

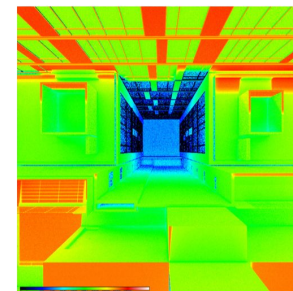
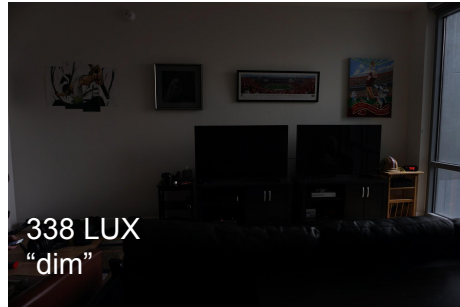
1525 Pine St Light Study
Board of Supervisors
Hearing

Study does not show Indoor view

Sponsors have all data to simulate indoor view but did not present to the Planning Commission.

This is insufficient data at best and misleading at worst.

Mitigation should not be based on insufficient and misleading data.



SUMMER SOLSTICE
JUNE 21

9:00 AM

PERCENTAGE CHANGE IN
PERCEIVED BRIGHTNESS
BETWEEN A 65-FT VS.
79-FT PROJECT

-15.0%

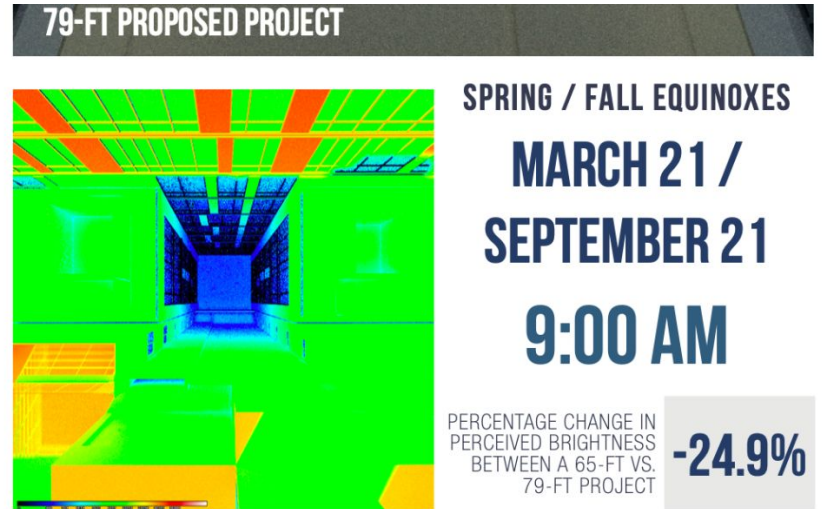
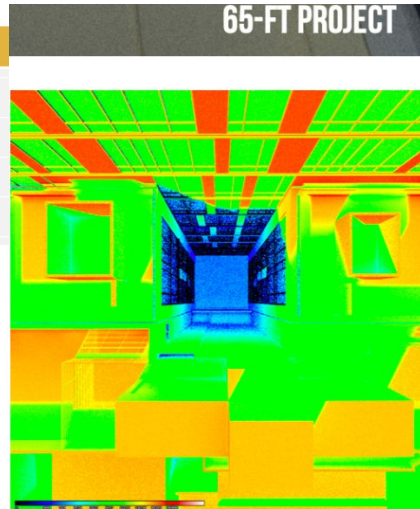
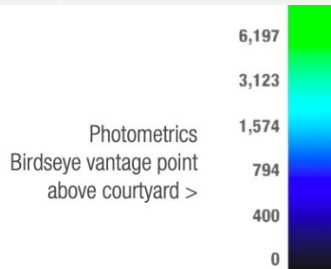
65ft Project Significantly Reduces Light For Lower Floors

Citing the sponsor's study for fall and spring mornings we show that the 65ft build already casts dark shadows floors 2 through 5.

The average difference is 24% but that does not communicate that the lower floors will still be in the dark with the 65ft project

Values Lux vs Perceived

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors



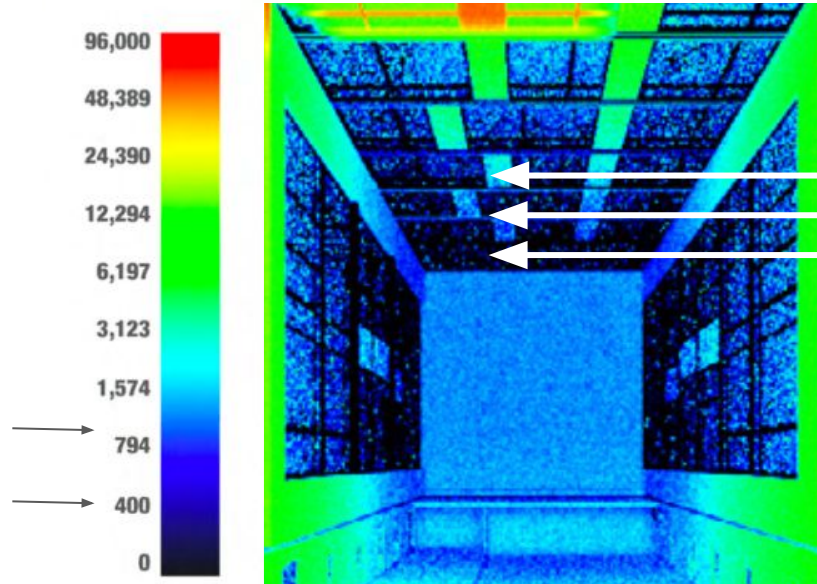
Average LUX Measurements Mask Effects On Lower Floors

Sponsor's study presents 840 LUX average at 9AM in the summer
 Photometrics shows that lower floors are lower than average (dark blue)
 Average does not show disproportionate effects on lower floors
 2nd,3rd,and 4th floors are significantly below average

Summer Morning Average

Proposed 79-ft Project	June 21
9:00 AM	840 lux

Average →
 Floors 2,3,4 →



Values Lux vs Perceived

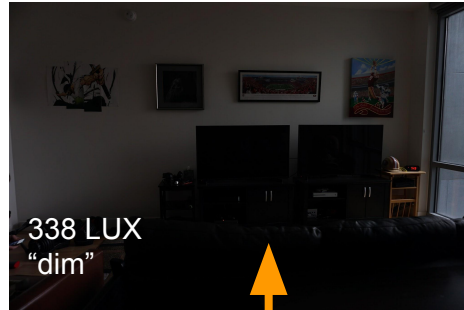
Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

*citing Images from prevision study page 10, page 7

Light at the window is brighter than indoor light

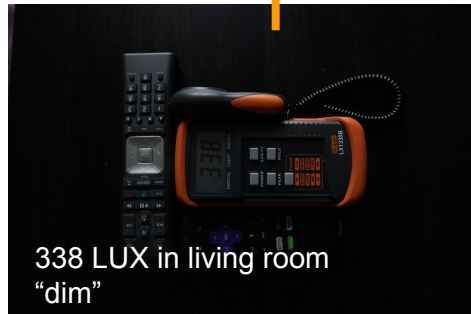
Pictures showing light measured at 526 LUX at the window, 338 LUX in the living room, 87 LUX in the kitchen
Exterior Light is “Normal” perceived brightness while Interior Light is “Dim” and “Dark”

526 at the window
“normal”



Values Lux vs Perceived

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors



Exterior Annual Comparison Chart

Annual Comparison Chart

This table cites page 35 of the sponsor's light study.

