POINT IN TIME DAYLIGHT ANALYSIS

USING ANNUAL DAYLIGHT ANALYSIS

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Arch 753 Building Performance Simulation

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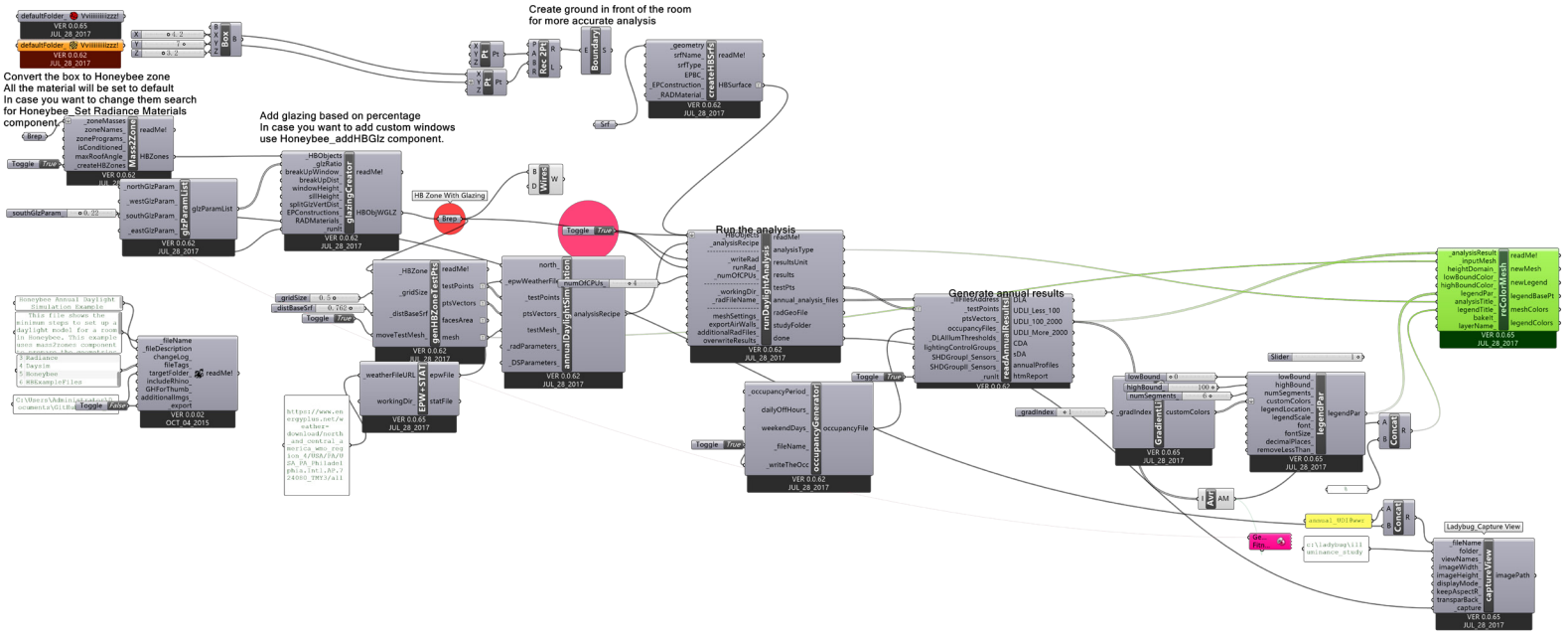
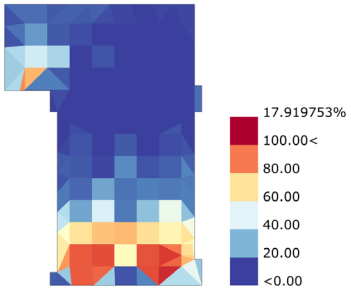
University of Pennsylvania

School of Design

Useful Daylight Illuminance (UDI) Evaluation



Potential case scenario for the design: to get as much UDI as possible for the living space in which reading or studying activities might take place.
In this scenario the Window to Wall Ratio to expect best UDI is 0.22.



