Week6 YUYUE

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 ?

$$q^{net_{1-2}} = \frac{\dot{Q}_{net_{1-2}}}{A} = \frac{A\sigma(T_2^4 - T_1^4)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}/A = \frac{(5.67 * 10^{-8}) * (800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1}$$

$$= 1036 W/m^2$$

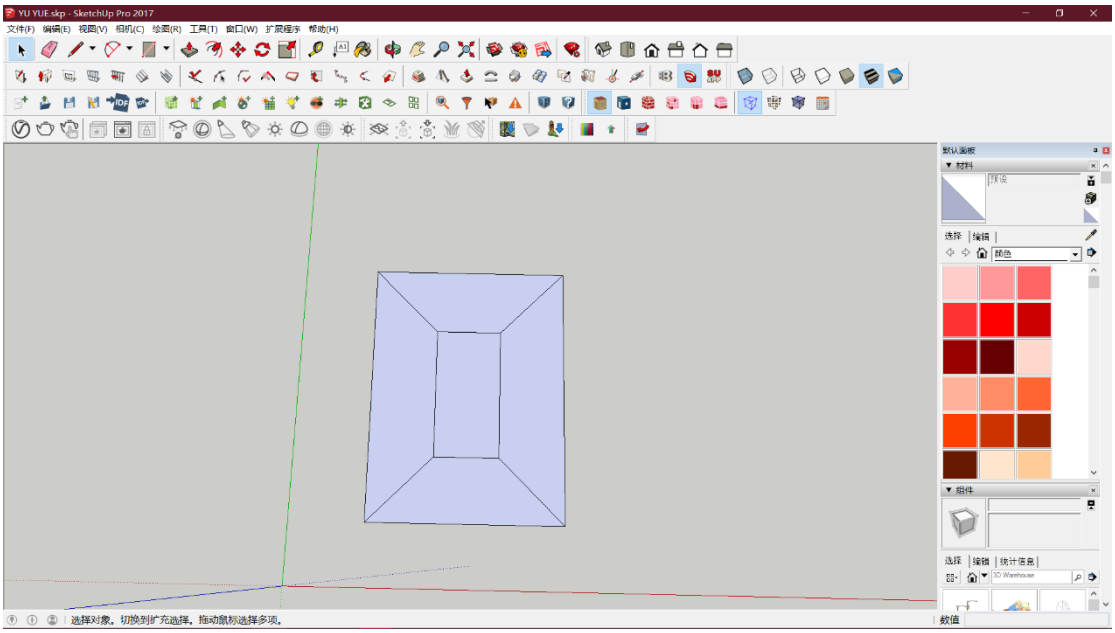
$$q^{net_{1-2,shields}} = \frac{\dot{Q}_{net_{1-2}}}{A} = \frac{A\sigma(T_2^4 - T_1^4)}{(n+1)\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}/A$$

$$\frac{\sigma(T_2^4 - T_1^4)}{(n+1)\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} = \frac{\sigma(T_2^4 - T_1^4)}{(100)\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}$$

