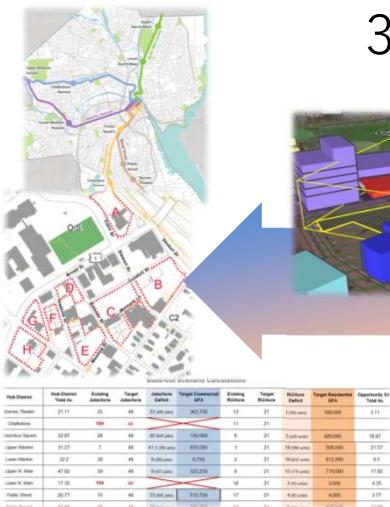
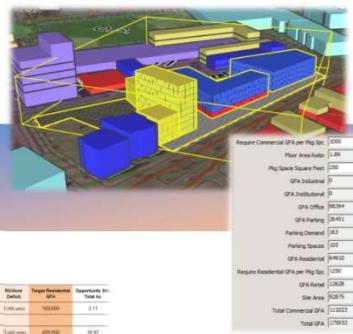


# The pbcGIS Buildout Calculator

Planners



3D GIS



Designers



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The pbcGIS Buildout Calculator is a plugin for Trimble SketchUp that facilitates the design and evaluation of massing scenarios .

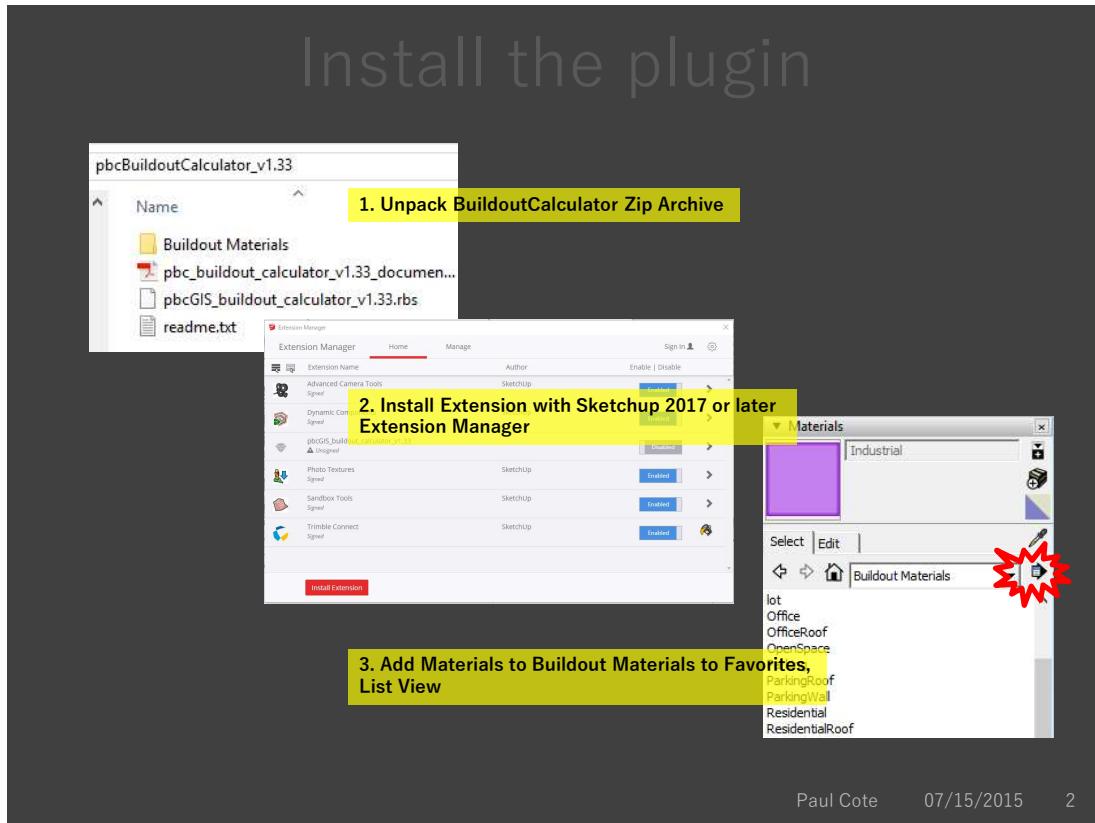
The plugin adds a group of Buildout Calculator tools to right-click menu to Sketchup. The tools permit you to create special types of groups for Sites, Buildings and Schemes. These groups have attributes reflecting the amount of gross floor area per use for buildings and the amount of parking in lots or in structures.

