Arch 463
ECS
Fall 2022 **Name**_____

Quiz #1

"Transit Shelter Moves to Chicago"

For this problem you are the climate consultant for the new Chicago transit shelter. A visiting professor (Prof. X) from IIT was charmed by the transit shelters in Moscow, declaring, "We could use a shelter like the one near Gritman Hospital on our campus! It's so Miesian!"

Climate Context. IIT's campus is low-density with ample open space compared to the surrounding city. Climate data from TMY2 analysis is given in this quiz.

Modular Design. The shelter is a modular glass box with an opaque roof. The glass panels are 2' wide by 8' tall. Overall the shelter is 4' x 10' and the bench is 6' long, allowing space for wheel chair parking.

Chicago Context. A similar site that allows for openings to the south has been selected for the IIT campus. The campus bus only operates from 6am until 6pm. Prof. X has suggested that seasonally changable replacement panels could be used to make the shelter more comfortable in Chicago's climate, which is more severe in summer and winter than Moscow's. He's suggested several modular options for your consideration:

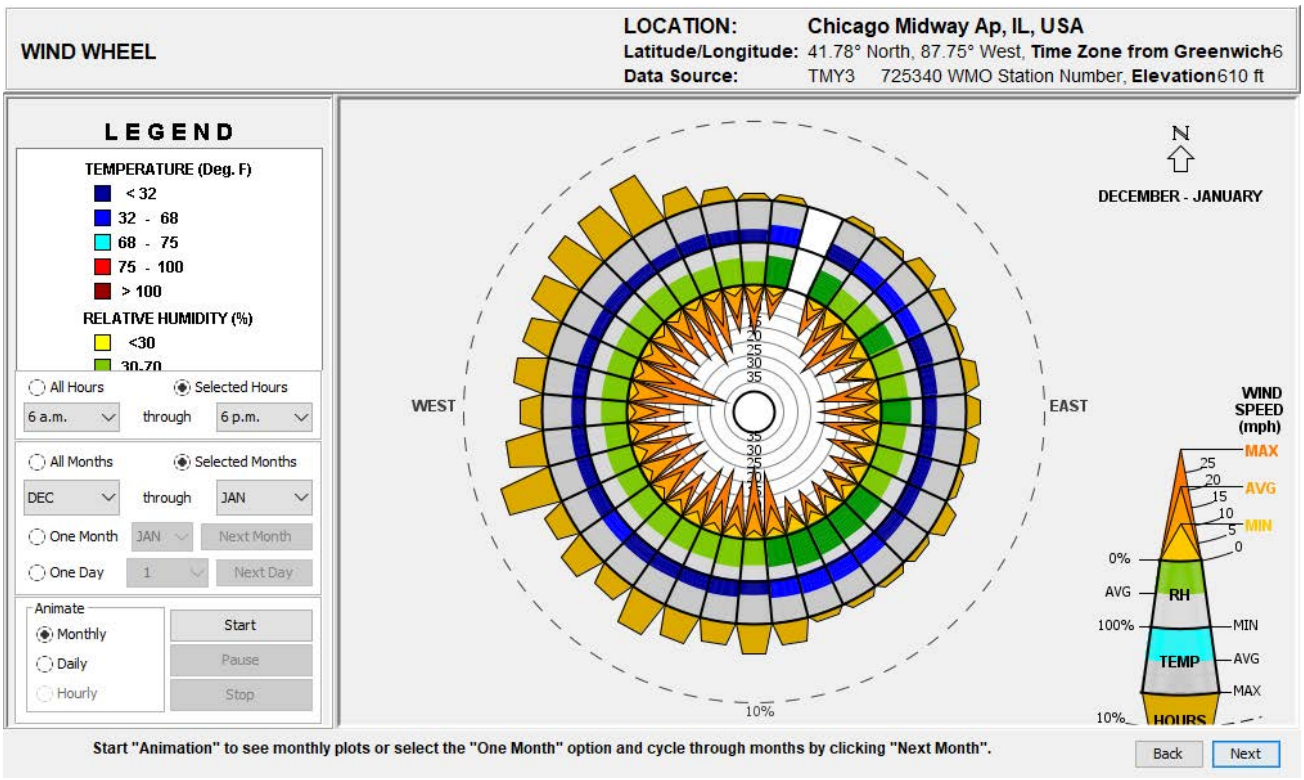
1. clear glass block panels
2. precast concrete panels (4" thick)
3. Kalwall translucent panels
4. perforated steel panels
5. photovoltaic glazing
6. curtain wall glazing
7. woven bamboo panels

The bus shelter is planned to occupy the site above, just to the west of the architecture school in Crown Hall. It will replace the lovely HVAC system shown in the photo below.

