

**BUILDING PERFORMANCE SIMULATION
ARCH-753 Fall 2017**

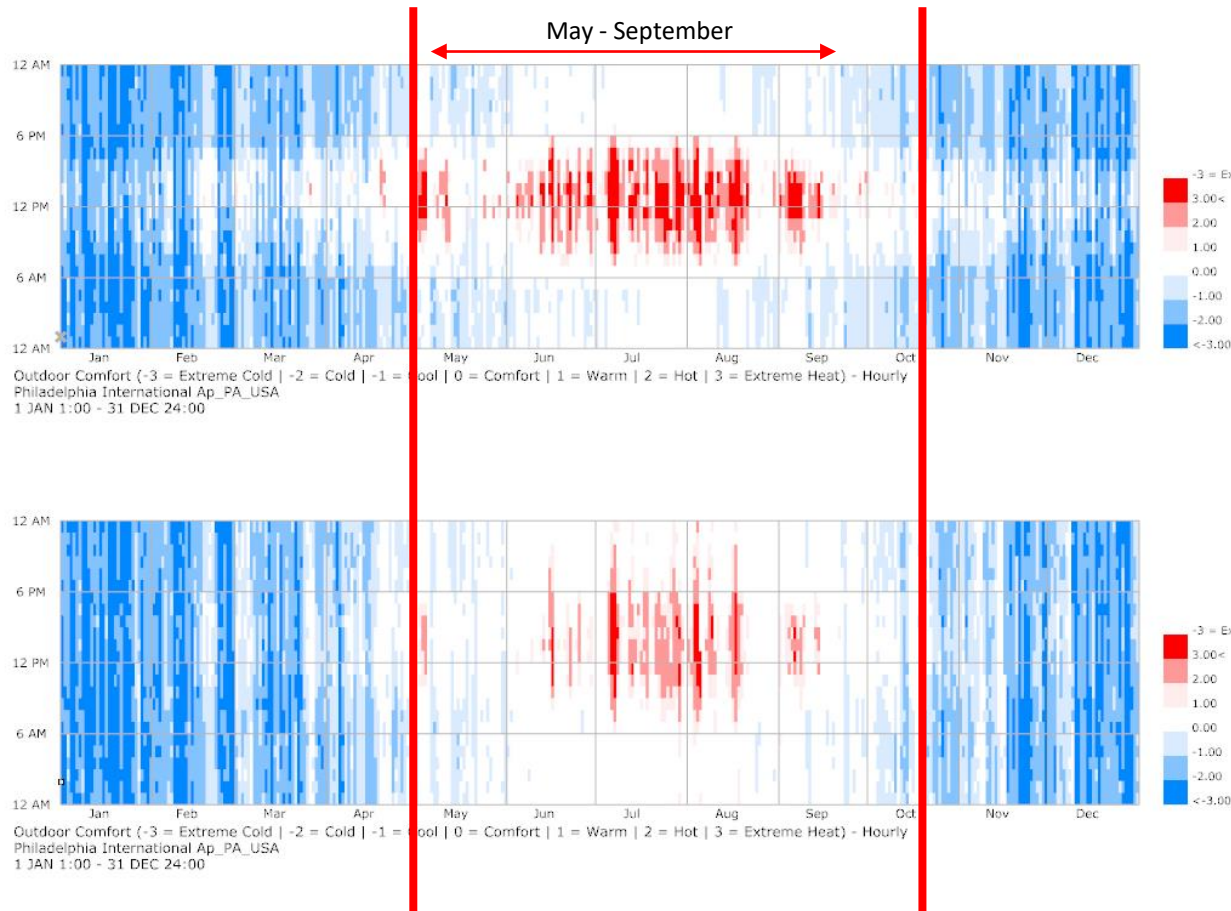


ASSIGNMENT 3

Meyerson Hall Shading Design

Hwang, Youngjin

Thermal Stress Analysis



Solar Adjusted

Percentage of Comfortable Hours
41.27%

Percentage of Heat Stress
3.13%

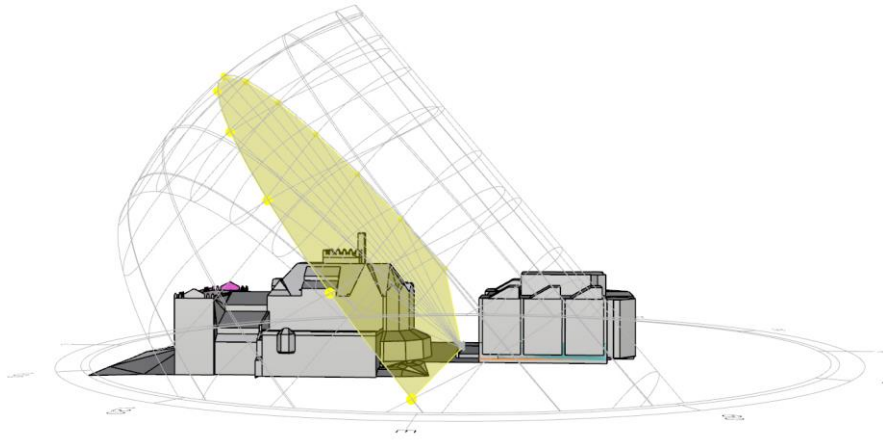
Fully Shaded

Percentage of Comfortable Hours
34.5%

