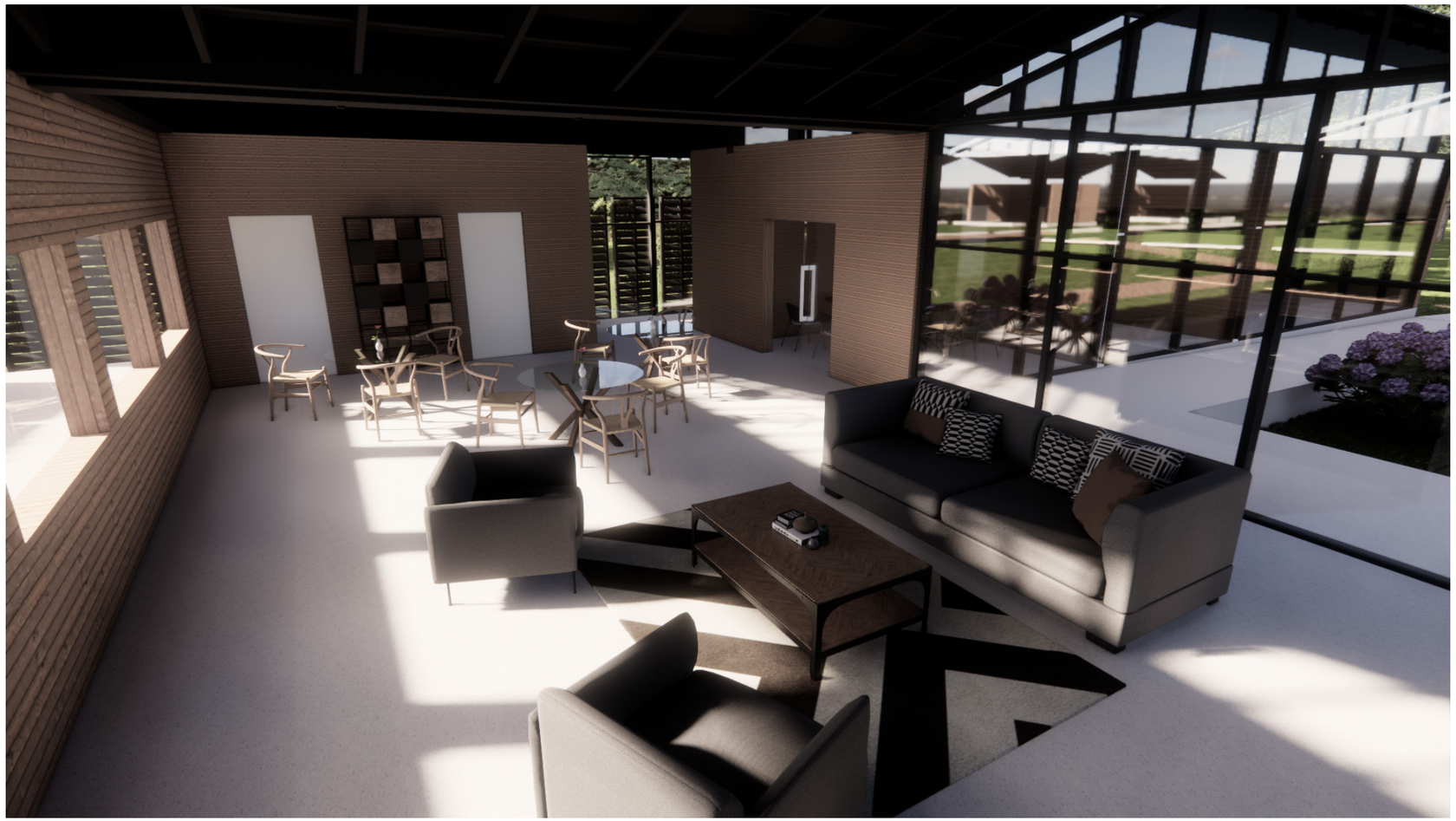
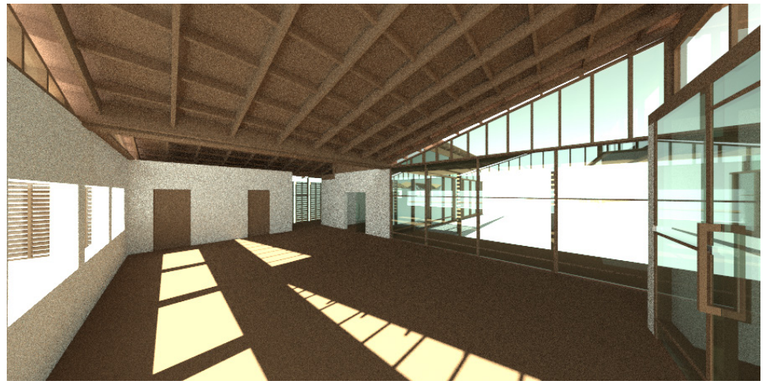
Assignment 7: Radiance Rendering, Point-In-Time Illuminance, and Daylight Availability (LEED v4.1)
ARC 3723 | EBS II
Anna Barnes and Hannah Zhou



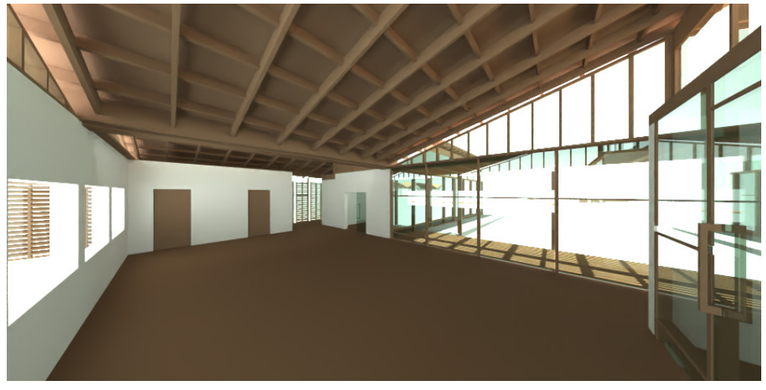
This is a radiance rendering and daylight availability study on our community center for TKO Farming Center. This project was located in Louisville, Mississippi and was designed for an education center for the farm. As we were designing this community center, especially the hangout space, we were concerned with the amount of direct sunlight entering the space fromt the curtain wall on the west side of the building. This specific area of the building was designed to be the a comfortable central community area. After running the analysis, we learned that there was a lot of direct light in the mornings that then heated up the area for the rest of the day, which would be a problem in the summer and spring. During the summer and spring equinox, there was also some indirect light in the afternoon. During the winter, the direct lighting in the morning would not be a huge problem if it were not for the glare. Our solution to this is to put a covered walkway in front of those windows to still allows for indirect lighting to enter the space but also reduce the amount of direct light into the space.

Daylighting Analysis

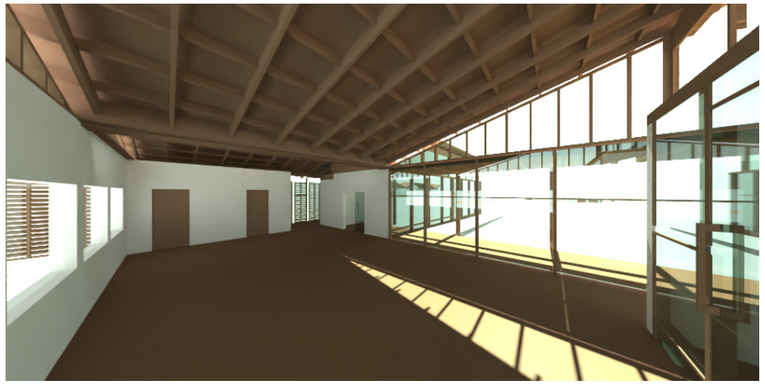
Radiance Rendering - Summer Solstice
CIE Clear Sky



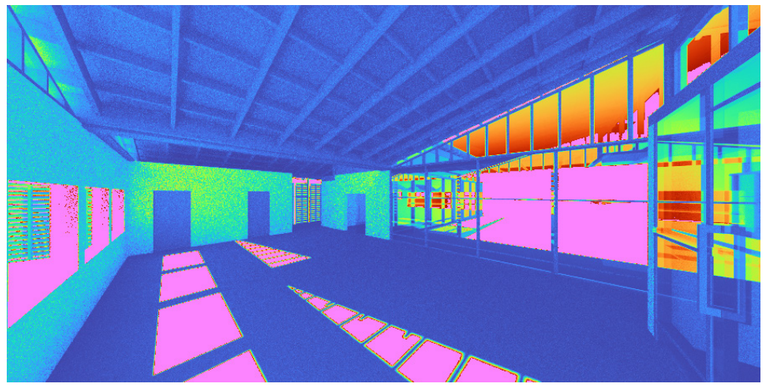
Radiance Rendering
9:00 AM



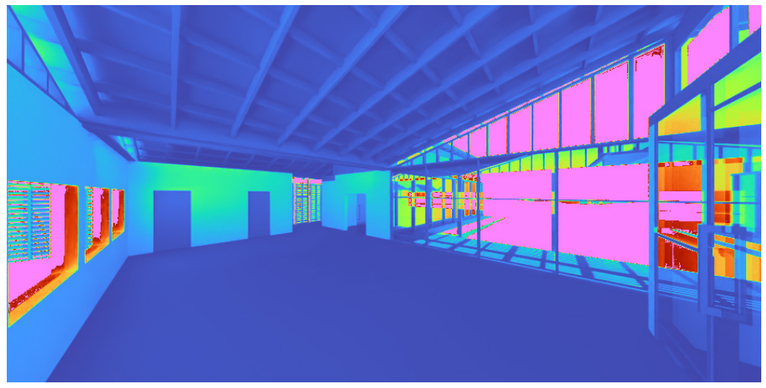
Radiance Rendering
12:00 PM



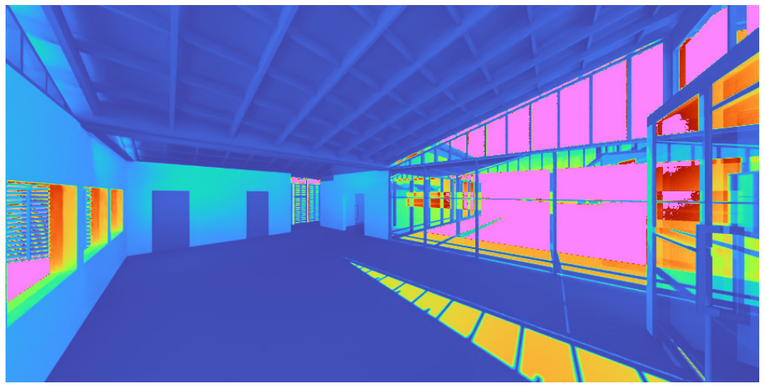
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



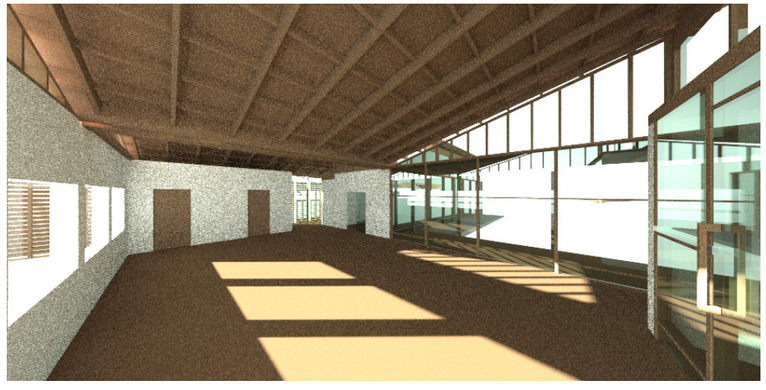
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



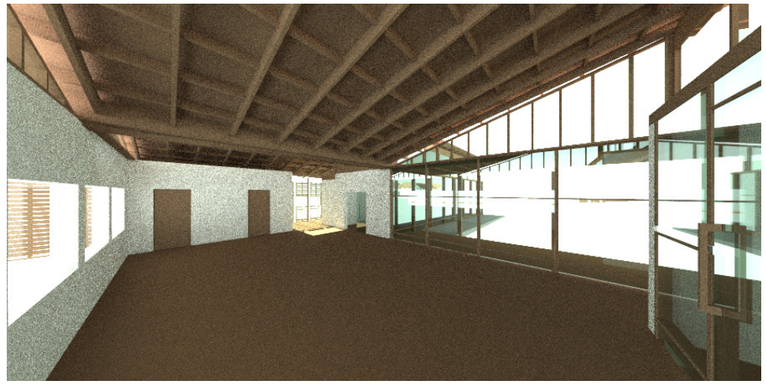
Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Daylighting Analysis

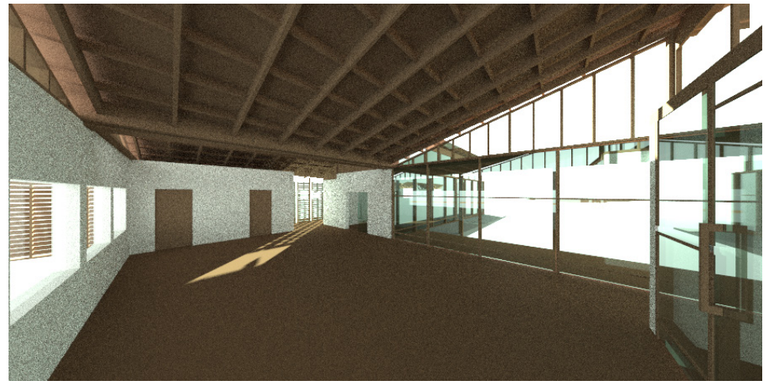
Radiance Rendering - Winter Solstice
CIE Clear Sky



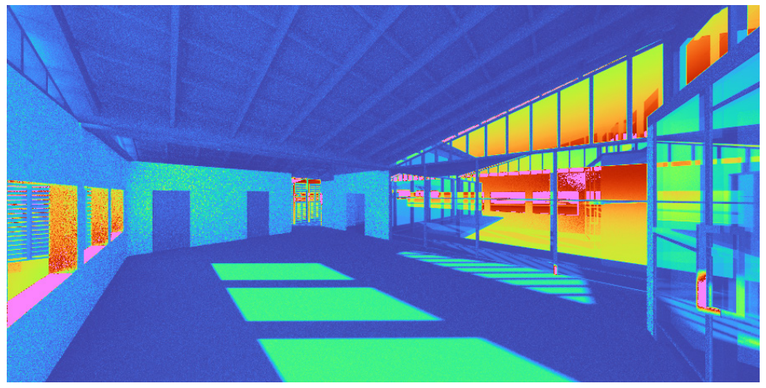
Radiance Rendering
9:00 AM



Radiance Rendering
12:00 PM



Radiance Rendering
3:00 PM



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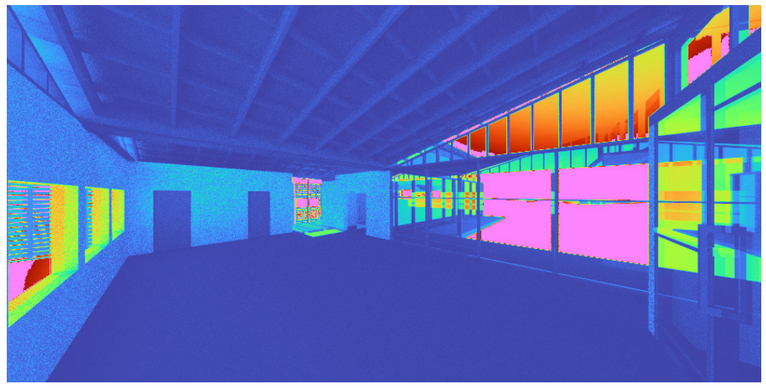
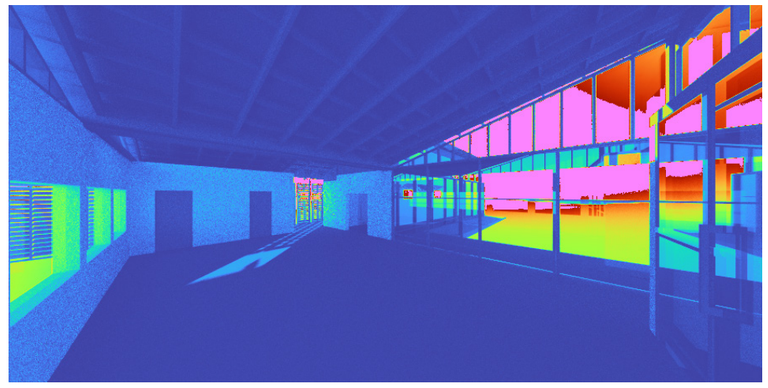


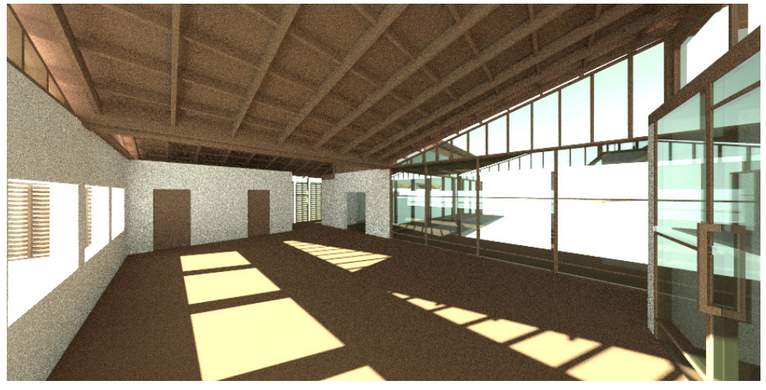
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



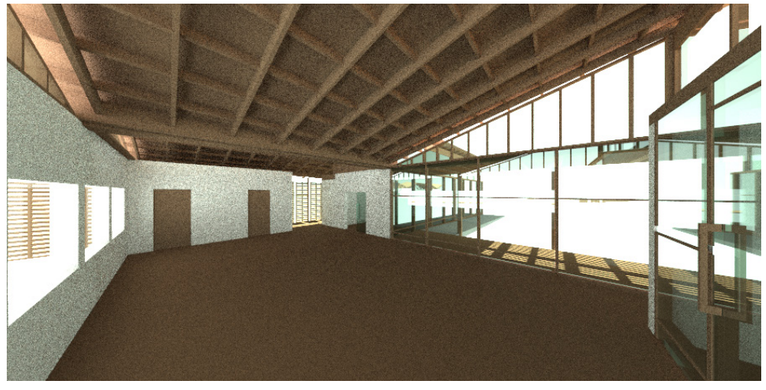
Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Daylighting Analysis

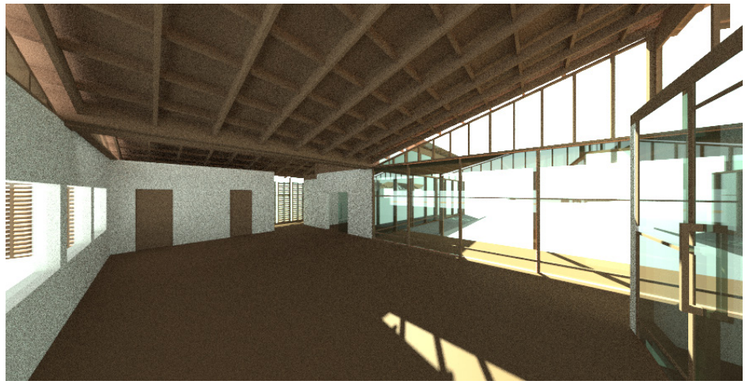
Radiance Rendering - Spring Equinox
CIE Clear Sky