65-ft Project	June 21	September 21	December 21	March 21
9:00 AM	2,376 lux	1,330 lux	517 lux	1,330 lux
12:00 PM	7,551 lux	4,483 lux	868 lux	4,483 lux
3:00 PM	597 lux	265 lux	122 lux	265 lux
Daily Average Lux/hr	4,085 lux/hr	2,377 lux/hr	554 lux/hr	2,377 lux/hr

Annual LuxHrs	859,824
Average Annual Perceived Brightness	79.15%

Proposed 79-ft Project	June 21	September 21	December 21	March 21
9:00 AM	840 lux	228 lux	129 lux	228 lux
12:00 PM	6,755 lux	3,824 lux	803 lux	3,824 lux
3:00 PM	711 lux	199 lux	79 lux	199 lux
Daily Average Lux/hr	3,338 lux/hr	1,761 lux/hr	404 lux/hr	1,761 lux/hr

Annual LuxHrs	664,978
Average Annual Perceived Brightness	75.40%

Proposed Project + Lighting	June 21	September 21	December 21	March 21
9:00 AM	1,451 lux	831 lux	722 lux	831 lux
12:00 PM	7,273 lux	4,358 lux	1,399 lux	4,358 lux
3:00 PM	1,274 lux	814 lux	668 lux	814 lux
Daily Lx/SF/hr	3,896 lux/hr	2,338 lux/hr	997 lux/hr	2,338 lux/hr

Annual LuxHrs	875,276
Average Annual Perceived Brightness	79.39%

Interior Annual Comparison Chart

65-ft Project	June 21	September 21	December 21	March 21
9:00 AM	1188	665	258.5	665
12:00 PM	3775.5	2241.5	434	2241.5
3:00 PM	298.5	132.5	61	132.5
Daily Average Lux/hr	2042.5	1188.5	277	1188.5
			Annual Lux Hrs	429912
			Average Annual	??
79-ft Project	June 21	September 21	December 21	March 21
9:00 AM	420	114	64.5	114
12:00 PM	3377.5	1912	401.5	1912
3:00 PM	355.5	99.5	39.5	99.5
Daily Average Lux/hr	1669	880.5	202	880.5
			Annual Lux Hrs	332493.5
			Average Annual	??
79-ft Project + lighting	June 21	September 21	December 21	March 21
9:00 AM	725.5	415.5	361	415.5
12:00 PM	3636.5	2179	699.5	2175
3:00 PM	637	407	334	407
Daily Average Lux/hr	1948	1169	498.5	1169
			Annual Lux Hrs	437638
			Average Annual	??

This chart shows the annual LUX hrs measurements for interior light.

We assumed that interior light will be 50% less than the exterior light readings from the sponsor's study in the previous slide.

The periods highlighted in red are below the minimum 500 LUX requirement for performing indoor tasks.

Conclusion

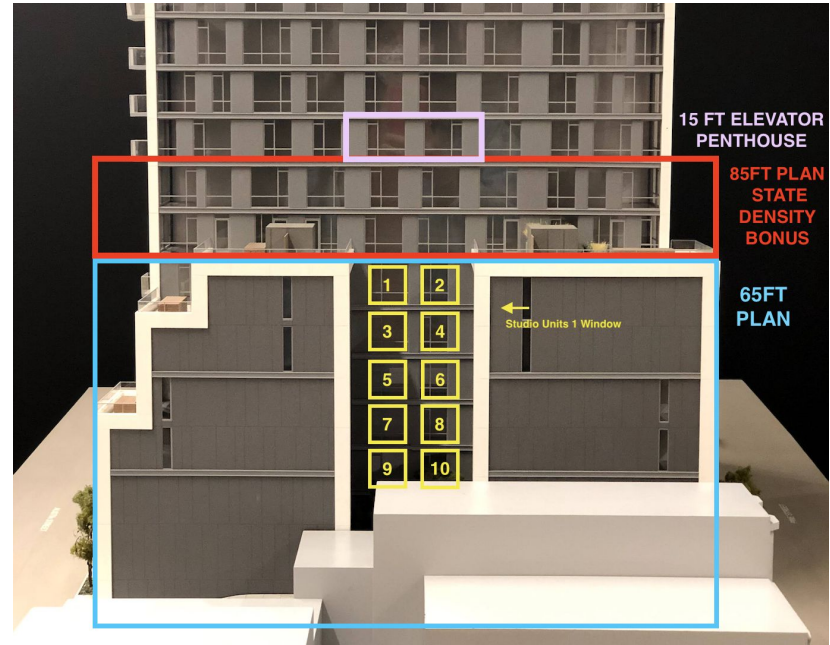
- **Require Environmental Impact Review** to understand effects of dark living environments on residents' health and specifically include the effects on the lower floors
- Failure to adequately mitigate will result in negative effects on resident's health which include depression, sleep disruption and bone density loss
- Neighbors will also be required to turn on their lights during the day which increases energy costs and is contrary to the state's policy for energy conservation
- Mitigation should be based on accurate indoor light conditions
- Mitigation should not be temporary and unregulated
- Reducing building height is the adequate mitigation for the negative effects

Additional references

Units Affected

21 total units affected

- 10 studio units with single east facing window and no exposure to street or alley
- 10 north and south facing units
- 2 BMR units
- 1 studio unit in new building (376 sqft)



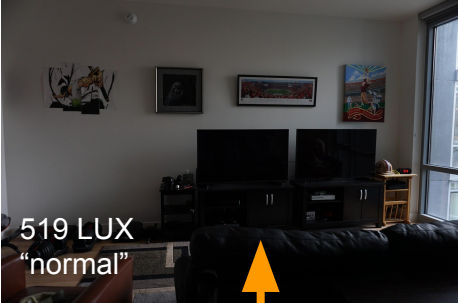
Using Sponsor's Light Study to Simulate Interior Light

1. Use a Light Meter to measure LUX at the Window
2. At that time, measure LUX in the middle of the living room and kitchen (see orange arrows)
3. Measured many light ranges to cover very dark - normal lighting conditions ie. 79 LUX - 830 LUX (See slides 24 - 29)

Exterior Light is **“Normal”** perceived brightness while Interior Light is **“Normal”** and **“Dark”**
 LUX readings drop by up to 40% from window to living room.



830 LUX at the window “normal”



519 LUX
“normal”



101 LUX
“dark”



519 LUX in living room
“normal”



101 LUX in kitchen
“dark”

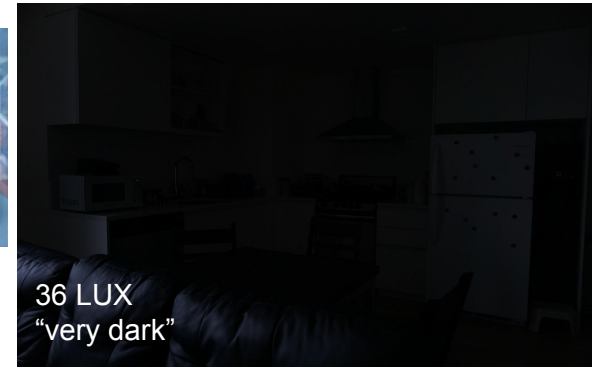
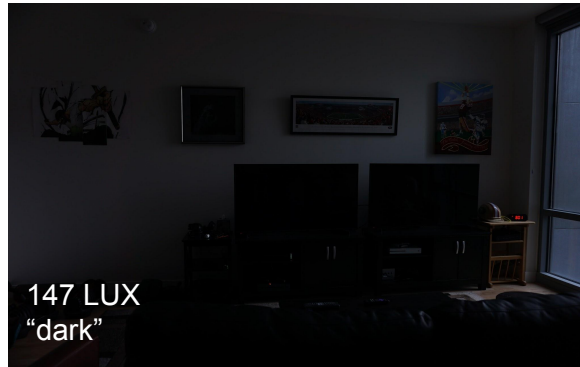
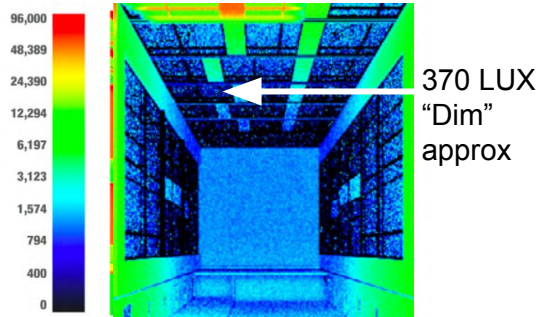
Values Lux vs Perceived

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

Interior Light in 3rd Floor Unit on Summer Morning

1. The sponsor's light study shows that a summer morning on the 3rd floor would have around 400 LUX.
2. The picture shows the inside of the unit at the time when we measured 370 LUX at the window matching the study.
3. At that same time, we measured with 147 LUX at the living room (50% less) light than at the window 36 LUX in the kitchen.
4. These are considered "dark" and "very dark" according to a standard
5. The interior light is below the average LUX reading and is disproportionately darker in the lower floors.