Sites and buildings are grouped as schemes . A scheme has parameters reflecting the ratio of parking spaces per GFA for residential and commercial uses. Multiple schemes might be made for each site to evaluate different massing plans or regulatory requirements.

The Buildout Calculator will create a table summarizing the capacities of selected schemes. This table may be saved as an HTML document and opened in a spreadsheet.

The Buildout Calculator Plugin uses a special set of Sketchup Materials that are used to distinguish the uses of buildings and site areas.

If you find this plugin saves you time and helps you to do work that you are paid for, consider making a donation at [www.pbcGIS.com/buildout\\_calculator](http://www.pbcGIS.com/buildout_calculator). We are also happy to consider requests for new features. Email [paulbcote@gmail.com](mailto:paulbcote@gmail.com) for more information.



1. Install Sketchup 2017 or later. The Free Sketchup Make will be fine.

### **Unpack the Buildout Calculator Zip Archive**

1. Downloaded the zip archive containing the pbcBuildOut Calculator plugin and its resources to a folder on your hard drive. This wil be a folder you want to keep.
2. Extract the contents of the zip archive to the folder. (See illustration, above).

### **Load the Extension**

1. From the Window menu in SketchUp, open **Extensions Manager**.
2. **Use the Install button at the lower left of the Extensions Manager and find the BuilsoutCalculator...rbz file included in the zip archive.**
3. **The Builsout Calculator extension should appear in your extensions.**

### **Install Buildout Materials**

1. Open your Sketchup, Material Window.
2. Click the **Details** button next to the Materials Pulldown and select, **Add Collection to Favorites**.
3. You should now see a collection of textures created for the BuildOut Calculator.
4. Click Details again and choose **List View**, so you can see the names of the textures.

