$$\dot{q}_{net\,1-2} = \frac{\dot{Q}_{net\,1-2}}{A} = \frac{A\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} \Big/ A =$$

$$\frac{\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} = \frac{\left(5{,}67 \cdot 10^{-8}\ \frac{W}{m^2 K^4}\right) \cdot \left(800^4 - 500^4\right) K^4}{\frac{1}{0{,}1} + \frac{1}{0{,}1} - 1}$$

$$\approx 1035{,}82\ \frac{W}{m^2}$$

THE NEW HEAT TRANSFER SHOULD BE 1% OF THE $\dot{Q}_{net\,1-2}$.

i.e. $\dot{q}'_{net\,1-2} = \dot{q}_{net\,1-2\,m\,shields} = \frac{1}{100} \cdot \dot{q}_{net\,1-21}$

$$\dot{q}_{net\,1-2m\,shiels} = \frac{\dot{Q}_{net\,1-2,\,shields}}{A} =$$

$$= \frac{A\sigma\left(T_2^4 - T_1^4\right)}{\left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right) + \left(\frac{1}{\varepsilon_{3,1}} + \frac{1}{\varepsilon_{3,2}} - 1\right) + \ldots \ldots \left(\frac{1}{\varepsilon_{m,1}} + \frac{1}{\varepsilon_{m,2}} - 1\right)} \Big/ A$$

$$= \frac{\sigma\left(T_2^4 - T_1^4\right)}{\left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right) + \left(\frac{1}{\varepsilon_{3,1}} + \frac{1}{\varepsilon_{3,2}} - 1\right) + \ldots \left(\frac{1}{\varepsilon_{m,1}} + \frac{1}{\varepsilon_{m,2}} - 1\right)}$$

$$\varepsilon_1 = \varepsilon_2 = \varepsilon_3 \ldots \varepsilon_m = 0{,}1$$

$$\dot{q}_{net\,1-2\,shiels} = \frac{\sigma\left(T_2^4 - T_1^4\right)}{(m+1)\left(\frac{1}{\varepsilon} + \frac{1}{\varepsilon} - 1\right)} = \frac{1}{m+1} \cdot \frac{\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon} + \frac{1}{\varepsilon} - 1}$$

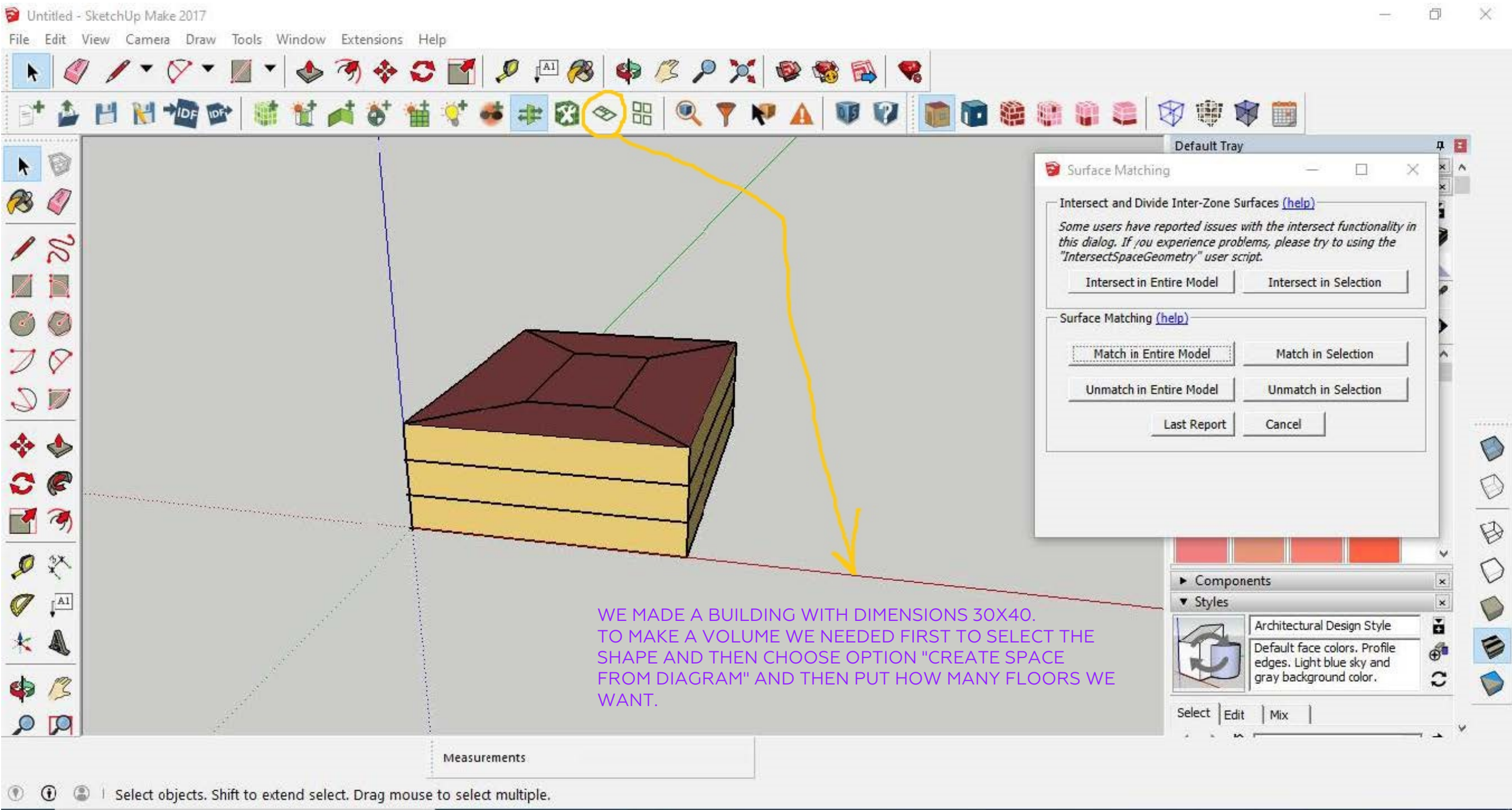
SINCE $\dot{q}_{net\,1-2} = \dot{q}_{net\,1-2,\,shiels} = \frac{1}{100} \cdot \dot{q}_{net\,1-2} =$

