

Metcalf Building - RISD (Built in 1915)

Program/Primary Use:

Studio- Furniture

Glass

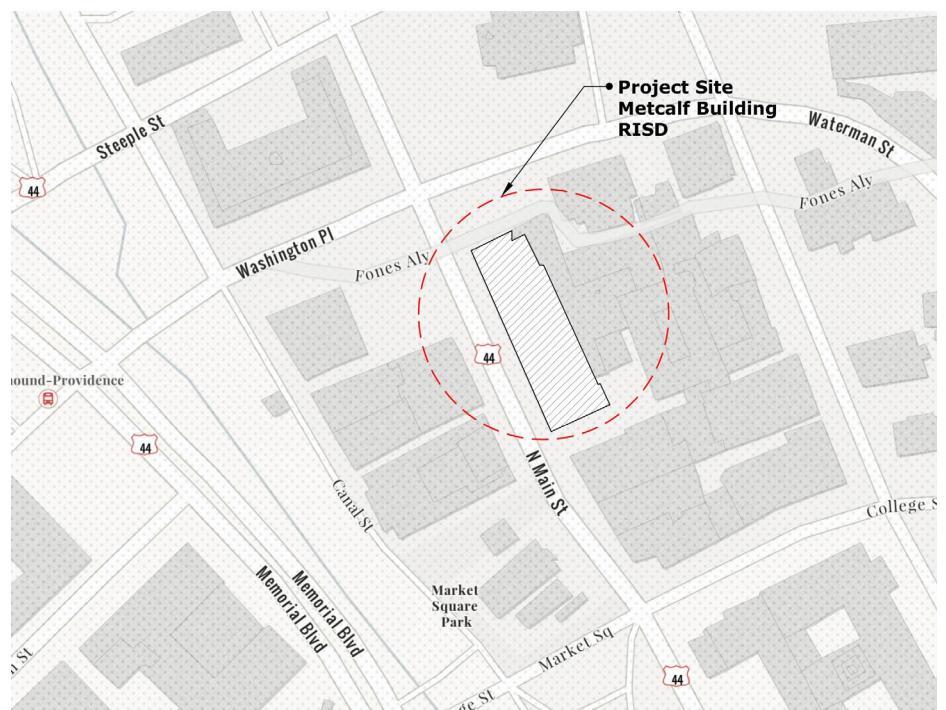
Ceramic

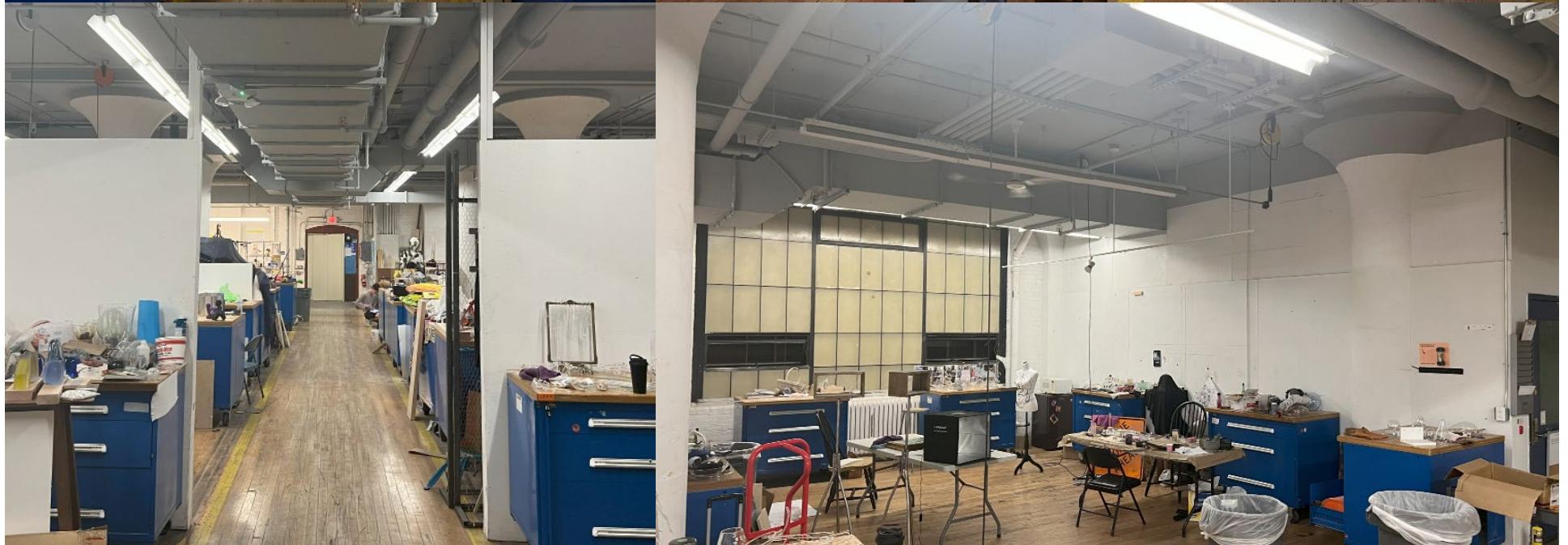
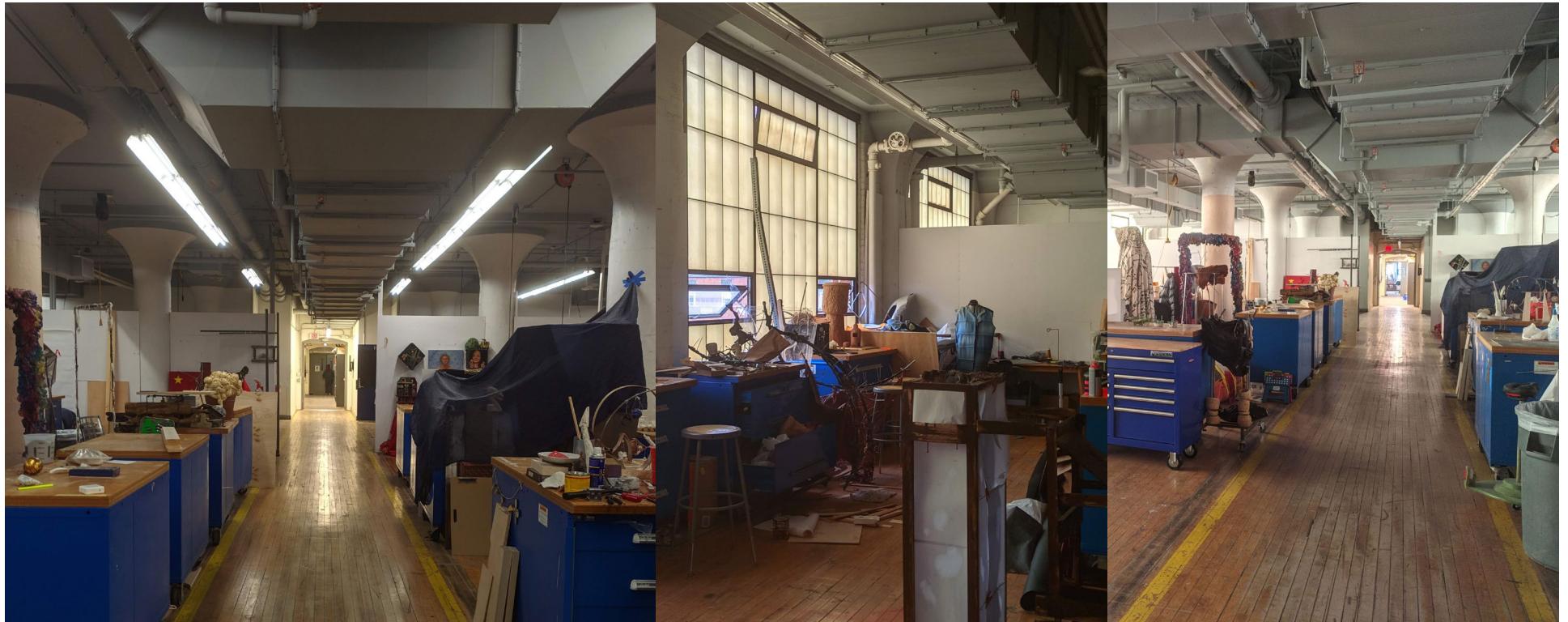
Jewelry

Sculpture

Primary Occupants:

Glass-Sculpture

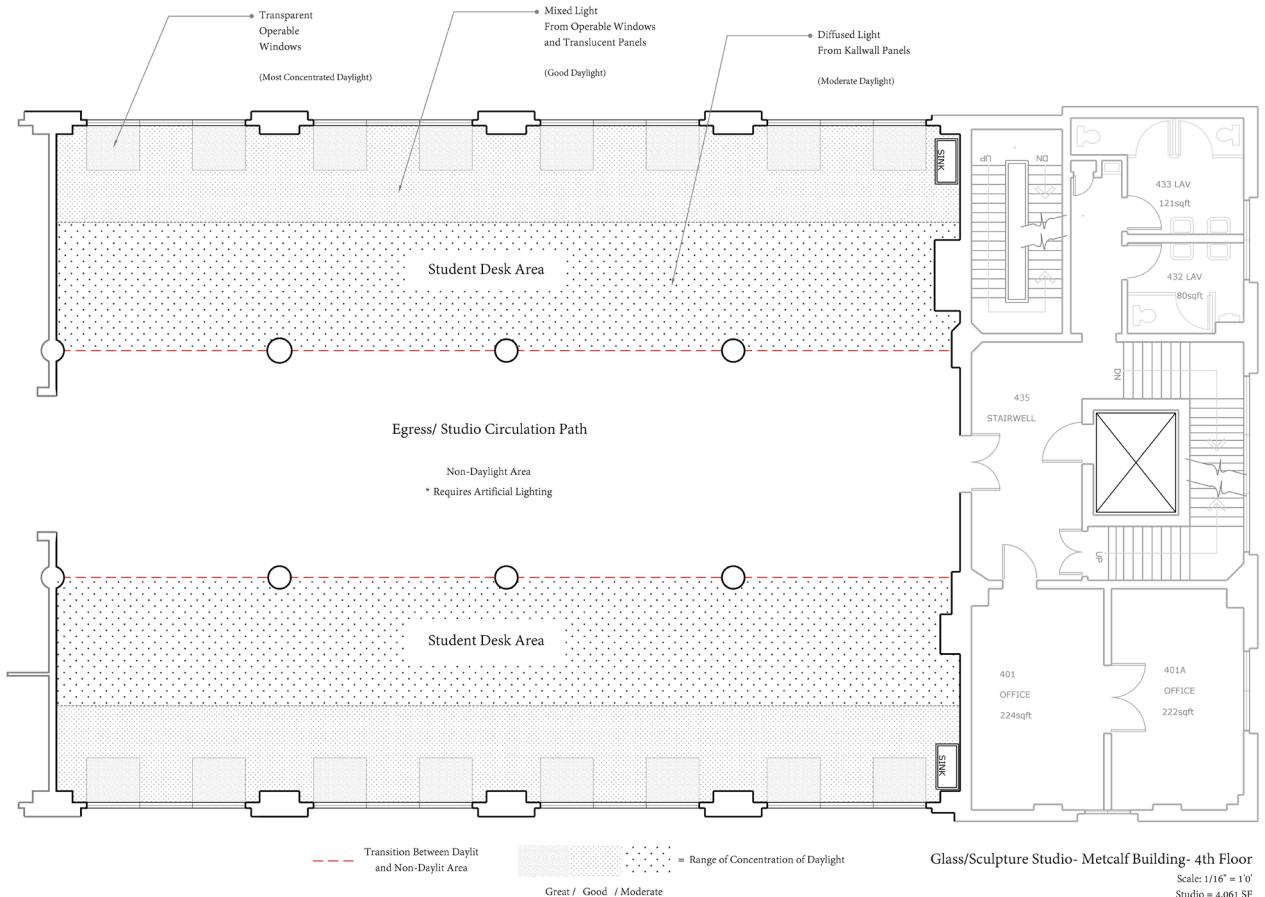




Qualitative Analysis

The 4th Floor of the Metcalf

- Daylighting Zone
 - Transparent
 - Operable Windows
- Workspace Zone
 - Mixed Light
 - Diffused Daylight
 - Kalwall Panels
- Egress Zone
 - Non-Daylight Area
 - Required Artificial Light