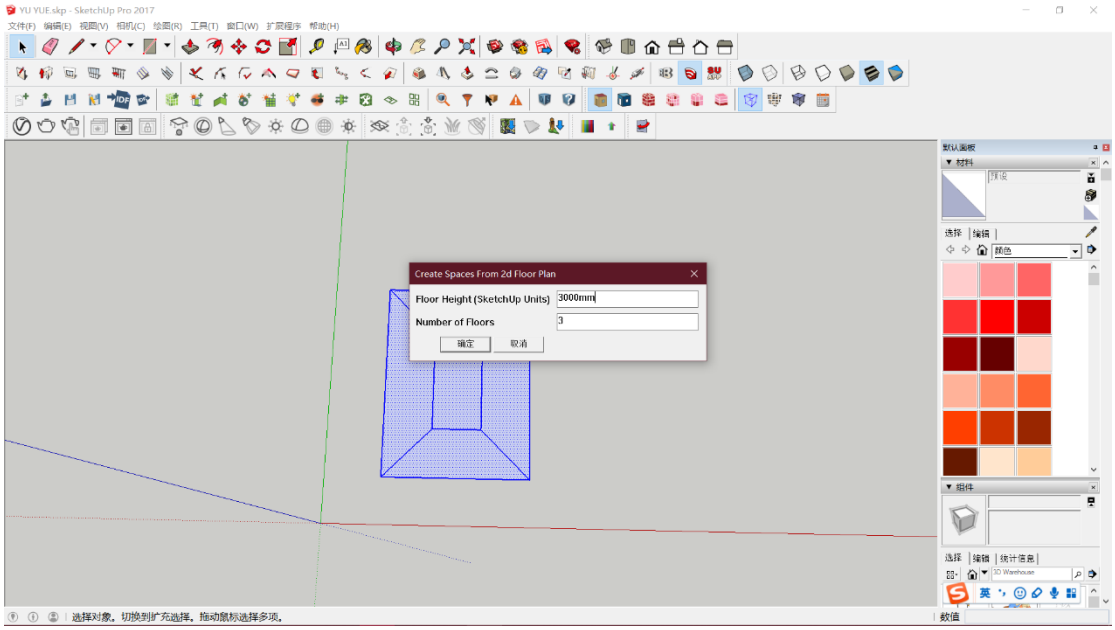
N=99

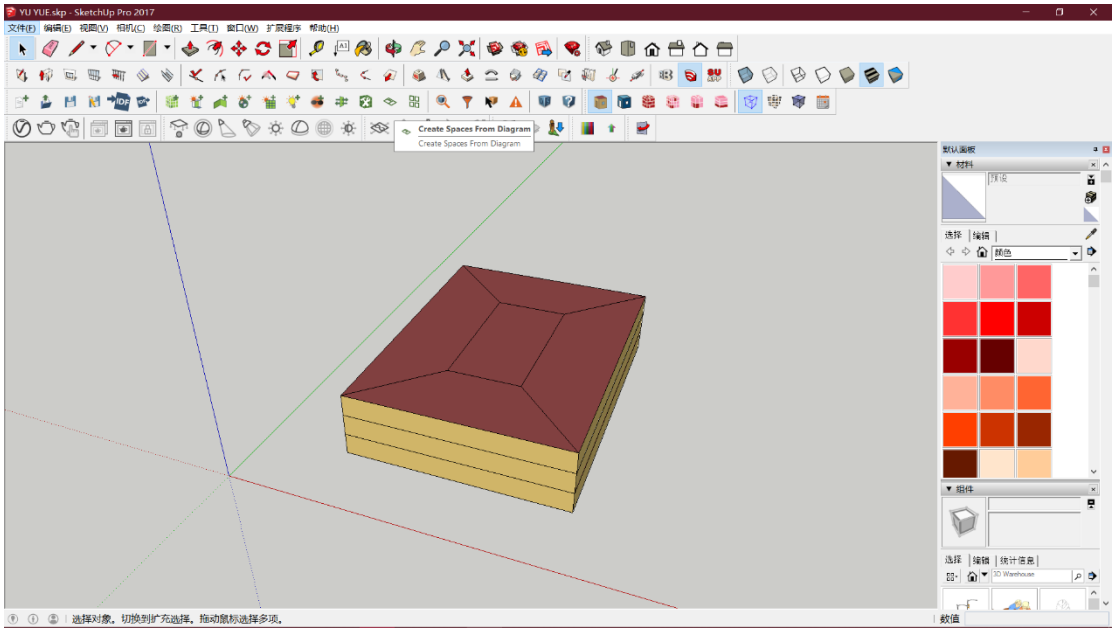
2.Open studio

1) Draw the rectangle and lines in sketchup

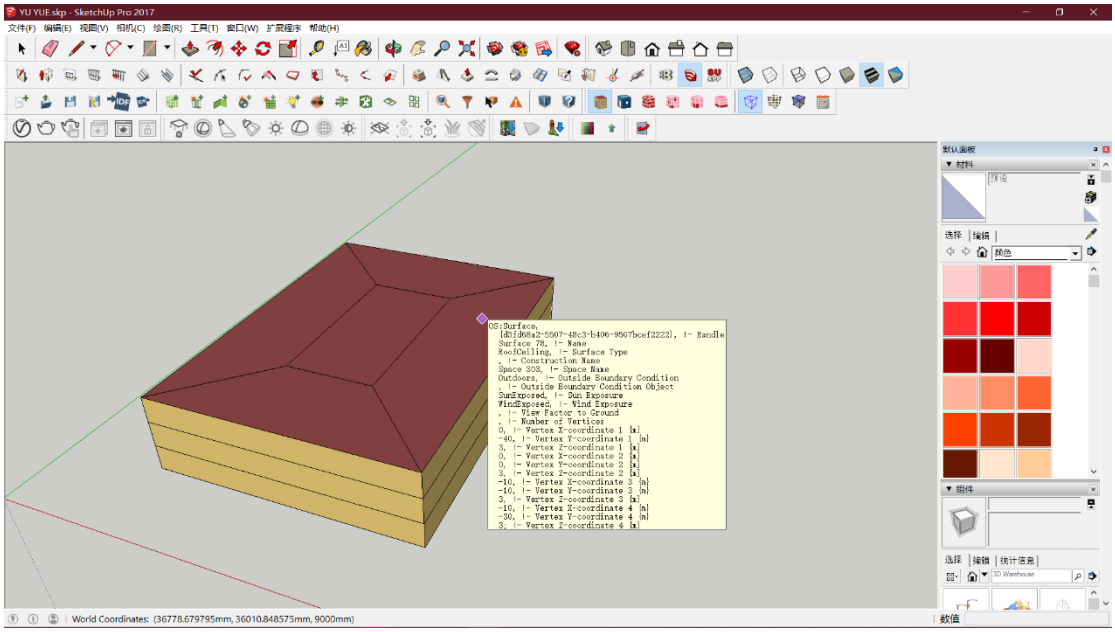


2) Click "create spaces from diagram" to create building

