DDU
Digital Design Unit — Digitales Gestalten

TECHNISCHE UNIVERSITÄT DARMSTADT

URBAN MINEOPOLIS

by Nicolas Ceulaers, Mingquan Ding, Timotheus M. Krzywik

RESEARCH & DEVELOPMENT PROGRAMME SS2017

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URBAN MINEOPOLIS
BY NICOLAS CEULAERS, MINGQUAN DING,
TIMOTHEUS MAXIMILIAN KRZYWIK

PROJECT SUPERVISOR
ANTON SAVOV

DDU — DIGITAL DESIGN UNIT
PROF. DR. ING. OLIVER TESSMANN
FACULTY OF ARCHITECTURE

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URBAN MINEOPOLIS IS AN OPEN WORLD GAME TEACHING ABOUT URBAN DESIGN PRINCIPLES

Urban Mineopolis is developed as a modification for the existing game *Minecraft*. It is based on the game modification 20.000 Blocks by DDU - *Digital Design Unit* from the architecture faculty of *TU Darmstadt*.

Our goal is to make an urban design game including our own developed game structure and a new vocabulary of modules. It should educate the player about urban design principles and give us, as architects, information about the city planning procedure of the players.
In the end, the player can use the game as a design tool, by changing the vocabulary of the game to fit into actual cases.

In addition, it should be a basis for other developers, developing their own Minecraft modification, by changing the game settings, the vocabulary and the educational goal.

PROBLEM STATEMENT

To develope the 20.000 Blocks game, we want to give the possibility not only to place buildings, but also to create the area around buildings. We developed an extensive game structure to keep the players interests on exploring our game deeply. In addition we developed a NPC system, so that the players enjoy interactive experience.

We give the player the possibility to enjoy *Minecraft* in the normal way by jumping out of the designed game loop. In this way the city he or she built can be used as a scenery.

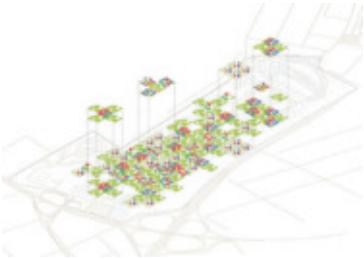
Our game can be used as a **design tool for city planning**, because players can make their own vocabulary to fit into real cases.

As becoming architects, we also want to include an **educational component**, teaching architectural and urban planning principles.

In the other way round, we want to analyse the gameplay of different players to learn about their ideas of rising up and keep running a city.

BACKGROUND

20.000 BLOCKS



First of all our basic-tool is *Minecraft*, a game, which is one of the biggest rising games in the last years, also because of a high variation of players. They can use modifications, created by different people, like i.e. the *IBA_Heidelberg* and DDU in Darmstadt. They combine the problem of building a part of a city and the integration of citizens including their ideas. The result is the game *20.000 Blocks*.

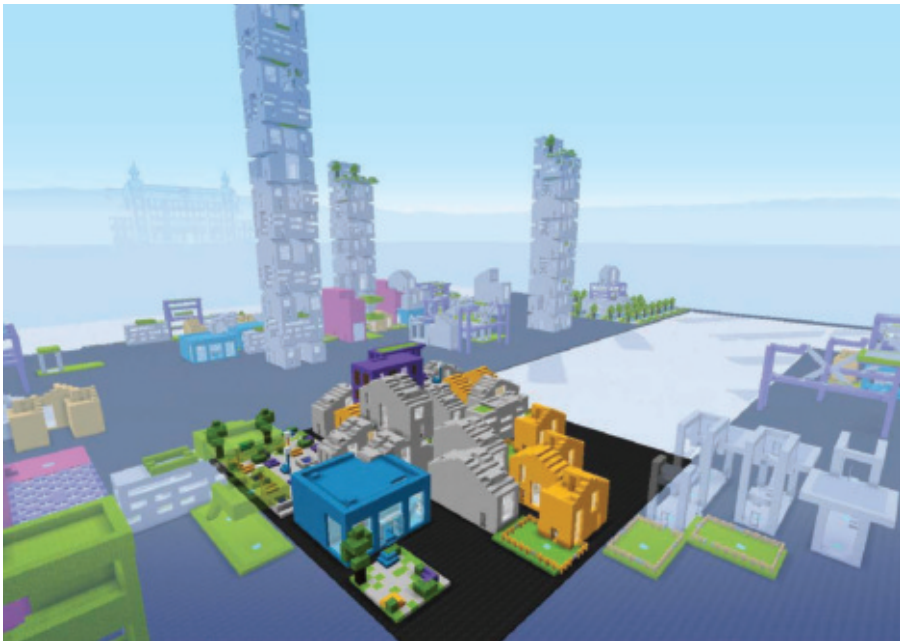
The game works with placing different modules. These modules are different components of a city, like streets, parks, buildings. To get those components it is necessary to put one of the resources in a special key-order around a spawnblock. The two resources are:

natural resource  and

urban resource. 

Players are introduced how to combine these modules and build their own neighbourhood. In the end there will be several parts of a city in different types.

It is possible to look at these neighbourhoods on the internet and compare them with each other, i.e. in Heidelberg, there is the option to show the city what its citizens think and how they could build a new part of the city.



REFERENCES

BLOCK'HOOD

Block'hood is a neighborhood-building game, in which players can experiment the diversity and the balance within a city. In this game players use different kinds of resources to build modules and each built module is using and producing different resources. This is the basic idea of our resources system.

