

Evolving Worlds from the Crumbling Chaos

The Art Led Approach of Darkest Dungeon 2's
Procedural Generation System



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Presentation Overview

- Darkest Dungeon 2's Art Direction
- DD2's unique Environmental Procedural Generation
- Artist Tools
- Artist / Programmer Relationship



Roadtrip through the apocalypse



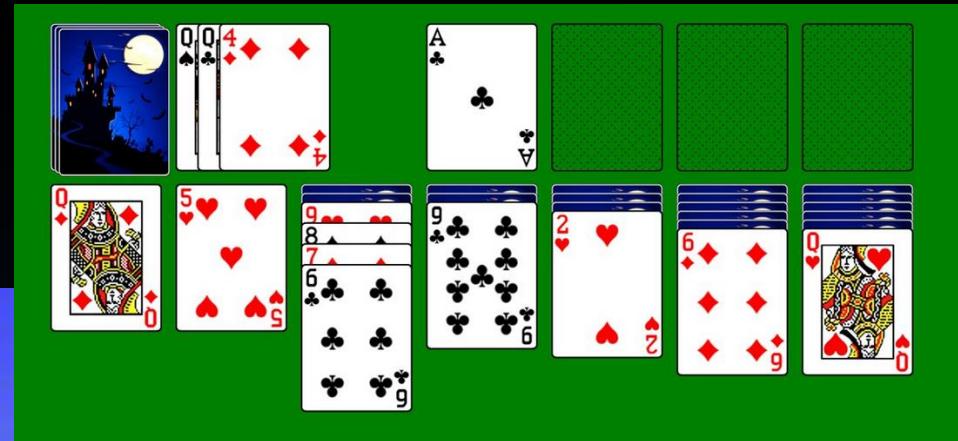
Iconic strategic combat



Managing relationships

Procedural Generation Systems in Games

- Systemic Randomization
- Different Experience every time



Procedural Generation Systems in Games

- Typically Tech-led
- Visuals are secondary
- System bleeds through



What makes DD2's Proc Gen different?



It's all about the ART!

Darkest Dungeon's Art Direction

- Hard-lined pooling
black shadows
- Solid black silhouette
outline
- Painterly colors
secondary



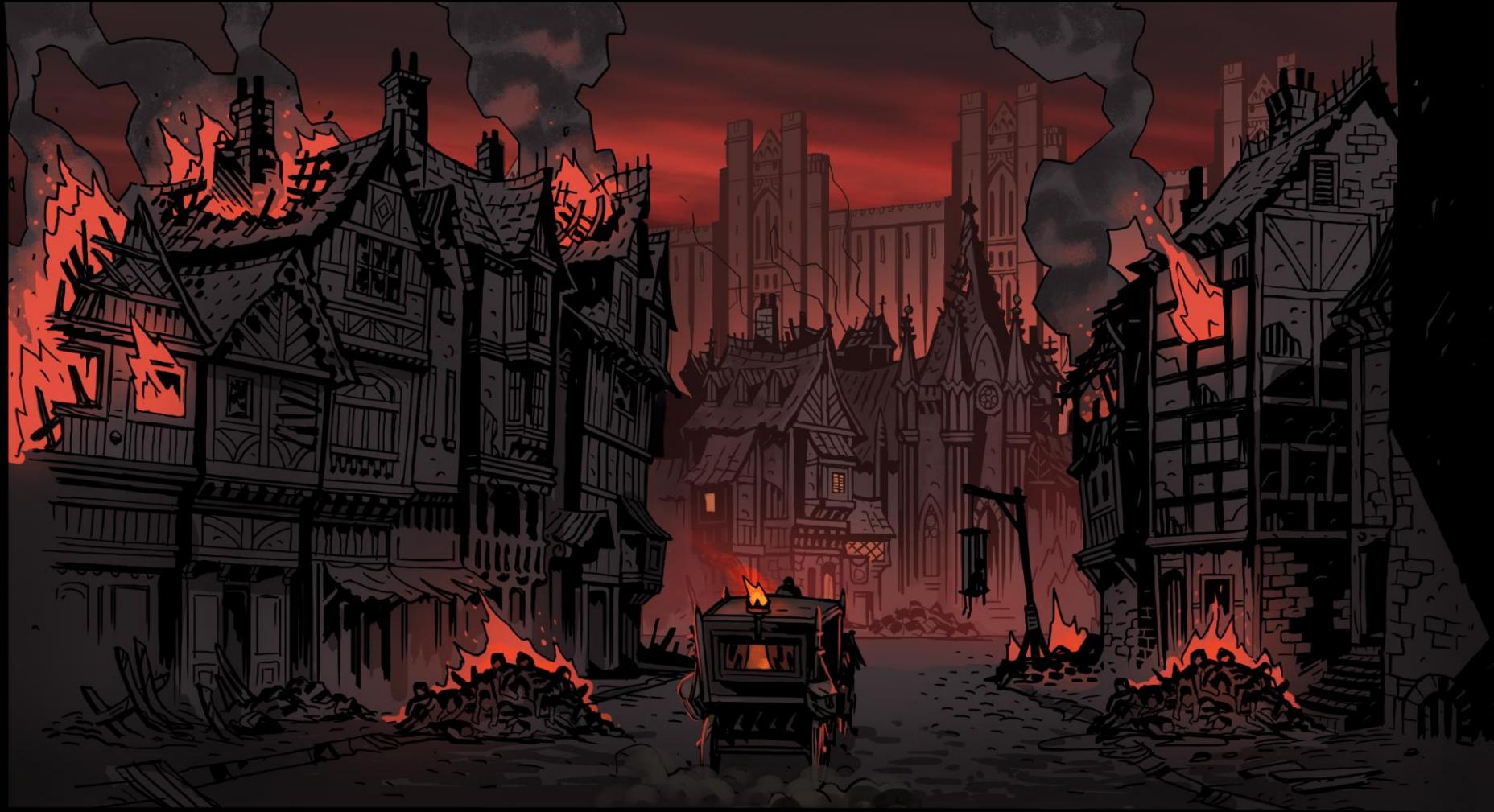
0% of rooms.

Darkest Dungeon™

1TM

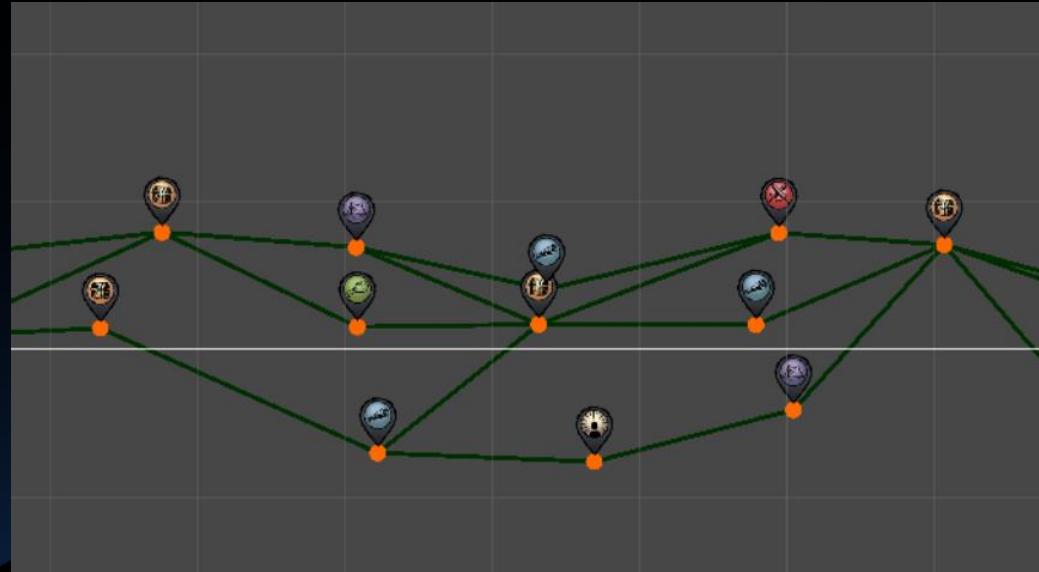


Darkest Dungeon's Art Direction



Concept by Chris Bourassa, Creative Director

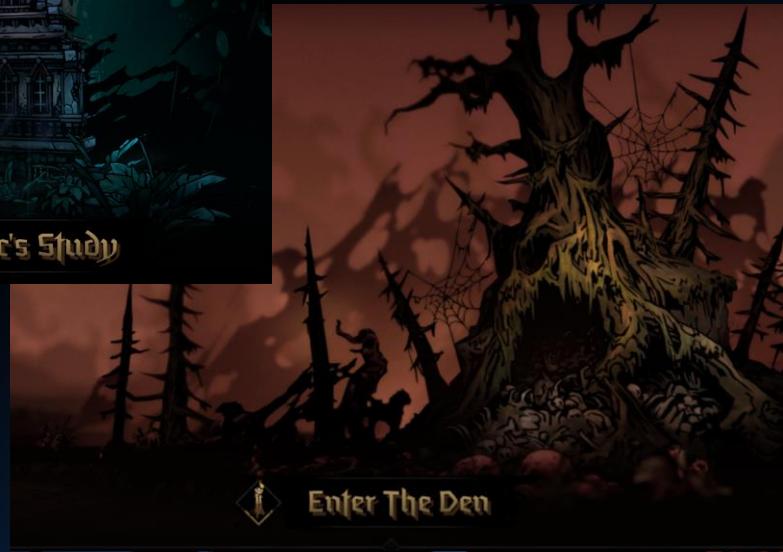
DD2's Proc Gen System Goals



How do we merge these?

