

Pennsylvania State Employees Credit Union

Corporate Headquarters



Presentation Outline

PSECU Corporate Headquarters

Electrical Depth

Façade and Entrance Plaza

Lobby

Marketing Office

Overview | Design Concept

Cost-Benefit Analysis of Increasing Feeder Sizes

Exterior Space | Landscape Architecture Breadth

Circulation Space

M.A.E. Daylighting | Glare Analysis

Analysis | Conclusion



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Façade and Entry Plaza

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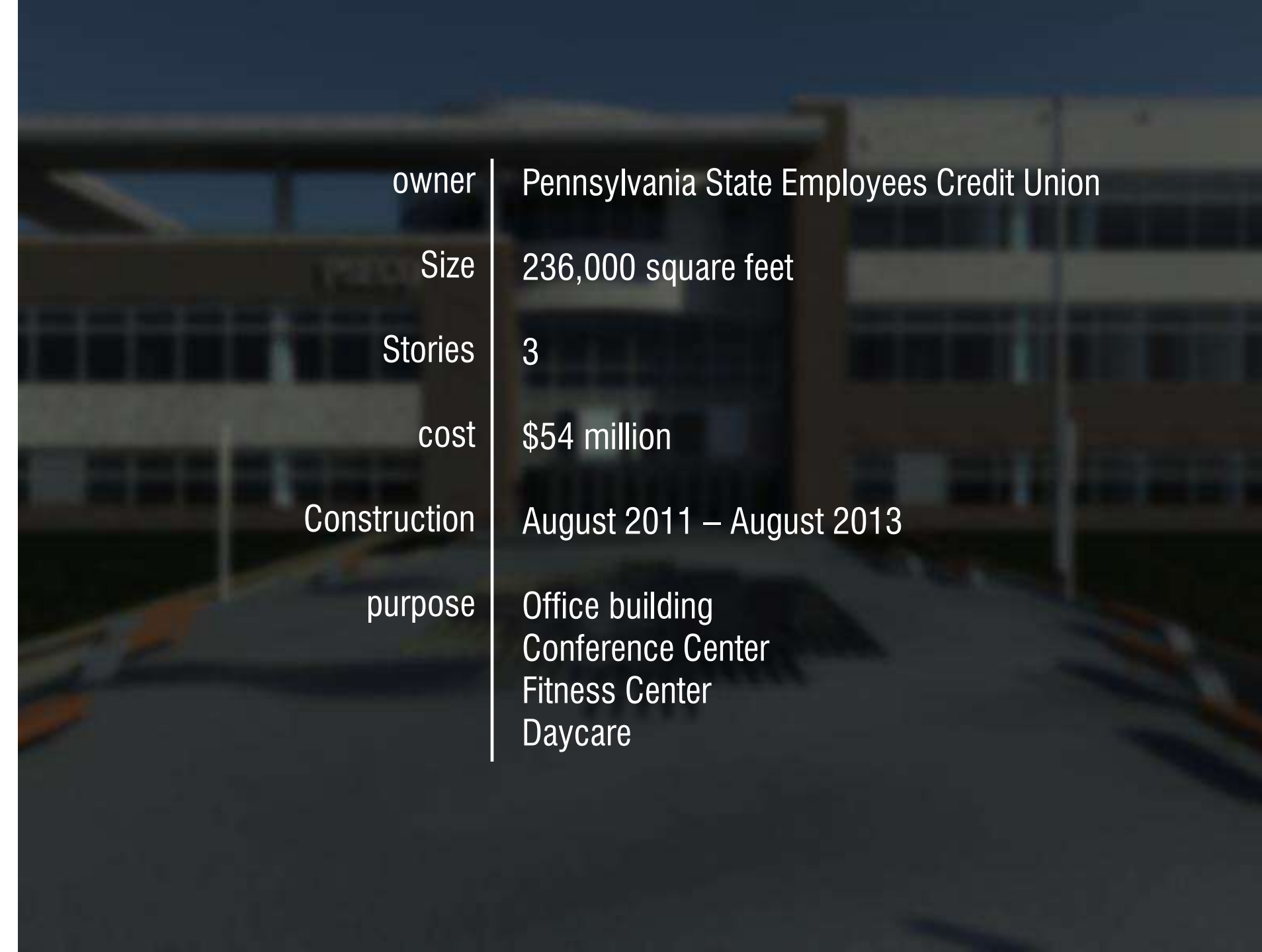
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owner Pennsylvania State Employees Credit Union

Size 236,000 square feet

Stories 3

cost \$54 million

Construction August 2011 – August 2013

purpose Office building
Conference Center
Fitness Center
Daycare

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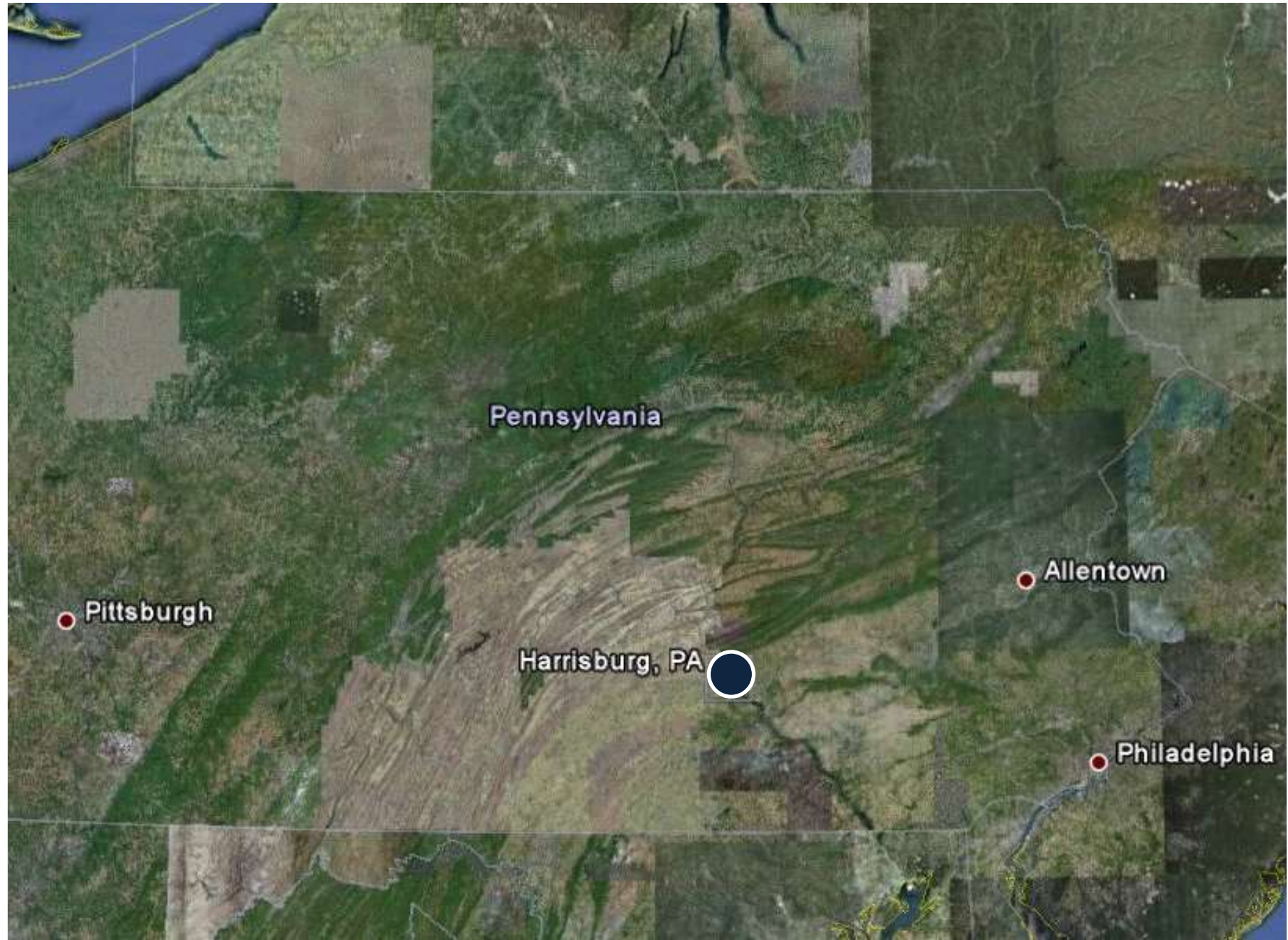
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Straight lines and angle

Eco-Friendly

Minimalist architectural design

Emphasizing materials

Organic

Way-finding

Connection to nature

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Overview

- Smaller wire sizes have a greater impedance
 - energy lost
- Analysis of initial cost vs. energy loss

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Cost-Benefit Analysis of Increasing Feeder Sizes

Method

- Calculate total initial cost
- Voltage drop per feeder
- Calculate energy loss per feeder
- Increase wire size by 1 and 2 sizes

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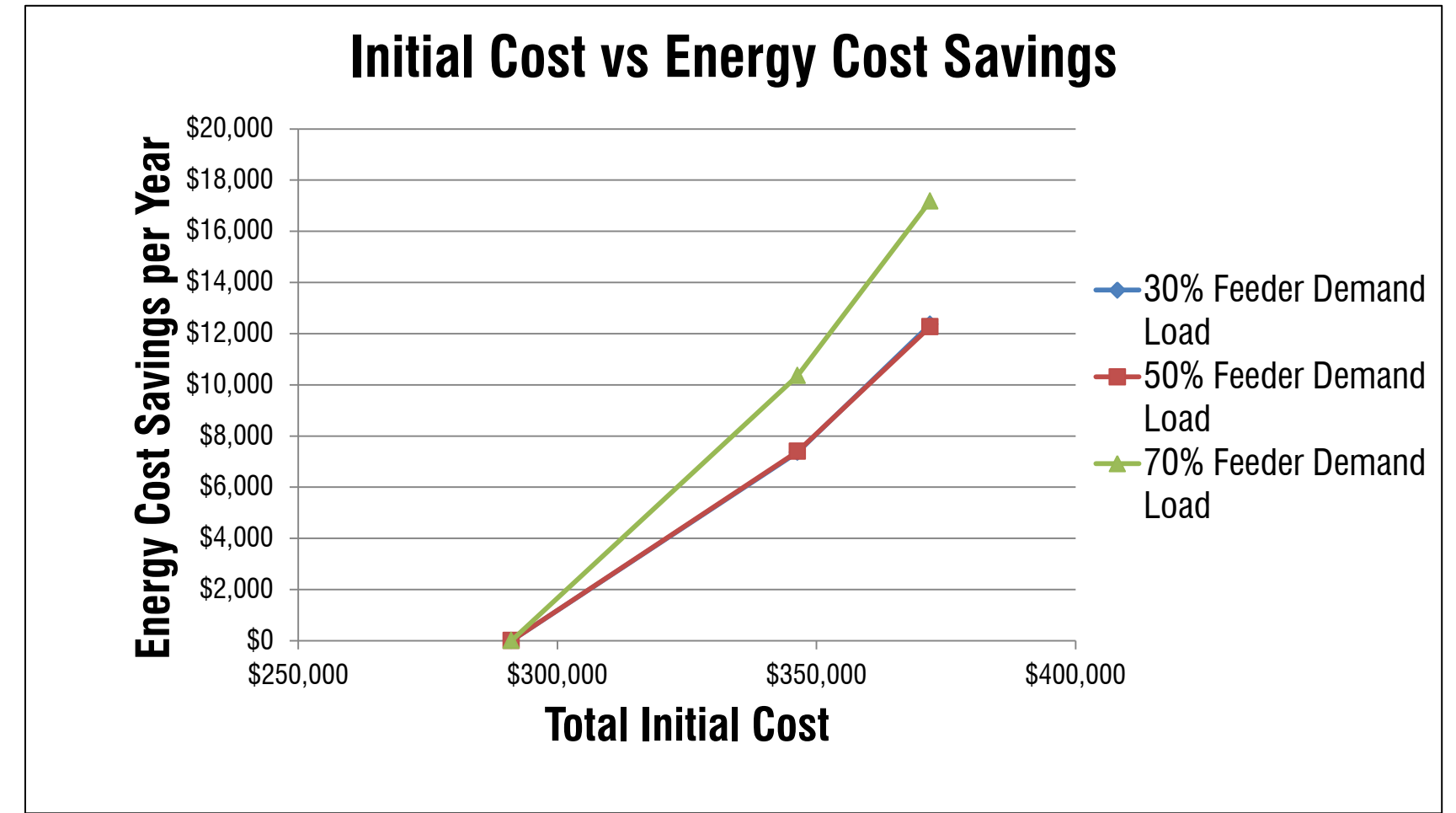
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Payback Period

	1 Size Increase	2 Size Increase
30% Demand Load	7.5 years	2.07 years
50% Demand Load	7.47 years	6.59 years
70% Demand Load	5.33 years	4.71 years

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Design Goals

Visibly ENGAGING

GUIDE pedestrians with **LIGHT**

Harmonious with NATURE

ORGANIC

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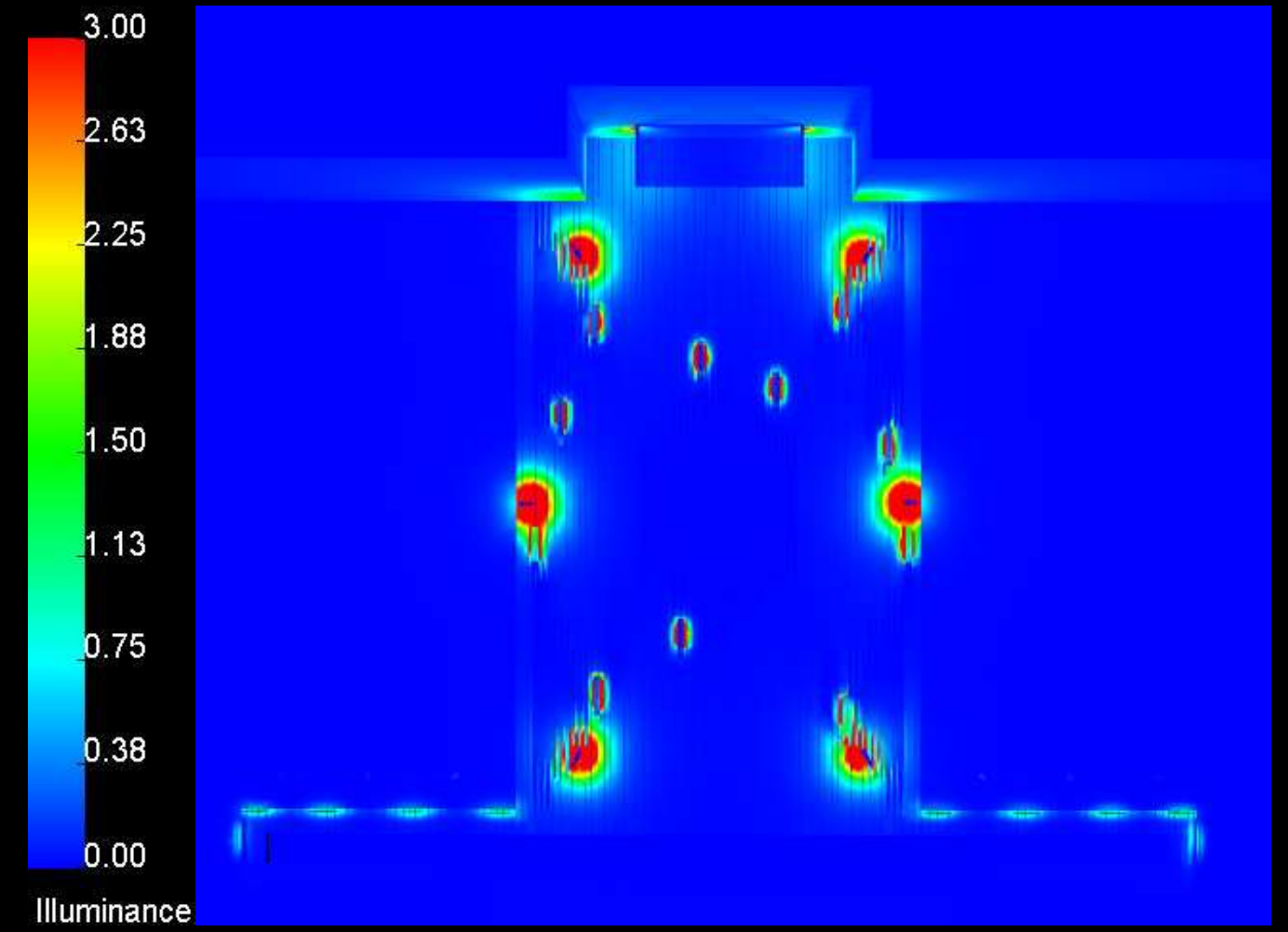
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	Plaza	
	Horizontal	Vertical
Average Illuminance	1.9	0.37 fc
Design Criteria	0.8 fc	0.3 fc

