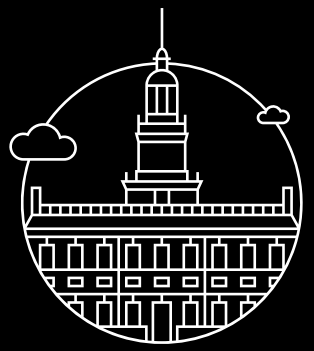
**Assignment 08 | Meyerson Ventilation**



39.87° N | 75.23° W

PennDesign
Environmental Systems I
Fall 2017
Andrew Matia

# Original | Cross Ventilation

## March

8:30 am

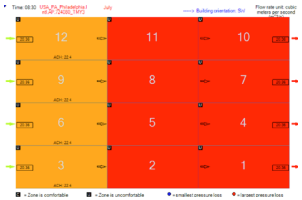
12:30 pm

4:30 pm

8:30 pm

## July

8:30 am



12:30 pm

4:30 pm

8:30 pm

## December

8:30 am

12:30 pm

4:30 pm

8:30 pm

## Scenario Summary

Simulation type: transient

Building type: cross ventilation

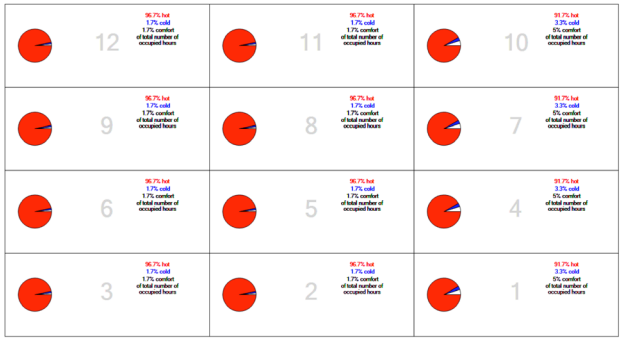
| | | |
|---|---|---|
| Building footprint: | **2450.0** | m^2 |
| Occupied area per floor: | **2450.0** | m^2 |
| Glazing-to-wall ratio per floor: | **55.1** | % |
| Opening-to-wall ratio per floor: | **11.0** | % |
| Ratio of roof opening to roof area: | **0.0** | % |

## Thermal Comfort Analysis

March

July

December

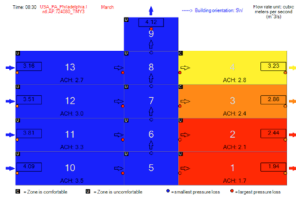


* All Data Collected From CoolVent Version 1.0.6150.40690

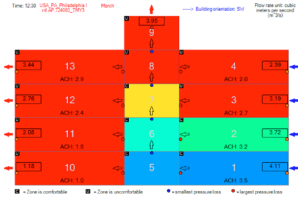
# Scheme 1 | Central Atrium

March

8:30 am



12:30 pm



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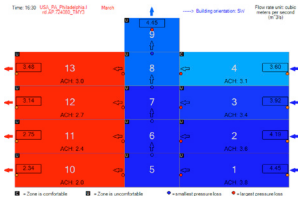
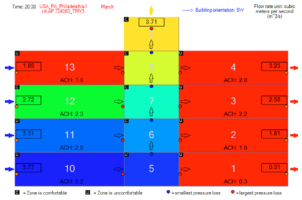
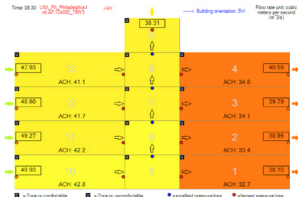


