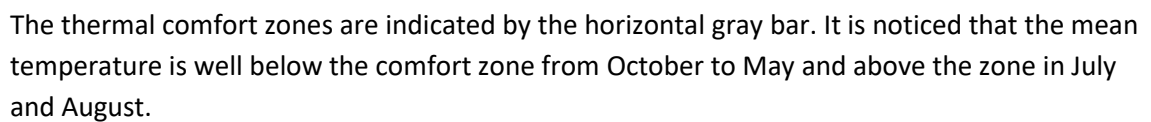


Software: Climate Consultant

- Temperature range chart

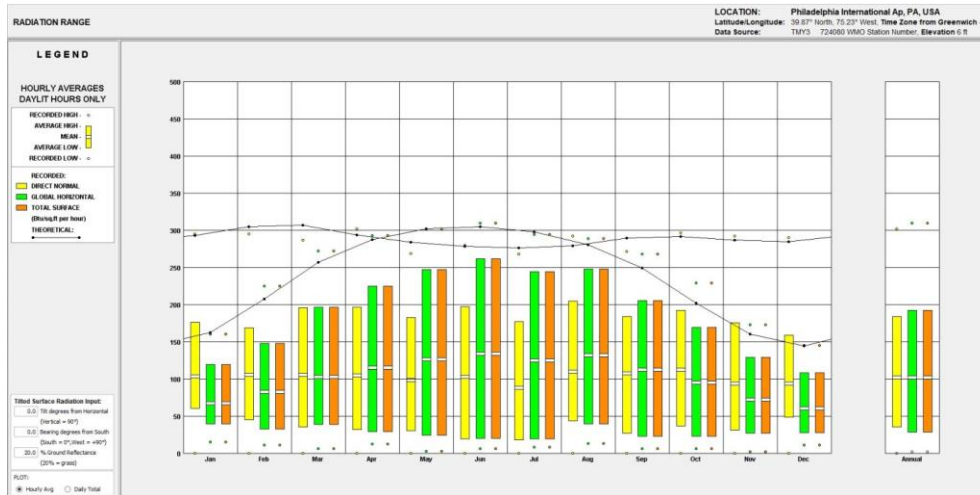


The monthly diurnal averages shows us both temperature swings and the amount of sunlight available on an average day in any month in Philadelphia.

The lower three measures are essentially ways of understanding the amount of sunlight available whereas temperature and wet bulb dry bulb and wet bulb are shown above.

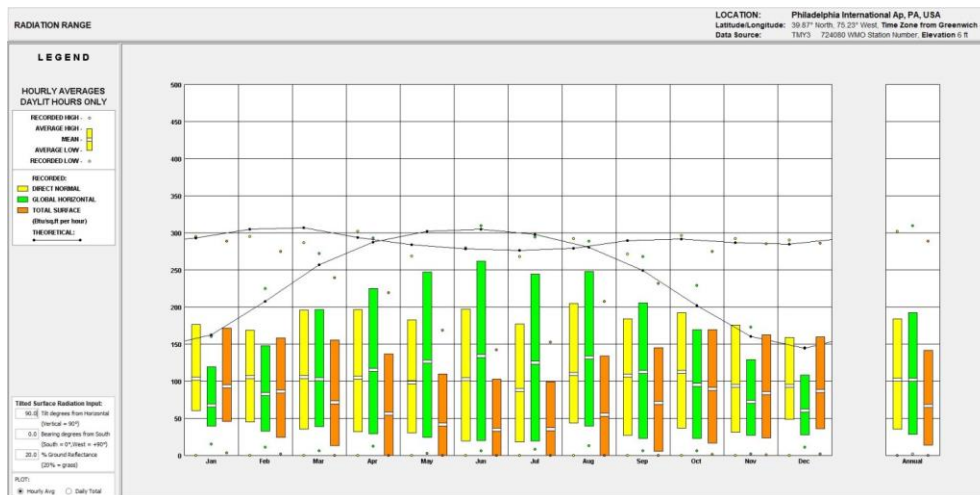
It also shows the relationship between the comfort zone and the temperature.