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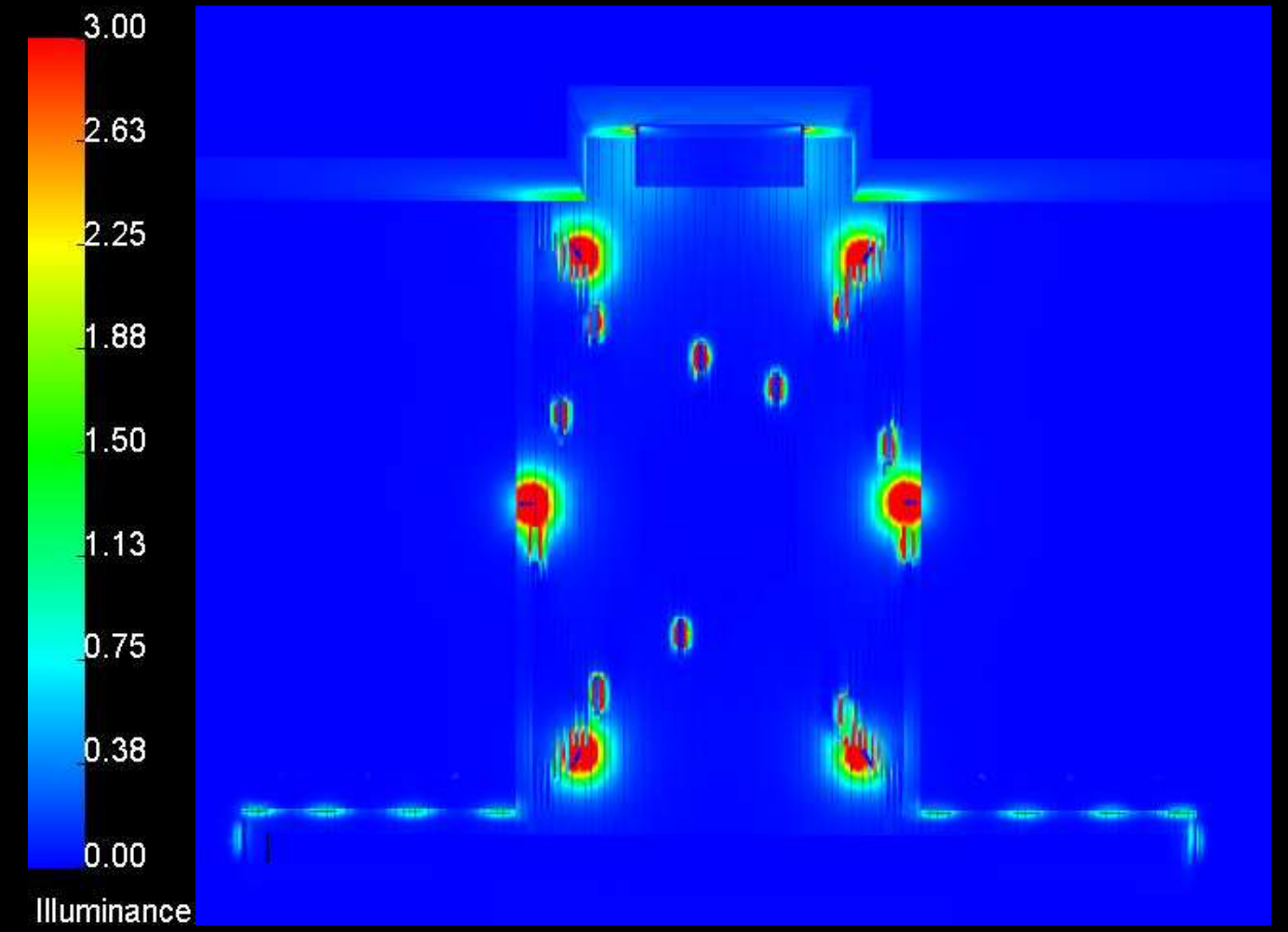
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	Plaza	
	Horizontal	Vertical
Average Illuminance	1.9	0.37 fc
Design Criteria	0.8 fc	0.3 fc

	Canopy	
	Horizontal	Vertical
Average Illuminance	1.8 fc	0.72 fc
Design Criteria	1.5 fc	0.8 fc

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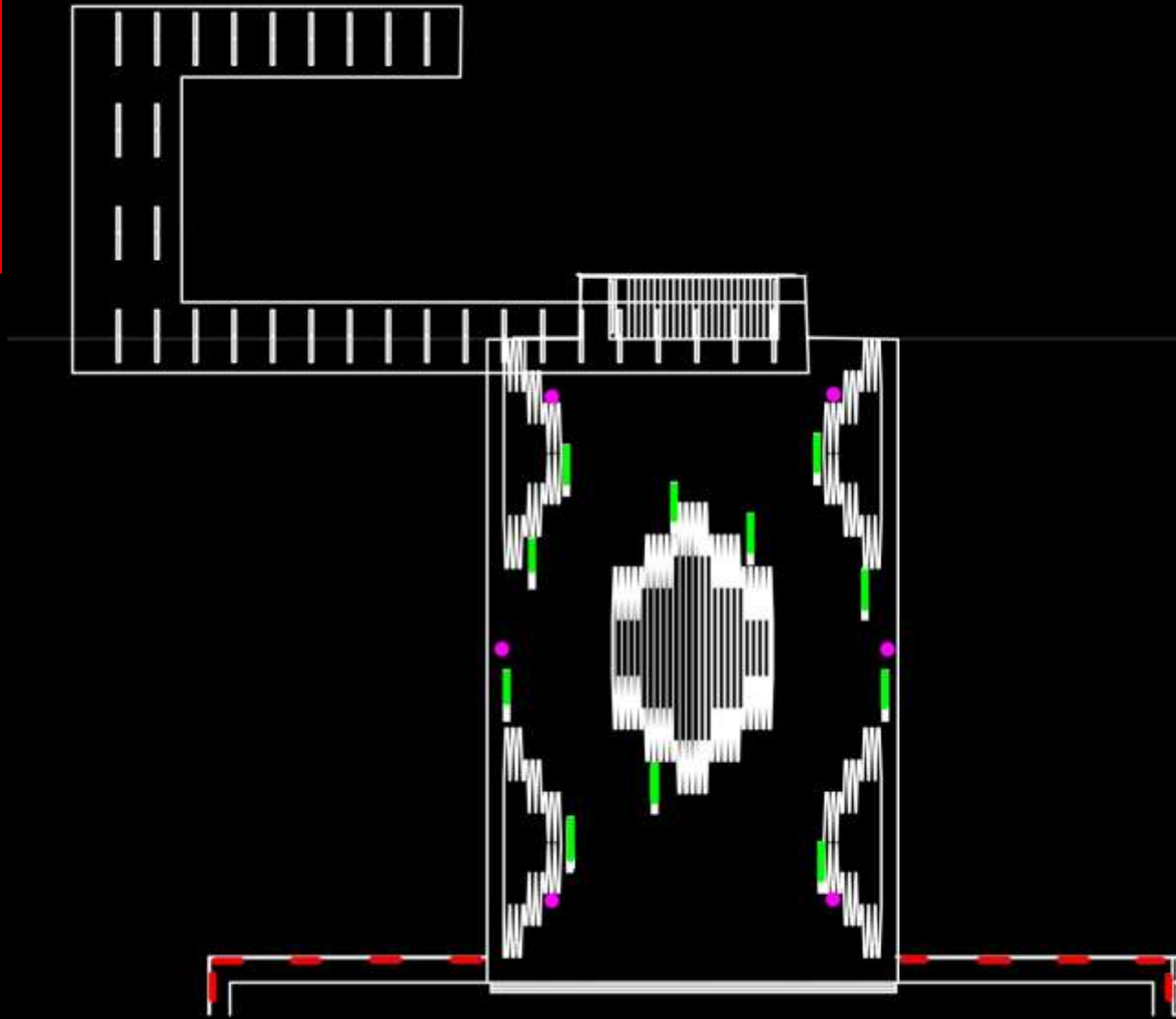
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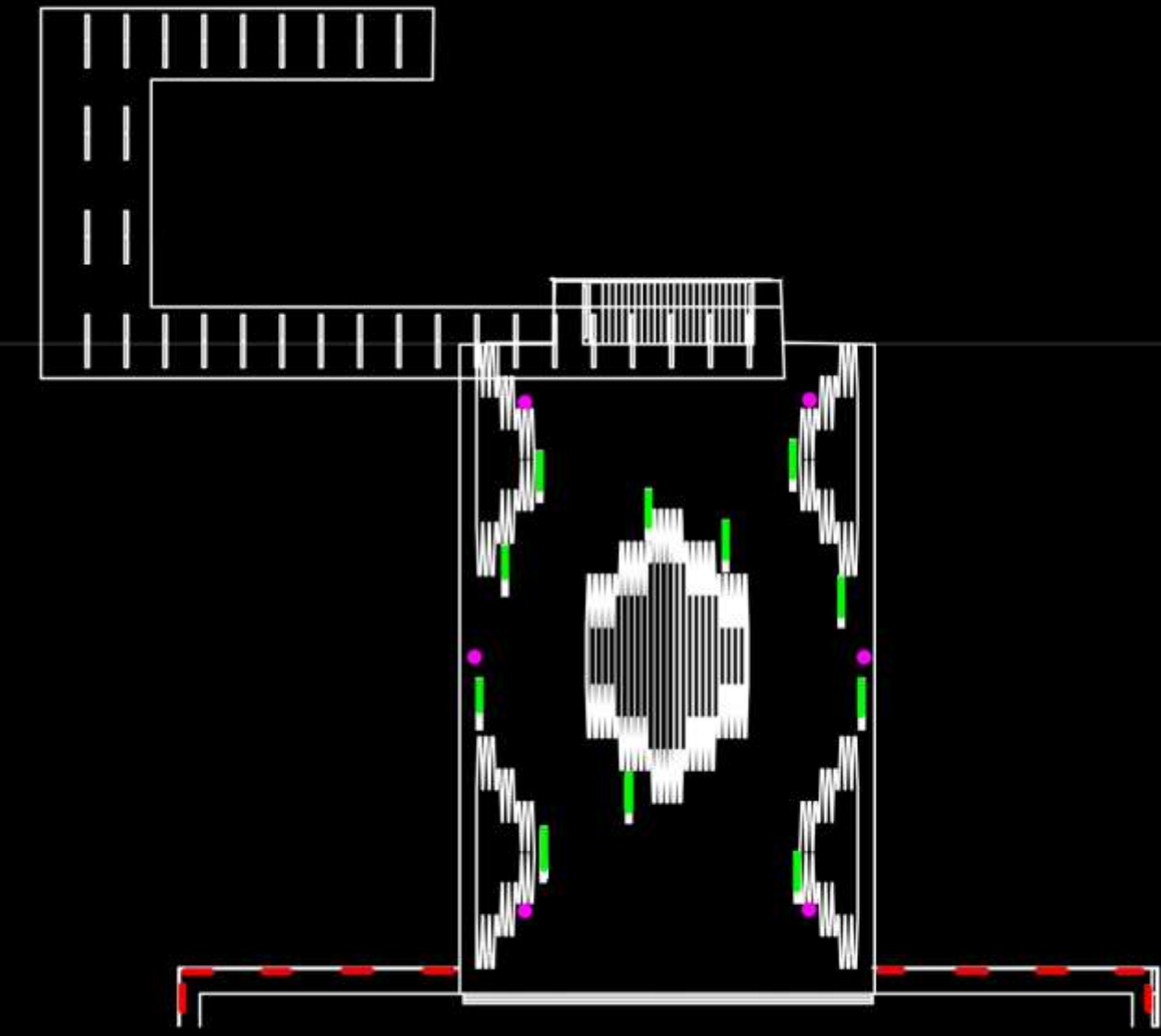
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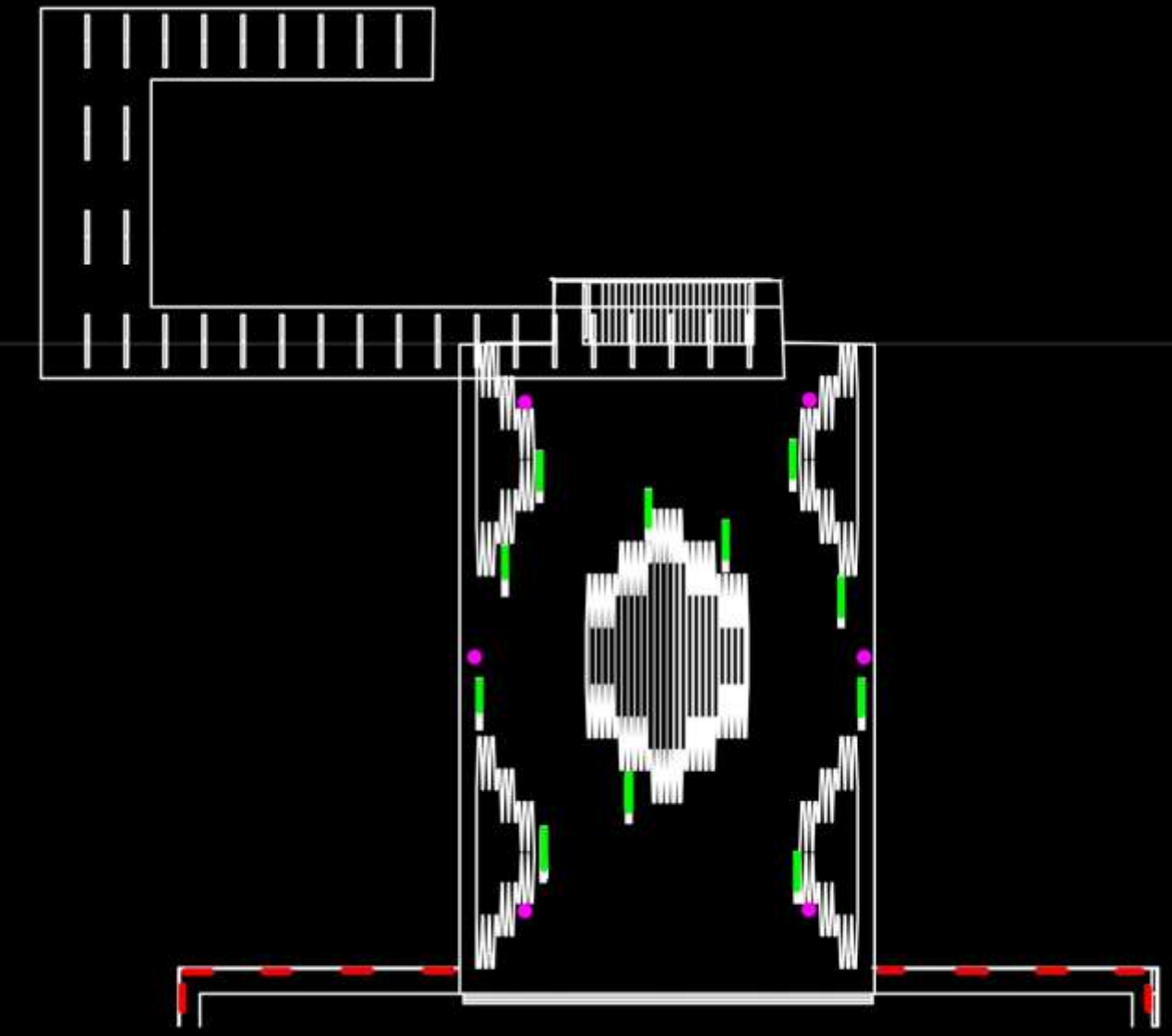
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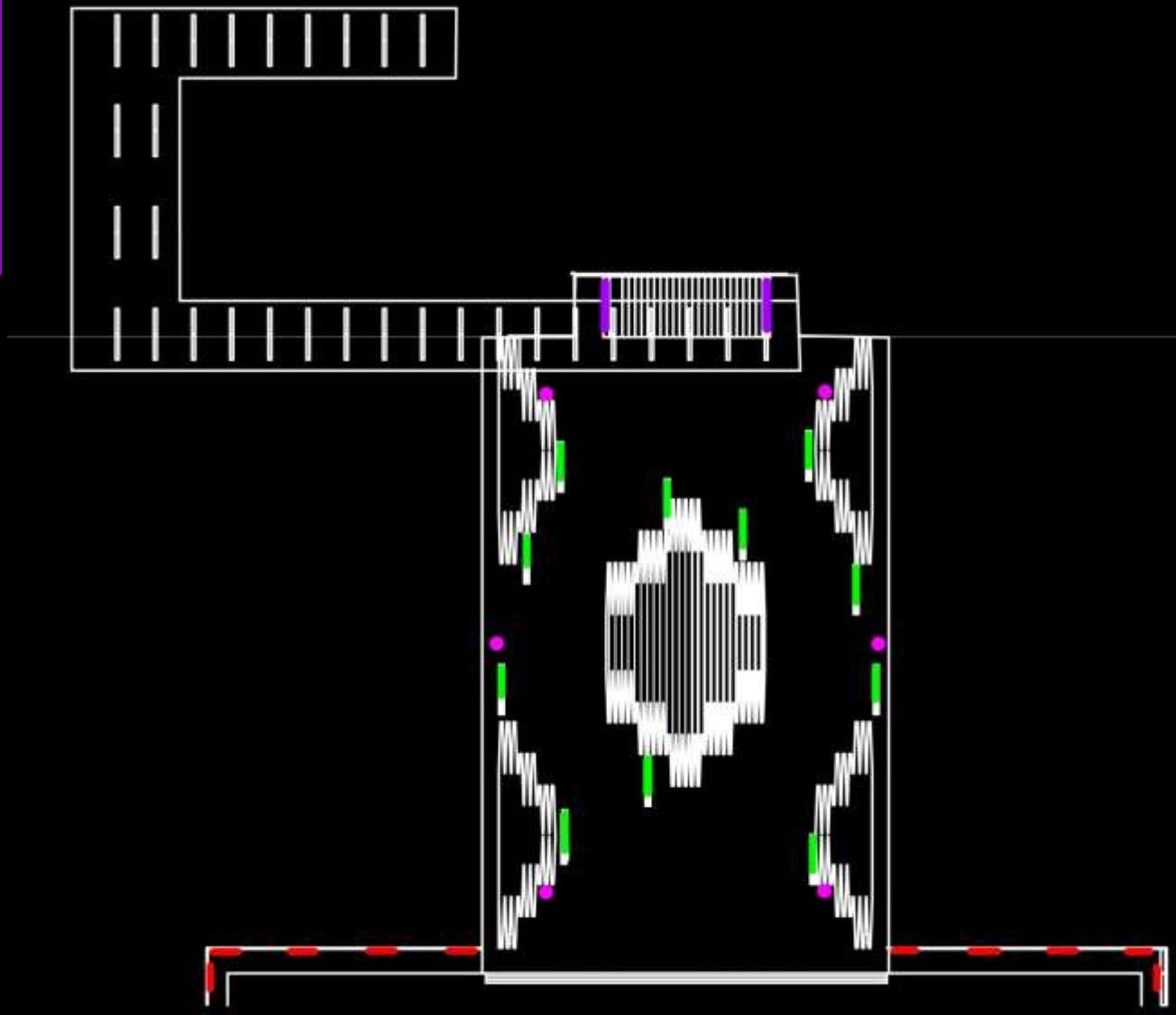
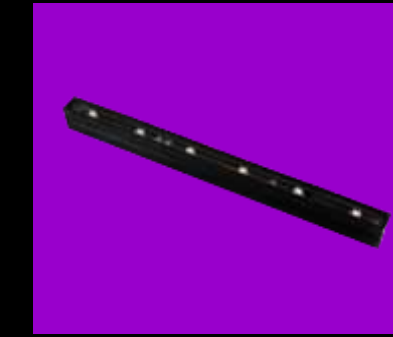
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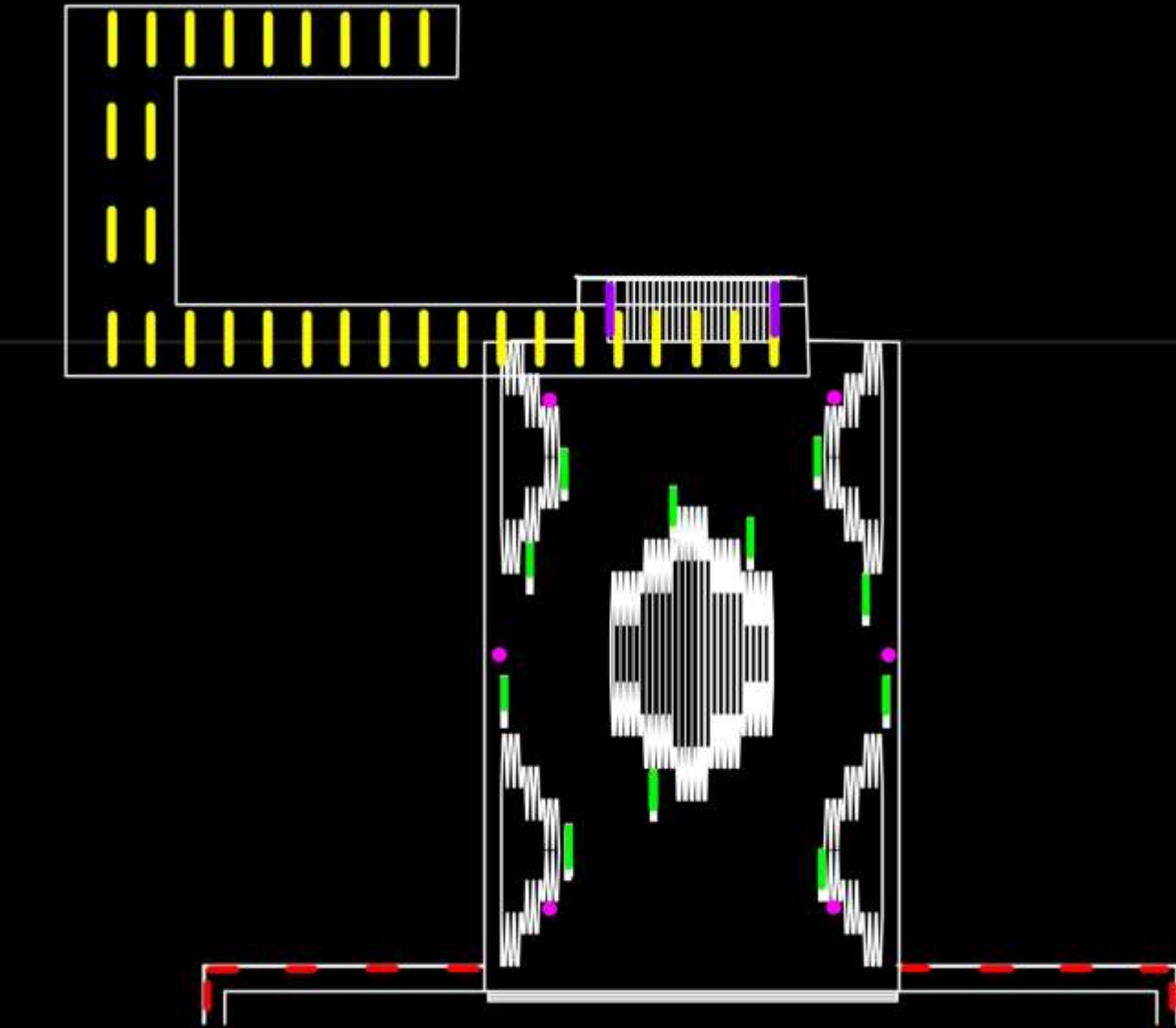
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Lighting Power Density Walkways >10'	
Area	3988
Watts	692
Designed	0.14 W/sq ft
Criteria	0.16W/sq ft