Summer Morning Simulation



Values Lux vs Perceived

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

Summer Morning Average

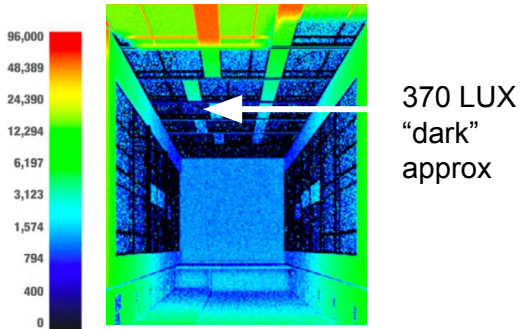
Proposed 79-ft Project	June 21
9:00 AM	840 lux

Dark Mornings All Year for Lower floors

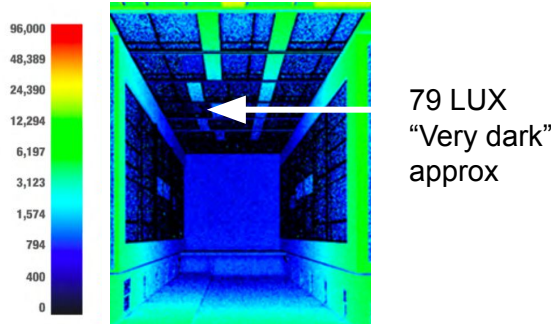
Below shows the approximate light on 3rd floor studio using the light readings from the simulation.

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

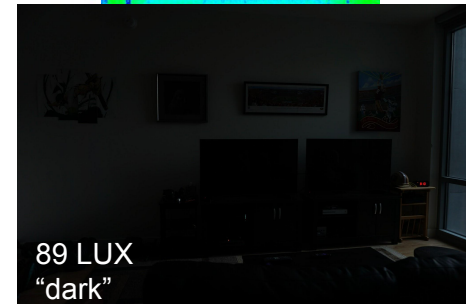
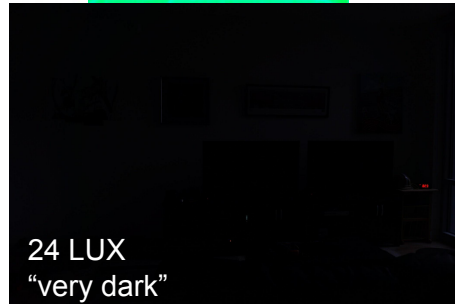
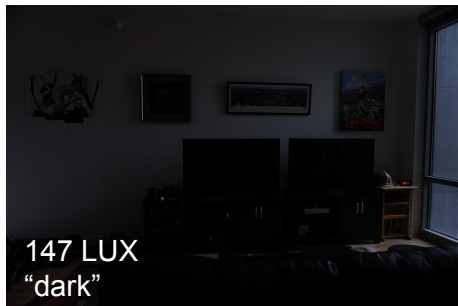
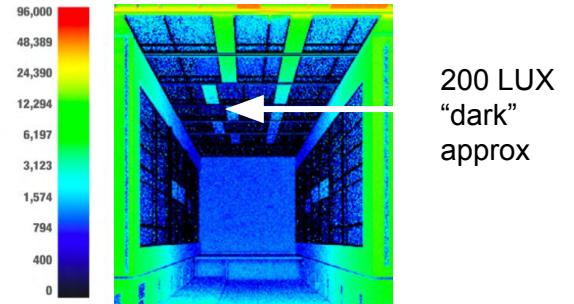
Summer Morning



Winter Morning



Fall/Spring Morning



*See slide 23/24/25 for breakdown of LUX readings

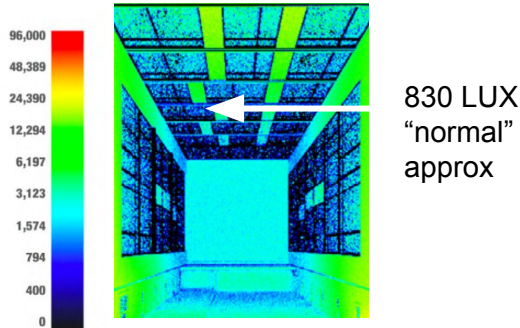
Dark Afternoons 3 out of 4 seasons for Lower floors

Values Lux vs Perceived

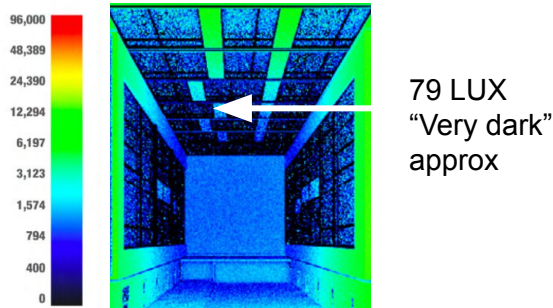
Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

Below shows the approximate light on 3rd floor studio using the light readings from the simulation.

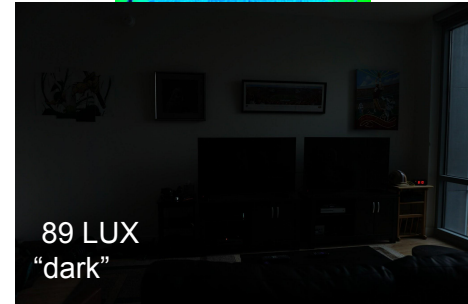
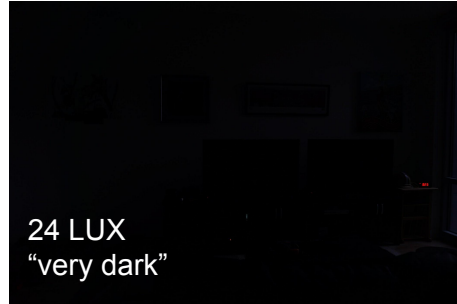
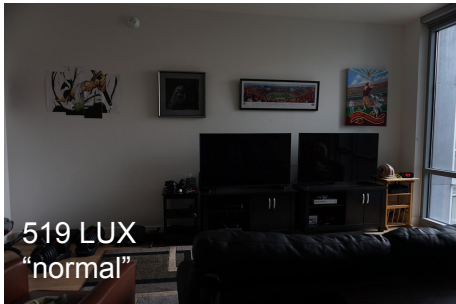
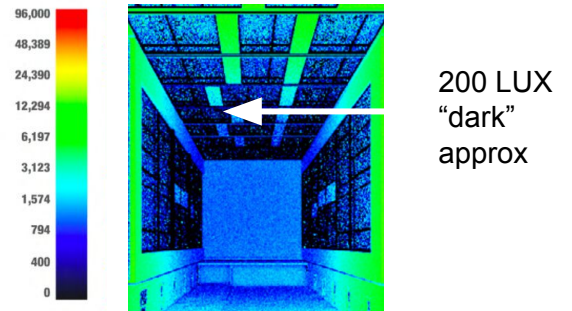
Summer Afternoon



Winter Afternoon



Fall/Spring Morning



*See slide 22/24/25 for breakdown of LUX readings

Critiques of Sponsor's Light Study

- Sponsor's light study did not tell the full story
 - Does not show **interior light in the individual units**
 - Does not show that **lower units have significantly below average light**
 - Does not show that **morning light is significantly reduced for east facing studio units**
- Comparing the difference between 79ft and 65ft are “not significant” but does not show significant reduction from current light levels

Request: Protect Morning Light for East facing Studio Units

We are want to focus on improving morning light for **east** facing **studio** units that have no other light source. 9AM - 12PM is the only time we get direct light.

Supplemental Light Study Findings

- Morning light reduction with 79ft building is significant (99% reduction) from current levels
- Lower floors (including 2 BMR units) are disproportionately affect and face extremely dark conditions that has adverse effects on residents and their health
- Lowering height to 4 floors effectively mitigates morning light blockage for lower floors

Significantly Adverse Effects on Light Quality

- 10 units are extraordinarily dark with 79ft proposal
- 1 window with no other exposure to street or alley
- **Dim to very dark** during morning and afternoon 6am - 9am and 3pm - 8pm during throughout the year
- **Very dark to pitch black** interior light all day during winter solstice
- Disproportionate effects on lower floors including 2 BMR units

Human Costs

- Light conditions are detrimental to the health of seniors and disabled residents in the light well.
- Significantly affects the Light exposure for 2 BMR units.

