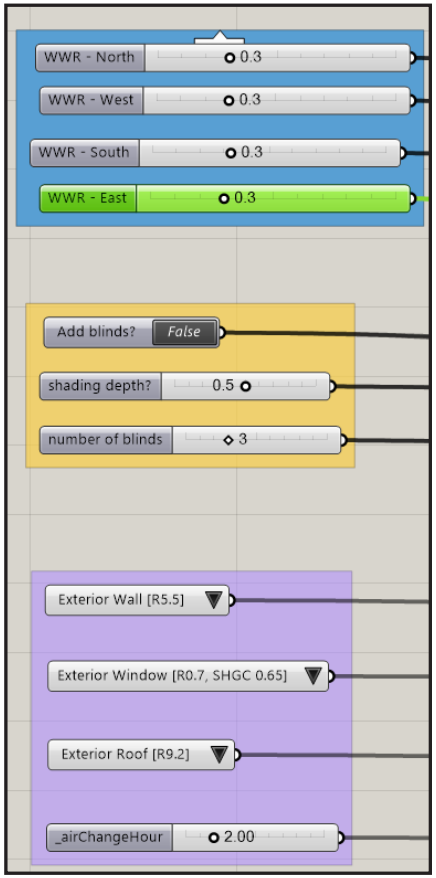
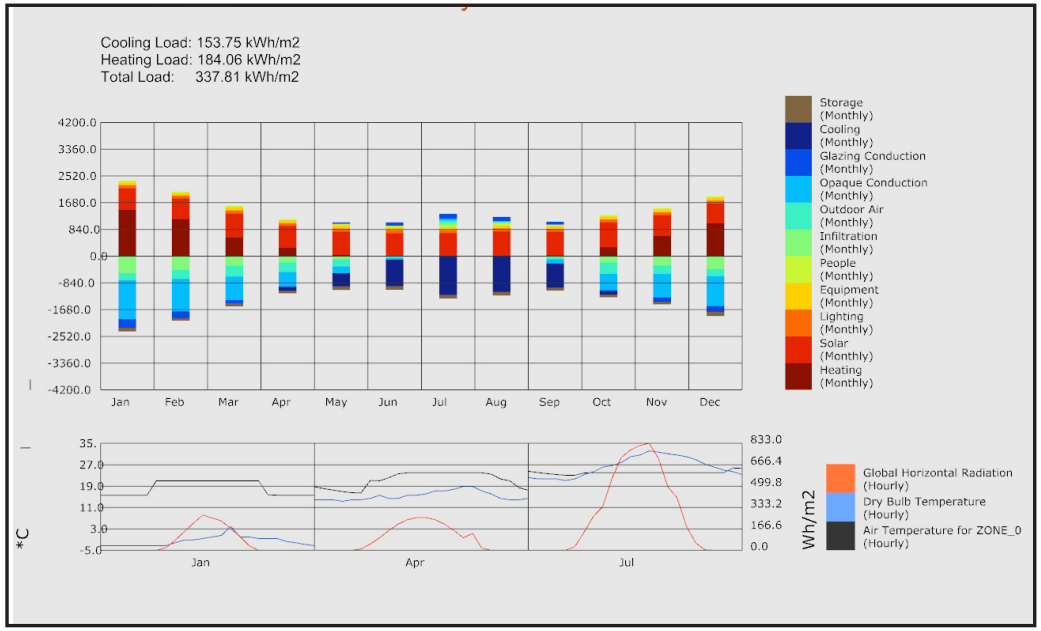
ATTEMPT #1: GIVEN SETTINGS