Lighting Power Density Walkways <10'	
Length	133 feet
Watts	98
Designed	0.74 W/ linear foot
Criteria	0.8W/ linear foot

Lighting Power Density Roof Garden	
Area	10050 sq ft
Watts	732 W
Designed	0.072 W/sq ft
Criteria	0.18 W/sq ft



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Design Goals

Strong LINES and ANGLES

Visibly ENGAGING

GUIDE pedestrians with LIGHT

Emphasize MATERIALS

ECO-FRIENDLY

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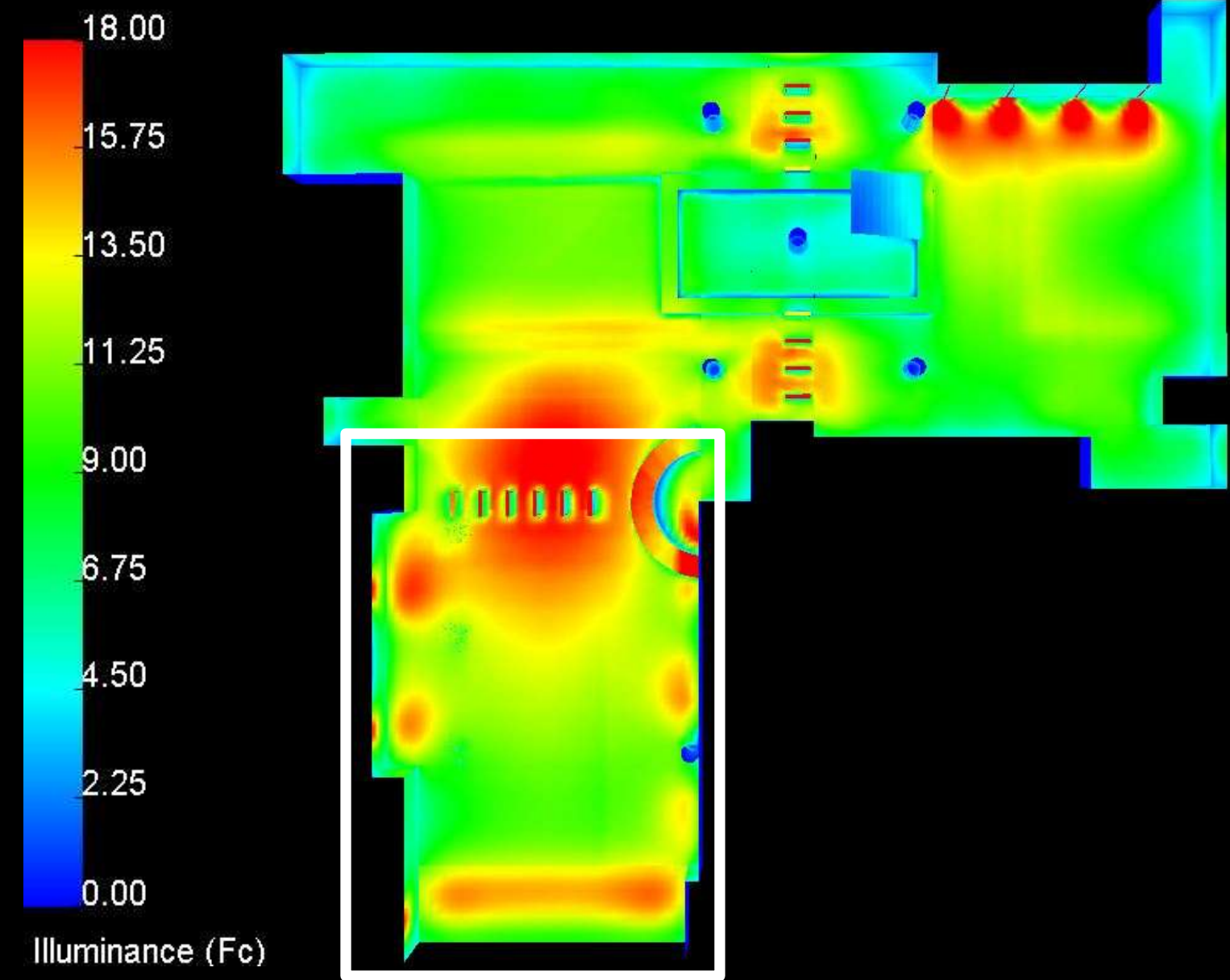
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	Vestibule	
	Horizontal	Vertical
Average Illuminance	11.9 fc	6.5 fc
Design Criteria	10 fc	3 fc

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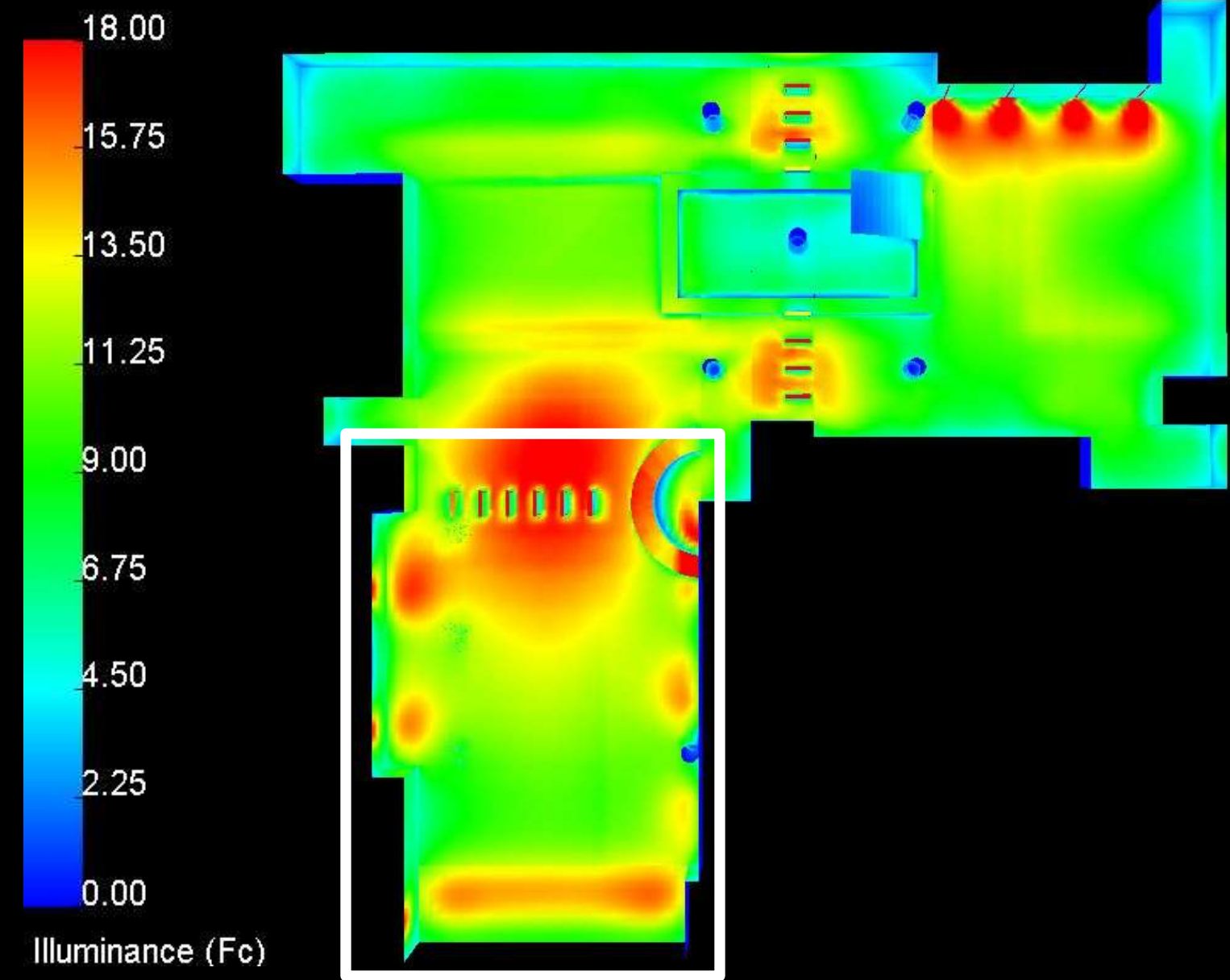
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	Vestibule	
	Horizontal	Vertical
Average Illuminance	11.9 fc	6.5 fc
Design Criteria	10 fc	3 fc

	Outer Lobby	
	Horizontal	Vertical
Average Illuminance	12.1 fc	5.4 fc
Design Criteria	10 fc	3 fc

