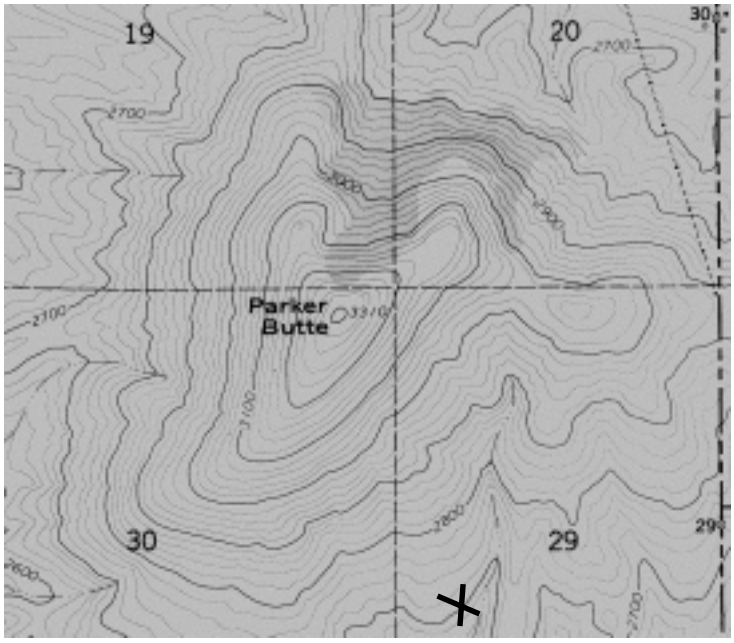
Arch 463
ECS
Fall 2001 Name_____

Quiz #1

"Parker Butte Wildlife Observation Shelters"

For this problem you are the designer of two new wildlife observation shelters to be located at Parker Butte, near Phoenix, Arizona. The butte rises from flat open land and supports some small trees and tall bushes on its north flank. The shelters will be used only during the months of June and December by the eccentric octogenarian Col. Parker and his 10-year-old granddaughter. The two shelters should be identical in design, but may be oriented differently. They should be located at places that offer optimum comfort through out the year without using any mechanical devices. Combustion and noise will scare off the wildlife that the Parkers come here to observe! Wildlife roams the entire site.

You have chosen a modular design for the 4' x 8' shelter. Each corner is marked by a spaced column of four 2" L-shaped steel posts, the wall modules fit snugly between the posts. There are no utilities on the site, neither water nor electricity. Your task is to wisely choose the wall modules and roof type to complete the structure and offer optimal comfort to the Parkers.



Site plan. The site flattens out at the 2,700' contour (marked by the X). North is up.

Climate Context. The site is north of Phoenix, Arizona. Diurnal winds are typically from the east in the morning, calm around noon, and from the west in the afternoon. Wind roses for June and December are provided. Generally, the climate is quite arid, usually dropping to about 20% at the warmest time of day. June and December temperature and RH charts are given.

Kit-of-Parts. You must choose your wall and roof modules from a restricted kit-of-parts.

<u>Wall or Roof choices (4' x 6' modules)</u>
(Use 6 different modules, 4 for the walls, 2 for the roof)

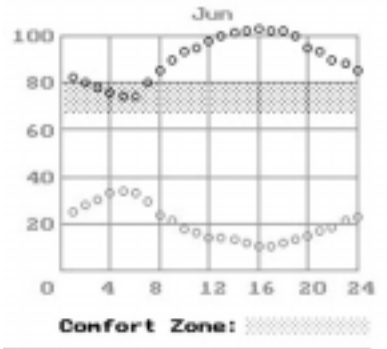
Pre-cast Concrete Panel, 2" thick	Stress-skin panel, 2" rigid insulation
Cedar lattice, 2" x 2" holes	Glass block panel, 12" x 12" see-through vision blocks
Perforated steel, 80% opaque	Sliding glass window, 3' x 4' slider, double glazing
Oriented strand-board panel, 3/4" thick	Insulated roll-up door, 1" rigid insulation

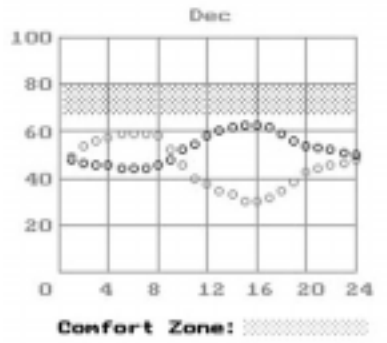
Egg-crate shading device made of 1" x 4" fir, with 4" x 4" cells.

2 points

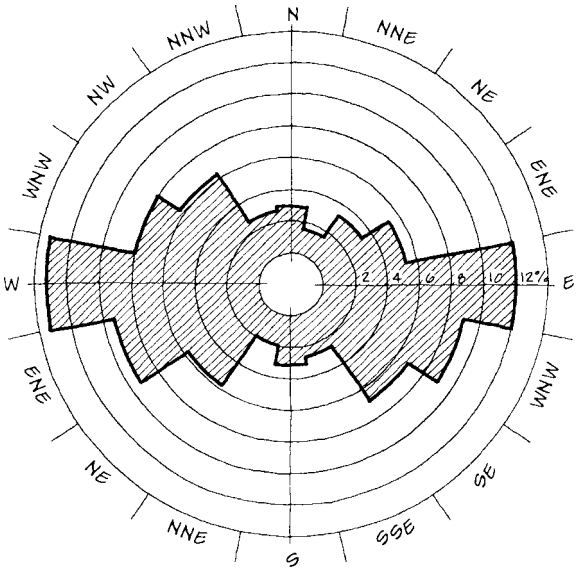
1. Analysis

Col. Parker wants to place a single shelter on the top of the butte. Explain why this choice is not the best for providing comfort in Phoenix's climate. Propose two alternative sites and make an argument that convinces the colonel that your proposal is better. Show where the two site are on the plan on page one. Also show the orientation of each shelter on the site. Label them A & B to avoid confusion.

