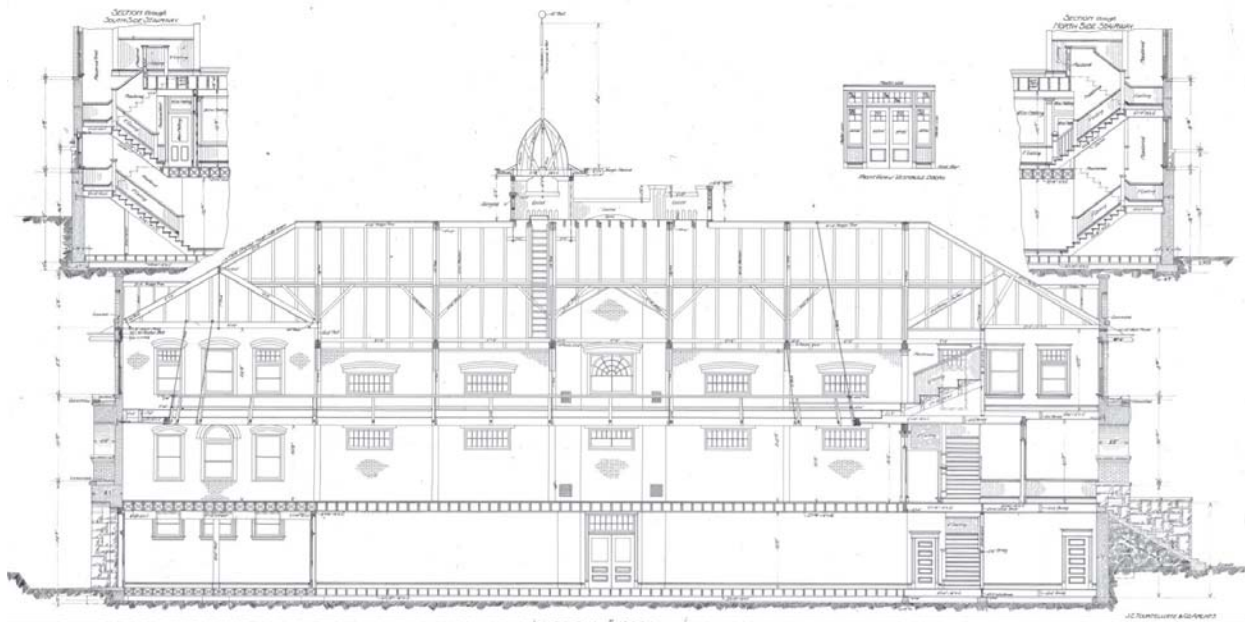


AAS Performance Analysis

Brooke
Dakota
Jackson
Karlee
Kyle

Existing condition

EUI= 9.68 in 2018



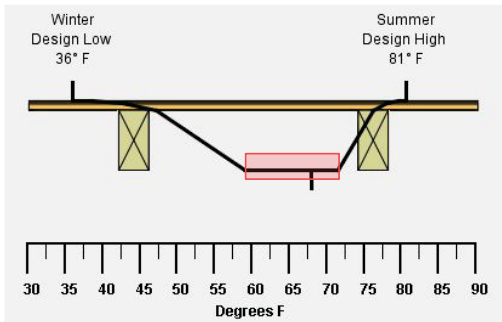
Current Condition (Roof)

Original Roof assembly

-Shiplap and Shingles

-R Value = 3.13

-Large temperature fluctuation

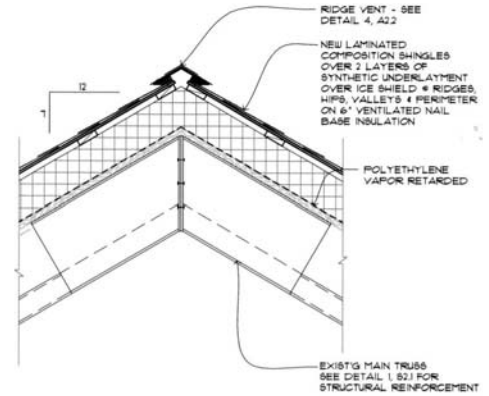
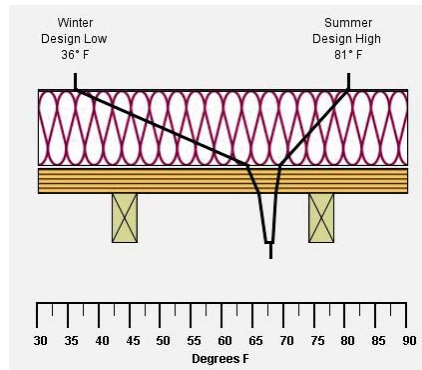


Current Roof assembly

-6" ventilated nail base insulation

-Shiplap and Shingles

-R Value = 34.76



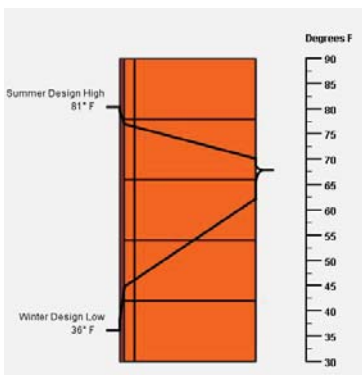
Current Condition (Wall)

Original wall assembly

-13" masonry wall + wood paneling

-R Value = 3.82

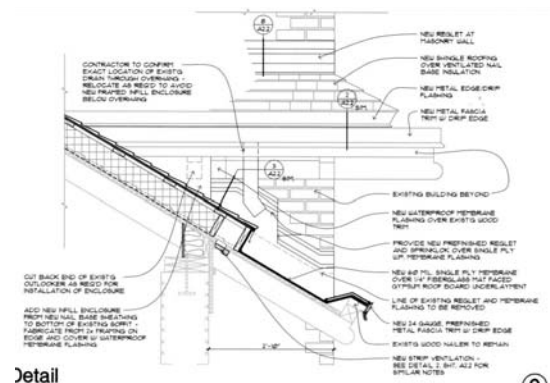
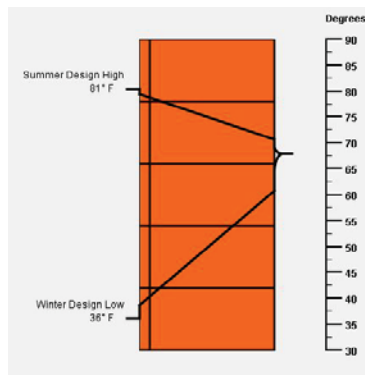
-More Thermal Mass



Current wall assembly

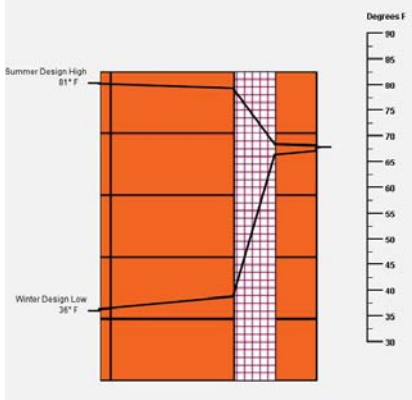
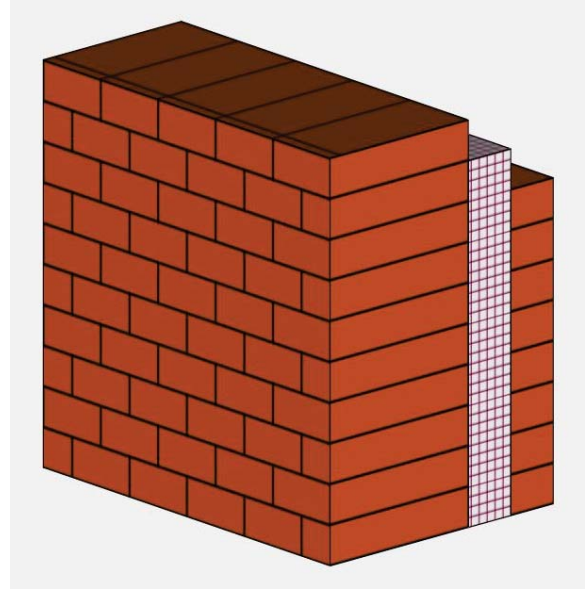
-13" masonry wall