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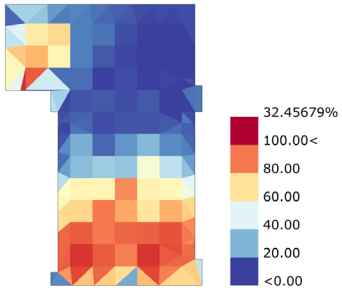

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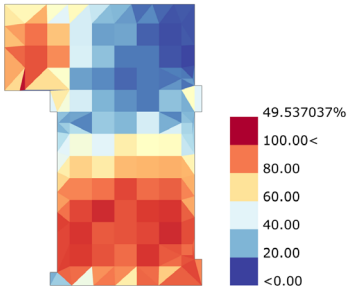

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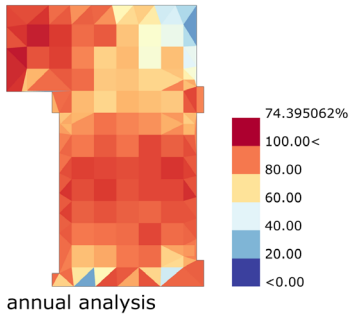

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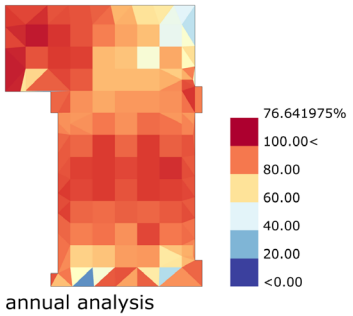

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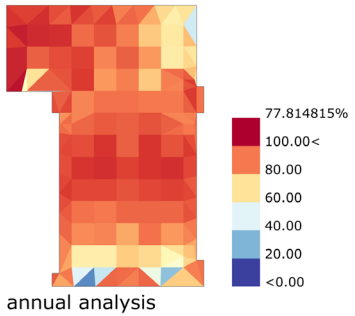

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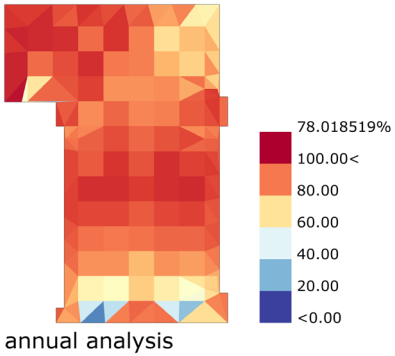

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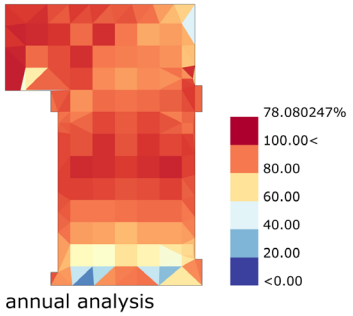

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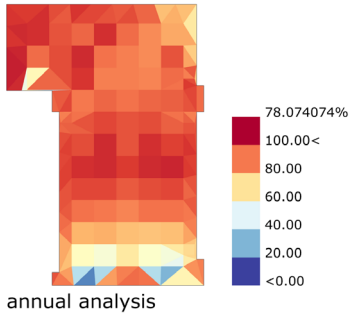

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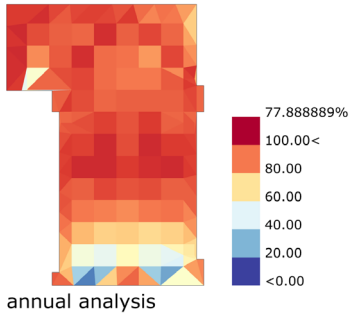

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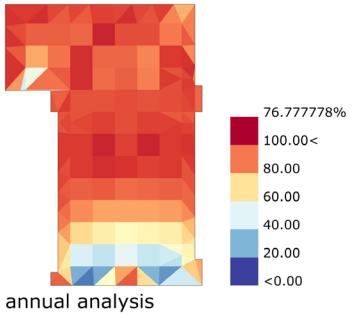

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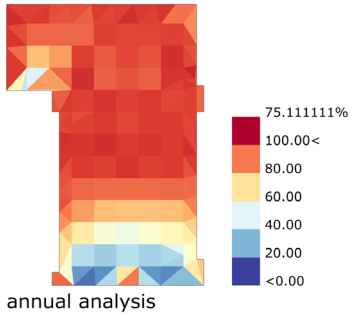

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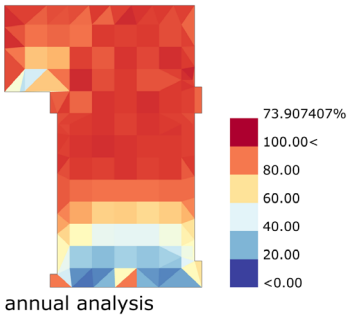