CITIES SKYLINES

Cities Skylines is a single-player open-ended city-building game. With a focus on city management, this game allows the players to experience detailed interactions with the city in many ways. The leveling-up system encourage players to experience the game further.

BLOCK BY BLOCK

Program *Block by Block* uses *Minecraft* as a community participation tool in urban design and fund the implementation of public space projects all over the world, with a focus on poor communities in developing countries. People, particularly youth, women and slum dwellers learn how to play *Minecraft* and then express their ideas in this 3D way, and communicate with each other. At the end their work is presented to city officials. This program inspires us that *Minecraft* can be used to solve urban design program and educate people about urban design principles.

METHOD

To achieve our goal, the most important thing is building up the game structure and setting up game rules. Because of the game structure and settings, the experience of our game transfers from simply placing blocks to get buildings into a wonderful journey of building a city.

In this journey, thanks to our vocabulary, players build not only just houses, but also other components of city, such as ways, squares, parks and so on. And in their journey three different building areas are provided, so that players can choose different kinds of environment to build their city and to play the normal *Minecraft* game in the wild. They will not only gain rewards after building or completing requests given by NPCs, but also face budget or supply challenges while their city grows. To overcome the challenges, they need to maintain the balances of different factors carefully.

The interactive system is another major feature of our game. Information and suggests are introduced to the player in a clear graphic way because of our hint system. In addition, the player will not feel lonely in his or her city, there will be NPCs accompany them and communicate with them, and animals are waiting for them in the wild.

METHOD - GRAMMAR - ACHIEVEMENTS

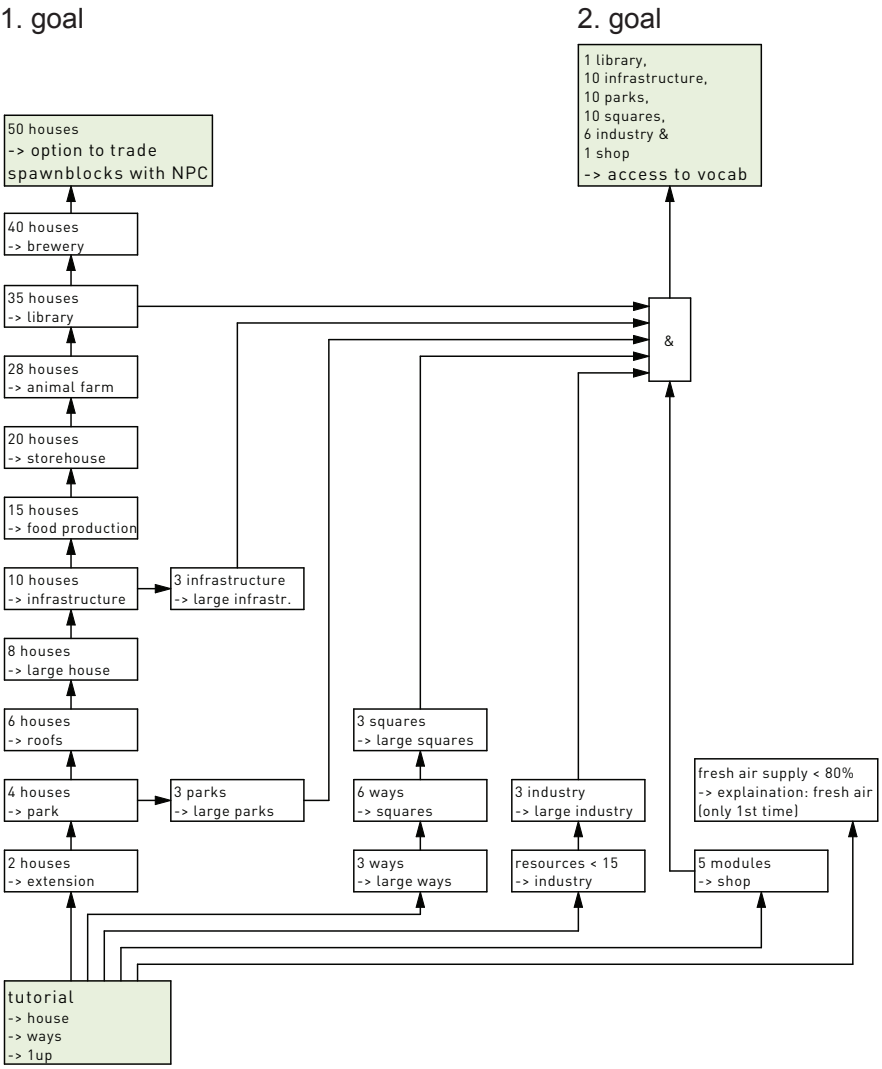
To give the incentive to the player to continue playing, we give several achievements.
Every unlocked achievement gives new hints with construction manuals to the player. That keeps the game interesting and the player will not be overstrained by getting all construction manuals at the same time.

As shown by the achievement tree, different modules are needed to reach the goals:

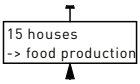
The first goal is to get the option to trade spawnblocks with NPCs, so that the player can decide to expand the building area in the way he wants.

The second goal is to get access to the building vocabulary. In a special room that is part of the spawning-area (where the player can also teleport to the different building-areas), the player can spawn the modules, edit them by mining and replacing blocks and afterwards saving the changed modules.
This allows the player to change the given vocabulary in the way he wants. By then the new spawned modules will be the player-changed ones.

