

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?

$$Q_{n1} = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = \frac{(5.67 \times 10^{-8}) * (800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1}$$

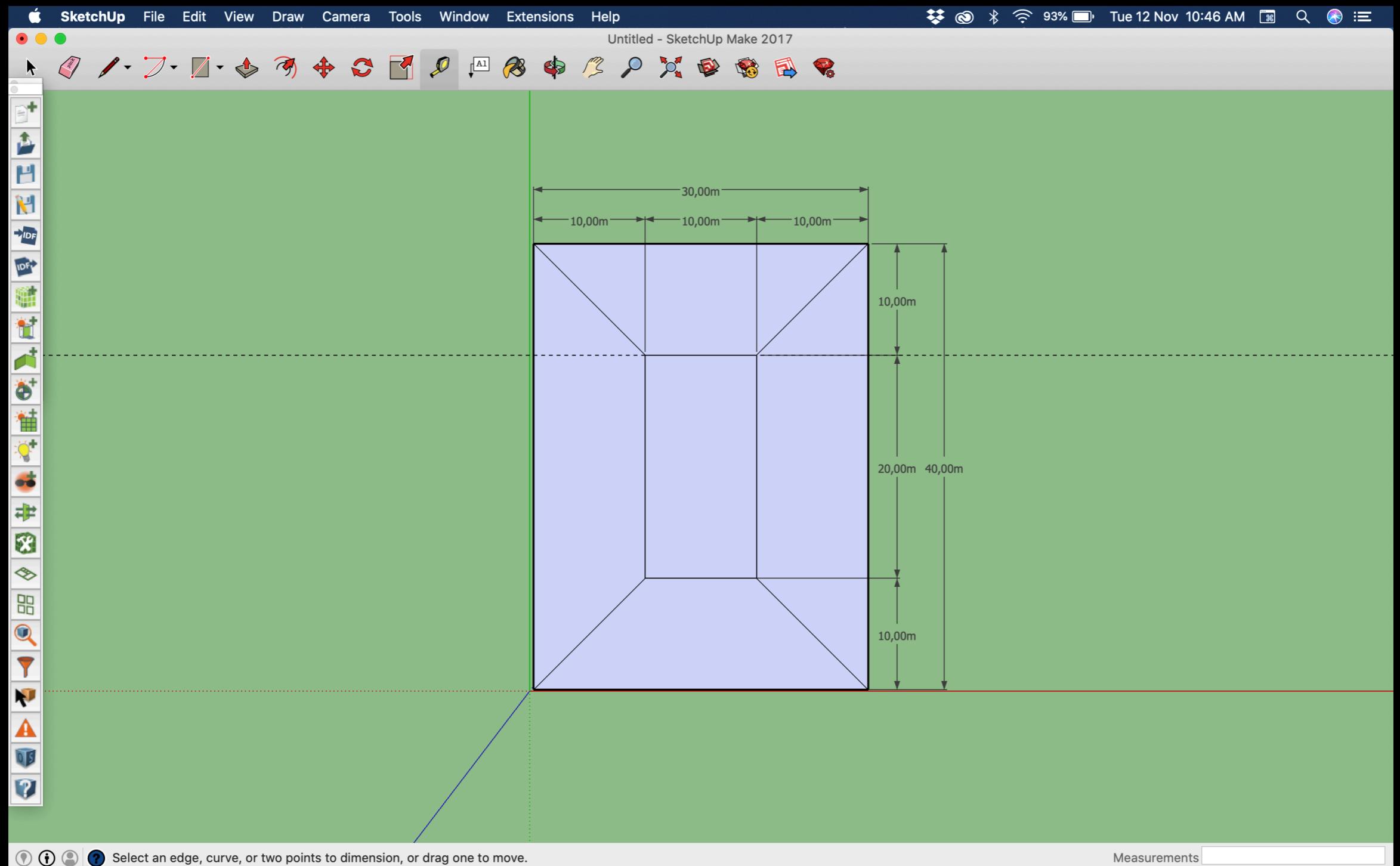
$$= 1035.82 \text{W/m}^2$$

The new heat transfer rates should be 1% of the Q12 net:

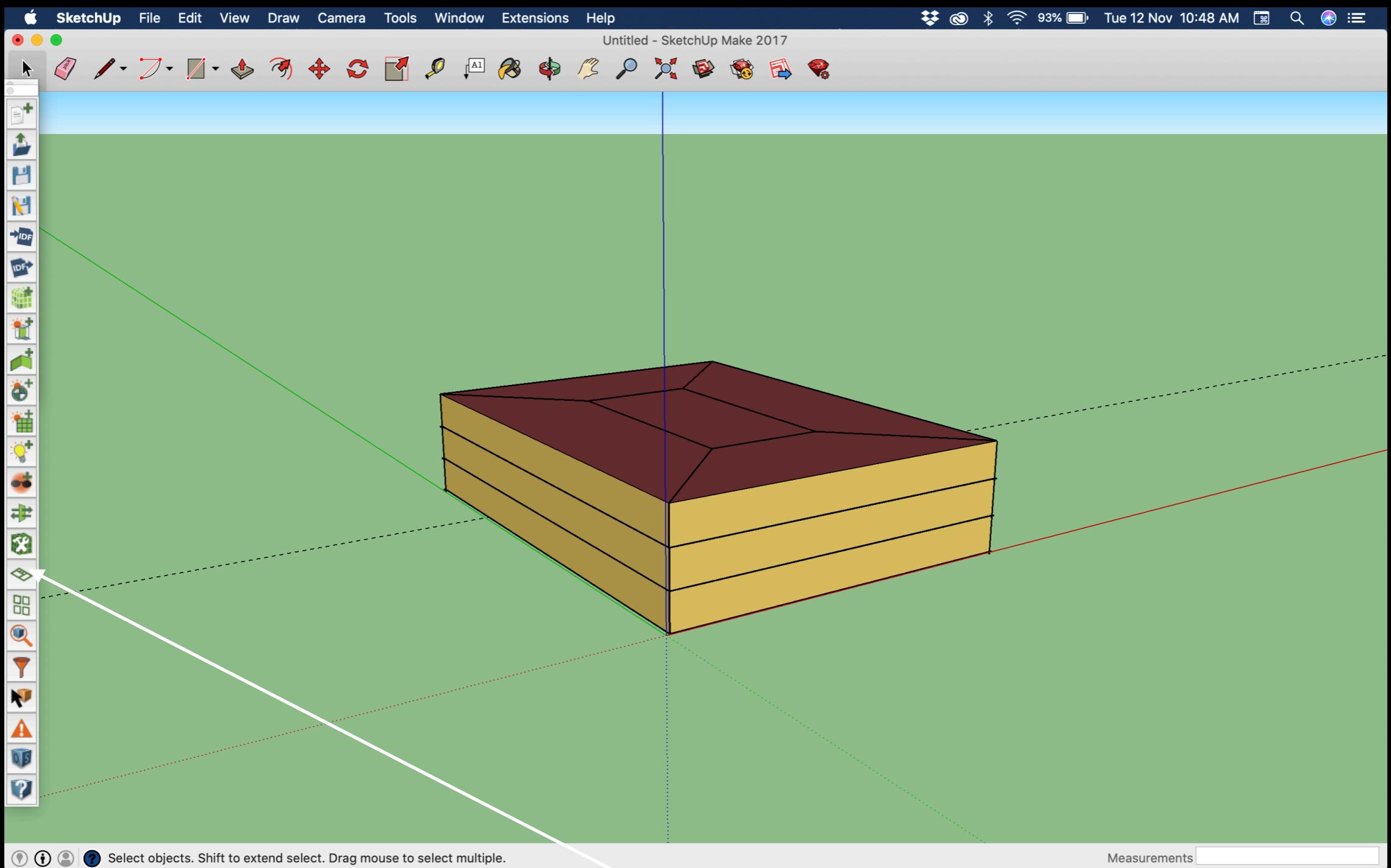
$$Q_{\text{net } 1-2} = \frac{1}{100} \times Q_{\text{net } 1-2}$$

