

Technical Environmental System/ Dr. Behzad NAJAFi

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TASK 1 :

Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with epsilon = 0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields?

ANSWER:

From the previous assignment

$$Q_{12} = 1035.81 \text{ W/m}^2$$

$$Q_{12 \text{ N_shield}} = 10.3581 \text{ W/m}^2$$

We need to calculate N

$$Q_{12 \text{ N_shield}} = 1/(N+1) Q_{12}$$

$$10.3581 = 1/(N+1) 1035.81$$

$$10.3581/1035.81 = 1/(N+1)$$

$$0.01 = 1/(N+1)$$

$$100 = N+1$$

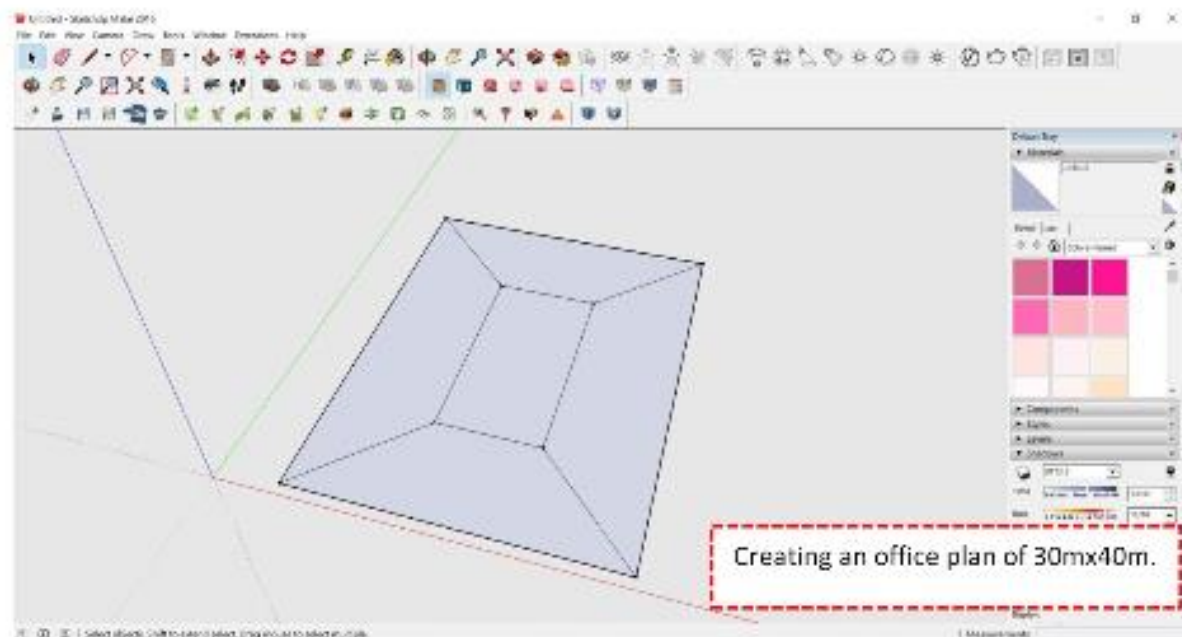
$$99 = N$$

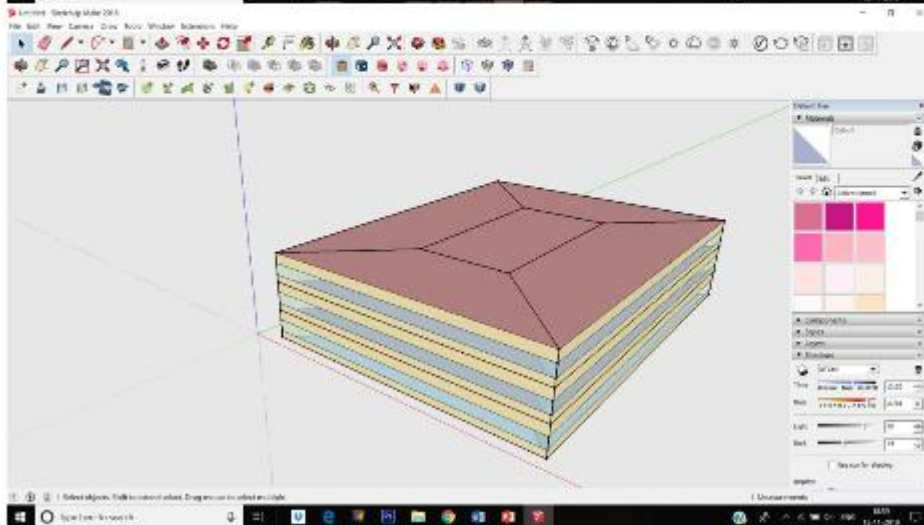
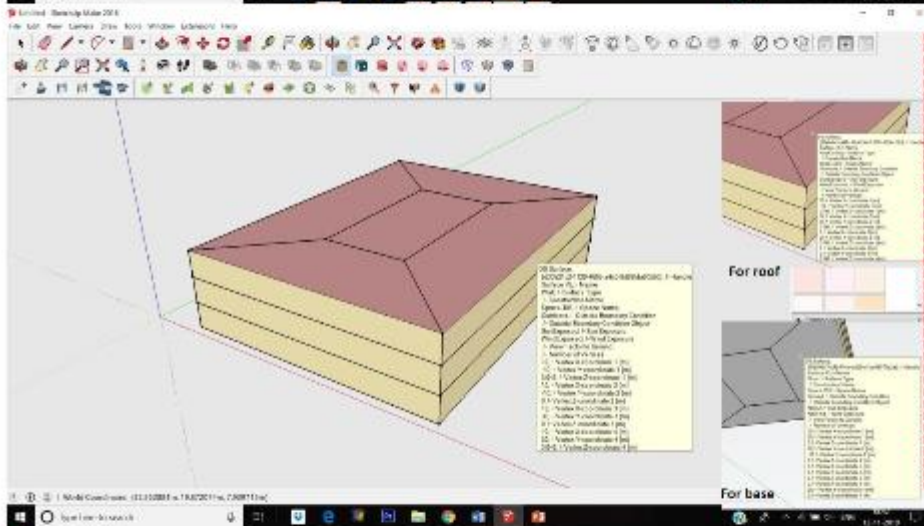
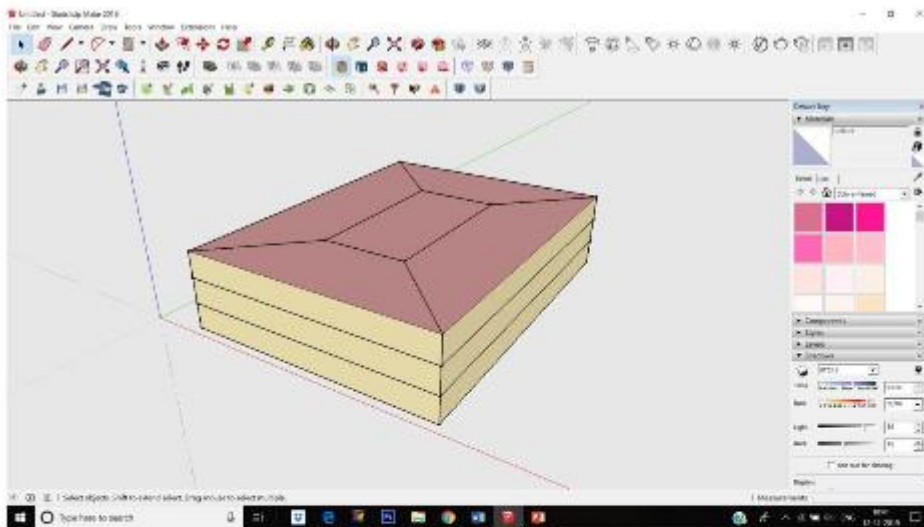
Hence, we need **99 shields** in order to have the new heat transfer to be 1% of the case without shields

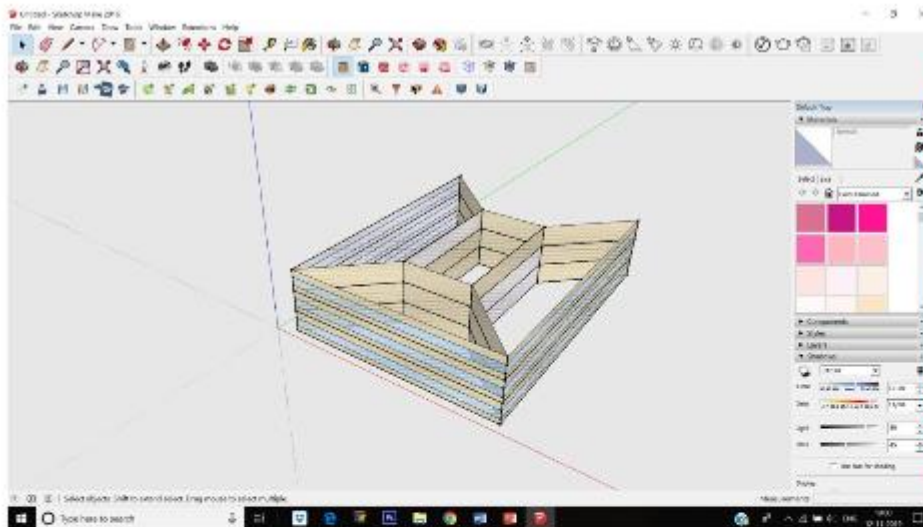
TASK 2 :

Create a pdf file with screenshots of all of the steps we went through and explain briefly the reason behind the use of each step.

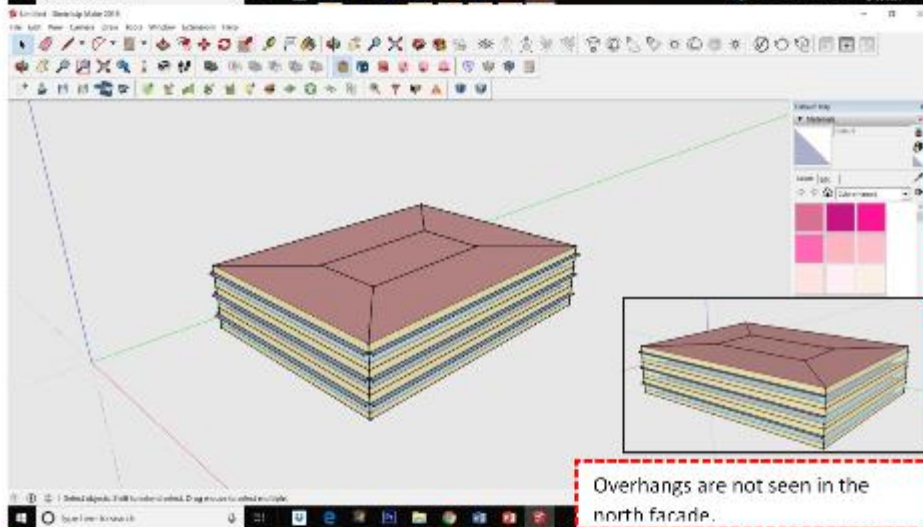
ANSWER:





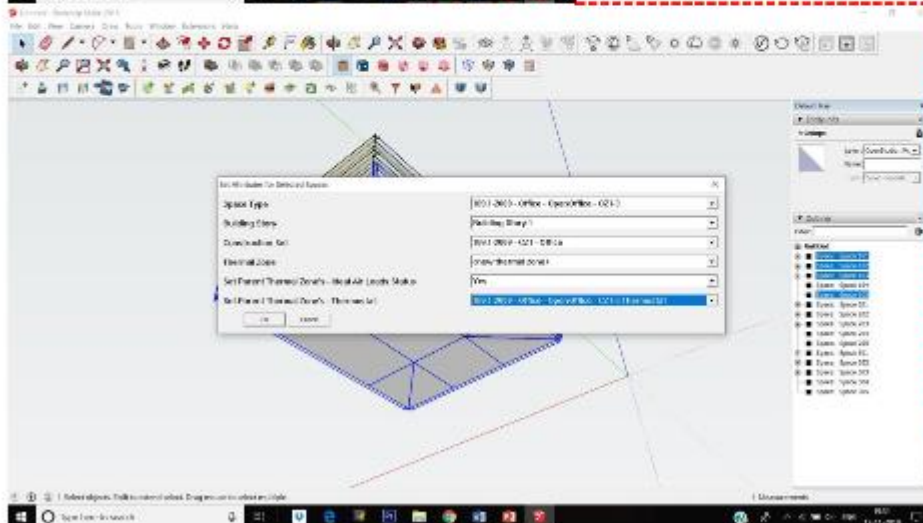


Using the 'search surfaces' tool to filter out the surface we need to provide shading (in this exercise). Assuming there is no harsh sun in the North façade, we exclude that by typing 90° to 360° in the dialog box

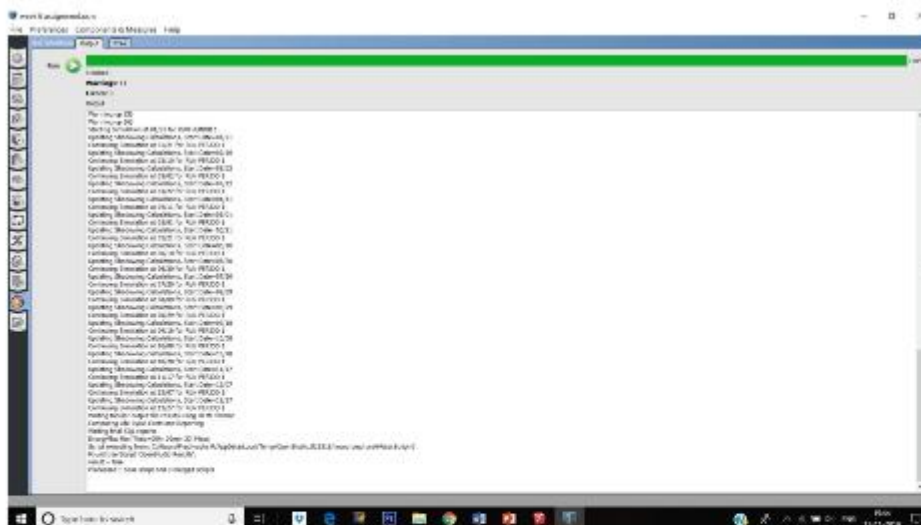


Using the 'add overhangs by projection factor' tool to provide sun shades for the windows by inputting the width of the projection.

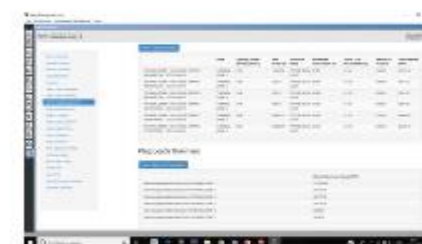
Overhangs are not seen in the north facade.



Using the 'set attributes for the selected spaces' tool to provide thermal zones for each spaces. In this case open office for the rooms facing outside and break room for the rooms facing inside



We open the 'OPEN STUDIO' software and input in the weather data file i.e. Piacenza weather data (assuming the office is in Piacenza). And then load the sketch file in this software and we run the model to calculate the energy consumption and other information



After, we run the data, we arrive at the result of the energy consumption like annual overview of the consumption, monthly overview, monthly bills, lighting consumptions, plug point consumption, exterior lighting, equipment consumption(if we have loaded any), water consumption, air loops detail, cash flow etc.

