

Arch 463  
ECS  
Fall 2015

Name \_\_\_\_\_

## Quiz #1

# "Transit Shelter Moves to Boston"

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

**Climate Context.** MIT'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.

**Boston Context.** A similar site that allows for openings to the south has been selected for the MIT 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 Boston's climate, which is more severe in summer and winter than Moscow's. He's suggested several modular options for your consideration:

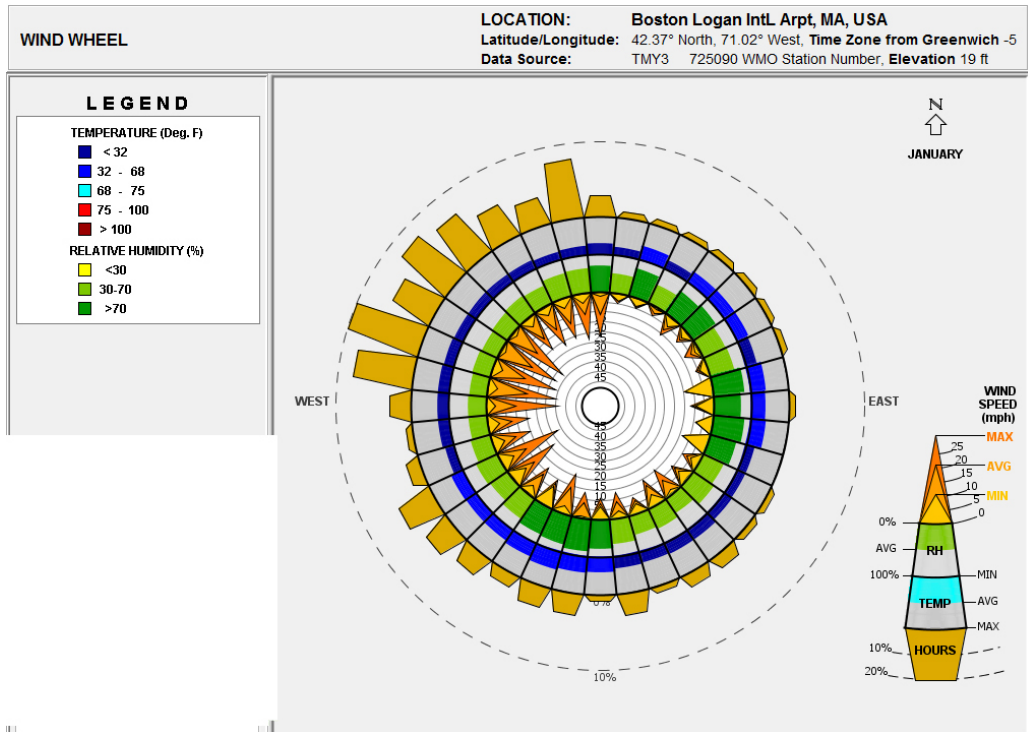
1. clear glass block panels
2. veneer brick panels (2" thick)
3. Kalwall translucent panels
4. perforated steel panels
5. photovoltaic glazing
6. wood frame panel with plywood sheathing and cedar shingles
7. woven bamboo panels



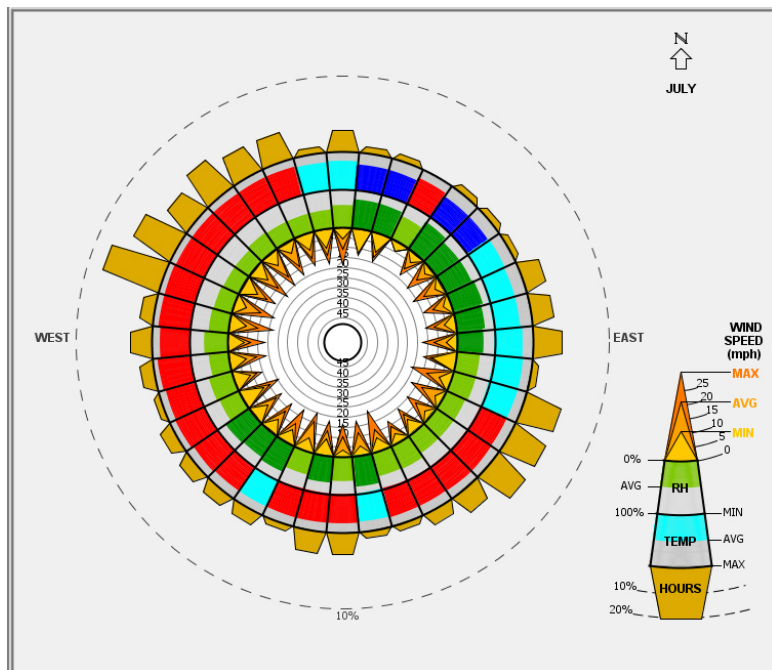
4 points

# Analysis

1. This is the January wind wheel for Boston. Explain one thermal problem and one thermal advantage that the all-glass shelter poses in January?



2. This is the July wind wheel for Boston. Explain one thermal problem and one thermal advantage that the all-glass shelter poses in July.