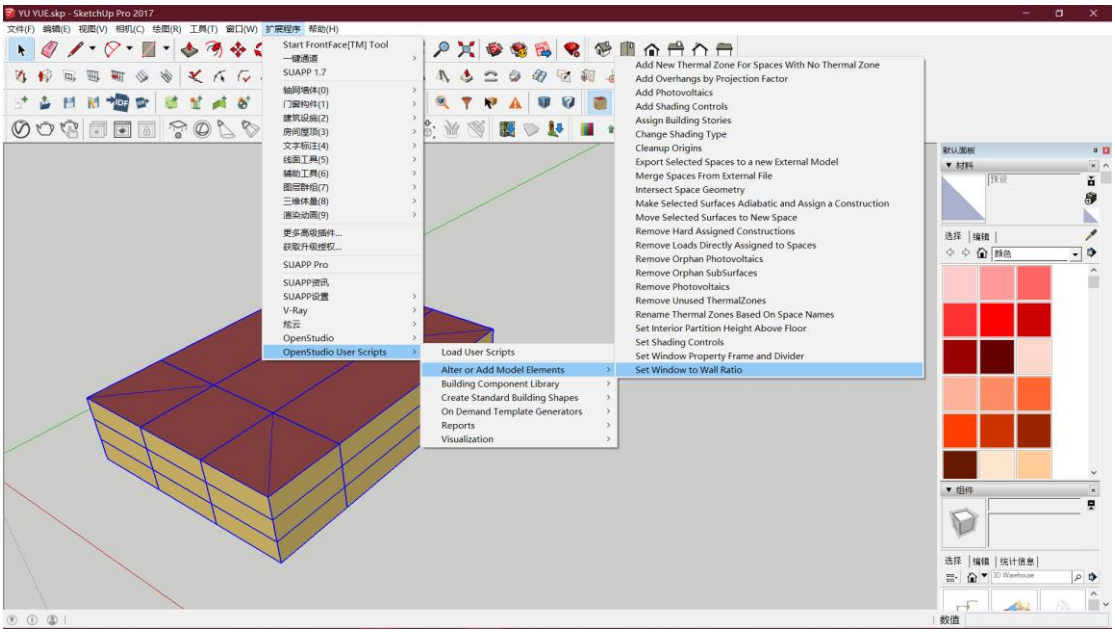


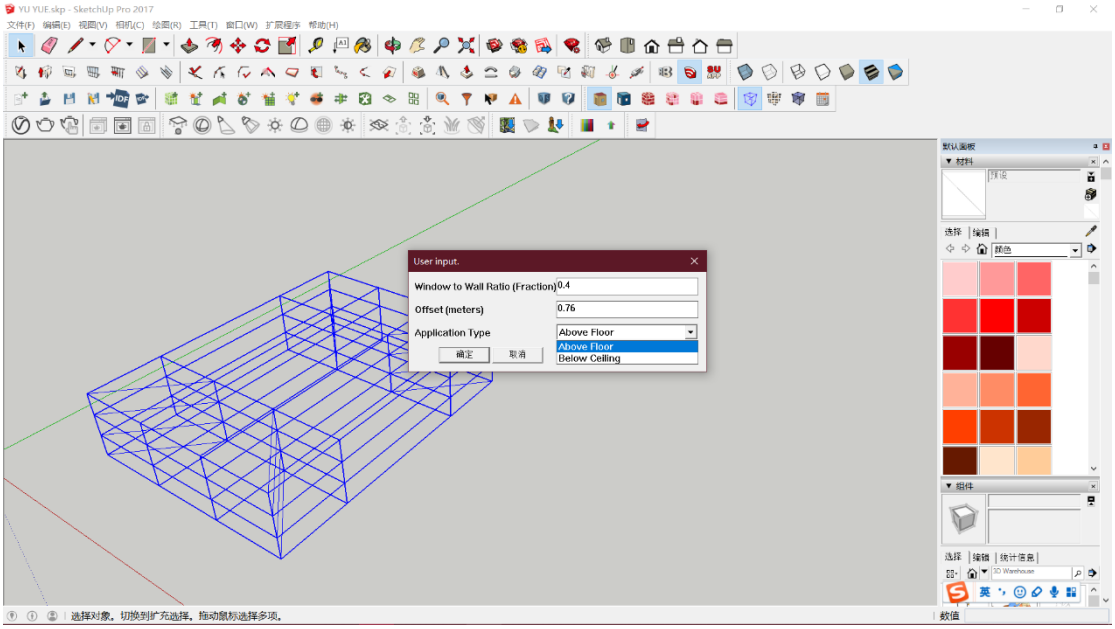


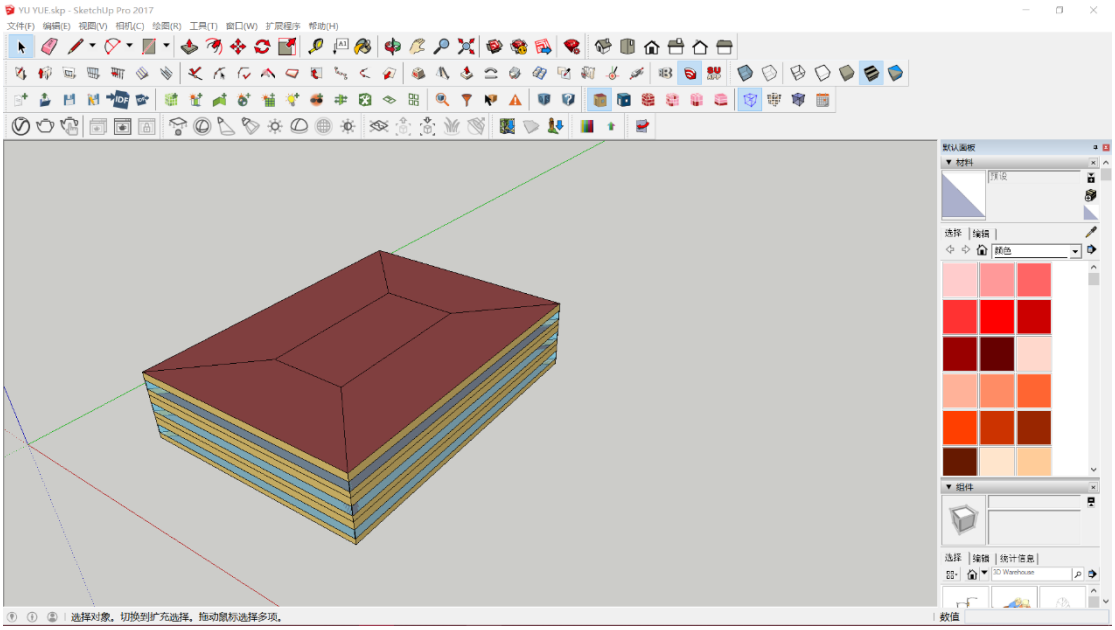
3) use info tool to see the properties of each surface and the boundary conditions