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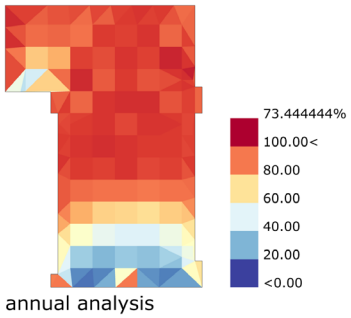

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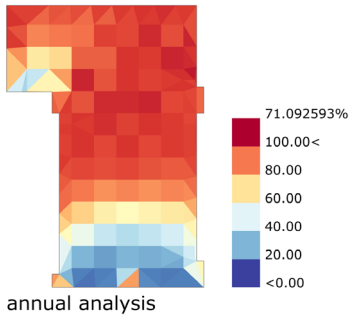

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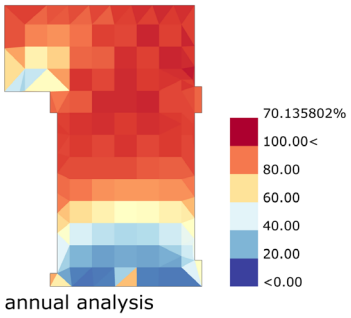

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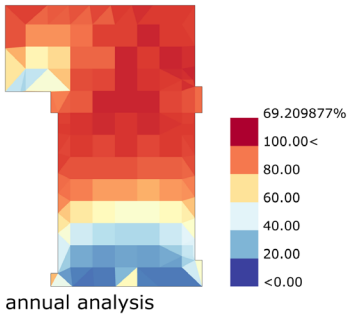

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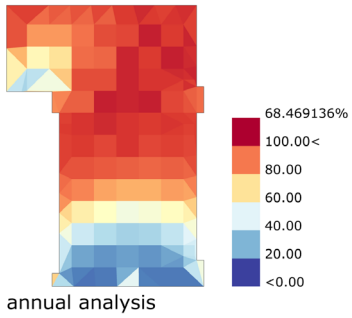

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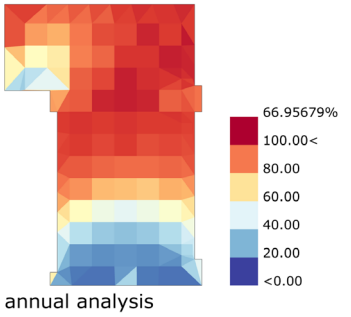

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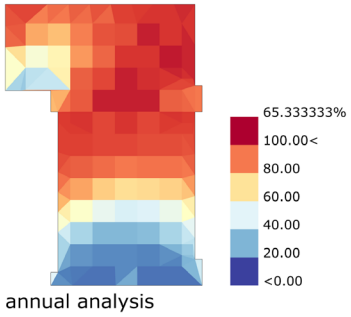

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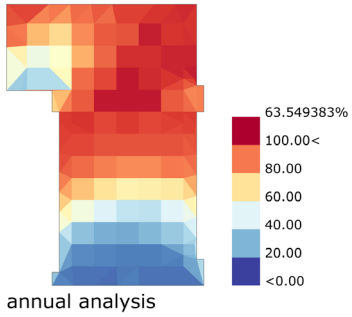

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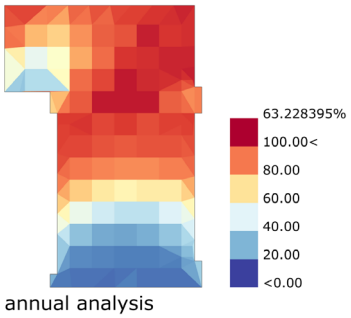

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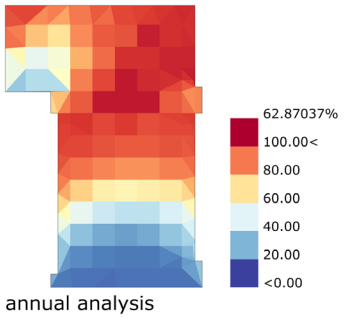

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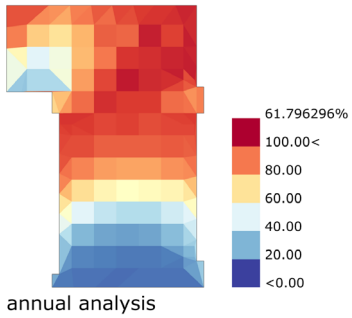

