Daylight Analysis

Which is better?

Daylight is a useful tool and can be manipulated to be advantageous. The major objectives for the daylight system s are to redirect daylight further into the space so more fixtures can be dimmed thus saving on energy, improving visual comfort with glare control for the students sitting at the window's mercy, and achieving thermal control.

Rio Hondo is a great site for a daylighting building due to the site and location of the building. Sitting atop a hill, the library has few obstructions to become a great daylighting building. Having the sunny and clear skies of Southern California is also an advantage for the system. The architecture already plays into this with the glass façade, skylights, and clerestories.

Three different systems were investigated. Light shelves were put to the daylighting test. All light shelves were positioned so views were not lost in the spaces.

The interior daylight shelf redirects and reflects light, and reduced the amount of light received in the interior compared to the window alone.

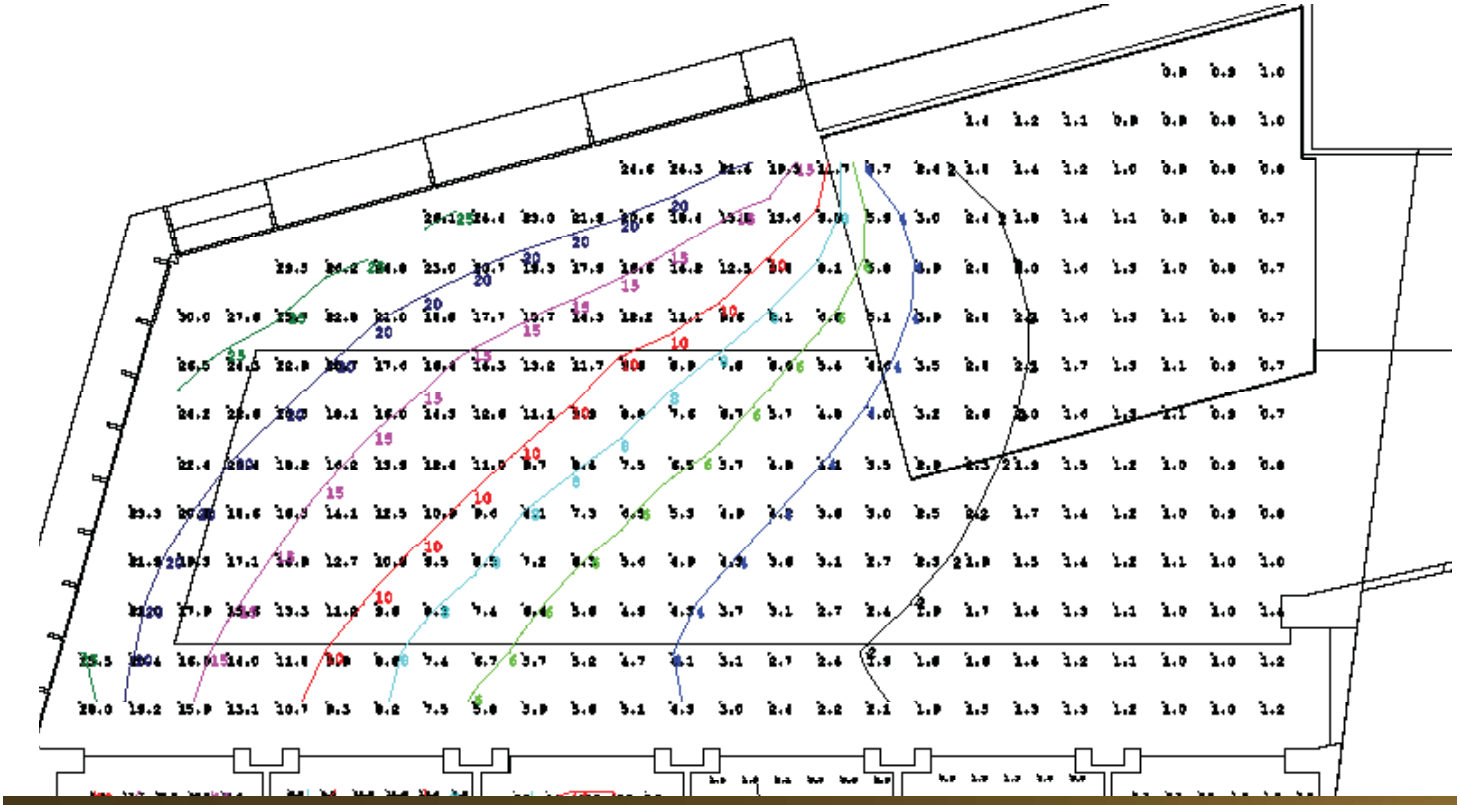
The purpose of the external light shelf is to increase the total amount of daylight in the space compared to the window alone.

Combining the systems into an interior/exterior shelf could have both the benefits.

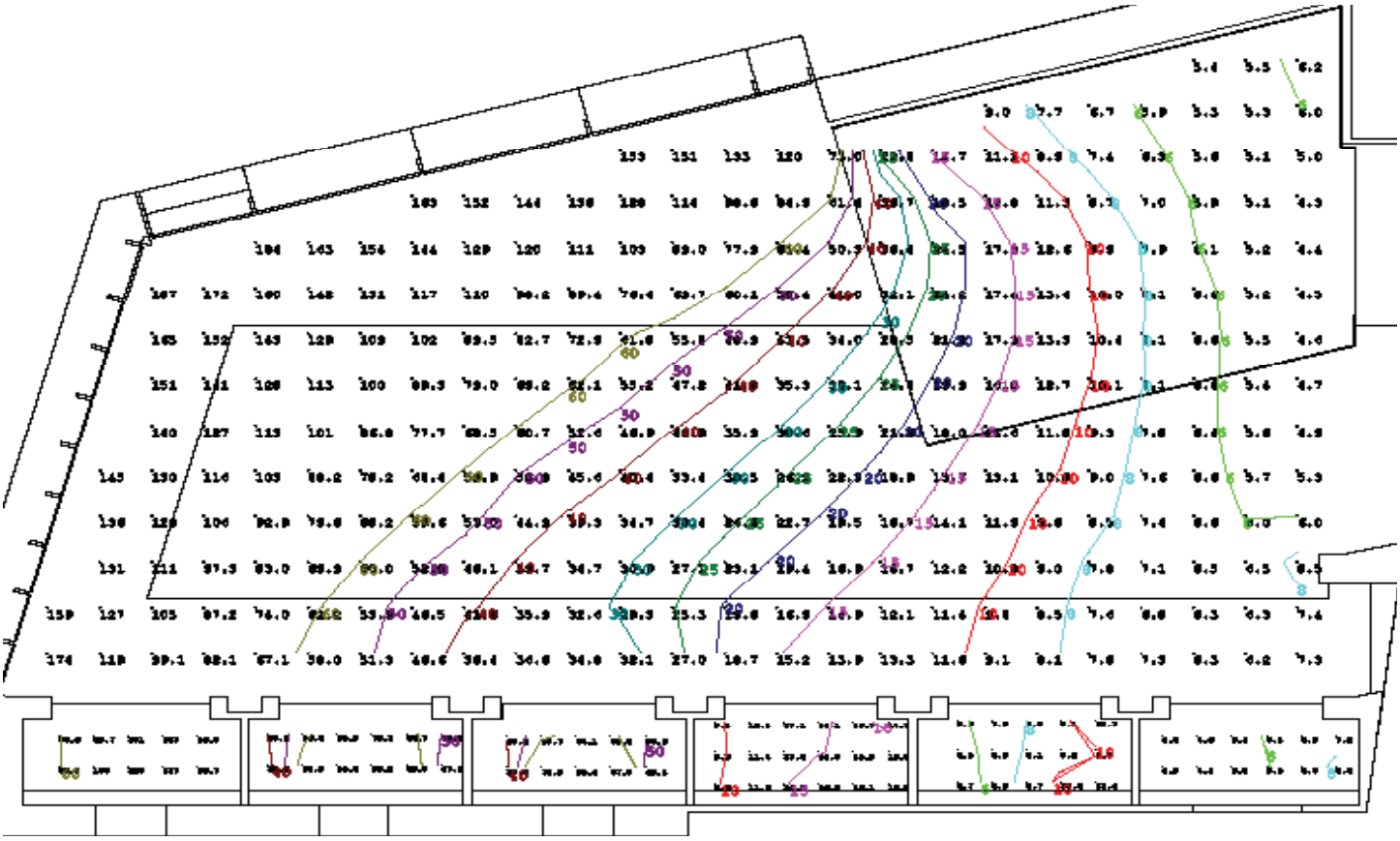
A daylight study was conducted for Feb 21 at 8:00 am, 11:00 am, and 3:00 pm. Light shelves output were then compared.