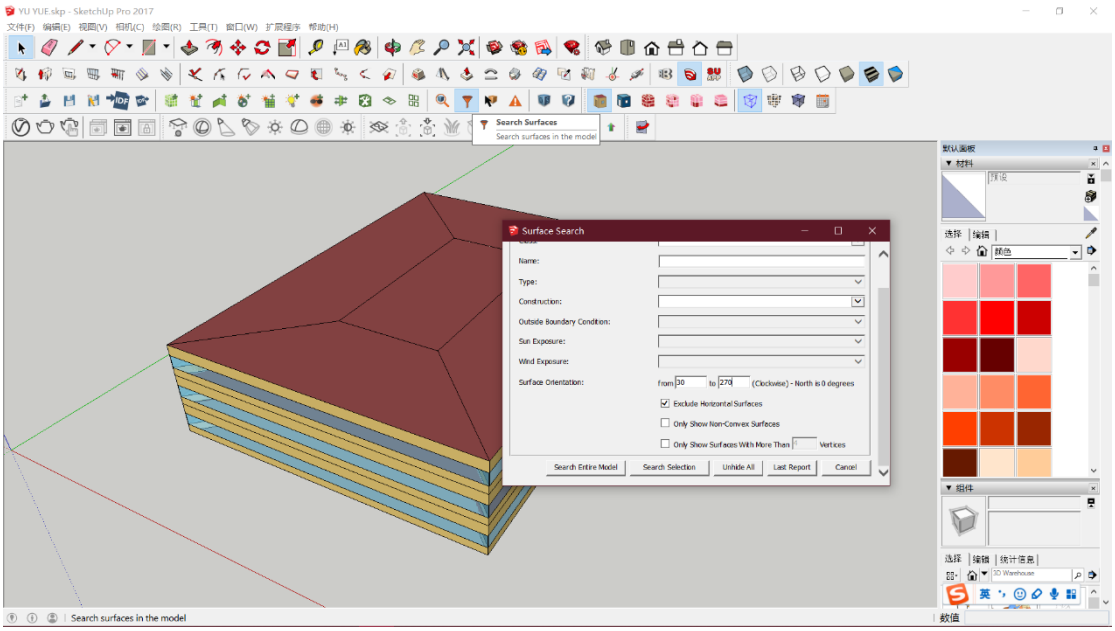
4) select walls, click “extension→OpenStudio user scripts→ alter or add model elements→ set window to wall ration” to add window

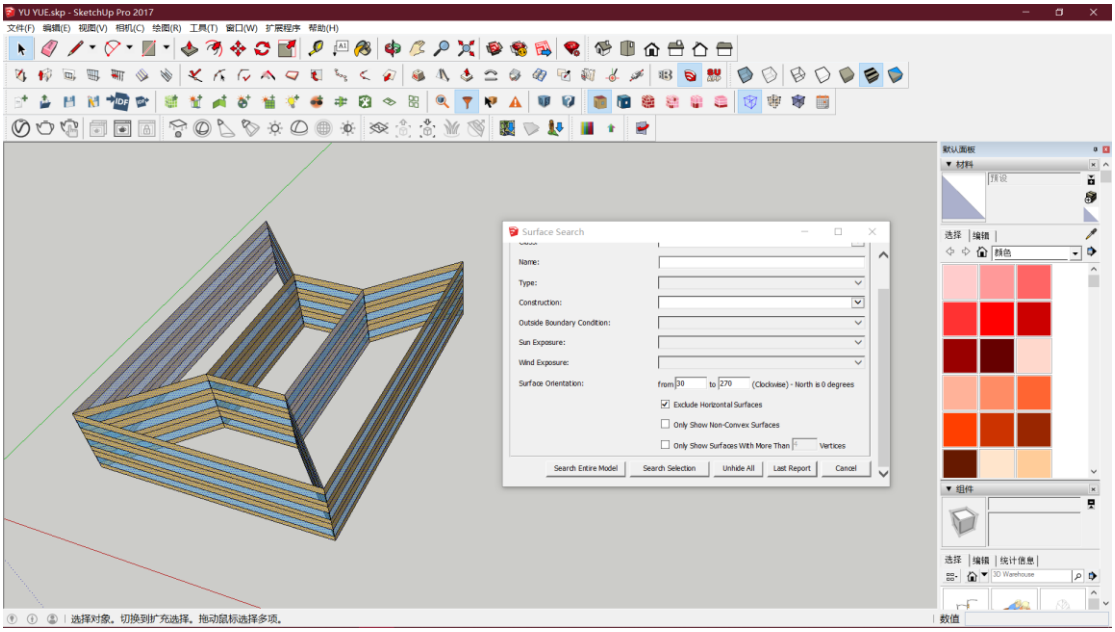



YU YUE.skp - SketchUp Pro 2017
User input.
Window to Wall Ratio (Fraction)
0.4
Offset (meters)
0.76
Application Type
Above Floor
Above Floor
Below Ceiling
确定
取消
选择对象。切换到扩充选择。拖动鼠标选择多项。
数值

