

Climate Analysis Report

Di Fan

Fall 2016 | ARCH 753 Building Performance Simulation

PennDesign | University of Pennsylvania

Climate Zones

WEATHER DATA:
USA_PA_Philadelphia.Intl.AP.724080_TMY3/all
LATITUDE:
39.87
LONGITUDE:
75.23

CLIMATE ZONE:
4A
CHARACTERISTIC:
Mixed-humid

Residential Prescriptive Requirements for Zone 4
(2009 IECC)

Climate Zone 4 (Except Marine)	
Ceiling R-value	38
Wood Frame Wall R-value	13
Mass Wall R-value ⁱ	5/10
Floor R-value	19
Basement Wall R-value ^c	10/13
Slab R-value ^d , Depth	10, 2 ft
Crawlspace Wall R-value ^c	10/13
Fenestration U-Factor ^b	0.35
Skylight U-Factor ^b	0.60
Glazed fenestration SHGC ^{b, e}	NR

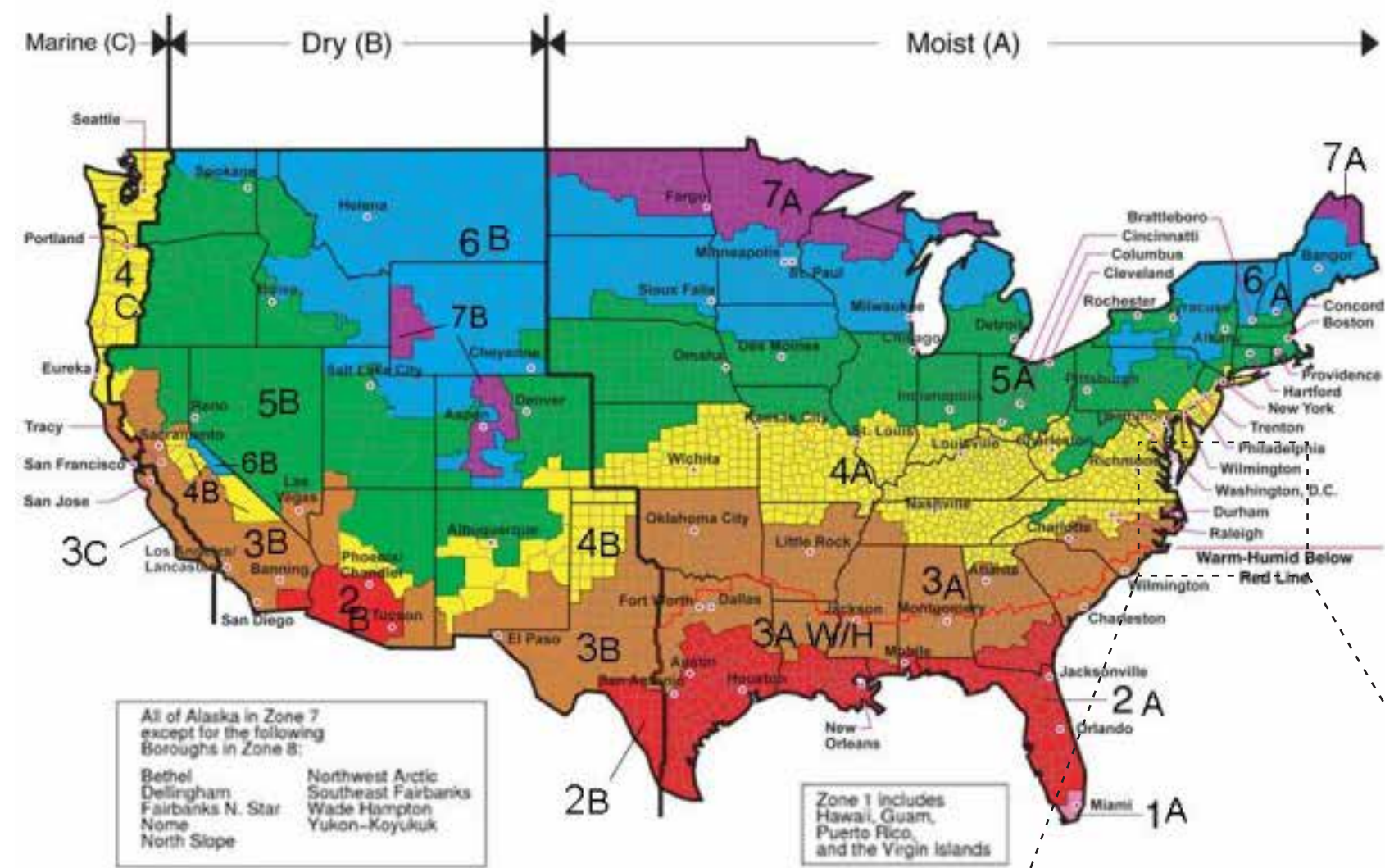
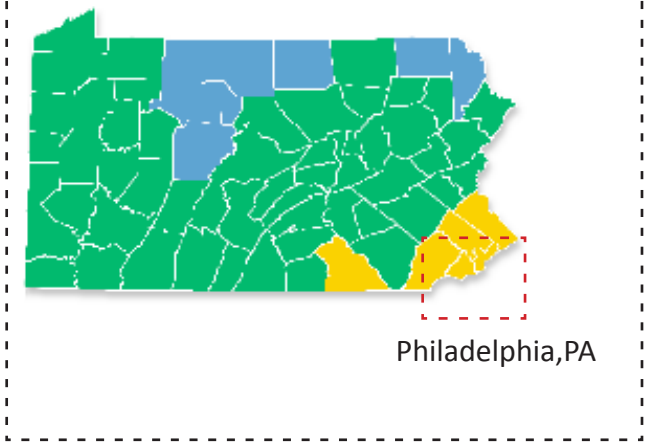