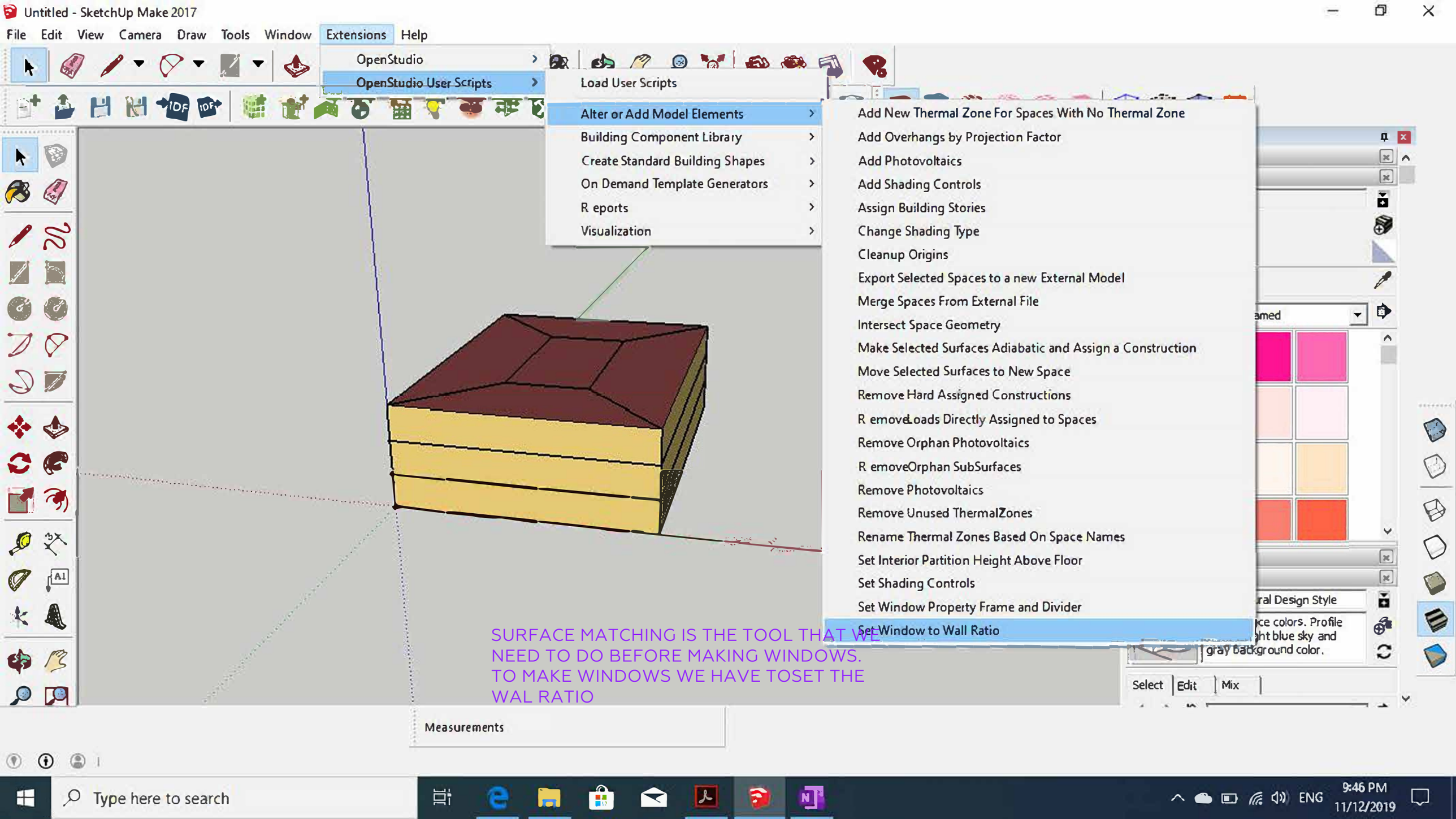
$$= \frac{1}{100} \cdot \frac{\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} \Big/ \frac{1}{100}$$