# Start a Model

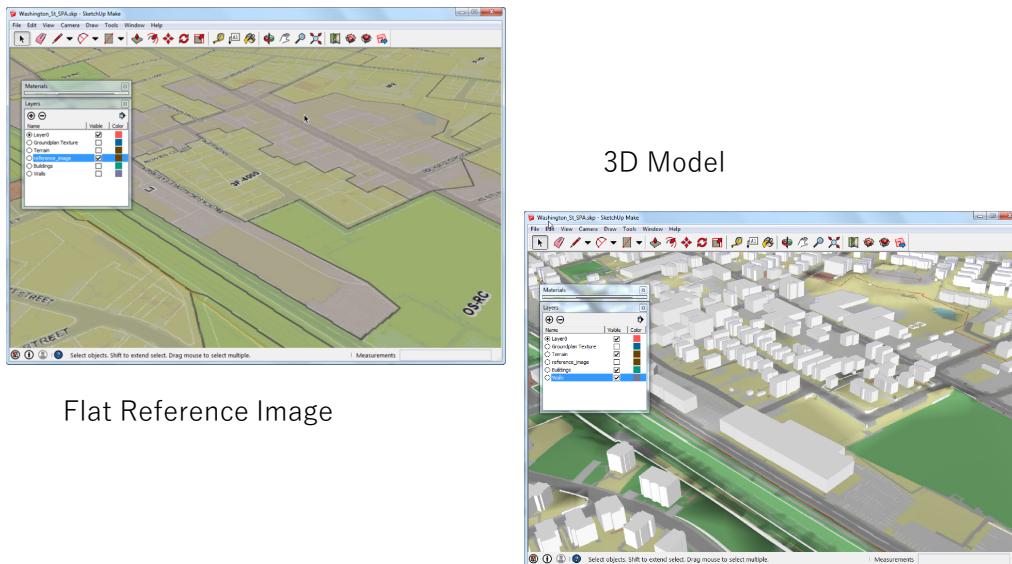


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Currently the Buildout Calculator plugin requires a model that uses units in Feet. To facilitate the design of sites at the correct scale it is helpful to have a groundplan image. The easiest way to get one of these is to use File>Geo Location to grab an image of your site.

Alternatively, you bring in any groundplan image and scale it. This process is described in the appendix of this documentation.

# Set Up a Model from GIS

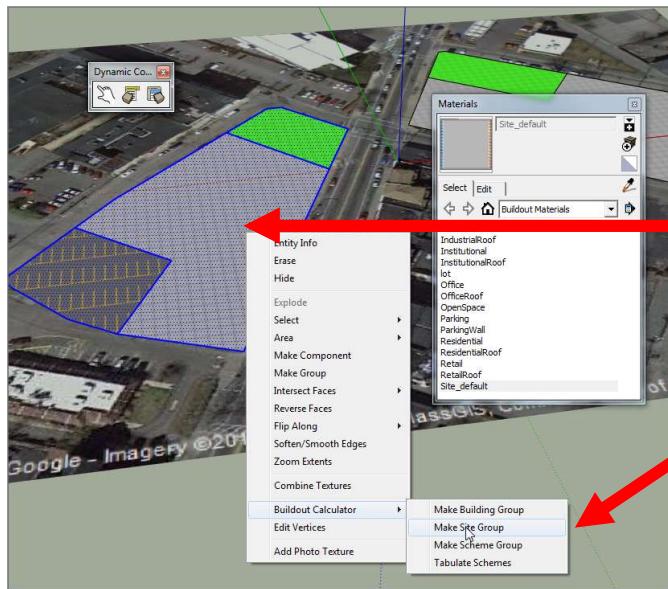


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Models created by pbcGIS are more detailed than models captured by Sketchup. There are a few steps you should go through to set up these models:

1. Go to Window > Preferences > OpenGL and specify **Use Maximum Texture Size**
2. When you create a new scheme, create a new layer for buildings that will be removed for that scheme. Move the existing buildings to this layer so you can easily turn them off.
3. When modeling your new scheme, turn off all layers except for the reference Image. This will allow you to create planar objects without snapping to the terrain.
4. When you want to preview your new scheme, you will need to move the objects up to the height of the terrain. Since the site objects are flat, you may need to move them a bit above the elevation of the ground.

# Create a Site Group



Create Polygon for Site

Apply Materials for  
Parking and Default  
Site Background

Select All, Right-Click  
And choose  
“Create Site Group”

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Sites are the unit of analysis over which development and parking capacity are calculated.

A site is simply a polygon created with any of the Sketchup draw tools.

Once you have created the polygon open the Materials window and find the Buildout Materials Folder. It is helpful to change the view of the Materials window to list the details for materials so that you can see their names.

