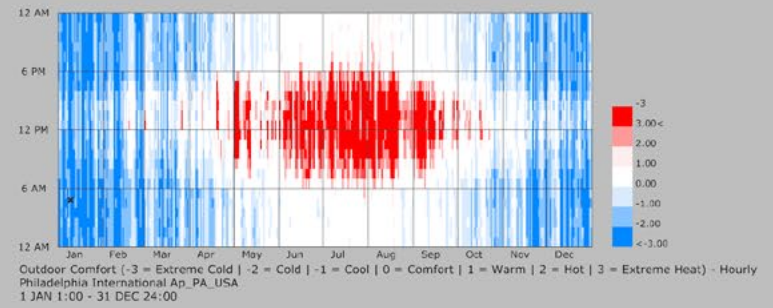
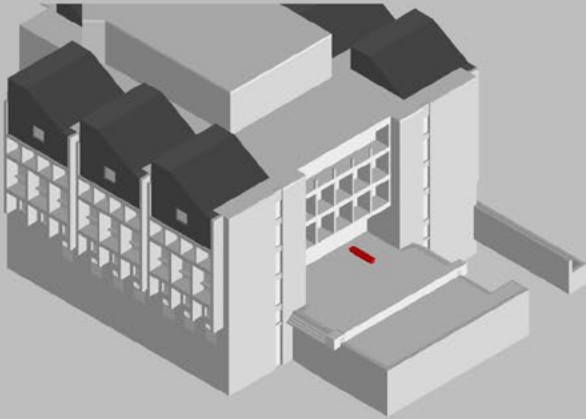
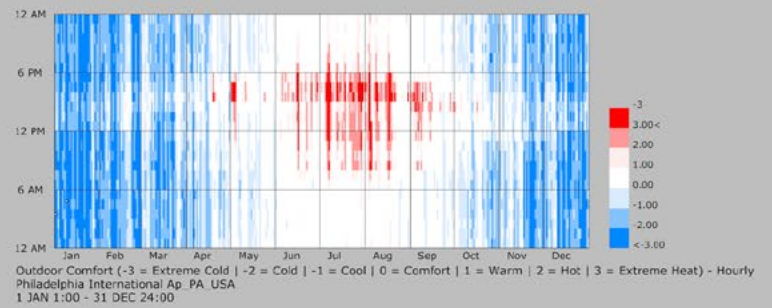
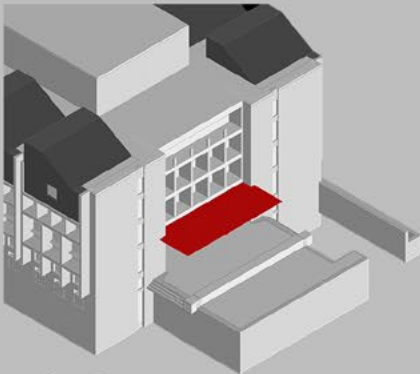


# Shading test position(bench on the right of Meyerson Hall entrance)

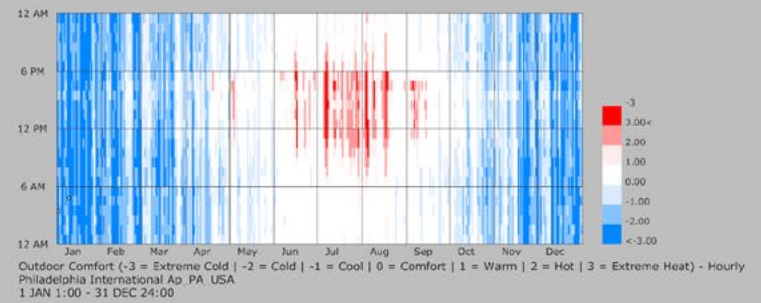
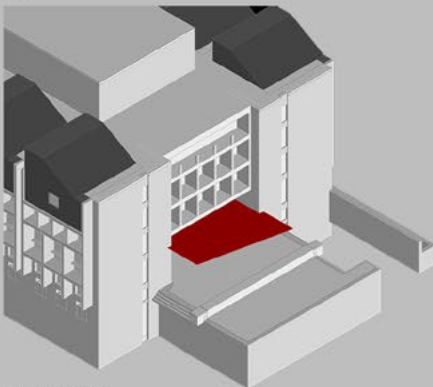
## Outdoor comfort diagram (without shading )