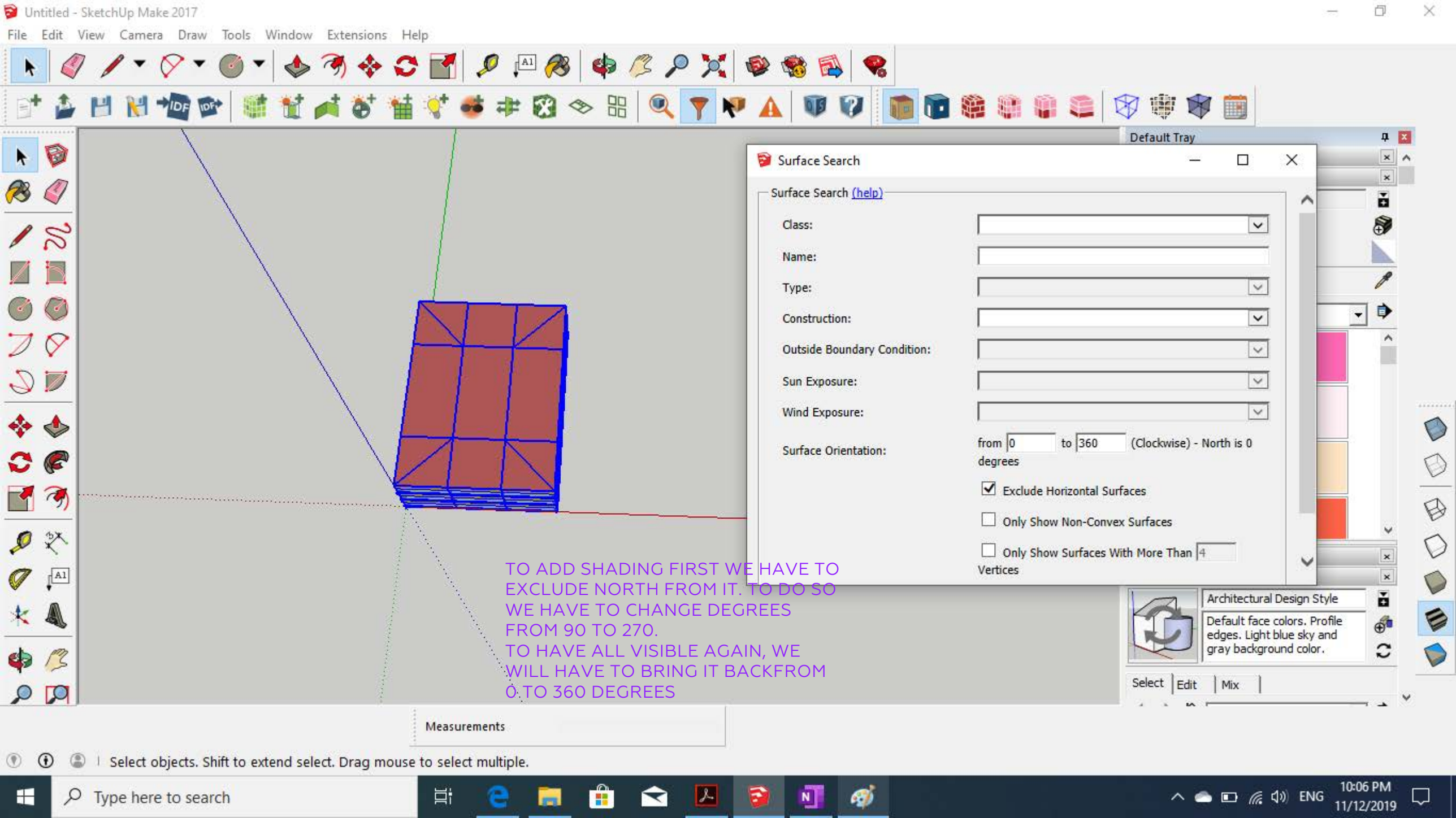
i.e. $\frac{1}{m+1} \cdot \frac{\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon} + \frac{1}{\varepsilon} - 1} = \frac{1}{100} \cdot \frac{\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon} + \frac{1}{\varepsilon} - 1}$