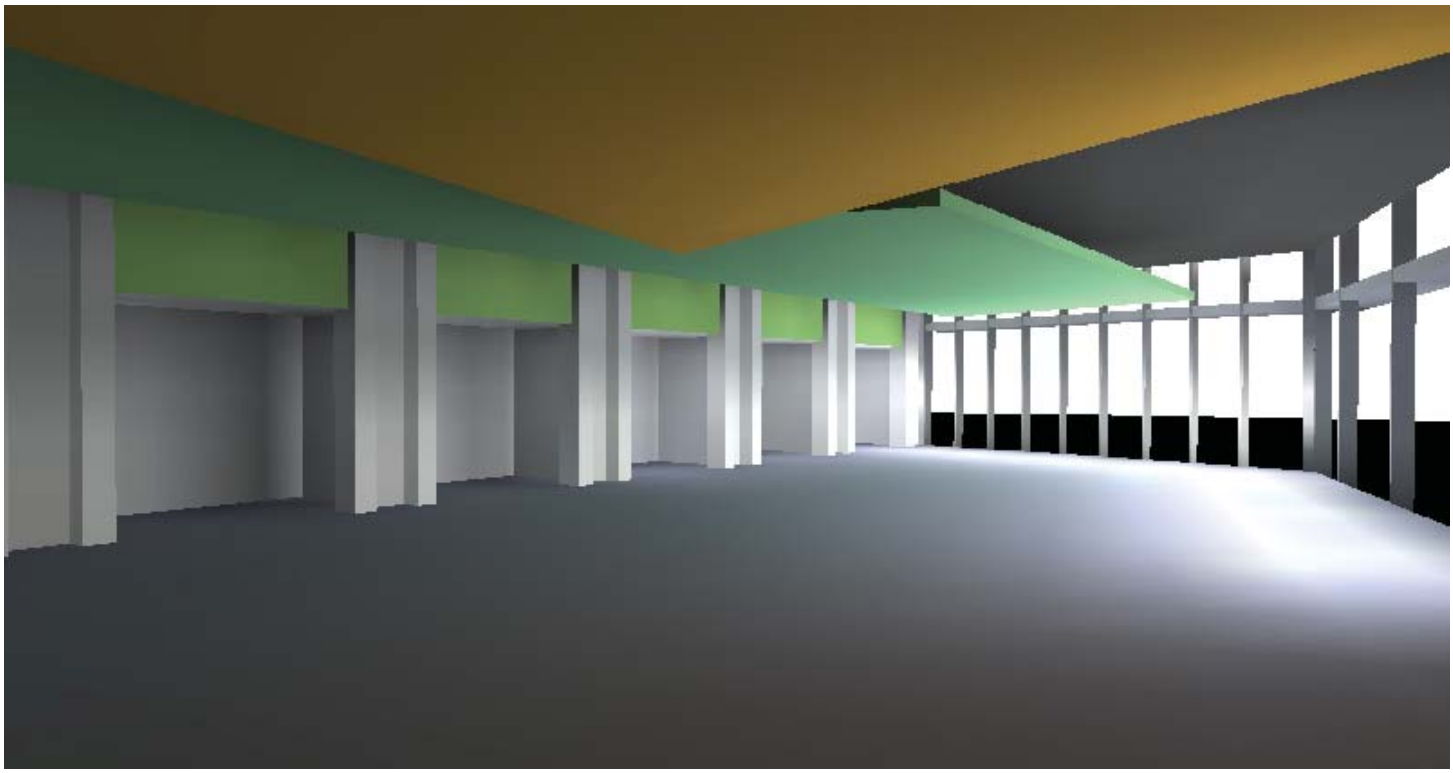
Exterior Shelf

8:00 am

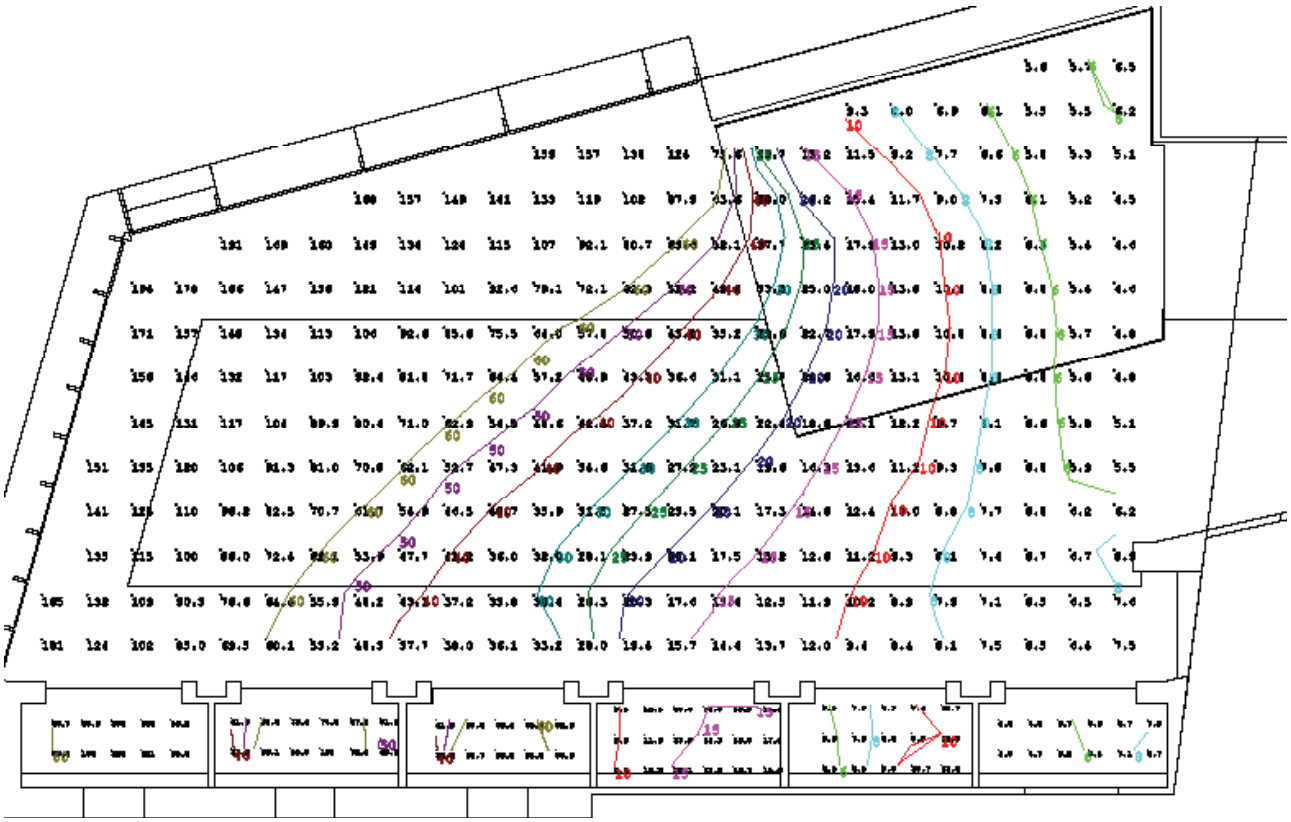


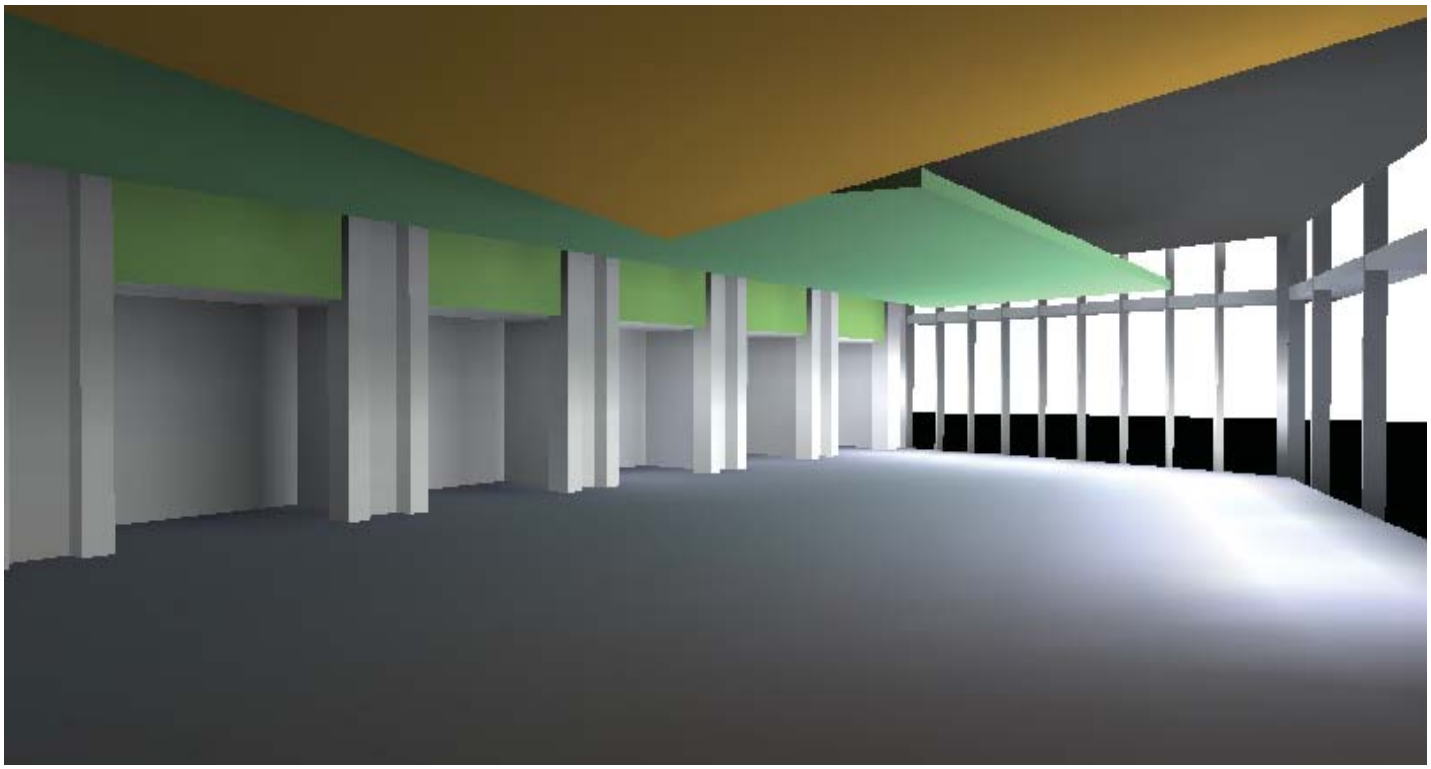
11:00 am





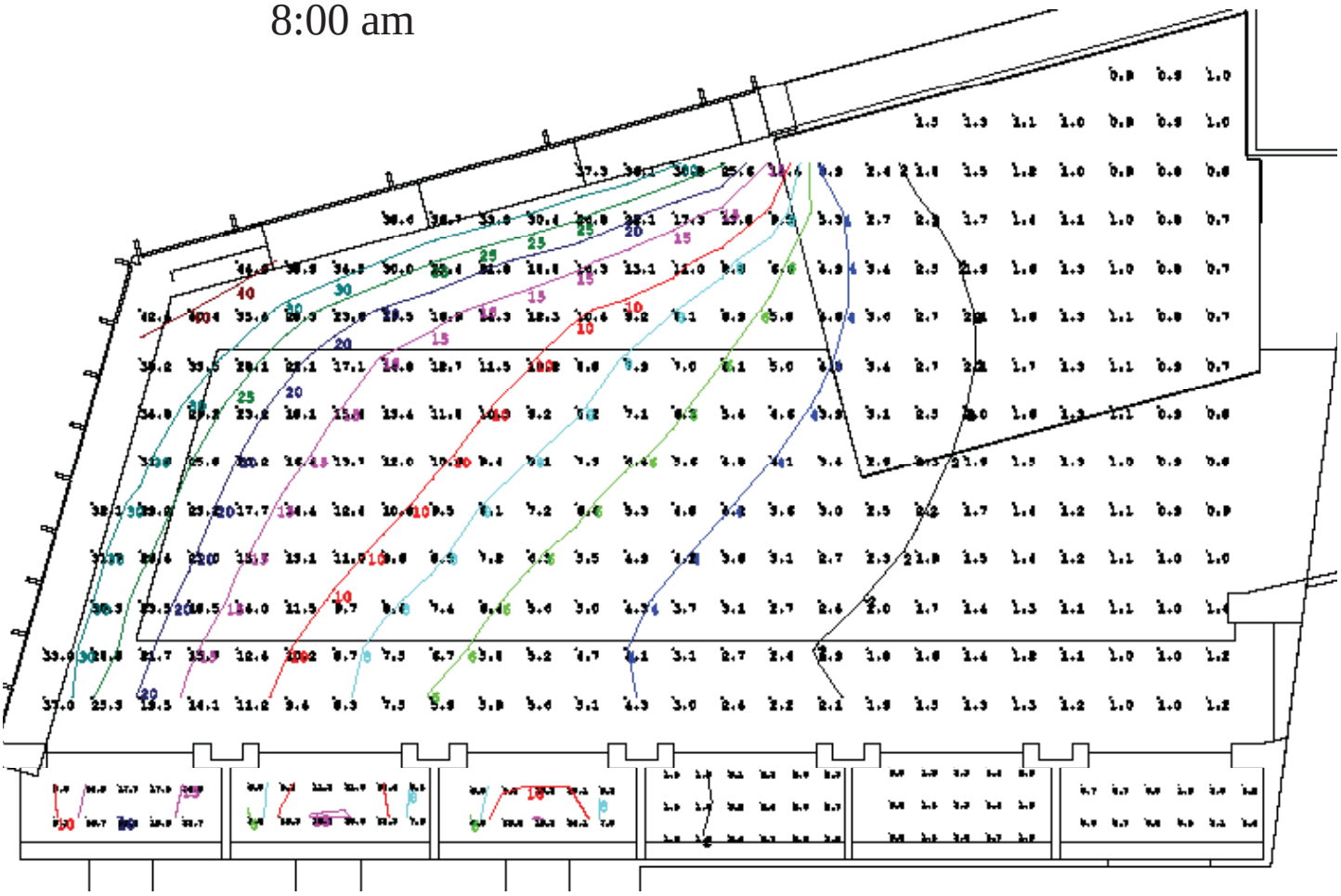
3:00 pm

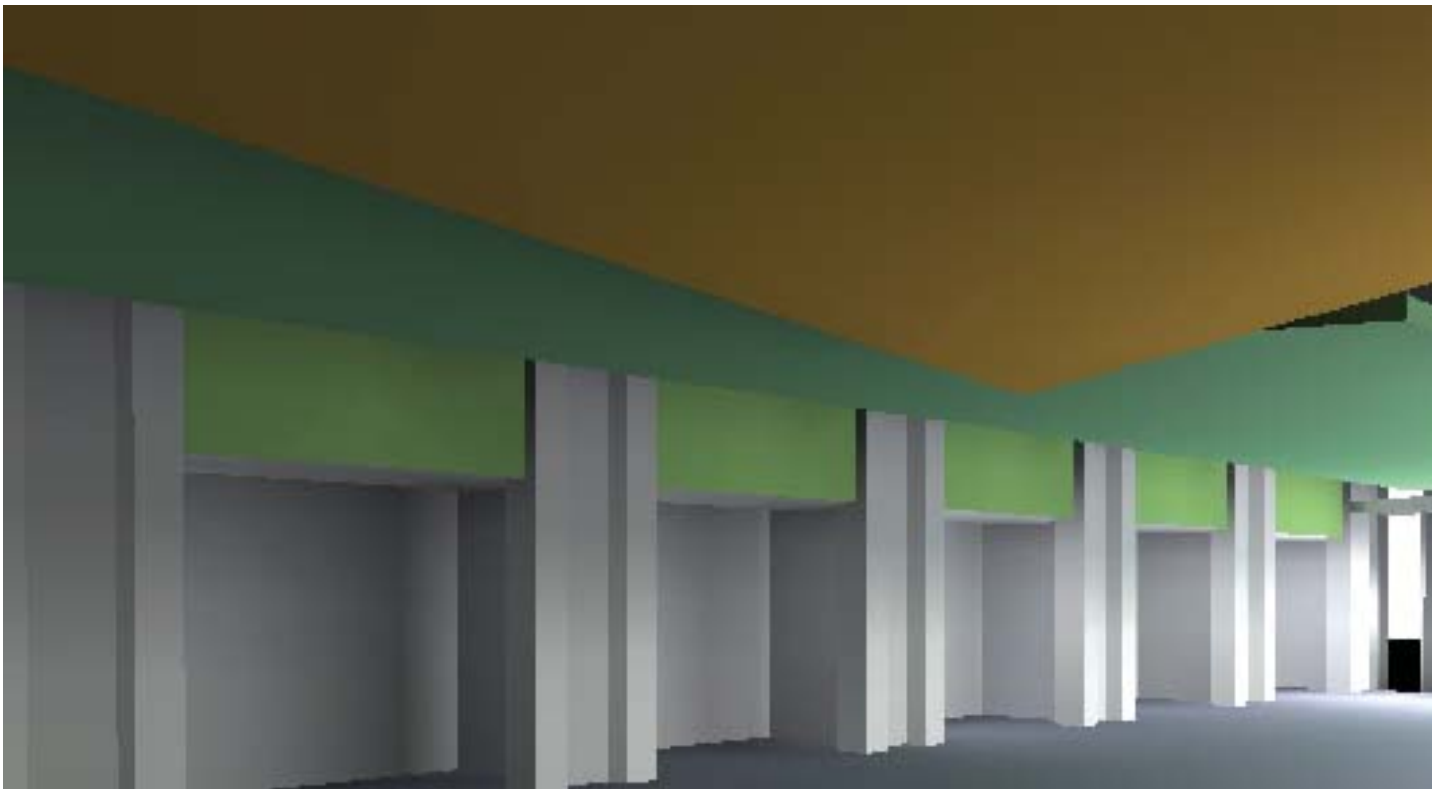




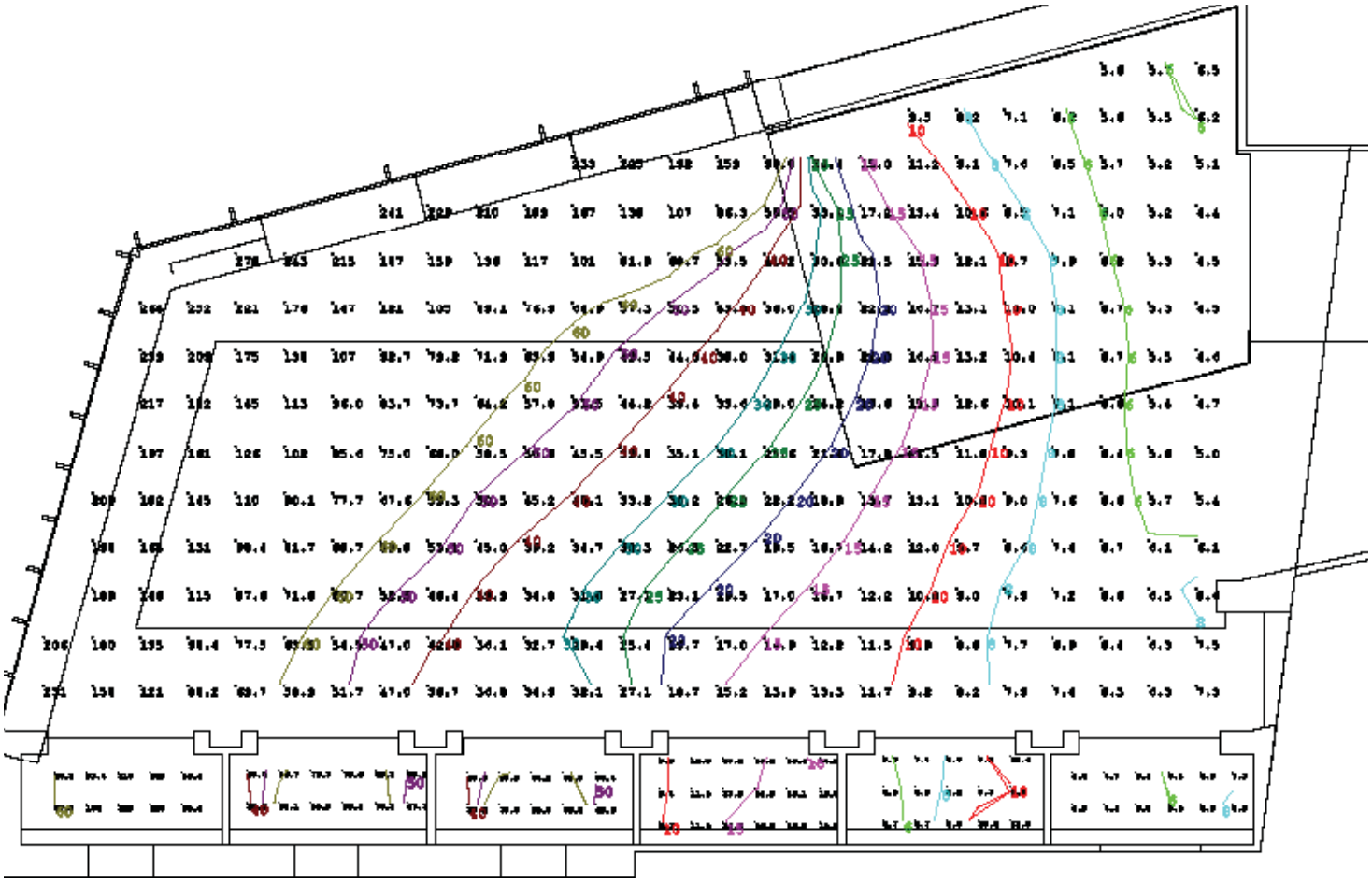
Interior Shelf

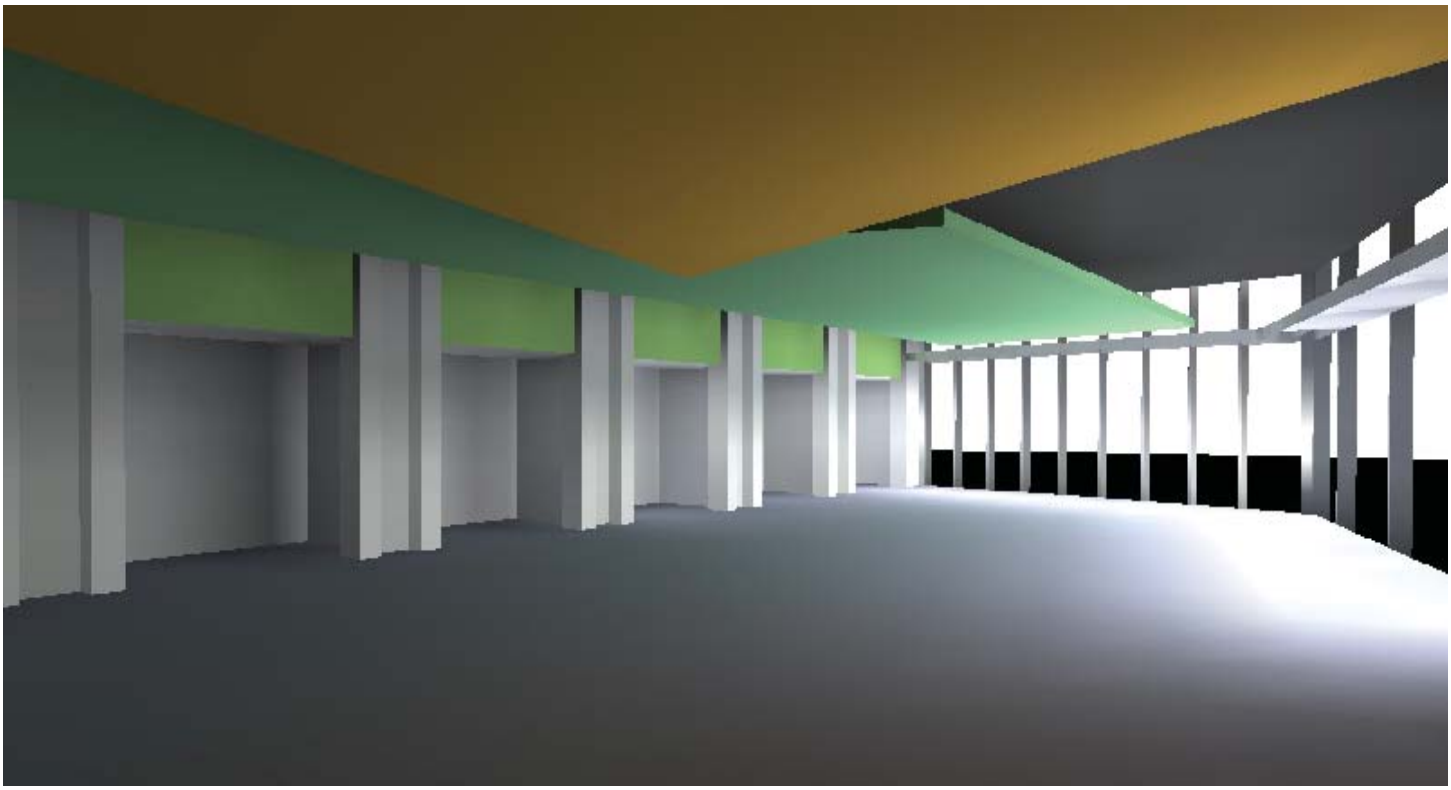
8:00 am



