

# CITY PRINT

HOW-TO GUIDE



MAKETANK

# Hello, and thank you for your Help!

Thank you for partnering with us in this endeavor. Through your support, we will demonstrate the power of collective community making and its ability to inspire an entire city through the creation of a new, digitally fabricated, city of Boston model for display at the Boston Society of Architects. The associated files you are helping with today will be released to the public as a free resource. We are proud to facilitate the creation and distribution of this resource for our community, and we hope you are proud too.

Here are some helpful links:

MakeTank Website: <http://maketank-bsa.com/>

City Print Tile Checkout: <http://maps.sasaki.com/tools/maketank/>

BSA Website: <https://www.architects.org/>

# What Do You Need to Get Started?

## Rhino 6 with Grasshopper

The following MakeTank GH Scripts:

- MAKETANK\_BUILDING\_V1\_1
- MAKETANK\_TOPO\_V1\_2
- MAKETANK\_TRIM

**Selected Tile highlighting specific area of Boston.**

Each Tile contains its own SketchUp file provided by the City of Boston that will later be imported into Rhino for use with the City Print initiative.

# SECTION 1 FILE SETUP

# 1. Start New Rhino File

Create a new Rhino file using the provided template or from the default Large Objects - Meters template.

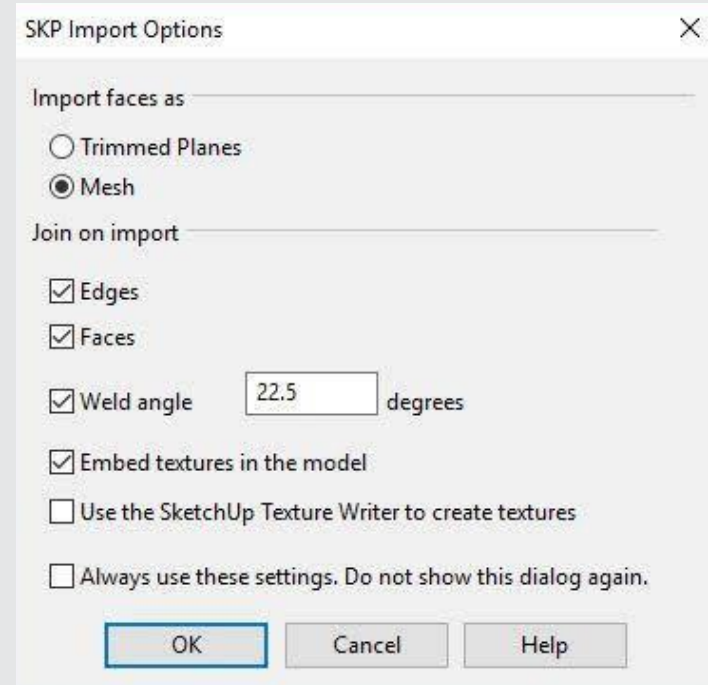
Confirm that the units are set to Meters. This will be scaled later when preparing the file for printing.

Note: Setting the 3D view from Perspective to Isometric has been found to make working with the model easier.

## 2. Import SketchUp File

### File > Import

In SKP Import Options window ensure that the options match those shown here.



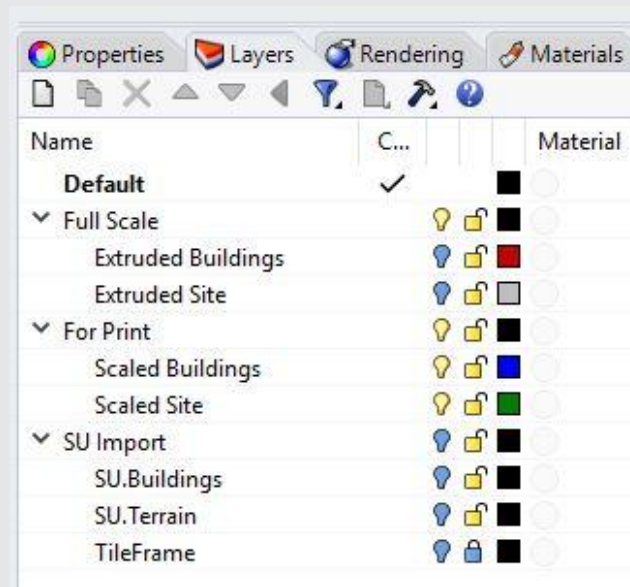
# 3. Review Layer Settings

For organization and consistency across all models, ensure that layers are assigned and set correctly as shown.