- The radiation range graph (horizontal surface)



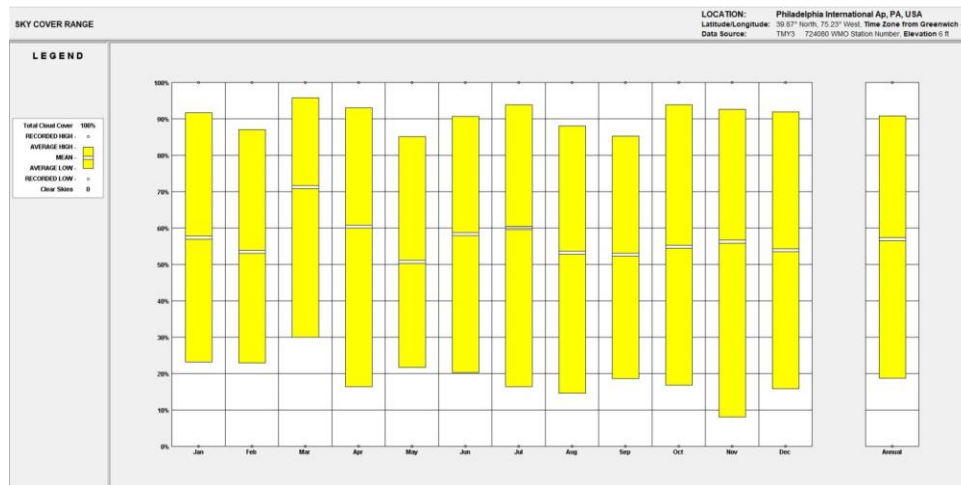
The radiation range graph shows how much sunlight is available on a surface in Philadelphia.

- The radiation range graph (vertical)



After changes to 90 degrees which is a vertical surface, we can see that we have considerably less available radiation especially in the summer months compared with that of a horizontal surface. This graph would be really helpful if you are working on photovoltaic design

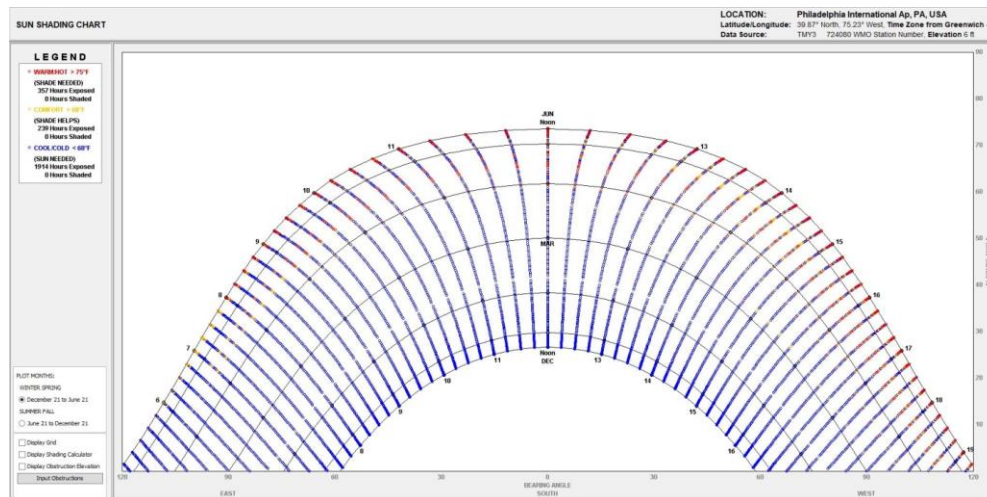
- Sky cover range



Sky cover range is a measure of cloudiness where zero is clear skies and 100% is total cloud cover.

