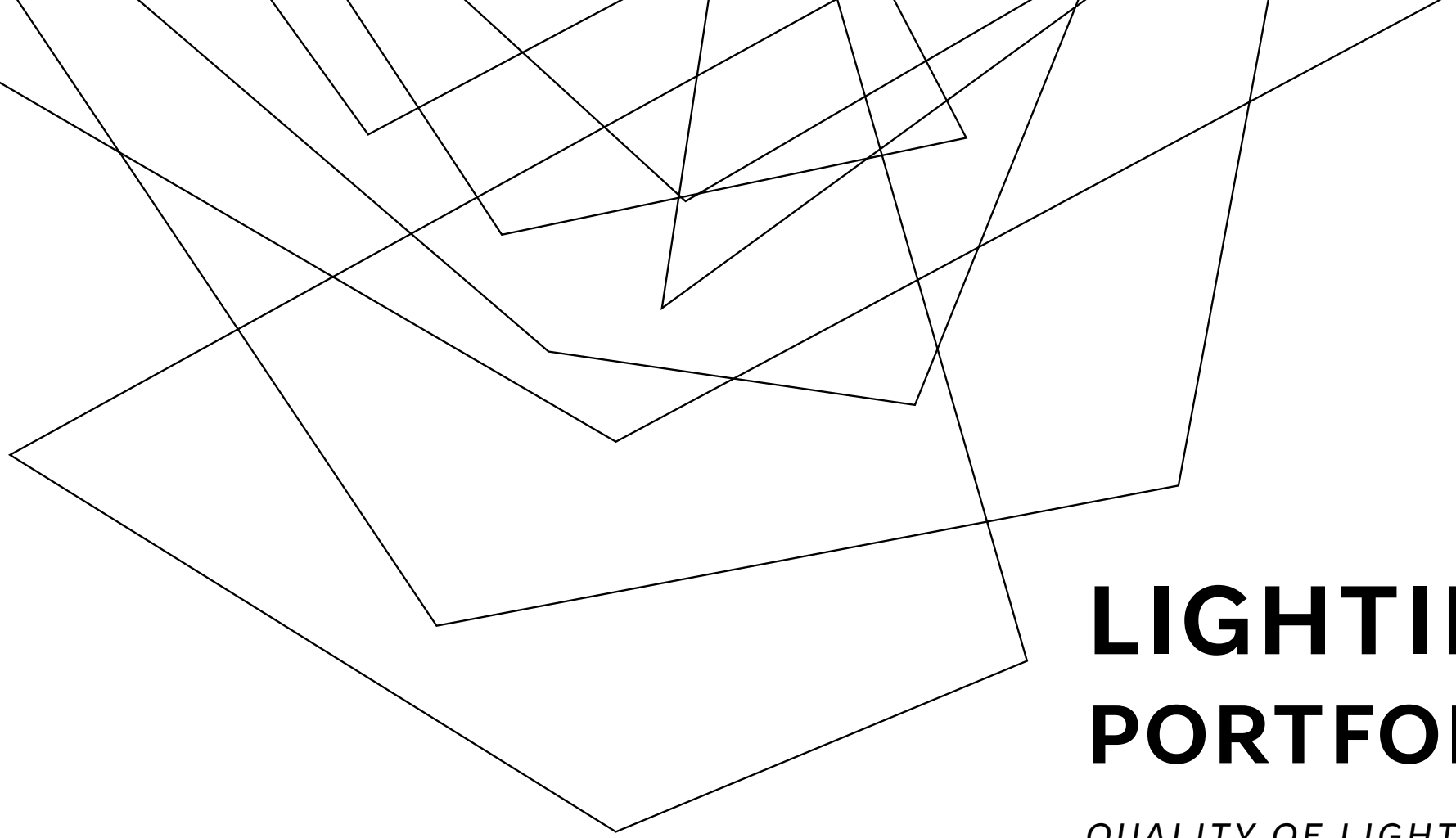


LIGHTING PORTFOLIO

QUALITY OF LIGHT FEATURING MONET'S ROUEN CATHEDRAL &

ROUNDHOUSE WORKS LIGHTING ANALYSIS

By Shristi Tamrakar, Carson Conery, and Jake Alt

CONTENTS

QUALITY OF LIGHT

ROUNDHOUSE WORKS

QUALITY OF LIGHT

MONET’S ROUEN CATHEDRAL PAINTINGS

2023

The Quality of Light

UofI Library | Late Summer

September 10, 6:10 AM (sunrise 6:19)
Sunny, Clear Sky

September 11, 9 AM
Sunny, Clear Sky (mostly)

September 8, 10:30 AM
Sunny, Clear Sky (mostly)

August 25, 10:10 AM
Cloudy Sky

The Quality of Light

UofI Library | Late Summer

September 9, 12:50 PM
Sunny, Clear Sky

September 7, 3 PM
Sunny, Clear Sky

August 29, 6:40 PM (Sunset 7:14)
Diffused, Cloudy, Rain

September 11, 7:20 PM (Sunset 7:05)
Diffused, Cloudy

The Quality of Light

UofI Library | Late Fall

November 17, 7:20 AM (sunrise 7:15)
Sunny, Clear Sky

November 8, 8:40 AM
Sunny, Clear Sky

November 8, 8:40 AM
Sunny, Clear Sky

November 15, 9:40 AM
Cloudy Sky

The Quality of Light

UofI Library | Early Fall

October 17, 7:50 AM (sunrise 7:10)
Sunny, Clear Sky (Mostly)

October 18, 9:20 AM
Sunny, Clear Sky

October 9, 9:50 AM
Sunny, Clear Sky

October 10, 11 AM
Cloudy Sky

The Quality of Light

UofI Library | Early Fall

October 19, 1:30 PM
Sunny, Clear Sky

October 12, 3:20 PM
Partly Cloudy Sky

October 24, 5:00 PM (Sunset 5:44)
Cloudy Sky

October 12, 6:15 PM (Sunset 6:05)
Clear Sky

The Quality of Light

UofI Library | Late Fall

November 17, 7:20 AM (sunrise 7:15)
Sunny, Clear Sky

November 8, 8:40 AM
Sunny, Clear Sky

November 8, 8:40 AM
Sunny, Clear Sky

November 15, 9:40 AM
Cloudy Sky

The Quality of Light

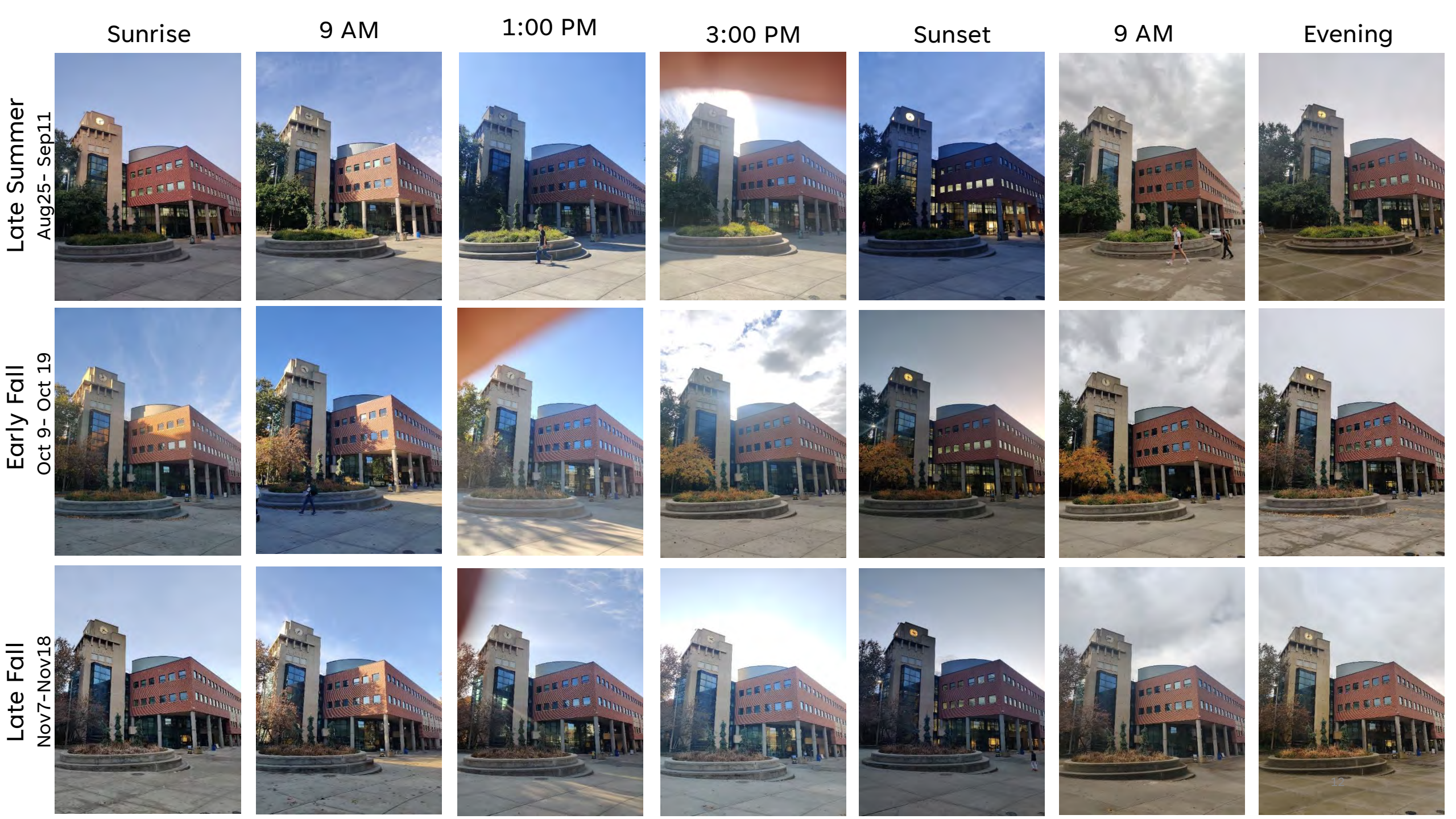
UofI Library | Late Fall

November 27, 12:55 PM
Sunny, Clear Sky

November 16, 2:20 PM
Sunny, Clear Sky

November 7, 2:00 PM (Sunset 4:20)
Clear Sky

November 18, 4:15 PM (Sunset 4:10)
Clear Sky


Sunrise
9 AM
1:00 PM
3:00 PM
Sunset
9 AM
Evening
Late Summer
Aug25- Sep11
Early Fall
Oct 9- Oct 19
Late Fall
Nov7-Nov18

The Quality of Light

U of I Admin Building | Late Summer

August 28 @ 2:08 PM

August 28 @ 5:17 PM

August 29 @ 9:16 AM

September 5 @ 6:26 PM

The Quality of Light

U of I Admin Building | Early Fall

September 5 @ 6:31 PM

September 6 @ 5:08 PM

September 8 @ 4:29 PM

September 8 @ 4:29 PM

The Quality of Light

U of I Admin Building | Late Fall

October 23 @ 2:17 PM

October 23 @ 5:07

October 24 9:21 AM

October 24 @ 3:32 PM

The Quality of Light

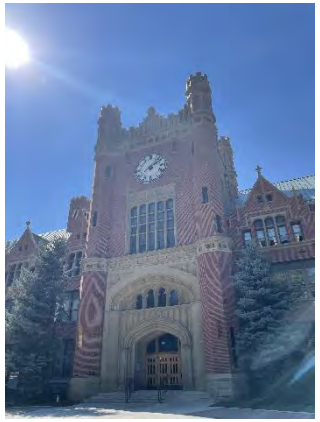
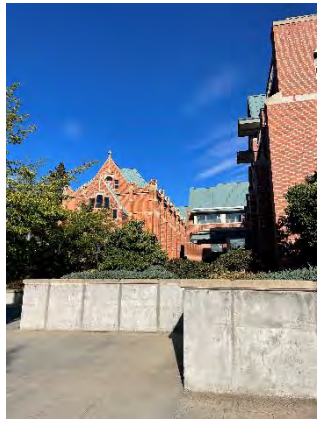
U of I Admin Building | Late Fall II

October 24 @ 3:32 PM

November 28 @ 10:53 AM

November 30 9:28 AM

December 10, 5:09 PM

	Early Morning	Noonish	Afternoon	Evening
Late Summer Aug25- Sep11				
Early Fall Oct 9- Oct 19				
Late Fall Nov7-Nov18				

The Quality of Light

U of I Admin Building | Late Summer

August 29th
@Morining

August 27th
@Mid-Morining

August 27th
@Afternoon

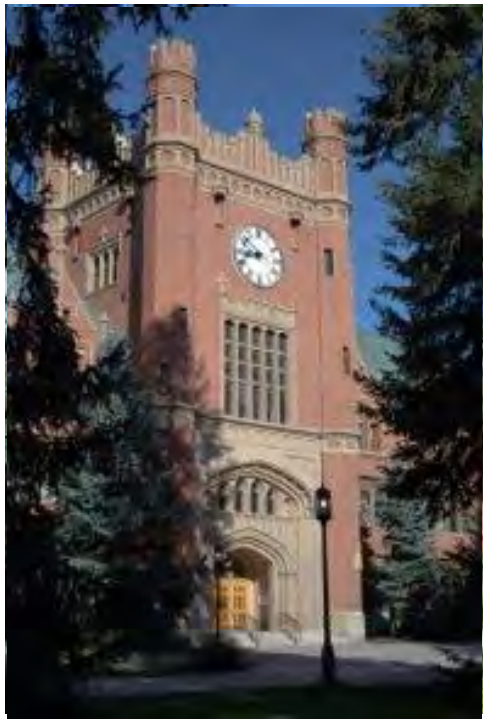
August 28th
@Mid-Afternoon

August 31st
@Evening

The Quality of Light

U of I Admin Building | Early Fall

September 27th
@Morining



September 27th
@Mid-Morining

October 8th
@Afternoon

October 11th
@Mid-Afternoon

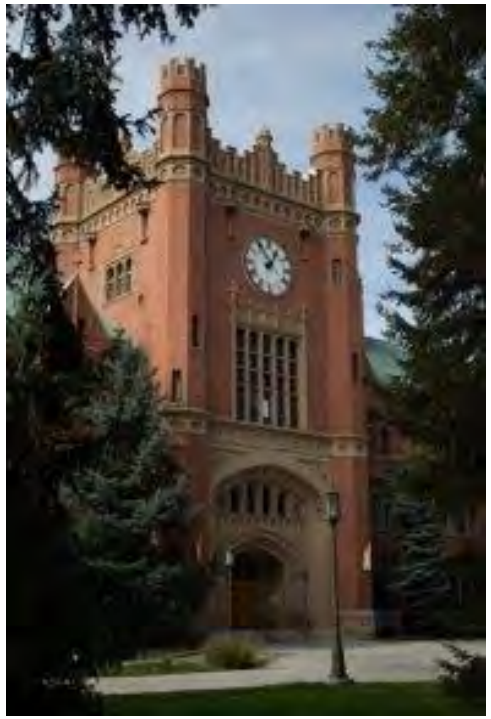
October 9th
@Evening

The Quality of Light

U of I Admin Building | Late Fall

Oct. 24th
@Morining

Oct. 20th
@Mid-Morining



Oct. 24th
@Afternoon

Oct. 24th
@Mid-Afternoon

Oct. 21st
@Evening

The Quality of Light

U of I Admin Building | Winter

Nov. 30th
@Morining

Nov. 17th
@Mid-Morining

Nov. 18th
@Afternoon

Nov. 28th
@Mid-Afternoon

Nov. 28th
@Evening

The Quality of Light

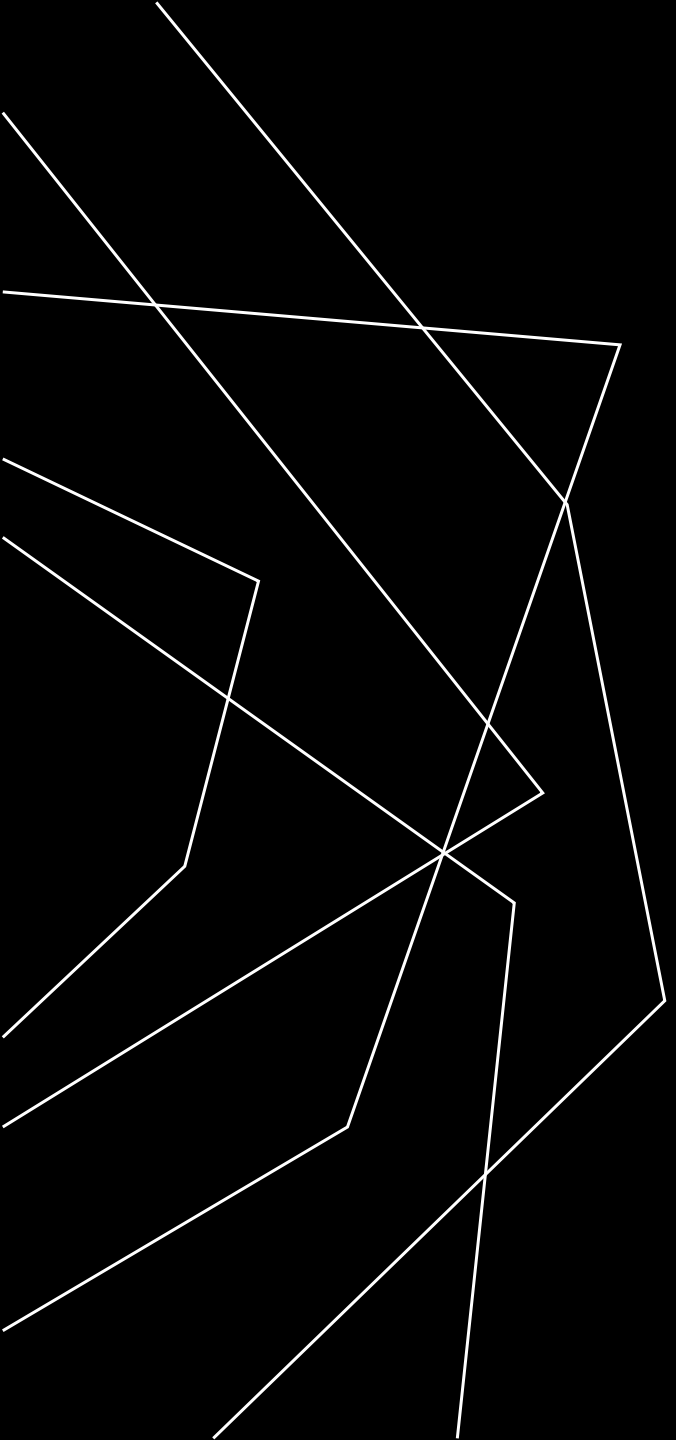
Uofl Library | Comparison

- How is the light?
- What was the sky conditions?
- How does it make you feel?