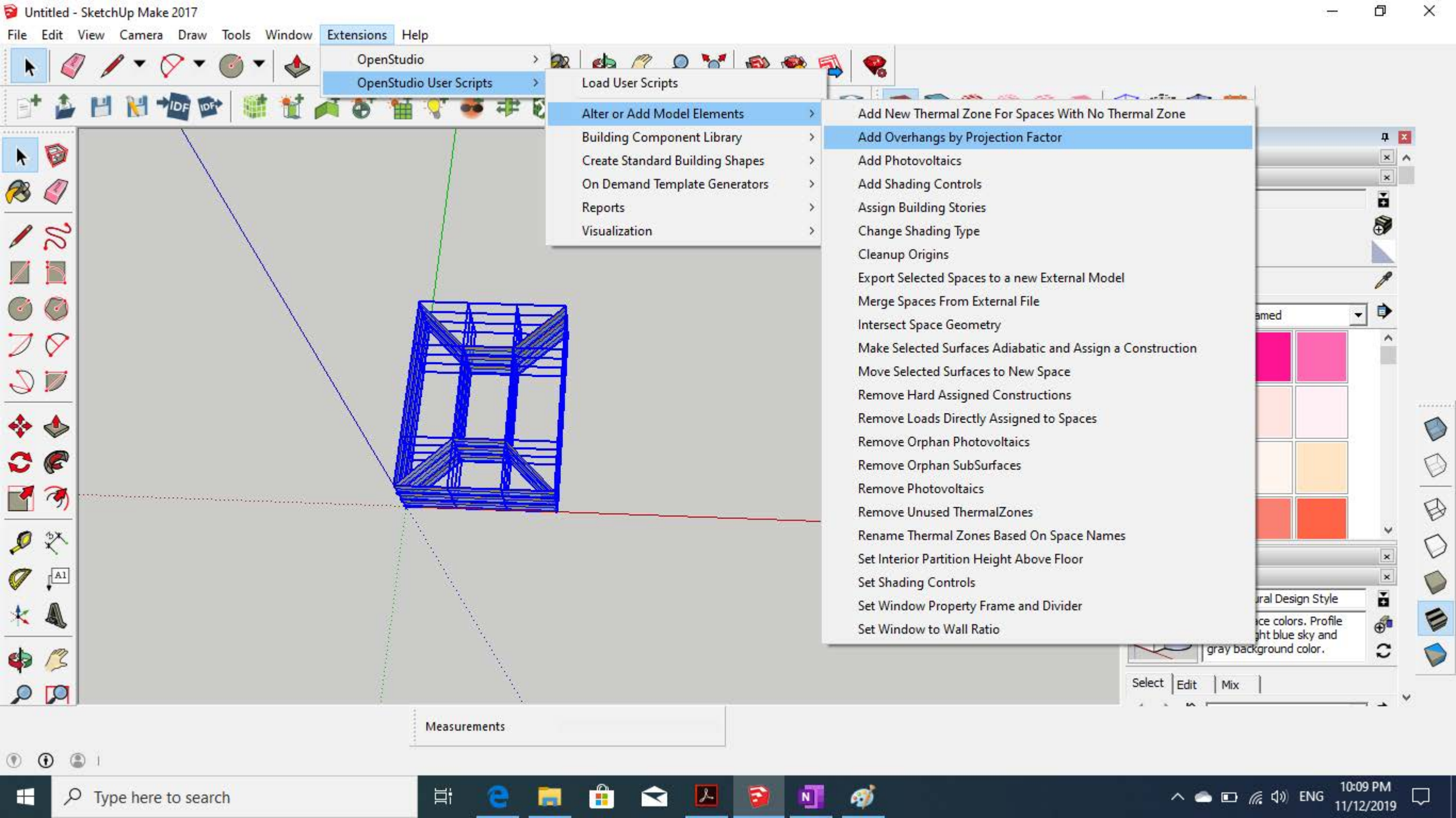
$m = 99$

TO HAVE HEAT TRANSFER RATE BE 1% WITHOUT ANY SHIELDS, WE NEED 99 SHIELDS WHER $\varepsilon = 0{,}1$


Untitled - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
Default Tray
Surface Matching
Intersect and Divide Inter-Zone Surfaces (help)
Some users have reported issues with the intersect functionality in this dialog. If you experience problems, please try to using the "IntersectSpaceGeometry" user script.
Intersect in Entire Model
Intersect in Selection
Surface Matching (help)
Match in Entire Model
Match in Selection
Unmatch in Entire Model
Unmatch in Selection
Last Report
Cancel
Components
Styles
Architectural Design Style
Default face colors. Profile edges. Light blue sky and gray background color.
Select
Edit
Mix
WE MADE A BUILDING WITH DIMENSIONS 30X40.
TO MAKE A VOLUME WE NEEDED FIRST TO SELECT THE SHAPE AND THEN CHOOSE OPTION "CREATE SPACE FROM DIAGRAM" AND THEN PUT HOW MANY FLOORS WE WANT.
Measurements
Select objects. Shift to extend select. Drag mouse to select multiple.