TABLE 301.3(2) INTERNATIONAL CLIMATE ZONE DEFINITIONS

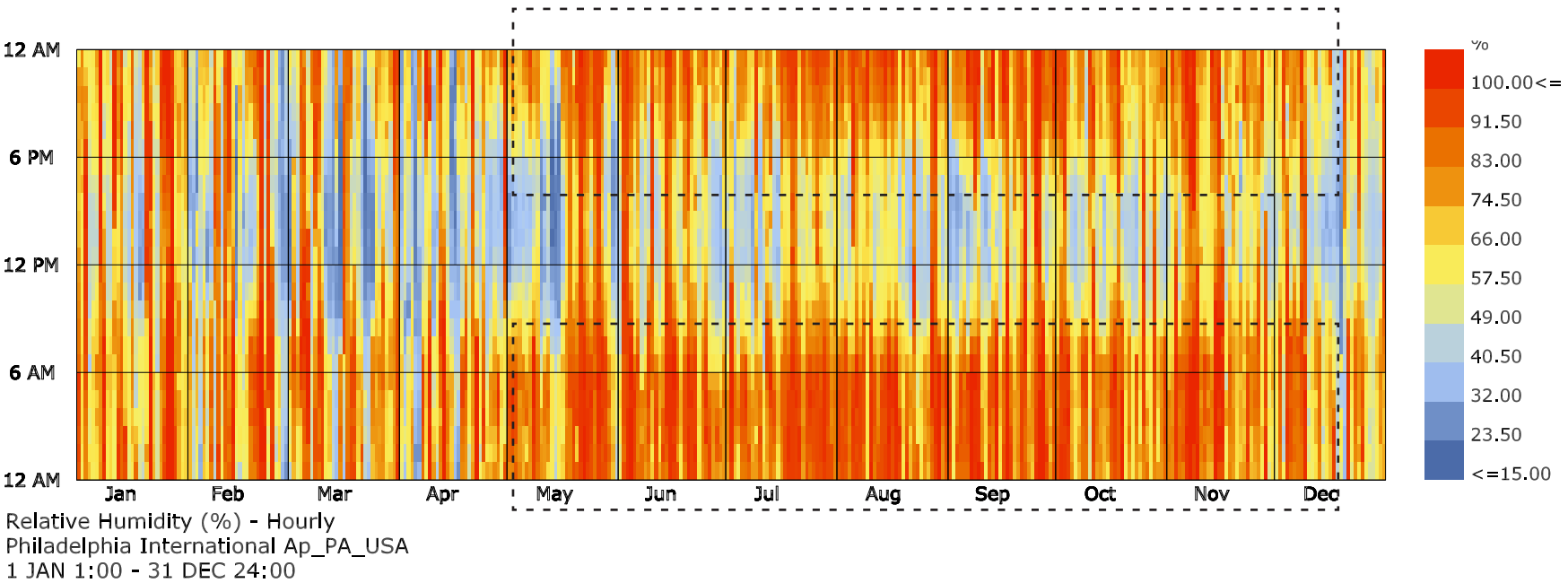
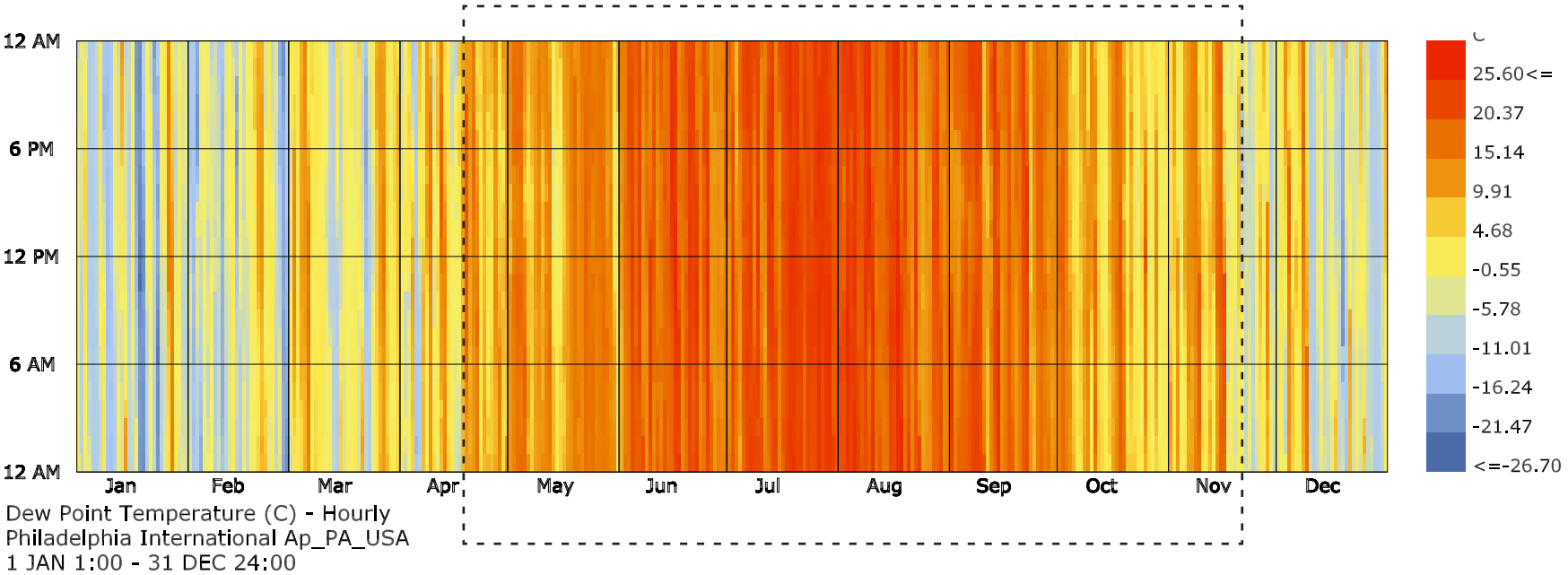
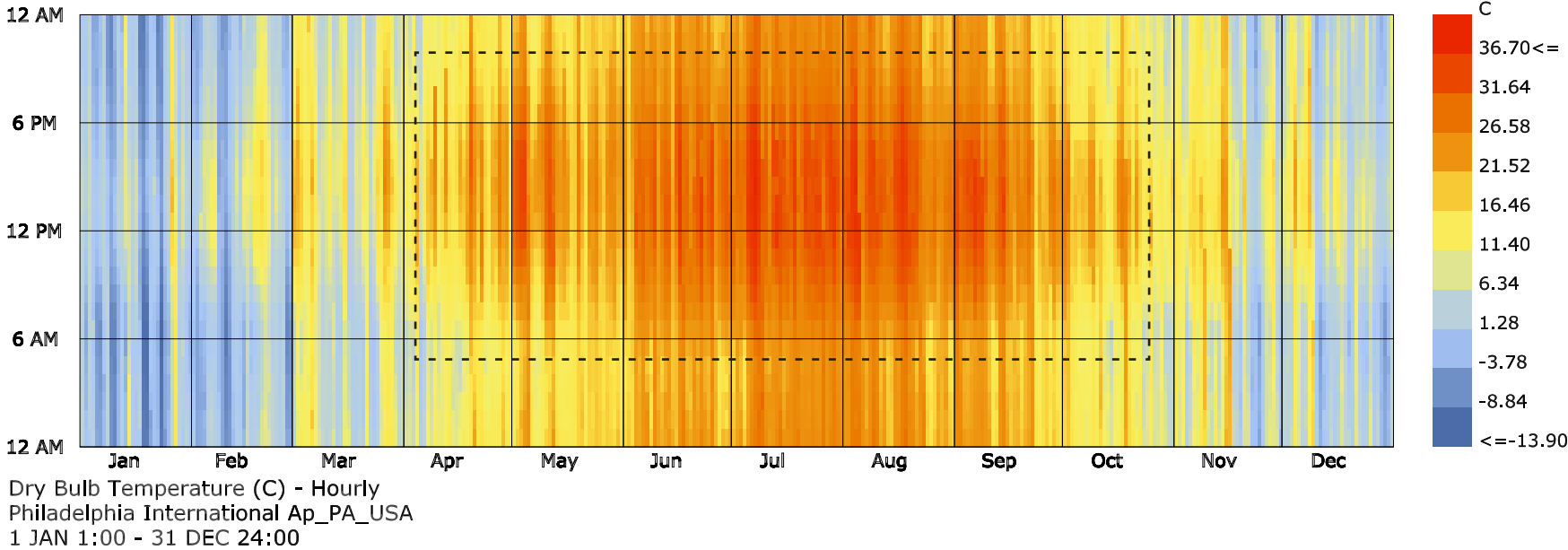
ZONE NUMBER	THERMAL CRITERIA	
	IP Units	SI Units
1	9000 < CDD50°F	5000 < CDD10°C
2	6300 < CDD50°F ≤ 9000	3500 < CDD10°C ≤ 5000
3A and 3B	4500 < CDD50°F ≤ 6300 AND HDD65°F ≤ 5400	2500 < CDD10°C ≤ 3500 AND HDD18°C ≤ 3000
4A and 4B	CDD50°F ≤ 4500 AND HDD65°F ≤ 5400	CDD10°C ≤ 2500 AND HDD18°C ≤ 3000
3C	HDD65°F ≤ 3600	HDD18°C ≤ 2000
4C	3600 < HDD65°F ≤ 5400	2000 < HDD18°C ≤ 3000
5	5400 < HDD65°F ≤ 7200	3000 < HDD18°C ≤ 4000
6	7200 < HDD65°F ≤ 9000	4000 < HDD18°C ≤ 5000
7	9000 < HDD65°F ≤ 12600	5000 < HDD18°C ≤ 7000
8	12600 < HDD65°F	7000 < HDD18°C