CONCLUSION

Understanding quality of light from Monet's point of view to actually seeing it yourself through the camera lens was very interesting. We found out that it was quite hard to get the variation in colors reflected on the building as it only happened during golden hours, sunset and sunrise. It was also important to have selected that particular side of the building and the surrounding elements did not cover the sky.

However, this was a great exercise to learn the sun angles, hours of natural light in respect to length of days. Even the quality of sunlight changed from summer to late fall from being very stark and hot to warm and crisp. Late fall in Moscow were a lot cloudy, rainy and we had some snow. Winter has started to be more white- the sky is white, and it snows and the ground is white.

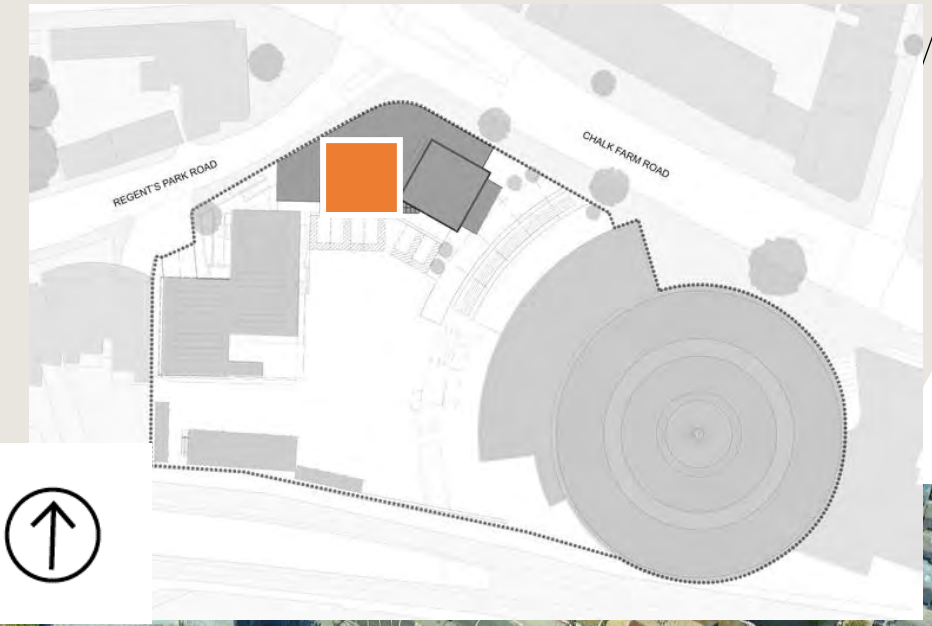


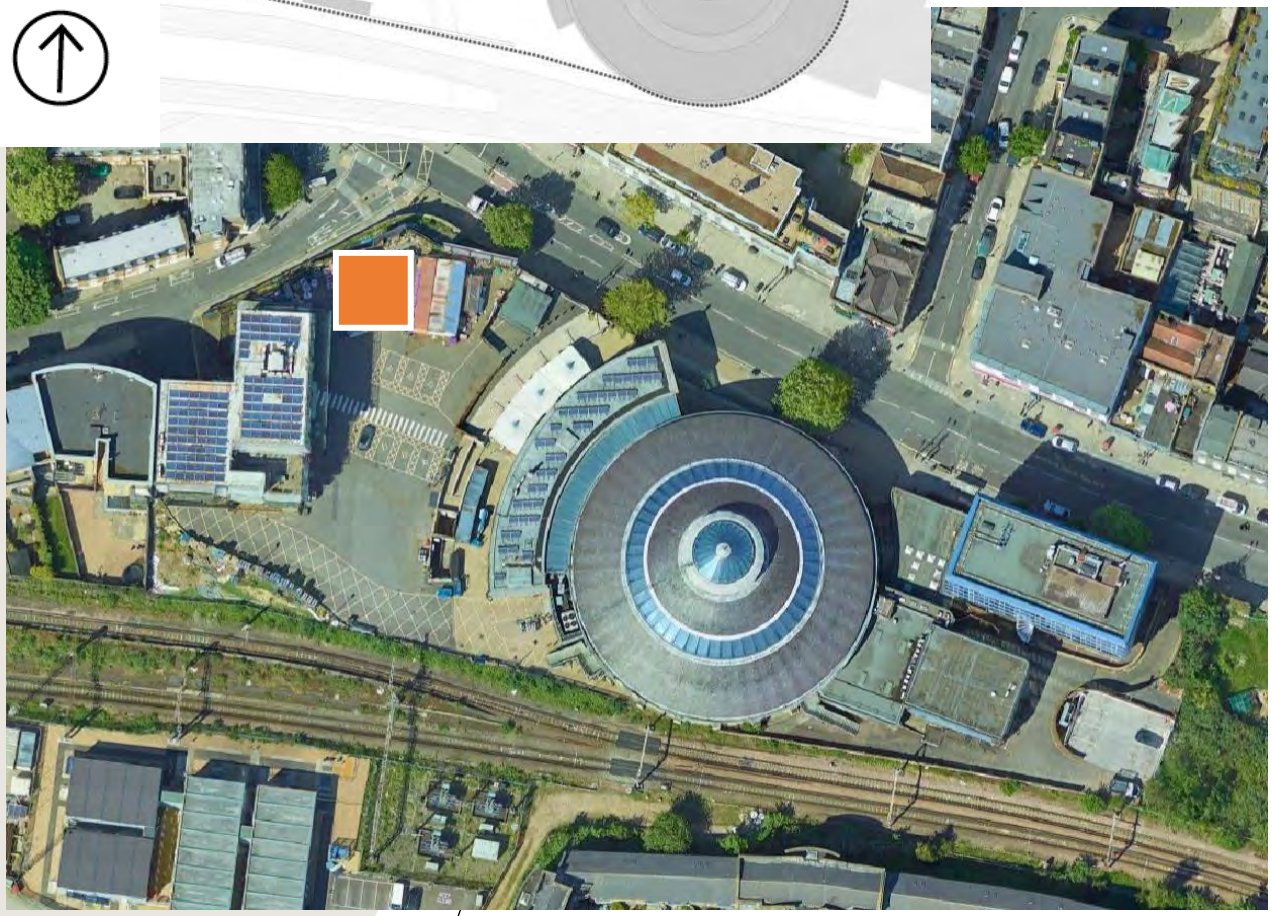
ROUNDHOUSE WORKS

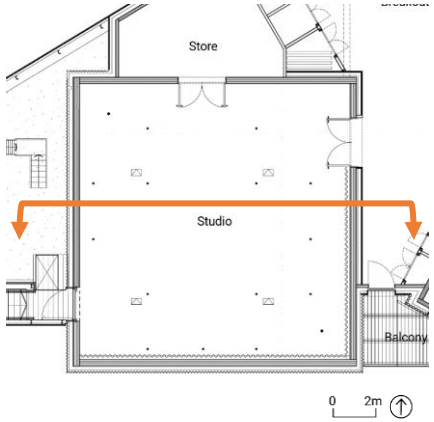
INTRODUCTION

Roundhouse Works provides space and state-of-the-art facilities to support young people to turn their creativity into a career, doubling the number of 11–30-year-olds the Roundhouse currently works with each year to 15,000. The new building houses a bespoke large music studio, a triple-height studio for circus and performance, a large multi-use studio for workshops, and a dedicated podcast studio run by Transmission Roundhouse.

ORIENTATION OF SITE







West facing Window

CONTEXT AND SITE SURROUNDINGS

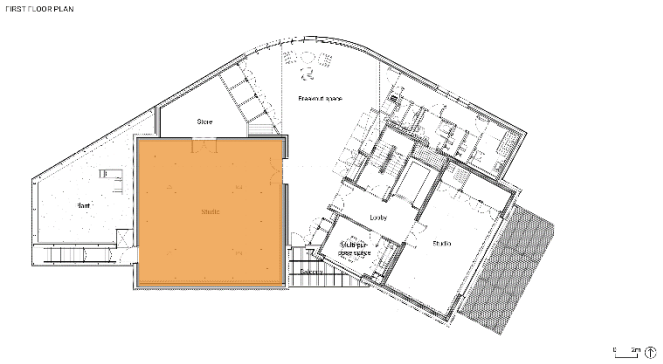
- 3- 4 Storey buildings
- Not a lot of trees
- Open to sky

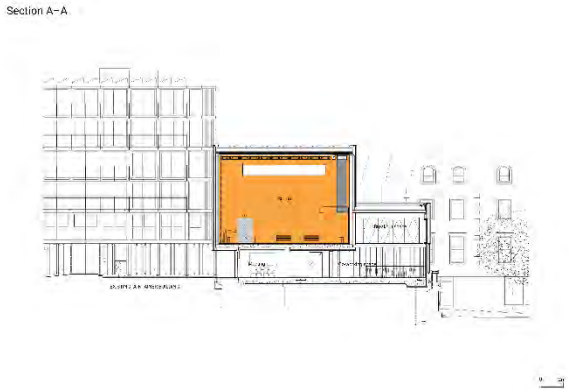
View towards Northwest

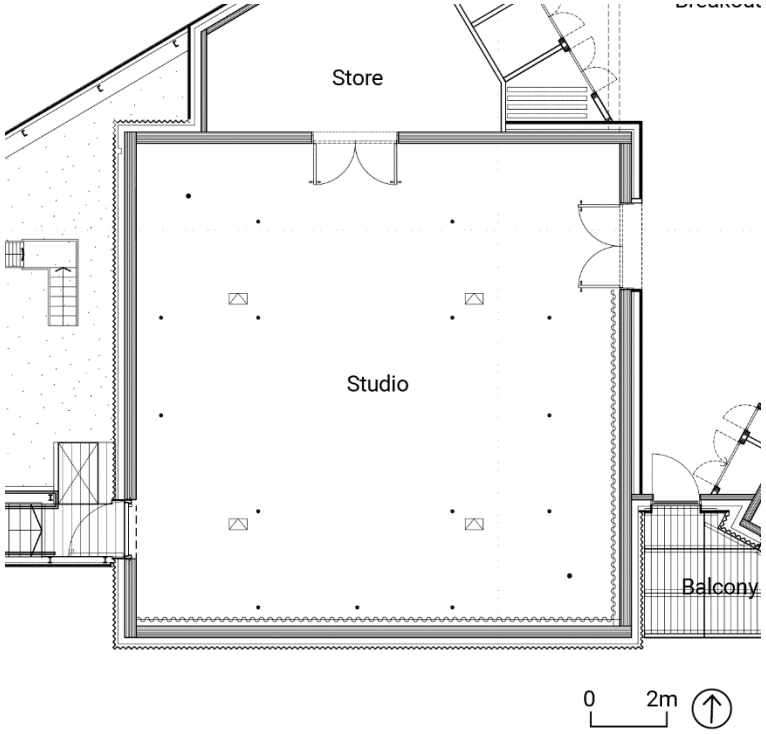
View towards Southeast

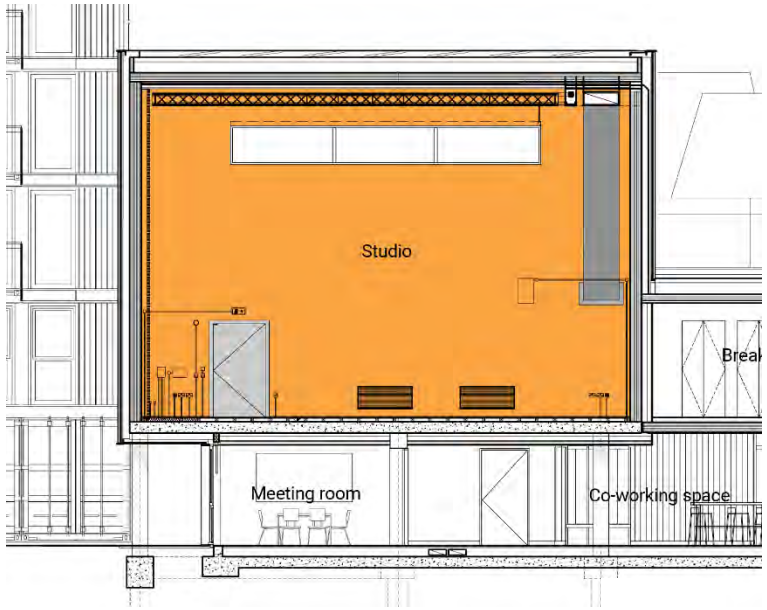
Section showing the office building on Southwest