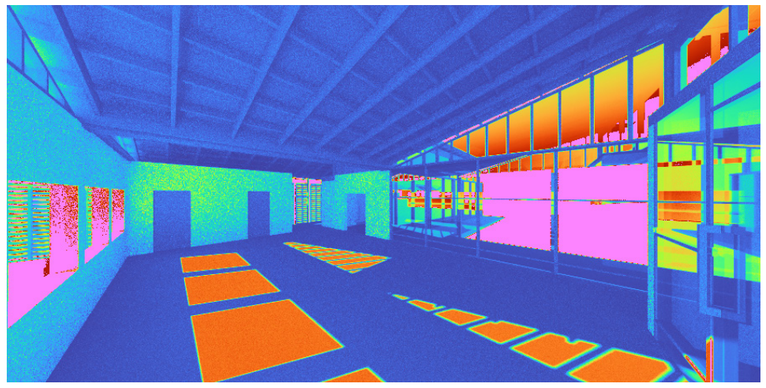
Radiance Rendering
9:00 AM



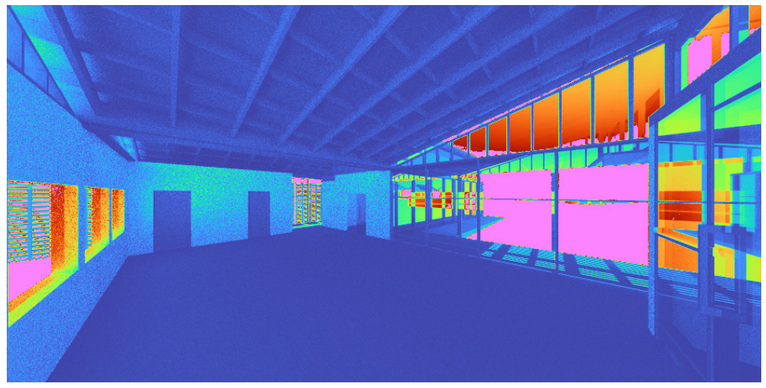
Radiance Rendering
12:00 PM



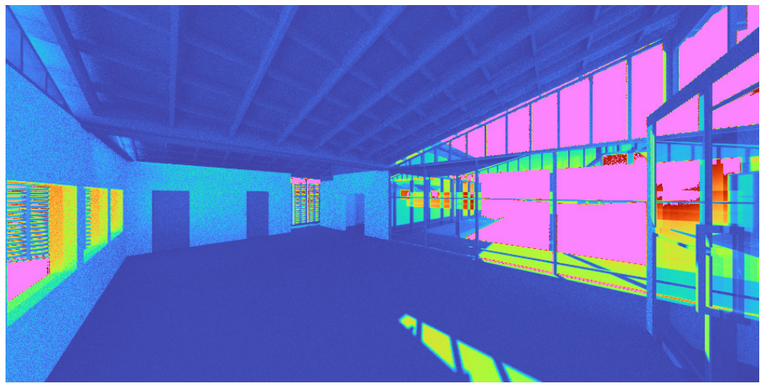
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



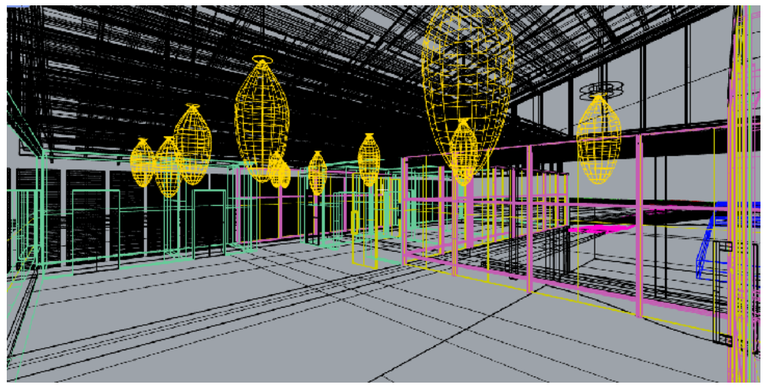
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



Falsecolor (Range 0-1000 cd/m2)
3:00 PM

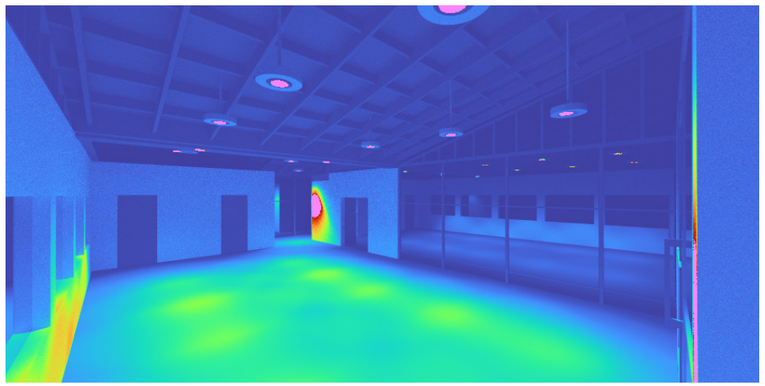
Electric Lighting Analysis

Radiance Rendering - Nighttime
Luminaires - (4) Circular Downlight 6-inch 11W 8 60 lm



Wireframe model showing luminaires

Radiance Rendering



Falsecolor (Range 0 - 300 cd/m2)

Daylight 11

3
credits

91.1%
sDA

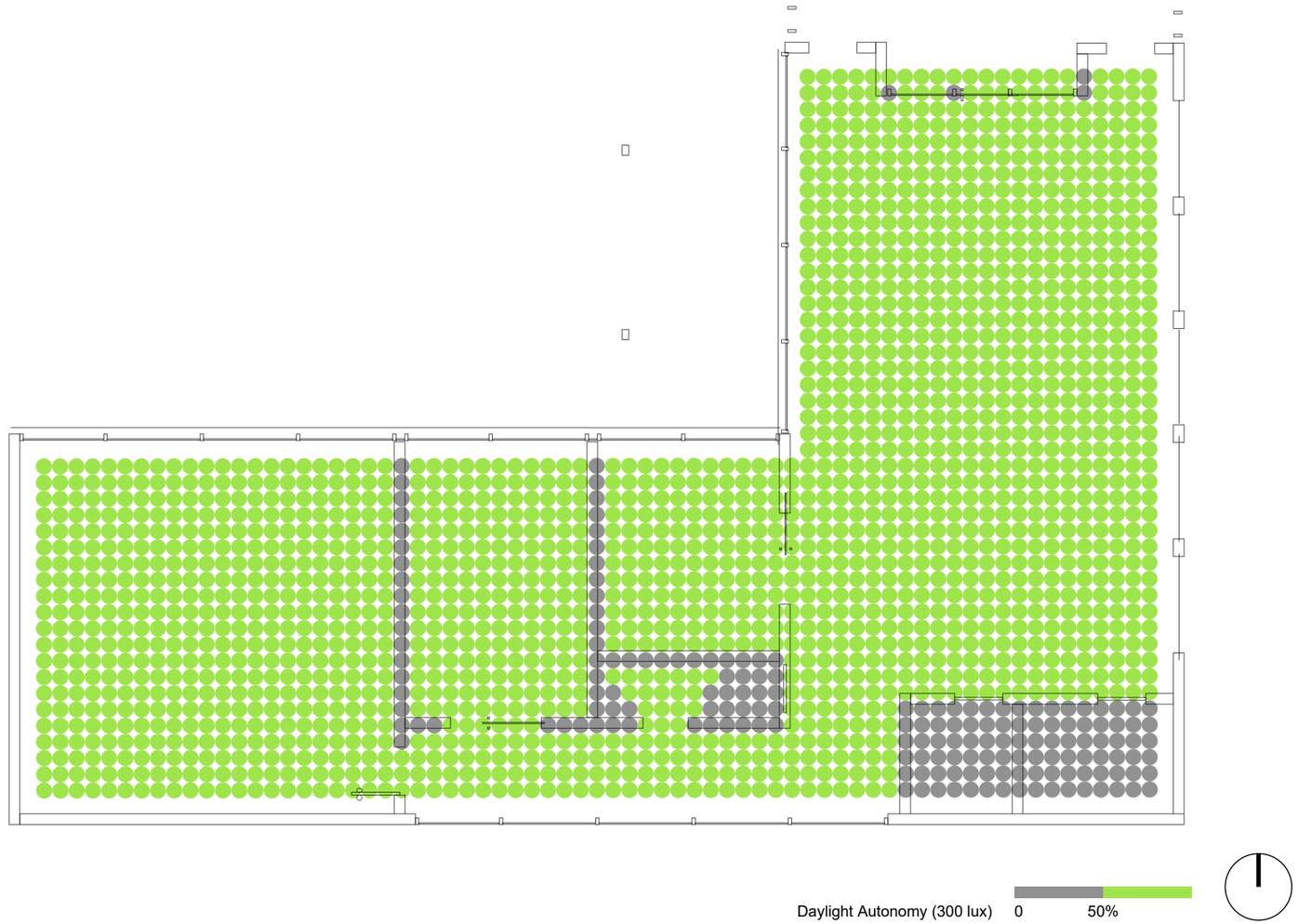
19.2%*
ASE

1701
avg lux

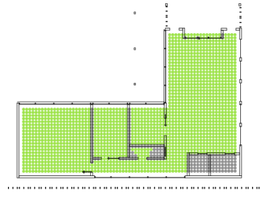
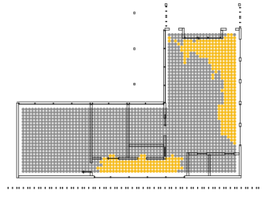
78.1%
blinds open

** ASE > 10% in one or more spaces. The design addresses glare in these areas as follows:*

With Blinds



LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
1	2189 ft²	1.0 ft	Y		91.10%		19.17%
Totals	2189 ft²				91.10%		19.17%

LEED v4.1 - Daylight Report

Appendix

Software: ClimateStudio v1.9.8389.21977
Engine: Radiance 5.3
Weather: USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset: 0°
Ambient Bounces: 6
Passes Completed: 100
Primary Ambient Samples: 6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
A-GLAZ-CURT	254	Clear	8.4%	87.7%
A-GLAZ-CWMG	844	Wood Walnut	16.2%	0.0%
A-GLAZ	576	Clear	8.4%	87.7%
A-WALL	710	Matte White wall	80.7%	0.0%
ActivesSunshade	417	Wood Walnut	16.2%	0.0%
Default	5829	Wood Walnut	16.2%	0.0%
Floor	12	Wooden Floor Planks	10.7%	0.0%
Ramp	6	Exterior Concrete floor	22.0%	0.0%
Roof	2463	Wood Walnut	16.2%	0.0%
roofglass	16	Clear - Sungate 460 (3) - Sungate 460 (5) (Argon)	15.2%	59.0%
WindowPanes	4	Clear	8.4%	87.7%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0	1	24 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
1	1	24 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	95.04%
2	1	669 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	76.77%

LEED v4.1 - Daylight Report

Appendix

Occupancy

Space ID	Occupancy Schedule
1	8am-6pm with DST

Glossary

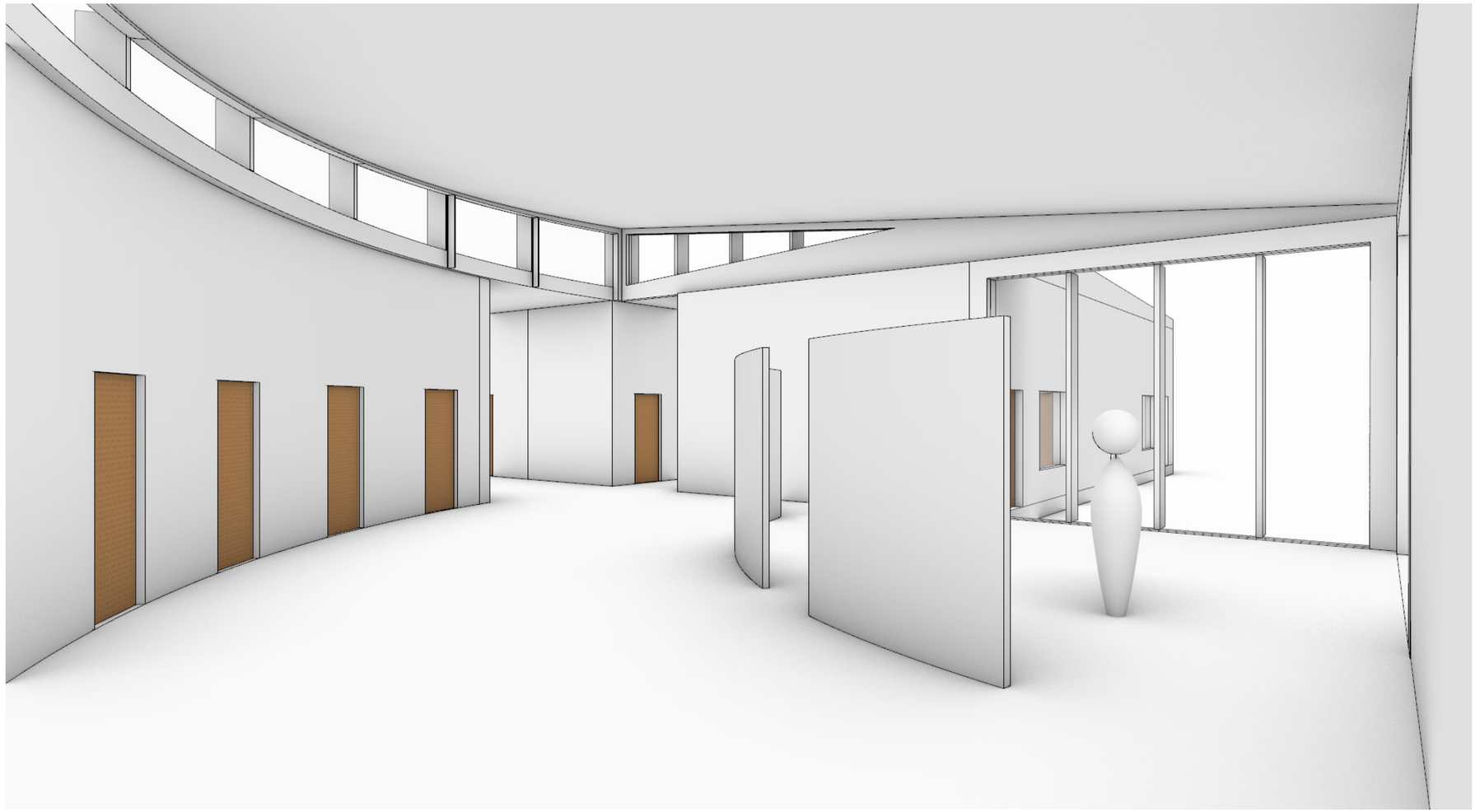
sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.

ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.

Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.

Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.

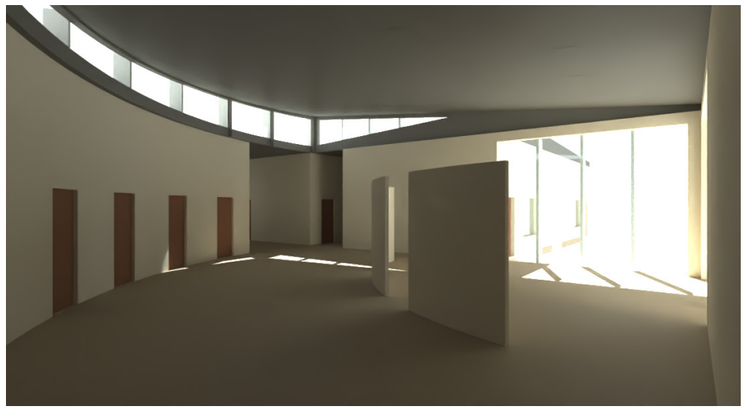


Assignment 8: Radiance Rendering and Daylight Availability (LEED v4.1)
ARC / BCS | Spring 2023
Amanda Noe

This is a radiance rendering and daylight availability study on my daycare project from Studio 2B. The site for this project was located on the MSU campus. As I was designing this daycare, I was particular concerned with how much direct sun was entering the central space from the large, south-facing windows . This space is where a cafeteria space and an indoor play space for would be located, so I did not want it to be an uncomfortable temperature. After running my analysis, I found that there was a lot of direct sunlight entering the space particularly during the equinoxes and the winter solstice. For the winter solstice, this may not be a bad result, since heat would be entering the space when it is cold outside, but there would be a lot of glare from the windows. I believe the best response to this problem would be to increase the tint of the windows and to add operable blinds.

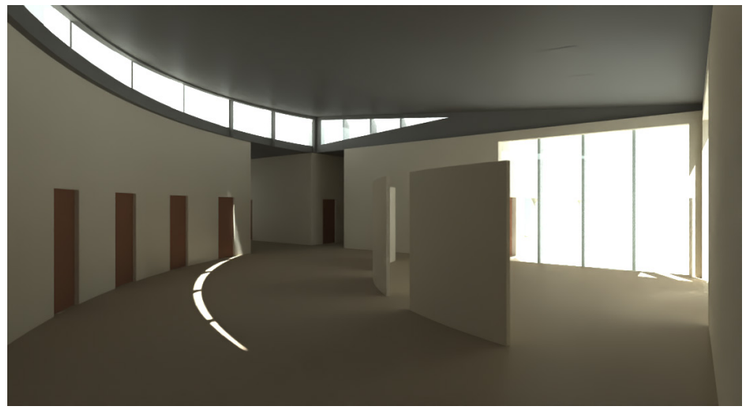
Daylighting Analysis

Radiance Rendering - Summer Solstice
CIE Clear Sky

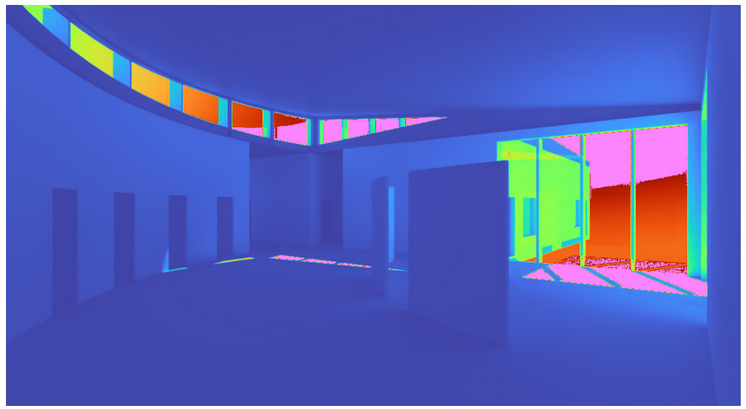


Radiance Rendering
9:00 AM

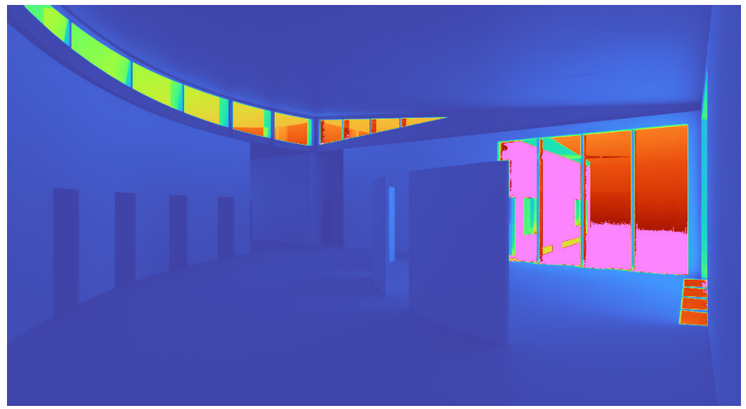
Radiance Rendering
12:00 PM



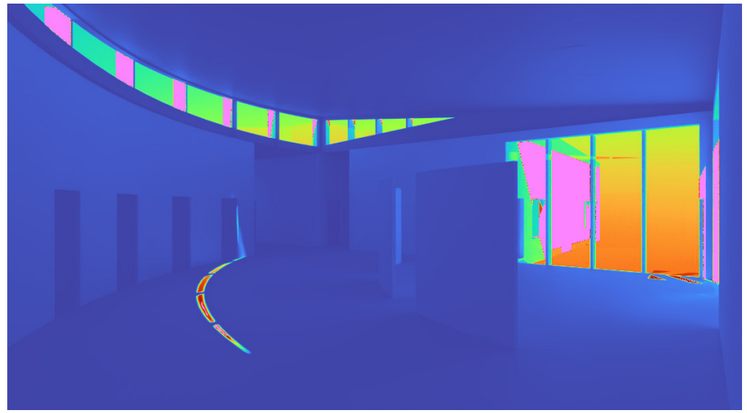
Radiance Rendering
3:00 PM



Falsecolor (Range 0-4000 cd/m2)
9:00 AM



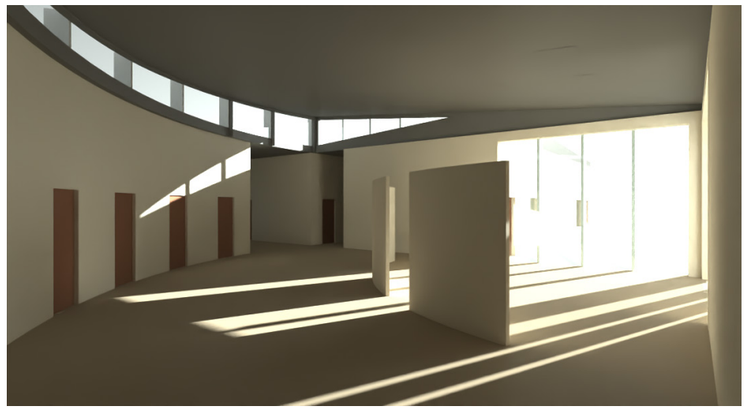
Falsecolor (Range 0-4000 cd/m2)
12:00 PM