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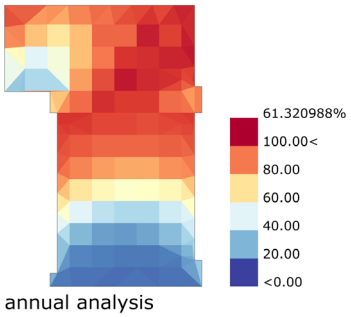

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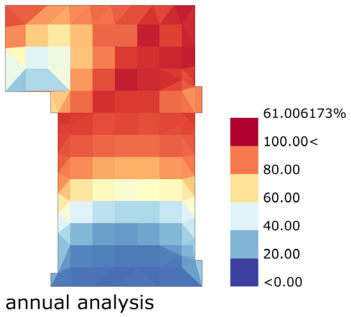

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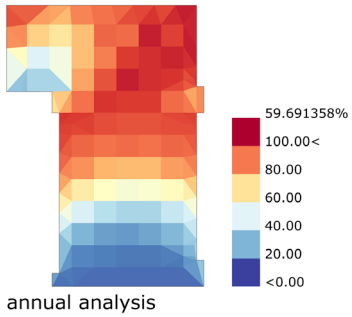

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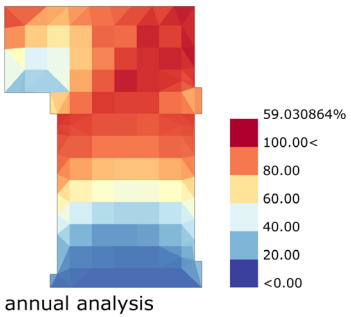

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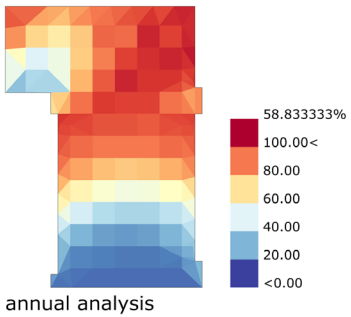

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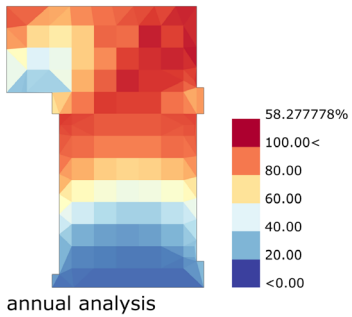