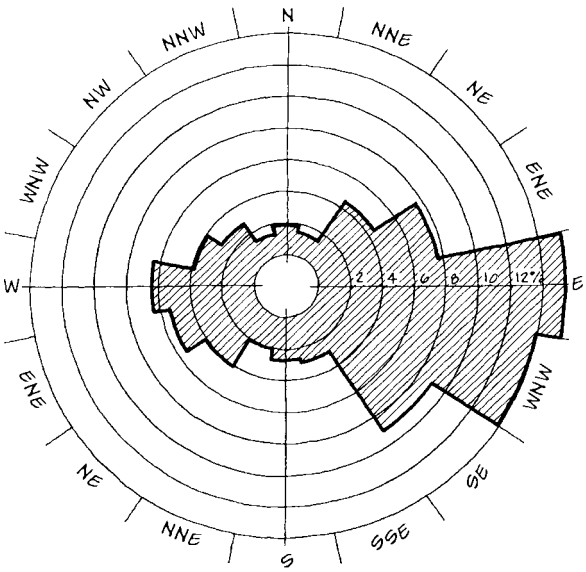




The darker circles indicate temperature, the lighterRH.



June Wind Rose, Phoenix



December Wind Rose, Phoenix

4 points

2. Design

Specify your choice of the module for each wall and the roof by labeling the axo below. Each panel must be different from the others.

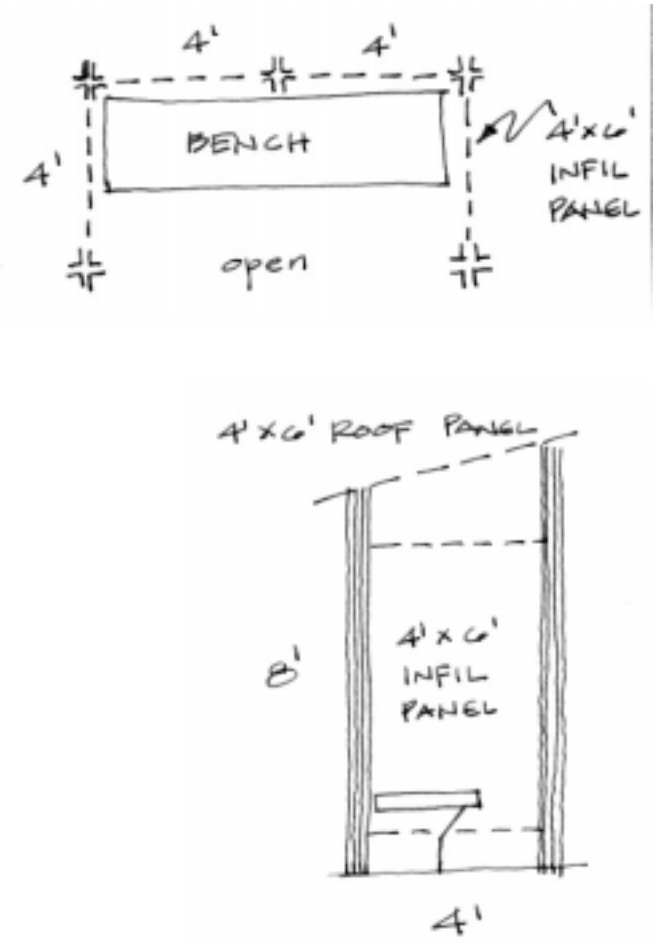
Explain the role of each module in responding to the climate at both locations (A & B). Remind me of the orientation of each shelter.

left wall

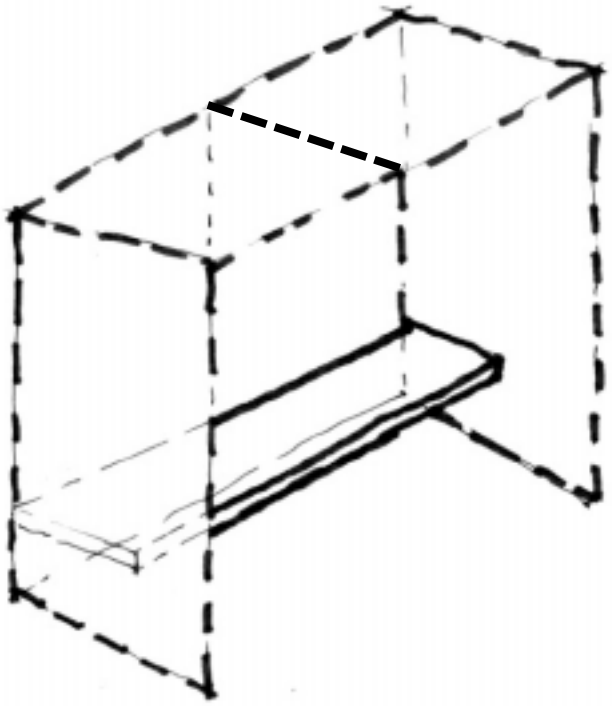
back wall (2 panels)

right wall

roof (2 panels)



Shelter plan and section.



Shelter axonometric. Side opposite bench is open. Label each panel with your module choice.

4 points

3. Scenarios

Explain how a shelter occupant can achieve comfort passively observing wildlife at four critical times of year. Tell which shelter, A or B, is occupied at each time. Base your argument on your design, the weather data, site microclimates, and Olgyay's assumptions about the comfort zone. You may need to make drawings to explain your rationale.

9 a.m on December 21

9 a.m on June 21

3 p.m. on December 21

3 p.m. on June 21