Daylighting Illuminance Map

Date of visit:

March 4 | 10:00 AM

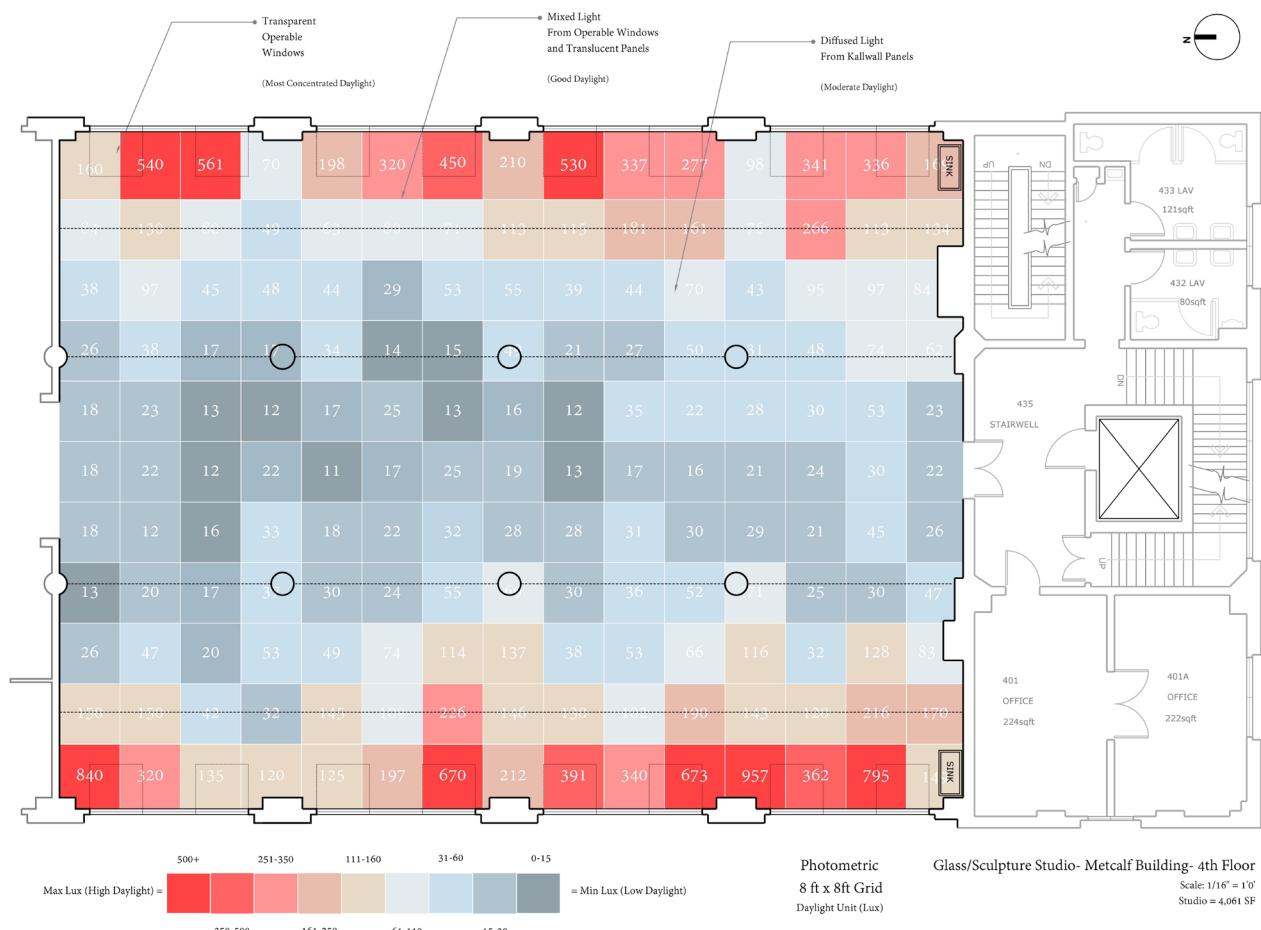
Weather or Sky condition:

March 4 | Overcast (light showers)

- Measured with a Lux Meter.

- Desks and work spaces situated near the West & East facades have high daylight exposure, as a result of the clear glazing.

- The Kalwall facade with a lower visable transmittance has a direct effect on the egress zone.



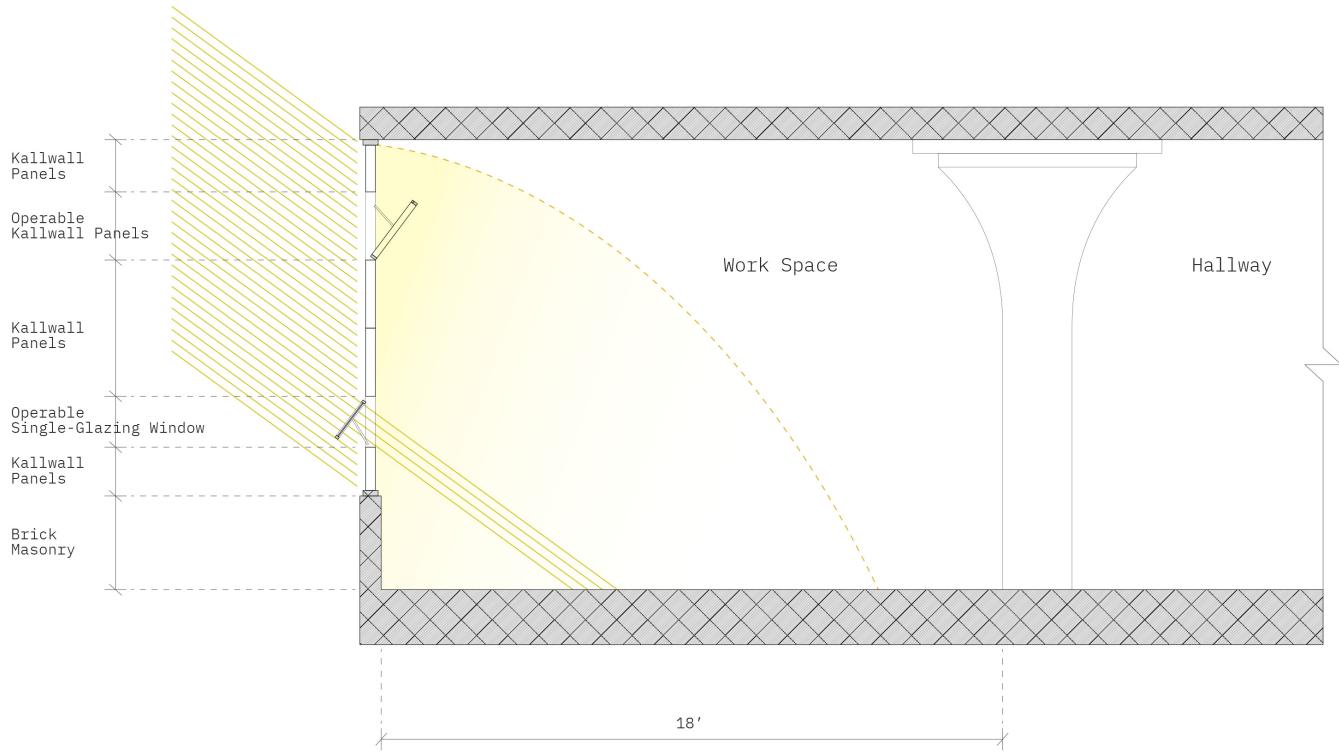
Daylighting Details

Composed of:

- Anti-Glare Kalwall panels
- Operable Kalwall windows
- Operable Clear Glaze windows

- This system allows for both direct and diffused light to enter the space

- Does not allow for a greater range in lighting to extend into the egress area.



Observations:

- * Kallwall Panels provide diffused Daylight
- * Operable single-glazing window brings direct sunlight
- * Portion that is being 'daylight' falls a little short of the first column

Daylighting Analysis

sDA 300/50% = 58.9%

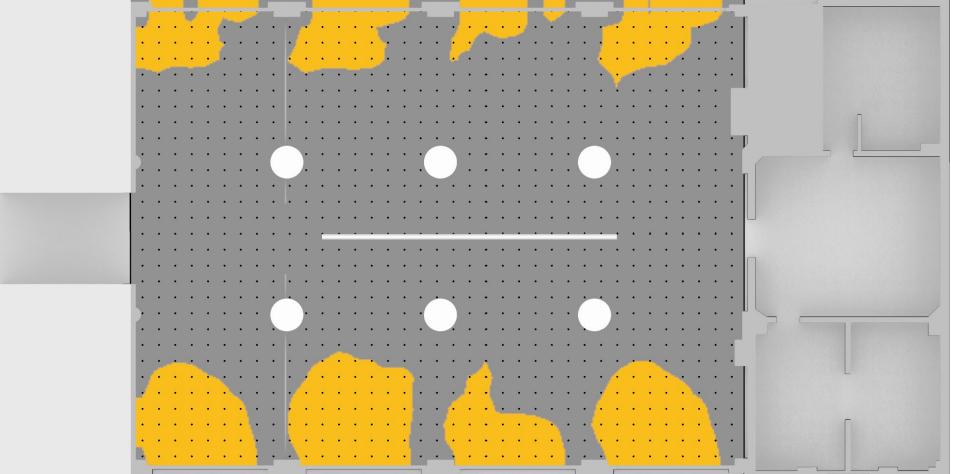
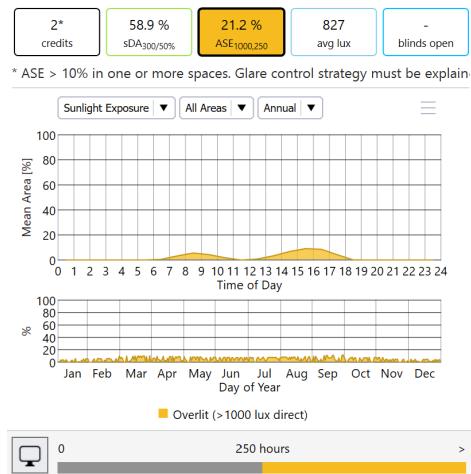
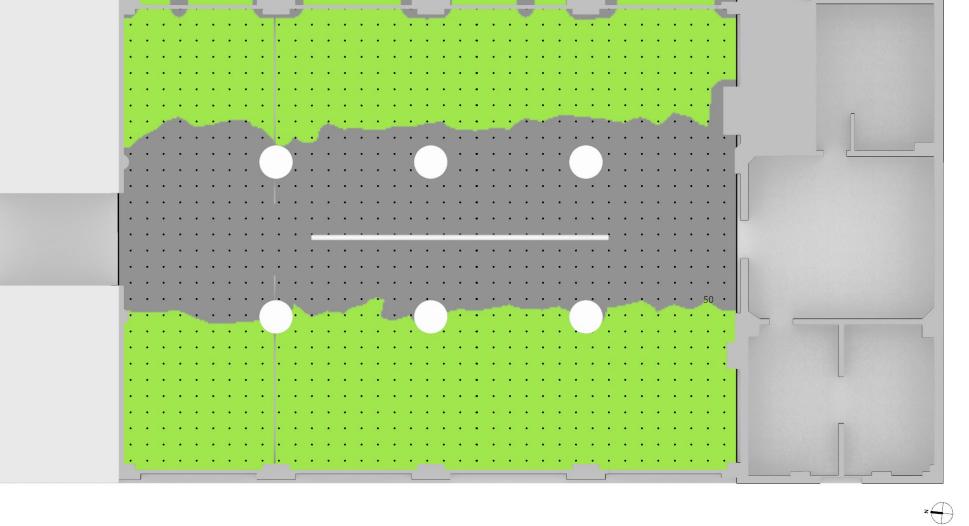
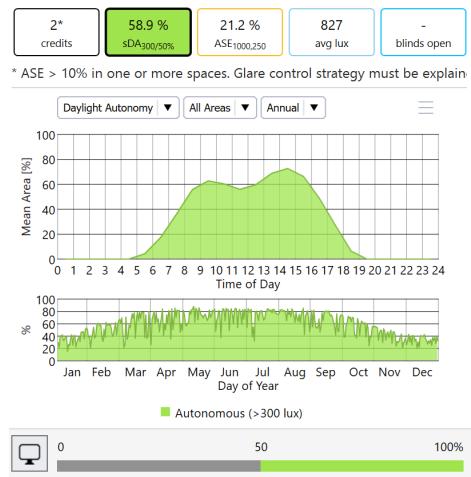
ASE 1000/250 = 21.2%