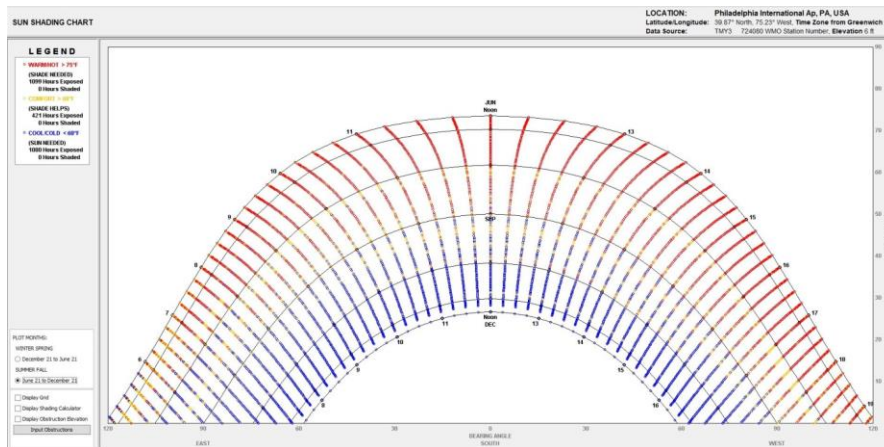
In Philadelphia the mean value hovers right around the 60 percent mark meaning that approximately 60 percent of the sky is cloudy.

- The sun shading chart (December to June)



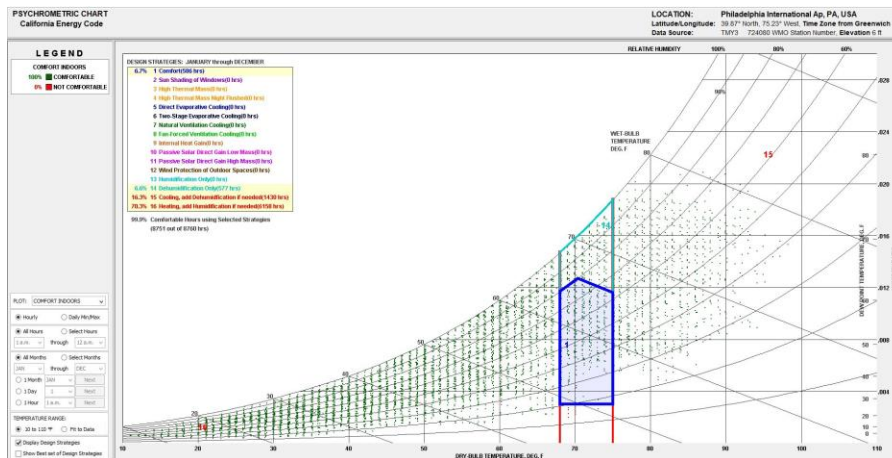
Each of these dots shows hourly data for temperature at different times of the day and different times of the year. The red dots show temperatures that are above the comfort zone, blue dots are temperatures below the comfort zone and yellow are those within the comfort zone.

- The sun shading chart (June to December)



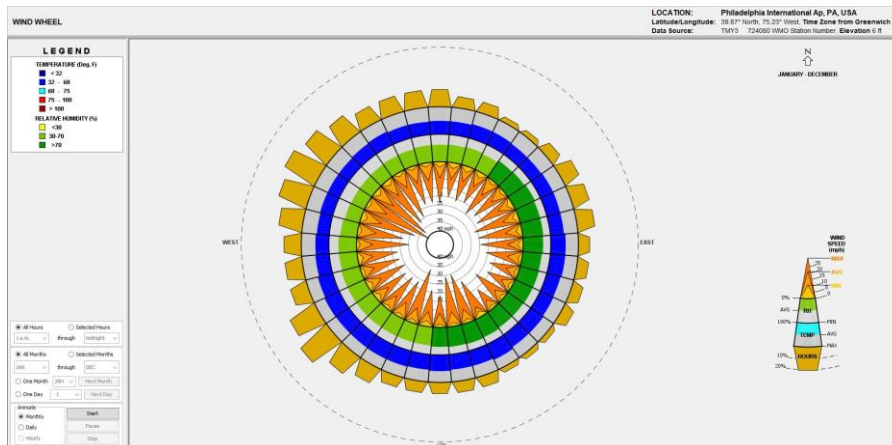
This chart has more hot temperatures compared with the last one (sun shading chart of December to June). This graph is showing that we do actually need some shading in the middle of the day in the summer months