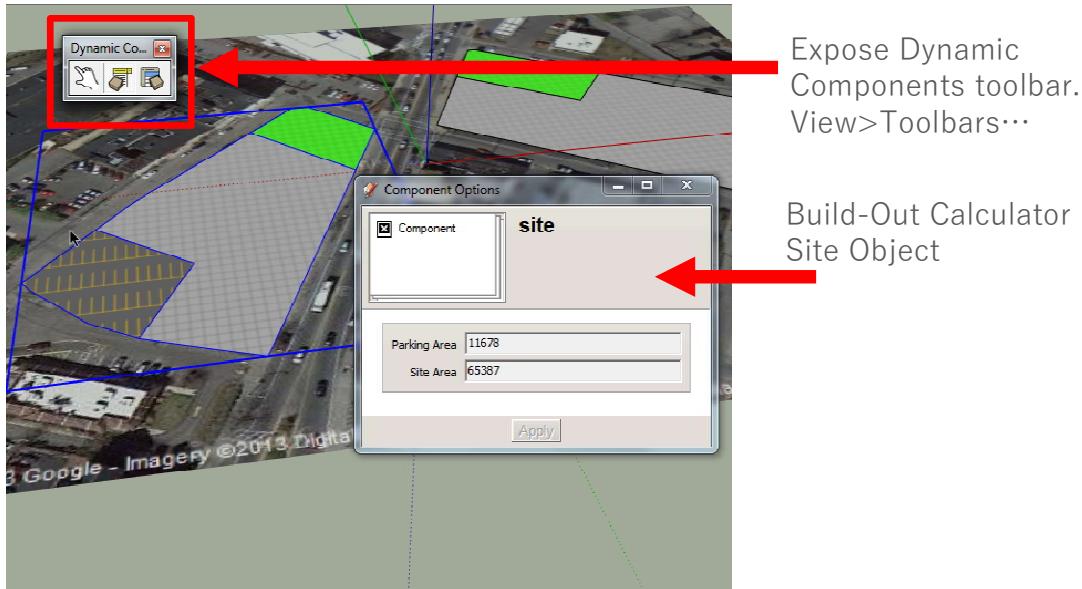
Color the site using the Site Default material.

If your site has a parking lot, divide the site polygon and color the parking area with the Parking Material.

Now triple-click the site polygon to select all of the connected faces and edges.

Finally Right-Click the selected geometry and choose Create Site Group for the Buildout Plugin tools.

# Inspect Site Attributes



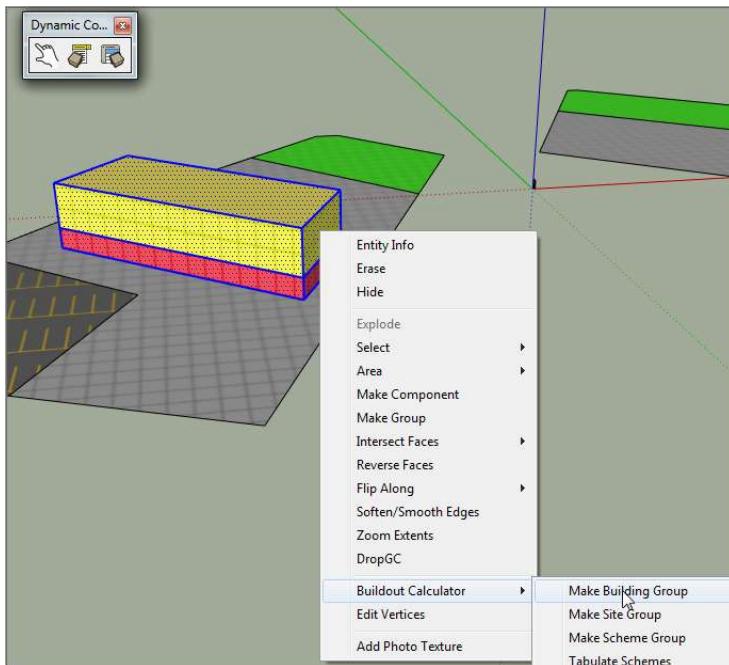
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The Buildout Calculator plugin uses a Sketchup functionality known as Dynamic Components. Dynamic Components let you attach attributes to groups or components within SketchUp. This makes Sketchup a little like GIS.

To inspect the attributes of your new site group, expose the Dynamic Components toolbar. In Sketchup 2013 this is accomplished by going to View>Toolbars and checking on the Dynamic Components toolbar.

Then select your site and click the Component Options button. This is usually the middle button in the Dynamic Components toolbar.

