

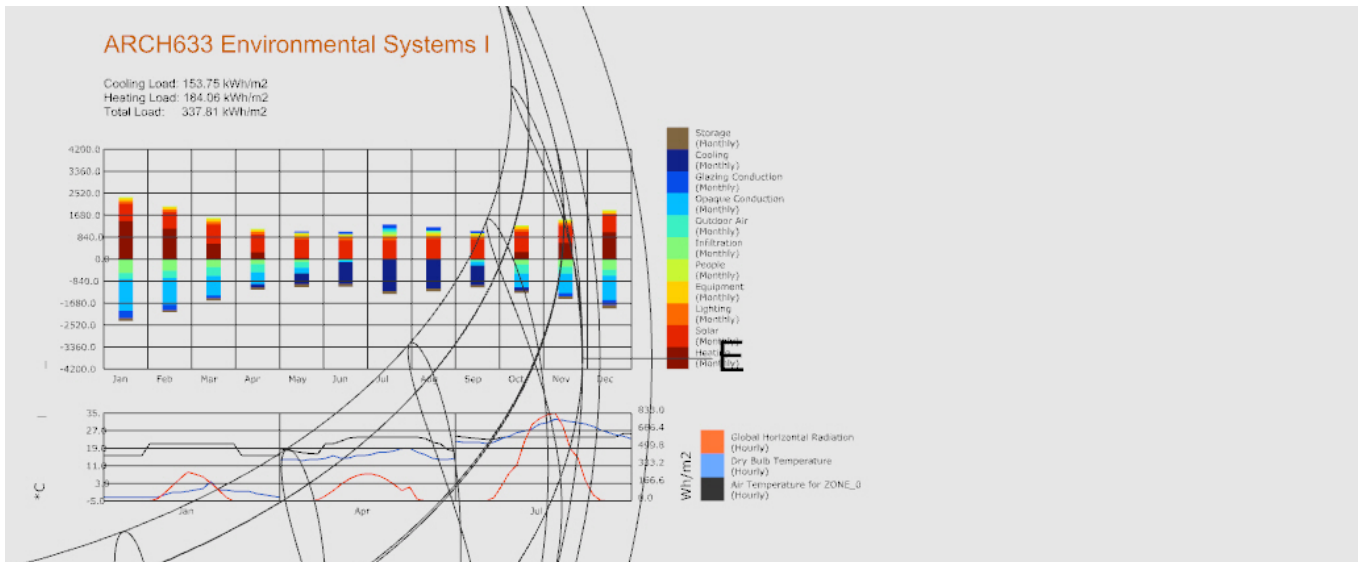
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ARCH 633