-R Value = 3.02



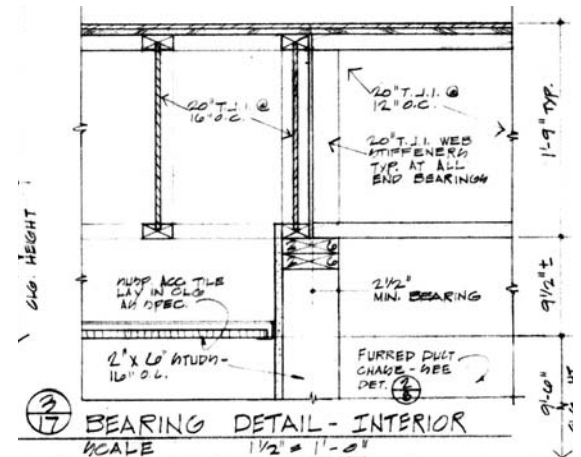
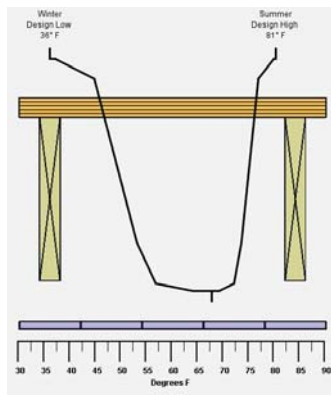
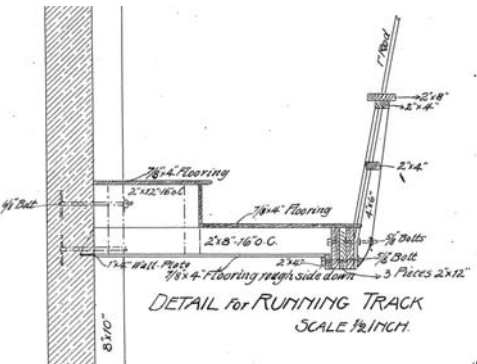
Recommended changes (Wall)

- Additions to interior :
 - 4" polyurethane foam
 - 2" brick cladding
- R Value = 26.75
- Similar look with better performance



Current Condition (Floor/Ceiling)

- | | |
|-------------------------|------------------------|
| Original floor assembly | Current floor assembly |
| -Suspended track floor | -16" joists 24" O.C. |
| -R value - 0 | -suspended ACT |
| -Open to ceiling | -R Value = 6.98 |



Current Condition (Windows)

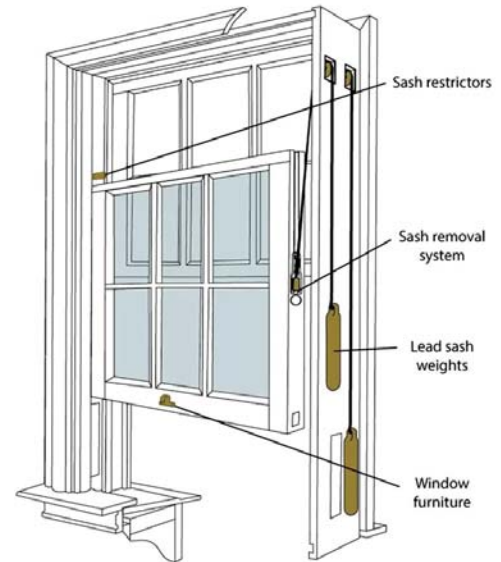
Original window assembly

-Single pane operable wood frame windows

-U factor of roughly 1.1

-The Saturation of the heat and or cold can be nearly 90%.

-Deteriorating frames lead to draftiness.



Recommended Changes (Windows)

Triple Pane Argon gas Insulated Windows

R value = 5

U factor = .2

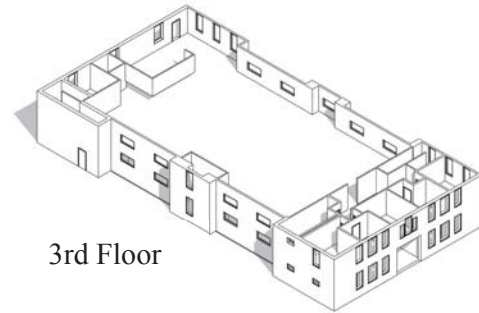
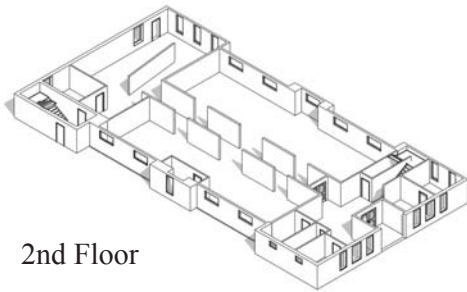
Non Operable

Selective shading device (Gallery Crit)



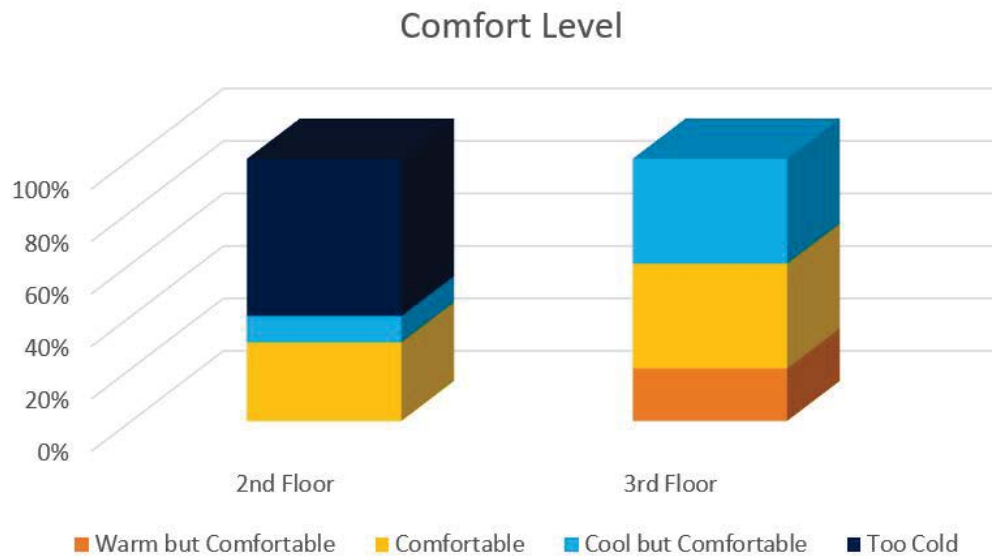
Hypotheses

1. 3rd floor, on average, will be hotter than the 2nd floor.
 - a. Hobos placed on 4 corners and 1 in middle
 - b. Collect data for multiple weeks



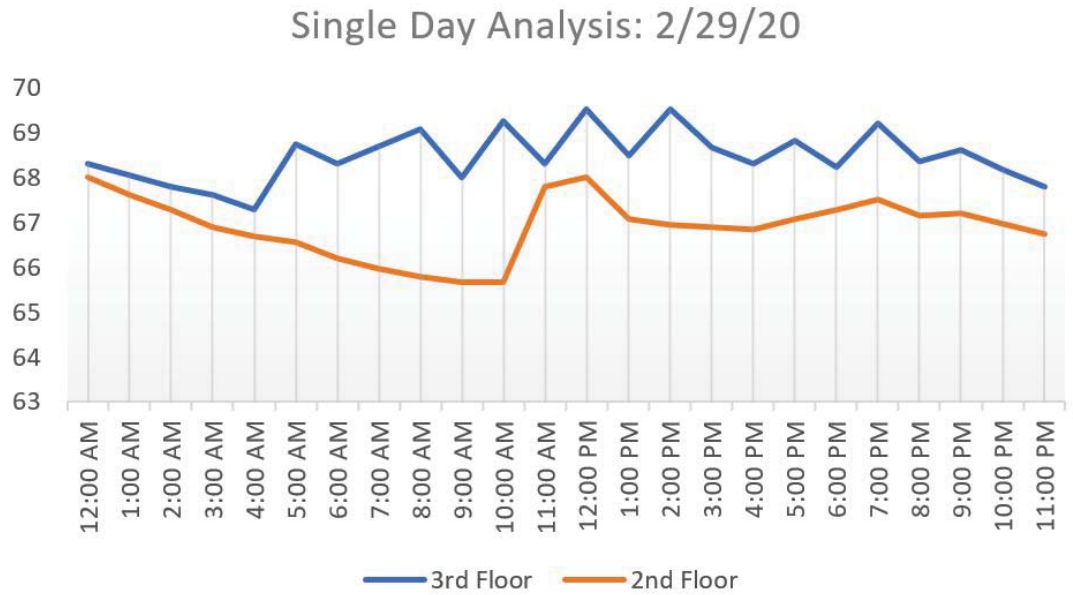
ROAST Survey Results

- On average, students on the 2nd floor reported that they were colder than those on the 3rd floor