ACHIEVEMENT TREE



Legend:



achievement: build 15 houses
unlocks: food production-module
gain: the associated construction manual

METHOD - GRAMMAR - HINTS

The game Urban Mineopolis wants to get in contact with the players, while explaining the game with the help of hints and building guides. As a modification for the main game *Minecraft* it is helpful to use a tool which is already implemented in. *Minecraft* gives this option with the help of maps.

A map shows a part of the surface of a *Minecraft* world. It transforms a field of 128x128 blocks into pixels with the same size and generates an item, which can be used while playing. In a normal case, the top view of the own surroundings would be shown there, but it can be also used to display explanations – hints.

There are two different types of these hints:

explanations
The first one is about helping with explanations. It guides the players through the game and gives always a hint to the achievement-system. The first time the infrastructure shows up problems, the hints point on it and give a hint on moving forward.

construction manuals
The other one is about constructions of the different modules. It is important to get in touch with the principal of the building system in a fast way. On the hint is the key-combination of the modules the player is able to put. It also shows also a simplified image of the module.

These hints will be given to the players after they reached specific goals. These goals depend on the progress of the players, the infrastructure and the achievement-system. As a specifically animated item of *Minecraft* it has also the opportunity to look at the map while playing. If it´s not needed anymore, it can be placed into the inventory or to a special location near the shop.

The explanation hints include the following themes:

introduction
tutorial/ how to build modules
achievements
shop/ trade items
supplies
teleporter & map expansion
“vocabulatory”

The construction manuals show how to build the different modules.


CONGRATULATION!
You have builded 5 houses, now you can build different parks!
Look at the construction muanual about parks to see the key-combination for the new modules.


CONSTRUCTION MANUAL
Small House
Legend
urban B.
natural B.

The shop is a module that has to be placed – on one side – to trade with the NPC and – on the other side – to get information about the game status.
The NPC- trading system will be explained on the next pages.

The information about the game status are shown as a status bar. On three different bars you can see the percentage of
1. **electricity supply** (produced by urban infrastructure),
2. **water supply** (produced by natural infrastructure) and
3. **fresh air supply** (produced by parks).

If the electricity supply drops under 80%, the lanterns in the city go out, if the water supply drops under 80%, the fountains lose their water.
If the fresh air supply drops under 80%, the player gets less resources back when placing a module. Fresh air supply under 40% effects, that the player gets no resources back.

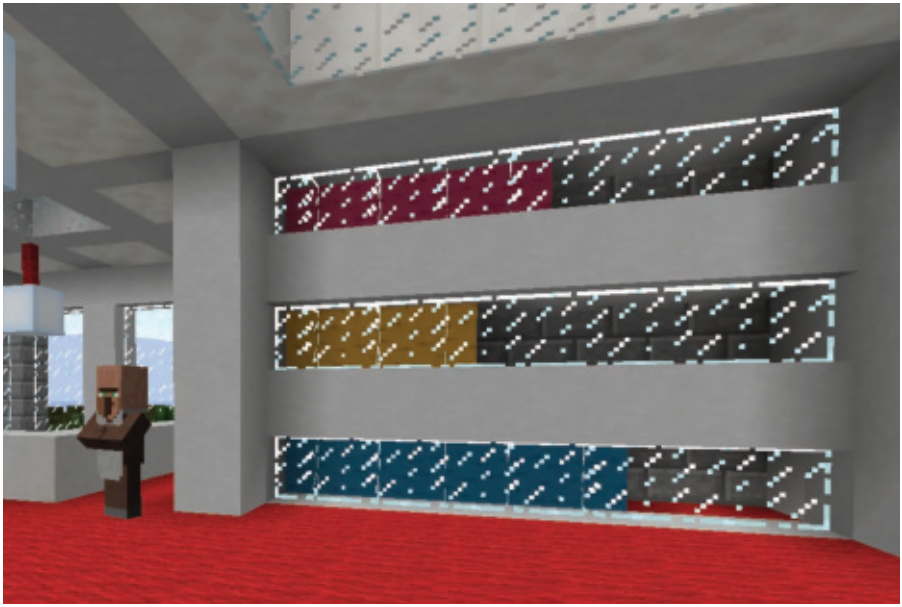
Calculation for the supply-status:

$$\%\ \text{of electricity supply} = \frac{10 \times [\text{number of urban infrastructure}]}{[\text{number of houses}]}$$

$$\%\ \text{of water supply} = \frac{10 \times [\text{number of nature infrastructure}]}{[\text{number of houses}]}$$

$$\%\ \text{of fresh air supply} = \frac{6 \times [\text{number of parks}]}{[\text{number of houses}]}$$

Large infrastructure-modules count as 2 infrastructure, large parks count as 2 parks, middle and long houses count as 1,5 houses.