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

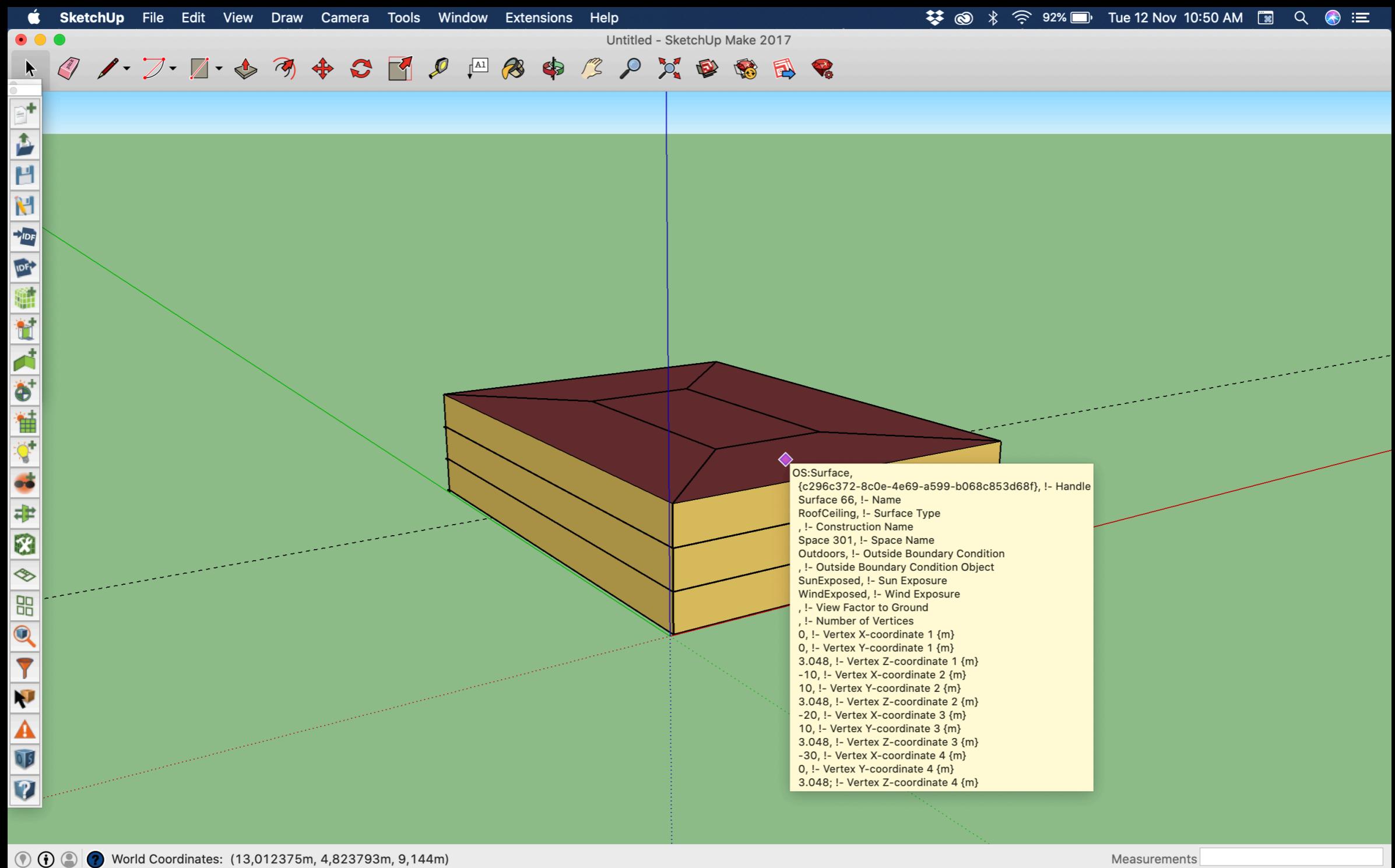
$$n=99$$



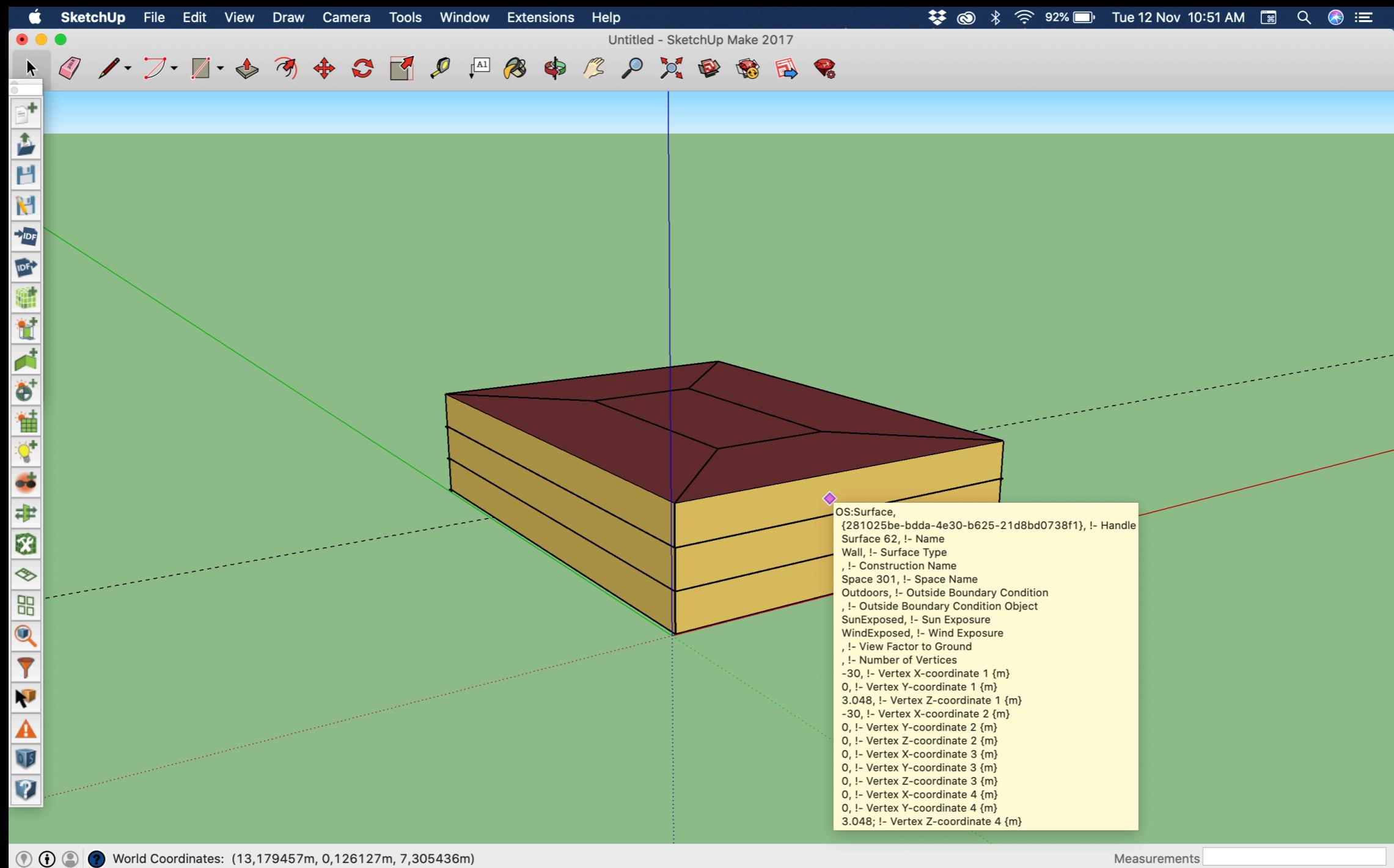
1. Make a rectangle of 30m by 40 m. Offset by 10 m and draw lines from the corners