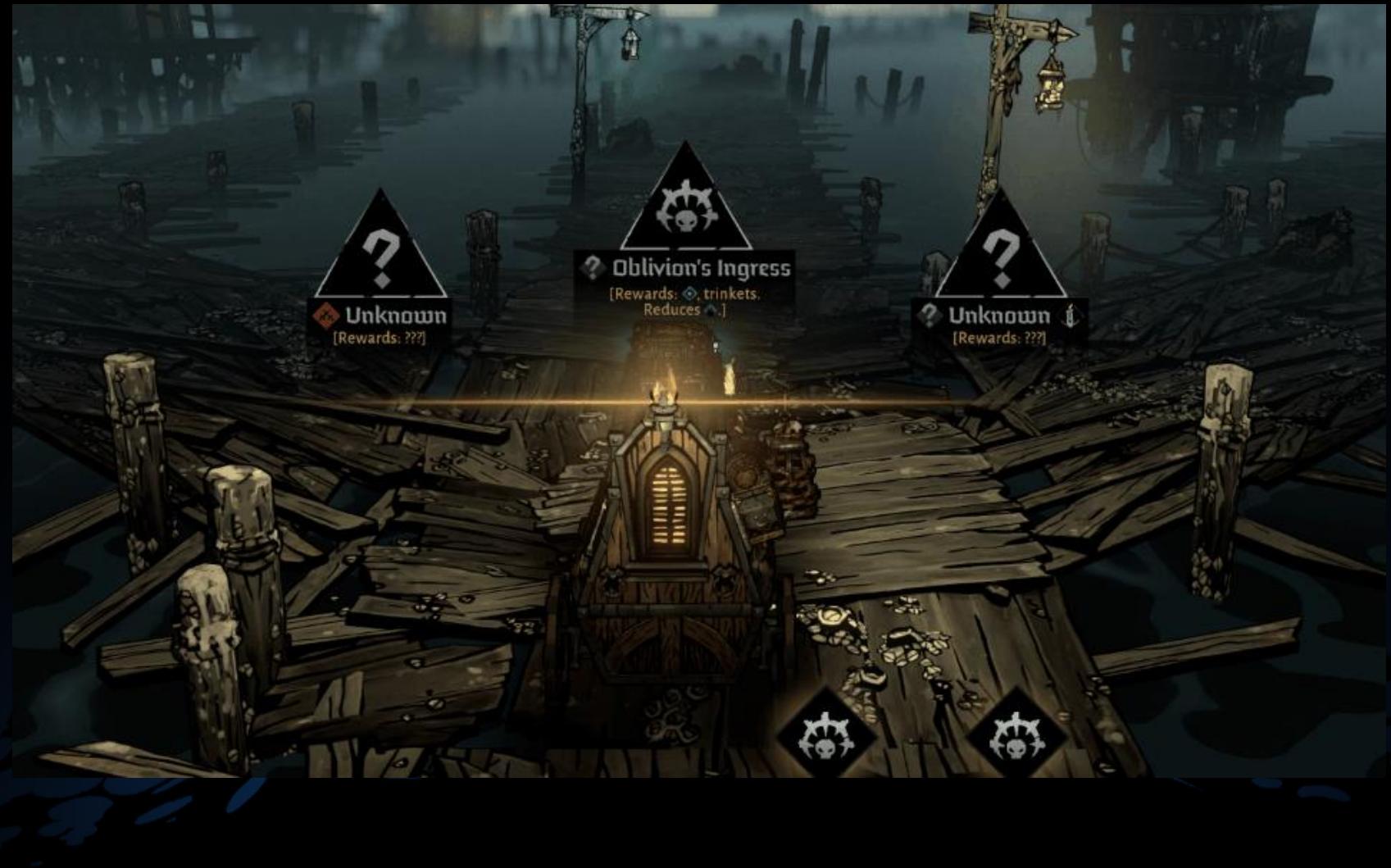
DD2's Proc Gen System Goals

- Interconnected Nodes
- Choices are meaningful



DD2's Proc Gen System Goals

- Fully traversable map
- Player's choices are clear



DD2's Proc Gen System Goals

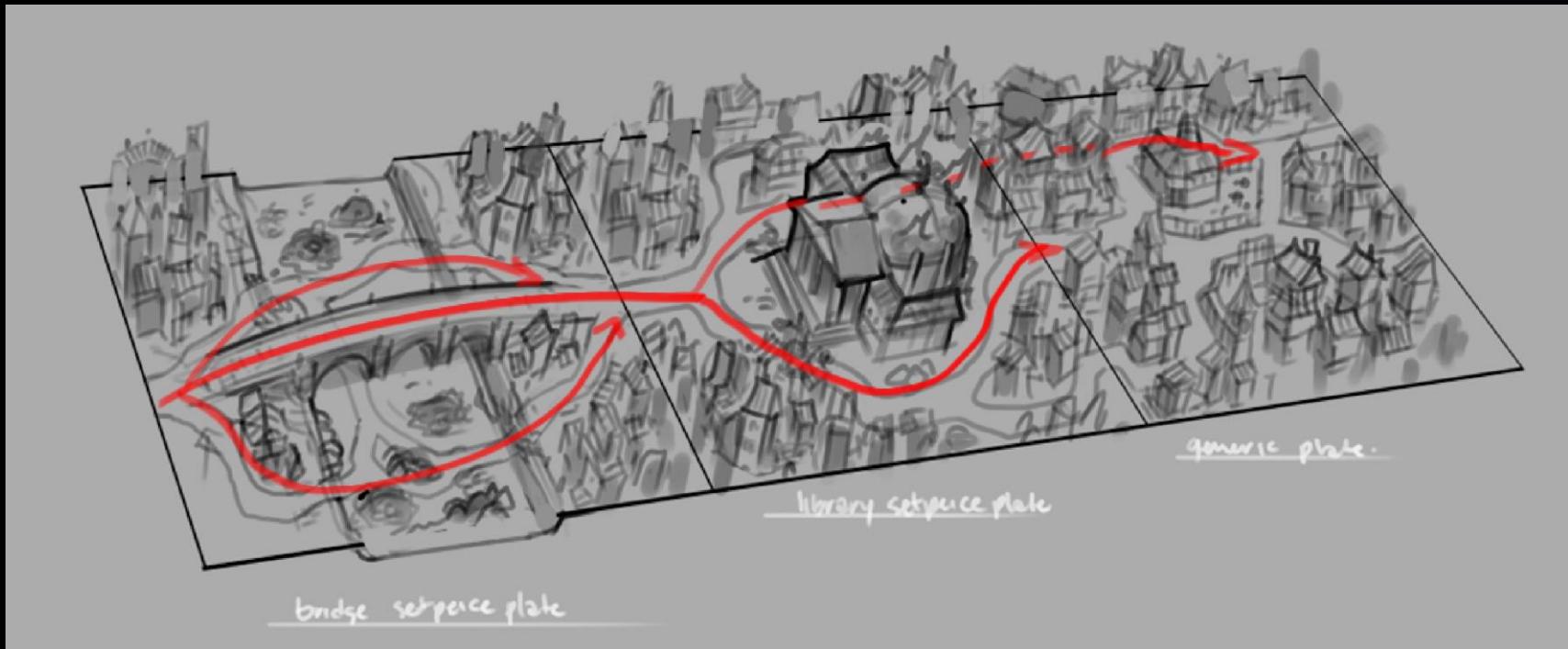


- Each biome should feel unique



Maintain Darkest Dungeon's art direction

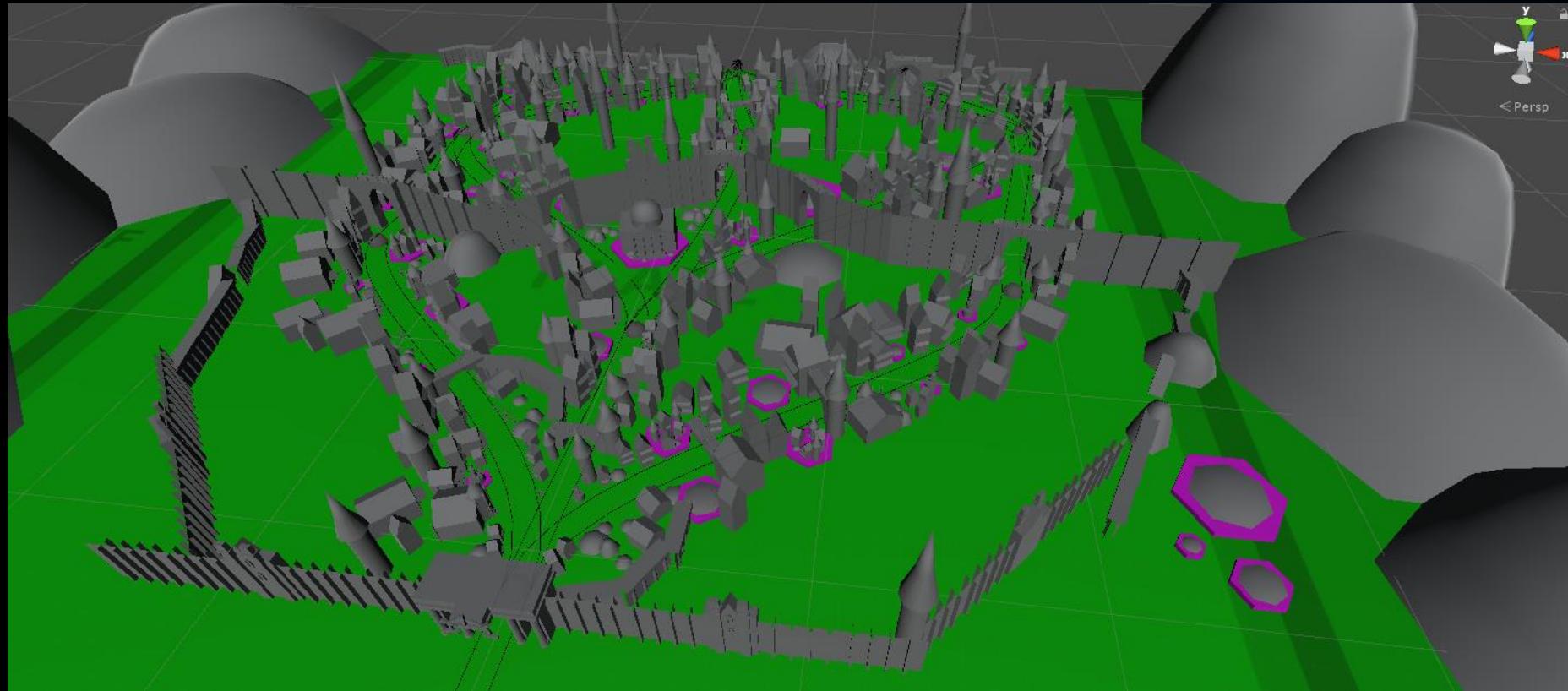
How do we make this happen?



- Hard task
- Many different approaches

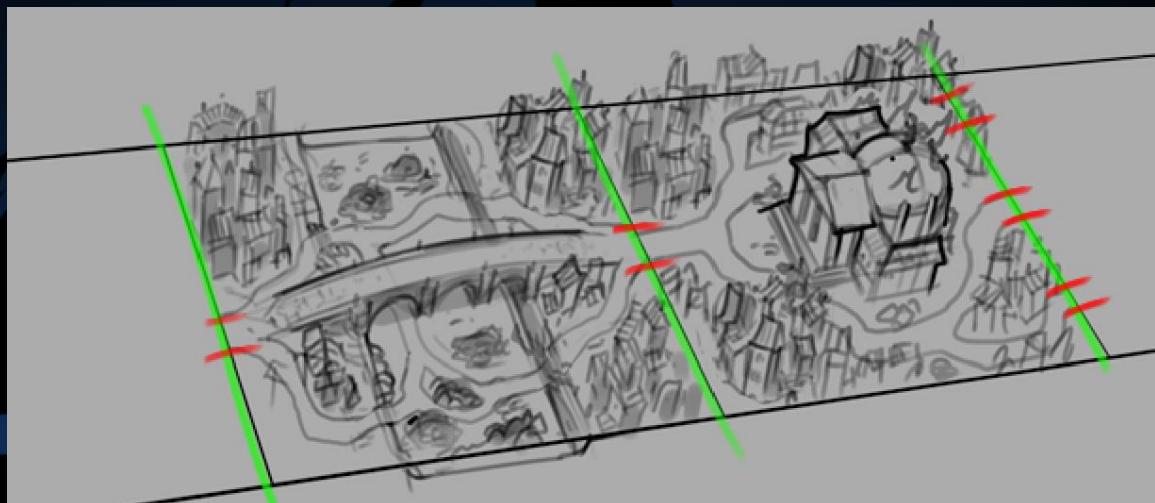
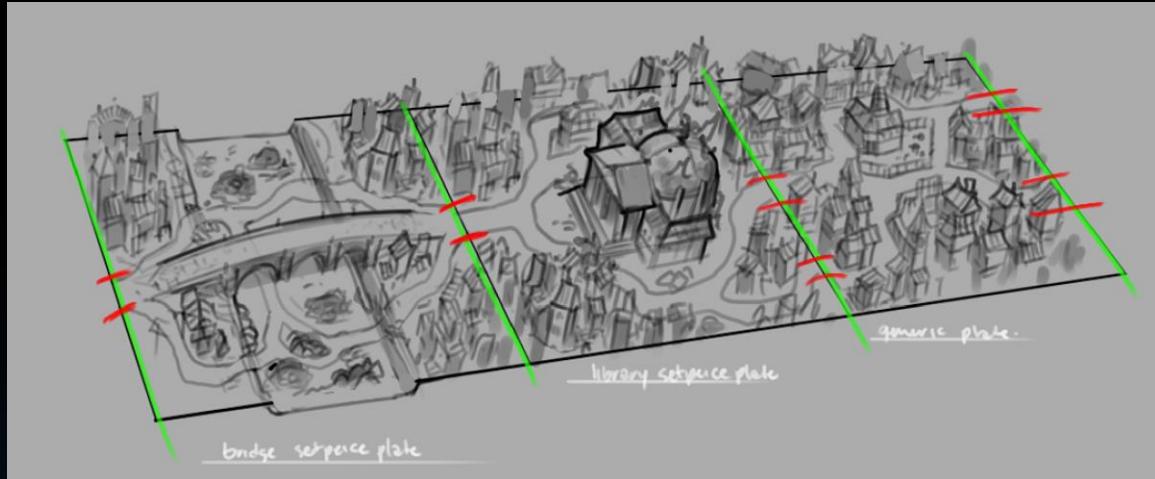
Sequential Plates System