Analysis

5 points

1. This is the 6am—6pm December / January wind wheel for Chicago Midway (close to IIT). Explain two thermal problems and two thermal advantages that an all-glass shelter would pose in winter?

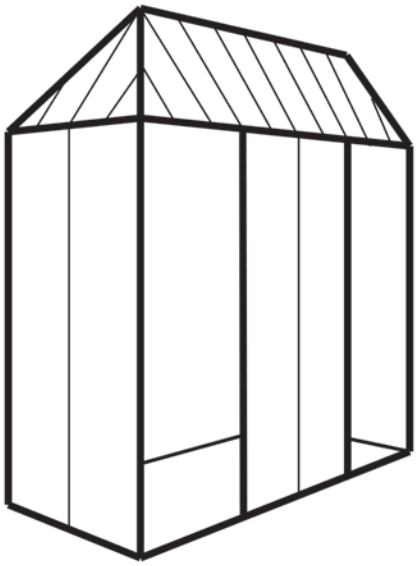


5 points

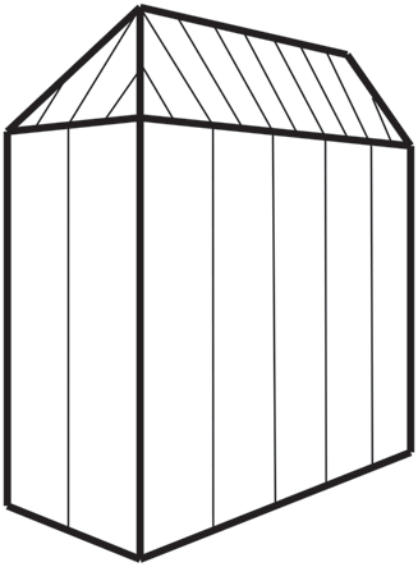
Preliminary Design

2. **Show which panels (use no more than 2 different panel types) you'd use to adapt the shelter for best daytime comfort in winter. Show where each is located on the plan and axo drawings. Explain how they improve human comfort in the shelter in terms of sun and wind exposure. Use Norberg–Schultz's source-path-receiver terminology.**

December / January adaptation.



Roof + West and South elevations



Roof + East and North elevations

PANEL LIST

1. clear glass block panels
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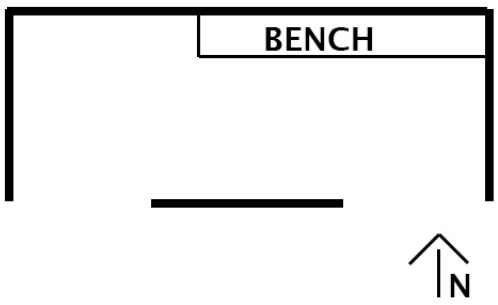
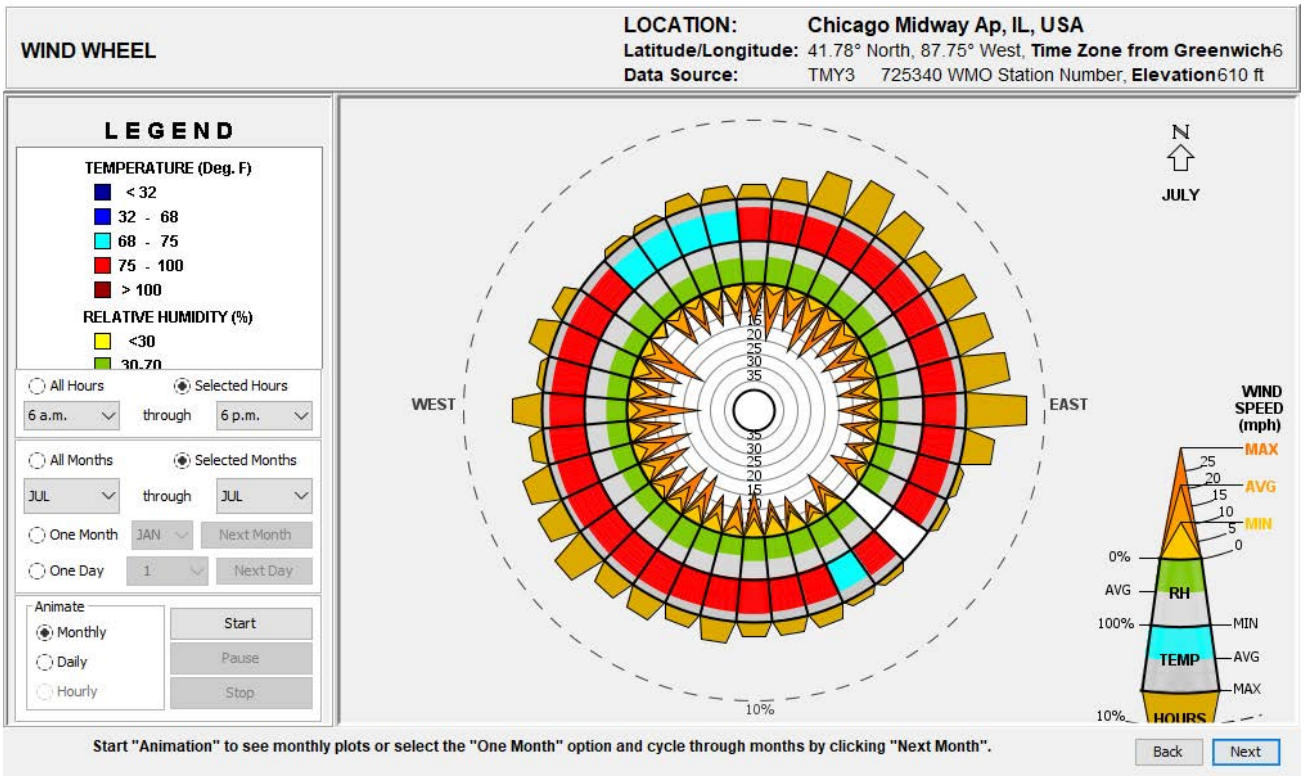
4. perforated steel panels
5. photovoltaic glazing
6. curtain wall glazing
7. woven bamboo panels