**Full Scale** layers are the “working” layers in which the majority of the work will be done.

**For Print** layers are copies of the Full Scale layers but scaled for print, which will be covered later.

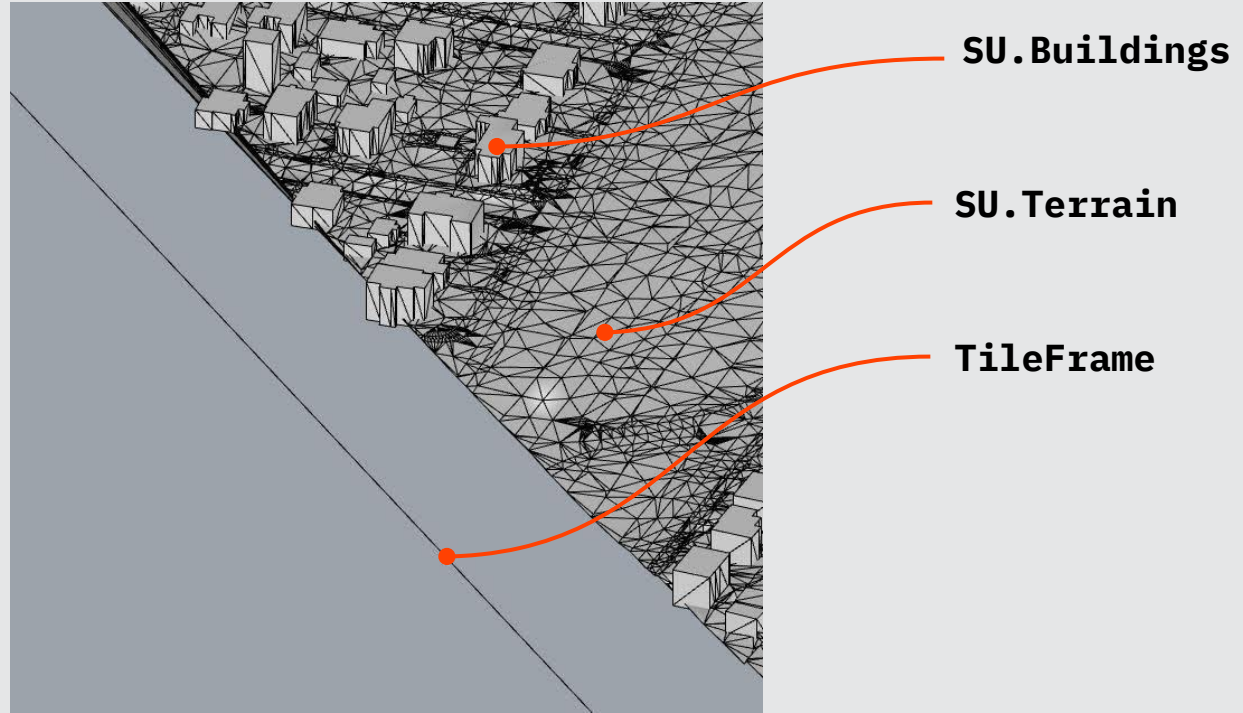
**SU Import** layers contain the imported data from the SU file. Maintain these for reference and consider locking so that nothing gets inadvertently moved or deleted.



# 3. Review Layer Settings

When the SketchUp file is first imported, it will assign the three individual elements (terrain, buildings, tile frame) to the "Default" layer.

Change and assign these elements to their correct layers as shown.





**SECTION 2**  
**MODEL BUILDINGS**

## 4. MeshtoNURB

Hide **SU.Terrain** and **TileFrame** layers. Select all elements on the **SU.Buildings** layer.