Avg. Lux = 827

- The lux range per node in winter is about 20-60%

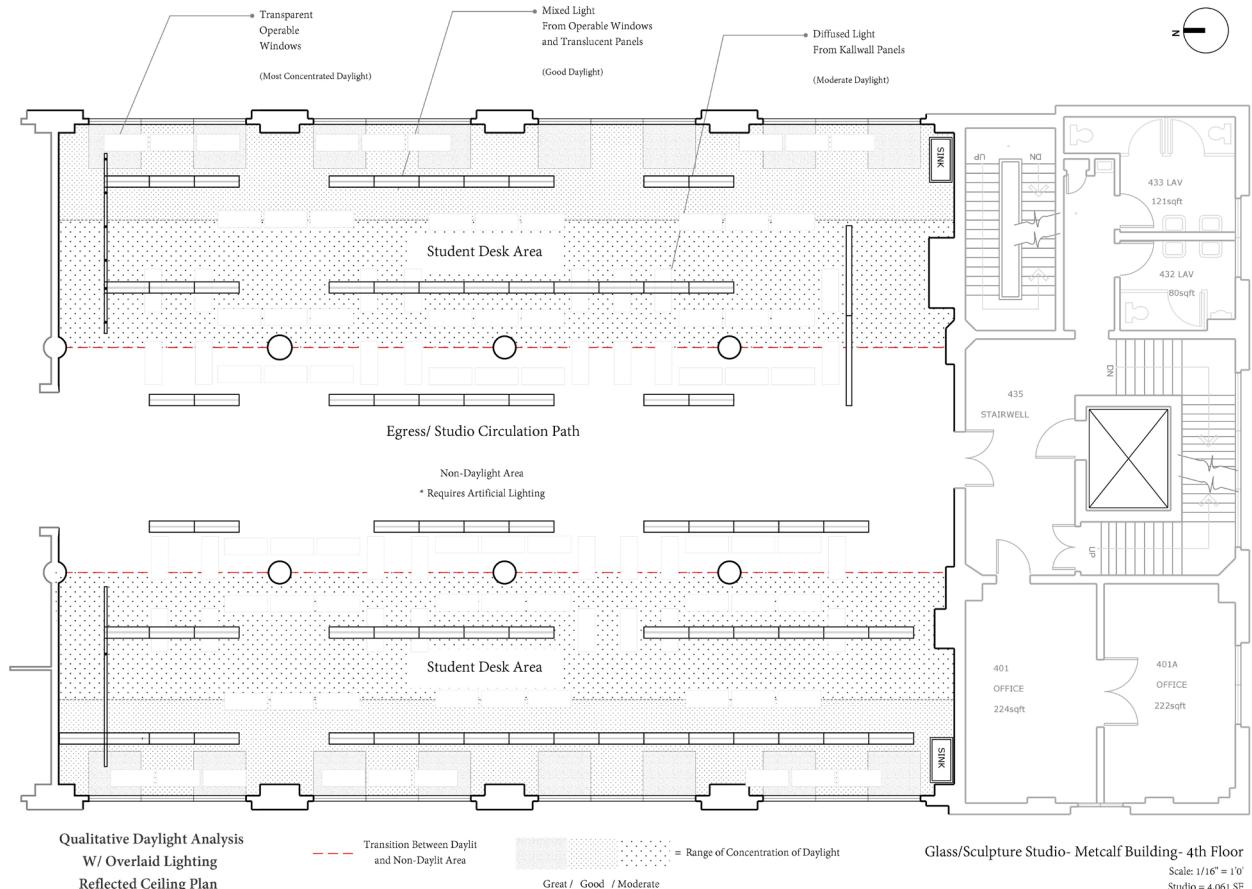
- The average daylight in the room in the summer is about 60-85%

- Overlighting conditions exist within peak sun hours of the East (8:30 A.M) & West Facade (3:30-4:00 P.M)



Electrical Lighting Map

- Existing Light Distribution
 - Direct Pendants
 - Linear LED Downlight
 - Track Lights



Electrical Lighting Illuminance Map

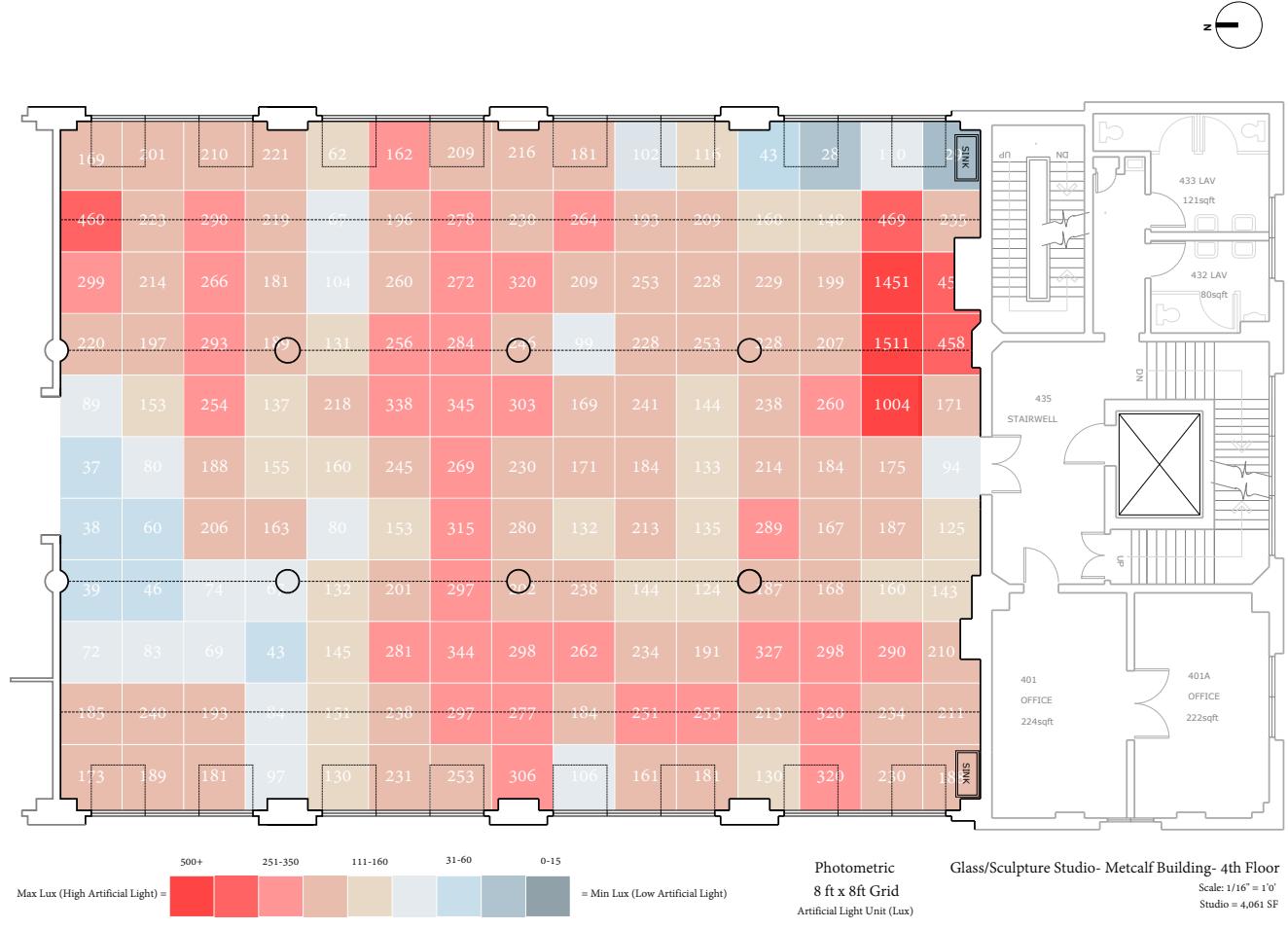
Date of visit:

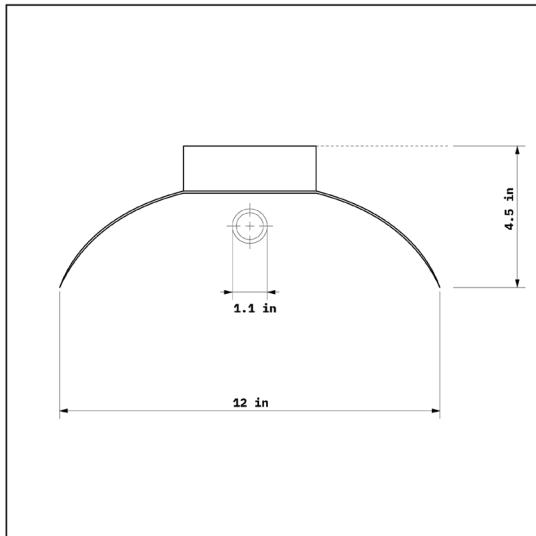
April 14 | 7:30 PM

Weather or Sky condition:

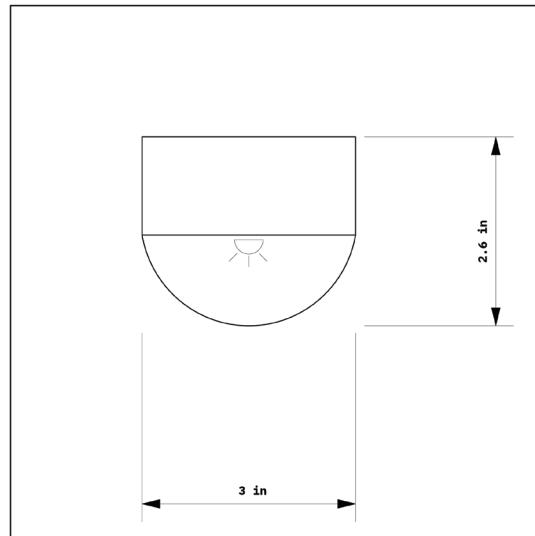
April 14 | Overcast Dusk

- The measuring of electric lighting as the primary light source at the work plane level indicates below-average light levels for a workspace.
- The level should be approximately 300-750 lux.
- Glare spots can be seen in the enclosed LED downlight linear fixture.
- Areas in the diagram with cooler blue hues were either gaps between the open fluorescent luminaire lamps or light bulbs that had burned out.