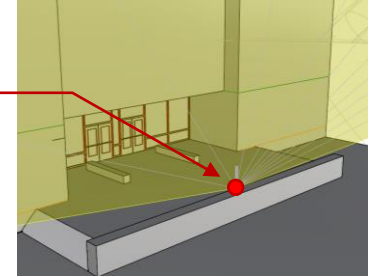
Percentage of Heat Stress
5.8%

As an analysis of thermal stress in Philadelphia,
there are nearly two times of heat stress depending on presence of shading.

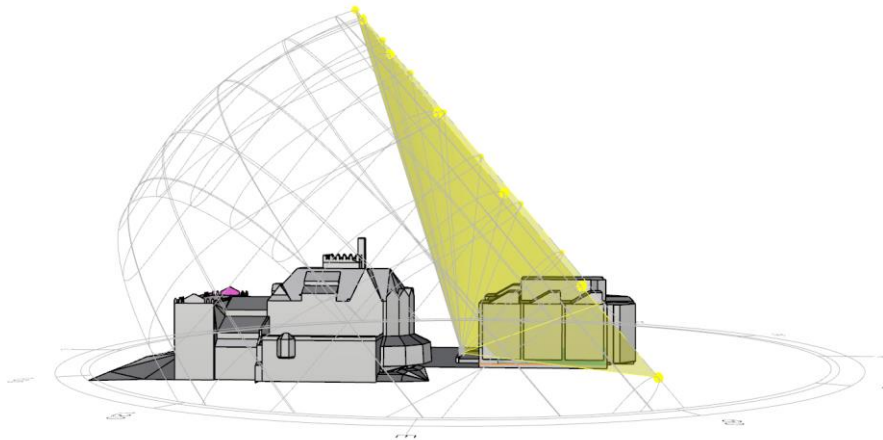
| Sun Path Analysis on Target



Target Point



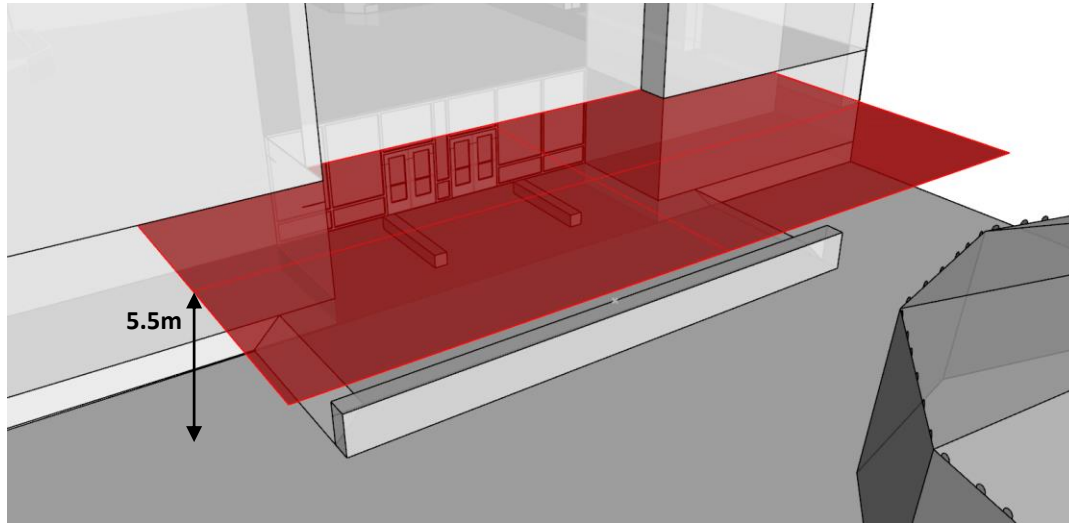
— Equinox Sun Path Analysis (September)



