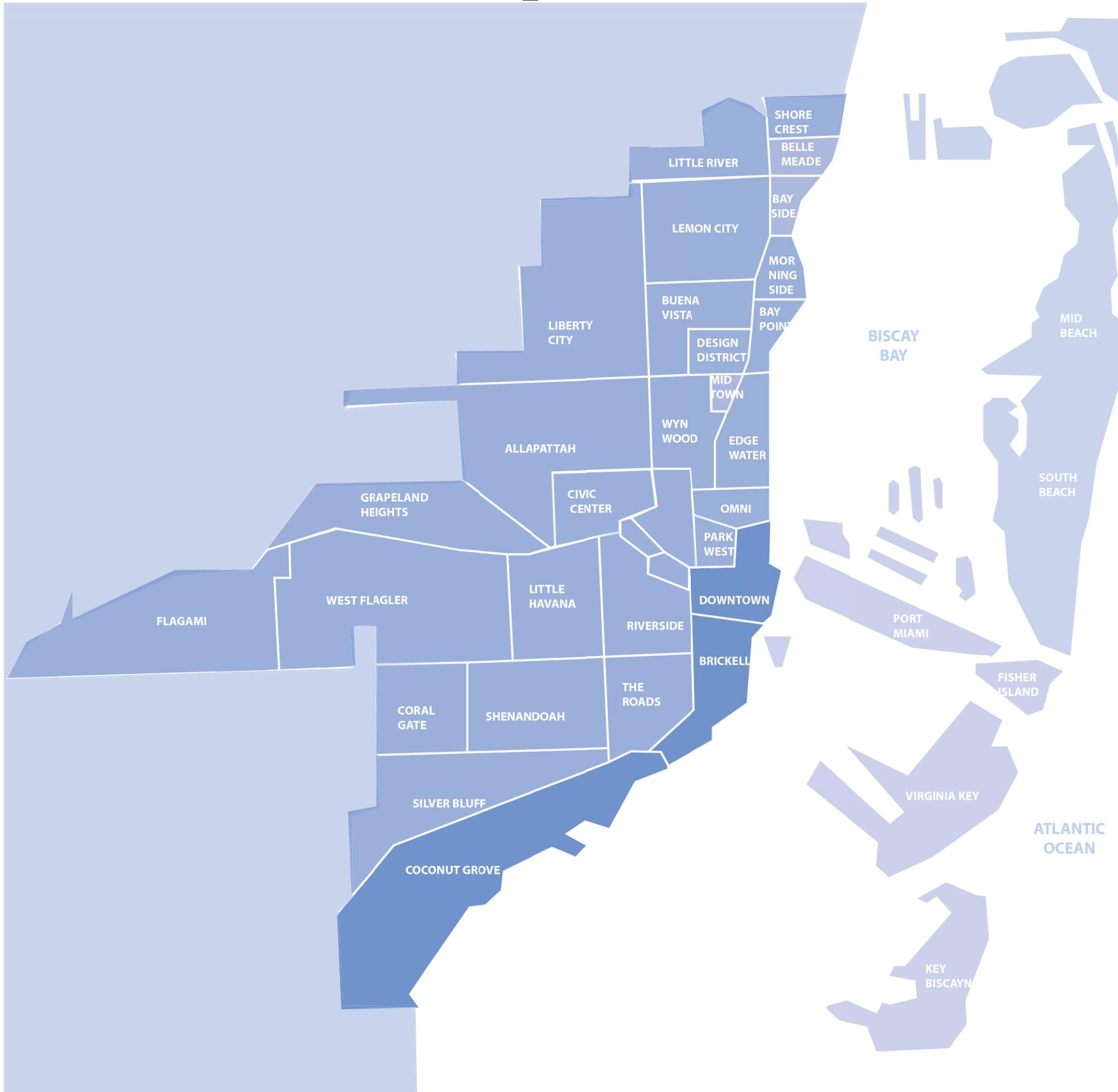


A wide-angle photograph of a tropical beach. The foreground is filled with clear, turquoise-blue water that gently laps onto a light-colored sandy shore. In the middle ground, the water extends to the horizon under a vast, bright blue sky. Several large, white, puffy cumulus clouds are scattered across the sky, particularly on the left side. The overall atmosphere is bright and airy.

# MIAMI

Janki A Vyas | Ksenia Knyazkina

# NEIGHBORHOODS + DEMOGRAPHICS\_MIAMI in numbers



8  
most  
walkable city  
in USA

399,457  
population

6 ft  
average  
elevation

11,135  
people per  
square mile

# MIAMI



## HIGH-RISE VS. LOW-RISE

# MIAMI

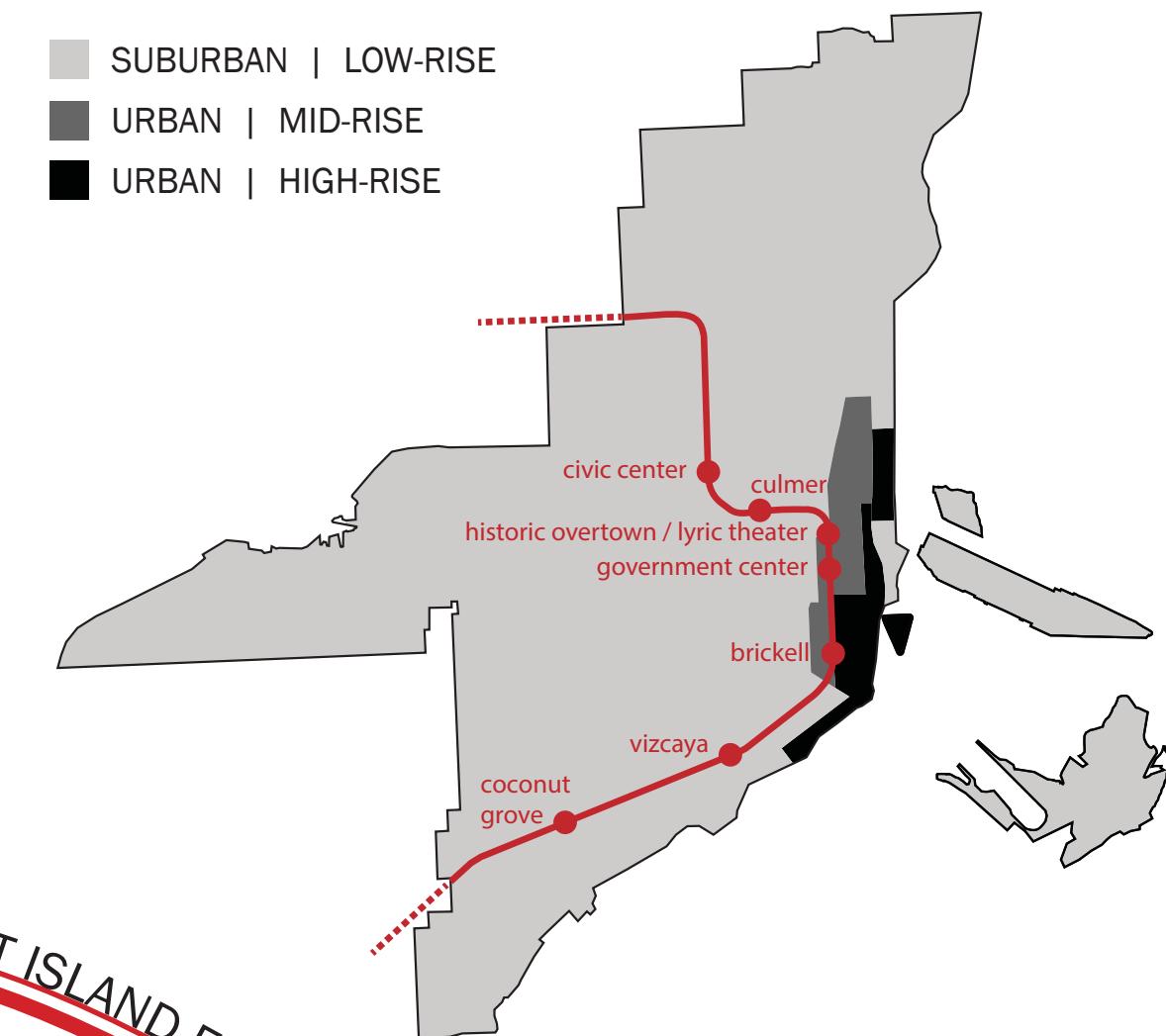
one of top three USA  
cities with most intense  
urban heat island effect

**+ 0.92 - 1.49 C**

Temperature swings



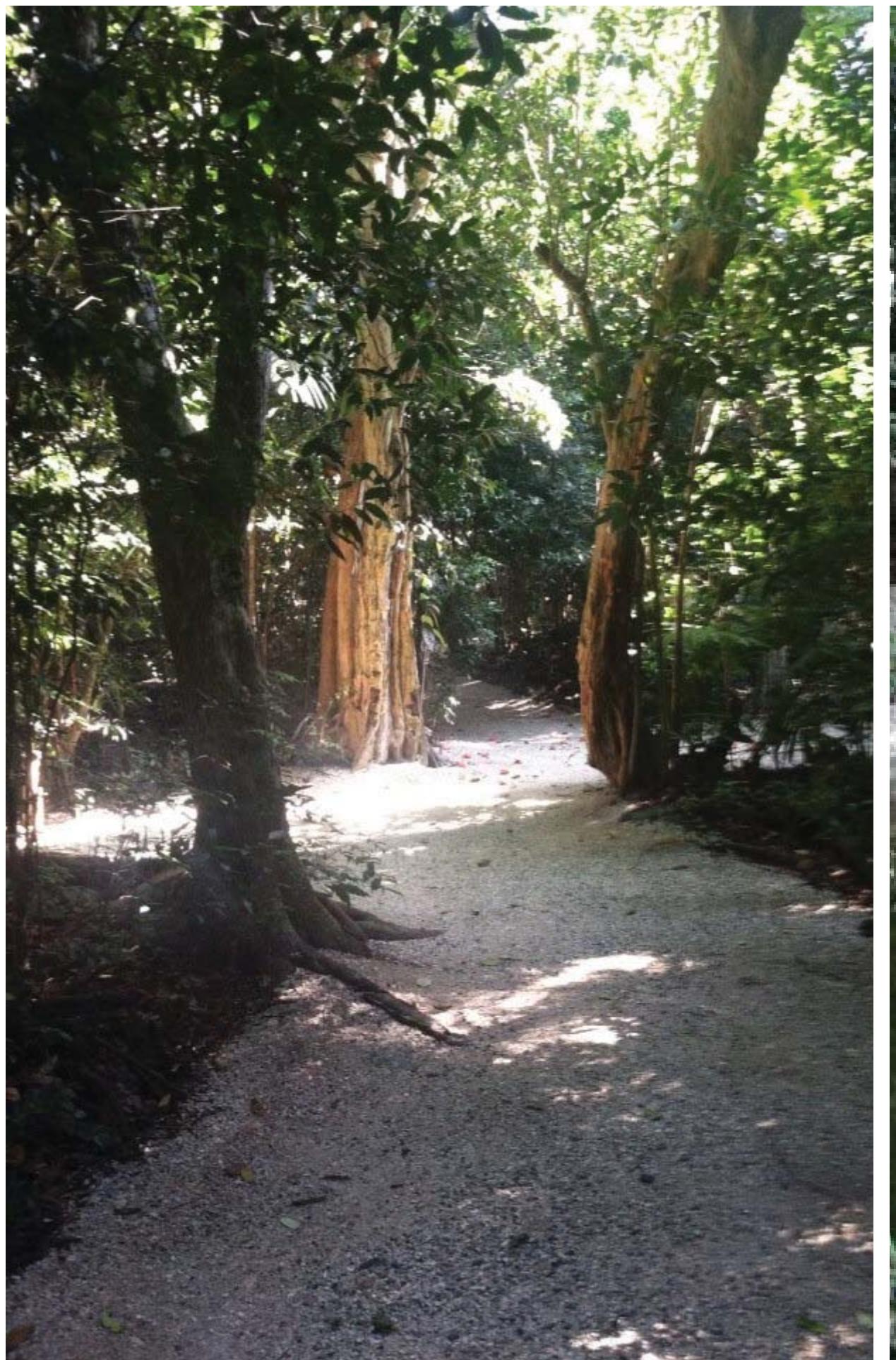
- SUBURBAN | LOW-RISE
- URBAN | MID-RISE
- URBAN | HIGH-RISE



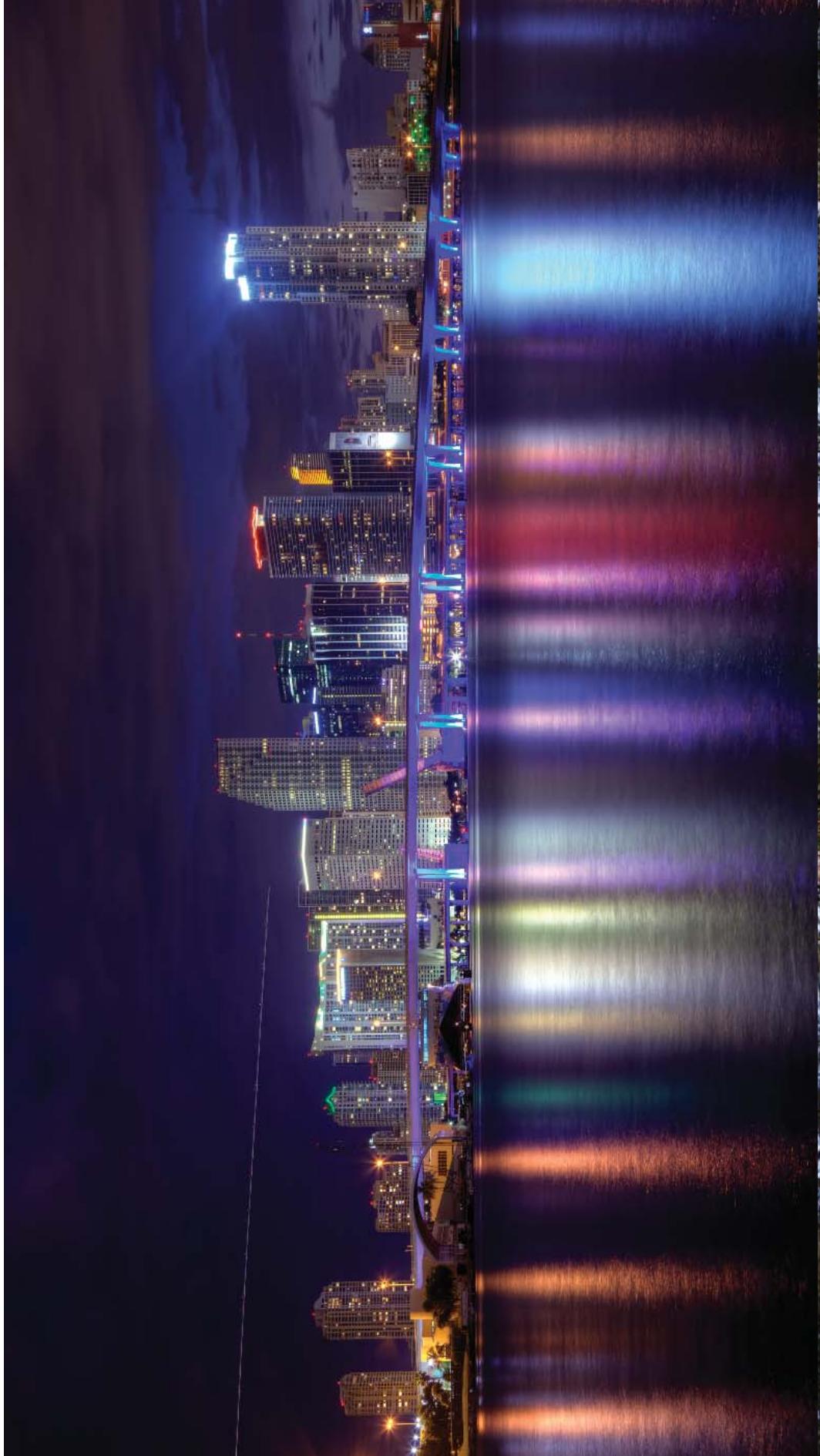


<http://www.abpan.com/wp-content/uploads/2014/08/macarthur-causeway.jpg>





## CHANGE IN MIAMI OVERTIME



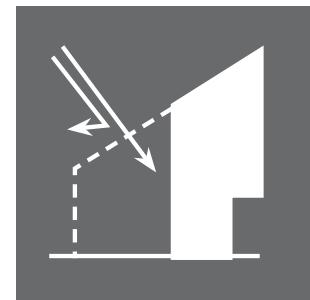
# GOALS AND STRATEGIES



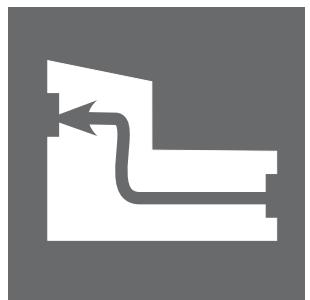
ARCHITECTURAL  
SHADING



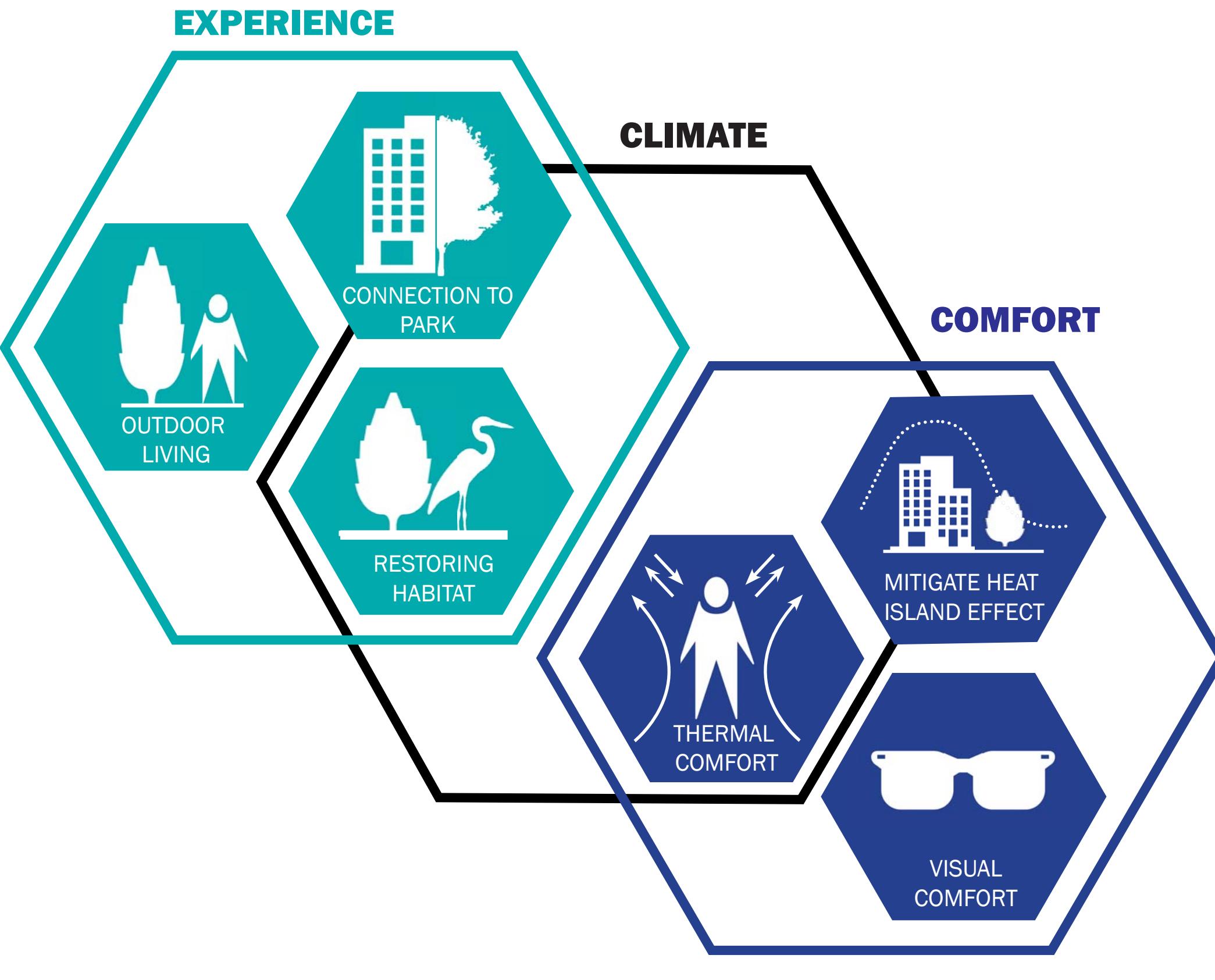
VEGETATIVE  
SHADING



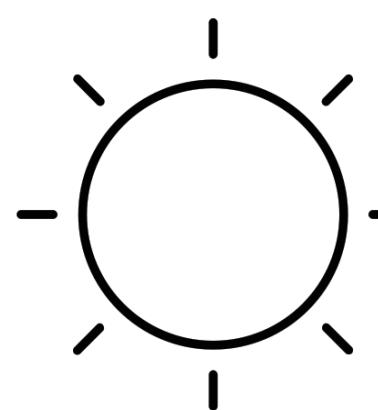
BUFFER ZONES



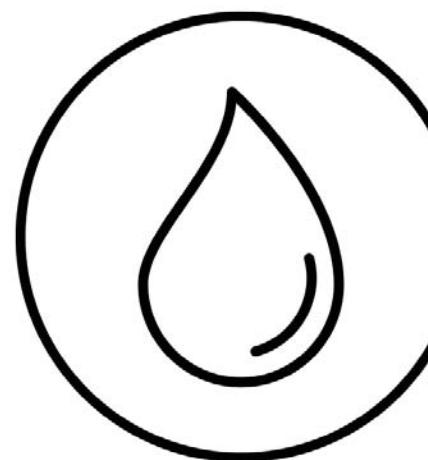
VENTILATION



# CLIMATE ANALYSIS



&



**HOT**

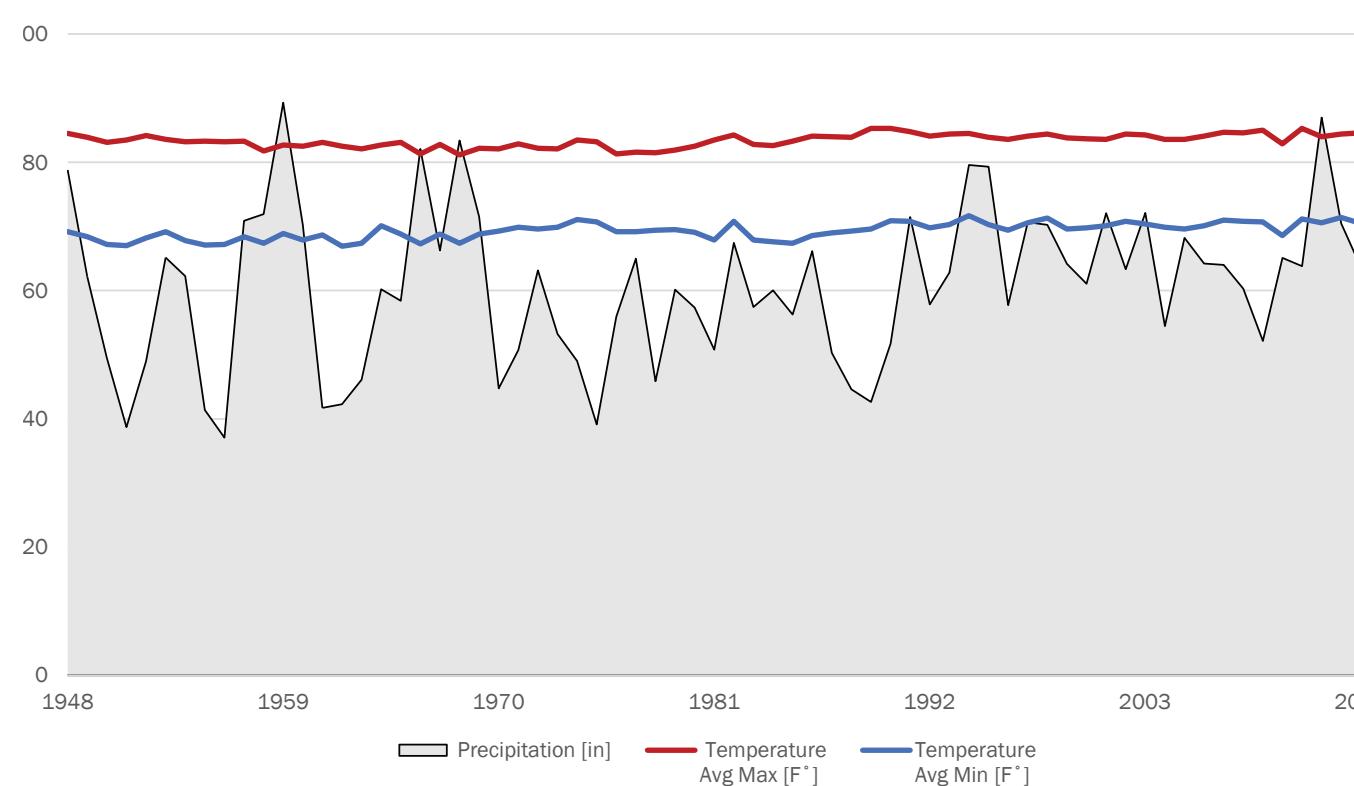
Annual High Temperature

**84.2 F**

**HUMID**

Average Relative humidity

**73%**



City: **Miami**

State: **Florida**

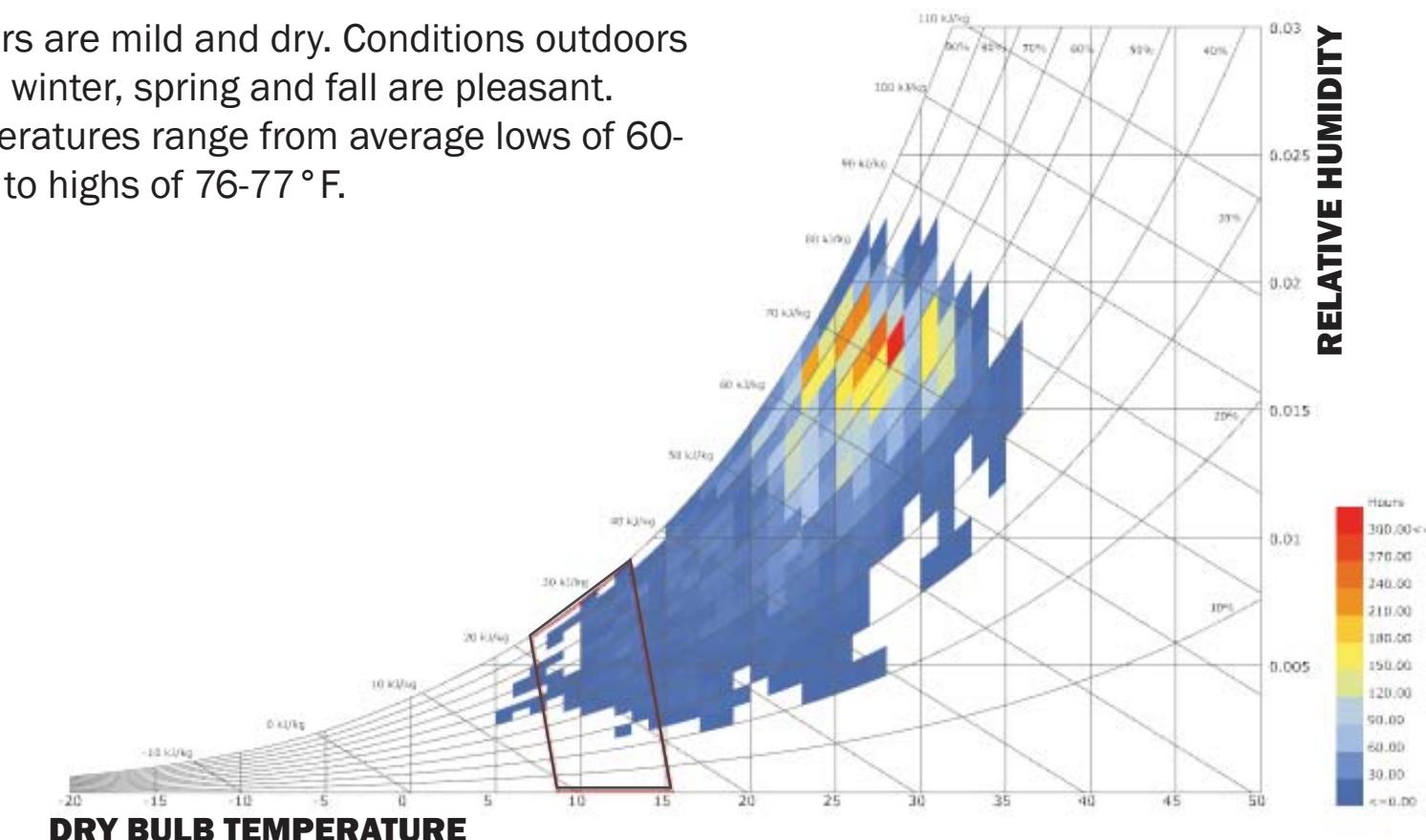
**25.76° N -80.21° W**

Miami is located at the lowest east coast of Florida. Biscayne Bay and Miami Beach are both to the east.