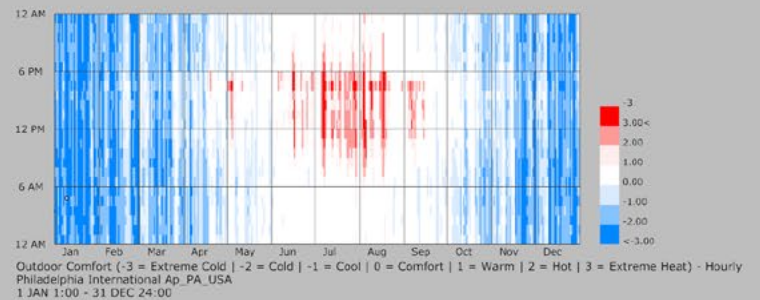
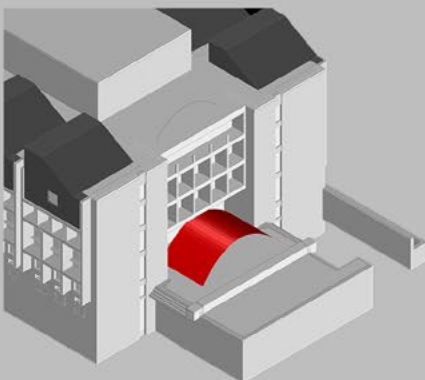
## option 1