- First iteration of DD2's proc gen
- One large plate generated one after another

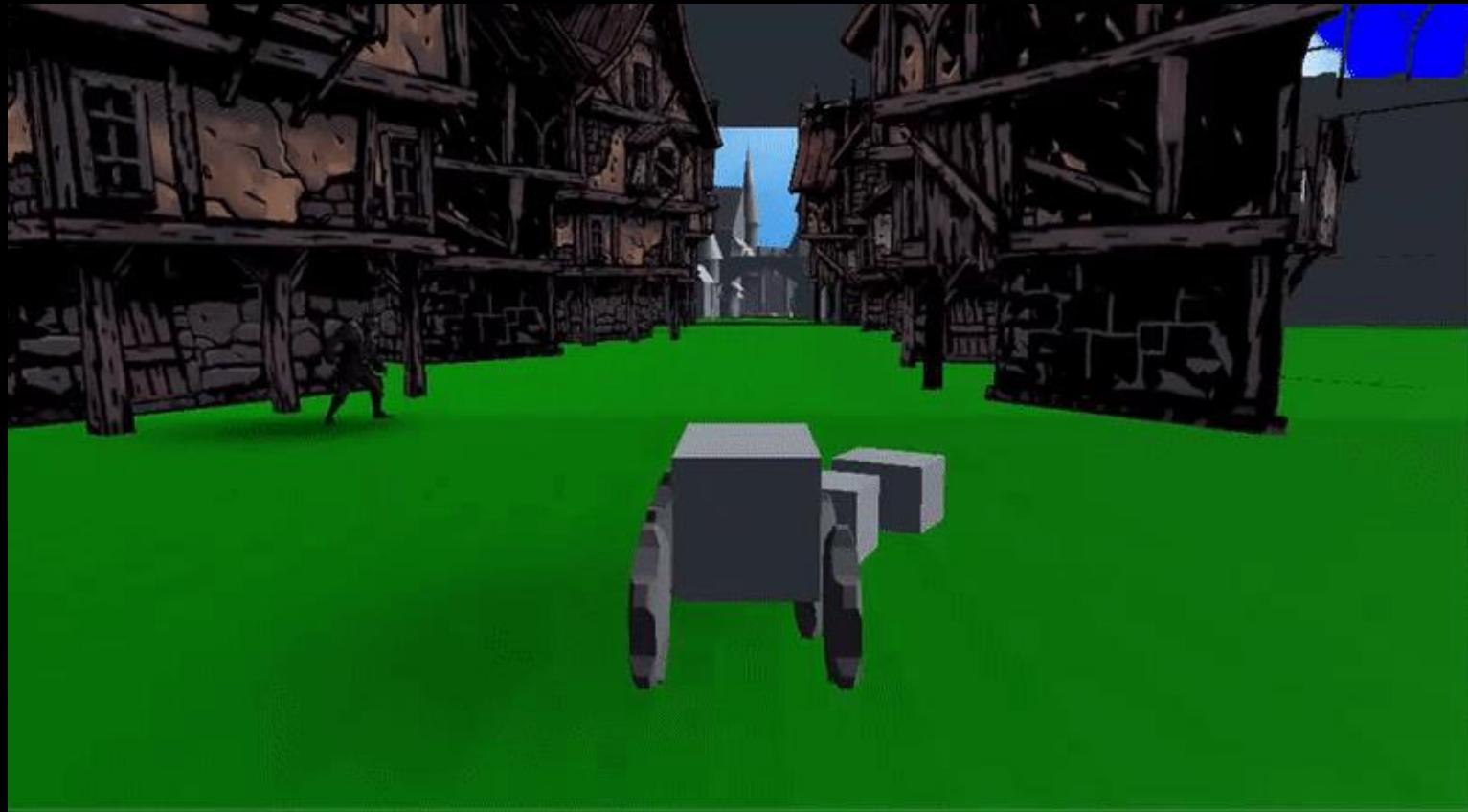


Sequential Plates System

- Standardized “entrances” & “exits”
- Defined number of roads per edge



Sequential Plates System

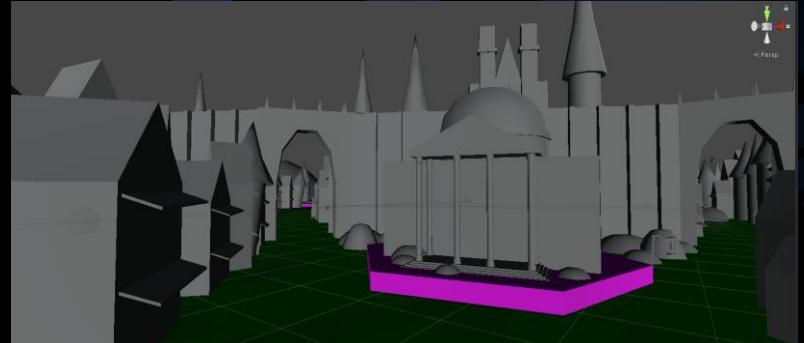
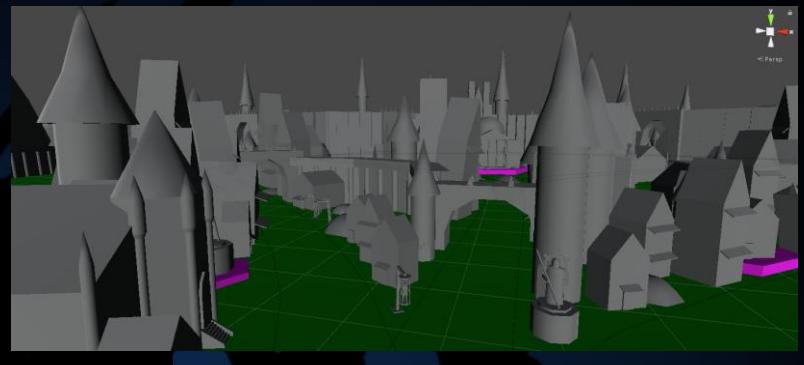


Met technical goals

Sequential Plates System

Why it sucked!

- Art authorship fine too high
- Created prior to Marielle's involvement
- Extremely repetitive visually – this is roguelike, you'll be seeing things a lot
- Did not execute on art direction's vision



Time to change directions

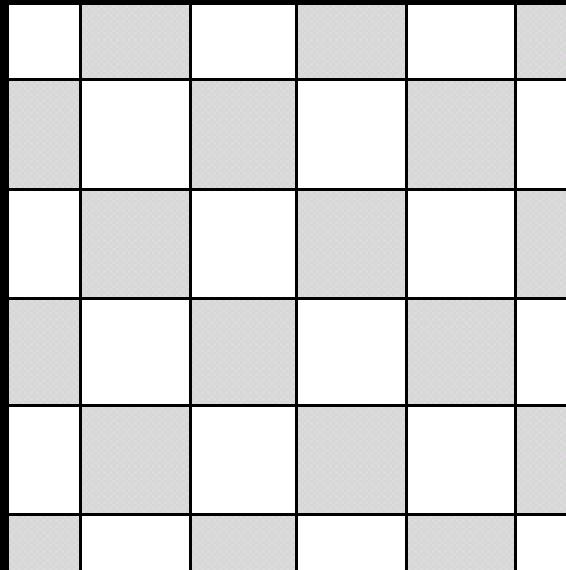


Art bears too much of the load

Pivot to a “grid” system

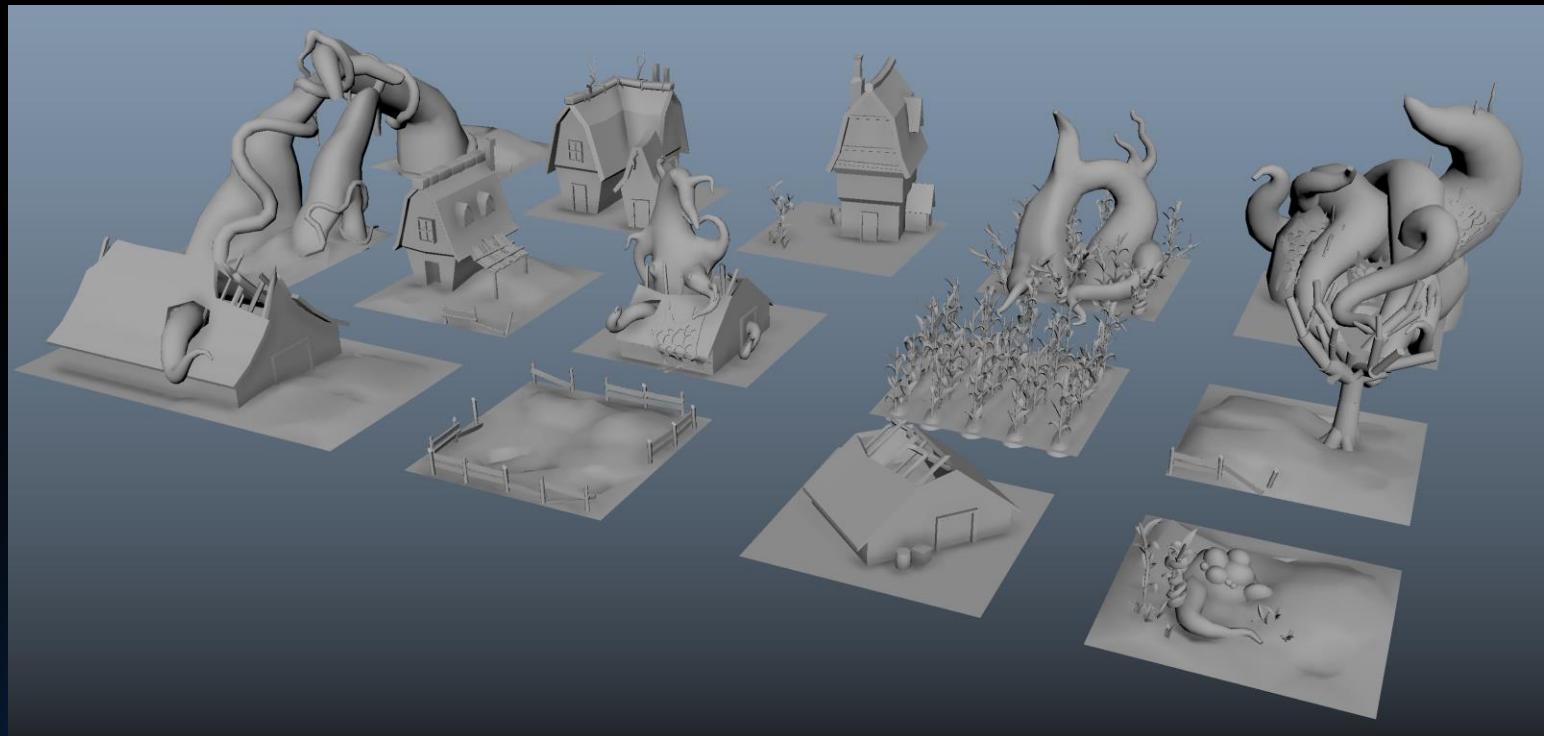
- Procedural generation takes on level design