Falsecolor (Range 0-4000 cd/m2)
3:00 PM

Daylighting Analysis

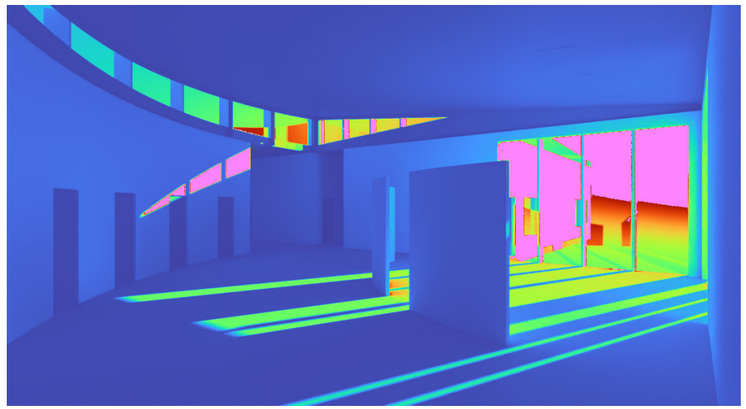
Radiance Rendering - Winter Solstice
CIE Clear Sky



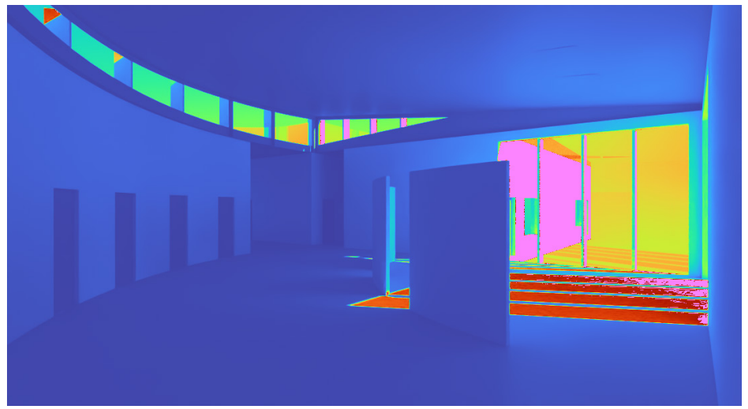
Radiance Rendering
9:00 AM

Radiance Rendering
12:00 PM

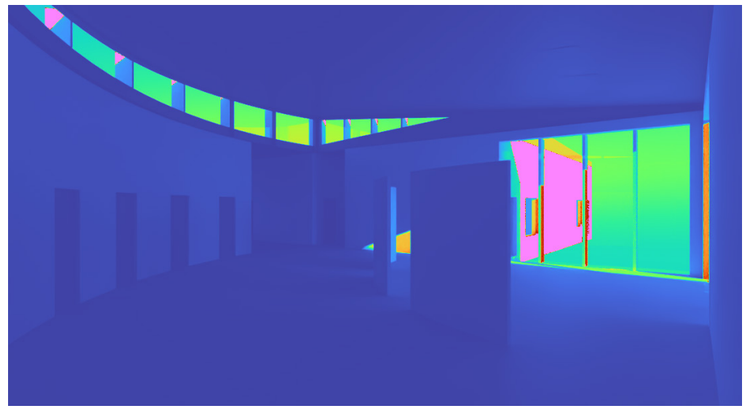
Radiance Rendering
3:00 PM



Falsecolor (Range 0-4000 cd/m2)
9:00 AM



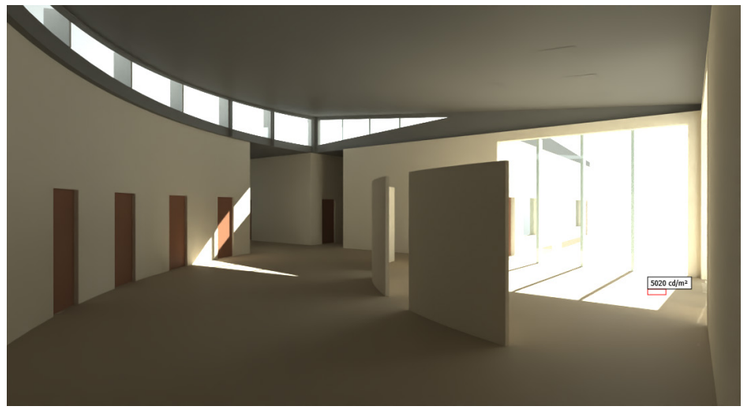
Falsecolor (Range 0-4000 cd/m2)
12:00 PM



Falsecolor (Range 0-4000 cd/m2)
3:00 PM

Daylighting Analysis

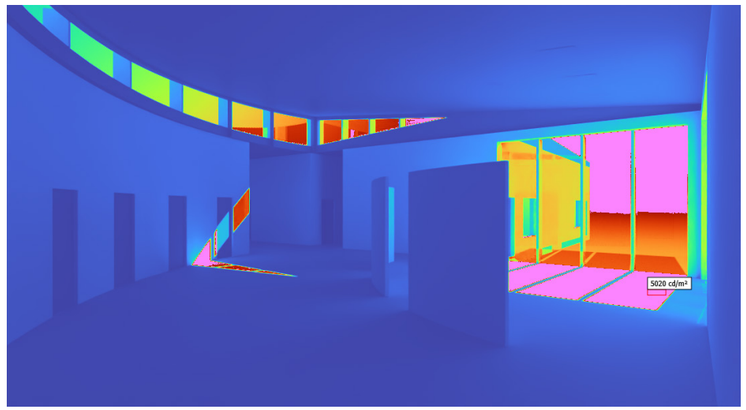
Radiance Rendering - Equinox
CIE Clear Sky



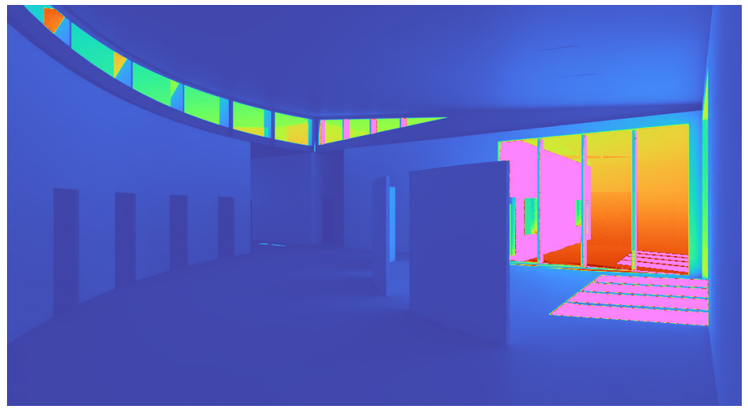
Radiance Rendering
9:00 AM

Radiance Rendering
12:00 PM

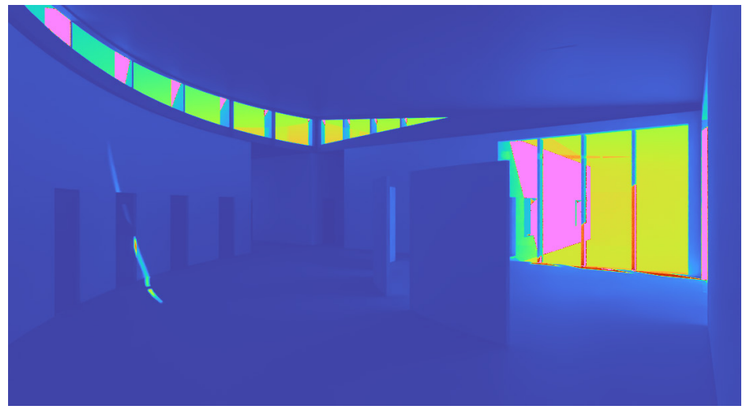
Radiance Rendering
3:00 PM



Falsecolor (Range 0-4000 cd/m2)
9:00 AM



Falsecolor (Range 0-4000 cd/m2)
12:00 PM



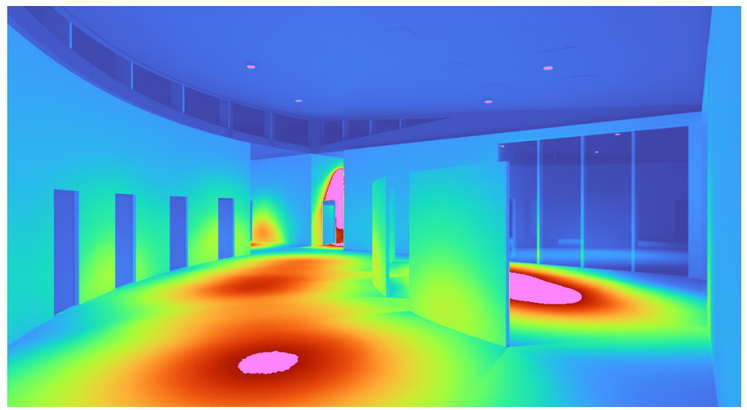
Falsecolor (Range 0-4000 cd/m2)
3:00 PM

Electric Lighting Analysis

Radiance Rendering - Nighttime
Luminaires - (7) Circular Downlight 6-inch 42W 2930 lm

Wireframe model showing luminaires

Radiance Rendering



Falsecolor (Range 0 - 20 cd/m2

Daylight 2

2
credits

59.8%
sDA

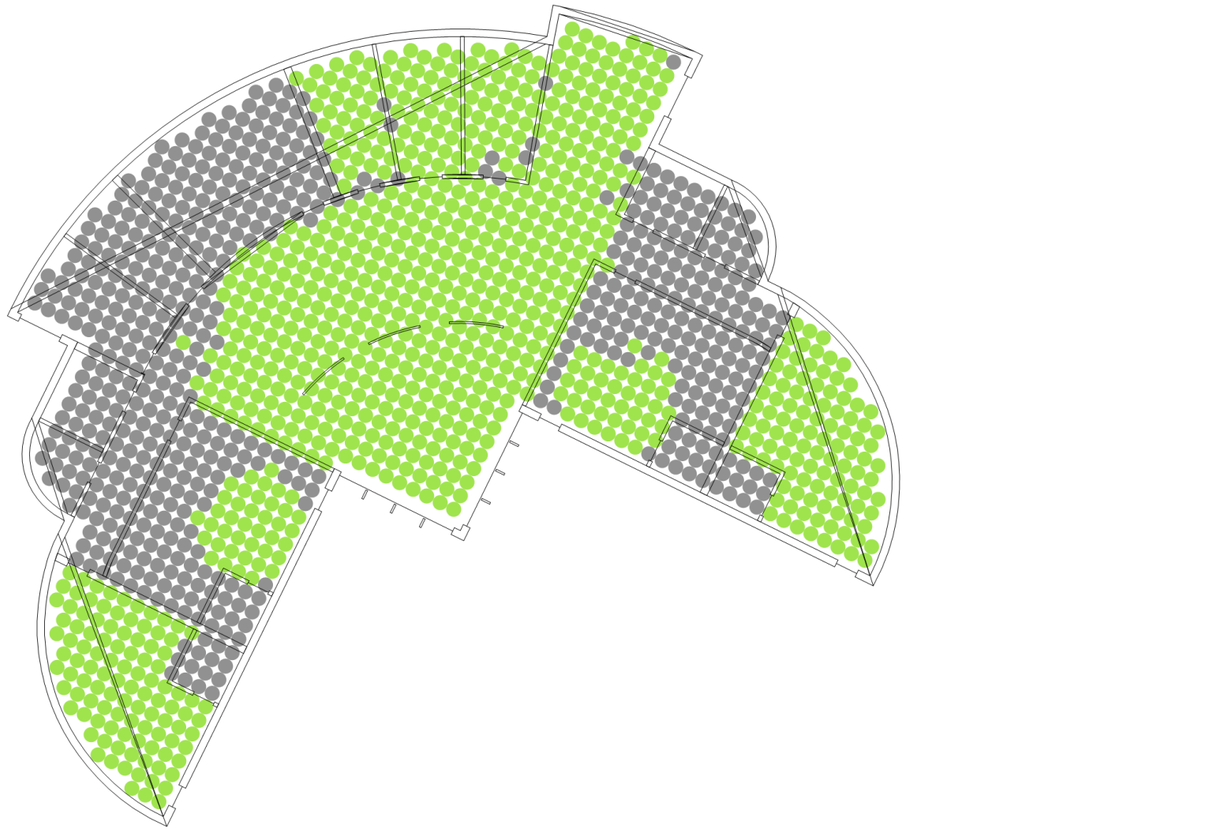
10.1%*
ASE

854
avg lux

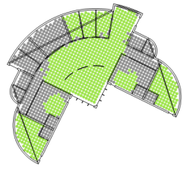
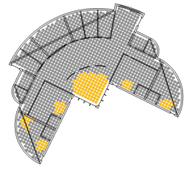
74.8%
blinds open

** ASE > 10% in one or more spaces. The design addresses glare in these areas as follows:*

with blinds



LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
Floor	6323 ft²	2.0 ft	Y		59.83%		10.13%
Totals	6323 ft²				59.83%		10.13%

LEED v4.1 - Daylight Report

Appendix

Software: ClimateStudio v1.9.8389.21977
Engine: Radiance 5.3
Weather: USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset: 0°
Ambient Bounces: 6
Passes Completed: 100
Primary Ambient Samples: 6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
roof	64	Dark Grey Aluminium Roof Lining	19.4%	0.0%
windows	20	Clear - Clear	14.9%	77.4%
doors	24	Dark Brown door	15.8%	0.0%
walls	348	Beige Painted wall	68.1%	0.0%
floor	25	Beige Tile floor	36.8%	0.0%
louvers	108	Aluminum metal cladding	64.8%	0.0%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0	Floor	217 ft²	Clear - Clear	77.4%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	77.32%
1	Floor	217 ft²	Clear - Clear	77.4%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	72.27%

Occupancy

Space ID	Occupancy Schedule
Floor	8am-6pm with DST

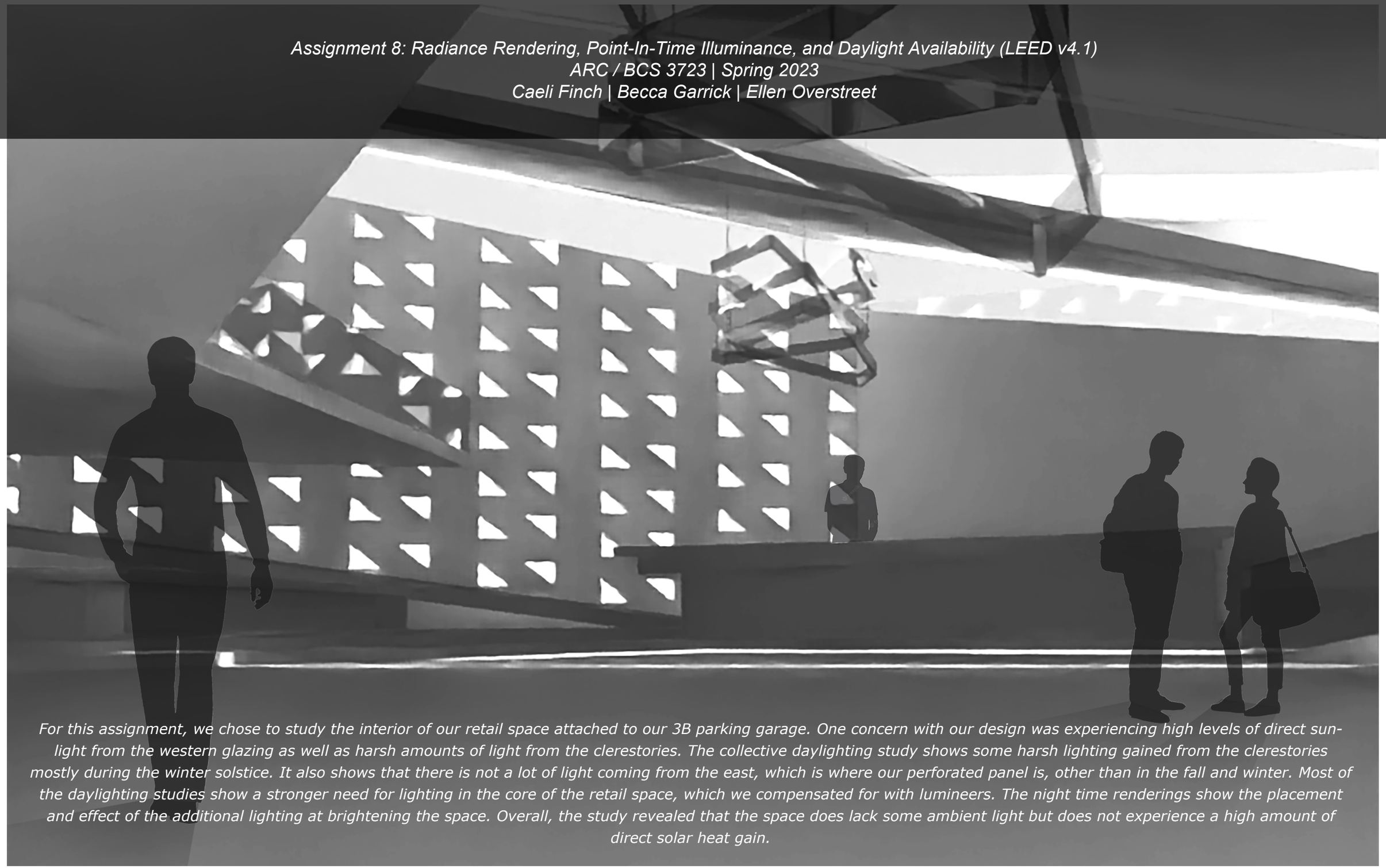
LEED v4.1 - Daylight Report

Appendix

Glossary

sDA:	Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.
ASE:	Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.
Avg Lux:	Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.
Blinds open:	Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.
Shading:	(Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE. The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.

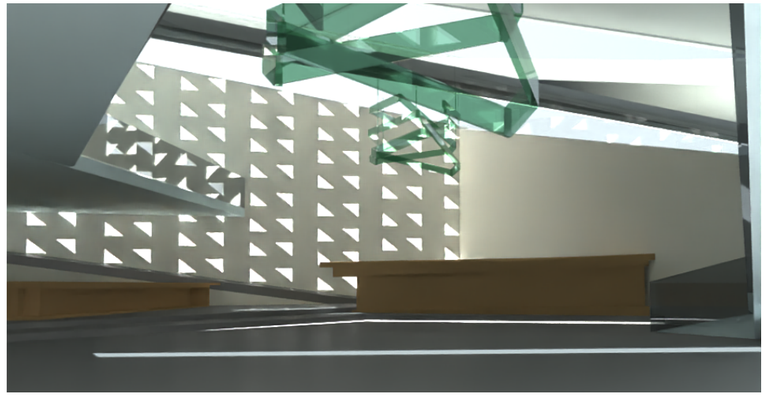
Assignment 8: Radiance Rendering, Point-In-Time Illuminance, and Daylight Availability (LEED v4.1)
ARC / BCS 3723 | Spring 2023
Caeli Finch | Becca Garrick | Ellen Overstreet



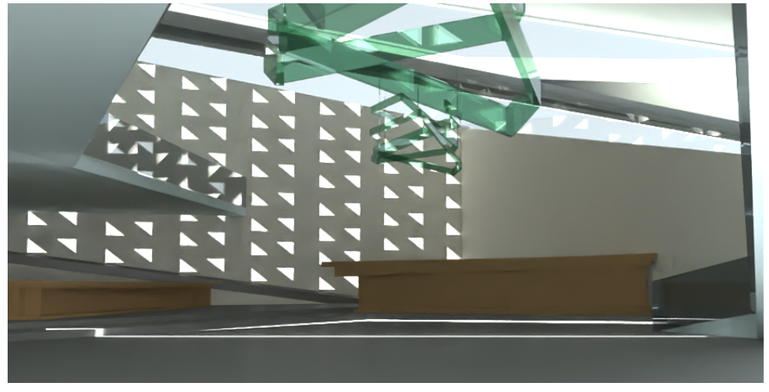
For this assignment, we chose to study the interior of our retail space attached to our 3B parking garage. One concern with our design was experiencing high levels of direct sunlight from the western glazing as well as harsh amounts of light from the clerestories. The collective daylighting study shows some harsh lighting gained from the clerestories mostly during the winter solstice. It also shows that there is not a lot of light coming from the east, which is where our perforated panel is, other than in the fall and winter. Most of the daylighting studies show a stronger need for lighting in the core of the retail space, which we compensated for with lumineers. The night time renderings show the placement and effect of the additional lighting at brightening the space. Overall, the study revealed that the space does lack some ambient light but does not experience a high amount of direct solar heat gain.