The climate of Miami is considered mild subtropical marine.

Summers are long and hot with plentiful rainfall, averaging about 60 inches a year. Temperatures range from average lows of 75-76°F to highs of 88-90°F.

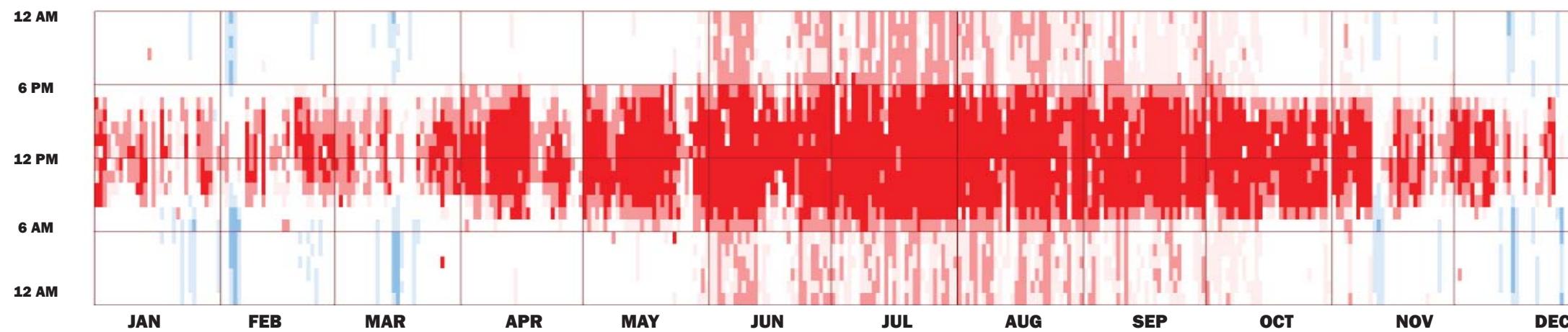
Winters are mild and dry. Conditions outdoors in the winter, spring and fall are pleasant. Temperatures range from average lows of 60-61°F to highs of 76-77°F.



# COMFORT

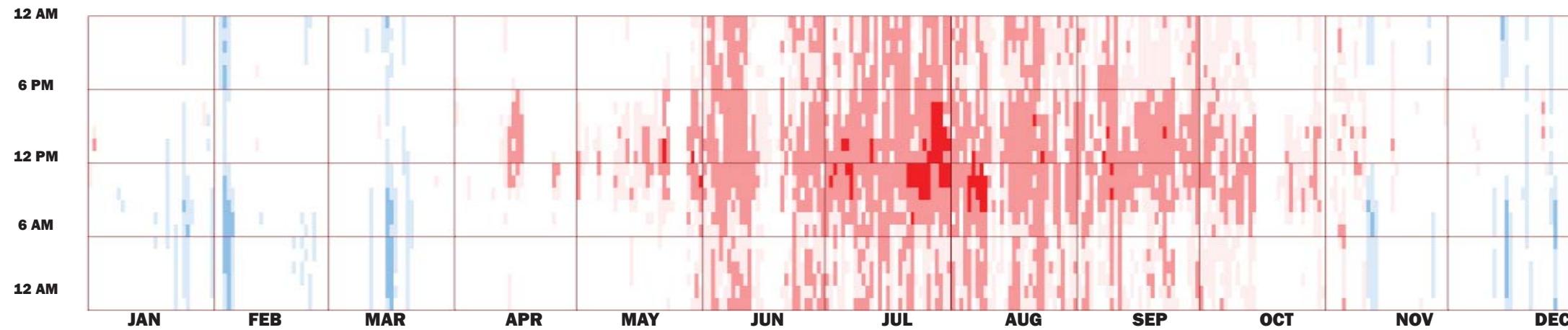
OUTDOOR COMFORT **NO SHADES**

**45% ANNUALLY**



OUTDOOR COMFORT **WITH SHADES**

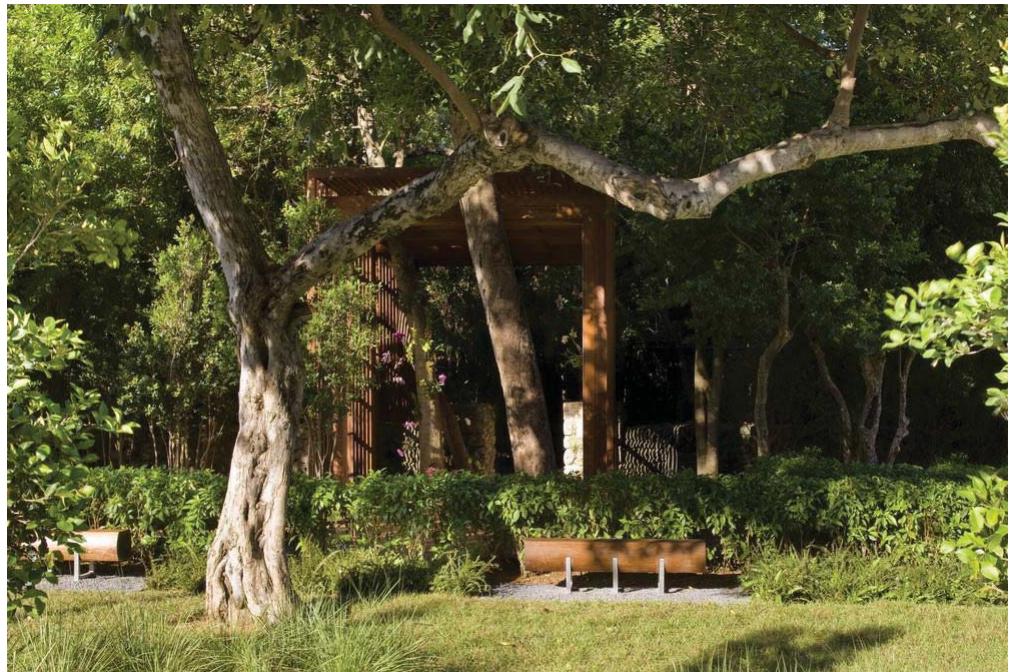
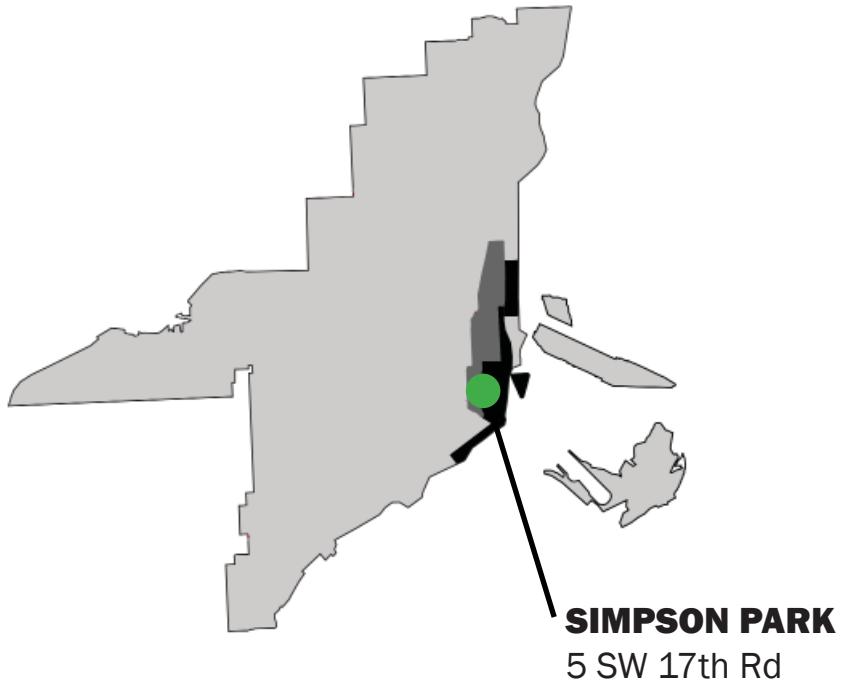
**61% ANNUALLY**



# EXPERIENCE - SIMPSON PARK

## MICROCLIMATE

The climate in the understory is shaded, humid and damp. Wind is greatly dampened, resulting in a still environment. Heat and humidity speeds up the decomposition of matter resulting in poor soil quality beyond the top layer.



## EMERGENT LAYER

Typically evergreens, which are able to withstand harsher temperatures and higher winds. Eagles, butterflies, and bats inhabit this layer.



## CANOPY LAYER

The densest areas of biodiversity are found in the forest canopy, a continuous cover formed by adjacent treetops. It traps moisture & humidity underneath & blocks ~95% of the sunlight.

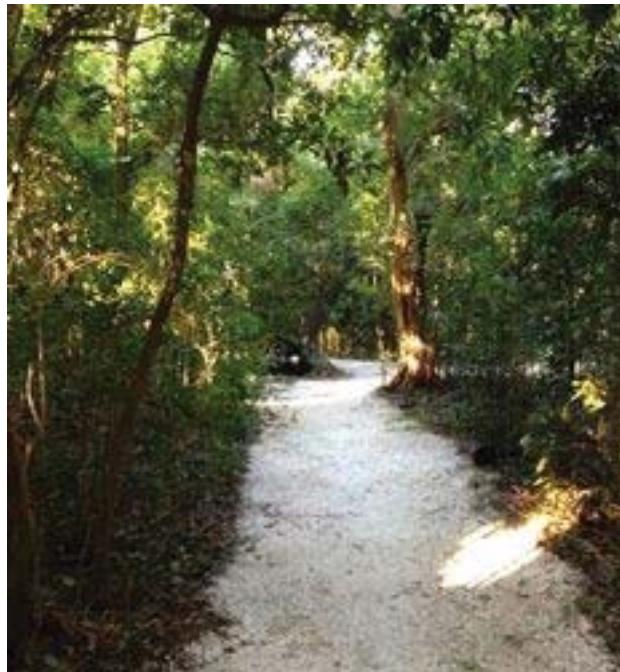
## UNDERSTORY LAYER

The leaves are much larger at this layer since very little light makes it down from the canopy.

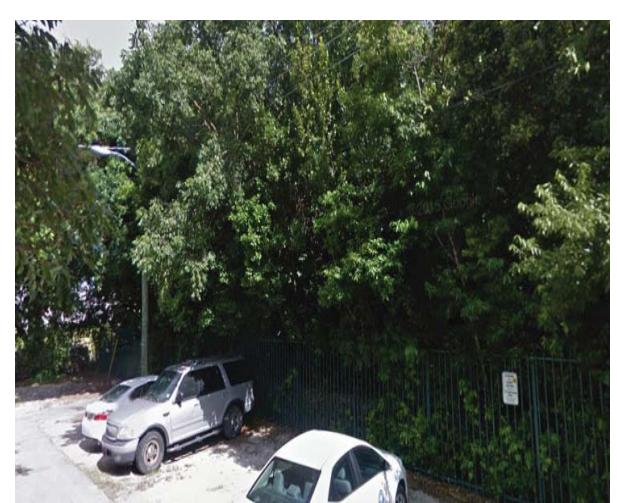
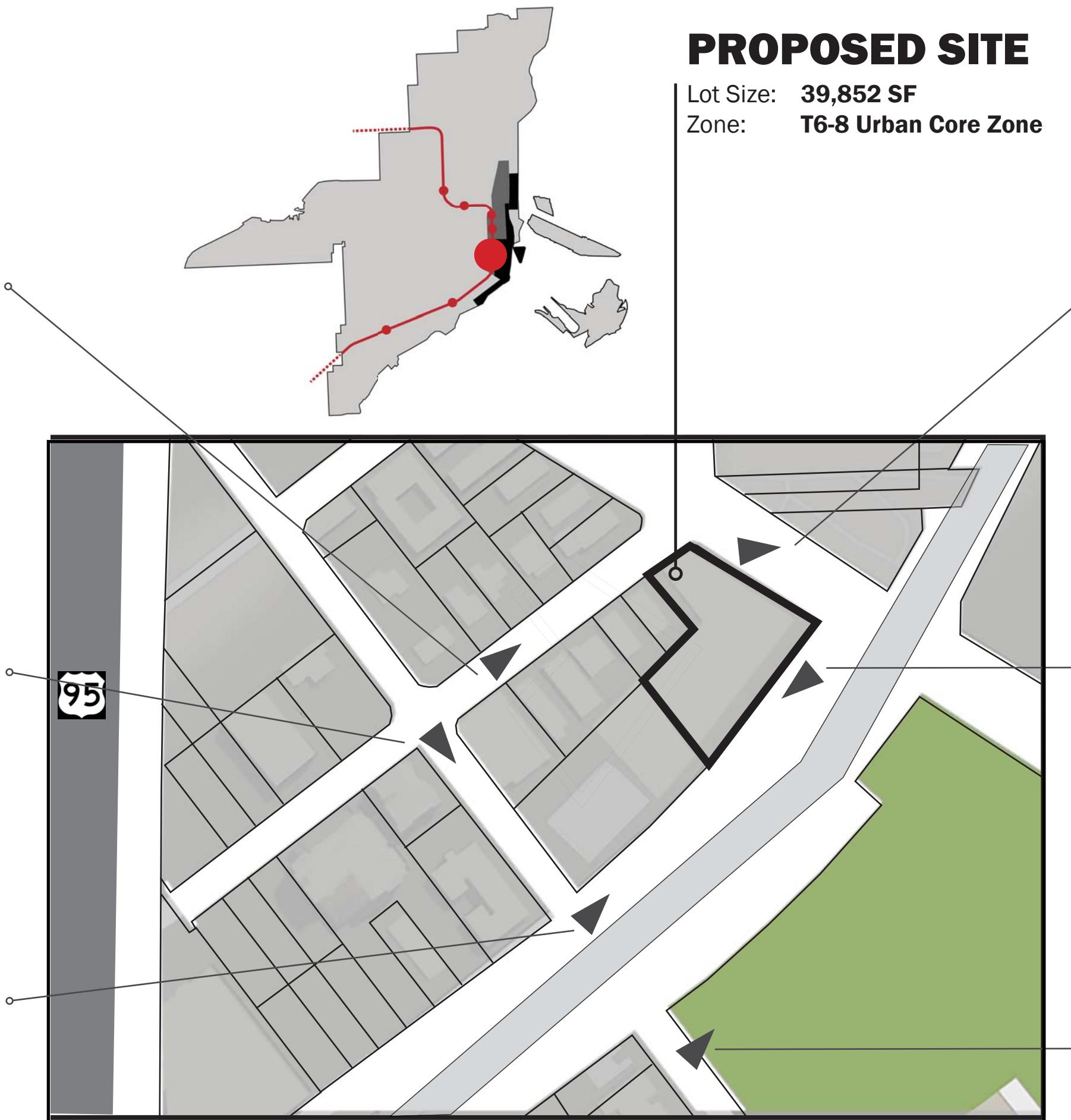
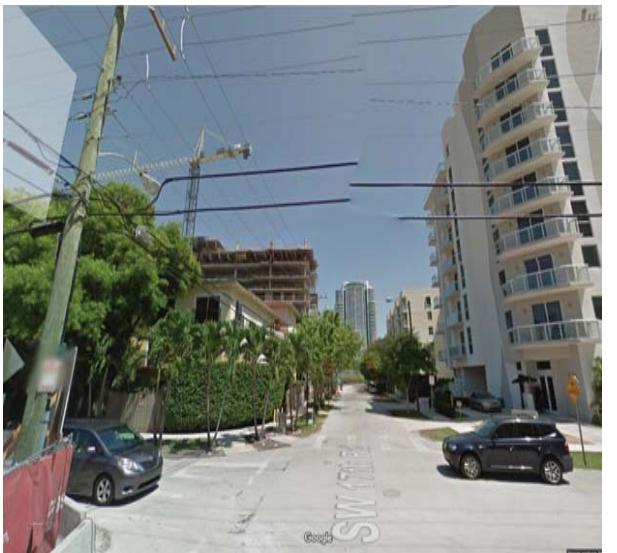
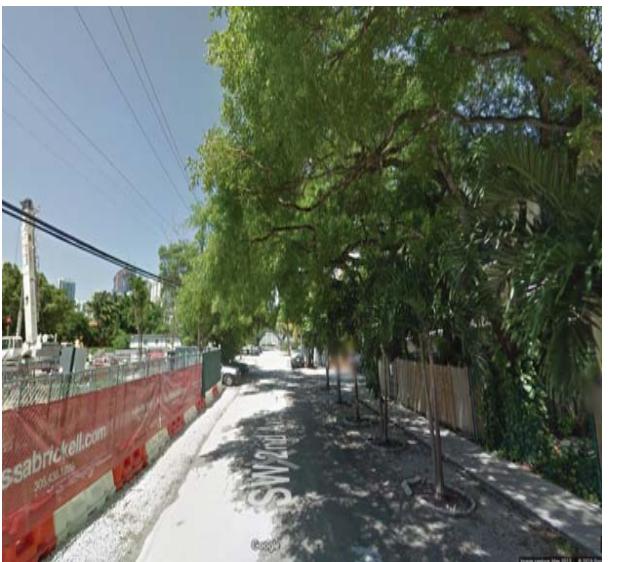


## FOREST FLOOR

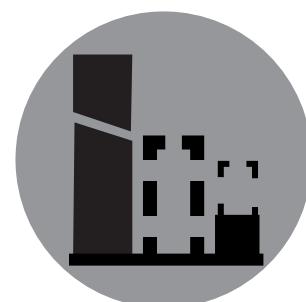
The forest floor is relatively clear of vegetation, since very little sunlight penetrates to ground level. It contains mostly decaying plant and animal matter, which disappear quickly due to the lack of sunlight.



# SITE



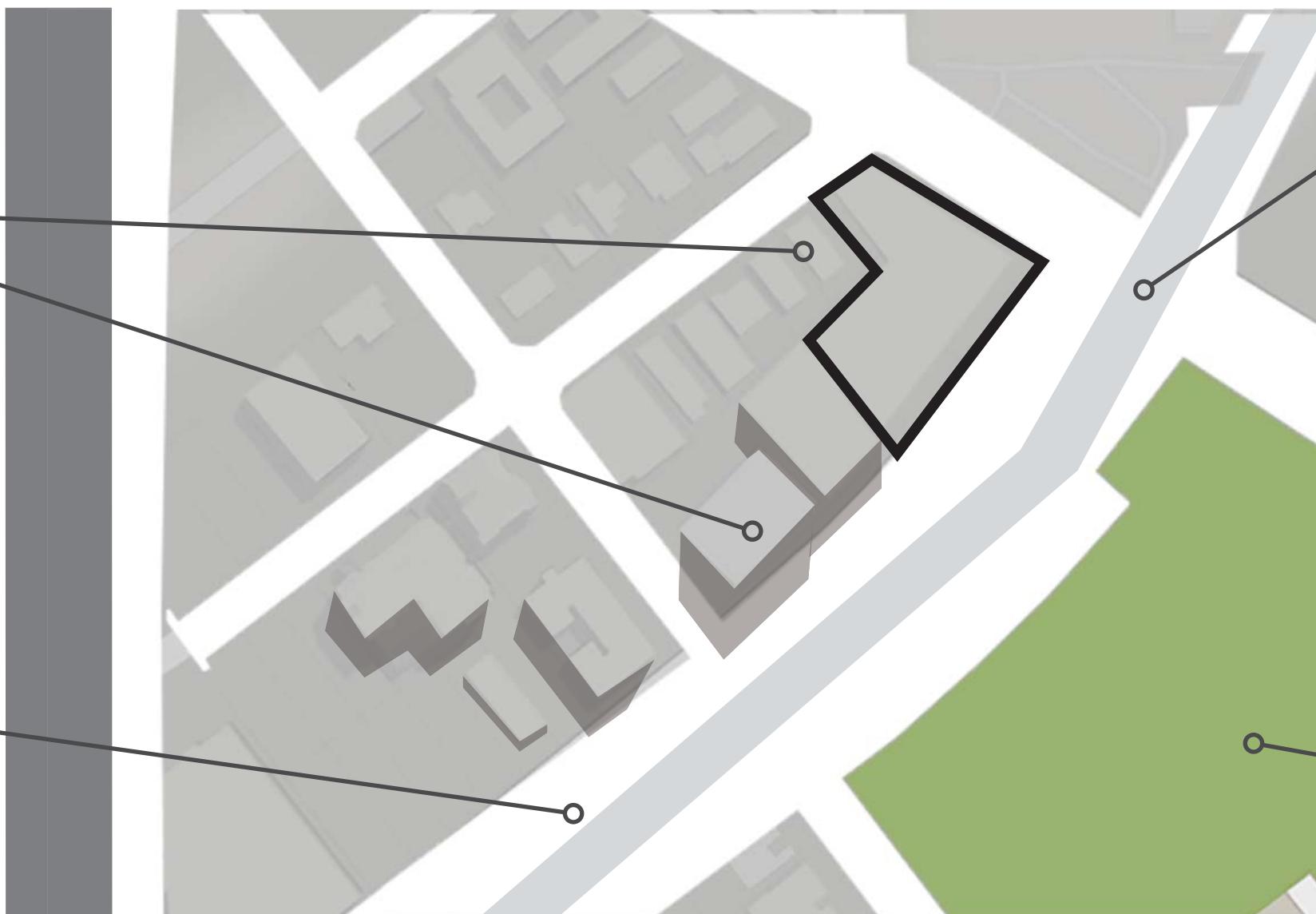
## SITE CONTEXT



**MIDRISE AND LOWRISE MIX**



**UNDERLINE PATH**  
Vegetated inviting walkpath



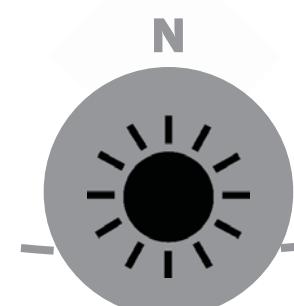
**METRORAIL**  
Access to the public transportation



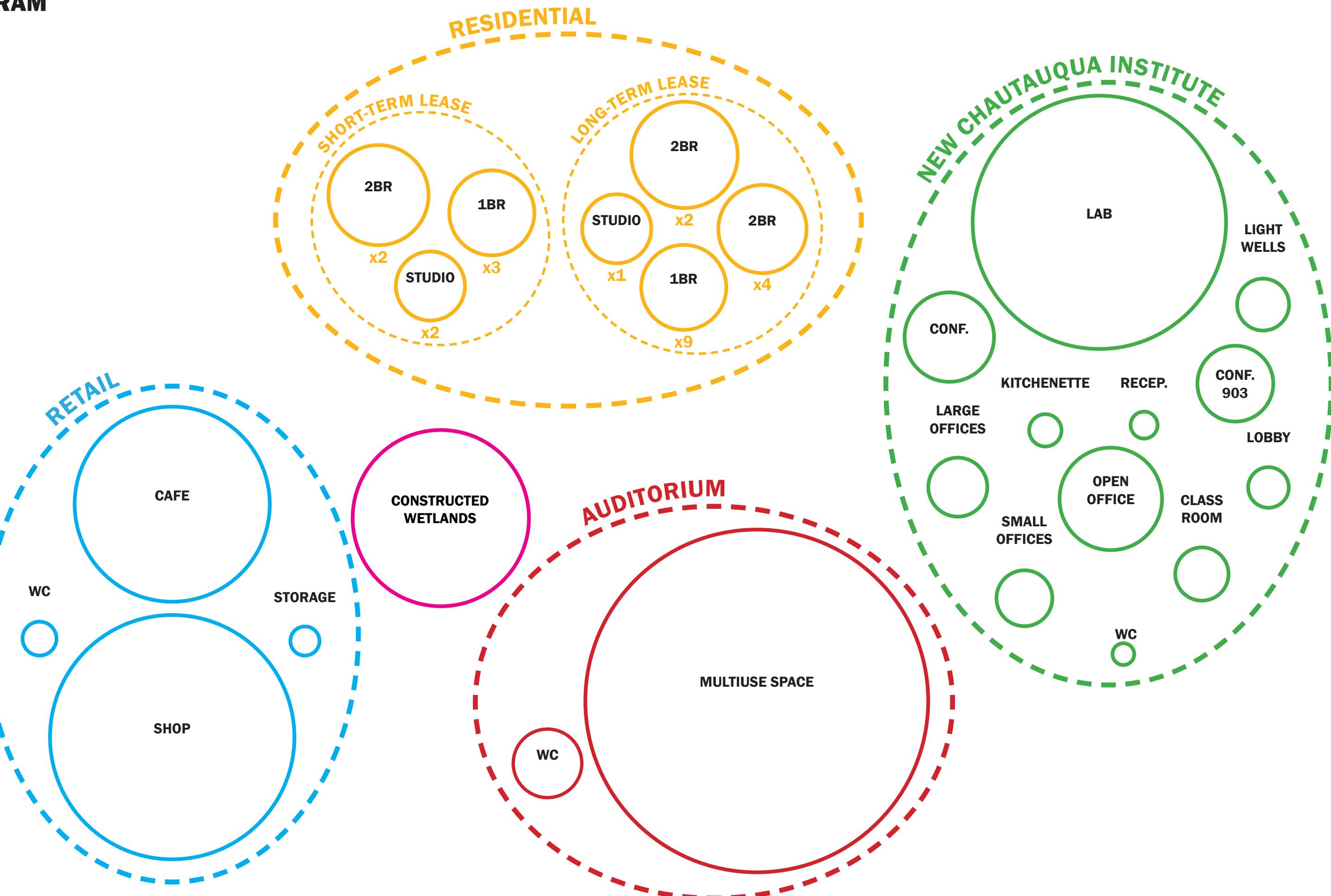
**OCEAN BREEZE**  
Prevailing wind from the East provide the opportunity for cross ventilation