GRASSHOPPER PARAMETERS



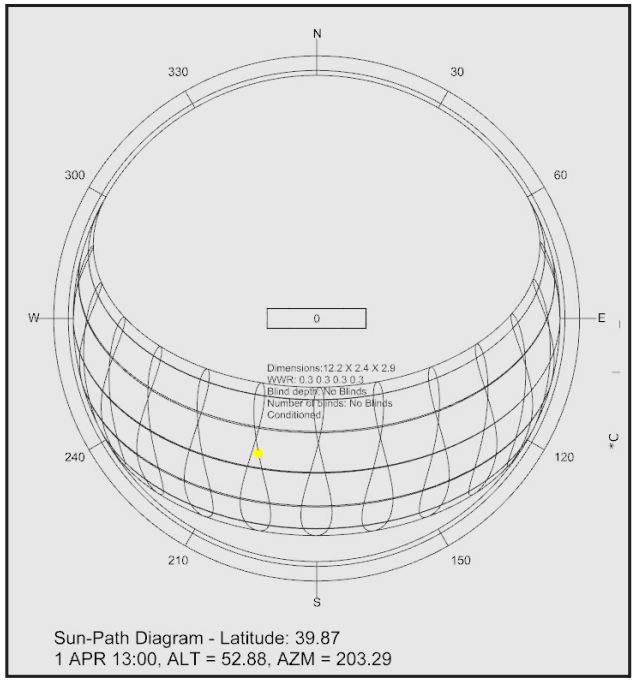
RESULTS



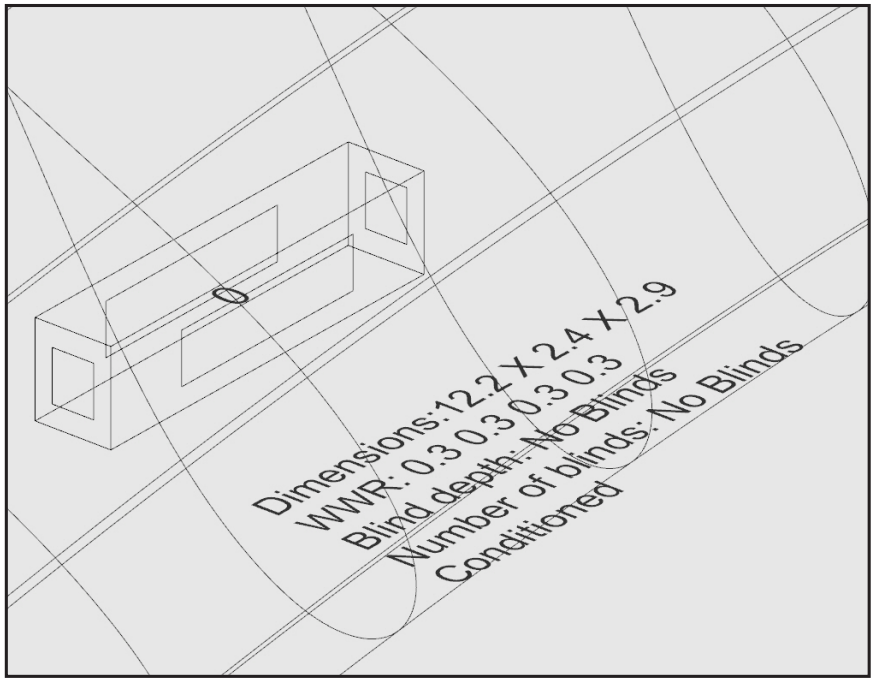
COMMENTS

This given set of parameters will act as a control to test the efficiency of different measures. In this model, both active heating and colling are needed in roughly the same proportions.

MODEL VIEW 1



MODEL VIEW 2



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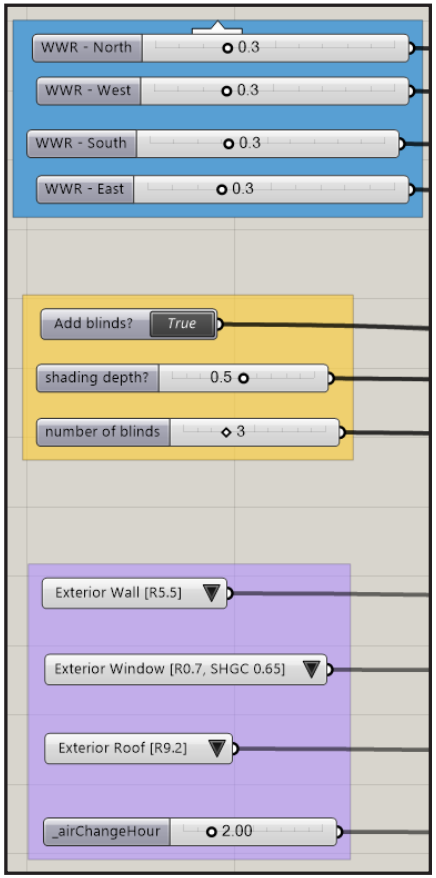
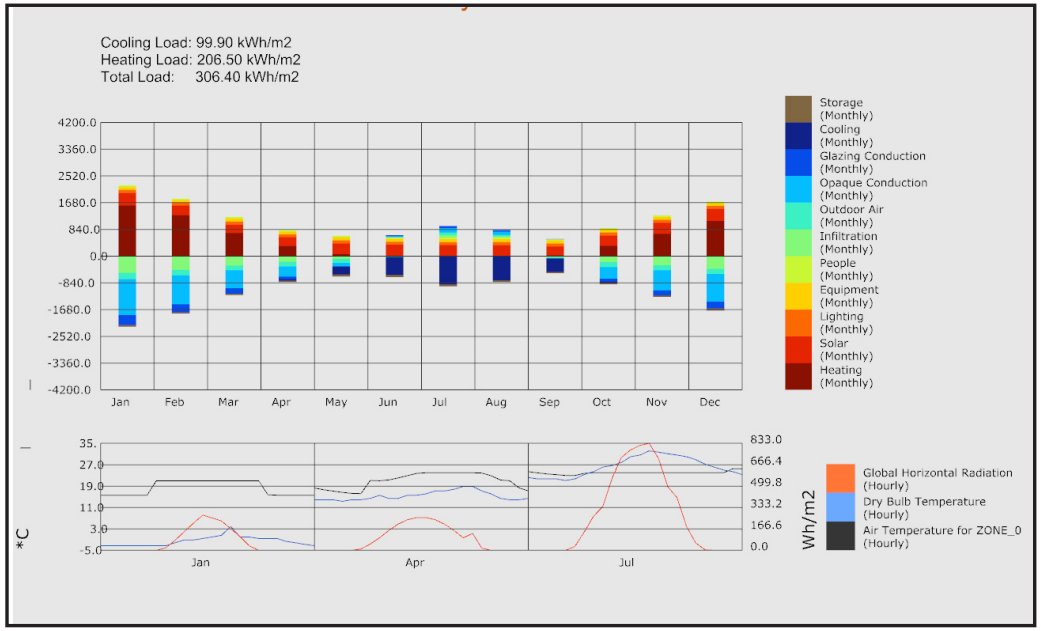
ATTEMPT #2: BLINDS ADDED