Conclusion and Request

Conclusion

- 10 units without other light source has adverse effects on health and safety of residents
- 2 BMR units affected in Austin
- 20 total units affected
- Sponsor's proposal to add artificial light does not address lack of access to real sunlight
 - No laws required to maintain artificial lights after construction
- Creating 14 small studios and destroying light for 11 studios is a bad tradeoff
- 1 studio unit in the new building also has low exposure and seeks a variance

Request

- Lower the height of the building to 4 floors to improve natural morning light for east facing studio units
- Do not grant exposure variance for 1 new studio facing lightwell

Appendix

Values Lux vs Perceived

Lux value range	Reference Lighting Condition	Light Step
0-10	Pitch Black	1
10-50	Very Dark	2
50-200	Dark Indoors	3
200-400	Dim Indoors	4
400-1,000	Normal Indoors	5
1,000-5,000	Bright Indoors	6

Average vs 3rd floor Simulation Light Readings

Proposed 79-ft Project	June 21	September 21	December 21	March 21
9:00 AM	840 lux	228 lux	129 lux	228 lux
12:00 PM	6,755 lux	3,824 lux	803 lux	3,824 lux
3:00 PM	711 lux	199 lux	79 lux	199 lux
Daily Average Lux/hr	3,338 lux/hr	1,761 lux/hr	404 lux/hr	1,761 lux/hr

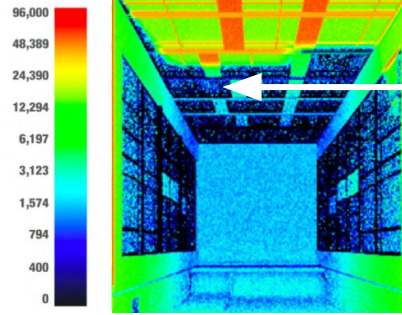
Approximate light on 3rd floor	June 21	September 21	December 21	March 21
9:00 AM	370	200	79	200
3:00 PM	830	200	79	200

Inside the 3rd floor Studio Summer Solstice Morning Simulation

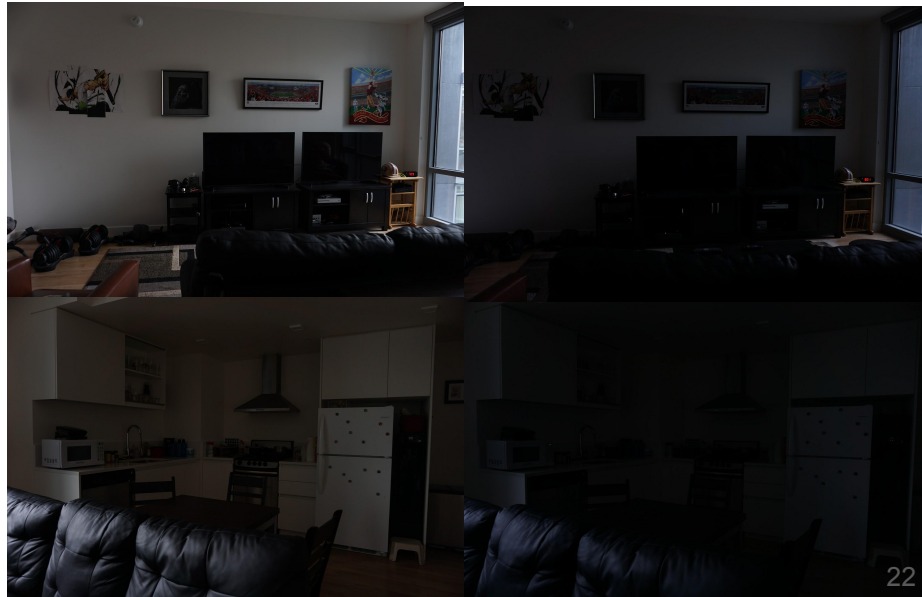
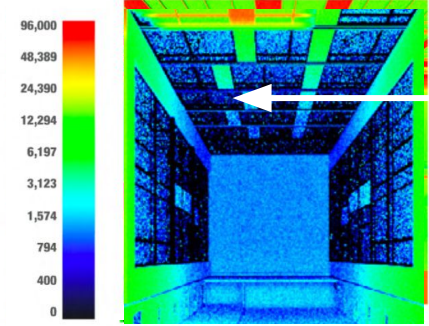
“Average” light does not paint the full picture.

	65ft project	79 ft project
Average	2376 LUX “Bright”	840 LUX “Normal”
3rd floor Exterior Window	830 LUX “Normal”	370 LUX “Dim”
3rd floor Interior Living room	519 LUX “Dim”	147 “Dim”
3rd floor Interior Kitchen	101 LUX “Dark”	36 LUX “Very dark”

65 ft project



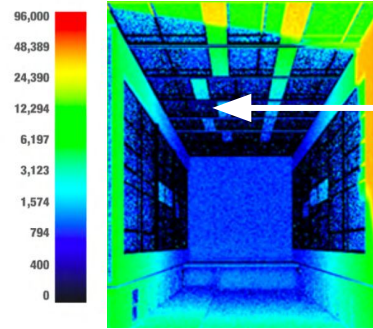
79 ft project



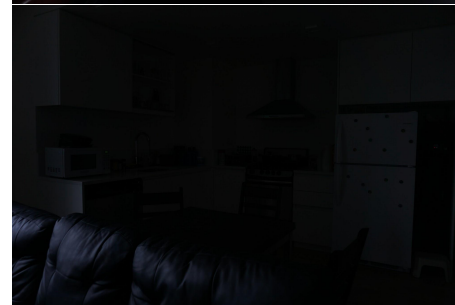
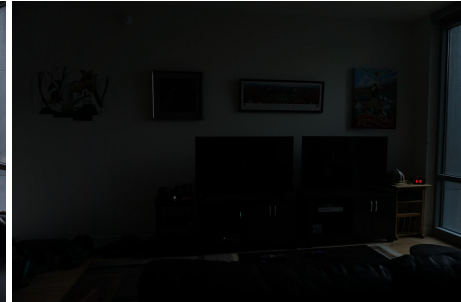
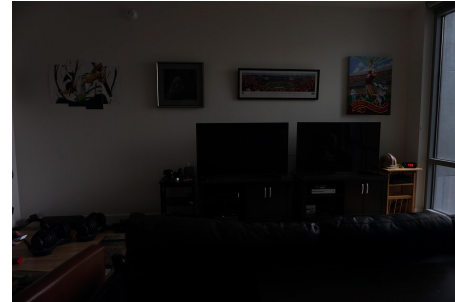
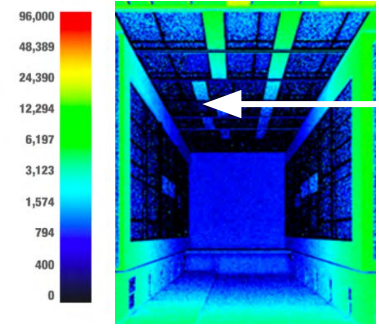
Inside the 3rd floor Studio Winter Solstice Morning Simulation

Light meter Location	65ft project	79 ft project
Window	526 LUX "Normal indoors"	200 LUX "Dim indoors"
Living room	338 LUX "Dim indoors"	89 "Dark indoors"
Kitchen	87 LUX "Dark indoors"	23 LUX "Very dark"

65 ft project



79 ft project

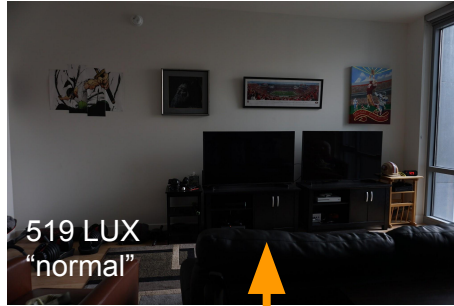


Normal Exterior Light is Normal/Dark Interior Light

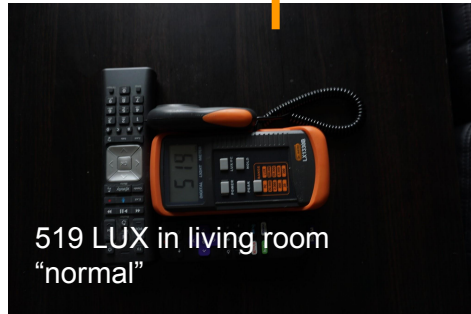
Pictures showing light measured at 830 LUX at the window, 519 LUX in the living room, 101 LUX in the kitchen
Exterior Light is “Normal” perceived brightness while Interior Light is “Normal” and “Dark”



830 at the window
“normal”



519 LUX
“normal”



519 LUX in living room
“normal”



101 LUX
“dark”

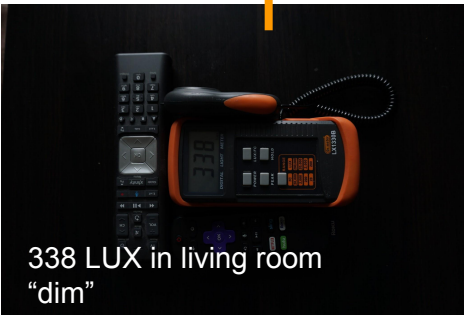
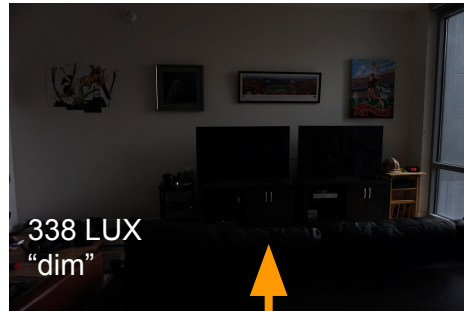