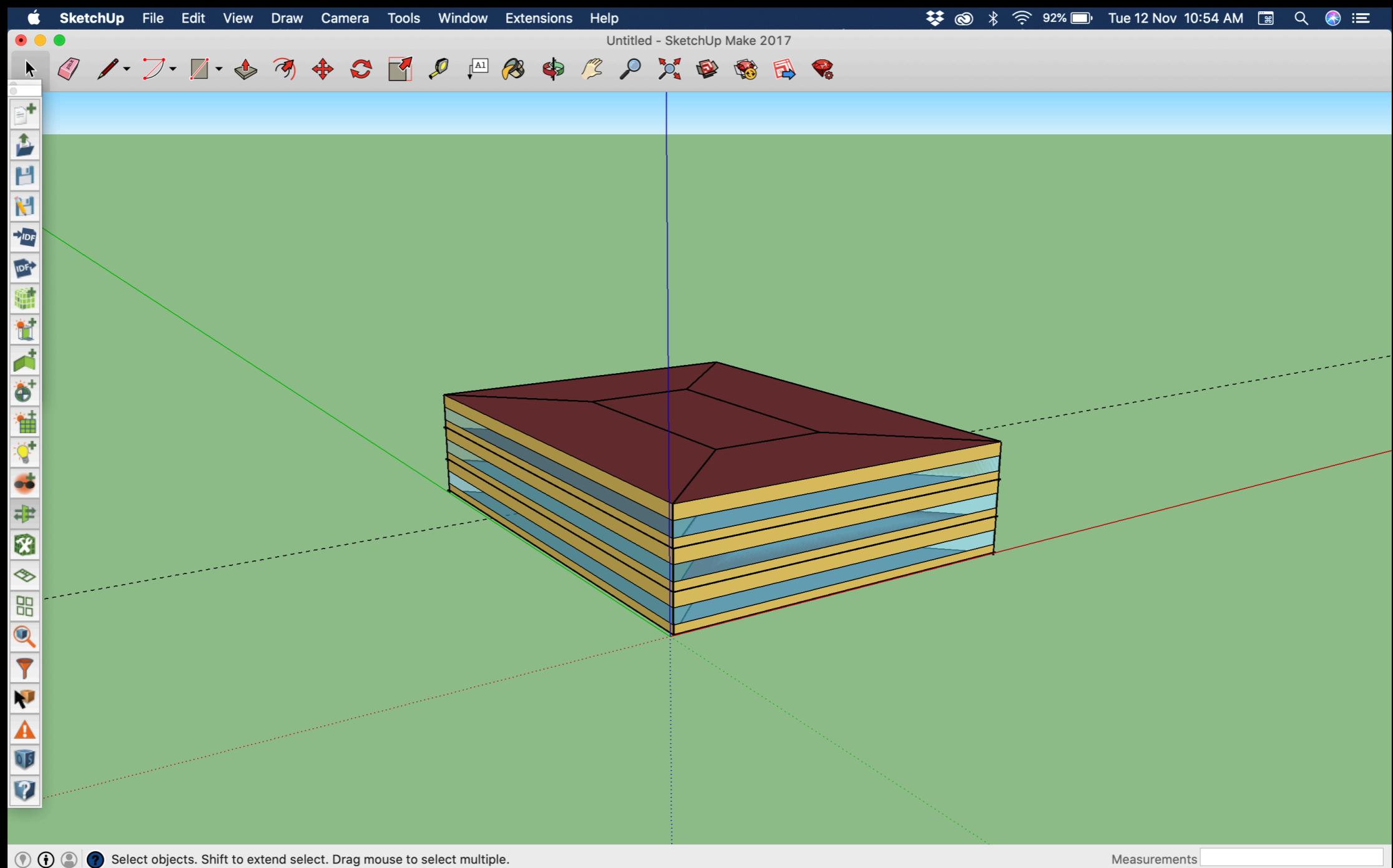


2. Create the form from the above mentioned tool. Keep in mind the model needs to be selected