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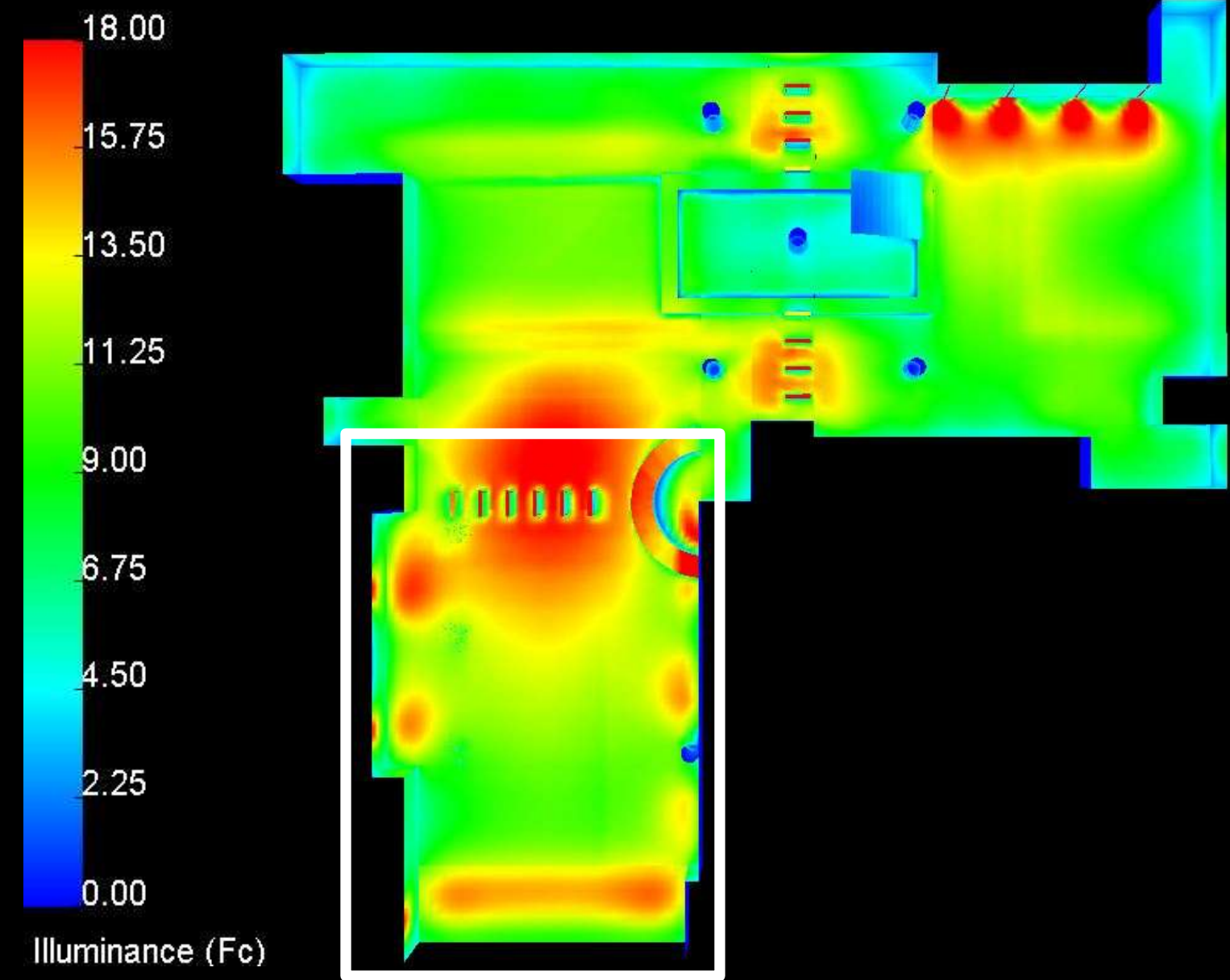
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	Vestibule	
	Horizontal	Vertical
Average Illuminance	11.9 fc	6.5 fc
Design Criteria	10 fc	3 fc

	Outer Lobby	
	Horizontal	Vertical
Average Illuminance	12.1 fc	5.4 fc
Design Criteria	10 fc	3 fc

	Outer Lobby Security	
	Horizontal	Vertical
Average Illuminance	18.9 fc	8.6 fc
Design Criteria	20 fc	10 fc

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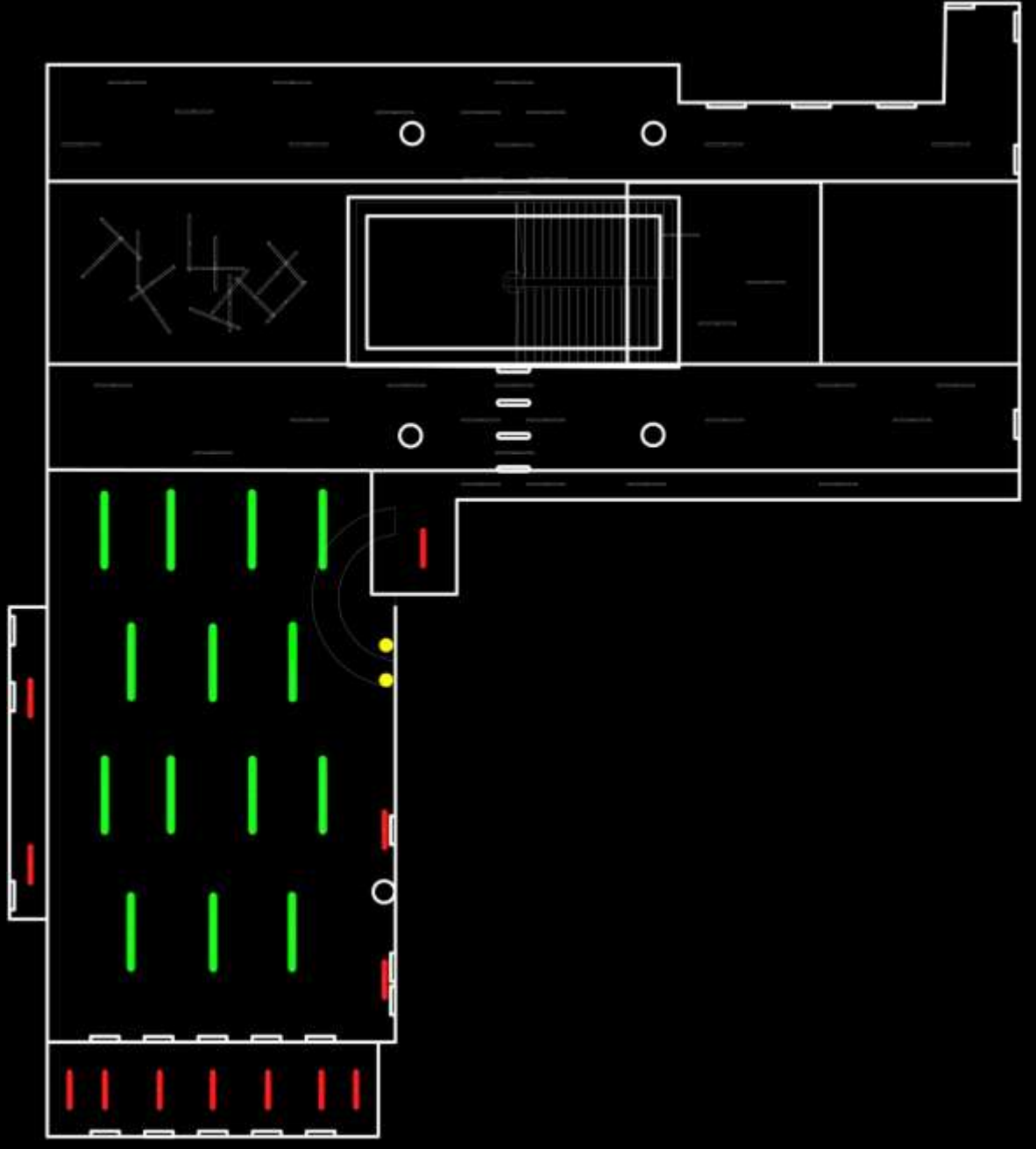
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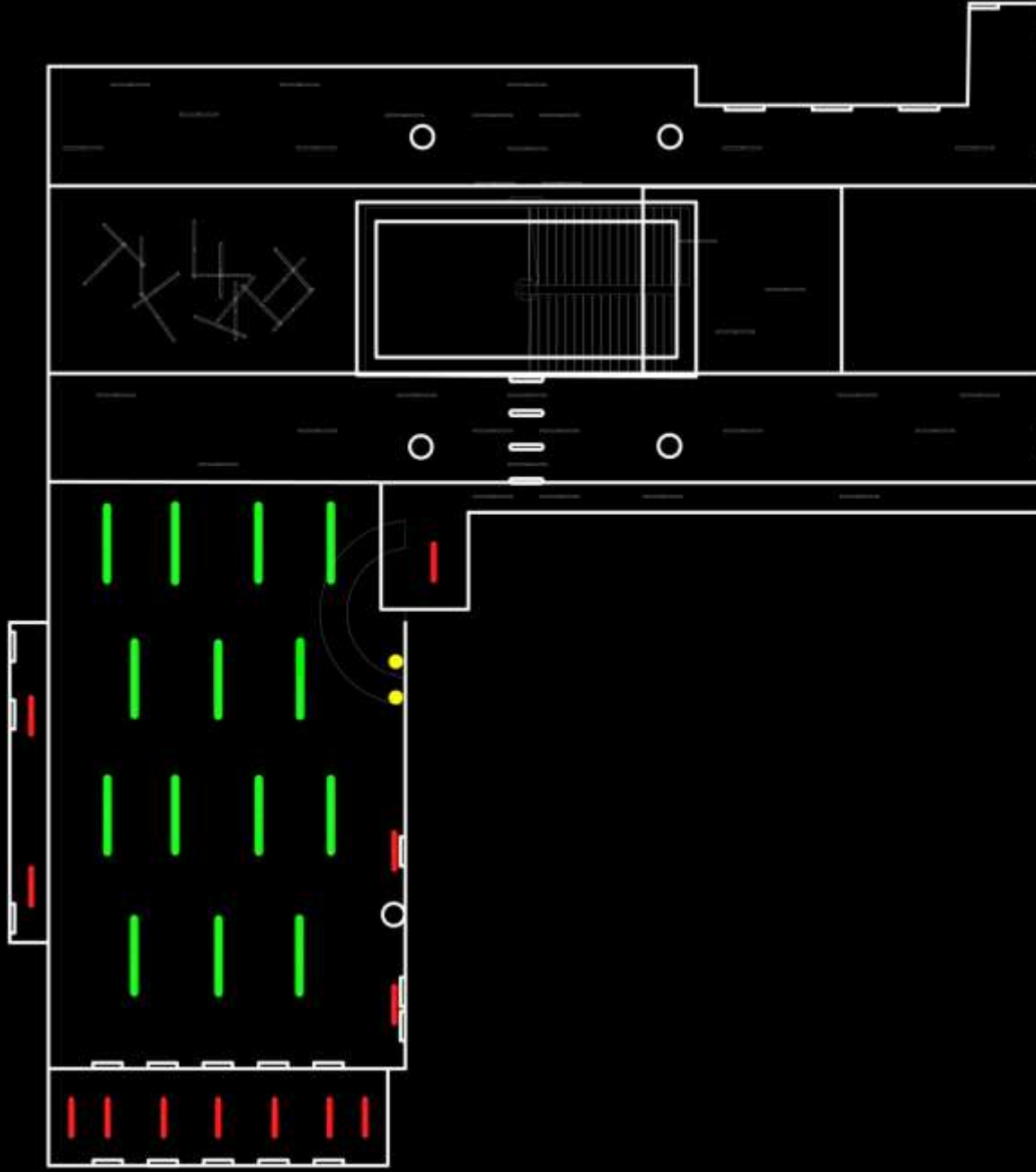
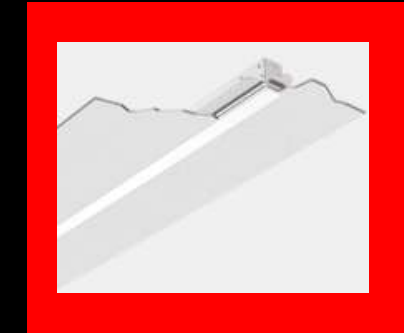
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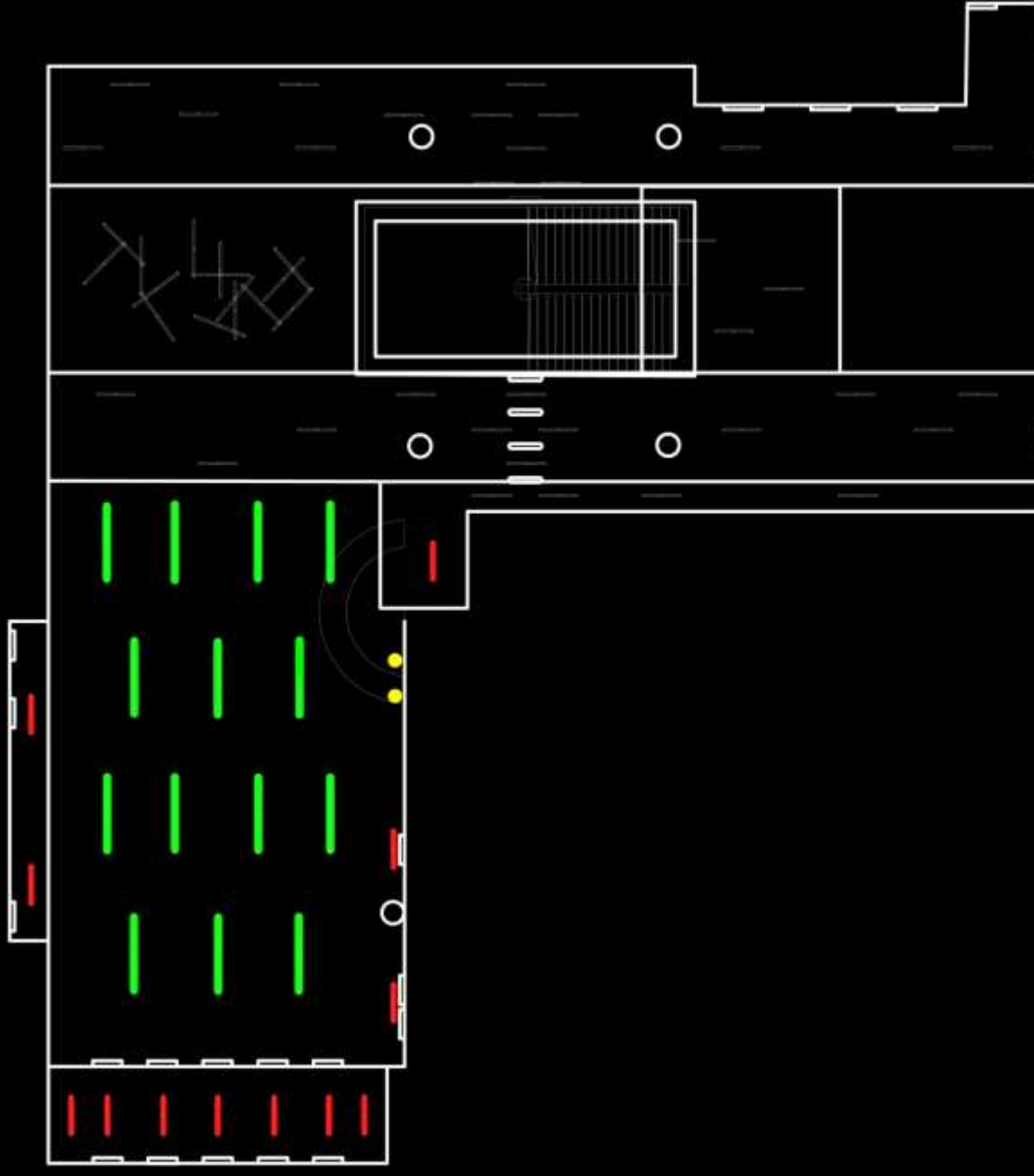
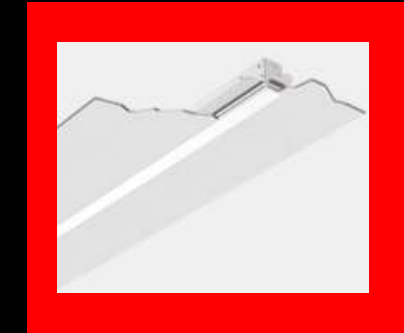
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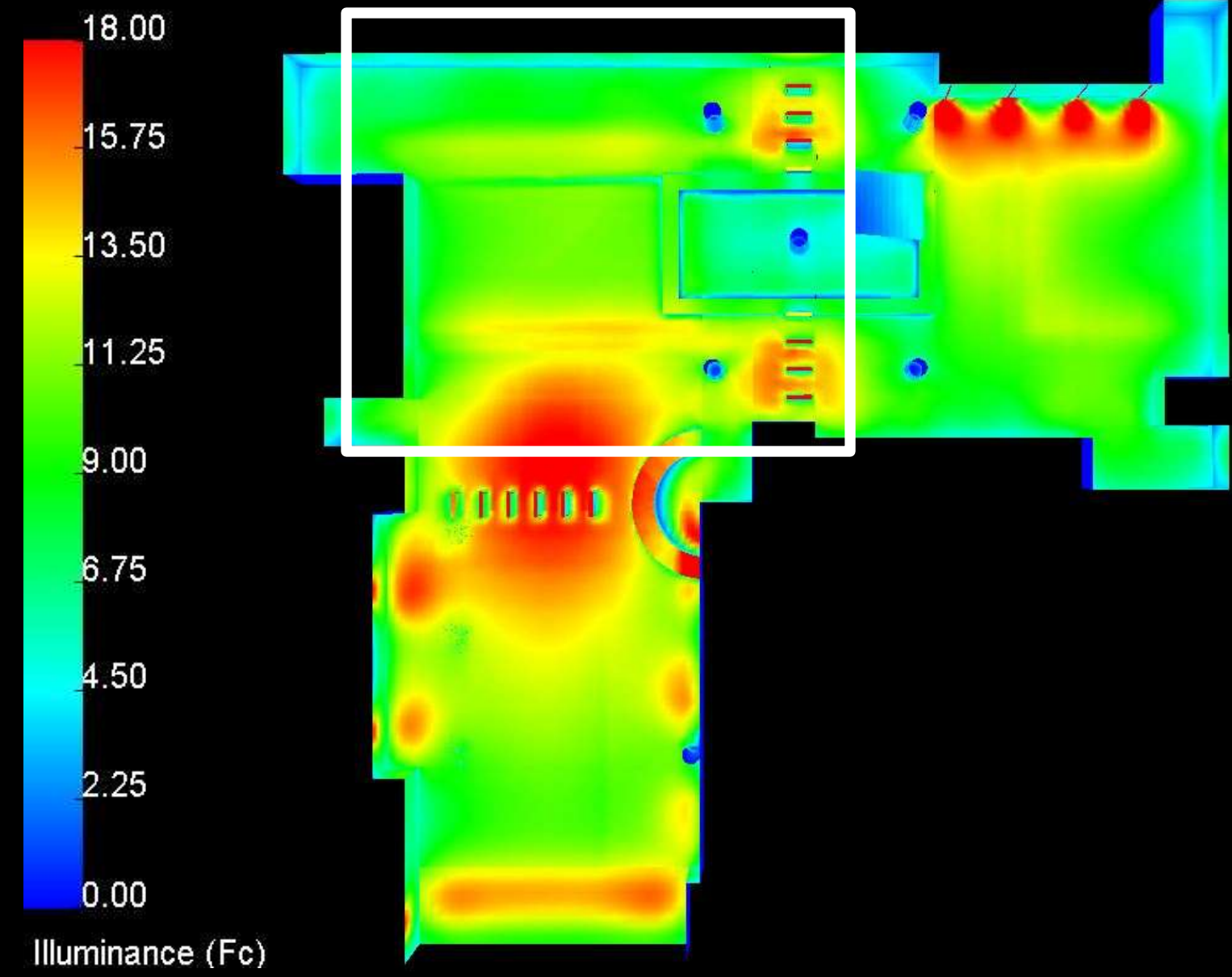
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	Inner Lobby	
	Horizontal	Vertical
Average Illuminance	11.5 fc	4.2 fc
Design Criteria	10 fc	5 fc