101 LUX in kitchen
“dark”

Normal Exterior Light is Dim/Dark Interior Light

Pictures showing light measured at 526 LUX at the window, 338 LUX in the living room, 87 LUX in the kitchen
Exterior Light is “Normal” perceived brightness while Interior Light is “Dim” and “Dark”

526 at the window
“normal”

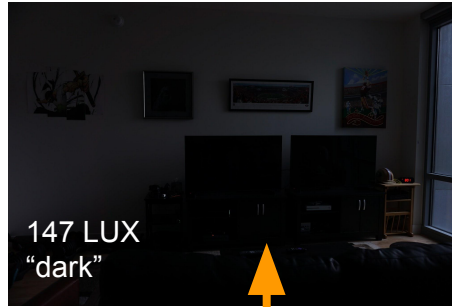


Dim Exterior Light is **Dark/Very Dark** Interior Light

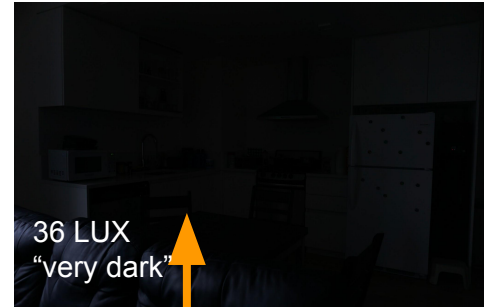
Pictures showing light measured at 370 LUX at the window, 147 LUX in the living room, 36 LUX in the kitchen
Exterior Light is “**Dim**” perceived brightness while Interior Light is “**Dim**” and “**Very Dark**”



370 at the window
“dim”



147 LUX
“dark”



36 LUX
“very dark”



147 LUX in living room
“dark”

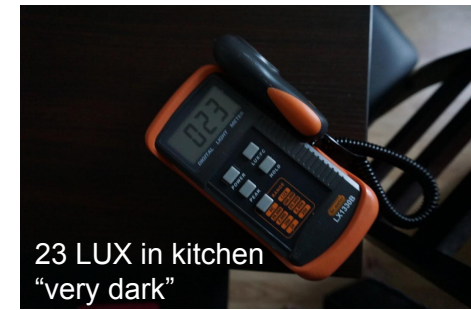
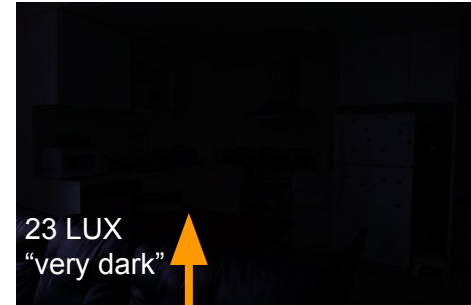
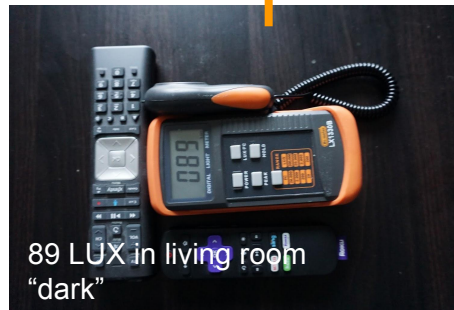
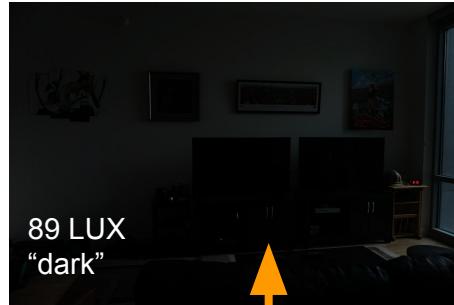


36 LUX in kitchen
“very dark”

Dark Exterior Light is Dark/Very Dark Interior Light

Pictures showing light measured at 200 LUX at the window, 89 LUX in the living room, 23 LUX in the kitchen
Exterior Light is **“Dark”** perceived brightness while Interior Light is **“Dark”** and **“Very Dark”**

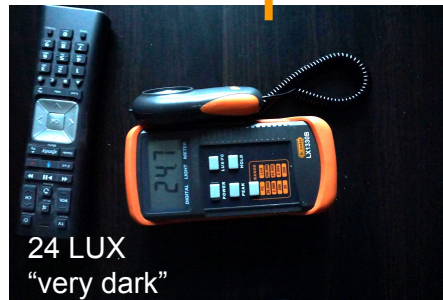
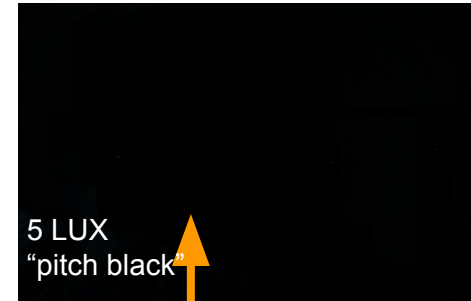
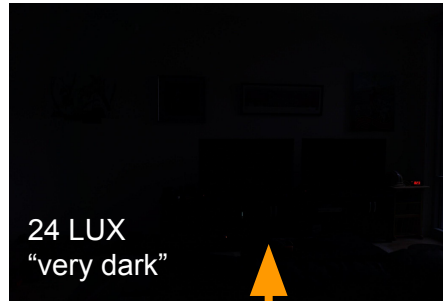
200 at the window
“dark”



Dark Exterior Light is **Very Dark/Pitch Black** Interior Light

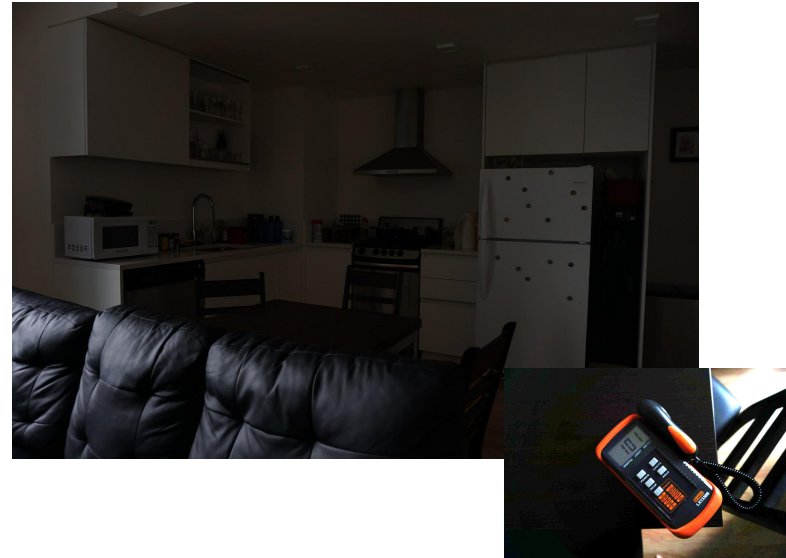
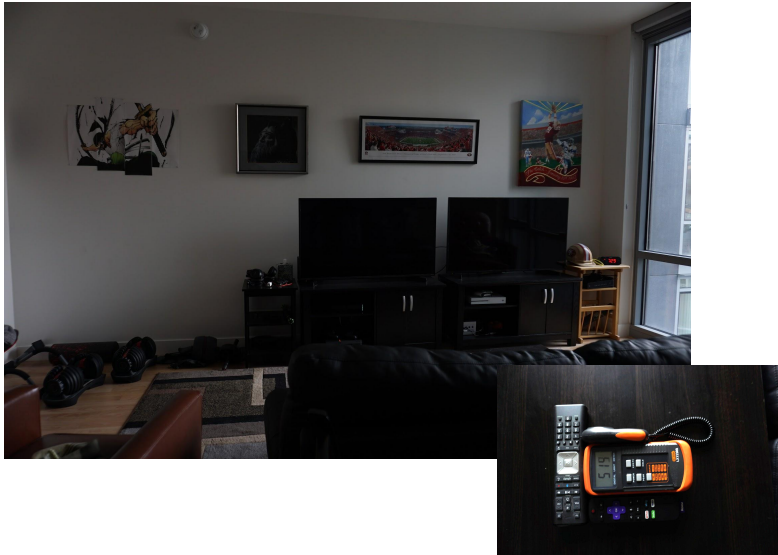
Pictures showing light measured at 79 LUX at the window, 24 LUX in the living room, 5 LUX in the kitchen
Exterior Light is **“Dim”** perceived brightness while Interior Light is **“Dark”** and **“Very Dark”**