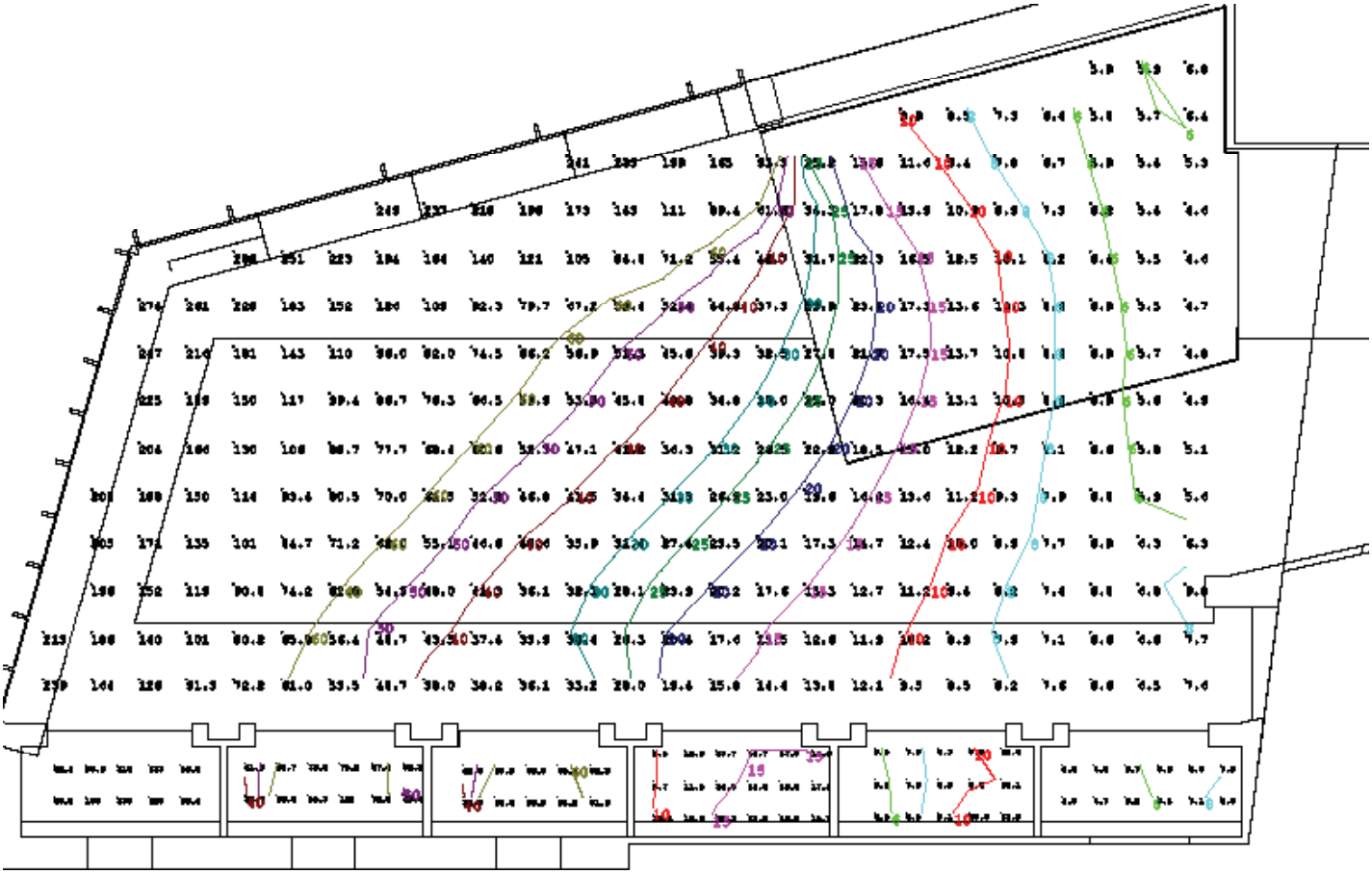


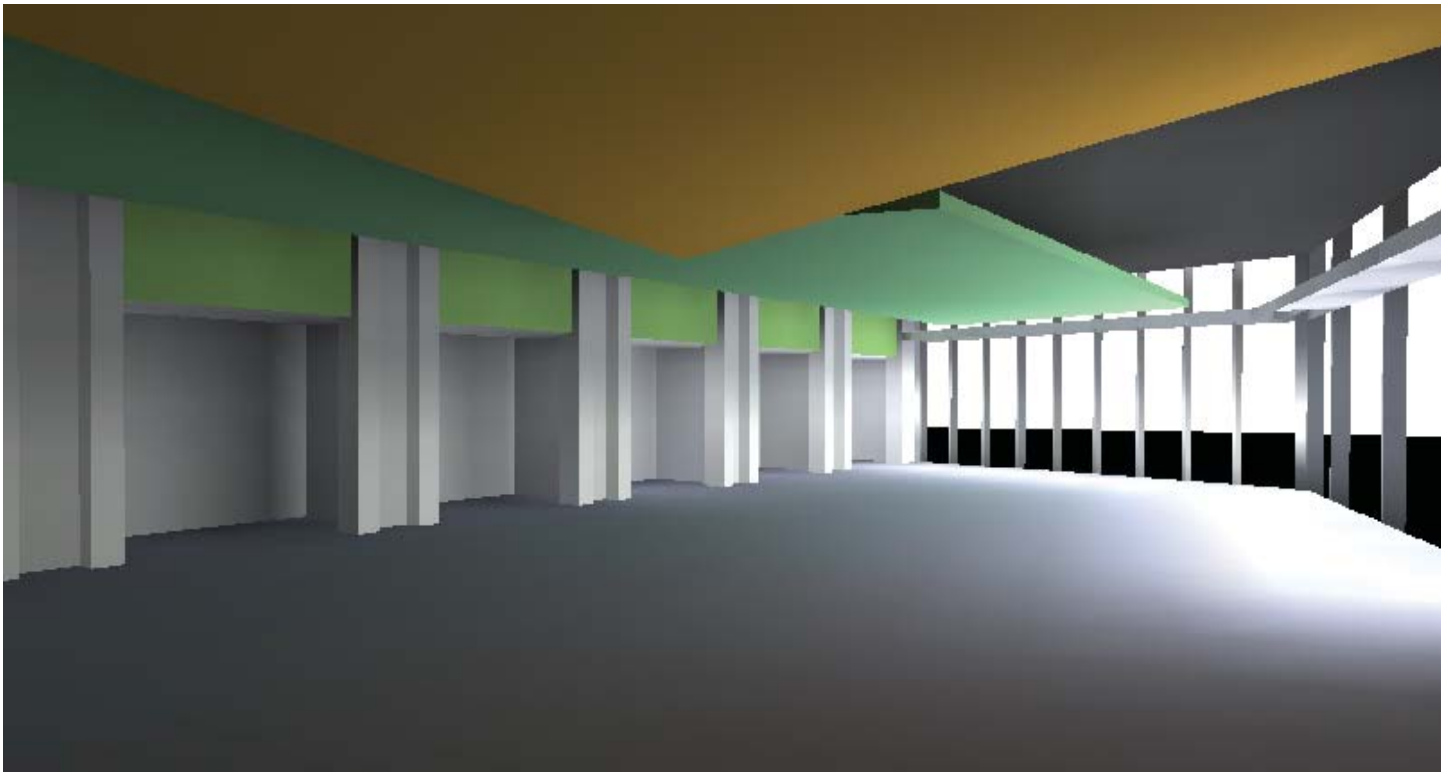
11:00 am



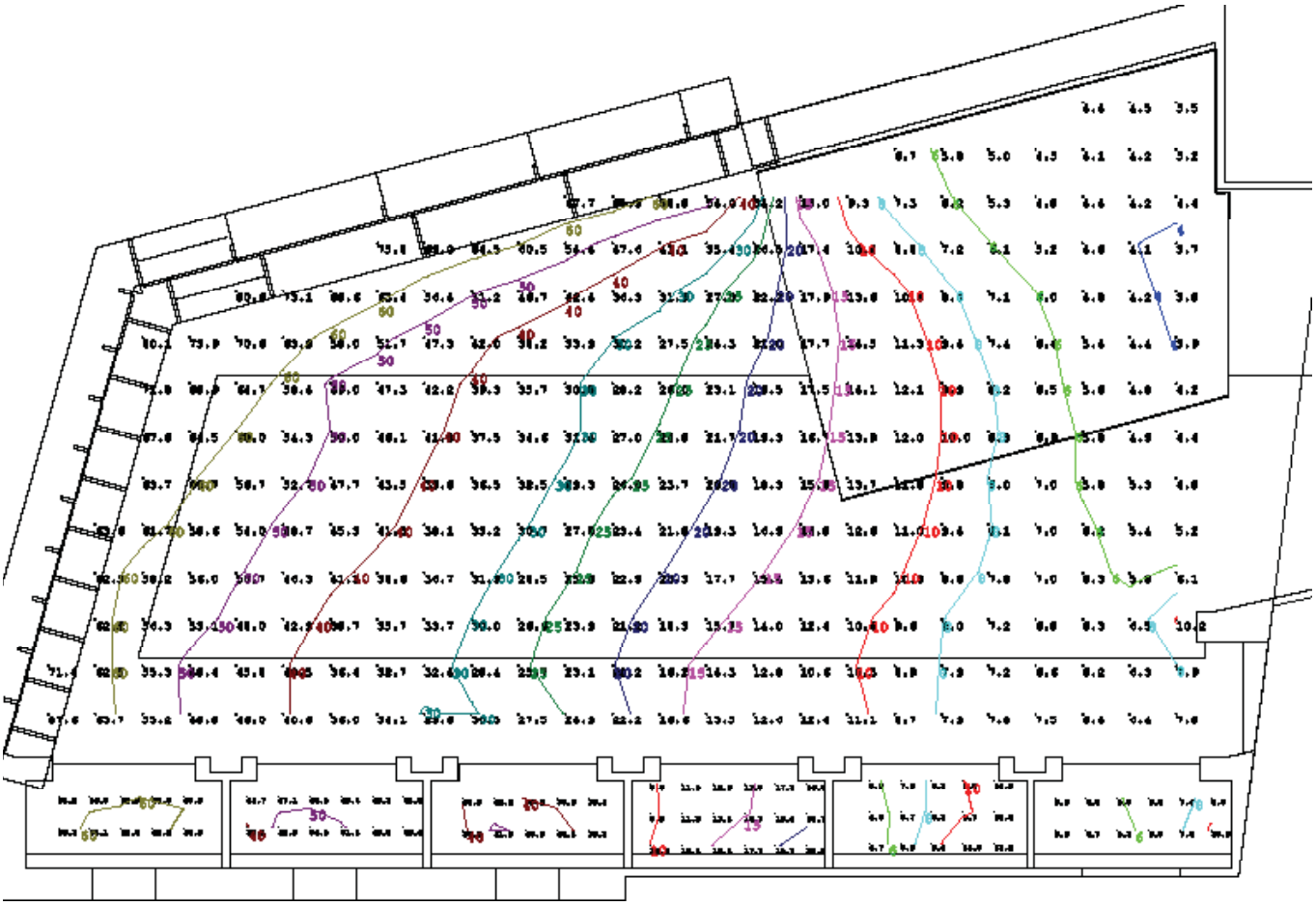


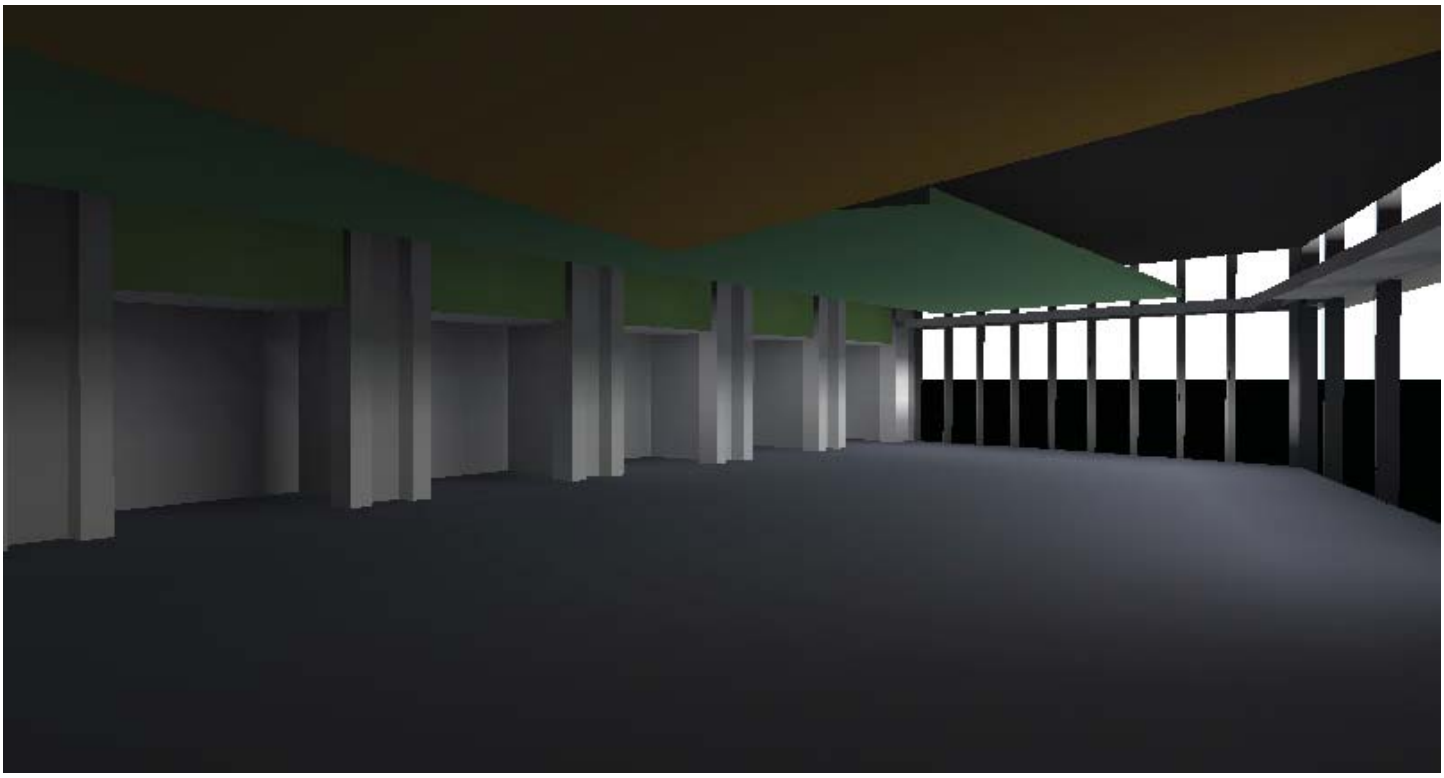
3:00 pm



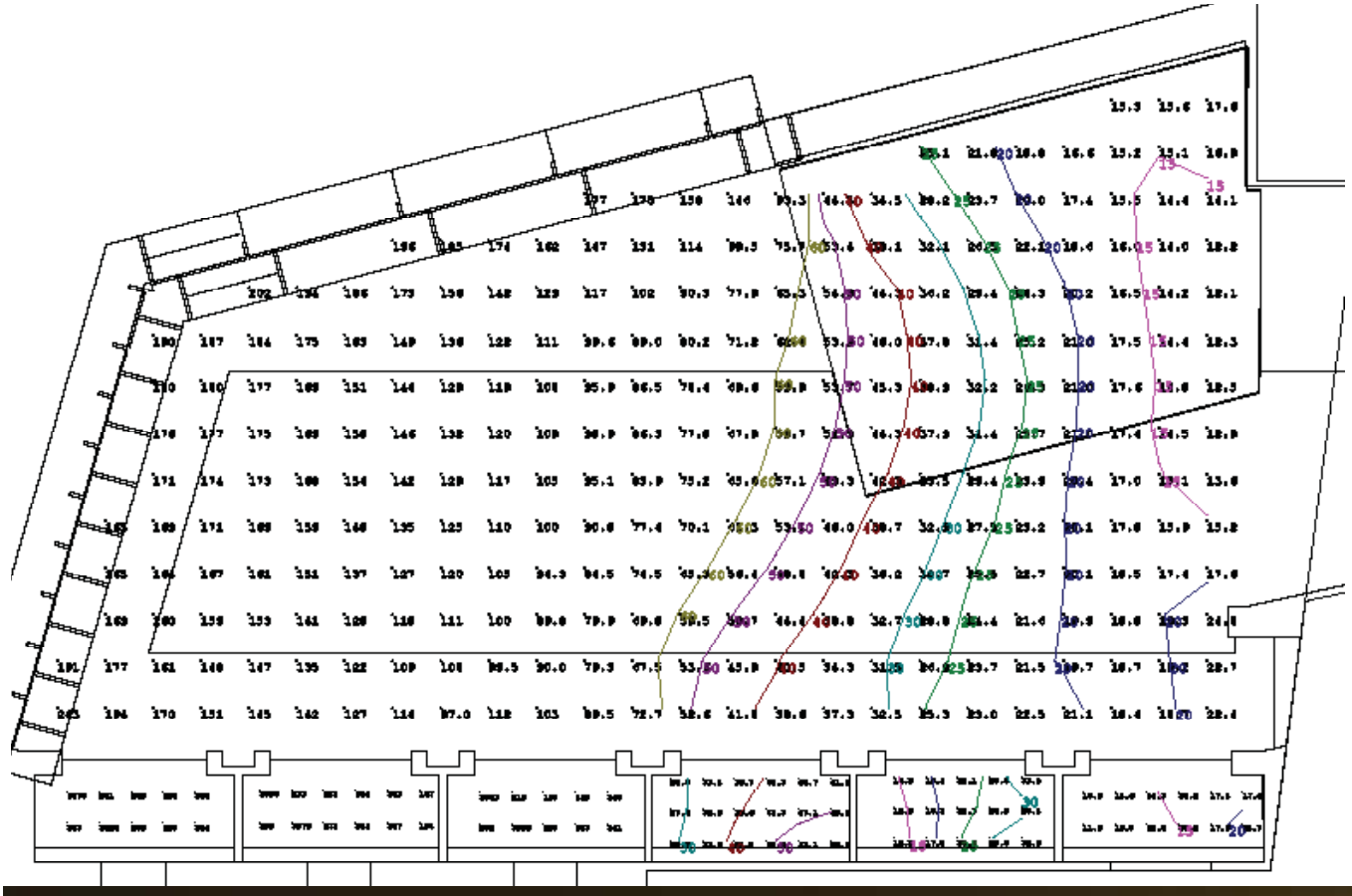


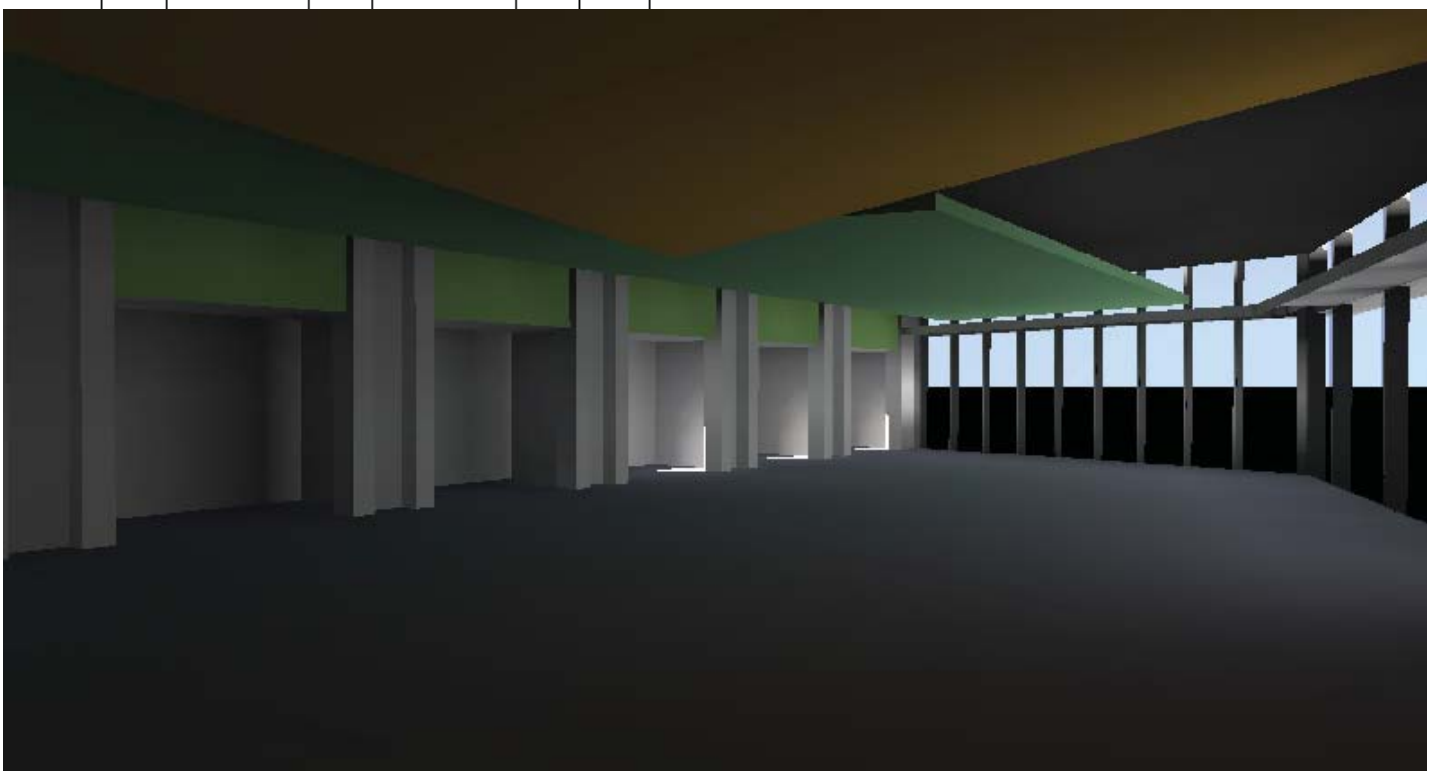
Interior/Exterior Shelf
8:00 am



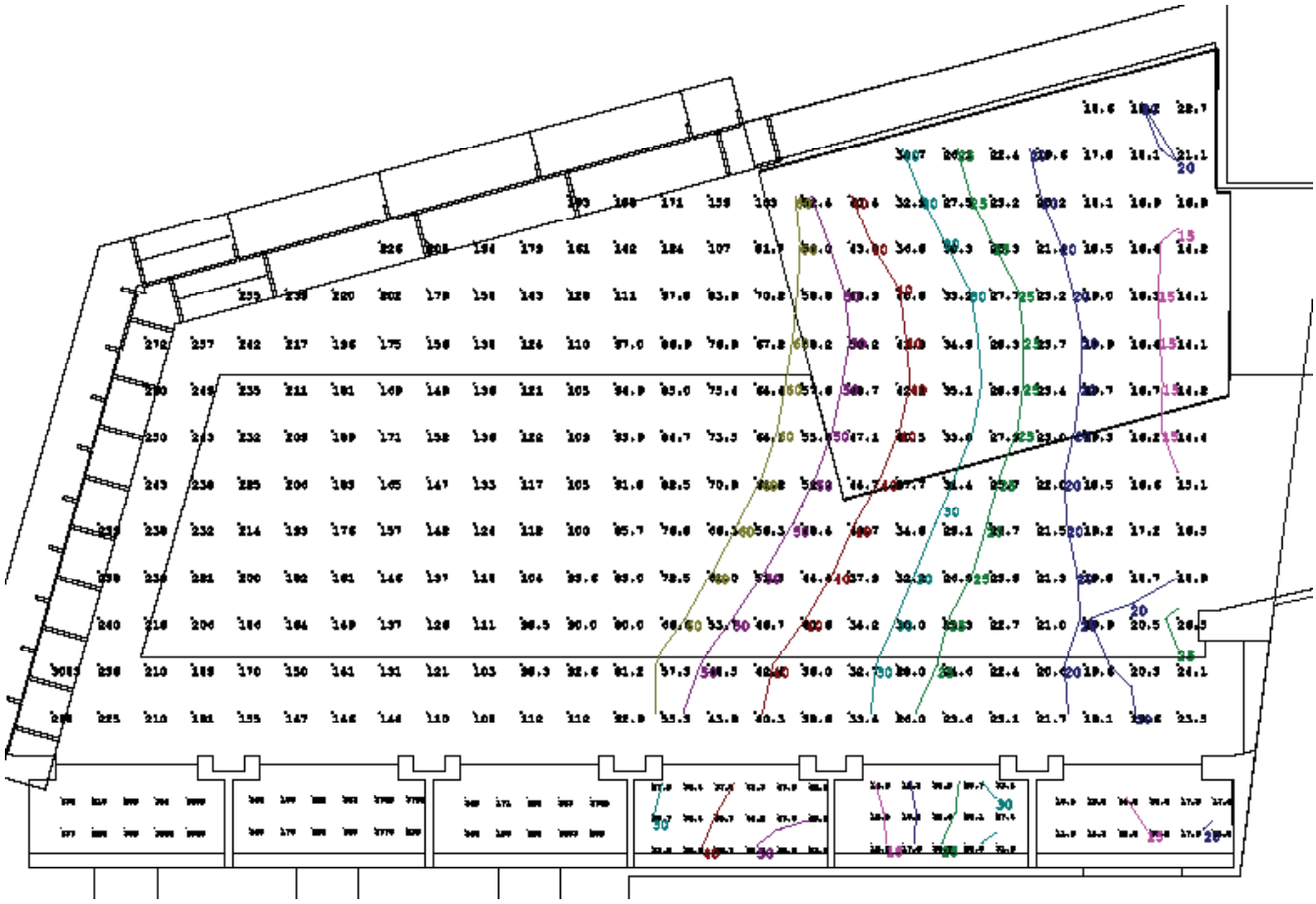


11:00 am





3:00 pm