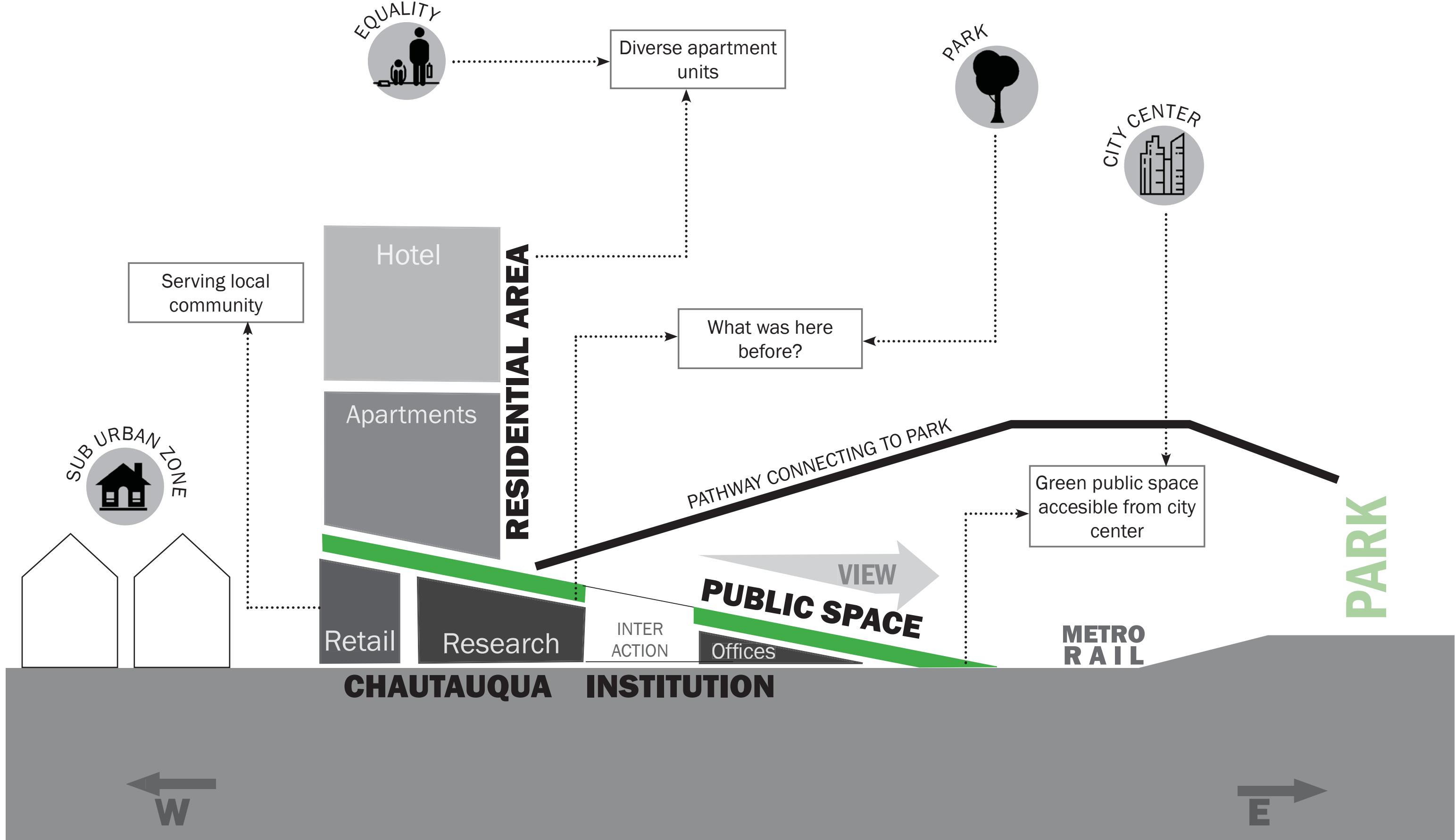
**SIMPSON PARK**  
Create visual and conceptual connection with “untouched” Miami



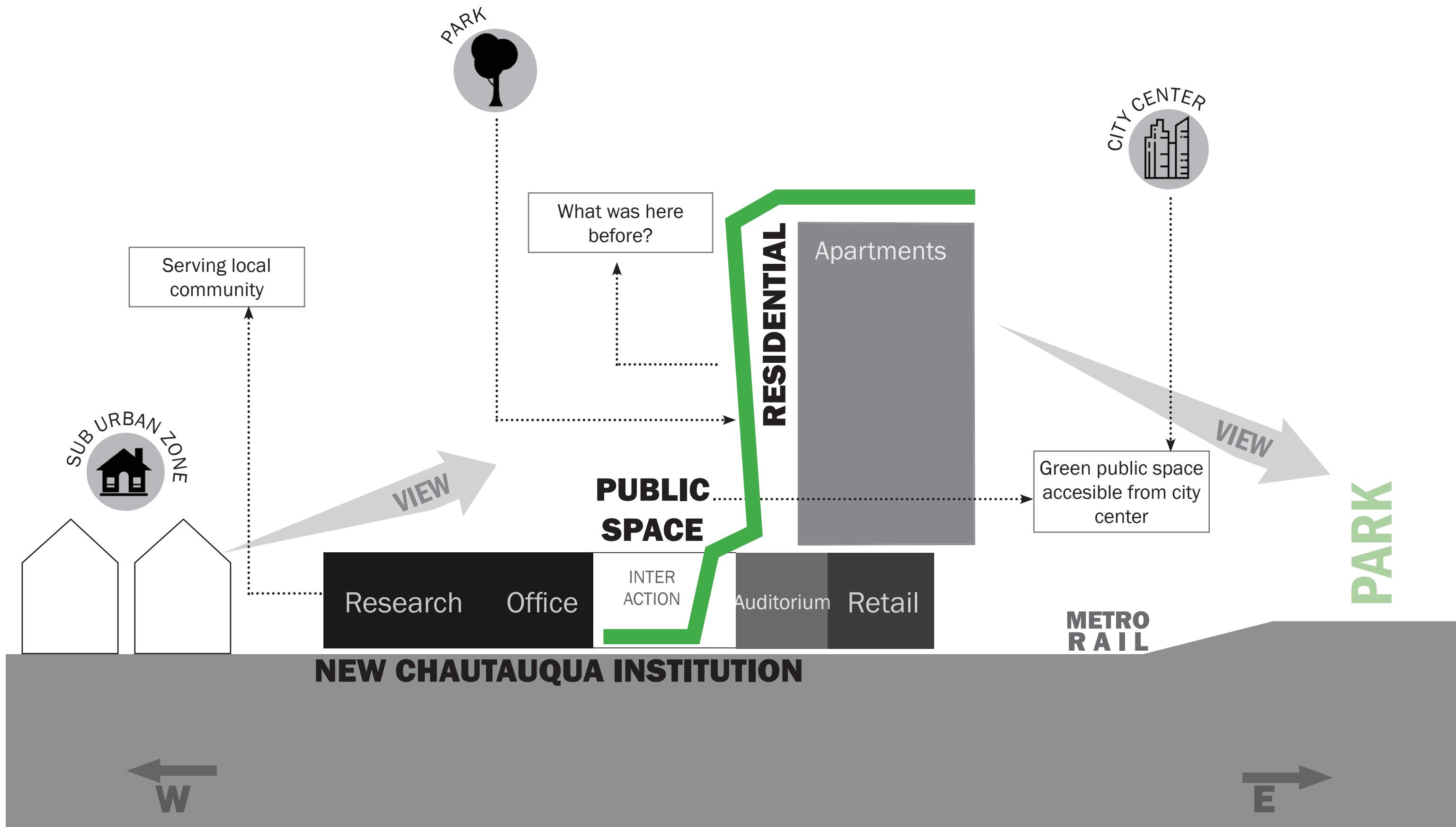
# PROGRAM



# PROGRAM SYNTHESIS

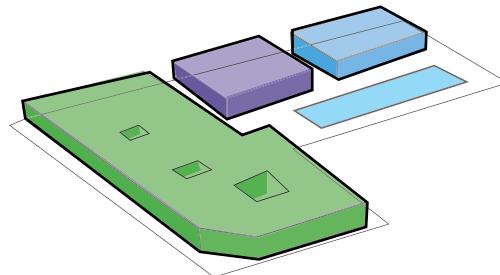


## PROGRAM SYNTHESIS

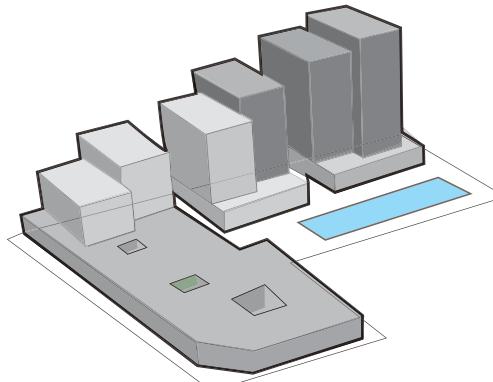


## DESIGN APPROACH

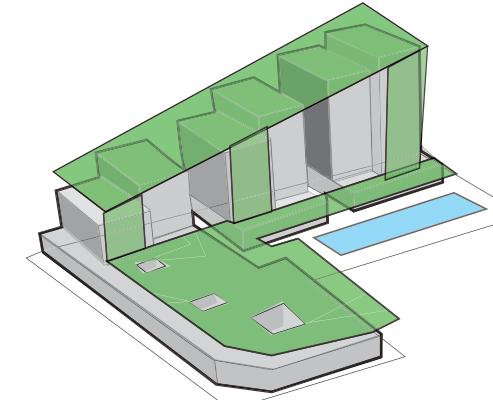
### MASSING AND SHADING



GROUND FLOOR

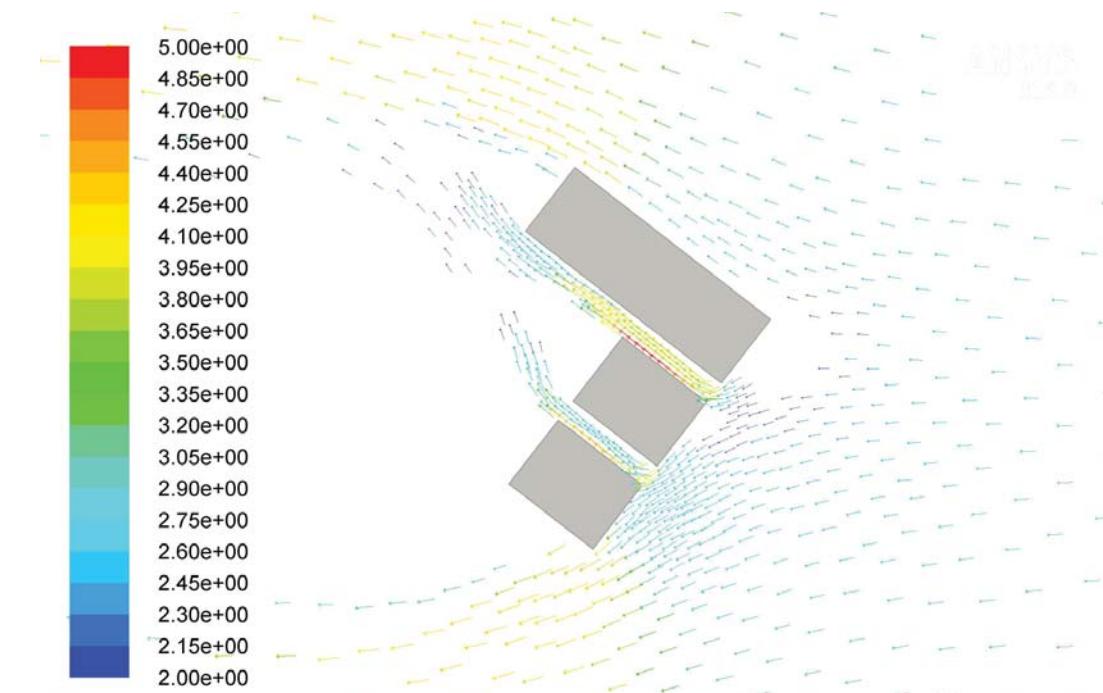


RESIDENTIAL UNITS

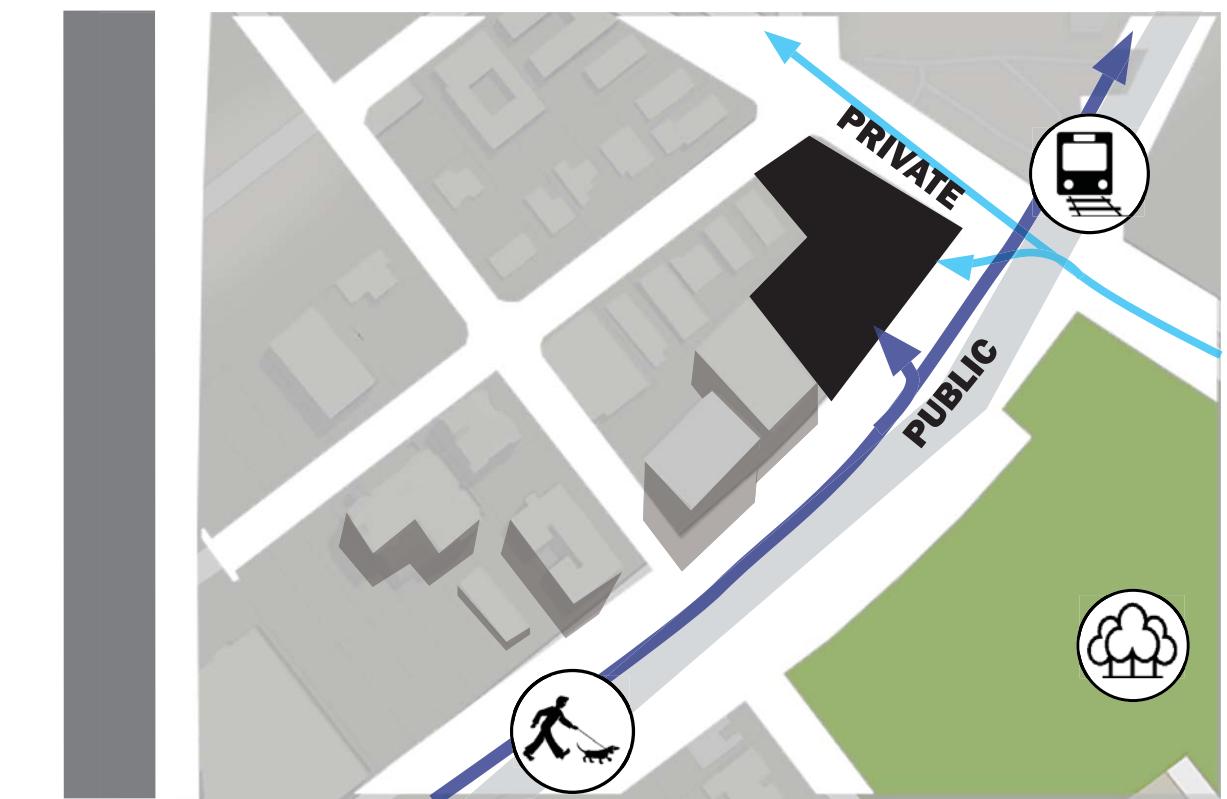
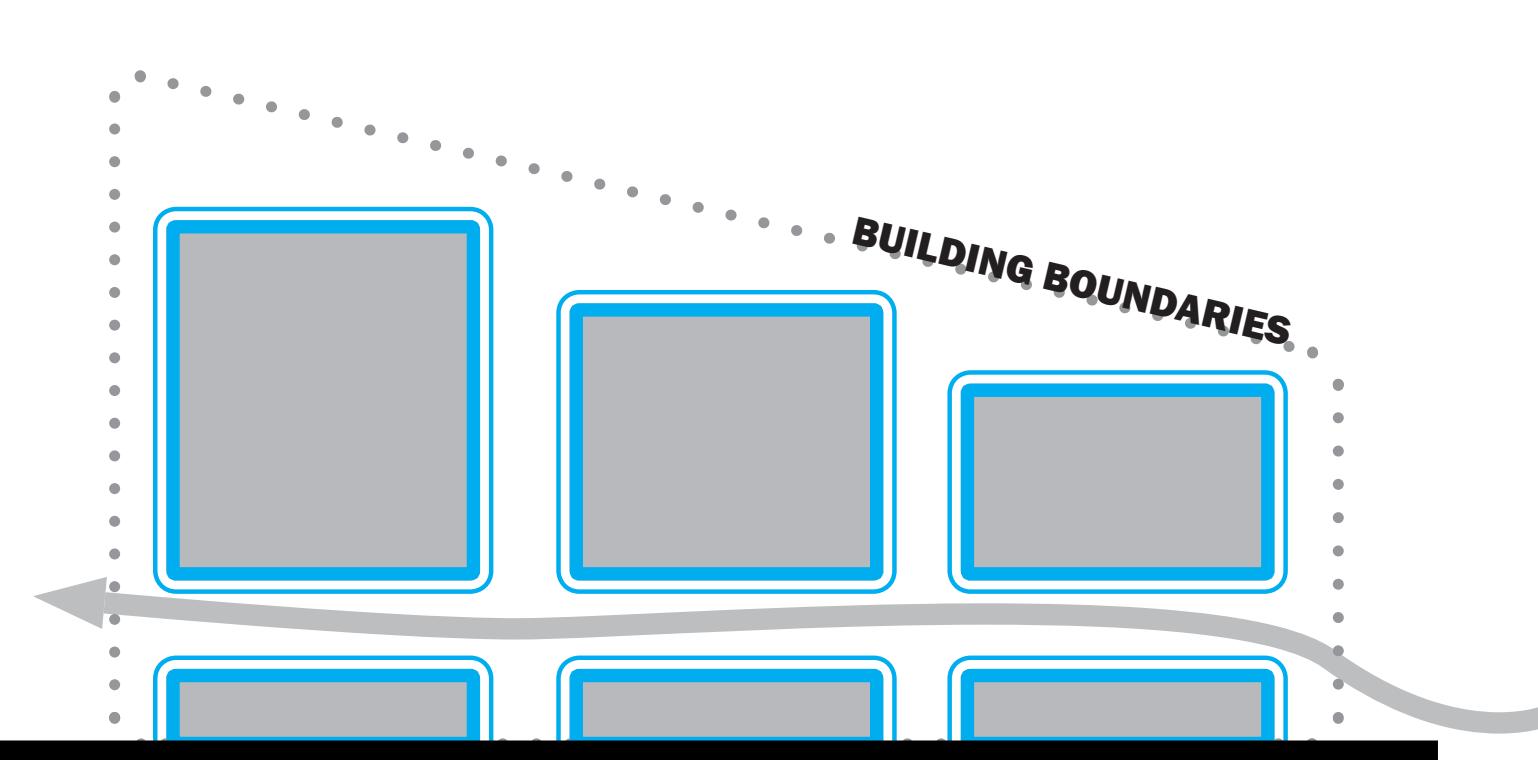


SCREEN

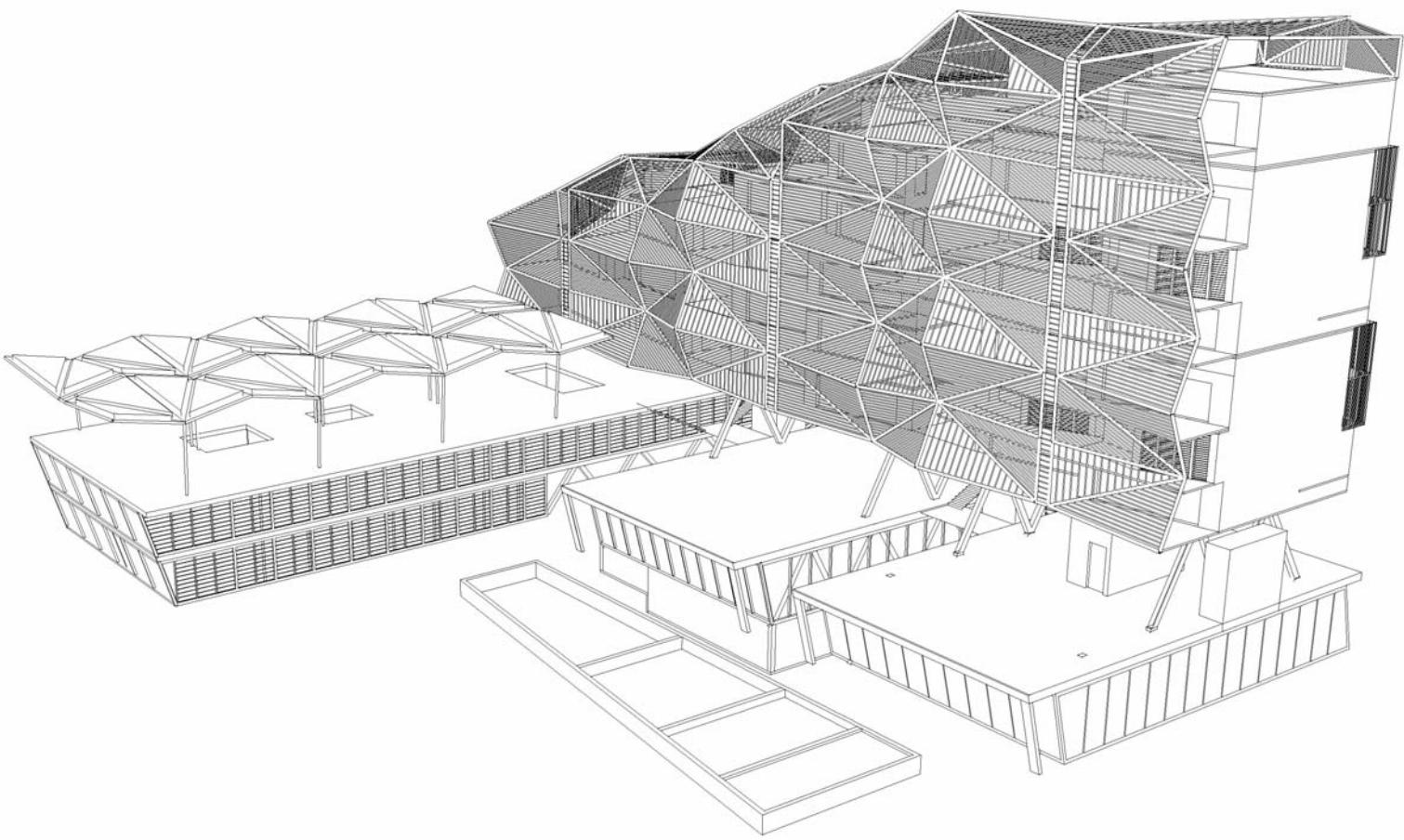
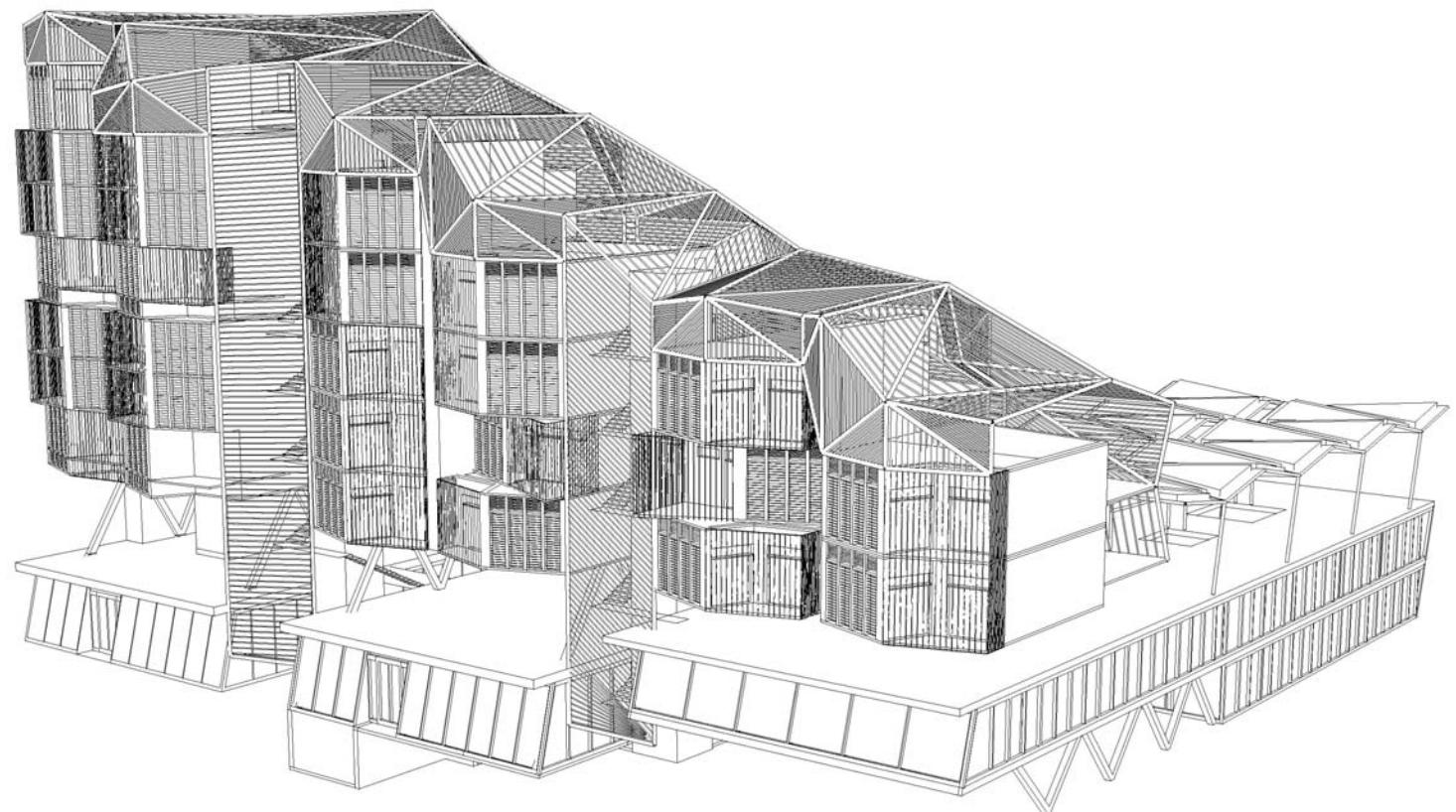
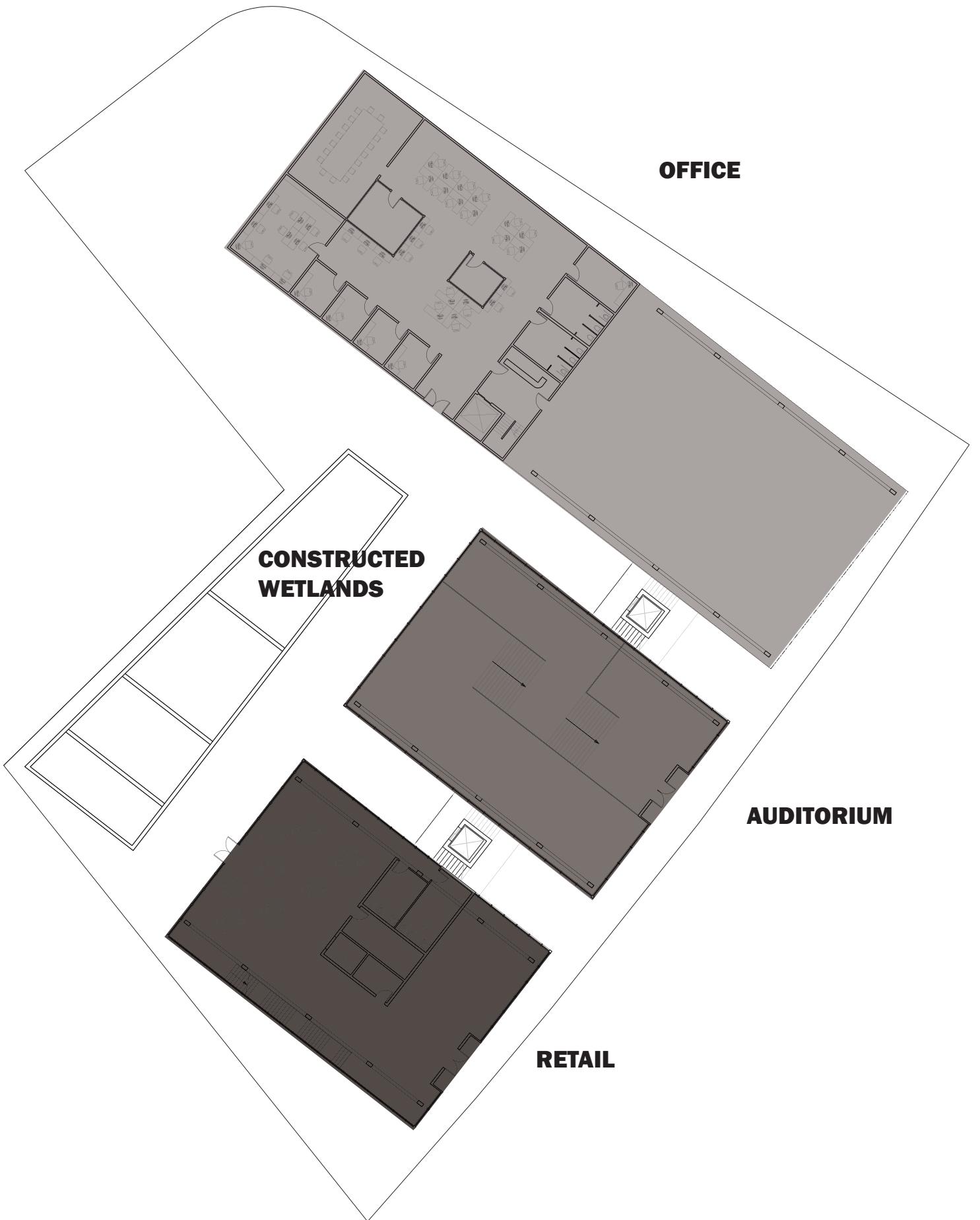
### VENTILATION