79 at the window
“dark”



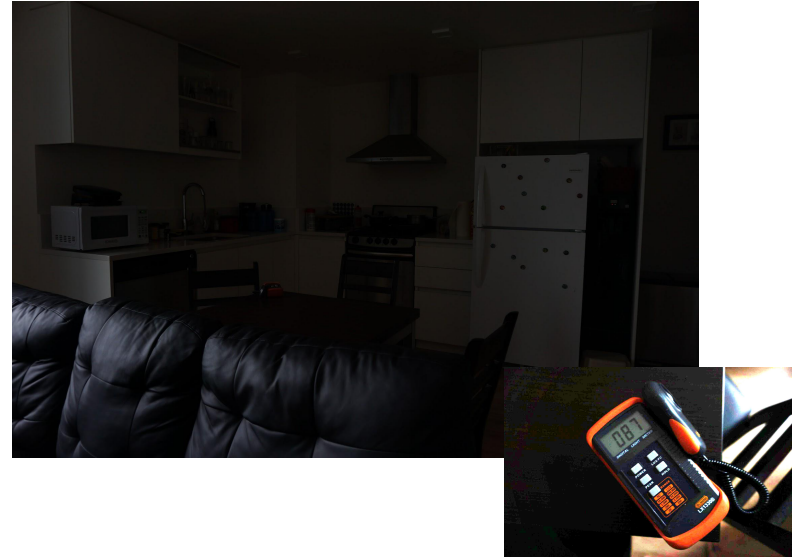
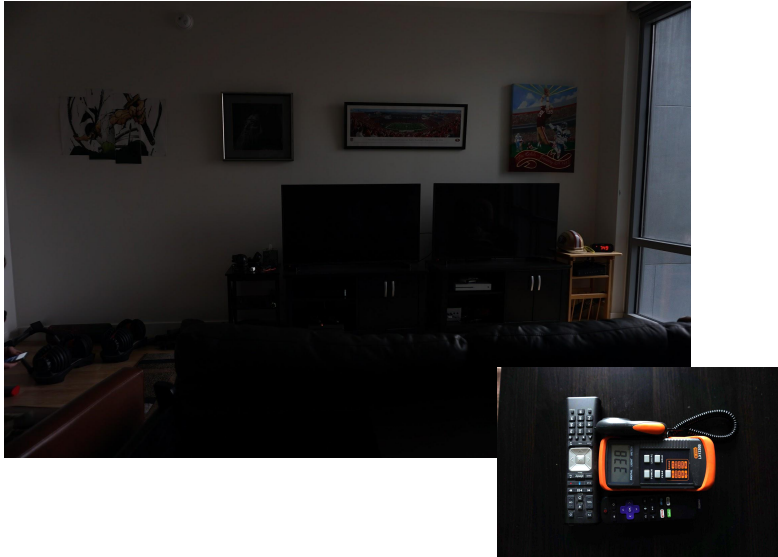
Interior Light “Normal Indoors” 830 LUX

830 LUX at the window = dim indoors
519 LUX in the living room = dim indoors
101 LUX in the kitchen = very dark indoors



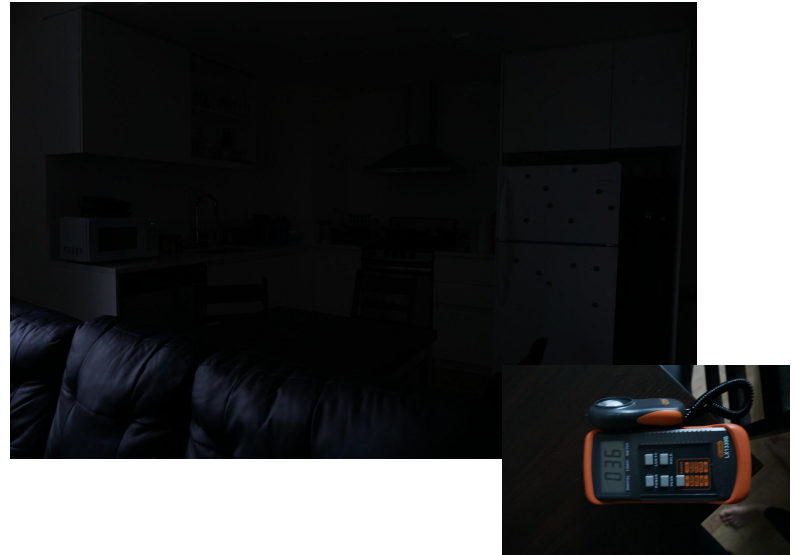
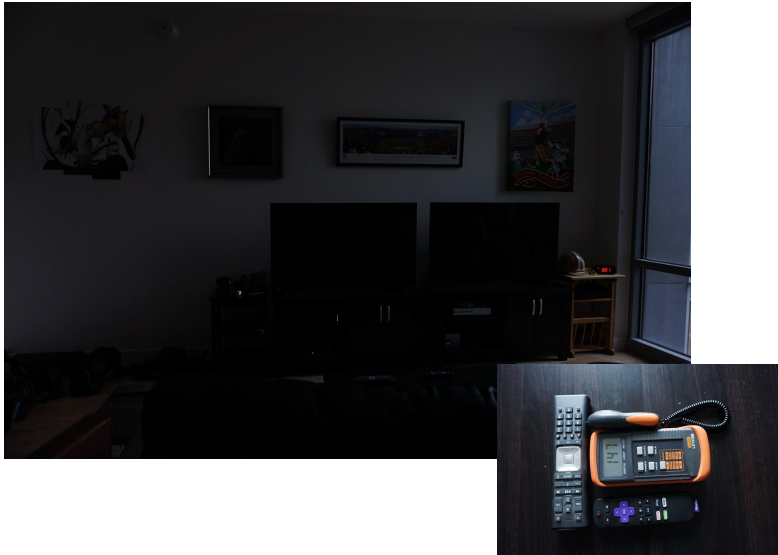
Interior Light “Normal Indoors” 526 LUX

526 LUX at the window = normal indoors
338 LUX in the living room = dim indoors
87 LUX in the kitchen = dark indoors



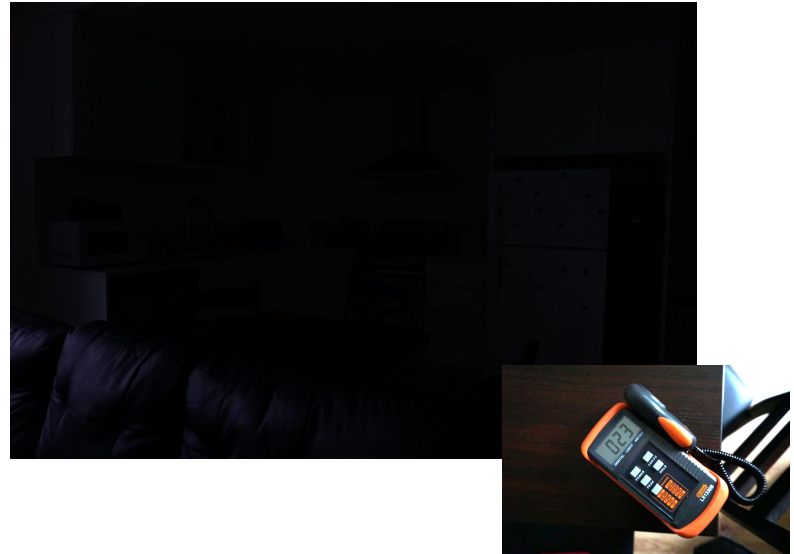
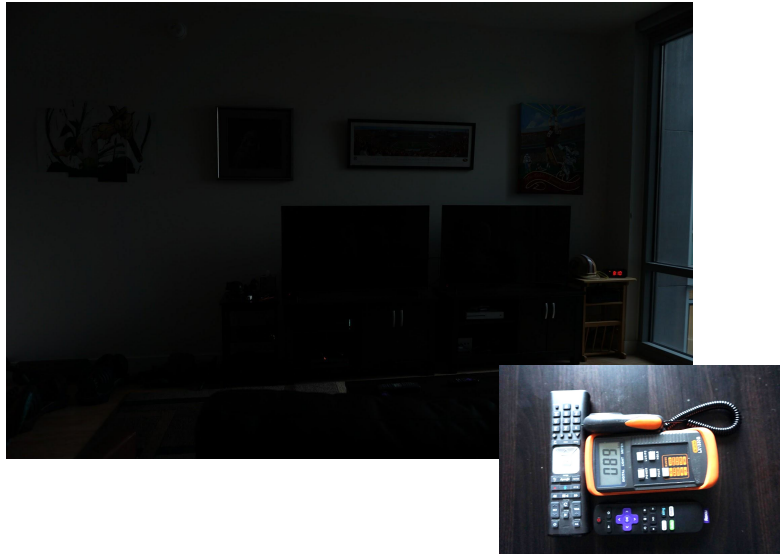
Interior Light “Dim Indoors” 370 LUX