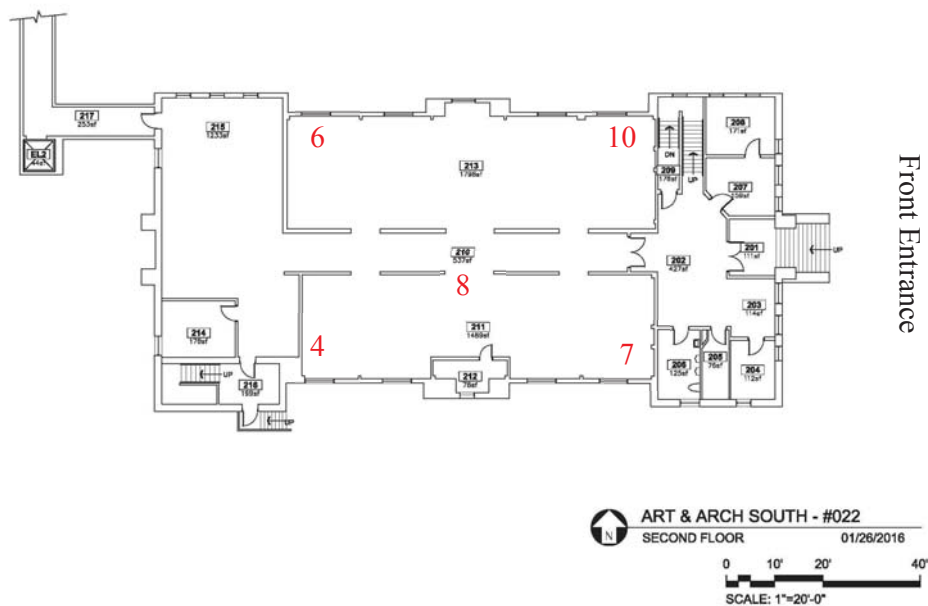
Single Day HOBO Data

- At all times during the day, the 2nd floor is colder than the 3rd floor

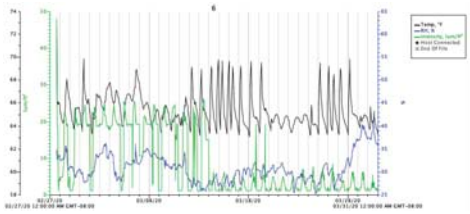


HOBO Data 2nd Floor

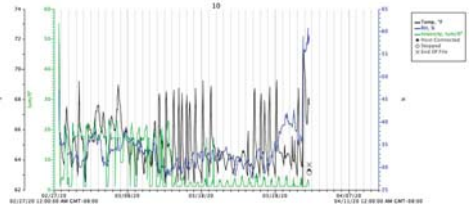
University of Idaho



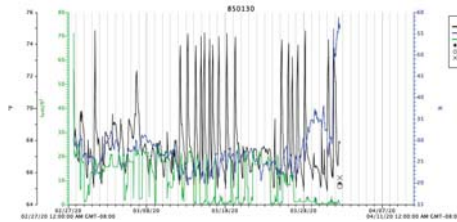
6



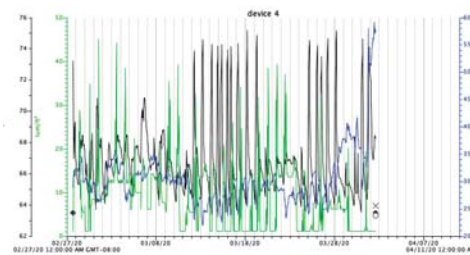
10



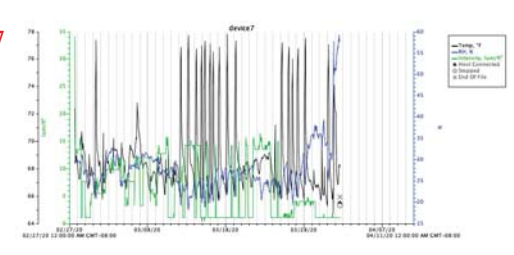
8



4



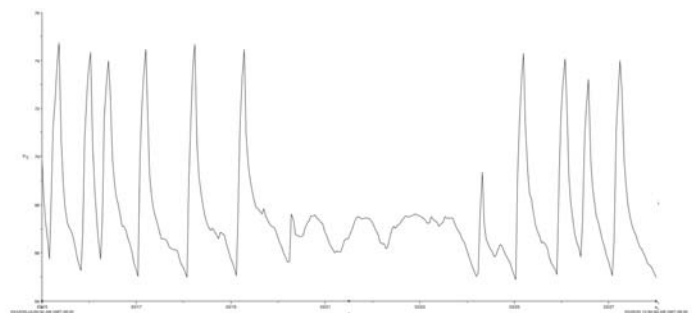
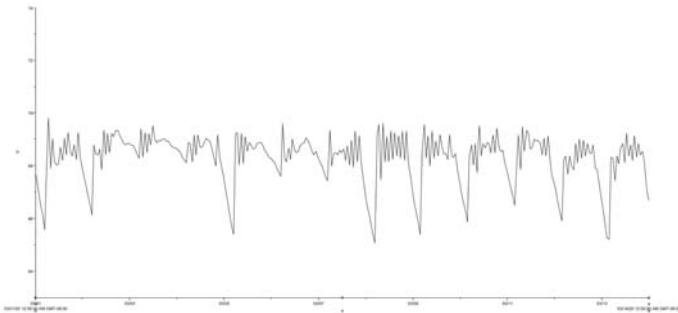
7



— Temperature
— Relative Humidity
— Intensity, Lum/Ft²

2nd Floor Temperature March 1st to 14th

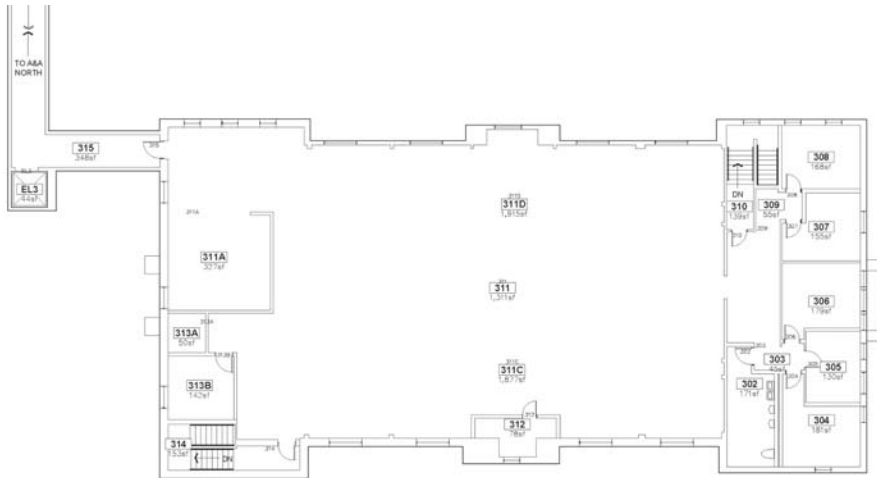
March 15th to 28th



High 70 Degrees
Low 65 Degrees

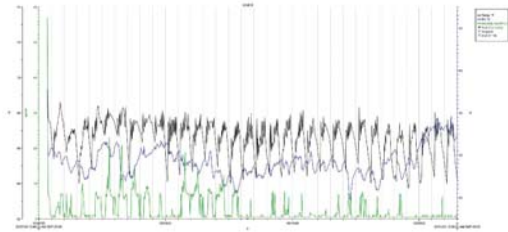
High 75 Degrees
Low 65 Degrees

HOBO Data 3rd Floor

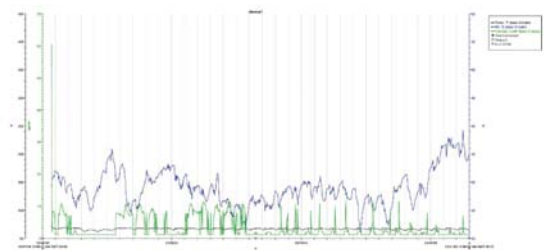


ART & ARCH SOUTH - #022
 THIRD FLOOR 06/04/2019
 0 7.5' 15' 30'
 SCALE: 1"=15'-0"