Enter **MeshtoNURB** command and follow all prompts as needed.

Once completed you will have “Nurb” surfaces of the buildings, now the original buildings can be deleted.



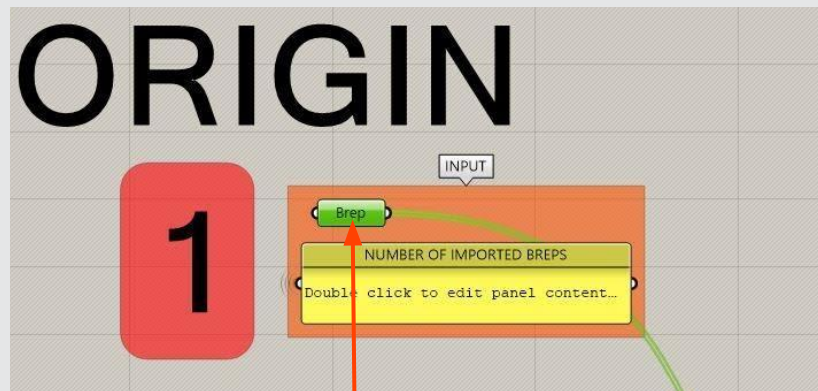
# 5. Run Grasshopper Scripts

## Open MAKETANK\_BUILDING\_V1\_1 Script

Highlight and select multiple groupings of buildings at once.

Note: Selecting all elements at once could hinder model performance, so it helps to break up the work into chunks at a time.

In the Grasshopper window, while you still have elements selected, right click on the **Brep** button and select **Select Multiple Breps**



**Right Click,  
Select Multiple Breps**

## 6. Bake!

Still in the Grasshopper window, right click on the **Successfully Unioned** button and select **Bake**.

A Layer Attributes Window will then pop up. Assign the newly created extrusions to the **Extruded Buildings** layer.

*Note: Successfully Unioned button will turn grey if previous step was successful.*

Repeat until all buildings are extruded.



**Right Click,  
Bake**

## 6. Bake!

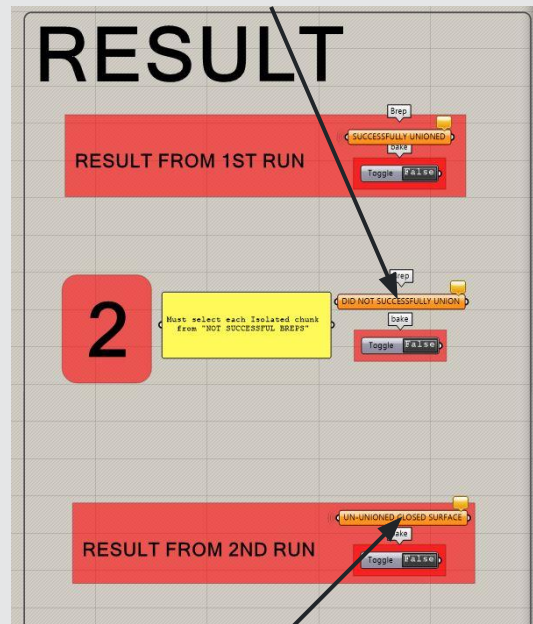
Sometimes the first run of the script does not work for some solids.

Select solids that did not successfully extrude. In Grasshopper, right click on the **Did Not Successfully Union** button and select **Select Multiple Breps**.

Then in the Result from 2nd Run field, right click on the **Un-Unioned Closed Surface** button and select **Bake**.

If this still does not work, you may have to manually model and extrude as needed.