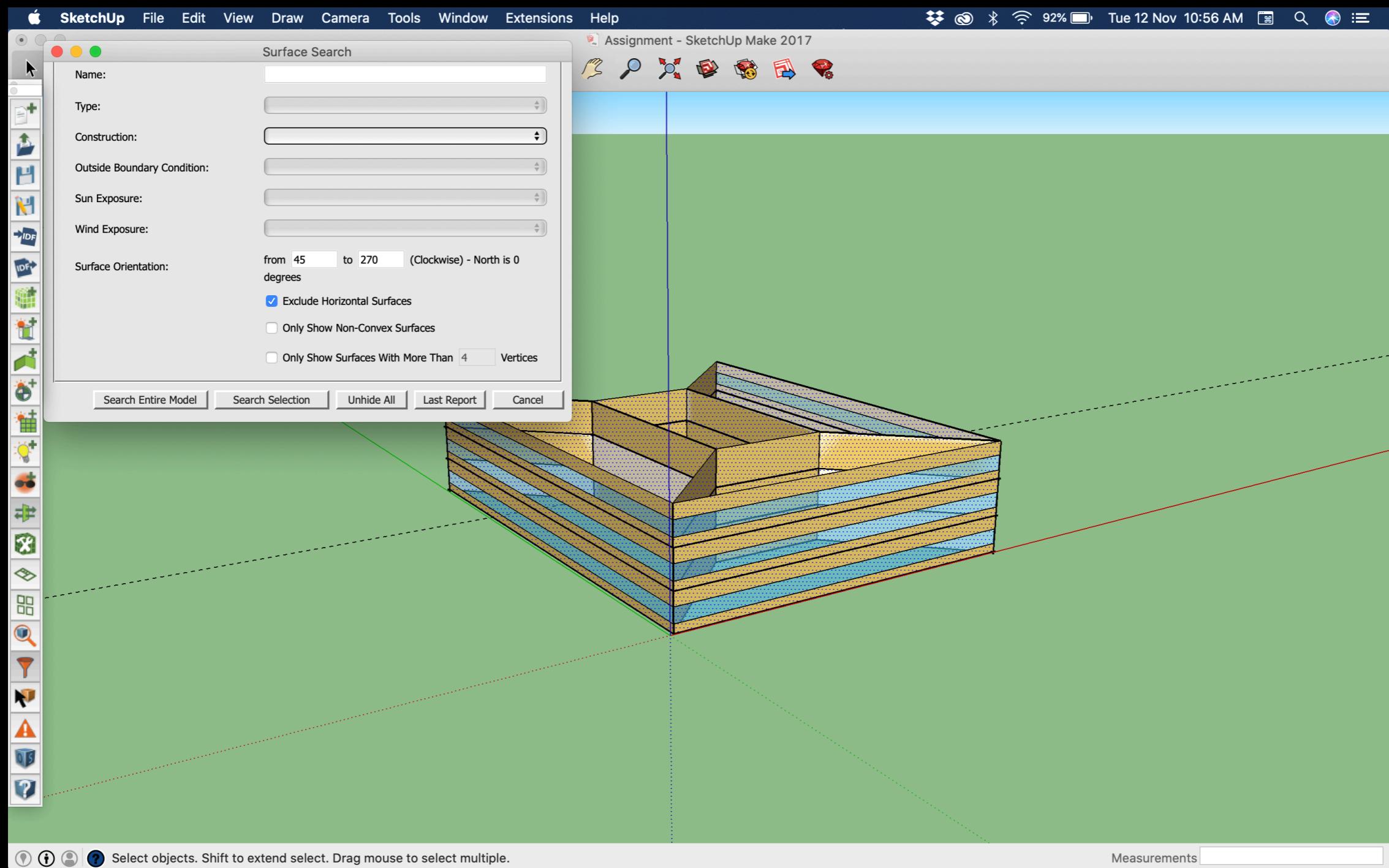


3. Use the Info tool to get info about the different surfaces.

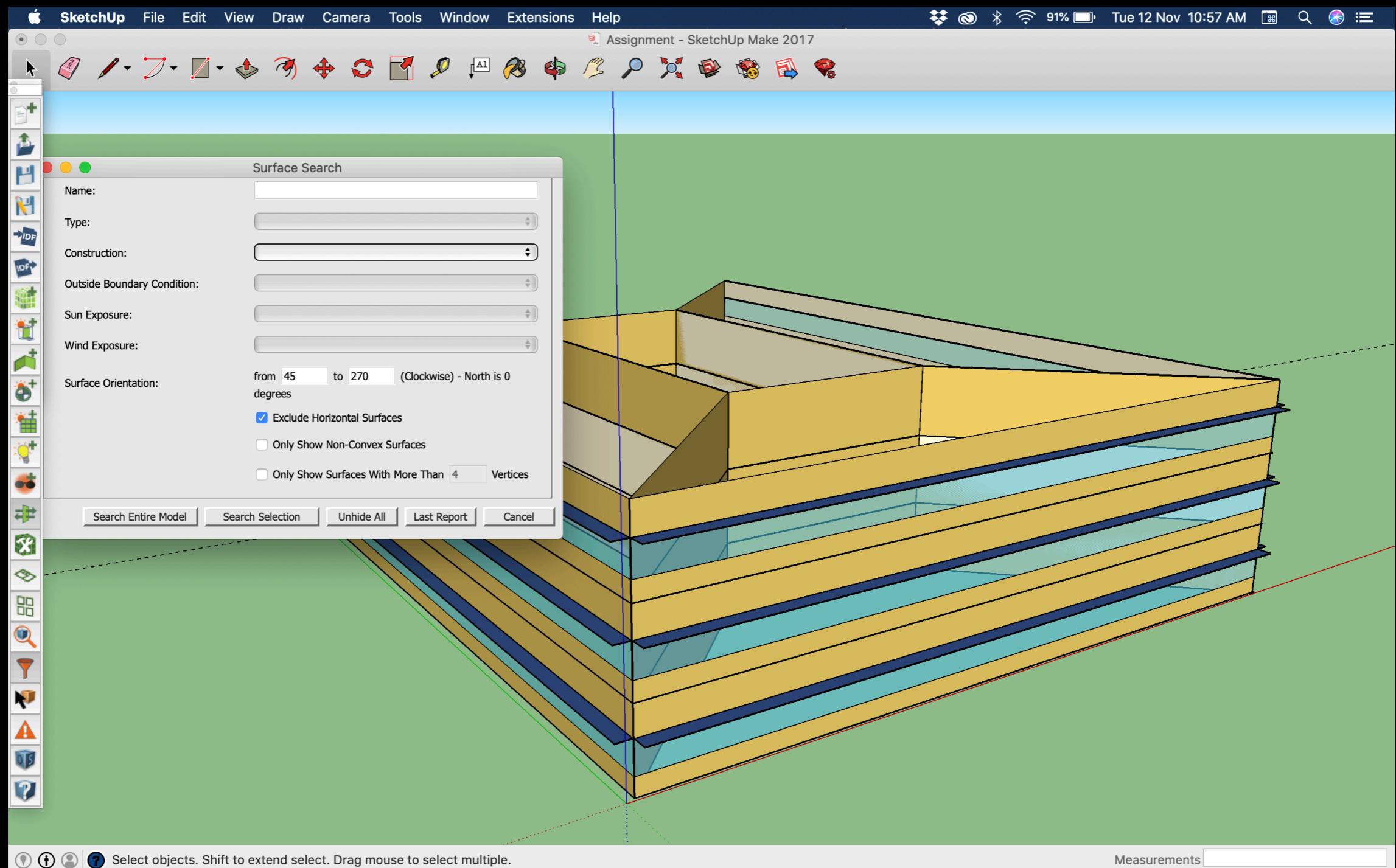