# Model a Building



Model building parts as simple extrusions.

Apply materials to indicate use.

Gridded materials Indicate stories.

Select All, Right-Click And choose  
“Create Building Group”

Buildings can be any sort of shape, but it is easiest to create them as polygons that are extruded with the Push-Pull tool. 7

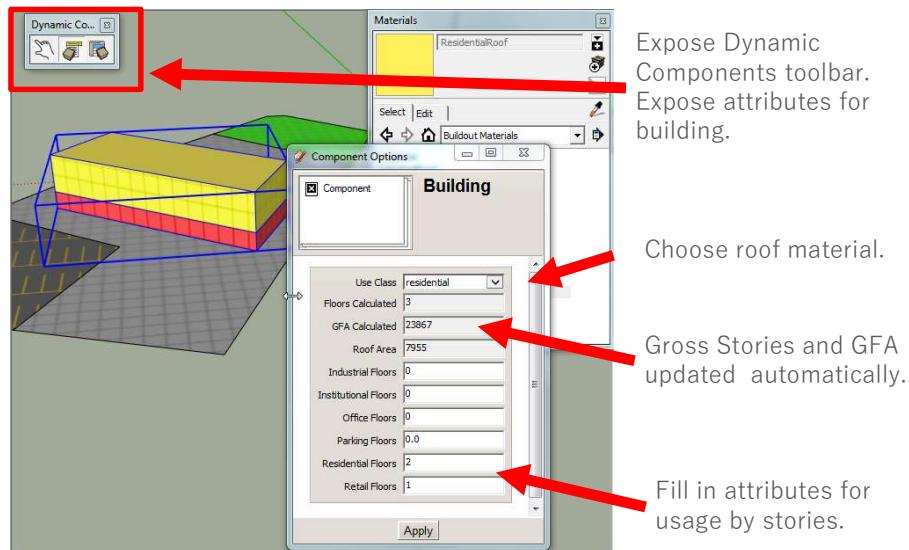
You can color buildings with any textures that you like except for the roof. It is important to color the roofs of buildings with one of the roof materials in the Buildout Materials group. This is how the building area is calculated.

I recommend that you use the Residential, Retail, Commercial ,Institutional, Industrial materials to color the vertical faces of buildings. The Parking Wall material is handy for indicating the faces of parking structures.

If you have different parts of a building that have different uses, such as Ground-floor retail, as pictured above, you do not need to make this a separate extrusion, you can simply divide the faces of your building and color them.

Now triple click the building to select all connected edges and faces , right-click the selected geometry and choose Create Building Group from the Buildout Calculator tools.

# Update Building Attributes



Expose Dynamic Components toolbar.  
Expose attributes for building.

Choose roof material.

Gross Stories and GFA updated automatically.

Fill in attributes for usage by stories.

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Use the Component Options tool from the Dynamic Components toolbar to bring up the Options inspector for your new building group.

Pull down the Use Class menu and pick the use-class designated by the roof material you assigned to the roof of your building. The area of all the polygons in your building group colored by this material will be used to calculate the floor-plate area of your building. For this reason it is important that you have only used this texture on the roof of the building. If you accidentally assigned the roof texture to other parts of the building, this can create errors in your GFA calculations.