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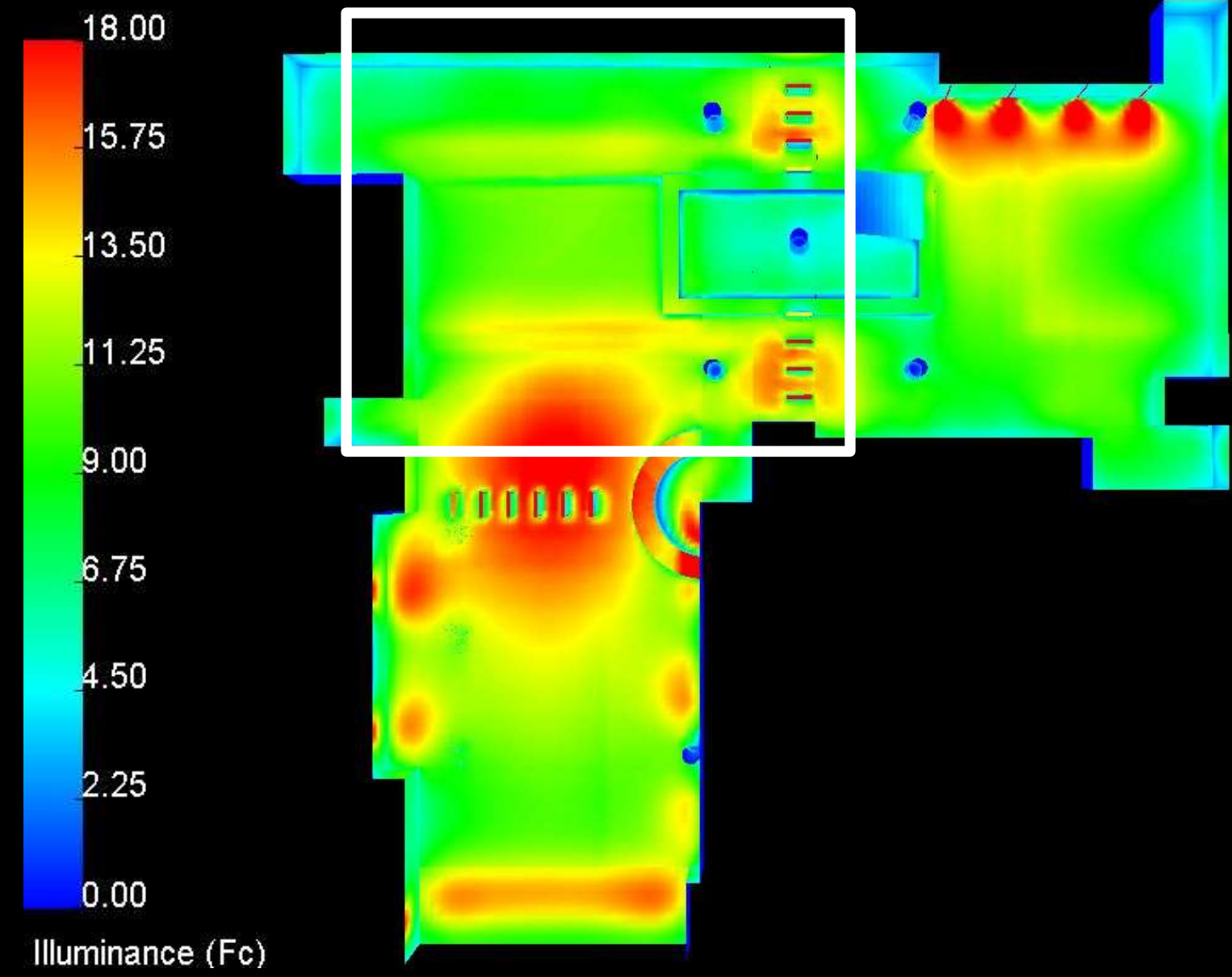
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	Inner Lobby	
	Horizontal	Vertical
Average Illuminance	11.5 fc	4.2 fc
Design Criteria	10 fc	5 fc

	Inner Lobby Security	
	Horizontal	Vertical
Average Illuminance	18.1 fc	8.3 fc
Design Criteria	20 fc	10 fc

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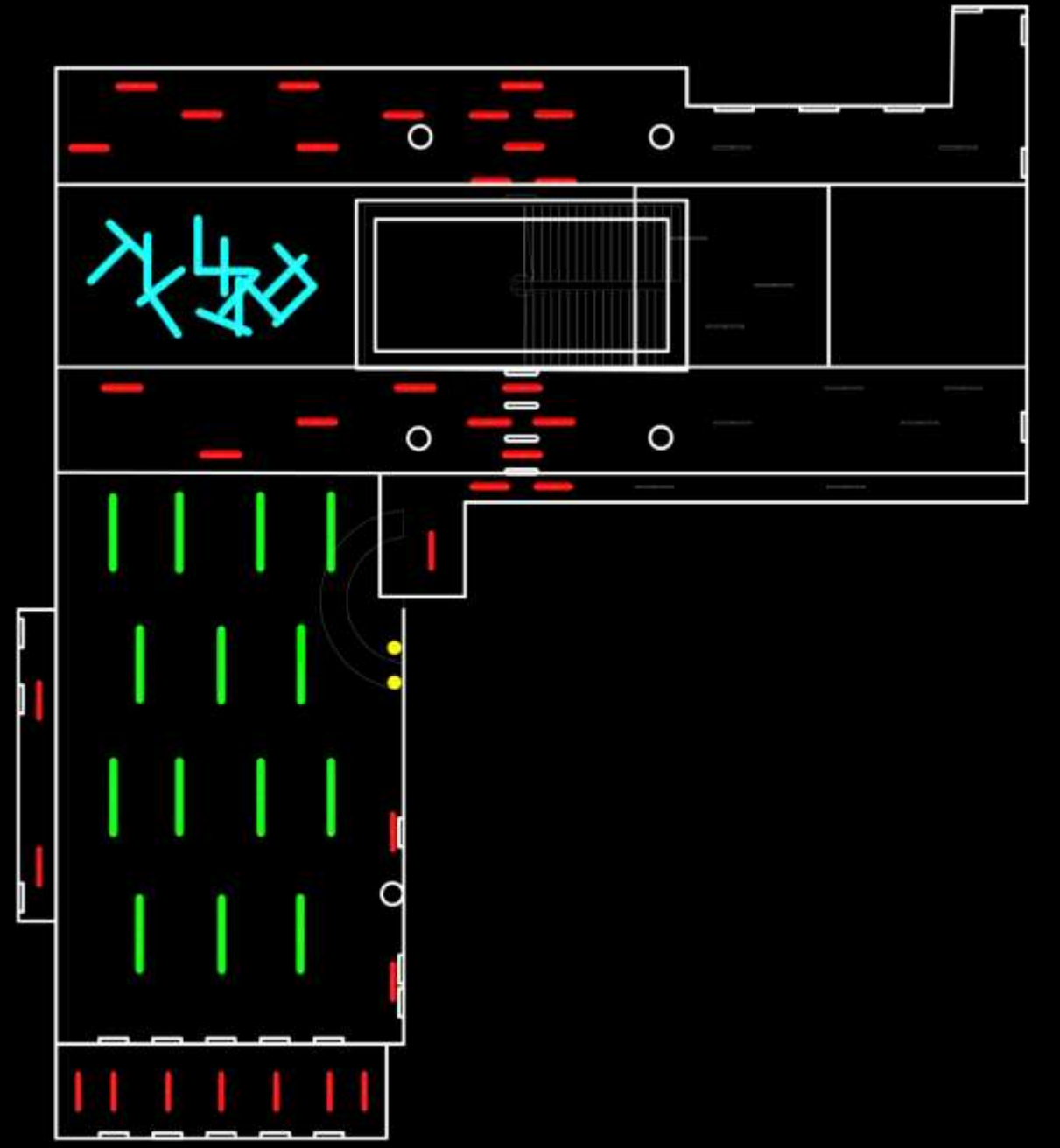
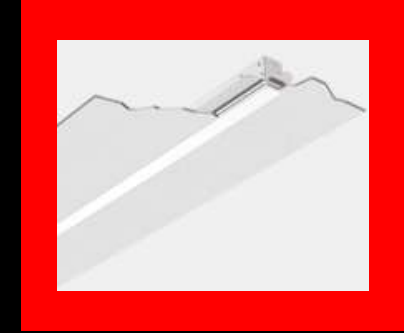
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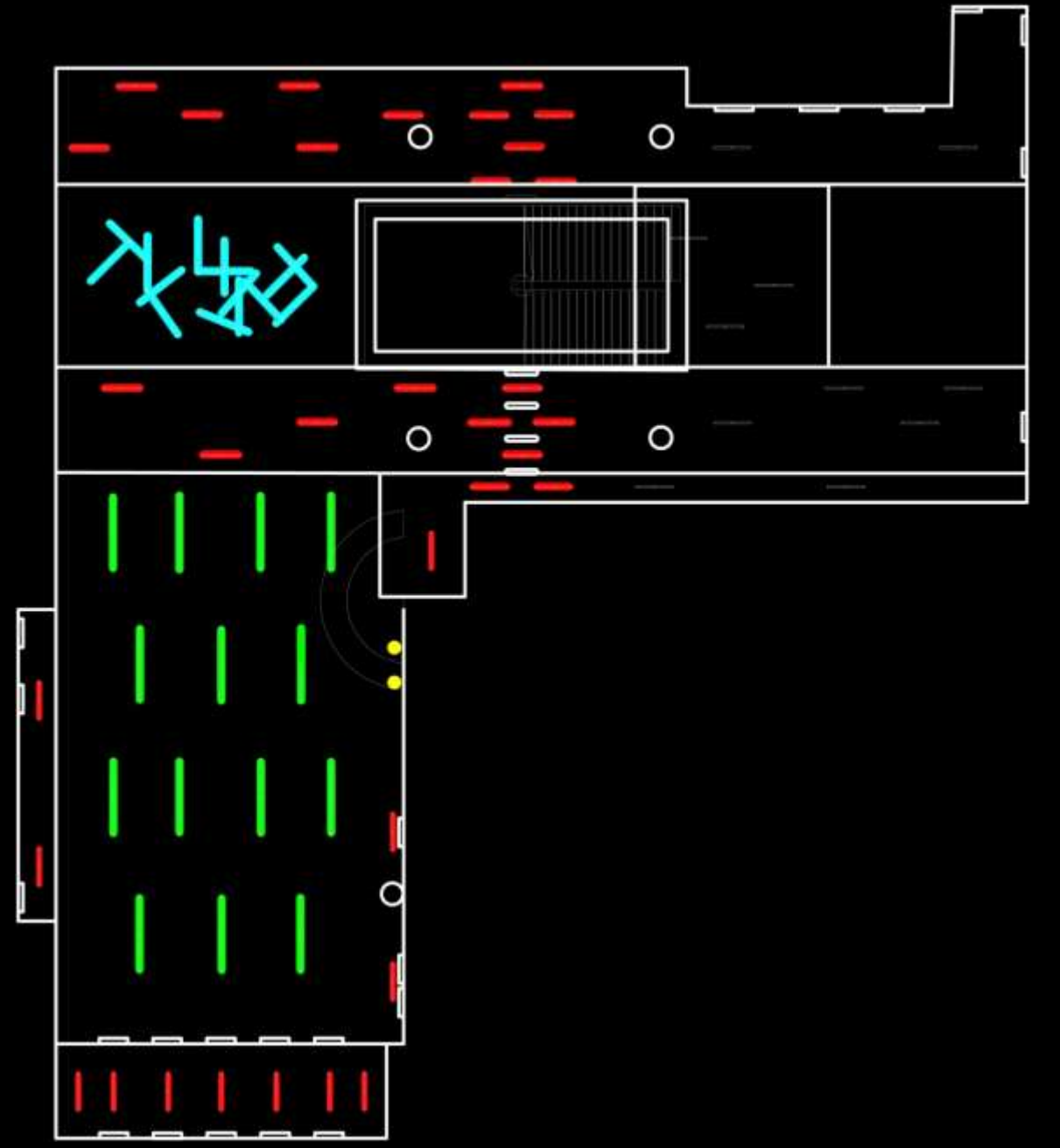
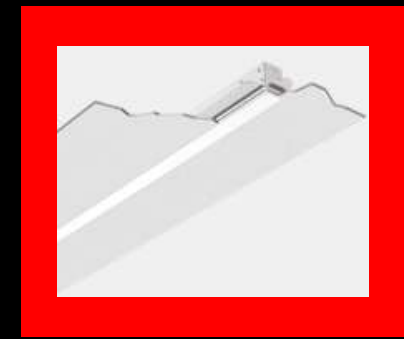
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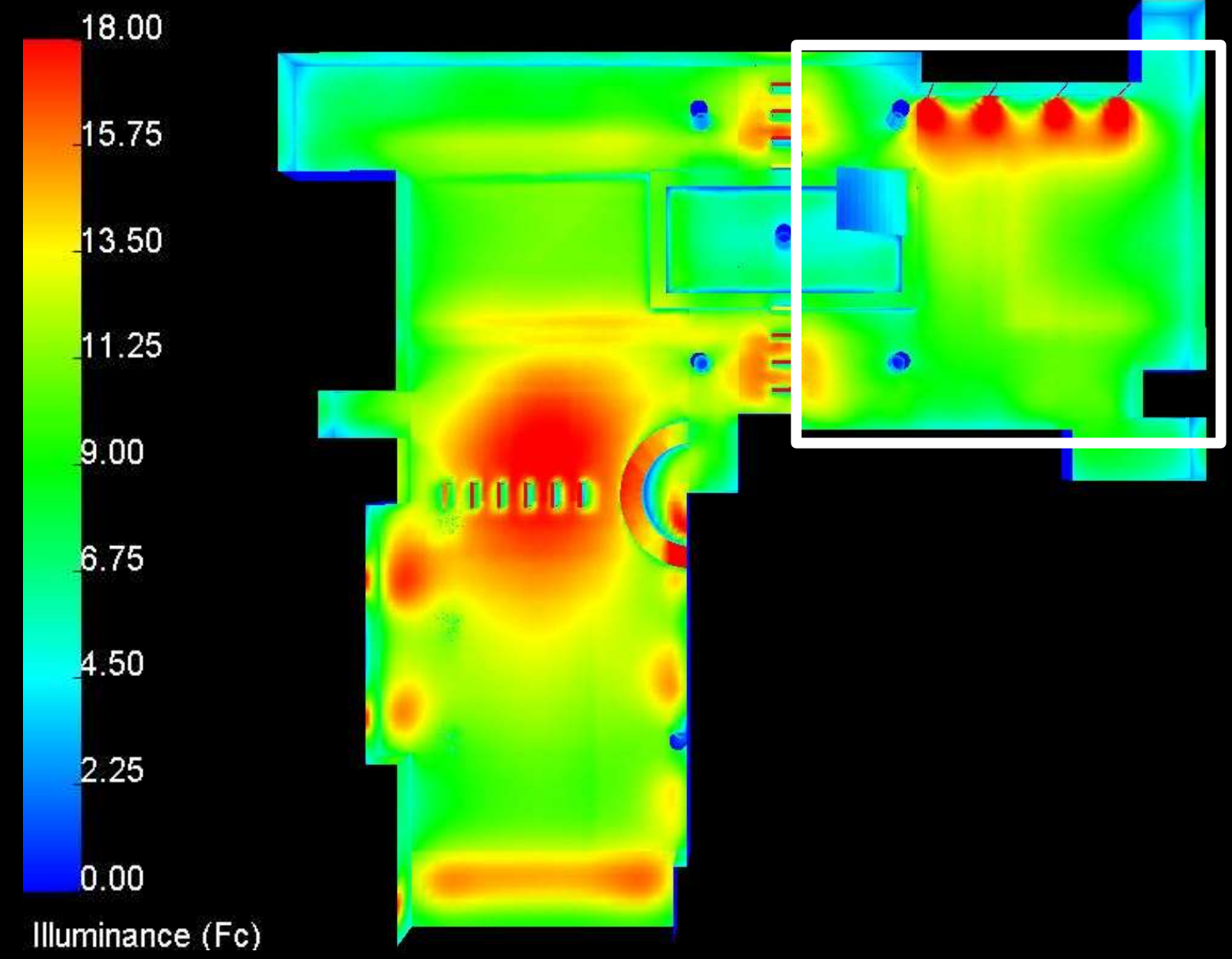
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	Elevator Lobby	
	Horizontal	Vertical
Average Illuminance	10.6 fc	4.9 fc
Design Criteria	10 fc	5 fc