GRASSHOPPER PARAMETERS



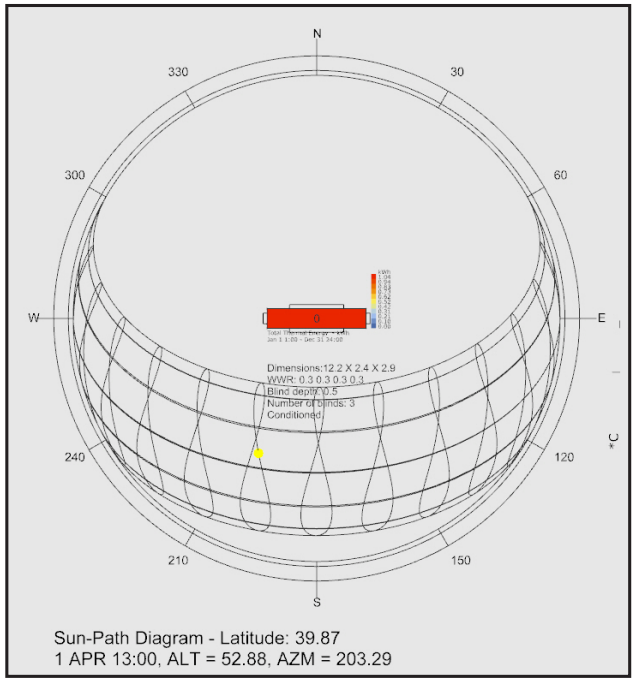
RESULTS



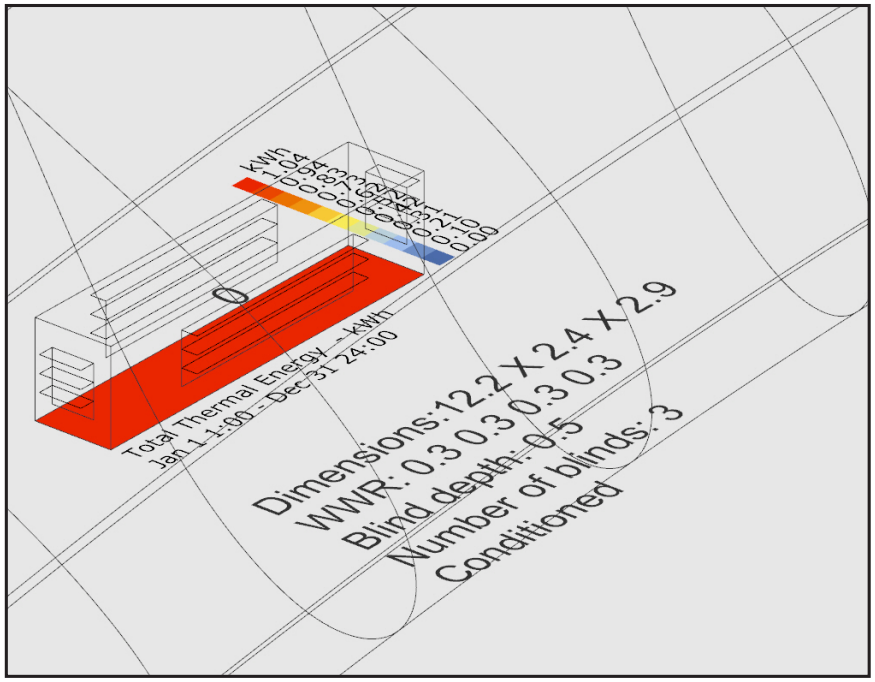
COMMENTS

Adding shading prevented solar heat gain during the warmer months while still allowing some gain during the winter. Overall energy costs were brought slightly down from this intervention.

MODEL VIEW 1



MODEL VIEW 2



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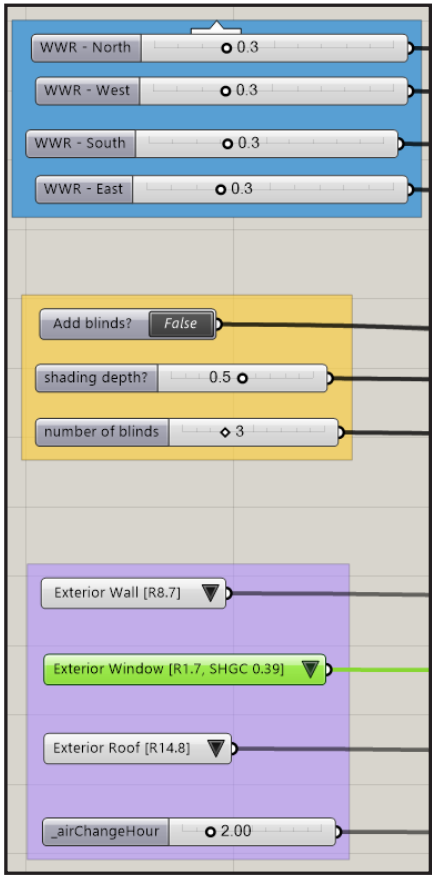
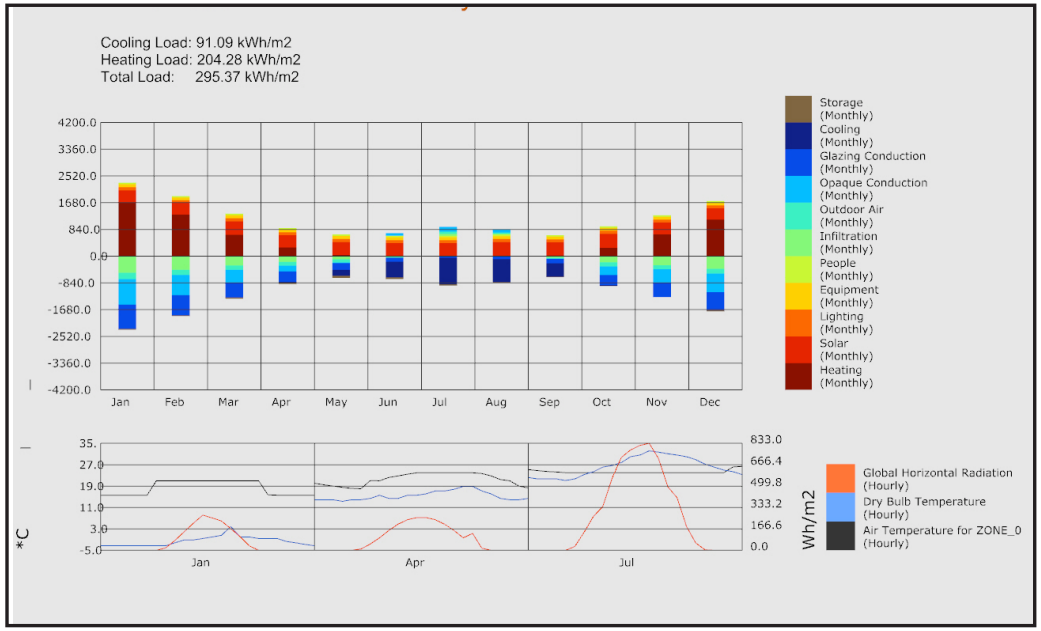
ATTEMPT #3: R-VALUES INCREASED