8:30 pm

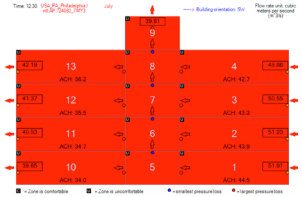


July

8:30 am

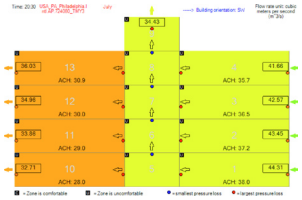


12:30 pm



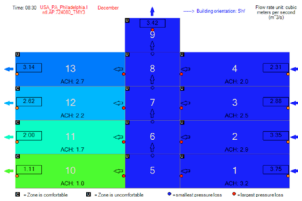
4:30 pm

8:30 pm



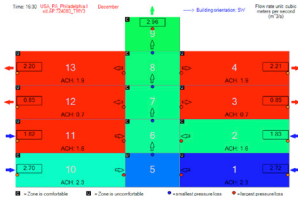
December

8:30 am

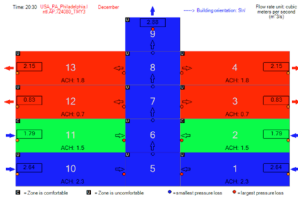


12:30 pm

4:30 pm



8:30 pm



Scenario Summary

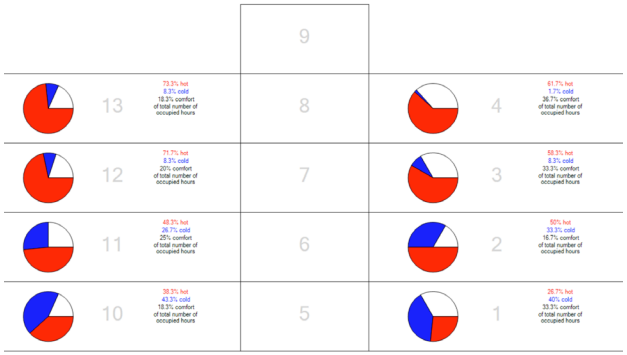
Simulation type: transient

Building type: central atrium

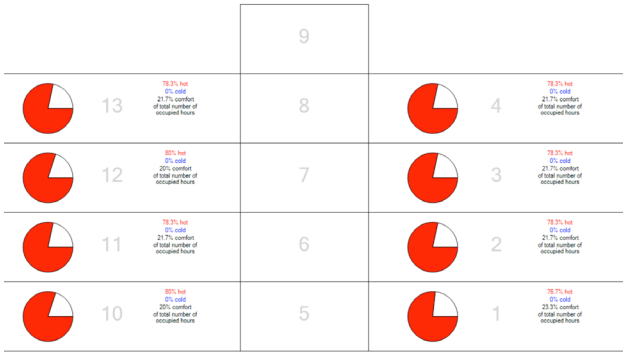
| | | |
|---|---|---|
| Building footprint: | **2450.0** | m^2 |
| Occupied area per floor: | **2100.0** | m^2 |
| Glazing-to-wall ratio per floor: | **71.4** | % |
| Opening-to-wall ratio per floor: | **57.1** | % |
| Ratio of roof opening to roof area: | **5.7** | % |