Can this serve art direction?

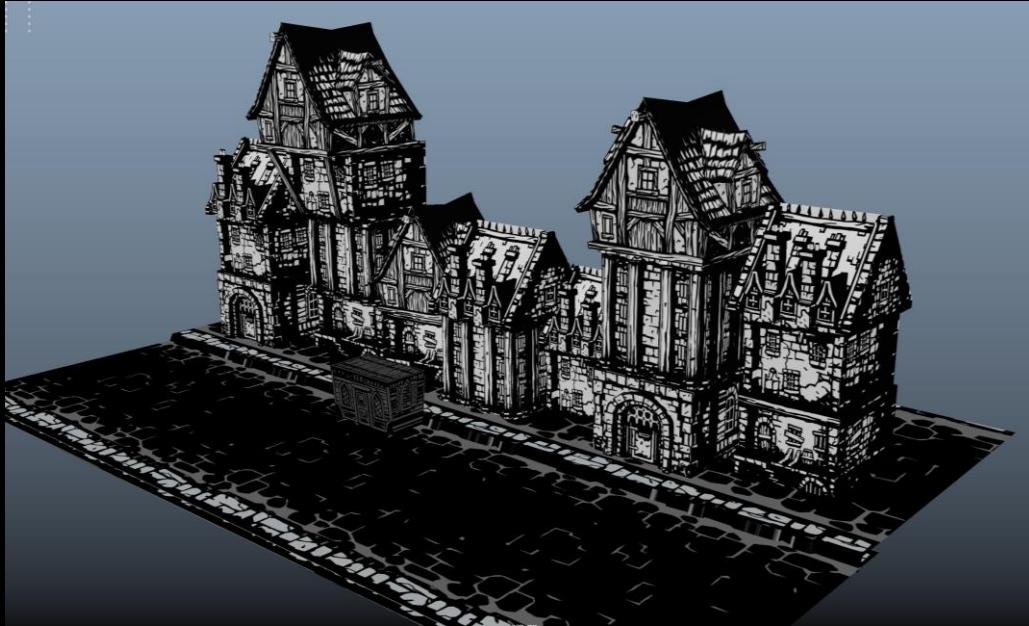


Smaller unit size

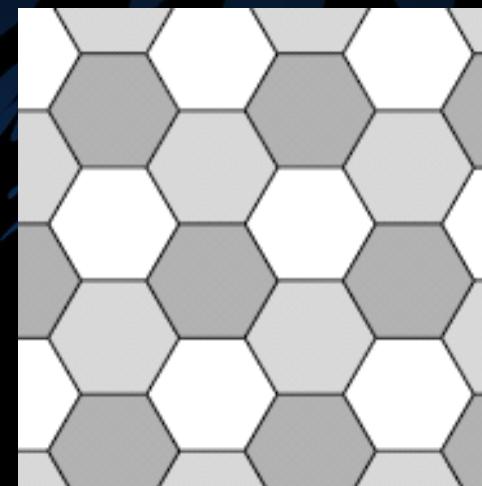
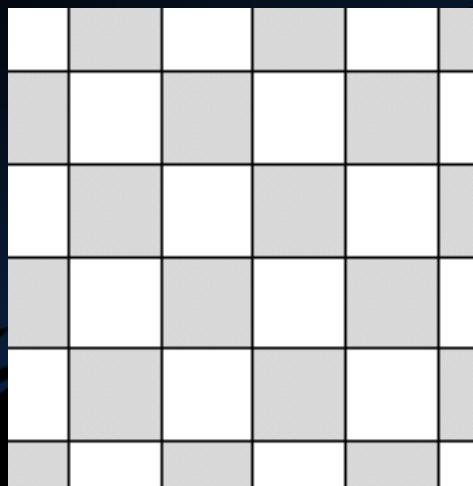
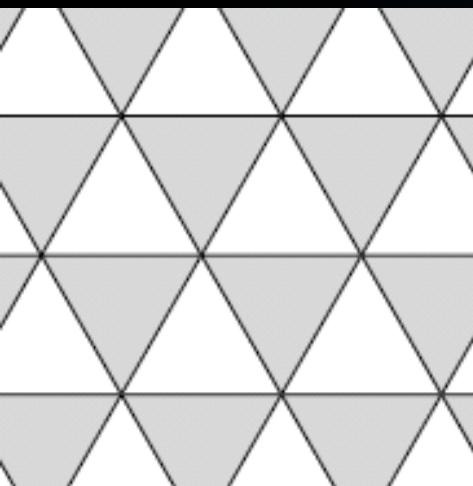
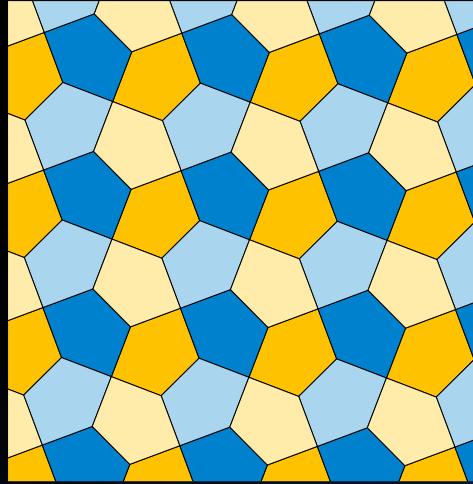
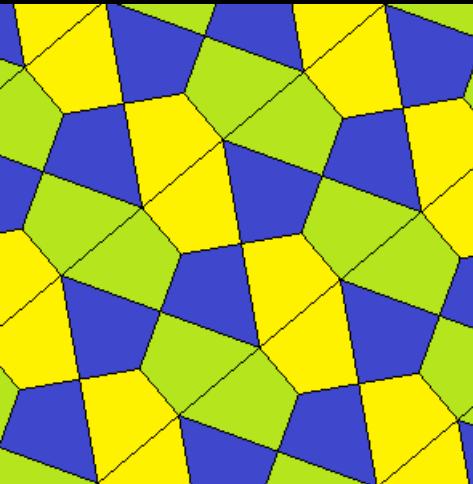
- **Bite sized authoring**
- **Modular, reuseable**
- **Easier to see progress**



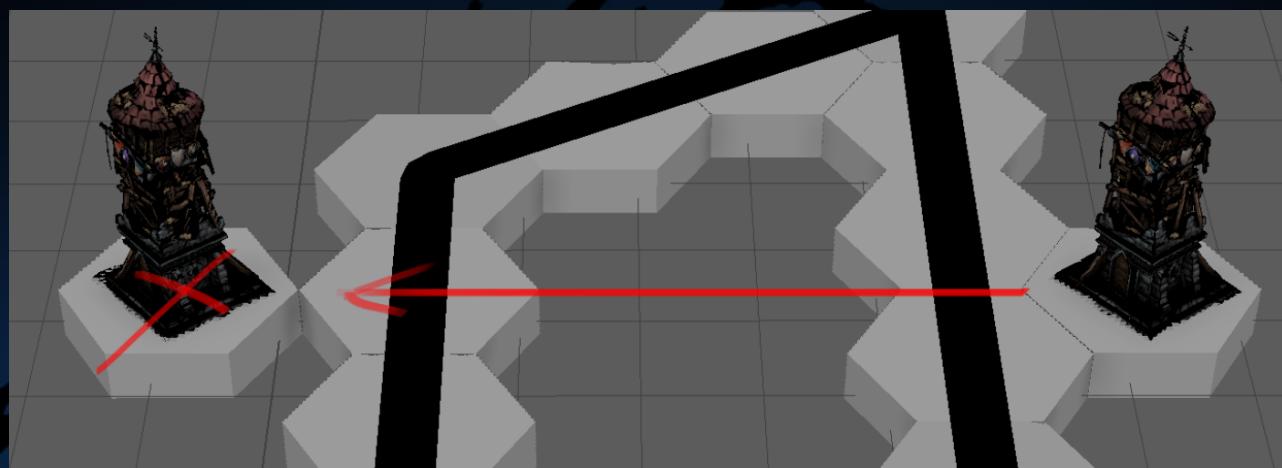
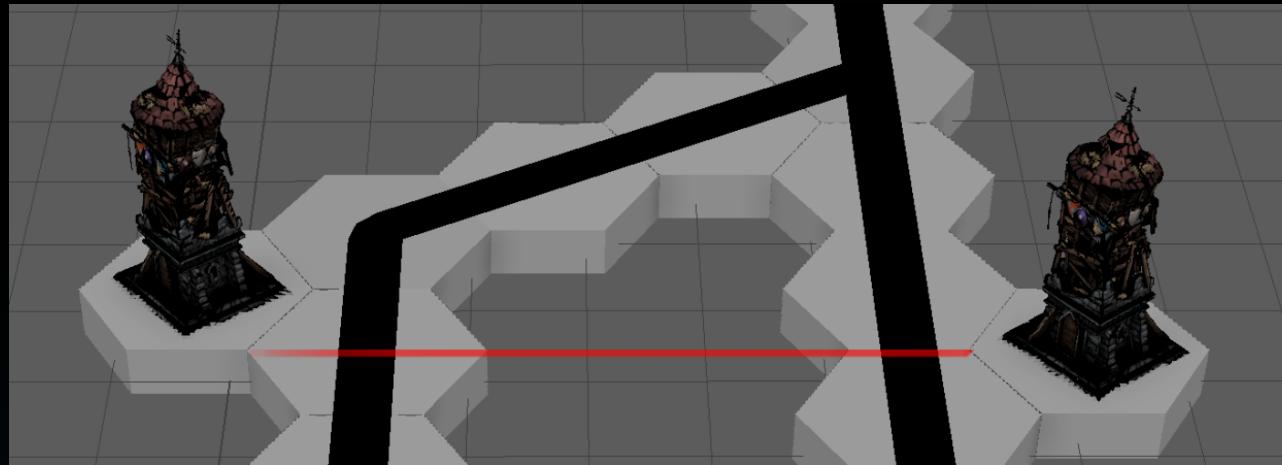
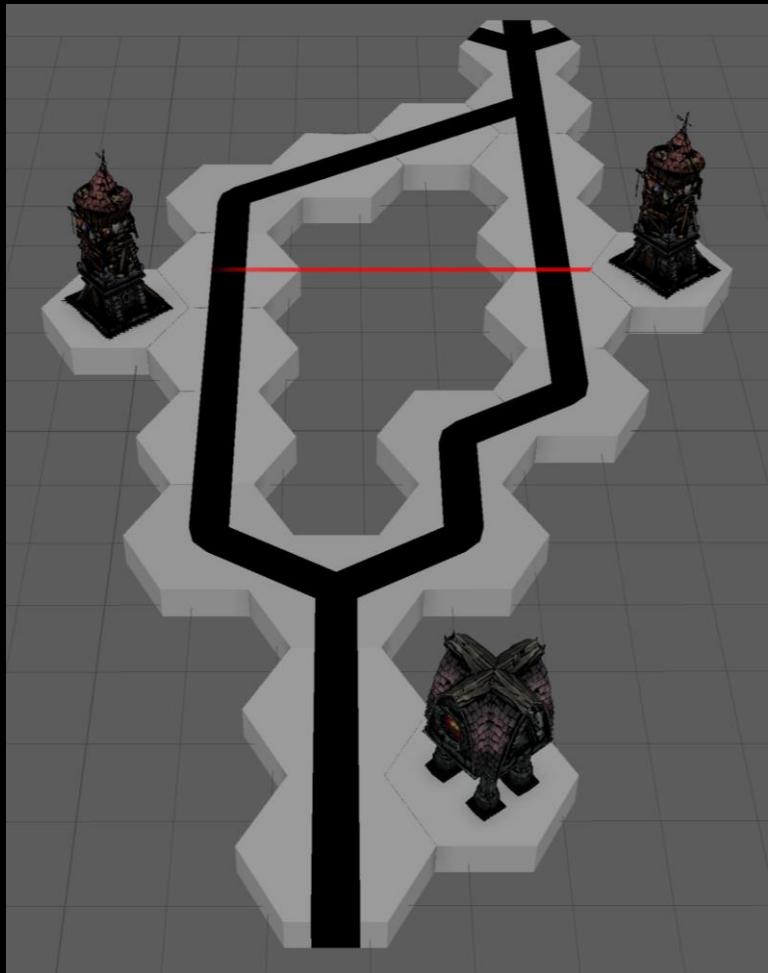
Smaller unit size



