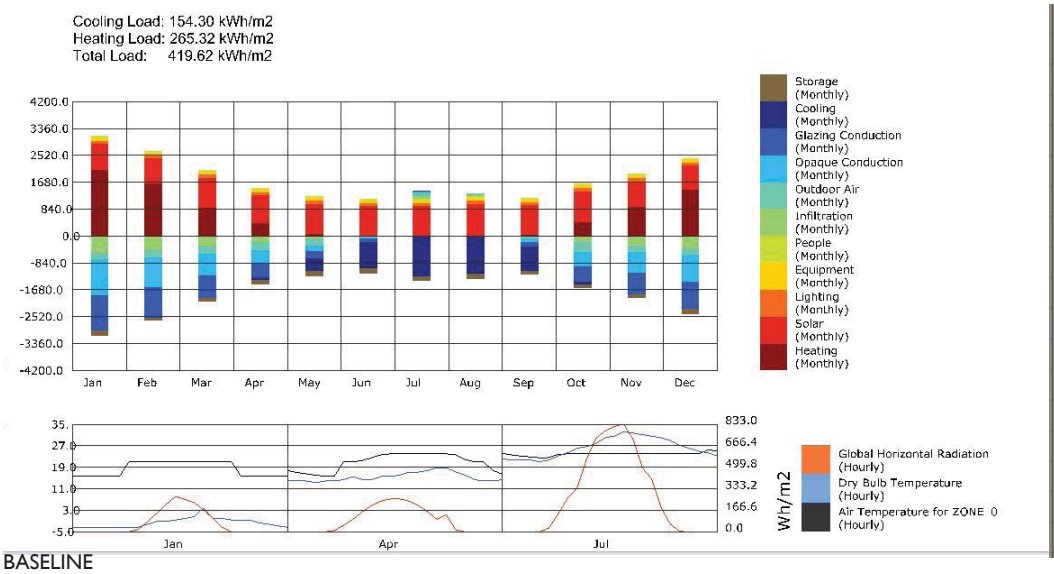
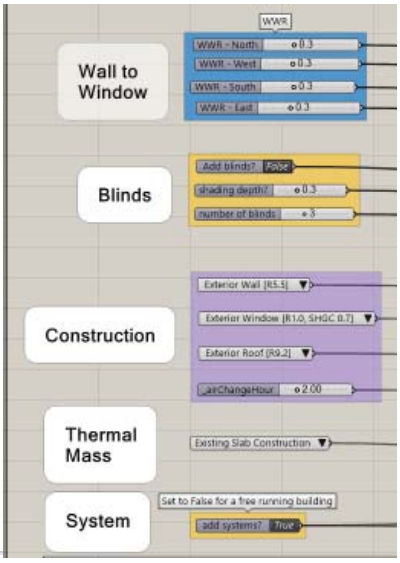
Calvin Vannoy
10/12/2017
Assignment 10
ARCH 633

The most effective parameters in the model that I found were percentage glazing, shading, and window and roof R-Values. Winter months require the largest energy loads to make the building habitable, and heat loss through window and wall assemblies was the biggest area of heat loss for the building.