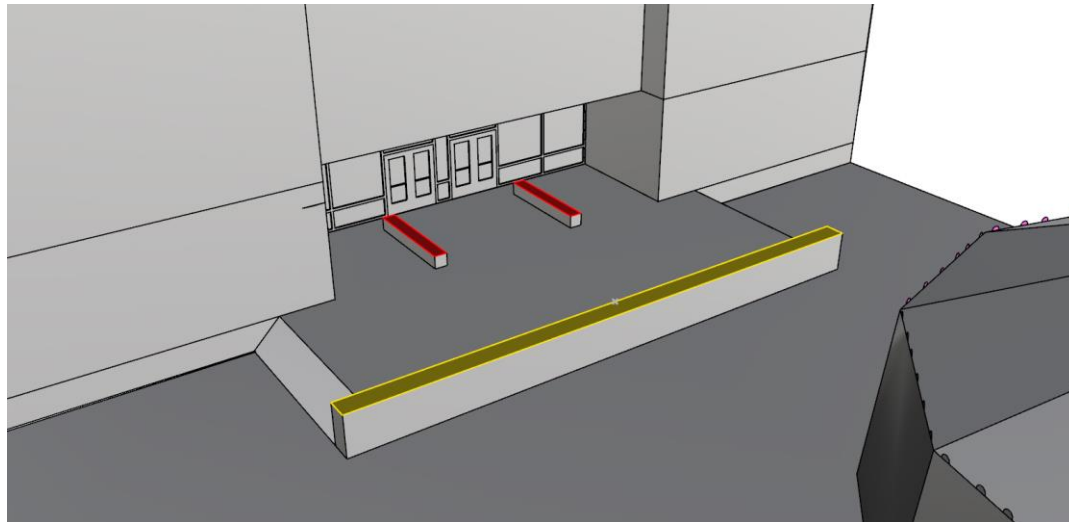
— Summer Sun Path Analysis (June)

From May to September, great influential period to gain heat stress, sun radiation directly come into the site and occurs physical discomfort.