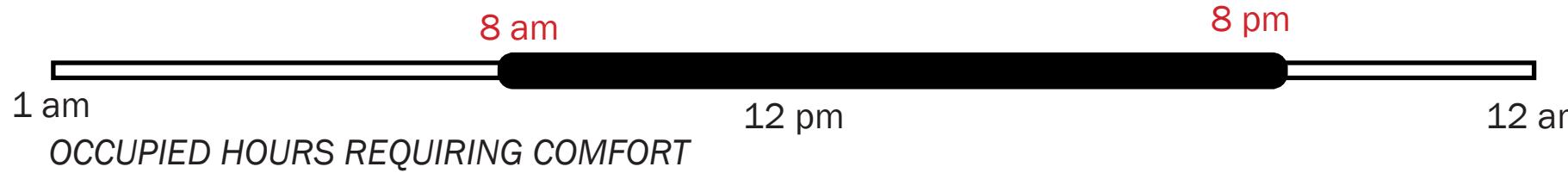
VENTILATION



## **GROUND FLOOR** WITH BIRDS EYE VIEWS OF BUILDINGS



## OFFICE PERFORMANCE REQUIREMENTS



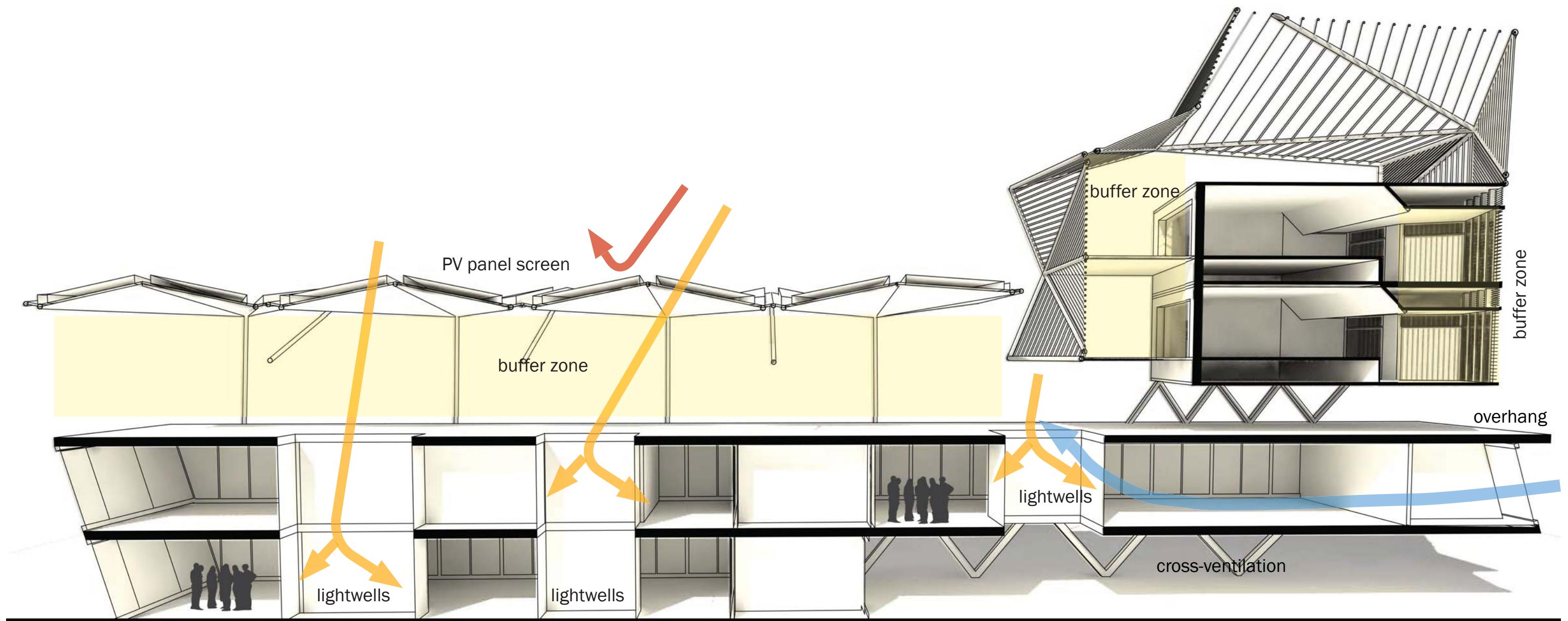
**DAYLIGHTING**  
Evenly spread sunlight  
300 lux min



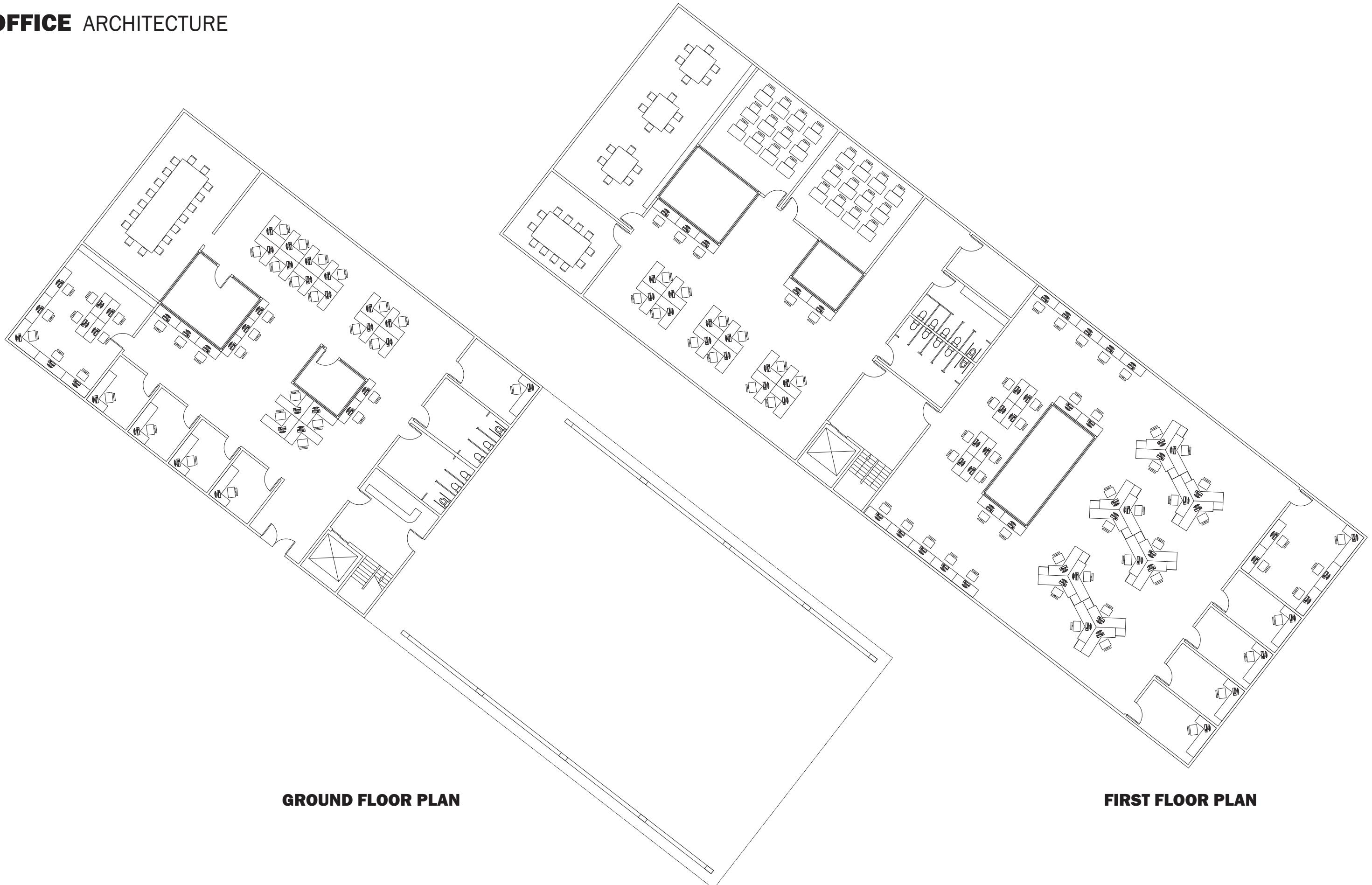
**GLARE**  
Prevent overlit spaces  
and glare



**THERMAL COMFORT**  
Maintain temperature  
in a range 20 - 28 C



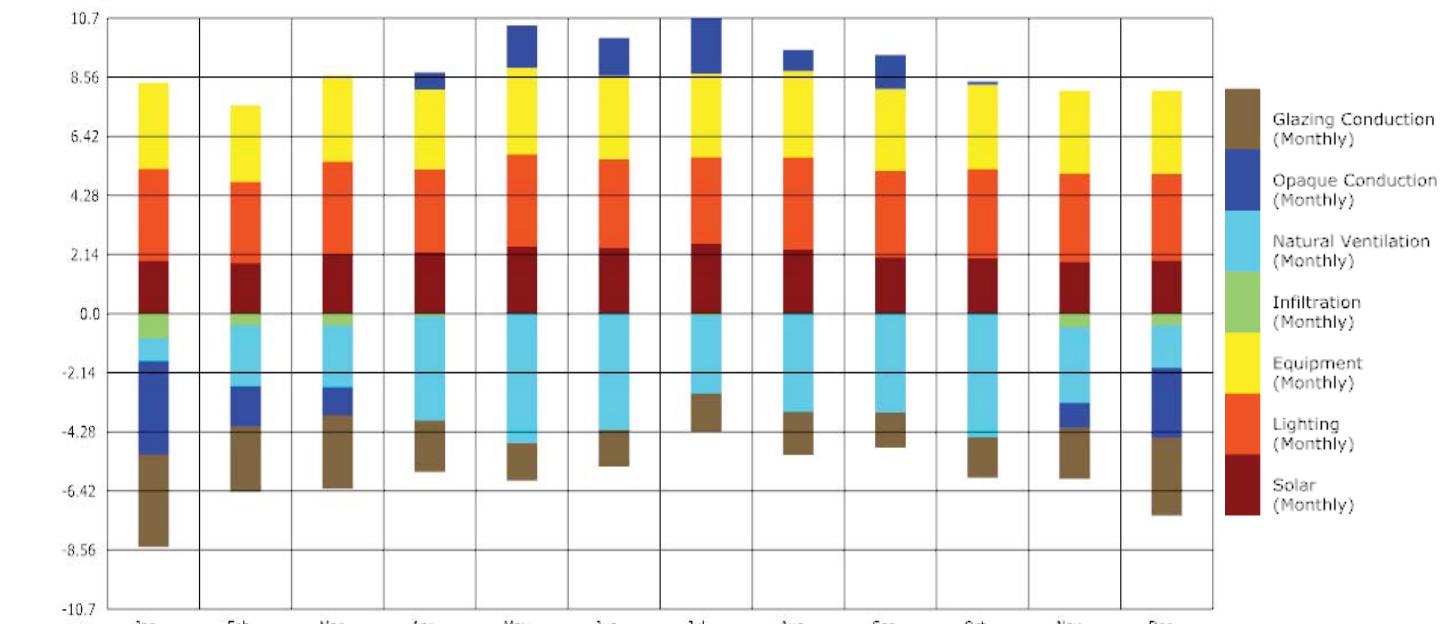
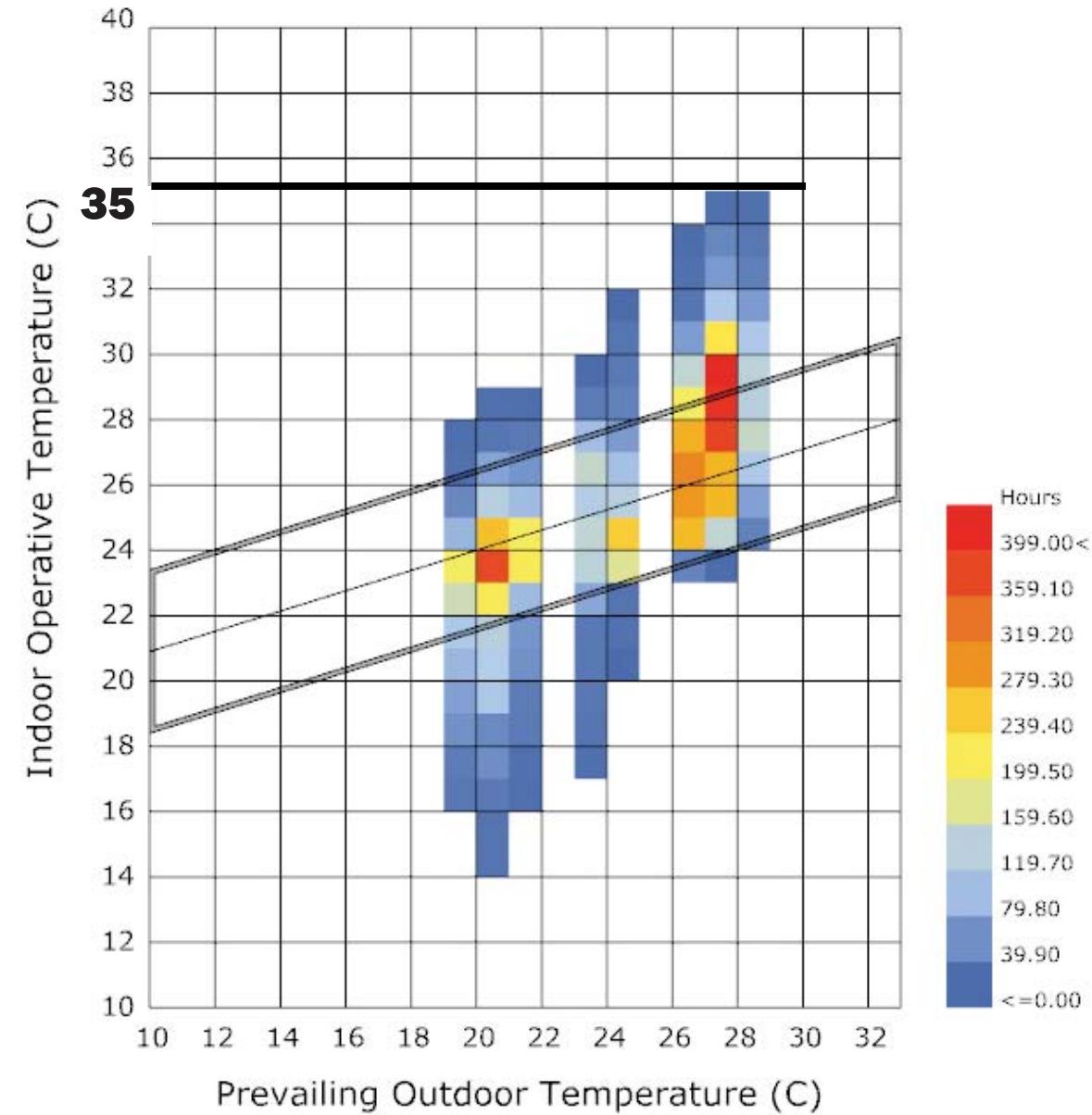
# OFFICE ARCHITECTURE