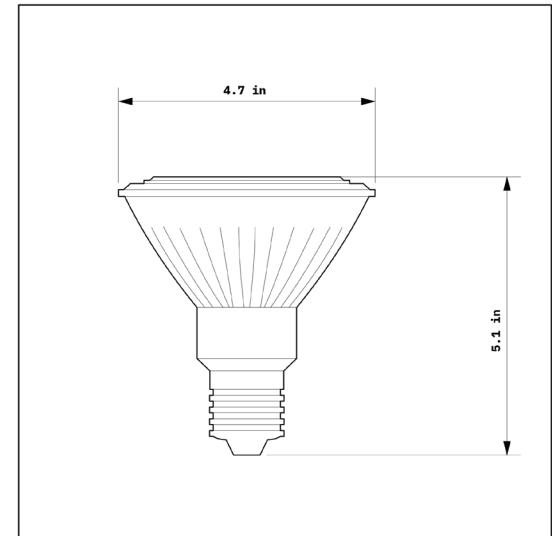




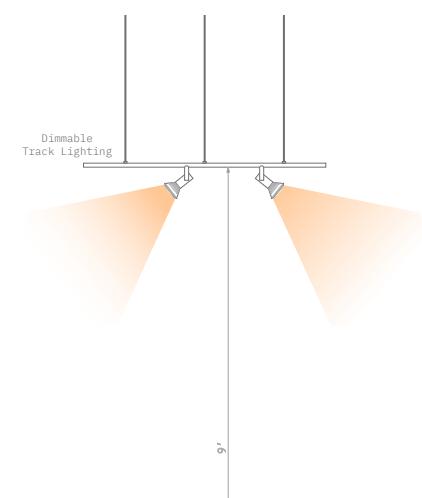
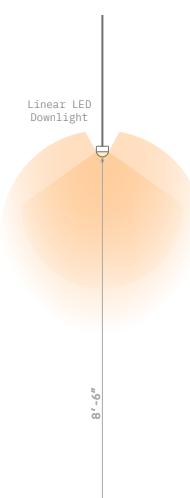
Symbol	
Fixture Type	Direct Pendant (Open Fluorescent Luminare with Reflector)
Function	Task Light (Lighting the main desk spaces)
Mounting Method	Suspended Pendant
Light Distribution	Direct Downlight
Light Source Characteristics	Cool White (4000K)
Size and Shape	12in x 4.5in x 4ft



Symbol	
Fixture Type	Linear LED Downlight
Function	Task Light (Lighting the tool work desk)
Mounting Method	Suspended Pendant
Light Distribution	Diffused semi-direct Downlight
Light Source Characteristics	Warm White (3000K)
Size and Shape	3in x 2.6in x 8ft



Symbol	
Fixture Type	Track Lighting
Function	Accent Light (Lighting the art works on the wall)
Mounting Method	Track lighting
Light Distribution	Direct Spot Light (Dimmable, Able to adjust angles)
Light Source Characteristics	Warm White (3000K)
Size and Shape	4.7in x 5.in

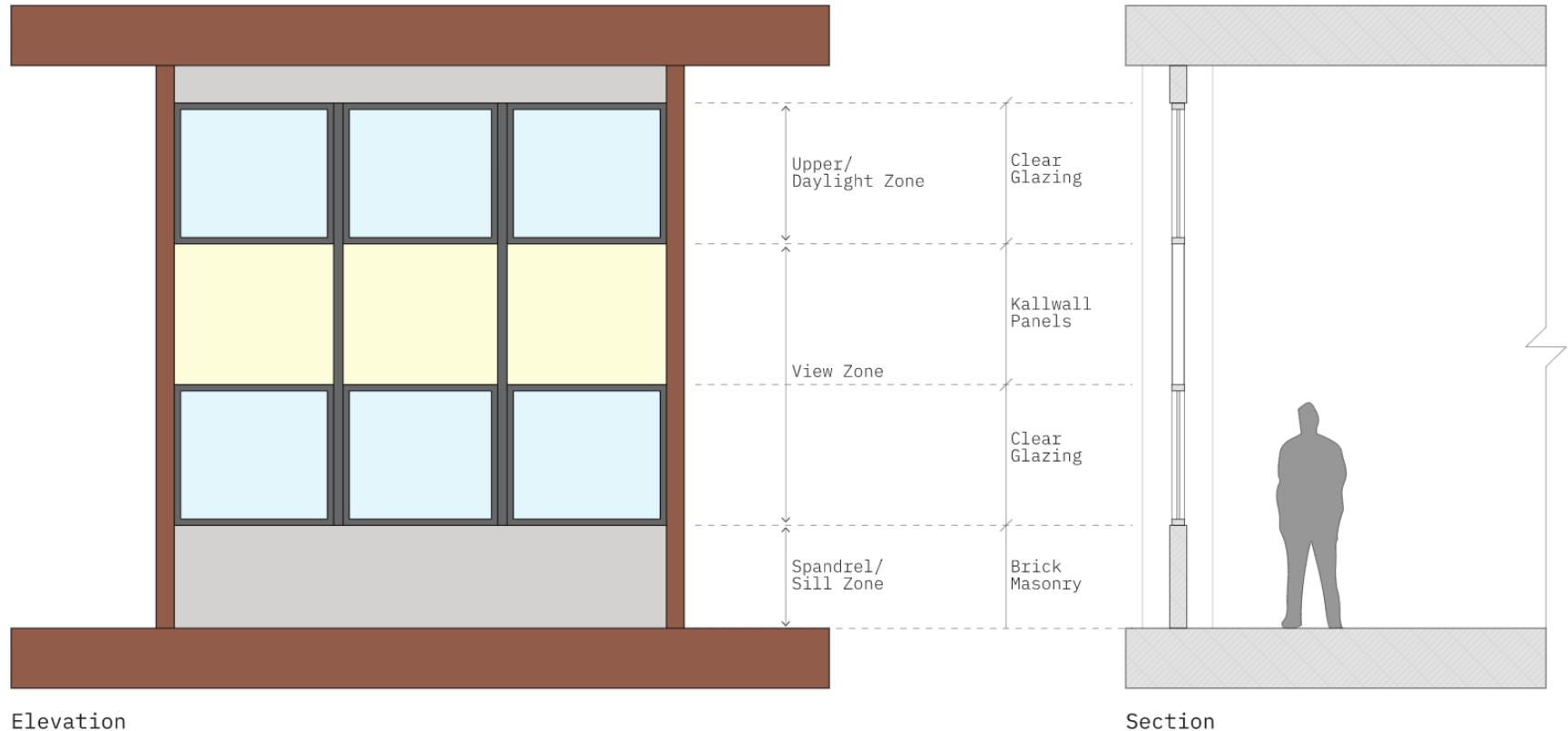


Design Proposal

Daylighting
Electrical Lighting
Acoustics

Hypothesis. We propose to alter the facade zones to address the lack of daylight within the primary egress/transition space. By rearranging the glazing sequence, we can better direct natural light into the dimmest areas of the room. The data from the photometry illuminance/luminance lab suggest there is an inadequate amount of natural light for task work. Under these conditions, artificial light is required to light the studio space properly. In order to limit the use of electric lighting, we will divide the glazing into three zones consisting of clear glazing on the upper and view zone and Kalwall panels in between or above head height. Reducing the amount of fiberglass glazing in the upper daylight zone will induce natural light to penetrate deeper within the student desk areas. We will also be testing different external/ internal overhangs to limit the amount of glare. Our daylight analysis revealed solar overexposure adjacent to the clear translucent glass.

Proposal Idea #1



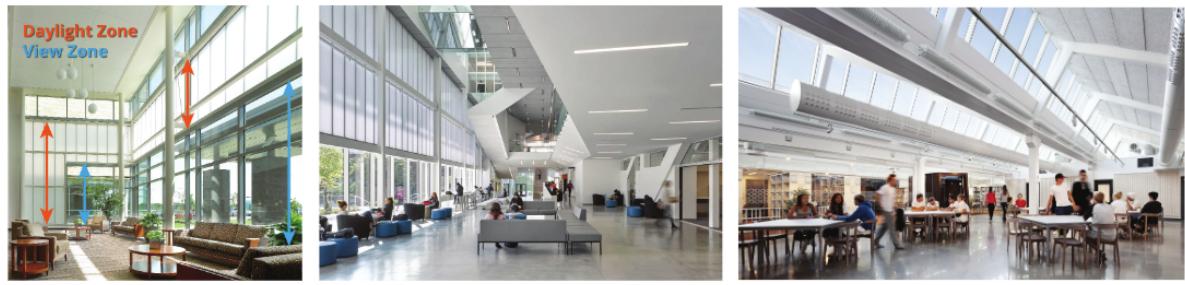
Elevation

Section

Design Hypothesis:

Due to the east-west orientation of the Metcalf building, we had to figure out a strategy to maximize the amount of light entering the structure. Our first proposal involved altering the ratio of clear glazing windows to Kalwall panels in various sections of the facade. Specifically, we proposed incorporating clear glazing in the "Upper/Daylight Zone" to take advantage of its effectiveness to admit daylight. In the "View Zone," we increased the amount of clear glazing in the lower half to enhance the view and increase the amount of daylight entering the space, while the top half retained Kalwall panels to diffuse light.

Precedent Study:



Langara Science & Technology Building
Teeple Architects
Vancouver, Canada

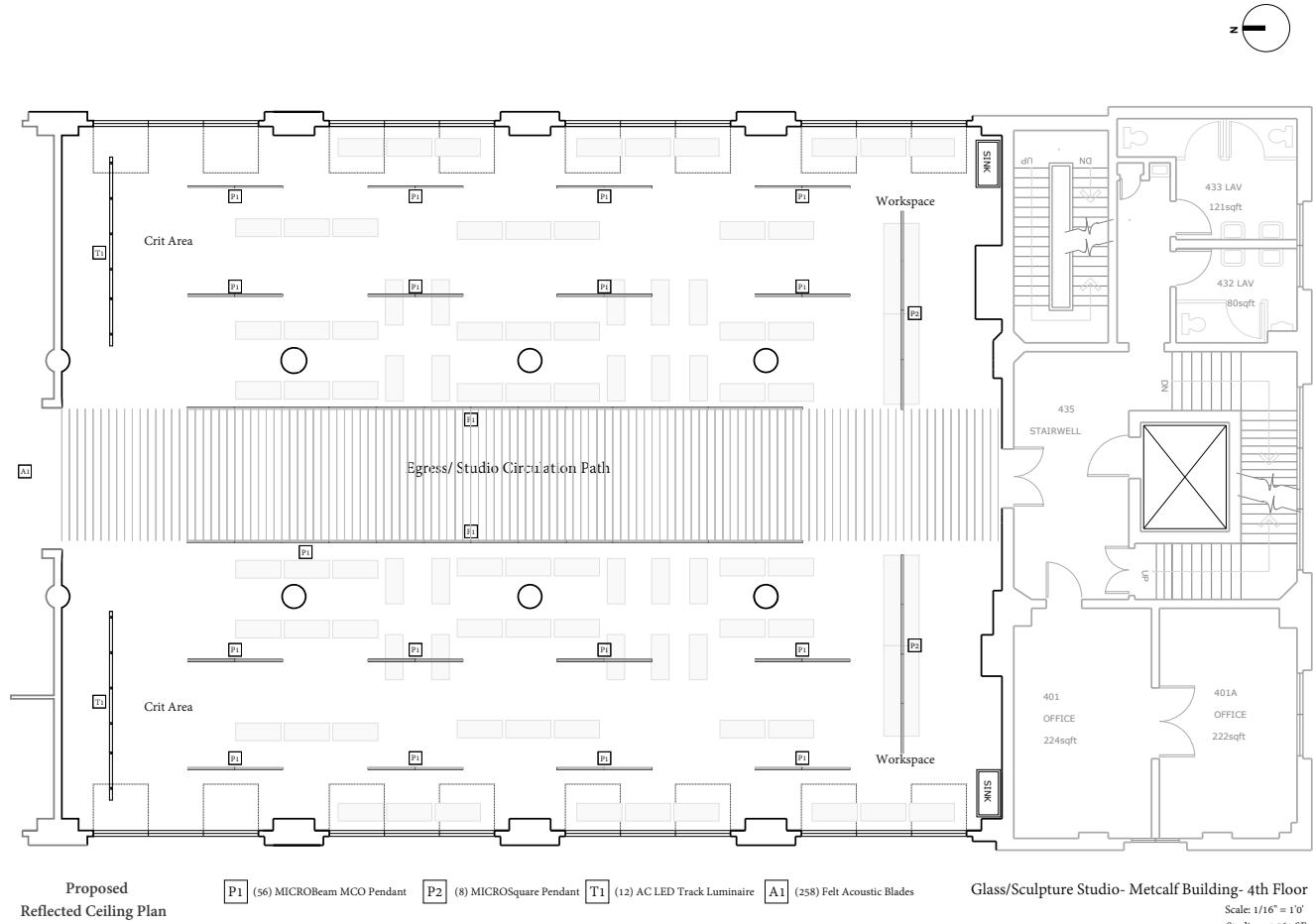
Sägbäcksgymnasiet (Vocational School)
Origo Arkitekter
Huddinge, Sweden

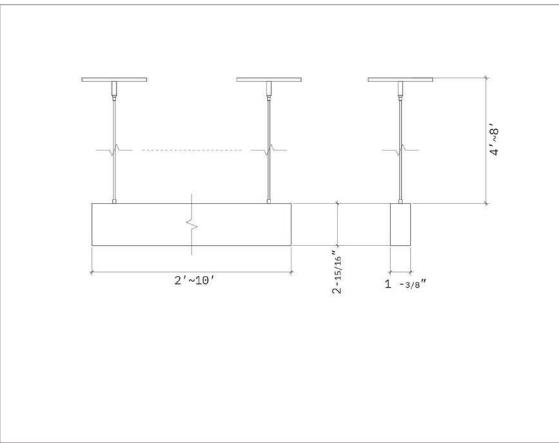
Proposed Electrical Lighting Map

- The 4th Floor of the Metcalf
- Mapping of Acoustic Panels running along egress corridor vertically.