| Shading Target & Region Setting

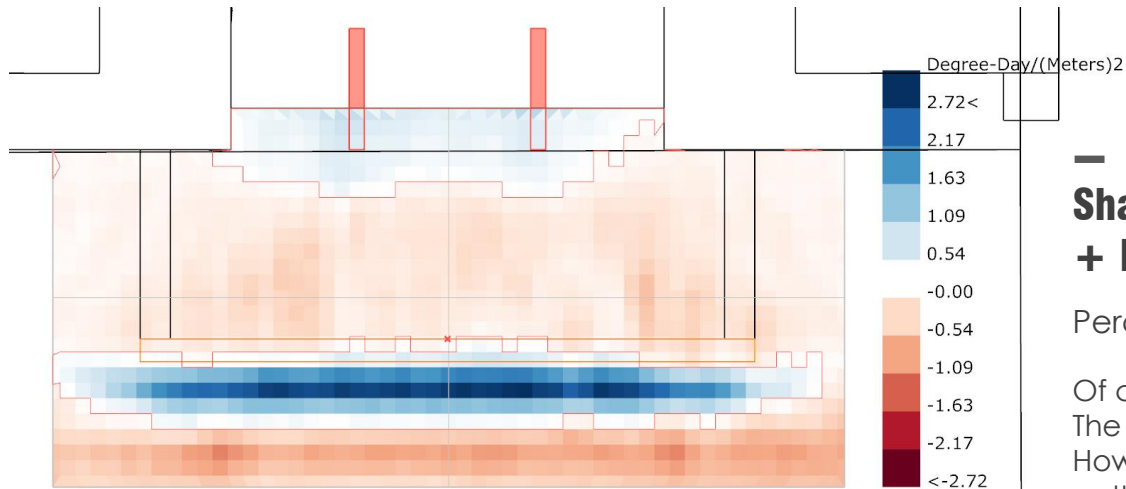


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Shading Target (Height 5.5m)



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Shading Region (Benches)

