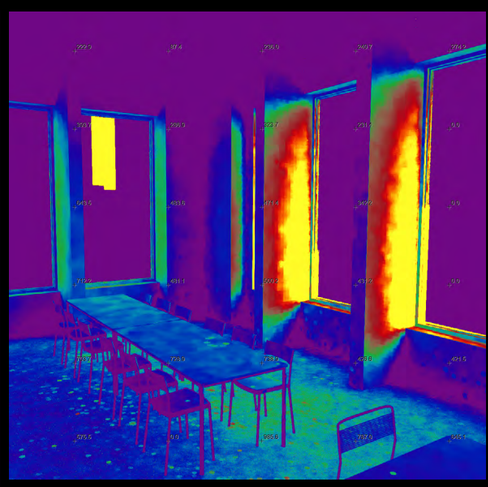
Room 1



03.00 pm



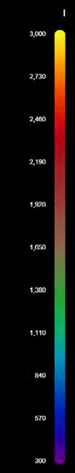
Room 1

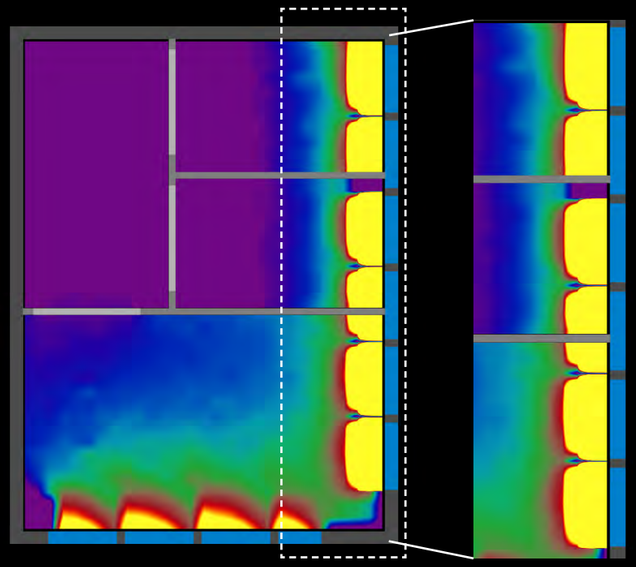


05.00 pm

New design Facade Daylight Study

21 September

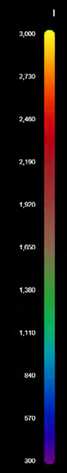


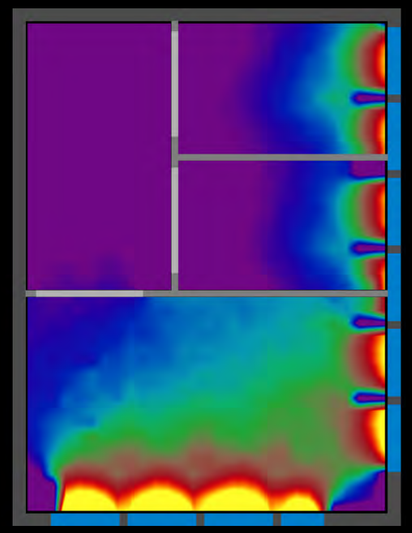


With Adjustable Blinder

In September, morning light is slightly softer and less direct, with lower peak illuminance in the same area.

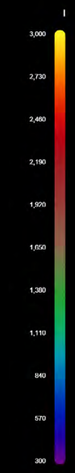
09.00 am

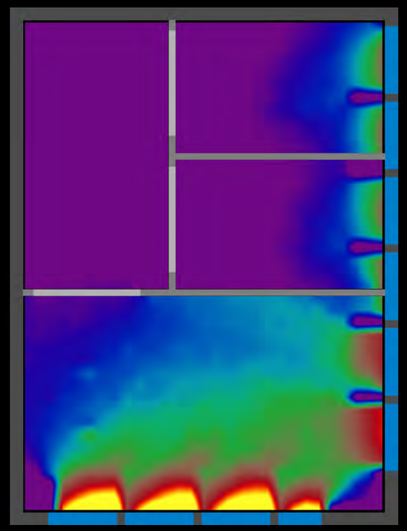




September has a slightly wider spread of daylight across the floor, possibly due to a slightly higher sun angle.

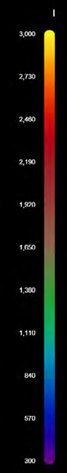
12.00 pm

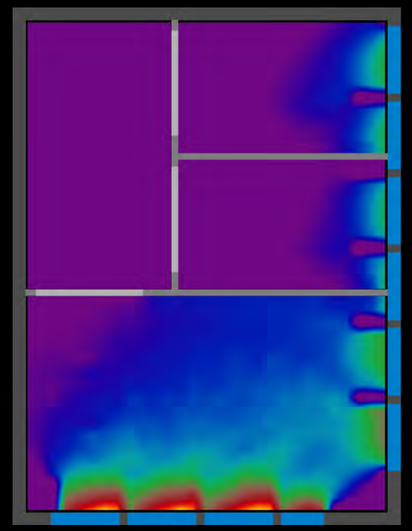




Light penetration from the south appears similar in both cases. In September, there is a more diffused transition between bright and shaded zones.

03.00 pm



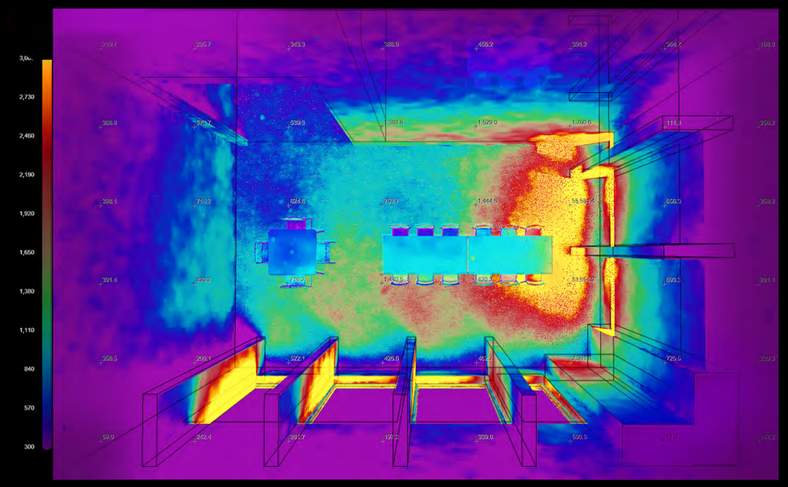


In September, the evening light is dimmer and more concentrated near the windows, meaning electric lighting may be needed deeper inside the space.