370 LUX at the window = dim indoors
147 LUX in the living room = dark indoors
36 LUX in the kitchen = very dark indoors



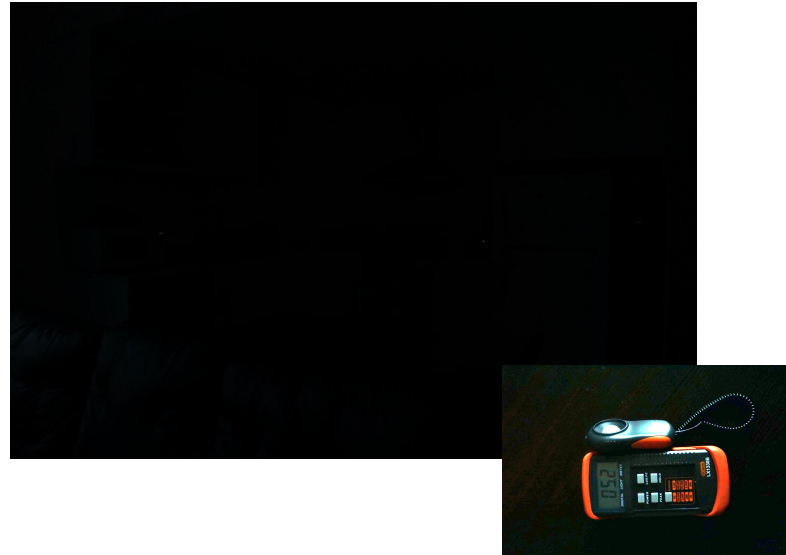
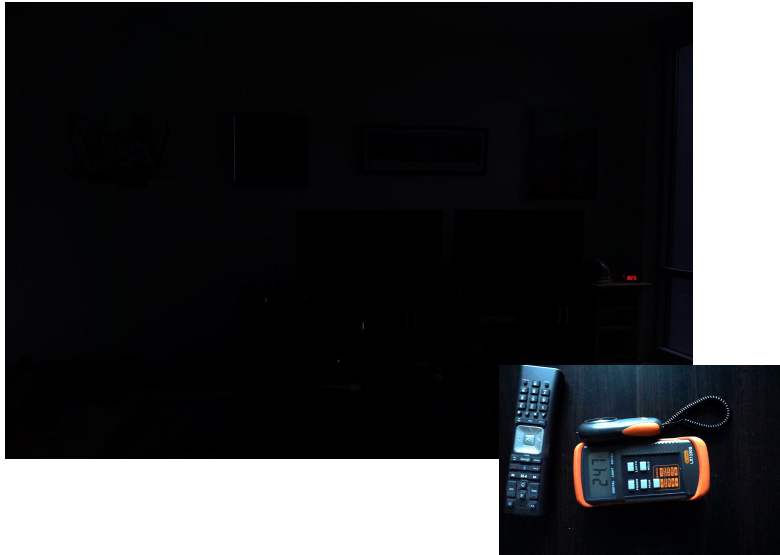
Interior Light “Dark Indoors” 200 LUX

200 LUX at the window = dark indoors
89 LUX in the living room = dark indoors
23 LUX in the kitchen = very dark indoors



Interior Light “Dark Indoors” 79 LUX

79 LUX at the window = dark indoors
24 LUX in the living room = very dark indoors
5 LUX in the kitchen = pitch black



Very Dark during Winter Solstice on Average

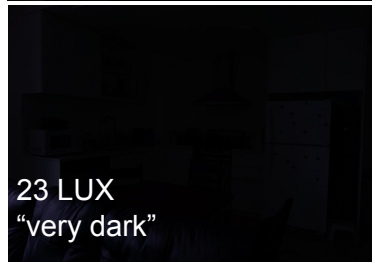
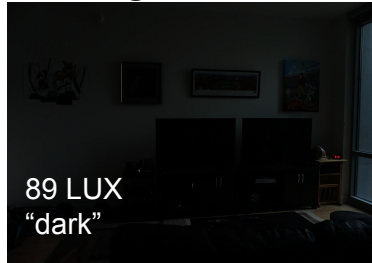
Sponsors Light Study Averages

Proposed 79-ft Project	December 21
9:00 AM	129 lux
12:00 PM	803 lux
3:00 PM	79 lux
Daily Average Lux/hr	404 lux/hr

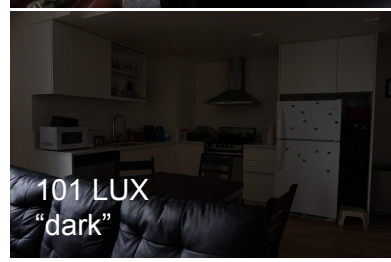
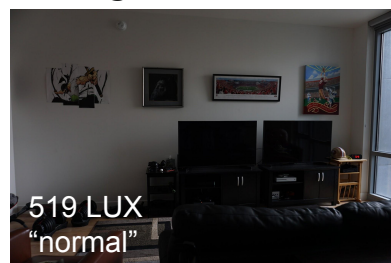
Values Lux vs Perceived

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

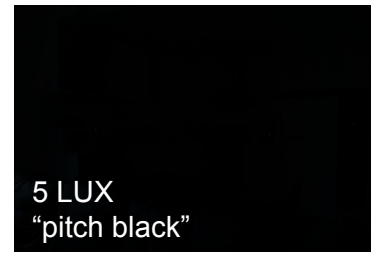
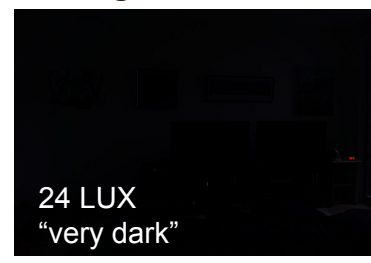
9 AM @ 200 LUX window



12 PM @ 830 LUX window



12 PM @ 79 LUX window



*See appendix slides 24/26/27 for detailed breakdown and lux readings

Compounding Shadows

- Shadows of the Austin already cast shadows from south and west
- New building will enclose court from the east blocking reflected light
- **Does not show the magnitude of light loss for 20 affected units**



1545 PINE STREET (THE AUSTIN) SHADOWFAN

Full year net new shadow fan diagram factoring in the presence of existing shadows

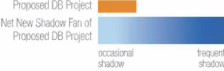


SHADOW FAN DIAGRAM
AFFECTED AREAS DURING SECTION 295 TIMES **FULL YEAR**
Parks and Open Spaces (Jurisdiction)



1525 PINE STREET SHADOWFAN: PROPOSED DENSITY BONUS (DB) PROJECT

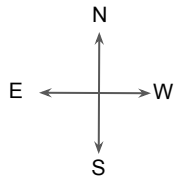
Full year net new shadow fan diagram factoring in the presence of existing shadows



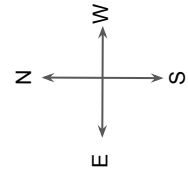
SHADOW FAN DIAGRAM
AFFECTED AREAS DURING SECTION 295 TIMES **FULL YEAR**
Parks and Open Spaces (Jurisdiction)