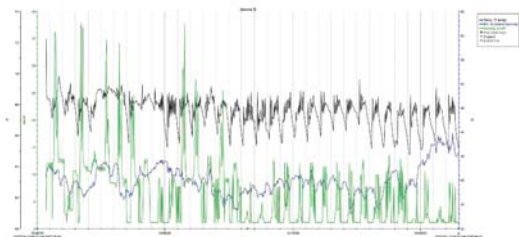
9



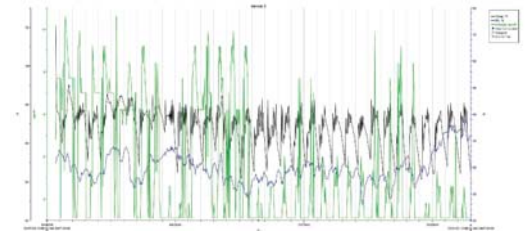
1



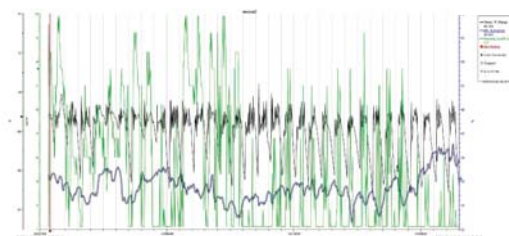
5



3

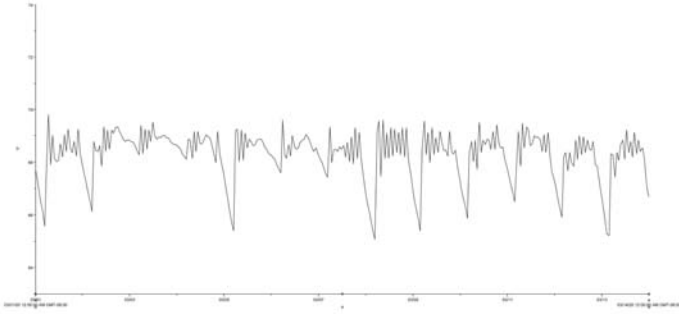


2



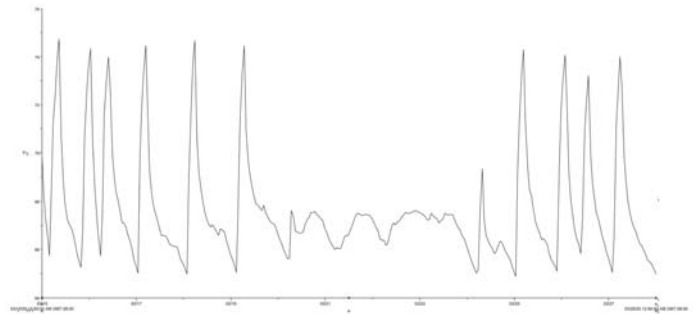
— Temperature
— Relative Humidity
— Intensity, Lum/Ft²

3rd Floor Temperature March 1st to 14th



High 70 Degrees
Low 65 Degrees

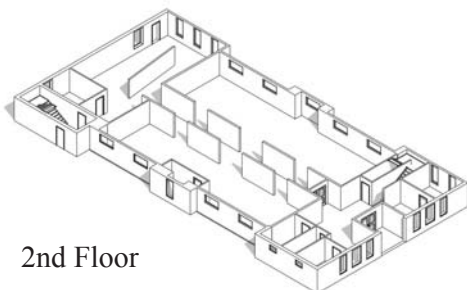
March 15th to 28th



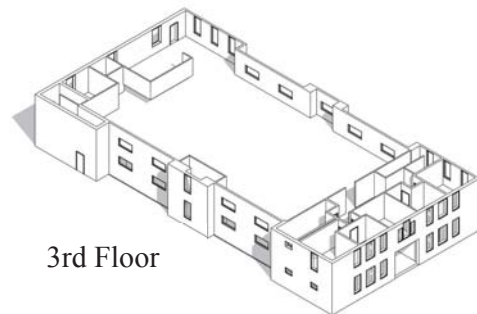
High 75 Degrees
Low 65 Degrees

Hypotheses

2. 3rd floor, on average, will be more humid than the 2nd floor.
 - a. Hobos placed on 4 corners and 1 in middle

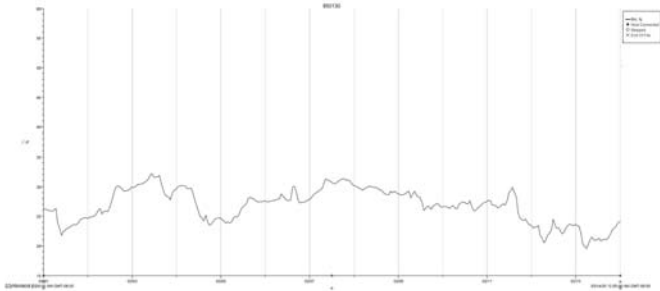


2nd Floor



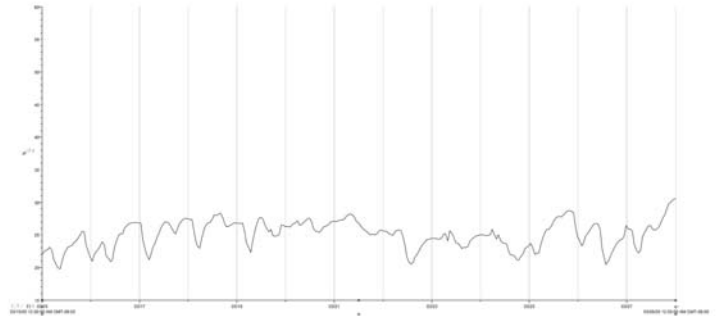
3rd Floor

2nd Floor Relative Humidity March 1st to 14th



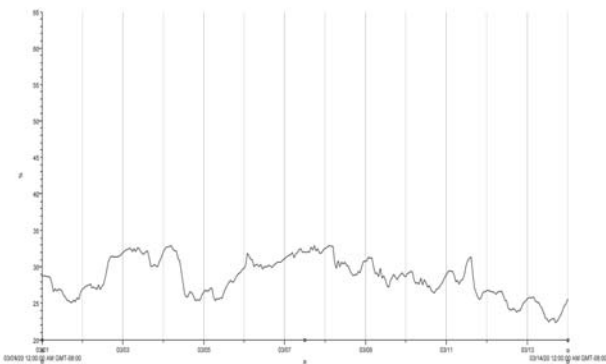
High 33%
Low 20%

March 15th to 28th



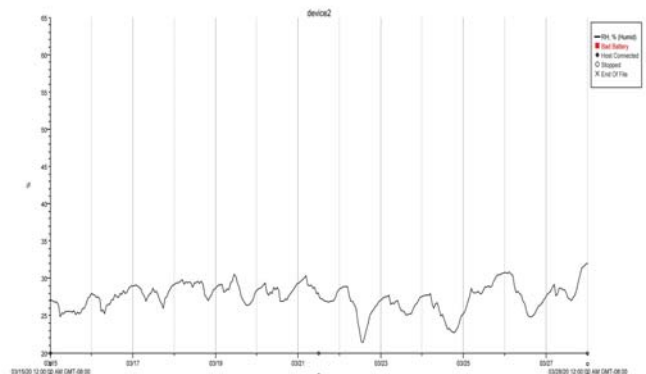
High 30%
Low 20%

3rd Floor Relative Humidity March 1st to 14th



High 32%
Low 22%

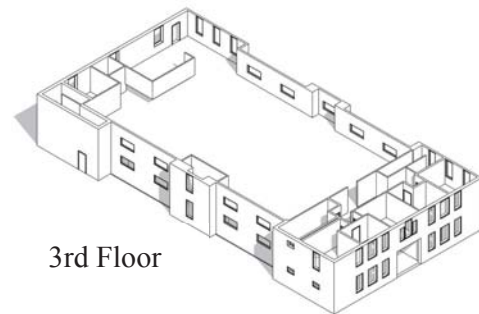
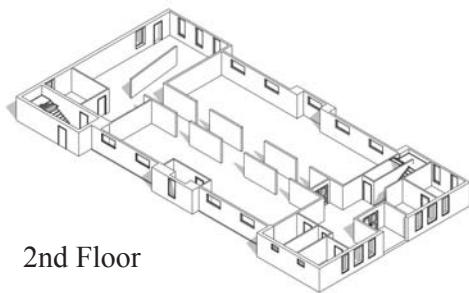
March 15th to 28th