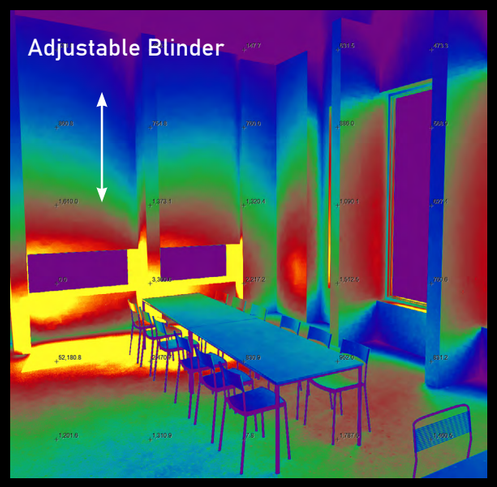
05.00 pm

New design Facade Daylight Study

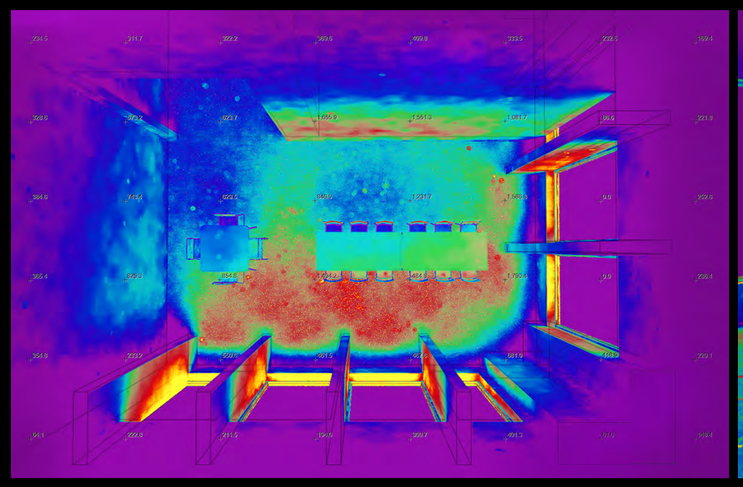
21 September



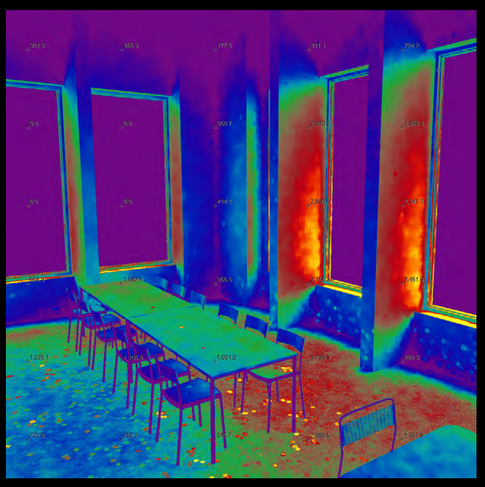
Room 1



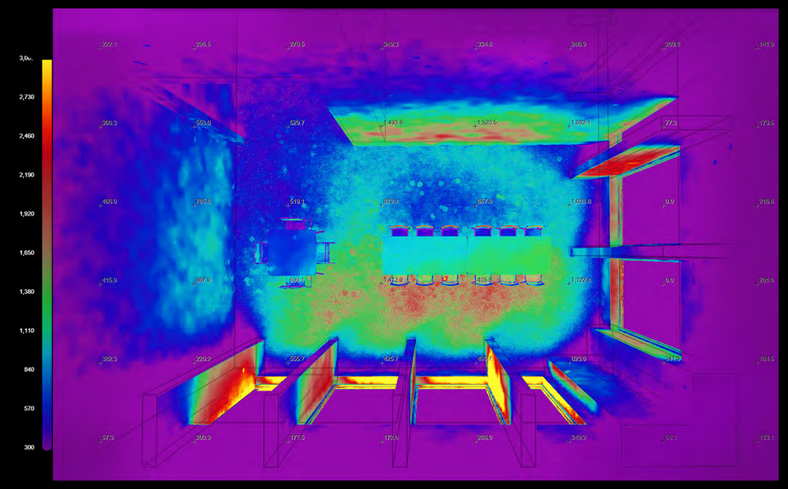
09.00 am



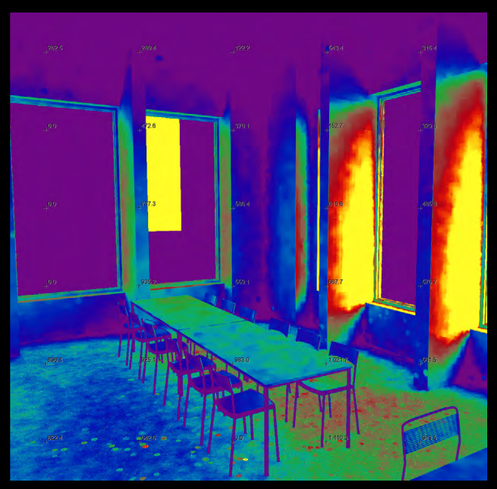
Room 1



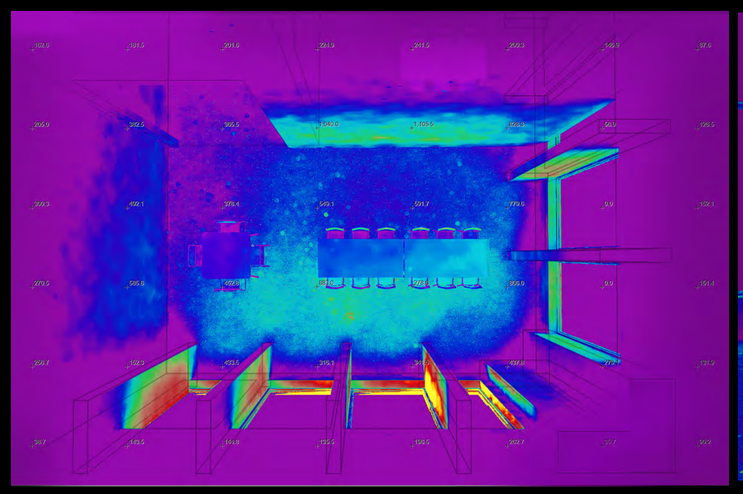
12.00 pm



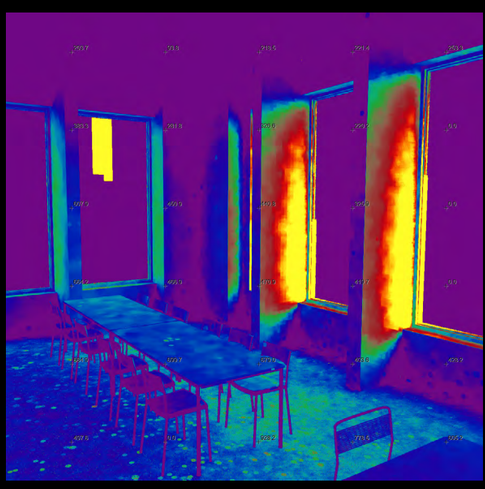
Room 1



03.00 pm



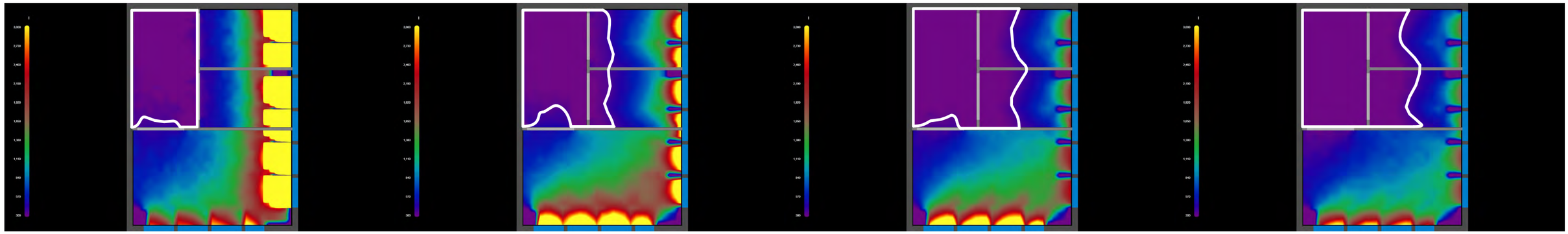
Room 1



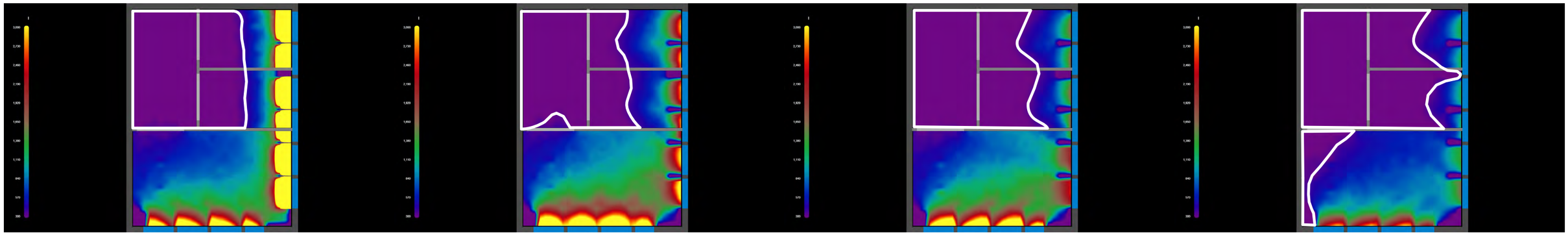
05.00 pm

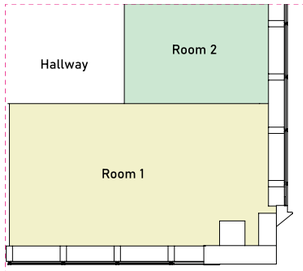
Summary of new daylight simulation and facade

21 March

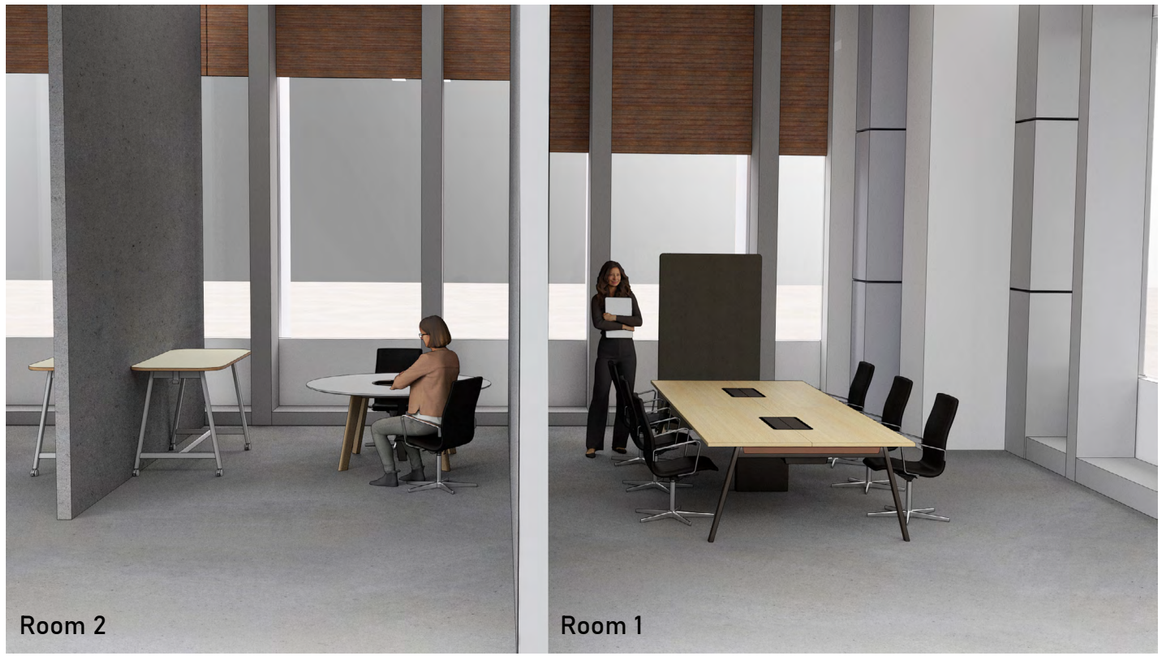


21 September





The updated daylight simulation for 21 March and 21 September demonstrates a clear improvement in daylight distribution and control compared to the existing condition. The application of new façade strategies—such as overhangs, vertical fins, blinds, and a reduction in glazing area—effectively limits excessive daylight exposure. Although the overlit yellow zones (above 3000 lux) do not exceed 50% of the room area in the existing condition, their presence still poses a risk of glare and visual discomfort, particularly during the morning hours. In the updated scenario, these high-lux zones are significantly reduced, creating a more balanced and comfortable interior environment. Daylight is now more evenly distributed across the rooms throughout the day, ensuring adequate daylight access while minimizing glare and overheating.