11.12.17

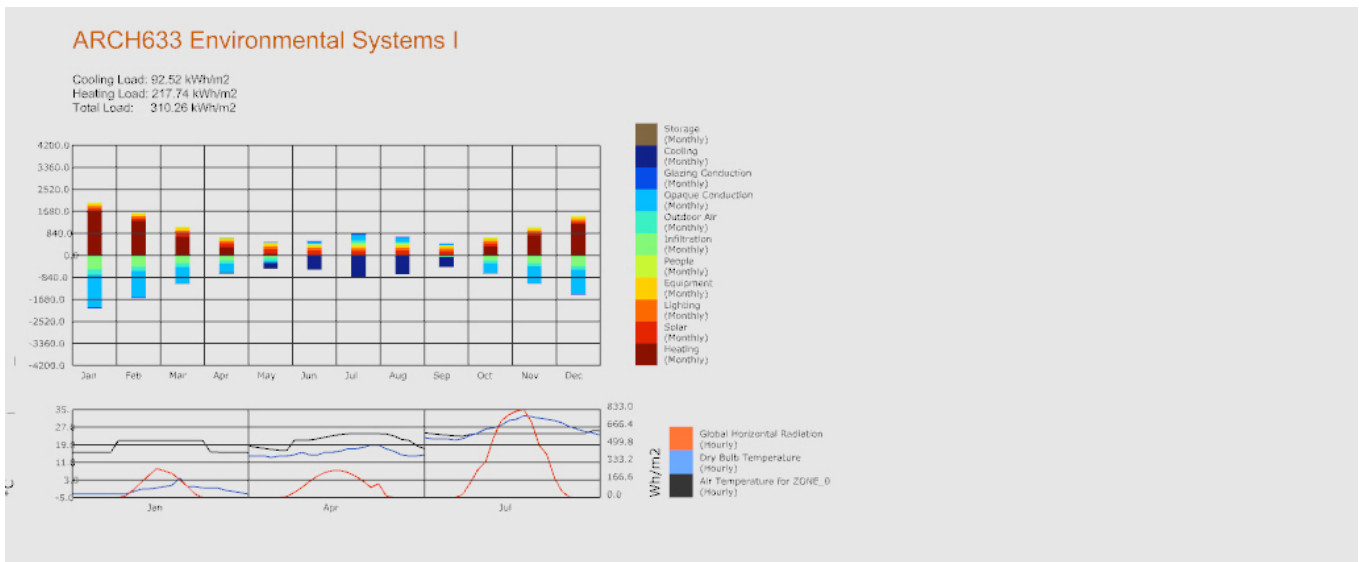
ASSIGNMENT 10

INITIAL STUDY



Before adjusting the parameters for the structure, I documented the initial inputs to see which loads were having the biggest impact on the geometry. Looking at this graph, I was the most intrigued by the cooling load in the summer months, and then the heating in the winter months. The following adjustments that I made were in attempts to try and reduce those loads.

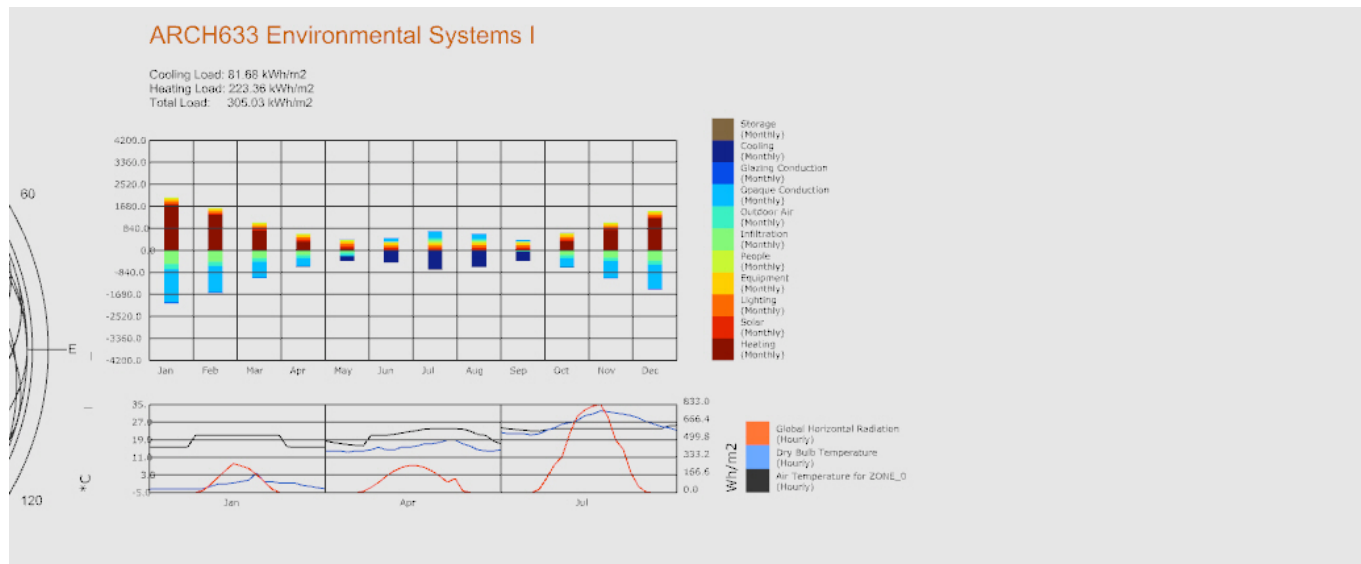
WINDOW ADJUSTMENTS



The first adjustment that I made was eliminating the windows on the north and south sides of the buildings. I preserved the windows on the east and west sides of the building because I wanted to allow the sun to come in on either side to hopefully help with the heating load and cooling load. In the summer, having less windows could help reduce the amount of heat

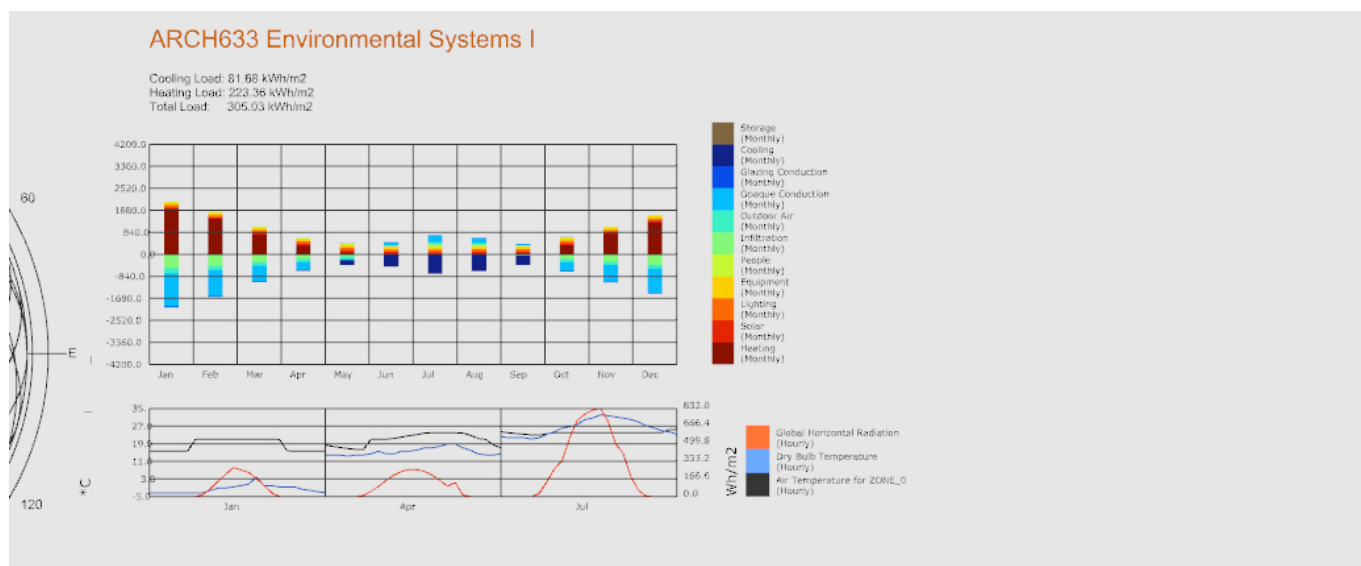
penetrating the structure, and in the winter having the windows on the east and west will allow the sun to heat the building naturally hopefully reducing the dependency on the HVAC system. Reducing the number of windows did reduce the cooling load, as well as the solar load in the winter.

ADDING BLINDS



I was still bothered by the heaving heating and cooling loads despite the reduction in the number of windows. I added blinds to the remaining windows hoping that that might further reduce the heating load in the winter. However, once I added the blinds the load didn't change that much, which made me think it had more to do with the construction of the building and less with the number of windows.

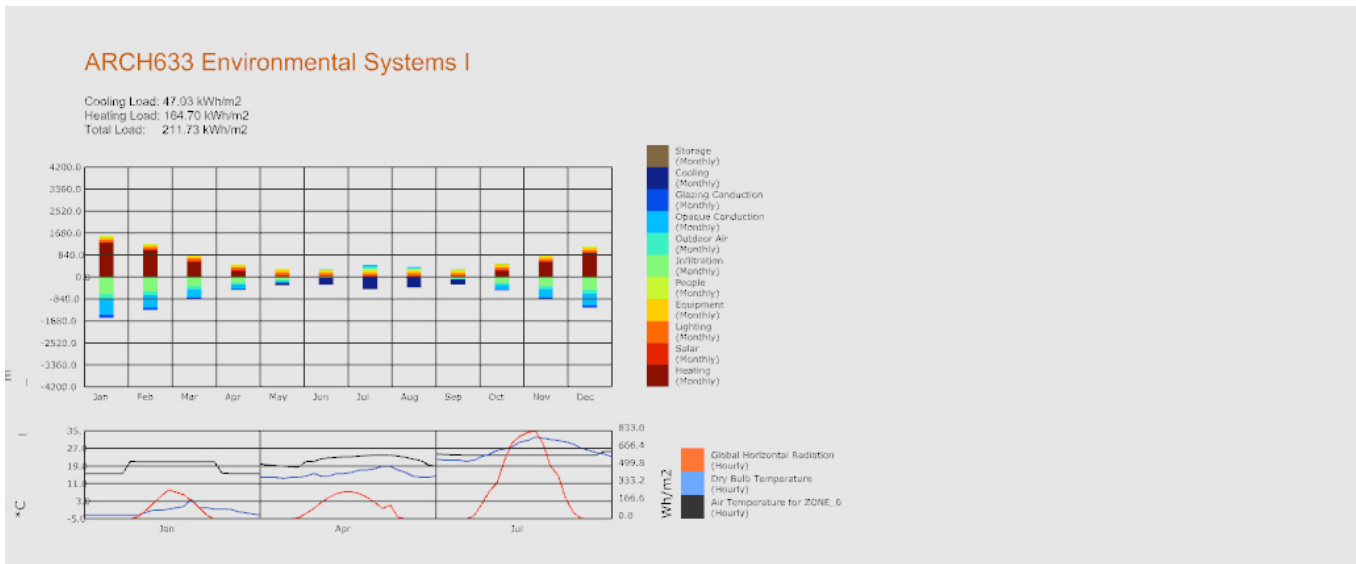
ALTERING CONSTRUCTION



Next I tried altering the construction of the building. I increased the R value of the exterior of the building to 34.4 so that it would hopefully be better insulated and therefore require less energy to heat in the winter and cool in the summer. I also increased the R value of the exterior windows to 1.9, and the R value of the exterior roof to 34.4. Again, I hoped that doing so would insulate the building more so that less energy would be required to maintain the desired

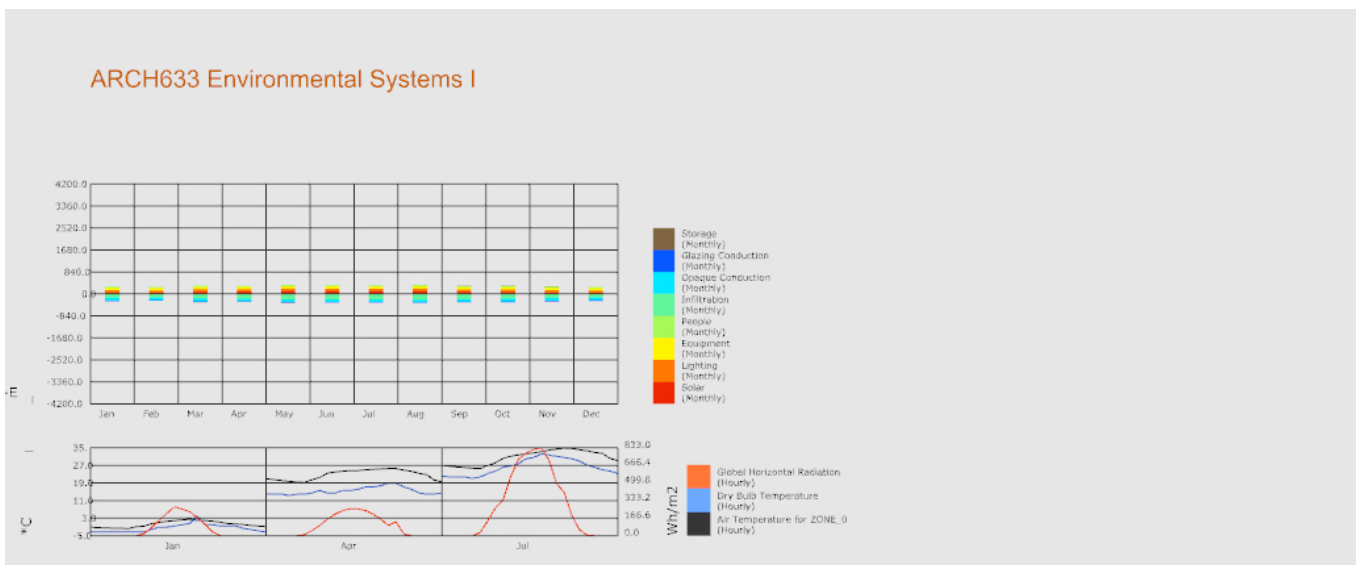
temperatures. However, changing the R value of the construction materials did not have the same impact that I hoped for, as most of the loads appeared identical to before.

ALTERING CONSTRUCTION II



Finally, I tried increasing the slab to 4 inches, hoping that that would also help to insulate the building and preserve the desired temperatures. Increasing the slab seemed to have a decent impact on the loads in the building, as it reduced all of the heating and cooling loads to some extent, as well as some of the opaque conduction loads.

FREE SYSTEM



After adjusting all these parameters, I made the system a Free Running Building, which drastically decreased the loads in all categories. Overall, I discovered that the windows and the slab thickness appear to have the biggest impact on the buildings loads, and its ability to perform. Based on the parameters I set, before making the building a free running building, the temperature in the structure was fairly consistent year round. However, once it became a free running building, the loads became less but the amount that the buildings temperature altered greatly increased.