Thermal Comfort Analysis

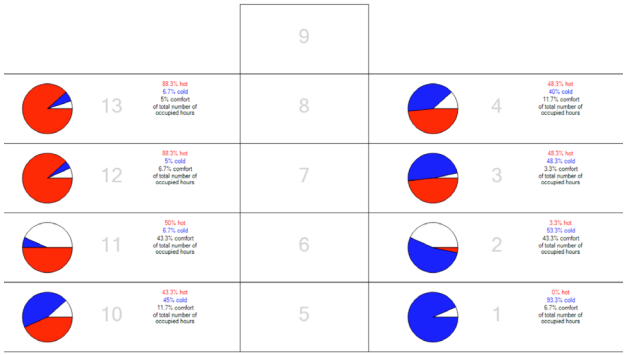
March




July




December

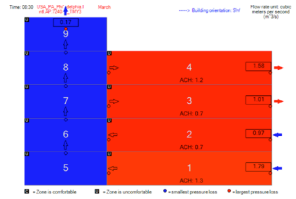



* All Data Collected From CoolVent Version 1.0.6150.40690

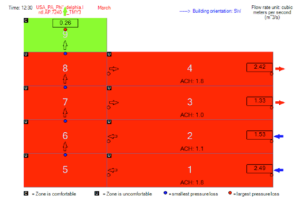
# Scheme 2 | Chimney

## March

8:30 am

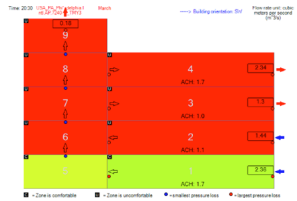


12:30 pm



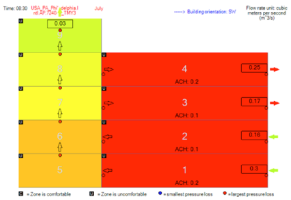
4:30 pm

8:30 pm



## July

8:30 am



12:30 pm

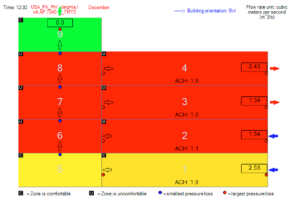
4:30 pm

8:30 pm

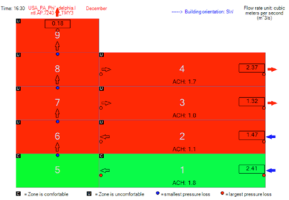
## December

8:30 am

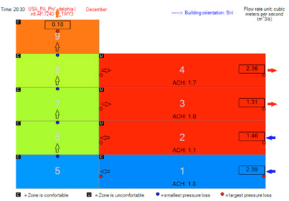
12:30 pm



4:30 pm



8:30 pm



## Scenario Summary

Simulation type: transient

Building type: chimney

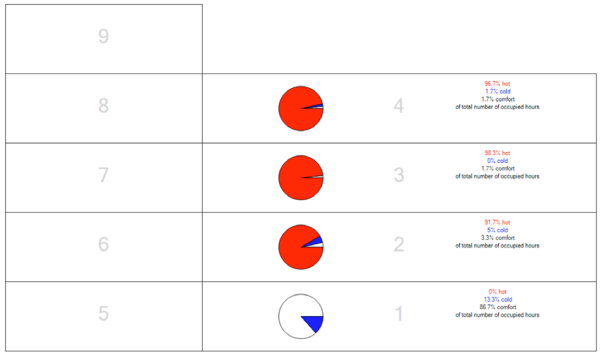
| | | |
|---|---|---|
| Building footprint: | **2450.0** | m^2 |
| Occupied area per floor: | **1225.0** | m^2 |
| Glazing-to-wall ratio per floor: | **57.1** | % |
| Opening-to-wall ratio per floor: | **28.6** | % |
| Ratio of roof opening to roof area: | **0.1** | % |

## Thermal Comfort Analysis

March


July


December




* All Data Collected From CoolVent Version 1.0.6150.40690

Analysis Report

Best Thermal Comfort

Scheme 1: 43.3% comfort during occupied hours in December

Worst Thermal Comfort

Original: 1.7% comfort during occupied hours in December

My assumption was that the current ventilation model for Meyerson was most closely associated with the cross ventilation scheme. This original design rendered on average the worst thermal comfort throughout the year. I believe the biggest reason for this low thermal comfort precentage has more to do with the Opening-to-Wall ratio of Meyerson than it has to do with the overall configuration of the building. While I did try two different schemes for ventilation, a central atrium and chimney, I noticed the biggest increase in overall thermal comfort when I increased the Opening-to-Wall ratio of Meyerson. This was true across all schemes. My estimation is that the current design of Meyerson has an 11% ratio that is made up of small 1 x 2 meter sliding windows on the West and East facades, as well as the few sliding glass doors on the balconies distributed throughtout the building. I progressively increaed this ratio to 57.1% and saw this having the biggest effect on increasing thermal comfort. Additionally, I would conclude that out of the three tested schemes the central atrium configuration has the most potential for high thermal comfort due to natural ventilation throughout the year.