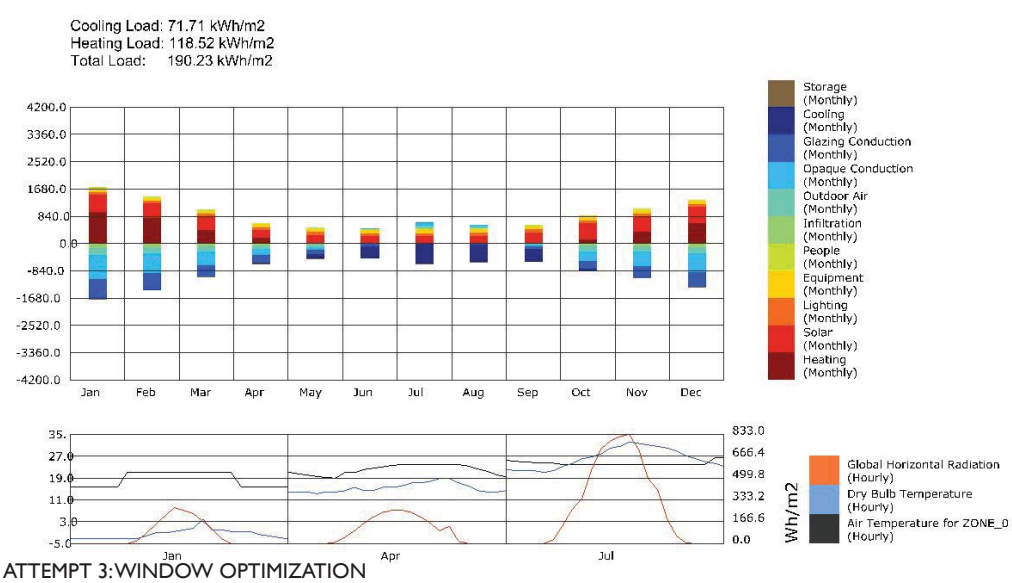
Glazing was a wash in terms of solar gain vs heat loss due to conduction. With a high enough R-value in the wall assembly, it was much more efficient to do away with windows entirely and rely on heating and insulation than to try to capture solar gain. In models where I tried to maximize solar gain in winter months and minimize in summer months I used short blinds to block the summer sun and utilize the lower winter rays.

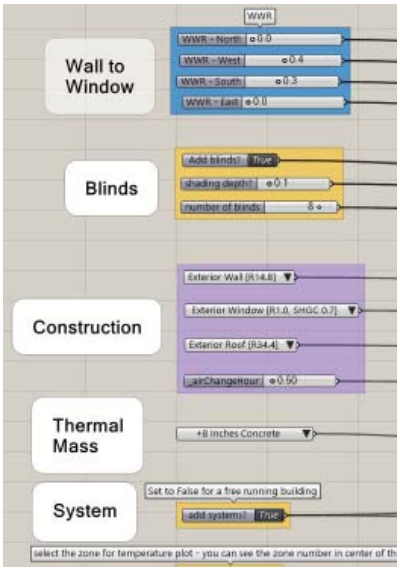
The best model I found used no windows, insulated heavily in the roof and walls, and minimized air exchanges in order to minimize infiltration. This house would be miserable to live in, but very cheap in terms of utilities. With the systems turned off the building hovered at 3 degrees C in winter, 27 C in spring, and 30 C in summer. Obviously not optimal.