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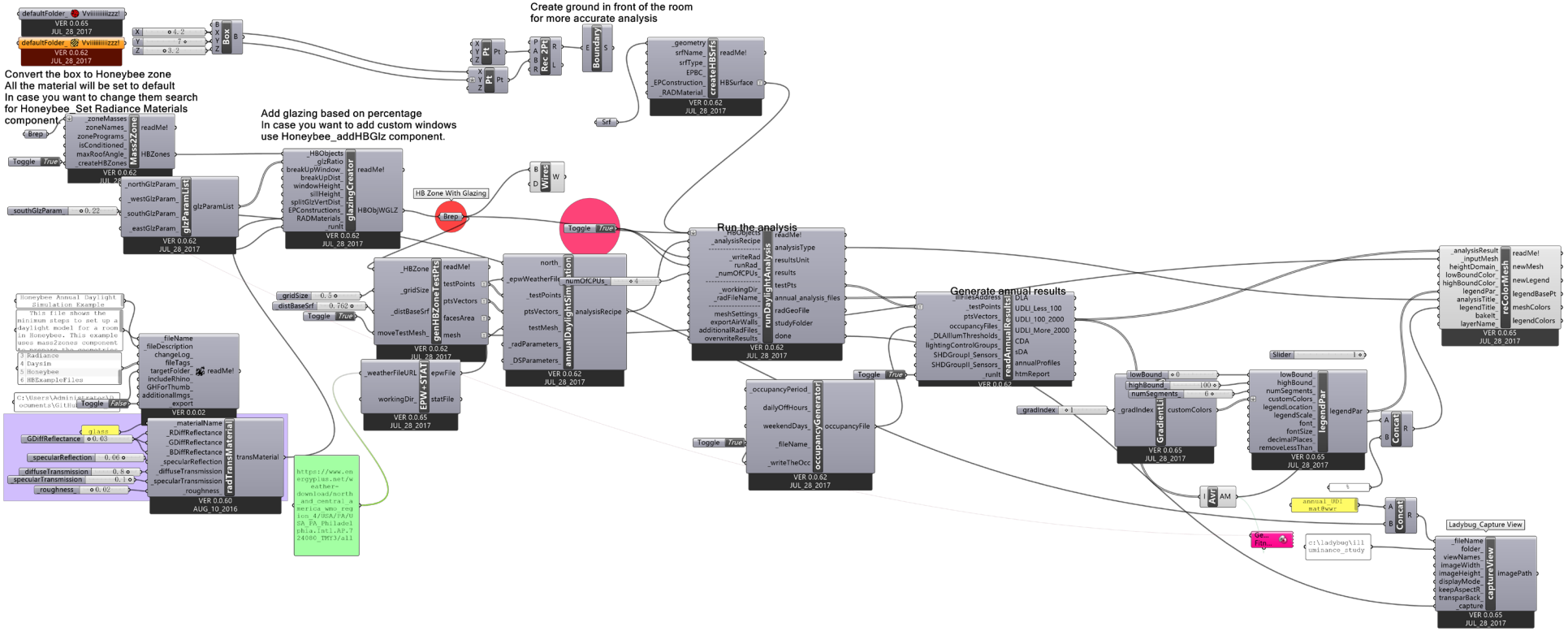
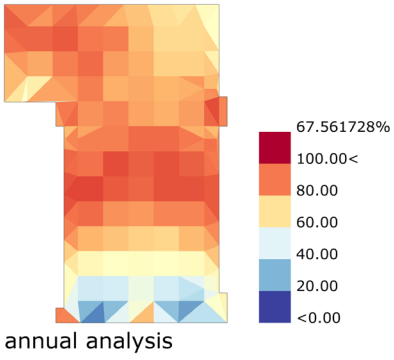
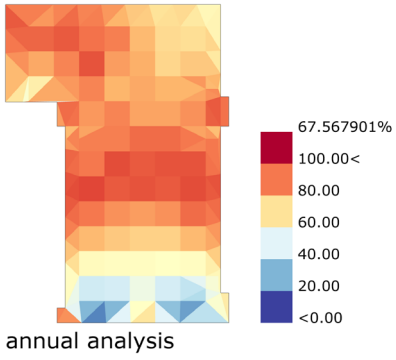
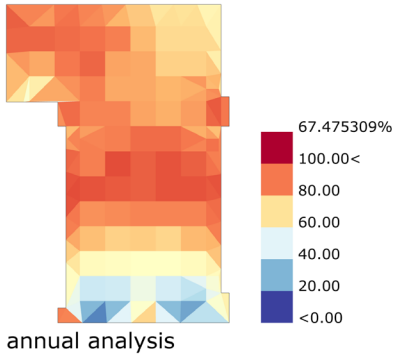
Material Variations



RGBDRF(WWR=0.22)







#RGBDRF has little impact on the UDI distribution

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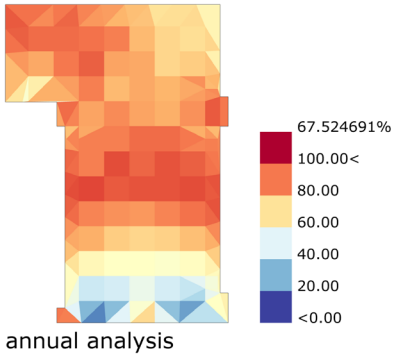
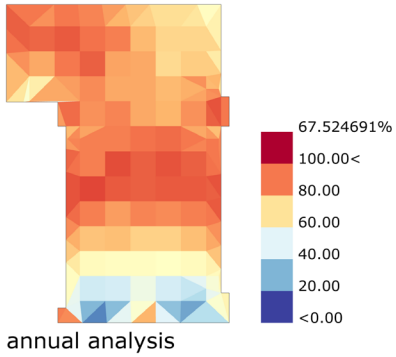
RGBDiffReflectance=0.02

RGBDiffReflectance=0.03

SpecularReflectance(RGBDRF=0.02)