GRASSHOPPER PARAMETERS



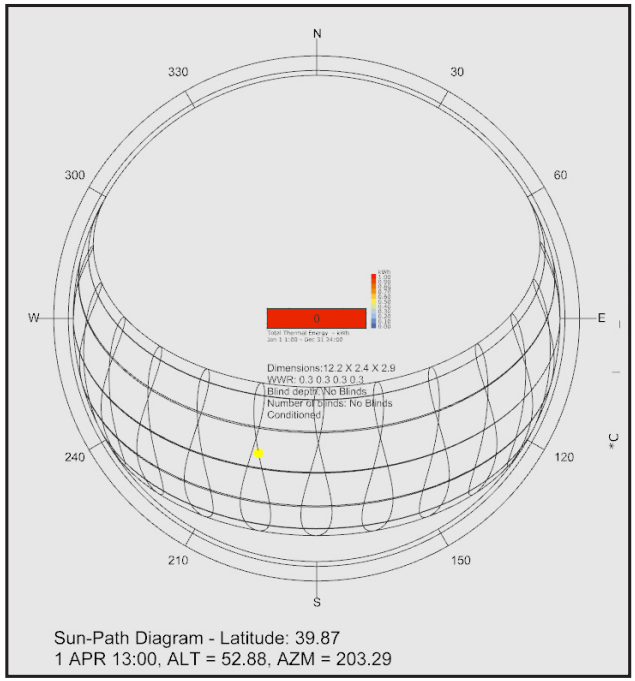
RESULTS



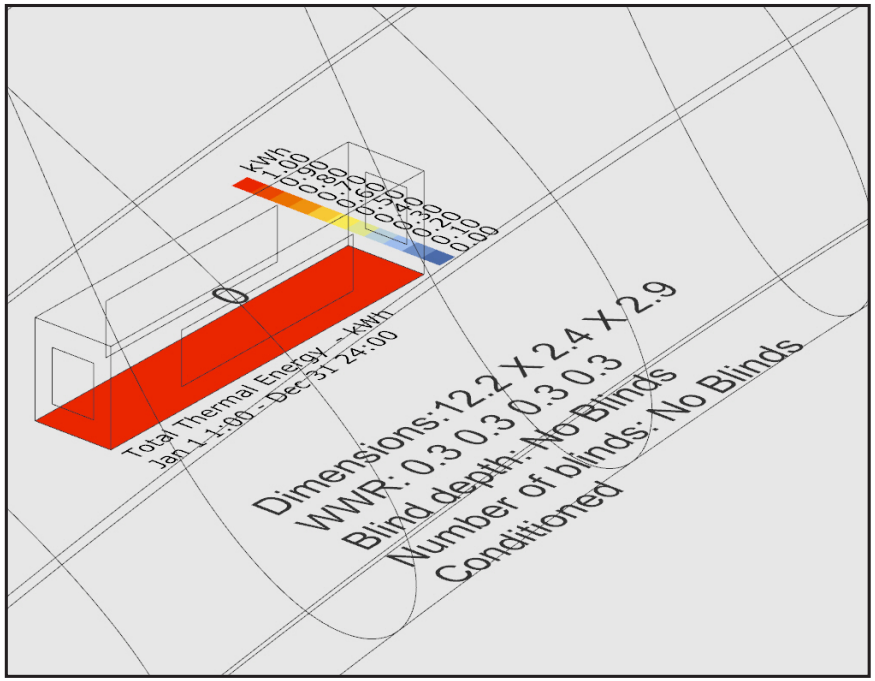
COMMENTS

Increasing the R Value of materials (predictably) aided in maintaining the building's temperature in both hot and cool months. This material change was more effective than the geometric change of the blinds.