Floor plan

5 points

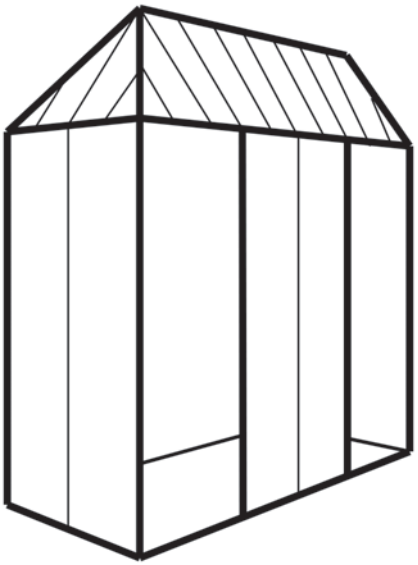
3. This is the 6am—6pm July wind wheel for Chicago Midway (close to IIT). Explain two thermal problems and two thermal advantages that an all-glass shelter would pose in July.



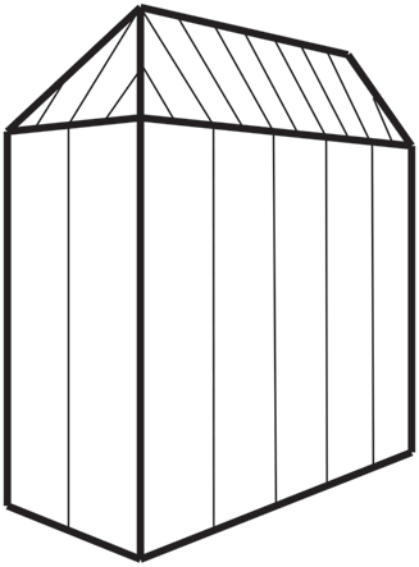
5 points

4. **Show which panels (use no more than 2 different panel types) you'd use to adapt the shelter for best daytime comfort in July. Show where each is located on the plan and axo drawings. Explain how they improve human comfort in the shelter. Use Norberg–Schultz's source-path-receiver terminology.**

July adaptation.



Roof + West and South elevations



Roof + East and North elevations

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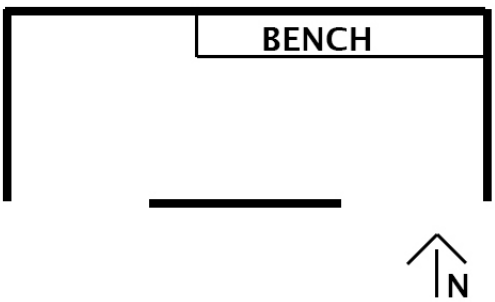

Floor plan