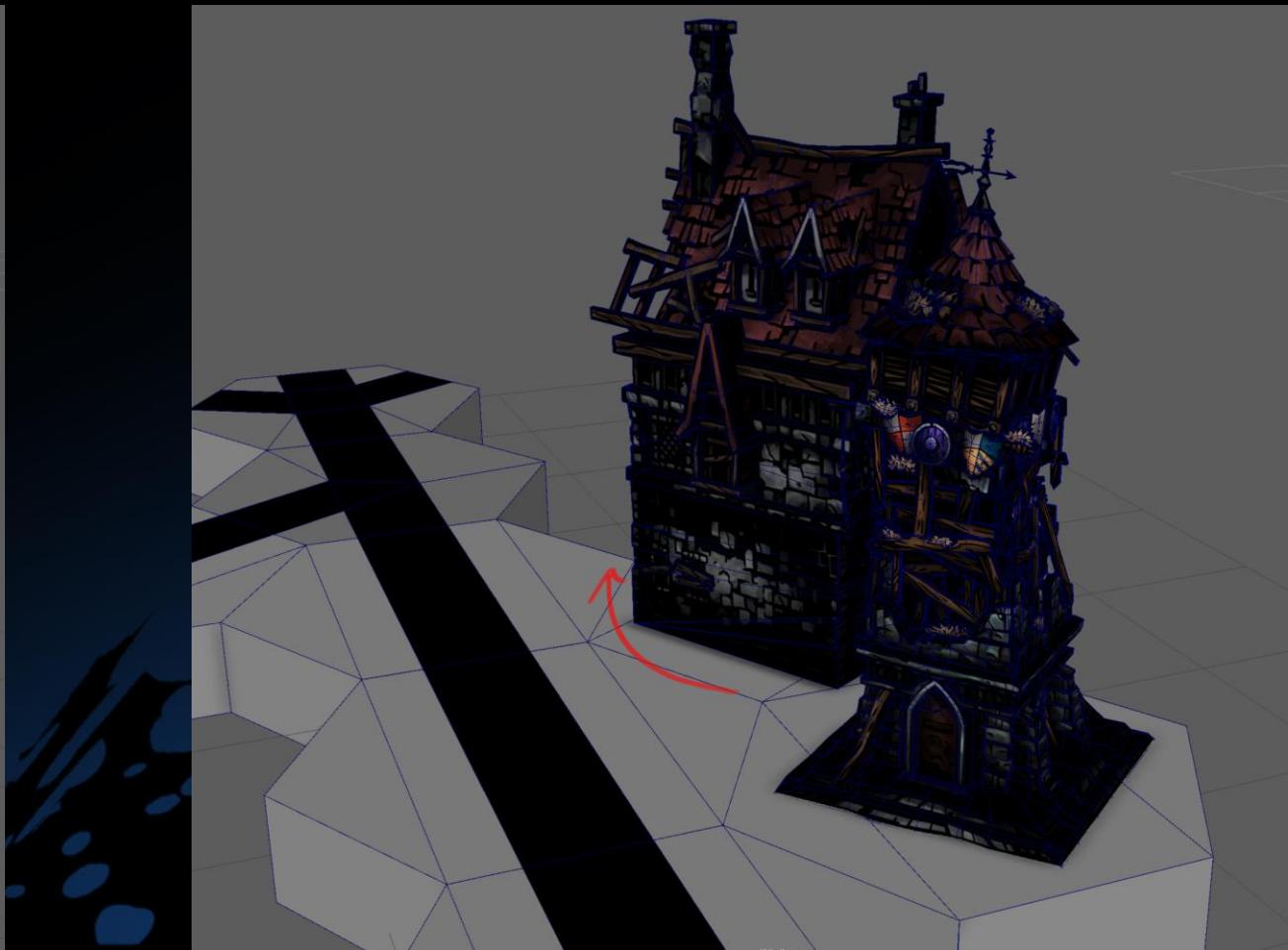
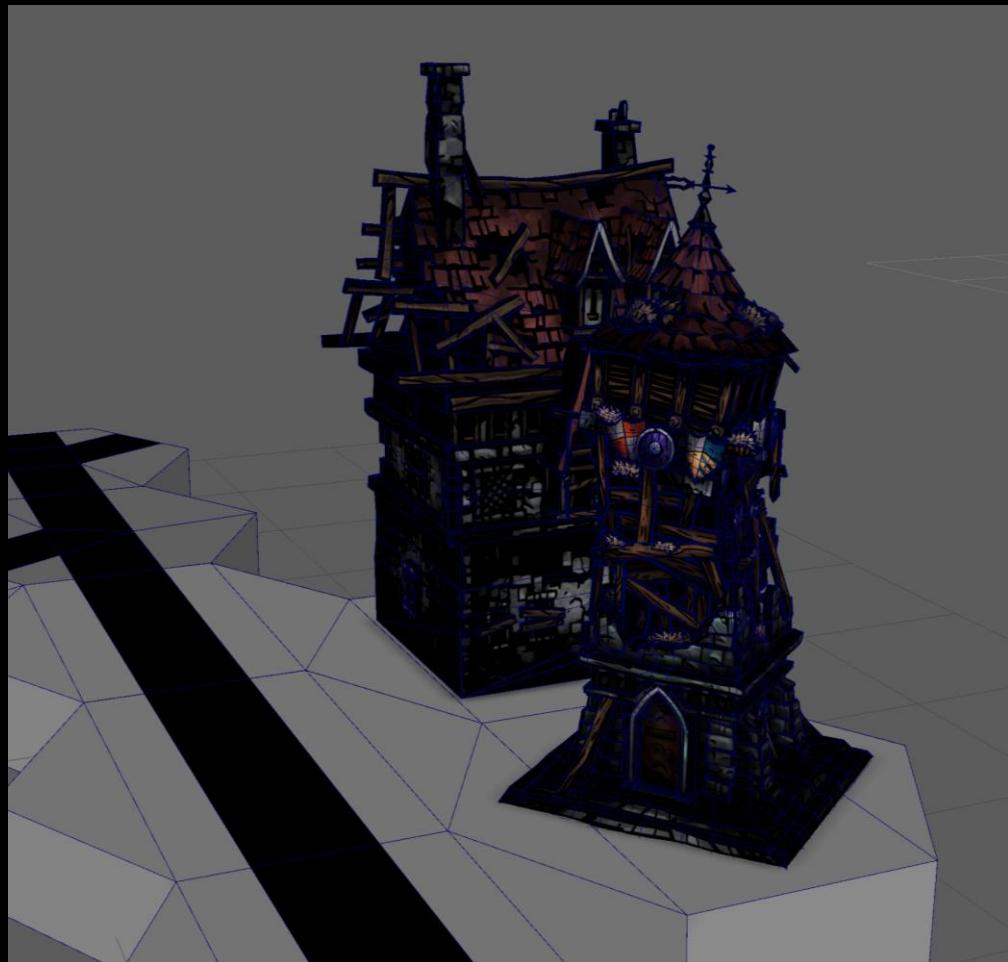
What type of grid?