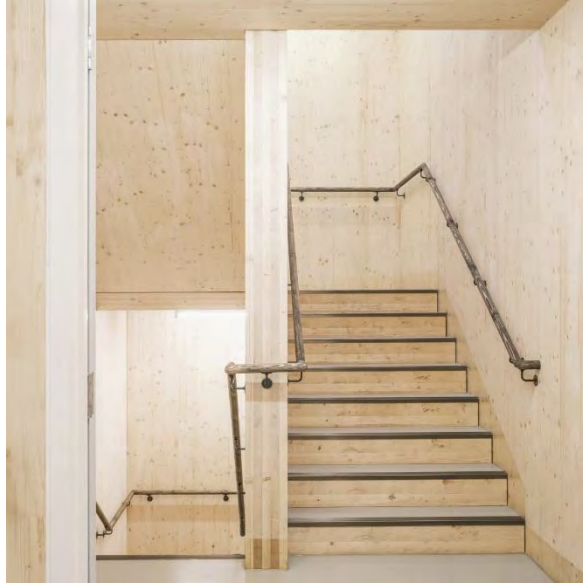
View towards Southwest

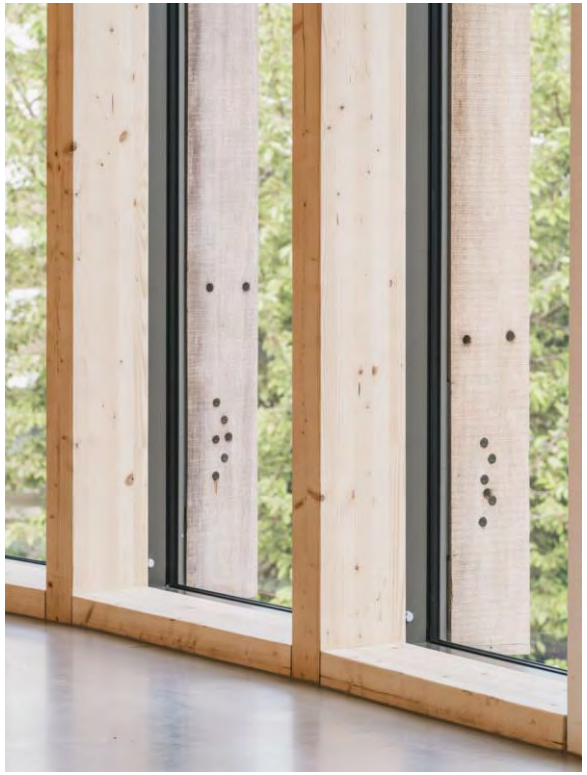

FIRST FLOOR PLAN
Store
Studio
Lobby
Studio
Balcony


Section A–A


Store
Studio
Balcony
0
2m


Studio
Meeting room
Co-working space
0
2m

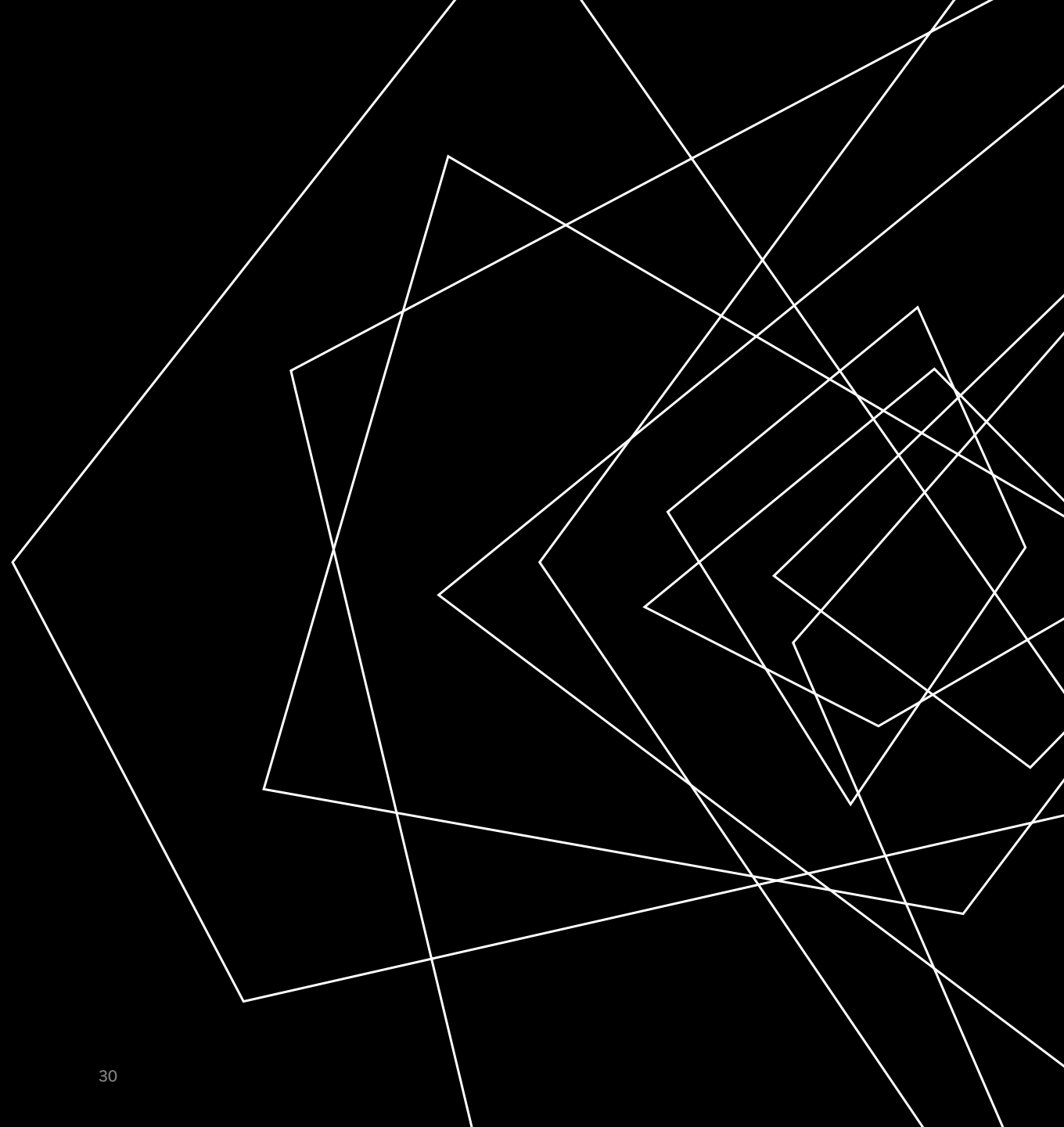




2023

STRENGTHS AND WEAKNESSES

In Lighting



STRENGTHS

IMPROVED SAFETY

The upgraded lighting system significantly improves safety within the Roundhouse. Enhanced visibility reduces the risk of accidents, which is particularly important in a facility where potential accidents could happen.

INCREASED PRODUCTIVITY

The improved lighting conditions lead to increased productivity among maintenance crews. Technicians can perform tasks more efficiently and with greater precision, resulting in faster turnaround times for repairs and maintenance.

ENERGY EFFICIENCY

The new lighting system incorporates energy-efficient LED fixtures, reducing energy consumption and operational costs. This helps the Roundhouse meet sustainability goals and reduce its environmental footprint.

FLEXIBILITY

The lighting system is designed with flexibility in mind. It includes dimming controls and adjustable color temperature options, allowing for customization based on specific tasks and time of day.

ENHANCED AESTHETICS

The upgraded lighting not only serves functional purposes but also enhances the architectural beauty of the Roundhouse. Carefully designed lighting highlights the historical features of the building, making it more visually appealing to visitors.

WEAKNESSES

LACK OF DAYLIGHT DISTRIBUTION

The only light source of daylight is the long rectangular window that is about 20 feet off the floor on the west side and it doesn't bring in enough light as it is.

LACK OF VISUAL CONNECTION TO THE OUTSIDE

With the window being so high off the ground, it is difficult for users to feel a visual connection to the outside world.

GLARE FROM THE WEST

With the only window being on the west side, the glare is more harsh in the later parts of the day. Where it would be more beneficial to access more day light from different directions in other parts of the day

DEPENDENCY ON ELECTRICAL LIGHTING

With the lack of daylight available to the space, a higher dependency on electrical lighting is necessary

HISTORICAL CONFLICTS

With new lighting systems comes the confliction of historians that may not be amenable to a new and more modern lighting strategy

CLIMATE

Summers

Temperatures are usually very pleasant in the summer and don't often exceed an excessive uncomfortable temperature.

18°C to 23°C (64°F to 73°F)

Winters

Winters are fairly cool but pleasant when the sun is out. This due to London being a temperate oceanic climate.

2°C to 8°C (36°F to 46°F)

Overall Yearly Weather

London will usually see rainfall more than half of its year. So, London is fairly cloudy place because it is an oceanic climate

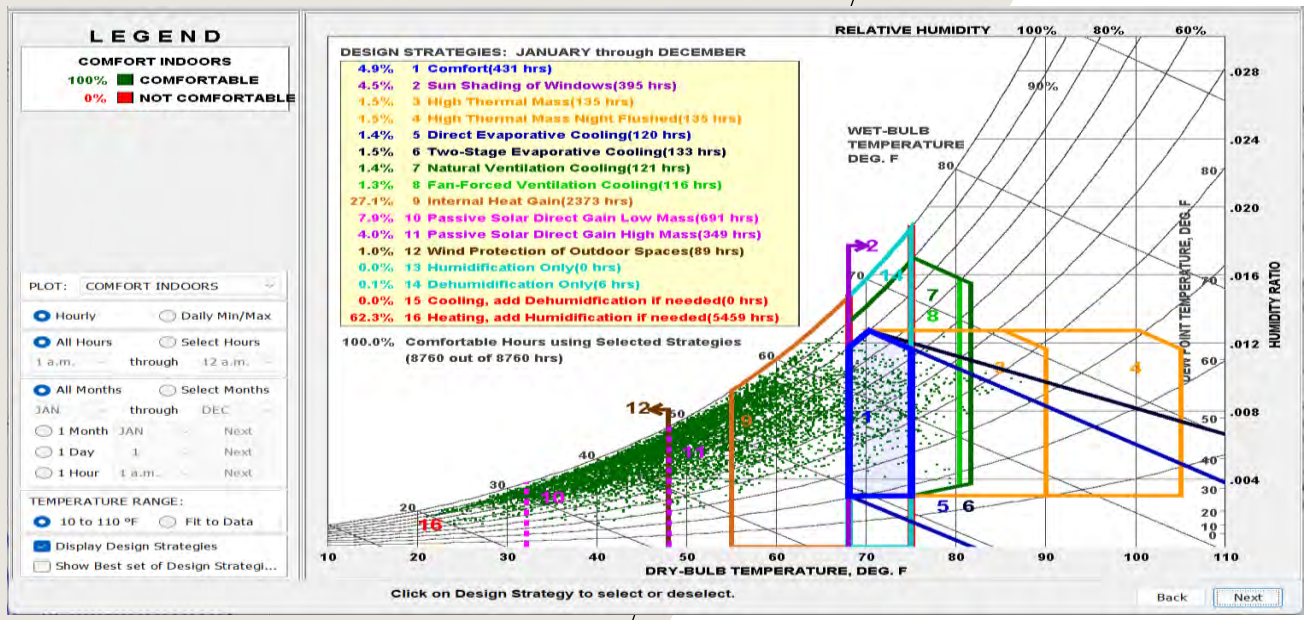
Location: **London, UK**

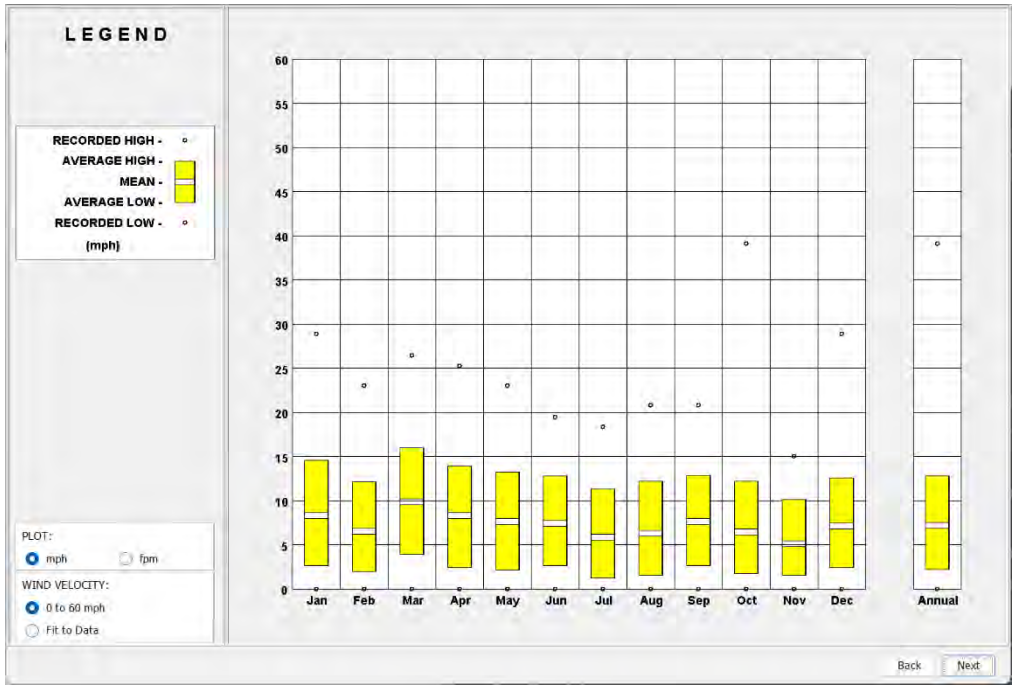
Climate: (Köppen-Geiger) **Cfb:**
Humid- temperate oceanic climate
- Lots of rainfall
- Average Temperature: 51.4° F

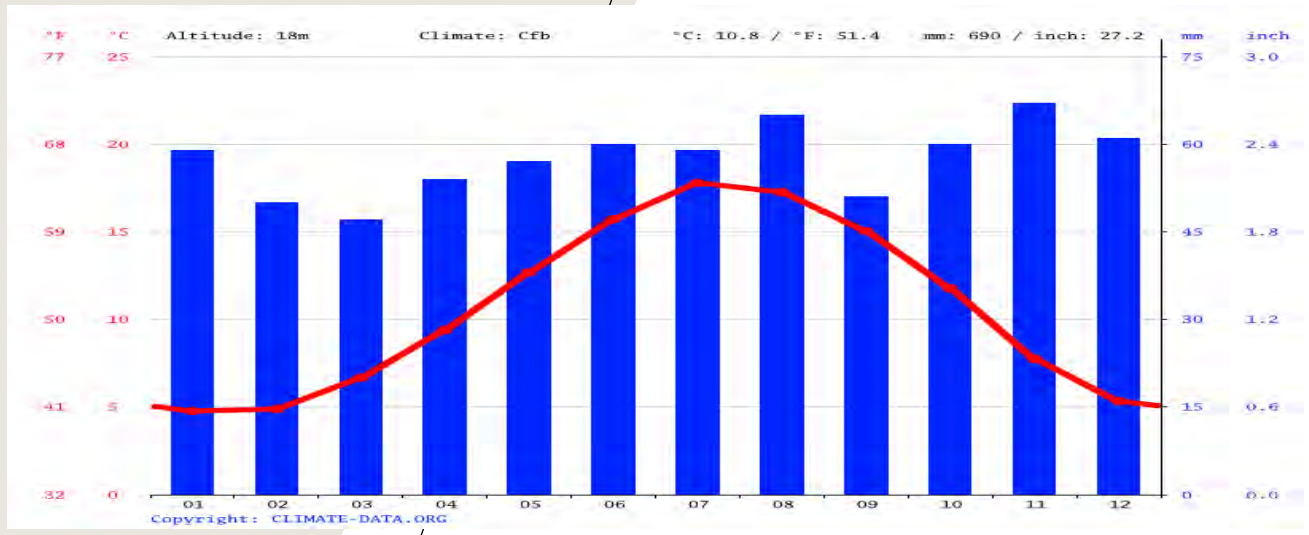
Latitude: **51.51 degrees North**
Heating Days: **4638.9 °F** base temp. 65° F
Cooling Days: **180.5 °F** base temp. 65° F

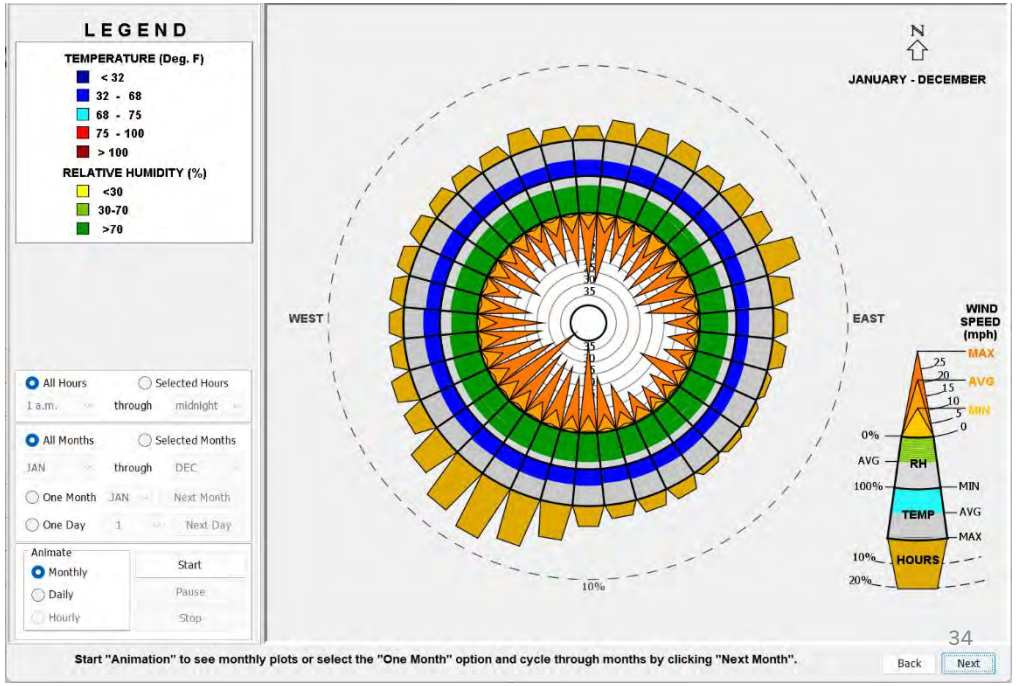
	Solar Angles: Noon	**Length of Day**
June 21	62.2°	16h 38 m
March/Sept 21	38.7°	12h 15m
December 21	15.2°	7h 50m