SpecularReflectance=0.01



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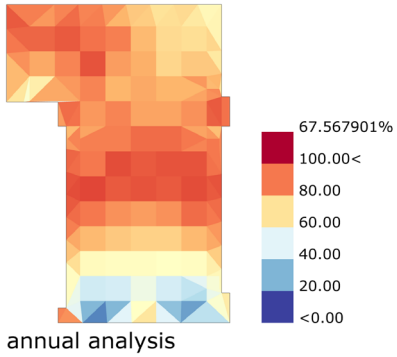
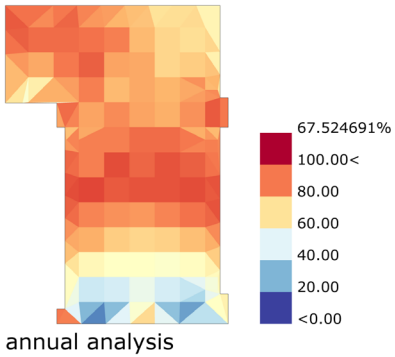


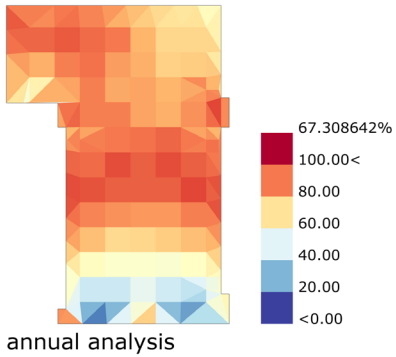
SpecularReflectance=0.06

#Specular Reflectance has little impact on the UDI distribution

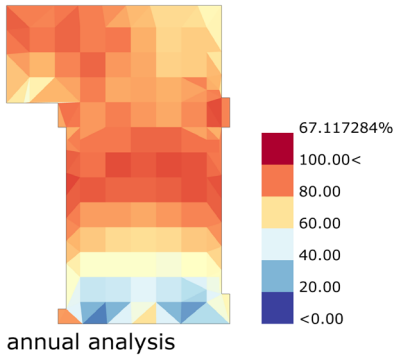
Diffuse Transmission(SpecularReflectance=0.06)



Diffuse Transmission=0.80



Diffuse Transmission=0.83



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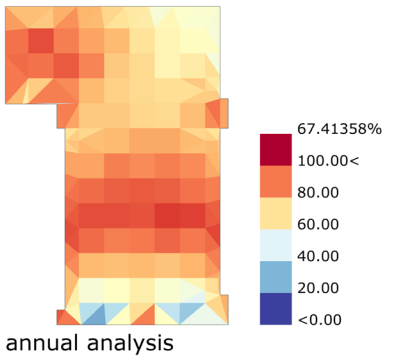

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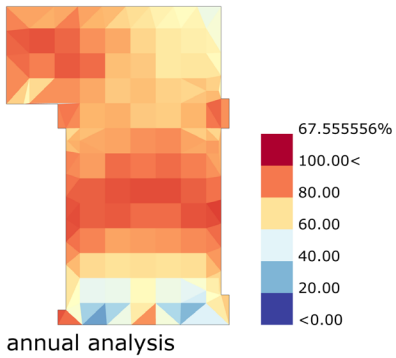
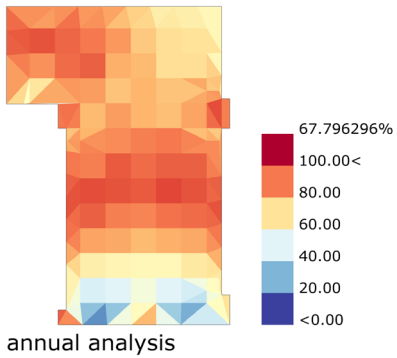