Comparison of both existing and new daylight simulation and facade

21 March

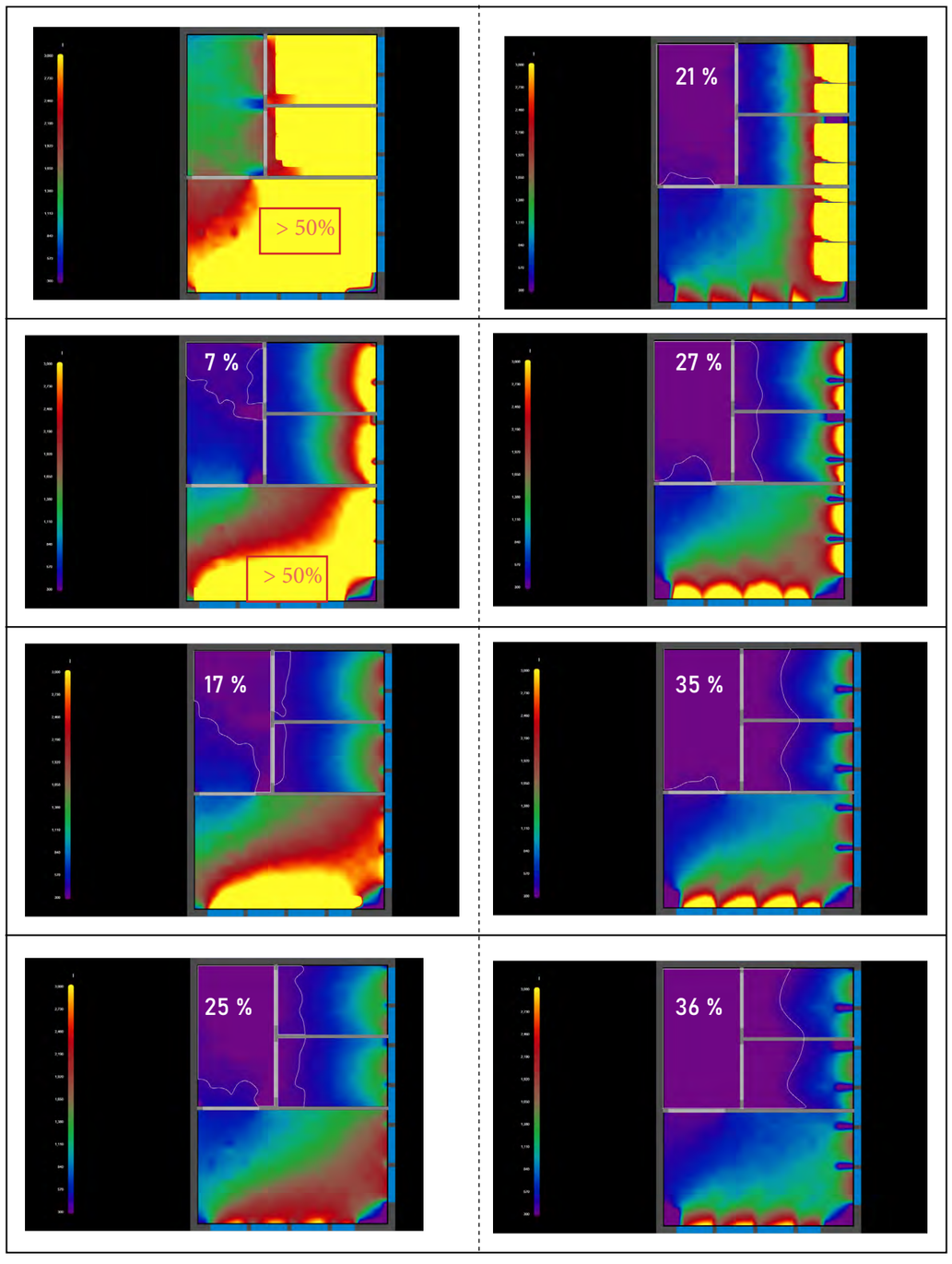
21 September

9.00 am

12.00 pm

3.00 pm

5.00 pm

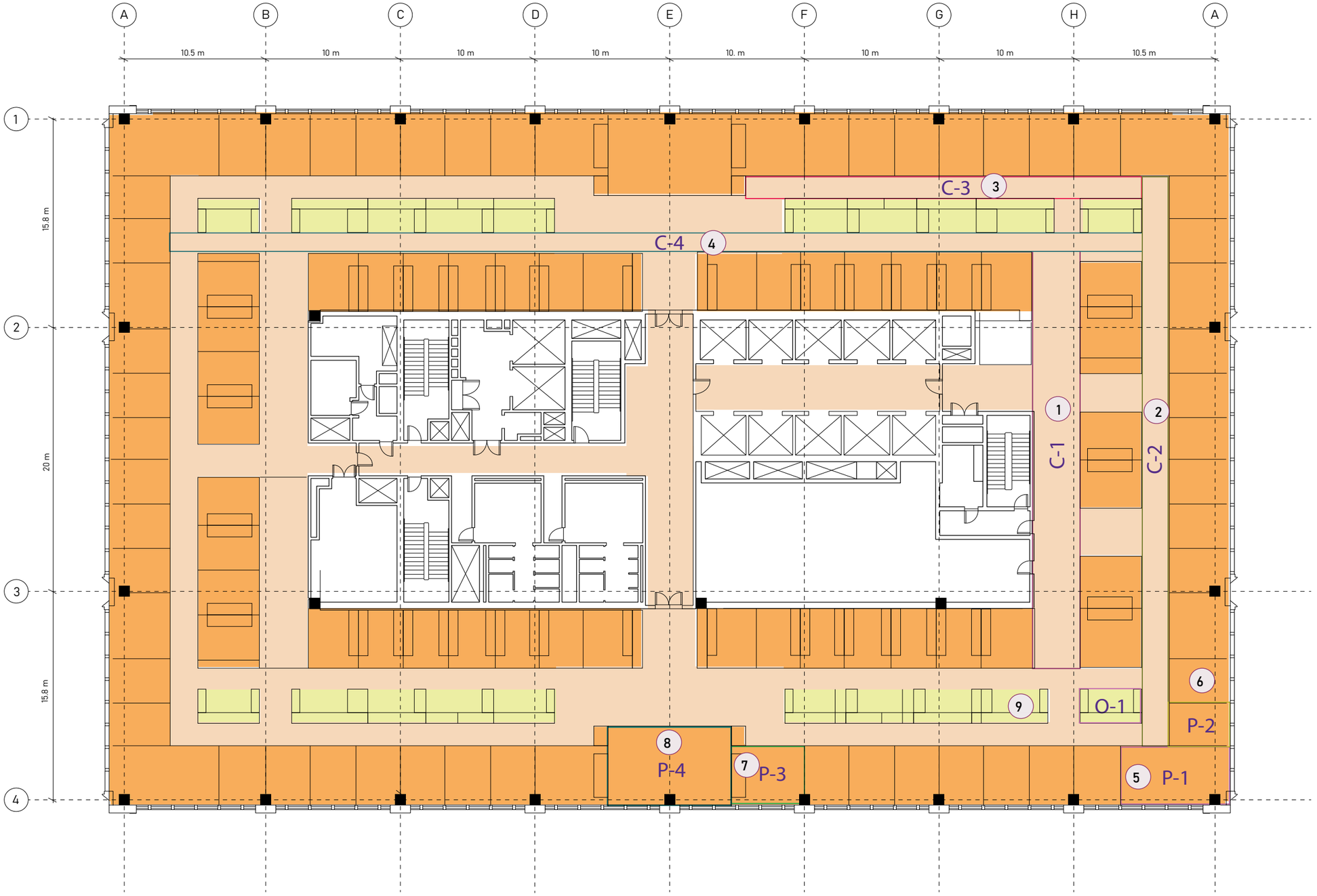


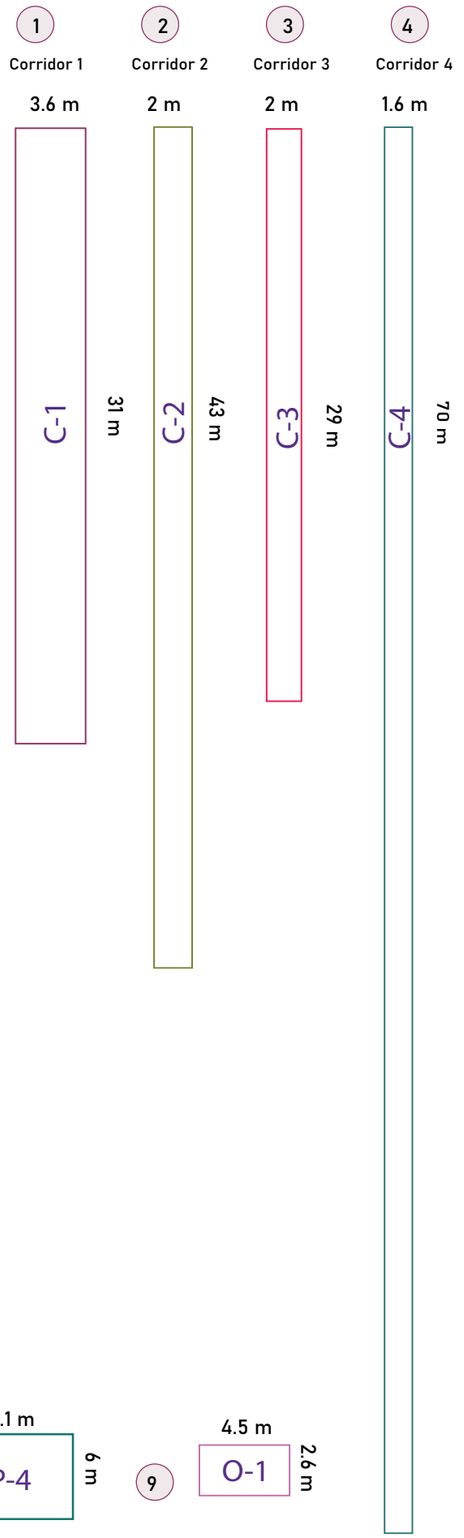
Existing

New

Existing

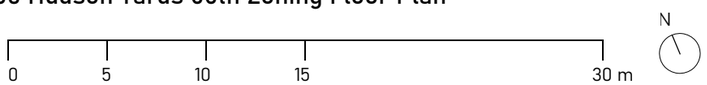
New

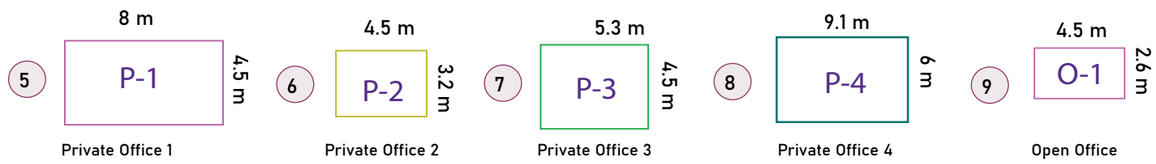




Open offices
Private offices
Corridors

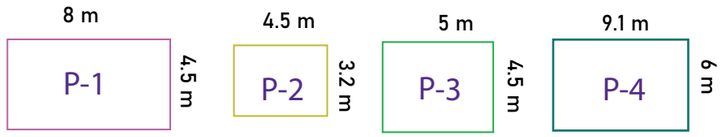
50 Hudson Yards 55th Zoning Floor Plan