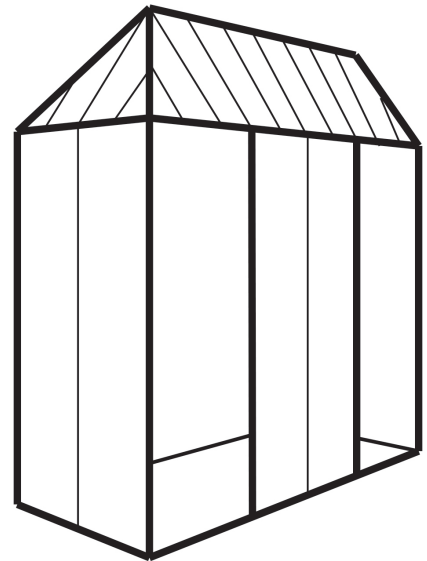


3 points

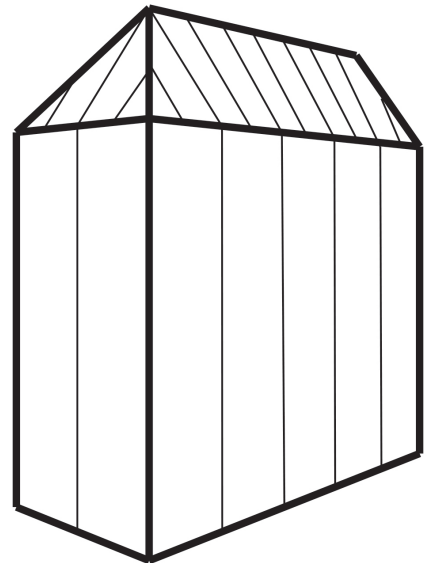
## Preliminary Design

3. Show which panels (use no more than 2 different panel types) you'd use to adapt the shelter for best daytime comfort in January and in July. Show where each is located on the drawings to the right. Explain how they improve comfort in the shelter.

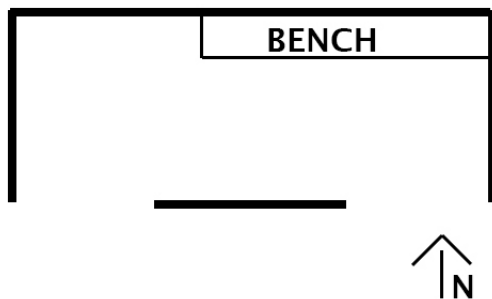
January adaptation.



*Roof + West and South elevations*



*Roof + East and North elevations*



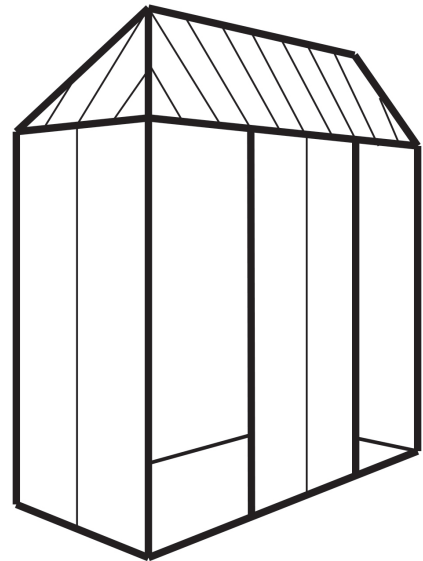
### PANEL LIST

1. clear glass block panels
2. veneer brick panels (2" thick)
3. Kalwall translucent panels
4. perforated steel panels
5. photovoltaic glazing
6. wood frame panel with plywood sheathing and cedar shingles
7. woven bamboo panels

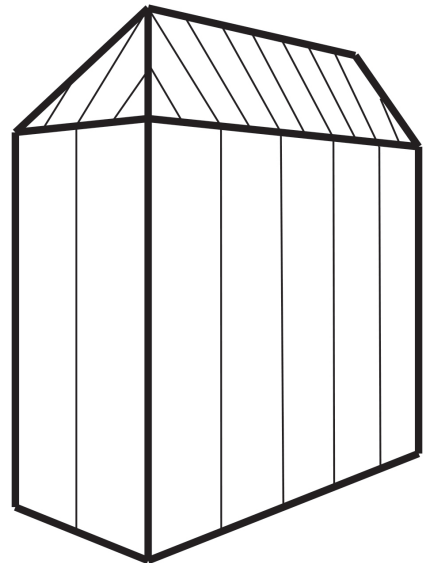
3 points

4. Show which panels (use no more than 2 different panel types) you'd use to adapt the shelter for best daytime comfort in January and in July. Show where each is located on the drawings to the right. Explain how they improve comfort in the shelter

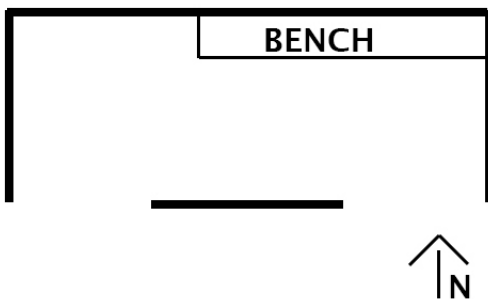
**July adaptation.**



*Roof + West and South elevations*



*Roof + East and North elevations*



**PANEL LIST**

1. clear glass block panels
2. veneer brick panels (2" thick)
3. Kalwall translucent panels
4. perforated steel panels
5. photovoltaic glazing
6. wood frame panel with plywood sheathing and cedar shingles
7. woven bamboo panels