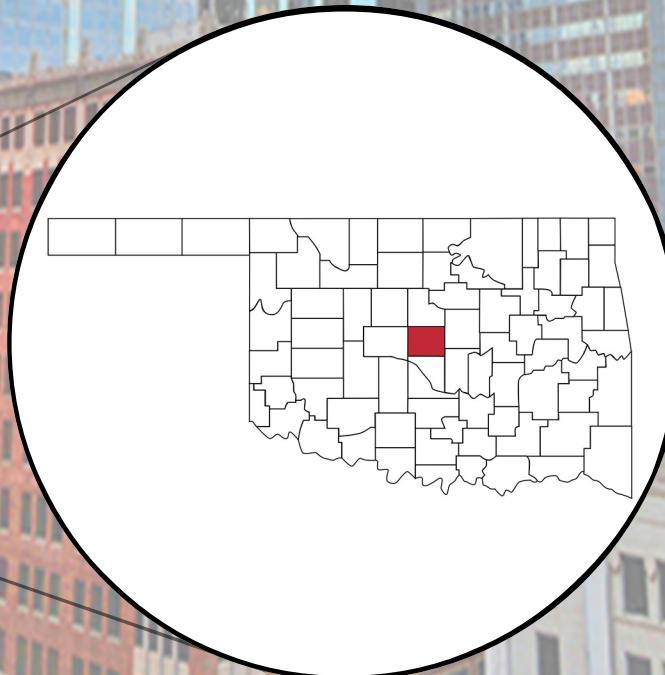


# CLIMATE ANALYSIS

## OKLAHOMA CITY, OKLAHOMA

JUAN D. GUARIN



### OKLAHOMA CITY

POPULATION:  
**638,317**

MINIMUM ANNUAL TEMPERATURE:  
**-19.3°C**

MAXIMUM ANNUAL TEMPERATURE:  
**36.7°C**

COORDINATES:  
**35° N 97° W**

WEATHER STATION:  
**WILL ROGERS AIRPORT**

FILE TYPE:  
**TMY3**

ROOM ORIENTATION:  
**WEST**

HOURS OF USE:  
**8:00 PM - 8:00 AM**



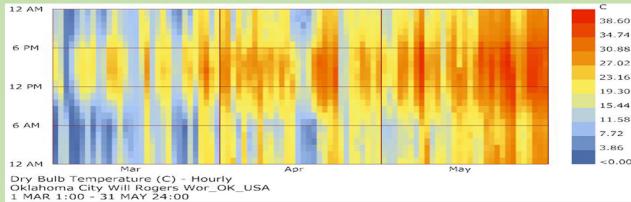
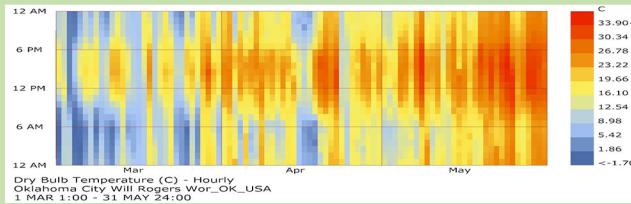
## COMFORT CONCLUSIONS