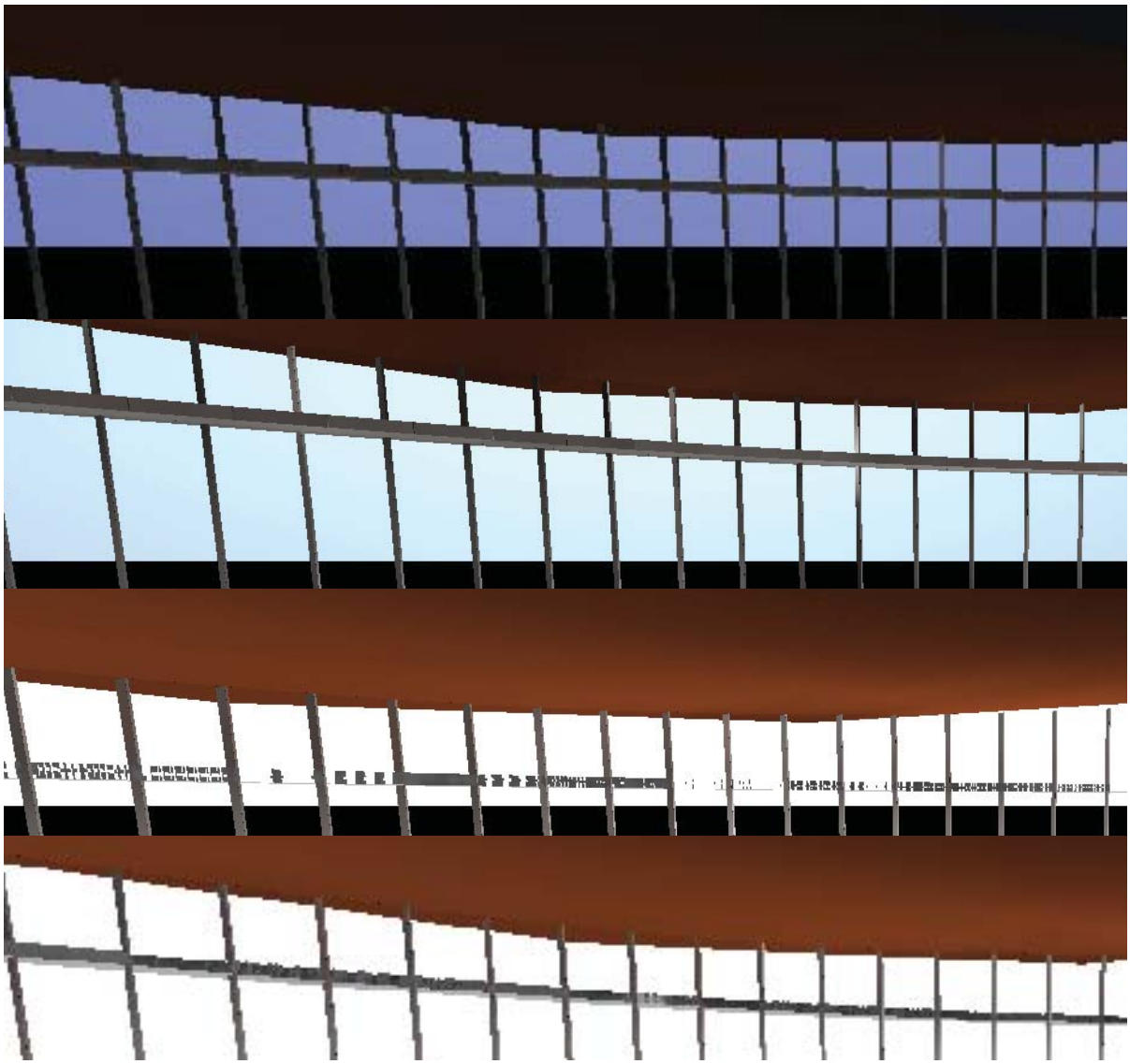


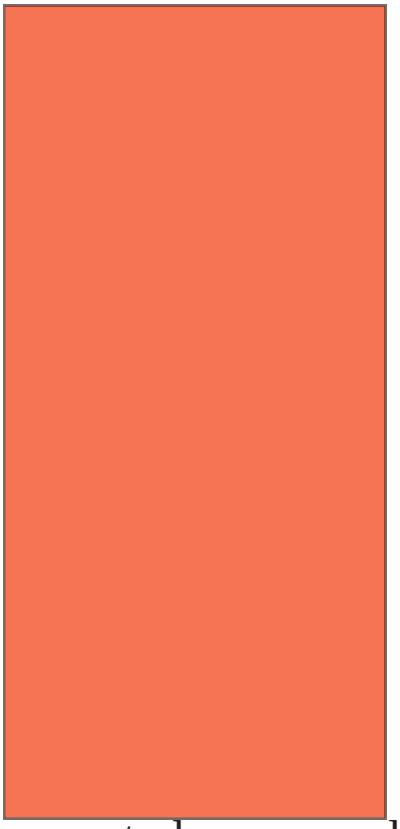
Conclusions

Seeing how the different systems differed under the same conditions was interesting. After seeing how each system was tested the choice was the interior shelf. This shelf aids in avoiding glare because it cuts off the direct sun angles at the student's that use the