High 31%
Low 21%

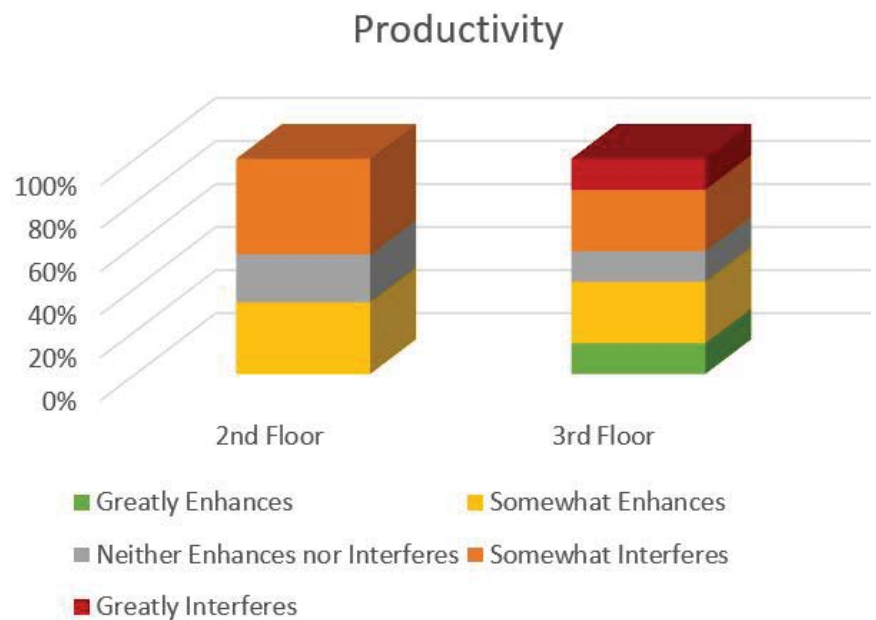
Hypotheses

3. People on the 3rd floor are more productive than the 2nd floor.
 - a. ROAST Survey Results – see what people say
 - b. Using data from previous experiments to make conclusions



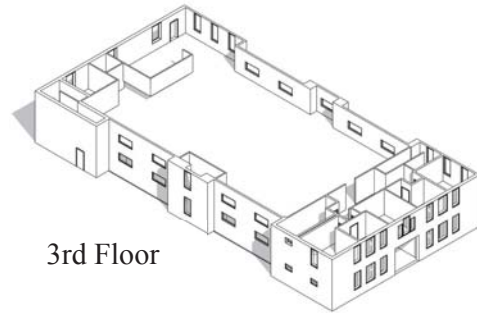
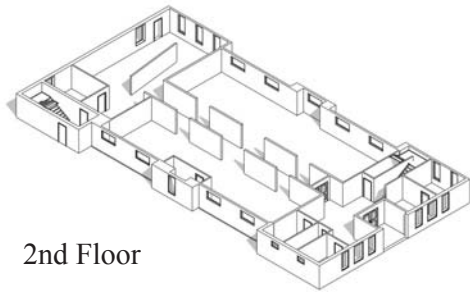
ROAST Survey Results

- Due to the wide spread of results across both floors, the survey is somewhat inconclusive as far as measuring productivity



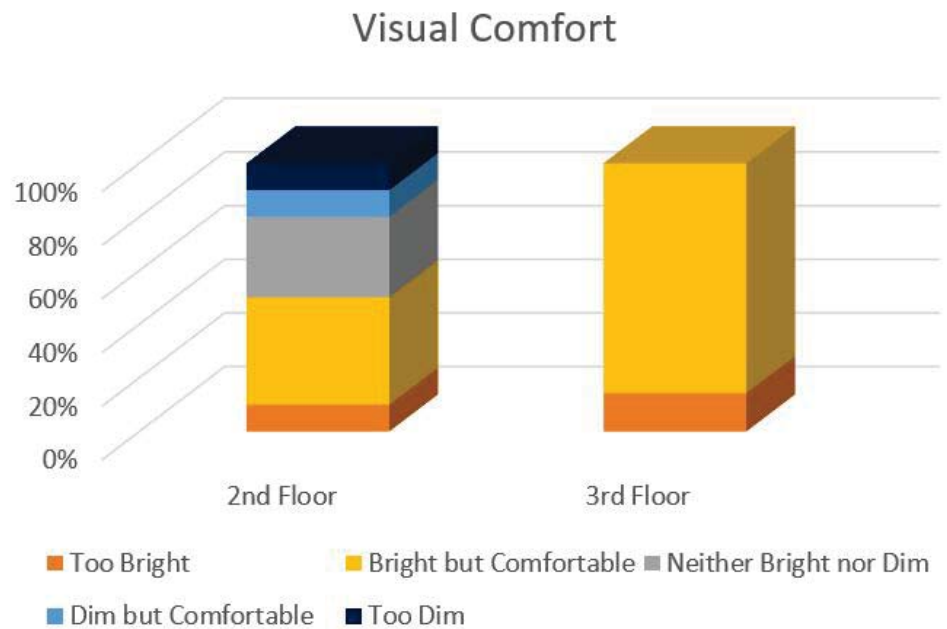
Hypotheses

4. 2nd floor has more glare than the 3rd floor.
 - a. ROAST Survey Results
 - b. Culp light – glare analysis program



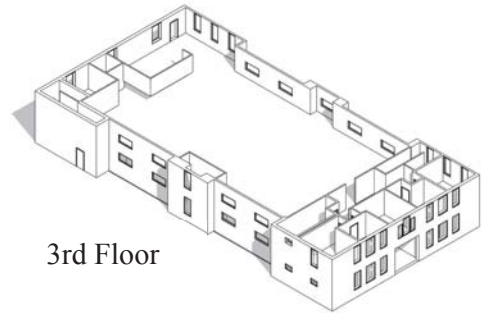
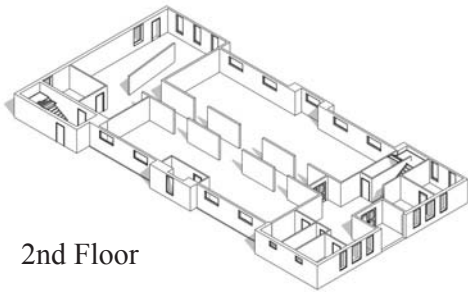
ROAST Survey Results

- These results, while somewhat inconclusive, suggest the opposite of our hypothesis