MODEL VIEW 1



MODEL VIEW 2



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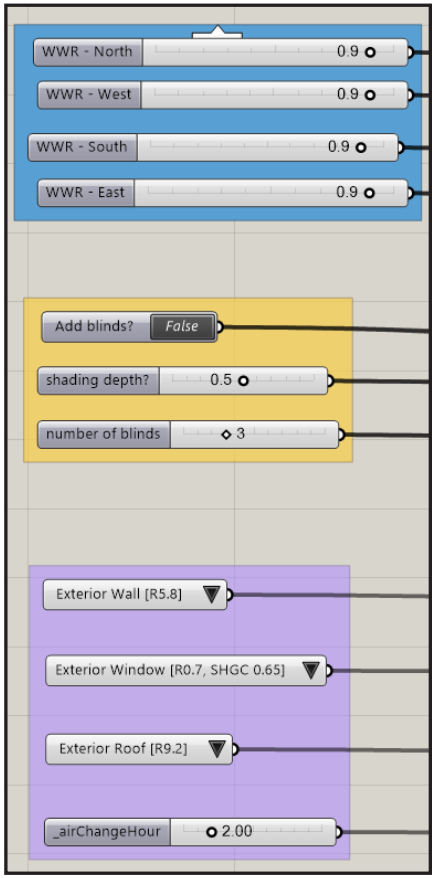
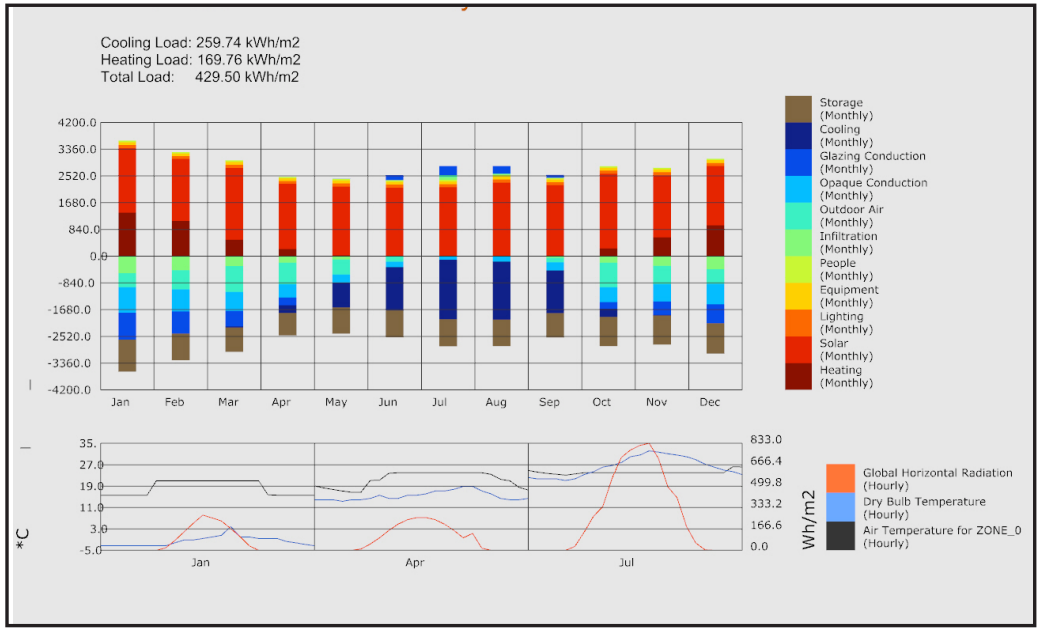
ATTEMPT #4: FENESTRATION % INCREASED