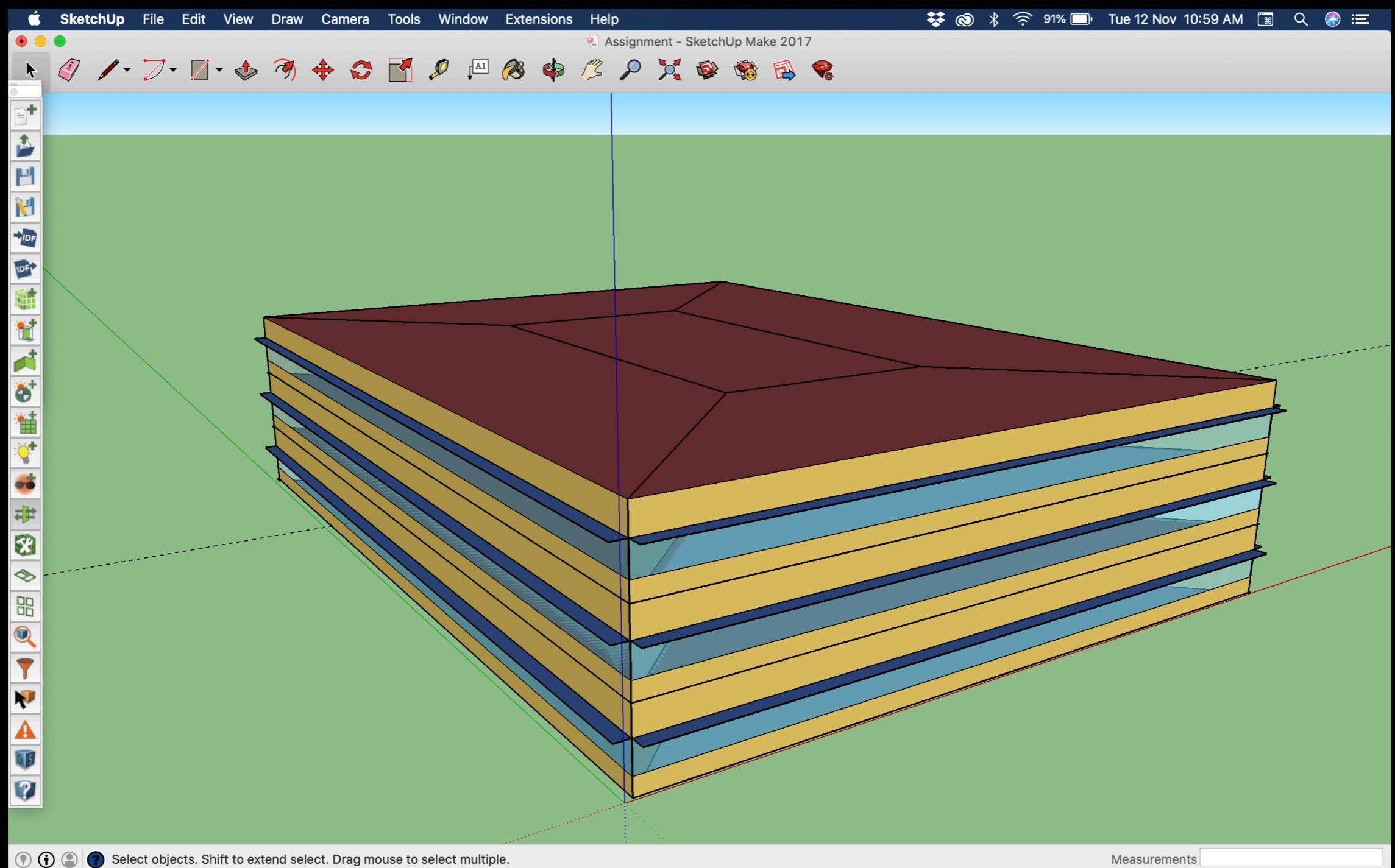
4. Select model then go to Extensions>Open Studio User Script> Alter or add elements> Wall to window Ratio, Set to 0.4 : 0.7