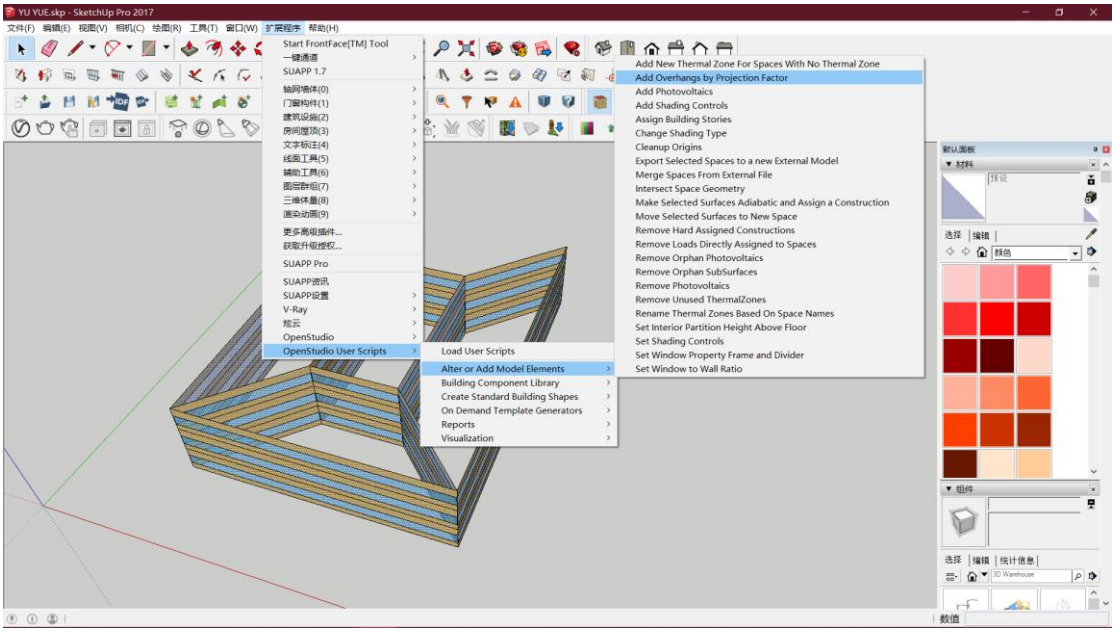

YU YUE.skp - SketchUp Pro 2017
选择对象。切换到扩充选择。拖动鼠标选择多项。
数值

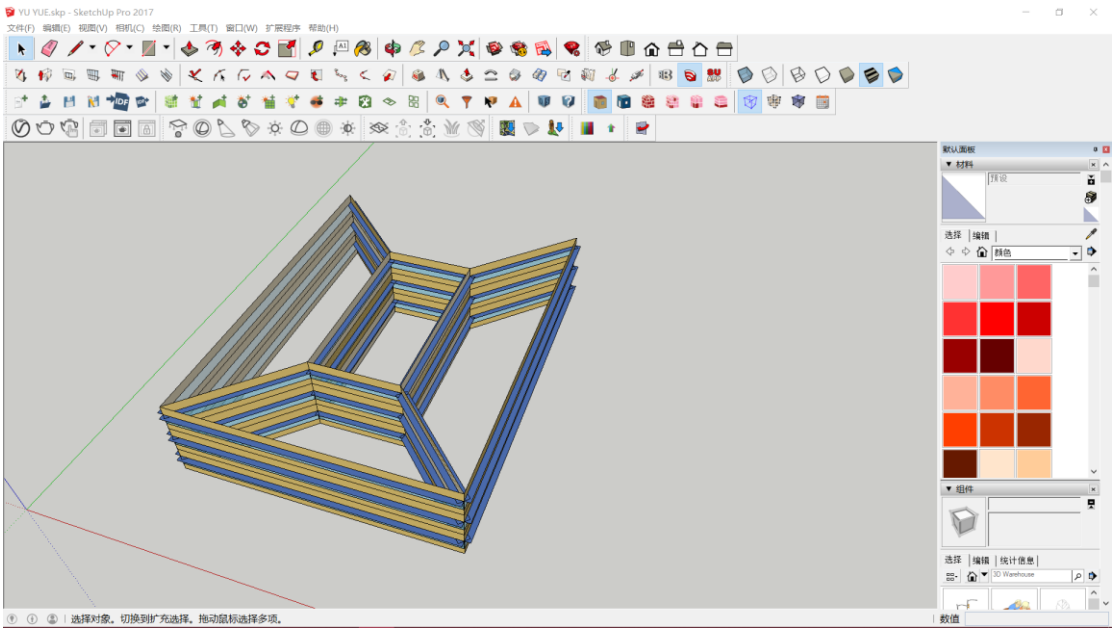
5) Choose desire surfaces except north



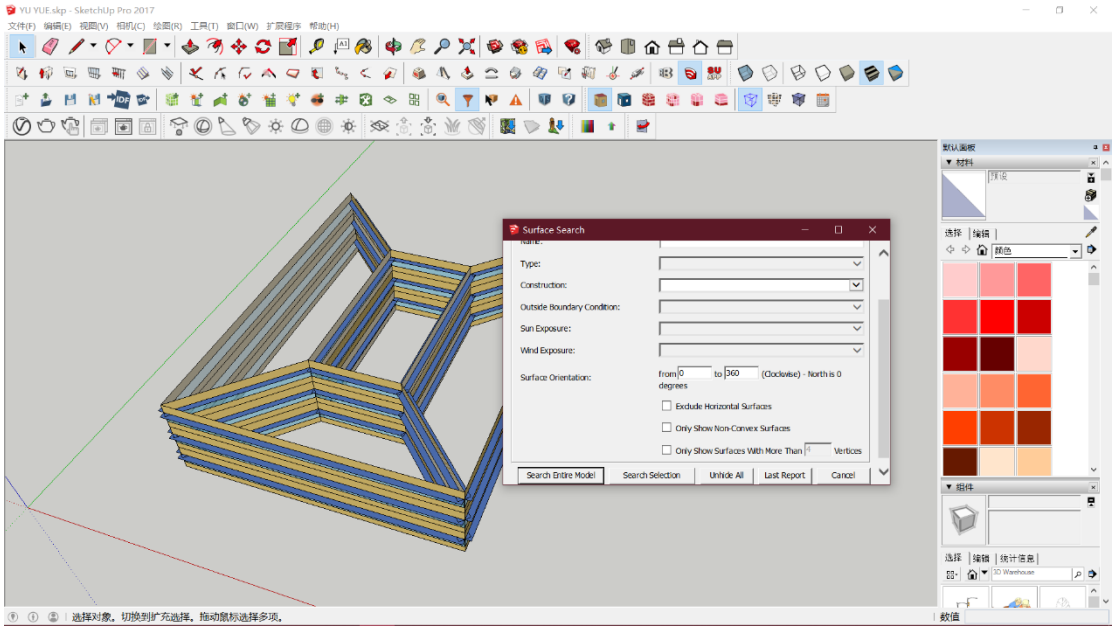