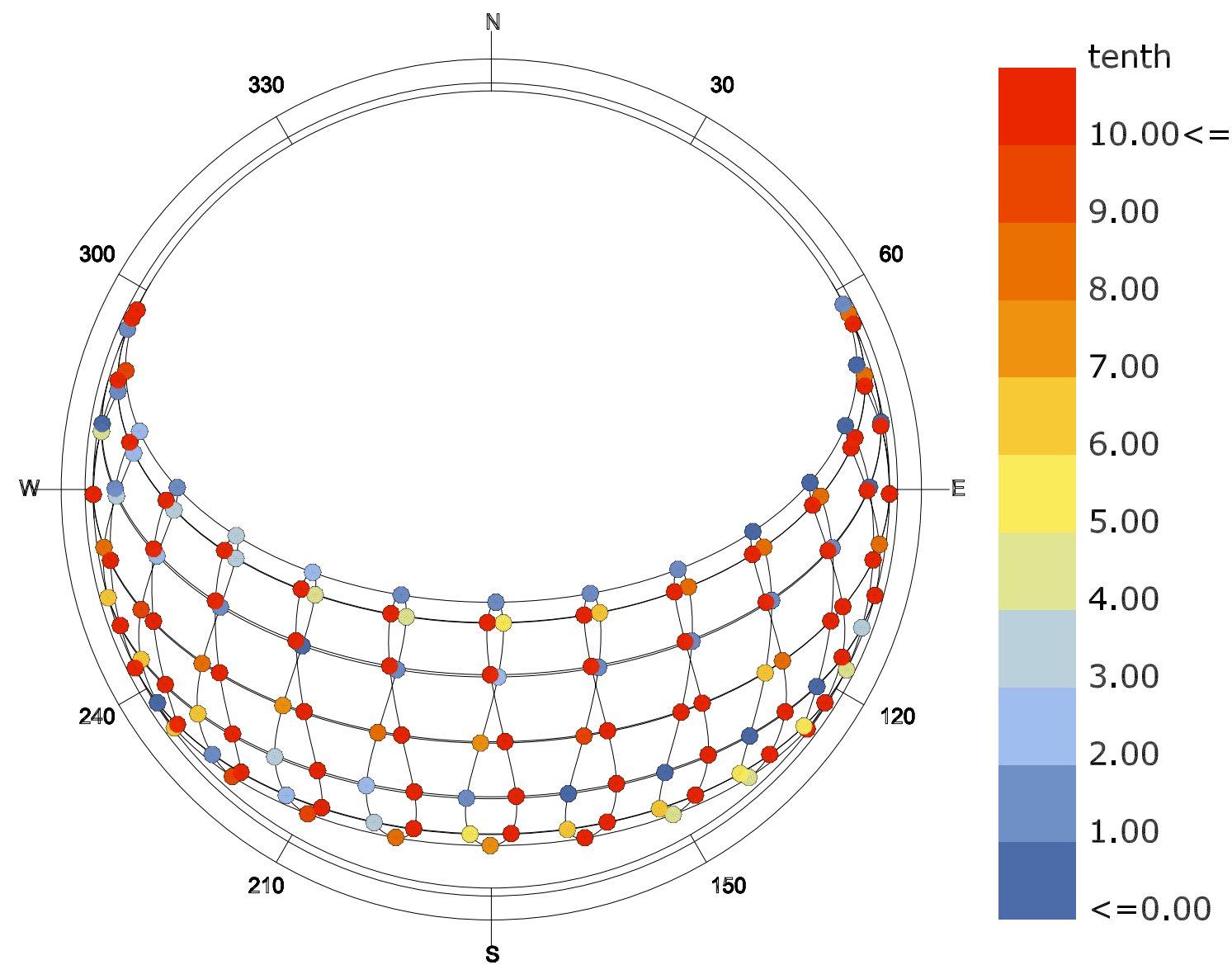
Exterior Factors

Temperature in Philadelphia has a wild range from summer to winter. It is relatively hot and humid in summer while cold and dry during winter time. The relative humidity is really high at early morning and nighttime through out the year, and can reach up to 80%-100%. At daytime, relative humidity could drop down to 15% - 40%. And it is generally more humid from May to November than from December to April.

As the building type of this project is residential, and the main occupied time is from 6pm - 8am, we could suggest to use dehydrator and increase ventilation of the building during summer to mid autumn to cool down the temperature in the building. Also, as it is cold and dry during winter time, improve the thermal insulation capacity of the building envelope is important.