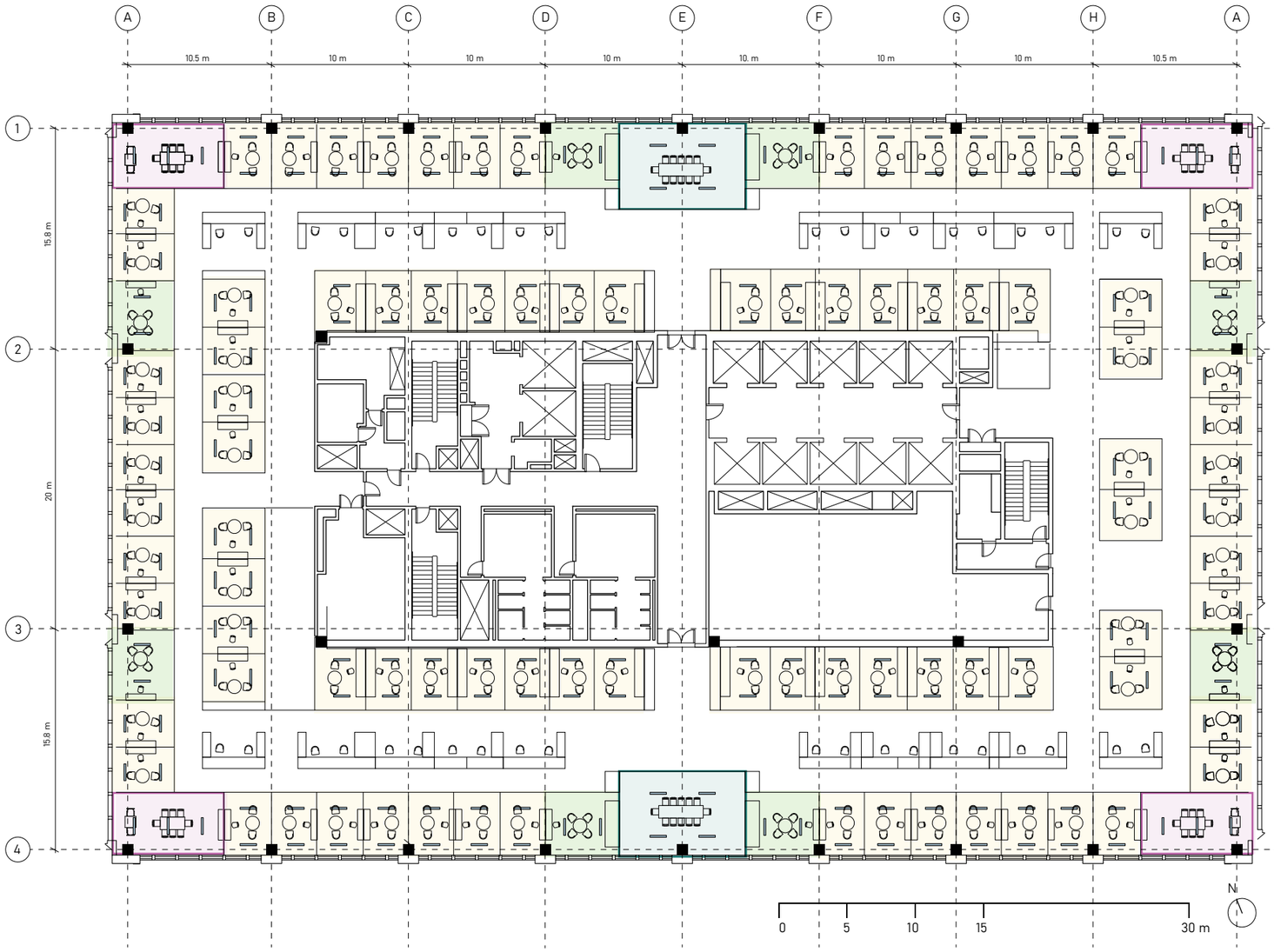




Private Office

lluminance private office room = 300 - 500 lux



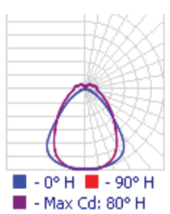


Luminaire LED

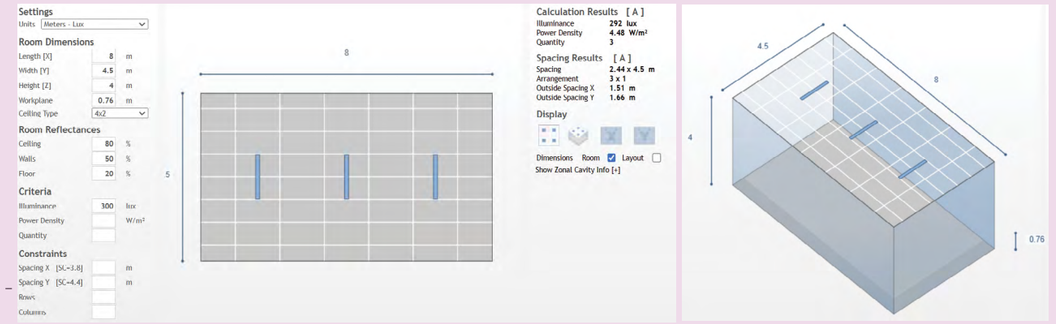
[A] - LVP524L 50W 40K CLP

LVP524L 50W 40K CLP

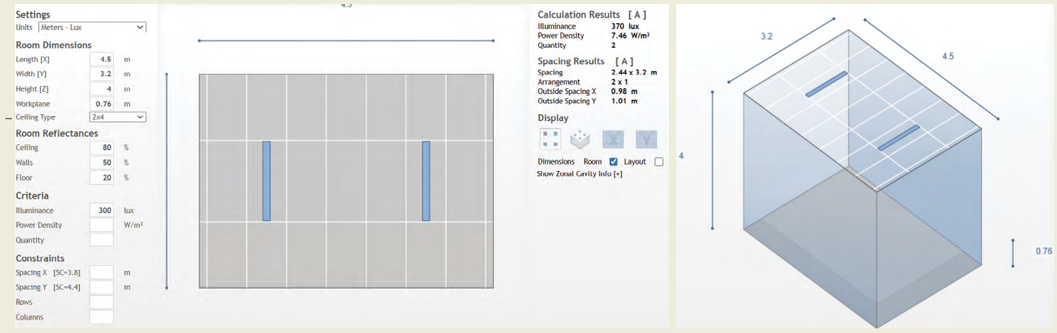
Light Loss Factor	1	Symbol Shape	Rectangular	Lamp Quantity	336
Suspension Length	0	Symbol Length	.11	Lumens Per Lamp	18
Orientation	0	Symbol Width	1.19	Wattage	53.7