workspace along the perimeter. The shelf also directs a good amount of light further into the space. The electrical zoning control will be based on the zones of daylight into the area. Further information can be found in the electrical section of the report.

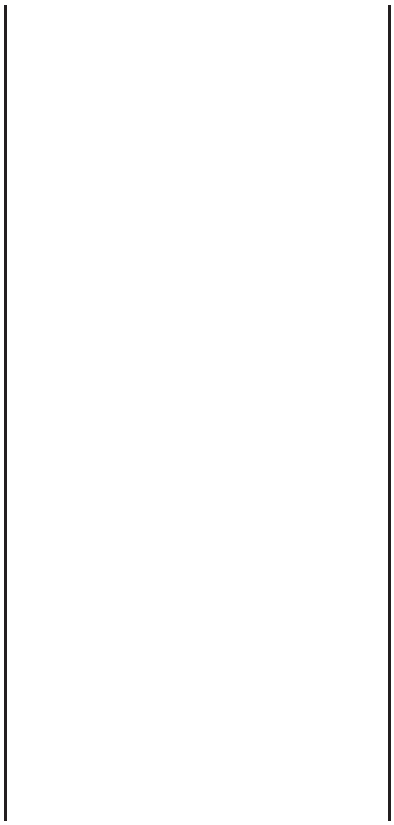
Stack Area

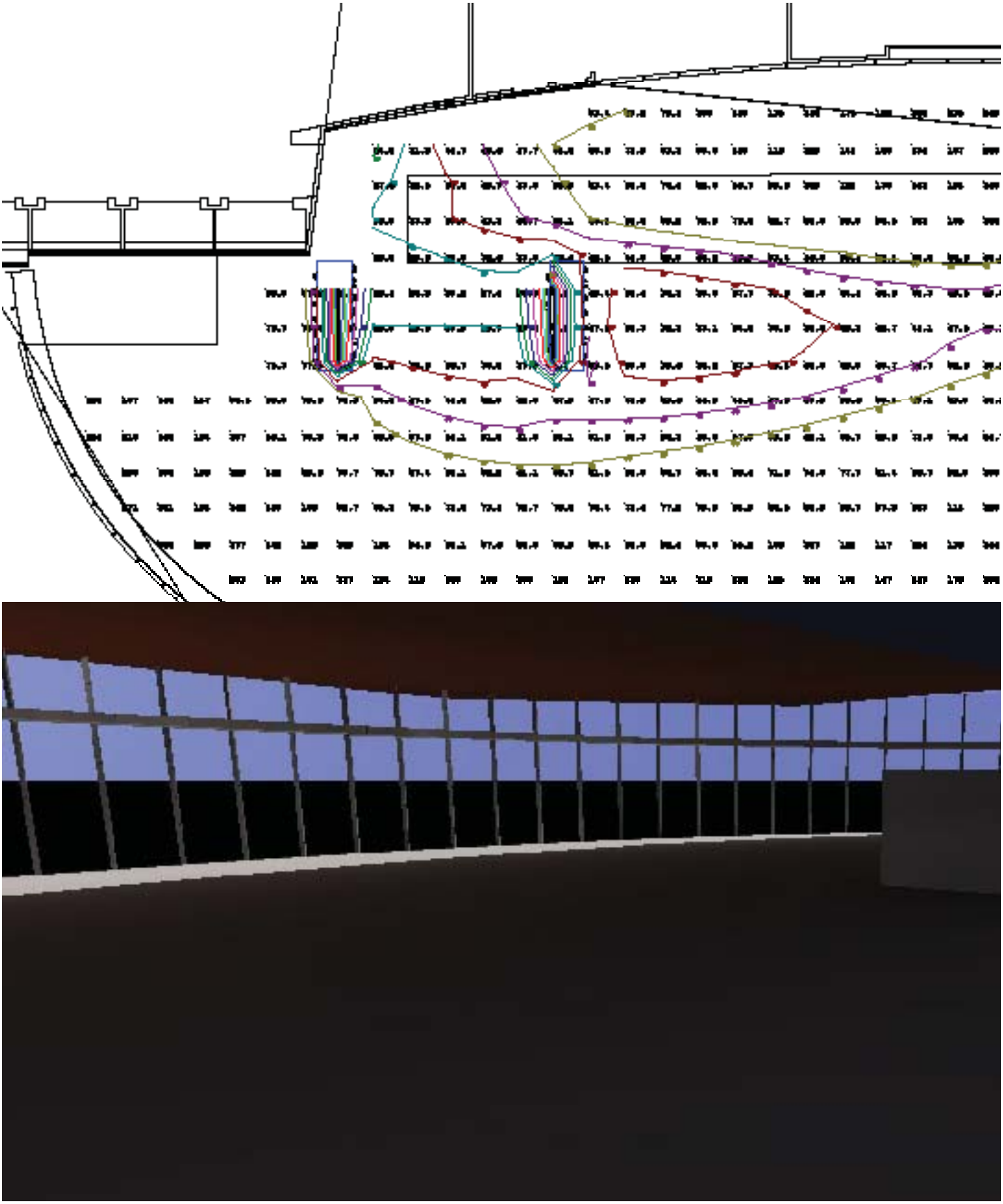
Which is better?



