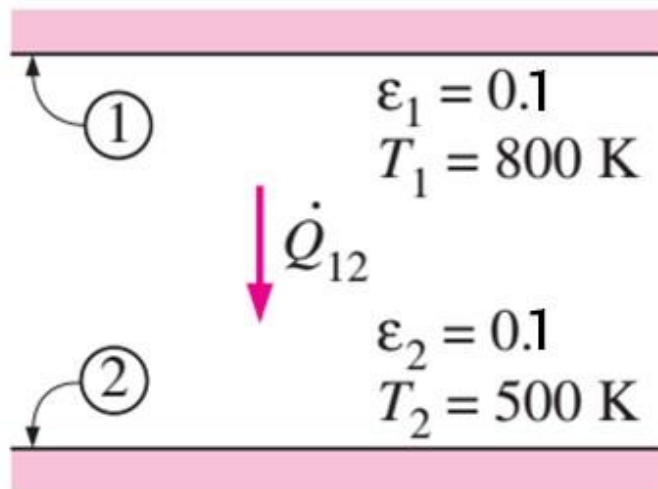


Task 1:



$$\dot{Q}_{N \text{ shield}} = 1\% \dot{Q}(\text{no shield})$$

$$\dot{Q}(\text{no shield}) = 1.5 \times 5.67 \times 10^{-8} \frac{800^4 - 500^4}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1553.72 \text{ W}$$

$$\dot{Q}_{N \text{ shield}} = \frac{A\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1\right) + \left(\frac{1}{\epsilon_{3,1}} + \frac{1}{\epsilon_{3,2}} - 1\right)}$$

$$Q(\text{n-shields}) = A\sigma(T_1^4 - T_2^4) / ((n+1)[2\epsilon - 1])$$

$$Q_{1-2(\text{with } n \text{ shields})} = \left(\frac{1}{n+1}\right) \frac{A\sigma(T_1^4 - T_2^4)}{\left[\frac{2}{\epsilon} - 1\right]}$$

Q with n shield= 1% Q without shield

Q with shield/ Q without shield = 0.01

$$\frac{1}{(n+1) \left(\frac{2}{e^3} - 1 \right)} = 0.01$$
$$\frac{1}{\frac{1}{e^1} + \frac{1}{e^2} - 1} - 1$$

$$\frac{1}{\frac{19(n+1)}{1}} = 0.01$$

$$100 = n + 1$$

$$n=99$$

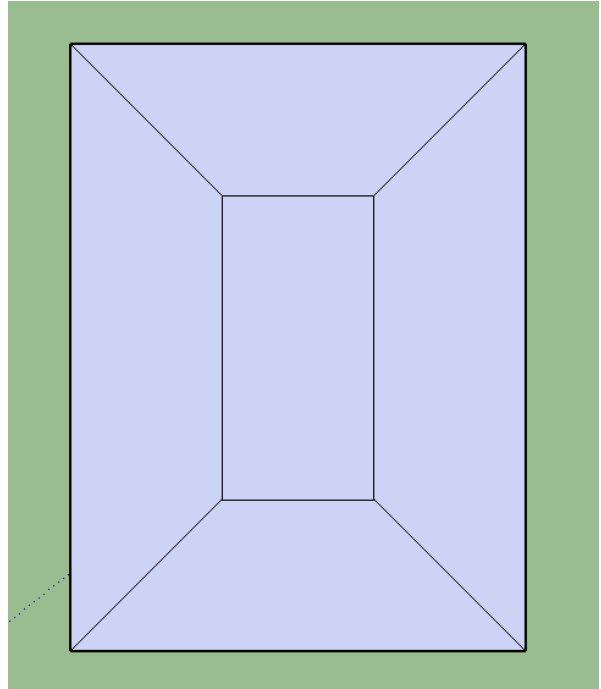
And hence the number of shield is 99 shields

Task 2:

The steps using sketchup and open studio.