## option 2

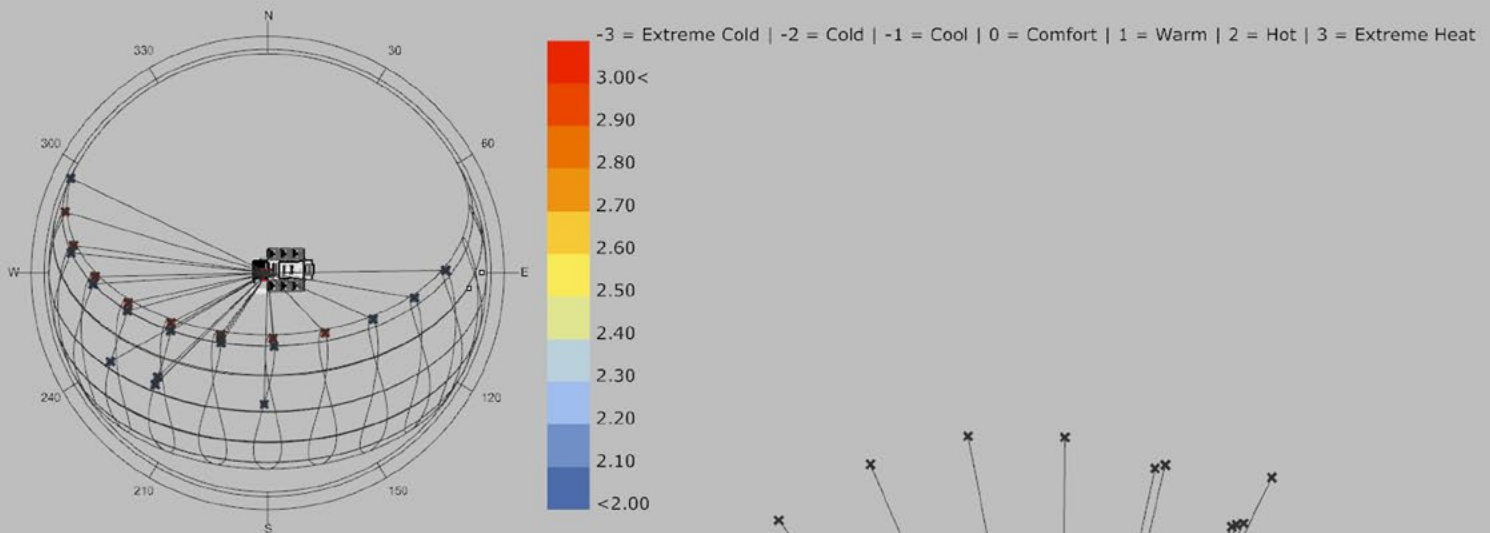


## option 3



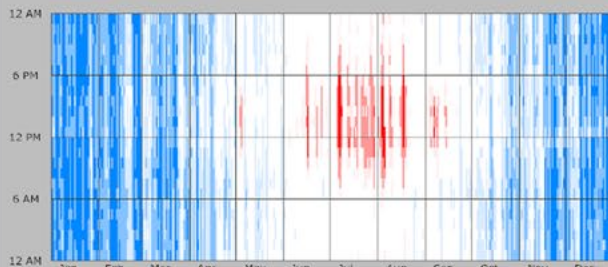
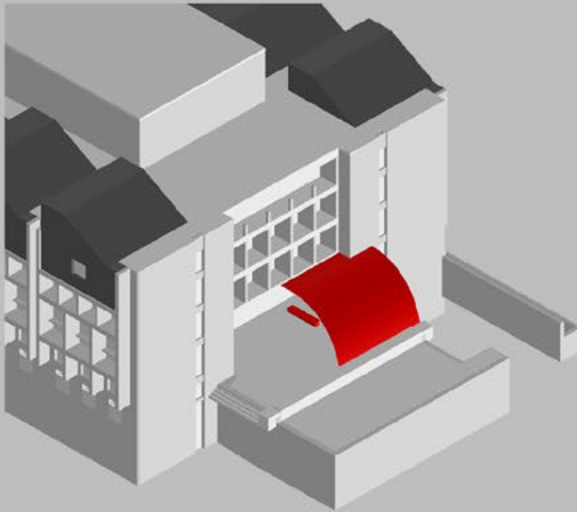
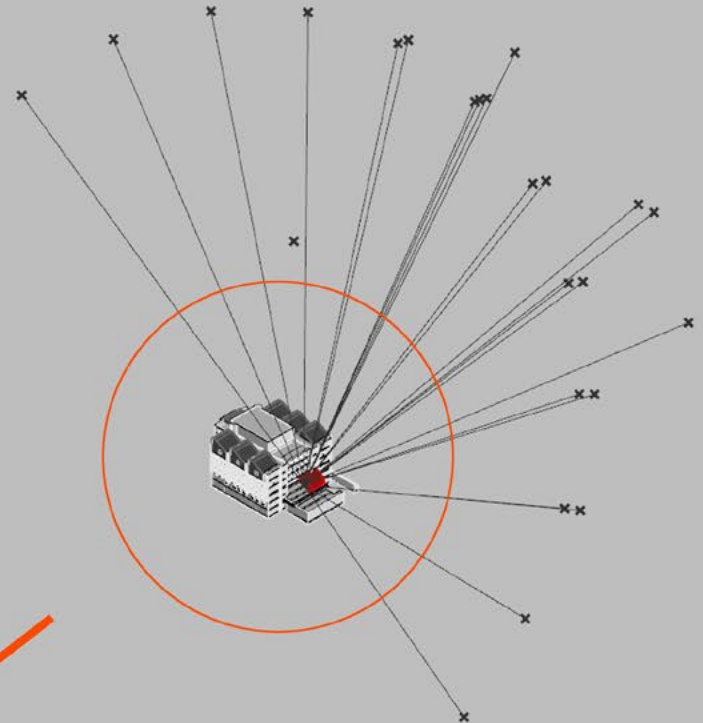
#### option 4

- Sun position when outdoor is hot or extreme hot (comfort  $3 > a > 2$ ).



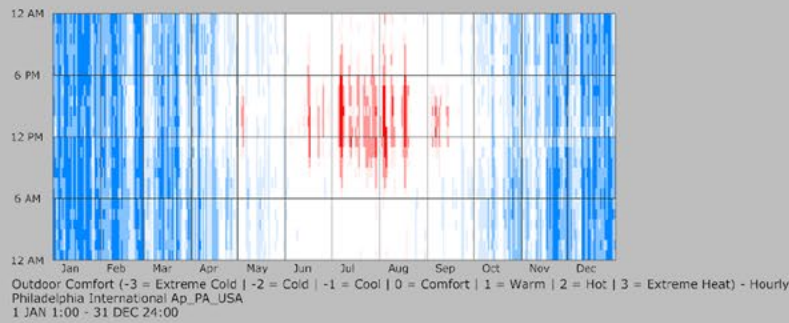
- This diagram shows the sun vector to the bench when outdoor is hot for people

- The curve shape is designed to block all the hot sun vectors to provide all sided shading for people on the bench.



Outdoor Comfort (-3 = Extreme Cold | -2 = Cold | -1 = Cool | 0 = Comfort | 1 = Warm | 2 = Hot | 3 = Extreme Heat) - Hourly  
Philadelphia International Ap\_PA\_USA  
1 JAN 1:00 - 31 DEC 24:00

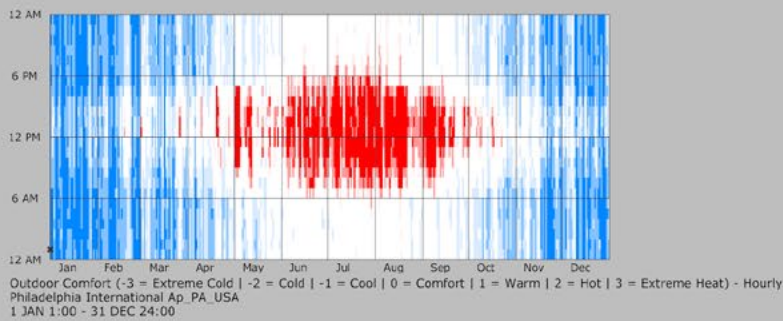
Comfortable: 41.13%  
short period comfortable: 21.31%  
heat stress: 2.98%  
cold stress: 34.58%



Comfortable: 41.13%  
short period comfortable: 21.31%  
heat stress: 2.98%  
cold stress: 34.58%



comfortable hour  
increased  
6.48%



Comfortable: 37.4%  
short period comfortable: 18.56%  
heat stress: 12.39%  
cold stress: 31.66%

- Even though we block the sun for extreme hot place, the percentage of comfortable hour for people is increased, the cold stress time is also increased. People cannot achieve comfort for 100% of the time. Shading designed for summer makes people comfortable during summer time will also block the sun light during winter which will cause cold feeling. Therefore people cannot always feel comfortable outdoor both in summer and winter in Philadelphia.