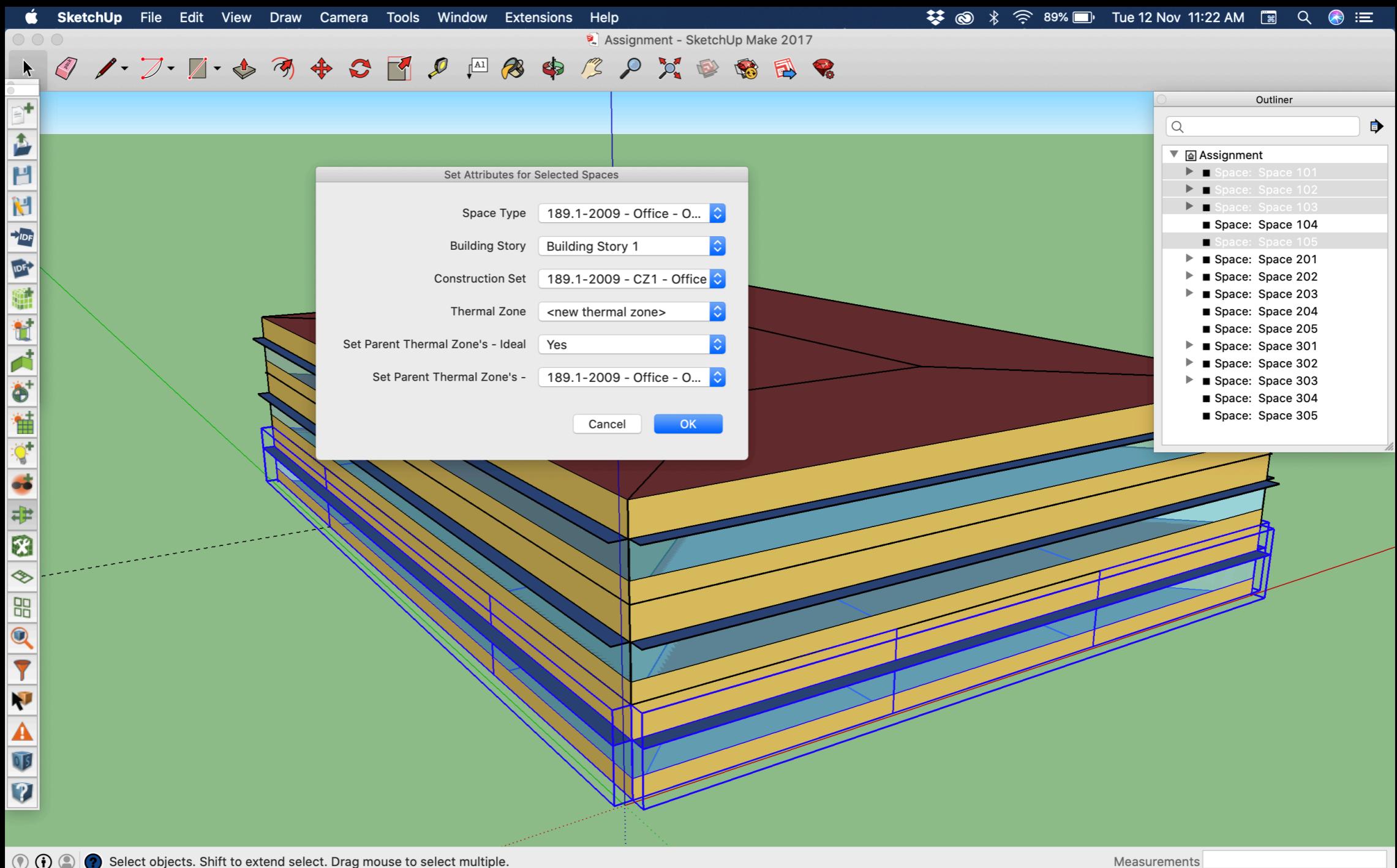
5. Using Filter Select all walls except the north wall.



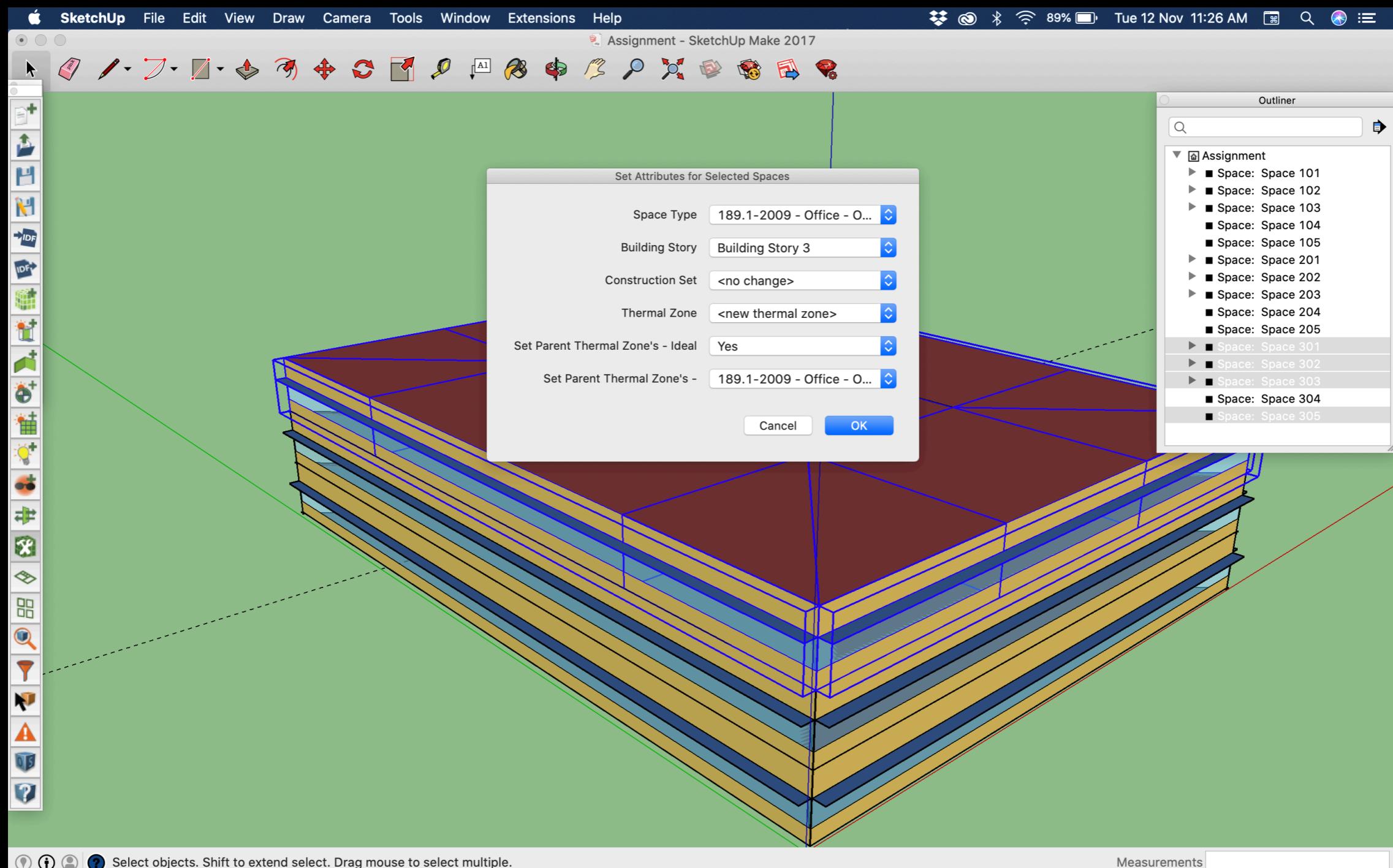
6. Select model then go to Extensions>Open Studio User Script> Alter or add elements>Add overhang with projection Factor