Right Click,  
Select Multiple Breps



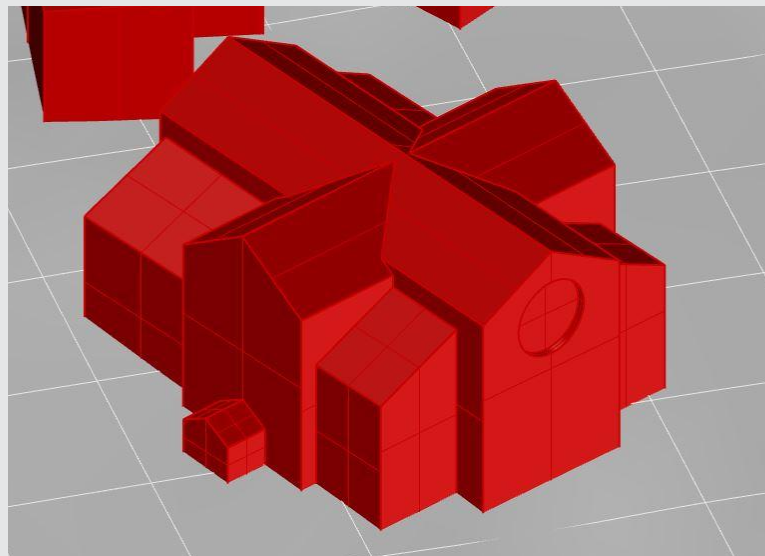
Then Right Click,  
Bake

# 7. Model Clean Up

A manual “clean up” or adjustment of buildings is often necessary.

**Important: Review available resources (like Google Maps) to confirm that the selected tile is modeled to a reasonable degree of accuracy so that a quality final product is delivered.**

Any landmark buildings such as institutions, places of worship or culturally significant architecture should be modified to bring them up to a higher level of detail.



Example: Church modified from its initial block massing to communicate a higher level of detail and importance within the larger context of the tile.

**SECTION 3**  
**MODEL TOPOGRAPHY**

# 8. Run Topo Script

## Open MAKETANK\_TOPO\_V1\_2 Script

Turn on imported topo layer (SU.Terrain) and select the original mesh from SketchUp.

In the Grasshopper window, right click on the **Mesh** button and select **Set One Mesh**.



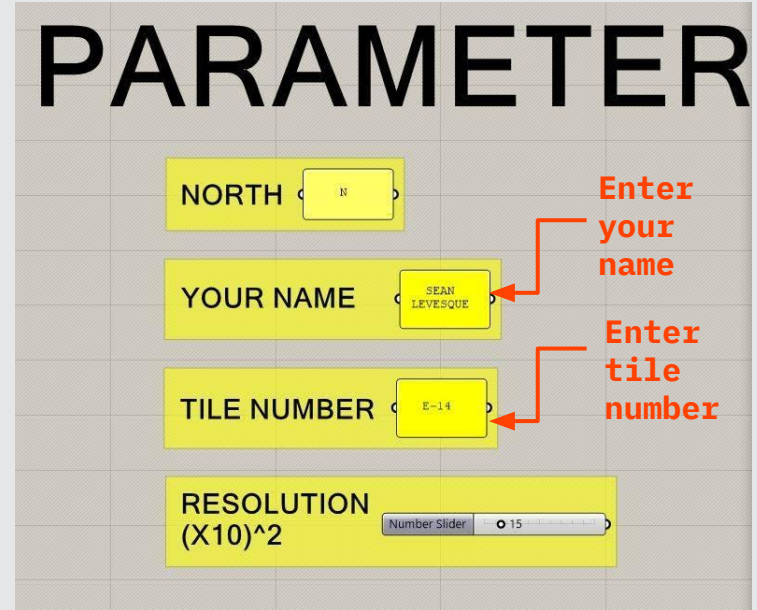
**Right Click,  
Set One Mesh**



# 9. Set Tile Parameters

Still in Grasshopper, go to the **Parameter** section of the file to set specific tile description parameters. This includes your **Name** and **Tile Number** which will be included at the bottom of the printed tile.

Note also the **Resolution** slider that allows you to adjust the detail level that the final topography is modeled at. In some instances adjusting this may come in handy to correct any oddities that may come out of using this script. Some trial and error here may be needed.