Untitled - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
OpenStudio
OpenStudio User Scripts
Load User Scripts
Alter or Add Model Elements
Building Component Library
Create Standard Building Shapes
On Demand Template Generators
R eports
Visualization
Add New Thermal Zone For Spaces With No Thermal Zone
Add Overhangs by Projection Factor
Add Photovoltaics
Add Shading Controls
Assign Building Stories
Change Shading Type
Cleanup Origins
Export Selected Spaces to a new External Model
Merge Spaces From External File
Intersect Space Geometry
Make Selected Surfaces Adiabatic and Assign a Construction
Move Selected Surfaces to New Space
Remove Hard Assigned Constructions
R emoveLoads Directly Assigned to Spaces
Remove Orphan Photovoltaics
R emoveOrphan SubSurfaces
Remove Photovoltaics
Remove Unused ThermalZones
Rename Thermal Zones Based On Space Names
Set Interior Partition Height Above Floor
Set Shading Controls
Set Window Property Frame and Divider
Set Window to Wall Ratio
SURFACE MATCHING IS THE TOOL THAT WE NEED TO DO BEFORE MAKING WINDOWS. TO MAKE WINDOWS WE HAVE TOSET THE WAL RATIO
Measurements
Select Edit Mix
Type here to search
ENG
9:46 PM
11/12/2019


Untitled - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
Default Tray
Surface Search
Surface Search (help)
Class:
Name:
Type:
Construction:
Outside Boundary Condition:
Sun Exposure:
Wind Exposure:
Surface Orientation:
from 0 to 360 (Clockwise) - North is 0 degrees
Exclude Horizontal Surfaces
Only Show Non-Convex Surfaces
Only Show Surfaces With More Than 4 Vertices
TO ADD SHADING FIRST WE HAVE TO EXCLUDE NORTH FROM IT. TO DO SO WE HAVE TO CHANGE DEGREES FROM 90 TO 270.
TO HAVE ALL VISIBLE AGAIN, WE WILL HAVE TO BRING IT BACKFROM 0 TO 360 DEGREES
Architectural Design Style
Default face colors. Profile edges. Light blue sky and gray background color.
Select Edit Mix
Measurements
Select objects. Shift to extend select. Drag mouse to select multiple.
Type here to search
ENG
10:06 PM
11/12/2019