GRASSHOPPER PARAMETERS



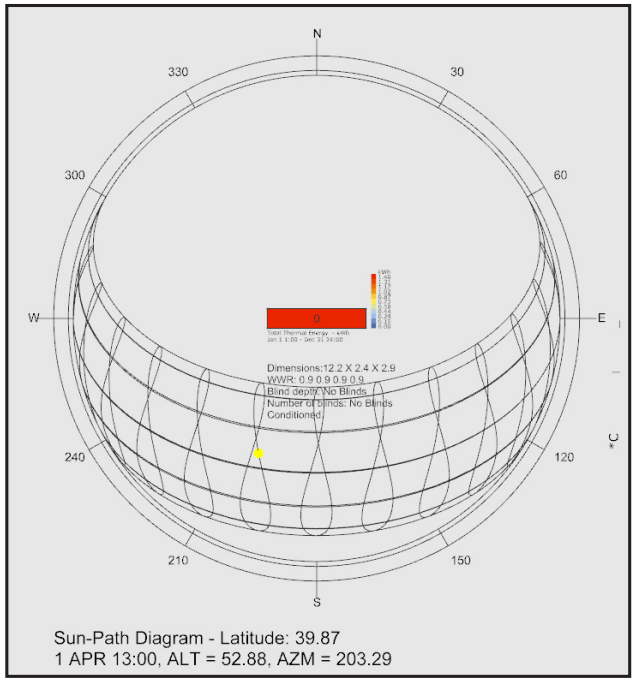
RESULTS



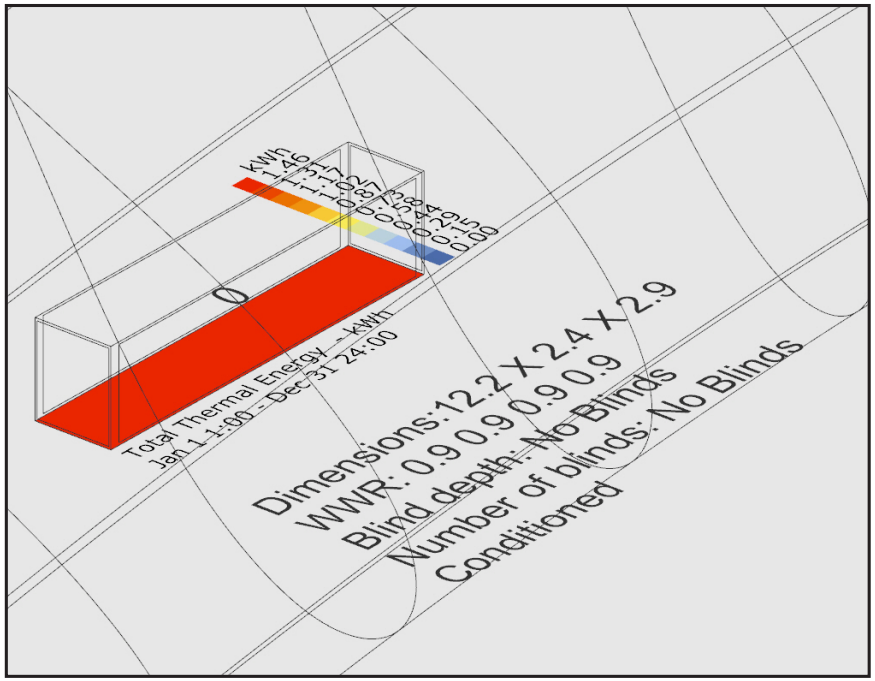
COMMENTS

Solar gains provided a lot of heat to the building, lowering heating costs during the colder months, but unwanted heat gain in the summer raised cooling costs a lot.

MODEL VIEW 1



MODEL VIEW 2



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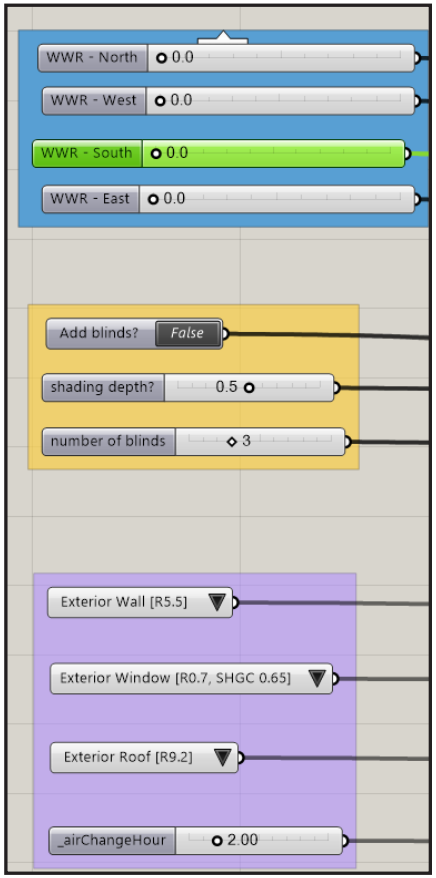
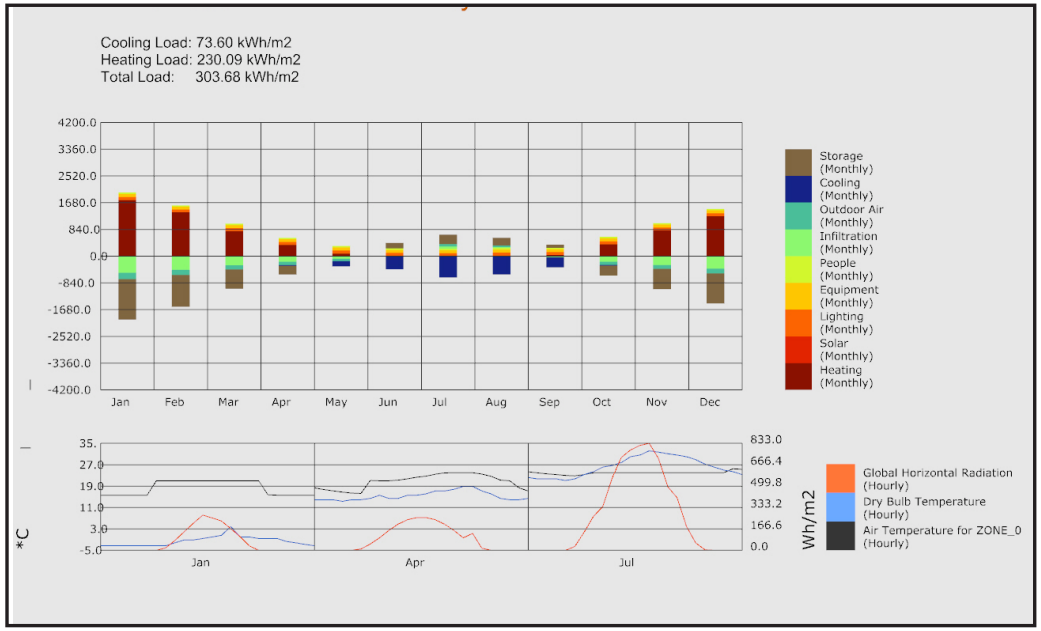
ATTEMPT #5: FENESTRATION ELIMINATED