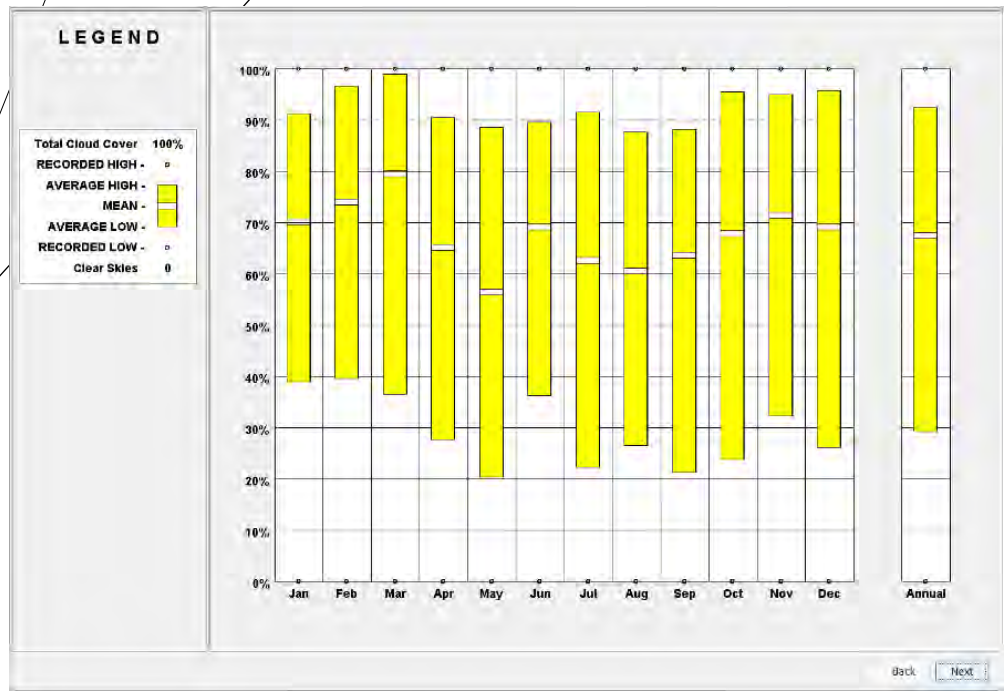
CLIMATE PROFILE

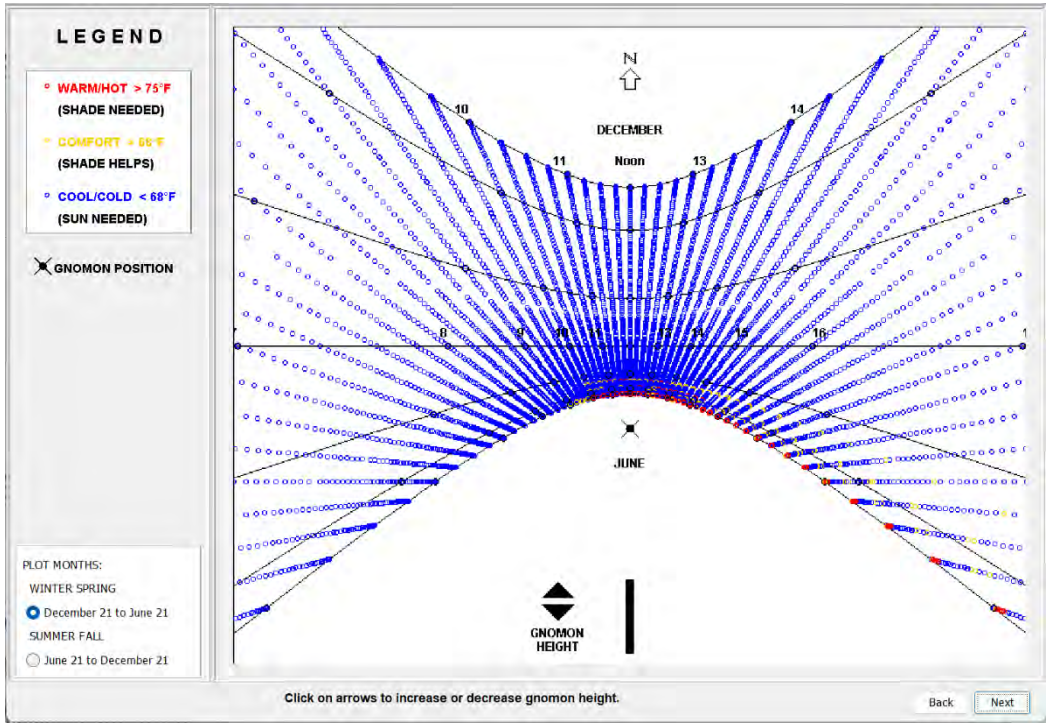


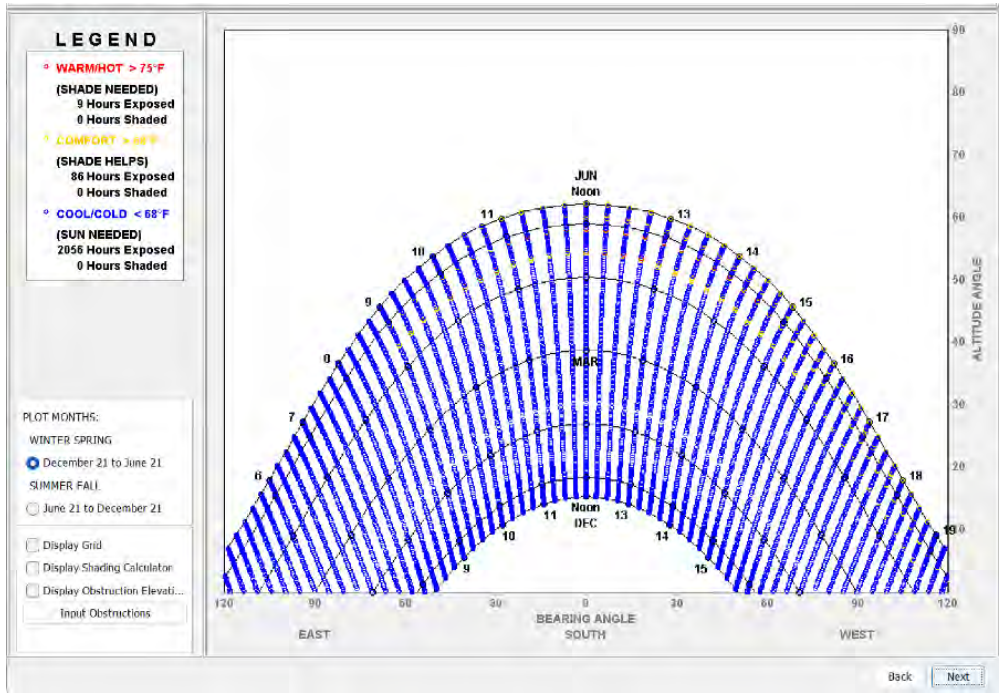


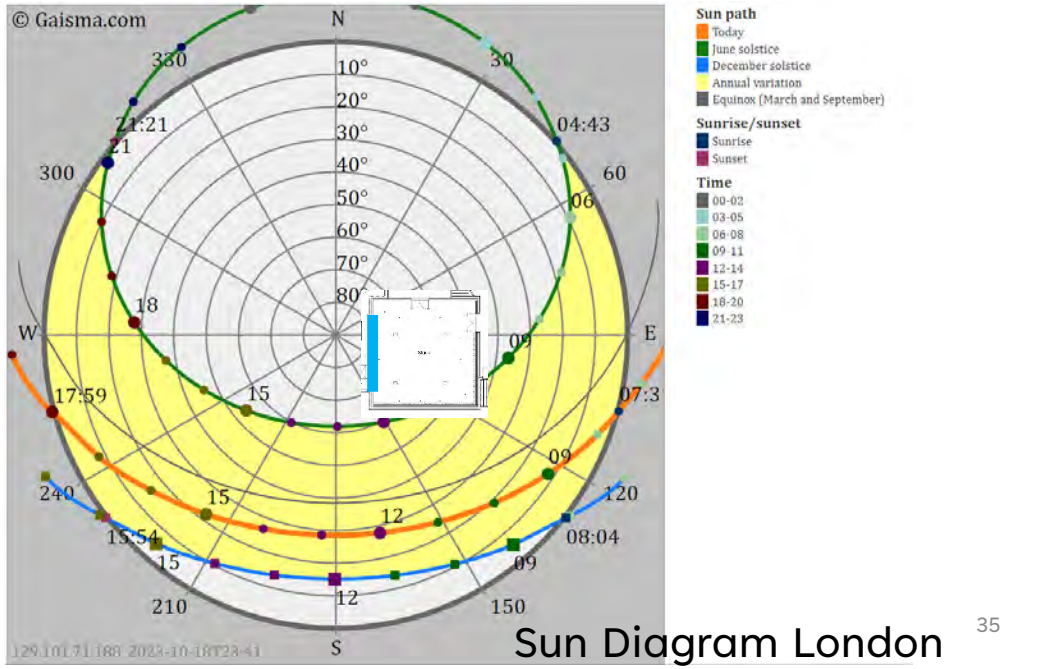












Sun Diagram London

LIGHTING ANALYSIS

- Existing Physical Model
- Existing Digital Lighting Model
- Remodeled Digital Lighting Model
- Remodeled Physical Model
- Analysis

PHYSICAL MODEL

(SUNNY MIDDAY- NOV 9)

LOOKING WEST

LOOKING NORTH

LOOKING EAST

LOOKING SOUTH

PHYSICAL MODEL

(NATURALLY LIGHTED ARTIFICIAL SKY)

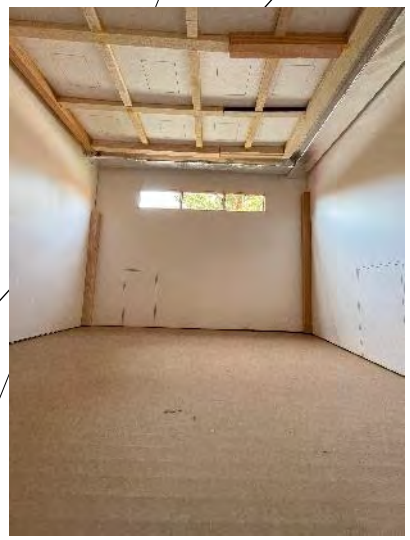
LOOKING WEST

LOOKING NORTH

LOOKING EAST

LOOKING SOUTH

SUNNY VS DIFFUSED SKY CONDITIONS












LOOKING WEST

LOOKING NORTH

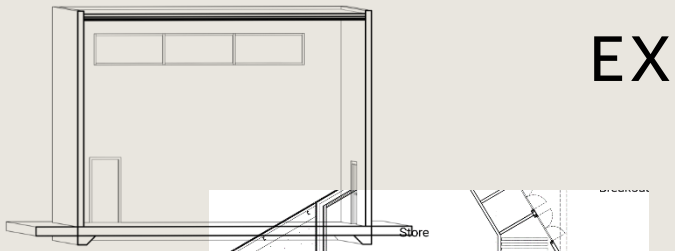
LOOKING EAST

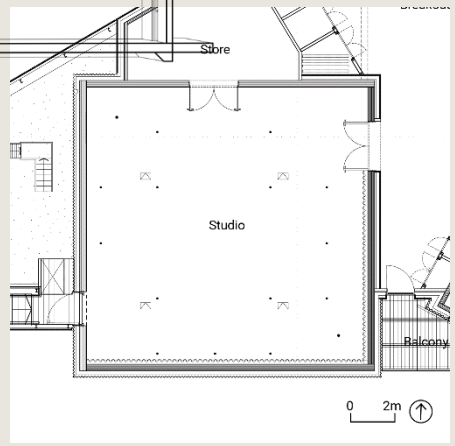
LOOKING SOUTH

NORTHWEST

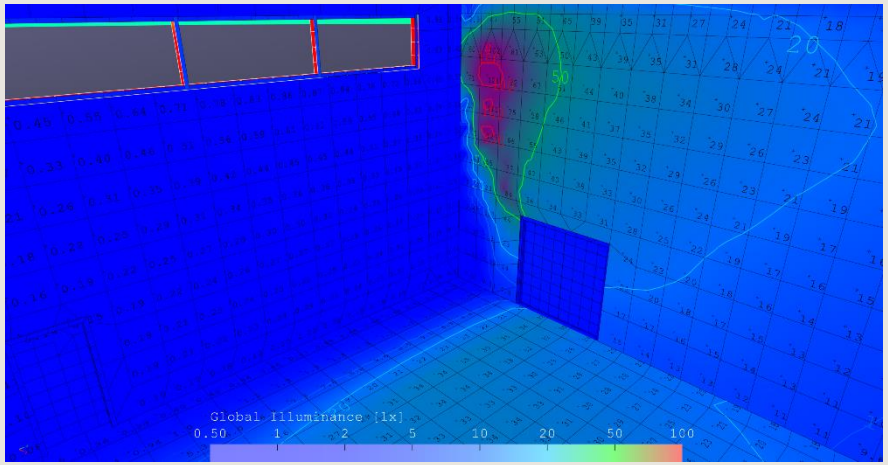
SOUTHEAST/
NORTHEAST

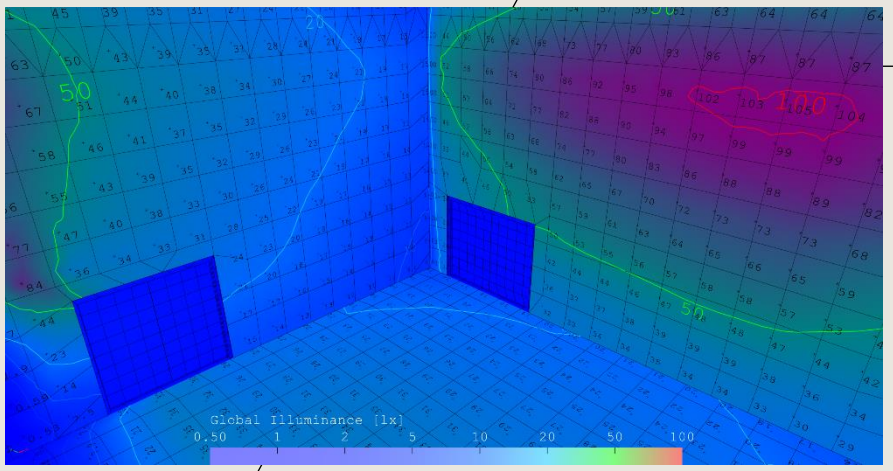
EXISTING DIGITAL LIGHTING MODEL

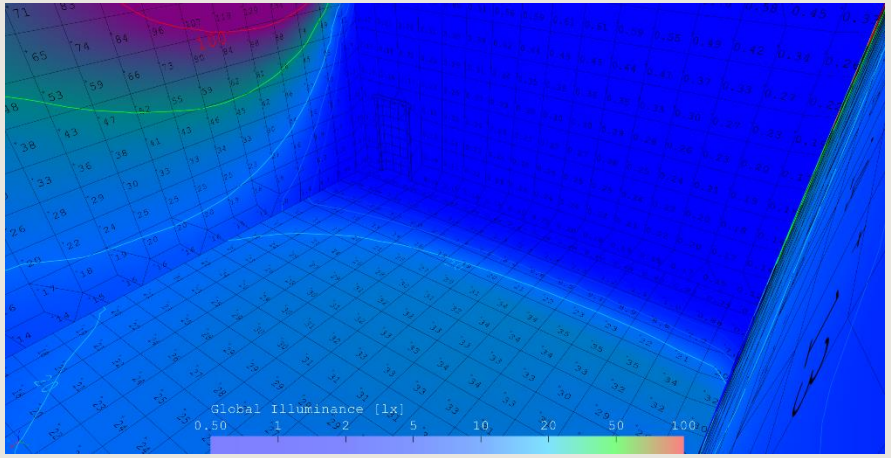


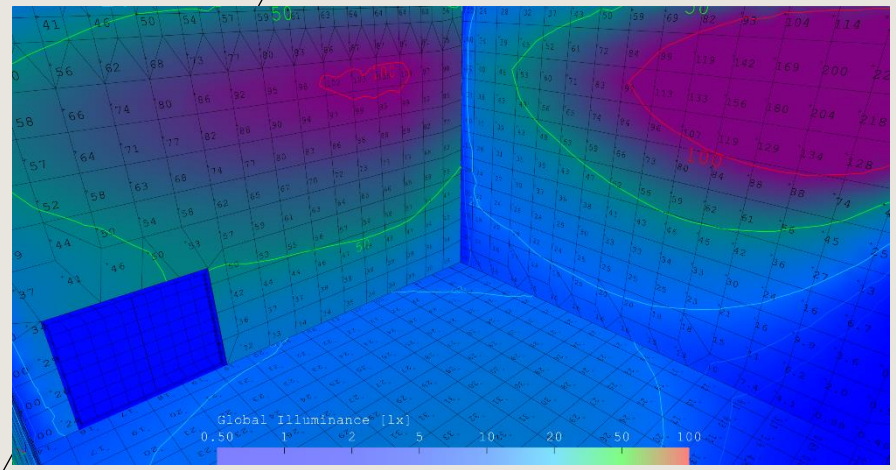


The studio is very dimly lit from the only window present on the West side. Even though the images show red as high amount of light, it is only 100 lux- maximum lighting reaching to 220 lux. Most of the area has about 50 lux which is not enough for most works. 150 –200 lux is good for household activities and 300-500 lux for offices and focused activities.