Untitled - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
OpenStudio
OpenStudio User Scripts
Load User Scripts
Alter or Add Model Elements
Building Component Library
Create Standard Building Shapes
On Demand Template Generators
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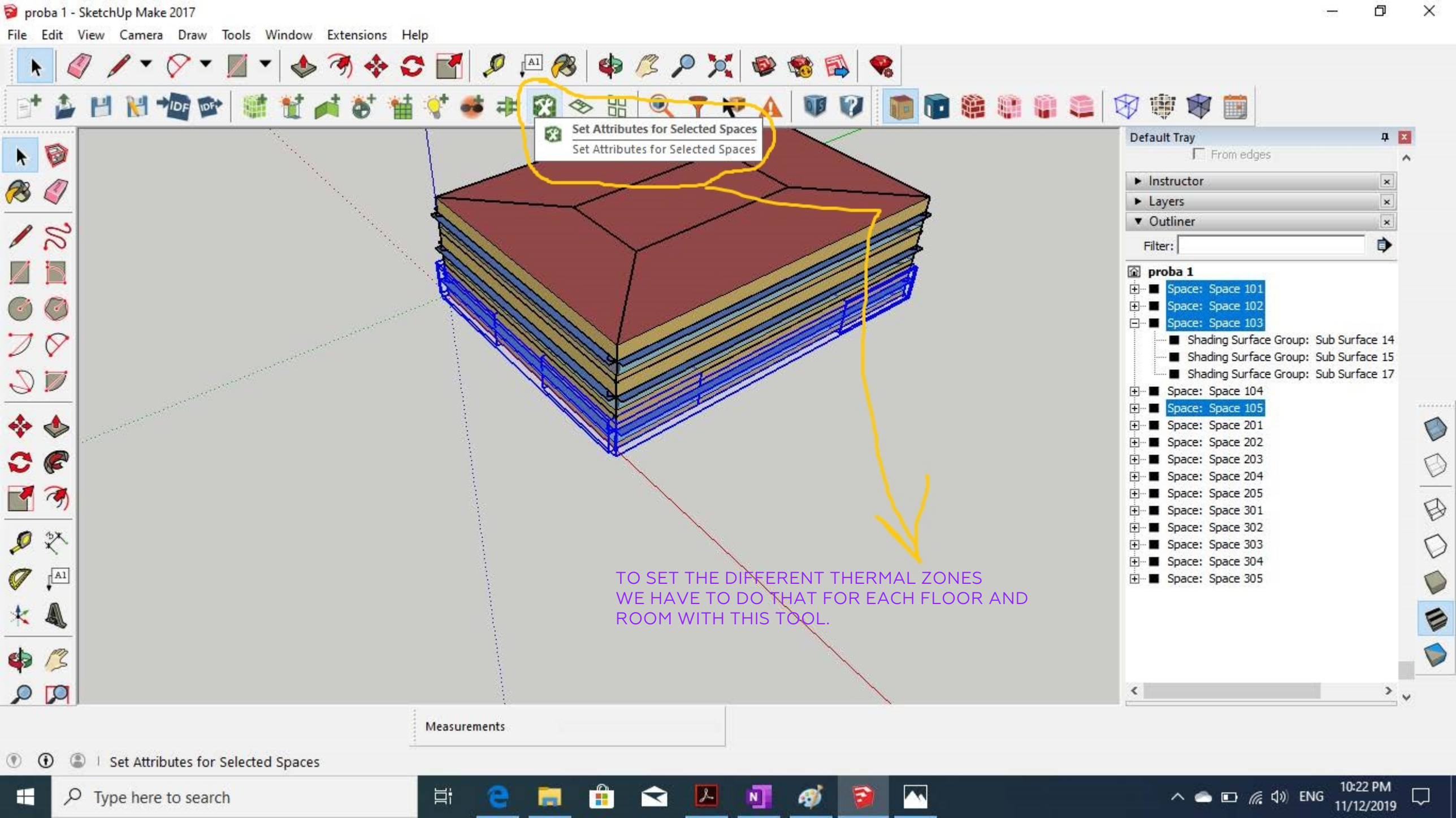
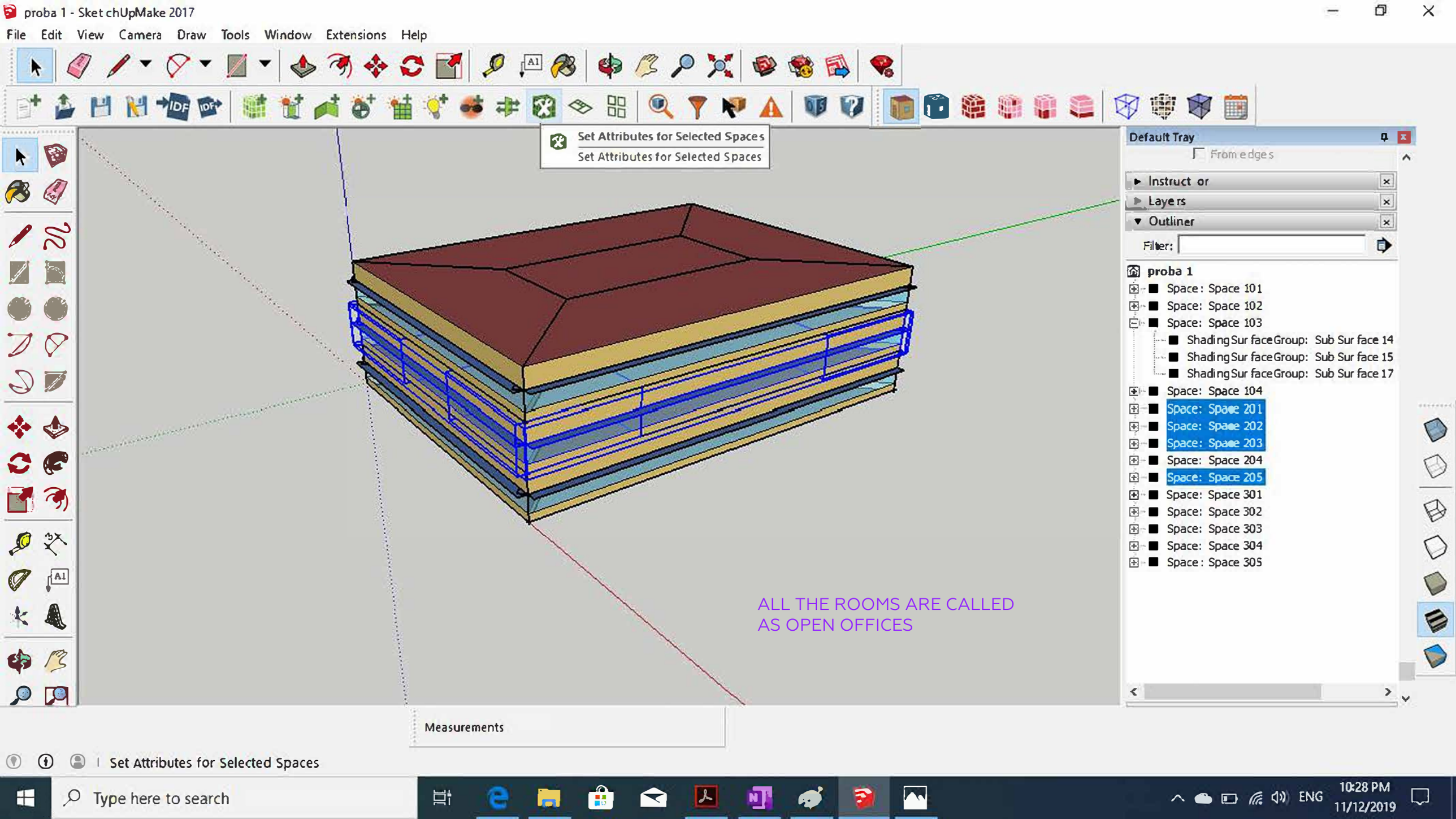
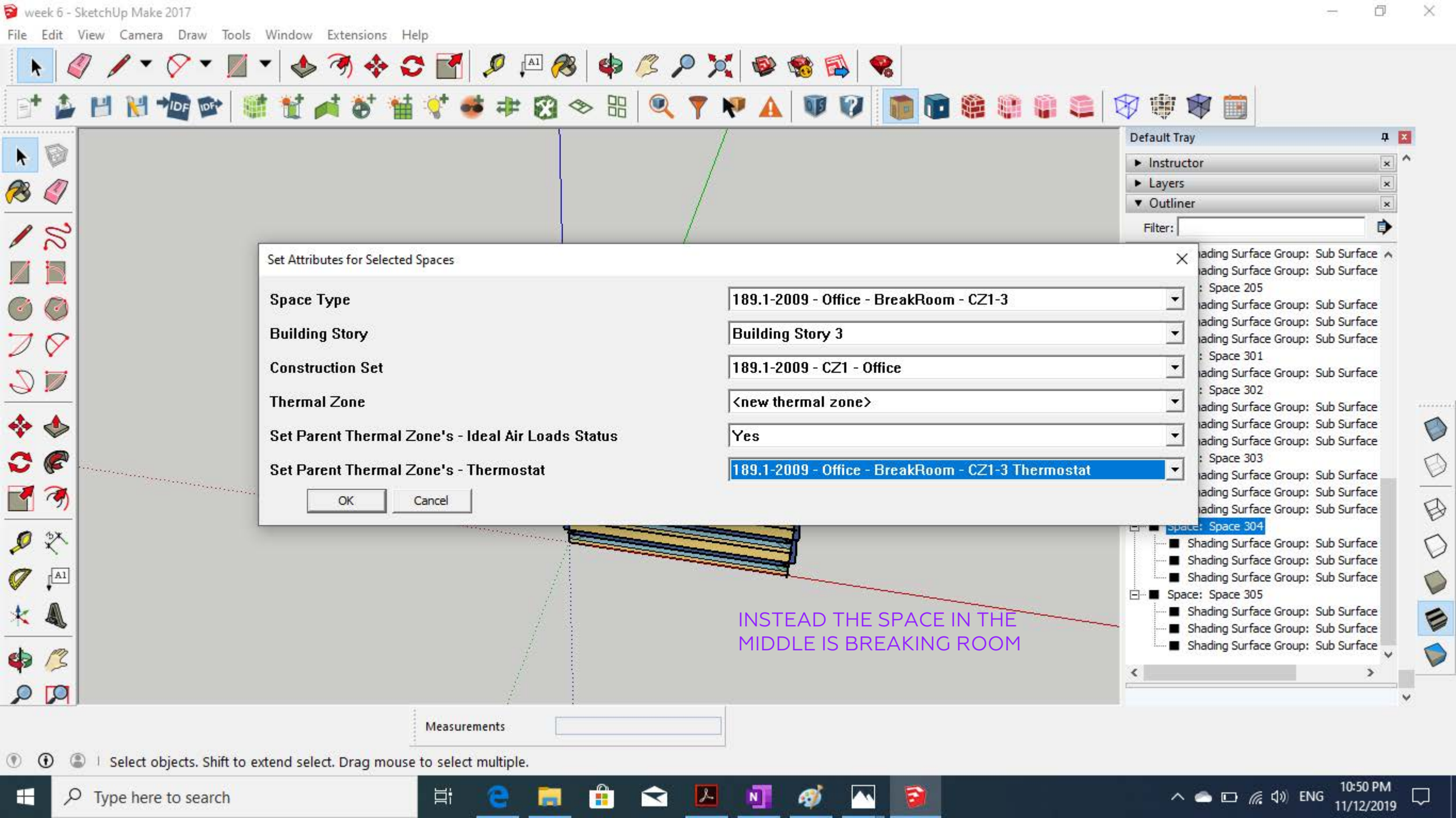
Visualization
Add New Thermal Zone For Spaces With No Thermal Zone
Add Overhangs by Projection Factor
Add Photovoltaics
Add Shading Controls
Assign Building Stories
Change Shading Type
Cleanup Origins
Export Selected Spaces to a new External Model
Merge Spaces From External File
Intersect Space Geometry
Make Selected Surfaces Adiabatic and Assign a Construction
Move Selected Surfaces to New Space
Remove Hard Assigned Constructions
Remove Loads Directly Assigned to Spaces
Remove Orphan Photovoltaics
Remove Orphan SubSurfaces
Remove Photovoltaics
Remove Unused ThermalZones
Rename Thermal Zones Based On Space Names
Set Interior Partition Height Above Floor
Set Shading Controls
Set Window Property Frame and Divider
Set Window to Wall Ratio
Select Edit Mix
Measurements
Type here to search
ENG
10:09 PM
11/12/2019