GRASSHOPPER PARAMETERS



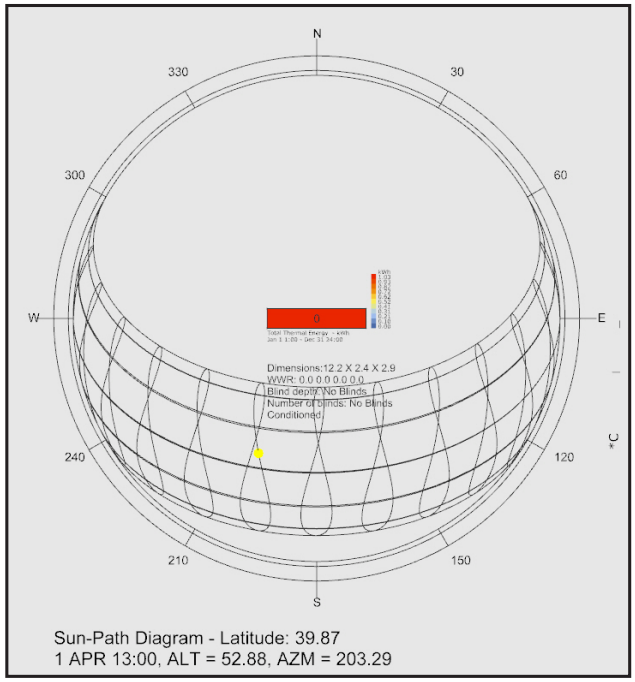
RESULTS



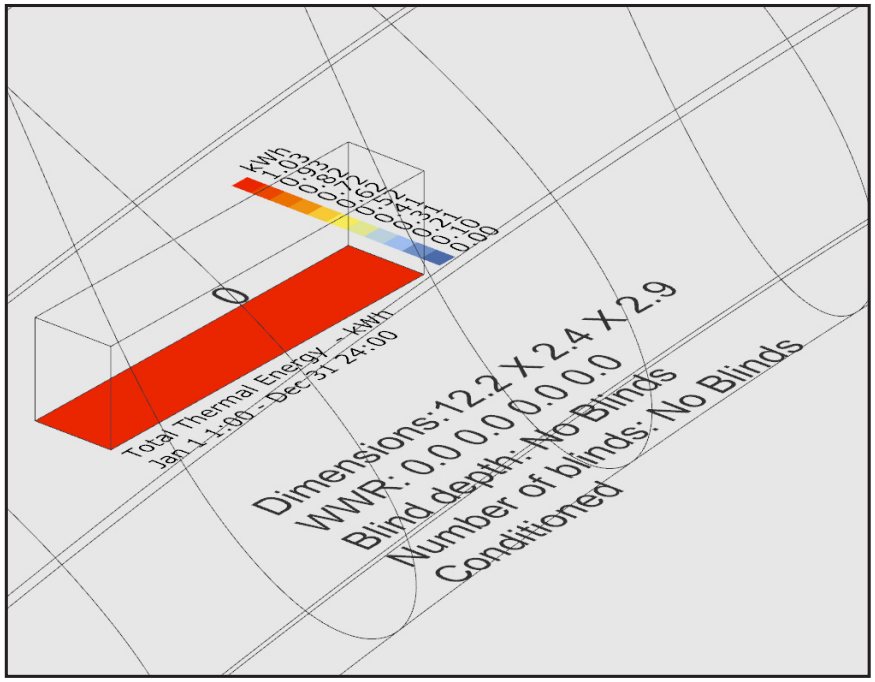
COMMENTS

Eliminating the fenestration on the building had a very positive effect in terms of reducing energy expenditure. The cooling load was dramatically decreased. However, no solar gains meant increased heating costs.

MODEL VIEW 1



MODEL VIEW 2



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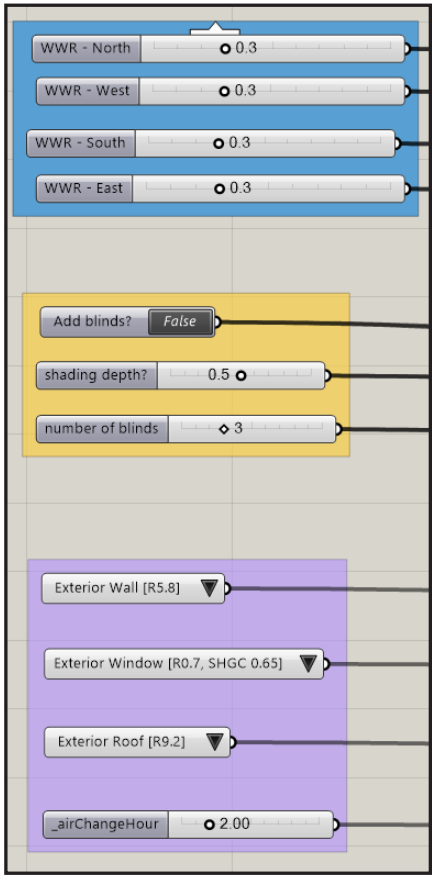
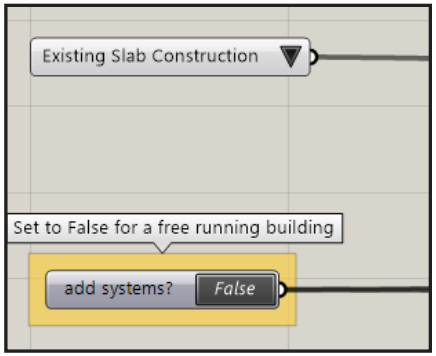
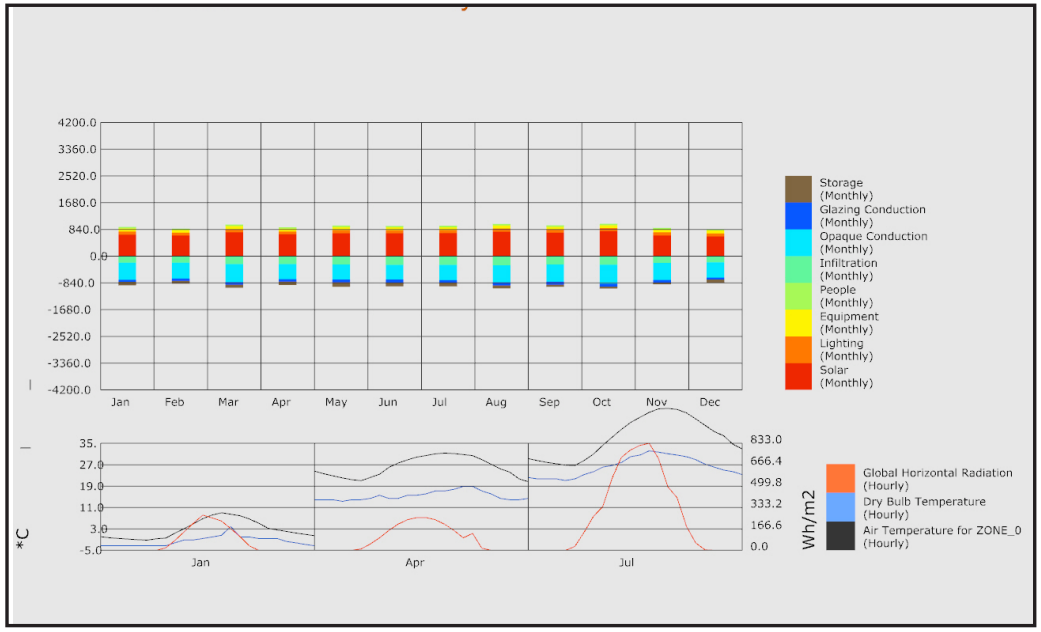
ATTEMPT #6: GIVEN SETTINGS, NO SYSTEMS