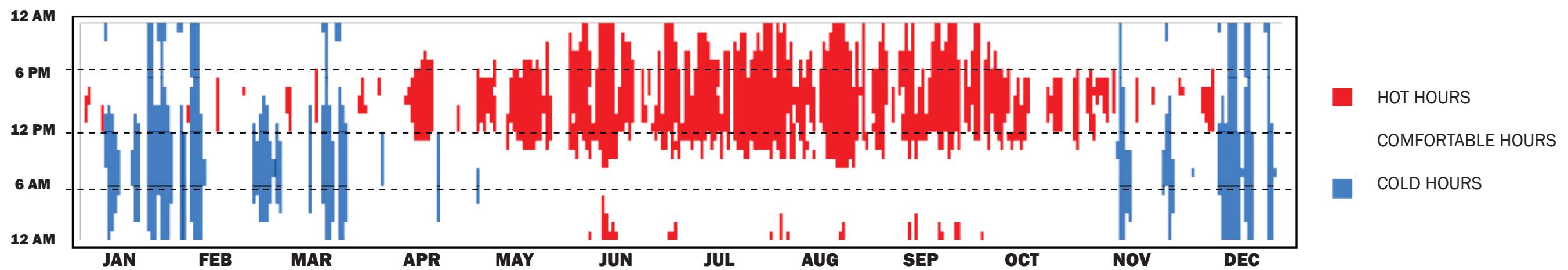
**GROUND FLOOR PLAN**

**FIRST FLOOR PLAN**

## OFFICE COMFORT ANALYSIS



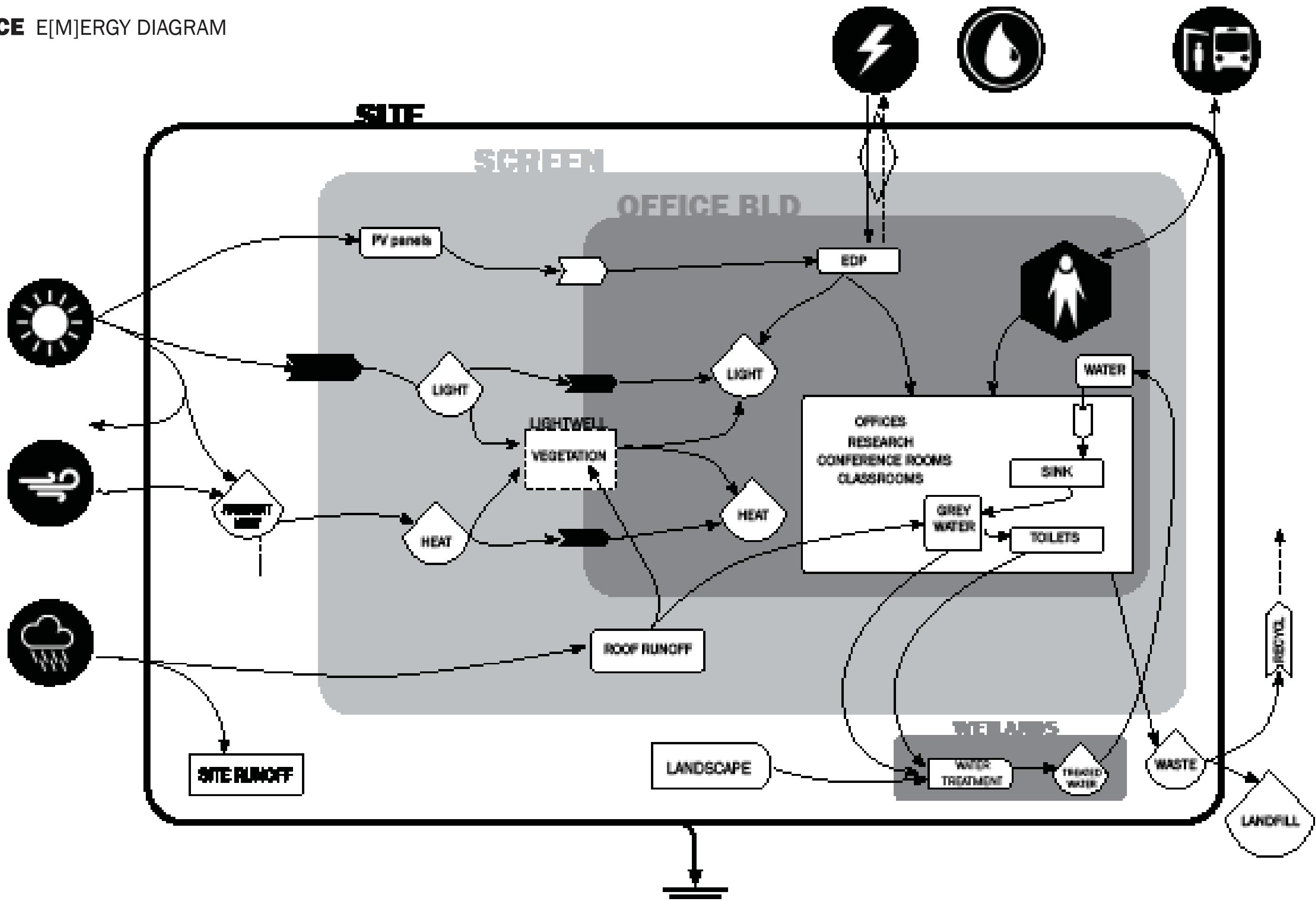
**ENERGY BALANCE (WITHOUT SYSTEMS)**



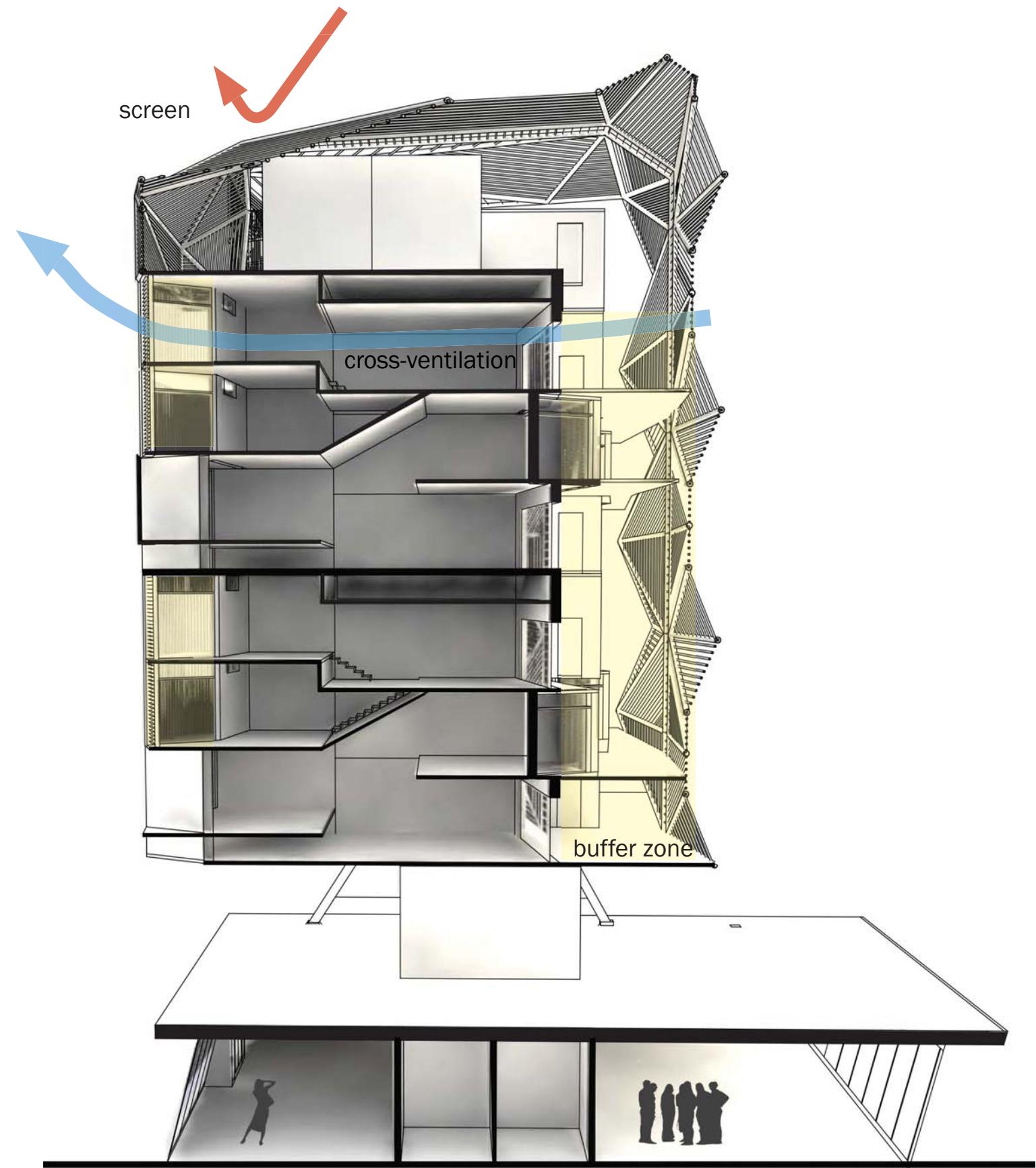
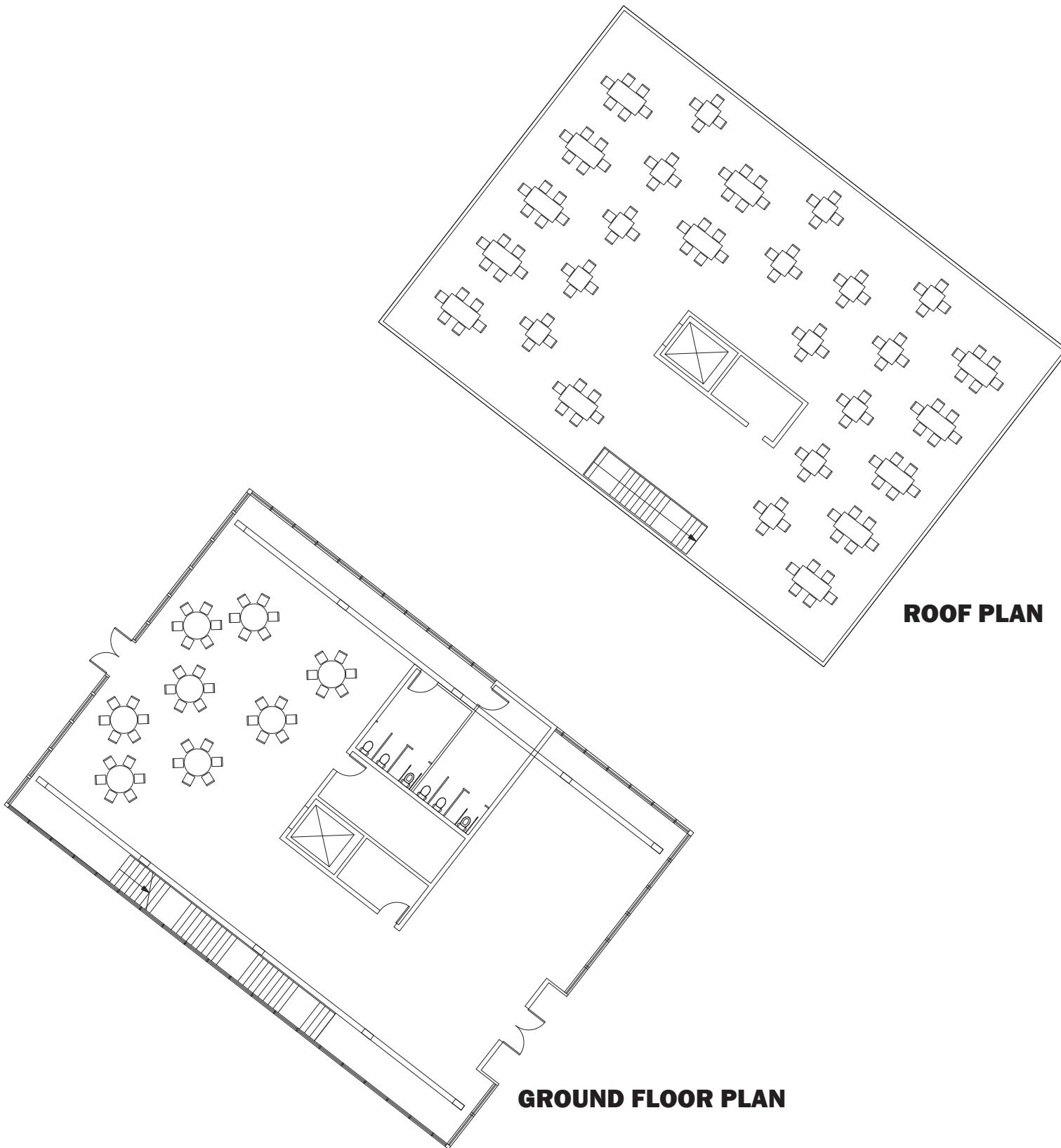
**ADAPTIVE COMFORT OPEN OFFICE**

**71.62% ANNUALLY**

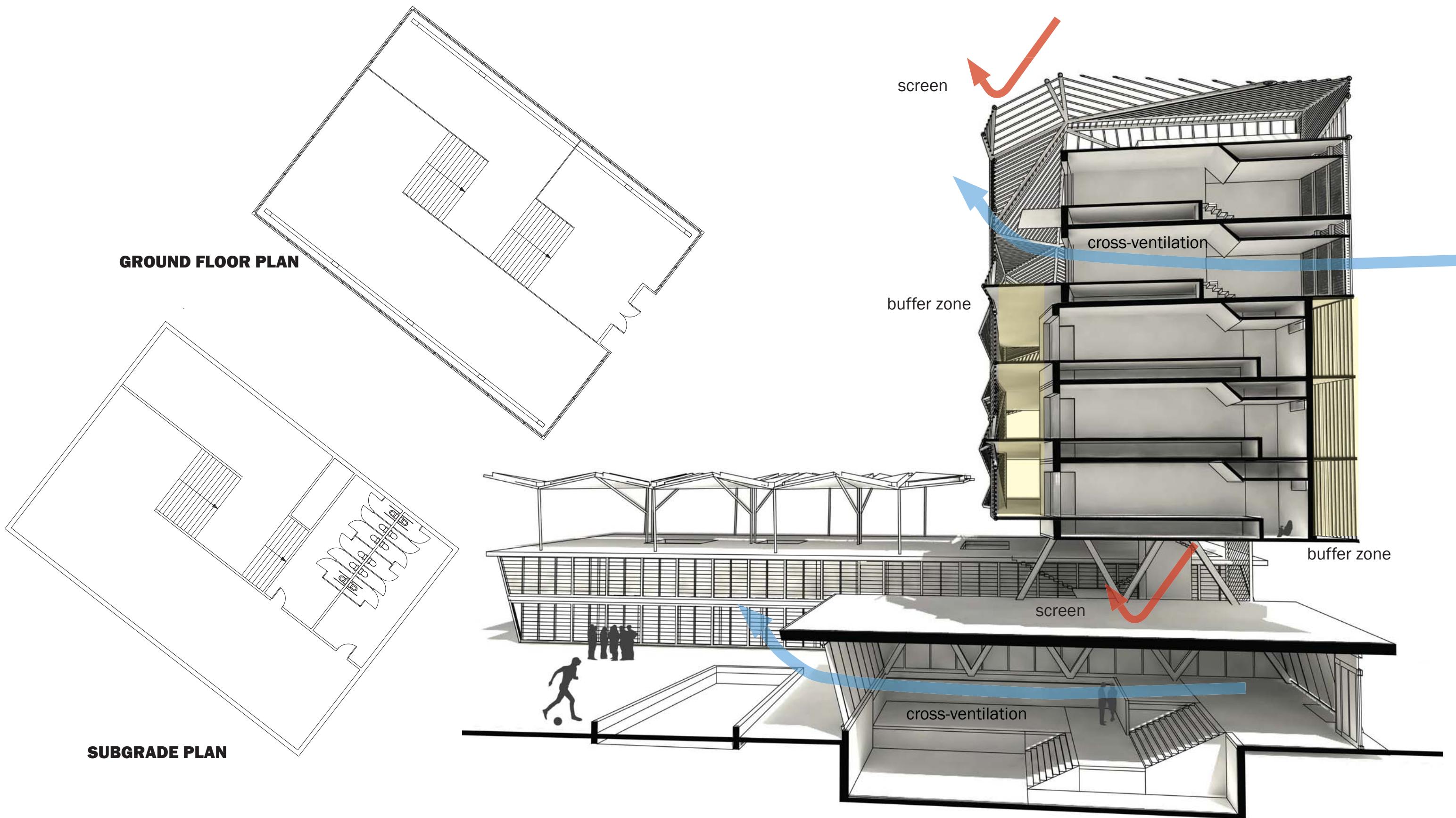
# OFFICE E[M]ERGY DIAGRAM



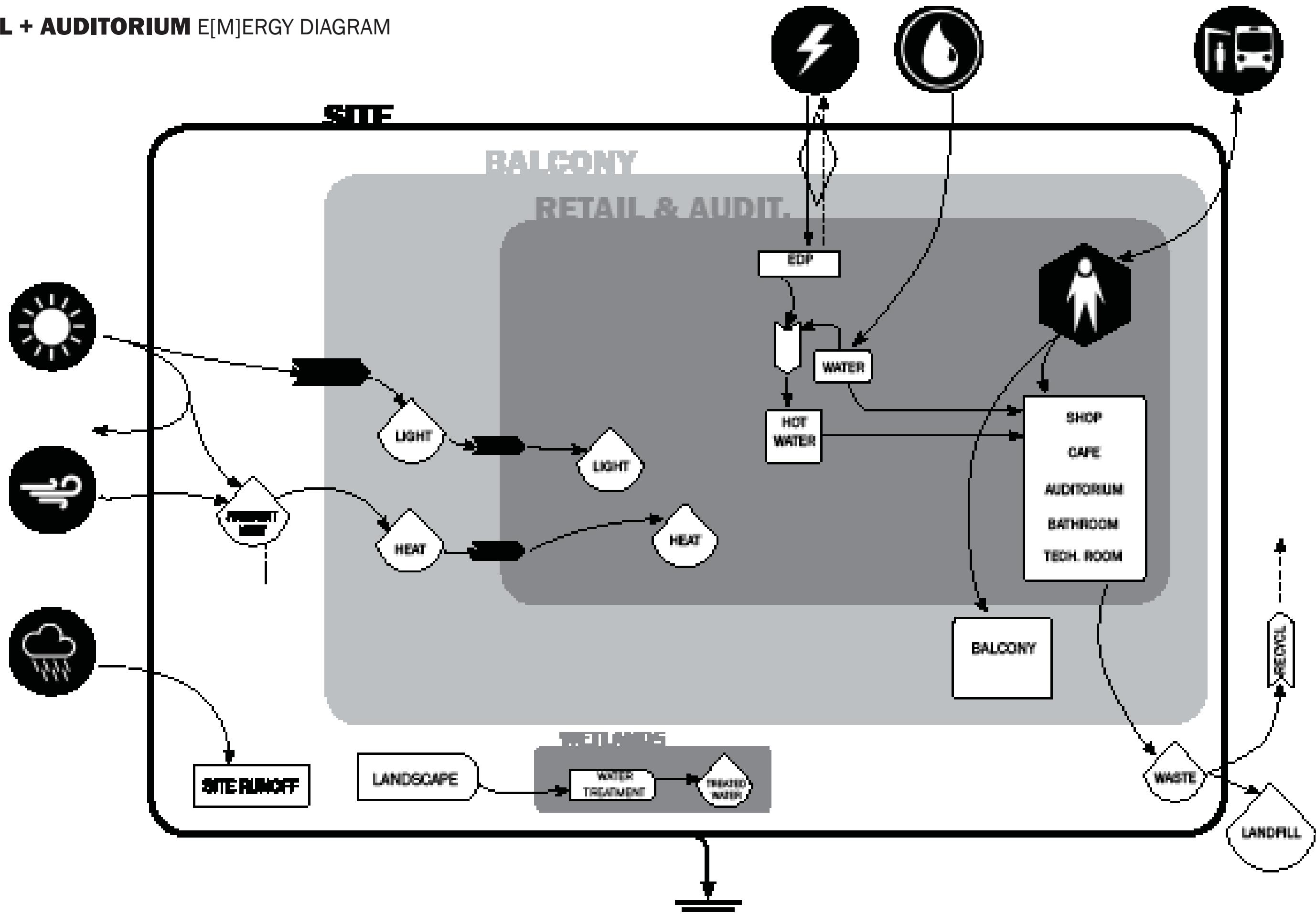
# RETAIL ARCHITECTURE



# AUDITORIUM ARCHITECTURE



## RETAIL + AUDITORIUM E[M]ERGY DIAGRAM

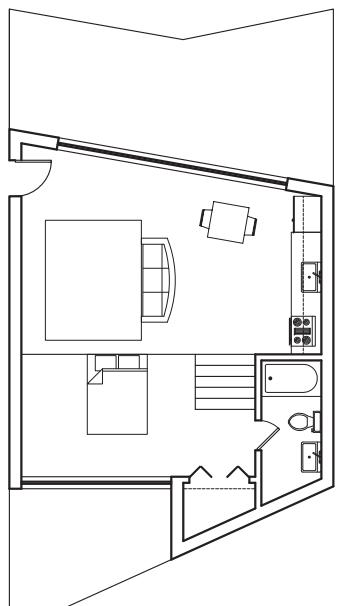


# RESIDENTIAL ARCHITECTURE



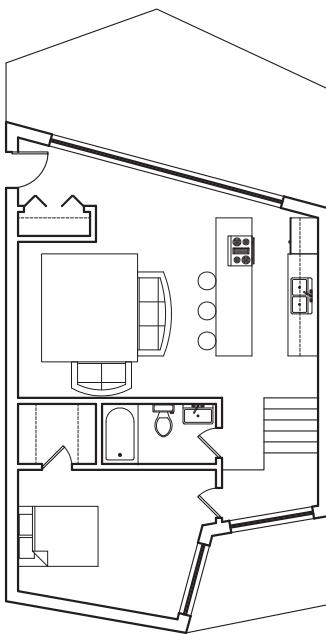
# RESIDENTIAL UNIT MIX AND SIZES

## STUDIO



670 SF

## 1 BEDROOM A



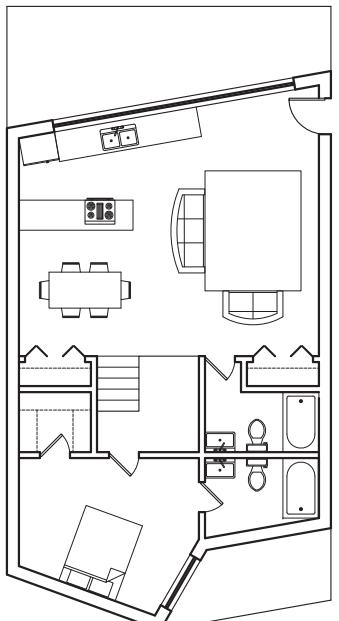
813 SF

Figure 10  
Unit Mix and Size Comparison

Submarket Unit Mix Comparison	Product Type	Studio %	1-Bedroom %	2-Bedroom %	3-Bedroom %	4+Bedroom %
Downtown Miami*	Existing	13%	39%	39%	7%	2%
Brickell	Proposed/Under Construction	8%	42%	42%	7%	1%
Edgewater	Proposed/Under Construction	0%	22%	50%	22%	6%
Unit Size Comparison	Average Unit Size (SF)	(SF)	(SF)	(SF)	(SF)	(SF)
Downtown Miami*	Existing	1,110	795	826	1,264	1,915
Brickell	Proposed/Under Construction	1,202	580	840	1,220	1,551
Edgewater	Proposed/Under Construction	1,375	N/A	973	1,364	1,712
						3,008

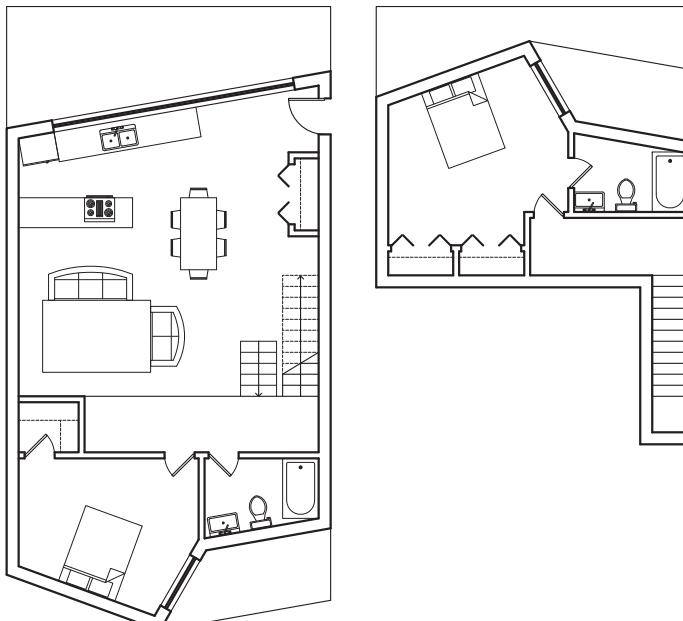
\* Sample of over 17,000 units from 75 +/- existing condo projects.

## 1 BEDROOM B



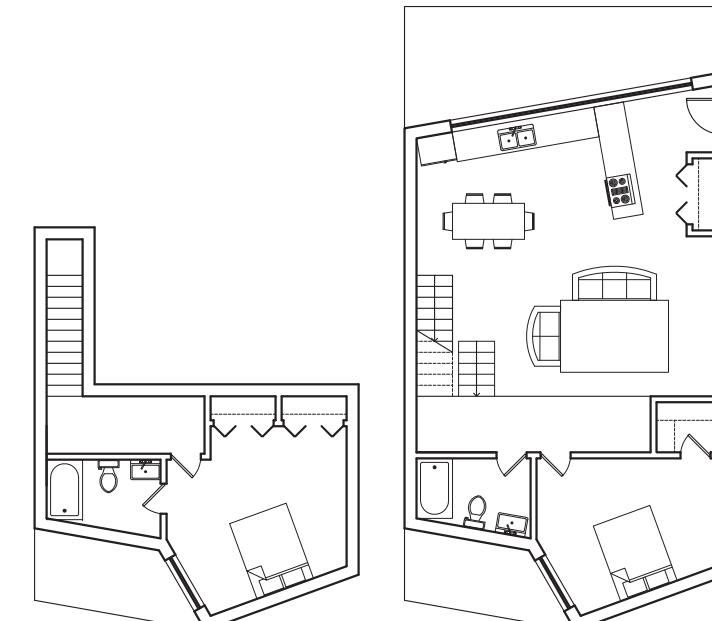
940 SF

## 2 BEDROOM A



1290 SF

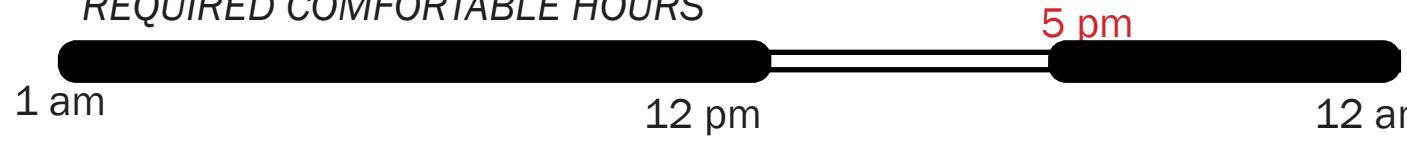
## 2 BEDROOM B



1290 SF

# STUDIO PERFORMANCE REQUIREMENTS

## REQUIRED COMFORTABLE HOURS



### DAYLIGHTING

Evenly spread sunlight  
300 lux min



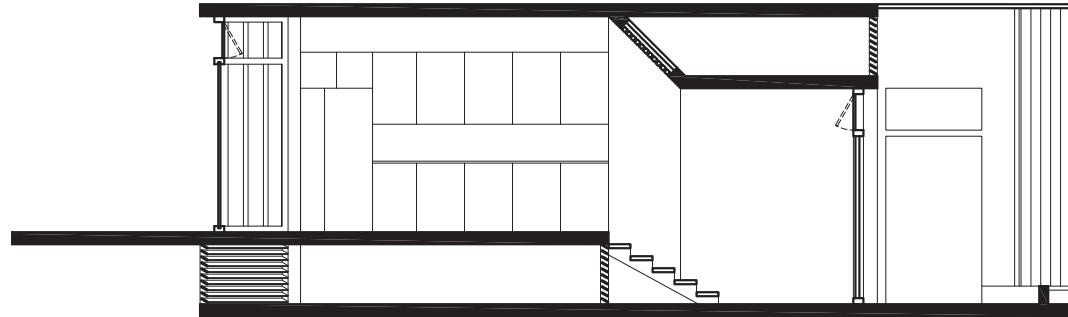
### THERMAL COMFORT

Maintain temperature  
in a range 20 - 28 C

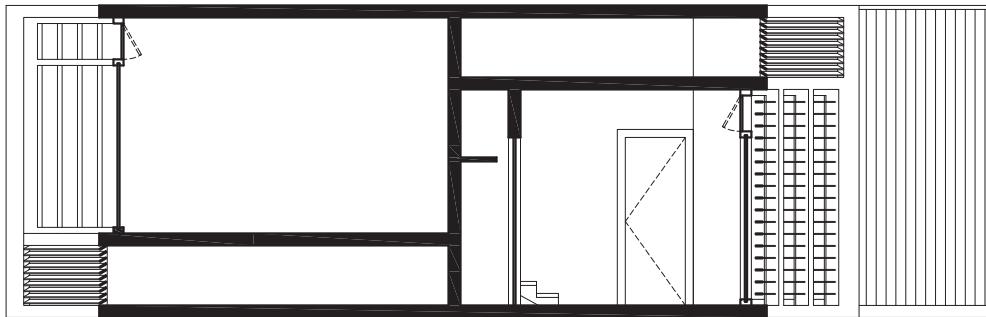


### CONTROL HUMIDITY

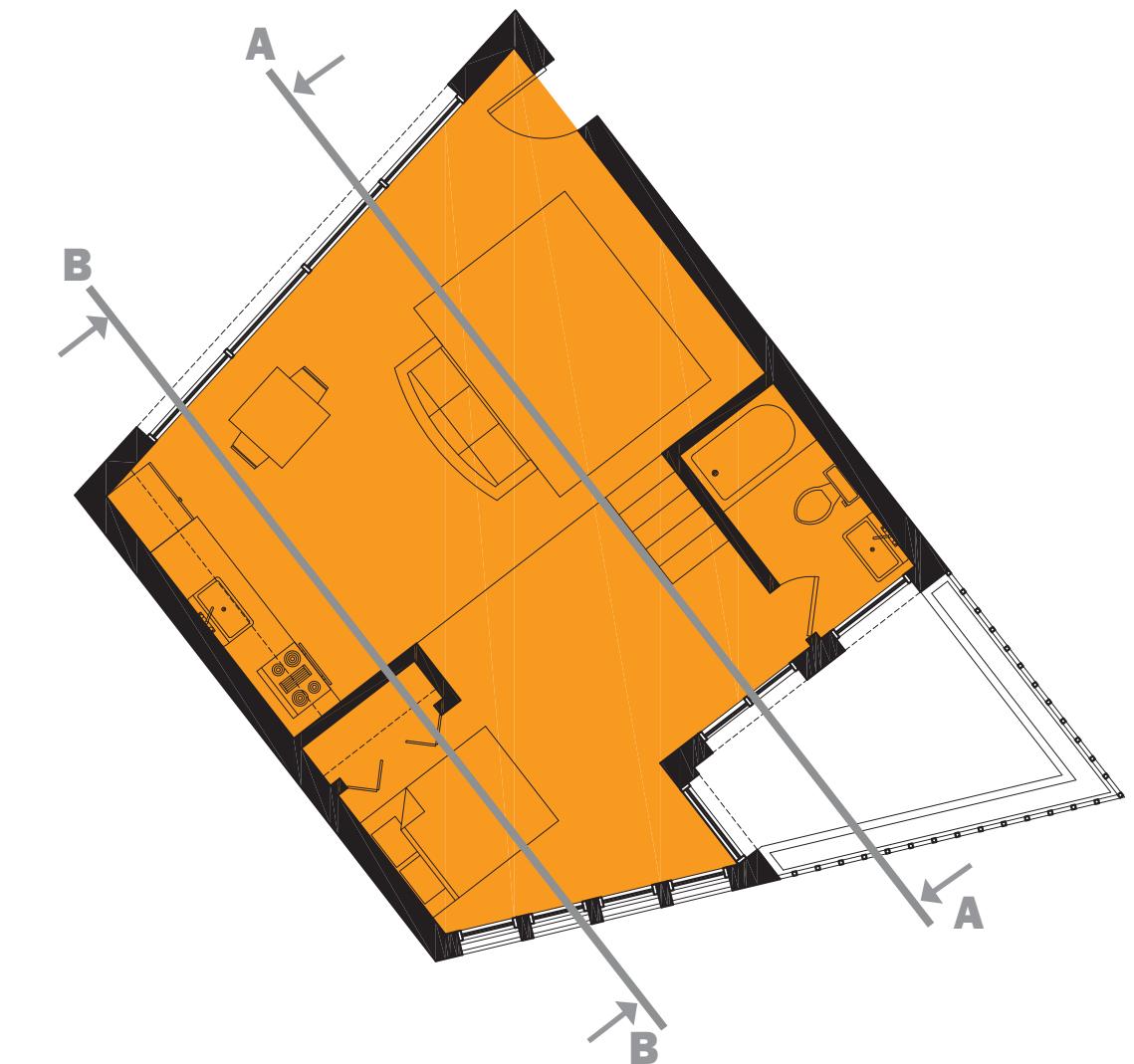
Spaces with high humidity  
level [kitchen/bathrooms]  
are located leeward