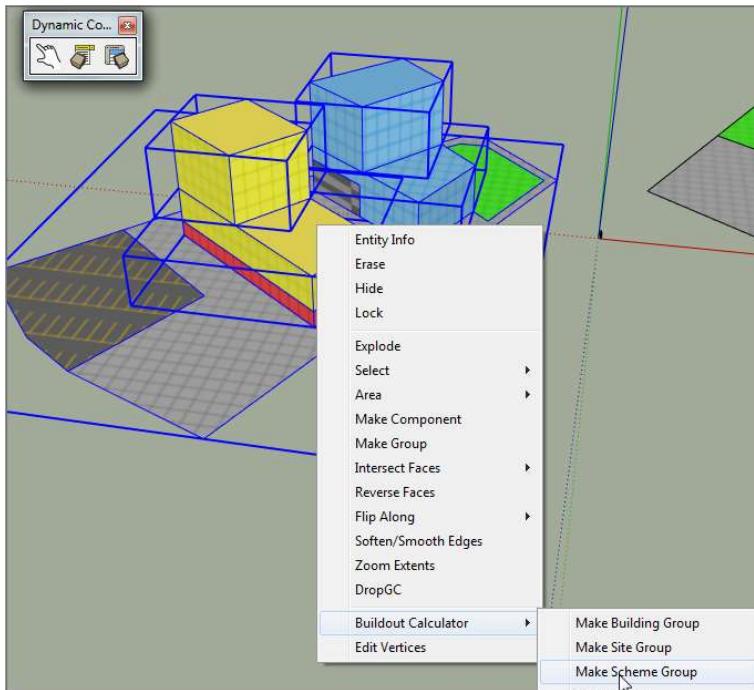
The Buildout Calculator automatically calculates a Gross Floor Area for the building based on the number of stories (estimated from the building height). This estimate assumes that the building is all one use.

The GFA figures that the calculator uses in its summaries are calculated according the numbers of floors for each use that you enter into the fields provided in the fields on the bottom half of the Building Options inspector. It is OK to enter fractional floors here.

After updating these values, click the apply button.

If you change the geometry of the building it is sometimes necessary to click it with the Redraw button from the Dynamic Components Toolbar to get the areas to recalculate.

# Create a Scheme



Add more buildings.

Select buildings and site

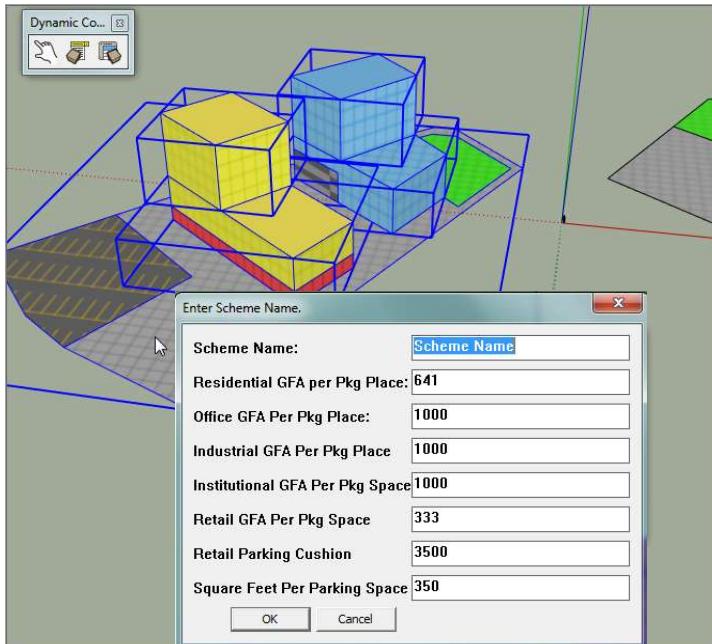
Right-click and choose:  
Create Scheme Group.

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If you have complicated buildings having parts of different shapes it is often easier to model the different pieces as independent building groups.

When you have a site group and a building group, you can select them all, right-click and choose Make Scheme Group from the Buildout Calculator tools.