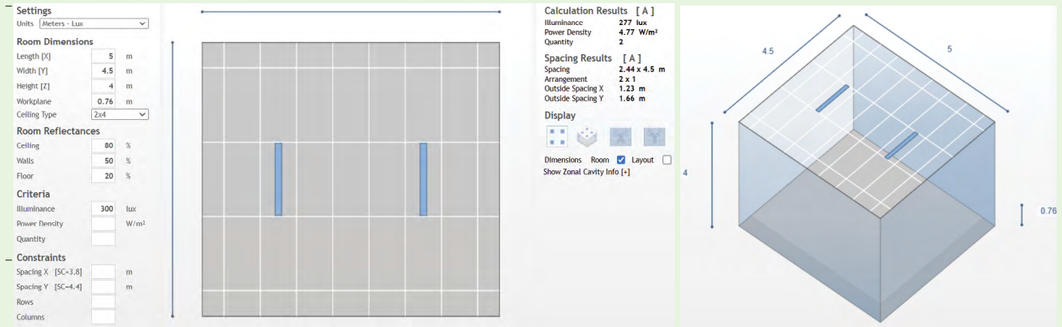
Private Office Room 1



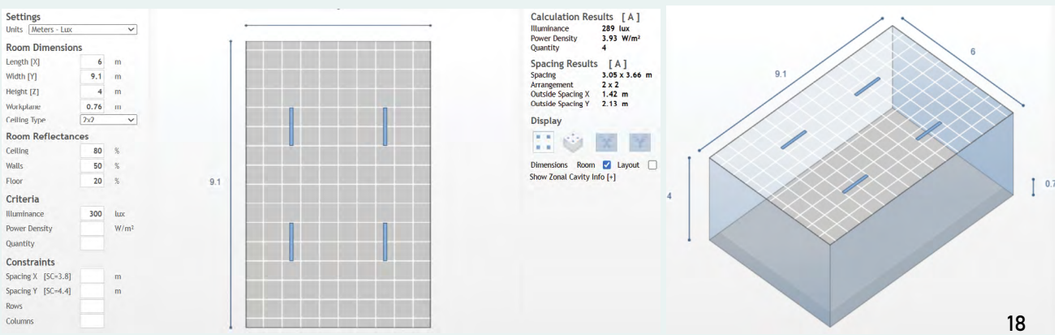
Private Office Room 2



Private Office Room 3



Private Office Room 4



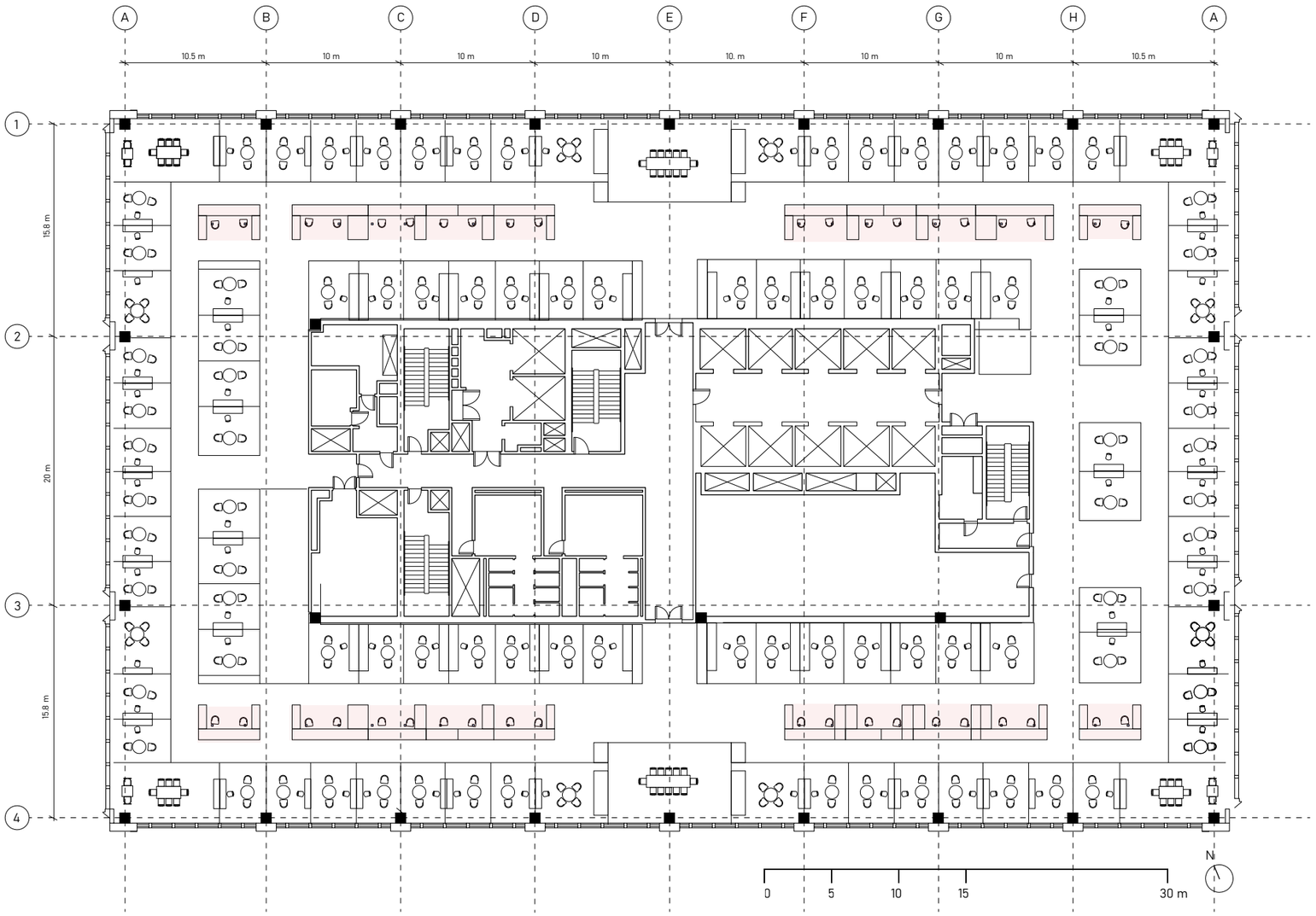
Open Office

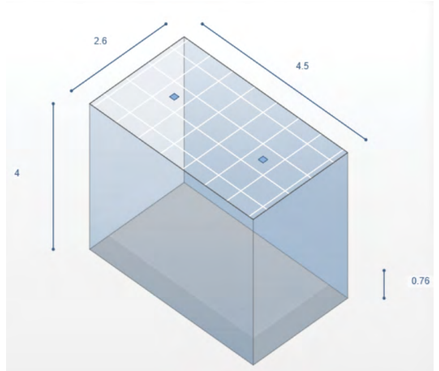
lluminance open office room = 300 - 500 lux

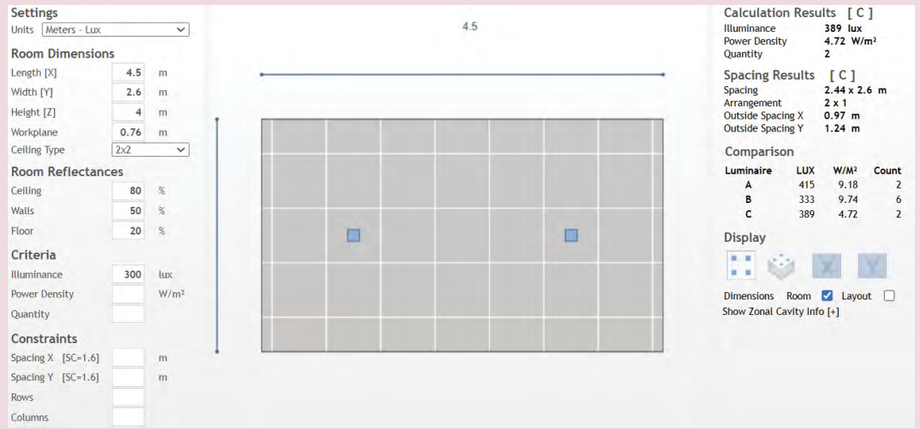
4.5 m

O-1

2.6 m





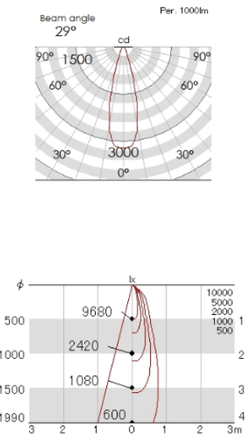


Fixture Specifications

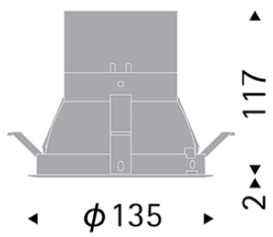
TYPE	2400TYPE
Cutout	Φ125
Glare Cut Off Angle	30°
Weight	0.5 kg
Frame	Die-cast aluminum (matt white)
Cone	Aluminum (polished matt finish)
Driver	Remote (sold separately)
Beam Angle	29°
Color Temperature	3000K
Color Rendering	85≦CRI
Lightsource Lumen Output	3044 lm
Rated Lumen Output	3044 lm

Image

Light Distribution

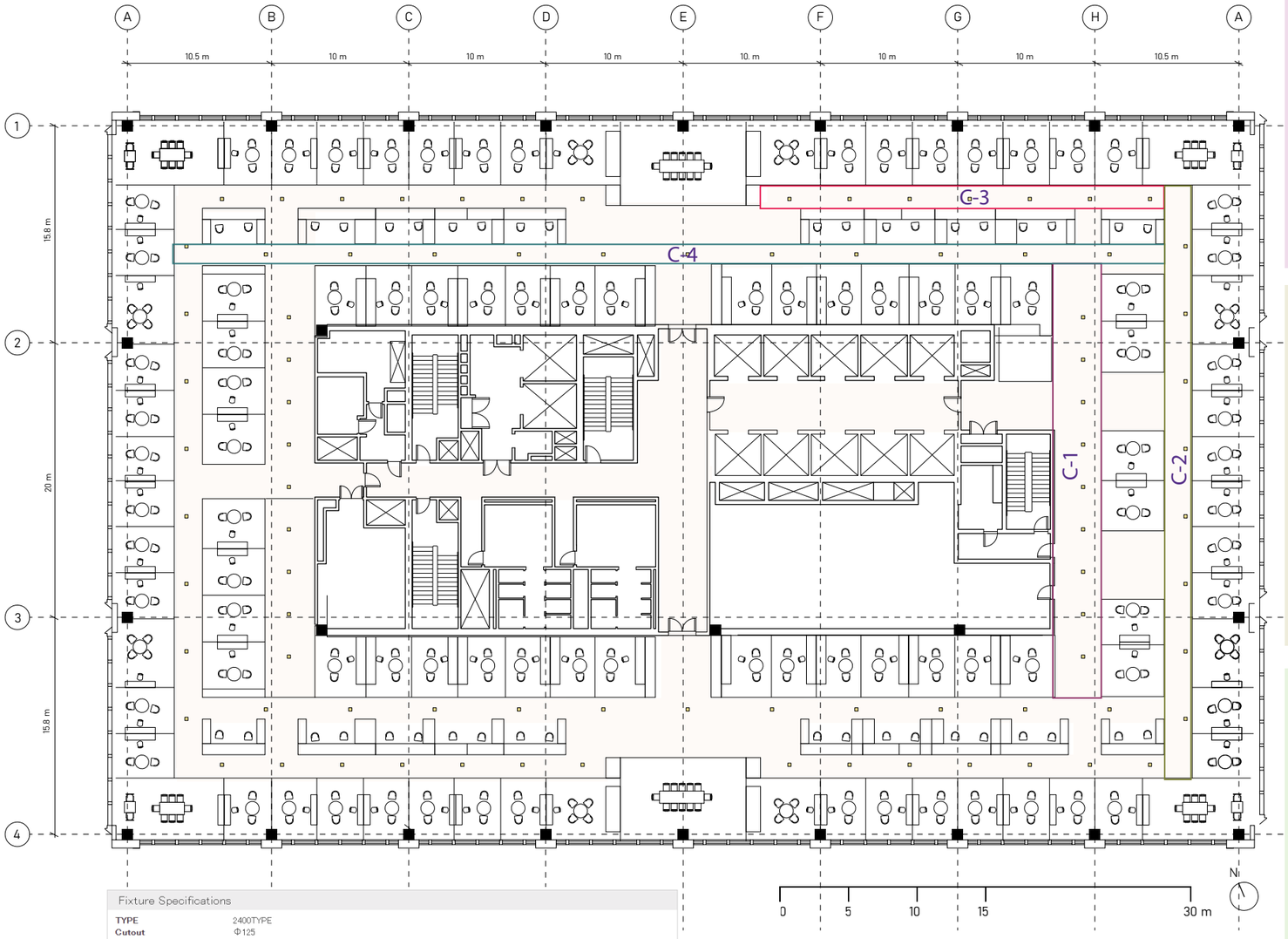


Dimensions



Corridor

lluminance corridor = 100-200 lux



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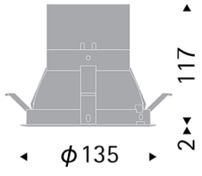
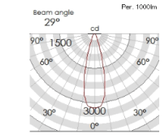
Color Temperature	3000K
Color Rendering	85≦CRI
Lightsource Lumen Output	3044 lm
Rated Lumen Output	3044 lm

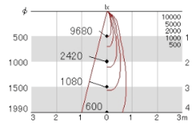
Image

Dimensions



Light Distribution





Corridor 1

Settings
Units: Meters - Lux

Room Dimensions

Length [X]	3.6	m
Width [Y]	31	m
Height [Z]	4	m
Workplane	0.76	m
Ceiling Type	2x2	

Room Reflectances

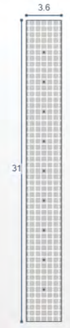
Ceiling	80	%
Walls	50	%
Floor	20	%

Criteria

Illuminance	200	lux
Power Density		W/m²
Quantity		

Constraints

Spacing X [SC=1.6]		m
Spacing Y [SC=1.6]		m
Rows		
Columns		



Calculation Results [C]

Illuminance	222 lux
Power Density	2.23 W/m²
Quantity	9

Spacing Results [C]

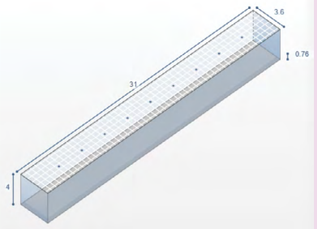
Spacing	3.6 x 3.05 m
Arrangement	1 x 9
Outside Spacing X	1.74 m
Outside Spacing Y	3.24 m