EXISTING DIGITAL LIGHTING MODEL

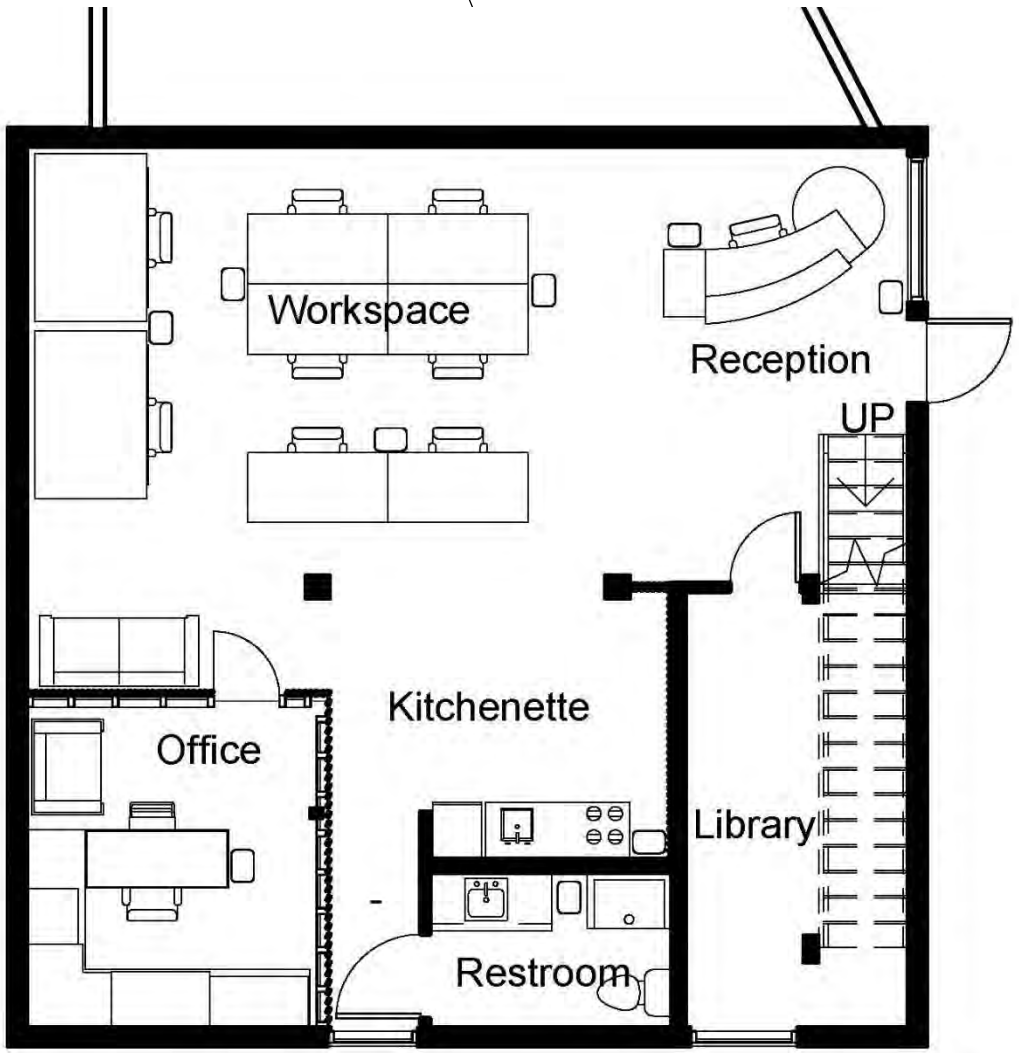
LOOKING NORTH

LOOKING EAST

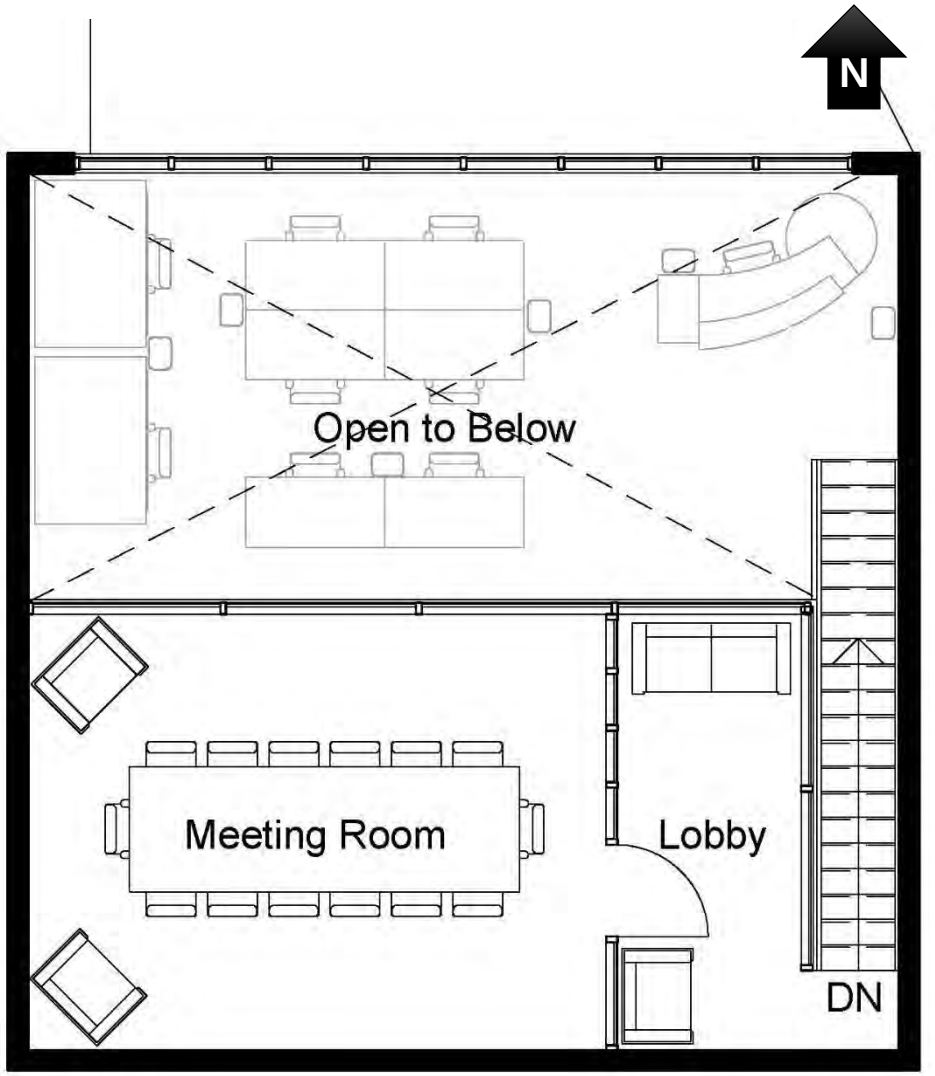
LOOKING SOUTH

LOOKING WEST

NEW USE- ARCHITECT'S OFFICE



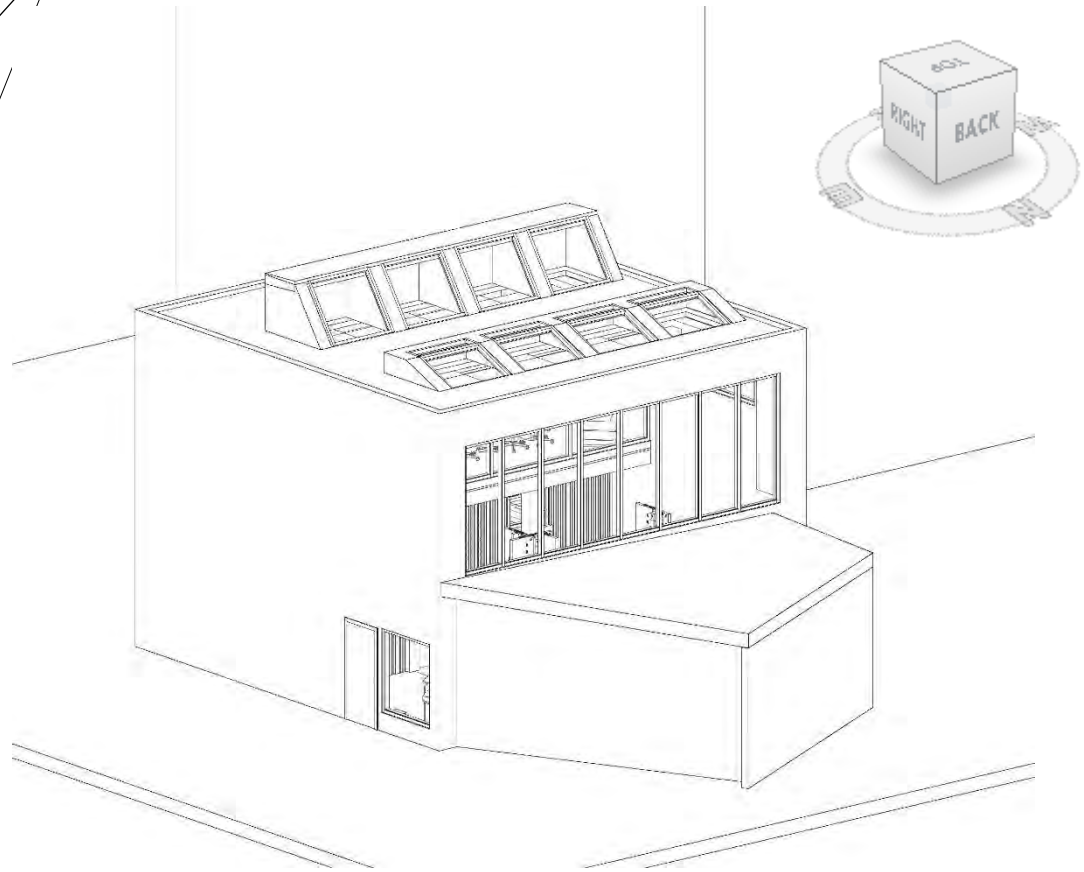
Level 1

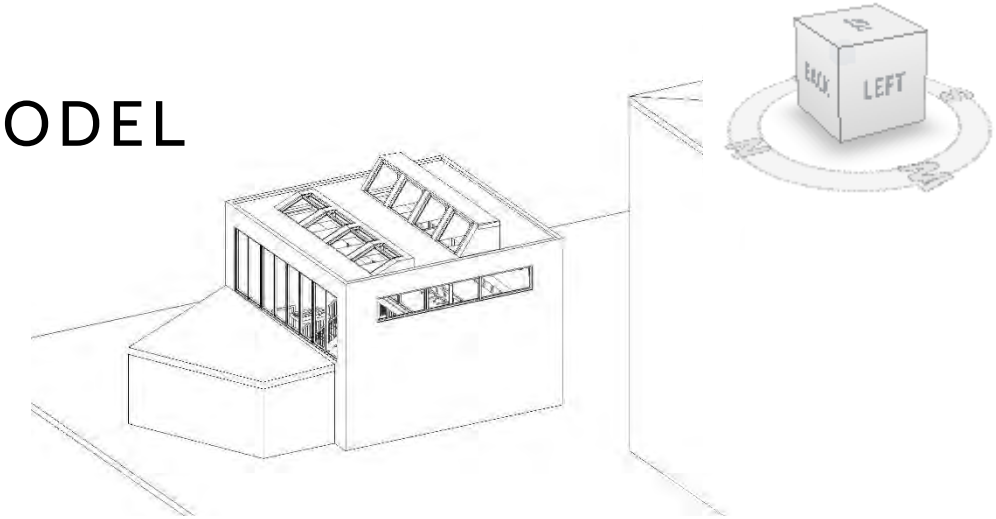


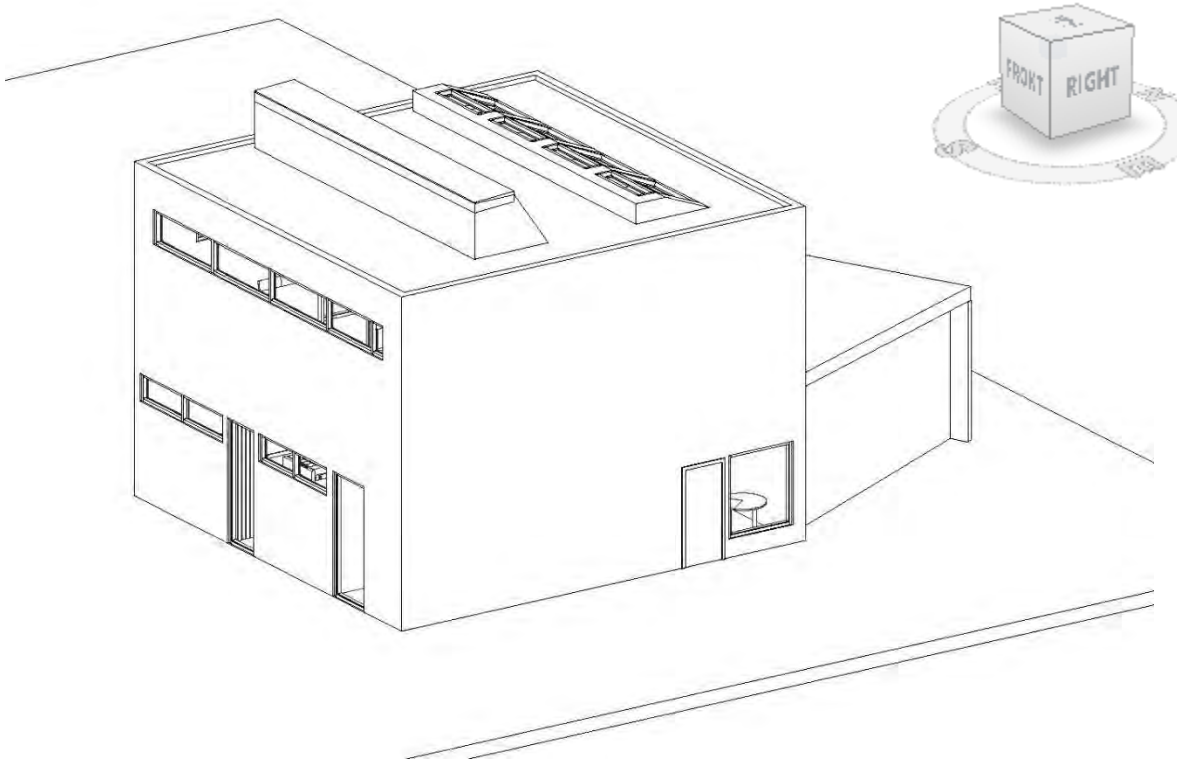
Mezzanine

REVISED DIGITAL MODEL

Large window on North
North facing angled skylights
Smaller windows on South
Window on East by the entry door
Existing window on West