proba 1 - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
Set Attributes for Selected Spaces
Set Attributes for Selected Spaces
TO SET THE DIFFERENT THERMAL ZONES
WE HAVE TO DO THAT FOR EACH FLOOR AND
ROOM WITH THIS TOOL.
Default Tray
From edges
Instructor
Layers
Outliner
Filter:
proba 1
Space: Space 101
Space: Space 102
Space: Space 103
Shading Surface Group: Sub Surface 14
Shading Surface Group: Sub Surface 15
Shading Surface Group: Sub Surface 17
Space: Space 104
Space: Space 105
Space: Space 201
Space: Space 202
Space: Space 203
Space: Space 204
Space: Space 205
Space: Space 301
Space: Space 302
Space: Space 303
Space: Space 304
Space: Space 305
Measurements
Set Attributes for Selected Spaces
Type here to search
ENG
10:22 PM
11/12/2019


proba 1 - Sket chUpMake 2017
File Edit View Camera Draw Tools Window Extensions Help
Set Attributes for Selected Spaces
Set Attributes for Selected Spaces
Default Tray
From edges
Instruct or
Layers
Outliner
Filter:
proba 1
Space: Space 101
Space: Space 102
Space: Space 103
ShadingSurfaceGroup: Sub Surface 14
ShadingSurfaceGroup: Sub Surface 15
ShadingSurfaceGroup: Sub Surface 17
Space: Space 104
Space: Space 201
Space: Space 202
Space: Space 203
Space: Space 204
Space: Space 205
Space: Space 301
Space: Space 302
Space: Space 303
Space: Space 304
Space: Space 305
ALL THE ROOMS ARE CALLED
AS OPEN OFFICES
Measurements
Set Attributes for Selected Spaces
Type here to search
ENG
10:28 PM
11/12/2019


week 6 - SketchUp Make 2017
File Edit View Camera Draw Tools Window Extensions Help
Default Tray
Instructor
Layers
Outliner
Filter:
Set Attributes for Selected Spaces
Space Type
189.1-2009 - Office - BreakRoom - CZ1-3
Building Story
Building Story 3
Construction Set
189.1-2009 - CZ1 - Office
Thermal Zone
<new thermal zone>
Set Parent Thermal Zone's - Ideal Air Loads Status
Yes
Set Parent Thermal Zone's - Thermostat
189.1-2009 - Office - BreakRoom - CZ1-3 Thermostat
OK
Cancel
Space: Space 304
Space: Space 305
INSTEAD THE SPACE IN THE MIDDLE IS BREAKING ROOM
Measurements
Select objects. Shift to extend select. Drag mouse to select multiple.
Type here to search
ENG
10:50 PM
11/12/2019

week 6 2.osm*

File Preferences Components & Measures Help

Site | Weather File & Design Days | Life Cycle Costs | Utility Bills

My Model | Library | Edit

Weather File Change Weather File

Name: Piacenza

Latitude: 44.92

Longitude: 9.73

Elevation: 134

Time Zone: 1

Download weather files at www.energyplus.net/weather

Measure Tags (Optional):

ASHRAE Climate Zone

CEC Climate Zone

Select Year by:

Calendar Year 2000

First Day of Year Sunday

Daylight Savings Time: off

Starts

Define by Day of The Week And Month First Sunday January

Define by Date 4/1/2009

Ends

Define by Day of The Week And Month First Sunday January

Define by Date 10/1/2009

Design Days Import From DDY

Design Days

Date | Temperature | Humidity | Pressure Wind Precipitation | Solar | Custom

Design Day Name	All	Day Of Month	Month	Day Type	Daylight Saving Time Indicator
		Apply to Selected	Apply to Selected	Apply to Selected	Apply to Selected

FROM OPEN STUDIO FILE, AFTER WE SET FILE ABOUT DATES AND TEMPERATURE WE CAN HAVE A SUMMARY ABOUT ENERGY AND OTHER STUFF

Type here to search

ENG 10:51 PM 11/12/2019

week 6 2.osm

File Preferences Components & Measures Help

Results Summary

Reports: EnergyPlus Results | Refresh | Open DView for Detailed Reports

Program Version:**EnergyPlus, Version 9.1.0-08d2e308bb, YMD=2019.11.12 22:52** 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 22:52:33**

Report: **Annual Building Utility Performance Summary** Table of Contents

For: **Entire Facility**

Timestamp: **2019-11-12 22:52:33**

Values gathered over 8760.00 hours

Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m2]	Energy Per Conditioned Building Area [MJ/m2]
Total Site Energy	3139.74	872.15	872.15
Net Site Energy	3139.74	872.15	872.15
Total Source Energy	9507.51	2640.98	2640.98
Net Source Energy	9507.51	2640.98	2640.98

week 6 2.osm

File Preferences Components & Measures Help

Results Summary

Reports: EnergyPlus Results | Refresh | Open DView for Detailed Reports

Net Source Energy	9507.31	2040.98	2040.98

Site to Source Energy Conversion Factors

	Site=>Source Conversion Factor
Electricity	3.167
Natural Gas	1.084
District Cooling	1.056
District Heating	3.613
Steam	0.300
Gasoline	1.050
Diesel	1.050
Coal	1.050
Fuel Oil #1	1.050
Fuel Oil #2	1.050
Propane	1.050
Other Fuel 1	1.000
Other Fuel 2	1.000

Building Area

Type here to search

ENG 11:00 PM 11/12/2019