- The psychrometric chart



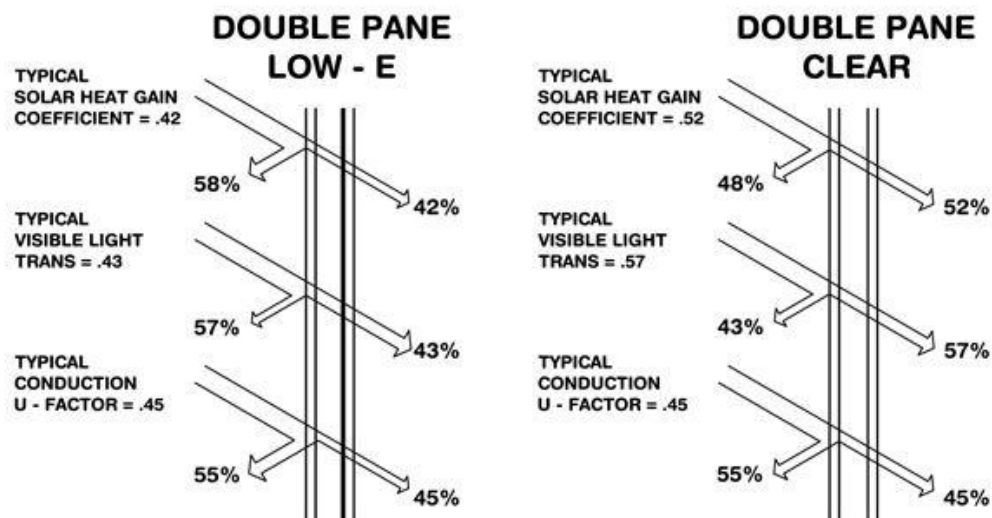
The psychrometric chart is a really powerful graphic tool that will help us to identify design strategies to achieve thermal comfort.

- The wind wheel

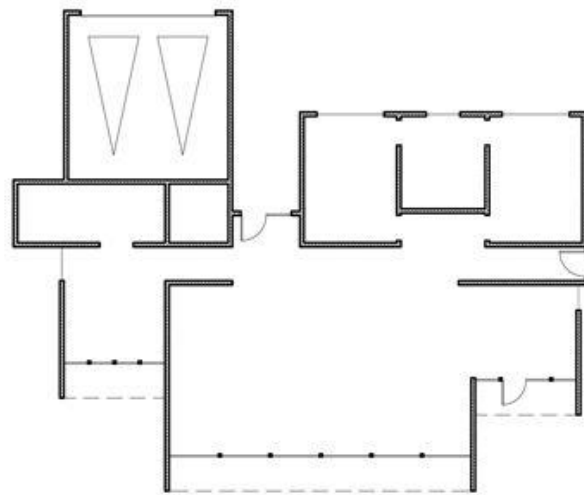


The wind wheel tool shows prevailing wind directions and seasonal correlations between wind and temperature.

II. Passive Design Strategies

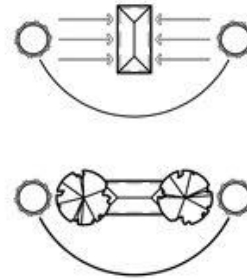


1. Provide double pane high performance glazing (Low-E) on west, north, and east, but clear on south for maximum passive solar gain



SOUTH
▽

19



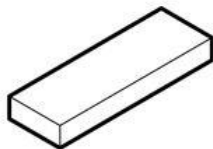
NO

YES

ORIENT BROAD BUILDING SURFACES AWAY FROM THE HOT WESTERN SUN. ONLY NORTHERN AND SOUTHERN EXPOSURES ARE EASILY SHADED

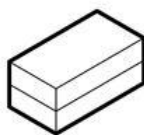
2.

For passive solar heating face most of the glass area south to maximize winter sun exposure, but design overhangs to fully shade in summer



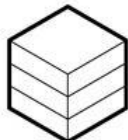
BAD

TOTAL VOLUME	=	13,824
SURFACE AREA	=	4,992
SVR	=	0.36



BETTER

TOTAL VOLUME	=	13,824
SURFACE AREA	=	2,688
SVR	=	0.19



BEST

TOTAL VOLUME	=	13,824
SURFACE AREA	=	1,920
SVR	=	0.14

3.

Use compact building form with square-ish floorplan and multiple stories to minimize heat loss from building envelope (minimize surface to volume ratio)