GRASSHOPPER PARAMETERS





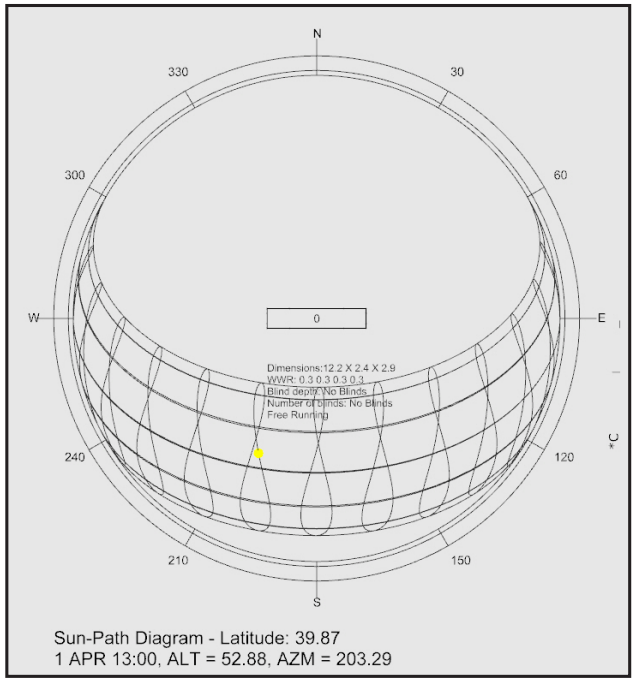
RESULTS



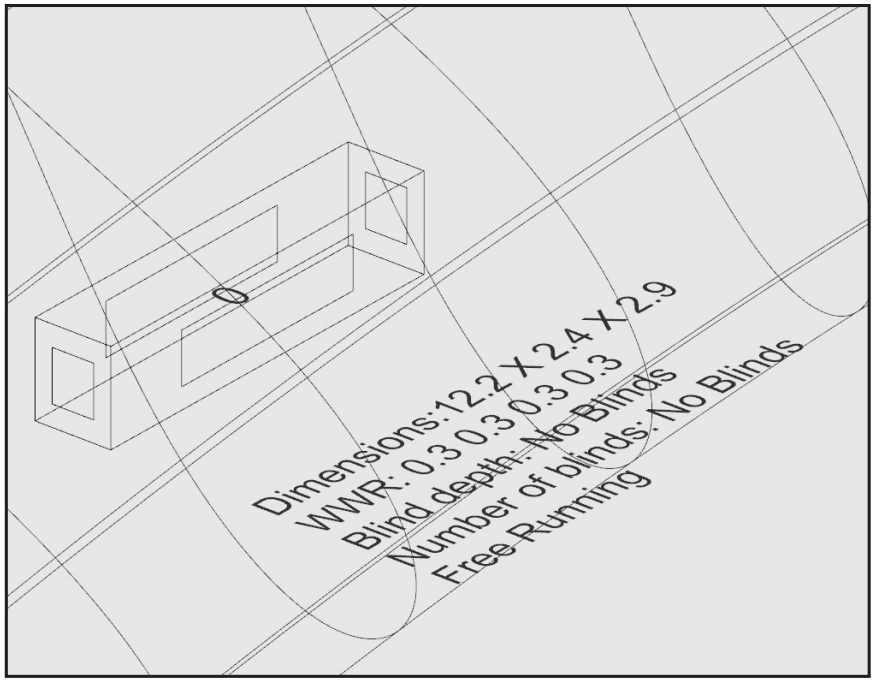
COMMENTS

Overall, results are relatively similar across months. This is likely due to the amount of fenestration, and also the lack of active systems means that the building has no way to resist heat gain and loss.

MODEL VIEW 1



MODEL VIEW 2



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OVERALL

COMMENTS

Using the given model as a control, I tested adding and subtracting fenestration, adding shading, and increasing and decreasing the R-Value of materials. From among these, the most effective was increasing the R-Values of the materials (in terms of a single variable that was changed). However, a combination of increased R-Value and strategic window placement, as discussed in the lab where we re-massed Meyerson, will yield the best results, as it will maximize the potential for passive heat gain when needed to offset cooling costs, while minimizing solar heat gain during the warmer months.

MOST EFFECTIVE SINGLE INTERVENTION: INCREASING R-VALUE

LEAST EFFECTIVE SINGLE INTERVENTION: INCREASING FENESTRATION