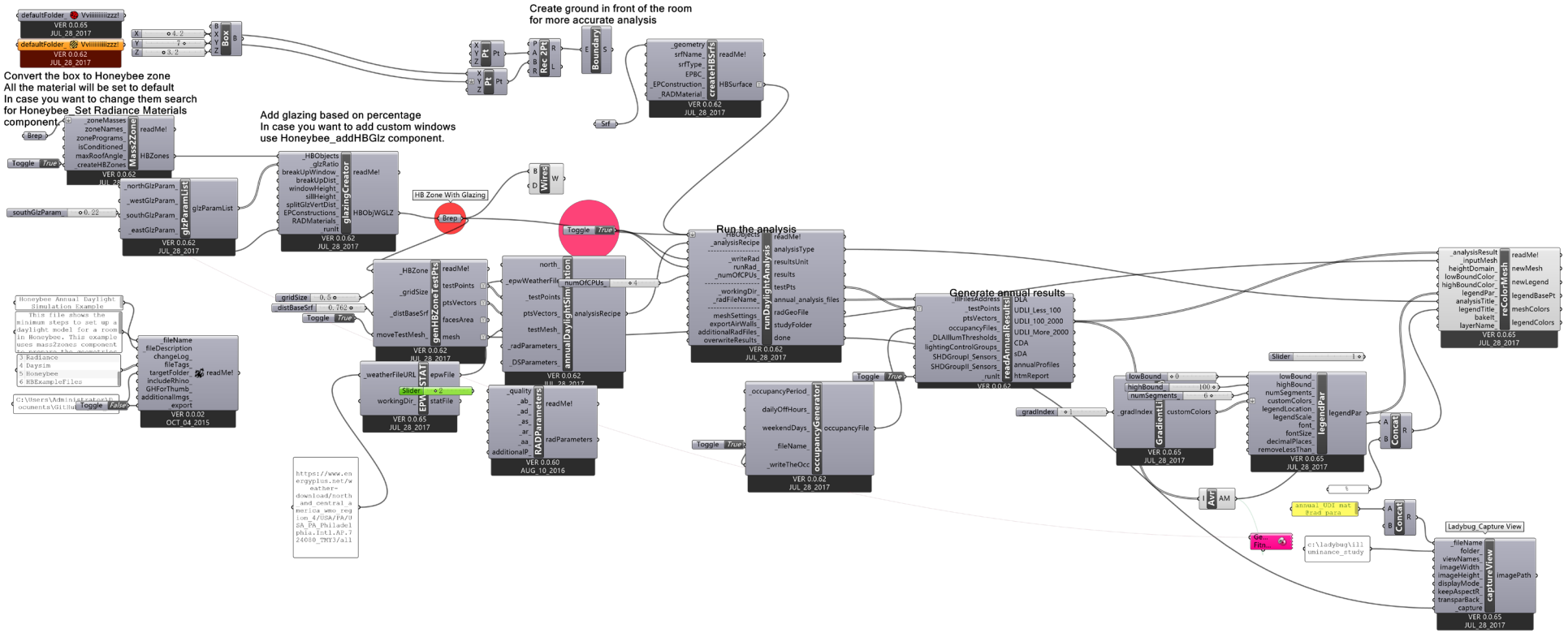
Diffuse Transmission=0.60

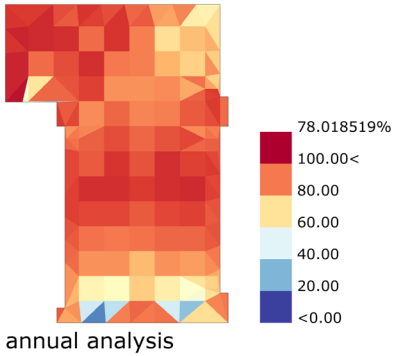


Diffuse Transmission=0.70

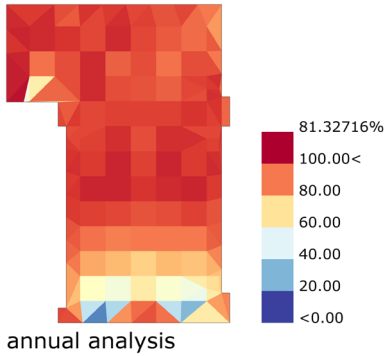
#Diffuse Transmission has little impact on the UDI distribution