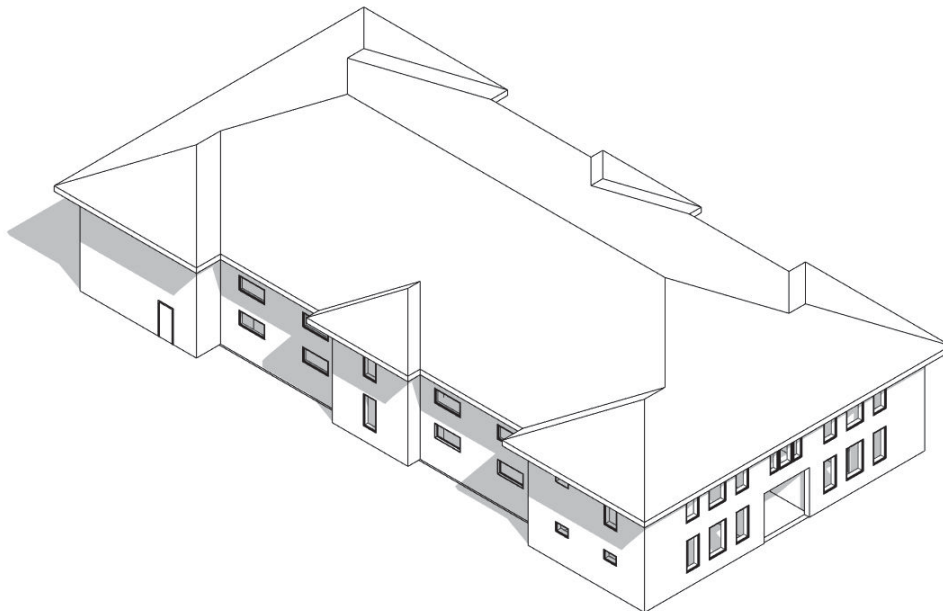


Hypotheses

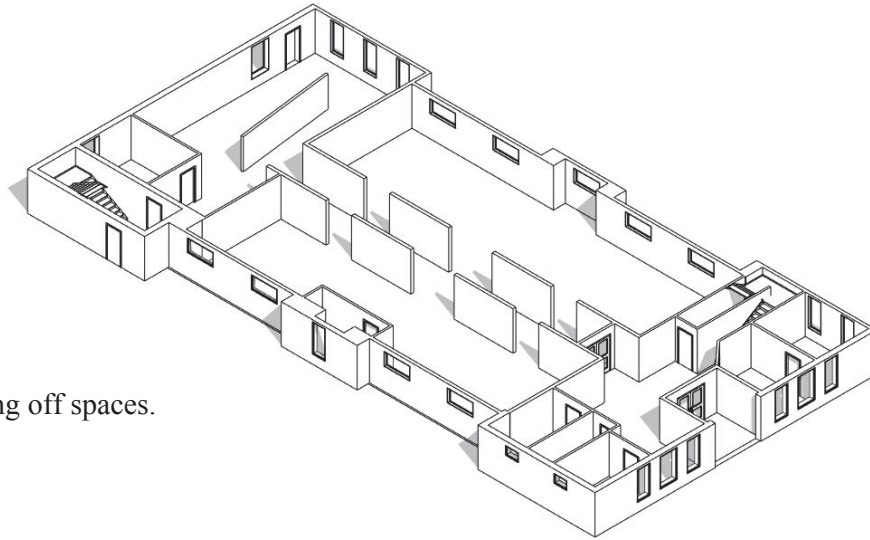
5. The 3rd floor has better distribution of natural daylight than the 2nd floor
 - a. Revit/Sefaira Daylight Analysis - footcandles/daylight factor



Digital Model

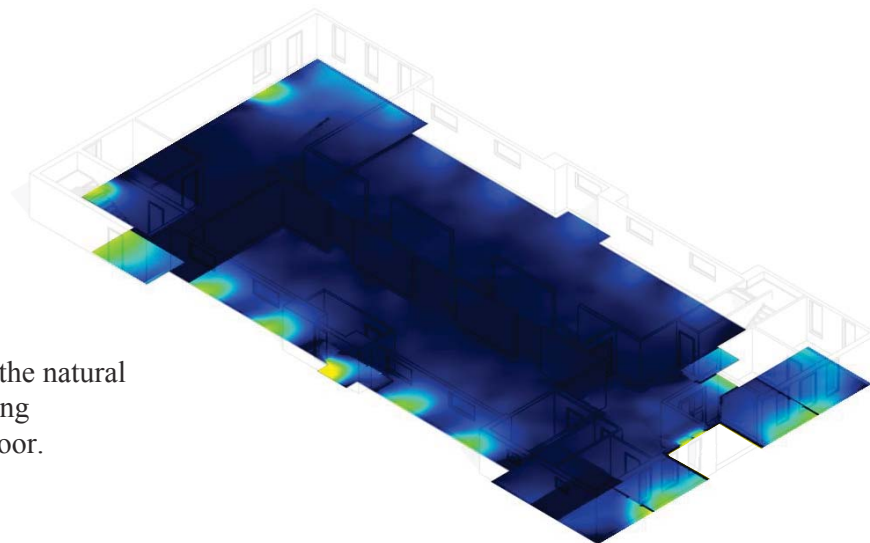


2nd Floor



Lots of partitions closing off spaces.

2nd Floor - Summer Solstice

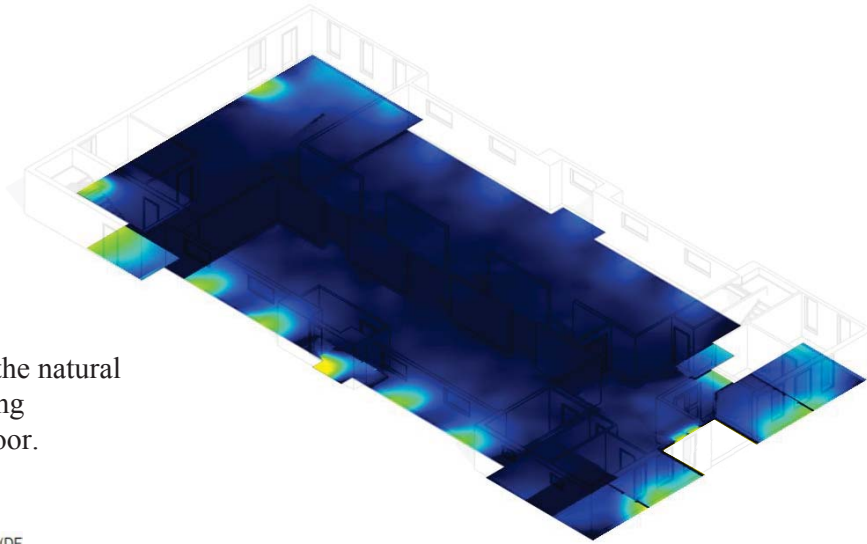


The partitions obstruct the natural daylight from distributing throughout the entire floor.

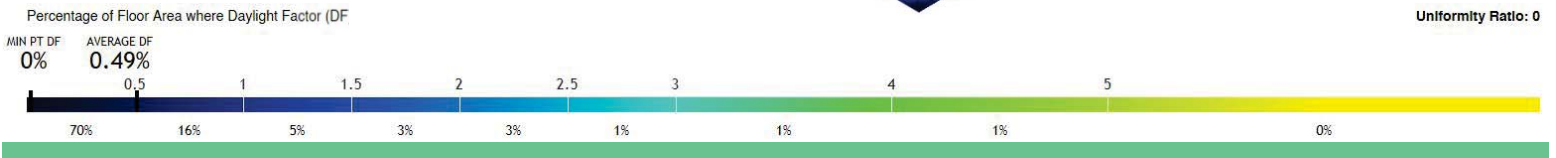
Footcandle levels on **June 20 at 12PM** measured at 2.79 feet above the floor plate. Time does not take into account daylight savings time.



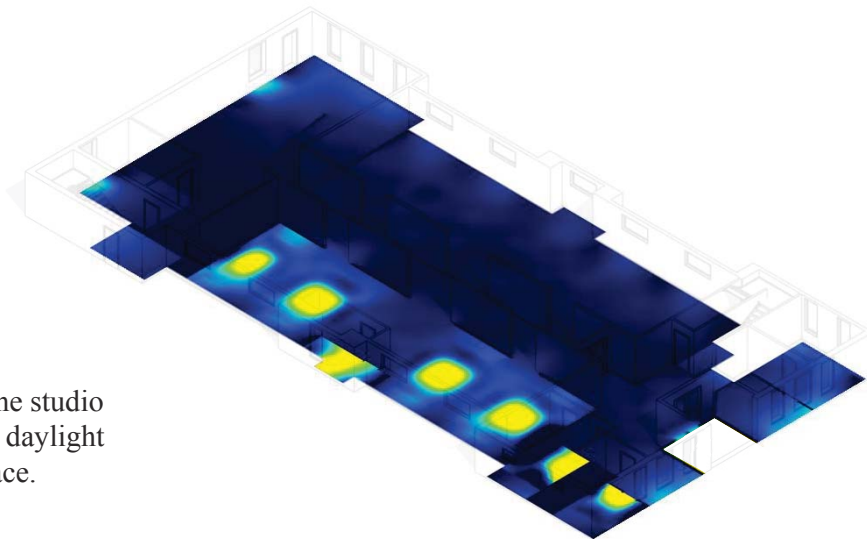
2nd Floor - Summer Solstice



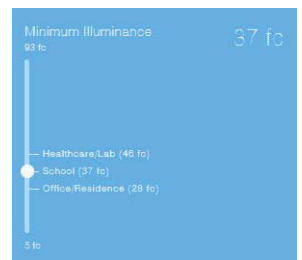
The partitions obstruct the natural daylight from distributing throughout the entire floor.