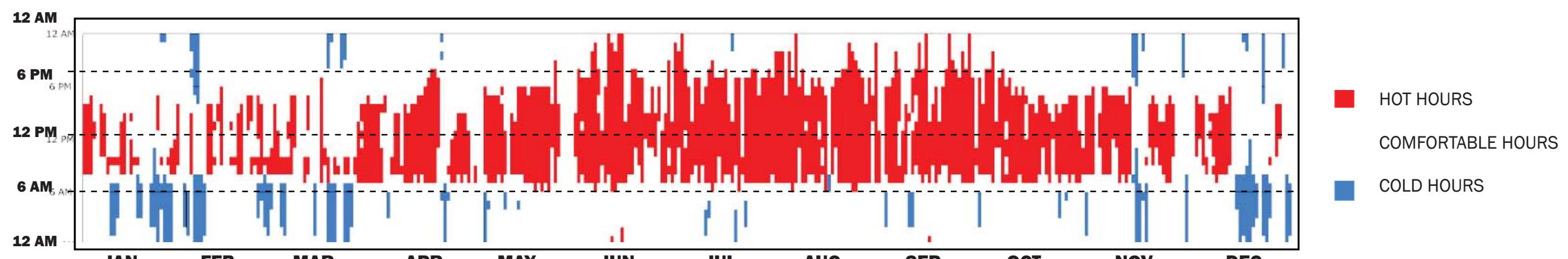
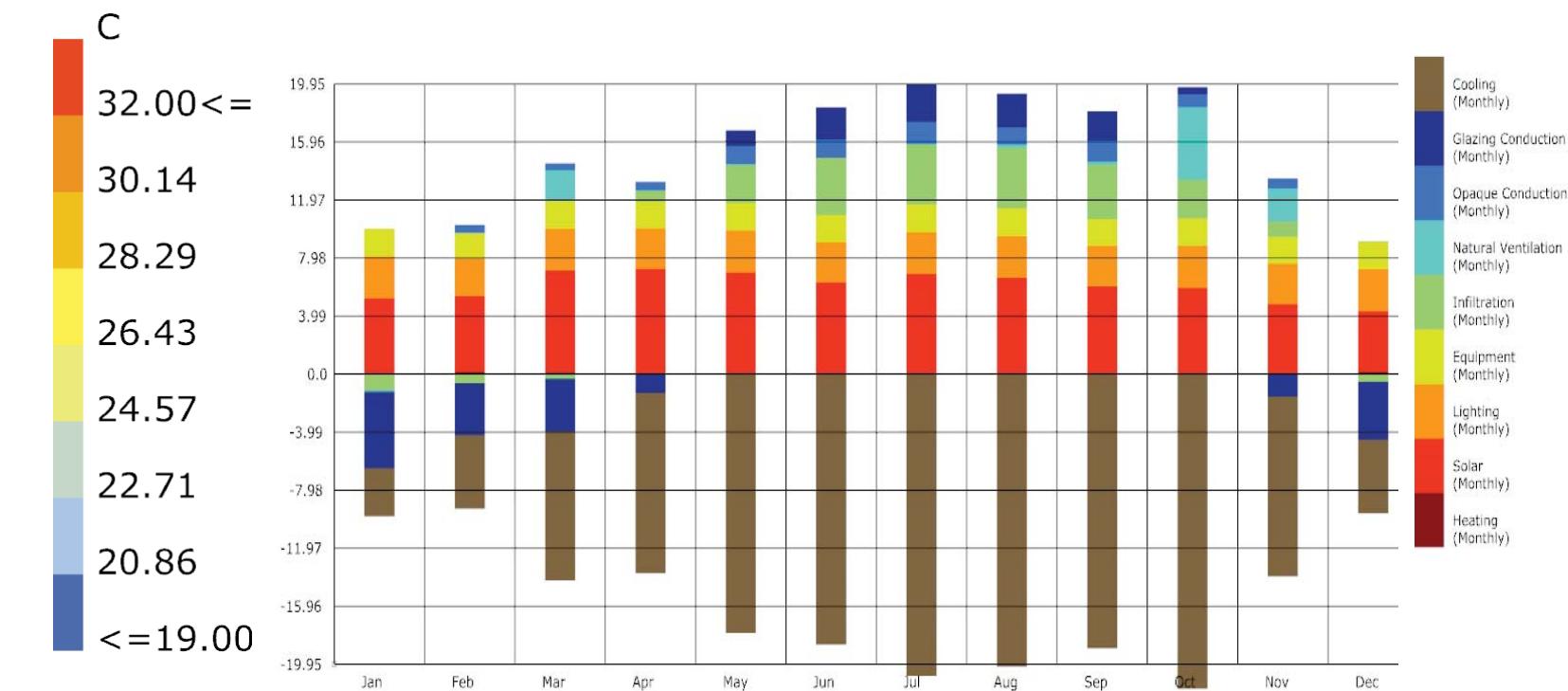
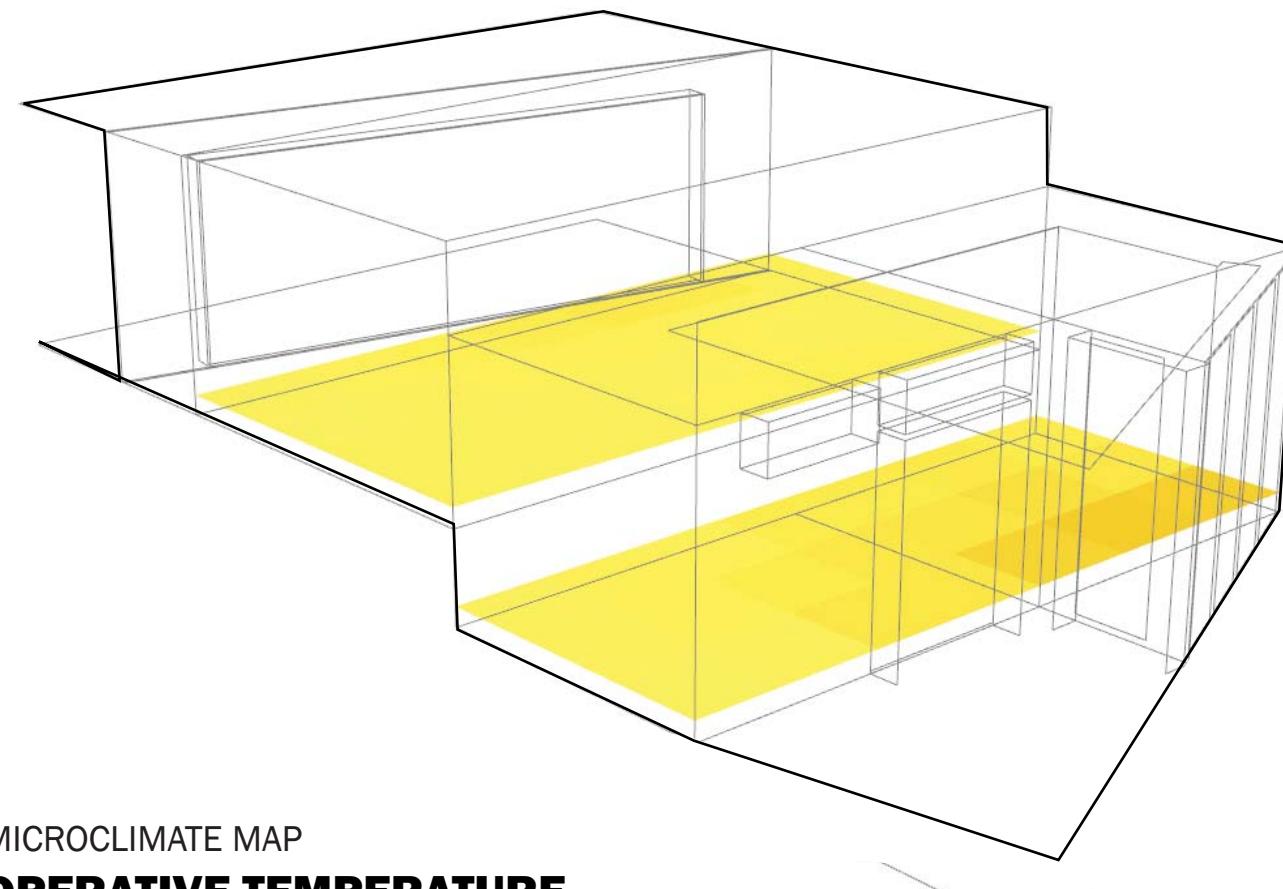
SECTION A



SECTION B



## STUDIO THERMAL COMFORT

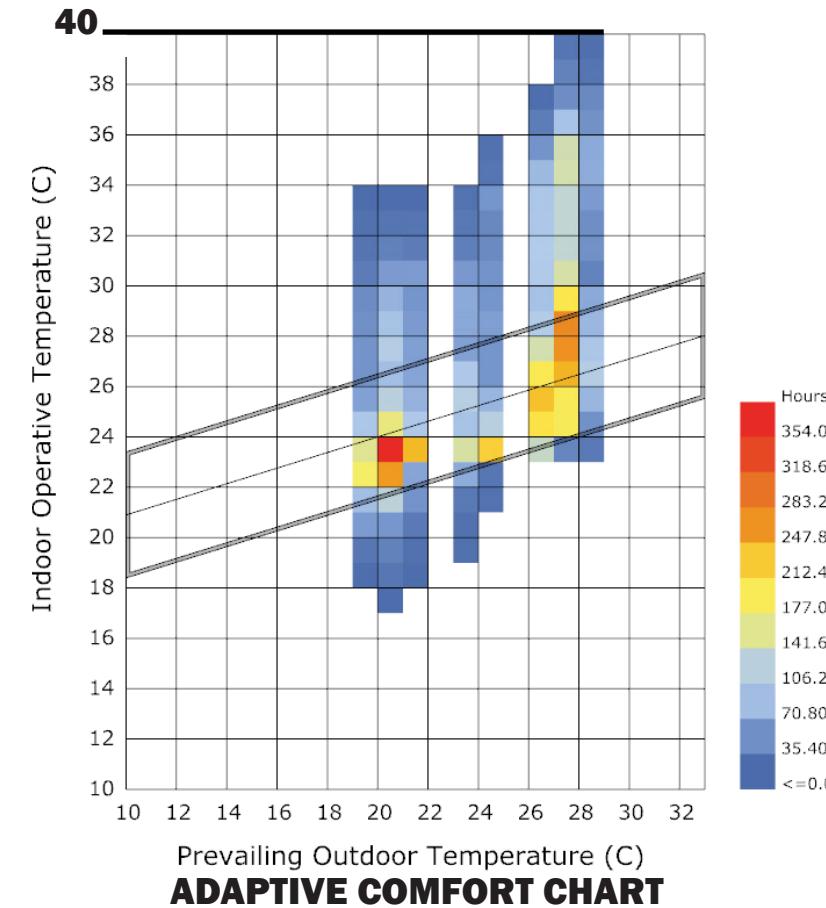
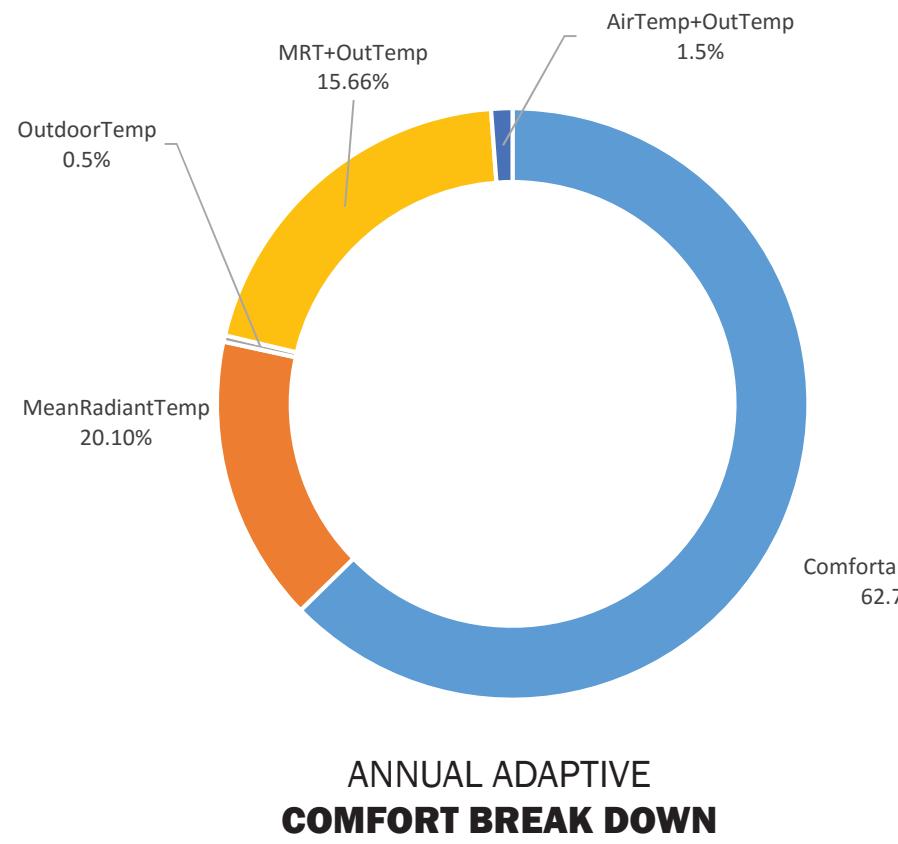
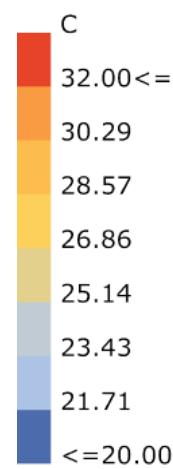
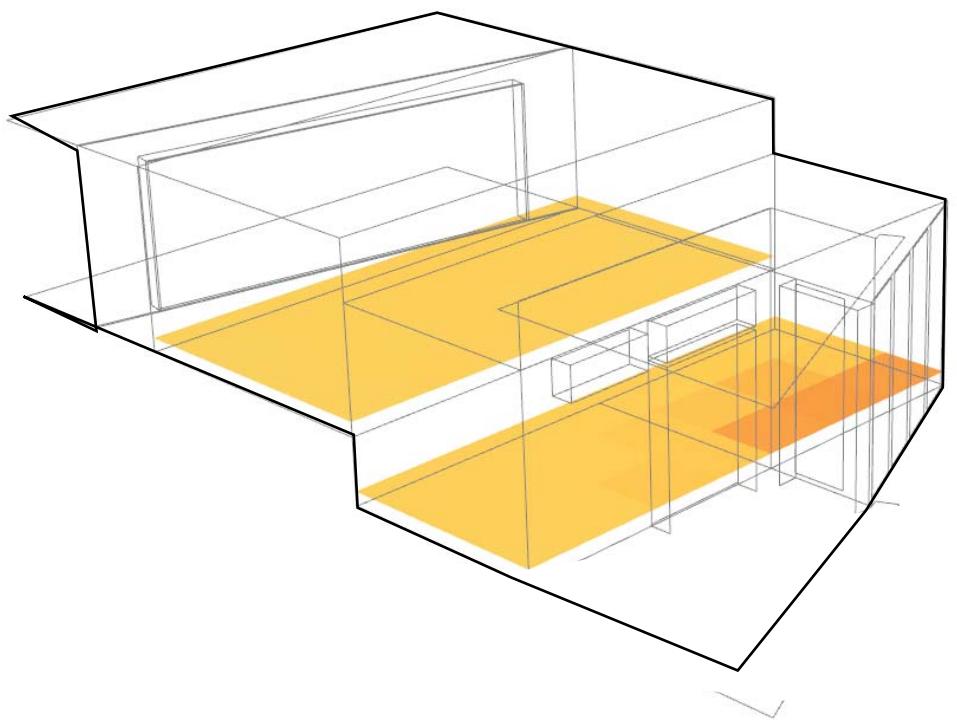


**ADAPTIVE COMFORT LIVINGROOM**

**77.62% ANNUALLY**

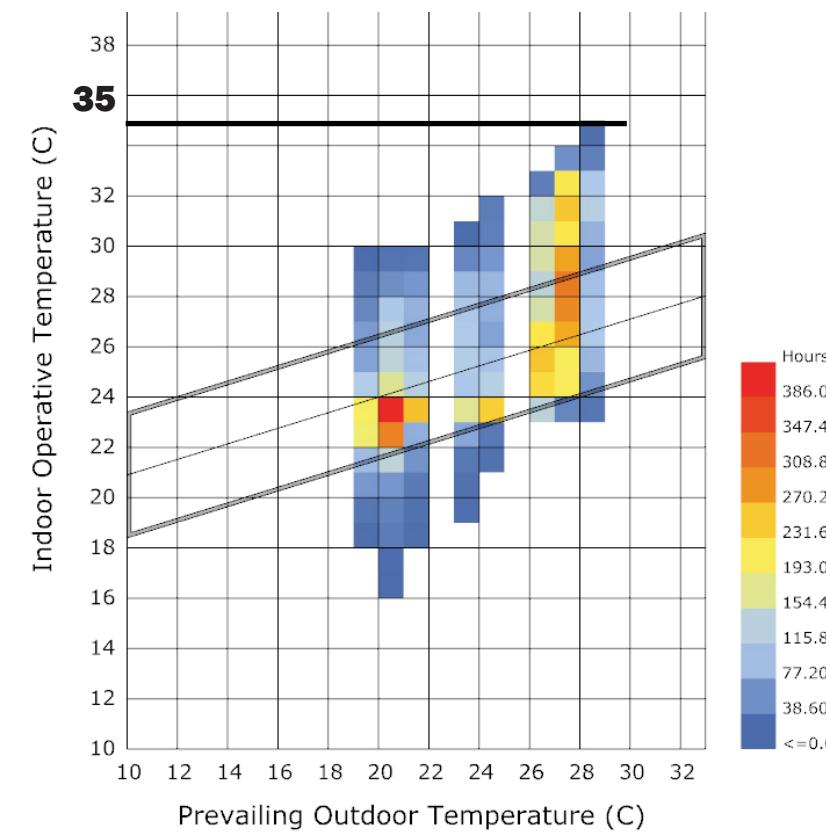
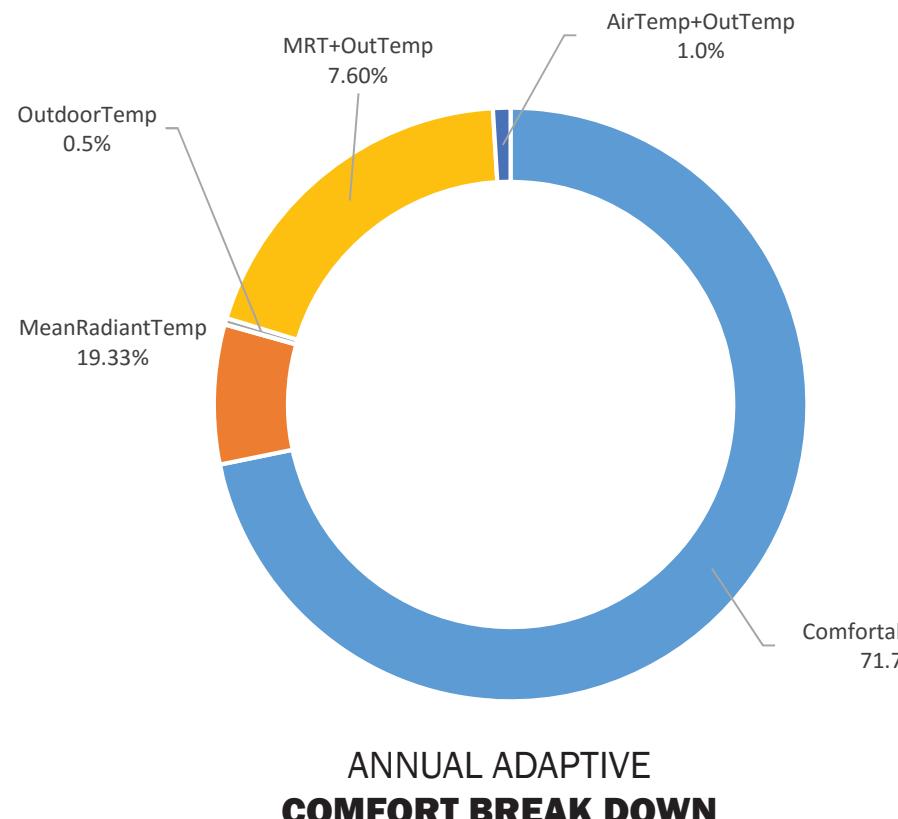
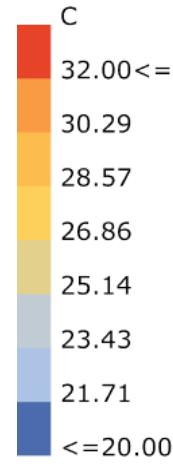
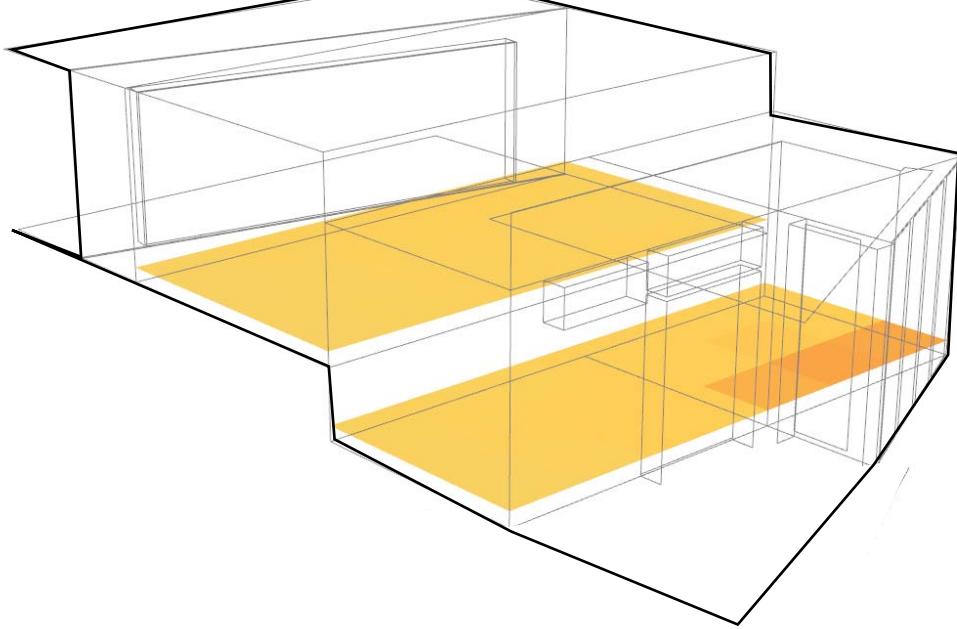
# STUDIO SHADING BENEFIT

