Jordan Hillier
Assignment 8
October 29, 2017
ARCH 633

INPUT VALUES:
Weather Data: Philadelphia
Month: October
Orientation: South
BUILDING DIMENSIONS (Taken from Rhino Model of Meyerson)
Floor Length: 43 Meters
Floor Width: 33 Meters
Floor-to-floor height: 4 Meters
Floor-to-ceiling height: 3.5 Meters
Chimney width: 15 Meters
Chimney height: 5.6 Meters

First Design Alternative: Central Atrium

			11				
	16	4.4% hot 41.2% cold 54.4% comfort of total number of occupied hours	10		5	5.9% hot 44.1% cold 50% comfort of total number of occupied hours
	15	14.7% hot 38.2% cold 47.1% comfort of total number of occupied hours	9		4	13.2% hot 42.6% cold 44.1% comfort of total number of occupied hours
	14	54.4% hot 38.2% cold 7.4% comfort of total number of occupied hours	8		3	54.4% hot 42.6% cold 2.9% comfort of total number of occupied hours
	13	0% hot 76.5% cold 23.5% comfort of total number of occupied hours	7		2	0% hot 77.9% cold 22.1% comfort of total number of occupied hours
	12	0% hot 77.9% cold 22.1% comfort of total number of occupied hours	6		1	0% hot 83.8% cold 16.2% comfort of total number of occupied hours

In the central atrium proposal, it appears that the middle floor actually experiences the most discomfort. In the visual analysis of the simulation, it appears that that middle floor experiences the greatest pressure loss. I cannot correctly diagnose the cause of the pressure loss and subsequent discomfort for every hour in which this central floor is shown as experiencing greater pressure loss/discomfort than the other floors. However, the floor experiences the greatest pressure loss and variation from other floors from approximately 12:00 pm to 1:00 pm, and at around 9:00 pm. The increase in pressure loss in zones 14 and 3 during these times is accompanied by a uniquely low ACH. For example, at 12:30, the ACH in zones 14 and 3 is 1.4, and the next lowest ACH is in zones 15 and 4, which is 5.1. I think that because zones 14 and 3 are experiencing less air changes at certain times of the day, they're getting warmer because of the lack of circulation, resulting in less comfort overall.

Second Design Alternative: Chimney

11			
10		5	11.8% hot 4.4% cold 83.8% comfort of total number of occupied hours
9		4	42.6% hot 2.9% cold 54.4% comfort of total number of occupied hours
8		3	29.4% hot 1.5% cold 69.1% comfort of total number of occupied hours
7		2	0% hot 63.2% cold 36.8% comfort of total number of occupied hours
6		1	0% hot 76.5% cold 23.5% comfort of total number of occupied hours

In the chimney design alternative seems to offer both pluses and minuses to the Meyerson Hall design and overall comfort levels. On one hand, the discomfort experienced by primarily the third floor in the form of excessive heat in the previous proposal, is now dispersed across three floors. However, with that being said, the amount of time comfortable on each floor is greater. In the central atrium proposal, overall comfort was very low across all the floors, the highest result coming in at 54%. In this proposal, three of the floors exceed that comfort percentage. In addition, the ACH values continued to correlate with the loss of pressure and increase in the amount of heat felt on each floor in this model as well. Zones 3, 4, and 5 continuously experienced lower ACH values, contributing to the fact that they experienced more heat. Overall, I would conclude that the chimney is a better design alternative for Meyerson Hall than the central atrium scheme.

Software Note: I was very intrigued by the cross-ventilation component, as based on Meyerson's design I thought that that might offer the greatest amount of comfort, but CoolVent wouldn't load the results so I was unable to obtain them. I would be interested in further exploring the components of that scheme in relation to Meyerson Hall.