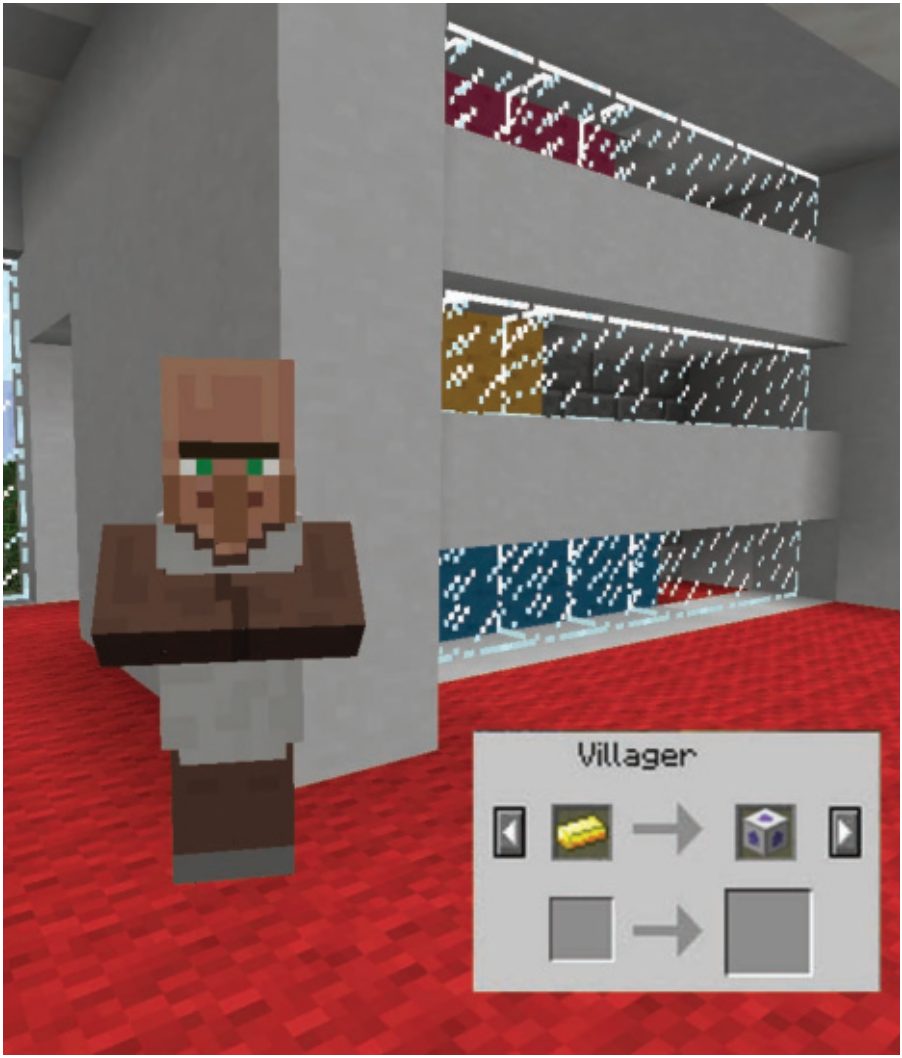
In our game are two types of NPCs: one type are normal villagers who live in this city that got created by the player. They can accompany the player during their game. The other type are NPCs with interactive functions. They are gathering in the shop and can affect the game process in different ways.

Those NPCs have the following functions:

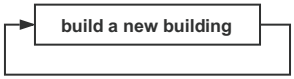
trading
Trading NPCs sell building resources such as urban resources and green resources to player. When player needs resources to build modules, he or she can go to the shop and use gold to buy them. Gold can be obtained by placing modules or farming in the *Minecraft* world outside the building area.

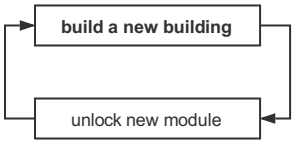
requesting
Some NPCs give player building request. This request can come from outside the game, i.e. a website that can be controlled by us and/or the wishes from the users of our game modification. Player can choose whether they want to complete the building missions from NPCs or not. After a mission is completed, the player can get gold or building resources as rewards.

noticing or complaining
NPCs will notice the player or complain to the player about their recently building progress, i.e. the water infrastructure is not enough in our city, or you built a high-rise building that blocks sunshine of others.


Villager

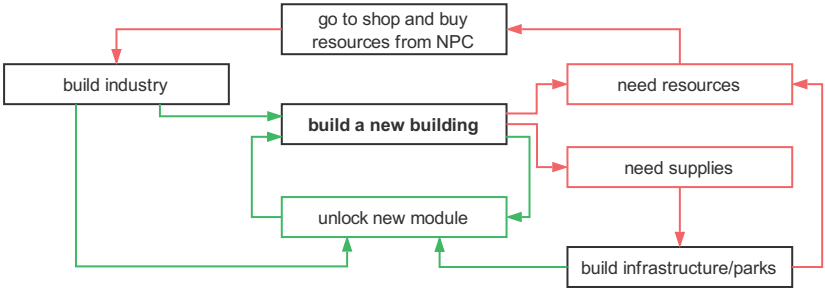
The first game loop is the current *20.000 Blocks*. Players keep on building new modules in a free building area. To avoid that players will get boring, we introduce a leveling-up system in the second game loop, so players will keep on building new modules to unlock larger, more complicated and more interesting modules to expand their own cities.





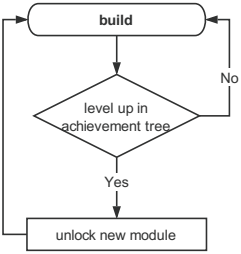
This is the core part of our third and final game loop. In this game loop, players get not only rewards but also challenges by build a new building, which is the core part of our game. The rewards (green lines)consist of two parts: first, **gold and/or building resources** as production of a new building; second, **level up** in achievement tree and unlock new modules. These rewards keep players able to carry on building their cities.

The challenges are also two parts: first, player would be at the edge of **running out of building resources**; second, the city would be **lack of supplies** (electricity, water and fresh air supply). The challenges (red lines) hinder player's building progress. Players must overcome them to continue building. To solve the first challenge, players need to go to the shop and use gold to buy resources from NPC. After shopping, players can also choose to build a factory to get a large amount of building resources. To solve the second challenge, players need to build infrastructure and parks to get enough supplies.