Comparison

Luminaire	LUX	W/M²	Count
A	234	3.37	7
B	204	4.43	26
C	222	2.23	9

Display

Dimensions Room ☑ Layout ☐
Show Zonal Cavity Info [+]



Corridor 2

Settings
Units: Meters - Lux

Room Dimensions

Length [X]	2	m
Width [Y]	43	m
Height [Z]	4	m
Workplane	0.76	m
Ceiling Type	2x2	

Room Reflectances

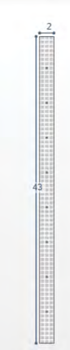
Ceiling	80	%
Walls	50	%
Floor	20	%

Criteria

Illuminance	200	lux
Power Density		W/m²
Quantity		

Constraints

Spacing X [SC=1.6]		m
Spacing Y [SC=1.6]		m
Rows		
Columns		



Calculation Results [C]

Illuminance	222 lux
Power Density	2.57 W/m²
Quantity	8

Spacing Results [C]

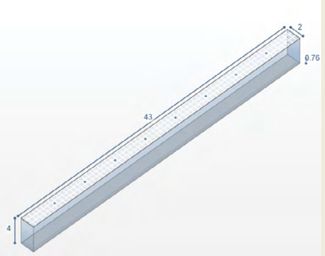
Spacing	2 x 4.88 m
Arrangement	1 x 8
Outside Spacing X	0.94 m
Outside Spacing Y	4.36 m

Comparison

Luminaire	LUX	W/M²	Count
A	220	4.37	7
B	204	5.52	25
C	222	2.57	8

Display

Dimensions Room ☑ Layout ☐
Show Zonal Cavity Info [+]



Corridor 3

Settings
Units: Meters - Lux

Room Dimensions

Length [X]	2	m
Width [Y]	29	m
Height [Z]	4	m
Workplane	0.76	m
Ceiling Type	2x2	

Room Reflectances

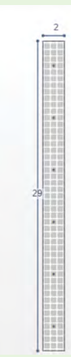
Ceiling	80	%
Walls	50	%
Floor	20	%

Criteria

Illuminance	200	lux
Power Density		W/m²
Quantity		

Constraints

Spacing X [SC=1.6]		m
Spacing Y [SC=1.6]		m
Rows		
Columns		



Calculation Results [C]

Illuminance	245 lux
Power Density	2.86 W/m²
Quantity	6

Spacing Results [C]

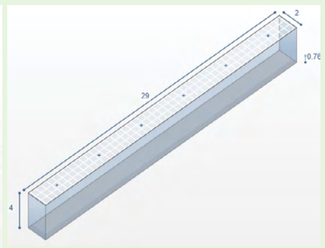
Spacing	2 x 4.88 m
Arrangement	1 x 6
Outside Spacing X	0.94 m
Outside Spacing Y	2.24 m

Comparison

Luminaire	LUX	W/M²	Count
A	230	4.63	5
B	204	5.57	17
C	245	2.86	6

Display

Dimensions Room ☑ Layout ☐
Show Zonal Cavity Info [+]



Corridor 4

Settings
Units: Meters - Lux

Room Dimensions

Length [X]	1.6	m
Width [Y]	70	m
Height [Z]	4	m
Workplane	0.76	m
Ceiling Type	2x2	

Room Reflectances

Ceiling	80	%
Walls	50	%
Floor	20	%

Criteria

Illuminance	200	lux
Power Density		W/m²
Quantity		

Constraints

Spacing X [SC=1.6]		m
Spacing Y [SC=1.6]		m
Rows		
Columns		

Calculation Results [C]

Illuminance	219 lux
Power Density	2.71 W/m²
Quantity	11

Spacing Results [C]

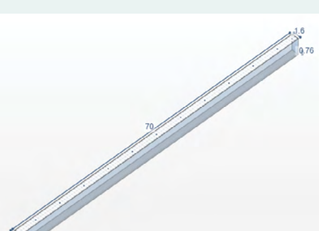
Spacing	1.6 x 6.1 m
Arrangement	1 x 11
Outside Spacing X	0.74 m
Outside Spacing Y	4.44 m

Comparison

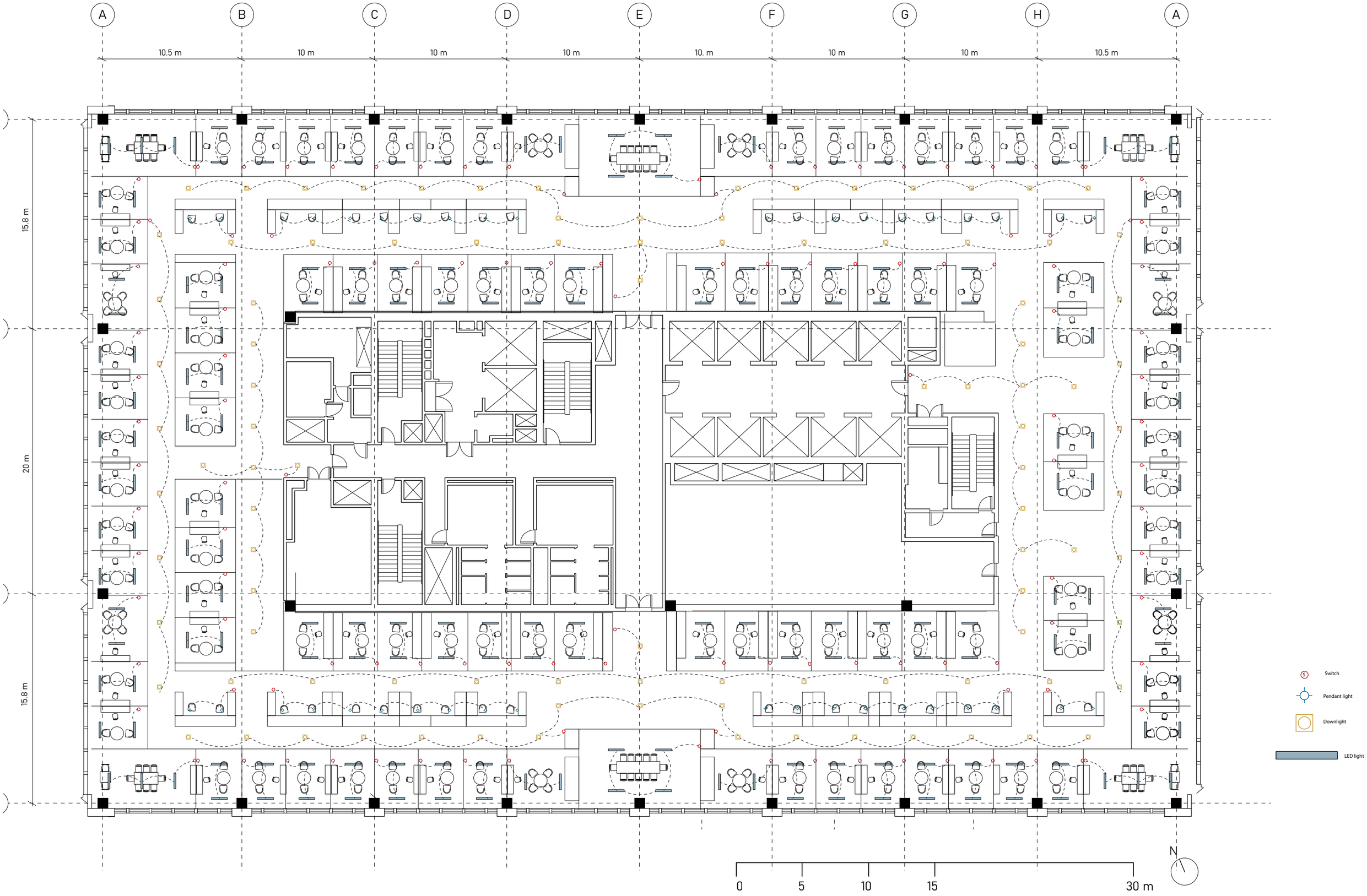
Luminaire	LUX	W/M²	Count
A	229	5.27	11
B	208	6.28	37
C	219	2.71	11

Display

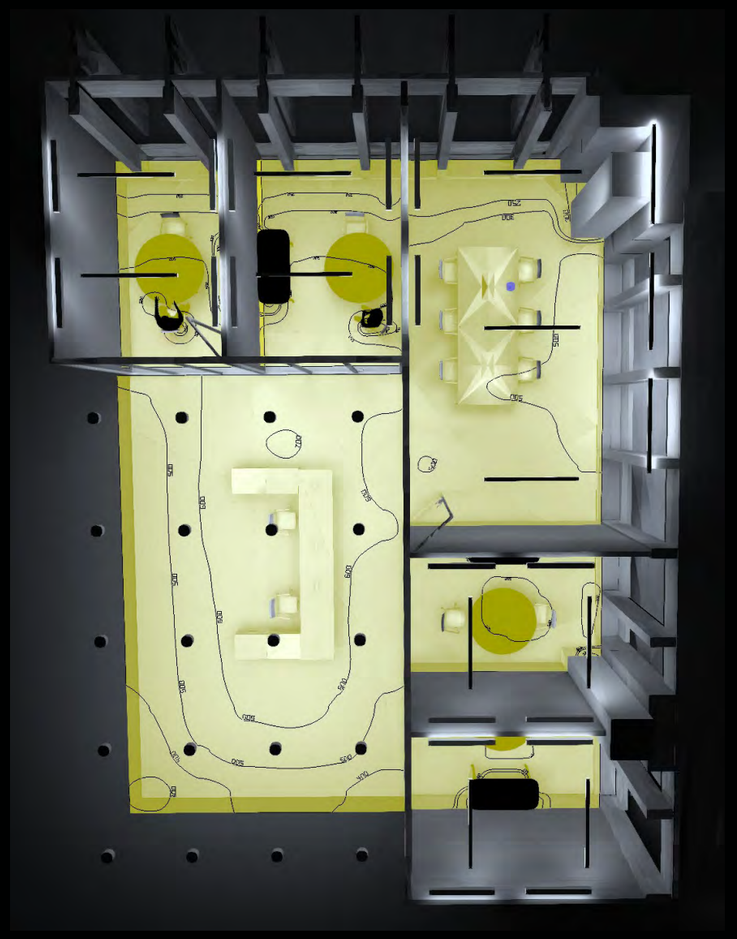
Dimensions Room ☑ Layout ☐
Show Zonal Cavity Info [+]