2nd Floor - Winter Solstice



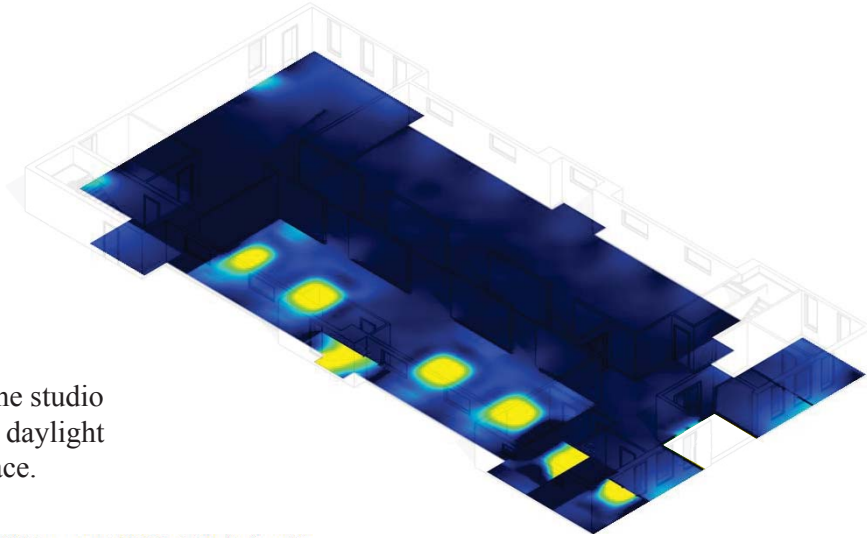
The window height in the studio spaces helps the natural daylight flow deeper into the space.



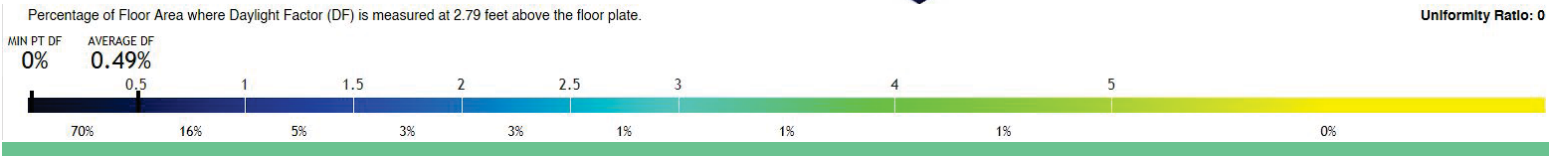
Footcandle levels on December 21 at 12PM measured at 2.79 feet above the floor plate. Time does not take into account daylight savings time.



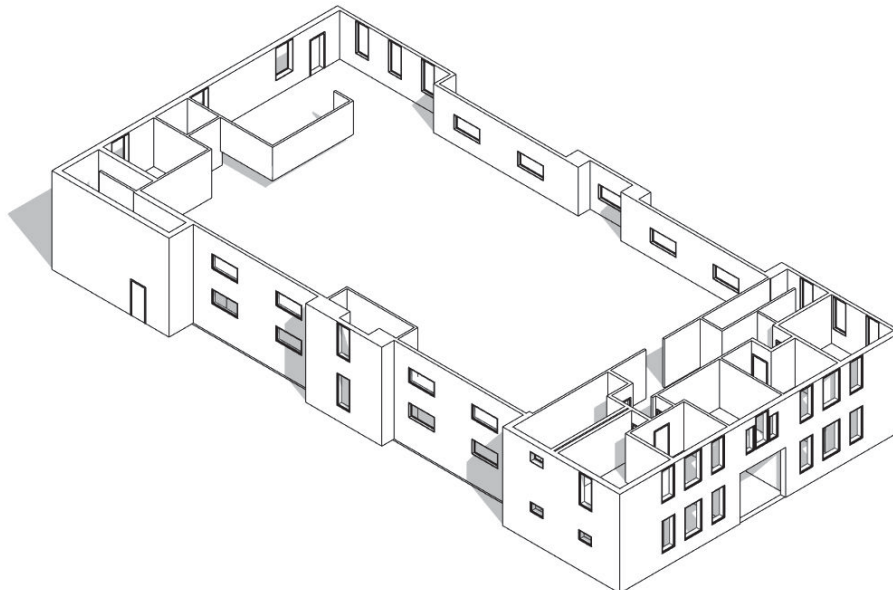
2nd Floor - Winter Solstice



The window height in the studio spaces helps the natural daylight flow deeper into the space.

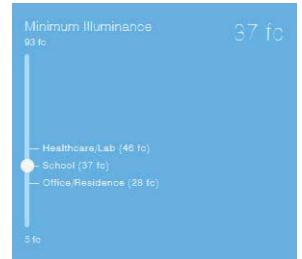
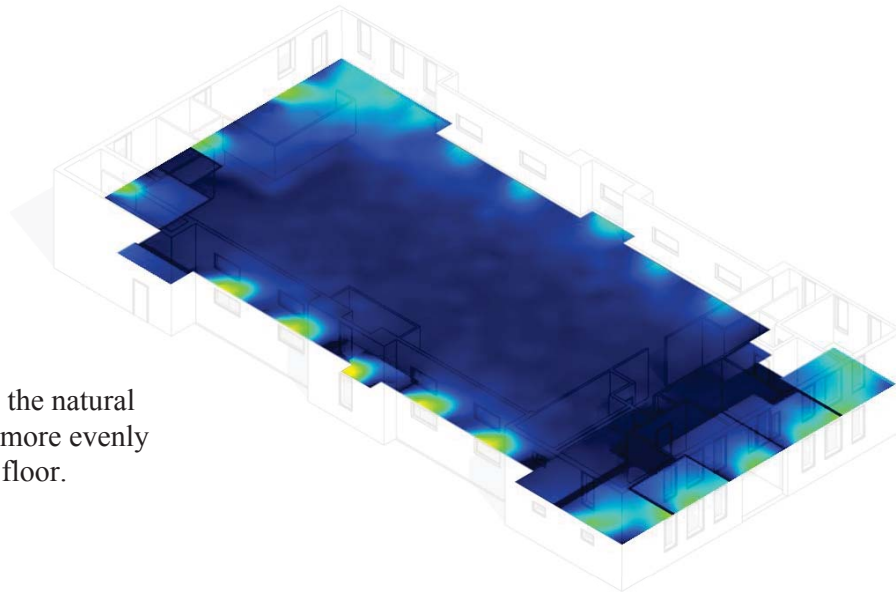


3rd Floor



Very open plan.

3rd Floor - Summer Solstice

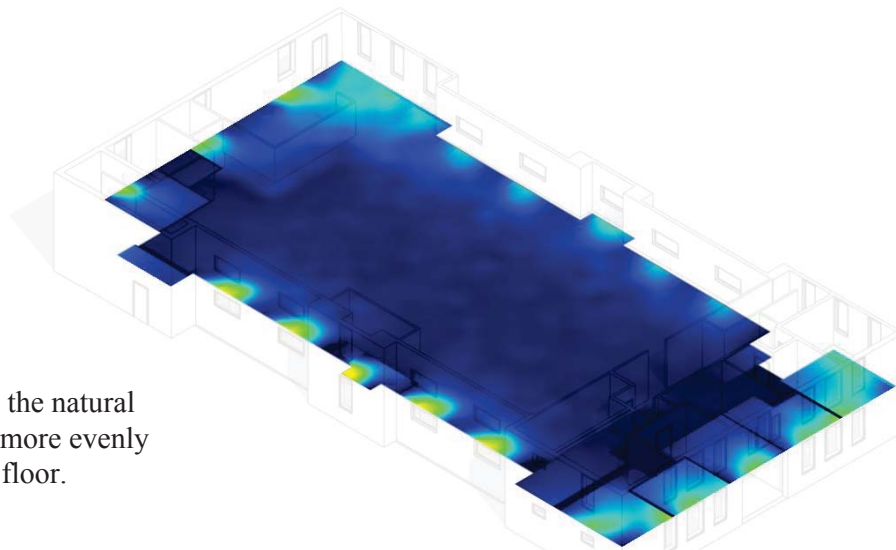


The open plan allows the natural daylight to distribute more evenly throughout the entire floor.