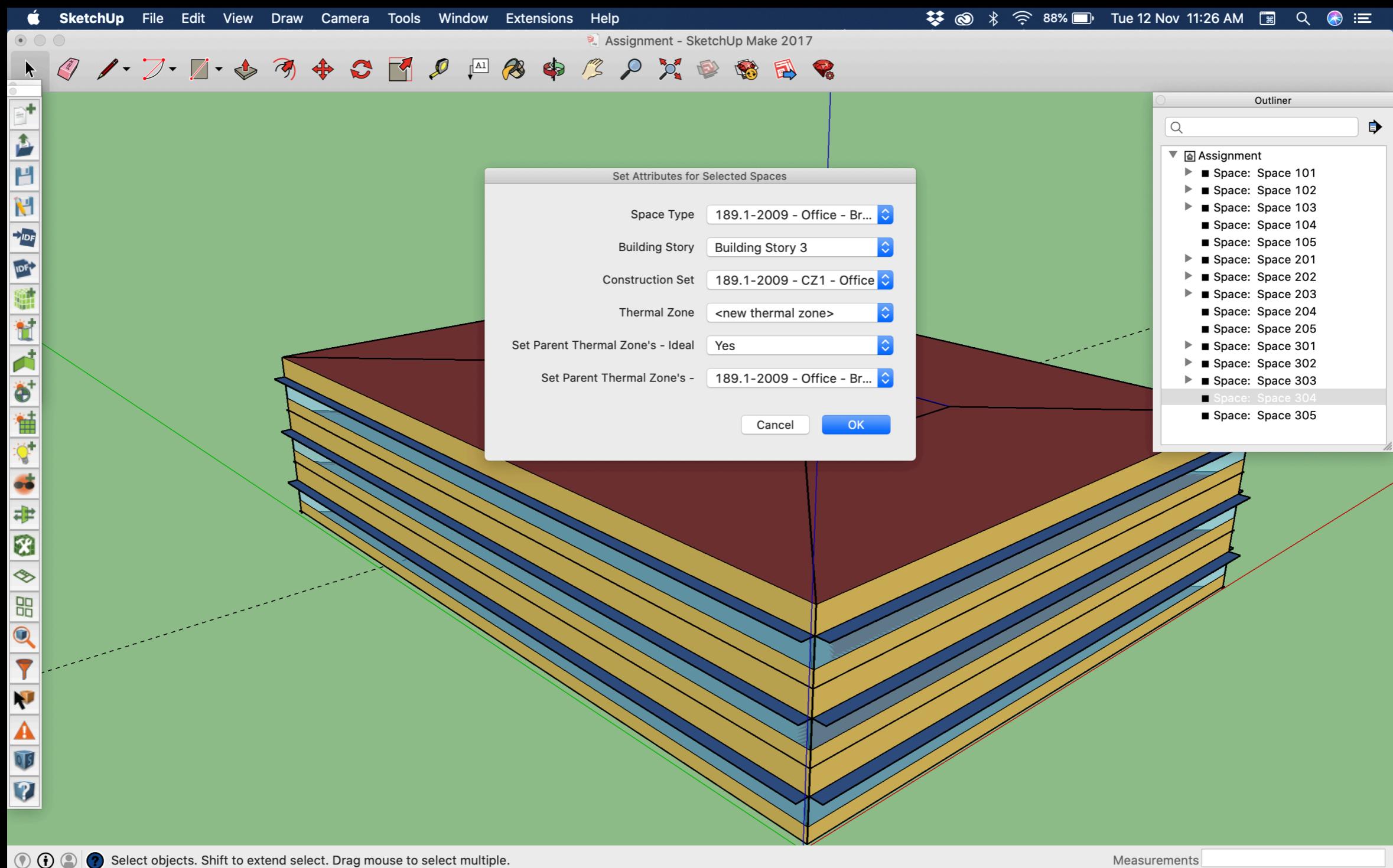
7. Undo filter

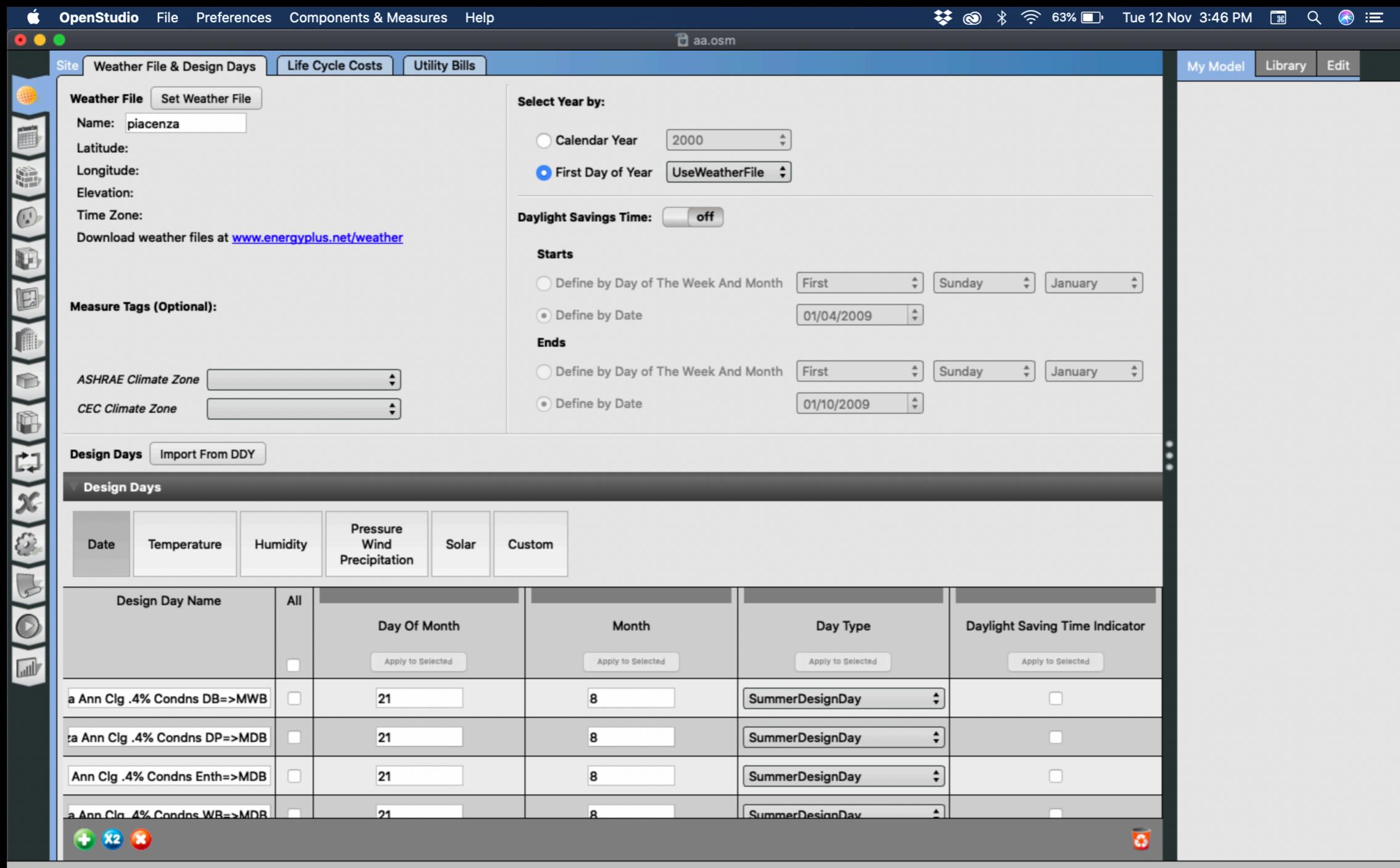


8.Window> Outliner Select Space 101,102,103 and 105. 104 is not selected because it's the break room



9. Do same for all floors





10. Run Simulation

OpenStudio File Preferences Components & Measures Help

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Run  Show Simulation

Warming up (4)
Warming up (5)
Warming up (6)
Starting Simulation at 01/01/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=01/21/2006
Continuing Simulation at 01/21/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=02/10/2006
Continuing Simulation at 02/10/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=03/02/2006
Continuing Simulation at 03/02/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=03/22/2006
Continuing Simulation at 03/22/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=04/11/2006
Continuing Simulation at 04/11/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=05/01/2006
Continuing Simulation at 05/01/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=05/21/2006
Continuing Simulation at 05/21/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=06/10/2006
Continuing Simulation at 06/10/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=06/30/2006
Continuing Simulation at 06/30/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=07/20/2006
Continuing Simulation at 07/20/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=08/09/2006
Continuing Simulation at 08/09/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=08/29/2006
Continuing Simulation at 08/29/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=09/18/2006