- THE COMFORT CHARTS PROVE OKLAHOMA CITY IS A PREDOMINANTLY HOT CITY, HAVING MORE COMFORT DAYS WITH THE ROOM FULLY SHADED THAN WITH THE ROOM UNSHADED.
- BASED ON THE INFORMATION SHOWN IN THE COMFORT GRAPHS, WINTERS IN OKLAHOMA CITY ARE NOT VERY EXTREME, GIVEN THAT THE DIFFERENCE BETWEEN HAVING A FULLY SHADED ROOM AND A FULLY SHADED ROOM DURING DECEMBER, JANUARY AND FEBRUARY IS MINIMUM.
- THERE IS A SIGNIFICANT DIFFERENCE BETWEEN THE SHADED AND THE UNSHADED MONTHS OF MARCH AND APRIL, WHERE THE "TORNADO SEASON" TAKES PLACE. WINDS DURING THESE MONTHS ARE EXTREMELY HIGH AND CONSIDERABLY COLD, SO HAVING MORE SUN DURING THIS SEASON CAN INCREASE THE THERMAL COMFORT IN THE ROOM.
- THE EFFICIENT SHADING SYSTEM IS DESIGNED BY SELECTING THE AMOUNT OF TIME IN WHICH THE ROOM IS COMFORTABLE FULLY SHADED OR COMFORTABLE WITHOUT SHADE. THIS SYSTEM WILL STILL BE ABLE TO BLOCK THE SUN FROM THE HOT SUMMER DAYS WHILE ALLOWING RADIATION INTO THE ROOM DURING THE COLD WINTER DAYS.
- IN 2050 THE SUMMER WILL HAVE LESS NUMBER OF COMFORTABLE DAYS AND THE SHADING SYSTEM WILL HAVE VERY LOW EFFICIENCY DURING THIS SEASON. PARADOXICALLY, THE WINTERS WILL HAVE MORE COMFORTABLE DAYS. "TORNADO SEASONS" ARE ALMOST IDENTICAL IN 2017 AND 2050, MEANING THAT EVETHOUGH THE EARTH IS WARMER, THE MAGNITUDE OF THE NATURAL DISASTERS WILL MAKE THE SPACES AS UNCOMFORTABLE AS THEY ARE TODAY.

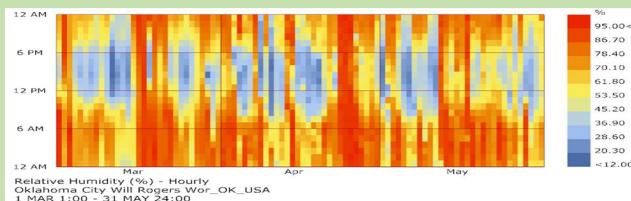
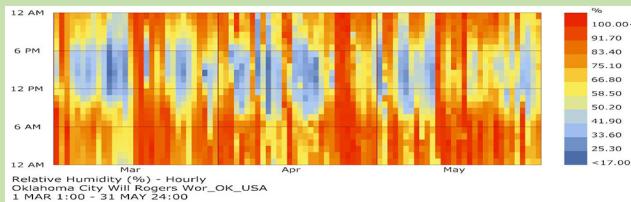


## SPRING (MAR 1 - MAY 31)

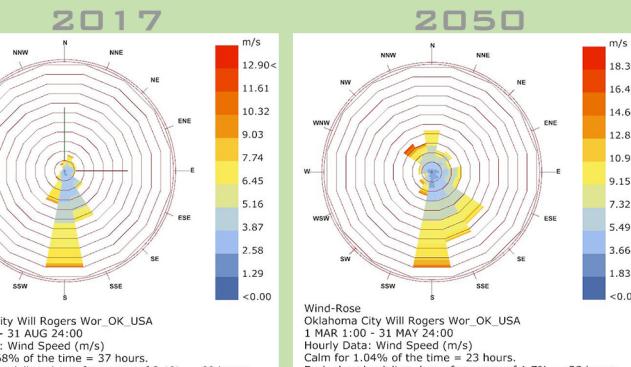
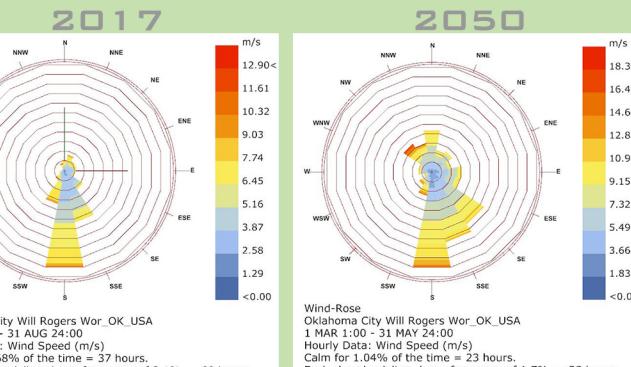
### TEMPERATURE