Daylighing Analysis

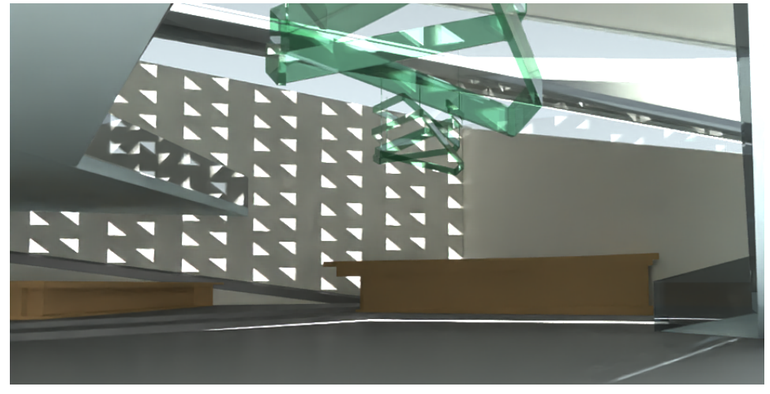
Radiance Rendering - Summer Solstice
CIE Clear Sky



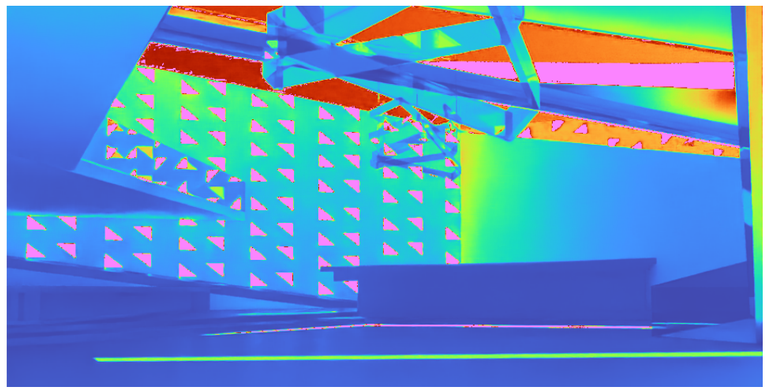
Radiance Rendering
9:00 AM



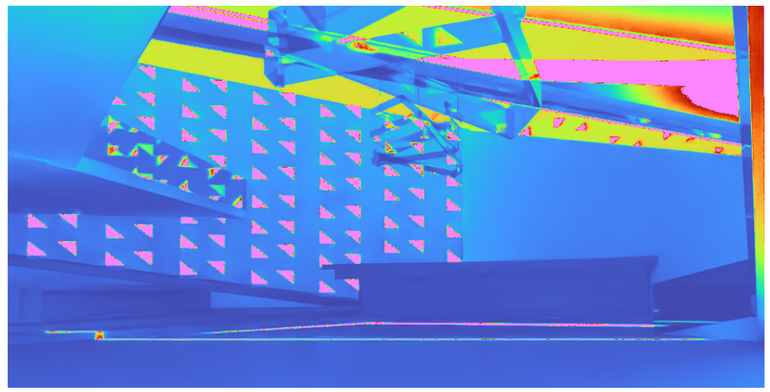
Radiance Rendering
12:00 PM



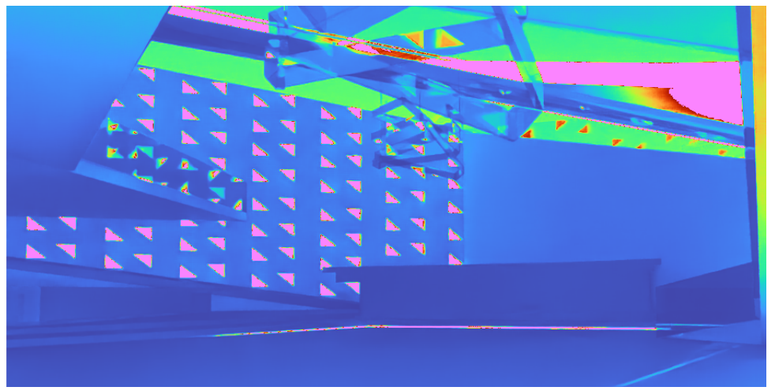
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



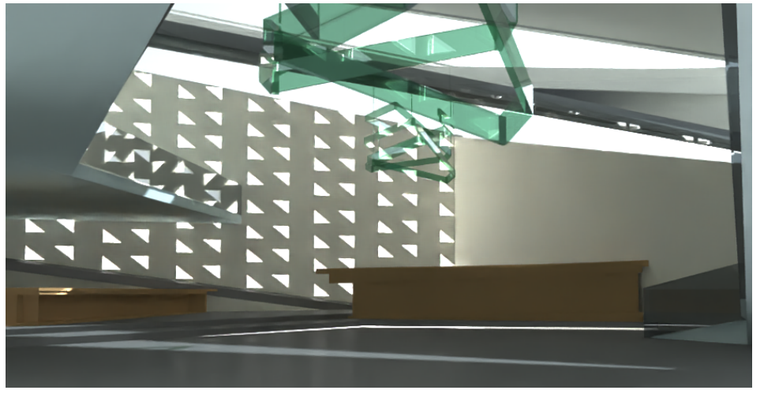
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



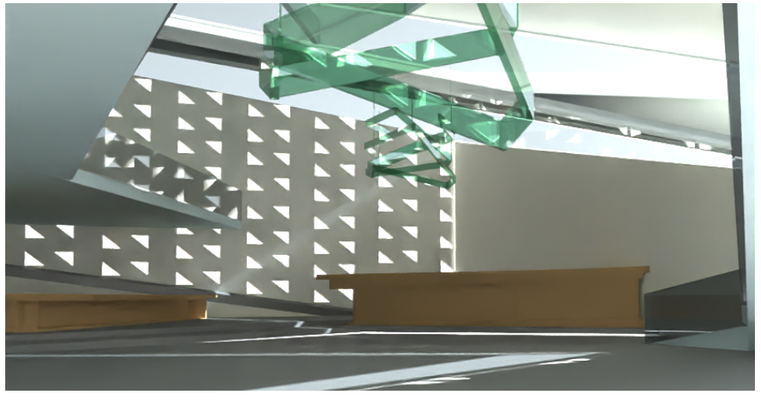
Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Daylighing Analysis

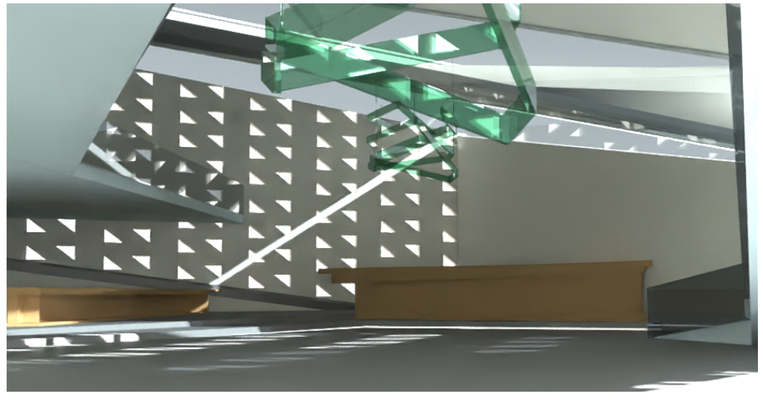
Radiance Rendering - Winter Solstice
CIE Clear Sky



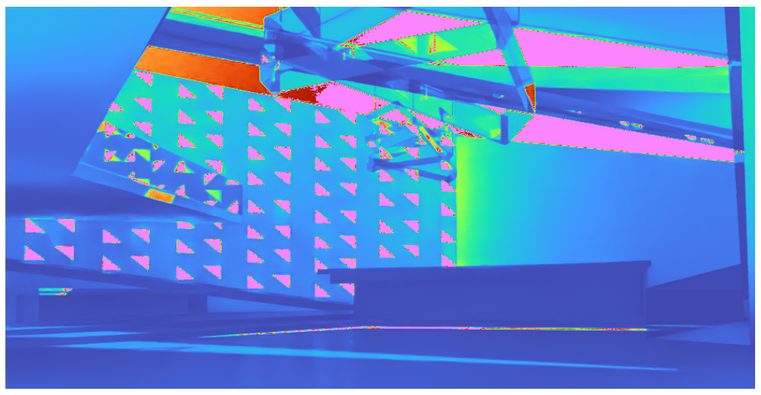
Radiance Rendering
9:00 AM



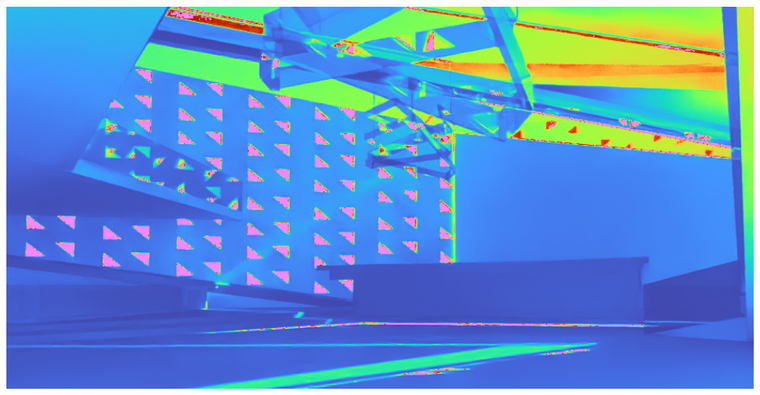
Radiance Rendering
12:00 PM



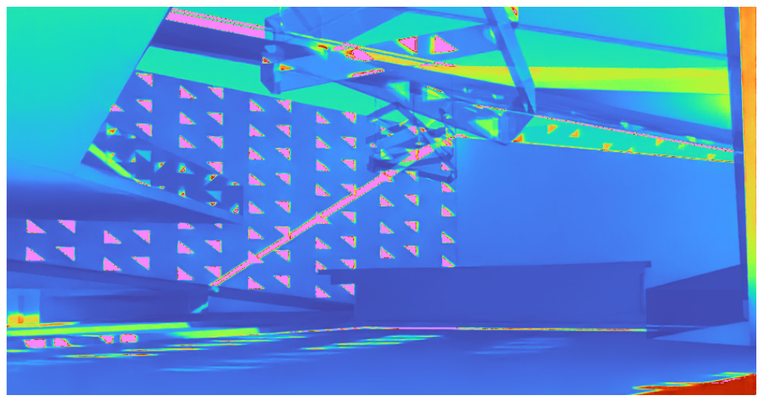
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



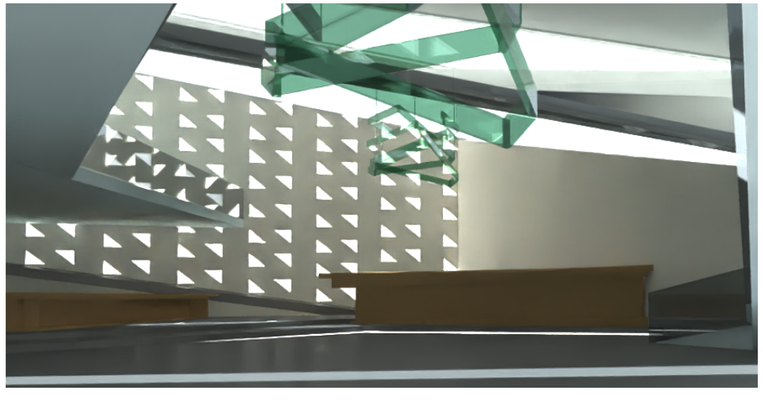
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



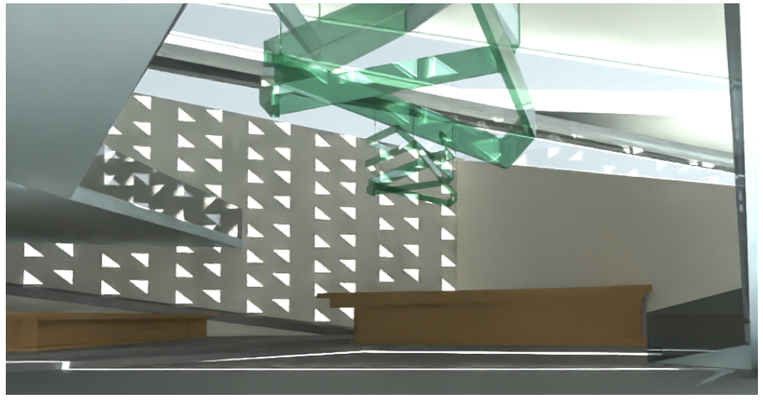
Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Daylighing Analysis

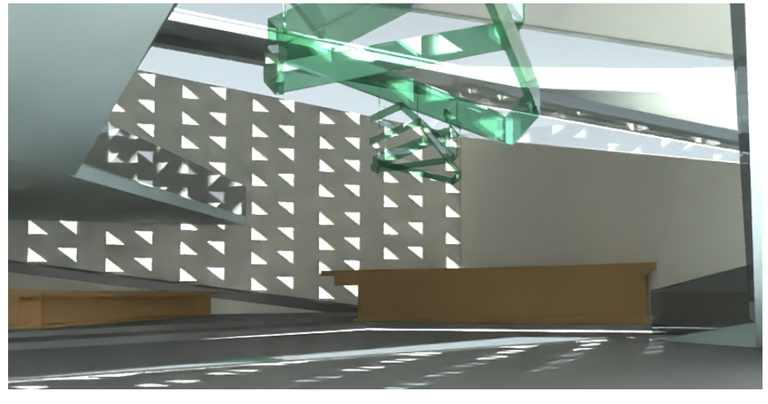
Radiance Rendering - Equinox
CIE Clear Sky



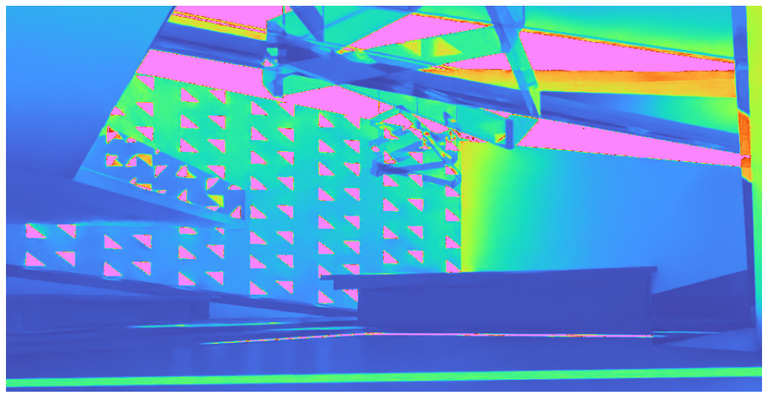
Radiance Rendering
9:00 AM



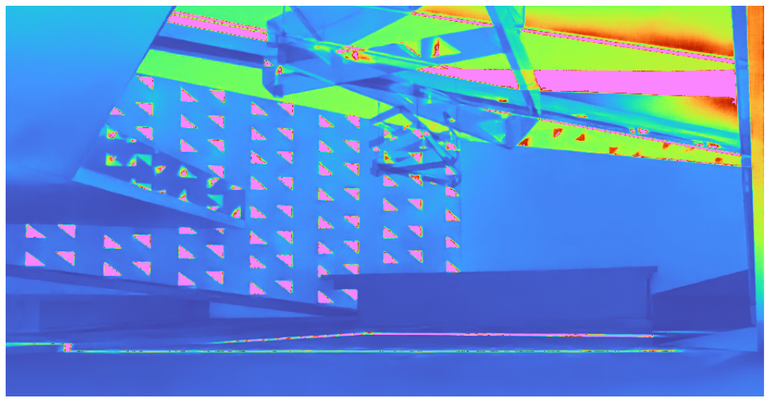
Radiance Rendering
12:00 PM



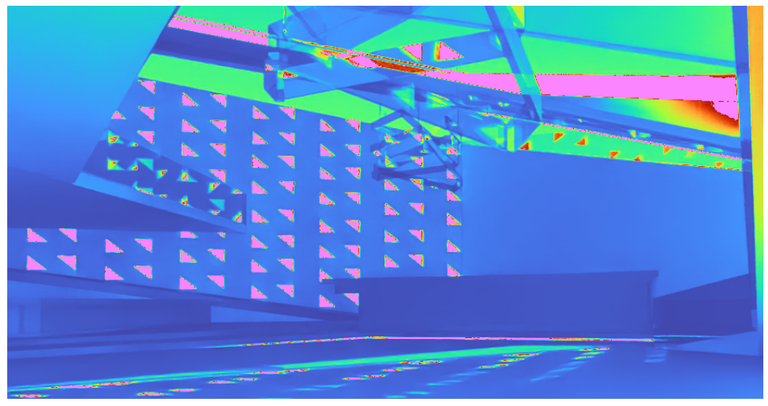
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



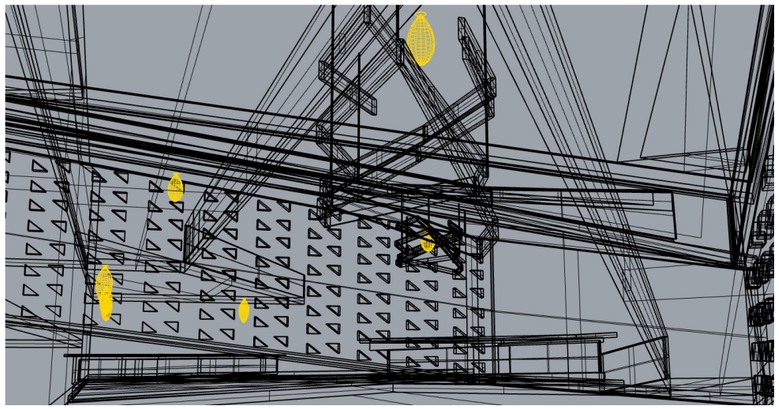
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



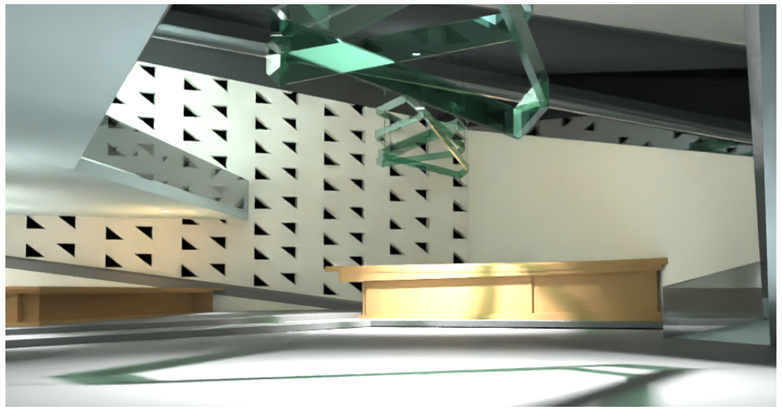
Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Electric Lighing Analysis

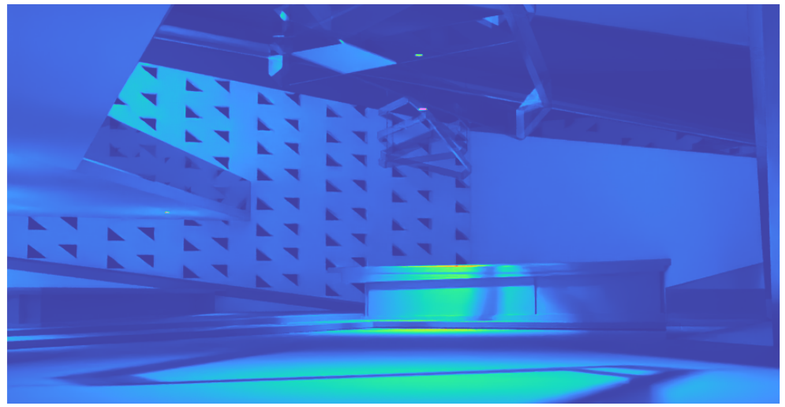
Radiance Rendering - Night time
Luminaires - (4) Circular Downlight 6-inch 11W 860 lm
(3) Circular Downlight 8-inch 85W 5840 lm



Wireframe model showing luminaires



Radiance Rendering



Falsecolor (Range 0 - 20 cd/m2)