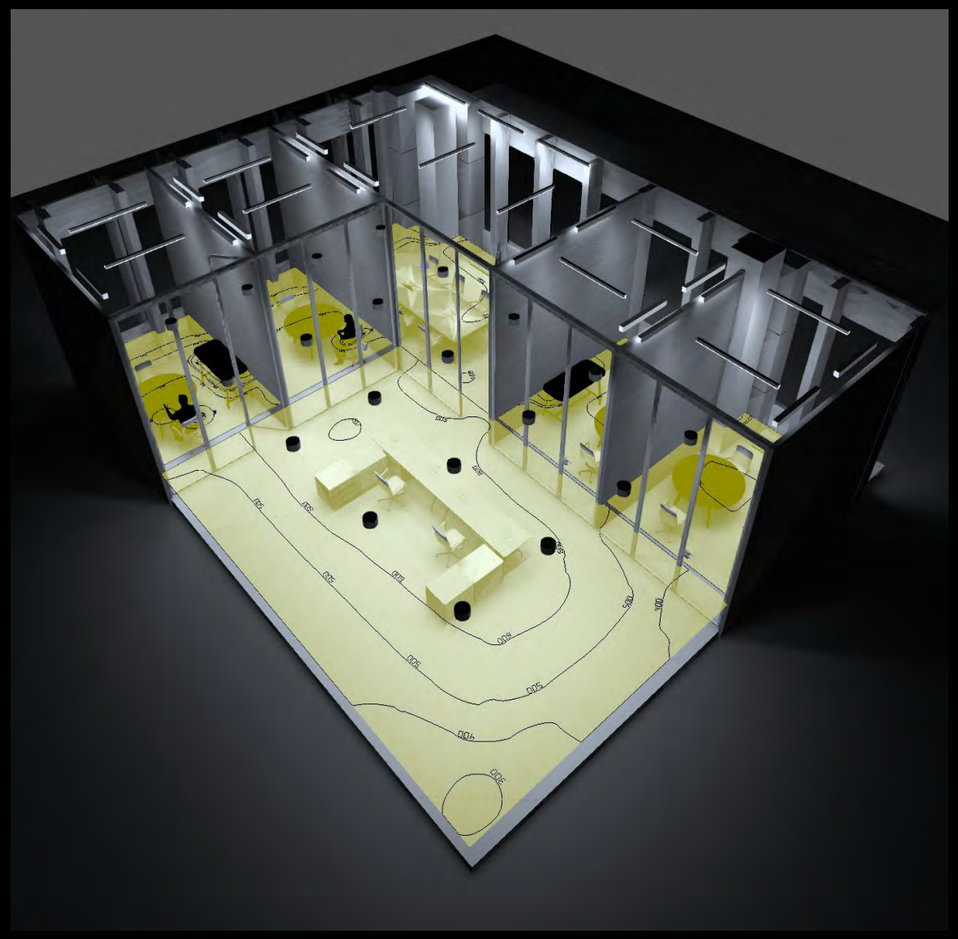


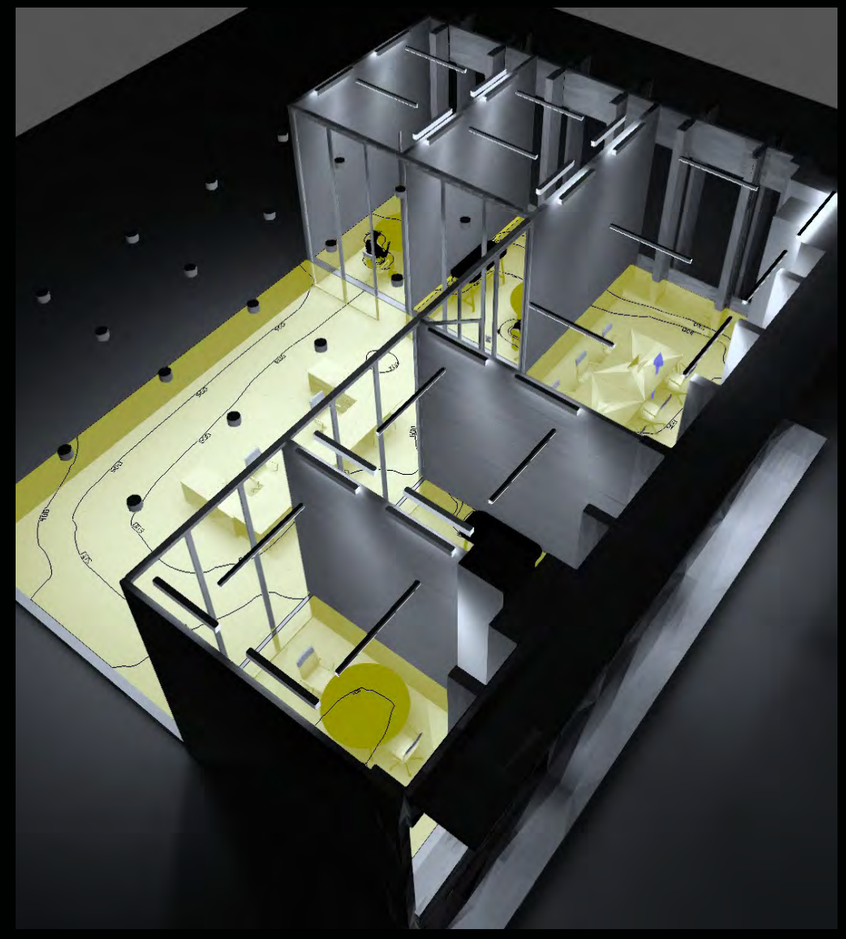
Lighting and Switch PLan Layout

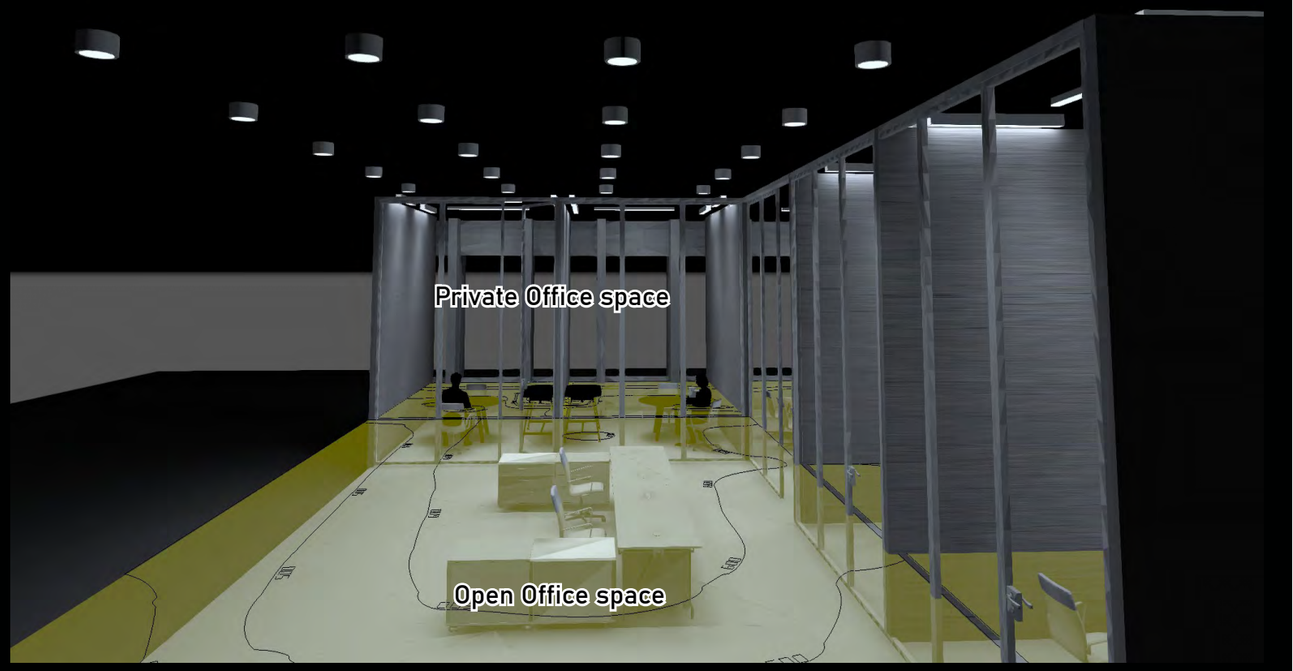


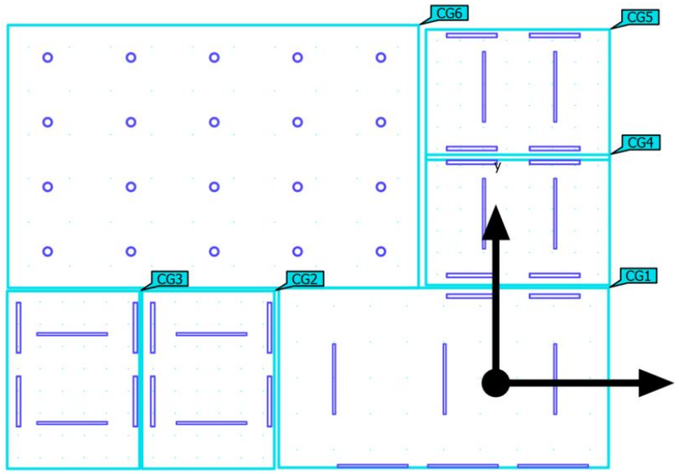
DIALux Analysis

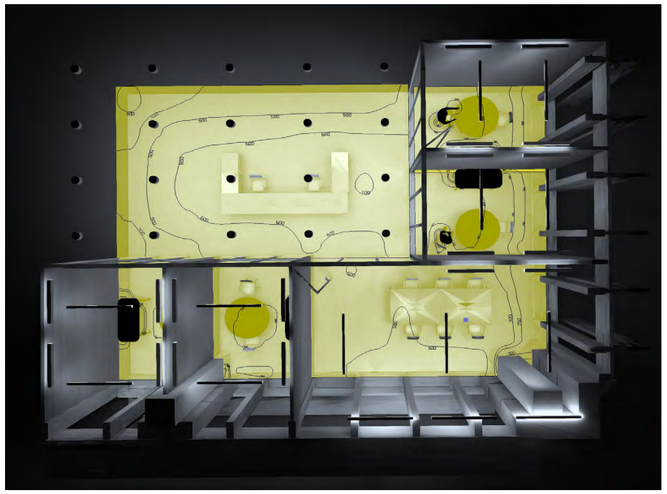








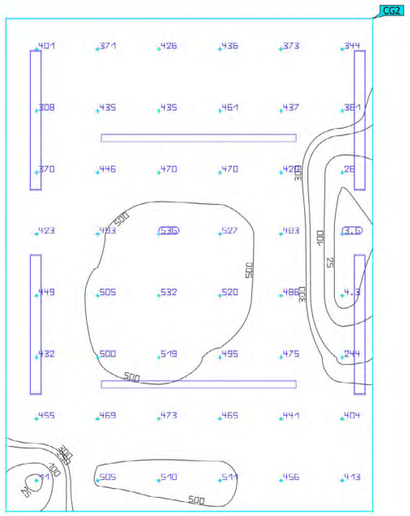




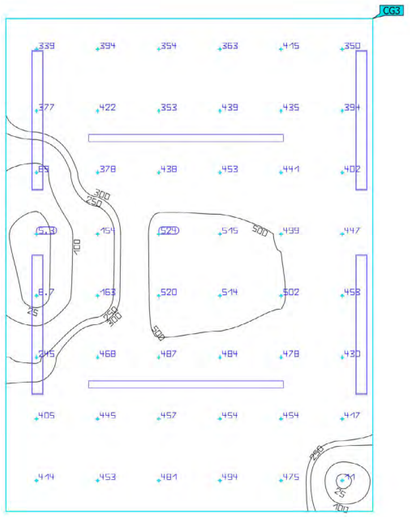
Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Calculation surface 1 Perpendicular illuminance Height: 1.000 m	407 lx	0.50 lx	673 lx	0.001	0.001	CG1
Calculation surface 2 Perpendicular illuminance Height: 1.000 m	411 lx	3.63 lx	536 lx	0.009	0.007	CG2
Calculation surface 3 Perpendicular illuminance Height: 1.000 m	389 lx	5.33 lx	524 lx	0.014	0.010	CG3
Calculation surface 5 Perpendicular illuminance Height: 1.000 m	402 lx	3.62 lx	703 lx	0.009	0.005	CG4
Calculation surface 6 Perpendicular illuminance Height: 1.000 m	373 lx	7.55 lx	683 lx	0.020	0.011	CG5
Calculation surface 7 Perpendicular illuminance Height: 1.000 m	555 lx	273 lx	706 lx	0.49	0.39	CG6

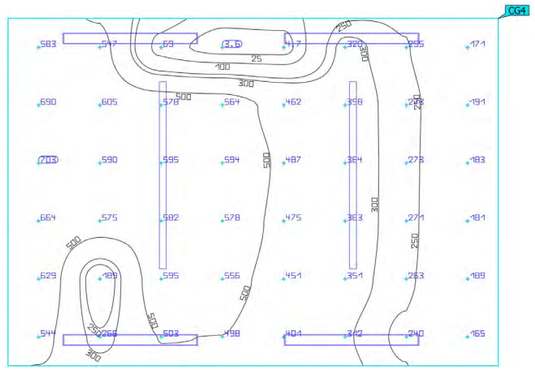
Private Office CG2



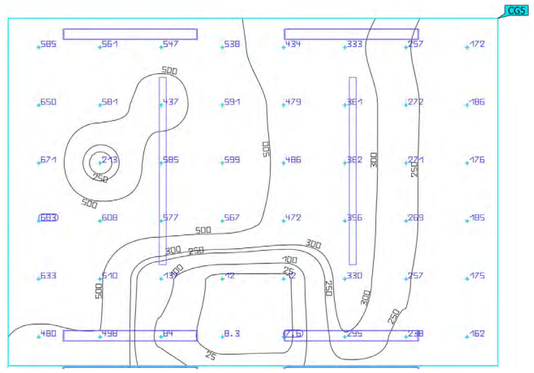
Private Office CG3



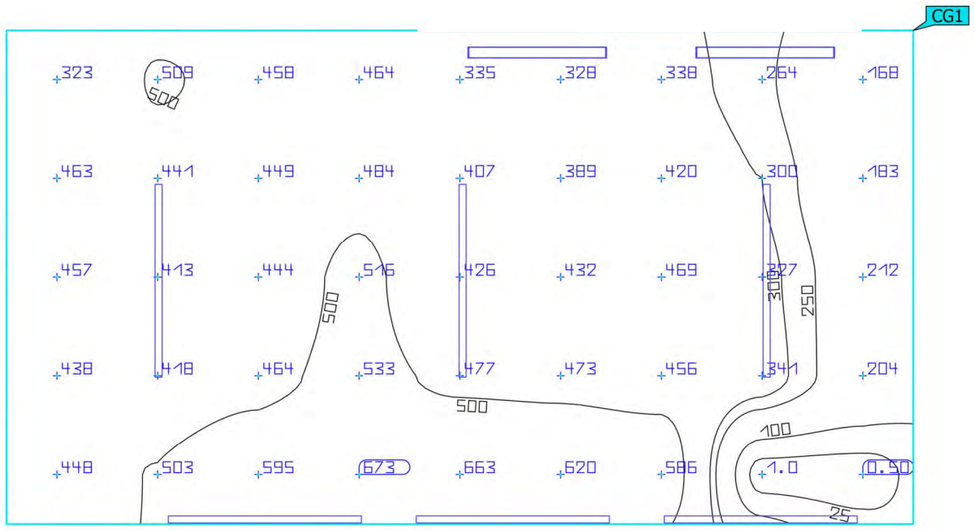
Private Office CG4



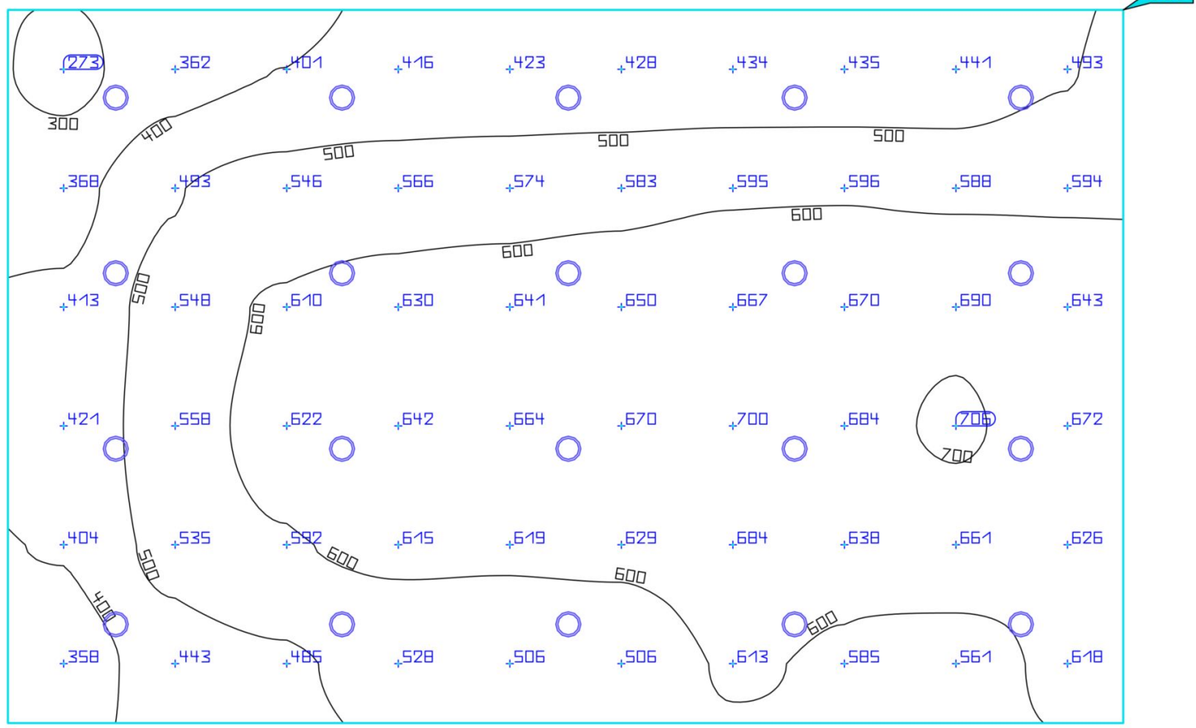
Private Office CG5



Private Office Large Meeting Room CG1



Corridor and Open office space CG6



Private Office space

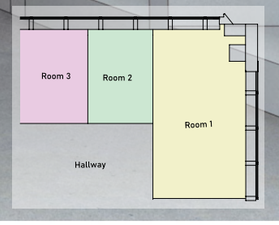
Indirect ceiling lighting softly reflects warm light off surfaces, creating a comfortable and glare-free glow.

Working Room

Linear LED lighting is ideal for work-intensive environments because it provides bright, uniform illumination across large surfaces like desks or meeting tables.

Downlights embedded around the ceiling edges are used for both accent and task lighting.

Meeting Room



Office Ceiling Lighting

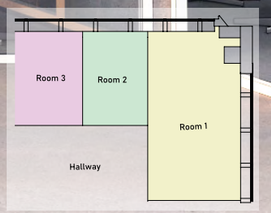
Lighting Type	Visual Reference	Lighting Distribution Type	Function in Office	Pros	Cons
Indirect Ceiling Lighting	Center panel glow (left side)	Indirect (90–100% up)	Creates ambient light with minimal glare	Glare-free, Warm, relaxing glow, Softens harsh lines	Not sufficient alone for tasks, Requires reflective surfaces
Linear LED Pendant	Center suspended fixture	Direct or Direct–Indirect	Uniform illumination over work areas	High brightness, Good for large surface areas, Efficient	Can cause glare without proper diffuser
Downlights	Perimeter lights in ceiling	Direct (0–10% up)	Focused task/accent lighting at edges	Precise lighting, Can highlight or frame spaces, Minimal visual intrusion	May create shadows if not layered with ambient light

References

Corridor

Indirect Ceiling Lights are hidden within ceiling recesses, this lighting bounces light off the ceiling or walls, creating a soft, ambient glow.

These ceiling-mounted circular LED fixtures provide uniform, glare-free illumination along corridors and walkways.



Lighting Type	Visual Reference	Lighting Distribution Type	Function in Office	Pros	Cons
Circular LED Light	Circular ceiling fixture in hallway	Direct (downward)	Provides general illumination along hallways and walkways	Energy-efficient, Uniform brightness, Good for guiding circulation	Can cause glare if not diffused properly, Not decorative
Indirect Ceiling Light	Cove lighting hidden above ceiling edge (hallway use)	Indirect (90–100% up)	Creates ambient light with minimal glare	Glare-free, Warm and relaxing glow, Softens harsh interiors	Not sufficient alone for tasks, Requires reflective surfaces

References