

DREAM ROOM AT PHILADELPHIA

WESTON HUANG

INTRODUCTION

Location: Philadelphia (39°57'N 75°10'W)

Köppen climate classification: Humid subtropical climate zone

Trewartha climate classification:
Temperate maritime climate

Average annual precipitation: 1,050 mm

Driest month average precipitation:

Snowfall: Fluctuates from light snow to snowstorms every year but is rare in November or April.

Normal seasonal snowfall: 57 cm.

Seasonal snowfall accumulation: 200 cm

Heaviest single-storm occurred in January 1996.

January average temperature: 0.6 °C

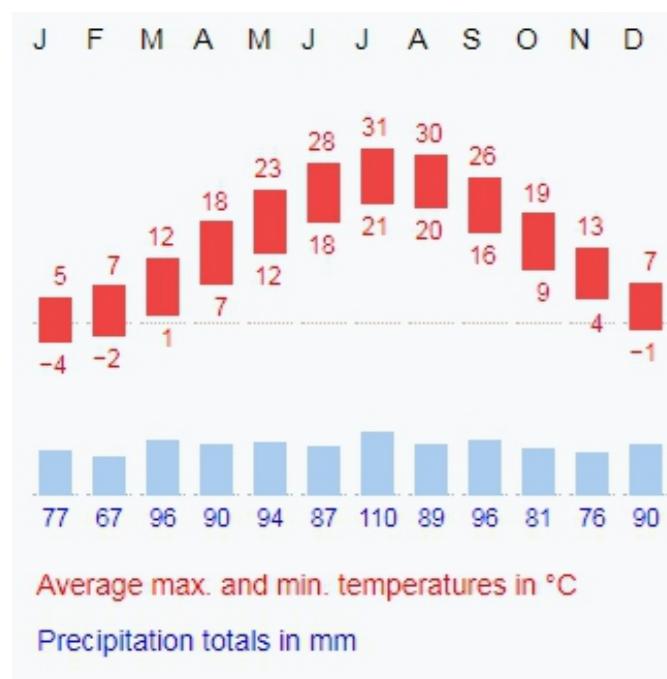
The average window for freezing

temperatures: November 6 thru April 2
Summer average dewpoint range:

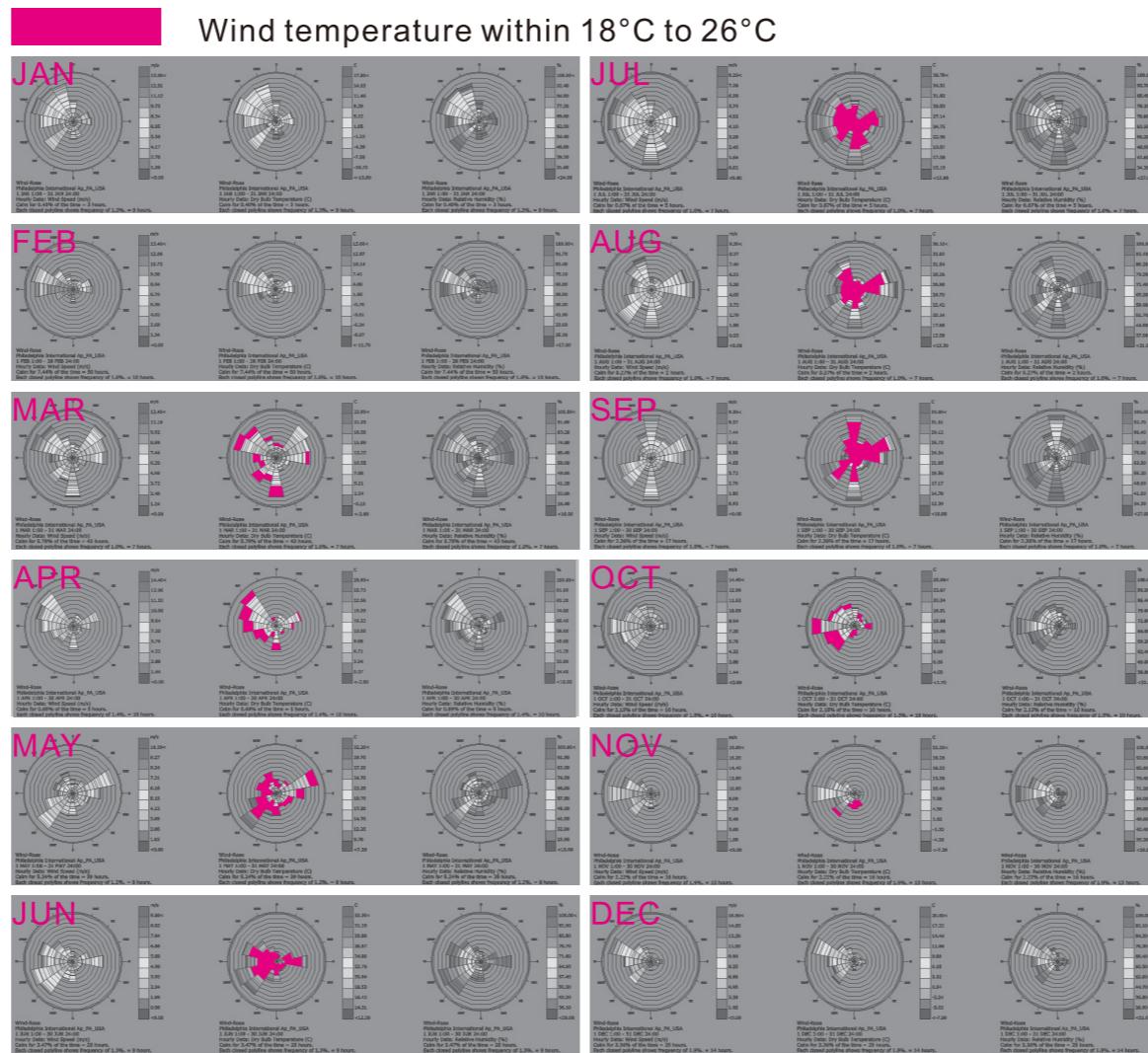
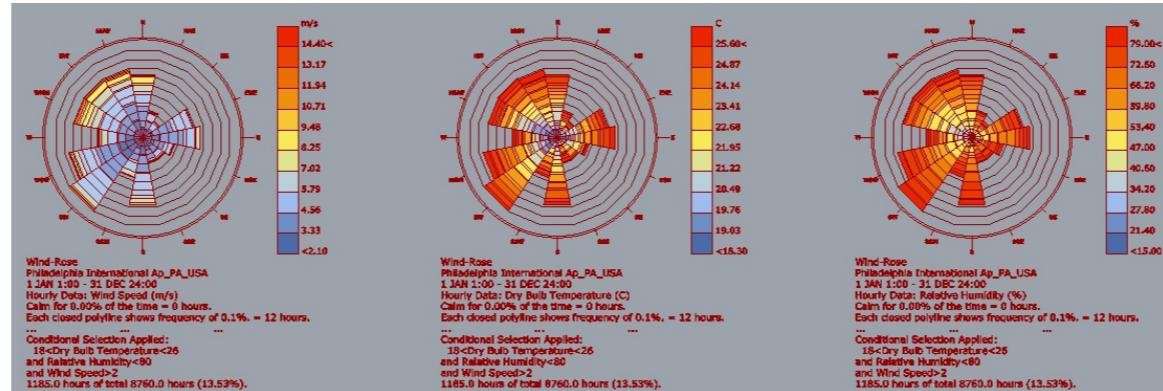
Summer average dewpoint range:
15 °C~18 °C