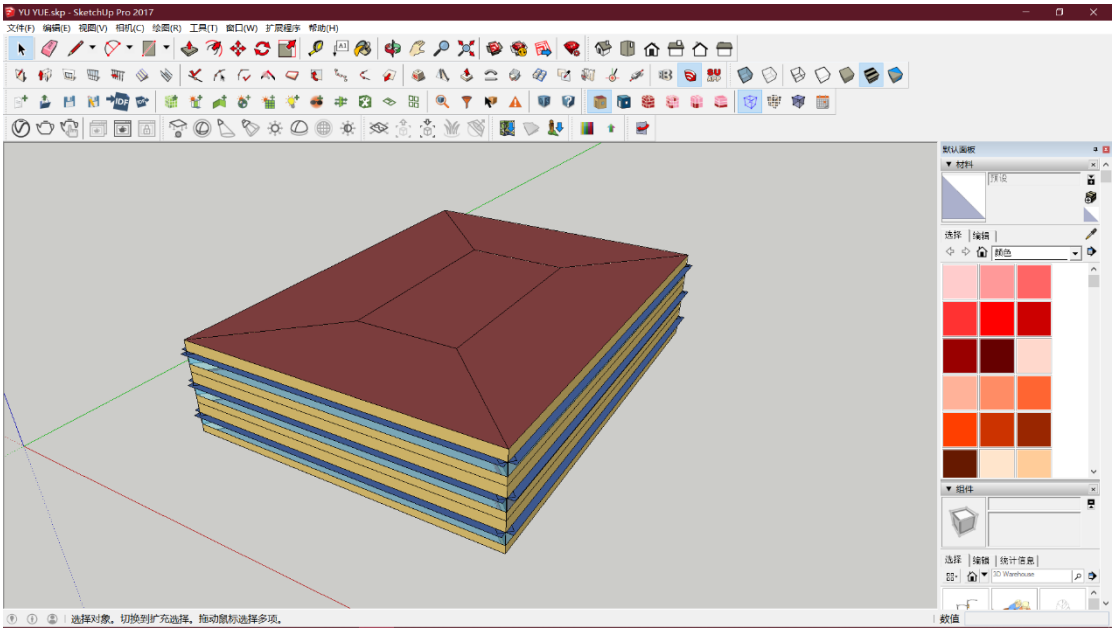
6) Click “extension → OpenStudio user scripts → alter or add model elements → add overhangs by projection factor” to add overhang (external shading)