### RELATIVE HUMIDITY

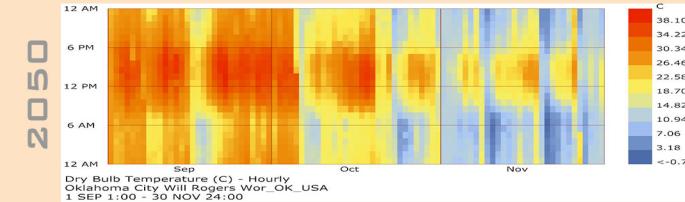
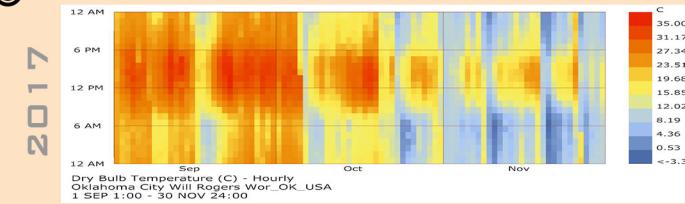


### WIND SPEEDS

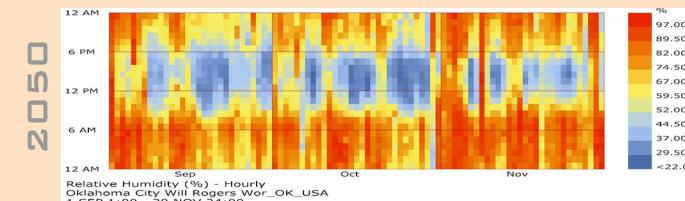
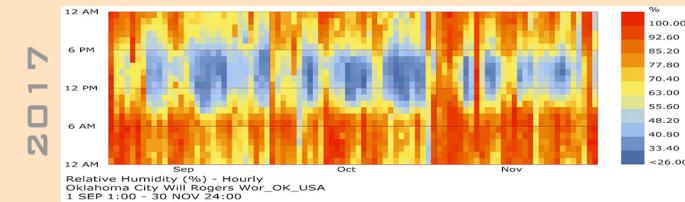


## FALL (SEPT 1 - NOV 31)

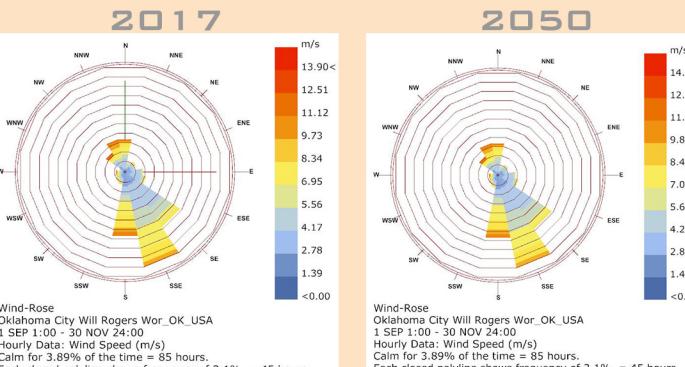
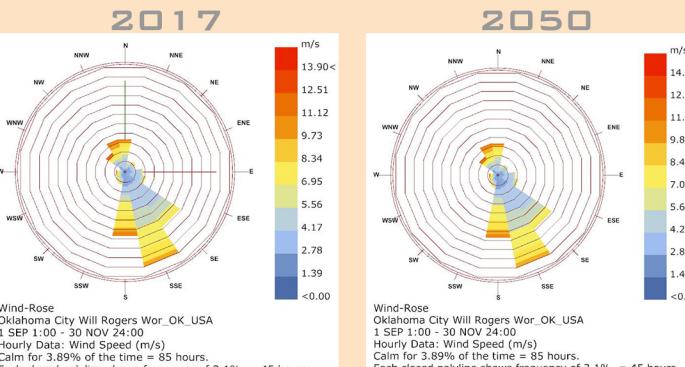
### TEMPERATURE



### RELATIVE HUMIDITY



### WIND SPEEDS



## CLIMATE CONCLUSIONS

- TEMPERATURES IN OKLAHOMA CITY ARE PREDOMINANTLY HIGH THROUGHOUT THE YEAR, REACHING PEAKS OF ALMOST 35°C DURING THE SUMMER. EVENTHOUGH WINTERS ARE NOT VERY LONG, THERE MIGHT BE SOME DAYS IN JANUARY WITH TEMPERATURES OF UP TO -18°C.