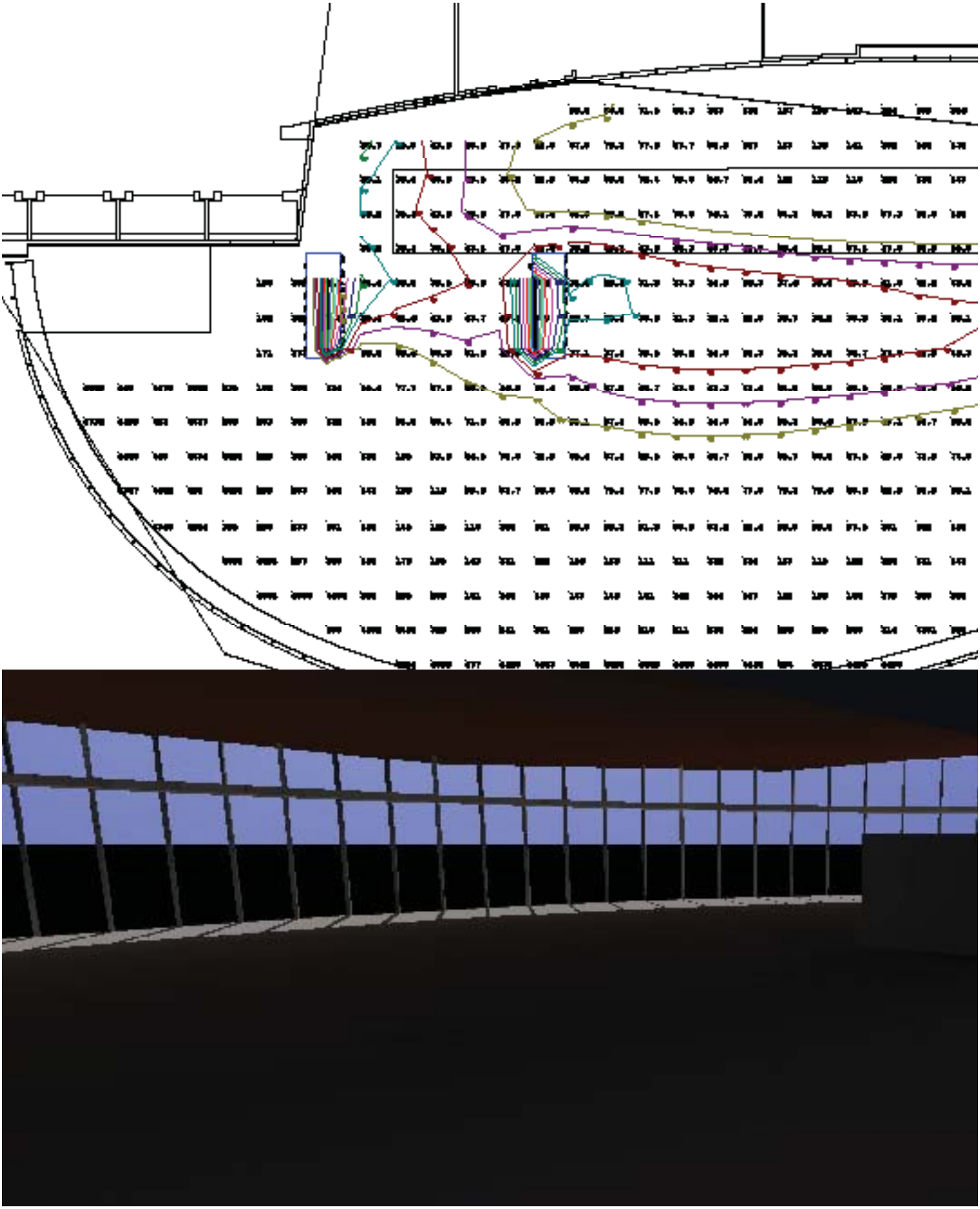


The same study was conducted for the stack area. Another daylight system was added to compare to the other light shelves, a fenestration control. This is to redirect the light but also to allow some direct sunlight through the shelf.





Interior Shelf 8:00am



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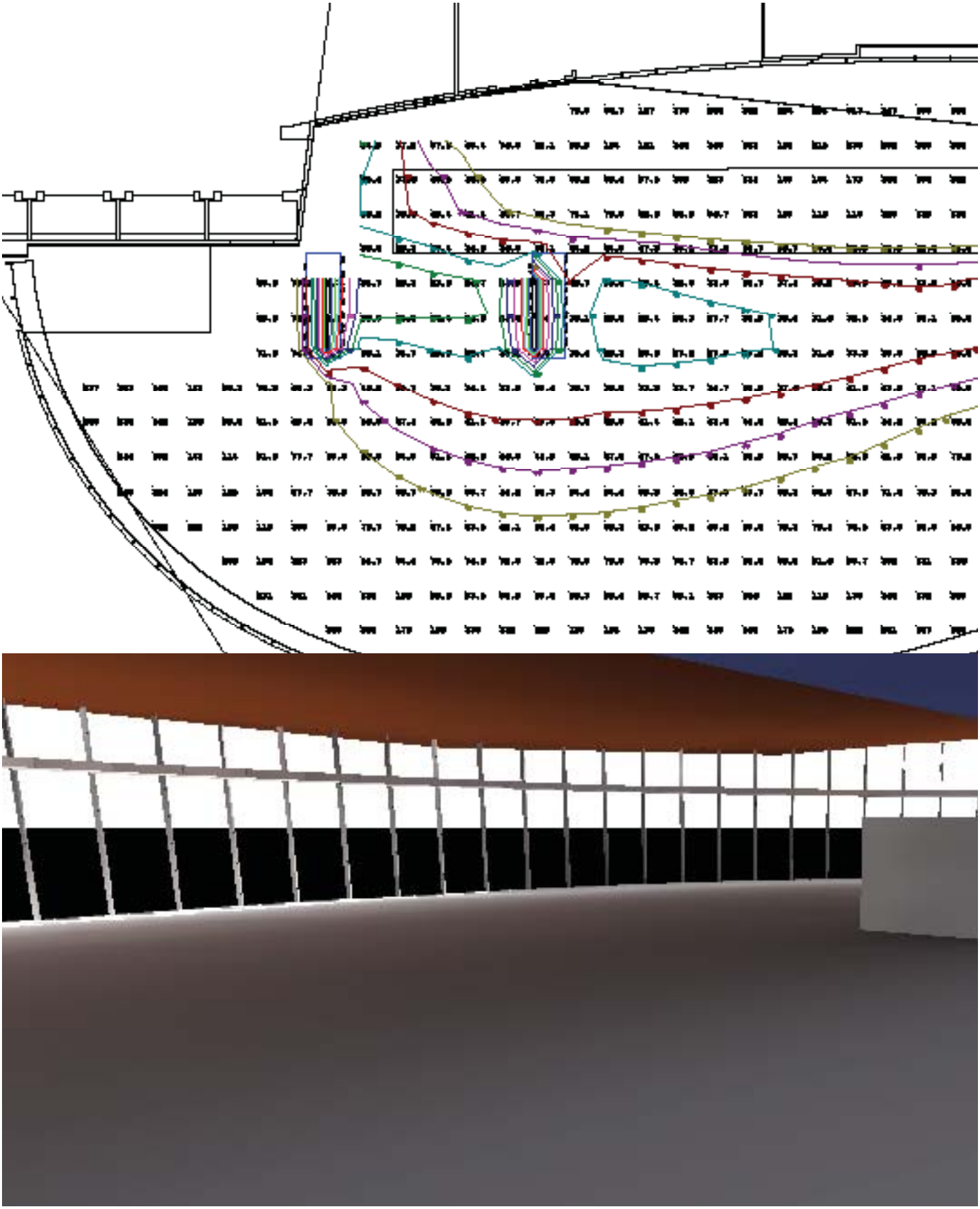

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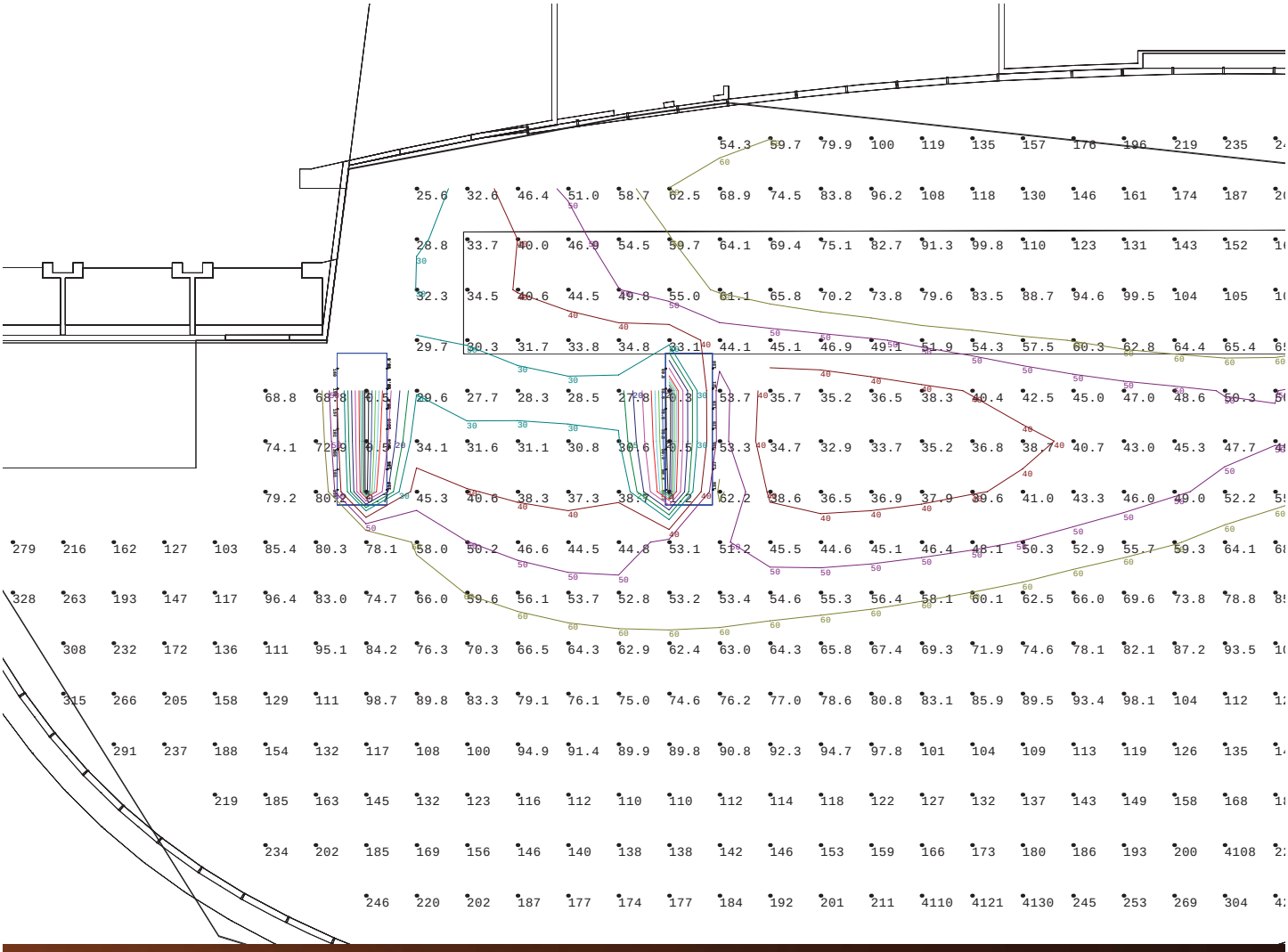
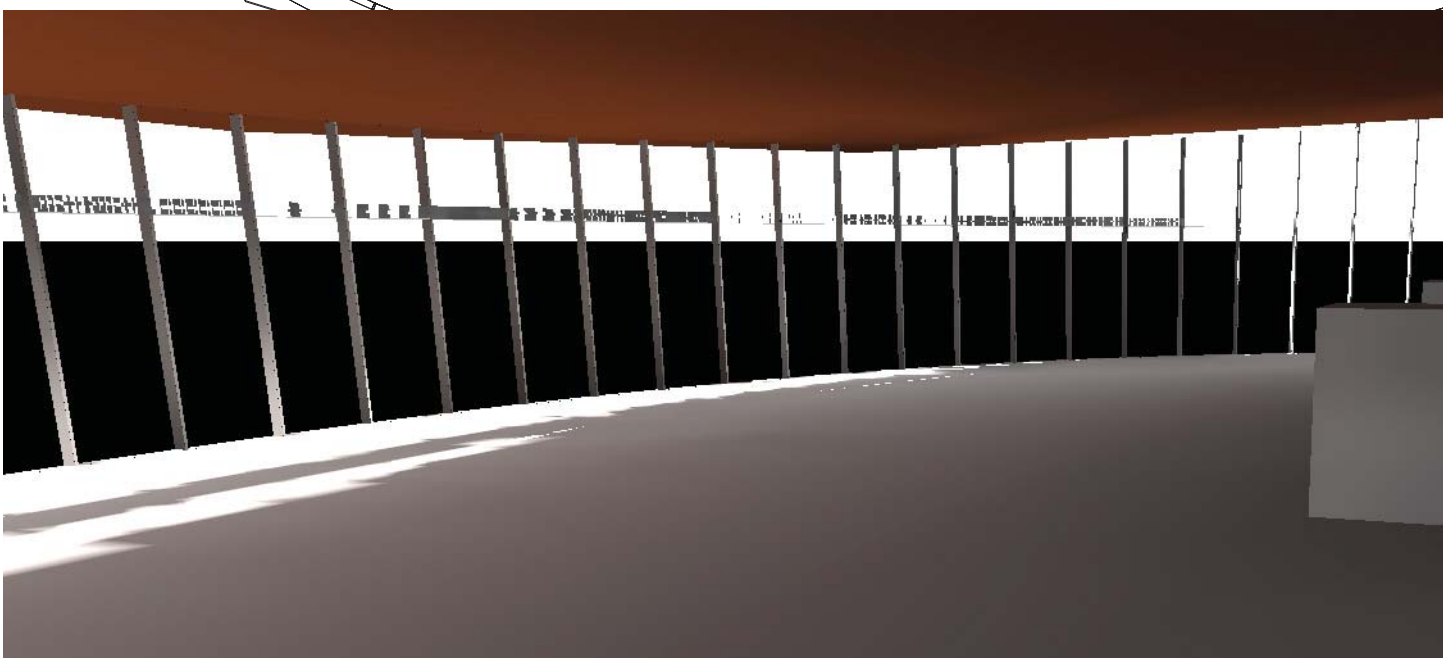
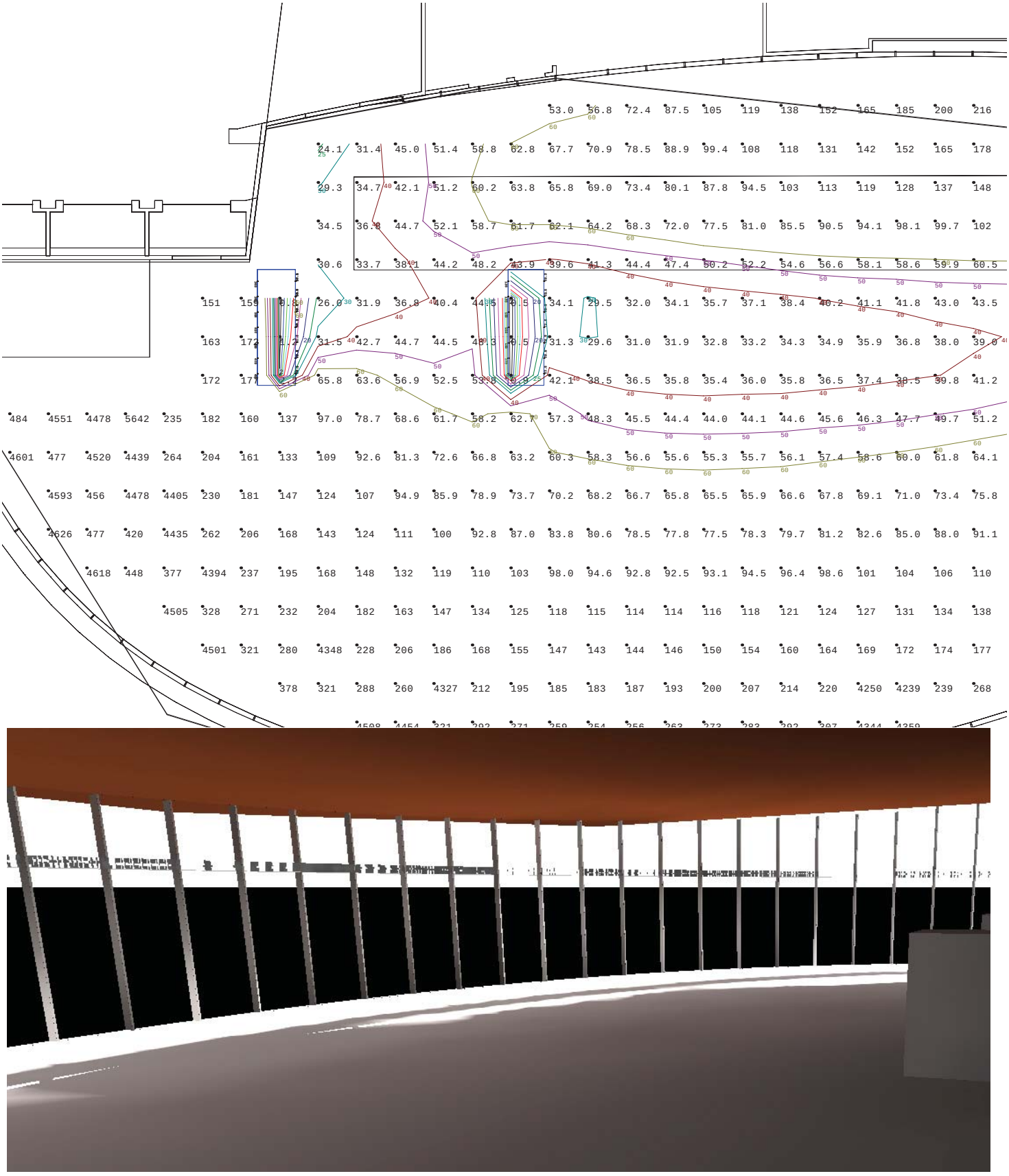