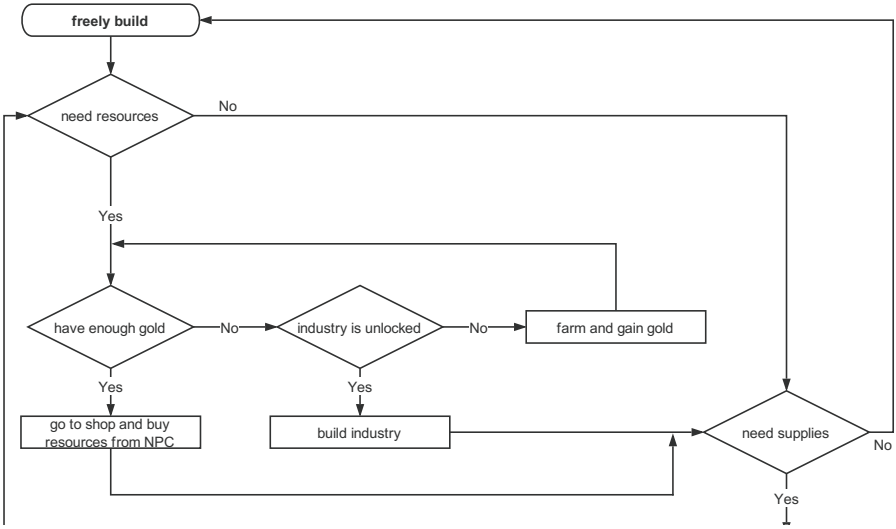


This is our detailed version of final game loop, which shows not only the reward system but also every decisions player need to make after every single movement in our game. This loop can help us to check whether the game will work good or not, and whether every setting is logic or not.

reward loop



decision loop



start area
Spawning the first time on the map, the player will appear in the start area.

It contains:

-a tutorial room

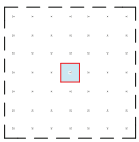
-a hall with a NPC that bids welcome the player and space to place the hints on a wall

-a teleporter room where the player gets three possibilities to teleport to different cities

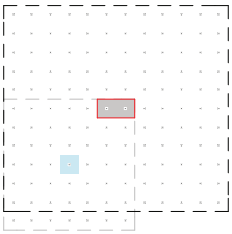
-the room, where the player gets access to the vocabulary, later in the game (“vocabulatory”)

teleporter-module
Three new block-items have to get integrated into the game. Placing one of them anywhere on the map creates a new building area with the teleporter-module in the middle, that allows to teleport between the start area and the different building areas. In this way players can choose where to start building and teleport to other building areas anytime they want.

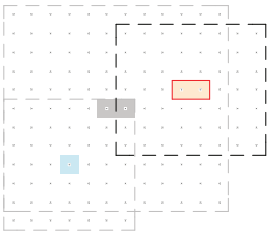
map expansion
To give the player the most possible amount of possibilities to get the building area started, we invented a teleporter-module, that can be placed anywhere on the minecraft map.
By spawning, a few spawnblocks will appear in a grid around that module. Those spawnblocks form the middle of the keys, that can be placed by the player. Every spawning module will expand the spawnblock-grid around itself.
Ways expand an area of 5 spawnblocks in every direction, houses and other modules expand an area of 3 spawnblocks.
That gives the possibility to expand the city in the way and the direction the player wants to.



teleporter module was placed



street with range 5 was placed



house with range 3 was placed

METHOD - VOCABULARY

The game vocabulary contains 39 different modules, each of them can be placed by placing resources around a spawnblock. The two resources are the urban resource  and the nature resource  .

The resource costs are formed by the amount of blocks needed for the key. Placing a module gives resources and gold back to the player. If the happiness factor is too low, the gain is getting lower.

The ground plans on the next pages show the size of the modules. A module that is 2x1 contains two spawnblocks and a foodprint of 18x9 blocks.

The appearance of all the different modules can be changed in the end by getting access to the “vocabulatory”.

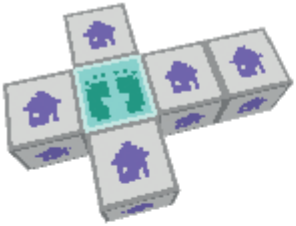
ID	module-name	size	hint, if...	costs	gain	gold
01/02	small house	2x1	tutorial	5	2	4
03/04	middle house	2x2	8 houses	6	1	3
05/06	long house	3x1	8 houses	6	2	3
07/08	extension	1x1	2 houses	3	1	4
09/10	saddle roof	2x1	6 houses	5	3	2
11/12	flat roof	2x1	6 houses	7	5	3
13/14	normal way	2x1	tutorial	3	1	2
15/16	large way	3x1	3 ways	4	1	4
17/18	small industry	2x2	< 15 res.	8	40	5
19/20	large industry	3x2	3 industry	11	60	15
21/22	small infrastructure	1x1	10 houses	4	0	8
23/24	large infrastructure	2x1	3 infrastr.	6	0	16
25	small square	1x1	6 ways	4	2	1
26	large square	2x2	3 squares	8	5	3
27	small park	1x1	4 houses	4	2	5
28	large park	2x2	3 parks	8	5	6
29/30	food production	2x1	15 houses	5	0	5
31/32	animal farm	3x2	28 houses	7	3	8
33/34	storehouse	3x1	20 houses	7	1	4
35	library	3x2	35 houses	10	4	10
36	brewery	3x2	40 houses	7	1	20
37	shop	3x2	5 modules	11	6	30
38	1up	1x1	tutorial	1	1	5
39	teleporter-module	1X1	tutorial	-	30 per res.	50