Daylight 5

3
credits

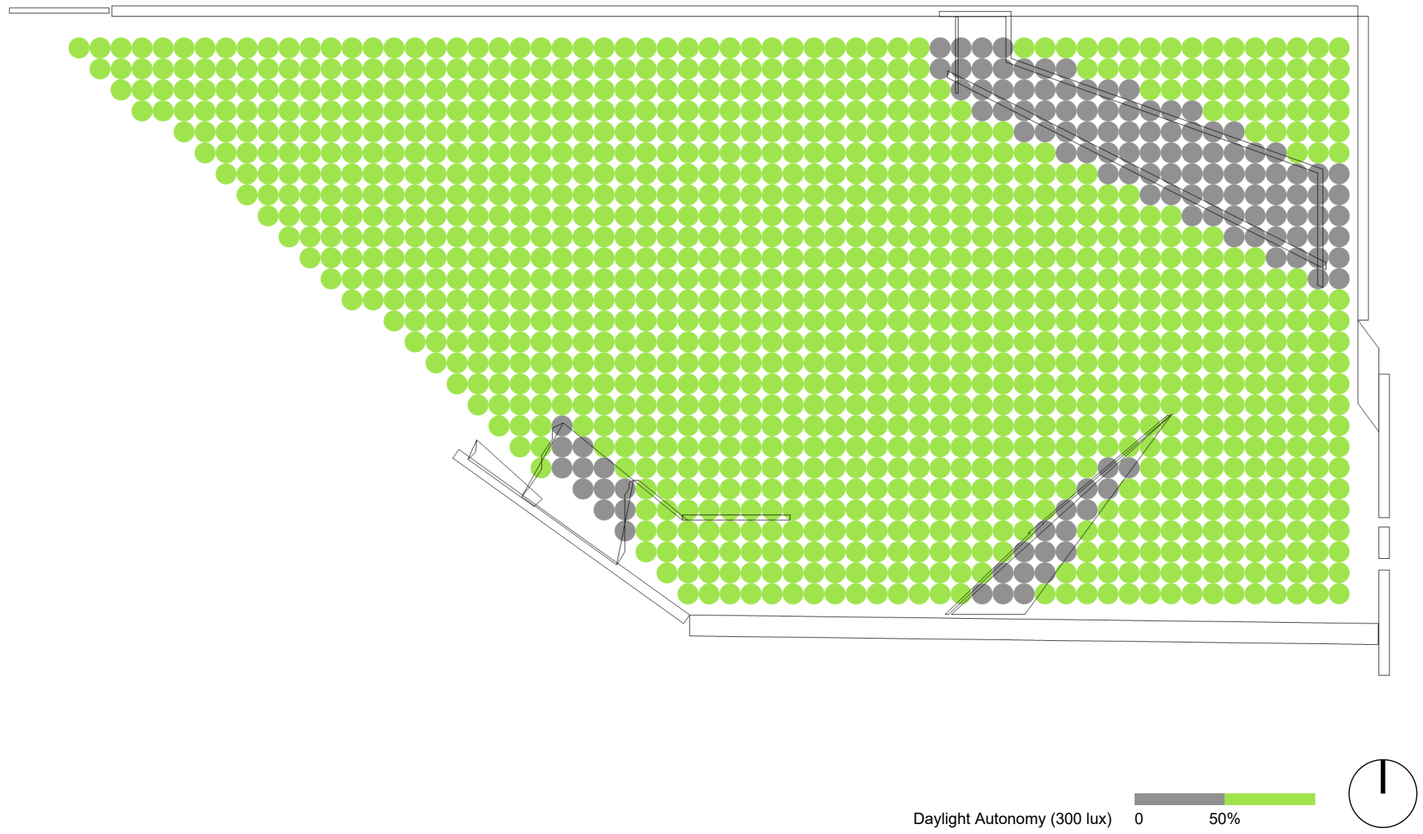
90.1%
sDA

7.1%
ASE

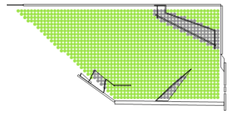
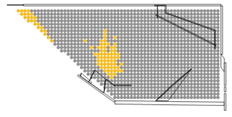
1410
avg lux

-
blinds open

No dynamic shading has been modeled because:



LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
10	5482 ft²	2.0 ft	N		90.10%		7.10%
Totals	5482 ft²				90.10%		7.10%

LEED v4.1 - Daylight Report

Appendix

Software: ClimateStudio v1.9.8389.21977
Engine: Radiance 5.3
Weather: USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset: 0°
Ambient Bounces: 6
Passes Completed: 100
Primary Ambient Samples: 6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
shell	4761	Wall Old Building	83.9%	0.0%
Glass	52	Solargrey - Clear	7.3%	39.1%
Lights	243	Solarban 70 (2) on Atlantica - Clear	8.8%	49.6%
Floor Slabs	148	Window Mullion	19.8%	0.0%
Wall	34	Wall E14 548	82.7%	0.0%
Counters	64	Walnut	28.6%	0.0%
Int Floor	8	Window Mullion	19.8%	0.0%
Ramp E	129	Dupont White Blue 108	71.3%	0.0%

Occupancy

Space ID	Occupancy Schedule
10	8am-6pm with DST

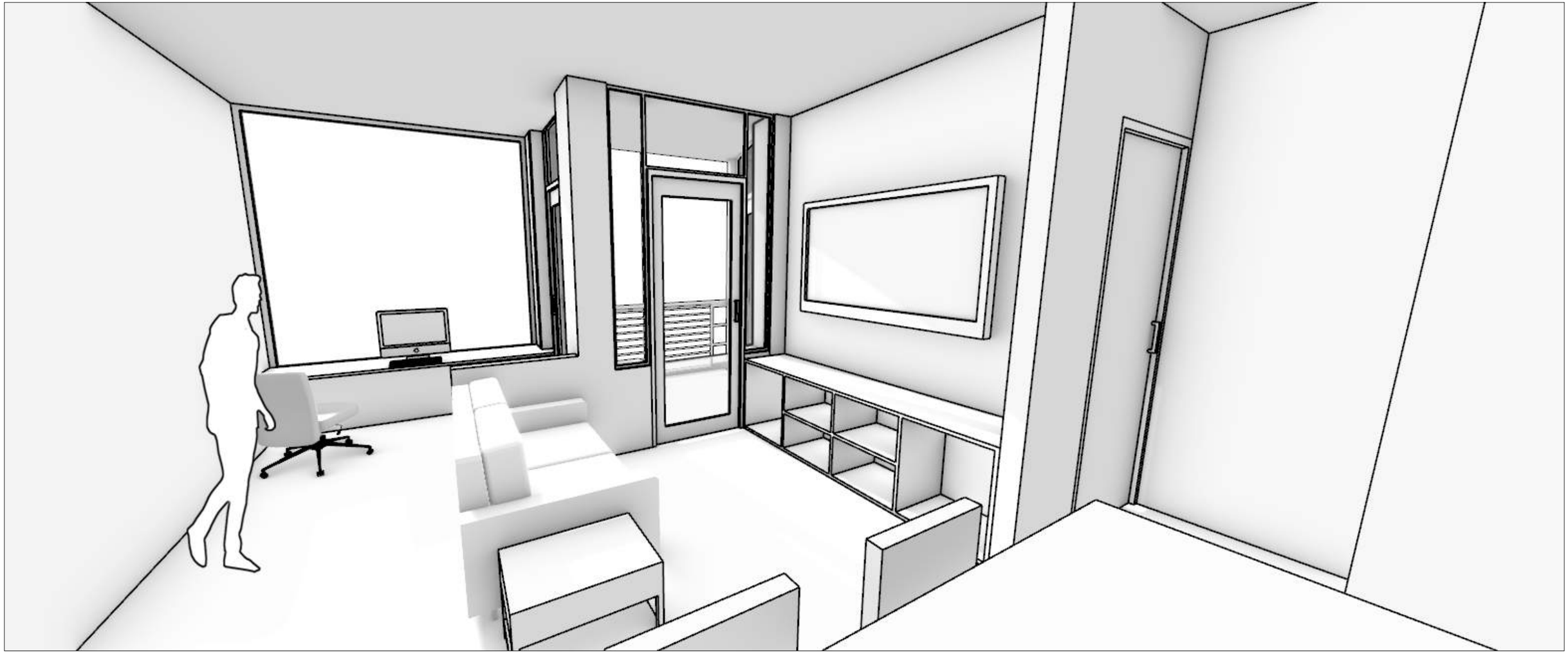
Glossary

sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.
ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.
Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.
Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

LEED v4.1 - Daylight Report

Appendix

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.



Assignment 10: Radiance Rendering and Daylight Availability (LEED v4.1)
ARC / BCS 3723 | Spring 2022
Sam Marcus

For this assignment, I studied the daylighting of my 3A apartment design in Chicago. As I was designing this one bedroom residential unit, I was concerned with the placement of a home office directly in front of two 8' x 8' south facing windows because I thought it might cause glare and create an uncomfortable work environment. According to the sDA, average lux, and the radiance renderings, particularly the ones taken during the equinox, glare would have occasionally created an issue for the home office space. The radiance renders also showed that direct southern sunlight could reach the living room space on winter mornings and hit the TV. Blinds could help with the TV glare issue, but the design intent for the office was to have a view of the city as you worked on your computer and blinds would prevent that. I believe the best response to this issue would be upping the tint / number of panes on the 8' x 8' windows or a shading device that specifically blocked southeastern light without obscuring the view of the city.

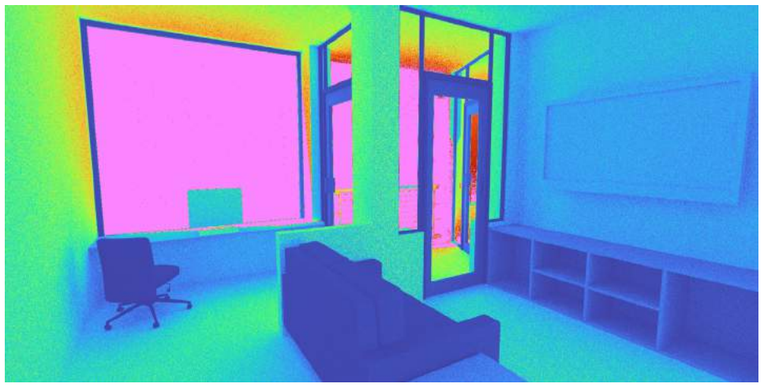
Daylighing Analysis

Radiance Rendering - Summer Solstice
CIE Clear Sky

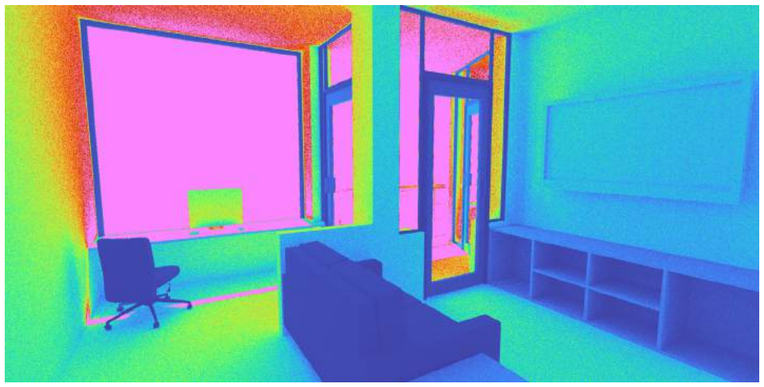
Radiance Rendering
9:00 AM

Radiance Rendering
12:00 PM

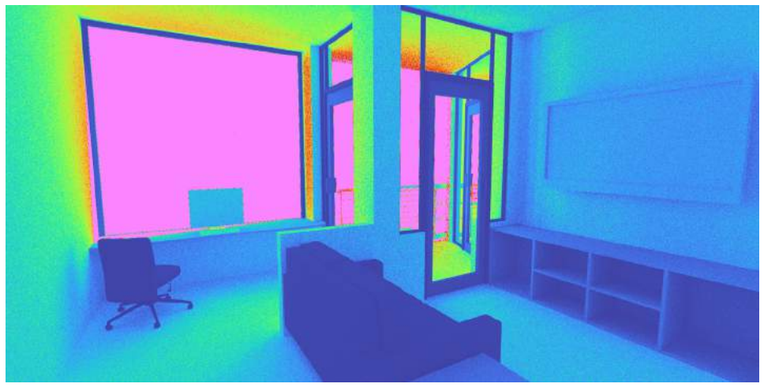
Radiance Rendering
3:00 PM



Falsecolor (Range 0-2000 cd/m2)
9:00 AM



Falsecolor (Range 0-2000 cd/m2)
12:00 PM



Falsecolor (Range 0-2000 cd/m2)
3:00 PM

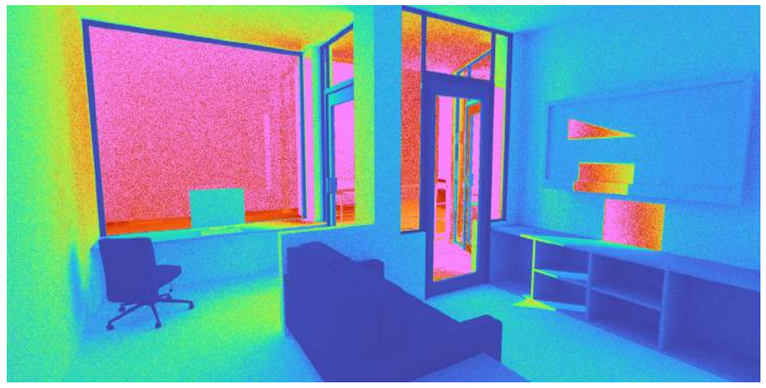
Daylighing Analysis

Radiance Rendering - Winter Solstice
CIE Clear Sky

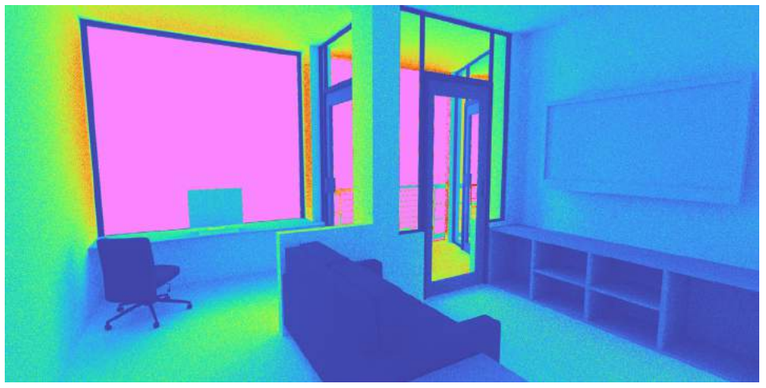
Radiance Rendering
9:00 AM

Radiance Rendering
12:00 PM

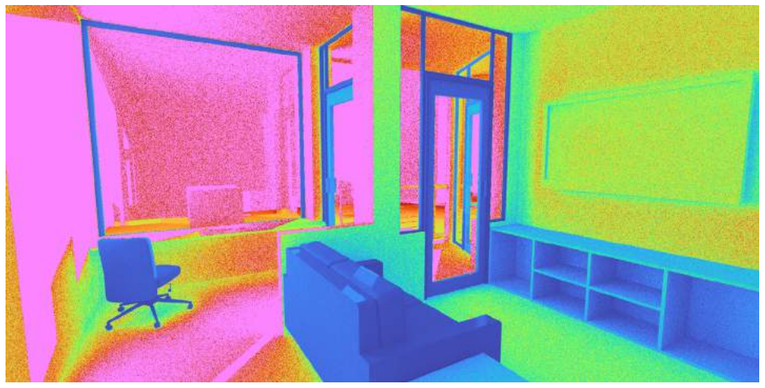
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



Falsecolor (Range 0-1000 cd/m2)
12:00 PM

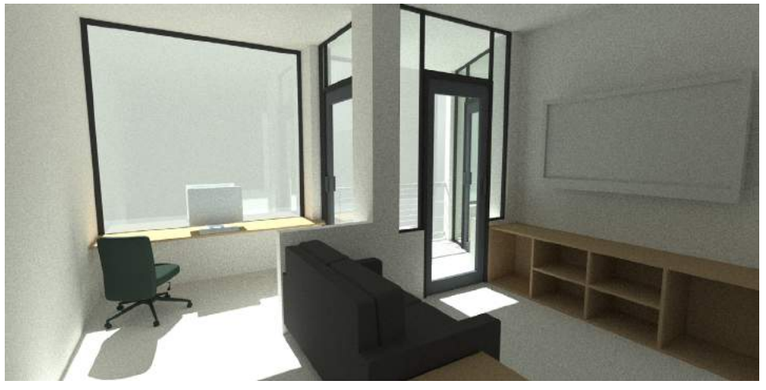


Falsecolor (Range 0-1000 cd/m2)
3:00 PM

Daylighing Analysis

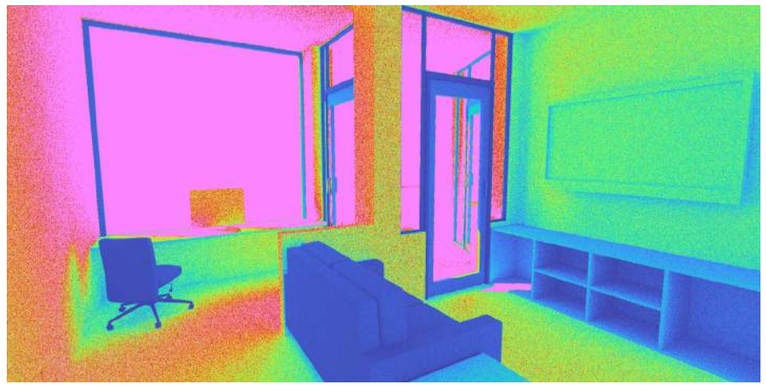
Radiance Rendering - Equinox
CIE Clear Sky

Radiance Rendering
9:00 AM

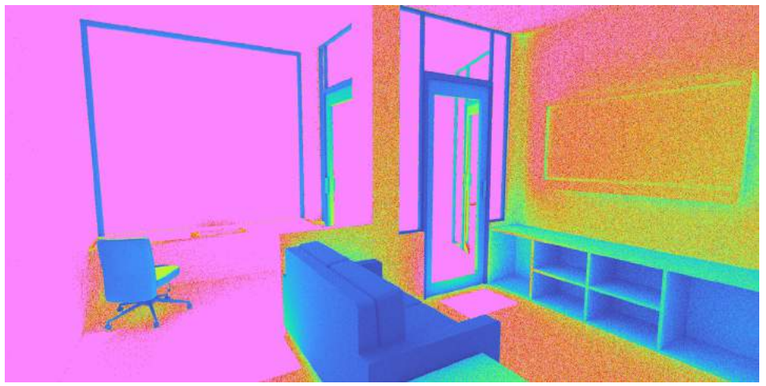


Radiance Rendering
12:00 PM

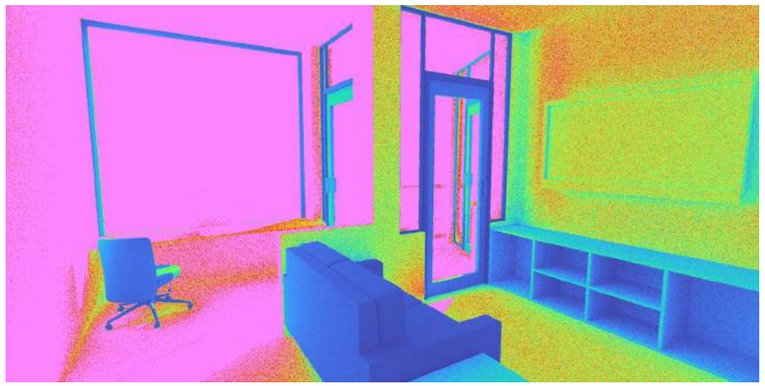
Radiance Rendering
3:00 PM



Falsecolor (Range 0-1000 cd/m2)
9:00 AM



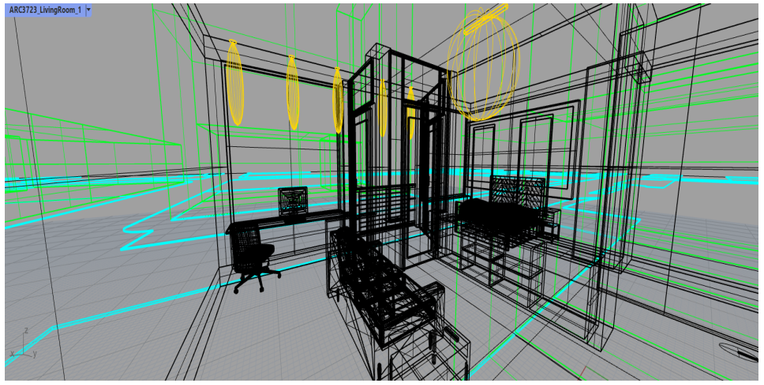
Falsecolor (Range 0-1000 cd/m2)
12:00 PM



Falsecolor (Range 0-1000 cd/m2)
3:00 PM

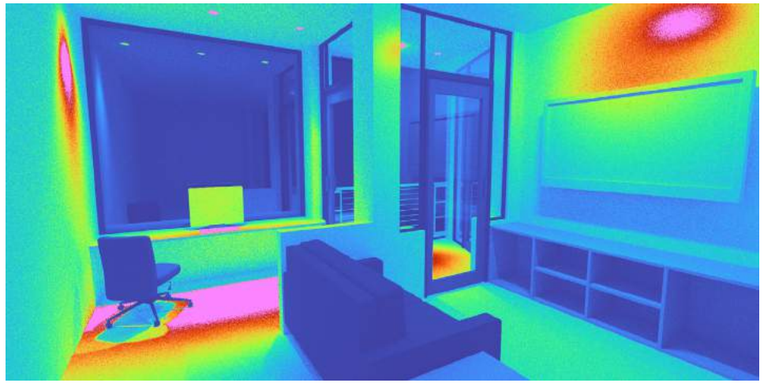
Electric Lighing Analysis

Radiance Rendering - Nighttime
Luminaires - (5) Circular Downlight 4-inch 11W 960 lm
(1) Linear Suspended Strip Diffuse Lens 4’ 24