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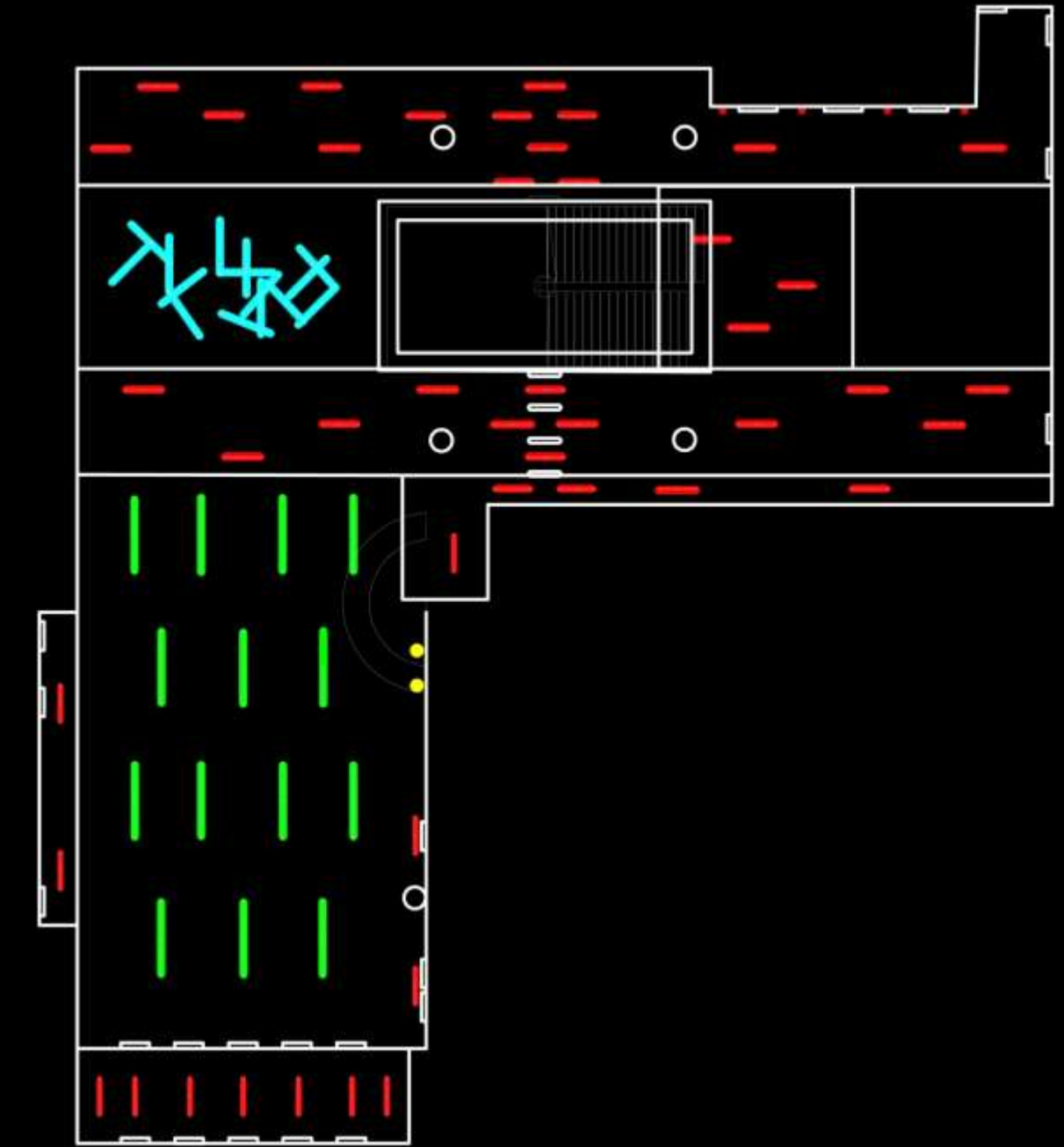
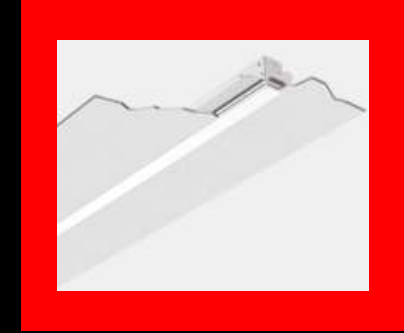
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Lighting Power Density	
Area	7727.2 sq ft
Watts	4226.9 W
Designed	0.55 W/sq ft
Criteria	1.3 W/sq ft



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Overview of Marketing Open Office

Calculate number of hours with shading

Glare Analysis with Radiance

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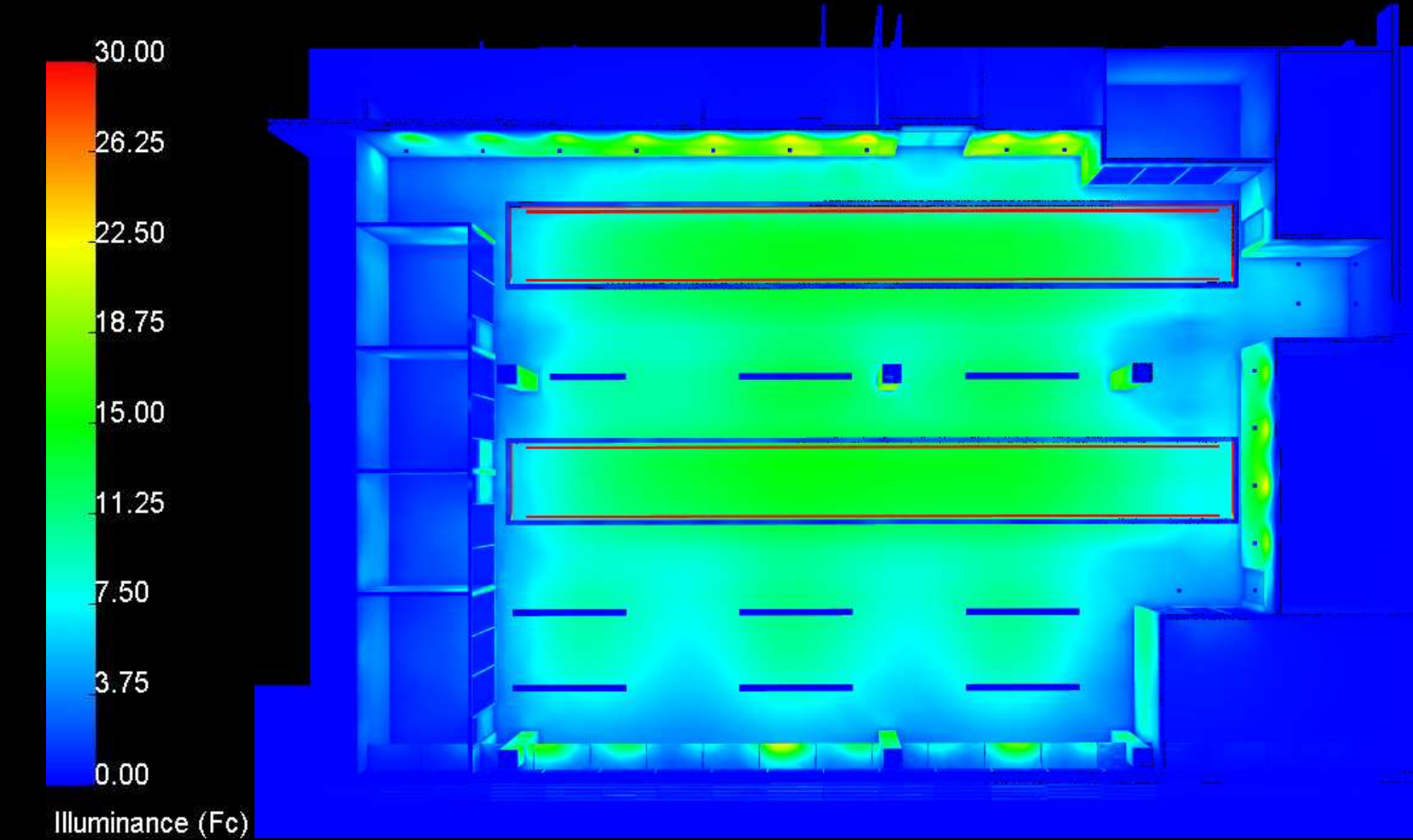
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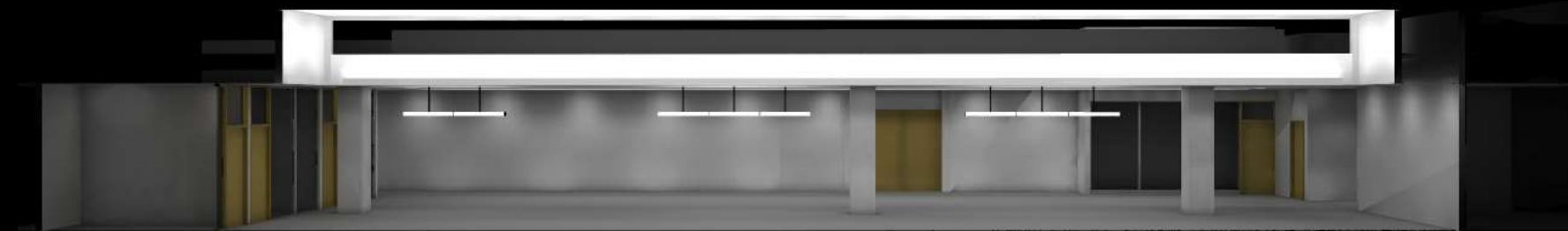
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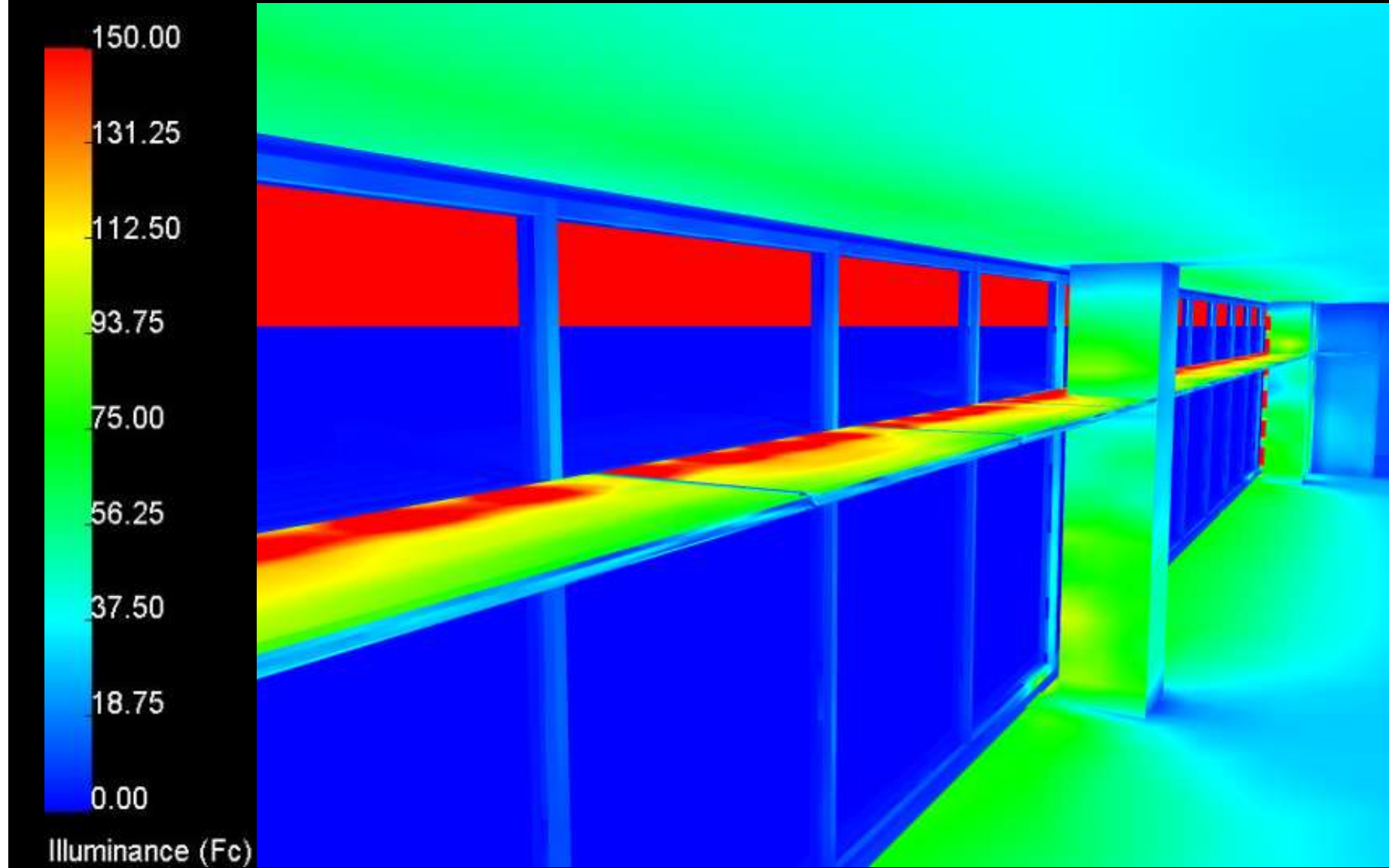
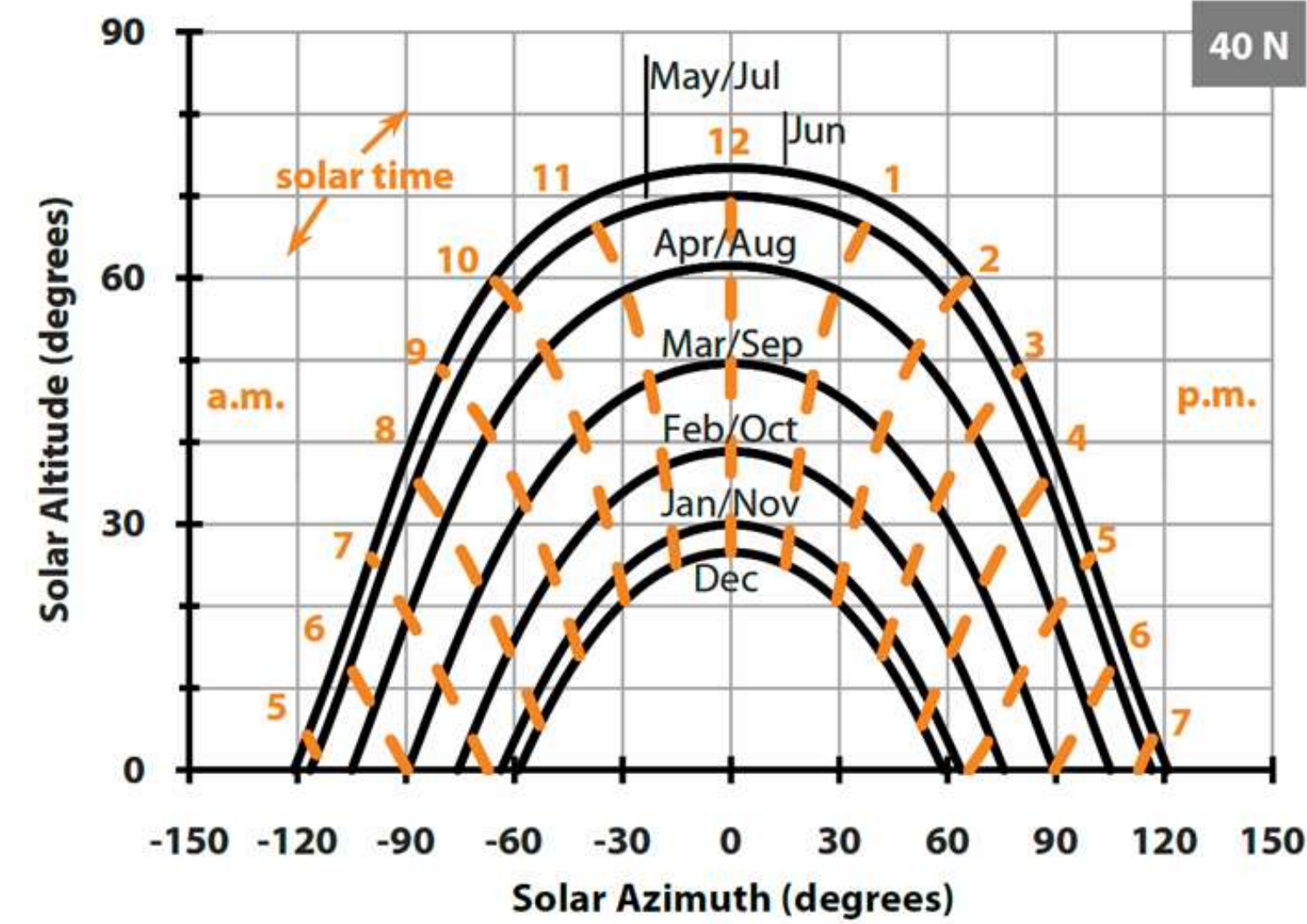
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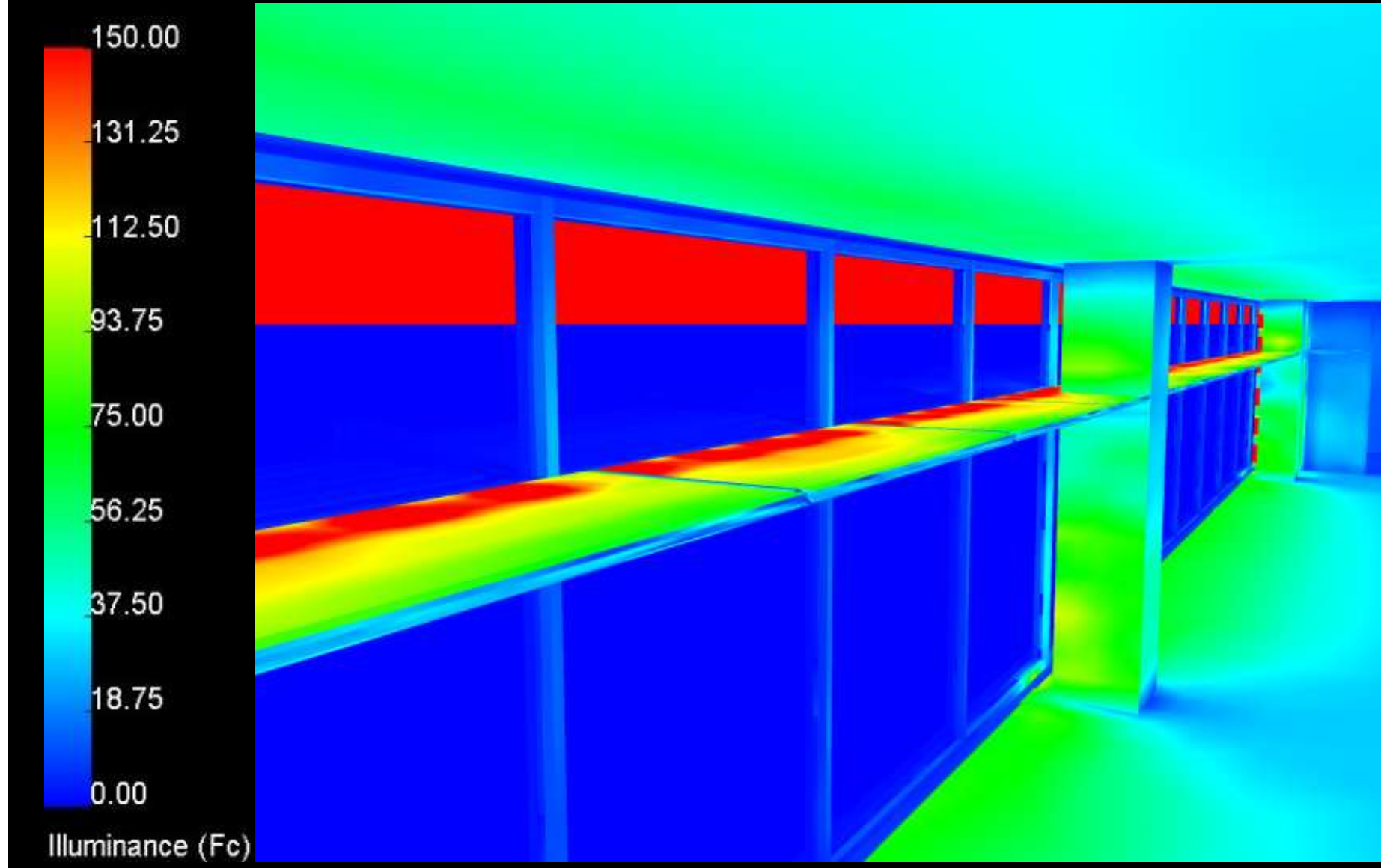
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Glazing System							
	Manufacturer	Type	Color	Transmittance	Reflectance	Solar Heat Gain Coefficient	LSG
Curtain Wall	Solarban	70XL	Solargray	32%	7%	0.24	1.34
Clearstory	Solarban	60	Solargray	35%	7%	0.28	1.26