- THE OKLAHOMA CITY REGION IS A PLACE WITH A CONSIDERABLY HIGH RELATIVE HUMIDITY, SPECIALLY. DURING MORNING AND NIGHT HOURS. THIS CAN AFFECT THE TEMPERATURE PERCEPTION, MAKING THE COLD DAYS SEEM COLDER AND THE HOT DAYS SEEM HOTTER.

- EVENTHOUGH WINDS ARE MAINLY PREDOMINANT FROM THE NORTHERN AND SOUTHERN DIRECTION, THEY CAN REACH EXTREMELY HIGH SPEEDS OF UP TO 18 M/S. THIS CAN ALSO AFFECT THE TEMPERATURE PERCEPTION ESPECIALLY DURING WINTER AND SPRING, WHERE WINDS ARE THE FASTEST.

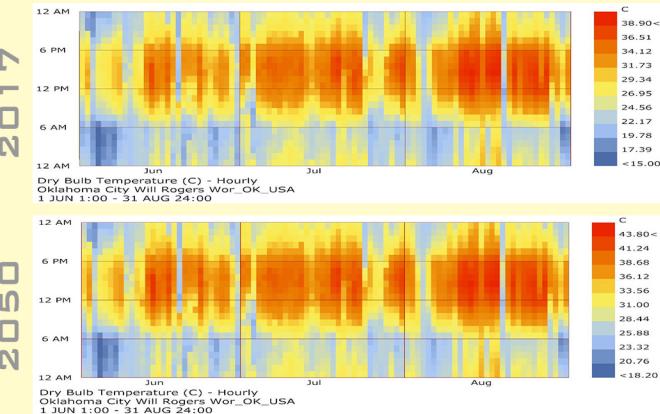
- “TORNADO SEASON” IN OKLAHOMA IS CONSIDERED TO GO FROM MARCH 15 TO JUNE 15, WHICH IS THE PERIOD OF TIME WITH THE HIGHEST WIND SPEEDS AND THE HIGHEST RELATIVE HUMIDITY IN THE YEAR.

- THERE ARE SEVERAL INDICATORS THAT SHOW GLOBAL WARMING WILL BE WORSE BY 2050. HIGHER TEMPERATURES, WITH PEAKS OF UP TO 45°C IN THE SUMMER, PROVE THE EARTH WILL BE WARMER BY 2050. HIGHER WIND SPEEDS DURING TORNADO SEASONS SHOW THAT NATURAL CATASTROPHES WILL BE MORE POWERFUL AND EXTREME.

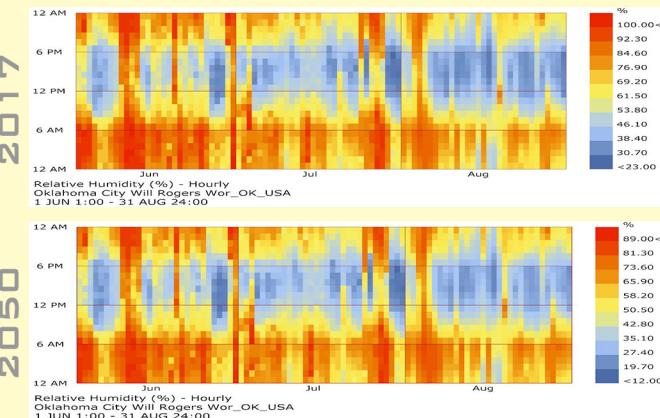


**SUMMER**  
**(JUN 1 - AUG 31)**

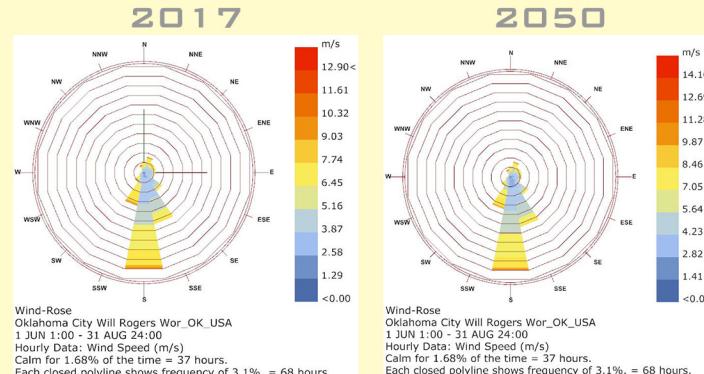
## TEMPERATURE



## RELATIVE HUMIDITY

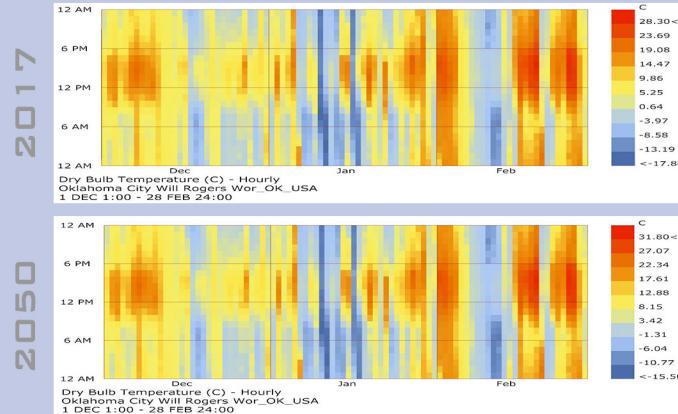


## WIND SPEEDS

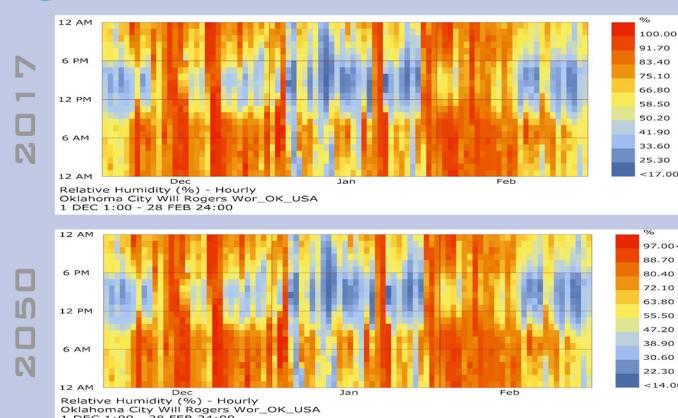


**WINTER**  
**(DEC 1 - FEB 28)**

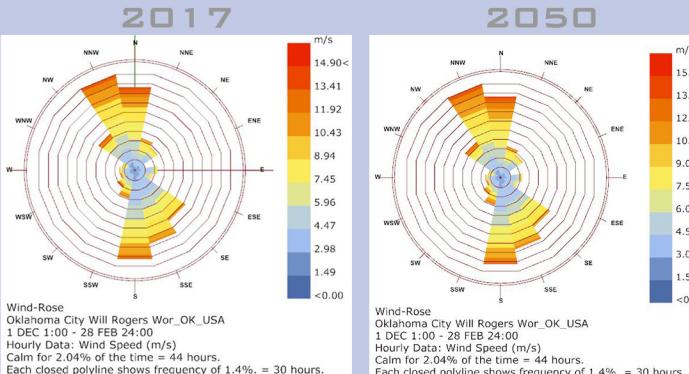
## TEMPERATURE



## RELATIVE HUMIDITY

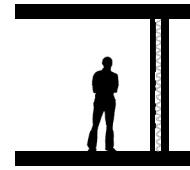
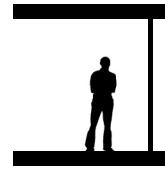


## WIND SPEEDS

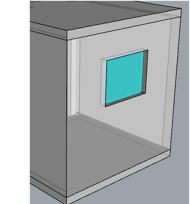
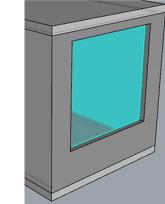


## DESIGN STRATEGIES

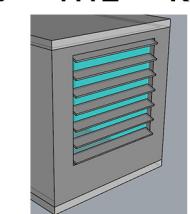
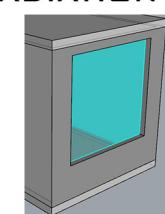
- HAVING THICKER WALLS, OR HIGHER INSULATION VALUES WILL REPRESENT A LOWER THERMAL LOSS/GAIN RATE, MEANING THAT THE ROOM WILL BE ABLE TO STAY COLDER IN THE SUMMER AND HOTTER IN THE WINTER.



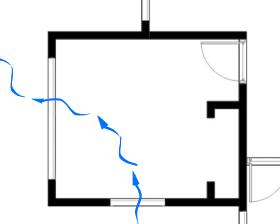
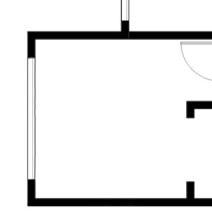
- SINCE THE WINDOW IN THE ROOM HAS A HIGH GLAZING AREA, REDUCING THE WINDOW-TO-WALL RATIO WILL REDUCE THE THERMAL GAIN/LOSS RATE.



- THE ROOM TENDS TO GET CONSIDERABLY HOT ESPECIALLY DURING THE SUMMERS AND IN THE AFTERNOONS, SO A SHADING SYSTEM WILL REDUCE THE AMOUNT OF RADIATION ENTERING THE ROOM.

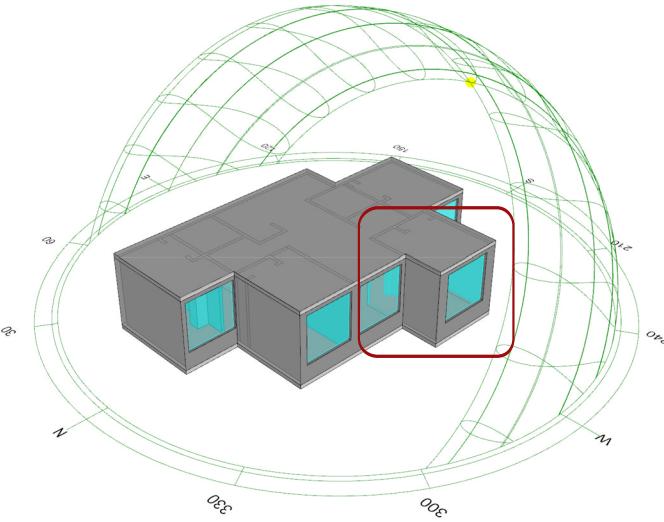


- MOST OF THE WINDS THROUGHOUT THE YEAR COME FROM THE SOUTH, SO HAVING AN OPERABLE WINDOW IN THE SOUTHERN FAÇADE WILL ALLOW TO HAVE CROSS VENTILATION IN THE ROOM.

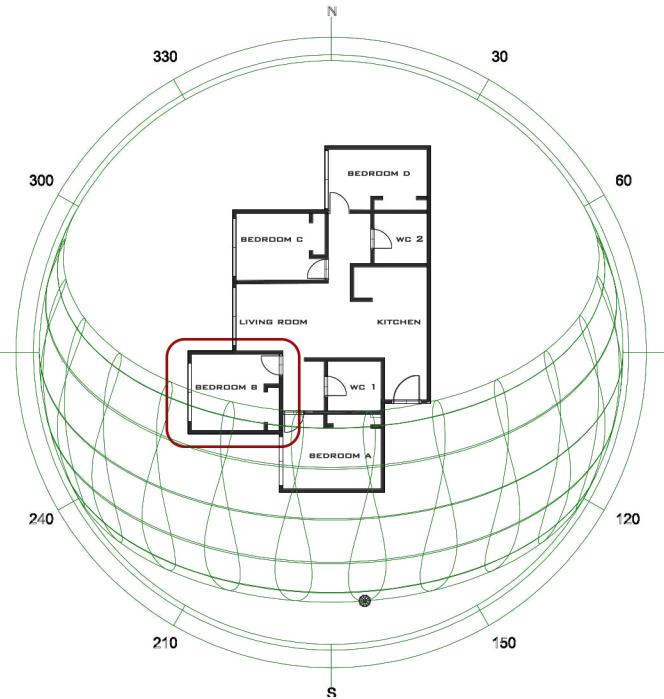


# MY “DREAM ROOM”

3D SUN PATH DIAGRAM



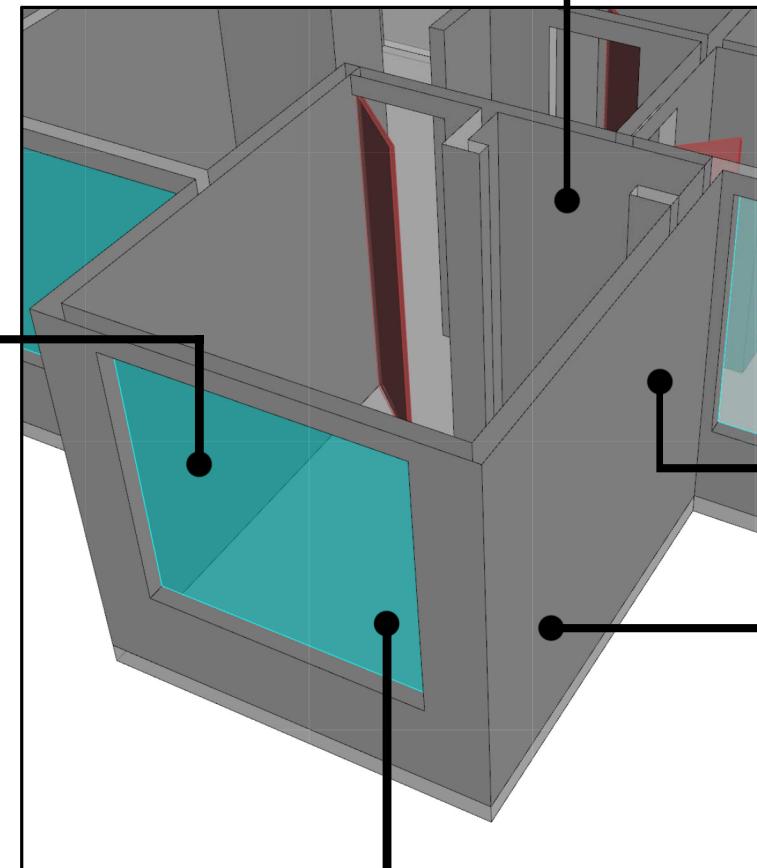
FLOOR PLAN  
SUN PATH DIAGRAM



INTERIOR MATERIALS WITH HIGH THERMAL INERTIA, SUCH AS CONCRETE OR MASONRY, WILL MAKE THE ROOM FEEL COOLER DURING THE SUMMER AND HOTTER DURING THE WINTER.



AUTOMATED SHADING DEVICES FOR PROTECTING THE ROOM FROM THE AFTERNOON SUN IN THE SUMMER AND HAVING RADIATION GAIN IN THE WINTER.



SMALLER, OPERABLE WINDOW WITH DOUBLE PANE GLAZING TO REDUCE THERMAL LOSS/GAIN.

TALL AND NARROW OPERABLE WINDOWS IN THE EASTERN SIDE OF THE SOUTHERN FAÇADE, PROTECTED FROM THE SUN BY THE ADJACENT ROOM, BUT ABLE TO RECEIVE ALL THE WINDS COMING FROM THE SOUTH.



THICKER, BETTER INSULATED WALLS THAT REDUCE THE RATE IN WHICH HUMIDITY AND MOISTURE TRANSFERS INSIDE THE ROOM.