Wireframe model showing luminaires

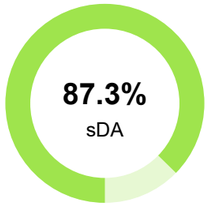
Radiance Rendering

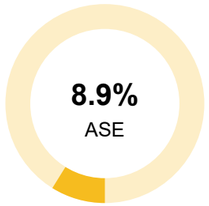


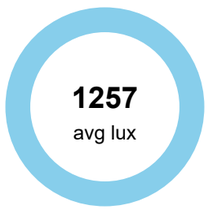
Falsecolor (Range 0 - 100 cd/m2)

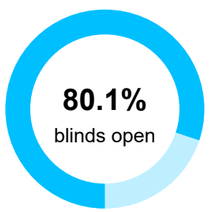
Daylight 7


3
credits


87.3%
sDA


8.9%
ASE


1257
avg lux


80.1%
blinds open


Daylight Autonomy (300 lux)
0
50%

LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
Floor	584 ft²	1.0 ft	Y		87.32%		8.85%
Totals	584 ft²				87.32%		8.85%

LEED v4.1 - Daylight Report

Software: ClimateStudio v1.6.8014.23531
Engine: Radiance 5.3
Weather: USA_IL_Chicago.Midway.Intl.AP.725340_TMYx.2004-2018.epw
North Offset: 0°
Ambient Bounces: 6
Passes Completed: 100
Primary Ambient Samples: 6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
4_BUILDINGEXTRUDESRF	261	Beige Ceramic Tile wall	85.2%	0.0%
ARC3723_Walls	99	Beige Ceramic Tile wall	85.2%	0.0%
ARC3723_Windows	10	Clear - Sungate 400 (3) (Argon)	13.4%	75.4%
ARC3723_Mullions	74	Black Painted Mullion	4.6%	0.0%
ARC3723_DoorFrame_1	30	Black Painted Mullion	4.6%	0.0%
ARC3723_DoorFrame_2	90	Grey Mullion	10.7%	0.0%
ARC3723_Railings	174	Aluminum metal cladding	64.8%	0.0%
ARC3723_Cabinetry	201	Wood Maple	35.9%	0.0%
ARC3723_Sofa	1600	Grey Sofa Fabric	5.8%	0.0%
ARC3723_OfficeChair	9711	Fabric Green	3.7%	0.0%
ARC3723_Computer	262	White aluminum mullion	70.3%	0.0%
ARC3723_Keyboard	4151	White aluminum mullion	70.3%	0.0%
ARC3723_TV	11	Aluminum metal cladding	64.8%	0.0%
ARC3723_PictureFrame_1	20	Black Painted Mullion	4.6%	0.0%
ARC3723_PictureFrame_2	2	Clear	8.4%	87.7%
ARC3723_Bed	16	Fabric White	83.4%	0.0%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0	Floor	59 ft²	Clear - Sungate 400 (3) (Argon)	75.4%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	83.70%
1	Floor	59 ft²	Clear - Sungate 400 (3) (Argon)	75.4%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	76.49%

Occupancy

Space ID	Occupancy Schedule
Floor	8am-6pm with DST

Glossary

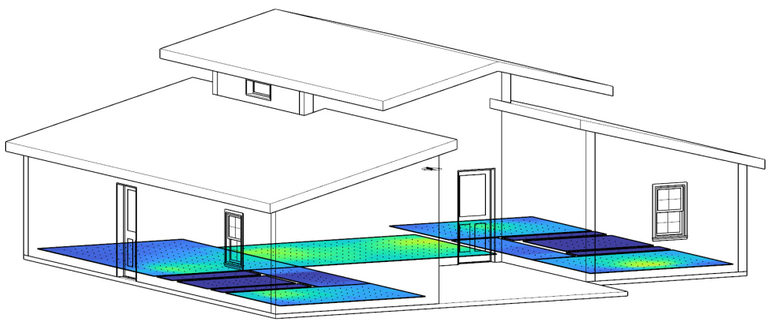
sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.

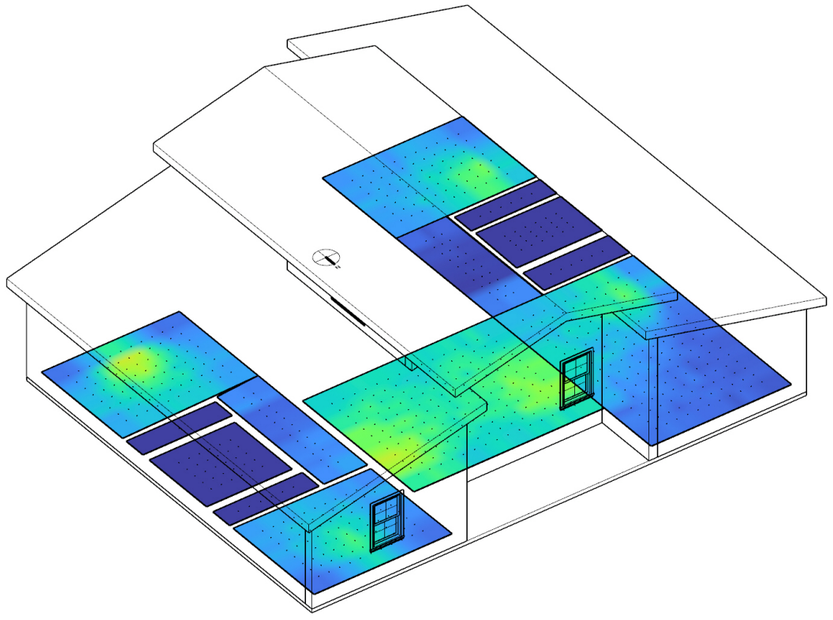
ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.

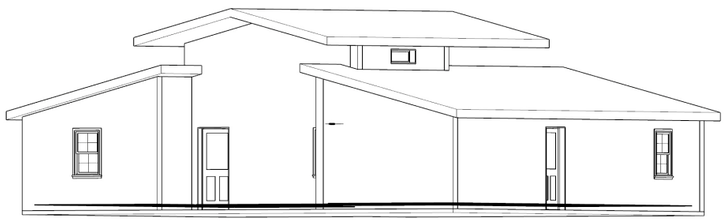
Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.

Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.





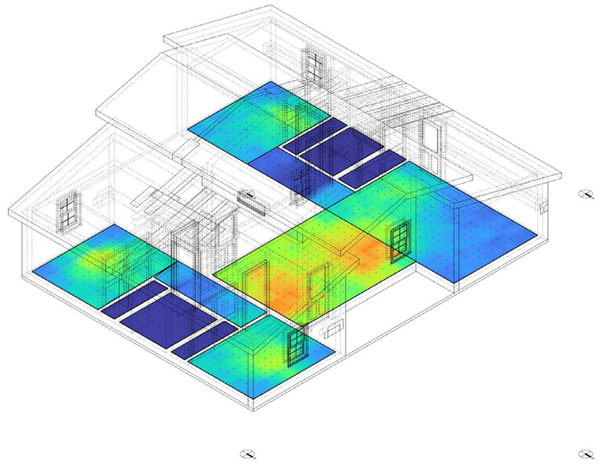


This is the Point-In-Time Illuminance and Daylight Availability study on my Habitat Home for studio. After following the instructions through the videos and adjusting materials, I found that through the daylighting analysis the house will be receiving high levels of daylighting during the winter time and lower levels in the summer and equinox as intended due to the weather in the Starkville area. With the electric lighting analysis, I can properly light the spaces with a smaller bulb and lower luminance which in turn can save money on the project. Lastly, the daylighting report demonstrates that the blinds will be open a high majority of the time as the autonomy and sunlight exposure are very low. In the end, I am satisfied with the results because the Habitat Home is suppose to minimize windows to save money not only on construction but also bills resulting from to much lighting without completely blocking out daylighting.

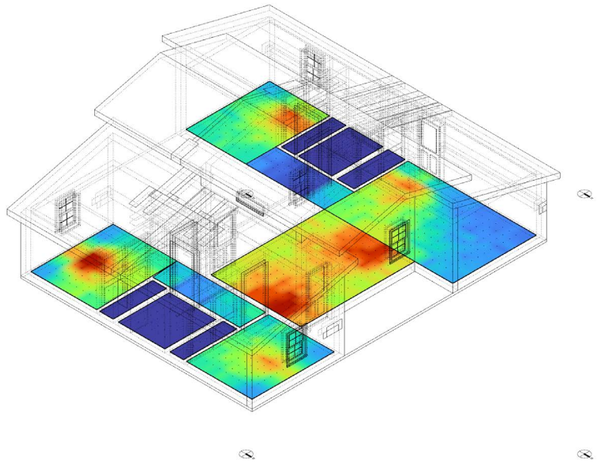
Assignment 10: Radiance Rendering, Point-In-Time Illuminance, and Daylight Availability (LEED v4.1)
ARC / BCS 3723 | Spring 2022
Elaine Otts

Daylighing Analysis

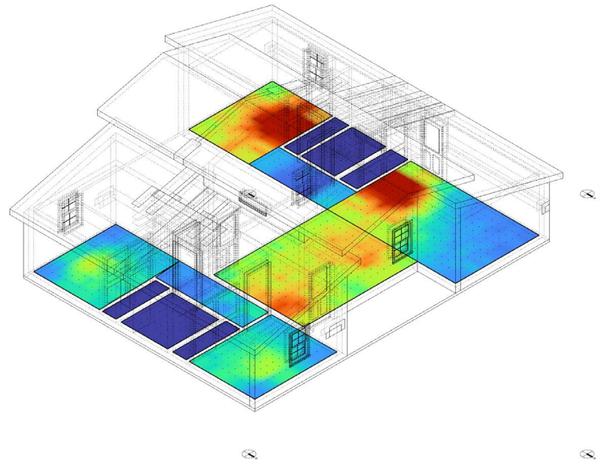
Point-In-Time Illuminance - Summer Solstice
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-300 Lux
9:00 AM



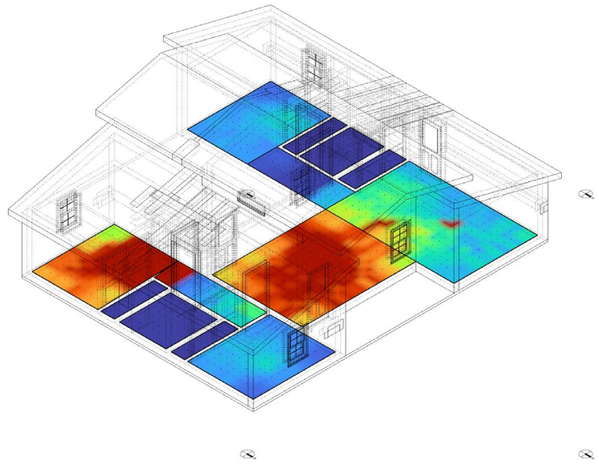
Analysis Grid - 1 ft spacing
Range 0-300 Lux
12:00 PM



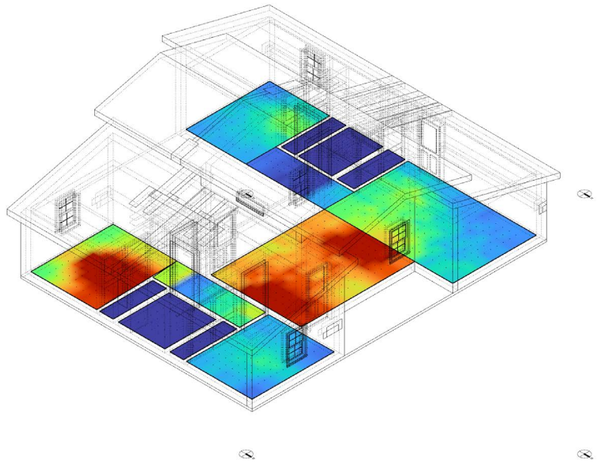
Analysis Grid - 1 ft spacing
Range 0-300 Lux
3:00 PM

Daylighing Analysis

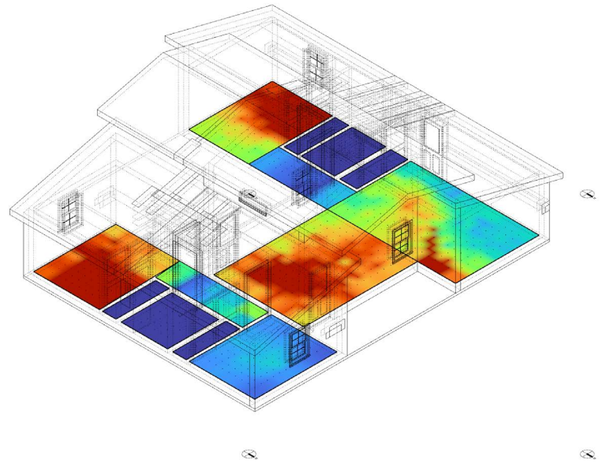
Point-In-Time Illuminance - Winter Solstice
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-300 Lux
9:00 AM



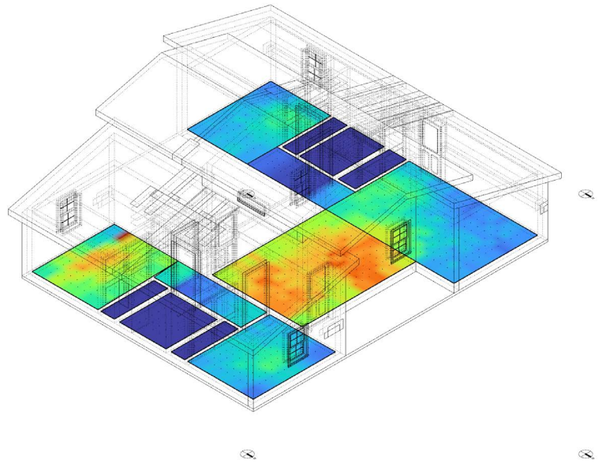
Analysis Grid - 1 ft spacing
Range 0-300 Lux
12:00 PM



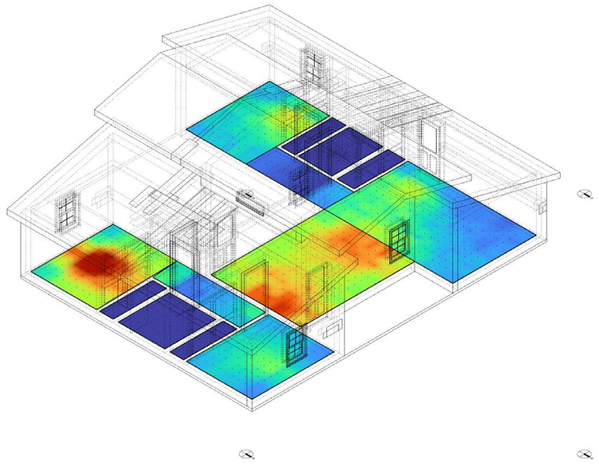
Analysis Grid - 1 ft spacing
Range 0-300 Lux
3:00 PM

Daylighing Analysis

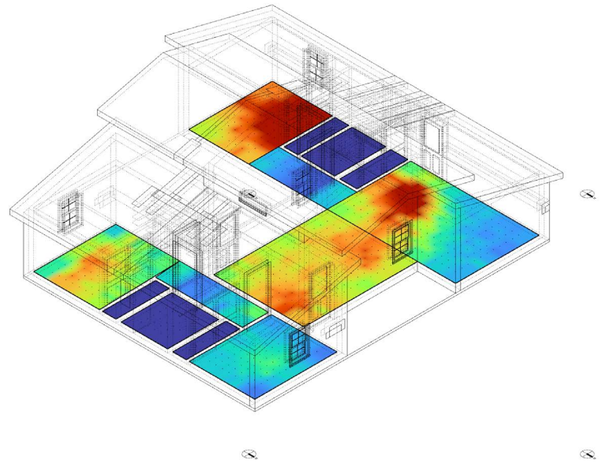
Point-In-Time Illuminance - Equinox
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-300 Lux
9:00 AM



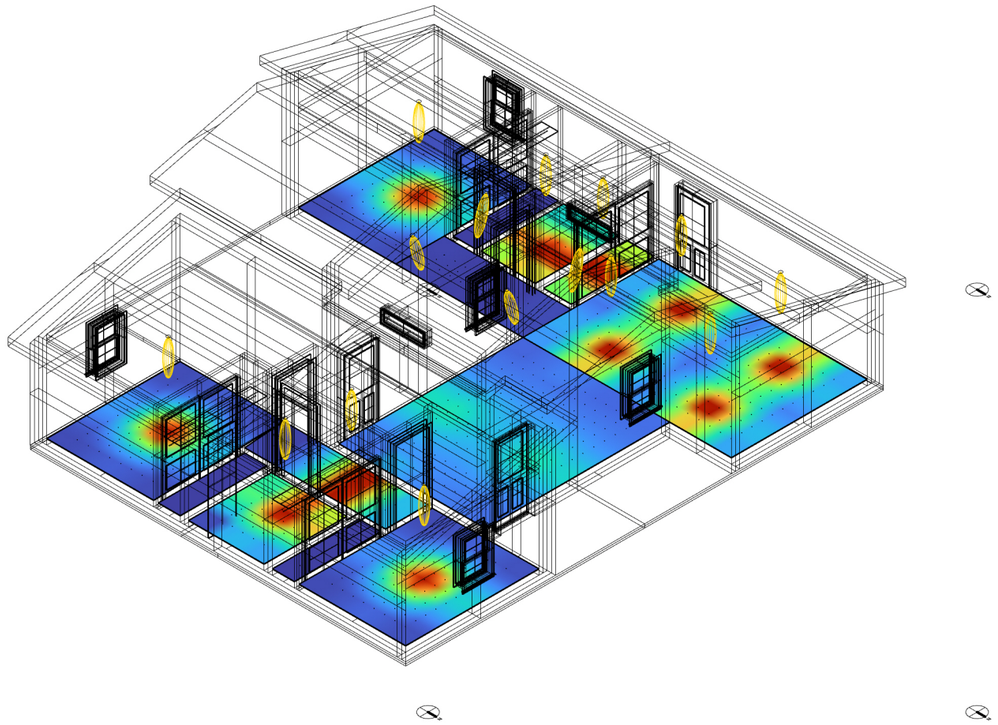
Analysis Grid - 1 ft spacing
Range 0-300 Lux
12:00 PM



Analysis Grid - 1 ft spacing
Range 0-300 Lux
3:00 PM

Electric Lighing Analysis

Point-In-Time Illuminance - Nighttime
Luminaires - (15) Circular Downlight 4-inch 11W 960 lm



Analysis Grid - 1 ft spacing
Range 0- 600 Lux

Daylight 6

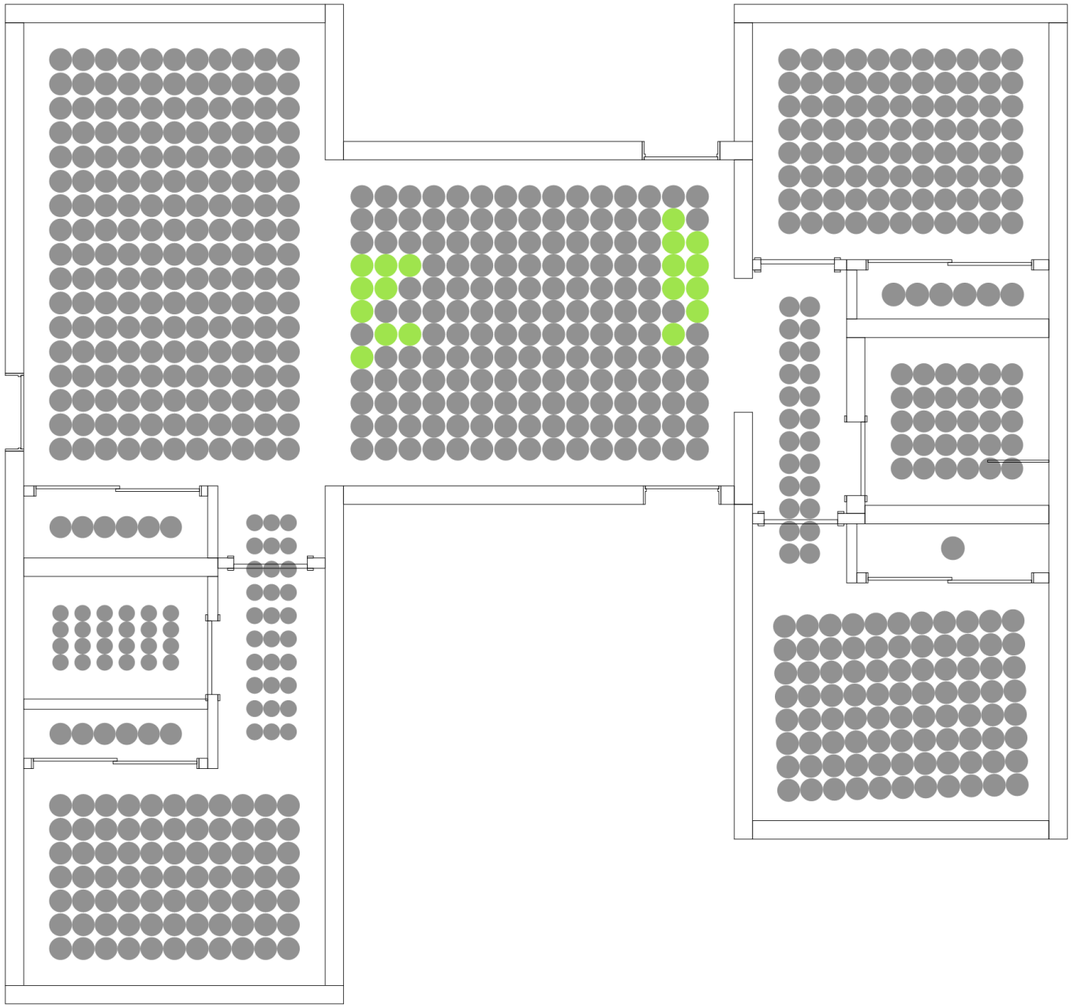
0
credits

2.1%
sDA

0.0%
ASE

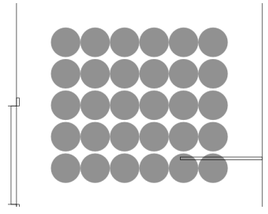
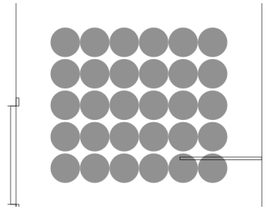
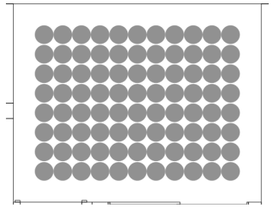
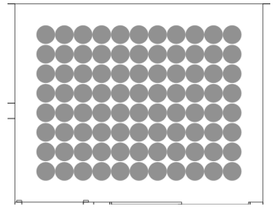
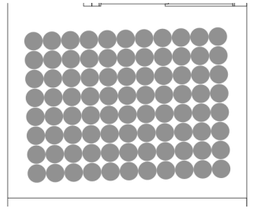
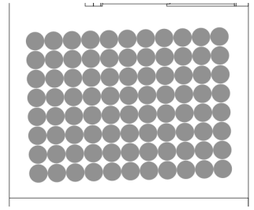
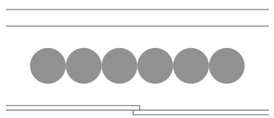
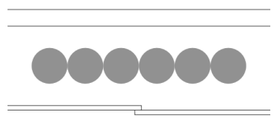
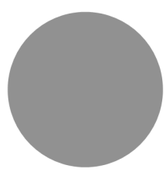
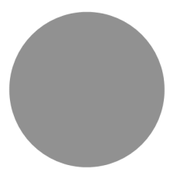
140
avg lux