## WITHOUT SHADING



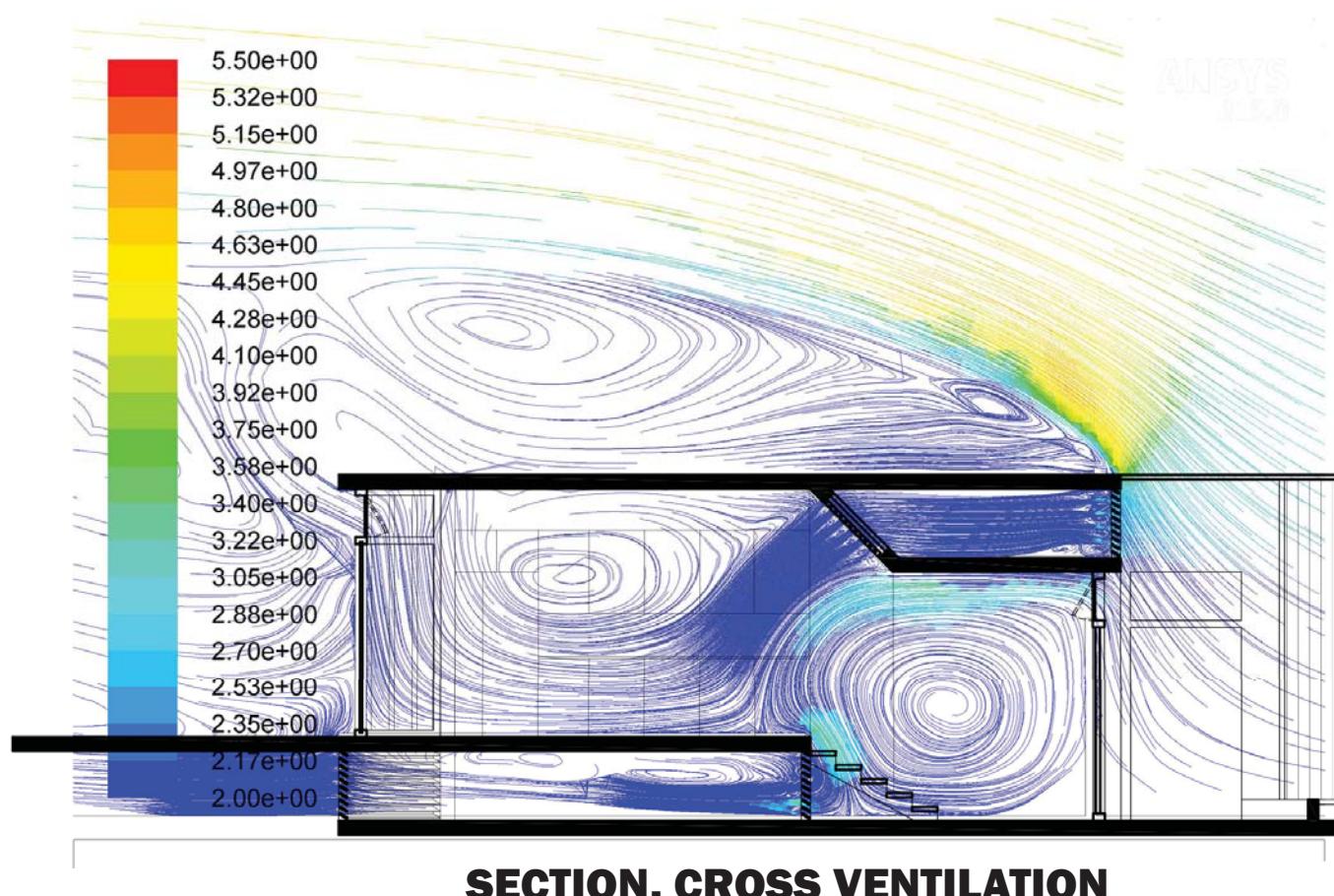
## MEAN RADIANT TEMPERATURE

## WITH SHADING

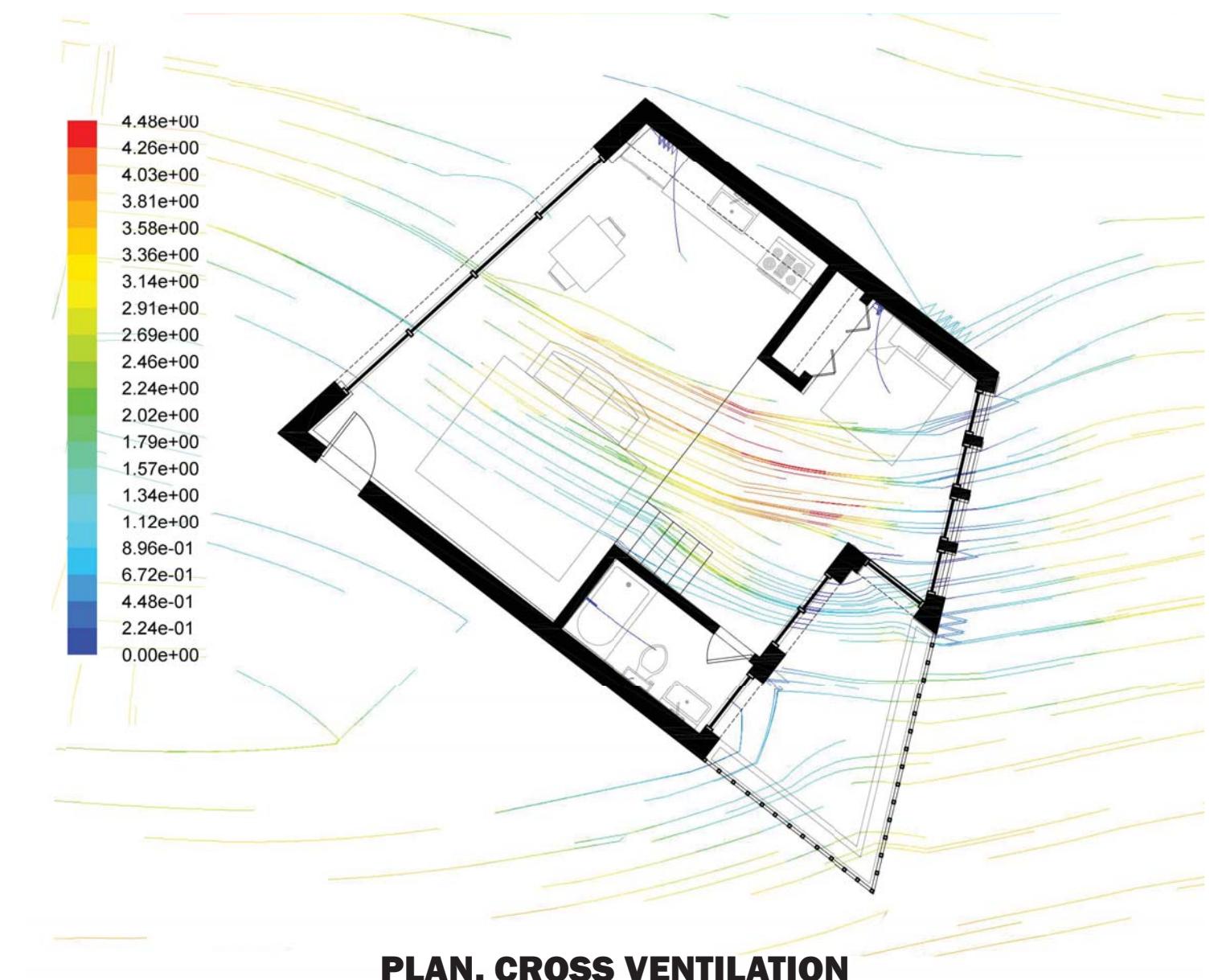


## MEAN RADIANT TEMPERATURE

# STUDIO CFD ANALYSIS

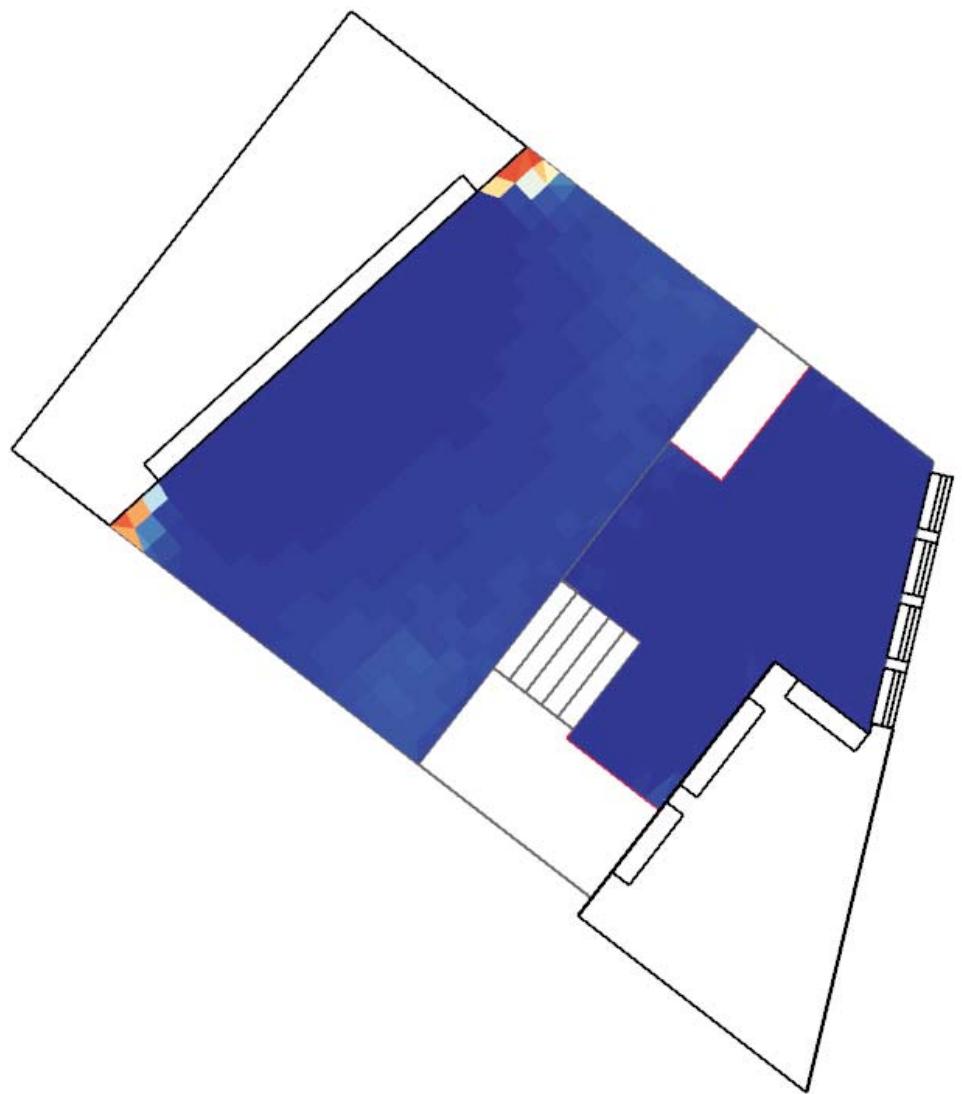


**SECTION. CROSS VENTILATION**

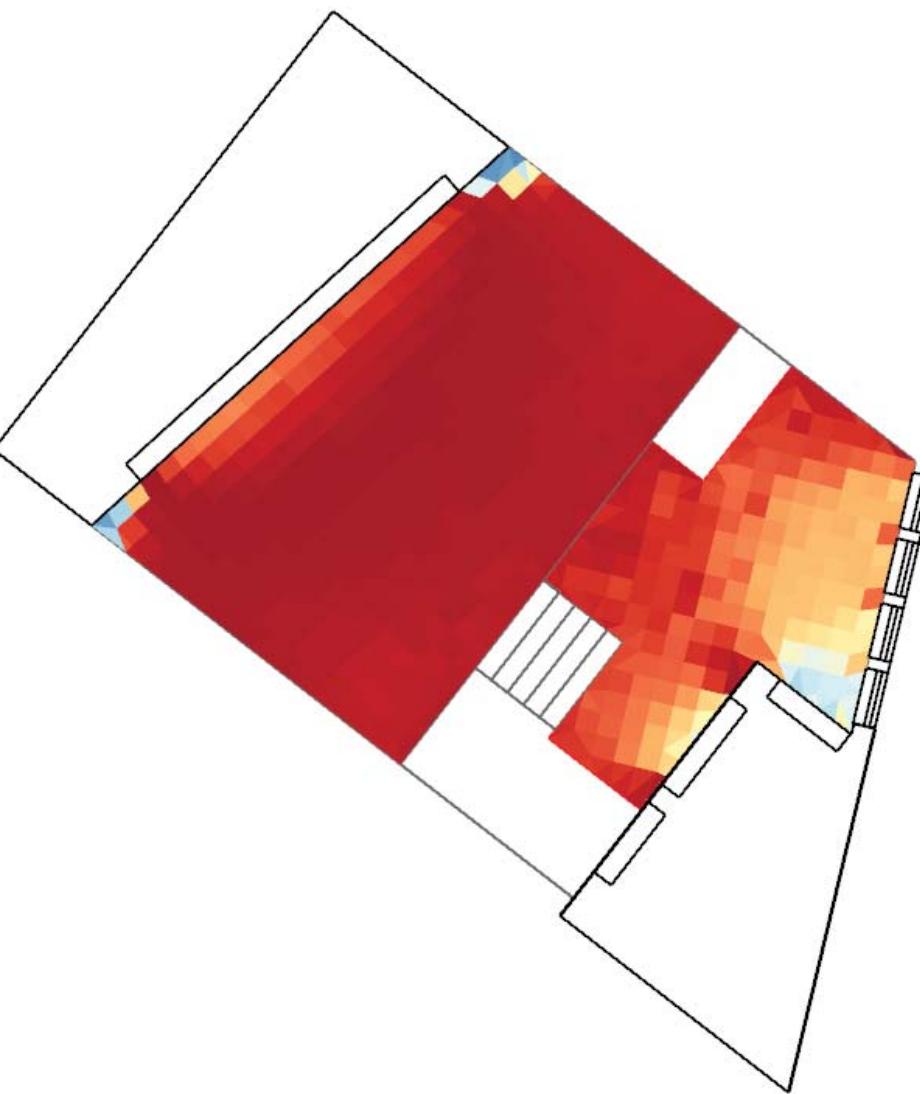


**PLAN. CROSS VENTILATION**

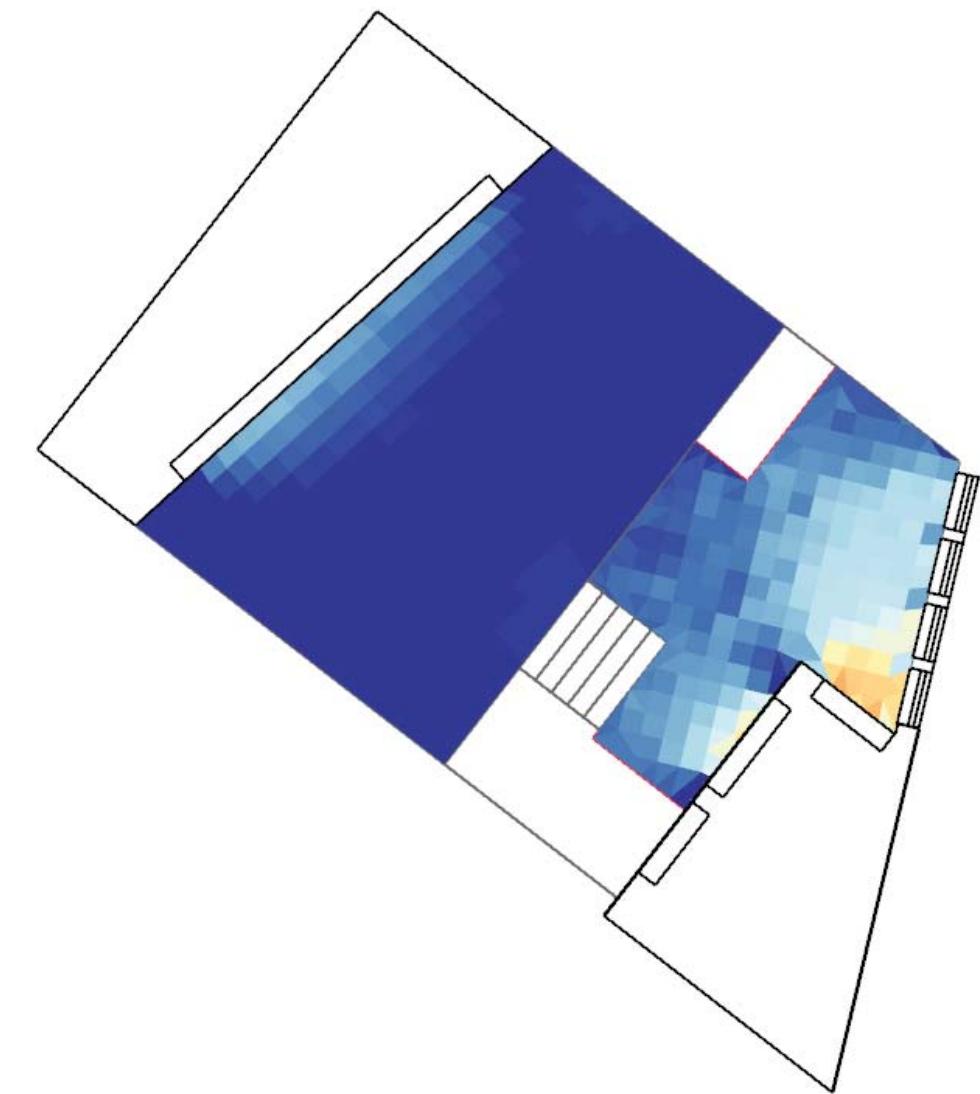
## STUDIO DAYLIGHTING ANALYSIS



**USEFUL DAYLIGHT ILLUMINANCE**  
**<100**



**USEFUL DAYLIGHT ILLUMINANCE**  
**100-2000**



**USEFUL DAYLIGHT ILLUMINANCE**  
**>2000**

## 2 BEDROOM UNIT PERFORMANCE REQUIREMENTS

REQUIRED COMFORTABLE HOURS

1 am                    12 pm                    5 pm                    12 am



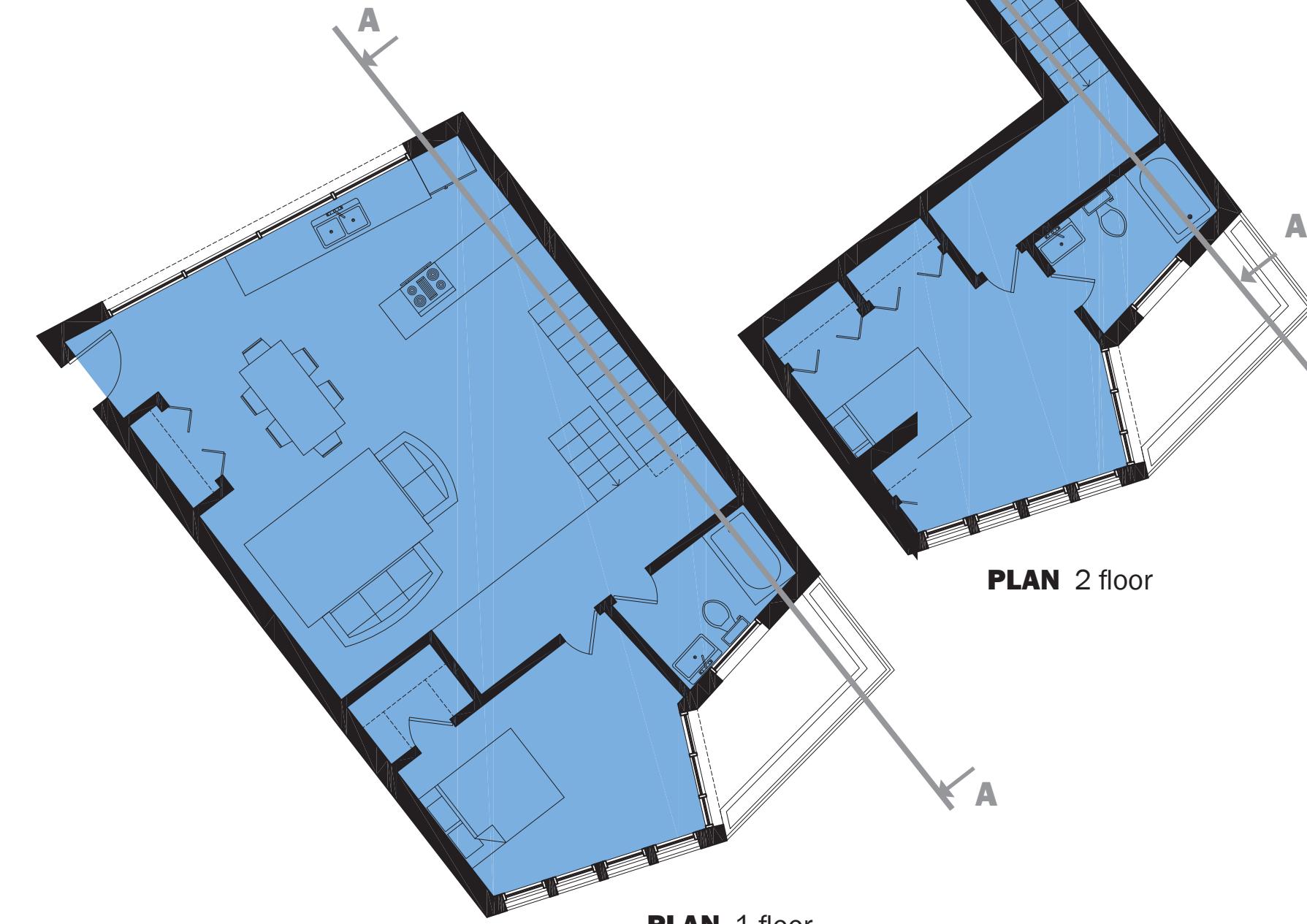
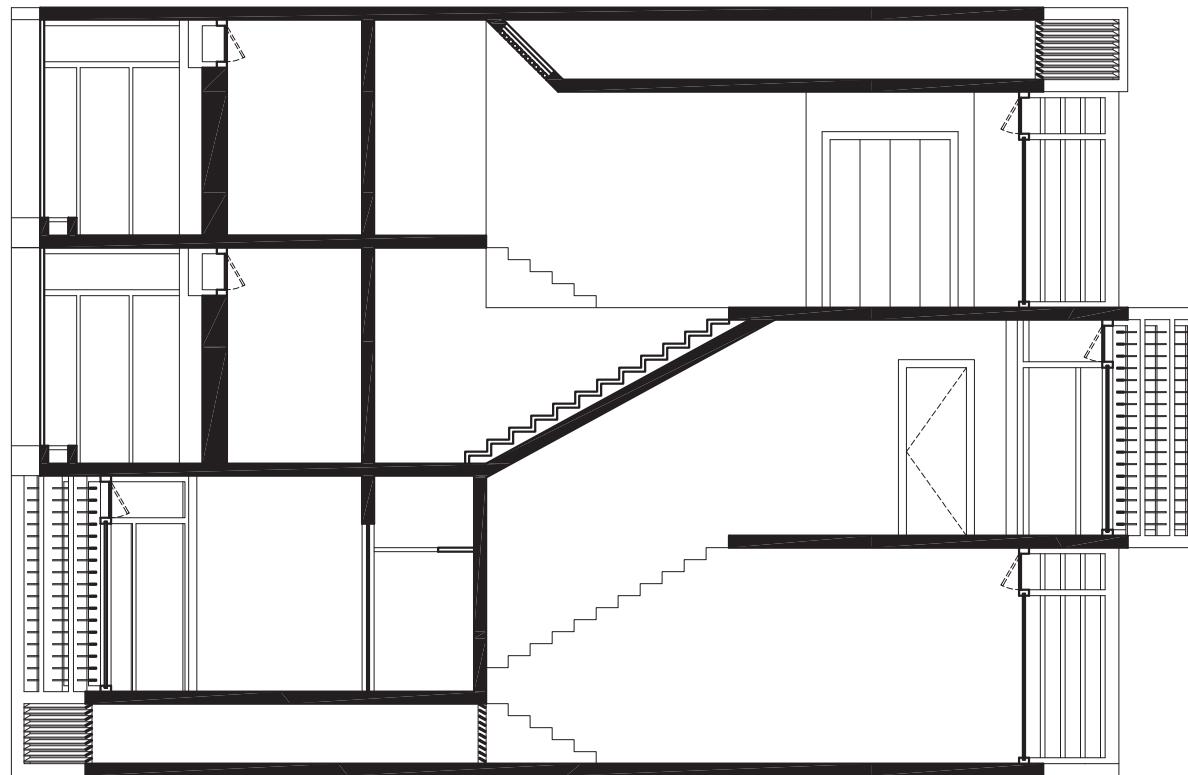
DAYLIGHTING  
Evenly spread sunlight  
300 lux min



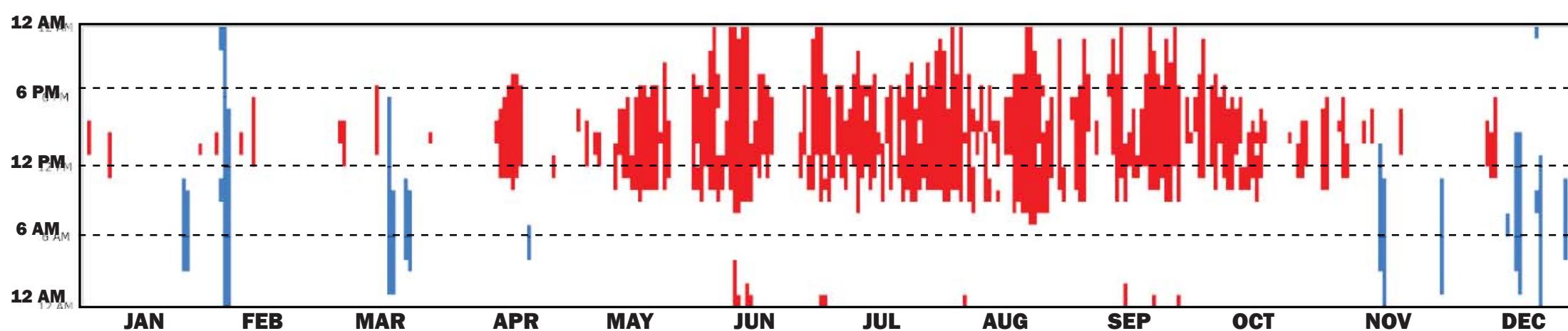
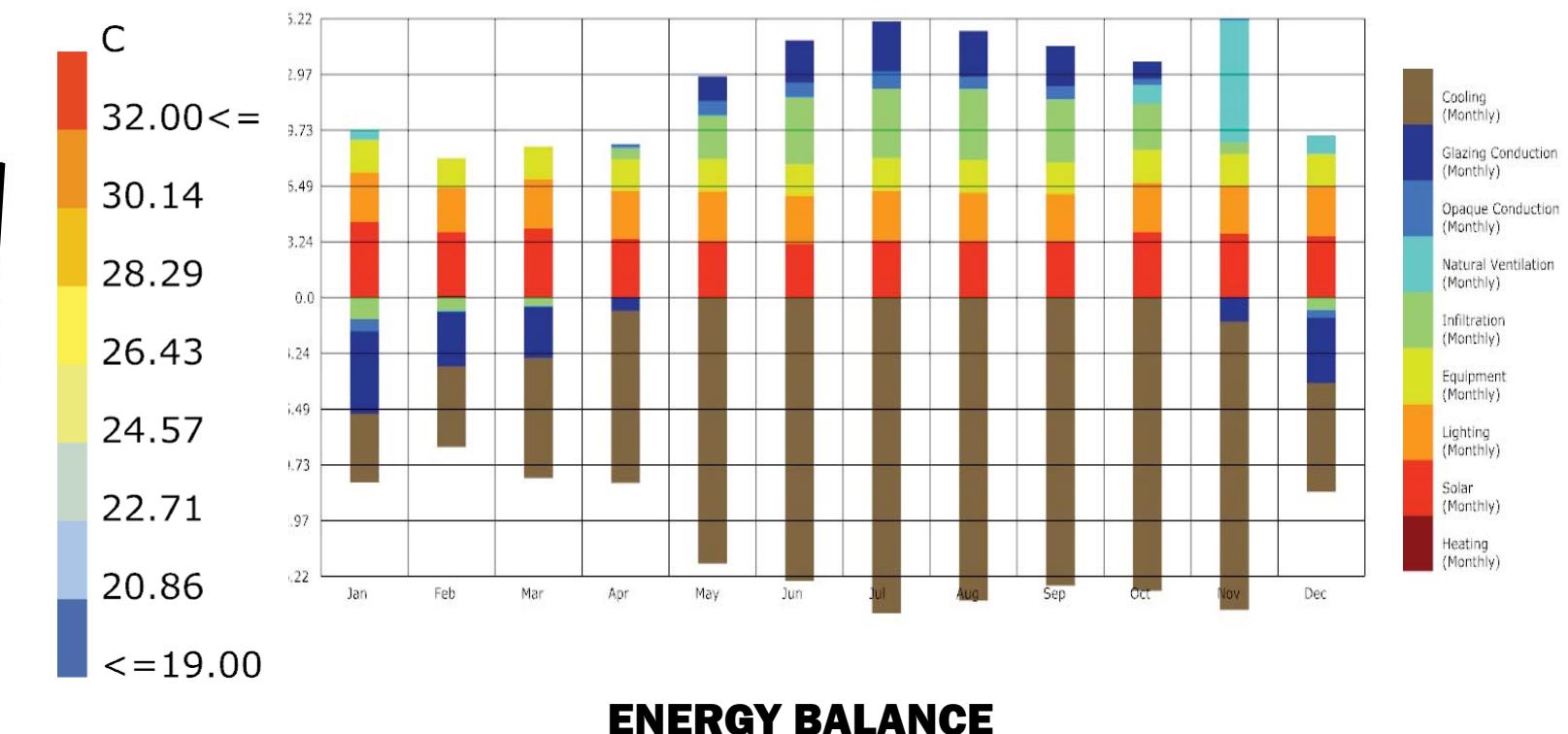
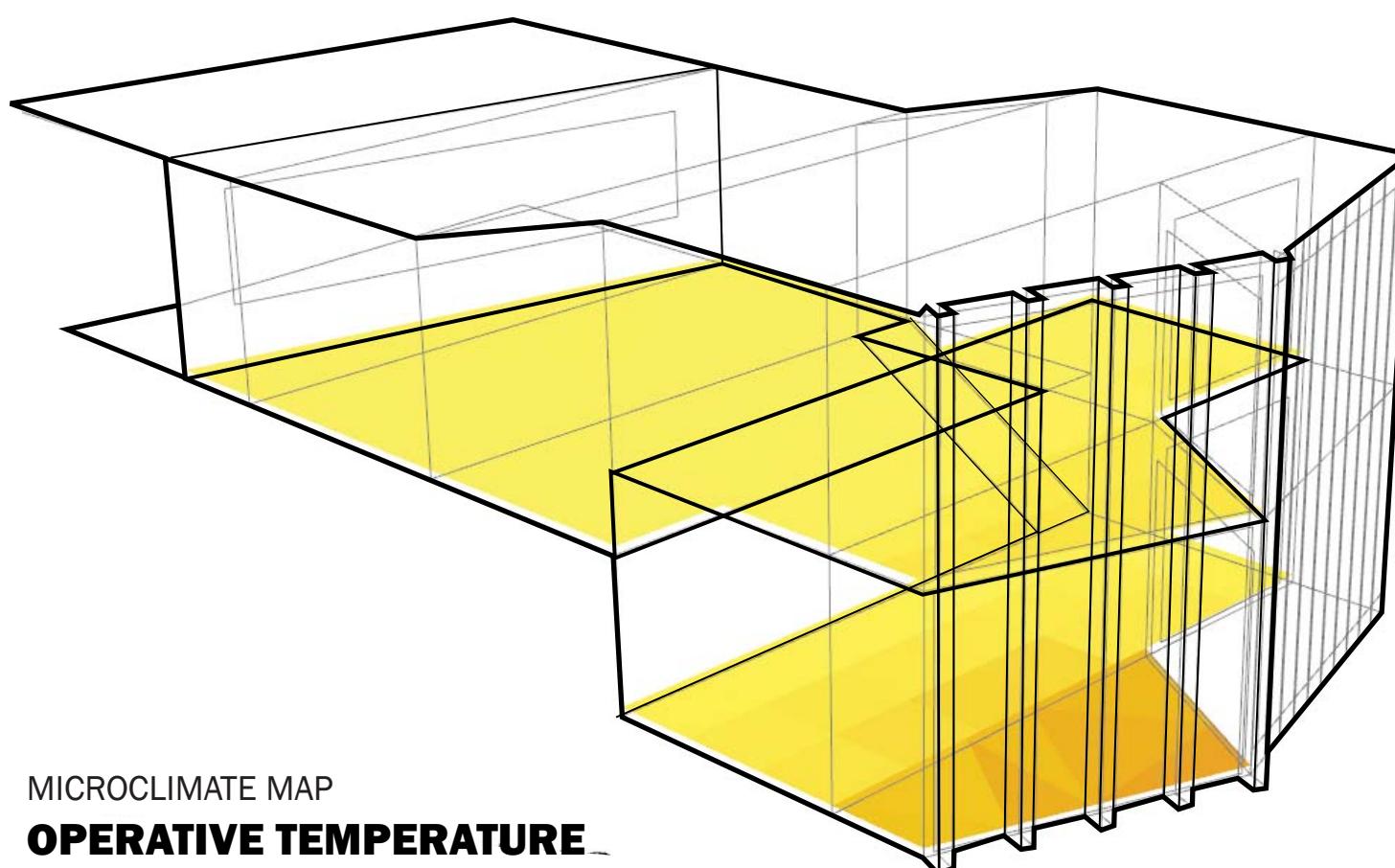
THERMAL COMFORT  
Maintain temperature  
in a range 20 - 28 C



CONTROL HUMIDITY  
Spaces with high humidity  
level [kitchen/bathrooms]  
are located leeward



## 2 BEDROOM THERMAL COMFORT

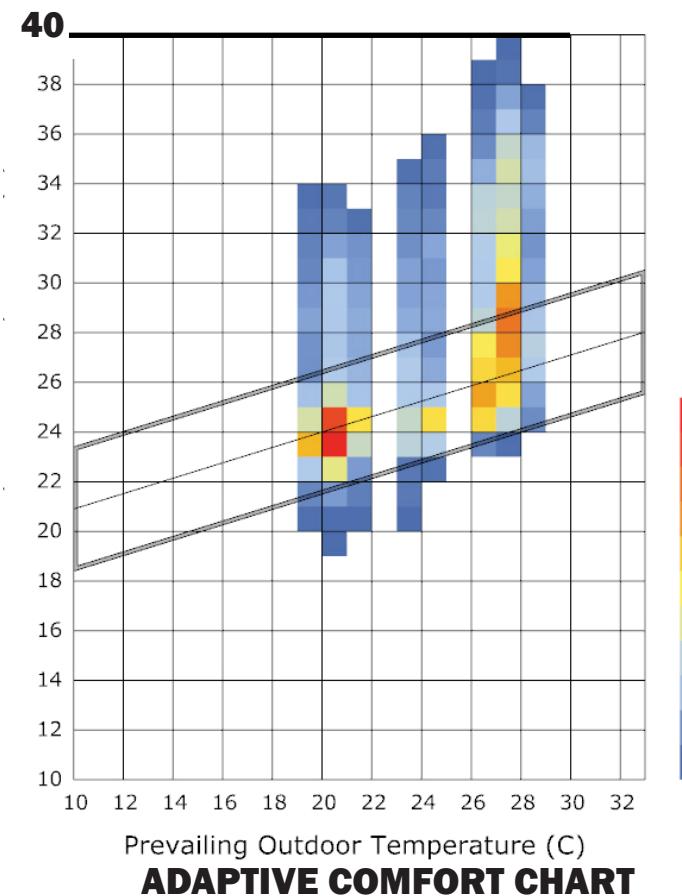
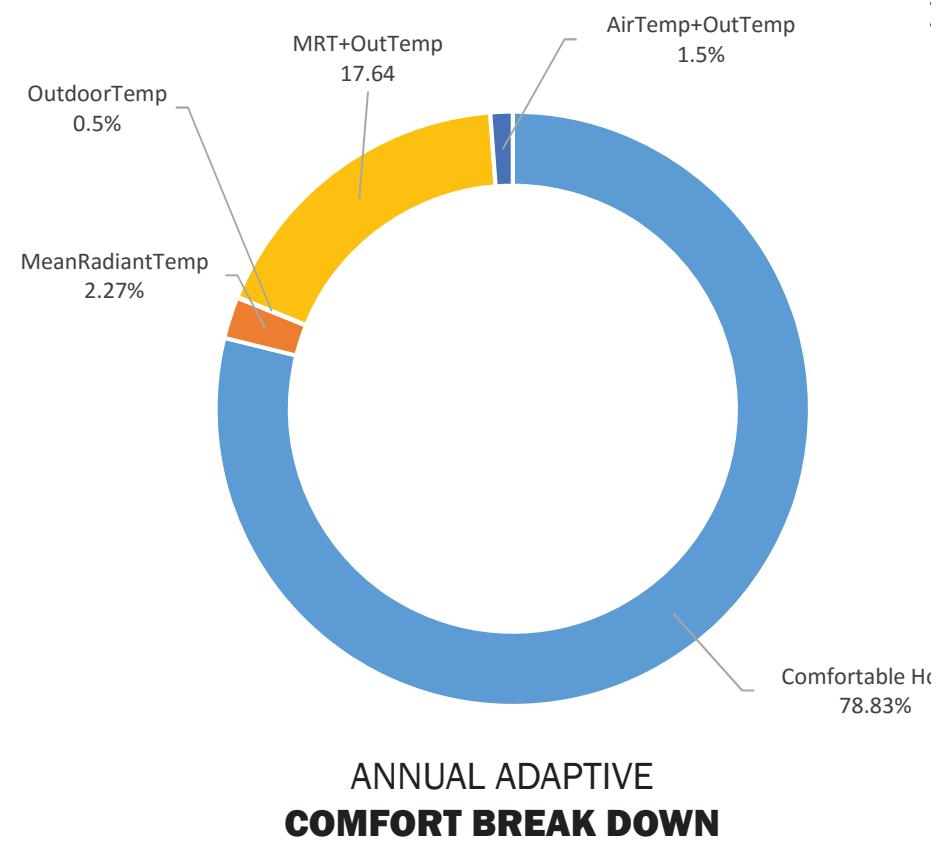
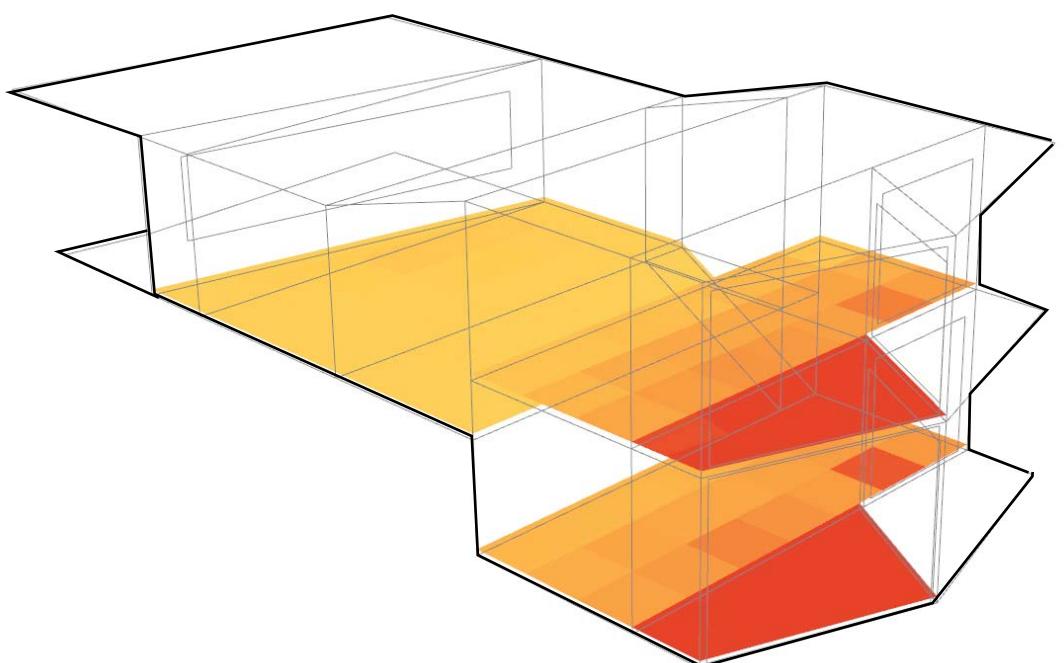


**ADAPTIVE COMFORT - LIVINGROOM**

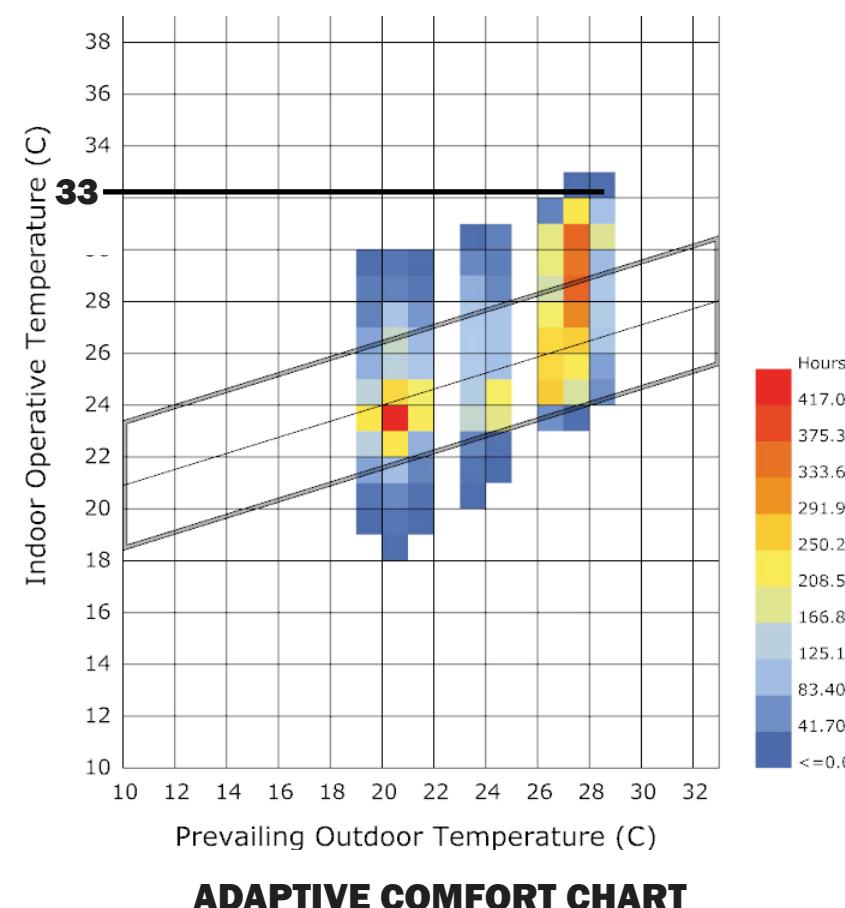
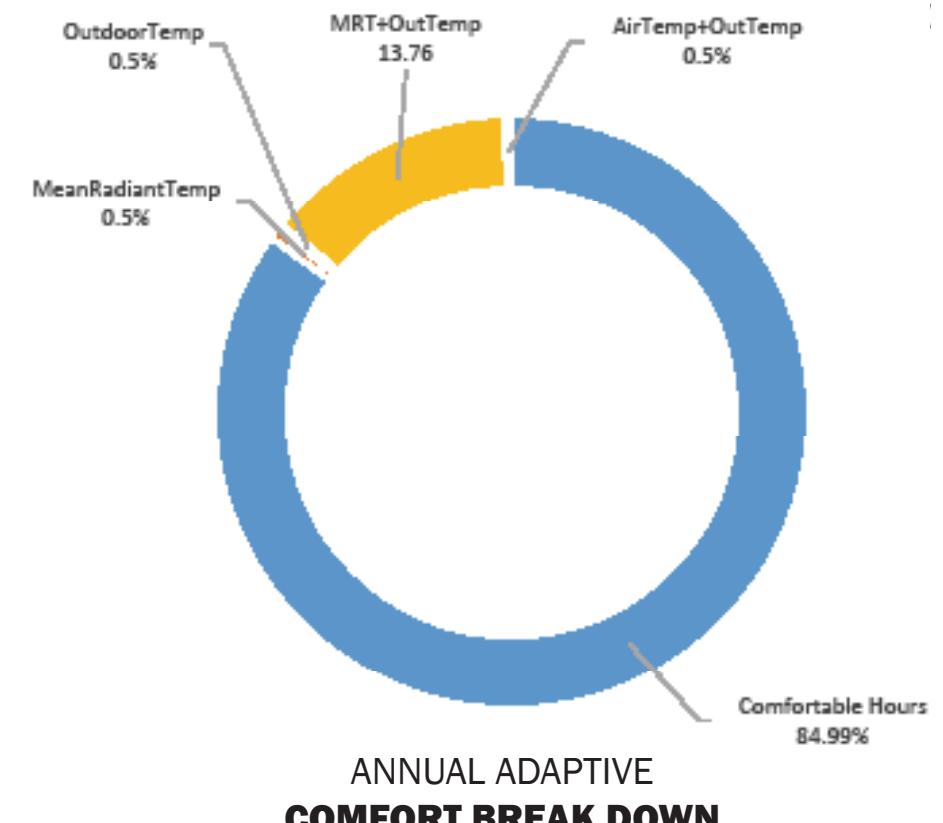
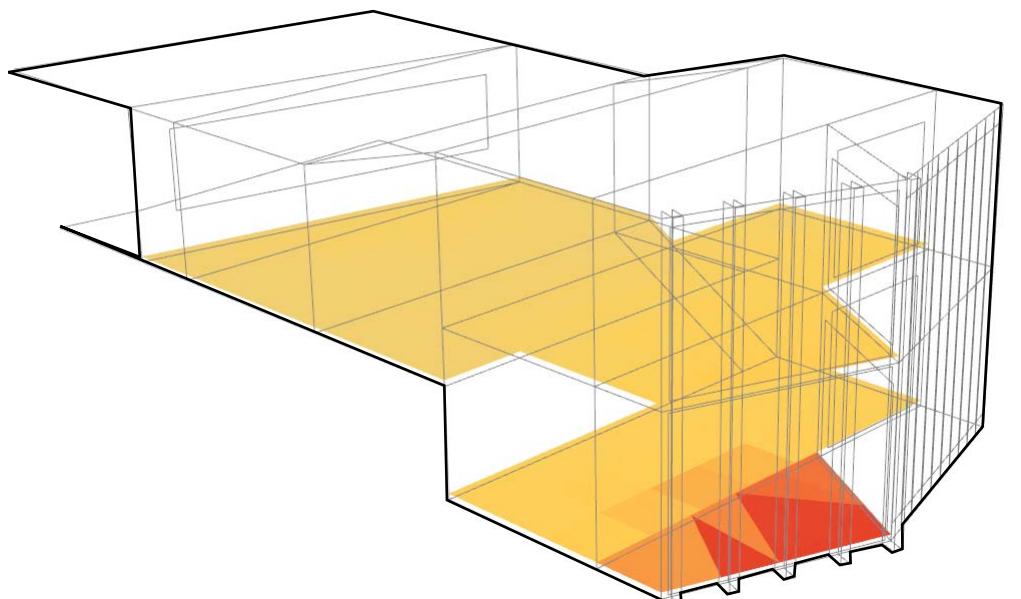
**84.99%** ANNUALLY

# SCREEN BENEFIT

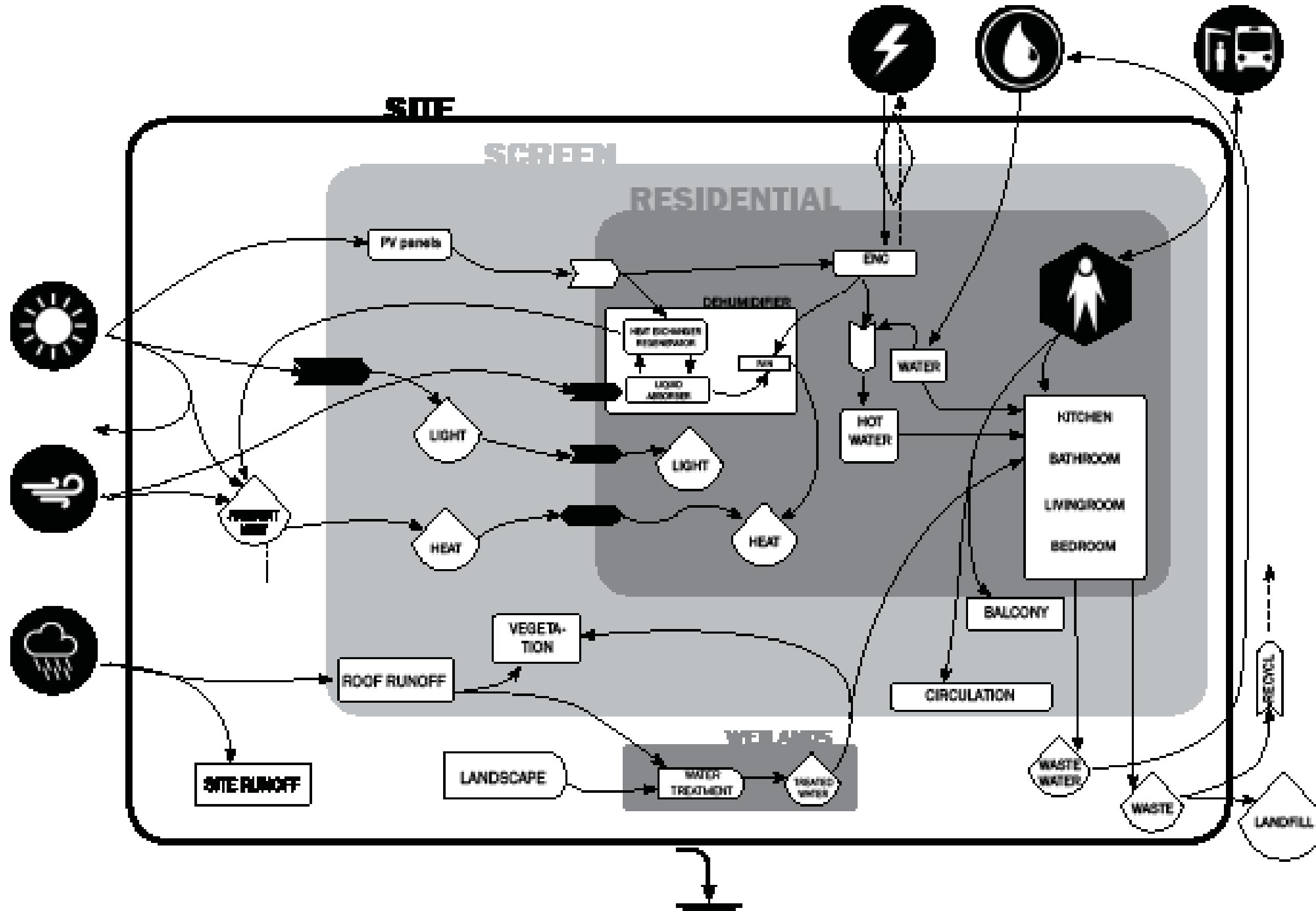
## WITHOUT SHADING

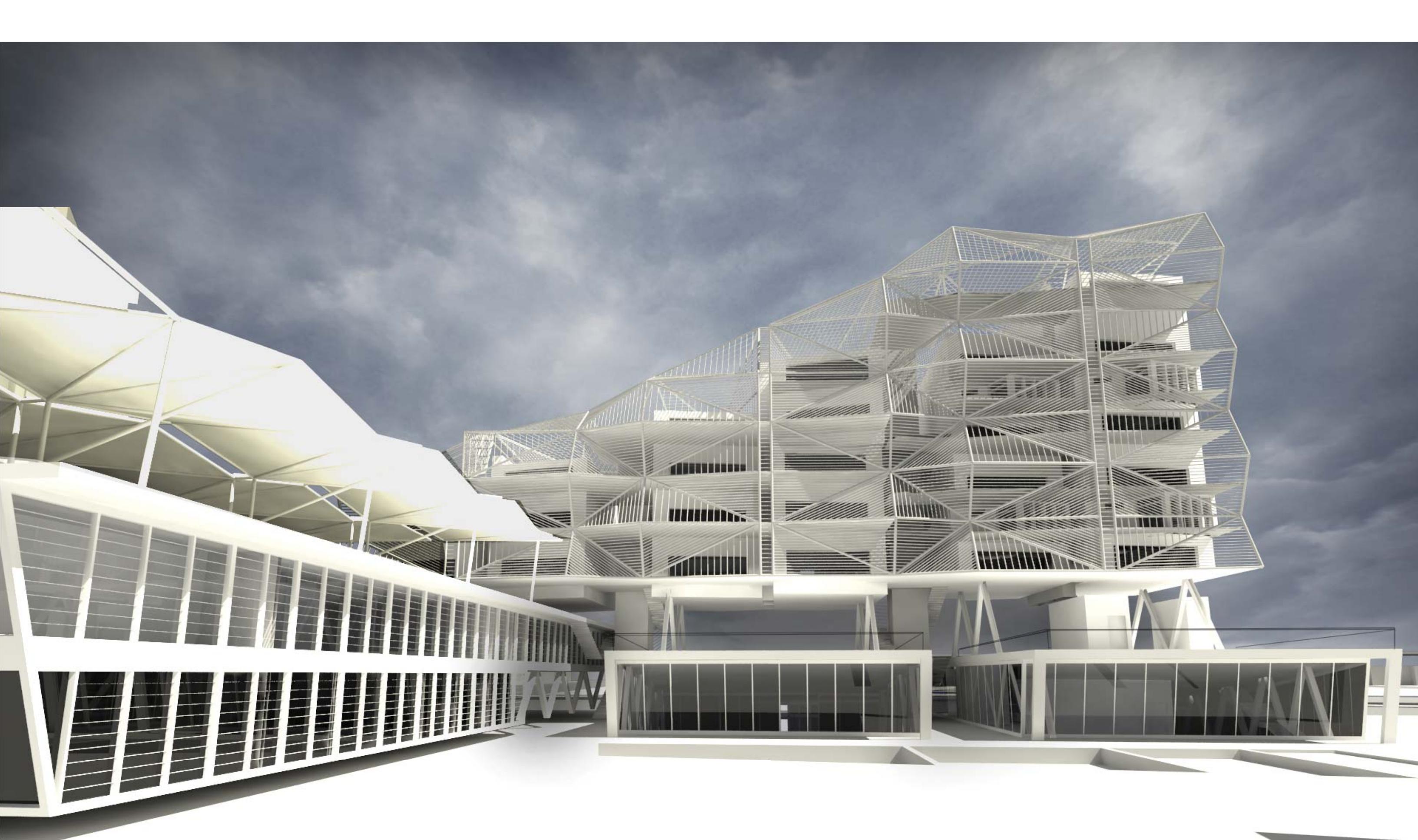


## WITH SHADING



# RESIDENTIAL E[M]ERGY DIAGRAM





ARCH 708 ENVIRONMENTAL BUILDING DESIGN STUDIO | KSEНИЯ КНЯЗКИНА | ЖАНКИ А ВЯС