NAME: urban small house

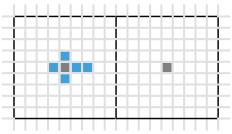
ID: #01

FUNCTION: living space

KEY:



GROUND PLAN:

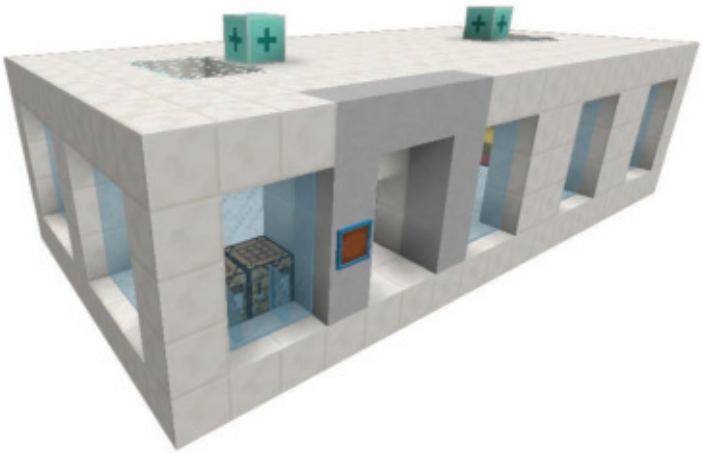


RESOURCES:

5 urban res.

GAINS:

2 green res.
4 gold



DESCRIPTION:

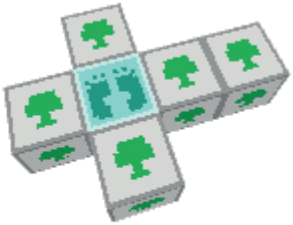
availible since tutorial

NAME: green small house

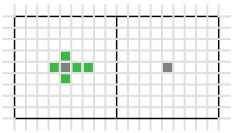
ID:
#02

FUNCTION: living space

KEY:



GROUND PLAN:



RESOURCES:
5 green res.

GAINS:
2 urban res.
4 gold

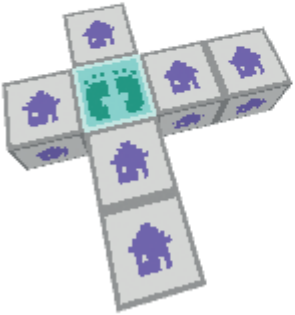
DESCRIPTION:
availible since tutorial

NAME: urban middle house

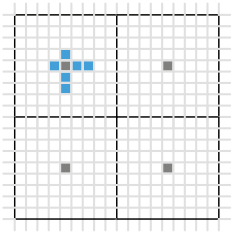
ID:
#03

FUNCTION: living space

KEY:



GROUND PLAN:

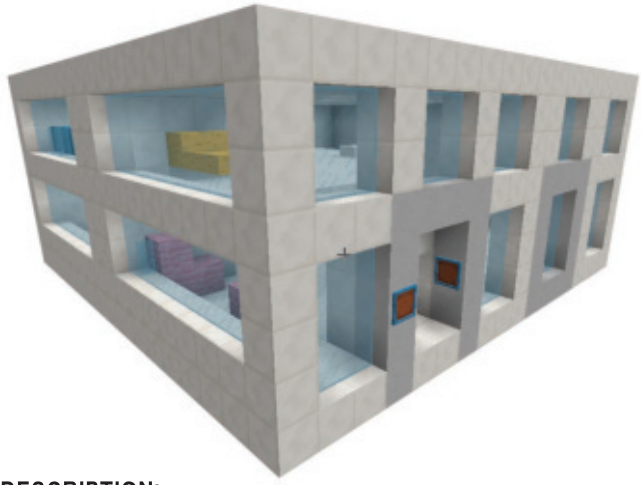


RESOURCES:

6 urban res.

GAINS:

1 green res.
3 gold



DESCRIPTION:

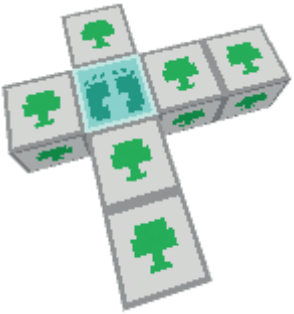
availible, when 8 small houses were built

NAME: green middle house

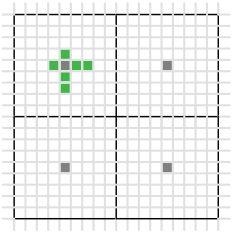
ID:
#04

FUNCTION: living space

KEY:



GROUND PLAN:



RESOURCES:

6 green res.

GAINS:

1 urban res.
3 gold

DESCRIPTION:

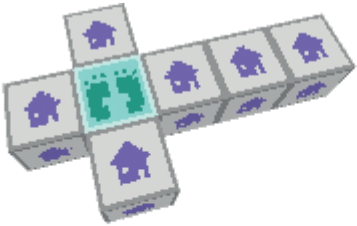
availible, when 8 small houses were built

NAME: urban long house

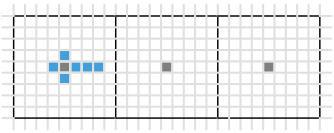
ID: #05

FUNCTION: living space

KEY:



GROUND PLAN:

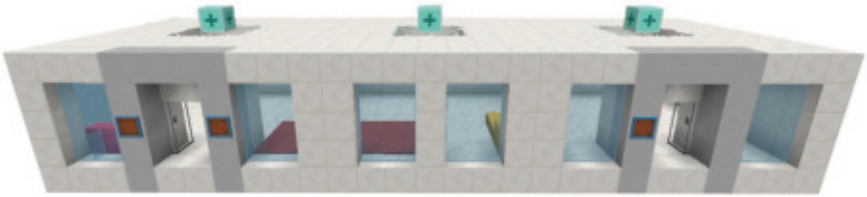


RESOURCES:

6 urban res.