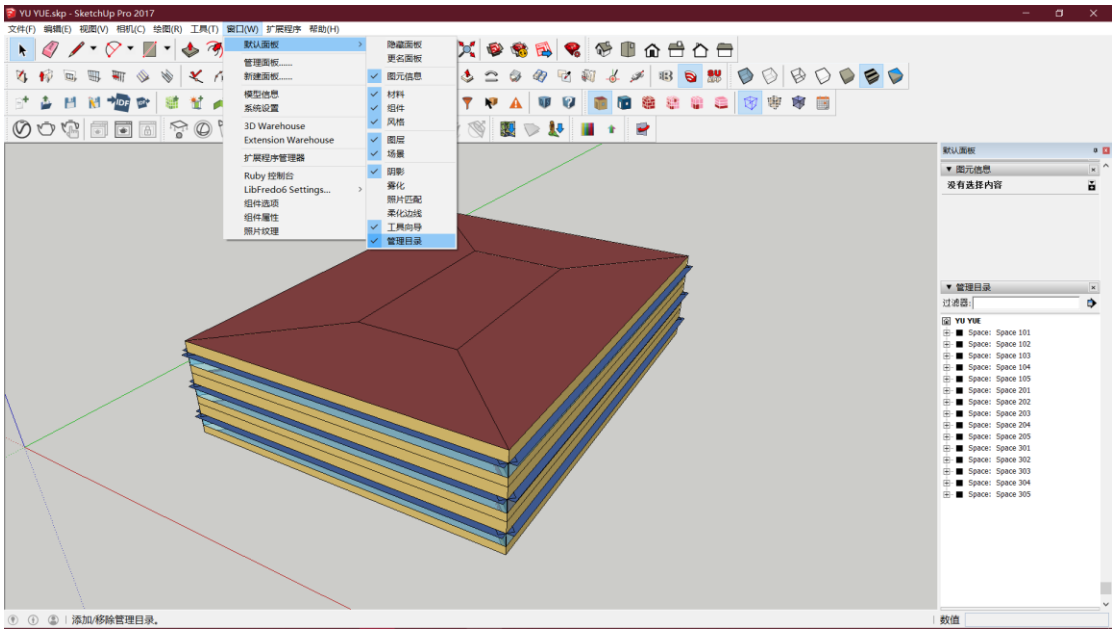


7) Go back to the previous selection to choose 0-360 surfaces

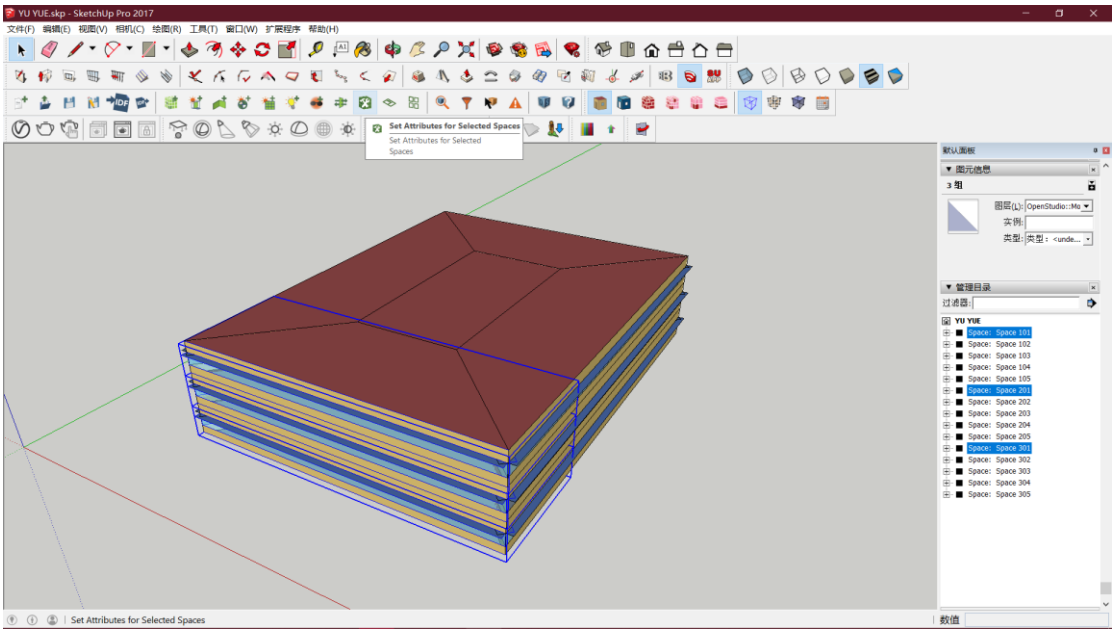


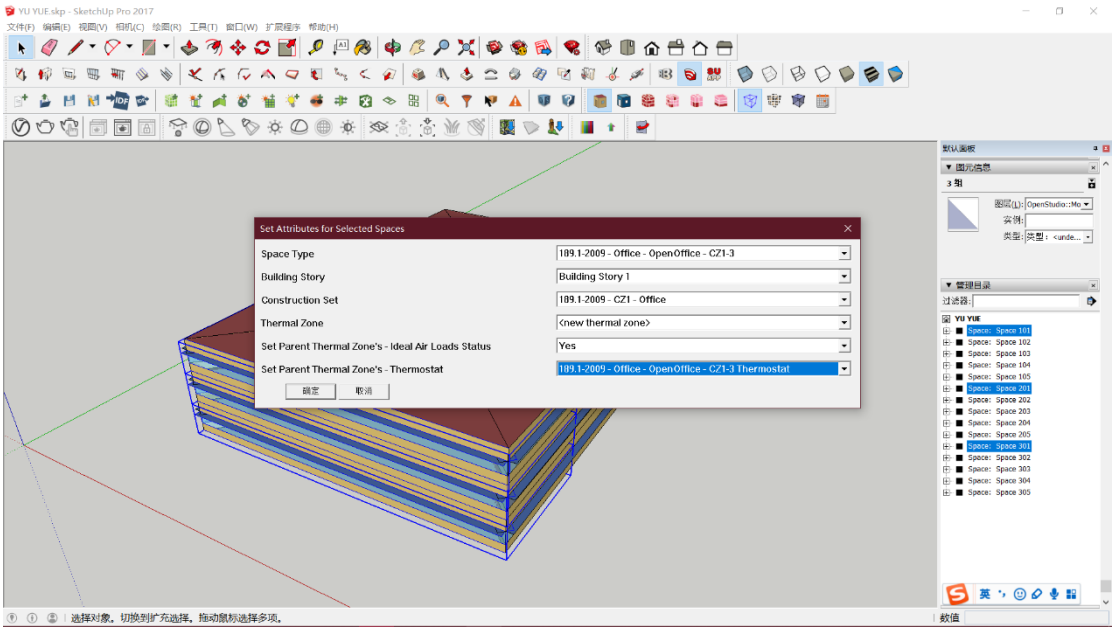


8) Click “Windows → default tray → outliner” to have outliner in our tray

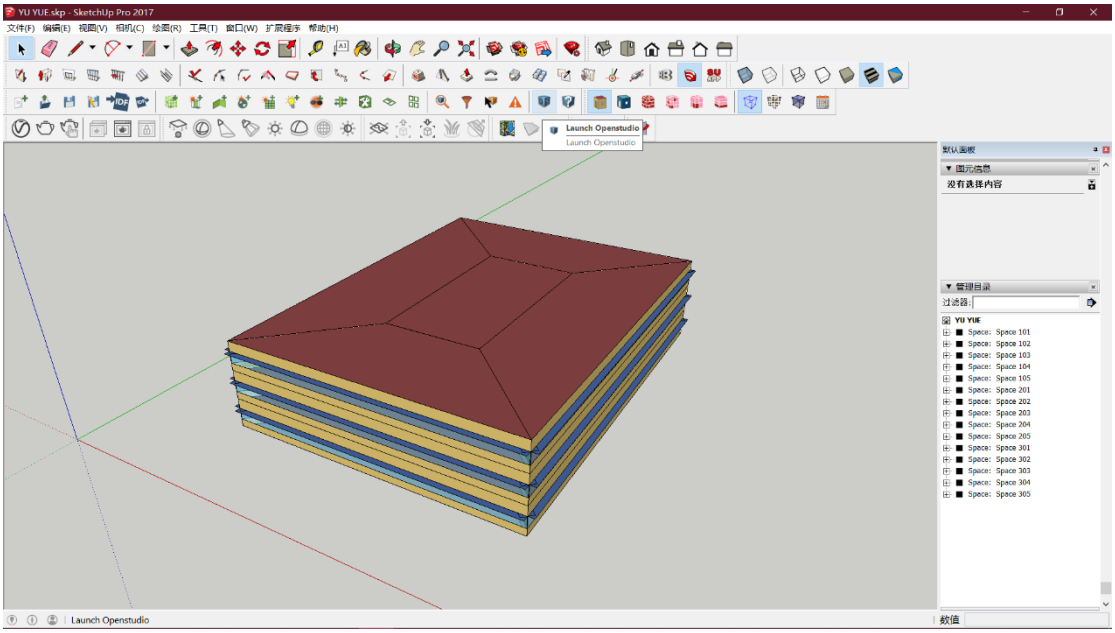