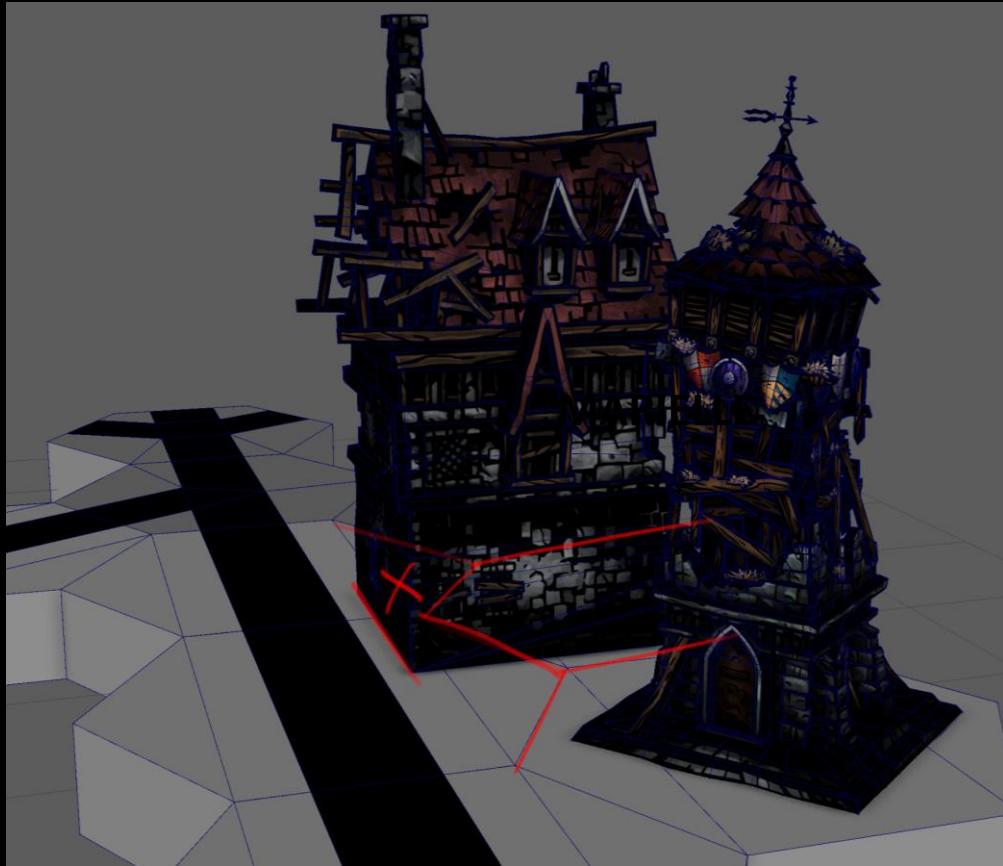
Experiments with Hexagon shape



Experiments with Hexagon shape



Experiments with Hexagon shape



Ultimately does not serve art direction

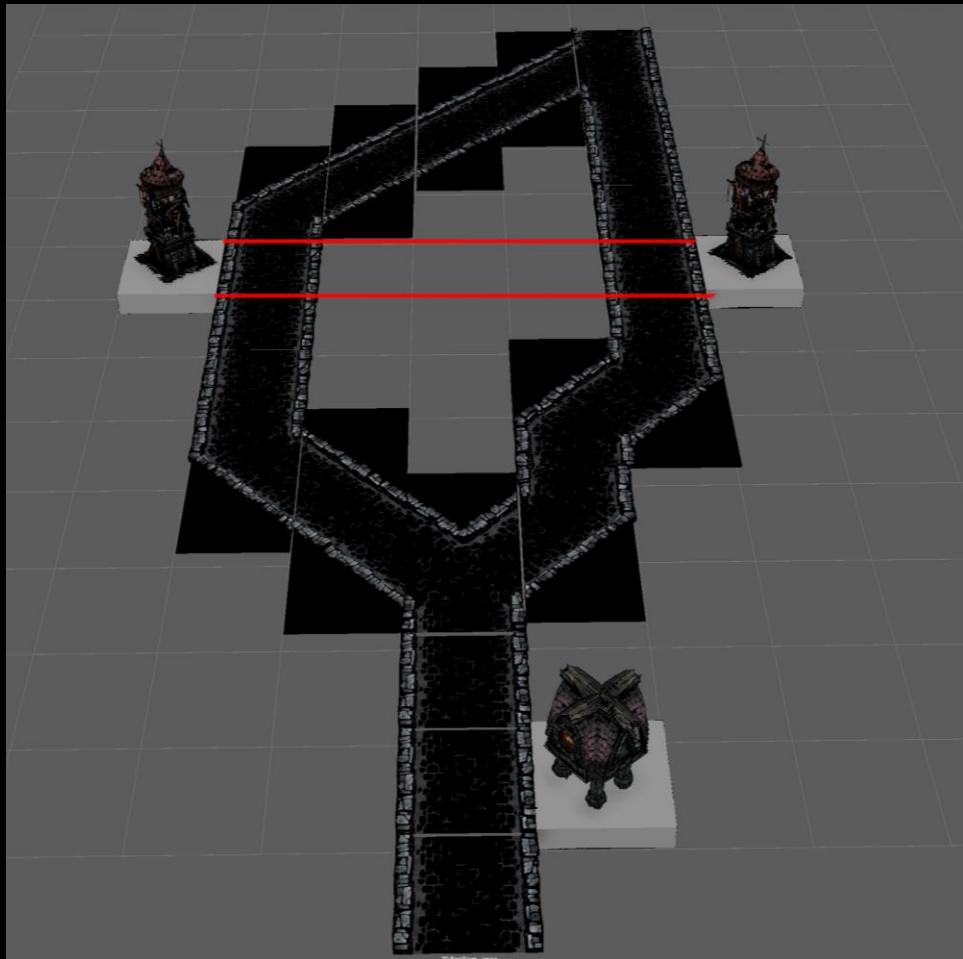
Square shaped grid



Target concept by Trudi Castle

Can a square grid help us build this??

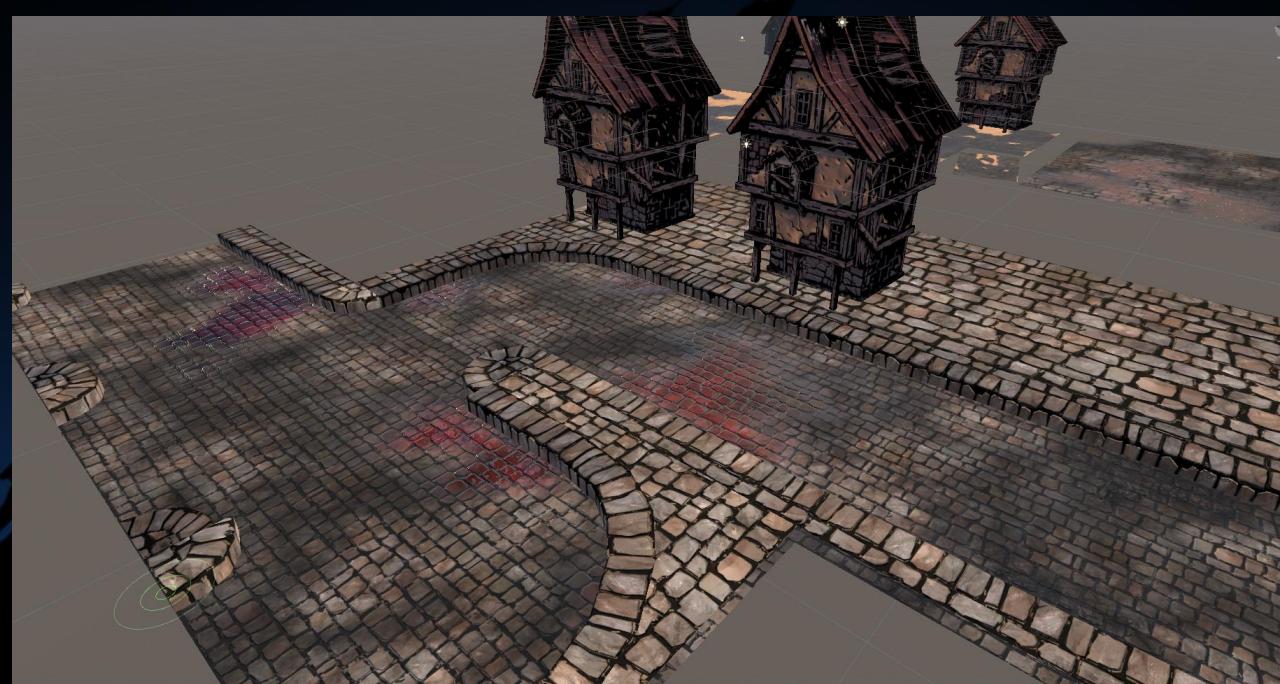
Square shaped grid



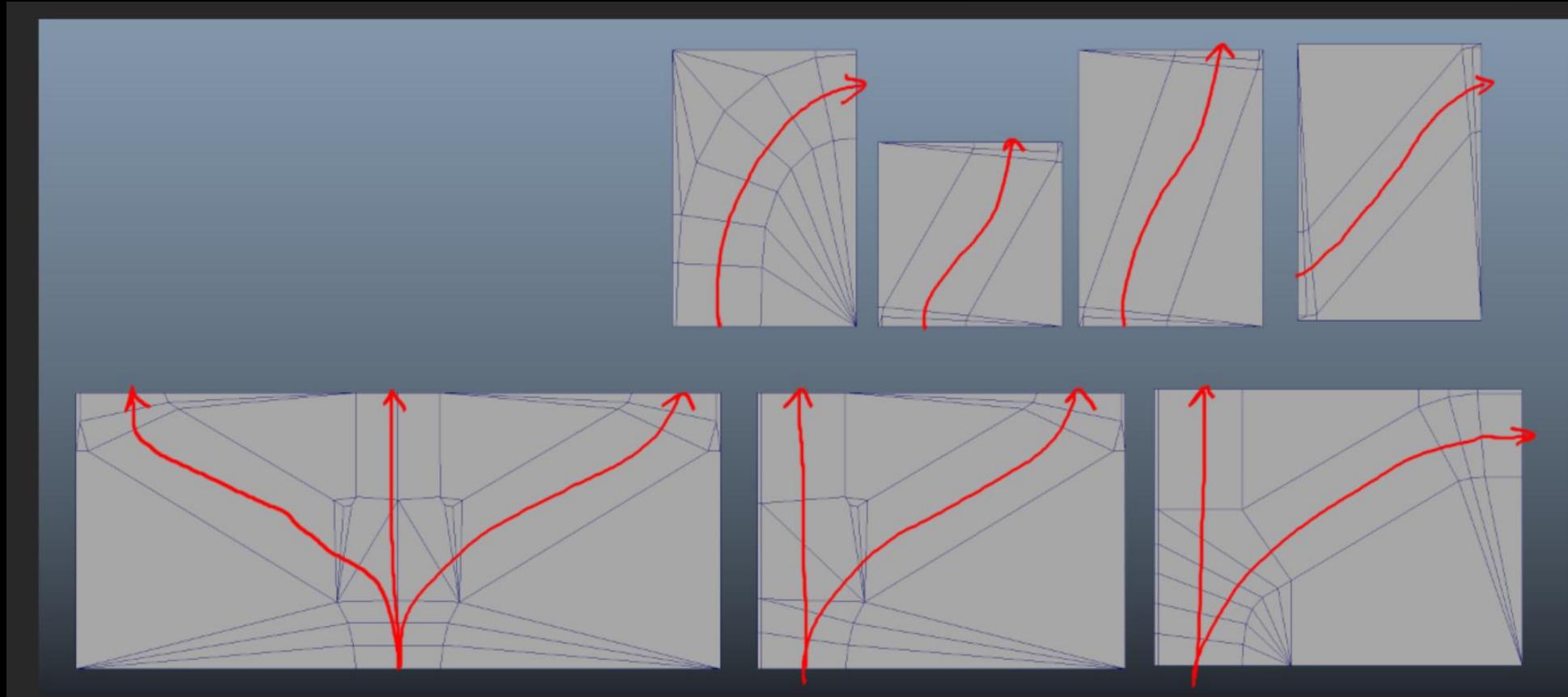
- Units fit tighter together
- Easier to align units
- Roads still worked, art creation felt closer to art direction goals

Square shaped grid

- All possibilities on a 1x1
- 90 degree turns over a 1x1 space were too harsh



Square shaped grid



We tried bigger tiles to soften corners

Square shaped grid



Eww

Square shaped grid

- Disallowed 90 degree turns
- Constant forward momentum for the player
- Forced diagonal paths to cut across squares

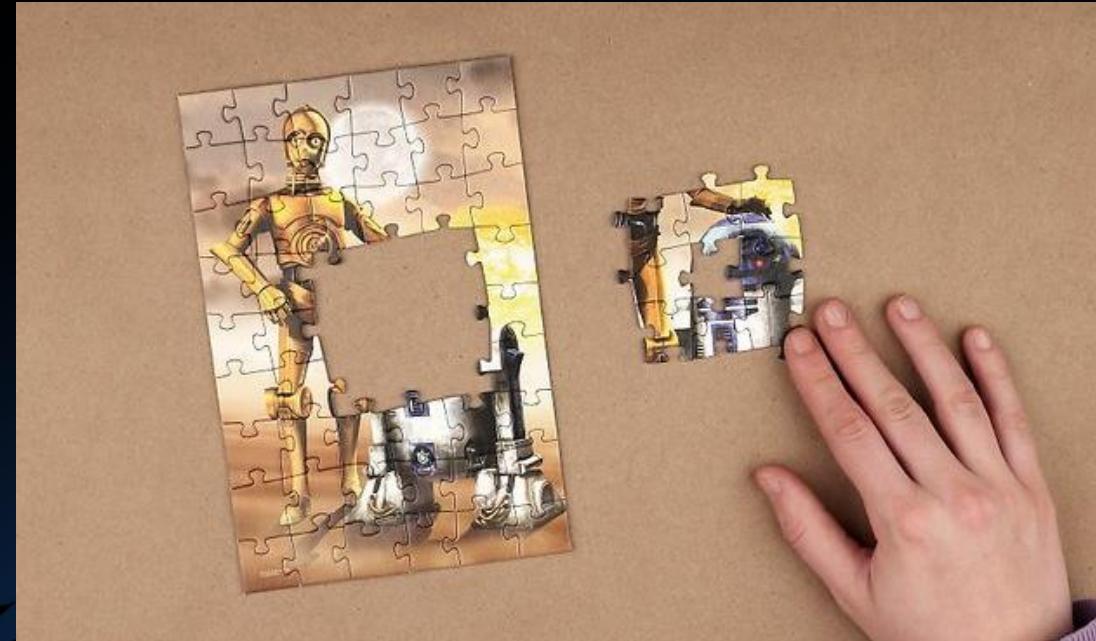
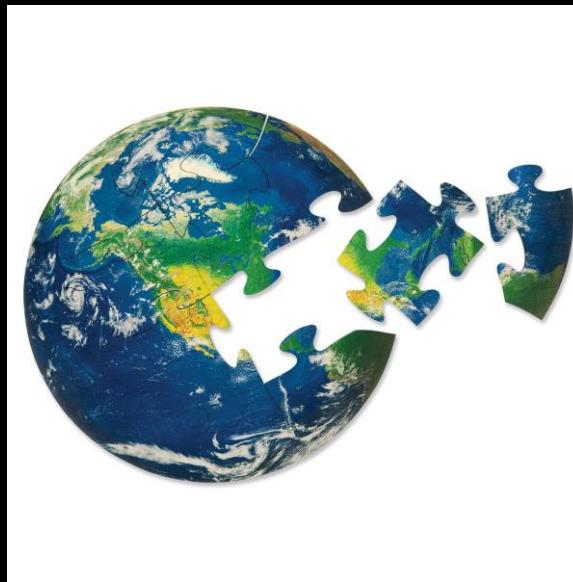


We're on to something!



Minimal Set Tiles

What tiles are needed to build a biome start to finish?



Minimal Set Tiles

- Serve art direction
- Environments can't look like they are on a grid



Minimal Set Tiles



There was no guidebook

Minimal Set Tiles

- Internal QA team too small
- Constant stress testing



Minimal Set Tiles

- Hard crashes highlighted what file shapes we were missing



Launched EA with zero generation issues!!!

Minimal Set Tiles



All 10 required basic road/tile shapes

Minimal Set Tiles

- Tiles can rotate and flip
- 1 file = 8 variations by default
- Additional mutators
- PROFIT??



Catacombs drive through video

Tile Types as a Method of Art Creation

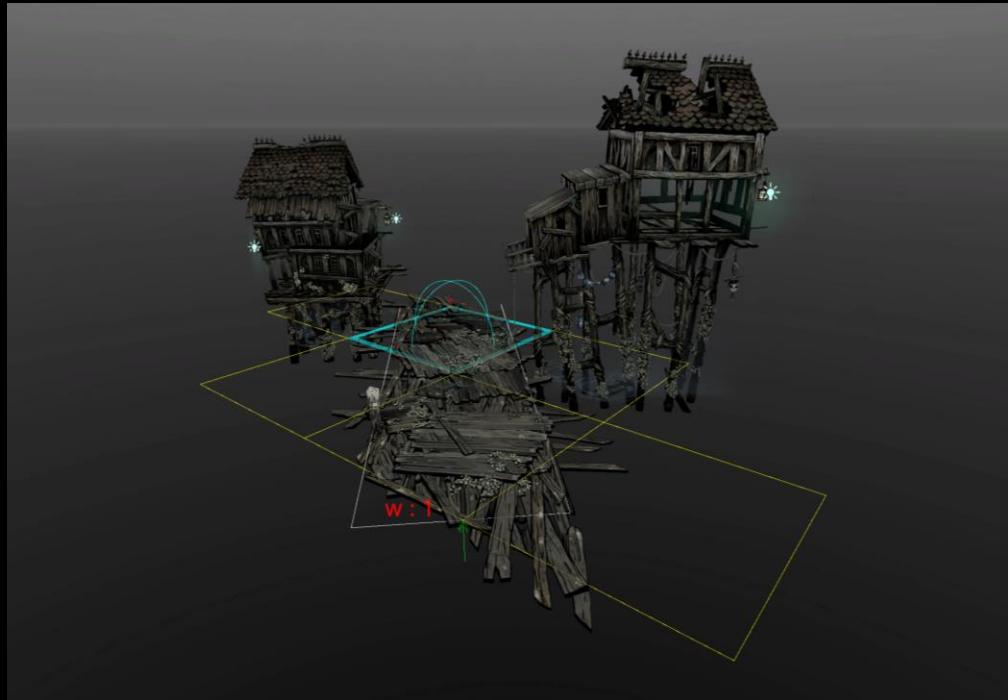
Roads were the priority, but we can't build all biomes from just Road Tiles

Different varieties of tile prefabs were required



Tile Types as a Method of Art Creation

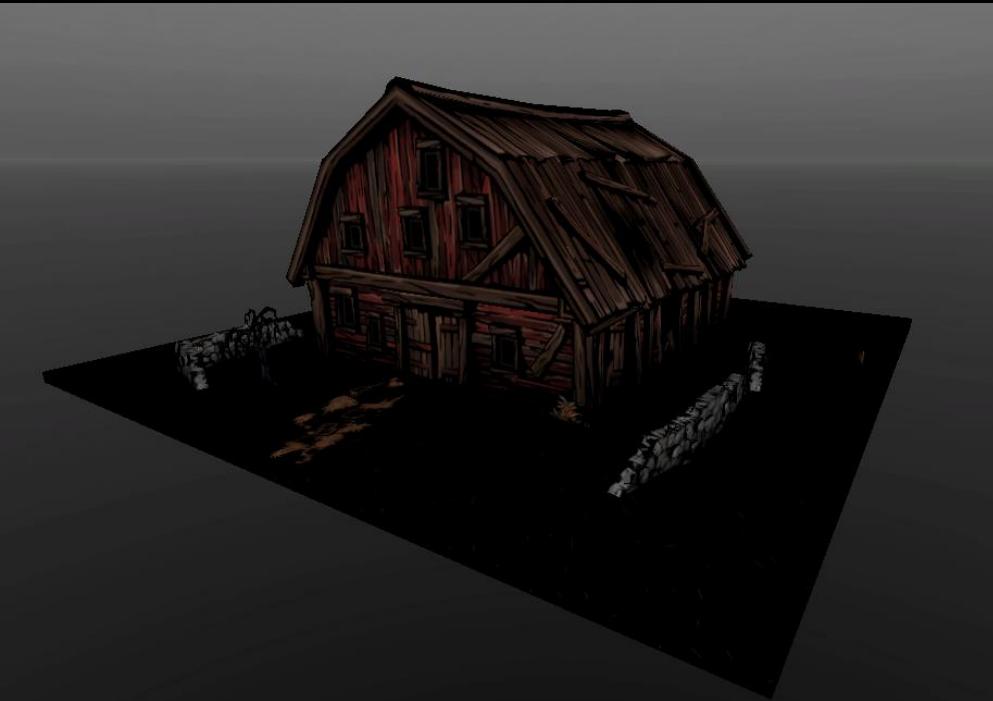
Highest visual priority: Road Tiles



- Road bounds
- Hi-res art

Tile Types as a Method of Art Creation

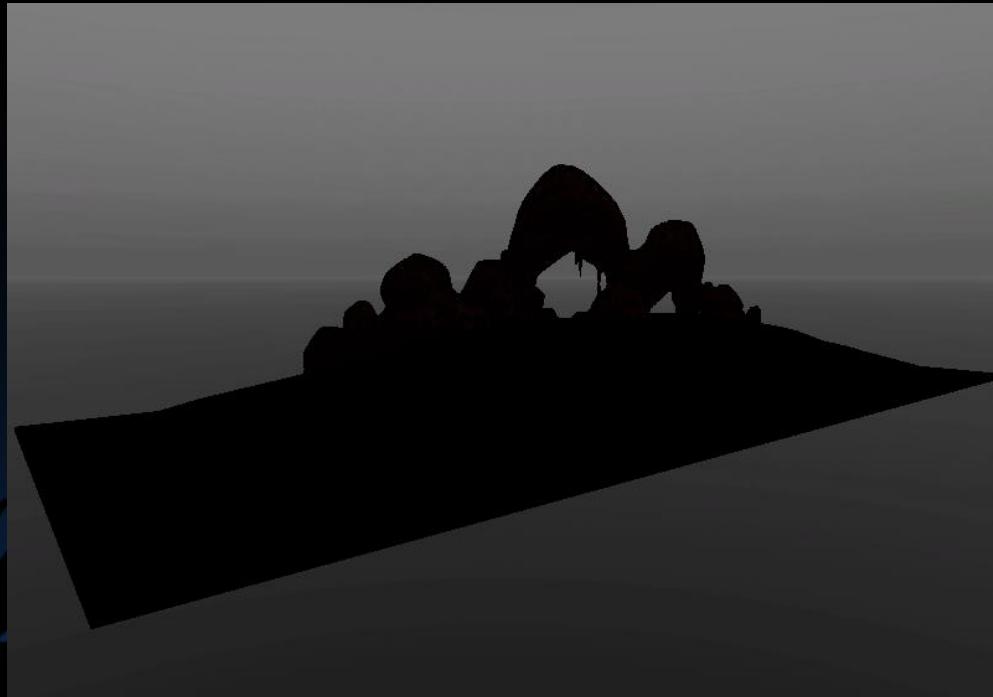
Medium visual priority: Decor Tiles



- Hi-res art only
- Always next to a road

Tile Types as a Method of Art Creation

Lowest visual priority: Background Tiles



- Low-res art
- Fill holes in map generation

Tile Types as a Method of Art Creation



Farm Road Tiles, Nodes

Tile Types as a Method of Art Creation



Farm Decor Tiles

Tile Types as a Method of Art Creation



Farm Background Tiles and Skybox

Tile Types as a Method of Art Creation



Valley Road Tiles, Nodes

Tile Types as a Method of Art Creation



Valley Decor Tiles

Tile Types as a Method of Art Creation



Valley Background Tiles and Skybox

Placement Values & Tile Balancing Tool



Placement Values & Tile Balancing Tool



How do we control the brush to paint like this?

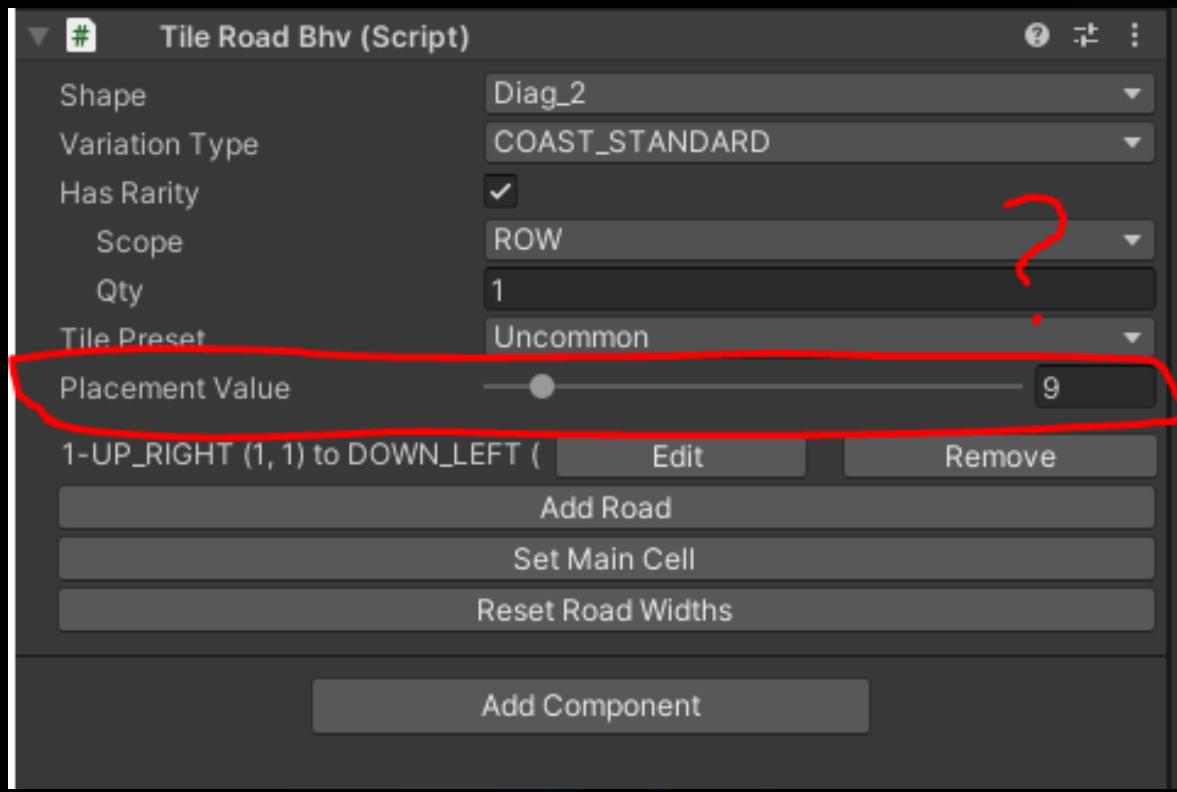
Placement Values & Tile Balancing Tool



Versus this?

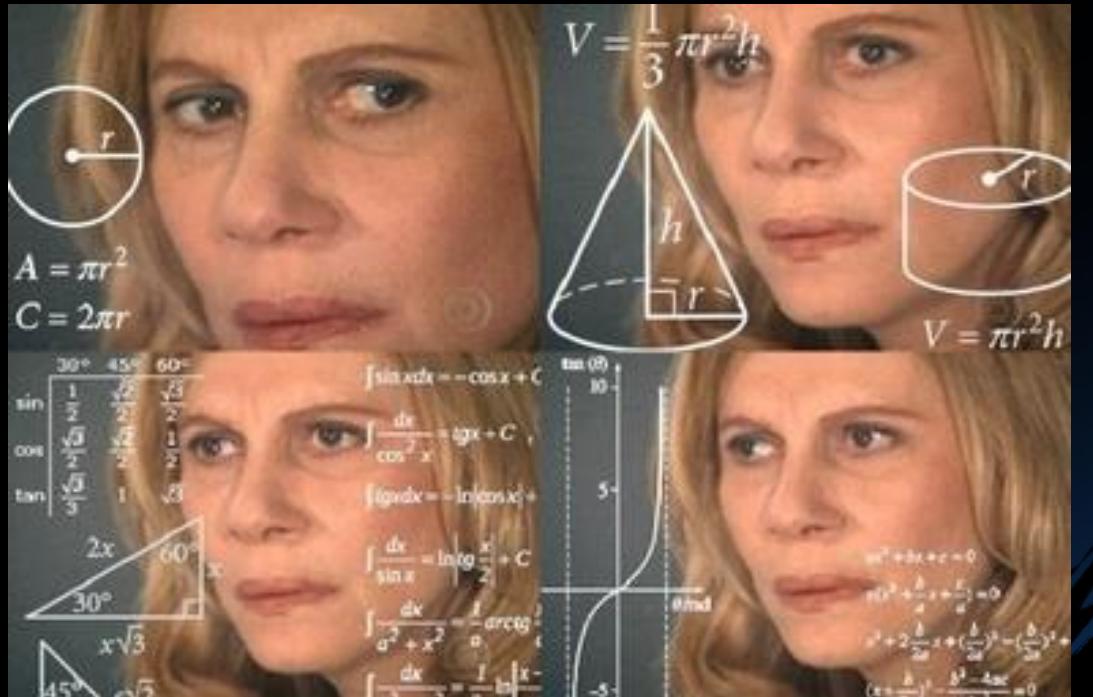
Placement Values & Tile Balancing Tool

Issue: Marielle could understand the math and definitions, but failed to see how changes in the math affected the art outcome



Placement Values & Tile Balancing Tool

Artist / Programmer communication breakdown



Resenfum - the slowest and deadliest poison of them all.



Placement Values & Tile Balancing Tool

Got really invested in making the “perfect” algorithm



Placement Values & Tile Balancing Tool

What I was making



What we needed



Placement Values & Tile Balancing Tool

The screenshot shows the 'Tile Balancing' tool interface. At the top, there are four numbered steps: 1-Choose a Biome, 2-Select Gen Data, 3-Test Biome, and 4-Check Results. Red arrows point from these steps to the corresponding sections of the tool. Step 1 points to the 'Biome Type' dropdown set to 'City'. Step 2 points to the 'defaultData (MapGenerationData)' dropdown. Step 3 points to the 'Test' button. Step 4 points to the results table.

PREFAB NAME

PREFAB NAME	SHAPE	PRESET	PLACEMENT	REPLACEMENT	QTY	%
road_alt_1	1X2	Preset Custom	Placement 15	Replacement 3	0 times	0%
road_alt_2	Vert_2	Preset Custom	Placement 15	Replacement 15	1 times	0.5%
road_alt_2_b	Vert_2	Preset Custom	Placement 15	Replacement 15	2 times	1.1%
road_alt_3	Vert_2	Preset Custom	Placement 15	Replacement 15	1 times	0.5%
road_alt_4	Vert_2	Preset Custom	Placement 15	Replacement 15	27 times	15.5%
road_alt_5	Vert_3	Preset Custom	Placement 15	Replacement 15	5 times	2.8%
road_alt_6	1X3	Preset Custom	Placement 15	Replacement 5	22 times	12.6%
road_alt_6_b	1X3	Preset Custom	Placement 15	Replacement 15	26 times	14.9%
road_alt_6_c	1X3	Preset Custom	Placement 15	Replacement 15	15 times	8.6%
road_alt_6_d	1X3	Preset Custom	Placement 3	Replacement 0	0 times	0%
road_alt_7	1x1	Preset Minimal Set	Placement 1	Replacement 0	66 times	37.9%
road_alt_8	L_Branch	Preset Minimal Set	Placement 1	Replacement 0	0 times	0%
road_alt_9	1X3	Preset Custom	Placement 13	Replacement 8	0 times	0%
road_city_elevation_tunnel	1X5	Preset Custom	Placement 5	Replacement 1	9 times	5.1%
Decor Tiles						
decor_tile_1x1_any	1x1	Preset Common	Placement 27	Replacement 9	34 times	8.4%
decor_tile_1x1_outside_corner	1x1	Preset Common	Placement 27	Replacement 9	225 time	56.1%
decor_tile_1x1_outside_corner_02	1x1	Preset Common	Placement 27	Replacement 9	33 times	8.2%
decor_tile_1x1_outside_corner_03	1x1	Preset Common	Placement 27	Replacement 9	35 times	8.7%
decor_tile_1x1_outside_corner_04	1x1	Preset Common	Placement 27	Replacement 9	42 times	10.4%
decor_tile_1x1_outside_corner_05	1x1	Preset Uncommon	Placement 9	Replacement 3	0 times	0%
decor_tile_1x1_outside_corner_06	1x1	Preset Common	Placement 27	Replacement 9	32 times	7.9%
decor_tile_1x1_side	1x1	Preset Custom	Placement 2	Replacement 1	0 times	0%
decor_tile_2X2_b	2x2	Preset Uncommon	Placement 9	Replacement 3	0 times	0%
decor_tile_bridge_01	Bridge_101	Preset Uncommon	Placement 9	Replacement 3	0 times	0%
1st Skirt Tiles						
city_skirt_mid_01	1x1	Preset Custom	Placement 2	Replacement 0	255 time	68.5%
2nd Skirt Tiles						
city_skirt_back_01	1X4	Preset Custom	Placement 4	Replacement 0	48 times	12.9%
city_skirt_back_02	1X2	Preset Custom	Placement 2	Replacement 0	8 times	2.1%
city_skirt_back_03	1x1	Preset Custom	Placement 2	Replacement 0	61 times	16.3%

6-Click name to select Tile in Unity

5- Modify Tile Values

- Tile command center
- Based on real stats
 - Ran actual generation
- Full artist control and predictability

Placement Values & Tile Balancing Tool



All decor files at equal placement values

Placement Values & Tile Balancing Tool



Decor files balanced to fit art direction

Artist/Programmer Relationship



Respectful

- Results from our combined skills were greater than the sum of their parts
- Shared feature ownership yielded better cooperation
- Unparalleled Artist Independence
- Marielle carries the torch

When We Knew We Had Succeeded



Takeaways



- Procedural generation CAN prioritize art direction
- Tile Balancing Tool = Artist power x 10 !
- Success looked like artist independence
- Cross-discipline compromise is a bond to be counted on

Thank you!

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