Supplemental Light Study

- Proportional
- Correct orientation
- Uses the real sun



Sun Position and Shadows



June 15 9:15 AM



June 11 12:40 PM



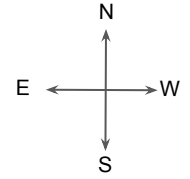
June 11 1:40 PM



June 11 3:50 PM



Light Well Shadows on June 11 at 10:30AM



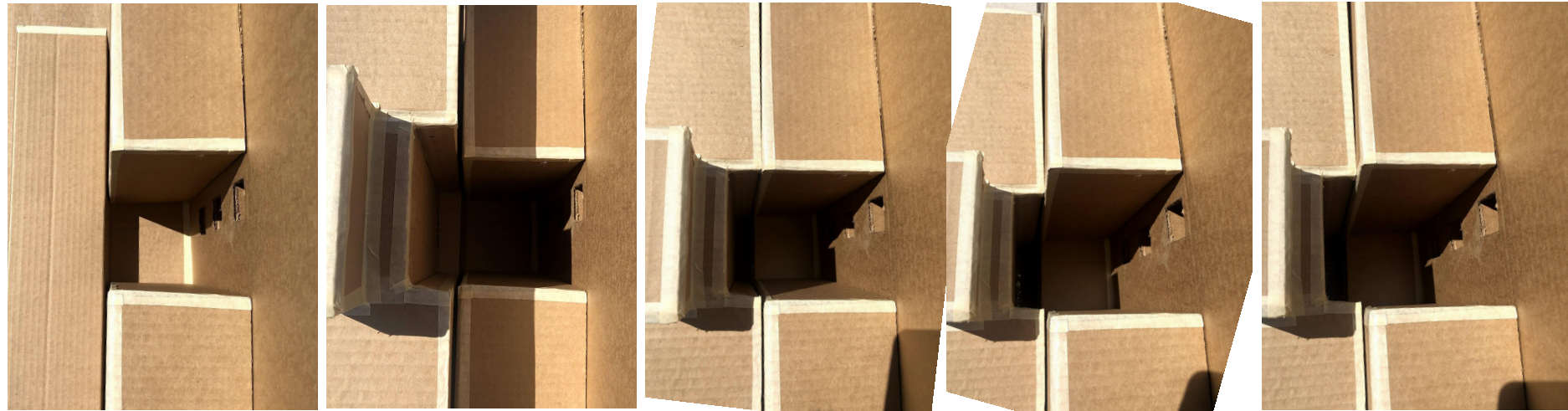
No building

79ft

65ft

5 floors

4 floors



Light Measurement on June 11 at 12:40PM

	No building	79 ft	65ft	5 floors	4 floors
4th floor (lux)	7190	4370	4290	4300	4730
% reduction		39%	40%	40%	34%
2nd floor (lux)	740	170	190	190	210
% reduction		77%	74%	74%	72%



Light Measurement on June 15 at 9:15 AM

	No building	79 ft	65ft	5 floors	4 floors
4th floor (lux)	34900	2340	3250	6650	n/a*
% reduction		99.93%	99.90%	99.80%	na/*
2nd floor (lux)	6000	40	70	99.9	118.2
% reduction		99.99%	99.98%	99.98%	99.98%



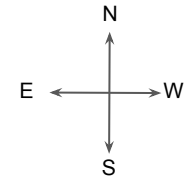
Light Measurement on June 11 at 4:00PM

	No building	79 ft	65ft	5 floors	4 floors
4th floor (lux)	598	262	376	262	346
% reduction		56%	37%	56%	42%
2nd floor (lux)	122	11	12	10	13
% reduction		91%	90%	92%	89%



Physical Light Studies on the roof

- Scale cardboard models with differing heights
- Using the real sun on the Austin's roof with correct orientation
- Objective measurements



No building

79ft

65ft

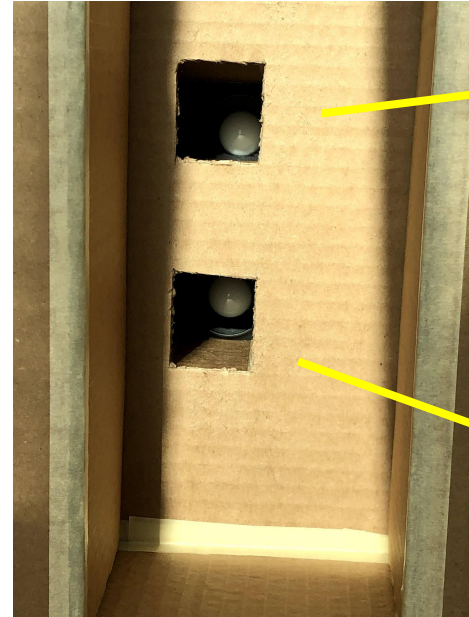
5 floors

4 floors



Scientific measurements of light on 2nd and 4th Floor

- 2 Light meters inside
2nd floor and 4th floor model
- Objective LUX measurement
- Reviewed by light expert

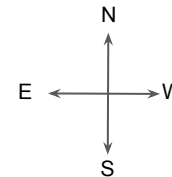


Light Measurement on June 11 at 10:30AM

	No building	79 ft	65ft	5 floors	4 floors
4th floor (lux)	11350	2970	8800	9780	11000
% reduction		73%	22%	13%	3%
2nd floor(lux)	1060	70	190	220	600
% reduction		93%	82%	79%	43%



Height Reduction is an Effective Mitigation For Morning Light Reduction



Morning light reduction for lower units between 9 AM - 12 PM can be improved by lowering the 1525 building height to 4 floors.

Light Reduction Percentage 9AM - 4PM 2nd floor

Time/height/%	79 ft	65ft	4 floors
9:15 AM	99.99%	99.98%	99.98
10:30 AM	93%	82%	43%
12:40 PM	77%	74%	72%
4:00 PM	91%	90%	89%



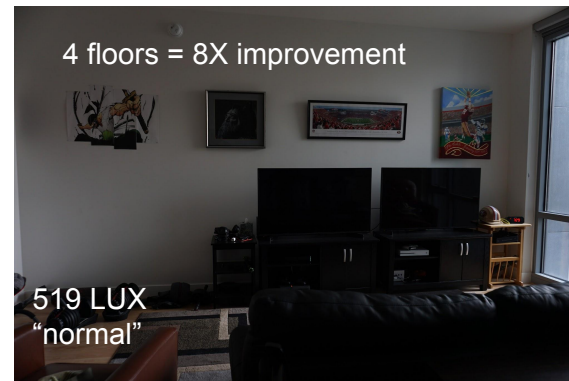
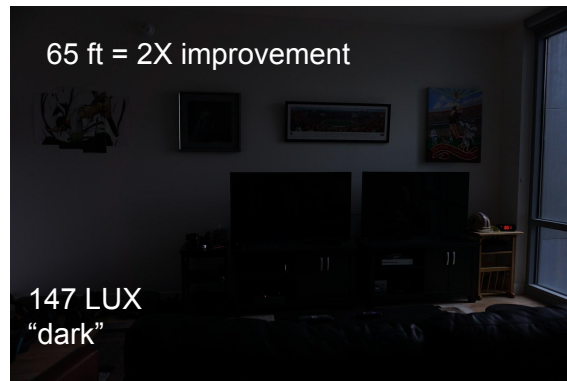
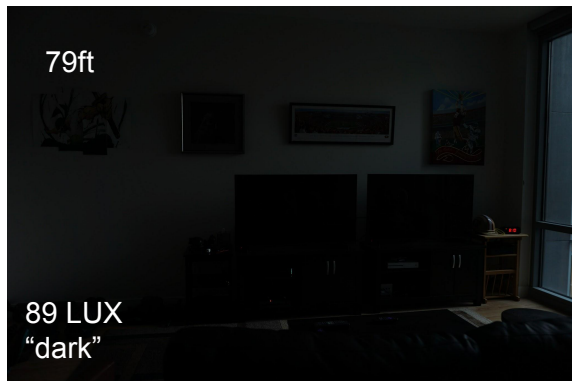
Effect of Lowering the Building to 4 Floors: Improved Morning Light from **Dark** to **Normal**

Lux value range	Reference Lighting Condition
10-50	Very Dark
50-200	Dark Indoors
200-400	Dim Indoors
400-1,000	Normal Indoors

June 11 @ 10:30 AM Light Measurements

By lowering the building to 4 floors, morning light between 9 AM - 12 PM for lower units can be improved from **dark** to **normal**,

	No building	79 ft	65 ft	4 floors
2nd floor(lux)	1060	70 "dark"	190 "dark"	600 "normal"
% reduction		93%	82%	43%



Light Reduction Percentage 2nd Floor Studio 9AM - 4PM

Lower floors are disproportionately and significantly impacted.

6 units from 2nd, 3rd, and 4th floors are most affected.

Sponsors' light study does not show reduction from current levels.

Similar light reduction on a park is considered a significant adverse effect.

Time/height/%	79 ft	65ft	4 floors
9:15 AM	99.99%	99.98%	99.98
10:30 AM	93%	82%	43%
12:40 PM	77%	74%	72%
4:00 PM	91%	90%	89

*See appendix for detailed breakdown and lux readings