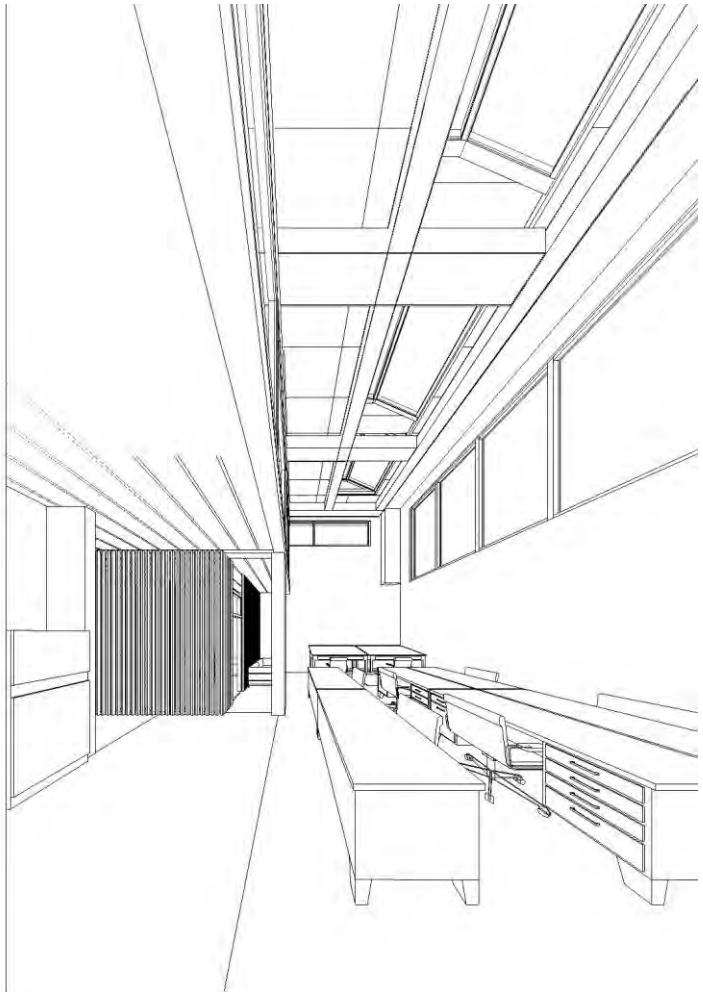




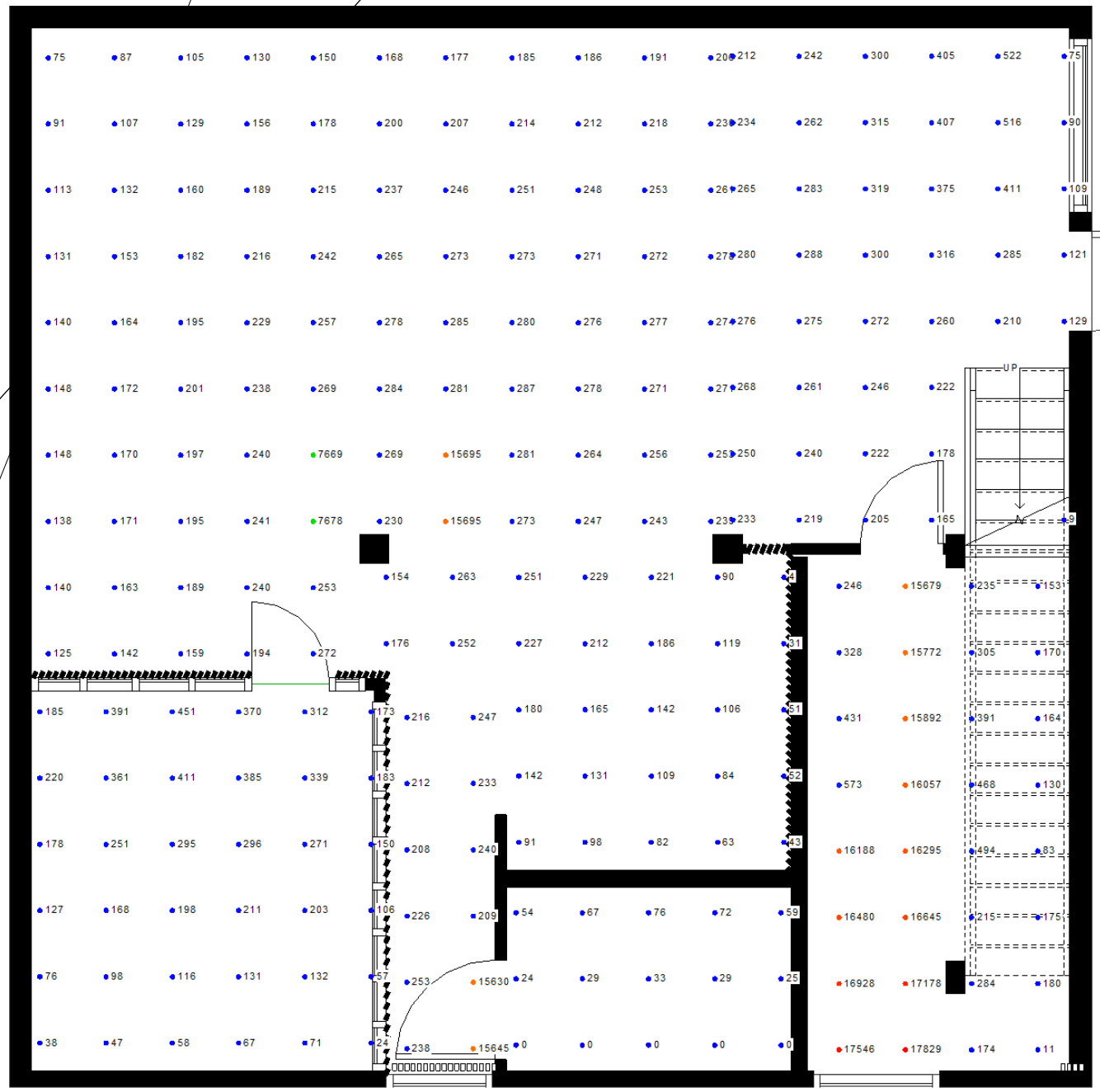


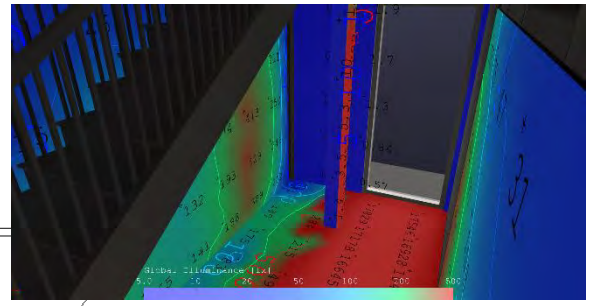
DIGITAL MODEL- VIEWS

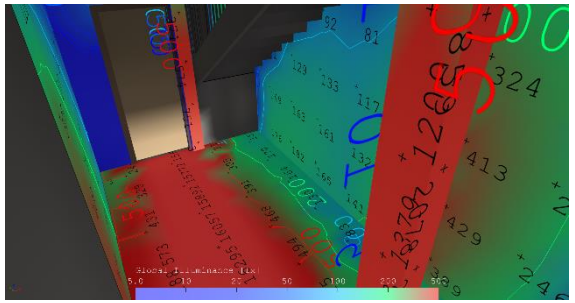
From entry door

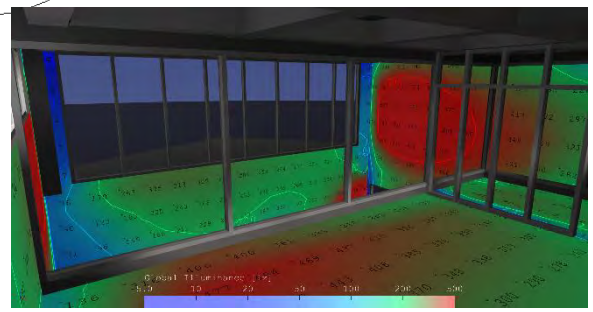


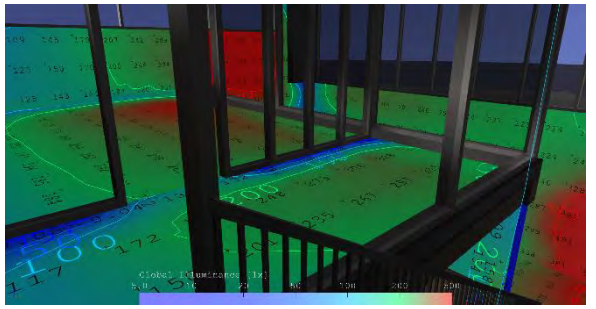
Looking west towards workspaces

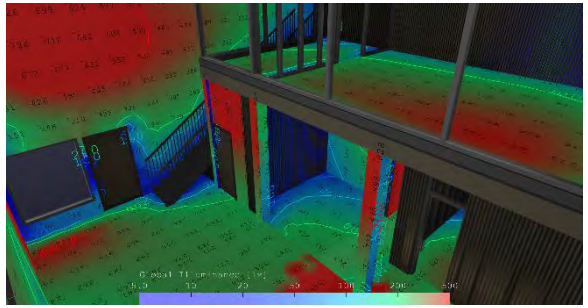

UP

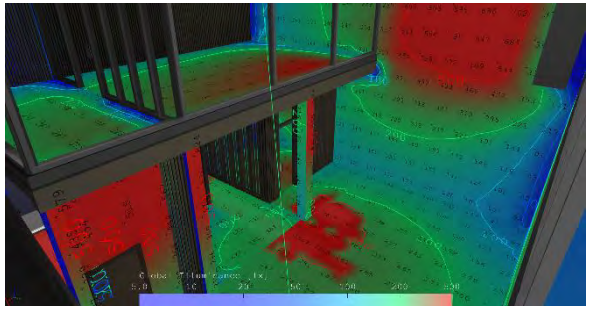




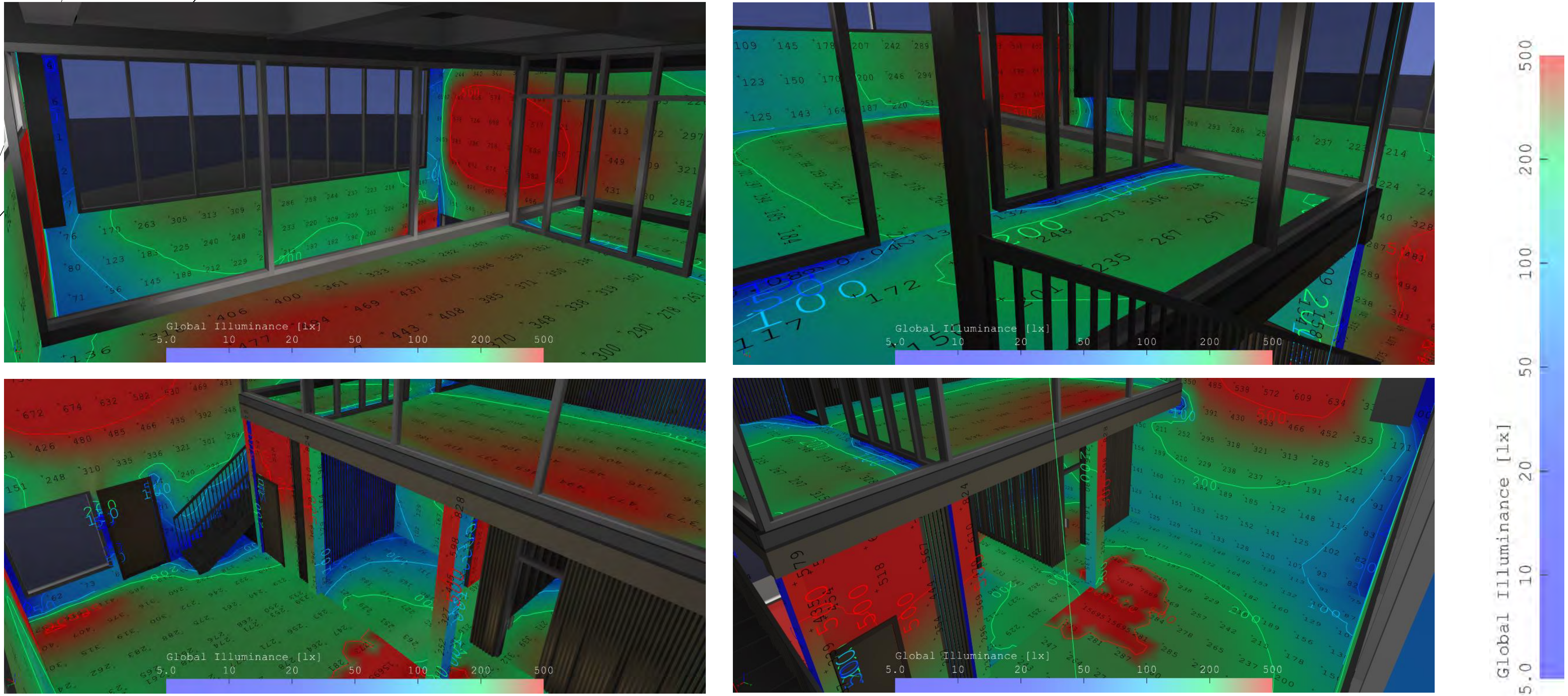








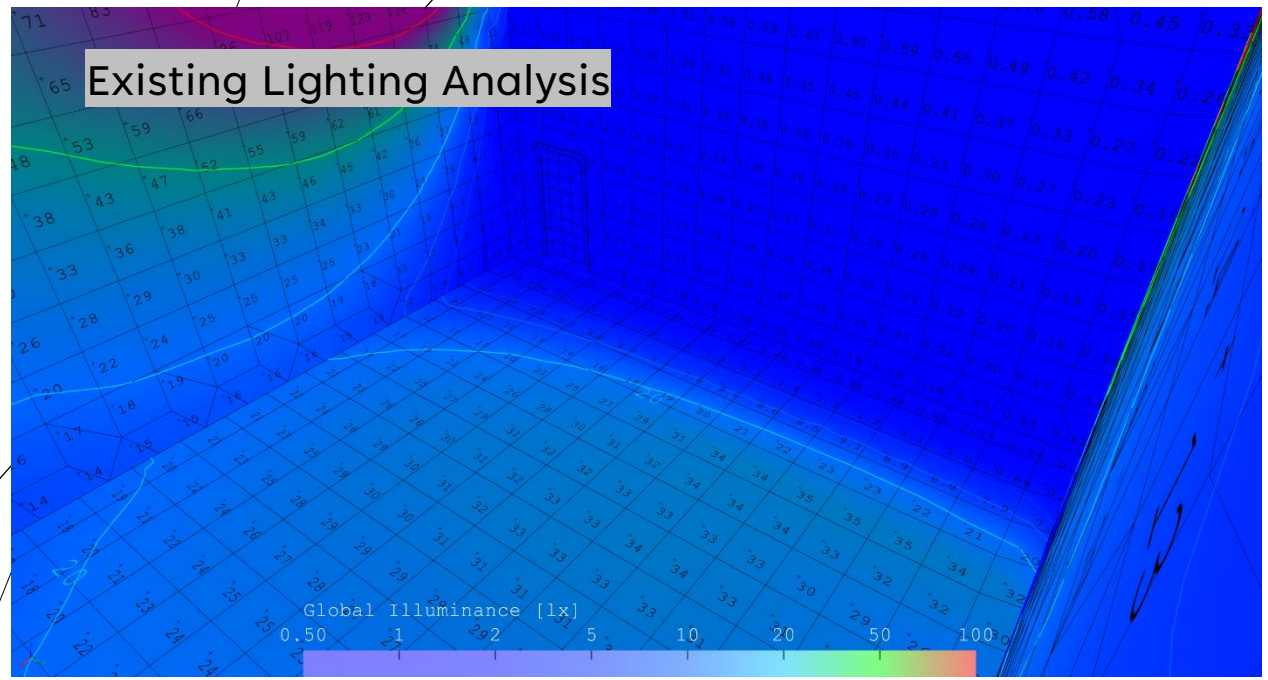

Global Illuminance [lx]
5.0
10
20
50
100
200
500

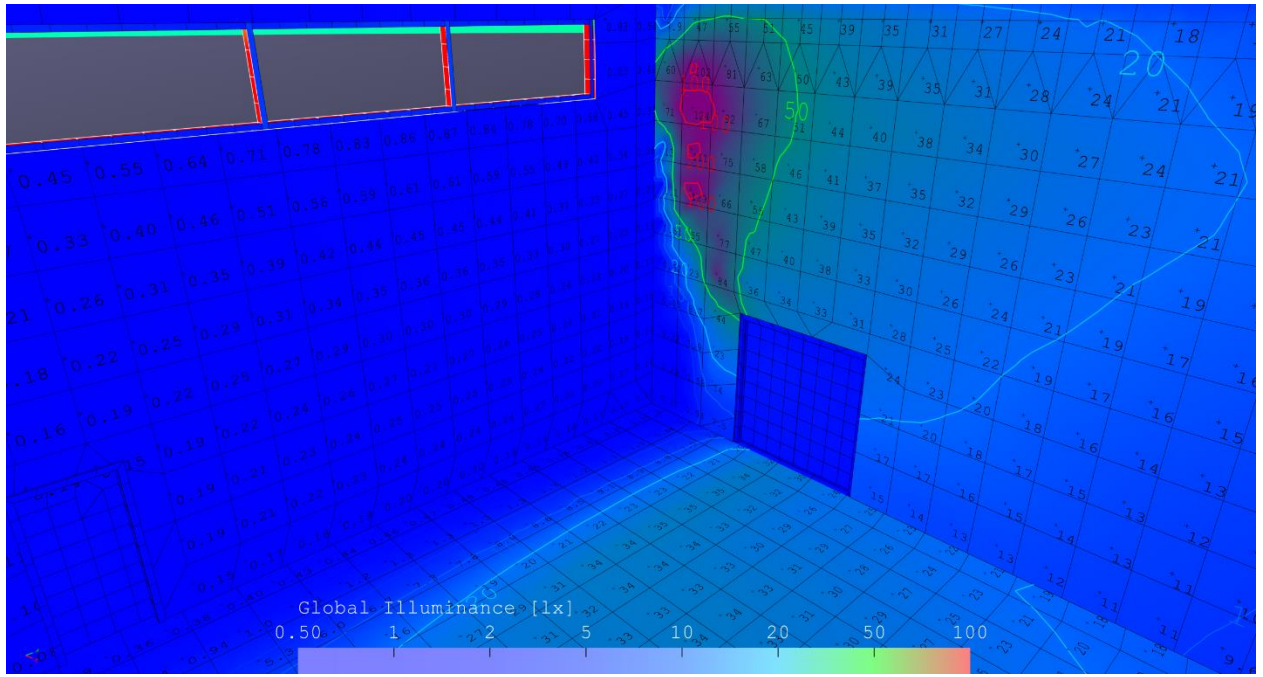


Remodeling for the new architect's office we need a lot of daylighting into the space. We had about 50 lux average. With the addition of windows and skylight we have around 200 lux at workstation spaces for the architects. The meeting room is well-lit with 300-400 lux.