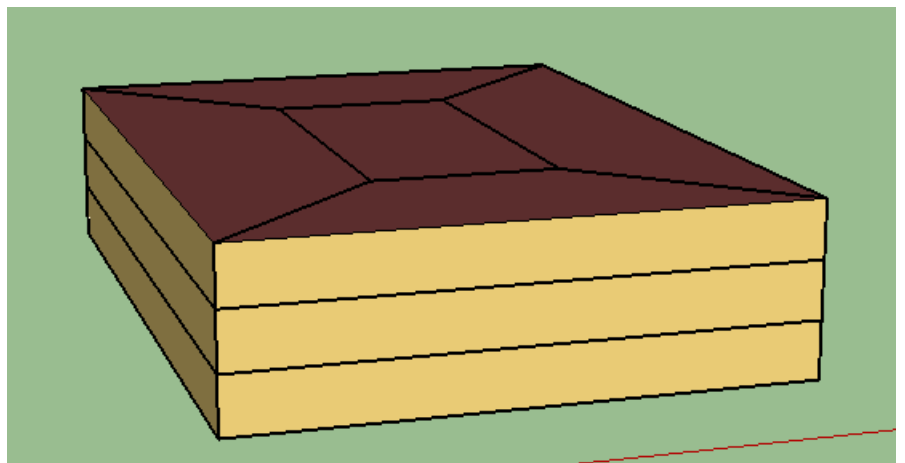
Step 1:

Creating a diagram with connected edges



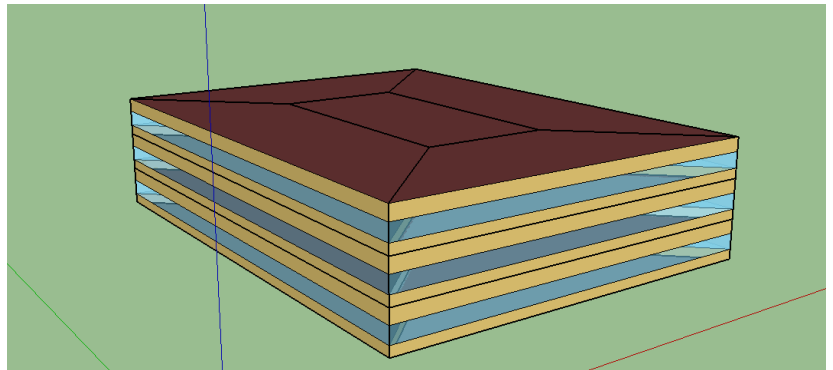
Step 2:

Creating spaces from diagram



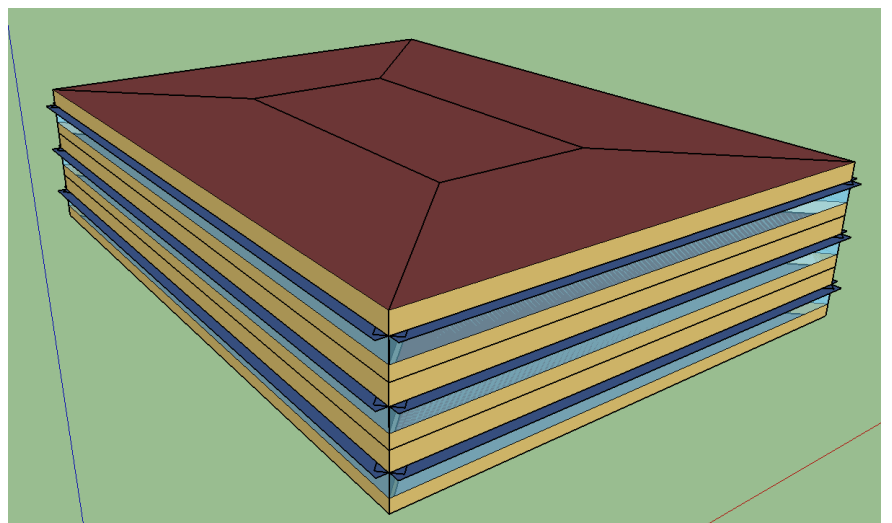
Step 3:

click on the surface
matchig tool to create
windows inn your building.

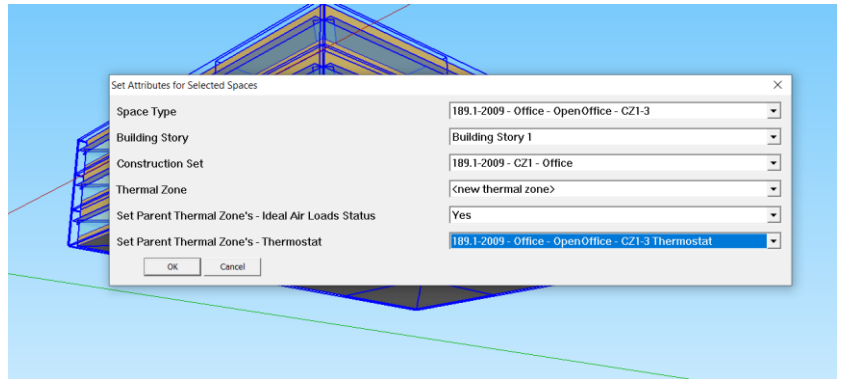


Step 4:

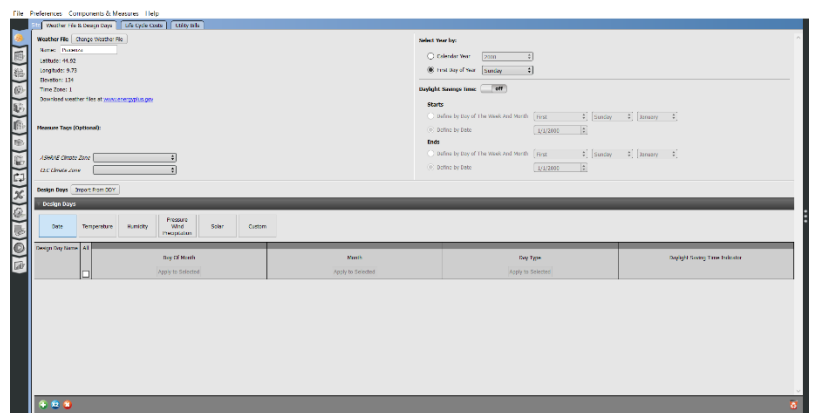
Overgang the external
shadings



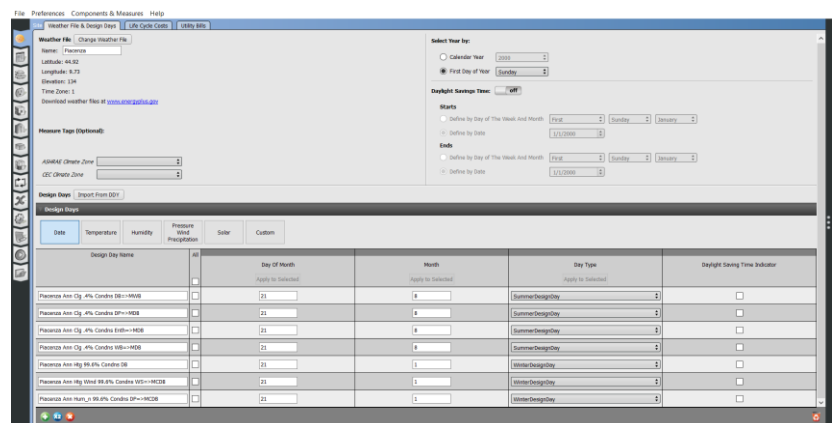
Add specifications to each thermal zone



Launching open studio using sketchup and adding the weather data

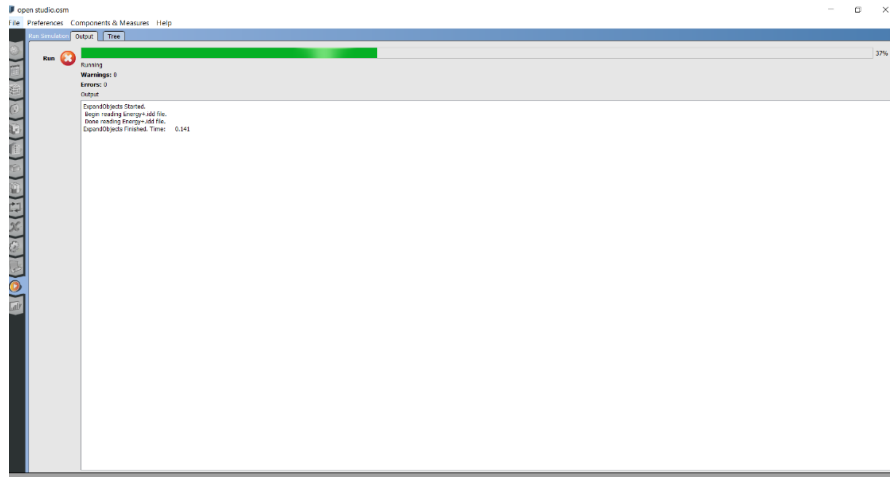


And design days



Step 8:

Running the model..



Step 9:

Reviewing the model summary in the last lab

OpenStudio Results
Model Summary

Open Results View for Detailed Report

Building Summary

Information	Value	Units
Building Name	Building 1	building_name
Net Site Energy	2,146,853	kBtu
Total Building Area	38,750	ft ²
ELI (Based on Net Site Energy and Total Building Area)	55.40	kBtu/ft ²
OpenStudio Standards Building Type		

Weather Summary

	Value
Weather File	Piacenza - ITA IGDD VMOW-160840
Latitude	44.92
Longitude	9.73
Elevation	440 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	