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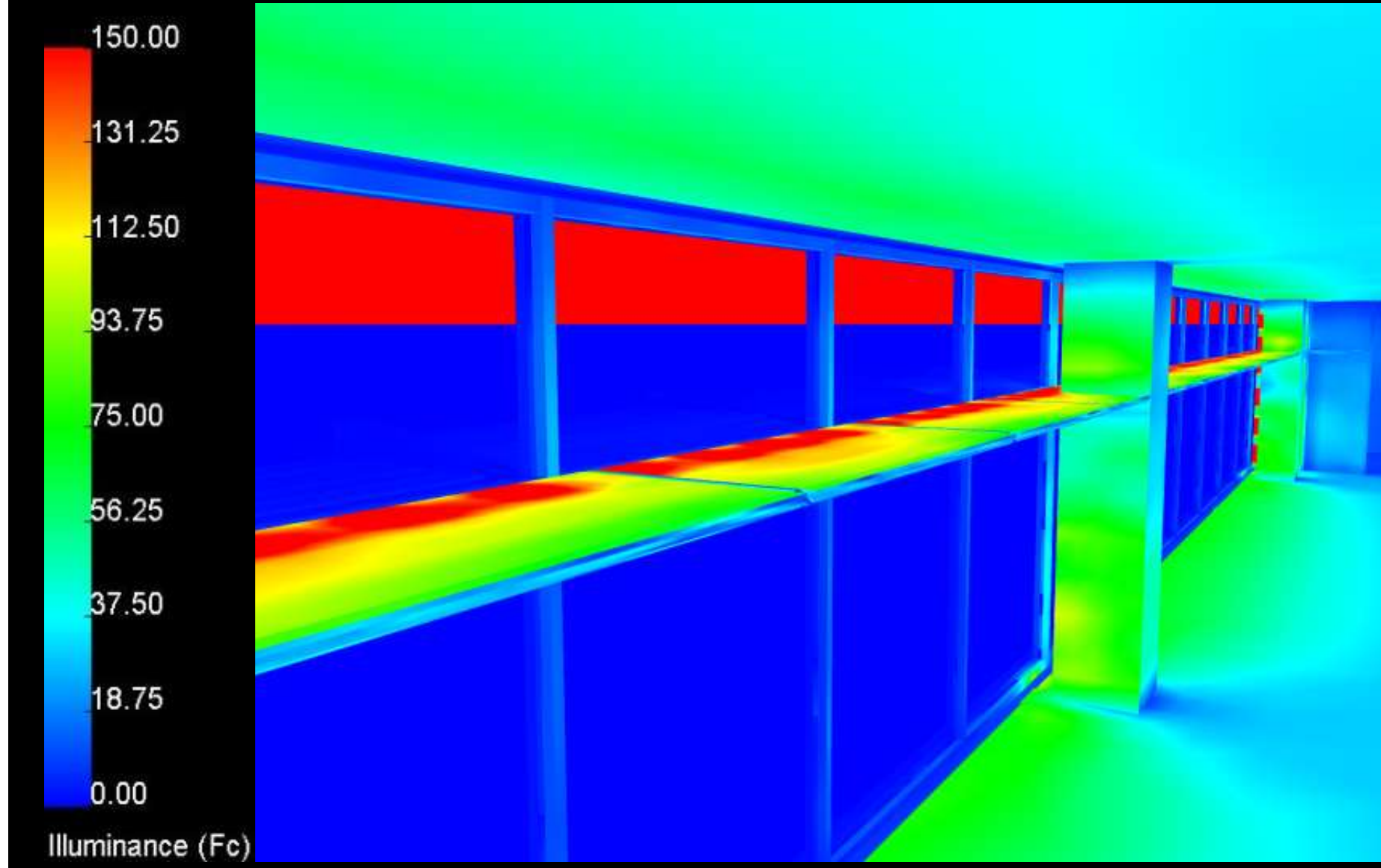
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	Manufacturer	Type	Color	Transmittance	Reflectance	Solar Heat Gain Coefficient	LSG
Curtain Wall	Solarban	70XL	Solargray	32%	7%	0.24	1.34
Clearstory	Solarban	60	Solargray	35%	7%	0.28	1.26

Shading System		
Manufacturer	Fabric	Oppeness Factor
Draper Inc	Light-Filtering SheerWeave	1%



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Cost-Benefit Analysis of Increasing Feeder Sizes

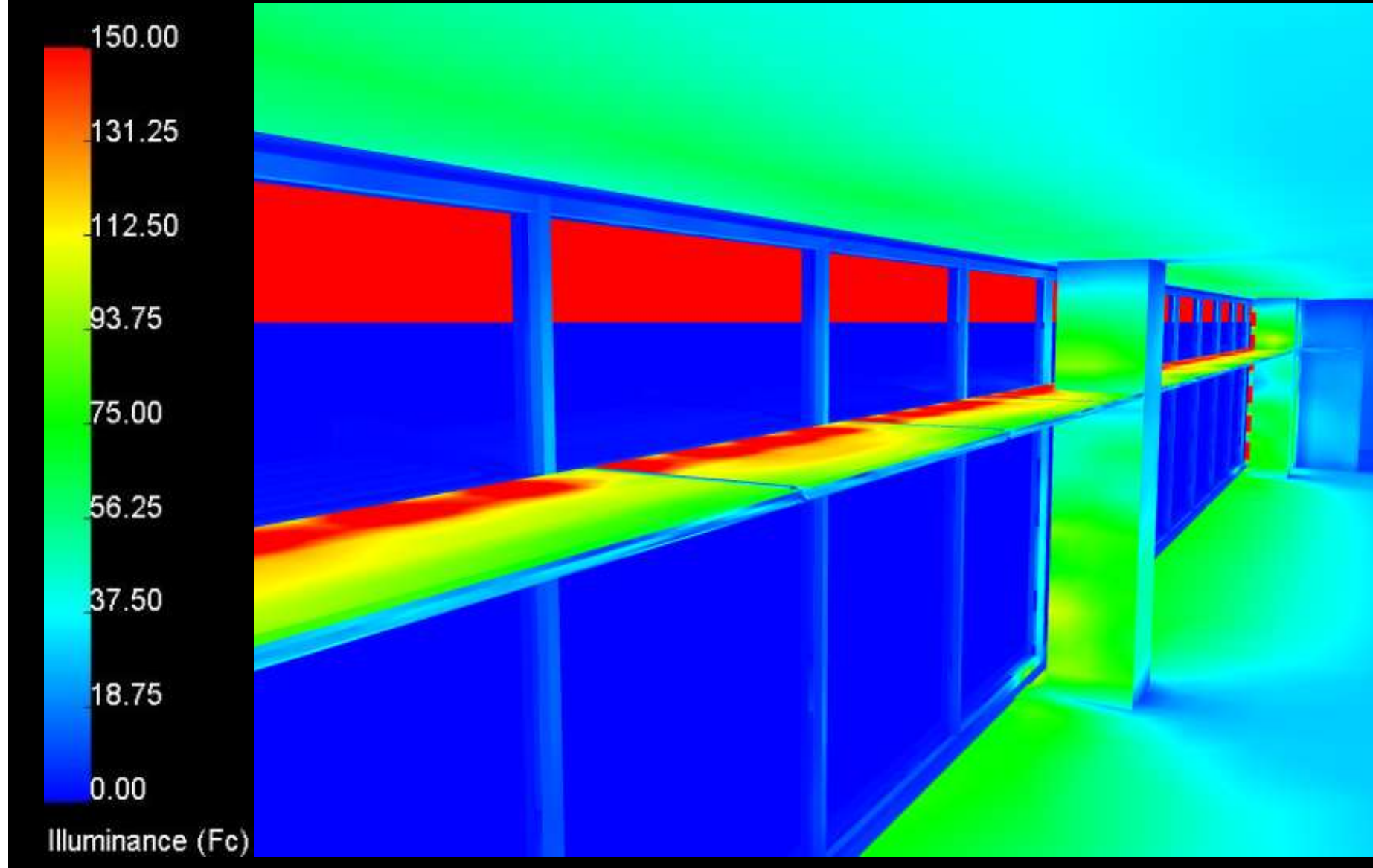
Exterior Space | Landscape Architecture Breadth

Circulation Space

M.A.E. Daylighting | Glare Analysis

Analysis | Conclusion

Shading Analysis	
Hours per year	407
Design Criteria	250



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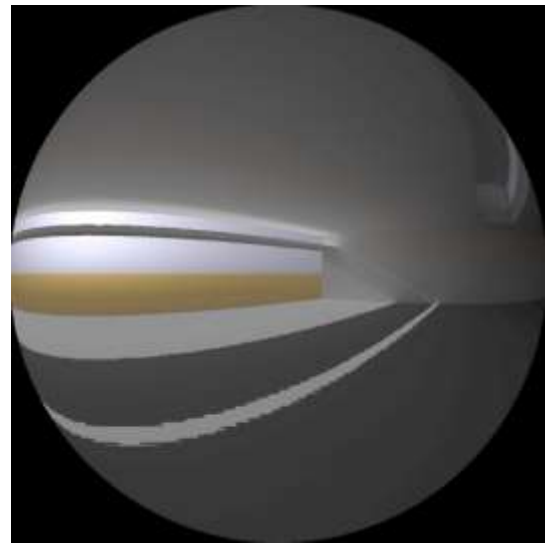
Exterior Space | Landscape Architecture Breadth