GAINS:

2 green res.
3 gold



DESCRIPTION:

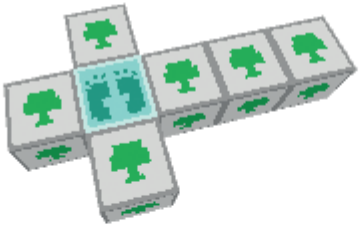
availible, when 8 small houses were built

NAME: green long house

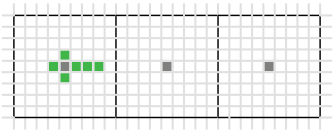
ID: #06

FUNCTION: living space

KEY:



GROUND PLAN:



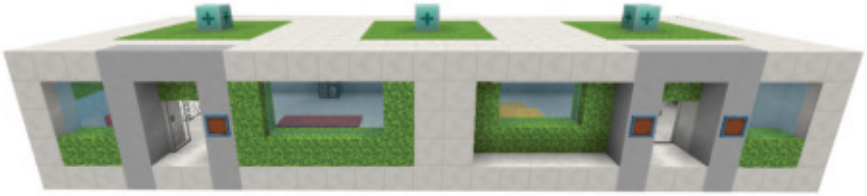
RESOURCES:

6 green res.

GAINS:

2 urban res.

3 gold



DESCRIPTION:

availible, when 8 small houses were built

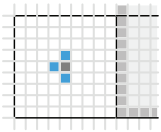
NAME: urban extension

ID:
#07

FUNCTION: living space

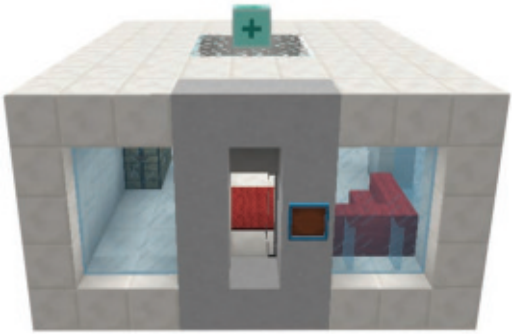
KEY:

GROUND PLAN:



RESOURCES:
3 urban res.

GAINS:
1 green res.
4 gold



DESCRIPTION:
availible, when 2 small houses were built

can only be placed directly near an existing house module

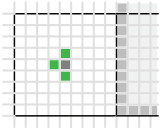
NAME: **green extension**

ID:
#08

FUNCTION: **living space**

KEY:

GROUND PLAN:



RESOURCES:

3 green res.

GAINS:

1 urban res.
4 gold

DESCRIPTION:

availible, when 2 small houses were built

can only be placed directly near an existing house module

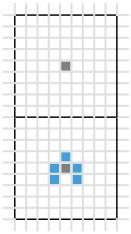
NAME: urban saddle roof

ID:
#09

FUNCTION: decoration

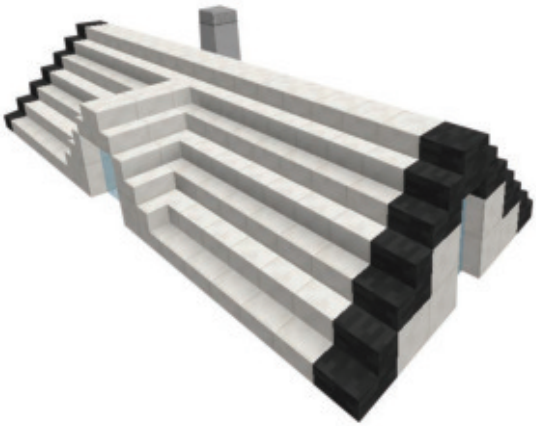
KEY:

GROUND PLAN:



RESOURCES:
5 urban res.

GAINS:
3 green res.
2 gold



DESCRIPTION:
availible, when 6 houses were built

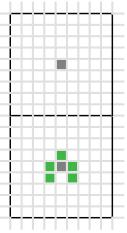
NAME: green saddle roof

ID:
#10

FUNCTION: decoration

KEY:

GROUND PLAN:

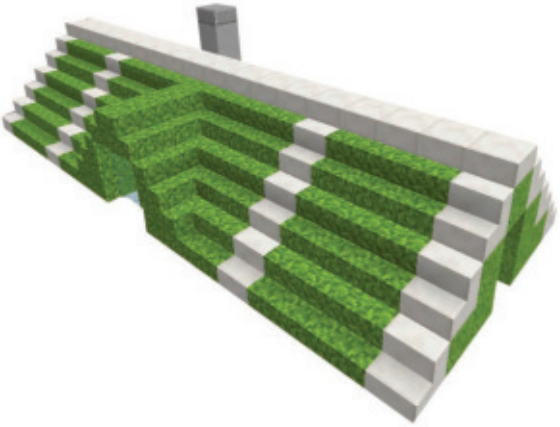


RESOURCES:

5 green res.