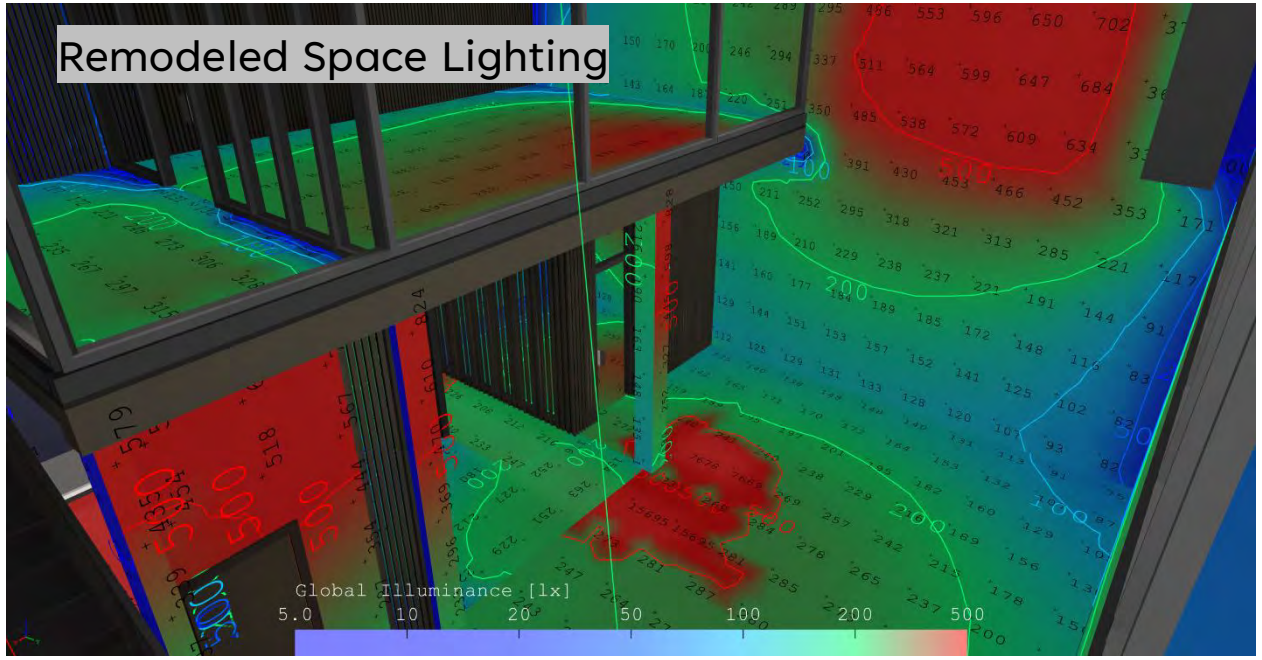
Most of the spaces have adequate light for working. Library and principal's office get light from the South windows. We have a little glare from the NW summer sun on the higher walls. The angled North skylight is angled to avoid the direct sun. Overall, the lighting is well.

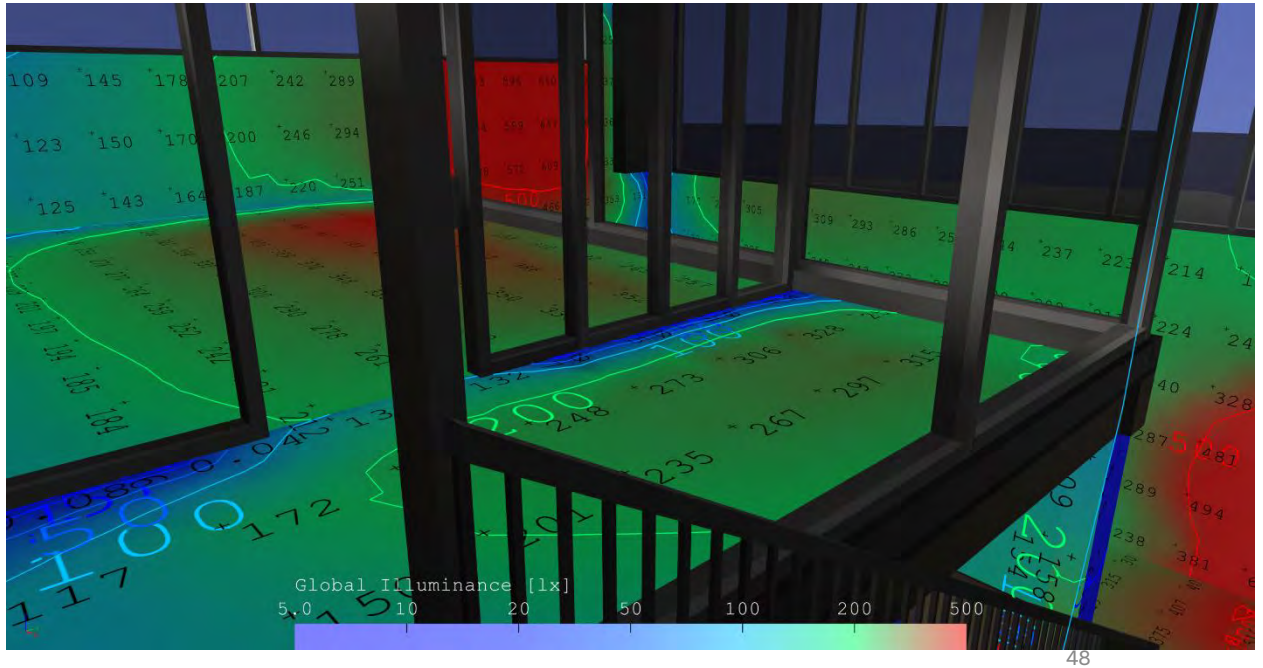
Existing Lighting Analysis



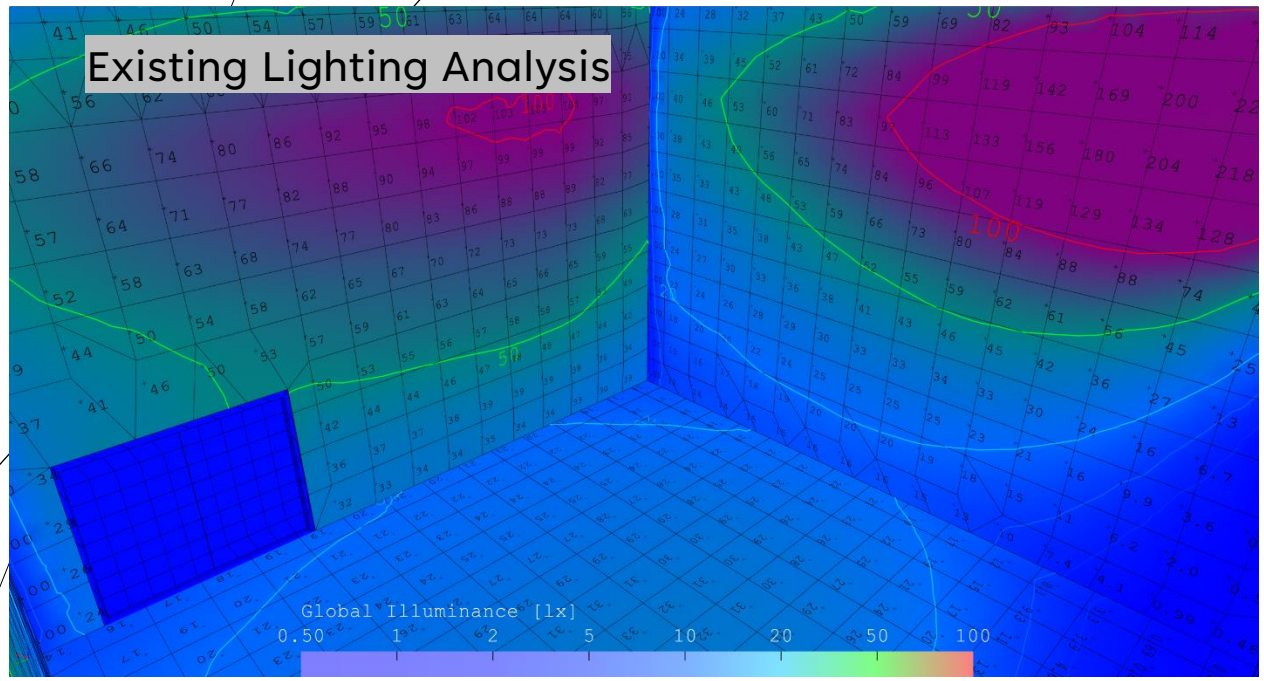


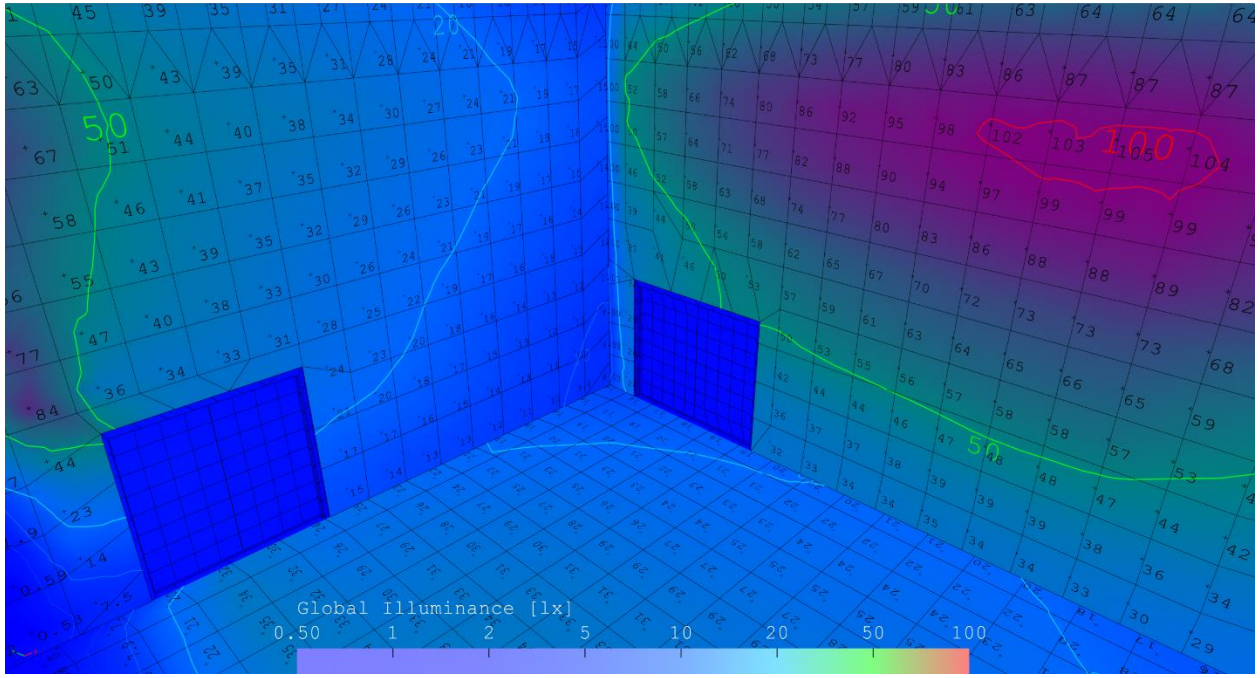
Remodeled Space Lighting



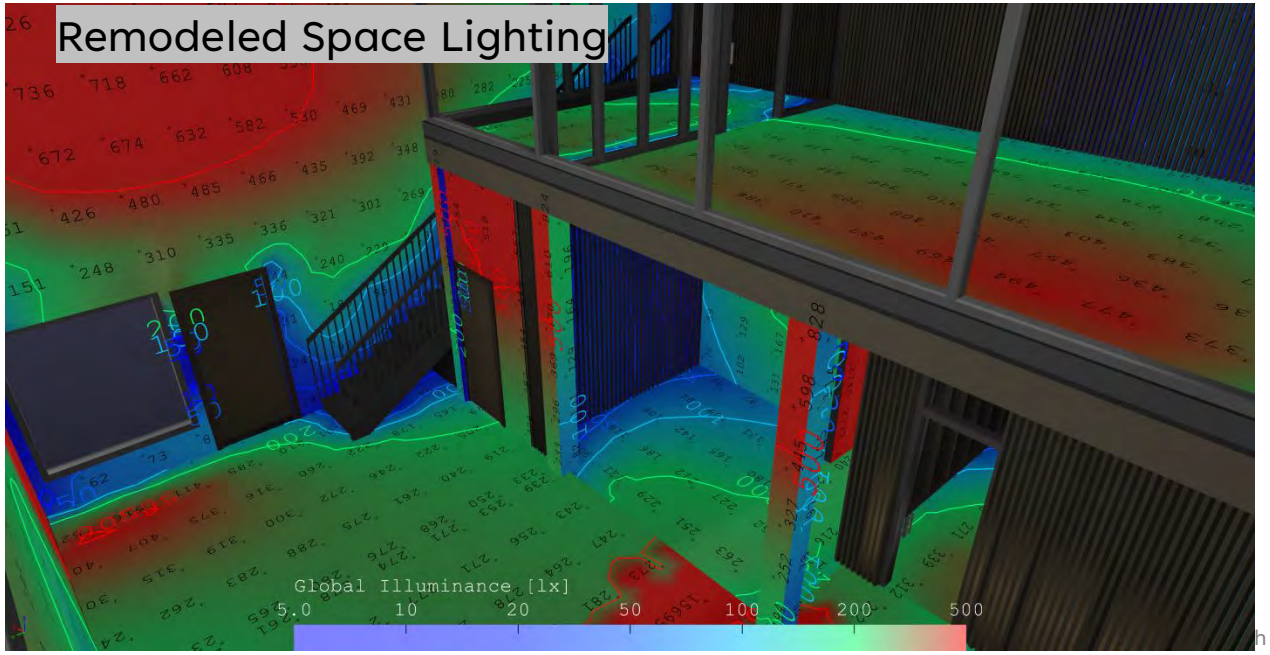


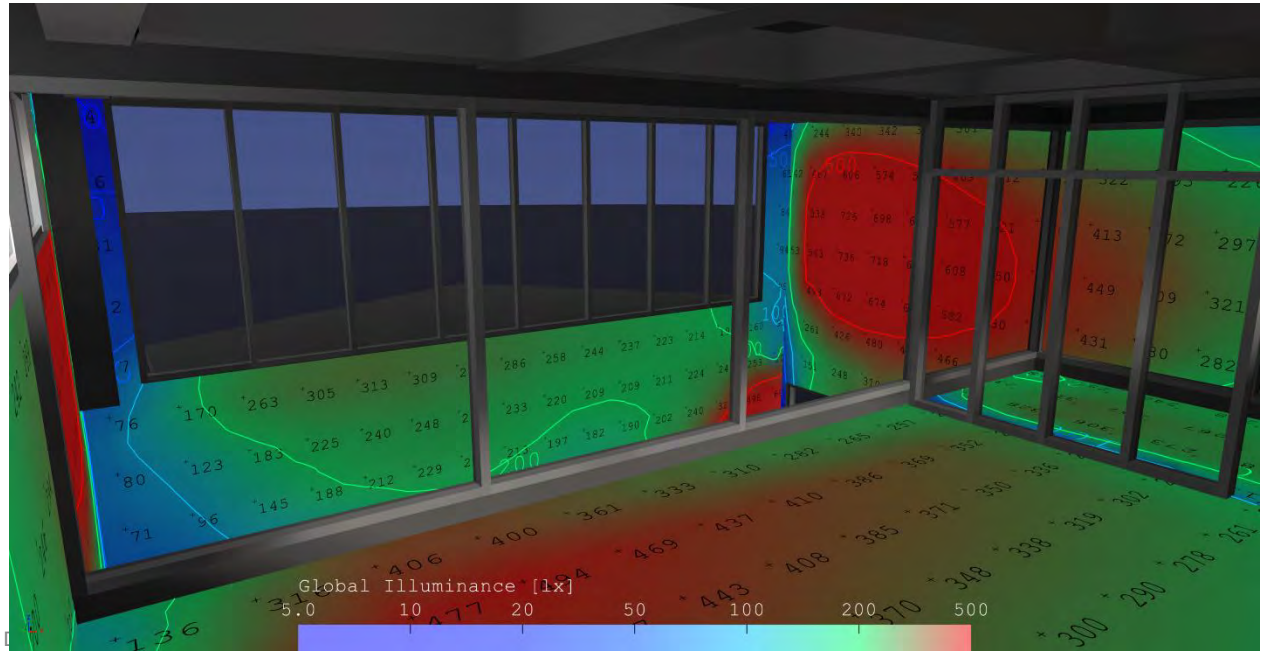
Existing Lighting Analysis





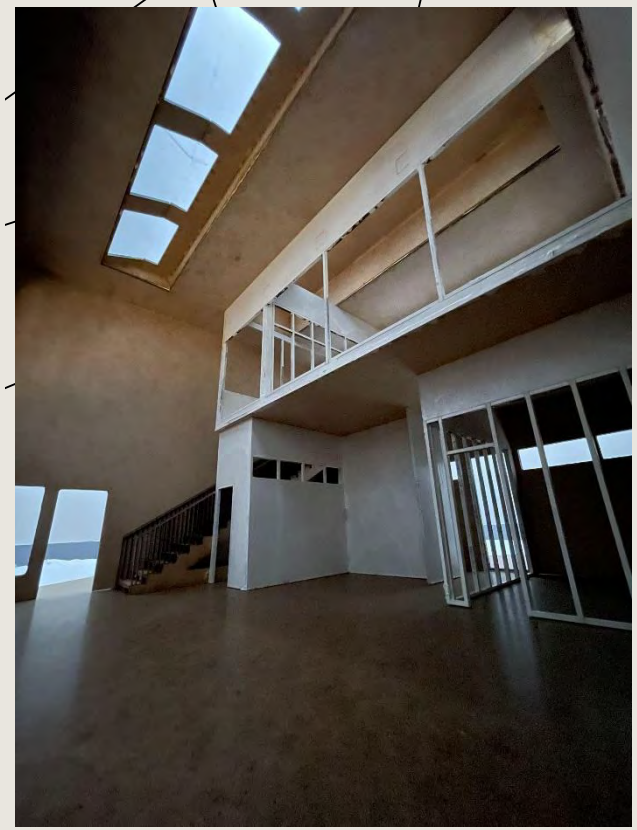
Remodeled Space Lighting



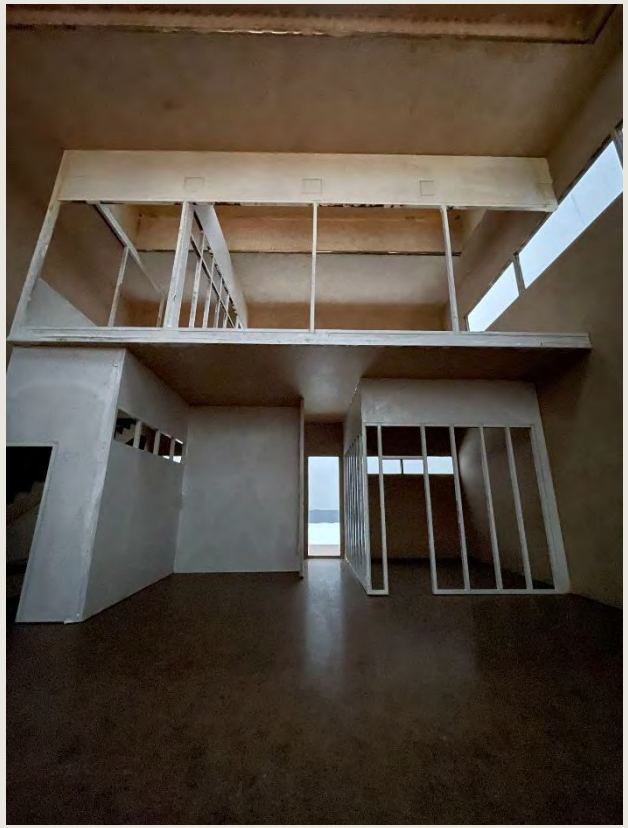


REMODELED PHYSICAL MODEL

(NATURALLY LIGHTED ARTIFICIAL SKY)