92.8%
blinds open

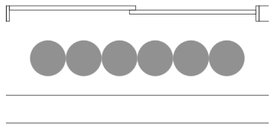
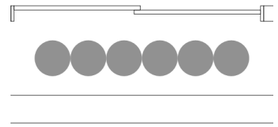
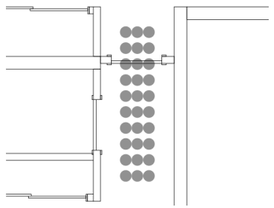
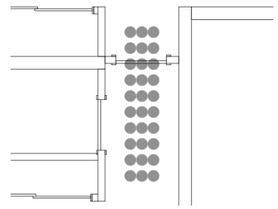
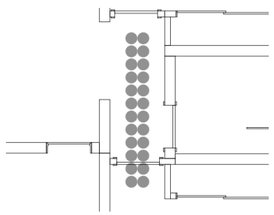
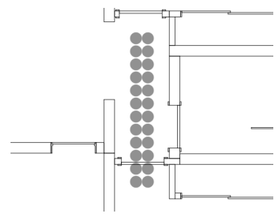
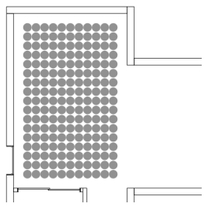
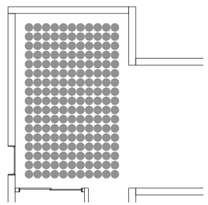
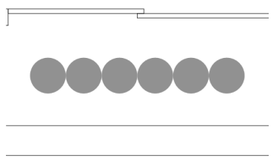
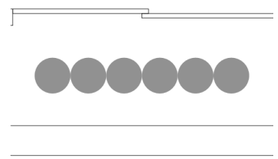


Daylight Autonomy (300 lux) 0 50%

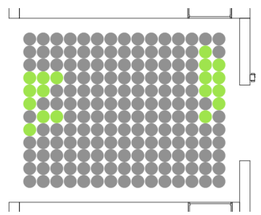
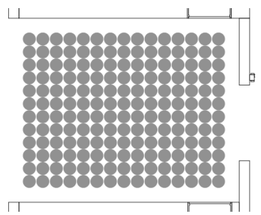
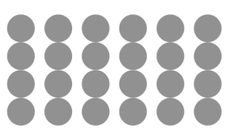
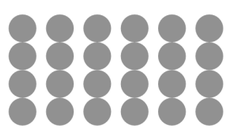
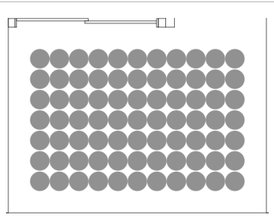
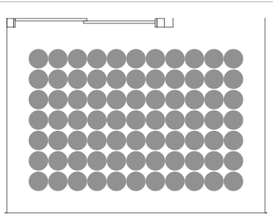
LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
ADA Bath	51 ft²	1.0 ft	N		0.00%		0.00%
bedroom 1	116 ft²	1.0 ft	Y		0.00%		0.00%
bedroom 2	115 ft²	1.0 ft	Y		0.00%		0.00%
closet	15 ft²	1.0 ft	N		0.00%		0.00%
closet	16 ft²	1.0 ft	N		0.00%		0.00%

LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
closet	16 ft²	1.0 ft	N		0.00%		0.00%
hallway	50 ft²	1.0 ft	N		0.00%		0.00%
hallway	49 ft²	1.0 ft	N		0.00%		0.00%
kitchen/dining	232 ft²	1.0 ft	Y		0.00%		0.00%
laundry	19 ft²	1.0 ft	N		0.00%		0.00%

LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
living room	222 ft²	1.0 ft	Y		10.00%		0.00%
master bath	37 ft²	1.0 ft	N		0.00%		0.00%
master bed	109 ft²	1.0 ft	Y		0.00%		0.00%
Totals	1047 ft²				2.12%		0.00%

LEED v4.1 - Daylight Report

Appendix

Software: ClimateStudio v1.7.8080.15269
Engine: Radiance 5.3
Weather: USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset: 0°
Ambient Bounces: 6
Passes Completed: 100
Primary Ambient Samples: 6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
A-GLAZ	452	Clear	8.4%	87.7%
A-GENM	205	Black Window Mullion	4.7%	0.0%
A-DOOR	346	Wooden door	45.4%	0.0%
A-DOOR-FRAM	194	Wooden Door 2	5.1%	0.0%
A-DOOR-GLAZ	18	Clear	8.4%	87.7%
A-WALL	168	Exterior Concrete wall	71.1%	0.0%
I-WALL	110	White plaster wall	89.9%	0.0%
A-FLOR	8	Exterior Concrete floor	22.0%	0.0%
A-ROOF	28	Dark Grey Aluminium Roof Lining	19.4%	0.0%
A-CLNG	12	Black Window Mullion	4.7%	0.0%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0	kitchen/dining	5 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
1	kitchen/dining	7 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	80.11%
2	living room	5 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	99.95%
3	living room	18 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
4	living room	18 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	98.11%
5	master bed	12 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	86.22%

LEED v4.1 - Daylight Report

Appendix

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
6	bedroom 2	12 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	73.56%
7	bedroom 1	12 ft²	Clear	87.7%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%

Occupancy

Space ID	Occupancy Schedule
ADA Bath	8am-6pm with DST
bedroom 1	8am-6pm with DST
bedroom 2	8am-6pm with DST
closet	8am-6pm with DST
closet	8am-6pm with DST
closet	8am-6pm with DST
hallway	8am-6pm with DST
hallway	8am-6pm with DST
kitchen/dining	8am-6pm with DST
laundry	8am-6pm with DST
living room	8am-6pm with DST
master bath	8am-6pm with DST
master bed	8am-6pm with DST

Glossary

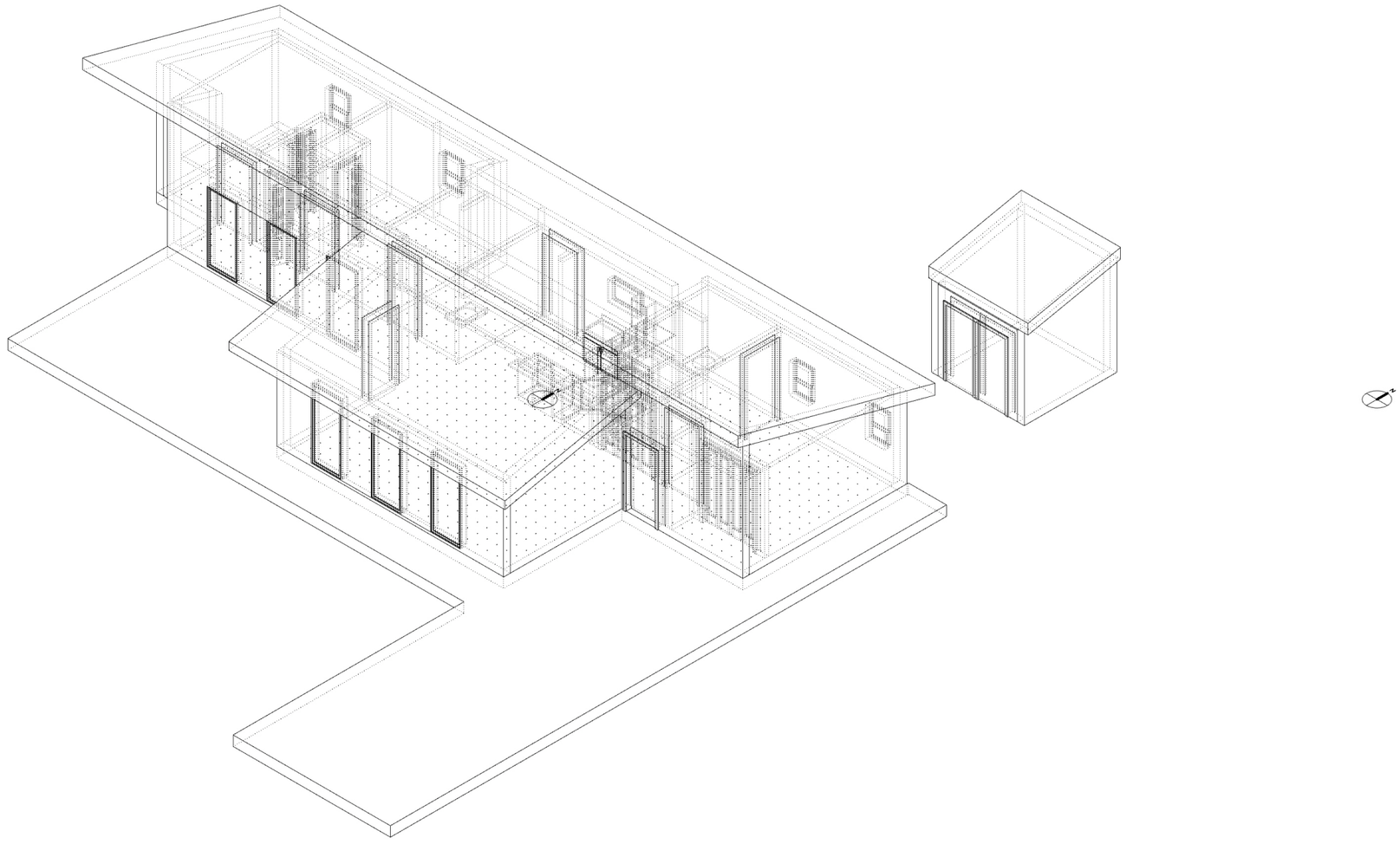
sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.

ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.

Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.

Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.

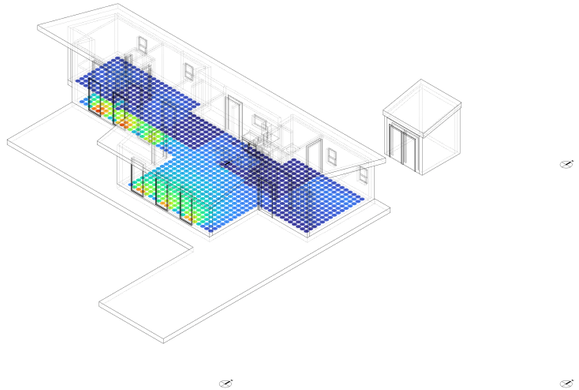


The purpose of this assignment was to get us to look closer at the amount of daylight that our windows allowed to the inside and the way that this daylight availability in turn affected our LEED requirements. While looking at this I discovered that my window placement was pretty ideal for allowing light to be let in, in the wintertime and for it to be kept out in the summer. I did notice that because the way my house was positioned, only the south facade got any direct daylighting at all. If I adjusted the position of my house I could see the effect of that shift using these techniques. This assignment also had us look at the way certain lighting choices could affect the surrounding room. As I was doing this study, I saw that some rooms needed more lighting than I originally thought and vise versa. This project helped me to look at the lighting qualities of not just the windows, but also artificial placement as well.

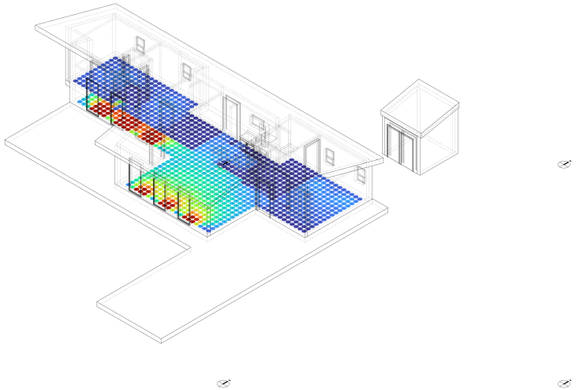
Assignment 10: Radiance Rendering, Point-In-Time Illuminance, and Daylight Availability (LEED v4.1)
ARC / BCS 3723 | Spring 2022
Kailyn Gardner

Daylighting Analysis

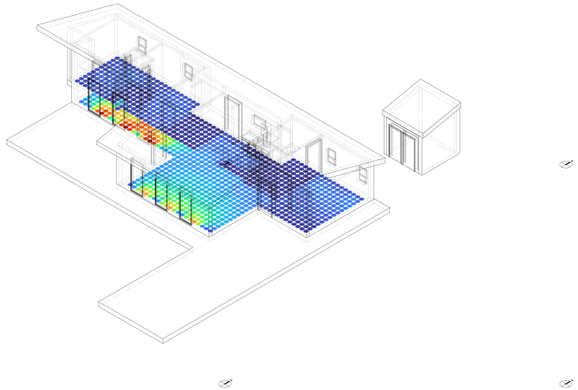
Point-In-Time Illuminance - Summer Solstice
CIE Clear Sky



Analysis Grid - 12 ft
spacing Range 0-400 Lux
9:00 AM



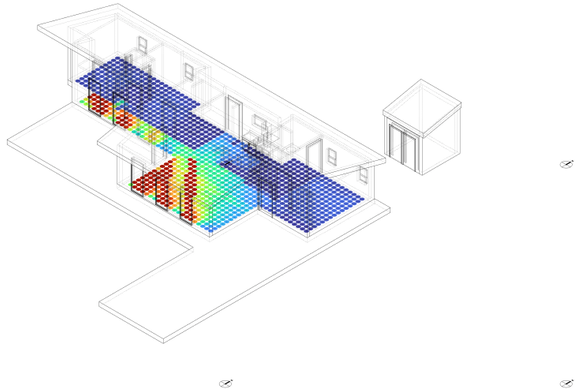
Analysis Grid - 12 ft
spacing Range 0-400 Lux
12:00 PM



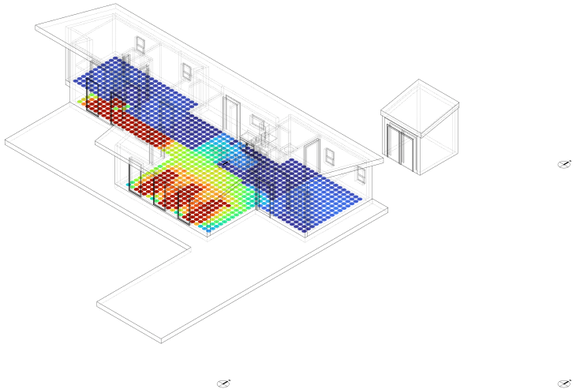
Analysis Grid - 12 ft
spacing Range 0-400 Lux
3:00 PM

Daylighting Analysis

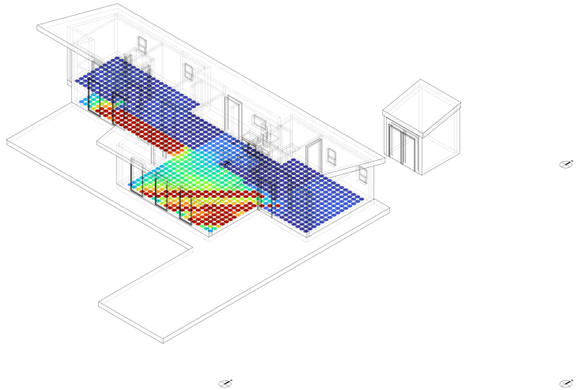
Point-In-Time Illuminance - Winter Solstice
CIE Clear Sky



Analysis Grid - 12 ft
spacing Range 0-400 Lux
9:00 AM



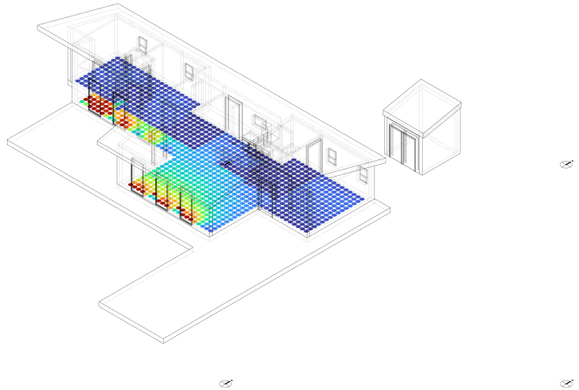
Analysis Grid - 12 ft
spacing Range 0-400 Lux
12:00 PM



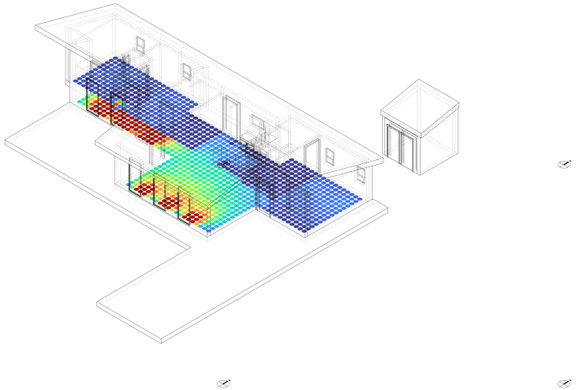
Analysis Grid - 12 ft
spacing Range 0-400 Lux
3:00 PM

Daylighting Analysis

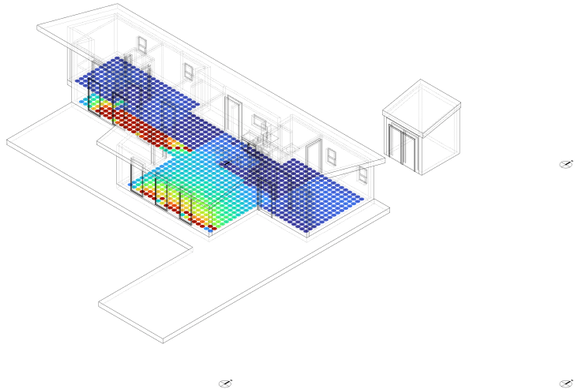
Point-In-Time Illuminance - Equinox
CIE Clear Sky