Exterior 8:00 am



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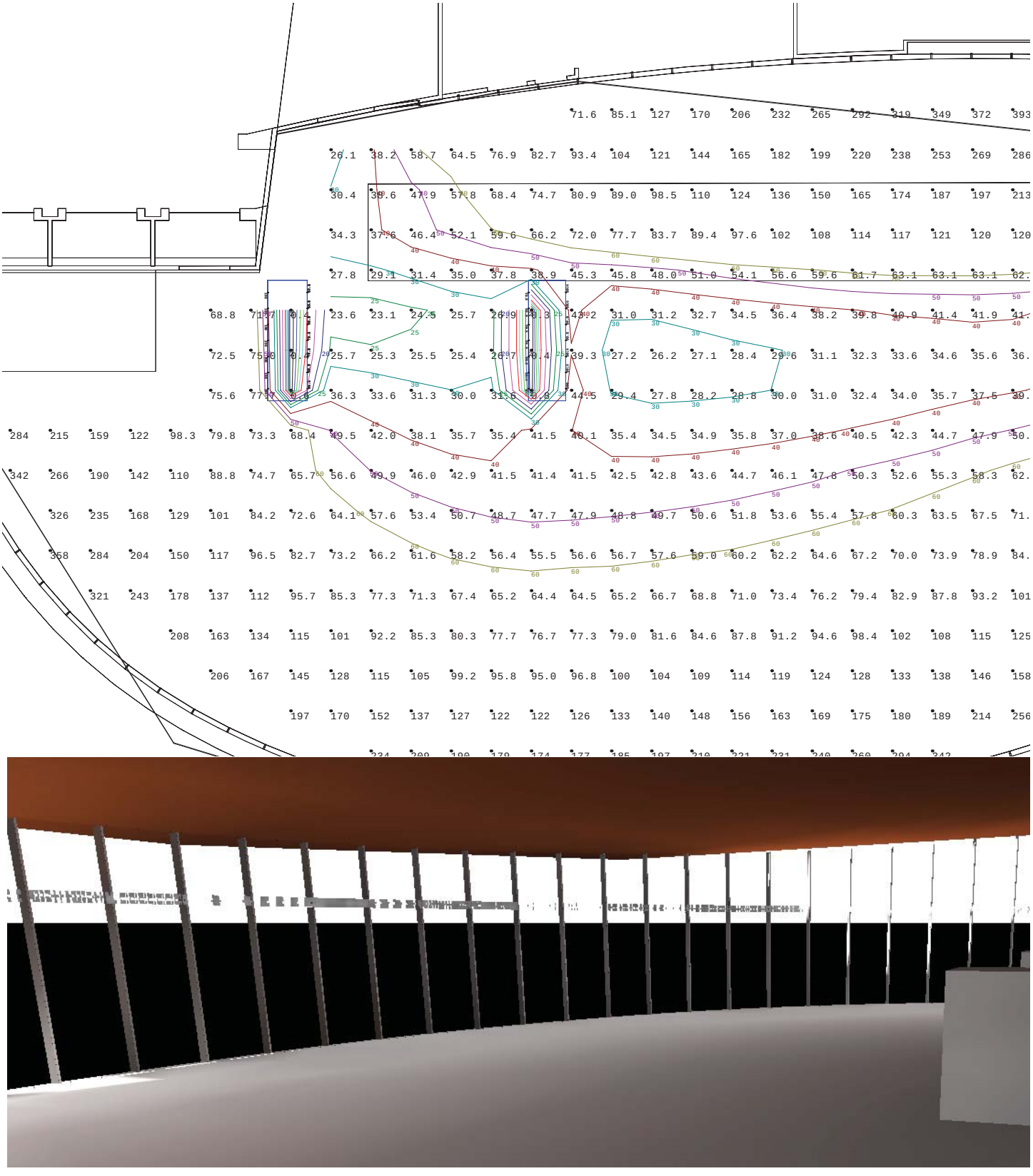

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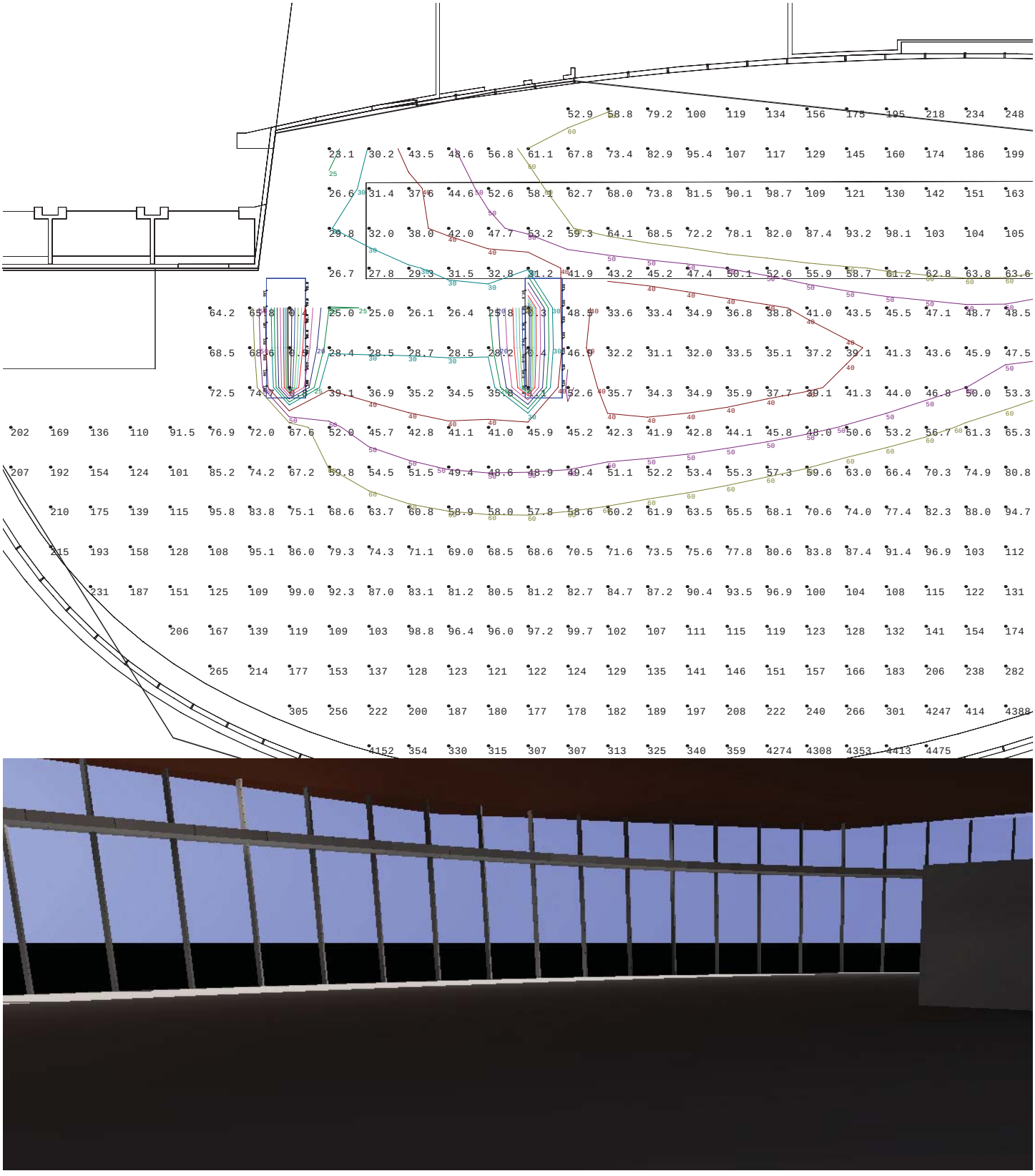
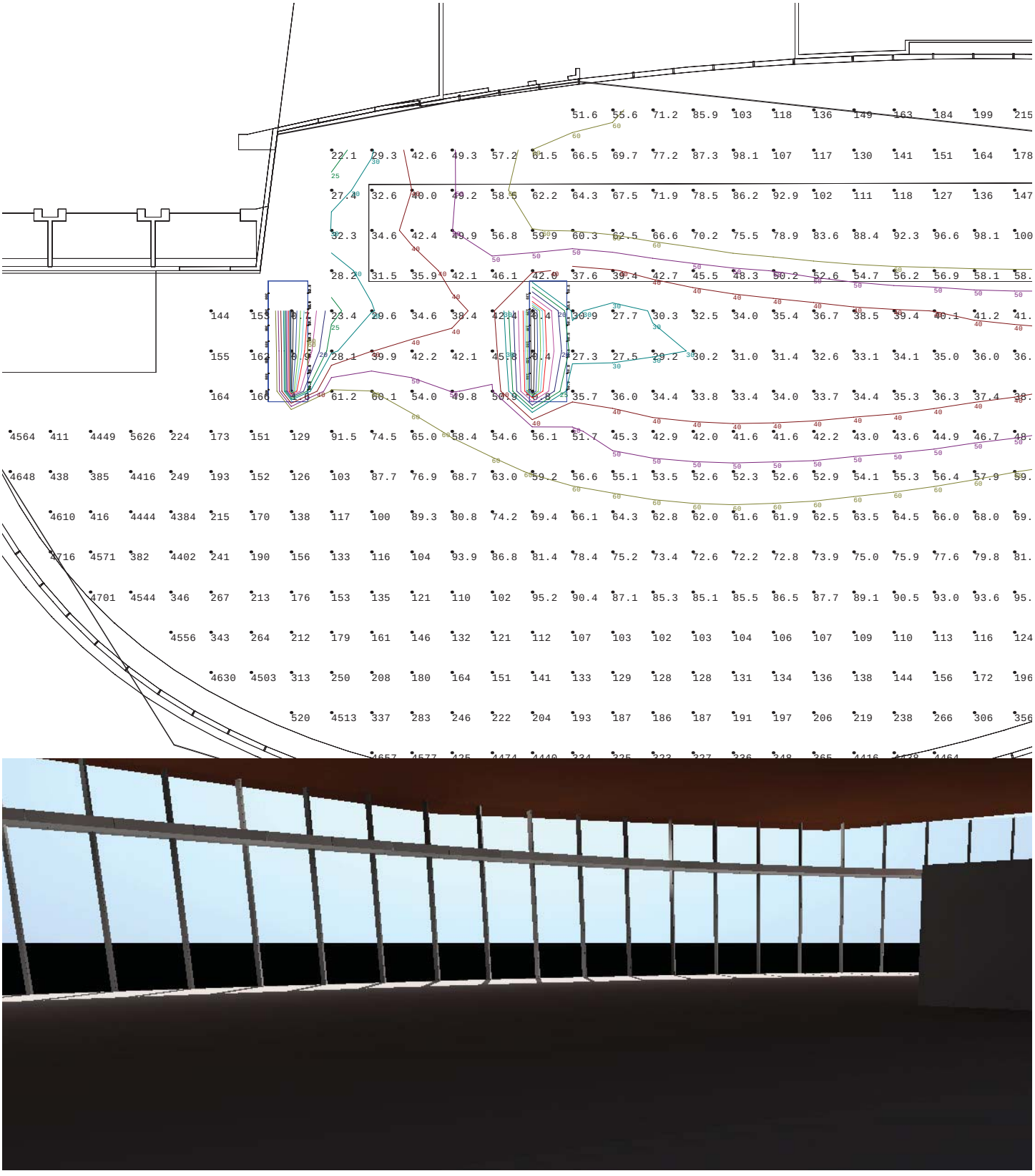