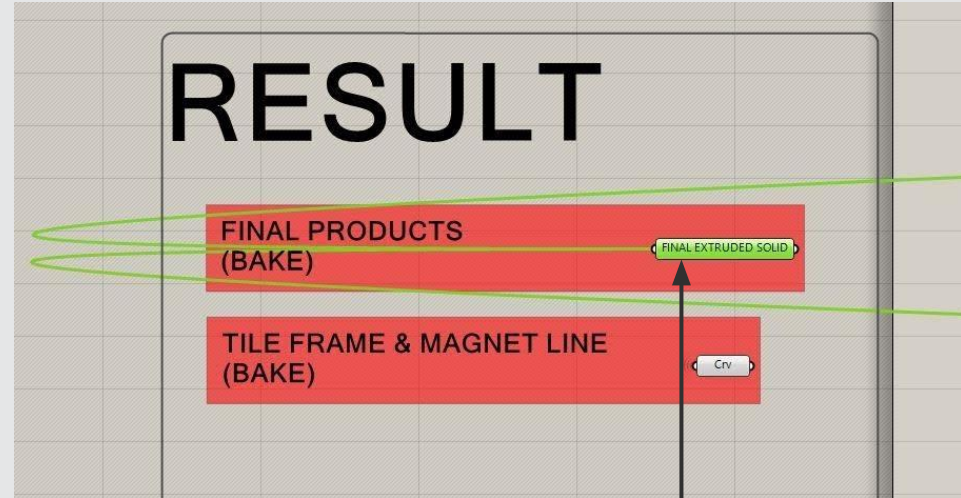


# 10. Bake!

Right click on the **Final Extruded Solid** button and select **Bake**. This will create the final tile base and topography with included tile descriptors set in the last step.

A Layer Attributes Window will then pop up. Assign the newly created extrusions to the **Extruded Site** layer.

*Note: Make sure that the topography contains the descriptors set in the last step and a circular indent at each corner*



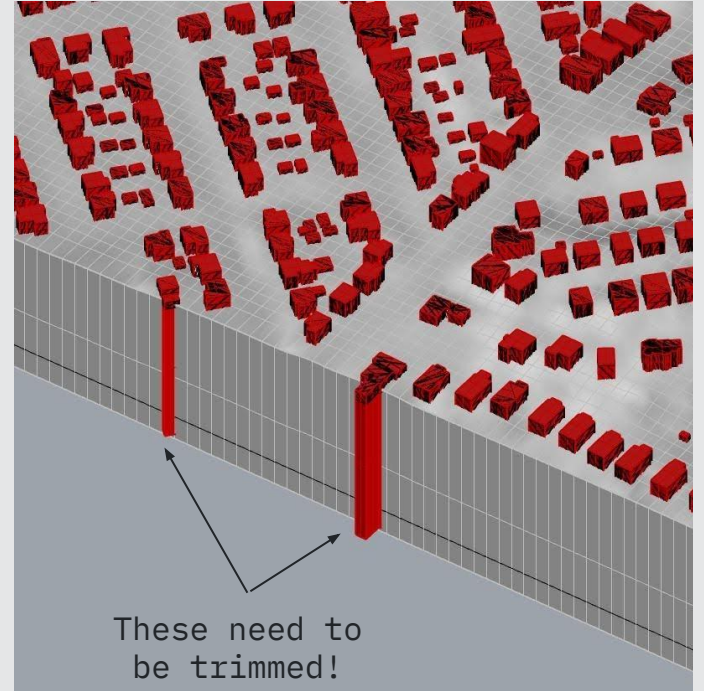
**Right Click,  
Bake**

# 11. Trim Buildings at Tile Edge

Once both the tile base, topography, and buildings are extruded and correctly modeled, you'll notice that buildings at the tile edge will need to be adjusted to fit within the tile boundary.

The quickest way to achieve this is to use the **MAKETANK\_TRIM** Grasshopper script.

