

ARCH633 Environmental Systems I

Assignment 5: Annual Comfort Map

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Site Basic Information



Campus Map



Perelman Quadrangle Map

Location:

Perelman Quadrangle, between College Hall & Houston Hall

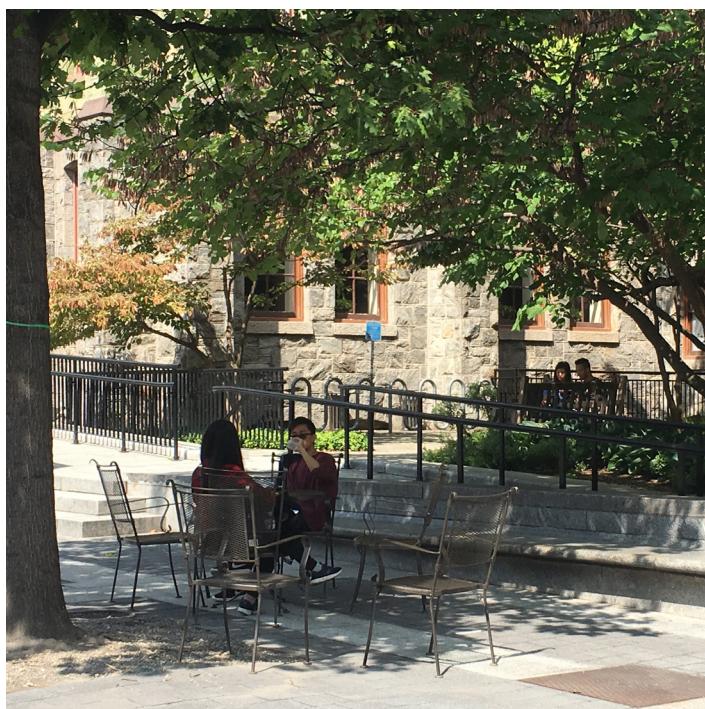
Area:

20,000 m²

Site Photos Documentation



Site Condition & Different Locations

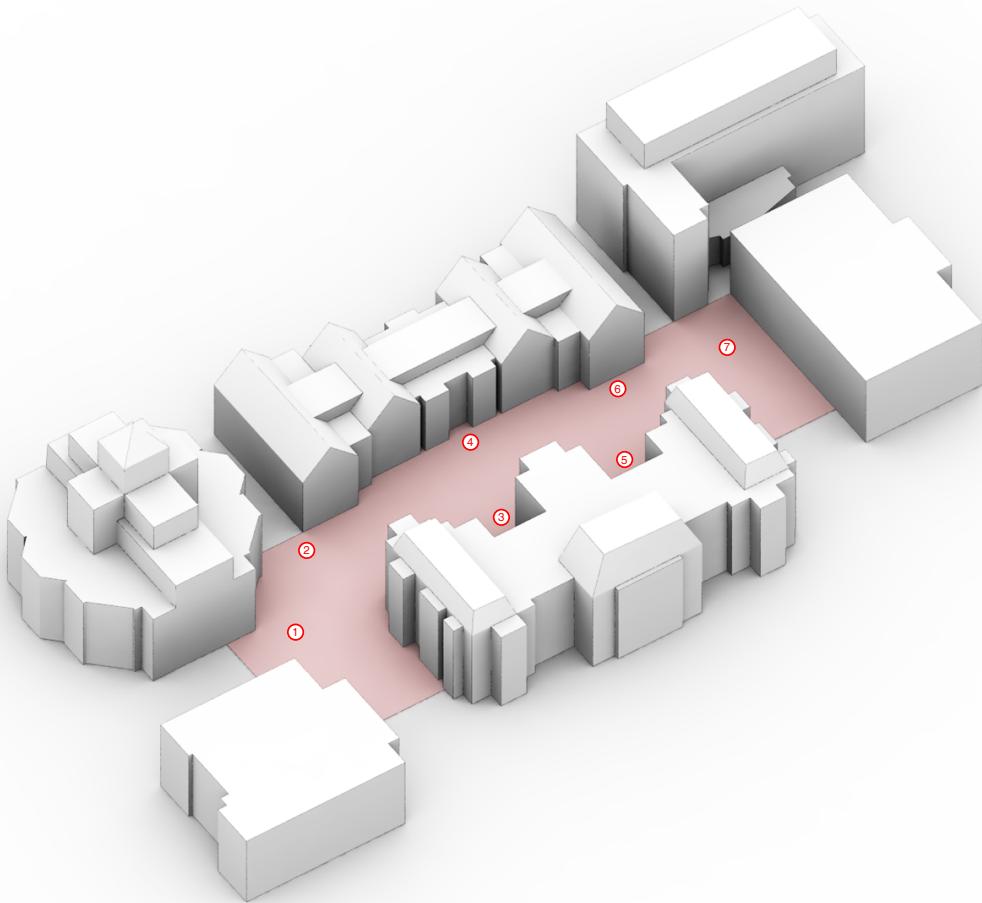


Sitting Conditions

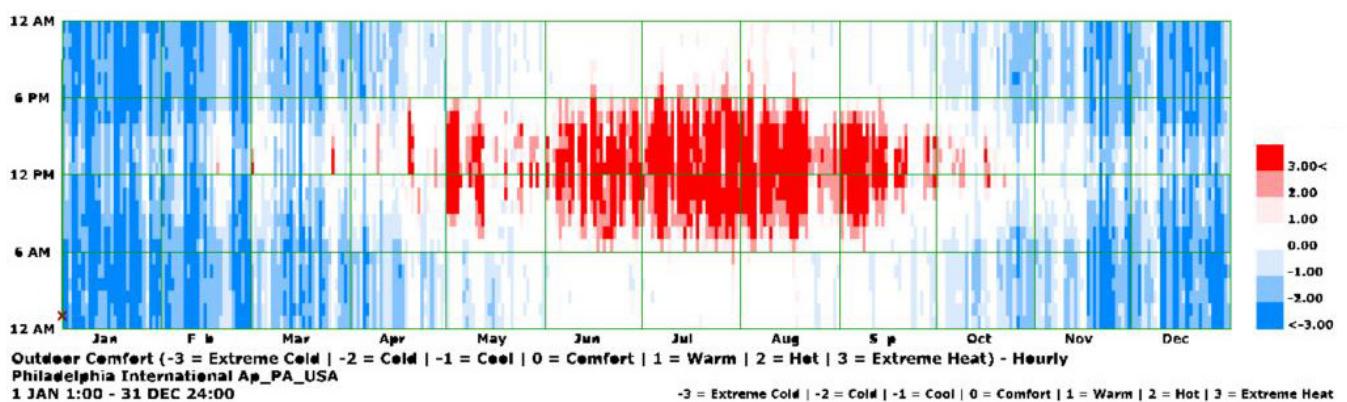
Different Types of Sitting Space:

Iron seats in sunshine / Iron seats in shadow
Masonry seats in sunshine / Masonry seats in shadow

Original Site & Location Points



Locations Picked On Site



General Annual Outdoor Comfort Chart

Percentage of Comfortable Hours during the Year:

37.3%

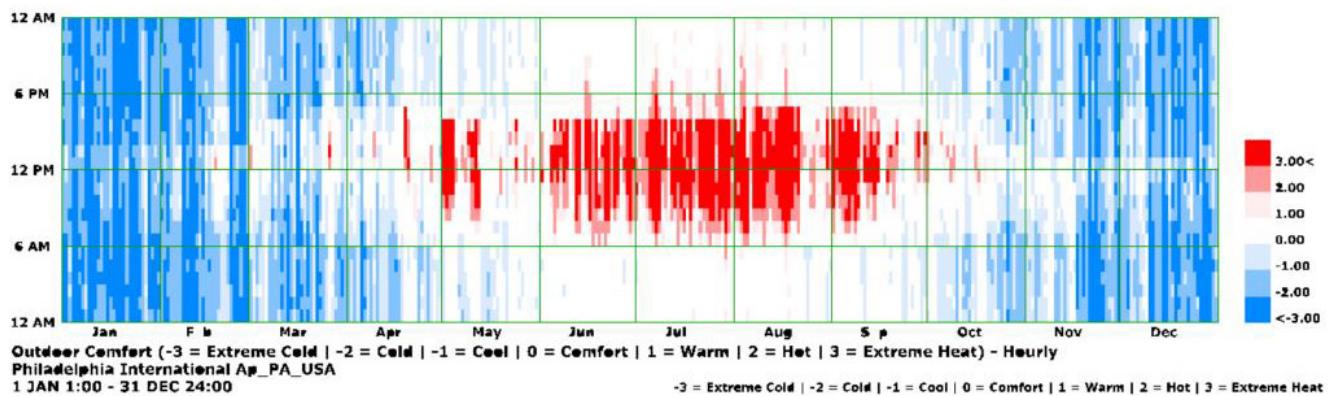
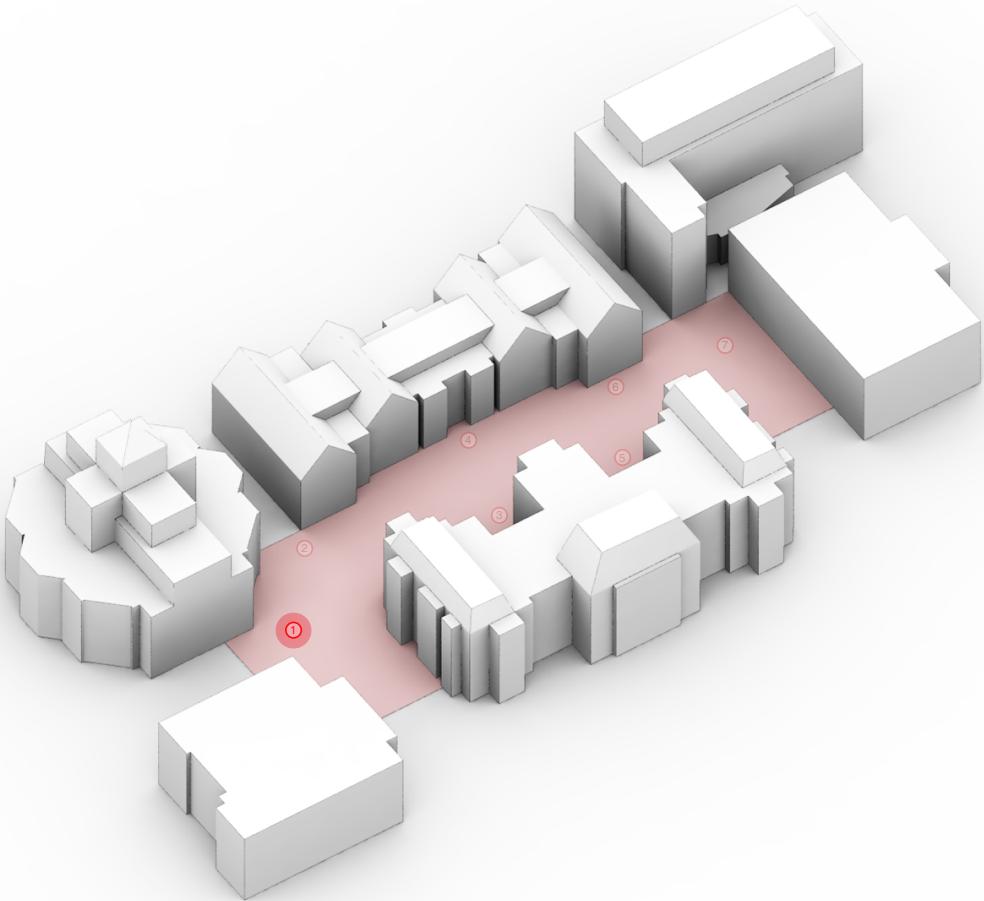
Percentage of Heat Stress during the Year:

12.5%

Percentage of Cold Stress during the Year:

31.6%

Location 1



Location1 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:

37.8%

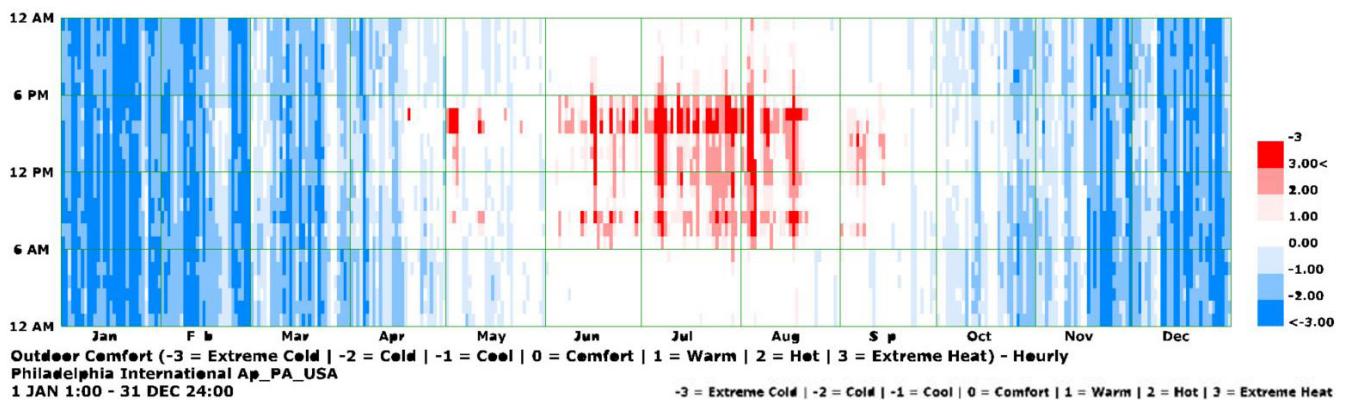
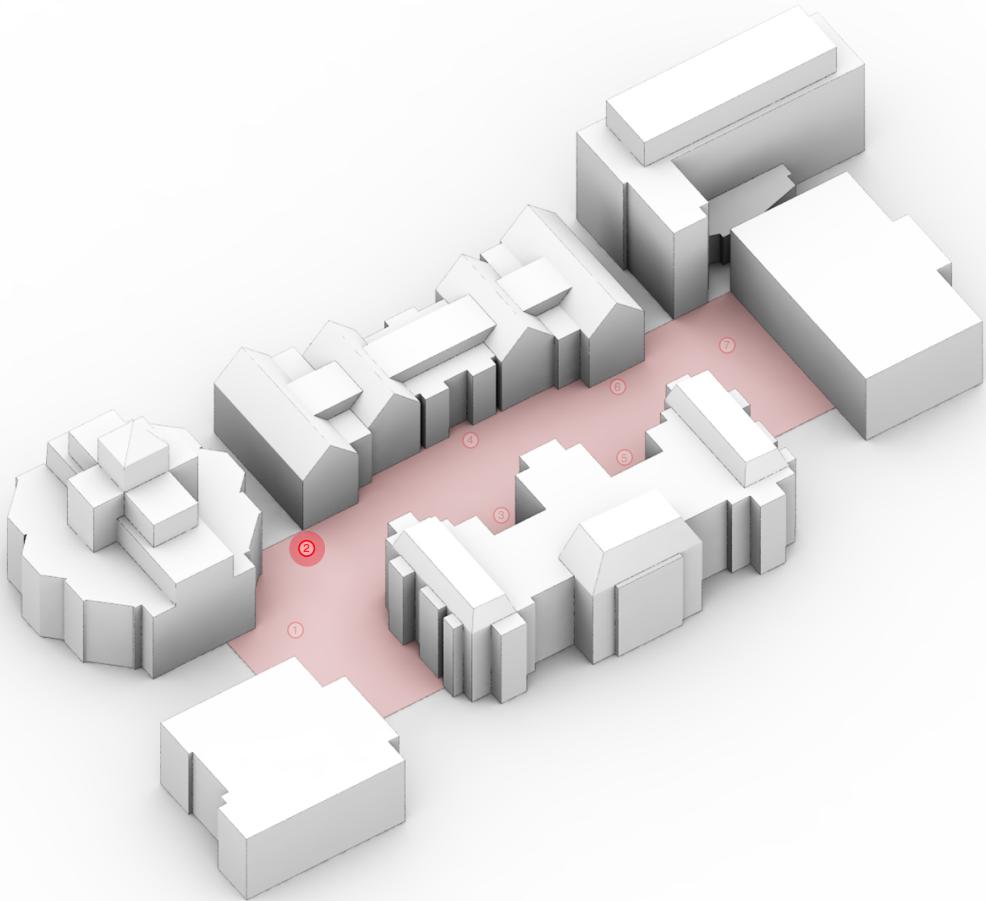
Percentage of Heat Stress during the Year:

10.4%

Percentage of Cold Stress during the Year:

32.6%

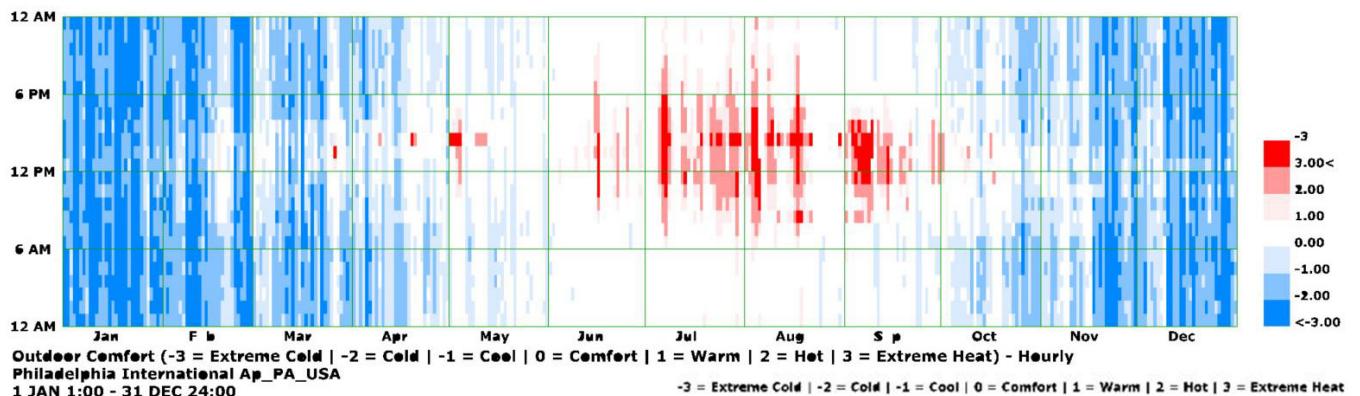
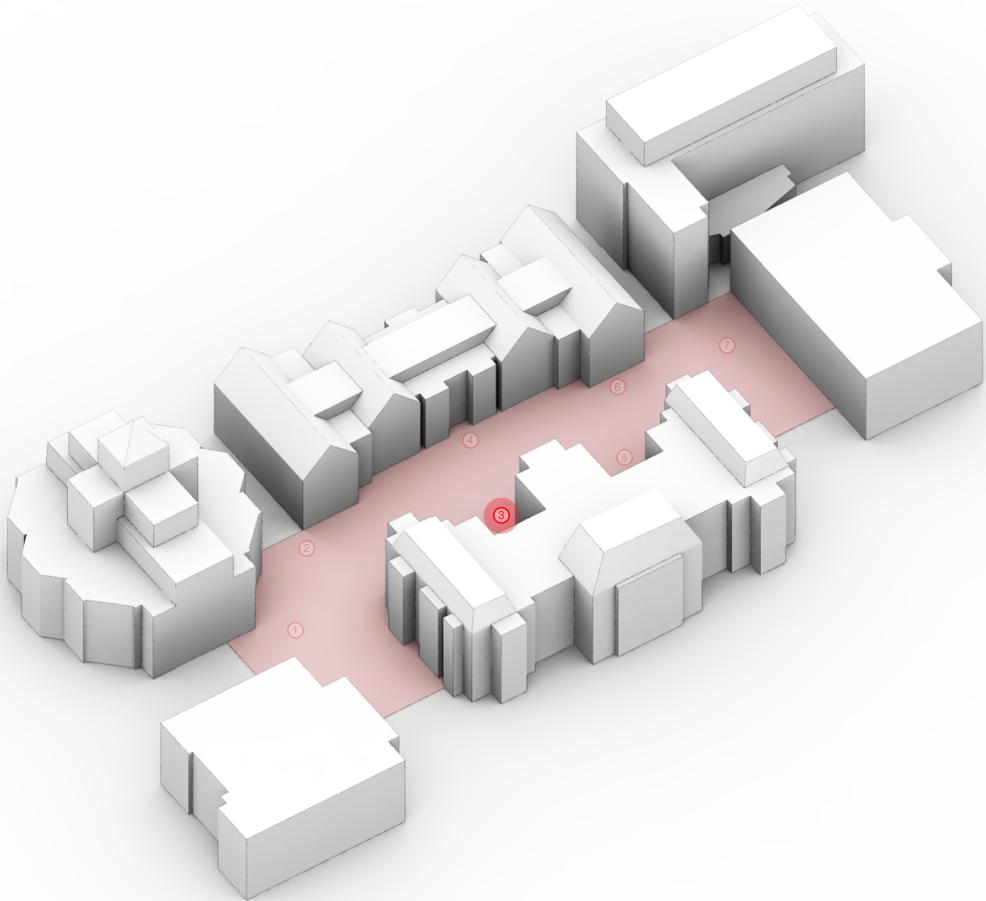
Location 2



Location2 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:	39.3%
Percentage of Heat Stress during the Year:	4.7%
Percentage of Cold Stress during the Year:	35.1%

Location 3



Location3 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:

42.1%

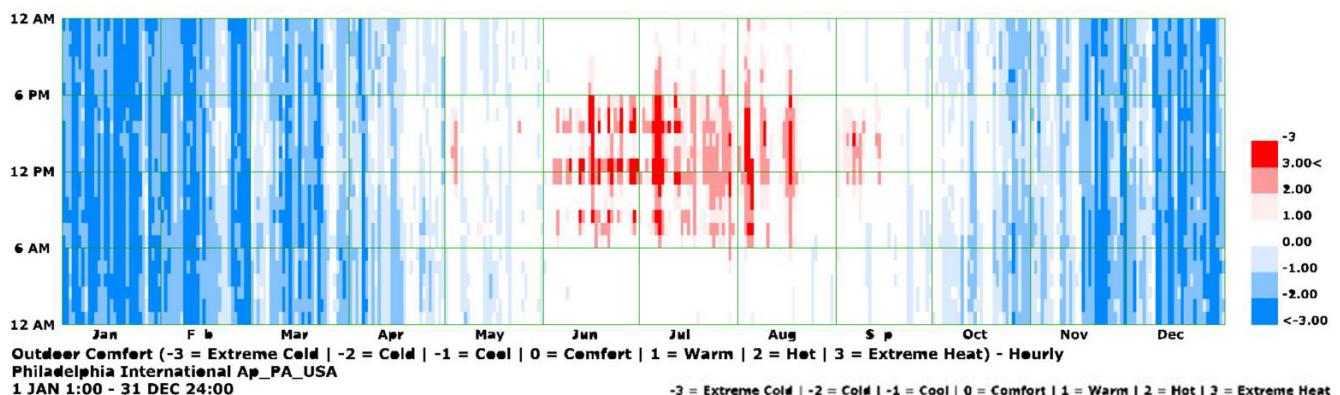
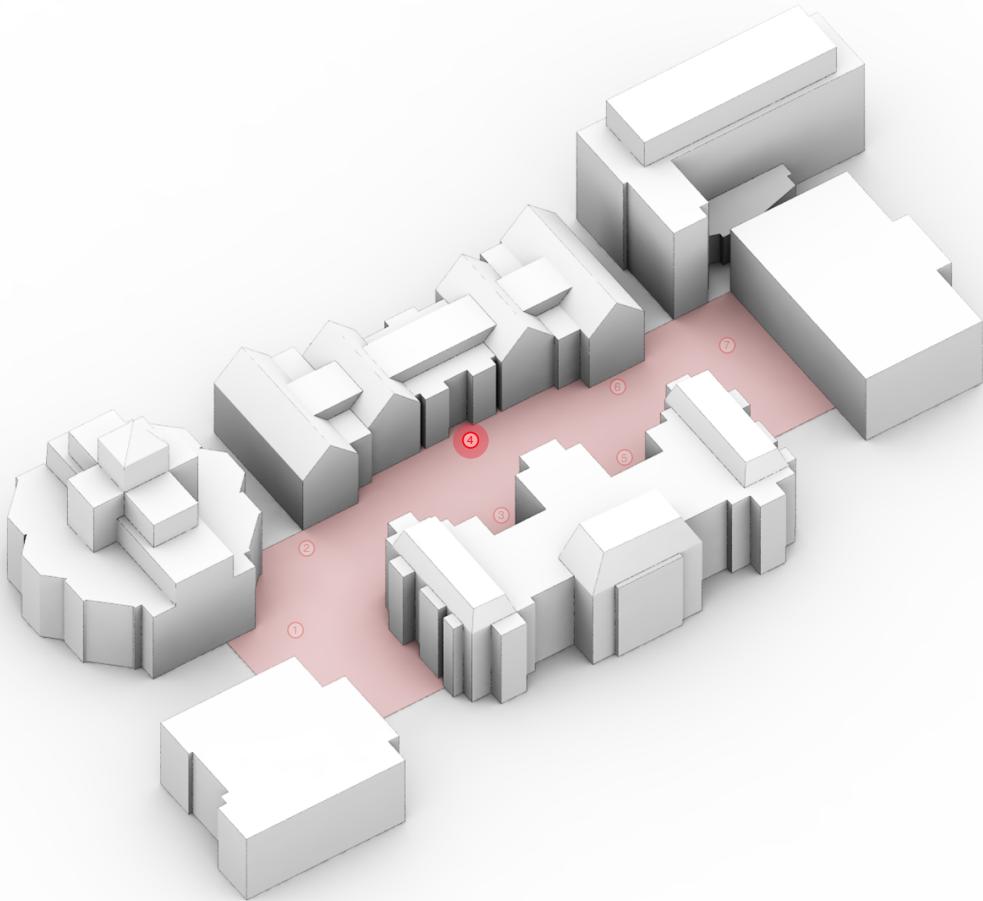
Percentage of Heat Stress during the Year:

4.2%

Percentage of Cold Stress during the Year:

32.8%

Location 4



Location4 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:

39.4%

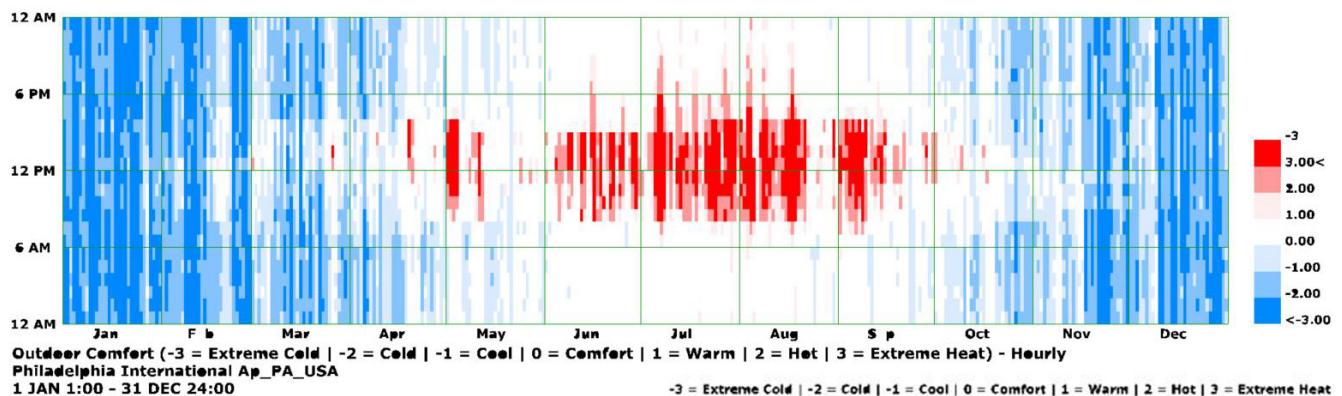
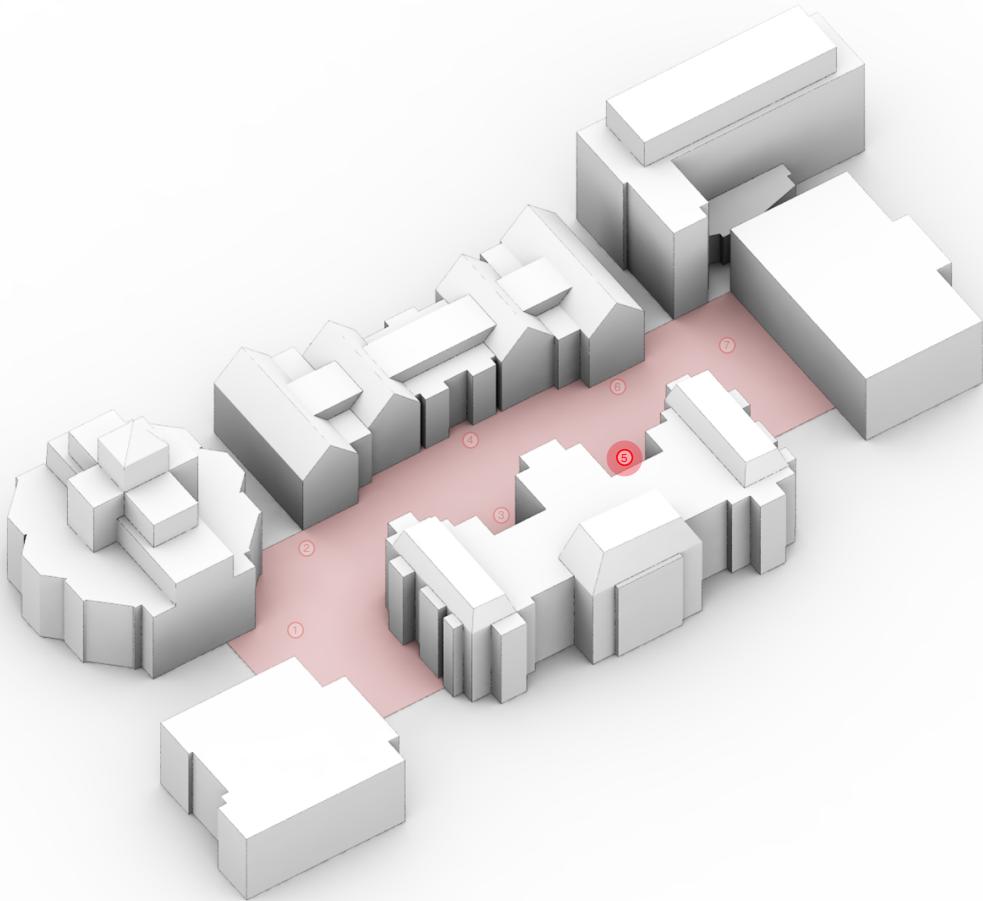
Percentage of Heat Stress during the Year:

4.3%

Percentage of Cold Stress during the Year:

35.3%

Location 5



Location5 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:

38.8%

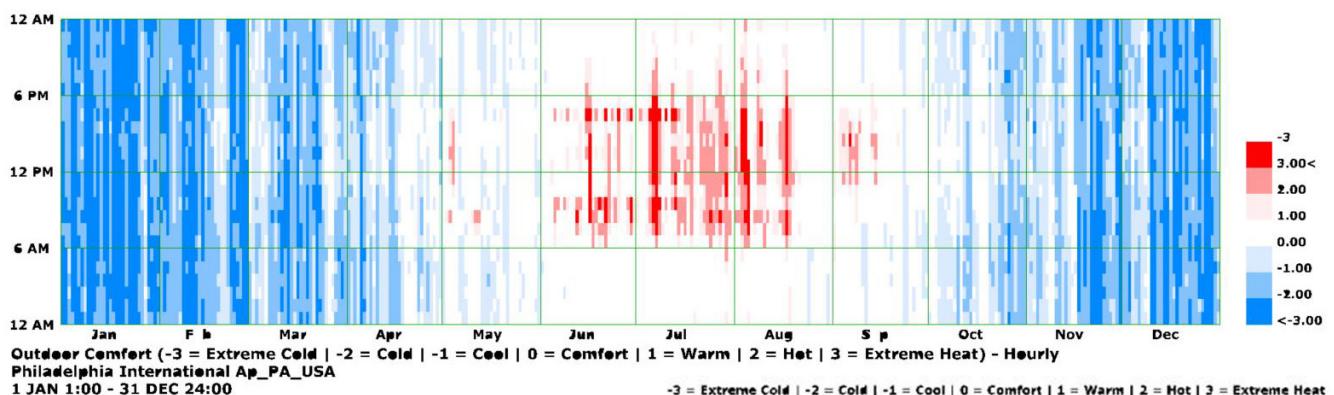
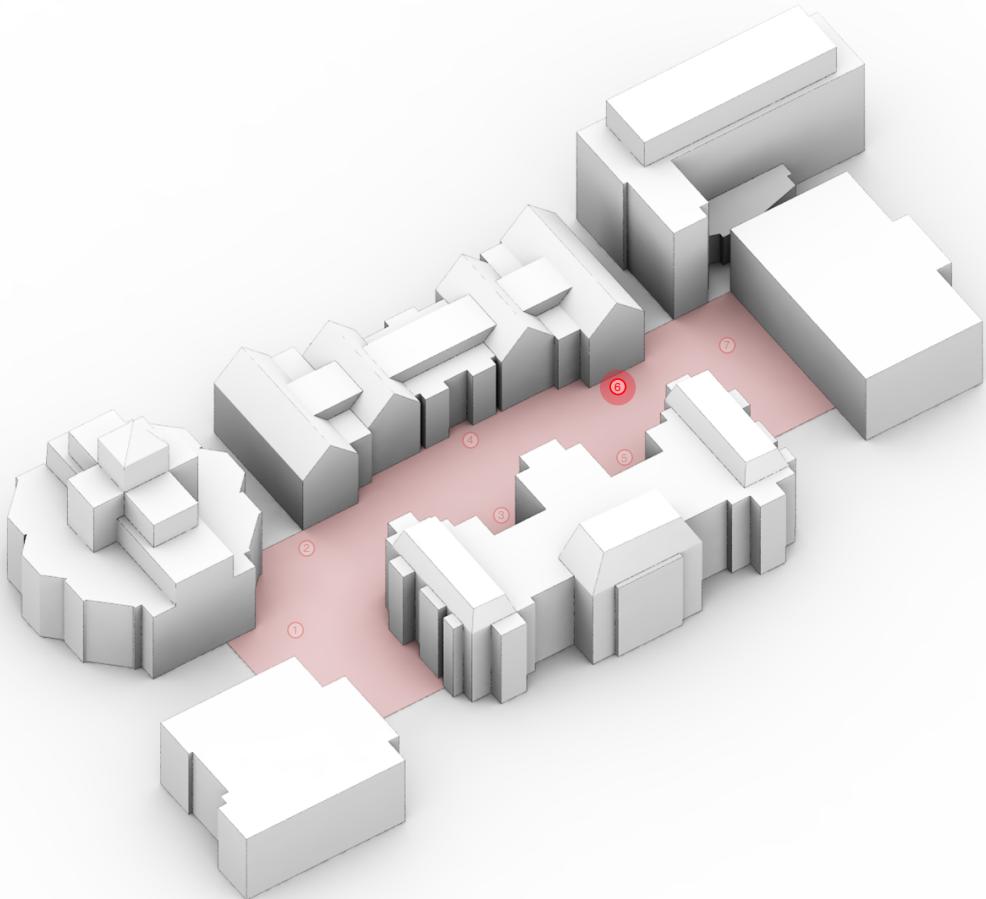
Percentage of Heat Stress during the Year:

7.8%

Percentage of Cold Stress during the Year:

33.2%

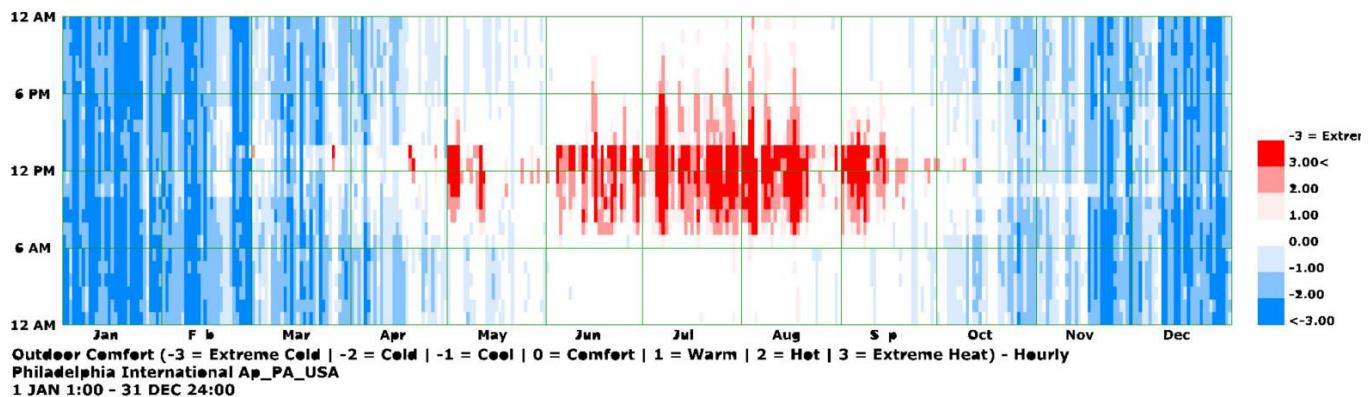
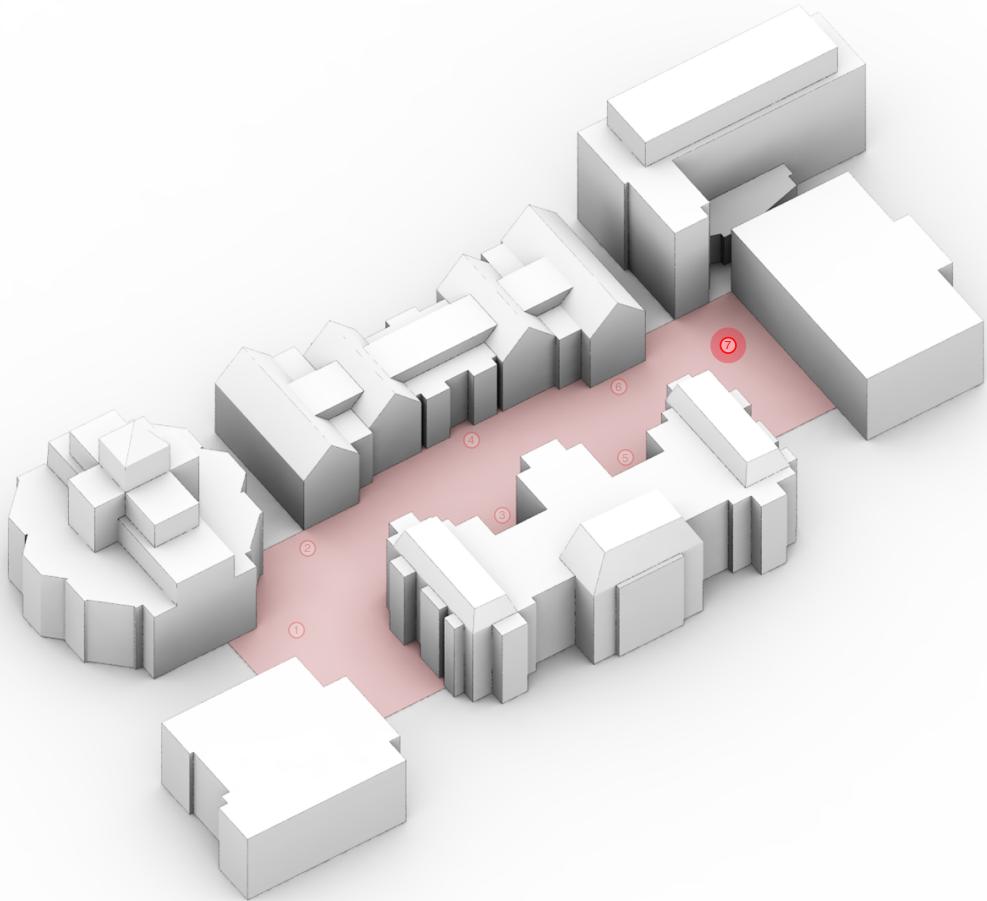
Location 6



Location6 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:	39.9%
Percentage of Heat Stress during the Year:	4.0%
Percentage of Cold Stress during the Year:	35.1%

Location 7



Location7 Annual Outdoor Comfort

Percentage of Comfortable Hours during the Year:	38.3%
Percentage of Heat Stress during the Year:	7.3%
Percentage of Cold Stress during the Year:	34.0%

Summary

The Most Comfortable Location:	3 (42.1%)
The Worst Location:	1 (37.8%)
Priority for choosing comfortable locations:	3>(6>4>2)>(5>7)>1

1. Thinking process to find the best location:

The plaza is surrounded by four buildings and has two entrances on the east and west end, two location points are picked here. There are two educational halls on the south and north side with two kinds seating facilities, including iron seats and masonry seats. In addition, some seats are covered by trees in the shadow some are not. The seating area on the south side are in the shadow of Houston hall building during most daytime, but those on the north side are not. Therefore, two points are selected on the north in front of the College Hall, the other three are picked on the south in front of the Houston Hall.

2. The difference between the best and the worst locations:

The most comfortable location is the Location 3, where in front of the College Hall with good sunlight but in the shadows of trees, as shown in the pictures in Page6. That's the reason why it has both the least percentage of heat stress and cold stress during the year among all 7 points. It could absorb most heat during the day but no direct sunlight with trees' protection, also the wind is not so large to prove that people won't feel too cold in the winter.

The worst location is the Location 1, on the east entrance of the plaza. It is surrounded by the three buildings and exactly located in a 'Valley' Area, where wind is large and without trees protection from the direct sunlight. Therefore, the percentage of heat stress is up to 10.4% during the year and few people chose to sit in this area according to the observation.

3. The effective parameters that makes the best location perform better than other spots:

The first is the on the north or south. For this site, the south side locations (2, 4, 6) are blocked by the Houston Hall building to their south, but the north one have better sunlight and thermal conditions.

The second is in the shadow or not, because Philly is hot in the summer, it is more comfortable to sit under the trees protection under the sunshine. This explained why location 3 is better than the 5 and has lower heat stress during the year.

The third one may be the wind, because the location 1 & 7 are in the wind opening area thus perhaps they are not the good choices for people in most time during the year.

4. The main limitations of the current simulation method for your study:

There is not much different between similar locations due to the rough model and simulation, such as between 2,4 & 6 in front of the Houston Hall. Another big limitation is that it is difficult to simulate the accurate benefits brought by trees and other kinds of canopy in the model. Probably the influence of materials, including the difference between iron sitting and masonry seats is not included in the simulation.