Highest recorded temperature: 41 °C

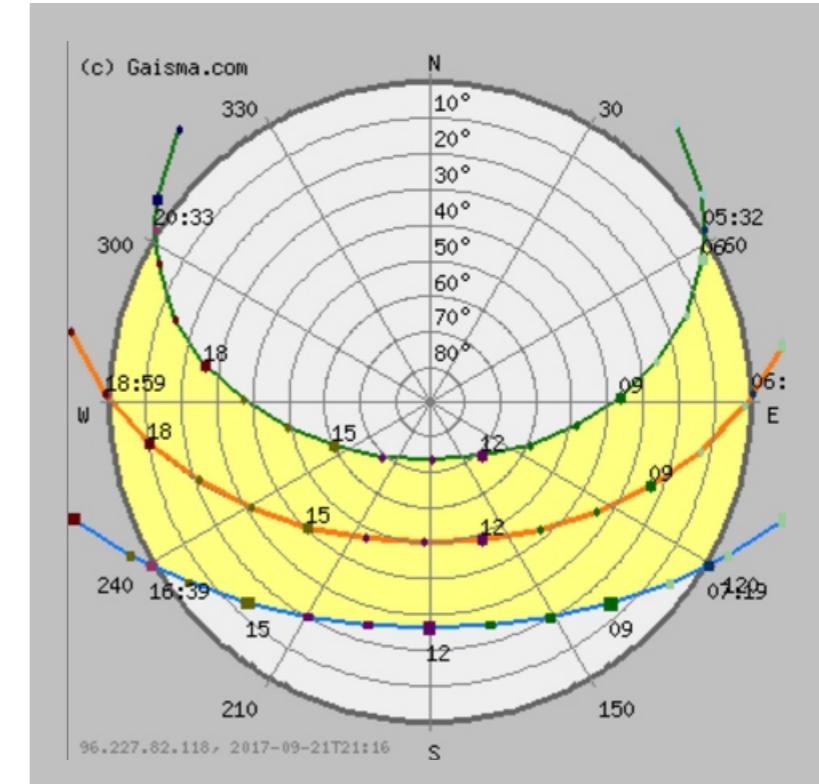
Lowest recorded temperature: -24 °C



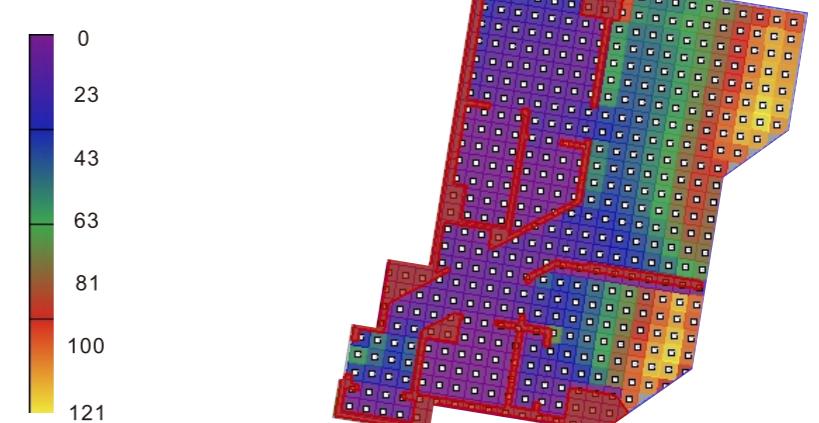
WIND ROSE



SUN PATH



RADIATION



Mean Radiation = 34.47 kWh/ m²
100% of Area between 0 & 121
0% of Area > 121 kWh/ m²
0% of Area < 0 kWh/ m²

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ABOUT THE ROOM

Location: Philadelphia (39°57'N 75°10'W)

Tower total height: 80m, 26 floors

Location height of the dream room:

42m, 14th floor

Using type: Residential

Structural type: RC

Room area: 93.74 square meter

Description: The room is located in a high-rise condominium. Since being above surrounding buildings, the room enjoys the unblocked view of Philadelphia and the sun. However, the facades are curtain window and can not be opened. So, natural ventilation is impossible now.



ISSUES & STRATEGIES

• Sick building?

Due to the fixed curtain wall facade, the window rarely can be opened to let the natural air flow into or the waste air flow out the room.

→ Open the window!

Changing the window from fixed to opened one will improve the air quality inside the room without relying on air-conditioner only. According to the Wind Rose Diagram, even though the north and west do not have wind that is strong enough and with temperature between 18 to 26 calceus, there are some months that have potential to natural ventilation. The west parts of the room may be benefitted by the fresh and temperate air from June to September.

• Hot room?

The Radiation Diagram reveals that west sides of the room will receive too much radiation, which has made the room too hot to be comfortable. Unfortunately, since the climate-change and the inflation of global temperature, the room will be drastically hotter and more uncomfortable in the future.

→ Improve insulation & shading!

Although the curtain walls have used the LOW-E glass, the room is still hot along the windows in the summer. The simplest way for resolving this is putting some curtains around the windows. But, if possible in adding new structure, it is recommended to hang the shading system outside the window for adjusting the radiation that will enter the room. Therefore, the room will not be heated up easily by the summer sun.

• Unfresh air quality?

The east room suffers from not only the disability of natural ventilation but also the weak artificial ventilation through air-conditioner.

→ Add the transom!

Even though opening the fixed window can definitely improve the ventilation. Unluckily, the Wind Rose Diagram shows that there is not a plenty of available north wind. So utilizing and importing the wind from the west is important. In order to let the wind flow into the east room, the wall between it and the living room can add a transom. This transom should be put no higher than 150 cm for better effect of ventilating.

• Cold room?

In the winter, the places nearing the window are freezing. A lot of heats loss through the window.

→ Improve insulation!

Adding the curtains with good insulating ability, such as animal fur or wool, along the window can prevent heat escaping easily from the interior space.