Footcandle levels on June 20 at 12PM measured at 2.79 feet above the floor plate. Time does not take into account daylight savings time.

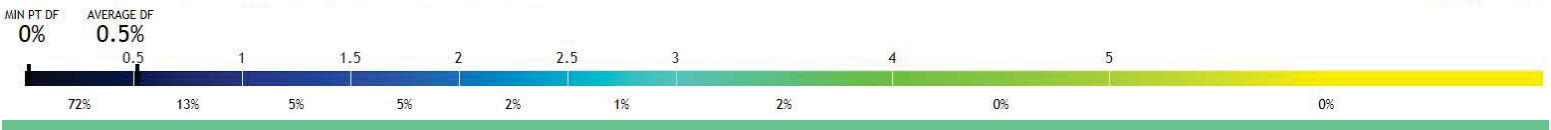


3rd Floor - Summer Solstice



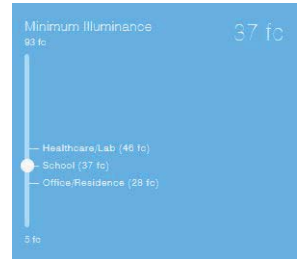
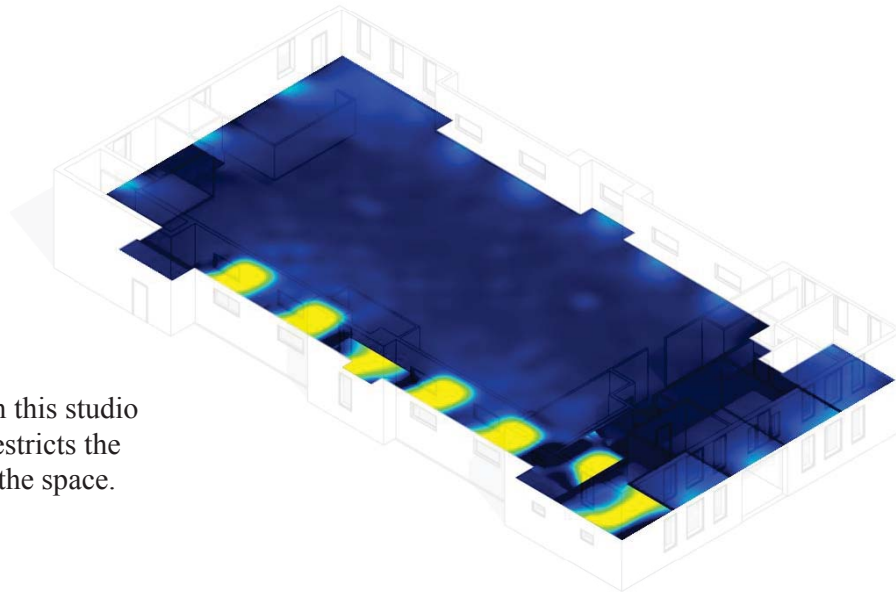
The open plan allows the natural daylight to distribute more evenly throughout the entire floor.

Percentage of Floor Area where Daylight Factor (DF) is measured at 2.79 feet above the floor plate.



Uniformity Ratio: 0

3rd Floor - Winter Solstice

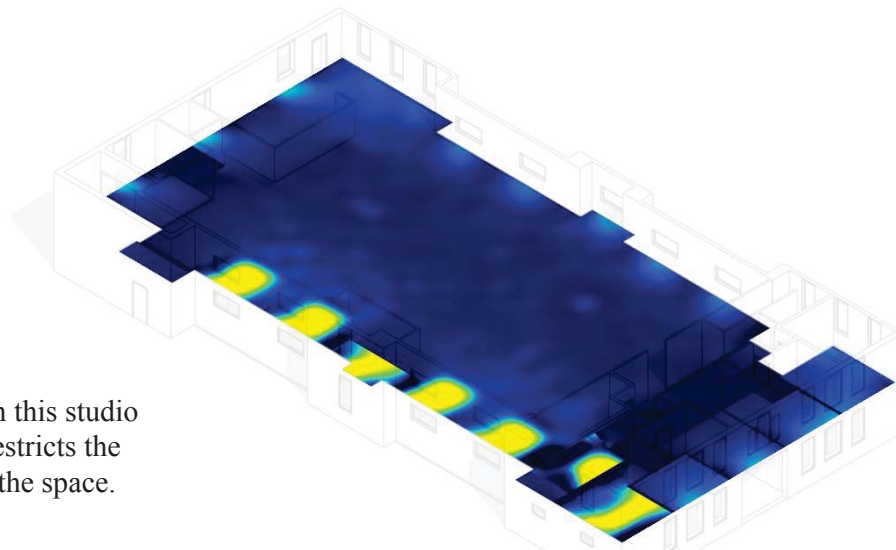


The window height in this studio space being shorter restricts the flow of daylight into the space.

Footcandle levels on **December 21** at **12PM** measured at 2.79 feet above the floor plate. Time does not take into account daylight savings time.

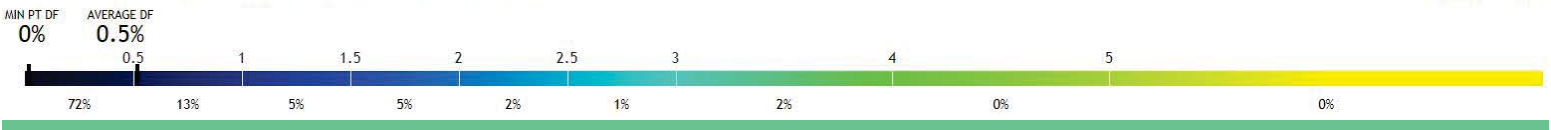


3rd Floor - Winter Solstice



The window height in this studio space being shorter restricts the flow of daylight into the space.

Percentage of Floor Area where Daylight Factor (DF) is measured at 2.79 feet above the floor plate.

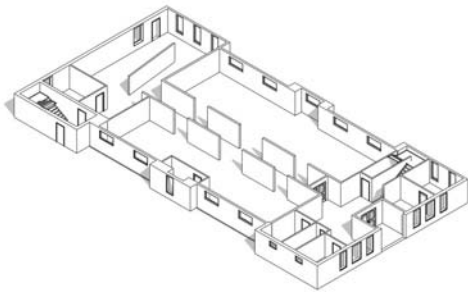


Conclusion

2nd Floor:

Average annual DF:

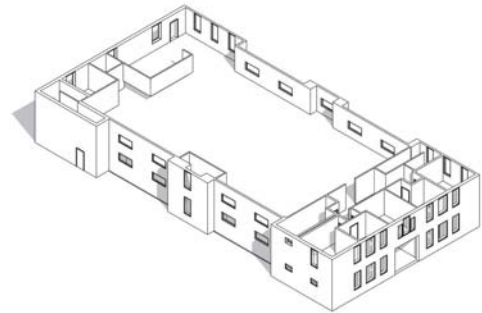
.49%



3rd Floor:

Average annual DF:

.5%



Conclusion

2nd Floor:

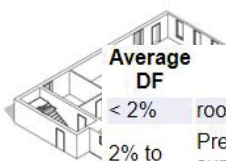
Average annual DF:

.49%

3rd Floor:

Average annual DF:

.5%



Average DF

- < 2%
- 2% to 5%
- > 5%

Appearance

- room looks gloomy
- Predominantly daylight appearance, but supplementary artificial lighting is needed.
- Room appears strongly daylight

Energy implications

- Electric lighting needed most of the day
- Good balance between lighting and thermal aspects
- Daytime electric lighting rarely needed, but potential for thermal problems due to overheating in summer and heat losses in winter