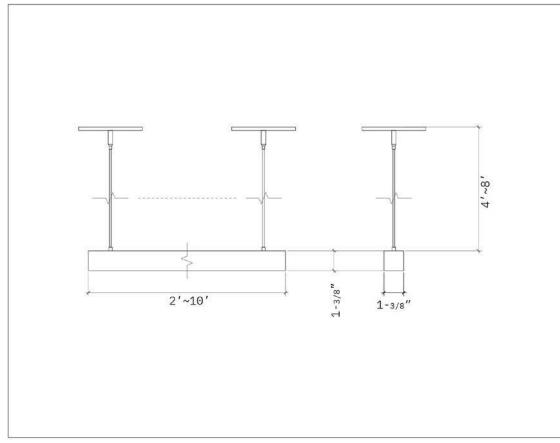
Light Fixtures:

- T1 | AC LED Track Luminaire
- P2 | MICROSquare Pendant
- P1 | MICROBeam MCO Pendant

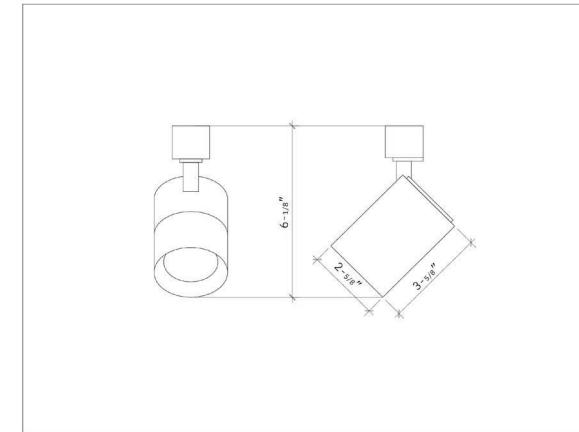




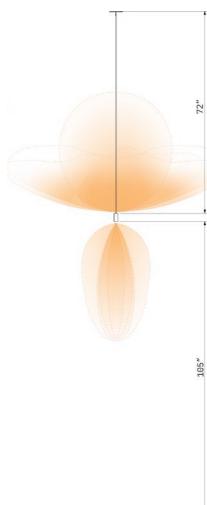
Symbol	
Model	MICRO Beam MCO Pendant
CRI	95+
Efficacy	150 lm/W combined
Fixture Type	Linear LED Downlight
Function	Task Light (Lighting the tool work desk)
Mounting Method	Suspended Pendant
Light Distribution	Direct / Indirect Downlight
Light Source Characteristics	2200K ~ 5000K



Symbol	
Model	MICRO Square Pendant
CRI	95+
Efficacy	150 lm/W combined
Fixture Type	Direct Pendant (Open Fluorescent Luminare with Reflector)
Function	Task Light (Lighting the main desk spaces)
Mounting Method	Suspended Pendant
Light Distribution	Direct / Indirect Downlight
Light Source Characteristics	2200K ~ 5000K

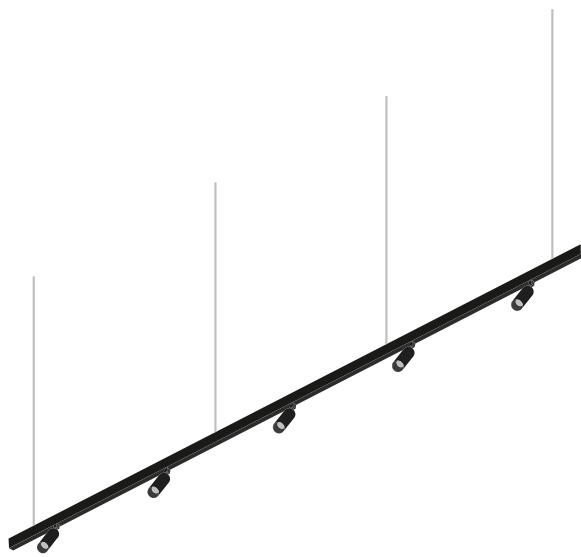


Symbol	
Model	H/L/J-LED202
CRI	90
Efficacy	36 lm/W or 50 lm/W
Fixture Type	Track Lighting
Function	Accent Light (Lighting the art works on the wall)
Mounting Method	Track Lighting
Light Distribution	Direct Spot Light (Dimmable, Able to adjust angles)
Light Source Characteristics	3000K

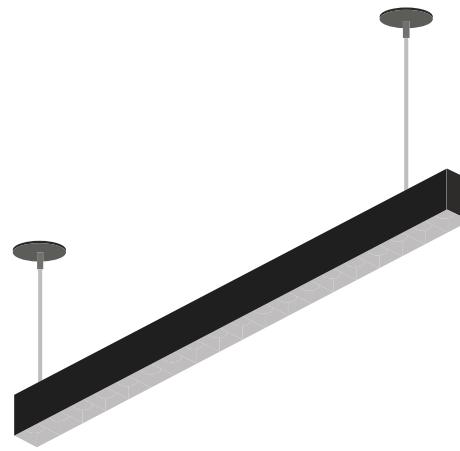


Proposed Electrical Lighting System

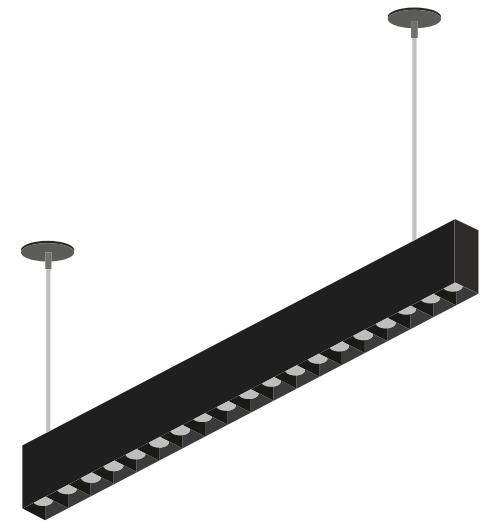
T1 (12) AC LED Track Luminaire
32 W per T1
 $32 \text{ W} * (12) = 384 \text{ W}$



P2 (8) MICROSquare Pendant
25.5 W per P2
 $25.5 \text{ W} * (8) = 204 \text{ W}$

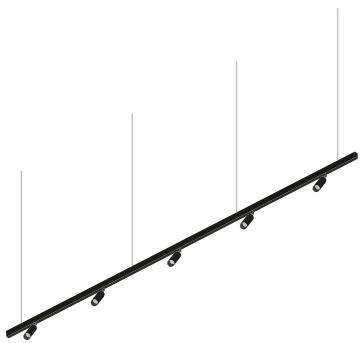


P1 (58) MICROBeam MCO Pendant
(32) 51.8 W Direct/Indirect Wide per P1
 $51.8 \text{ W} * (32) = 1,657.6 \text{ W}$
(26) 25.4 W Direct/Indirect per P1
 $25.4 \text{ W} * (26) = 660.4 \text{ W}$

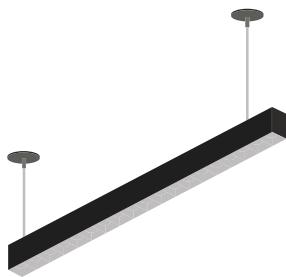


Total Wattage: 2906 W
Total Room Area: 4,061 SF
Lighting Power Density: $2906 \text{ W} / 4061 \text{ SF} = 0.715 \text{ W/SF}$
Classroom General LPD: 0.71

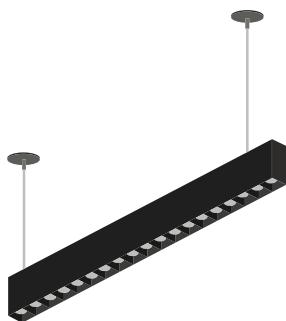
Lighting Power Density Calculations (LPD)



T1
(12) AC LED Track Luminaire
32 W per T1
 $32 \text{ W} * (12) = 384 \text{ W}$



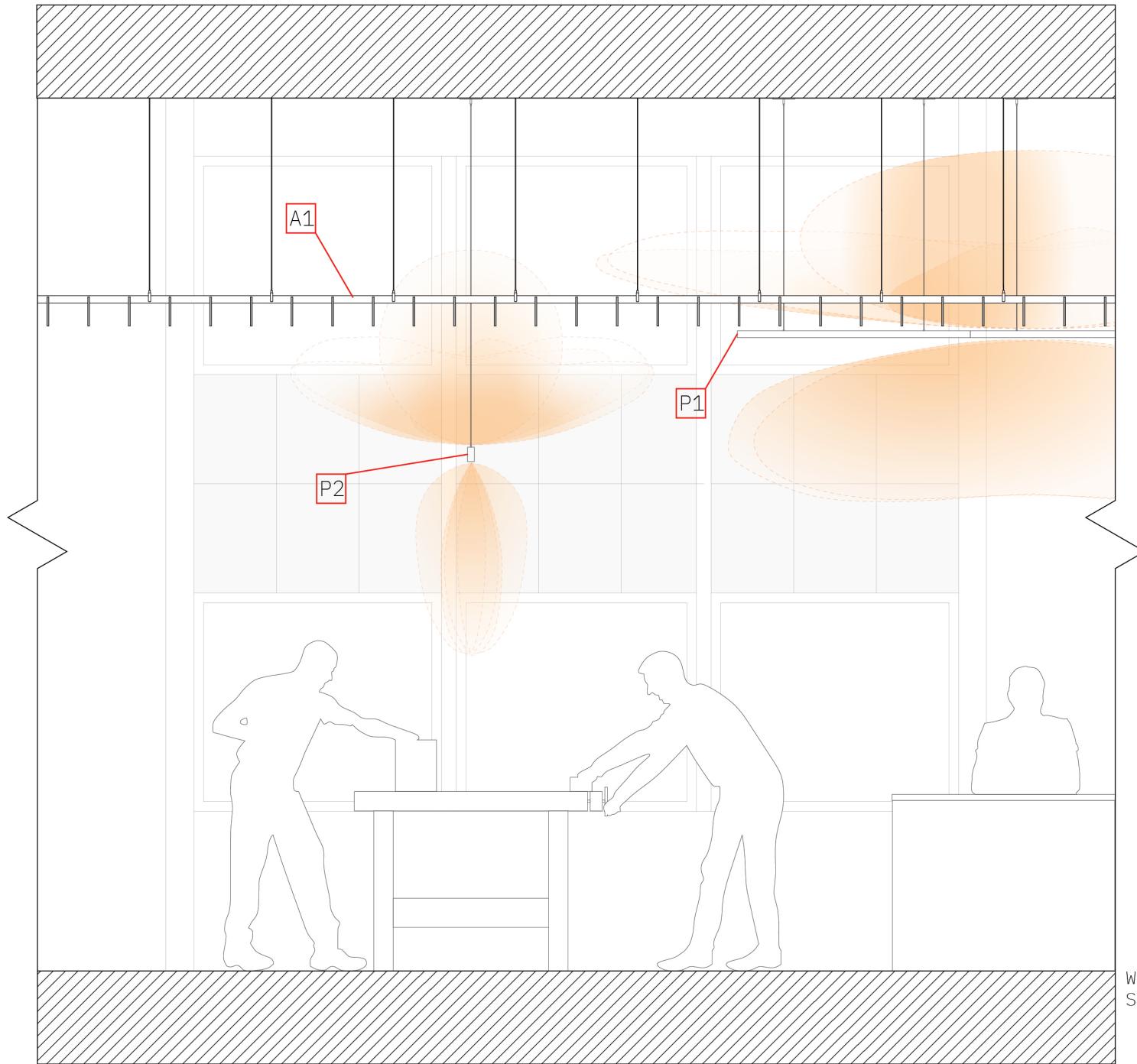
P2
(8) MICROSquare Pendant
25.5 W per P2
 $25.5 \text{ W} * (8) = 204 \text{ W}$