Analysis Grid - 12 ft
spacing Range 0-400 Lux
9:00 AM



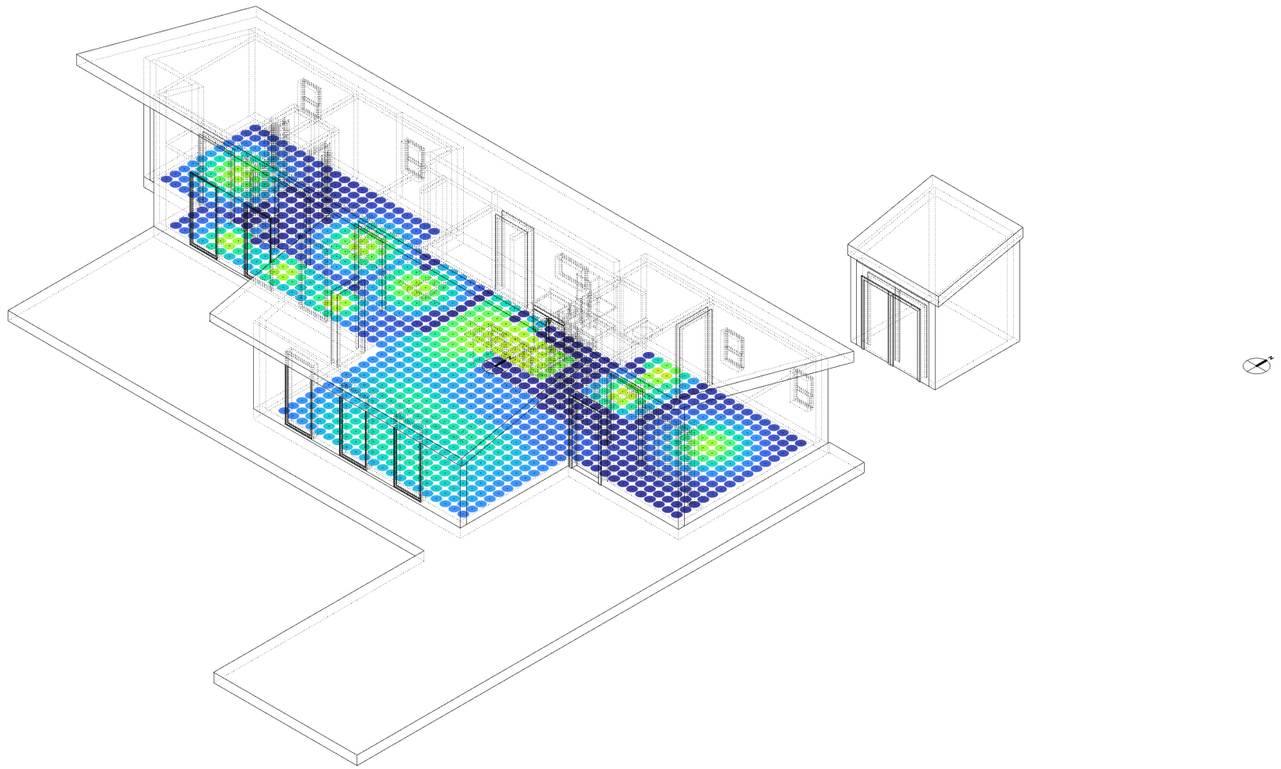
Analysis Grid - 12 ft
spacing Range 0-400 Lux
12:00 PM



Analysis Grid - 12 ft
spacing Range 0-400 Lux
3:00 PM

Electric Lighting Analysis

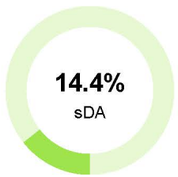
Point-In-Time Illuminance - Nighttime
Luminaires -
(5) Circular Downlight 4-inch 11W 960 lm
(4) Circular Downlight 4-inch 22W 1730 lm
(2) Linear Troffer Parabolic 2x4' 64W 5800 lm
(2) Linear Troffer Lensed 2x4' 64W 5700 lm

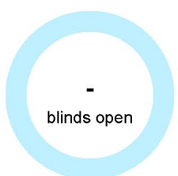


Analysis Grid - 12 ft
spacing Range 0-1000 Lux

LEED

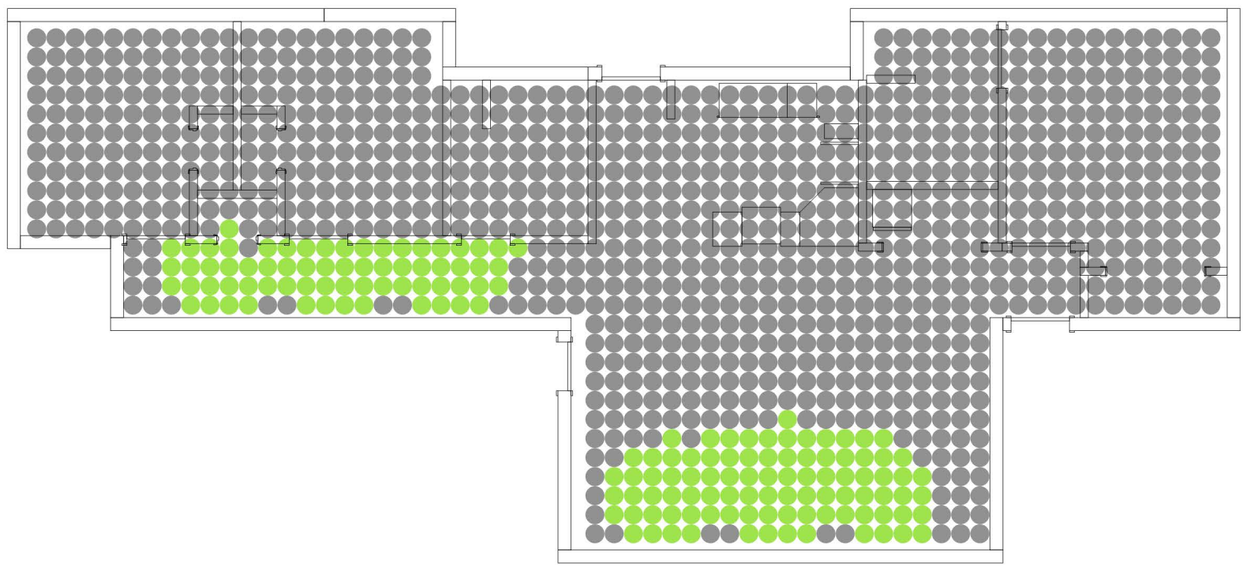
Daylight 5



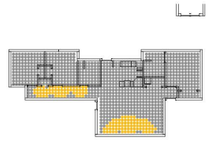


** ASE > 10% in one or more spaces. The design addresses glare in these areas as follows:*

Blinds



LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
Floor	1233 ft²	1.0 ft	N		14.36%		12.90%
Totals	1233 ft²				14.36%		12.90%

LEED v4.1 - Daylight Report

Appendix

Software:	ClimateStudio v1.6.8014.23531
Engine:	Radiance 5.3
Weather:	USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset:	0°
Ambient Bounces:	6
Passes Completed:	100
Primary Ambient Samples:	6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
A-DOOR-FRAM	240	Wooden Frame	13.3%	0.0%
A-DOOR	2714	Wooden Frame	13.3%	0.0%
Q-CASE	564	Ceramic Granite tile	35.4%	0.0%
Q-SPCQ	398	Aluminum metal cladding	64.8%	0.0%
A-WALL	180	Concrete Exterior Wall 3	38.0%	0.0%
I-WALL	152	Concrete Exterior Wall 3	38.0%	0.0%
A-FLOR	36	Exterior Concrete floor	22.0%	0.0%
A-GLAZ	556	Atlantica - Solarban 70 (3)	9.0%	47.9%
A-ROOF	18	Dark Grey Aluminium Roof Lining	19.4%	0.0%
A-CLNG	14	Dropped Ceiling Panel	85.1%	0.0%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0		2 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
1		2 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
2		2 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
3		7 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
4		4 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
5		2 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%

LEED v4.1 - Daylight Report

Appendix

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
6		17 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
7		34 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%
8		51 ft²	Atlantica - Solarban 70 (3)	47.9%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	100.00%

Occupancy

Space ID	Occupancy Schedule
Floor	8am-6pm with DST

Glossary

sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.

ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.

Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.

Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.

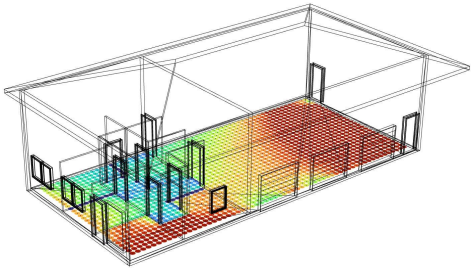
I have conducted a study on the illuminance and daylight availability of my Office Building for VDC, focusing on a specific points in time. By carefully following the instructions provided in instructional videos and leaving the materials from the last assignment, I have determined that the office will receive ample amounts of daylight during the winter months, but lower levels during the summer and equinox, which is consistent with the climate in the Starkville area. Furthermore, by analyzing the electrical lighting, I was able to light the entire building with just 10 fixtures cutting back on both construction costs and energy bills. The results of the daylighting report indicate roughly 70% of the time, the blinds can remain open as there is little autonomy and sufficient sunlight exposure. Overall, I am pleased with the findings of my office building.

Assignment 8: Radiance Rendering, Point-In-Time Illuminance, and Daylight Availability (LEED v4.1) ARC / BCS 3723 | Spring 2023

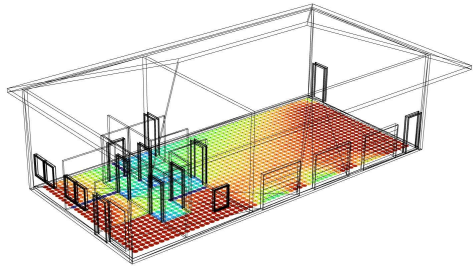
Joseph Williams

Daylighting Analysis

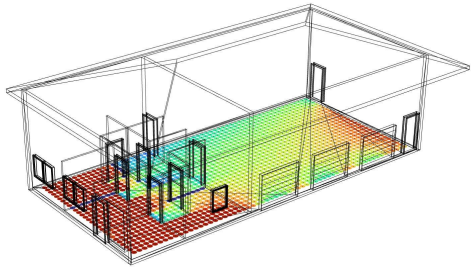
Point-In-Time Illuminance - Summer Solstice
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-3000 Lux
9:00 AM



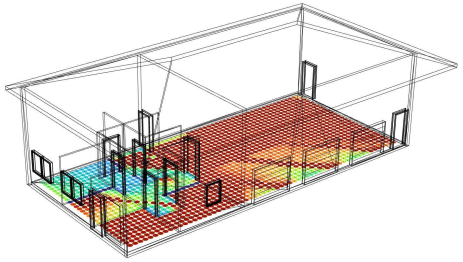
Analysis Grid - 1 ft spacing
Range 0-3000 Lux
12:00 PM



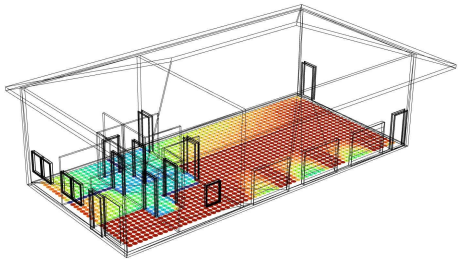
Analysis Grid - 1 ft spacing
Range 0-3000 Lux
3:00 PM

Daylighting Analysis

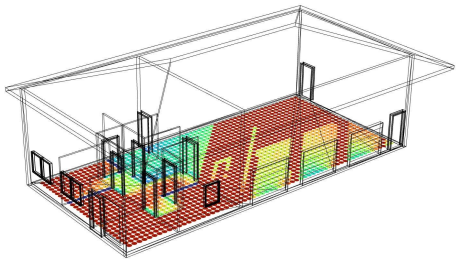
Point-In-Time Illuminance - Winter Solstice
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-3000 Lux
9:00 AM



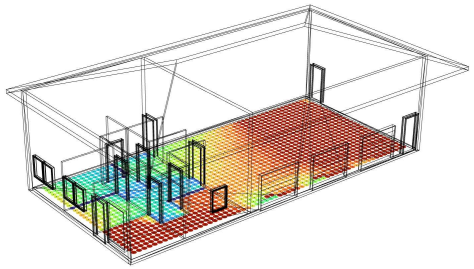
Analysis Grid - 1 ft spacing
Range 0-3000 Lux
12:00 PM



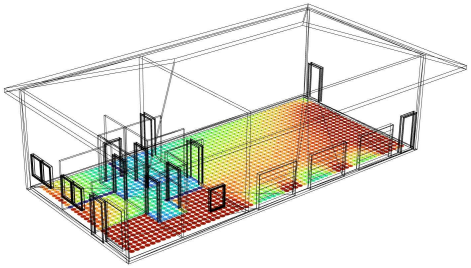
Analysis Grid - 1 ft spacing
Range 0-3000 Lux
3:00 PM

Daylighting Analysis

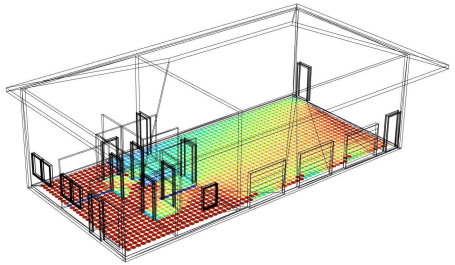
Point-In-Time Illuminance - Equinox
CIE Clear Sky



Analysis Grid - 1 ft spacing
Range 0-3000 Lux
9:00 AM



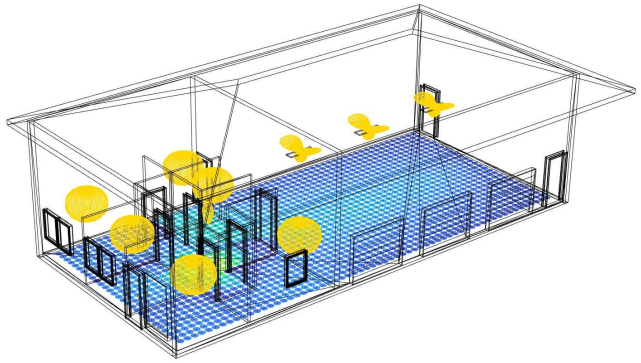
Analysis Grid - 1 ft spacing
Range 0-3000 Lux
12:00 PM



Analysis Grid - 1 ft spacing
Range 0-3000 Lux
3:00 PM

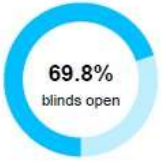
Electric Lighting Analysis

Point-In-Time Illuminance - Nighttime
Luminaires - (1) Circular Downlight 6-inch 11W 860 LM
Luminaires - (6) A21 Bulb 17W 1680 LM
Luminaires - (3) Linear suspended Ambient indirect-direct 4' 29W 3540 LM



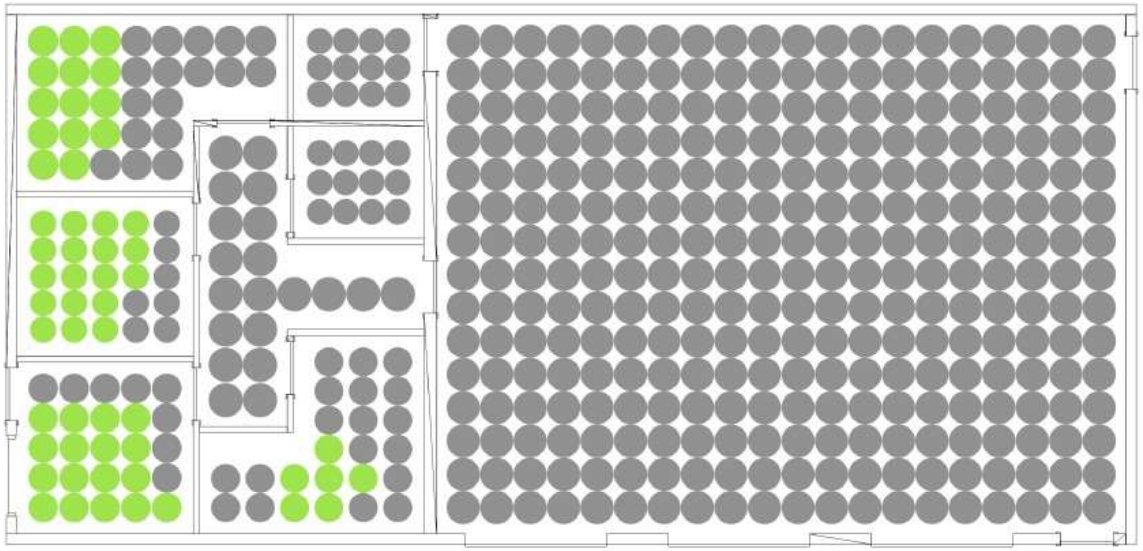
Analysis Grid - 1 ft spacing
Range 0- 300 Lux

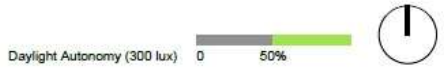
Daylight 1



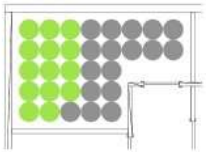
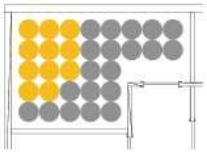
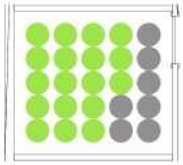
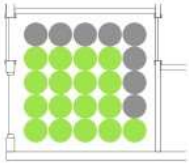
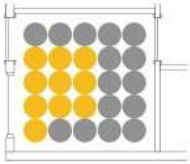
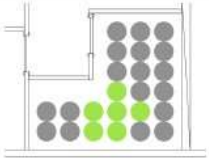
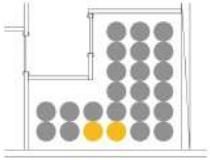
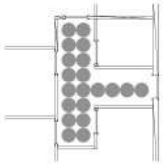
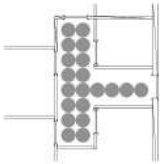
** ASE > 10% in one or more spaces. The design addresses glare in these areas as follows:*

blinds



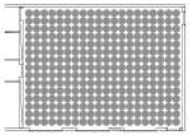
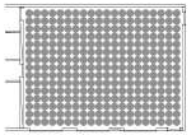


LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
1 Presidents Office	132 ft²	2.0 ft	Y		45.16%		35.48%
2 Office	90 ft²	2.0 ft	Y		72.00%		40.00%
3 Waiting	98 ft²	2.0 ft	Y		68.00%		40.00%
4 Reception	114 ft²	2.0 ft	Y		25.00%		8.33%
5 Hall	122 ft²	2.0 ft	N		0.00%		0.00%

Daylight 1 - LEED v4.1 Daylight Option 1 - 2

LEED v4.1 - Daylight Report

Space ID & Description	Area	Spacing	Shading	0 50%	sDA	0 250 hrs	ASE
6 Bath 2	47 ft²	2.0 ft	N		0.00%		0.00%
7 Bath 1	44 ft²	2.0 ft	N		0.00%		0.00%
8 Warehouse	1148 ft²	2.0 ft	N		0.00%		0.00%
Totals	1796 ft²				12.21%		7.31%

LEED v4.1 - Daylight Report

Appendix

Software:	ClimateStudio v1.9.8389.21977
Engine:	Radiance 5.3
Weather:	USA_MS_Starkville-Bryan.AP.720769_TMYx.2004-2018.epw
North Offset:	0°
Ambient Bounces:	6
Passes Completed:	100
Primary Ambient Samples:	6400

Layer Materials

Layer	Objects	Material	Rvis	Tvis
Walls	15	Wall LM83	50.0%	0.0%
Doors [Opaque]	33	Wall LM83	50.0%	0.0%
Windows [Opaque]	15	Wall LM83	50.0%	0.0%
Curtain Wall Mullions	4	Furniture LM83	50.0%	0.0%
Roofs	1	Ceiling LM83	70.0%	0.0%
Floors	1	Floor LM83	20.0%	0.0%

Window Groups

ID	Space ID	Area	Material	Tvis	Shade Material	Operation	Blinds Open
0	3	27 ft²	Clear - Solarban 90 (3)	50.3%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	67.62%
1	4	9 ft²	Clear - Solarban 90 (3)	50.3%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	69.32%
2	2	19 ft²	Clear - Solarban 90 (3)	50.3%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	71.45%
3	1	19 ft²	Clear - Solarban 90 (3)	50.3%	sheerWeave 2410 Performance + P12 Oyster	Default (LEEDv4 2% Rule)	71.75%

Appendix

Occupancy

Space ID	Occupancy Schedule
1	8am-6pm with DST
2	8am-6pm with DST
3	8am-6pm with DST
4	8am-6pm with DST
5	8am-6pm with DST
6	8am-6pm with DST
7	8am-6pm with DST
8	8am-6pm with DST

Glossary

sDA: Spatial Daylight Autonomy: Percent of space receiving at least 300 lux for at least 50% of occupied hours. Calculation includes dynamic shading if modeled.

ASE: Annual Sunlight Exposure: Percent of space receiving at least 1000 lux direct sun for at least 250 occupied hours. Calculation excludes dynamic shading.

Avg Lux: Mean workplane illuminance during occupied hours. Calculation includes dynamic shading if modeled.

Blinds open: Percent of occupied hours blinds are open (or dynamic glass is in clearest state). Building total is window-area weighted.

Shading: (Y/N) Does the space have dynamic blinds or dynamic glazing? If yes, shading operation affects sDA but not ASE.
The value must be yes for all perimeter spaces -- otherwise an explanation must be supplied via written addendum.