# Name and Adjust Scheme



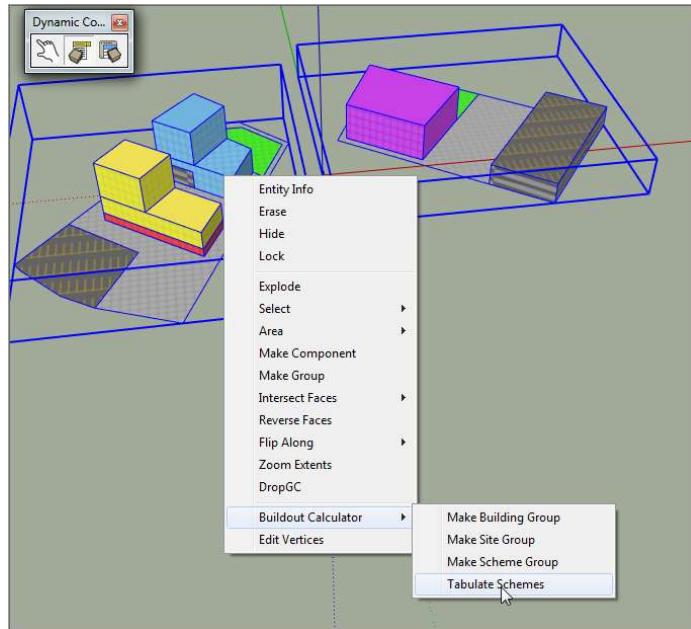
Name Scheme and edit Default parking requirements if necessary.

Use the Component Options tool from the Dynamic Components toolbar to reveal the scheme options. Paul Cote 07/15/2015 10

You should give each scheme a unique name. Because the Schemes are sorted alphabetically in the Buildout Report, it is useful to begin the scheme name with the identifier of the site. This will make it easier to compare the reports from different scenarios.,

The Scheme Options Inspector reveals the default ratios of parking area to floor area in your scheme. This is broken down by Residential area and Commercial area. You can also set the square feet of area required for each parking space according to the use-type. The Retail Parking cushion is the GFA that is permitted for retail before a parking requirement kicks in.

# Tabulate Schemes



Create another scheme

Use the sketchup  
Outliner window to  
Select and manage  
scheme groups

Right-click and choose:  
“Tabulate Schemes”

A table will appear.

If you have one or more schemes , you can select them, right-click and choose Tabulate 11  
Schemes from the Buildout Calculator Tools menu.

A table will appear in a pop-up window.

# Examine & Export Schemes Table



Save report as an HTML file.

Open table in excel.

Inspect this table and make sure it makes sense.

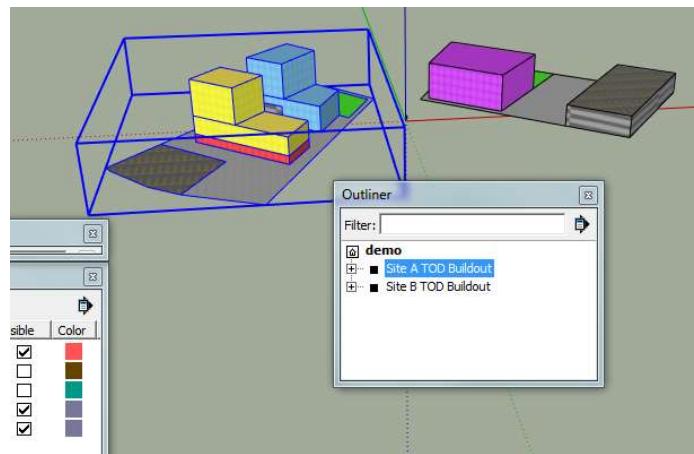
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If there are schemes that seem to have too little GFA or too little parking, you should go through the buildings and make sure that you have chosen their use-class appropriate for their roof material and set their Floor-Use attributes appropriately.

After inspecting this table you can dismiss it by simply closing the pop-up window .

The schemes report can be opened in Excel. The simplest way is by selecting the contents and then copy-paste them into a blank Excel worksheet. Or you can use the button at the bottom-right to save the table to a file on your hard drive. This file will be an HTML document that can be opened in Excel. Opening the HTML version of the report in Excel preserves the formatting of the table.

# Control Visibility of Schemes



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If you want to create and evaluate alternative design schemes for the same place,, then you can use the Sketchup Outliner Window to find the scheme. Right-click on the scheme and choose **Hide**.