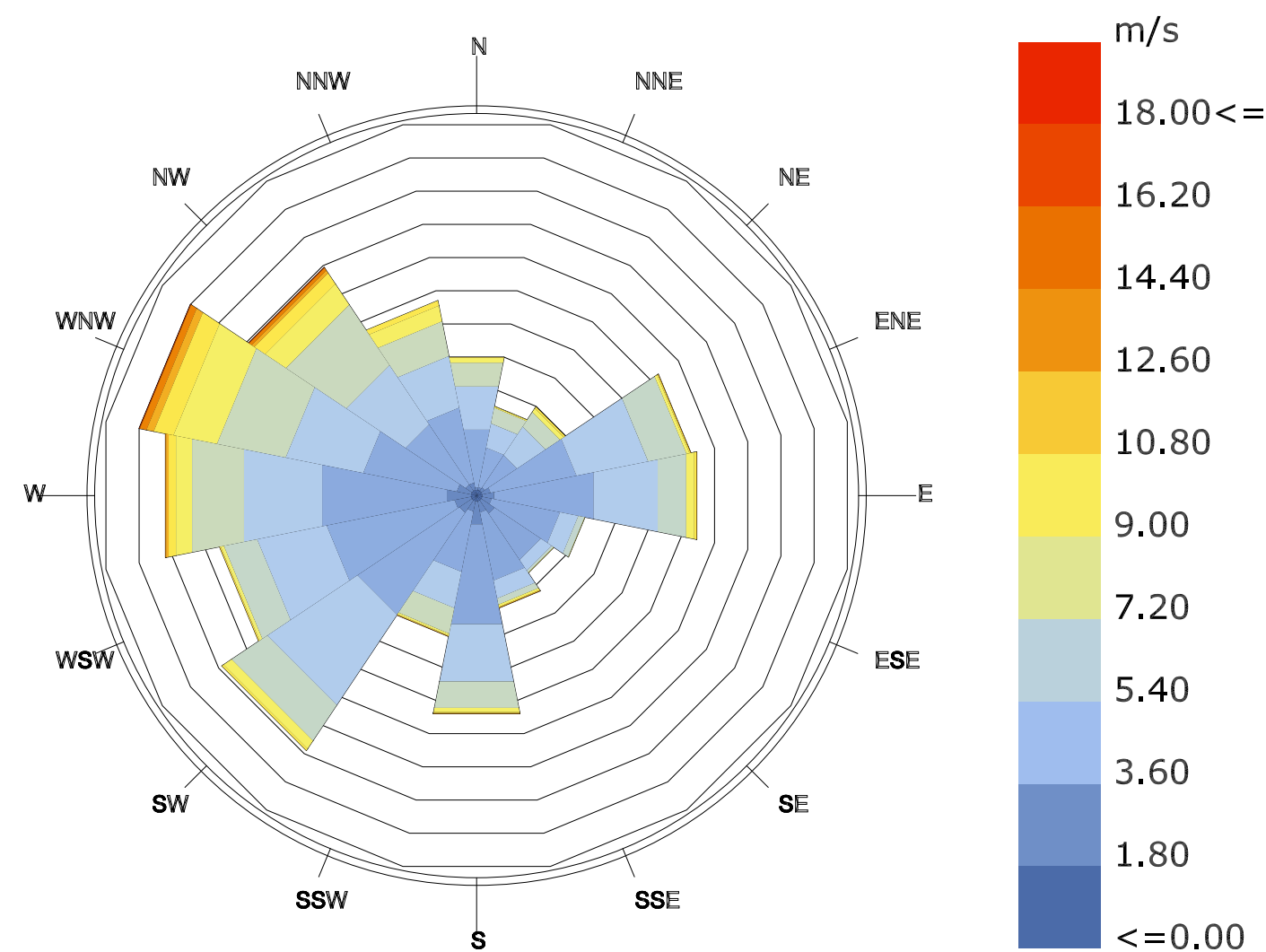
Sun Path



Sun-Path Diagram - Latitude: 39.87
Hourly Data: Total Cloud Cover (tenth)
Philadelphia International Ap_PA_USA

