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Building Crafter Version 0.8.0

Tutorial Version 1.2

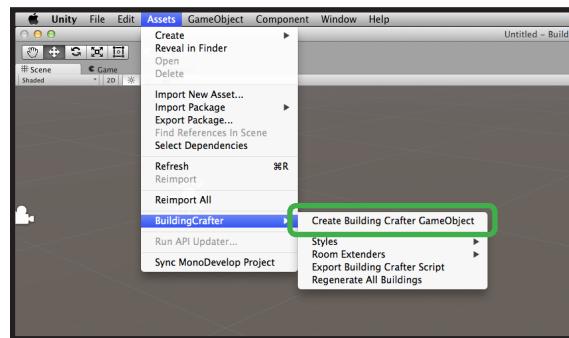
By Kellan Higgins

buildingcrafter@8bitgoose.com



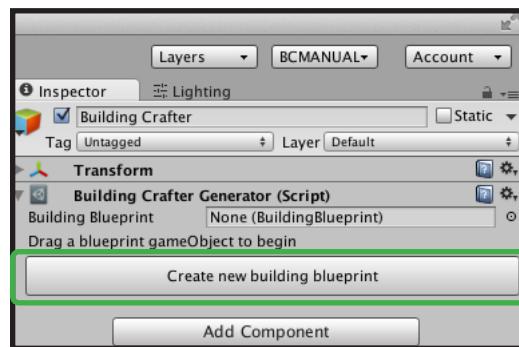
Creating your first building

First create the Building Crafter GameObject.



The Building Crafter GameObject can now create a new Building GameObject with a blueprint component.

This is like a factory that will create your new buildings.

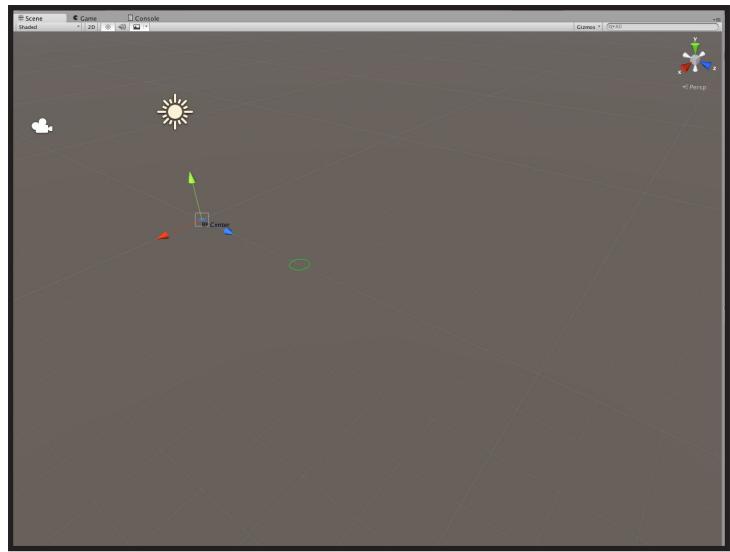


After creating a new building, the BuildingCrafter panel fills out. This is the area where you can edit, add and update your building. Modifying a building will be entirely from here.

Next, you will click on the plus button beside rooms.

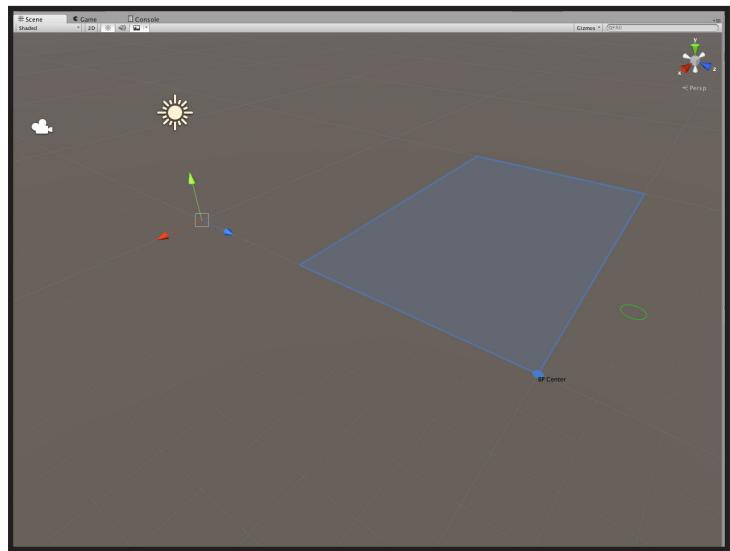


Hover over the Scene view. If a green button does not appear, please turn on **Animated Materials** in the effects drop down .



BuildingCrafter buildings are designed from the sum of their rooms, not by the outline of a building. You will create a building by laying down a room.

Lay down a simple square room by clicking each point in a wall and completing the square. Once a room is built, it will fill in with a blue inset.



Next, add a door by clicking on the plus button beside a door. Options here will only affect new doors.

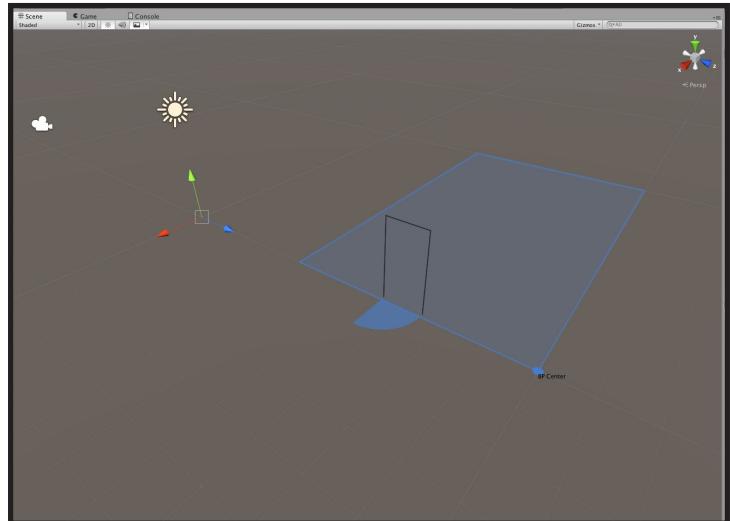
More info on doors later.



Click to begin the door opening. Doors may be laid at 0.5m distances, but are always 1 meter wide increments.

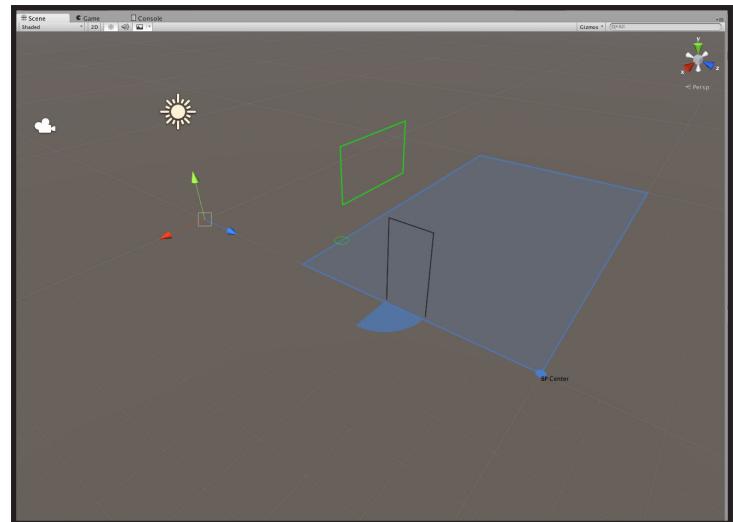
Doors that are not on a corner and are either 1m or 2m wide will receive single or double doors respectively.

The arc shows the direction that the door swings.



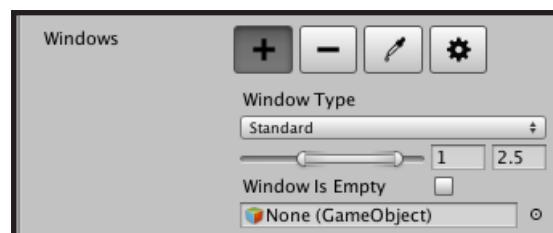
Next, add a window by clicking on any wall and clicking on the end of the window point.

Windows can be laid by 0.5m increments and can be as skinny as 0.5m.



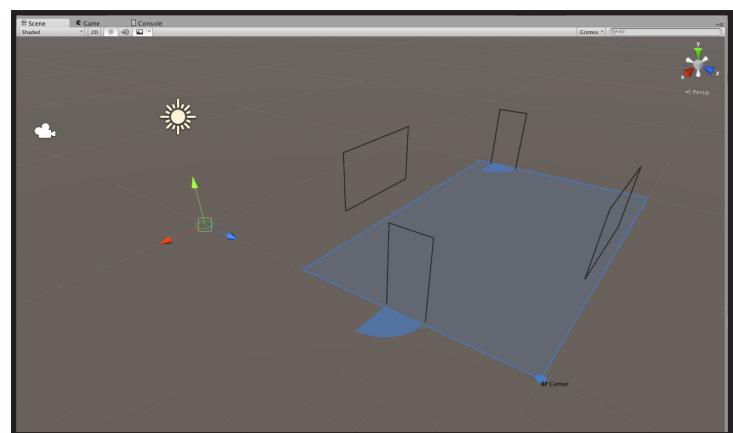
Window types dictate the bottom and top height of a new window. This dropdown only affects newly laid windows.

More on windows later.

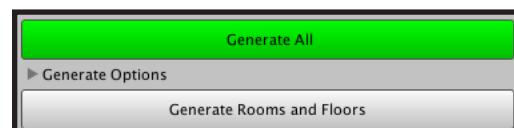


Lay a few more windows and doors on your new building.

Note, in the above options, you can

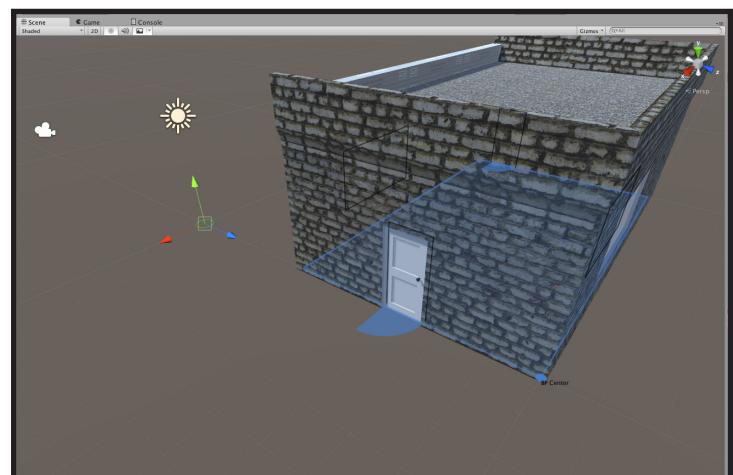


When you are ready, click the green generate all button.



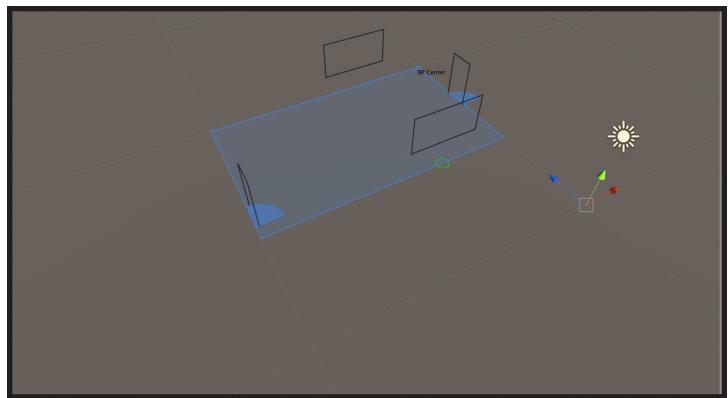
This will generate your new building automatically. Floors, wall, doors, windows and colliders will all be generated automatically based on the generic style. Building styles will be covered later in this manual.

Congratulations!

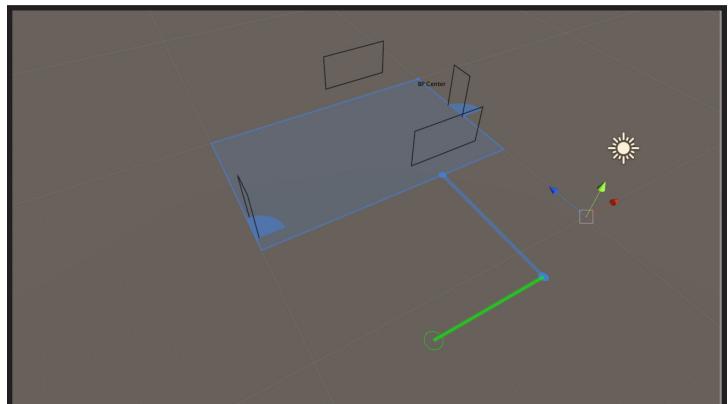


Creating multiple rooms

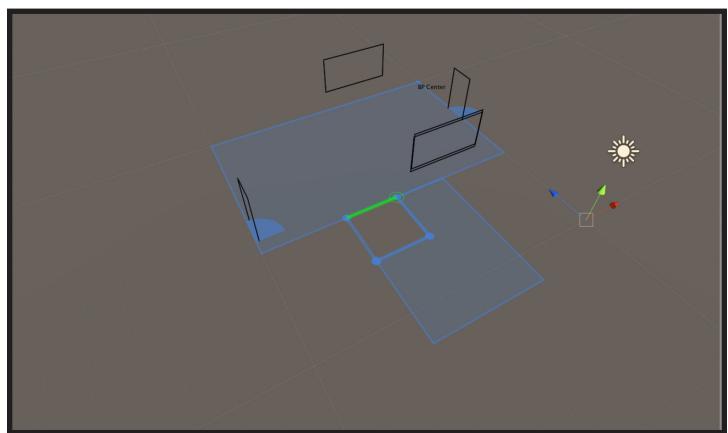
To add more rooms, lay the same way as the first room.



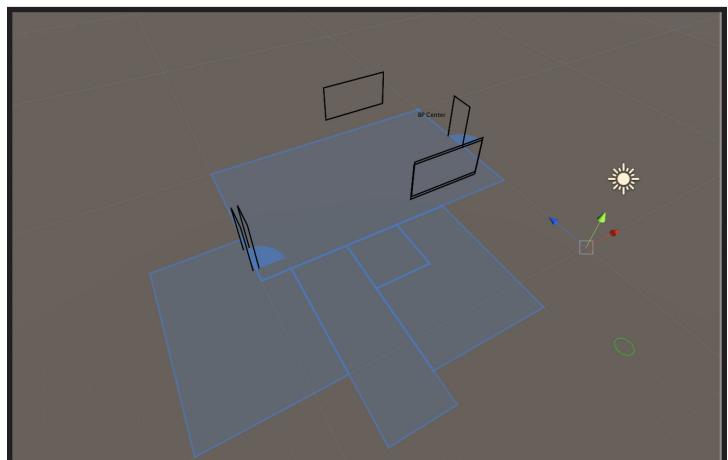
Rooms can not be laid inside other rooms.



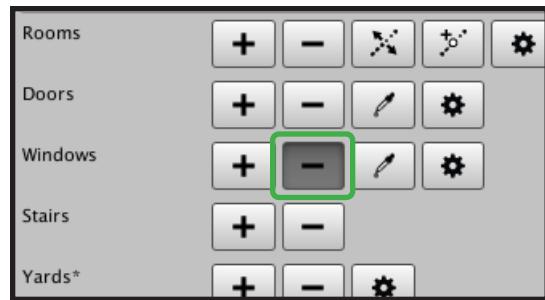
Rooms should have no spaces inside of the building. This can cause problems during the automatic generation of the outside walls.



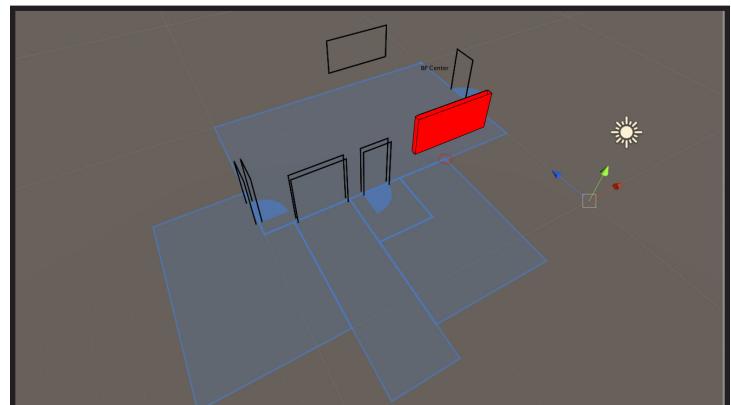
The window in this scene is crossing a wall. This will cause issues upon generation. We will need to remove it.



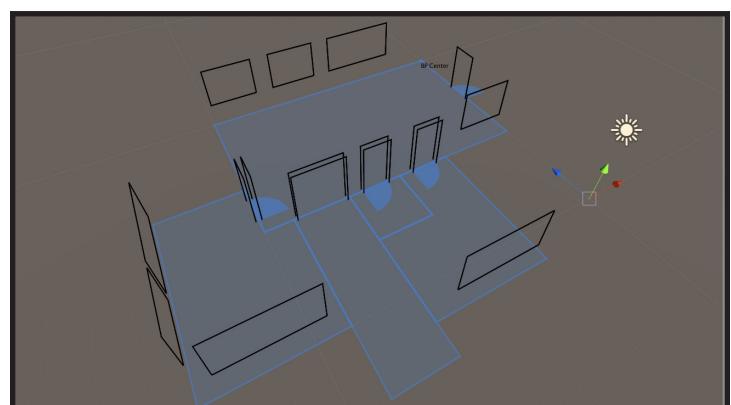
Click on the **minus** sign to remove the window.



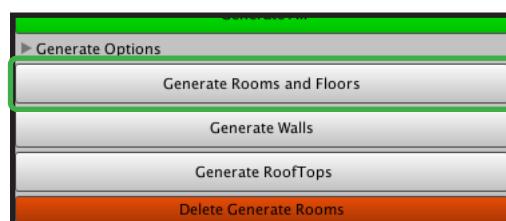
Hover under the window to delete it.
The delete works on where the cursor is on the floor plan.



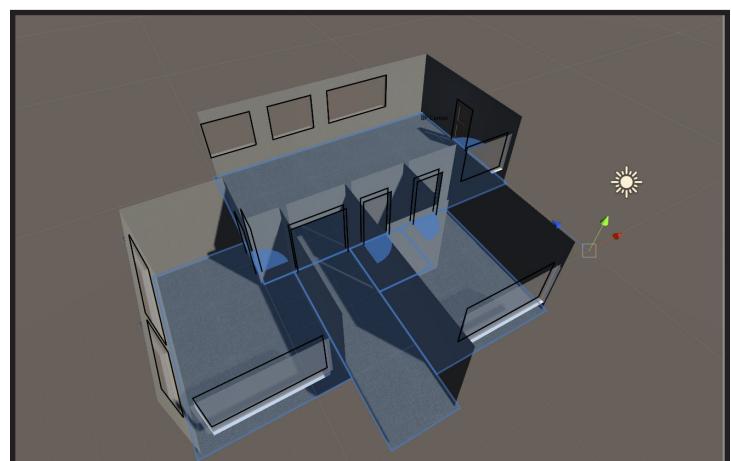
Also, the **window minus** will also delete doors and vice versa.



If you'd like to generate only the inside, click on **Generate Rooms and Floors**. This will delete the current building. Walls and Rooftops will generate the walls and roofs without deleting the interiors.



The completed building without the exterior walls and roof. Helpful if you want to see the interior while creating the building.



Generation Options

Since 0.72, Building Crafter has additional generation options. The biggest addition is the ability to export any building to an ASCII FBX format using a tool I created called **Unity FBX Exporter**.

<https://github.com/KellanHiggins/UnityFBXExporter/>

All windows are by default left non-static. This allows the Unity global illumination to work, but at a cost to performance. You can disable it here.

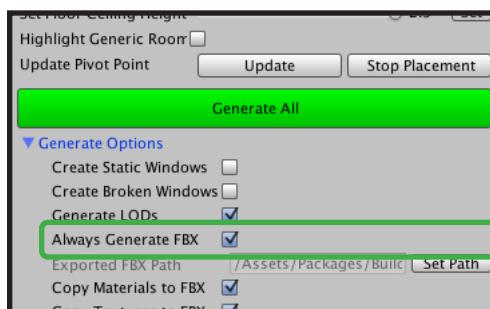
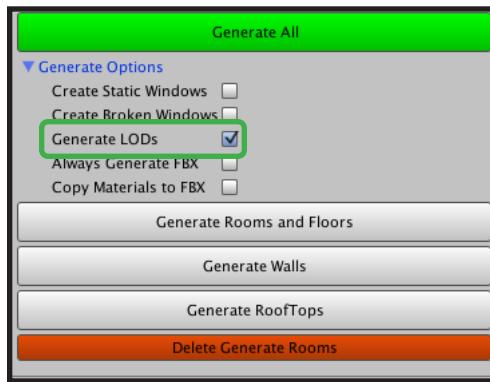
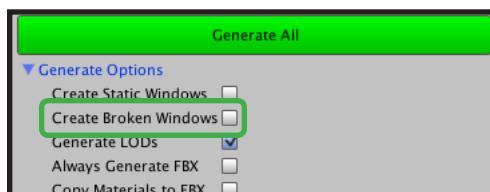
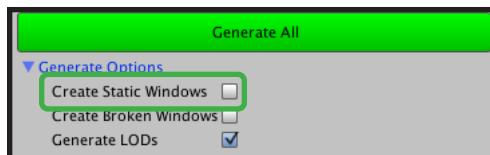
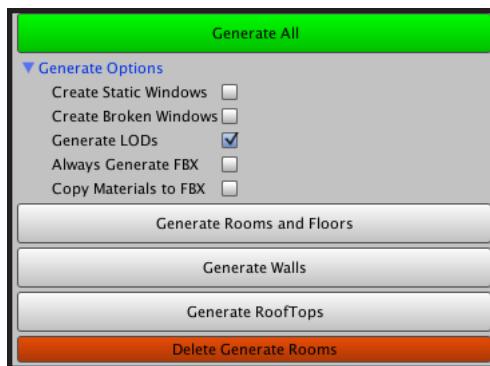
Building Crafter can generate randomly broken windows. By default, broken meshes are always non visible. This setting turns the generation on and off.

Building Crafter's LOD system allows many buildings to exist in a single scene. It renders flat planes with a shiny surface and then removes the interiors by using Unity's LOD system.

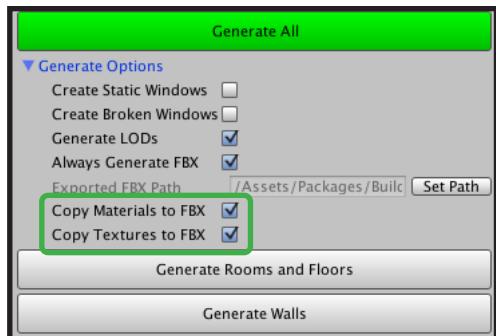
By disabling it, the filler items are no longer generated and the LOD components are not added to your building.

Always Generate, Copy Materials and Copy Textures relate to FBX exporting.

For the option **Always**, whenever this building is generated, a new FBX file will be exported to the file path in the grayed out space. A popup will appear confirming the location.

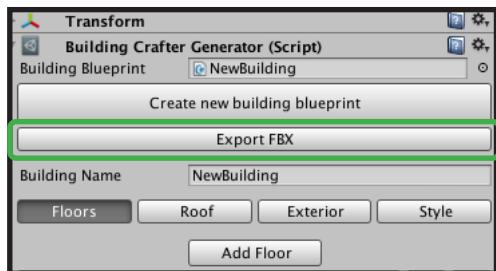


Copy Materials will create new duplicate copies in the “/Materials” folder of the new FBX file root. Same for **Copy Textures** which can take a while to duplicate the new textures.



At any time that a Building has been generated, you can export it as an FBX. It will export using the options in the **Generate Options** dropdown.

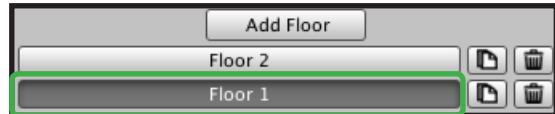
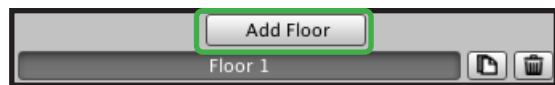
A building will not export if it is empty or has not been generated.



Adding multiple floors

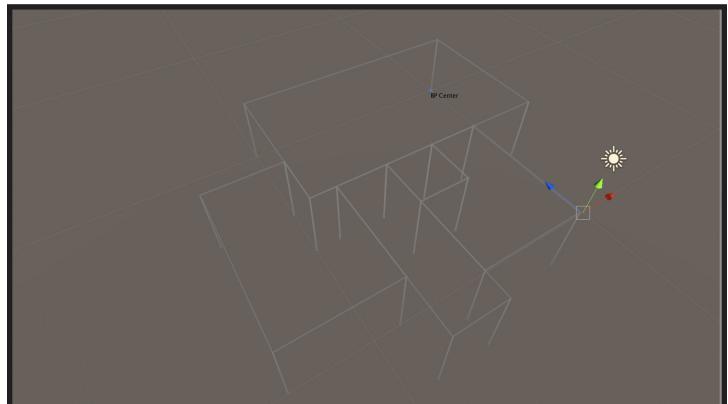
Buildings can have multiple floors, which are flat blueprints that offset by 3m's per floor.

To add a new floor, click *add floor*.

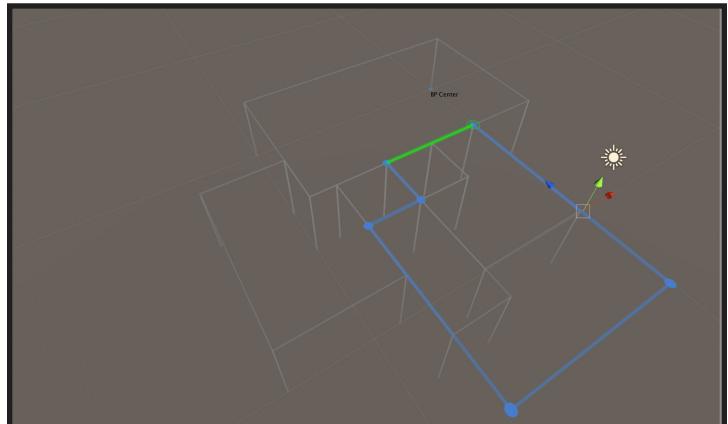


When on any floor, the floor below will be shown in a pale gray outline.

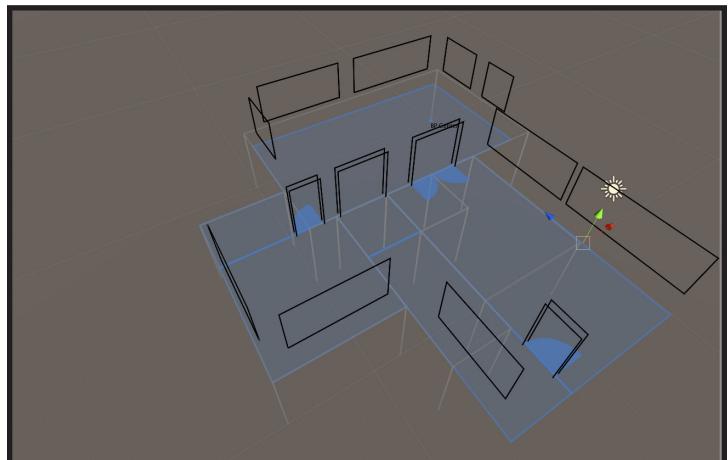
Remember floors will always be in increments of 3 meters high. Interior ceilings can be between 2m and 2.9m high.



Lay the second floor as you would the first. You can even have overhangs in the layout.



Once your floor is done, click generate again to generate the floor.

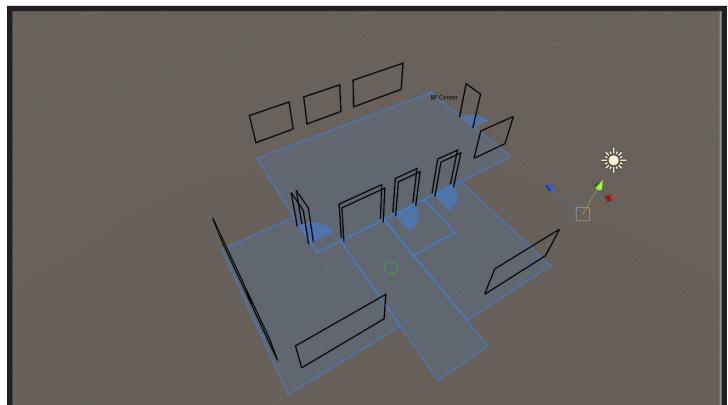


Stairs **Plus** will lay a new stair on the floor you are currently viewing.



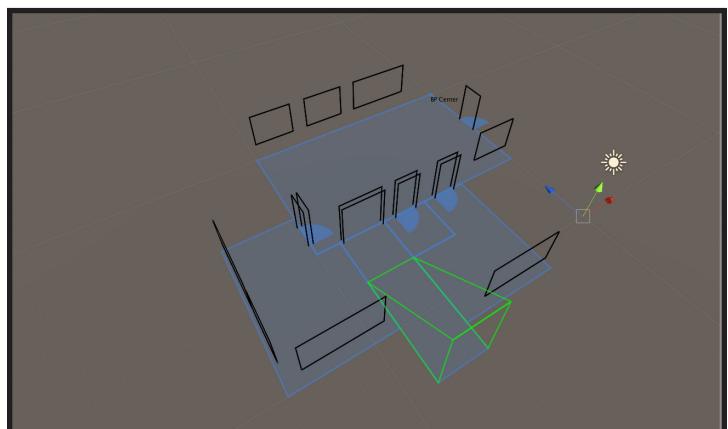
The only issue with this floor is that there are no stairs up to the second level. You will need to lay them on the floor below.

Hover over the start point. Stairs are currently always a 2m x 4m deep set.

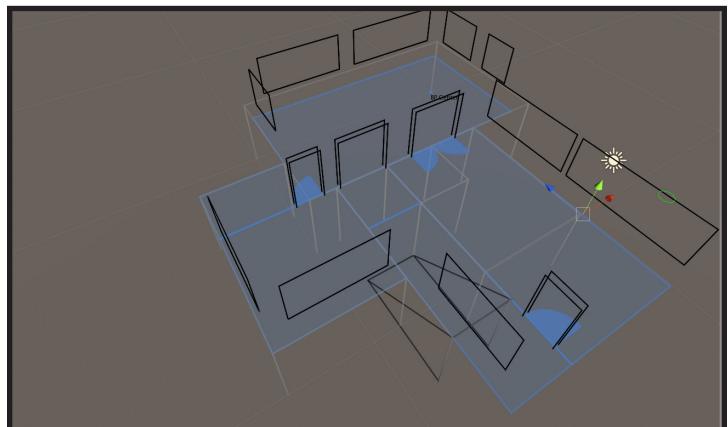


Drag the direction you want to have the stairs appear.

You will need to have walls on each side of the stair so the floor above is cut out correctly.



Stairs on the floor below will appear in the rendering on your currently viewed floor.



The rendered stairs will cut out a space for itself in the floor.



Floors can be duplicated by clicking the file copy icon.

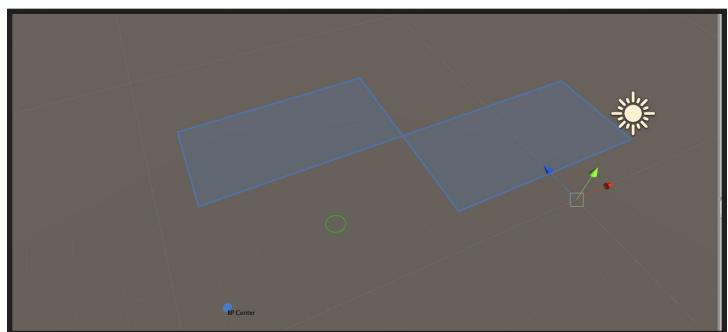


Or any floor can be deleted by selecting the trash can.

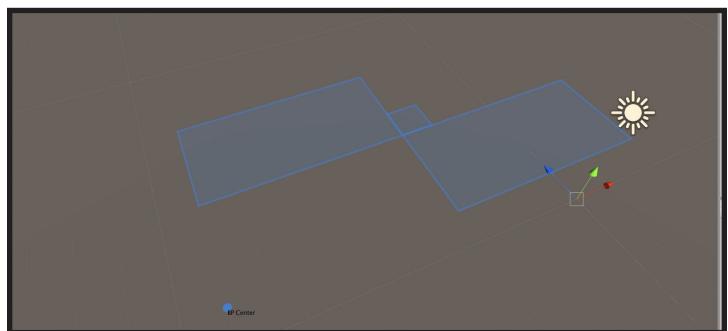


Problem layouts

Kitty-corner layouts will not generate correctly when created. To fix this issue, ensure this is never reproduced.

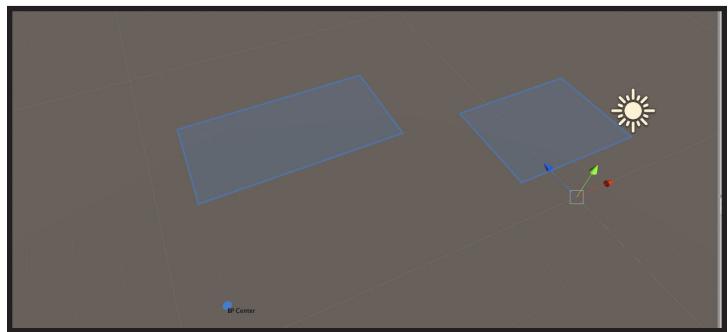


This layout will generate correctly.



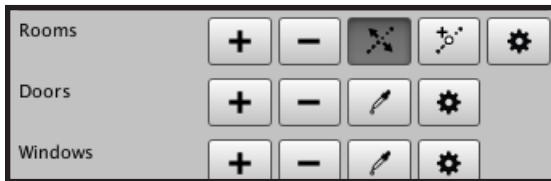
Exterior walls must be one contiguous outline to surround the building.
Blueprints must all be connected to each other by a 1m side at minimum.

These issues will be addressed in a future version of Building Crafter.

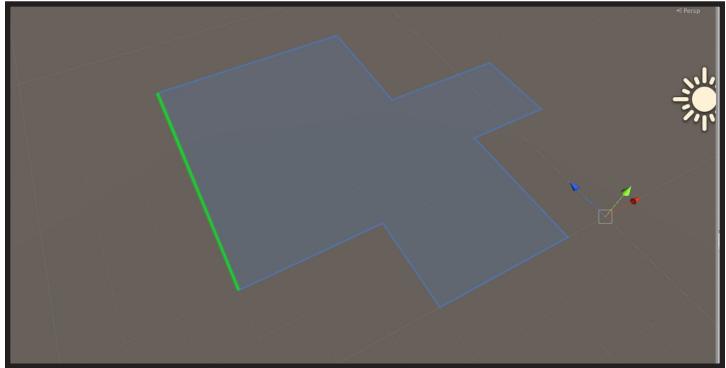


Modifying blueprint layouts

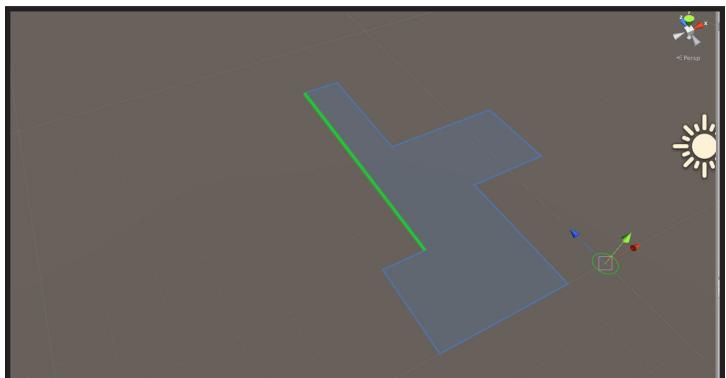
After laying walls, you can easily modify the room's walls. There are two options: move wall  and the add point to wall .



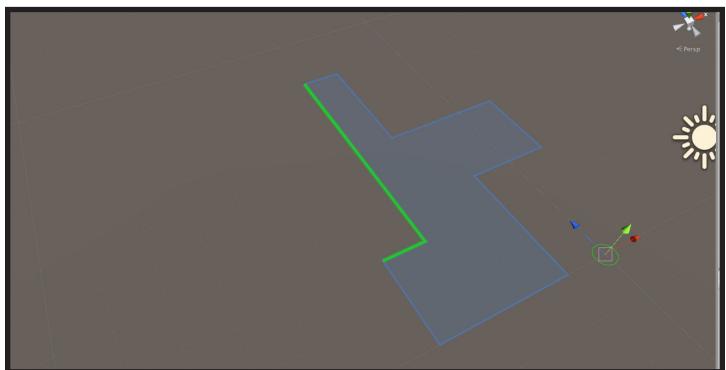
The move wall  option allows you to move either a full wall point or the corner point on a wall.



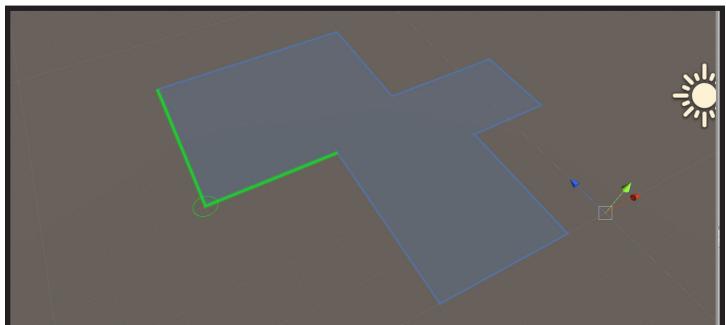
Do not cross walls across themselves, can cause issues when generating the building.



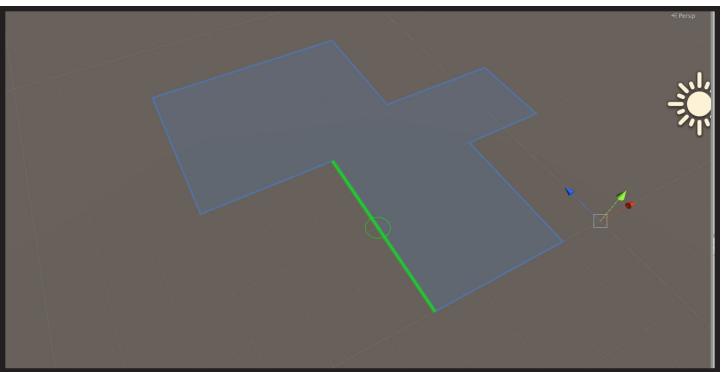
If two lines show selected, it means you can drag the corner around.



If two lines show selected, it means you can drag the corner around. Some corner placements do not work because of the way the wall intersects.

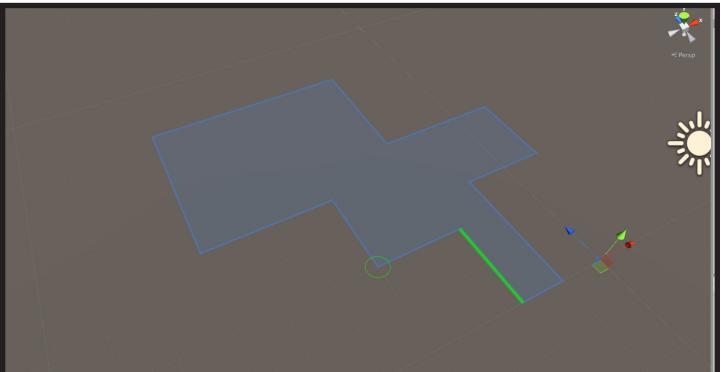


The **add point**  option allows you to break a wall in two and create a new wall section.

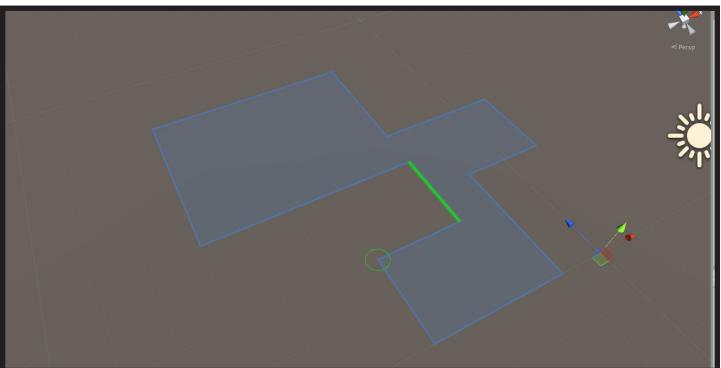


Depending on the side the mouse is hovering over will determine which side you drag out.

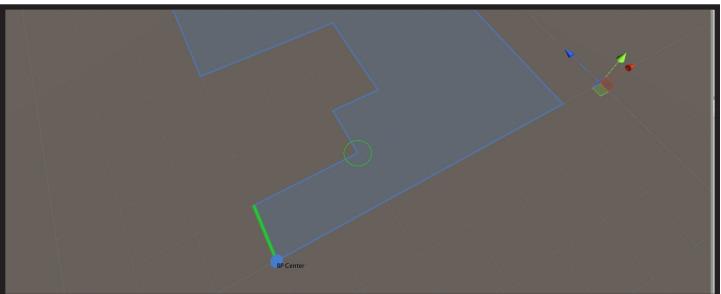
The mouse is below the green cursor.



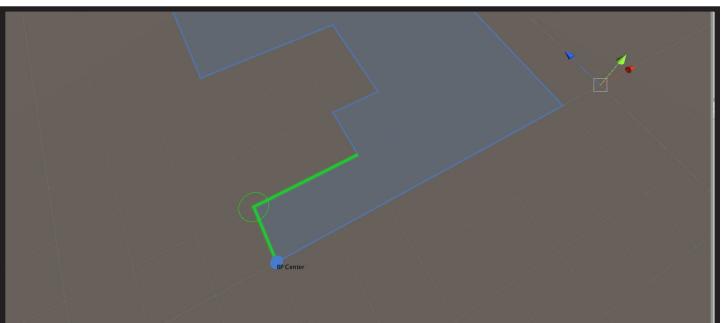
The mouse is above the green cursor here.



Can be used to quickly modify a room.

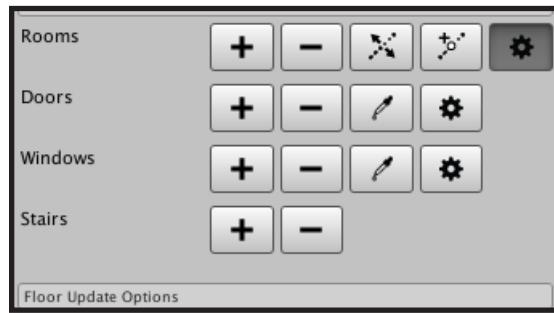


This mode can also modify corners the same as the move wall option.



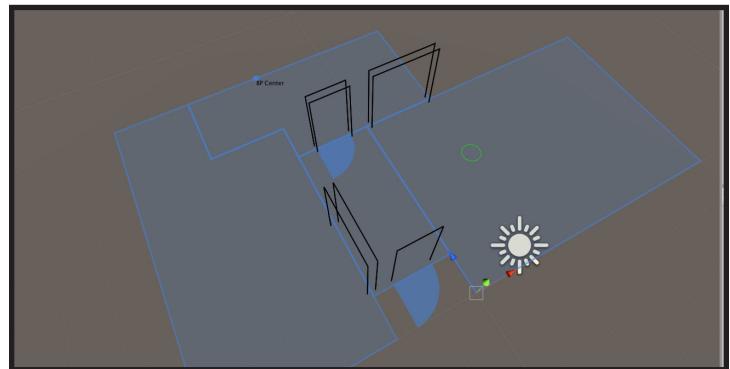
Room Properties

Rooms have properties, which affect the look of them when generated. Select the gear icon to modify a room's property.



Click anywhere on a room to bring up the room's properties.

Right click to exit viewing properties.

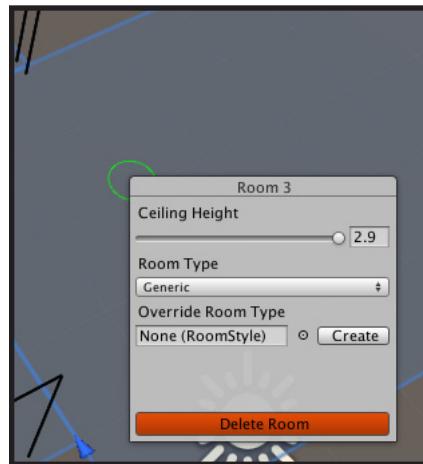


When clicking on any room, it shows the specifics for this building.

Ceiling height sets the interior height of the ceiling.

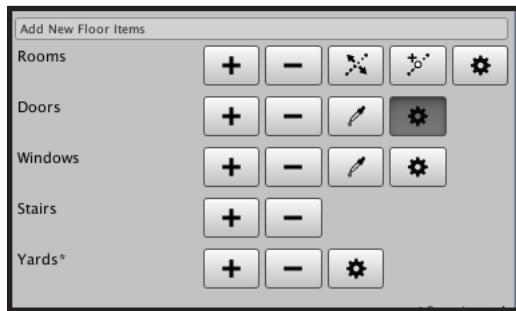
Room type determines what the room looks like when generated. Discussed later.

Can also add an override room type. Discussed in style section.



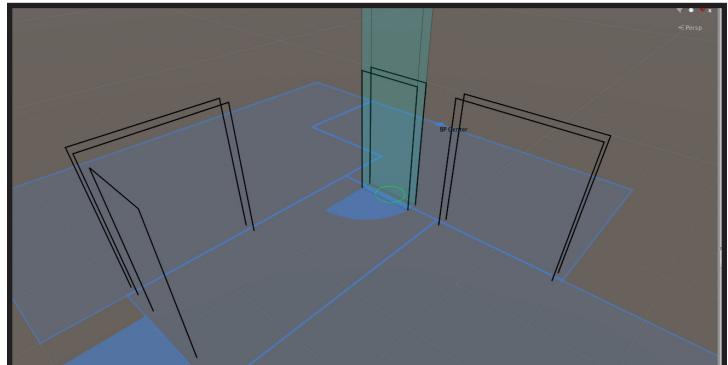
Door and Window Properties

Doors and windows have sizing and options that can be changed. These affect how the doors are generated.



Highlight a door by hovering below a door. When the door is surrounded by a invisible box, clicking will reveal its properties.

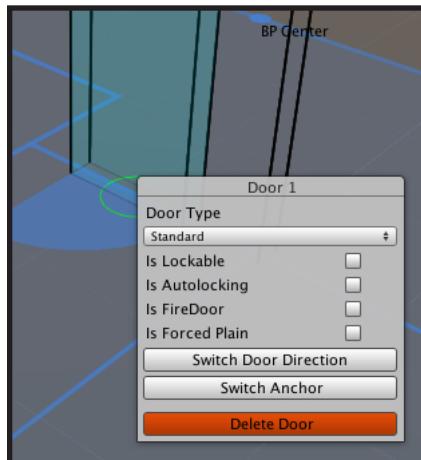
Right click to dismiss.



Door type affects what type of door it is. Standard and Heavy generate doors based on the Building's style. All other options leave the door open for hallway openings.

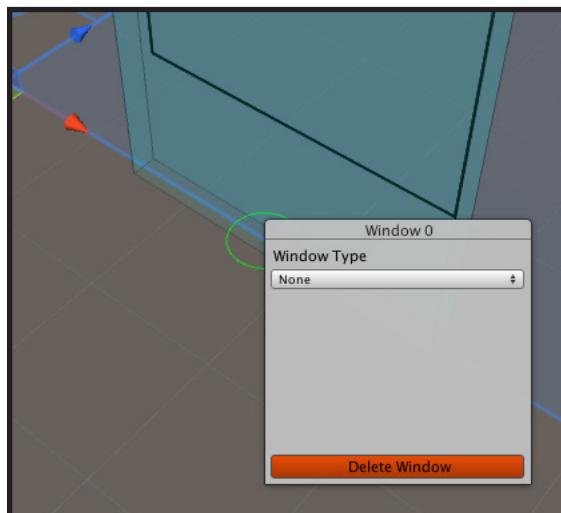
The toggle options will export to the generated door.

Door anchor and door direction can be changed here as well.



Windows can be selected in the same way. The only have one option that sets the bottom and top height of the window.

Tall2p5 is a 2.5m tall window starting at 10cm above the floor. **Tall2p8** is a 2.8 tall window starting at 10cm above the floor.



Door and Window Eyedropper

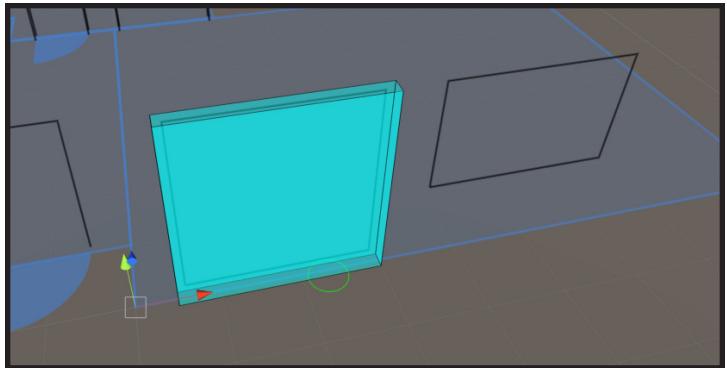
version 0.8.0

Windows and Doors have an eyedropper that allows you to select a door or window and it will assign to the new window options (that appear below the windows row when adding a new window).



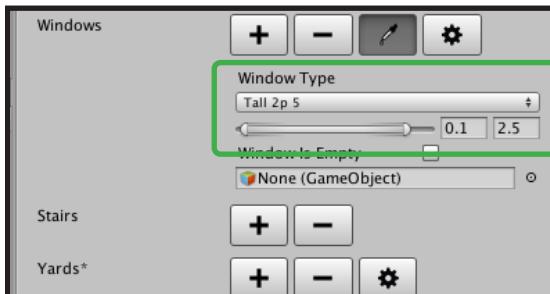
If you'd like to copy a style to be reproduced in any new windows or doors, simply click on it it when highlighted.

Note, you must hover under where the window sits on the current floor.



You'll note that the window type and the floor bottom height and top height have been set to the same as the eyedropperd window.

The eyedropper will work on either windows or doors and set them appropriately.



Floor Options

There are a few options that can be applied to the floor or building.

Set Floor Ceiling Height will update every room on the floor with that new ceiling height.

This will not affect the story height (always at 3m) but will lower the ceiling for the internal mesh.

When creating many buildings, each room should have a specific style. This option will highlight all rooms that are the regular, default style.

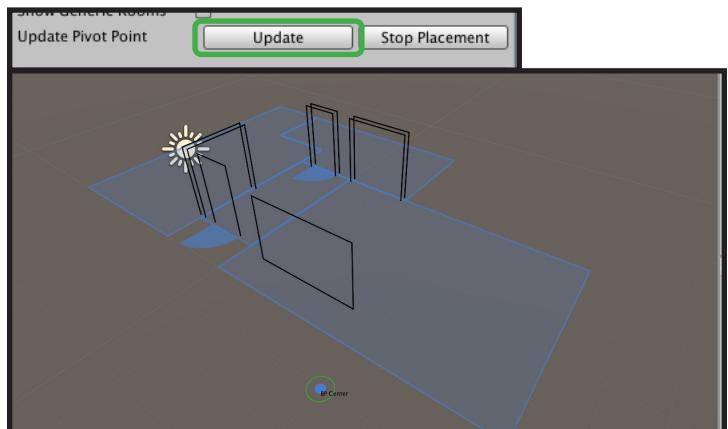
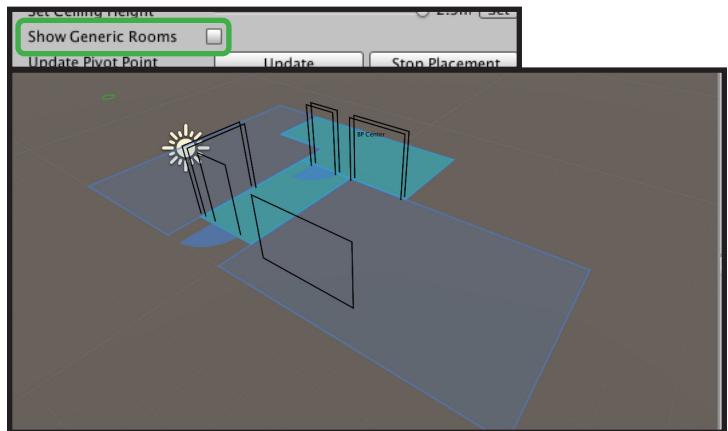
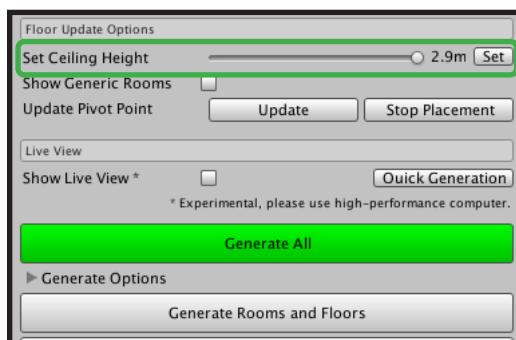
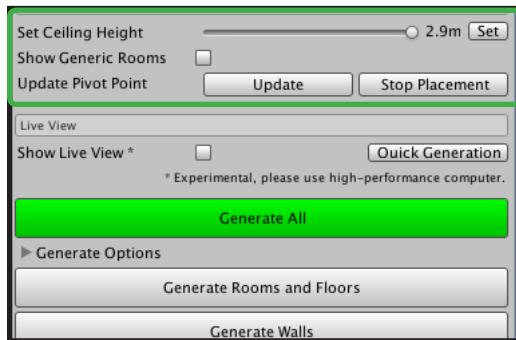
The cyan colored rooms are still the default Generic room type.

A building has a pivot point where the building rotates around as well as exists in the world.

Click on the point to update the pivot point for the building.

By updating the pivot point, the generated building will be deleted.

Clicking cancel will exit.



Live View*

version 0.8.0
*experimental

Since Building Crafter 0.8.0, you can use the live view setting. This will dynamically generate the building as you build it. It will only take the difference of the building changes, so it can generate it at almost instantaneous speeds.

When enabling live view, all floors are generated. However some parts are hidden to allow easier editing.

All rooms and walls above the current floor are hidden by turning off the mesh renderer.

The current floor's outside wall is hidden so you can see in your building.

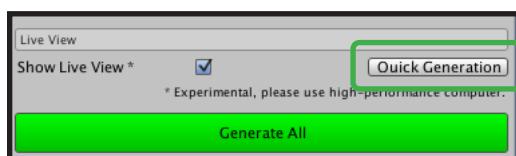
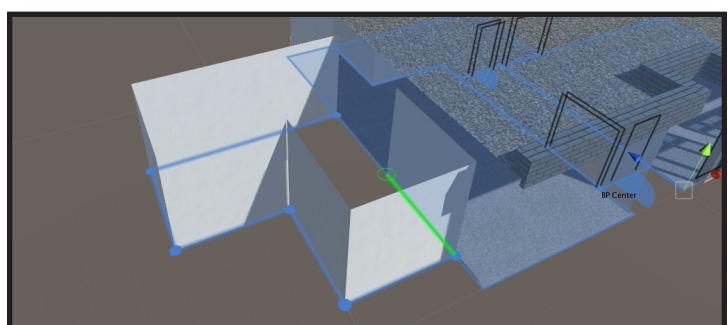
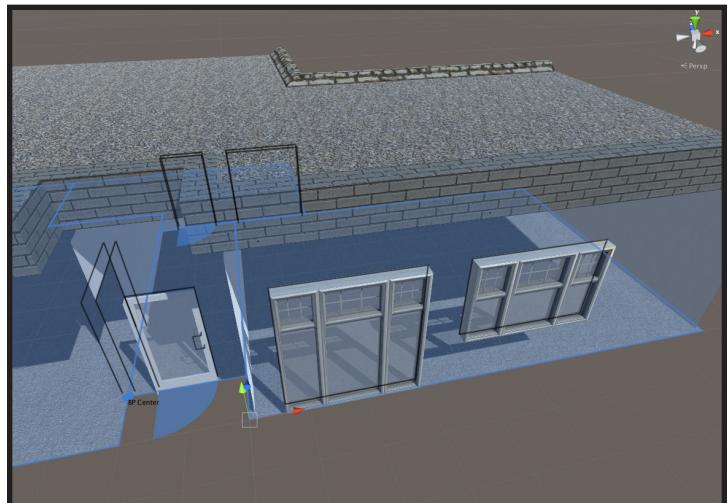
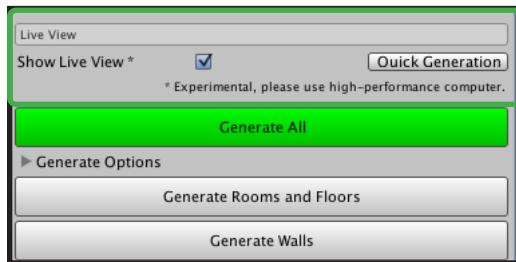
All roofs for the entire building are always shown.

When you click off the building, all hidden walls and rooms are reenabled.

NOTE: Building Crafter is still active in Play Mode, please deselect the building before you hit play to enable all walls.

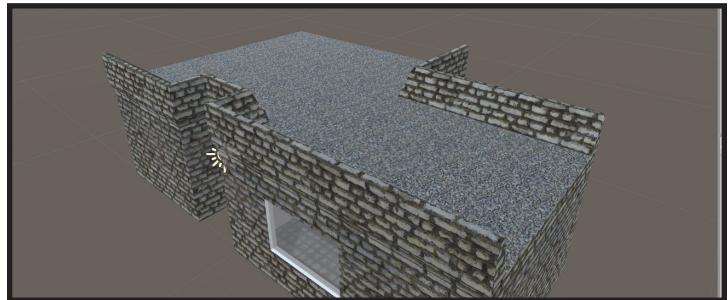
While laying rooms, a temporary wall two sided will be generated to show where the new room will go.

Since Live View is experimental, if the building isn't looking quite right, you can click on **Quick Generation** to regenerate the building properly.

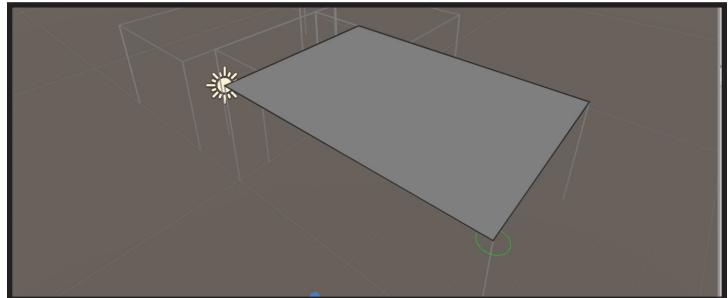


Creating a Roof

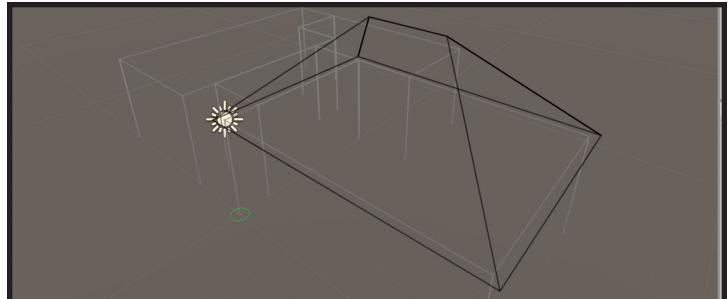
By default, flat roofs are generated (like commercial buildings). The top floor of a building can have manually laid slanted roofs for residential type buildings.



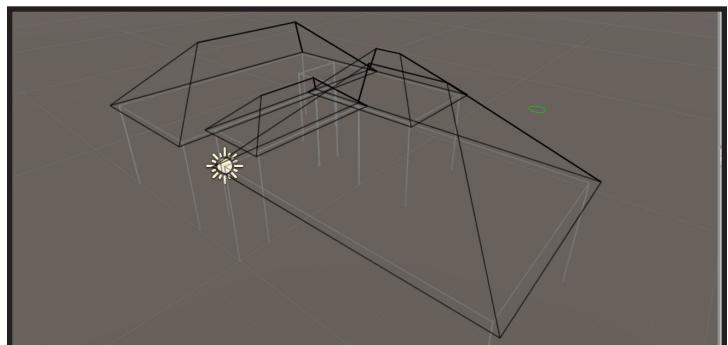
Clicking on the plus will allow you to add a square roof anywhere on the top floor of the building.



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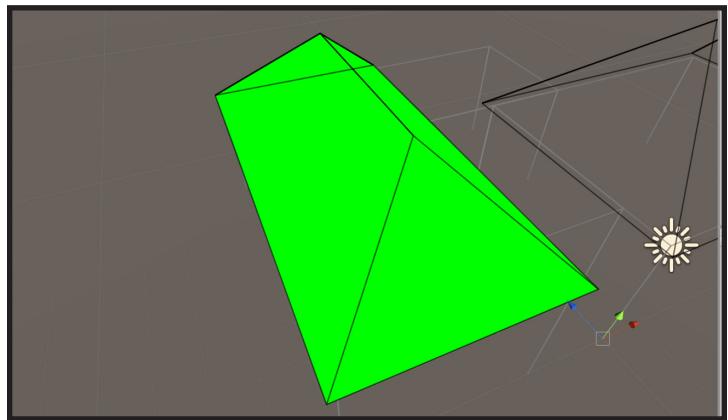


The roofs will generate instead of flat roofs. Note, the roof lips and the flat roofs will not generate on the top floor, but will on all floors below.

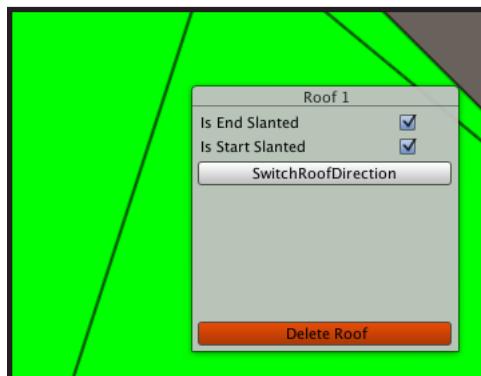


Modifying Roof Properties

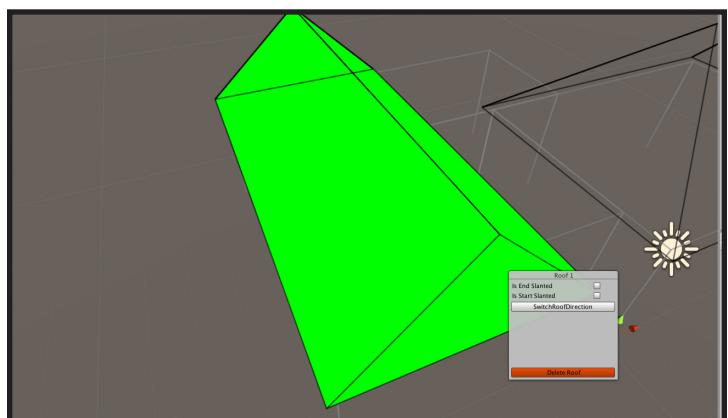
Same as floors, roofs can be modified with a few properties. Select by hovering over where the roof's outline is.



Each of a roof can be slanted or straight up and down.

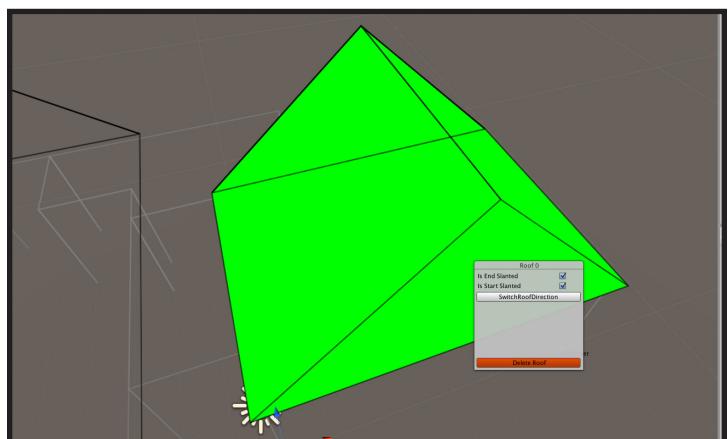


When unchecking end or start slanted, the ends of the roof are perpendicular to the ground.



By default, roofs will go the direction of the lowest peak. You can switch this manually to get very high rooftops.

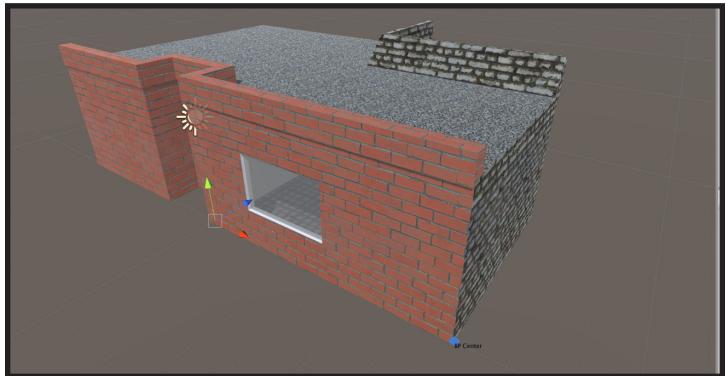
When going against the default, the roof may not be slanted on the edges



Setting Exterior Sides

Buildings have four distinct sides. Each side can either have a nice face, or a plain siding wall.

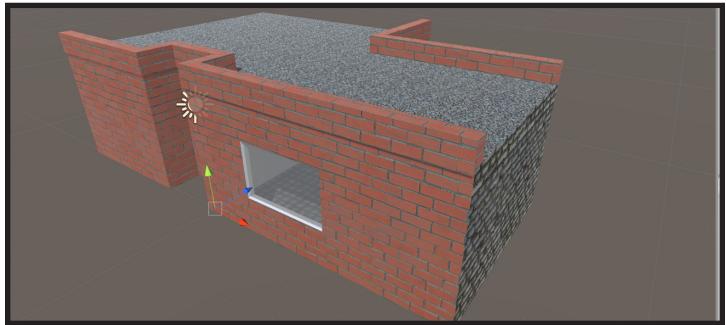
This building has one nice face.



Each side is determined by looking at the building by the standard directions. Use the 2D button to figure out what side will be the front.



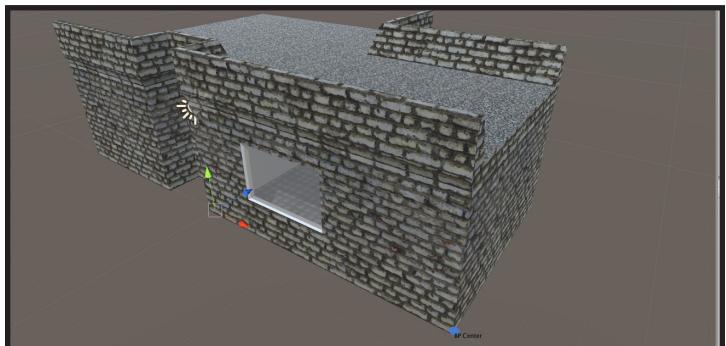
Changing the building to have a fancy back also updates the building lip.



A building with all four sides selected as fancy.



Same building with plain sides.



Building Crowns and Party Walls

All exterior walls are 10cm in width.

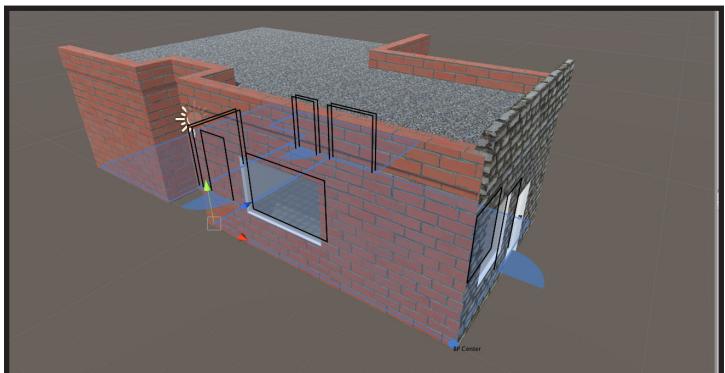
However, for row houses (like those in older cities like New York), buildings have to be placed beside each other.

If there are no openings (windows or doors) along a building side, the wall will not extend out. This is a party wall.



When a door and a window are added to a party wall, it loses its party wall status.

The building wall is extended out 10cm and a building lip is added to the building.



Building add interest to the rooftop. Building lips are automatically generated based on the roof outline.

Plain sidewalls receive a different crown type than fancy sides.

Building lips do not generate on party walls.



Party walls can also appear on a corner.

Party walls need a completely blank plain (including all floors) in order to be created.



Creating Stretchable Windows

As of Building Crafter 0.8.0, you can add complex windows to your building. Building Crafter comes with one window, but you can use almost any window you can find.

Windows will stretch similar to a 9-slice system with Unity's GUI. You tell which areas can stretch and which areas should not stretch.

To create a new window, add the BCWindow component to the parent GameObject. BCWindows work with both complex and single GameObjects.

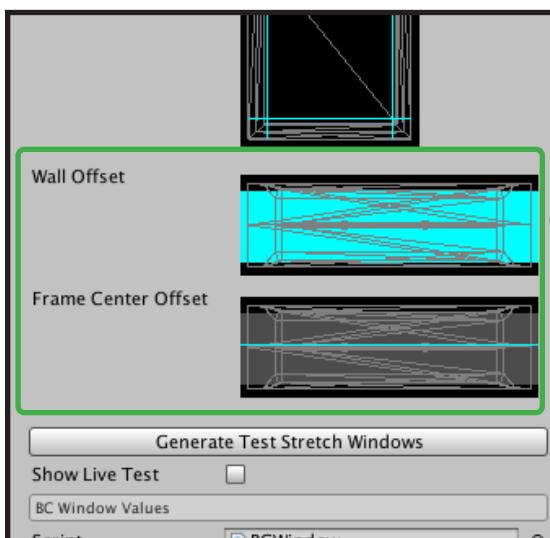
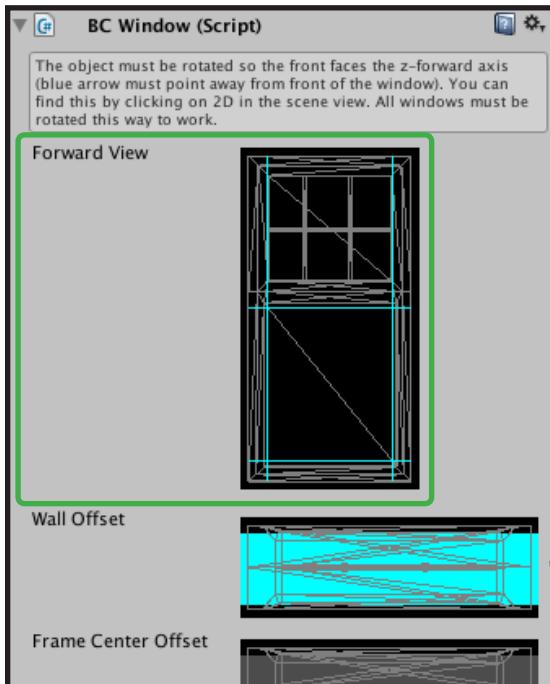
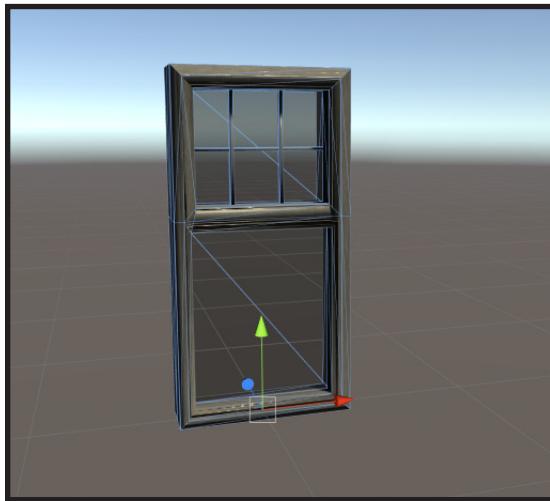
Windows should be rotated so that the z-axis (blue) is point into the window. You can find this direction by clicking on the 2D option.

Forward View: Shows how the window is sliced along it's face. Any mesh points before and after the vertical lines will remain unstretched. Those between the vertical lines will stretch as the window is morphed. Same with the horizontal lines.

Wall Offset shows where the frame of the window will appear. This allows you to have inset and outset frames when building a window.

The Frame Center Offset shows where the frame changes from the exterior mesh (brick) to the interior mesh (plaster). The gray box also shows where the wall is compared to the window frame.

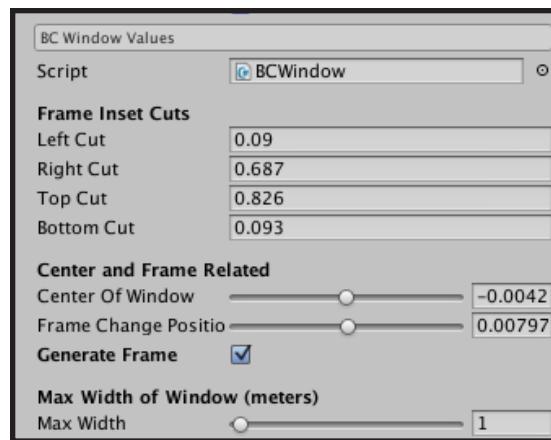
Frame Center will not appear if the window has "Generate Frame" off.



All the graphical numbers set in the GUI can also be set below.

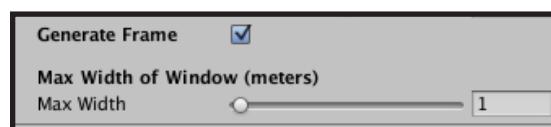
Frame Inset Cuts are for the vertical and horizontal lines in the first graphic.

Center of Window and Frame Change Position are for the second and third respectively. For thick framed windows, you can turn off the frame to save triangles.



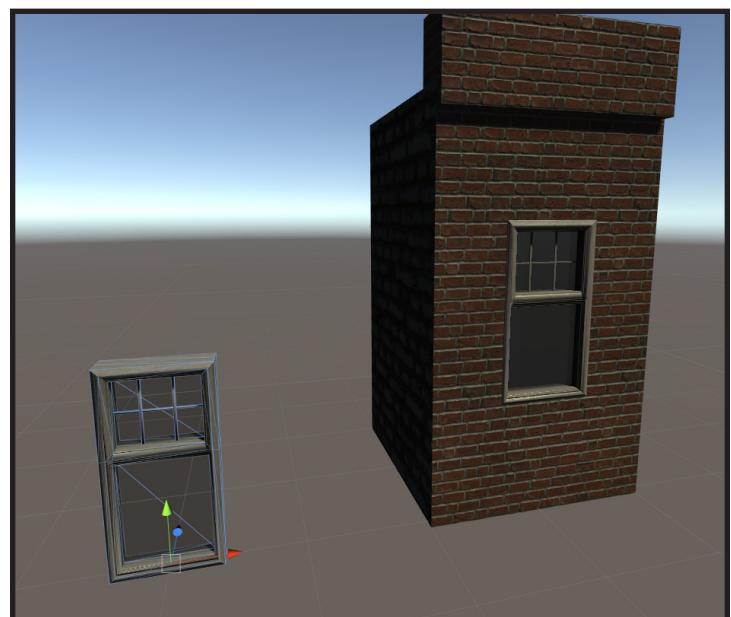
The last option sets the max width of a window, this allows many windows to be generated in a window frame.

The best way to understand the building stretcher is to turn on the live generation view.



When you select the live test, a fake building will appear to the right of your window. It will automatically get destroyed when you click off of the building, so don't worry about it introducing a new building into the world.

The first setting will generate a single 1m wide standard window.

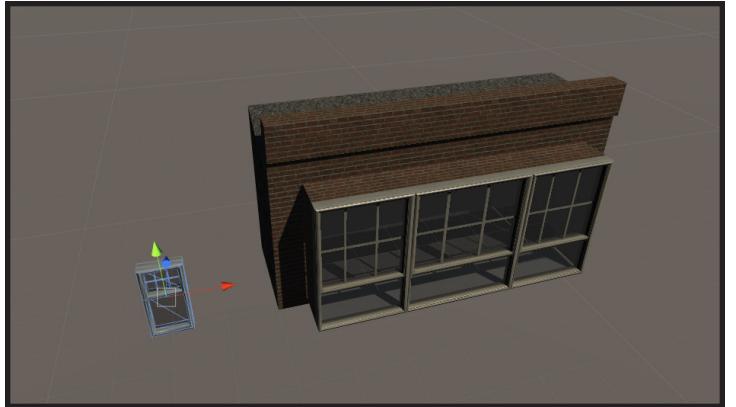


By changing the Width of Test Building or the Type of Window, you'll be able to have a preview of how the window will stretch based on your settings.

Clicking on Generate Test Windows will disable live view and show you a big building with all window types.



The windows can be quite flexible in how they are stretched. Here is another example of the same window stretched.



The non live version can be usefull to ensure that your window will fit in any space.



These windows were not stretched, and instead use the base window to fill the space. The cut applied would invert the windows mesh and make inside out windows, so it passes by this one.



Building Styles

Building styles allow two buildings with the same blueprint to look different upon generation.

They also allow two buildings with different blueprints to retain the same style for a consistent look.

These two buildings use the same blueprint, but use different styles.

The style tab allows you to edit a separate building style asset. These assets are shared across buildings and saved wherever you want. By default, they are in the BCAsset folder.

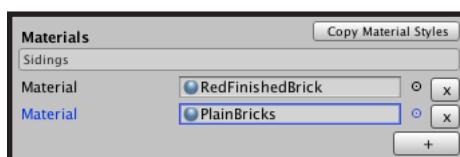
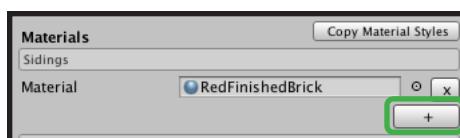
By changing this property, you will replace the Building Style of the building you currently have selected.

X removes the building style from the building selected.

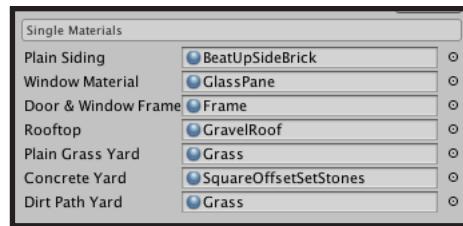
Adding a siding allows the building to have a randomly selected fancy face each generation of the building.

An unlimited amount of siding materials can be added to this place. The system uses Unity's Random function to select a style.

The same buildings as before, a single click has changed the front facade style of the building



All other materials used are present here. A building style may only have one of each of these.



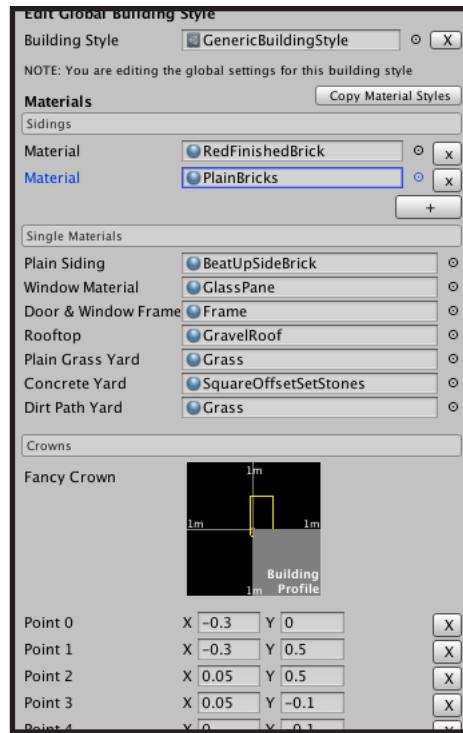
Crowns provide a visually pleasing edge to all roof tops. They are created by a list of Vector2s and extruded along the edge of the building roof.

The gray area is the building looking at it from the side in profile.

The yellow line represents the lines that will be extruded along the building roof edge.

The lip can be a maximum of 1m in all directions.

When generating the building, if the building lips look inside out, simply reverse them here.



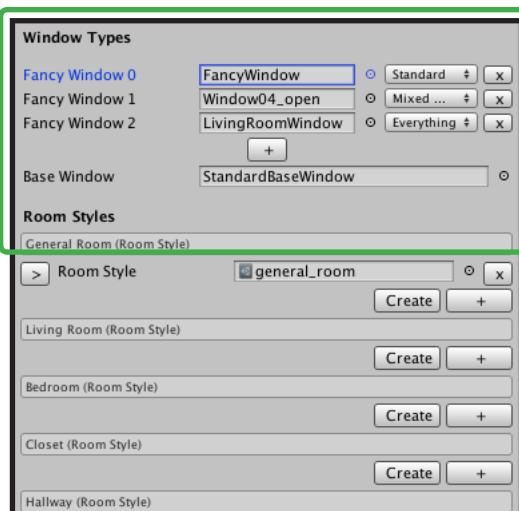
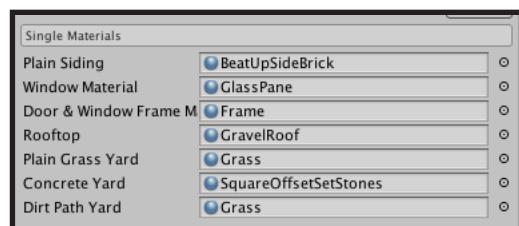
The building requires some prefab Game Objects when generating them. Outside doors will only appear on a wall to the outside.

The window pane shouldn't have a mesh.

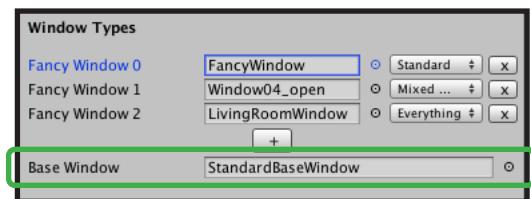
Since 0.8.0, buildings can now have stretched windows inserted automatically.

Windows are added in order. In this example, when a building is being generated, it will add FancyWindow to all Standard type window slots.

If the slot is not Standard, it will go to the next window (which is mixed) and if Window04_open doesn't fit, LivingRoomWindow will be placed.

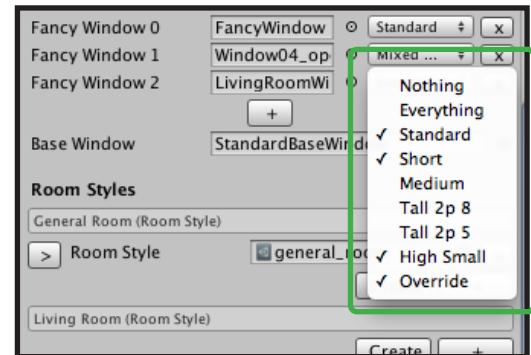


The Base Window is the simplest window for this building and must fit into a space of 30cm by 40cm. After all the windows above it have failed to fit in, this window will fit in.



The option for how a window will fill a space is a dropdown flag.

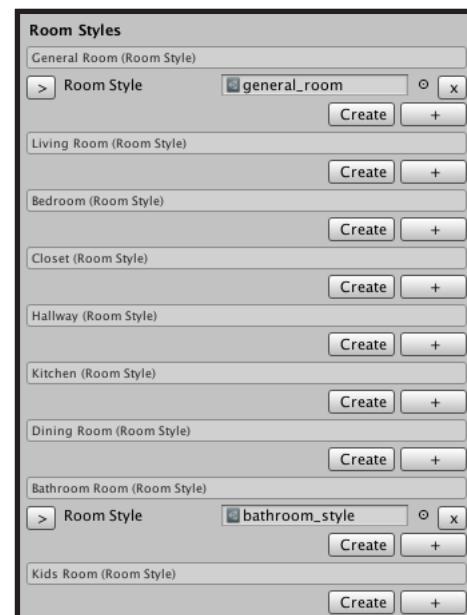
NOTE: If you set Fancy Window 0 to "Everything", any windows after will probably not appear in your building. Think of it like a favourite choice. 0 will always be had, but if it can't, 1 will be the next one. Etc.



Room styles dictate how a room will look upon being generated. A room style can be set from the gear property setter while editing each floor.

Rooms can also have multiple styles which are randomly selected by Unity's Random function.

By clicking on the arrow, you may edit an individual room style. These can also be edited directly from the asset file by selecting it in the project.



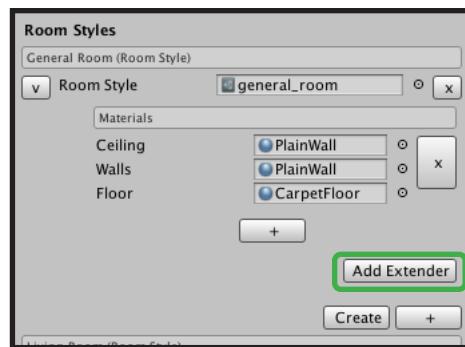
By clicking on the arrow, it shows the materials used for this room. You may add multiple materials that are randomly selected for this room upon generation.



Extenders are a special Unity Asset that allows you to add an action(s) after a room is generated.

An example extender and a template is included under the folder **BuildingExtensionsExample**.

This needs moderate scripting ability.



You are ready to build!



Thank you for reading this tutorial. If you have any questions, please contact me at buildingcrafter@8bitgoose.com. Have fun!