Continuing Simulation at 09/18/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=10/08/2006
Continuing Simulation at 10/08/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=10/28/2006
Continuing Simulation at 10/28/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=11/17/2006
Continuing Simulation at 11/17/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=12/07/2006
Continuing Simulation at 12/07/2006 for RUN PERIOD 1
Updating Shadowing Calculations, Start Date=12/27/2006
Continuing Simulation at 12/27/2006 for RUN PERIOD 1
Writing tabular output file results using HTML format.
Computing Life Cycle Costs and Reporting
Writing final SQL reports
EnergyPlus Run Time=00hr 00min 9.15sec
EnergyPlus Completed Successfully.
Processing Reporting Measures.
Gathering Reports.
Completed.

OpenStudio File Preferences Components & Measures Help aa.osm Tue 12 Nov 3:51 PM

Results Summary

Reports: EnergyPlus Results Refresh Open DView for Detailed Reports

Program Version: EnergyPlus, Version 9.2.0-921312fa1d, YMD=2019.11.12 15:51 Table of Contents

Tabular Output Report in Format: HTML

Building: Building 1

Environment: RUN PERIOD 1 ** Piacenza - ITA IGDG WMO#=160840

Simulation Timestamp: 2019-11-12 15:51:18

Report: Annual Building Utility Performance Summary Table of Contents

For: Entire Facility

Timestamp: 2019-11-12 15:51:18

Values gathered over 8760.00 hours

Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m ²]	Energy Per Conditioned Building Area [MJ/m ²]
Total Site Energy	2368.97	658.05	658.05
Net Site Energy	2368.97	658.05	658.05
Total Source Energy	6121.20	1700.33	1700.33
Net Source Energy	6121.20	1700.33	1700.33

Site to Source Energy Conversion Factors

	Site=>Source Conversion Factor
Electricity	3.167
Natural Gas	1.084