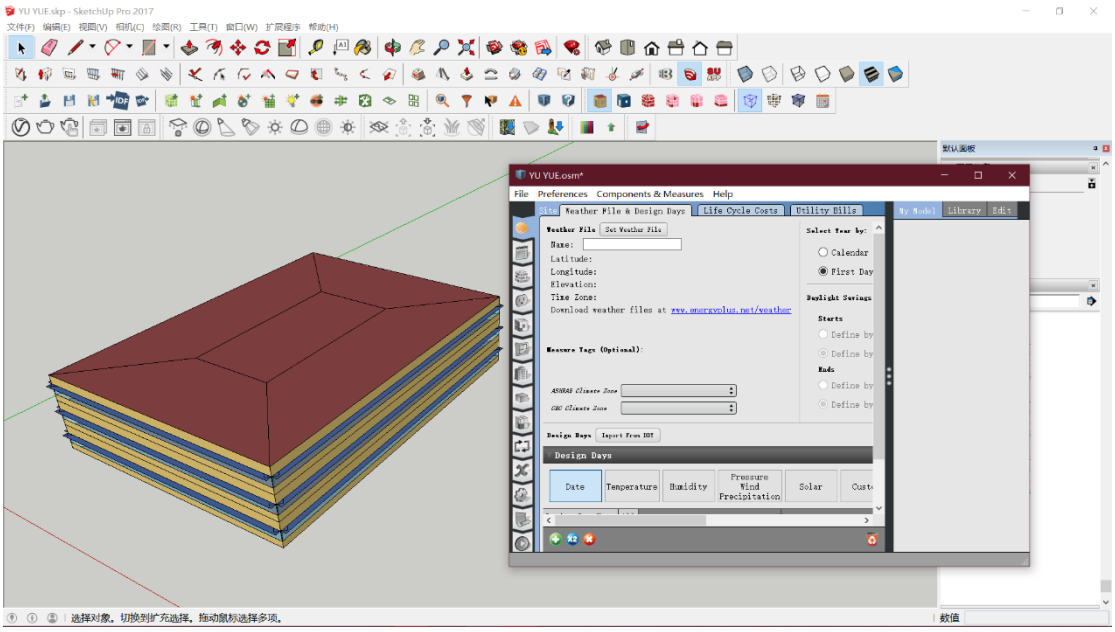
9) choose the spaces of each thermal zone and click “set attributes for selected spaces” to add specifications:



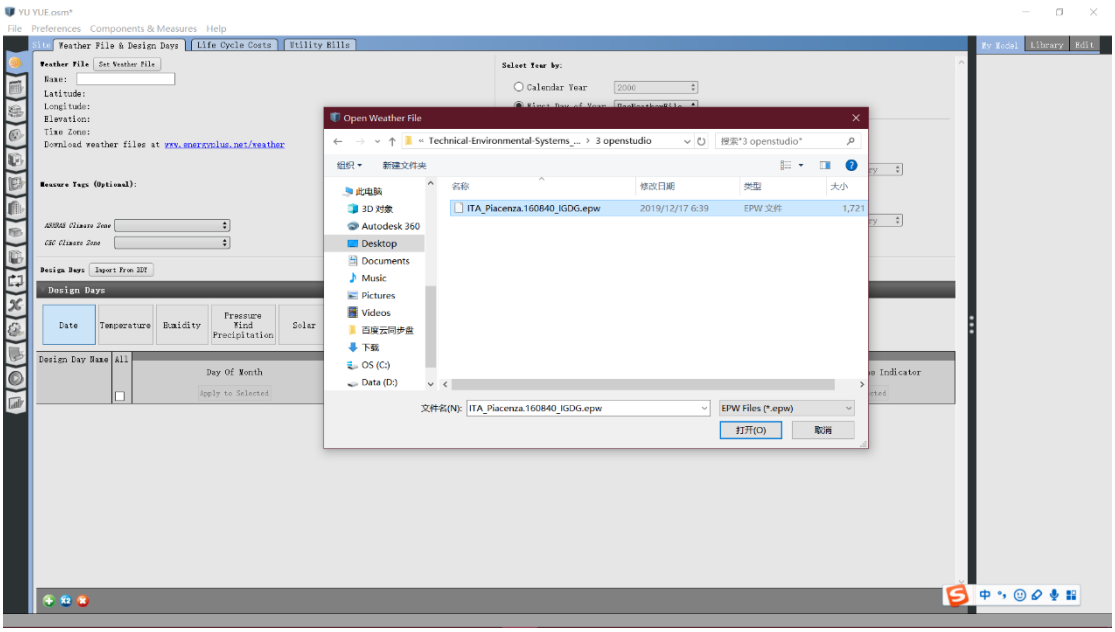


10) launch Openstudio in sketchUp





11) Add the weather Data



12) Run the model: