

Week 6

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?

Previous assignment, A= 1.5m²; ε₁ = 0.2; ε₂ = 0.7; T₁ = 800K; T₂ = 500K

$$\dot{Q} = A\sigma (T_1^4 - T_2^4) / (1/\epsilon_1 + (1/\epsilon_2) - 1) = \frac{1.5 * (5.67 * 10^{-8}) * (800^4 - 500^4)}{\frac{1}{0.2} + \frac{1}{0.7} - 1} = 5438.05 \text{ W}$$

With, A= 1.5m²; ε₁ = 0.1; ε₂ = 0.1; T₁ = 800K; T₂ = 500K

$$\dot{Q} = A\sigma (T_1^4 - T_2^4) / (1/\epsilon_1 + (1/\epsilon_2) - 1) = \frac{1.5 * (5.67 * 10^{-8}) * (800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1553.73 \text{ W}$$

So, to make it 1% th last result should be multiplied by 0.1

$$1553.73 * 0.1 = 155.4 \text{ W}$$

$$\dot{Q}_{12 \text{ Nshields}} = A\sigma (T_1^4 - T_2^4) / (N+1) * (1/\epsilon_1 + (1/\epsilon_2) - 1) = [1/(N+1)] * \dot{Q}_{12 \text{ No shields}}$$

Therefore,

$$\dot{Q}_{12 \text{ Nshields}} = \frac{1}{N+1} \times 155.4$$

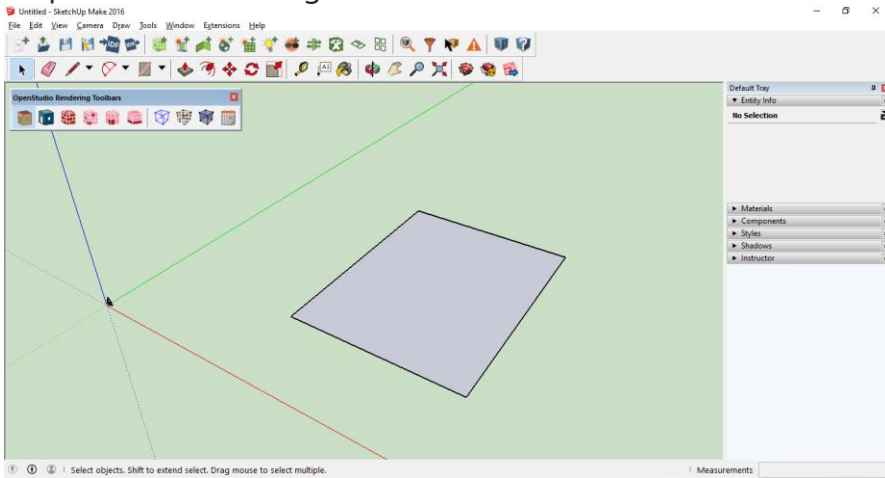
$$\frac{1}{N+1} = \frac{155.4}{1553.73}$$

$$N+1 = 1/0.1$$

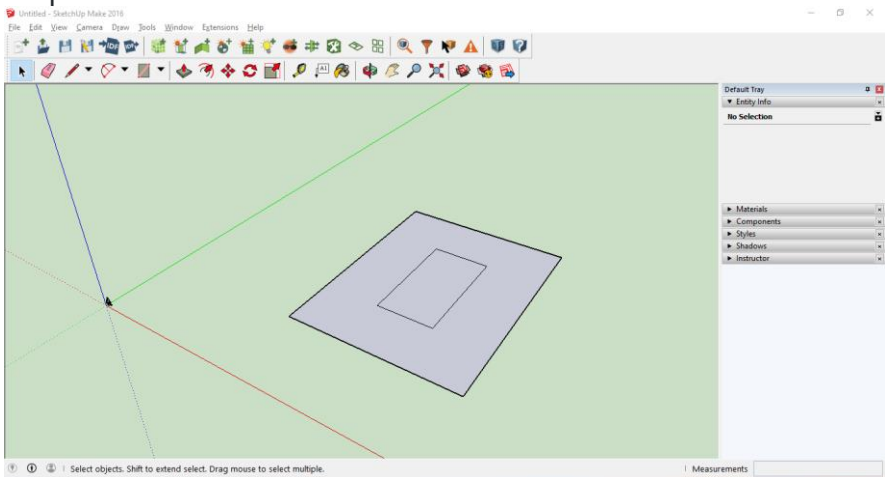
N= 9 are needed

Task 2

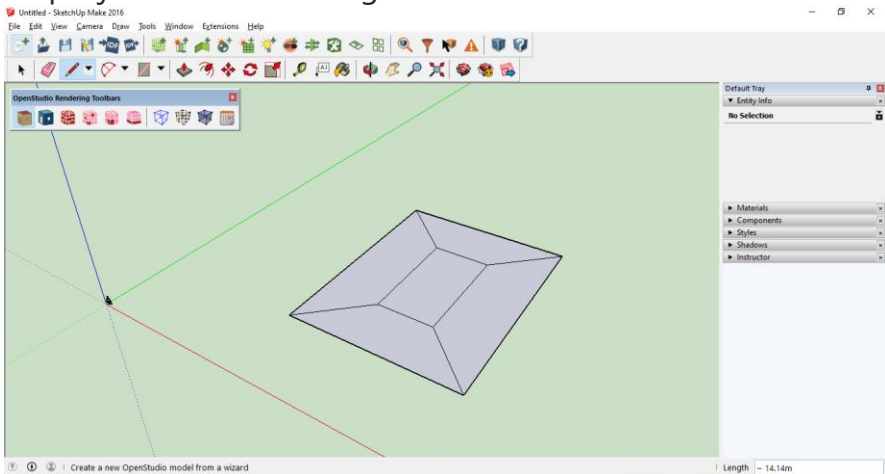
Step 1: Draw a rectangle 30, 40



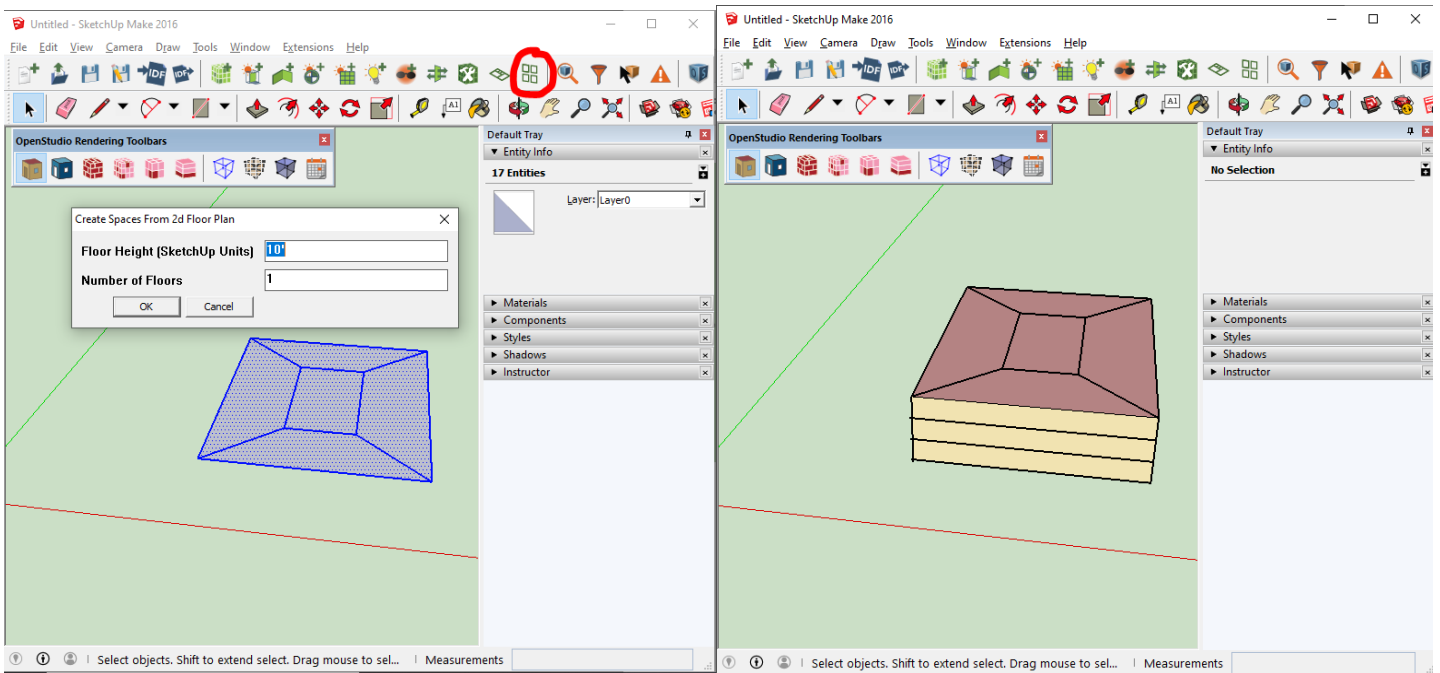
Step2: offset 10



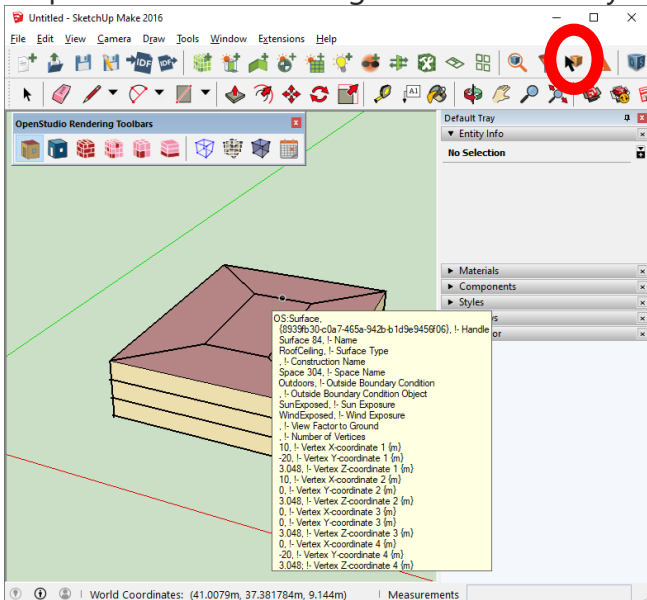
Step3: join the line making a roof



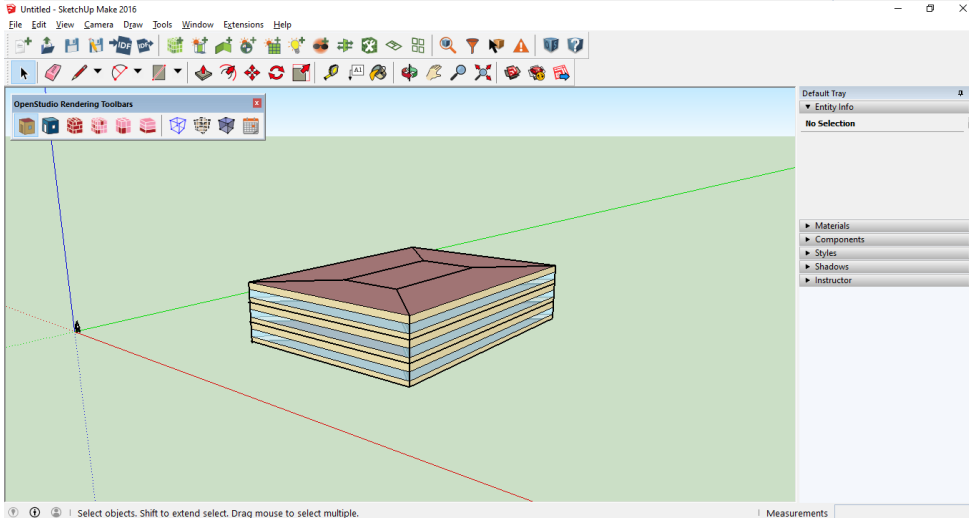
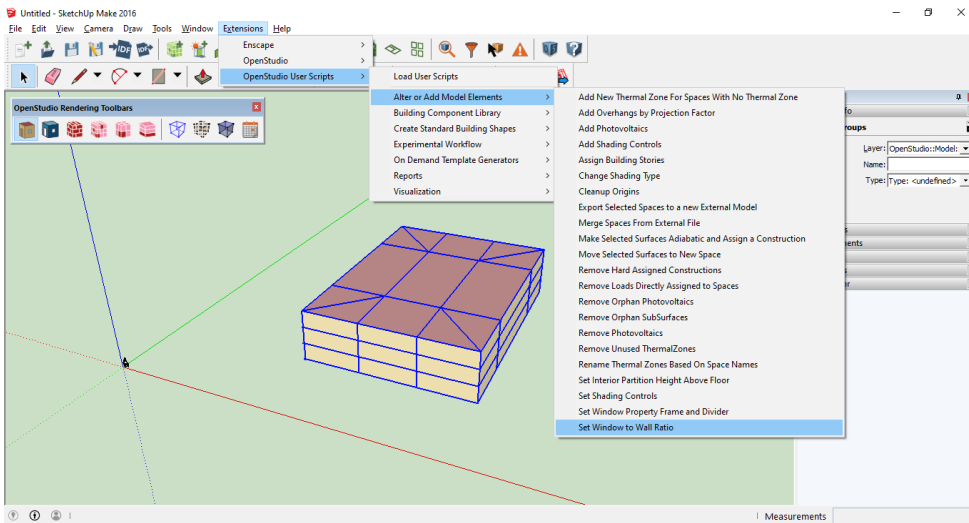
Step4: Select the diagram and click on "Create Spaces from Diagram" **Number of floor 3**



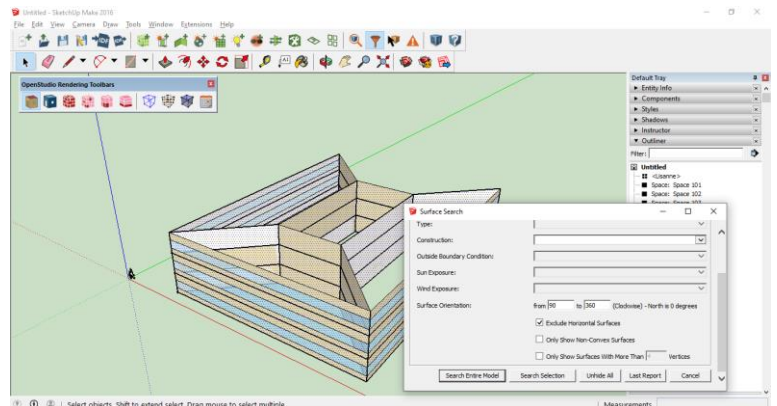
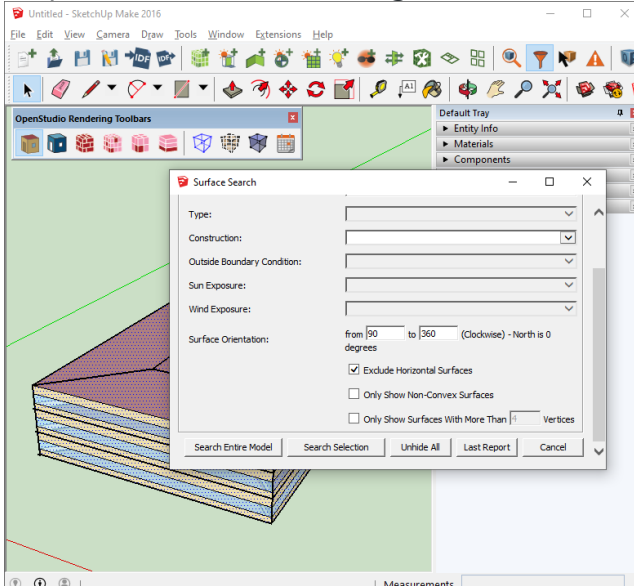
Step5: Info tool then drag the cursor on any surface



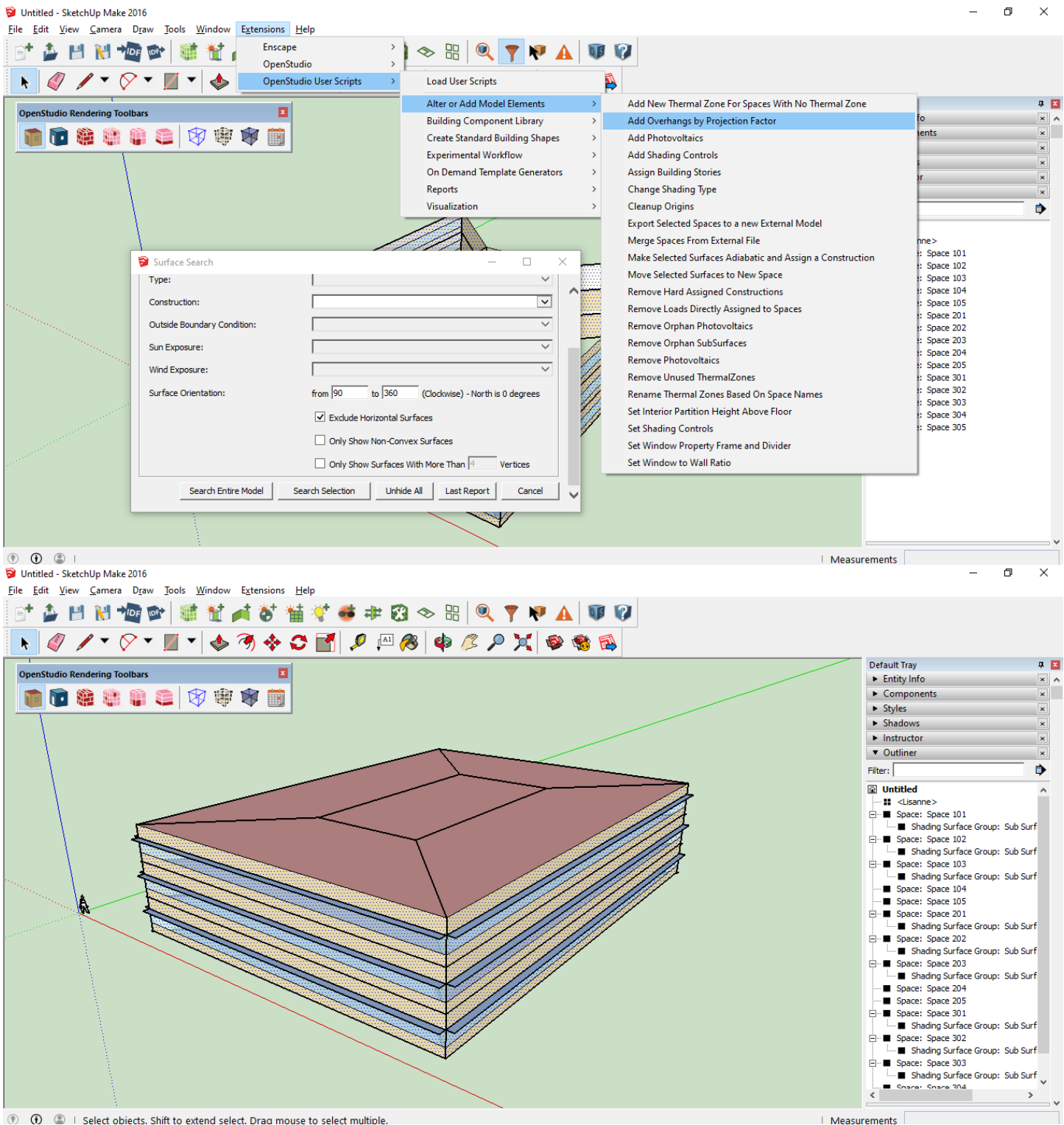
Step6: Click on "Surface Matching", then adding windows by clicking on "extensions"



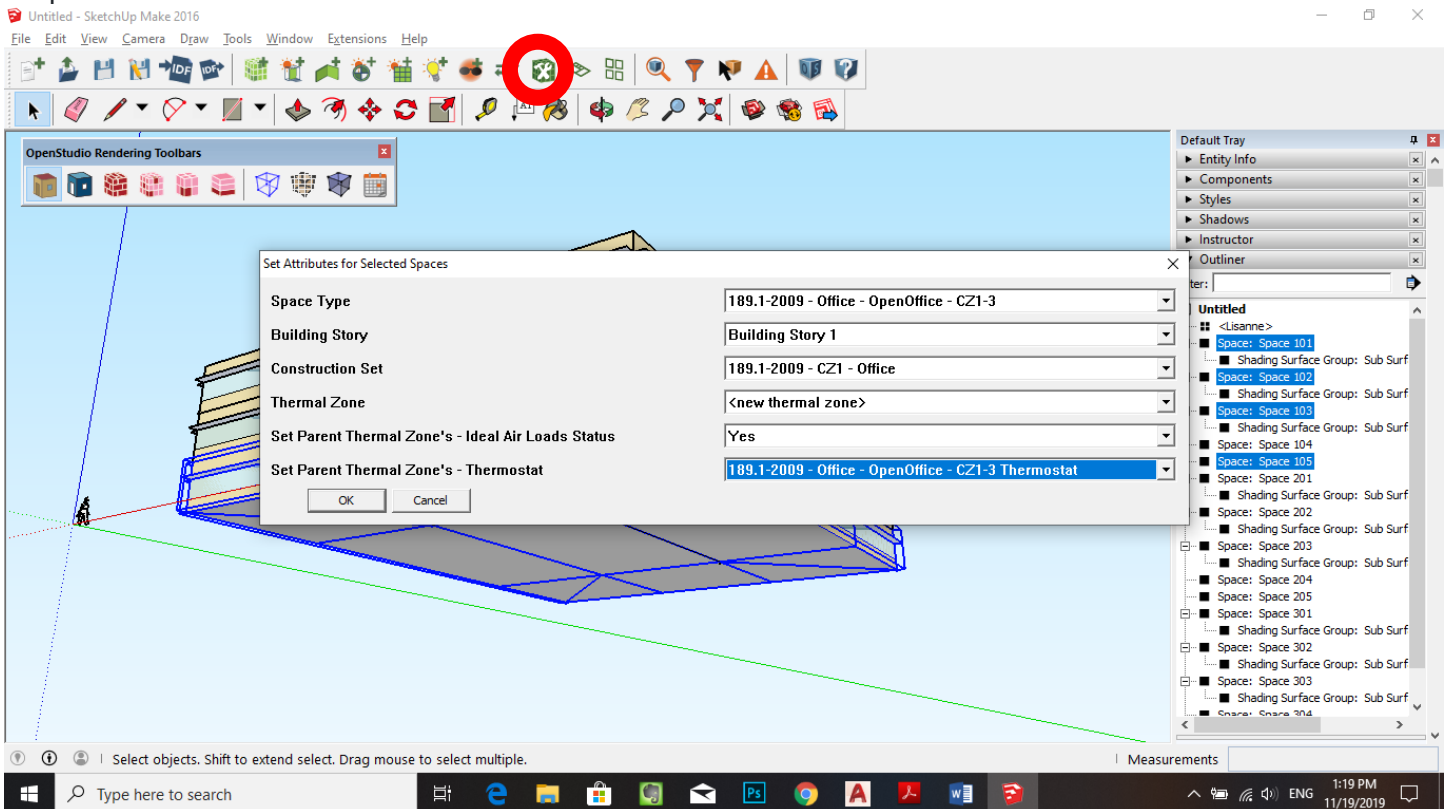
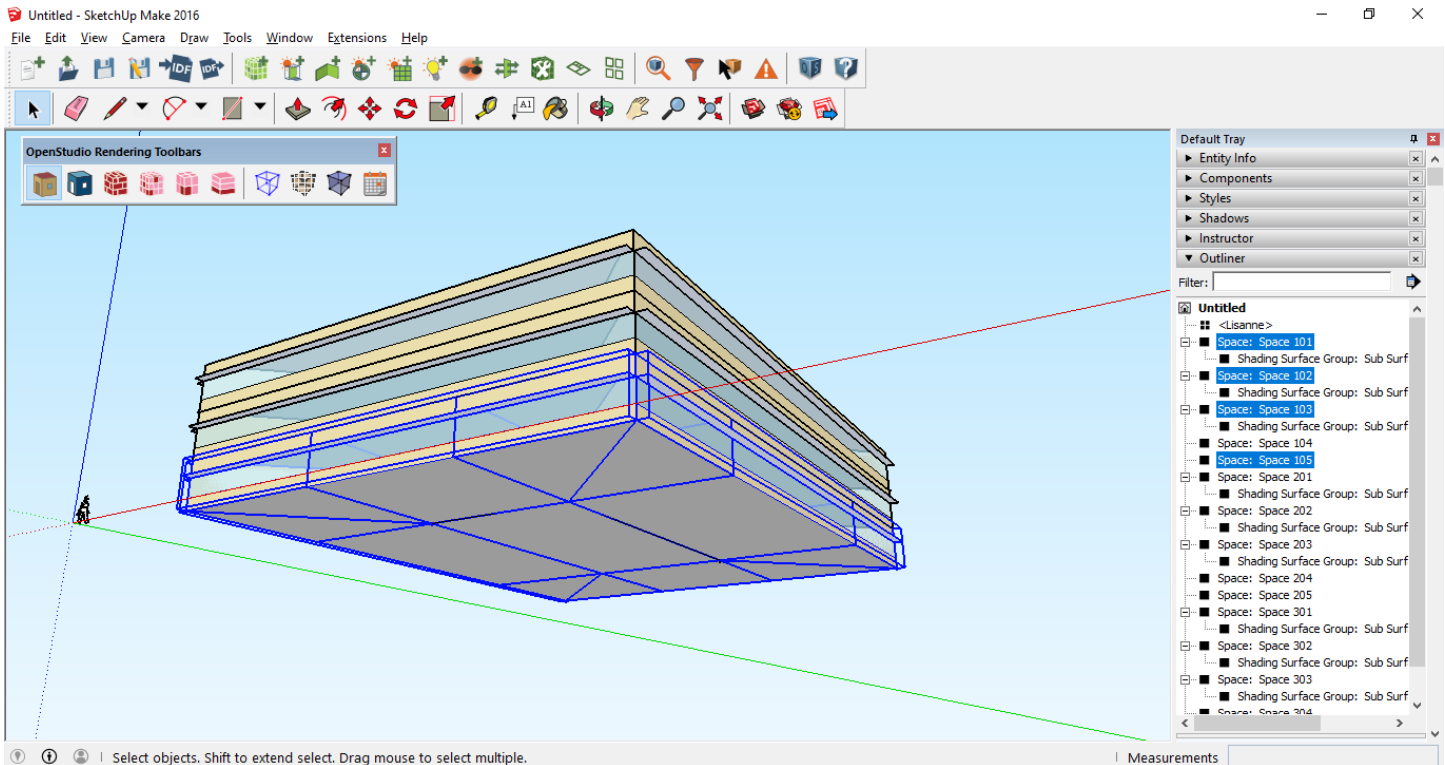
Step7: Surface Search, change the surface orientation 90 to 360 check" exclude horizontal surface"

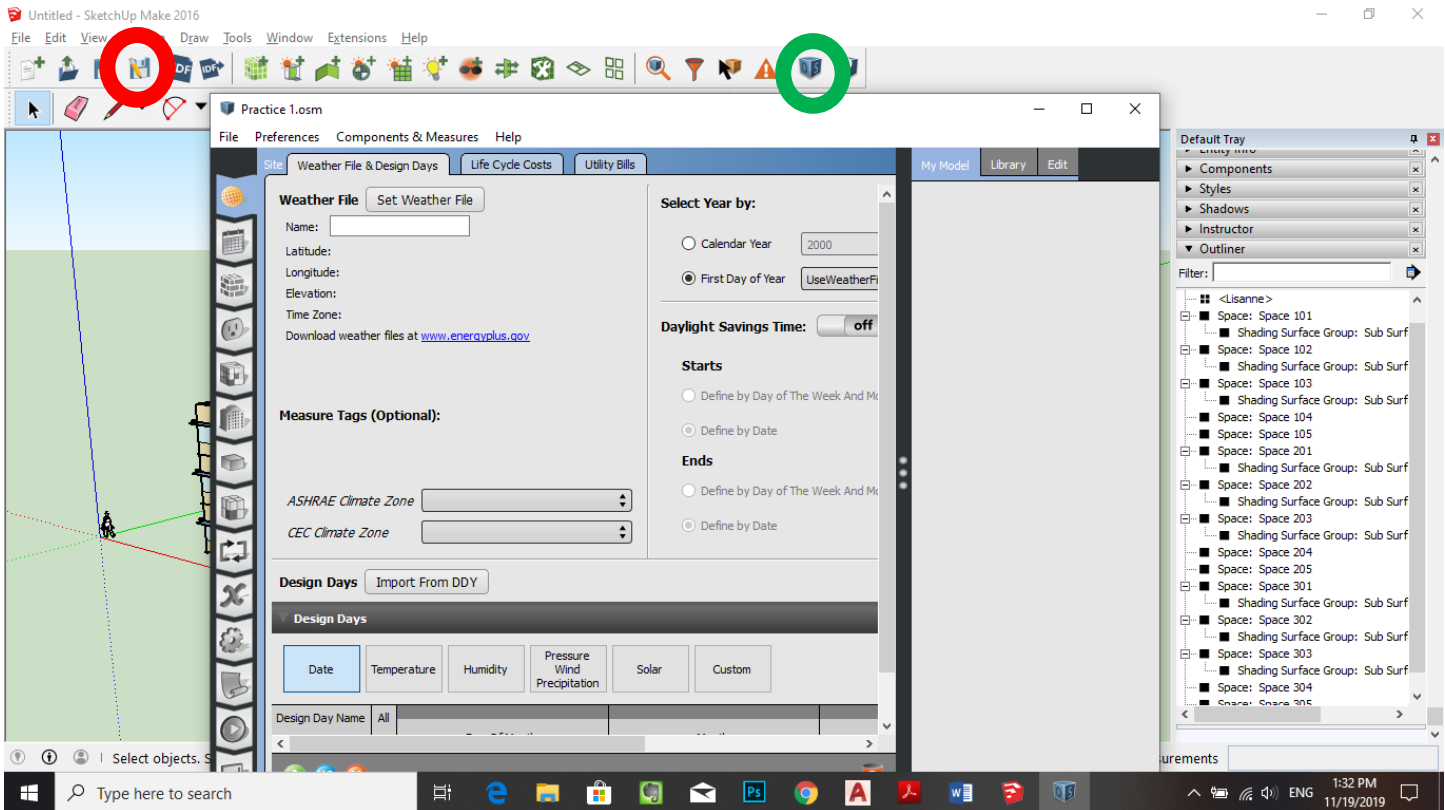


Step8: to add the overhangs click on extensions add overhangs by projections



Step9: select in the outliner box the following spaces: 101-105





Step13: add Piacenza in the weather name box, then run the simulation