| Shading Analysis

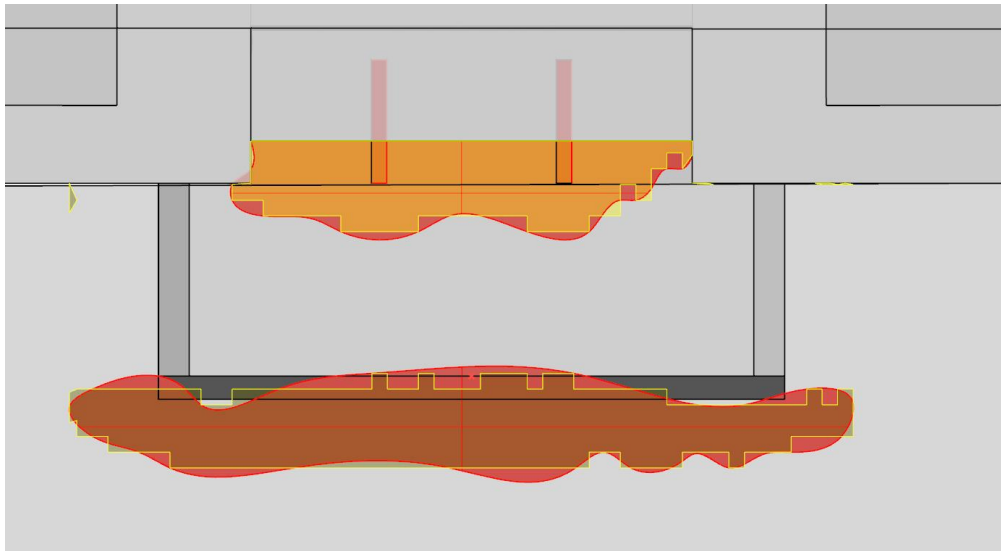


Shade Benefit Analysis

— Shade Benefit Analysis + Boundary Selection

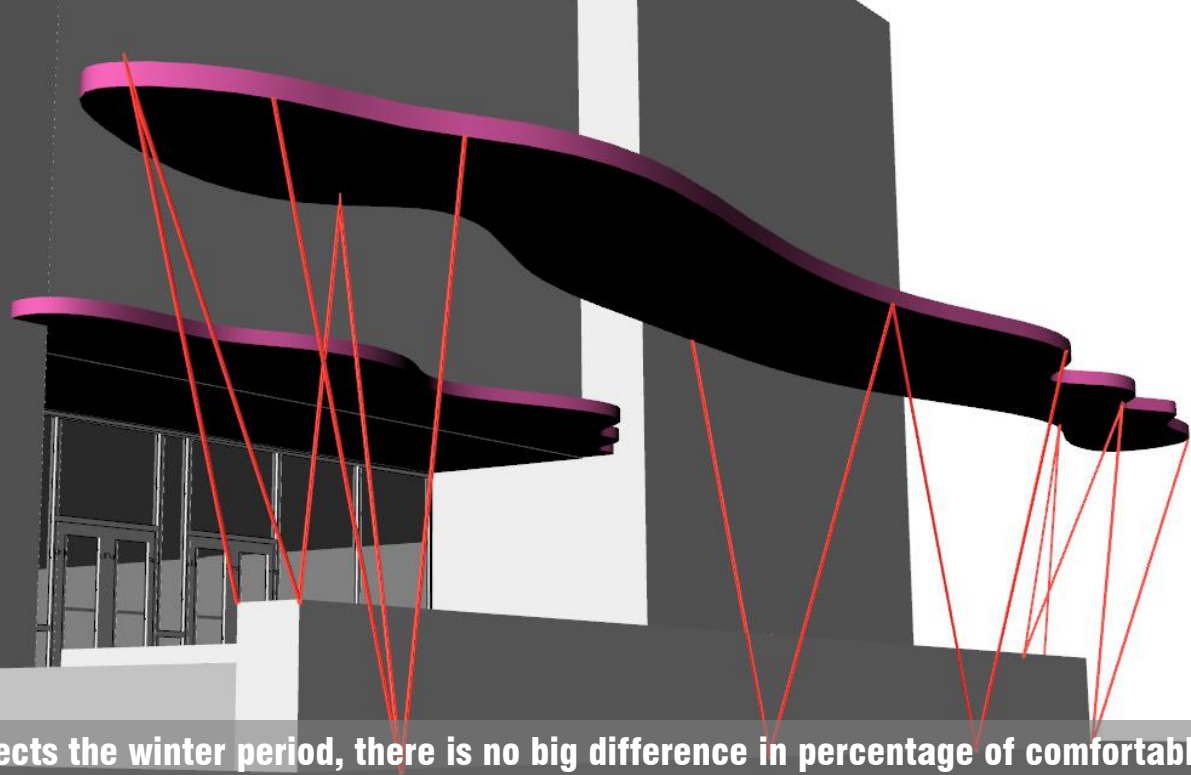
Percentage to Keep : 30%

Of course the bigger percentage it has,
The more effective shade it will be.
However, the area of shade is also increased
so that I tried to find the most efficient percentage
Between the shade area and shade efficiency.

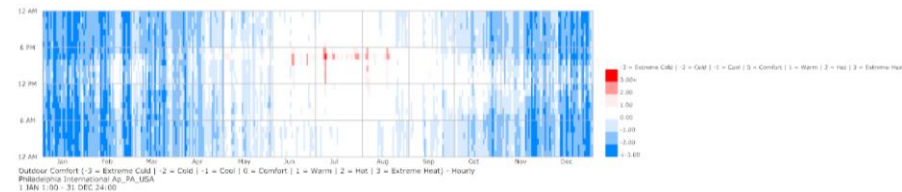
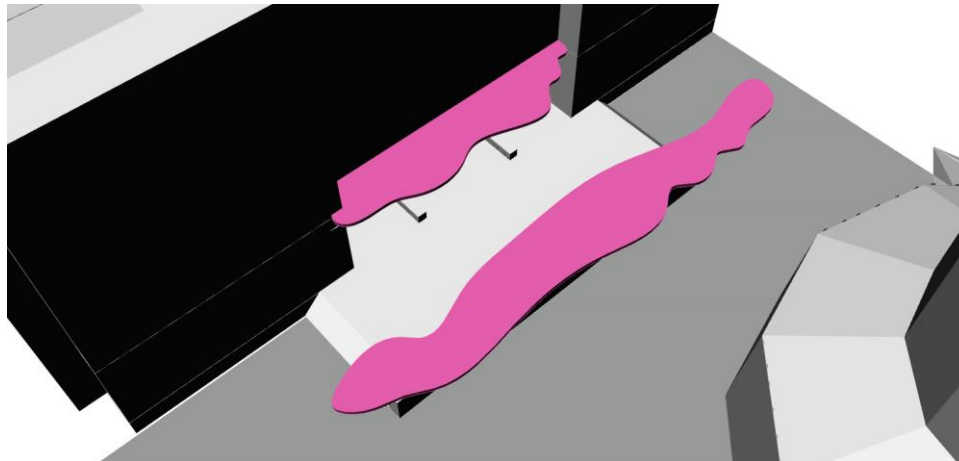


— Shading Design Based on Shade Benefit Analysis

| Proposed Shading



Since the shading also affects the winter period, there is no big difference in percentage of comfortable hours; however, the percentage of heat stress is dramatically decreased during the summer due to the new shading.



Thermal Stress Analysis with Proposed Shading

Percentage of Comfortable Hours
36.6%

Percentage of Heat Stress
0.3%