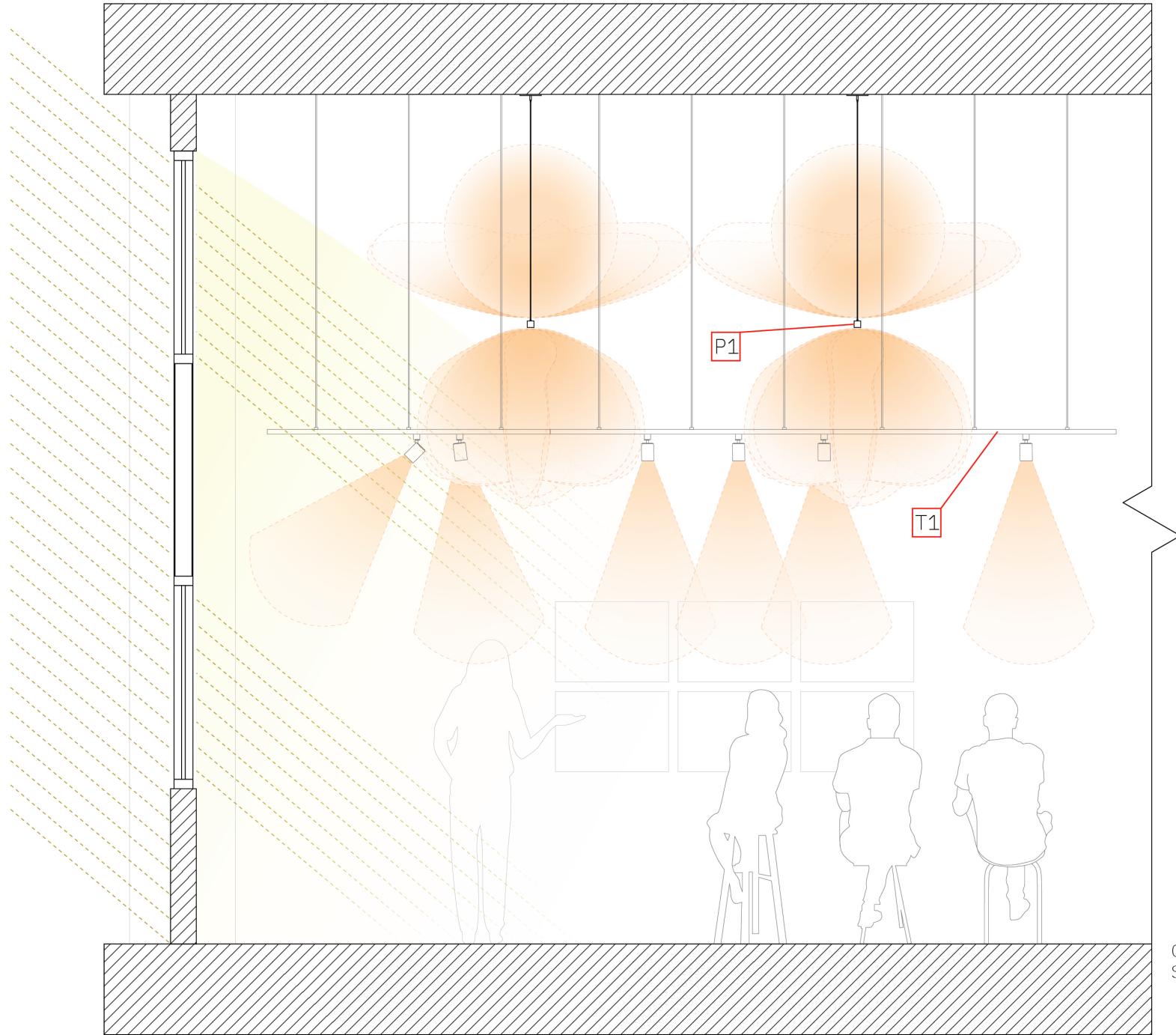


P1
(8) MICROSquare Pendant
(32) 51.8 W Direct/Indirect Wide per P1
 $51.8 \text{ W} * (32) = 1,657.6 \text{ W}$
(26) 25.4 W Direct/Indirect Wide per P1
 $25.4 \text{ W} * (26) = 660.4 \text{ W}$

Total Wattage: 2,906 W
Total Room Area: 4,061 SF
Lighting Power Density: $2909 \text{ W} / 4,061 \text{ SF} = 0.715 \text{ W/SF}$

Classroom General LPD: 0.71





Crit Area
Section Elevation

Proposed Acoustic Paneling

- Hangs along Egress corridor

Company:

Armstrong Ceiling & Wall Solutions

Material:

Felt (Recycled PET)

Acoustics:

Sound Absorption (NRC) | 0.85

Fire:

Fire Performance | Class A (25/450)

Anti-Microbial:

Mold/Mildew Resistance | Inherent

Durability:

Water Repellent

Impact Resistance

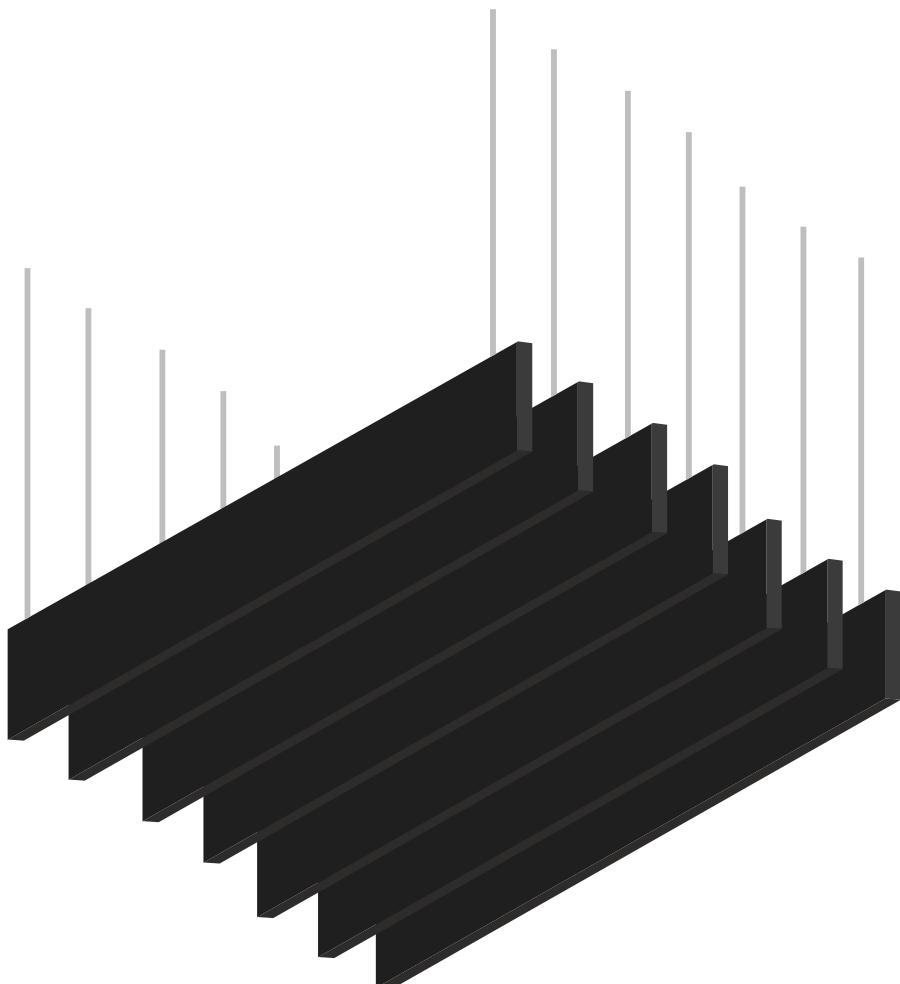
Scratch Resistance

Disinfectability:

Spray

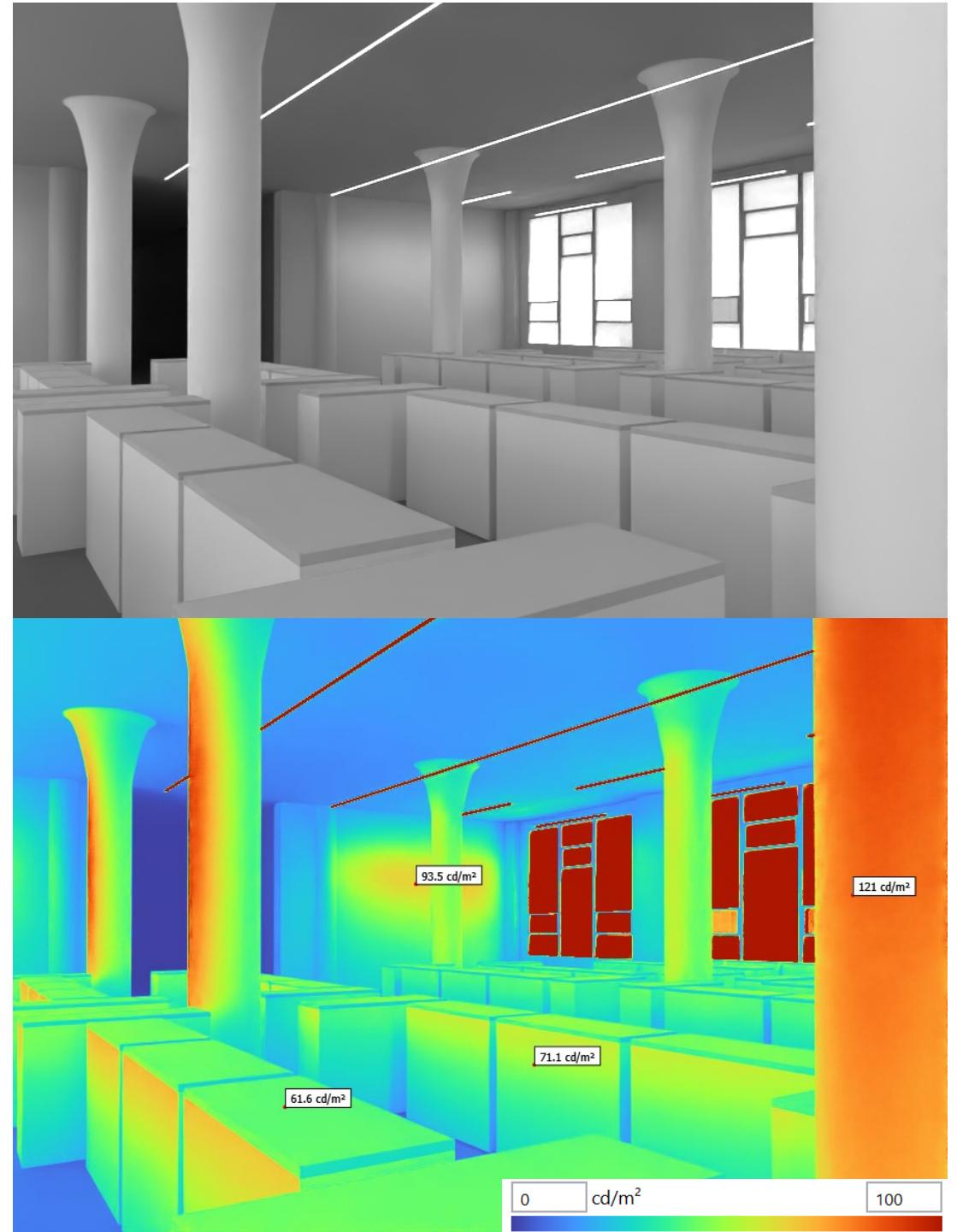
Special Applications:

Exposed Structure



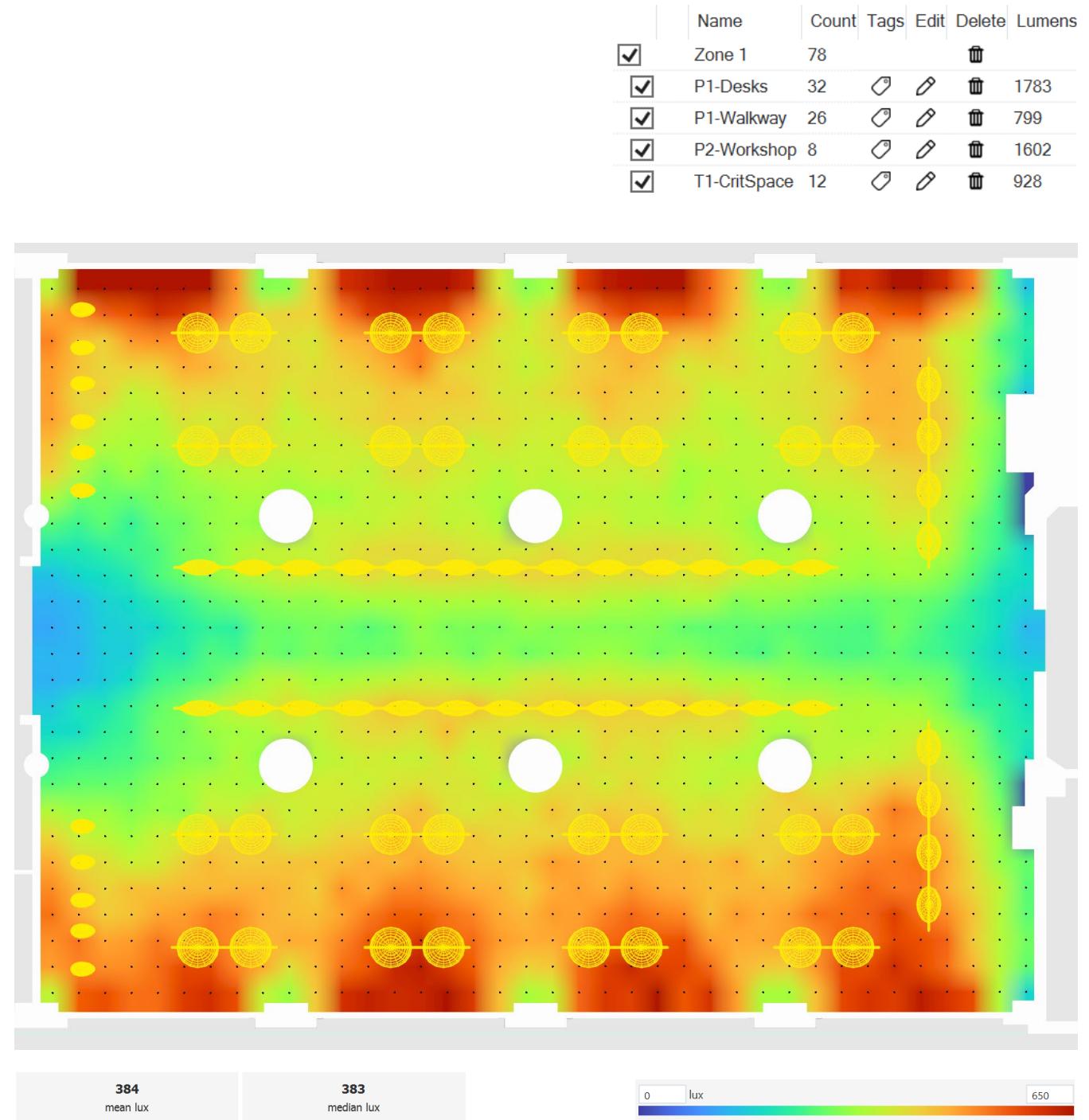
Daytime Luminance Render

- Student's would be more willing to work in studio due to the abundant amount of daylighting that adequately lights up the work space.



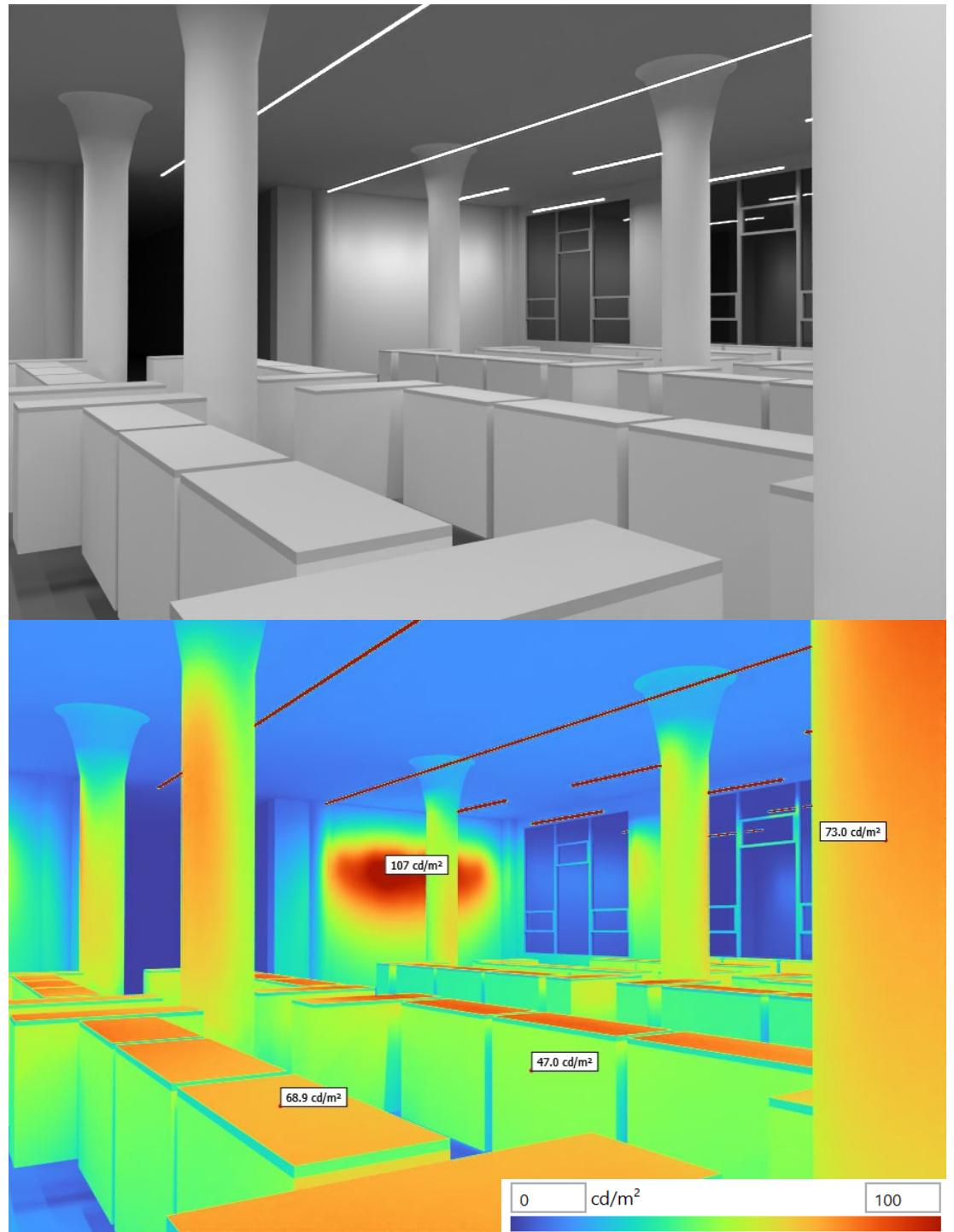
Proposed Illuminance Map

- Real life scenario Daytime
- The proposed lighting distribution works and complies with the power lighting density levels of both a classroom (300-500 lux) and a workshop space (300-750 lux).



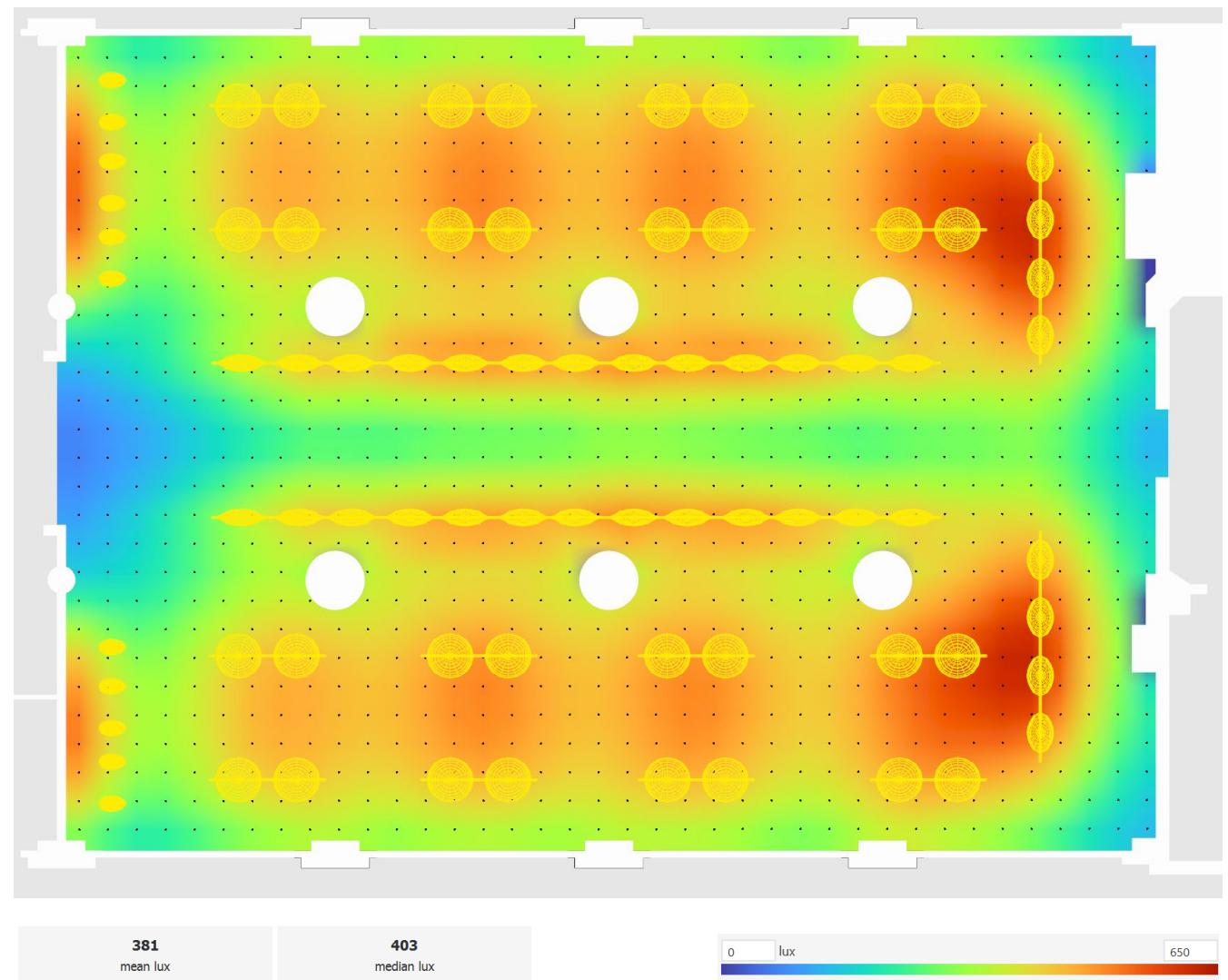
Nighttime Luminance Render

- Nightowls will be able to work more efficiently with comfortable electrical lighting that reduced veiling glare while maintaining task levels across all workspaces.