*Note: This will create new extruded solids that account for the edge condition, not trim the solid already there. You will later have to manually delete the old solid to remove any duplicates.*



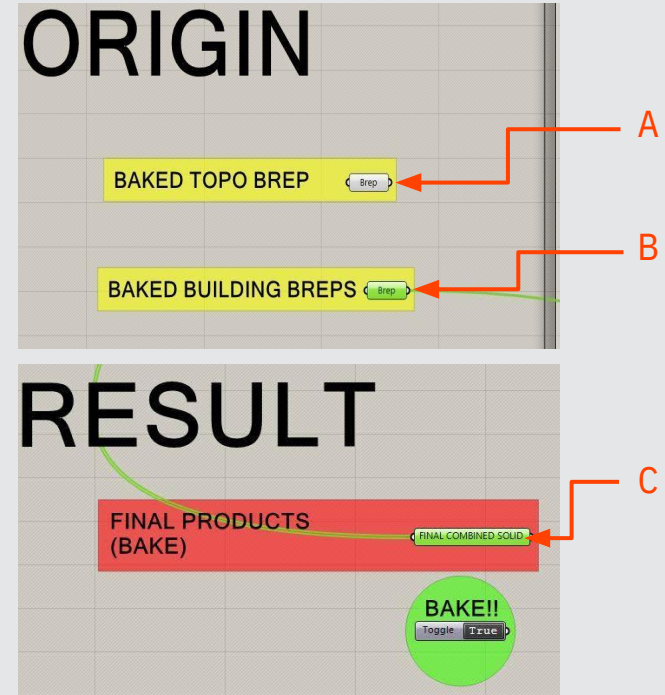
# 11. Trim Buildings at Tile Edge

A) Select the extruded topography. In the GH script, right click the **Brep** button and select **Select Single Brep**.

B) Then select all buildings that need to be trimmed. Right click the **Brep** button and select **Select Multiple Breps**.

C) Finally, right click on the **Final Combined Solid** button and select **Bake**. Assign Layer Attributes as **Extruded Buildings**.

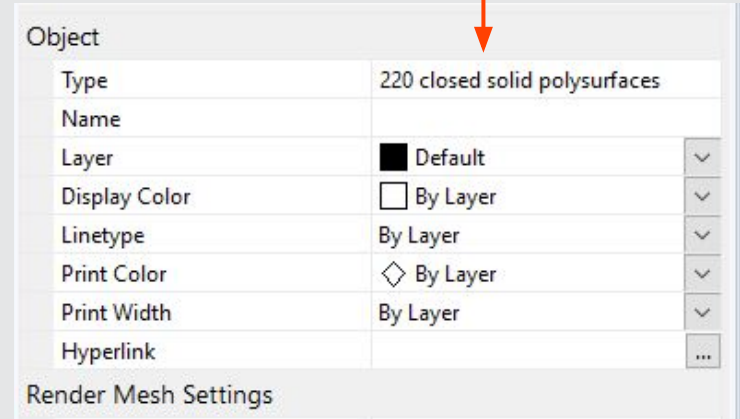
*Note: You will need to manually delete all the former extruded solids.*



# 12. Final Check

Almost done! Before calling it quits, select all of the new buildings and verify that the type description states that they are all **Closed Polysurfaces**, If the type description states **Varies** review the completed buildings for either **Non-Manifold Polysurfaces** or **Open Polysurfaces**, any such buildings will need to be manually corrected.

*Note: The Command **Select edge** can be a useful tool for finding any non-manifold or open edges of buildings.*



**SECTION 4**  
**PREPARE FOR PRINT**

# 13. Duplicate Full Scale Layers

Copy and paste full scale layers (Extruded Buildings, Extruded Topography) as well as the TileFrame Layer. Re-assign layers of duplicate model.

**Extruded Buildings > Scaled Buildings**

**Extruded Topography > Scaled Topography**

Maintain the full scale model (as well as the SketchUp import layers) for future reference, but be sure to **hide these in the final model**.

# 13. Scale For Print

Select the duplicated extruded solids, which should now be on the Scaled Buildings and Scaled Topography layers, as well as the duplicated TileFrame.

With the **Scale** command, scale things down using the TileFrame to a **25cm square**

Move the lower left corner of the tile (in plan view) to the model origin.

Again, make sure that all layers that are not to be printed are **TURNED OFF**.



# Done!

Congratulation! Please return the completed model to MakeTank via the upload link contained in the original email. Now go get yourself another tile!