Interior and Exterior 8:00 am



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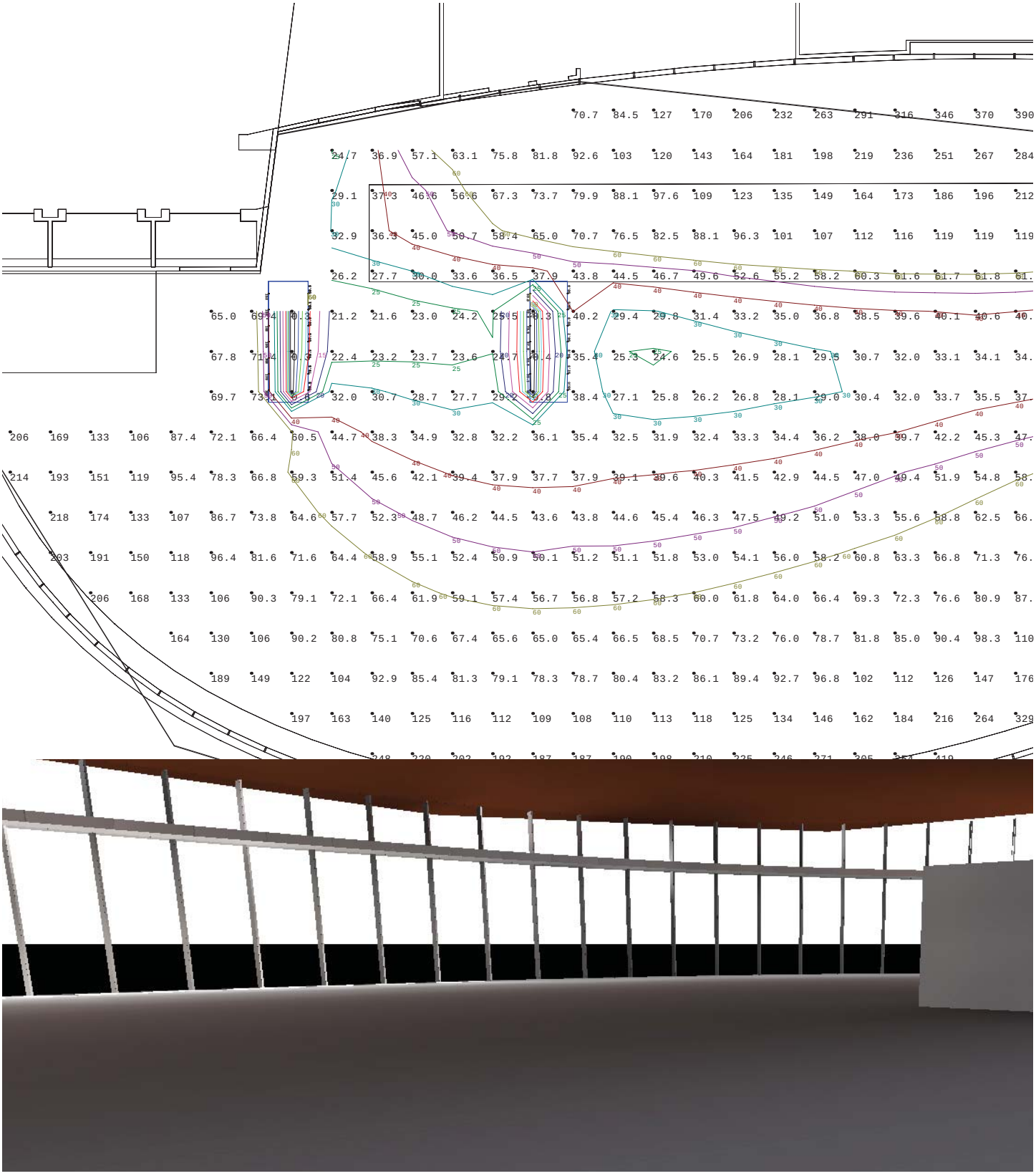

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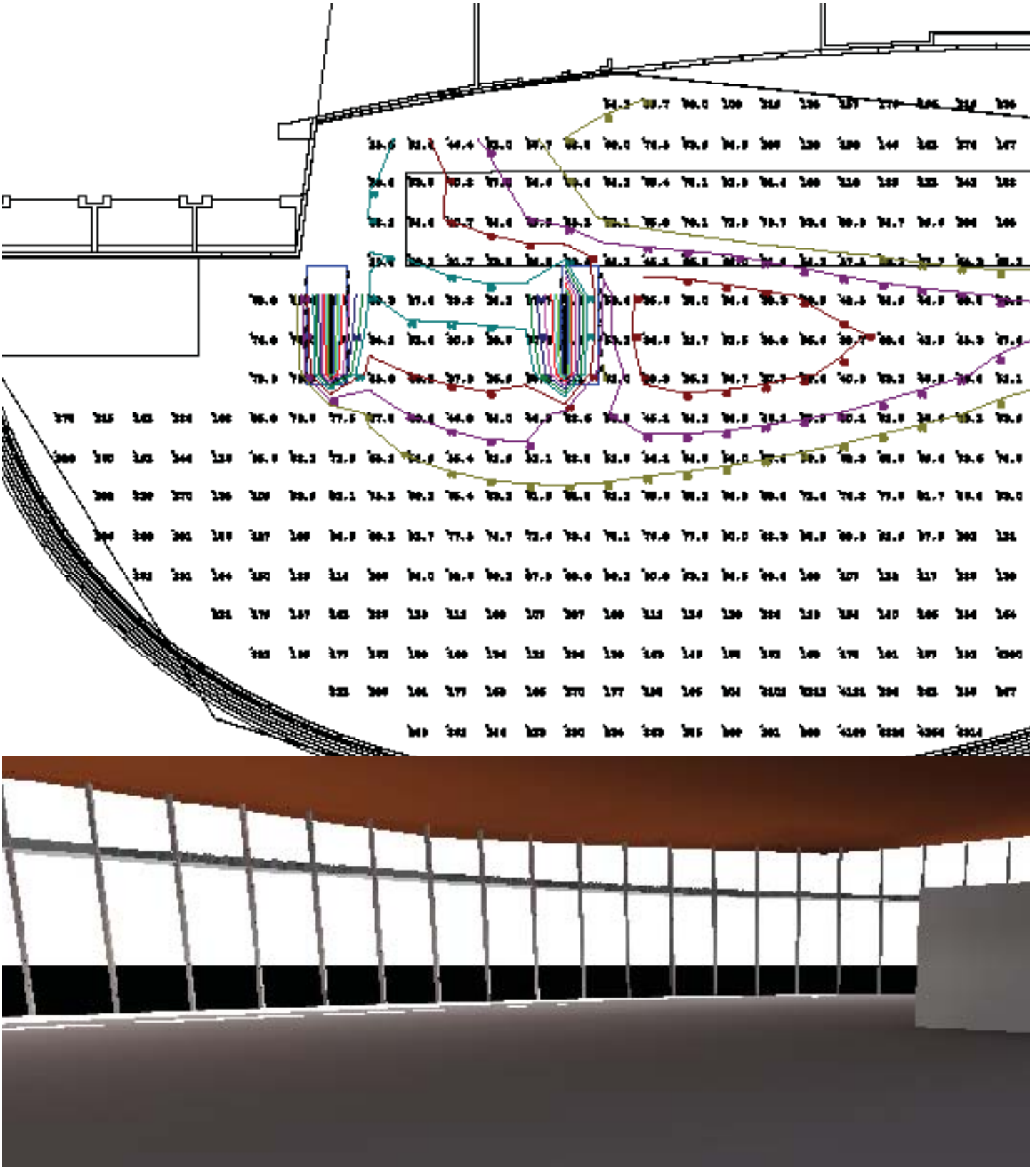
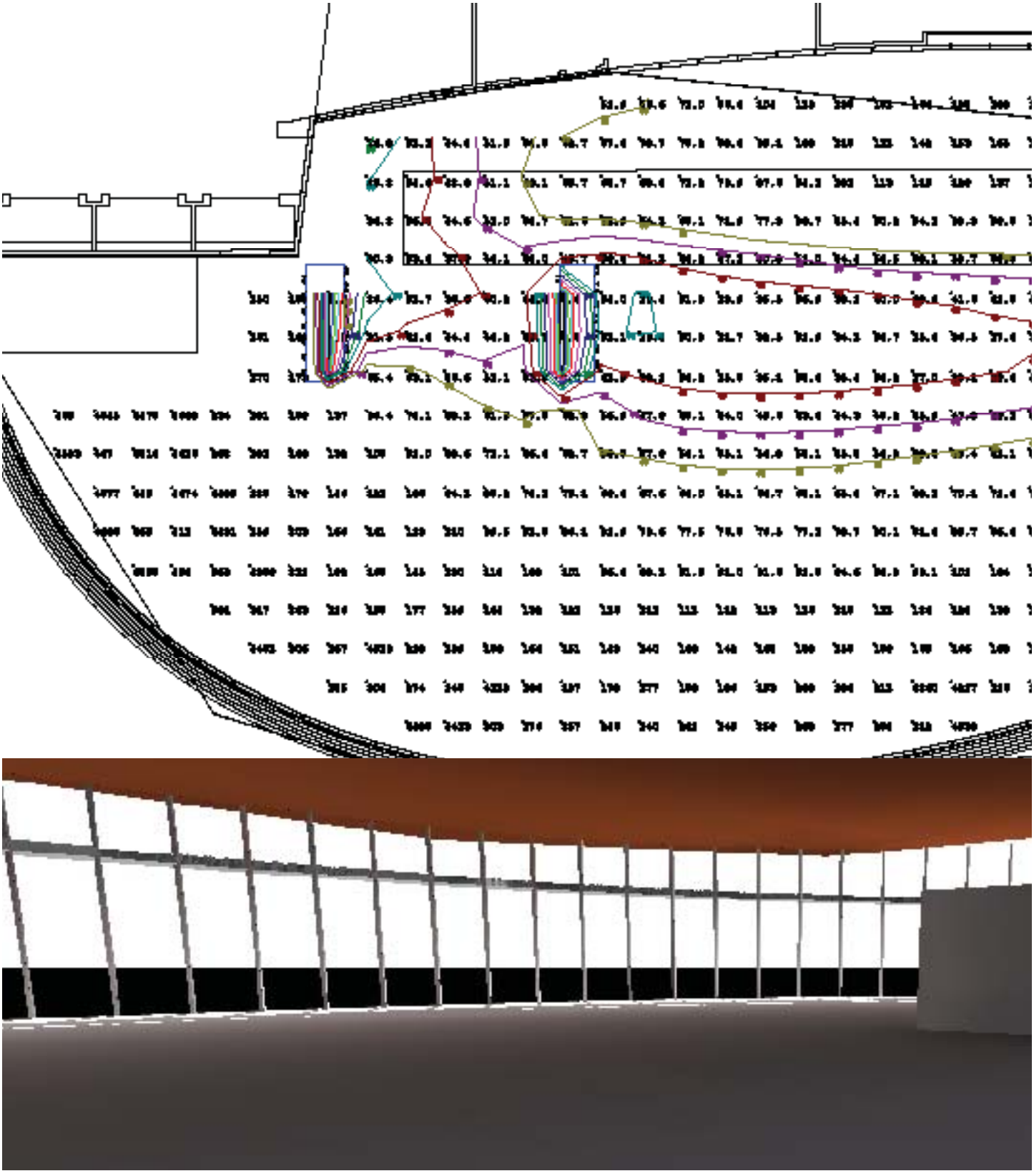


Fenestration Control 8:00 am



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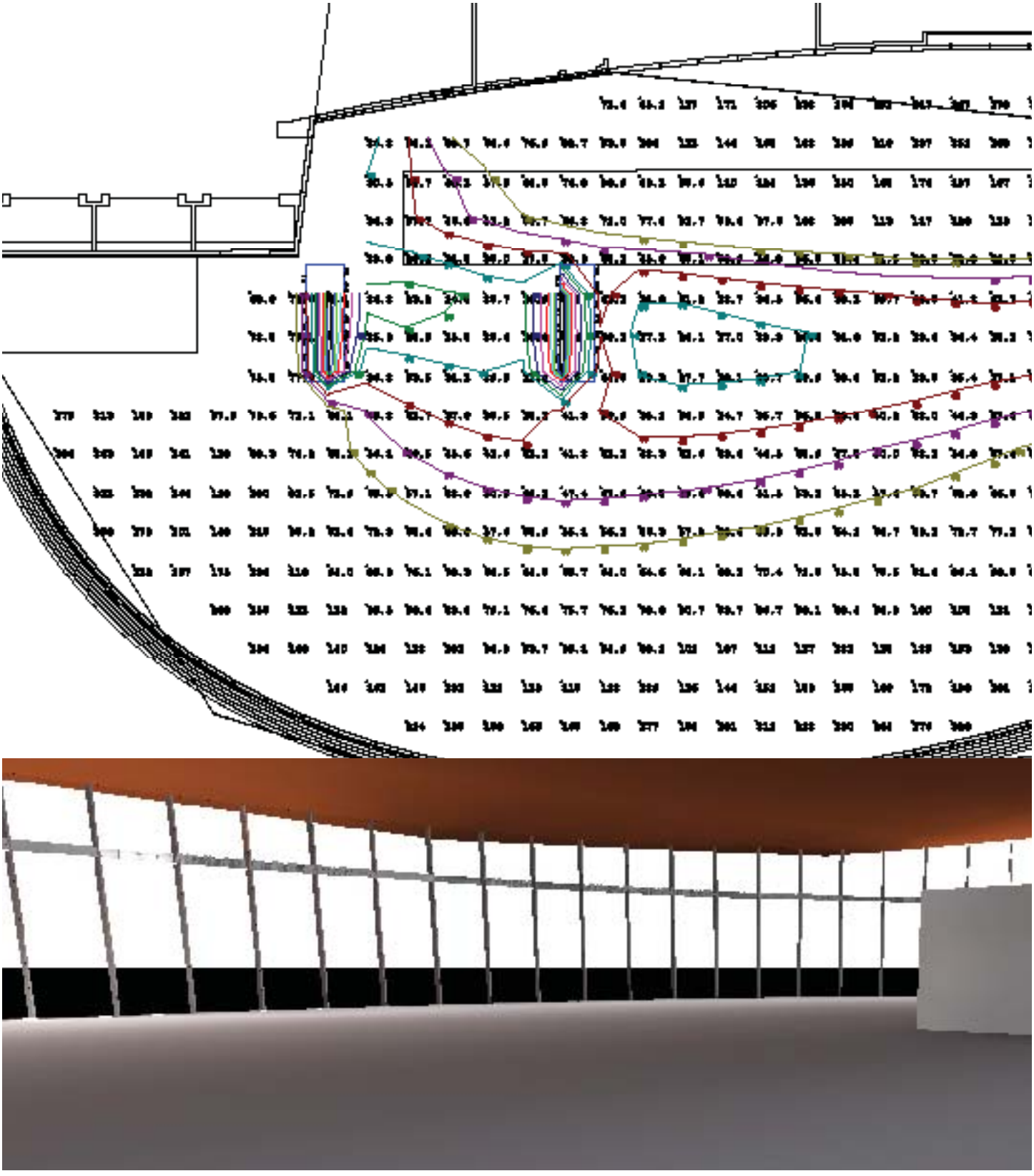

3:00 pm

The exterior light shelf brings the daylight the furthest into the space at all times of the day. Being able to get that much daylight into the space will cut down on energy costs due to the controls of the redesign. By adding more photocells the space will not need near the amount of electric lighting and can save energy throughout the year.