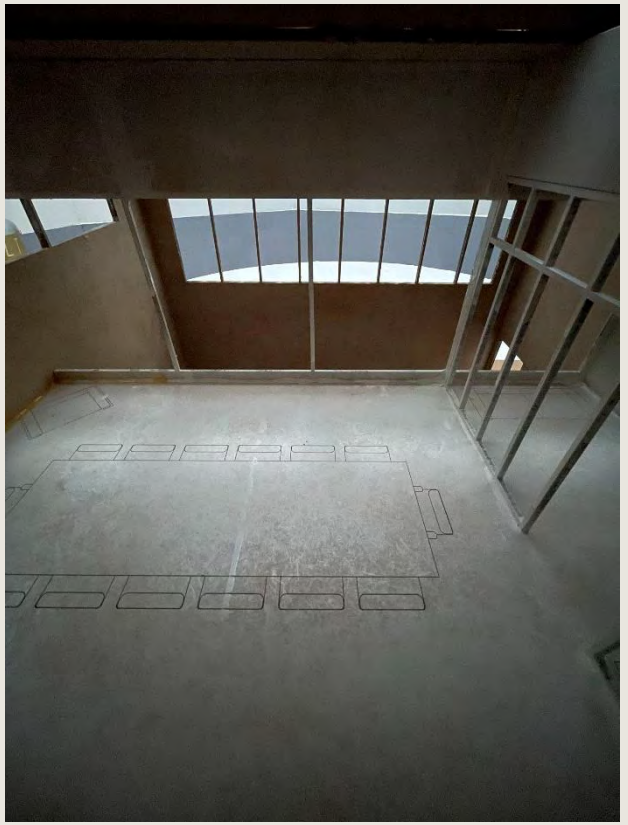


LOOKING SOUTHEAST



LOOKING SOUTH

LOOKING EAST



LOOKING NORTH FROM MEZZENINE

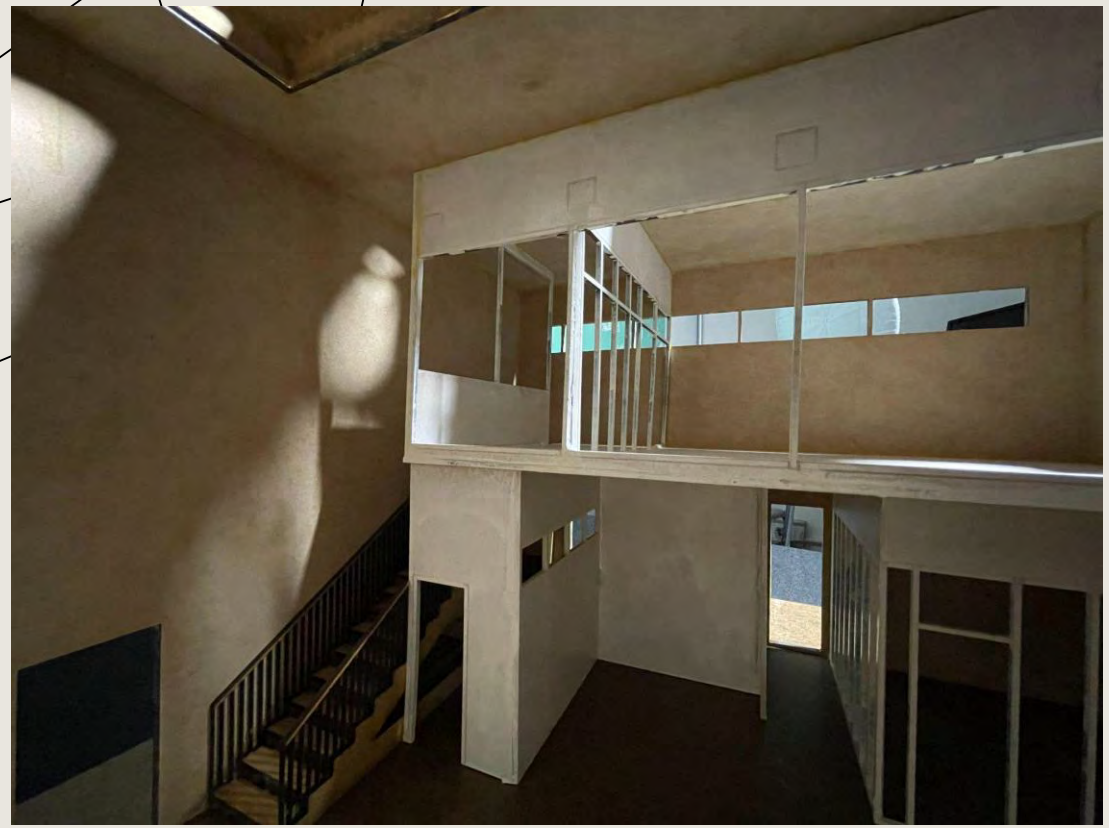
REMODELED PHYSICAL MODEL
(NATURALLY LIGHTED ARTIFICIAL SKY)

LOOKING SOUTHWEST

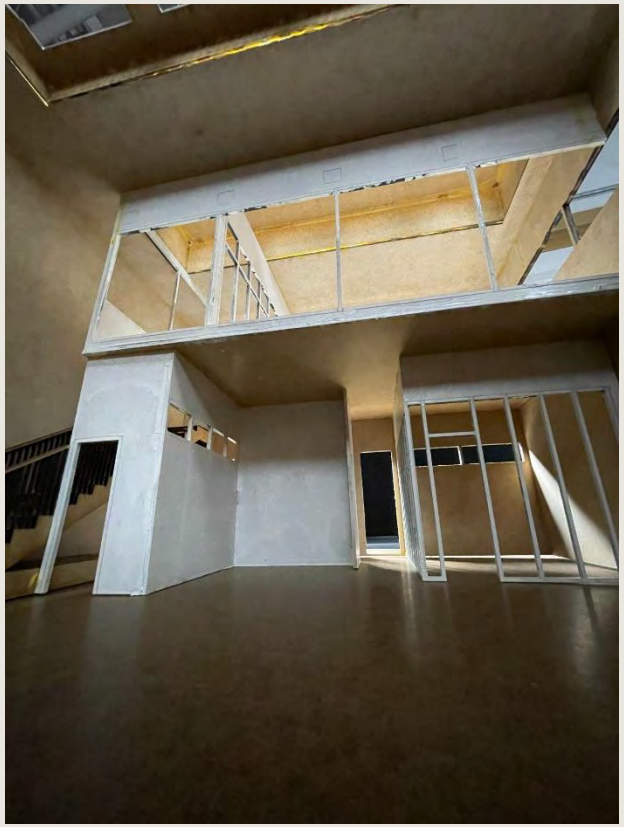
MEZZENINE

LOOKING NORTH FROM RESTROOM

REMODELED PHYSICAL MODEL
(SPOTLIGHT AS VIRTUAL SUN)



LOOKING SOUTHEAST



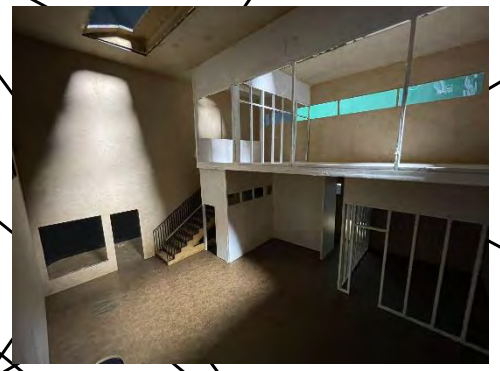
LOOKING SOUTH

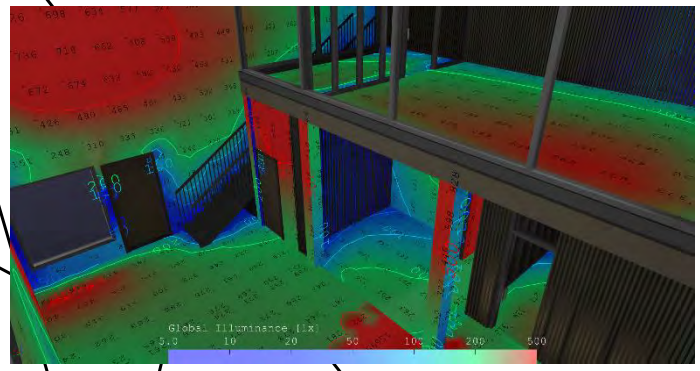
LOOKING NORTH FROM MEZZENINE

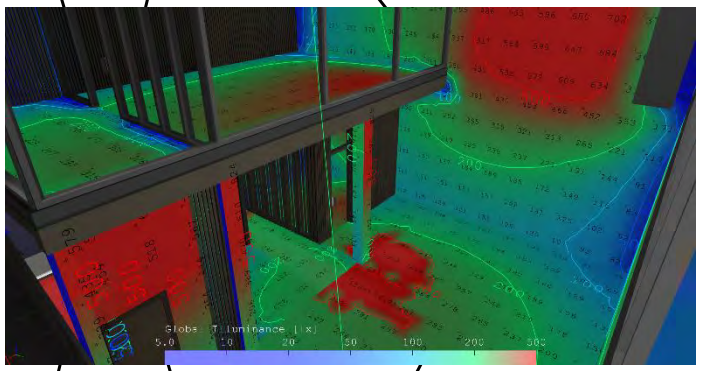
REMODELED PHYSICAL MODEL
(SPOTLIGHT AS VIRTUAL SUN)

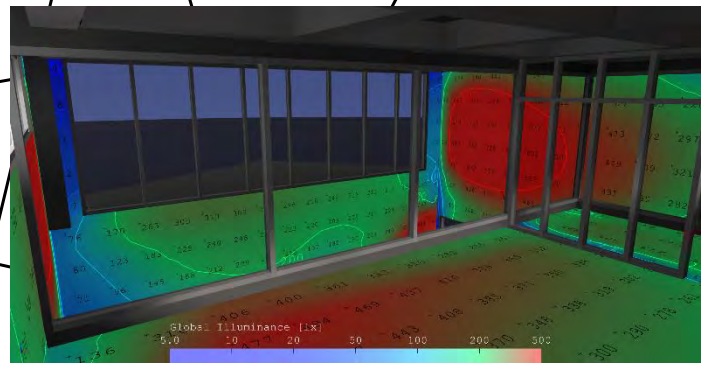
SUN AT WEST

SUN AT WEST









Lighting Analysis – 12-04-2023

Errors:

-Human error is involved when we are using electric lighting to simulate the sun, and this can cause skewed results.

-Camera error can make spaces look darker or brighter depending on aperture/iso/shutter speed

Differences:

-From initial findings we can see that the light isn't being distributed as evenly in the physical model as it is in the digital model.

-Physical Models seem to have different lighting scenarios as one is actual being lit from the sun rather than a spotlight

Similar:

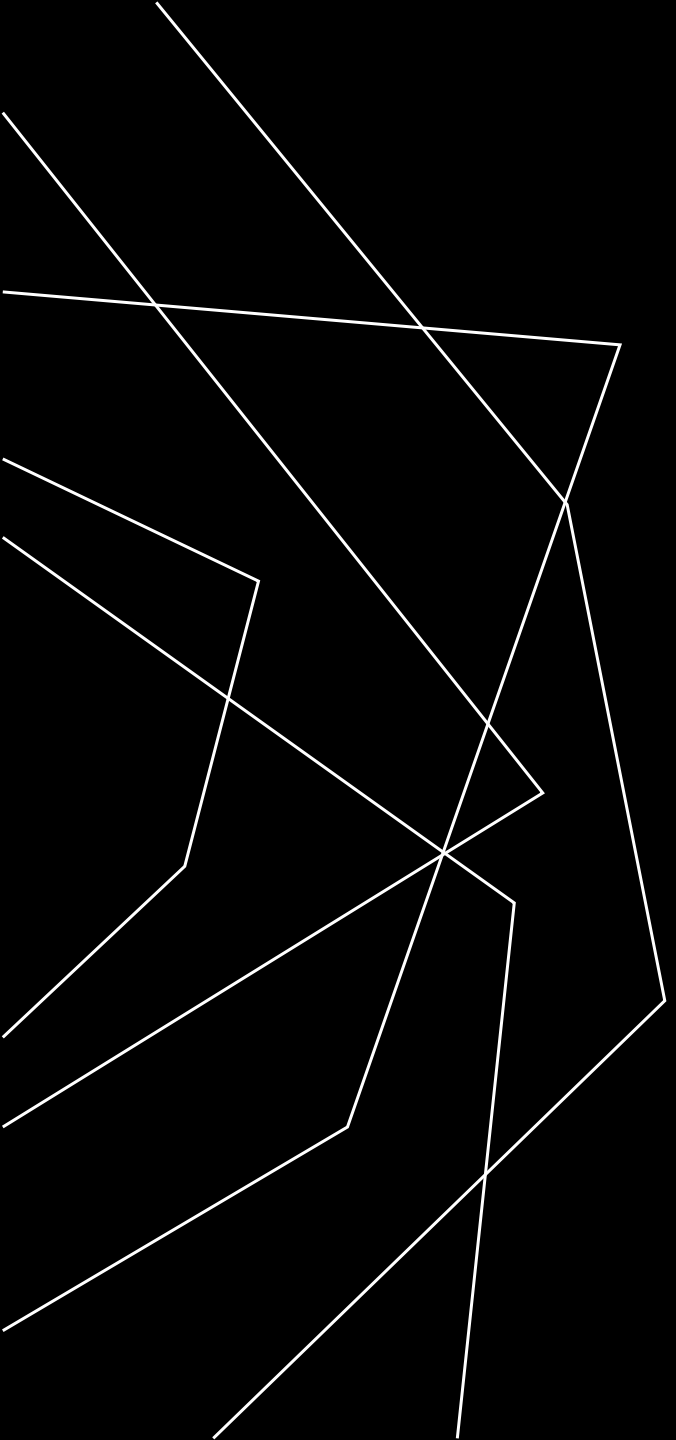
-We can see that the digital and physical model both share the same experience of extreme light along the walls and floor areas.

CONCLUSION

Analyzing a built space for its Natural lighting through a physical and digital model was a good exercise as the spaces we chose were not accessible due to the distance. Using AGI32 for lighting analysis helped a lot to understand the nature of Natural daylight.

Remodeling the space for a new use expanded the idea from understanding into implementation. The location, surrounding and site context and the local climate affects the daylighting. Using all these we made a box with one window into a light filled architects' office.

We did get discrepancies in digital vs physical model light analysis due to difference in sun positions. We could have gotten better comparisons had we tried to position the spotlight precisely for a particular time and had digital analysis for the same.



THANK YOU

Carson Conery

Jake Alt

Shristi Tamrakar