Radiance Parameter Variations

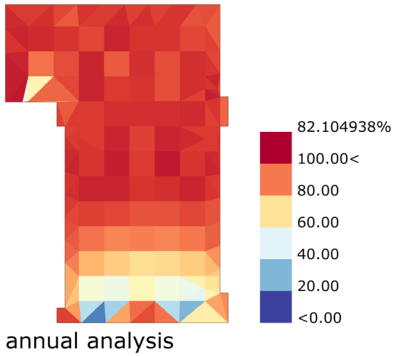




Quality=0



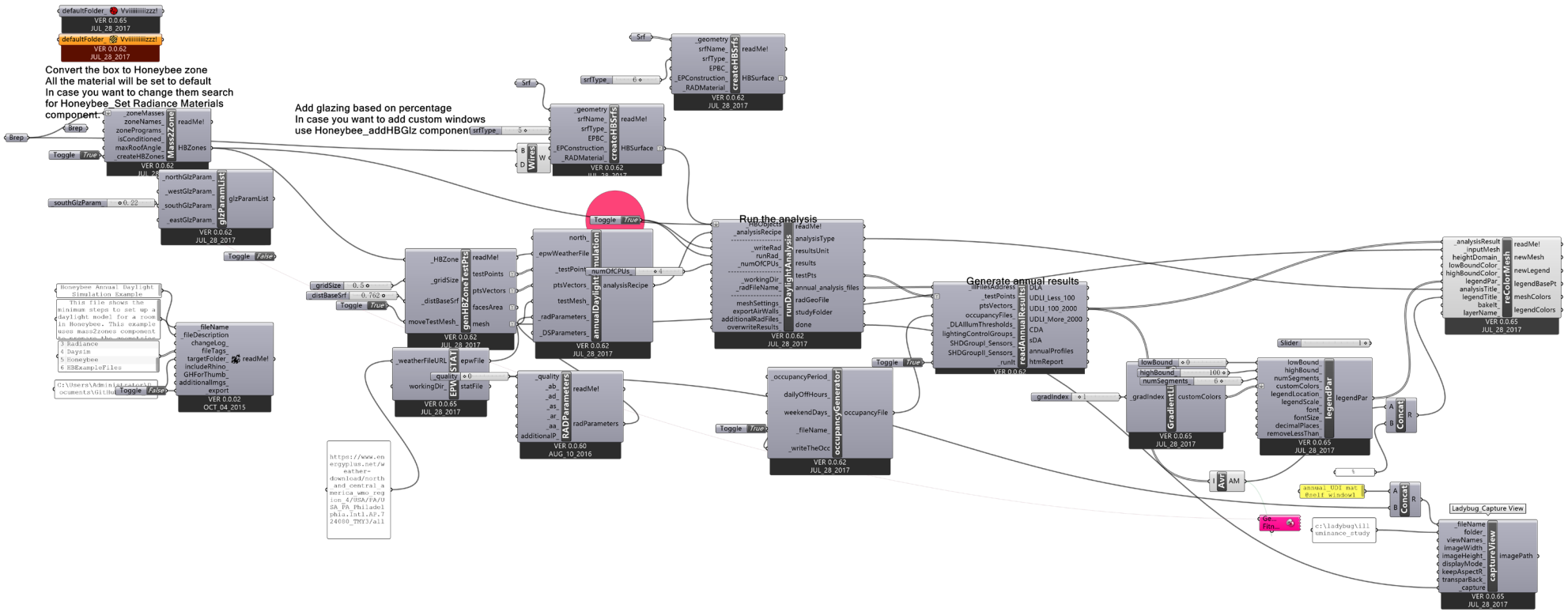
Quality=1

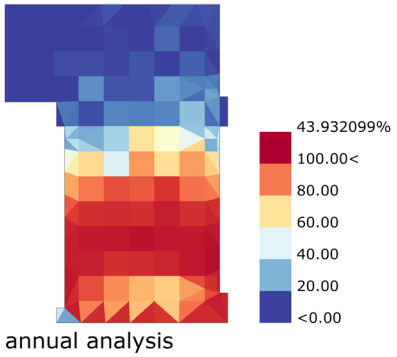


Quality=2

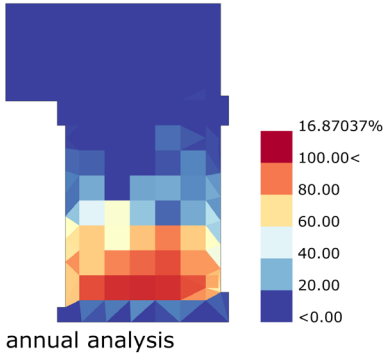
Increasing the quality in radiance parameters will help increase the average UDI.

Design Proposal Evaluation

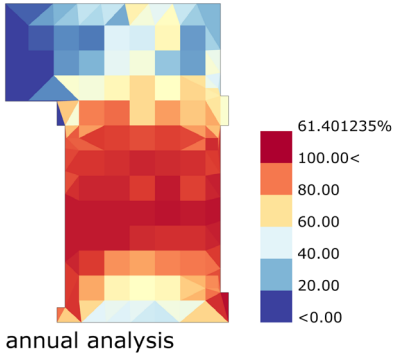




Base Case



With Shading



Window Enlarged
Without Shading

While shading decreases the UDI of the whole room, enlarging the window will greatly increase the UDI in the room.

The top left area is the restroom, the UDI of which could not be increased because there will not be windows available for it.