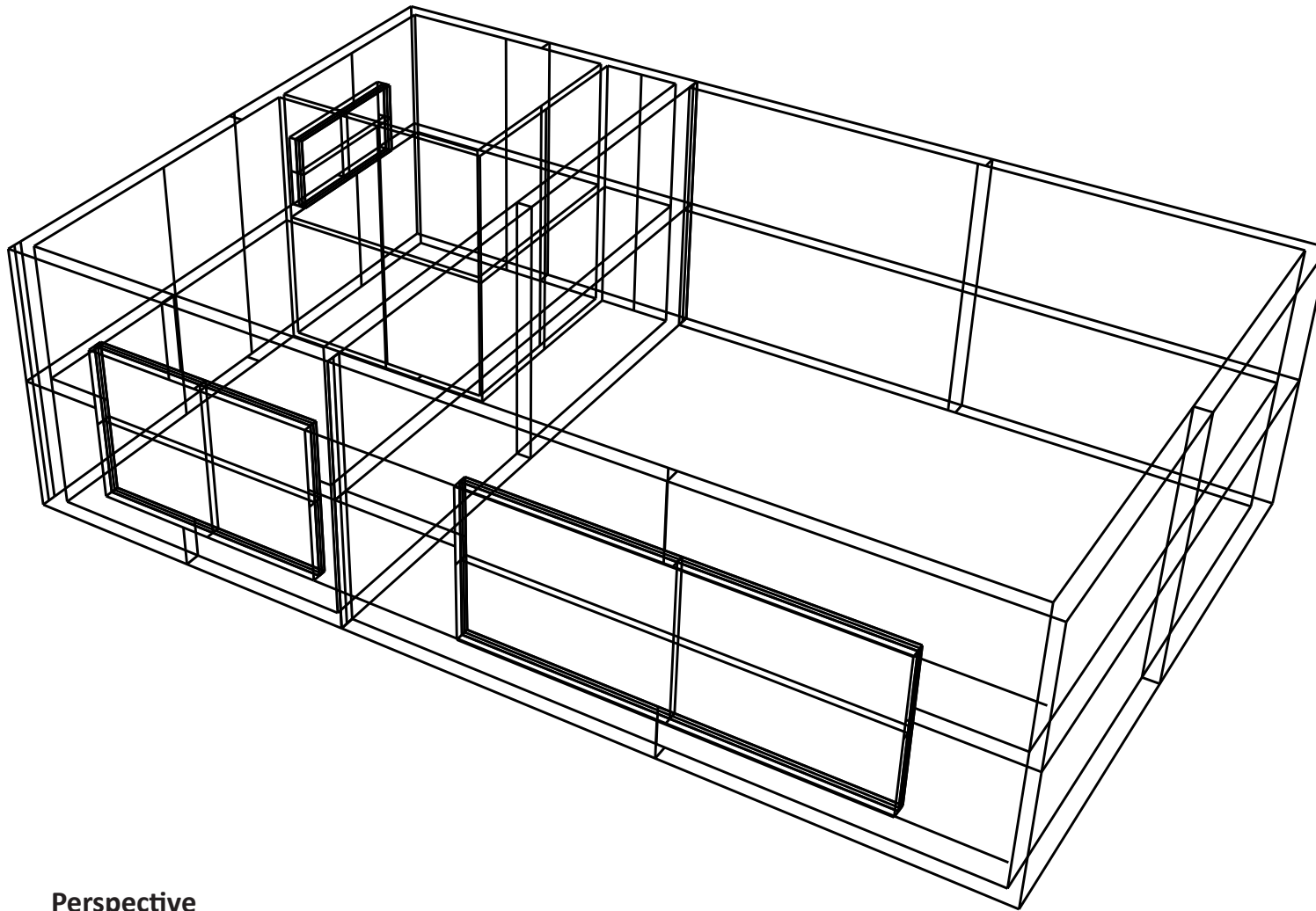
The sun path showed that it is relatively unclouded during summer time. Thus it has more radiation during this time. It is better to provide sun shade facilities to cool down the temperature of room. While, During winter time I suggest we could increase the sun exposure of the building to get more radiation.

Wind Frequency

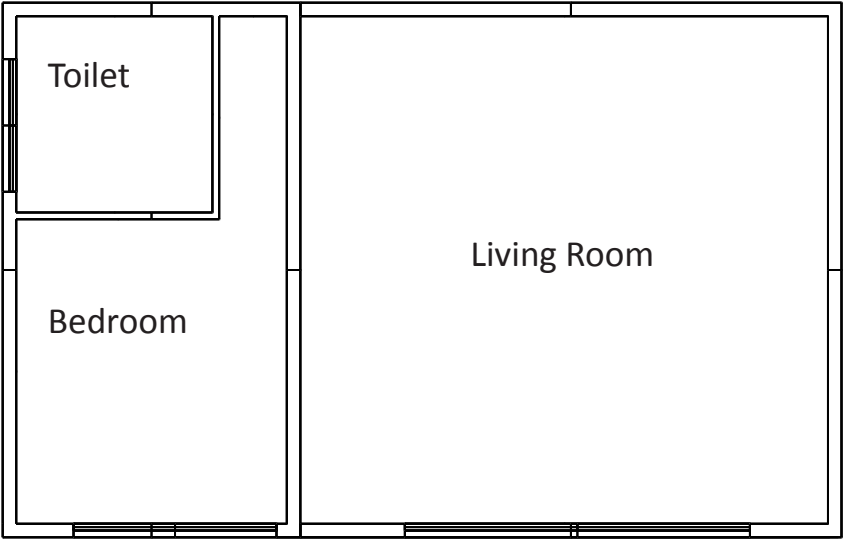


Wind-Rose
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00
Hourly Data: Wind Speed (m/s)
Calm for 2.81% of the time = 246 hours.
Each closed polyline shows frequency of 1.0%. = 90 hours.

The Wind Rose showed that most of the wind come from South west to north west. We could increase west to east ventilation to decrease humid during certain time of the year.



Perspective



Plan