Proposed Illuminance Map Nighttime

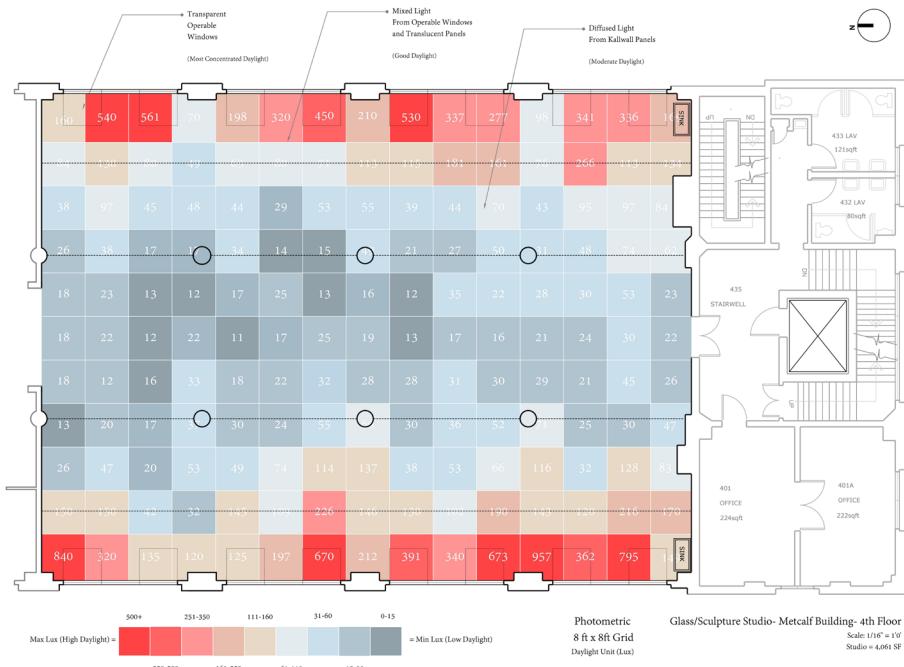
- Real life scenario Nighttime
- The proposed Lighting system would allow for the dimming of areas that are not being as proactively used in the nighttime.



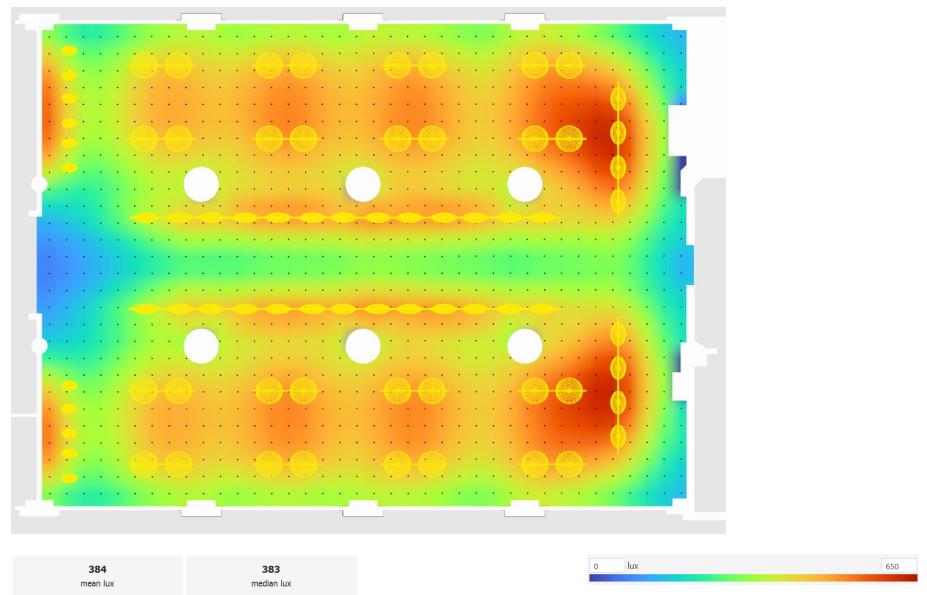
Illuminance Map Comparisons

- Real Life Scenario Daytime

Existing Conditions:



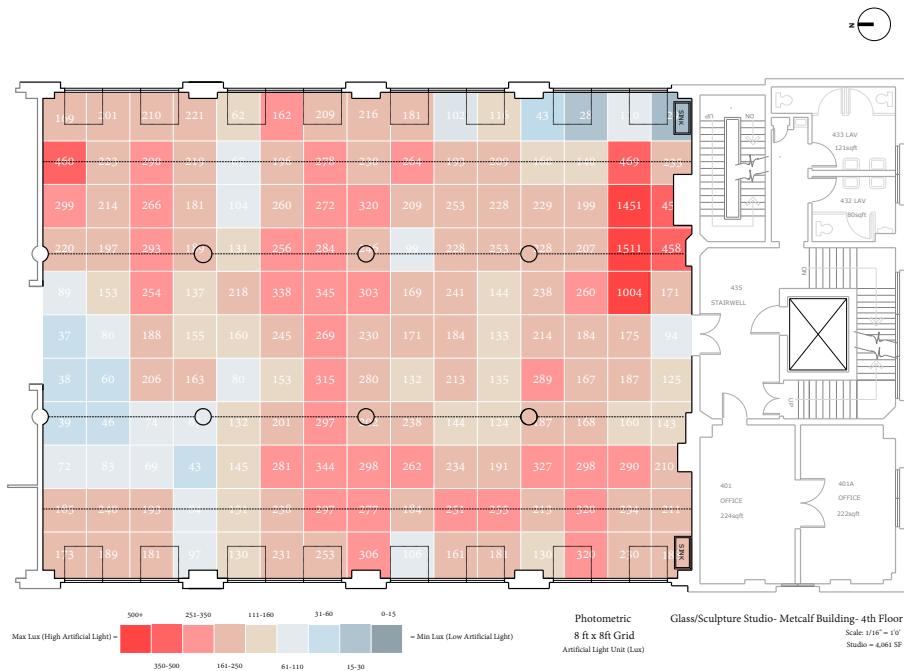
Proposal:



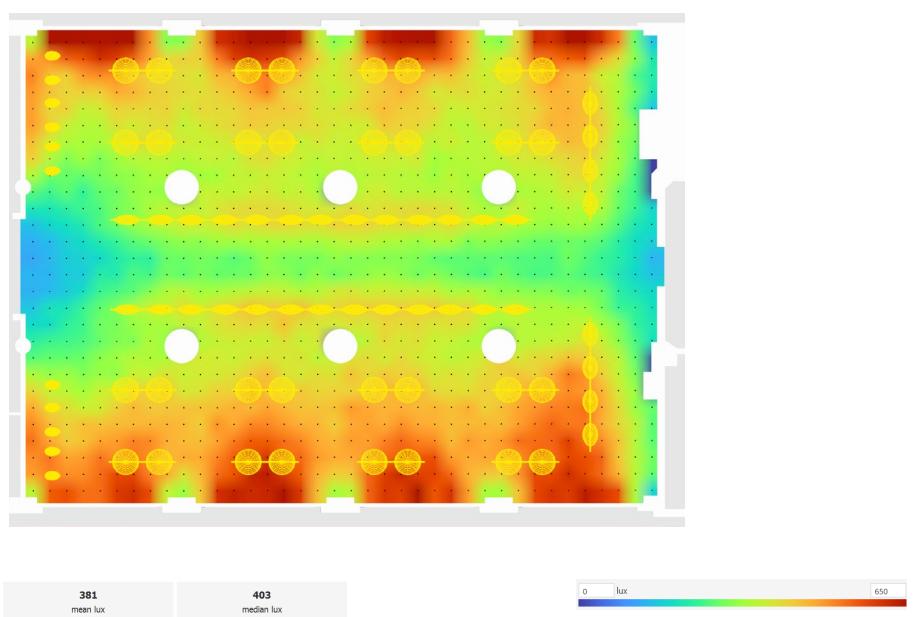
Illuminance Map Comparisons

- Real Life Scenario Night time

Existing Conditions:



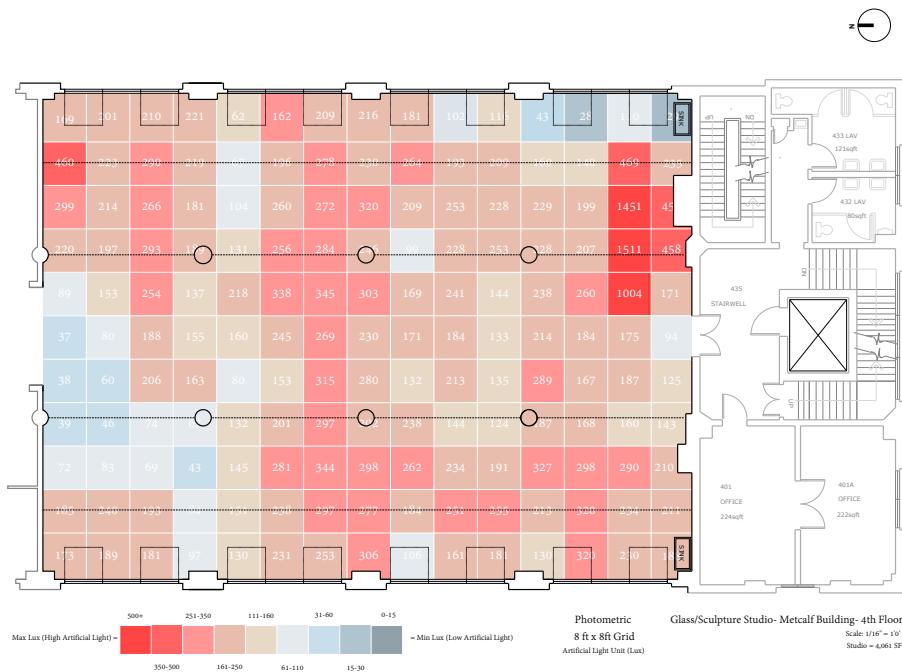
Proposal:



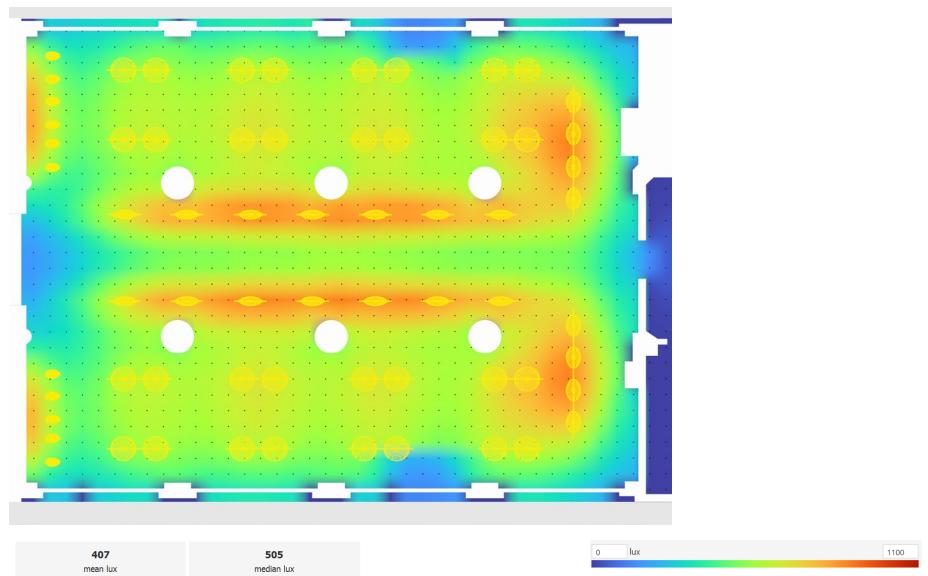
Illuminance Map Comparisons

Initial Lab 5B Illuminance Analysis

Existing Conditions:



Proposal:





Studio Hours: 7AM

The Studio as students begin to arrive to their first class.



Studio Hours: 7AM

The Professor steps away to take an important call,
stands underneath pendant lights encase they need to take notes.



Post Studio Hours: 8PM

A student comes in to take photos of their work lit up by electric lighting.



Post Studio Hours: 12AM
The Sudio is left with a student's work.



Lunch Break Hours: 12 PM

The room is lit up by natural and electric lighting.



Afternoon Studio Hours: 4 PM

Prevent direct eye contact with sunlight by Anti-Glare Kalwall panels.



Post Studio Hours: 8PM

A student comes in to take photos of their work lit up by electric lighting.



Post Studio Hours: 12AM
The Sudio is left with a student's work.