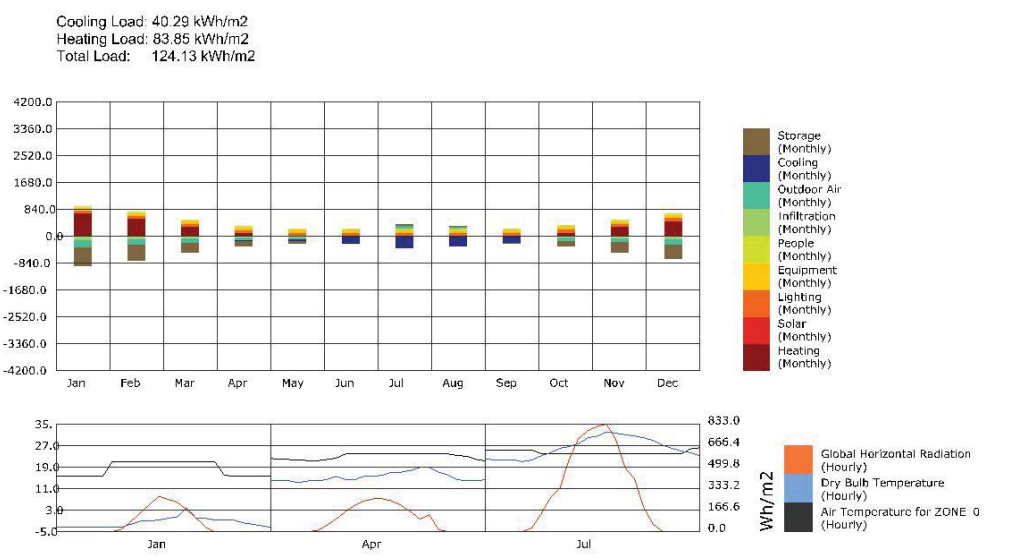


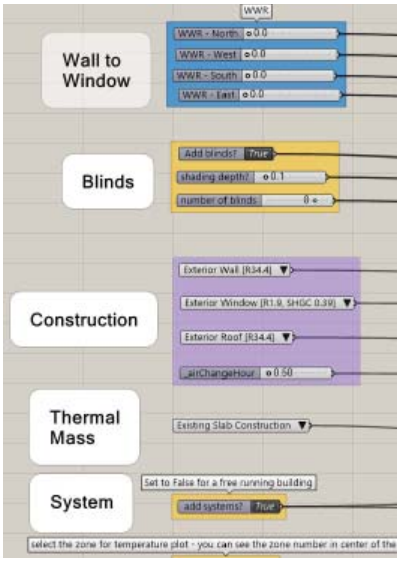
BASELINE



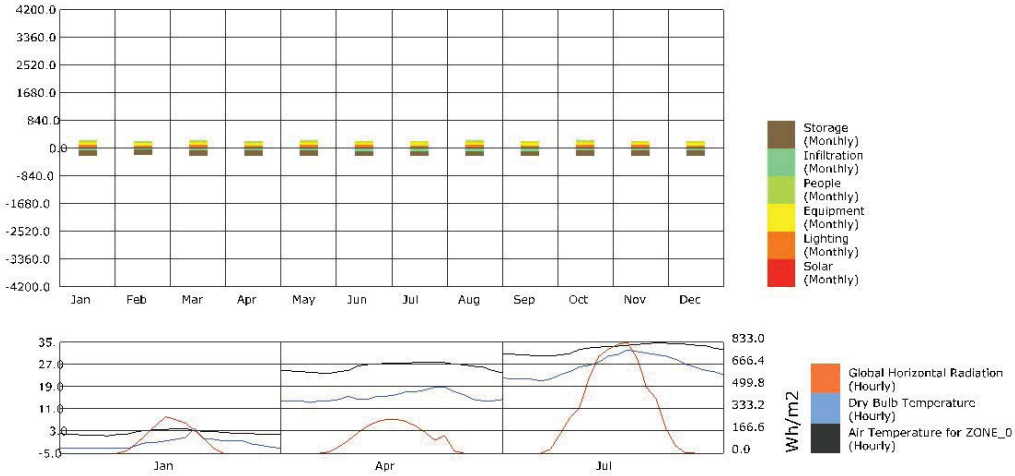


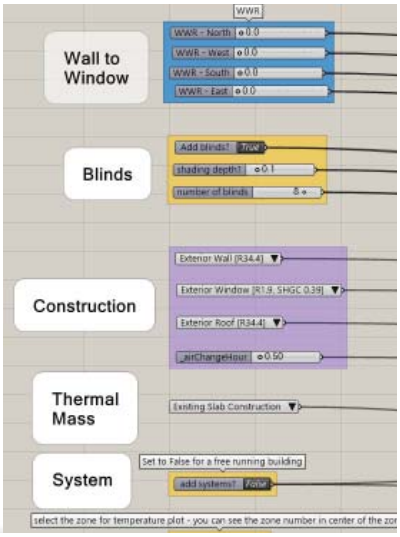
ATTEMPT 3: WINDOW OPTIMIZATION





ATTEMPT 5: NO WINDOWS





ATTEMPT 6: NO WINDOWS, NO SYSTEMS