Circulation Space

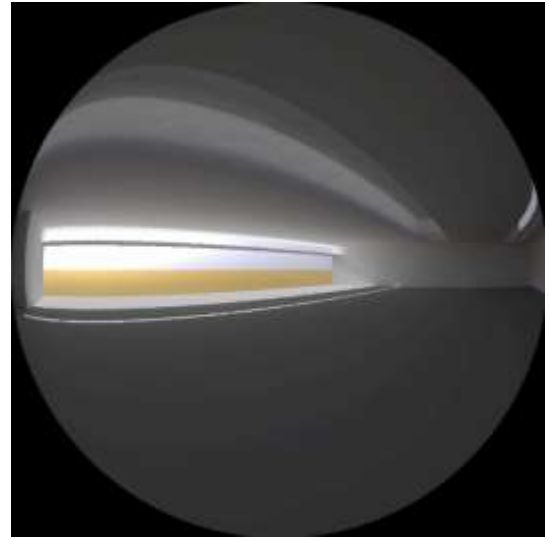
M.A.E. Daylighting | Glare Analysis

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December 21st Noon | Facing Curtain Wall

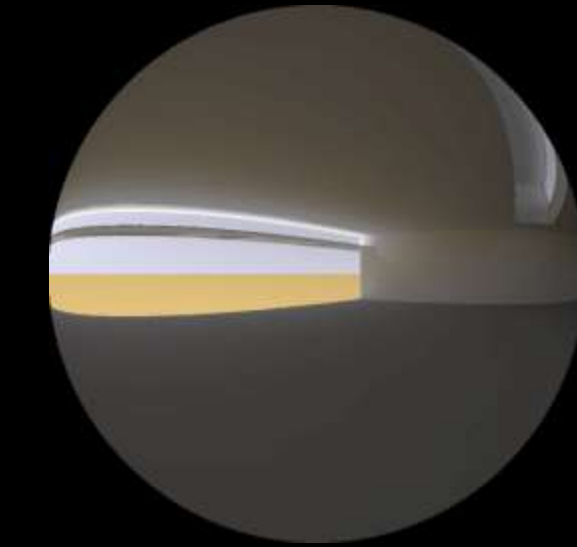


Average Luminance | 1277.2 cd / sq ft



Average Luminance | 644.8 cd / sq ft

June 21st Noon | Facing Curtain Wall



Average Luminance | 590 cd / sq ft



Average Luminance | 390 cd / sq ft

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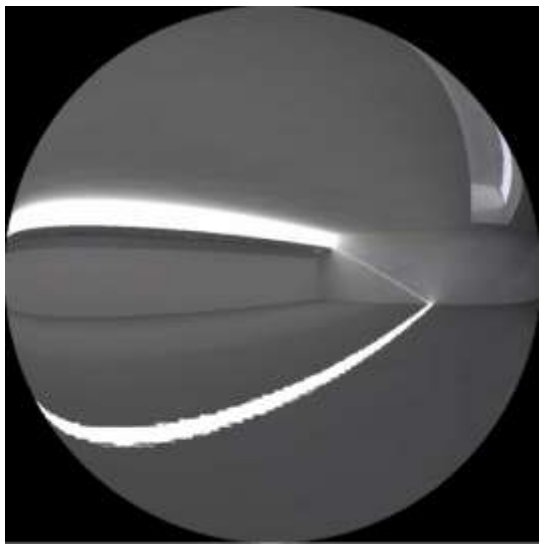
Exterior Space | Landscape Architecture Breadth

Circulation Space

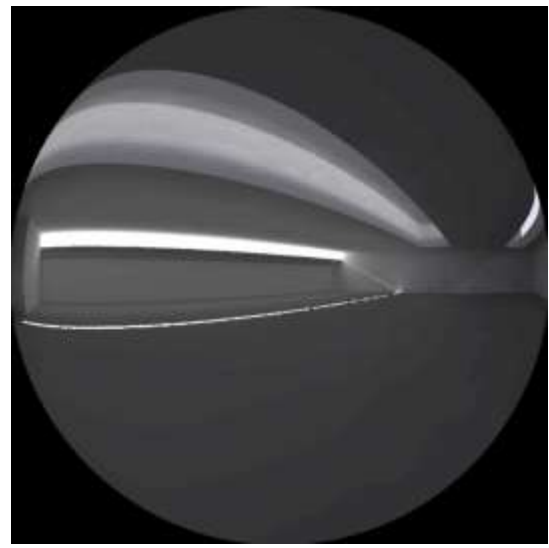
M.A.E. Daylighting | Glare Analysis

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December 21st Noon | Facing Curtain Wall with Shading



Average Luminance | 231 cd / sq ft



Average Luminance | 231 cd / sq ft

June 21st Noon | Facing Curtain Wall with Shading



Average Luminance | 163 cd / sq ft



Average Luminance | 163 cd / sq ft

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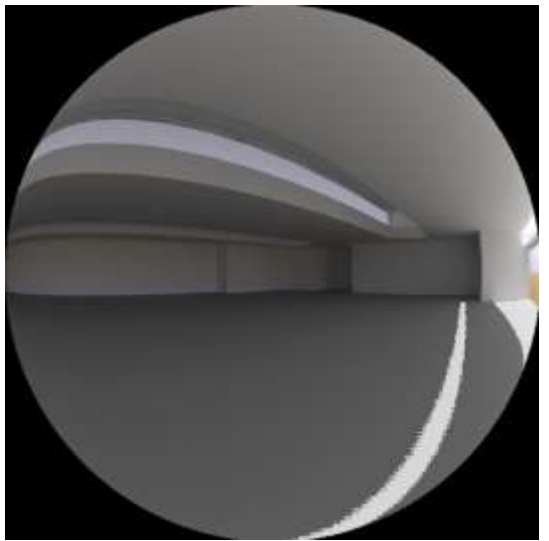
Exterior Space | Landscape Architecture Breadth

Circulation Space

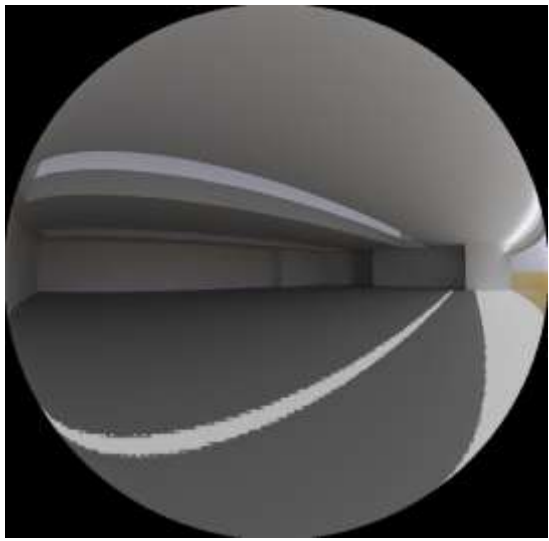
M.A.E. Daylighting | Glare Analysis

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December 21st Noon | Facing Clearstory

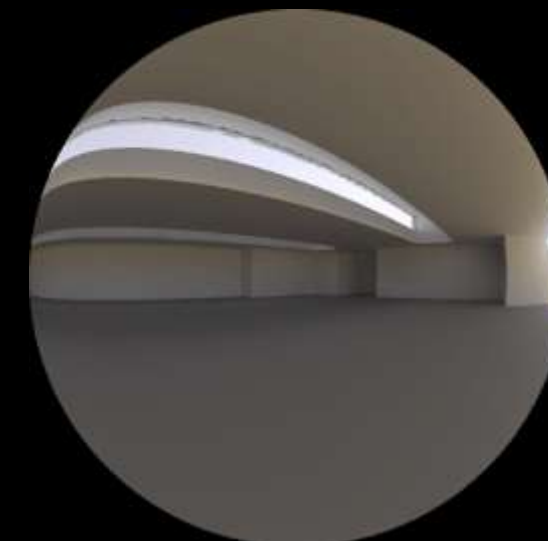


Average Luminance | 459 cd / sq ft

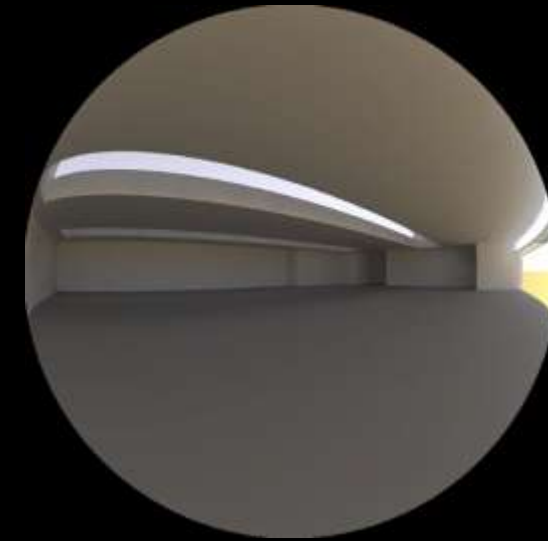


Average Luminance | 674 cd / sq ft

June 21st Noon | Facing Clearstory



Average Luminance | 252 cd / sq ft



Average Luminance | 283 cd / sq ft

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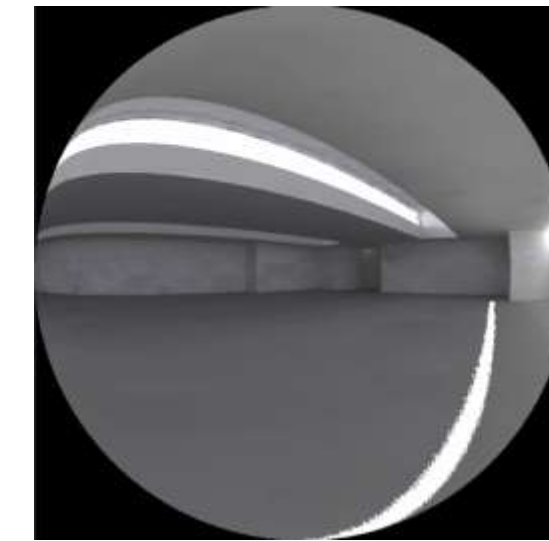
Exterior Space | Landscape Architecture Breadth

Circulation Space

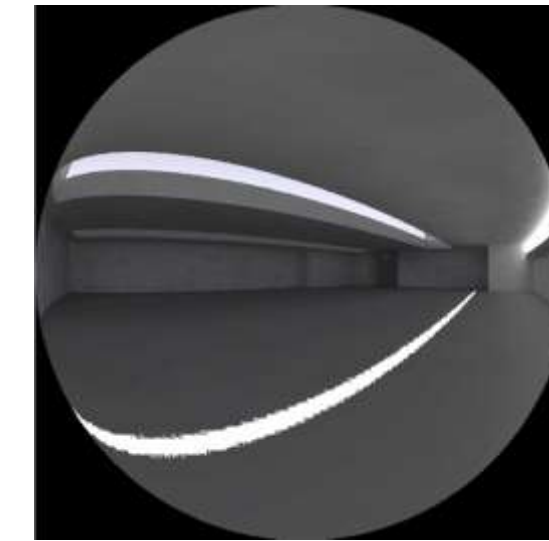
M.A.E. Daylighting | Glare Analysis

Analysis | Conclusion

December 21st Noon | Facing Clearstory with Shading



Average Luminance | 214 cd / sq ft

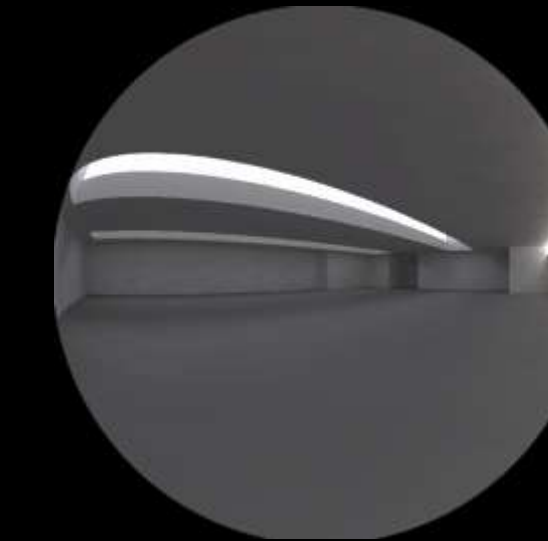


Average Luminance | 214 cd / sq ft

June 21st Noon | Facing Clearstory with Shading



Average Luminance | 120 cd / sq ft



Average Luminance | 120 cd / sq ft

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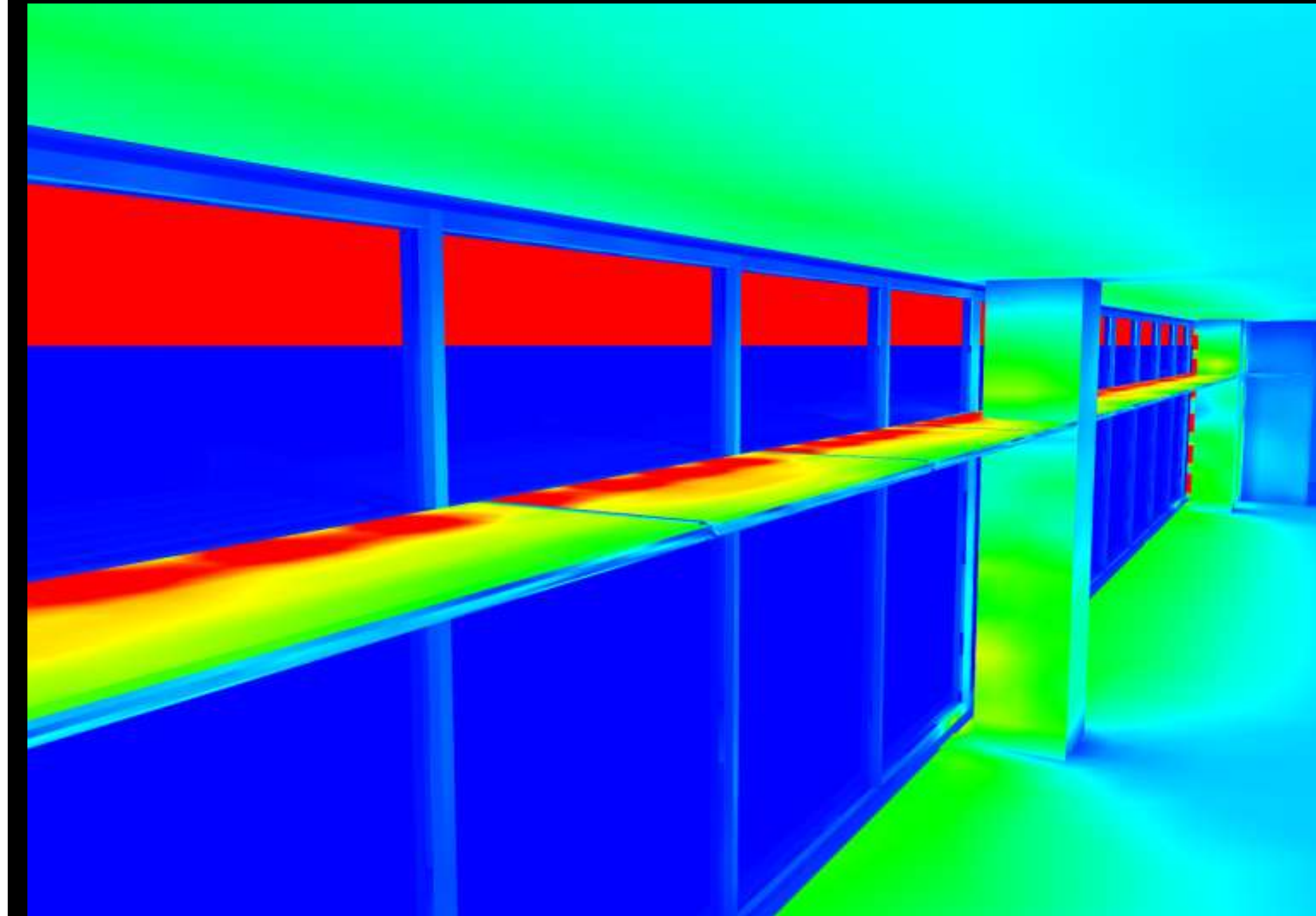
Analysis | Conclusion

Conclusion

Redesign curtain wall to **DECREASE** penetration

Glare **DECREASES** as move away from window

Glare is **CONSTANT** with shading



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M.A.E. Daylighting | Glare Analysis

Analysis | **Conclusion**

Electrical Design

Lighting design

Landscape Architecture

MAE Glare Analysis

Sustainability

Conclusion

Increase wire size to decrease energy loss and maximize cost savings

Minimalist design
Emphasized materials
Strong lines and angles

Harmonious with nature
Strong lines and angles

Redesign to decrease shading
Glare source analysis

Power Density



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Acknowledgements

Grenald Waldron Associates

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Professor Dannerth
Professor Parfitt
Professor Holland

For all of you who gave me
support when I needed it most



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Thank you
Questions?

