MAD City - Procedural City Generation

Introduction

The MAD City - Procedural City Generation tool is currently in early stages of development, the basis of the tool is to easily create full open world cities with tons of manageable variation.

Please remember this tool is in early stages and still growing, there are lots more updates planned and they will be added as soon as possible, i would love to hear your ideas on how to develop this tool and you can do so by joining the discord channel.

Generation

The generation is built on a grid system of city 'blocks'.

The blocks have been modelled by hand to allow control of the basic shape and building placement.

The blocks also contain '_building' objects which you can position where in the 'block' you would like to have a building.

The blocks contain scriptable objects which control the 'region' such as residential/ office/ industrial areas, these regions control the building created in that area.

The 'region' scriptable object holds building scriptable objects, these building scriptable objects hold the modules models that create the buildings based on the amount of floors and which module the building will consist of.

There are also 'Features' such as rivers and beaches that can be turned on and off to add more variety to the city.

Materials

All the materials in the project are customisable made in shadergraph for URP.

The Main Materials are built up of a single texture broken down into parts using UV Mapping, this reduces the number of textures and materials required for your project, making it much more lightweight.
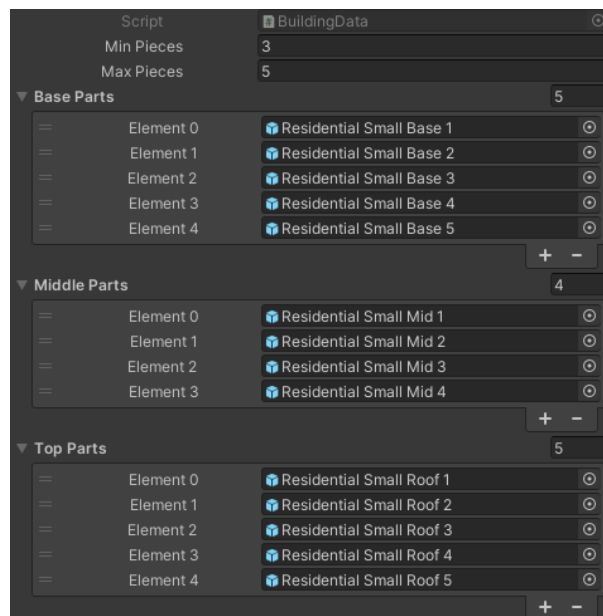
Data Objects

Data objects are at the core of the Mad City Generation.

Buildings

The Building data block holds all the prefabs for a required building, the buildings are made up by this information including how many floors a building can have.
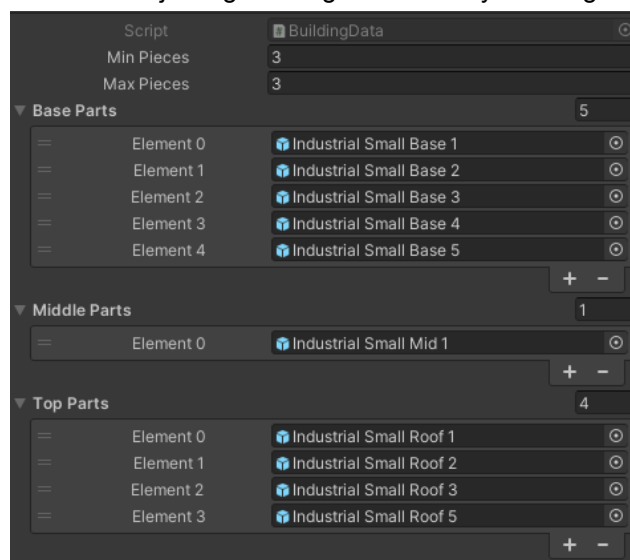
Example 1

In The Example project the residential buildings are completely random and will make a residential building that is between 3 and 5 stories tall.

|	Script	BuildingData	
	Min Pieces	3	
	Max Pieces	5	
▼ Base Parts			5
≡	Element 0	Residential Small Base 1	⊙
≡	Element 1	Residential Small Base 2	⊙
≡	Element 2	Residential Small Base 3	⊙
≡	Element 3	Residential Small Base 4	⊙
≡	Element 4	Residential Small Base 5	⊙
			+ −
▼ Middle Parts			4
≡	Element 0	Residential Small Mid 1	⊙
≡	Element 1	Residential Small Mid 2	⊙
≡	Element 2	Residential Small Mid 3	⊙
≡	Element 3	Residential Small Mid 4	⊙
			+ −
▼ Top Parts			5
≡	Element 0	Residential Small Roof 1	⊙
≡	Element 1	Residential Small Roof 2	⊙
≡	Element 2	Residential Small Roof 3	⊙
≡	Element 3	Residential Small Roof 4	⊙
≡	Element 4	Residential Small Roof 5	⊙
			+ −

Example 2

In The Example project the industrial buildings are all the same height with 1 model for the middle parts, this gives the effect that the adjoining buildings are actually one large building.

	Script	BuildingData	
	Min Pieces	3	
	Max Pieces	3	
▼ Base Parts			5
≡	Element 0	Industrial Small Base 1	⊙
≡	Element 1	Industrial Small Base 2	⊙
≡	Element 2	Industrial Small Base 3	⊙
≡	Element 3	Industrial Small Base 4	⊙
≡	Element 4	Industrial Small Base 5	⊙
			+ −
▼ Middle Parts			1
≡	Element 0	Industrial Small Mid 1	⊙
			+ −
▼ Top Parts			4
≡	Element 0	Industrial Small Roof 1	⊙
≡	Element 1	Industrial Small Roof 2	⊙
≡	Element 2	Industrial Small Roof 3	⊙
≡	Element 3	Industrial Small Roof 5	⊙
			+ −

Example 3

In The Example project the Office buildings are made up of a few different data blocks with very few prefabs because some office building models are supposed to be glass while others are brick, if we allowed this to be random it would look silly. However in some cases there are multiple possibilities for the roof to be different.
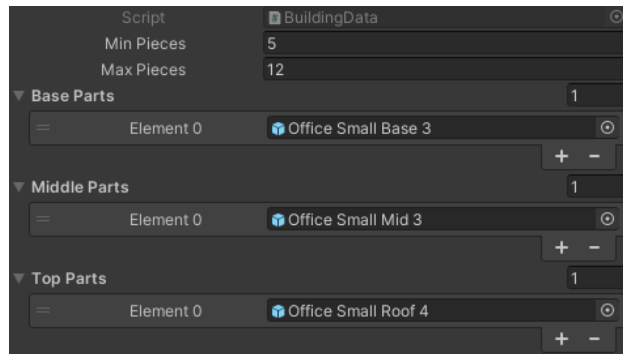
Using different data blocks in different ways like this is what adds a more random yet controlled look to your city.

Colour Palettes

Colour Palettes are a simple set of colours that the regions data blocks will use to add variety to your buildings, the pallets below is how the residential buildings are coloured.

For more variation add more colours, for less remove some, if you want your city to be more cartoony pick some brighter colours.

Regions

Each block is designated a region that is placed inside the City Generator prefab.
Name: the name for your region type.
Blocks: which city block prefabs will be created for this type of region.
Small Buildings: The building data blocks that will be used in this area.
Large Buildings: coming soon…
Points of interest: coming soon…
Building colours: the colour palette used for the buildings in this area.
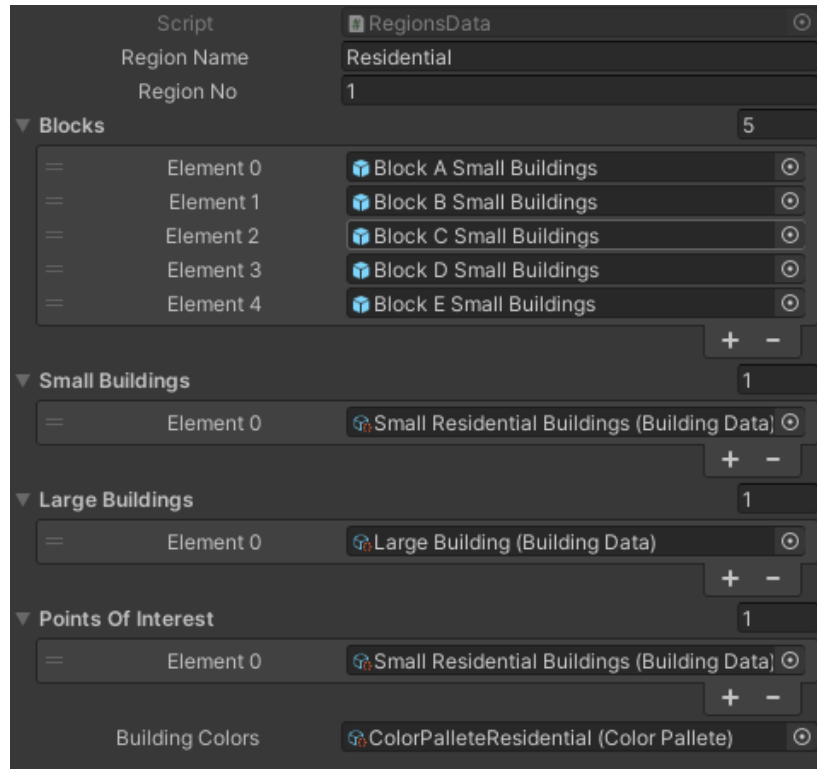
Using the MAD City Generator Prefab

1. Open an empty scene
2. Top toolbar goto Tools/ MADCity/MAD City Generator
3. Click on the City Gen prefab that is now in your scene and modify the following properties in the inspector according to the city you want to build.

City Grids

The first thing to establish is the size and basic shape of your city, this can be changed at any point.

- GridX & GridZ is how many city blocks you want to have in either direction.
- Grid offset should be left at 80 if using the MadCity prefabs, if you are creating your own blocks then this can be made to whatever size you require.
  (each of the MadCity city blocks is 80m wide)
- Grid Origin is the centre of the first city block.

City Features

The city features section allows you to add or remove features to your city, each of these enables more details for additional customisation if required.
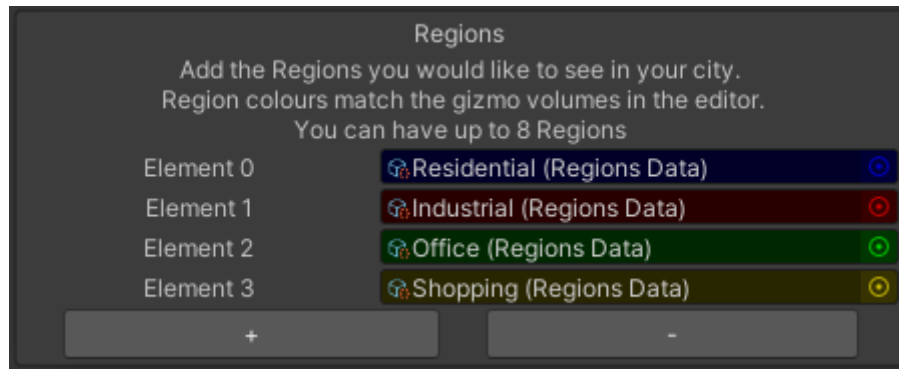
Regions

Regions are the areas that your city is broken down into, these areas are represented by a matching colour box gizmo. (Visible when you enable gizmos [icon] ▼)

You can have the same region more than once to multiply the probability of a certain type of region. Currently you can have upto 8 regions.
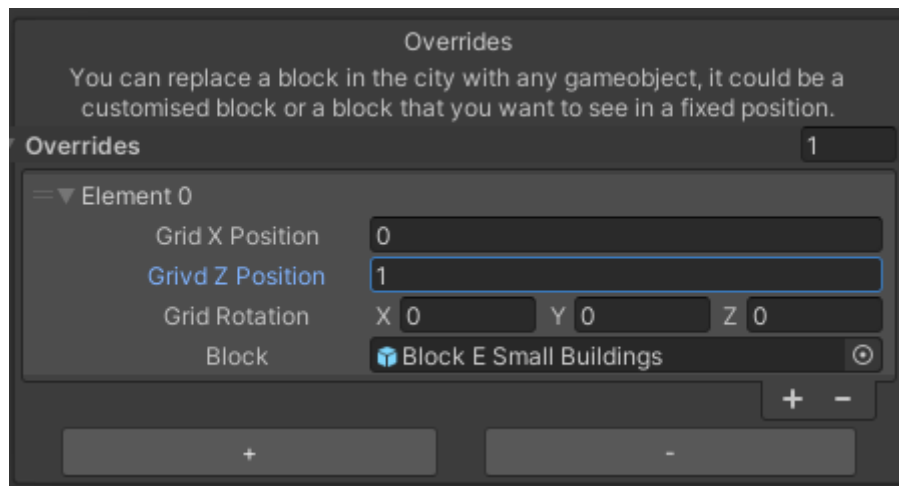See Region Data Blocks for more info about editing Regions.
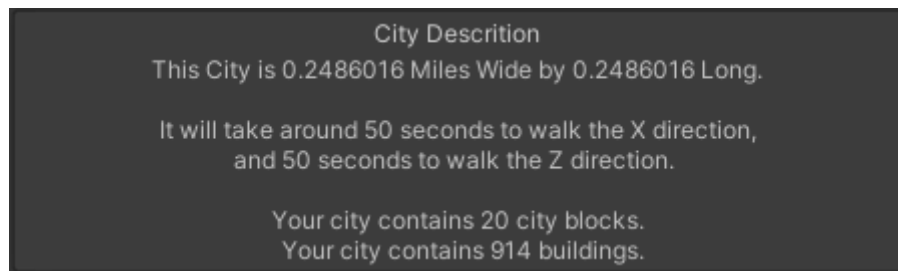

Overrides

Overrides is a way of having a certain block (or any game object) always generated in 1 place overwriting the block that is currently in that position.
This could be a city feature or a block you have customise especially for a certain area.

City Description

The city description area shows you some base information about your block.

City Descrition
This City is 0.2486016 Miles Wide by 0.2486016 Long.

It will take around 50 seconds to walk the X direction,
and 50 seconds to walk the Z direction.

Your city contains 20 city blocks.
Your city contains 914 buildings.

Generation Buttons

- Generate Your City - This creates a full city based on your input data above.
- Generate Random City - Generates a completely random City.
- Generate City Blocks - Generates the city without the buildings.
- Generate Buildings - Re-generates the buildings while maintaining the current block layout.
- Clear Blocks - Clears only the city blocks leaving the buildings.
- Clear Buildings - Removes the buildings.
- Clear Perimeter - Removes the city perimeter objects.

Generate City
Generate Your City
Generate Random City

Generate City Parts
Generate City Blocks
Generate Buildings

Remove
Clear Blocks
ClearBuildings
ClearPerimeter
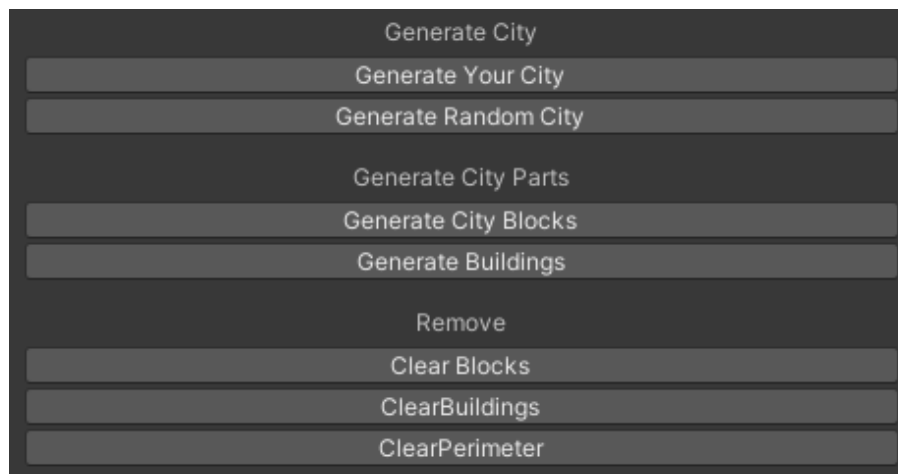
Technical Details

Model Details:

Model polygon count: 34,900
Current Number of meshes: 211 Meshes

Estimated breakdown

Building Module Models:100
Props:20
City Structure:10

All UV mapped

Custom Materials/Shaders (currently URP only):

MAD Perimeter Material-
MAD Glass Material- Basic Glass Material
MAD Leaves Material - Transparent Material for leaves on trees and bushes
MAD Building Material - Material for all parts of the buildings
MAD Module Material- Material for Features such as beach
MAD Props Material - Material For Props
MAD Ocean Floor - Basic Material
MAD Ocean Material- Editable Ocean Material (refraction/ waves/ foam/ speed)
MAD Road Variations - Multiple procedural road materials
MAD Sidewalk Material- basic materials
MAD Wire Fence - Editable transparent Wire material for fences

Custom Scripts:

Data objects for scripts
_block
_building
_indicator
_poi
_buildingLarge

Scriptable Objects
Building Data
Colour Palette
RegionsData

Main Generation Script
City Gen

Current Restrictions:

Custom Shaders (URP)

FAQ

An ever expanding list of frequently asked questions, submit any other questions on the discord page.

Can I add my own building?

Yes,
Import models from modelling software/ package
Right click create / building

If building has multiple floors add each type to the scriptable object

If it is a single model set the min and max pieces both to 1

Drag that model into the corresponding region data block, make sure this region is being used by the MAD City Gen.

Or test the building in the building model test scene

Can I make my own Blocks?

Yes,

Copy a prefab from the Prefabs/ City Blocks / Empty Blocks folder and customise it however you would like, alternatively create your own block completely but remember to stay to the grid size you have designated.

Can I edit a block?

Yes,

Blocks are just made of prefabs and these can be edited whichever way you would like.