GAINS:

3 urban res.
2 gold



DESCRIPTION:
availible, when 6 houses were built

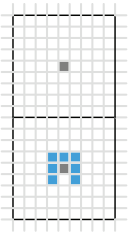
NAME: urban flat roof

ID:
#11

FUNCTION: decoration

KEY:

GROUND PLAN:

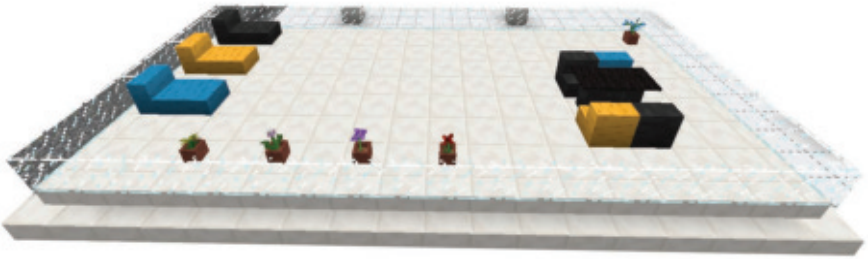


RESOURCES:

7 urban res.

GAINS:

5 green res.
3 gold



DESCRIPTION:

availible, when 6 houses were built

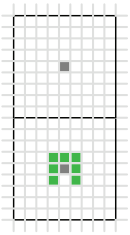
NAME: green flat roof

ID:
#12

FUNCTION: decoration

KEY:

GROUND PLAN:

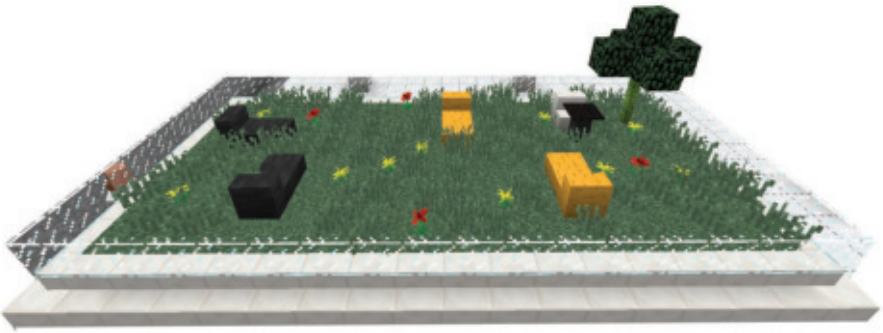


RESOURCES:

7 green res.

GAINS:

5 urban res.
3 gold



DESCRIPTION:
availible, when 6 houses were built

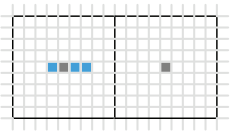
NAME: urban normal way

ID:
#13

FUNCTION: circulation

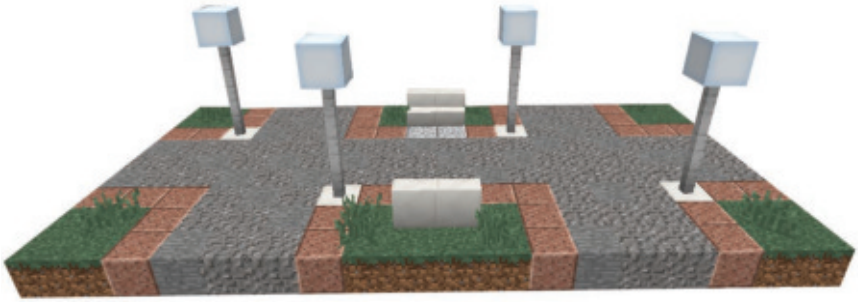
KEY:

GROUND PLAN:



RESOURCES:
3 urban res.

GAINS:
1 green res.
2 gold



DESCRIPTION:
availible since tutorial

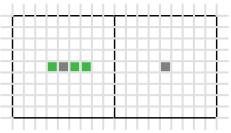
NAME: green normal way

ID:
#14

FUNCTION: circulation

KEY:

GROUND PLAN:



RESOURCES:

3 green res.

GAINS:

1 urban res.
2 gold

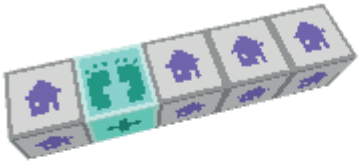
DESCRIPTION:
availible since tutorial

NAME: urban large way

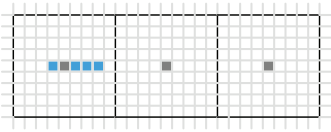
ID: #15

FUNCTION: circulation

KEY:



GROUND PLAN:

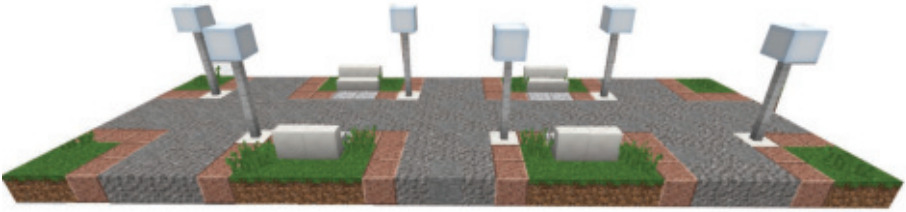


RESOURCES:

4 urban res.

GAINS:

1 green res.
4 gold



DESCRIPTION:

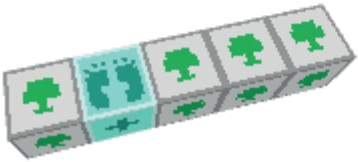
availible, when 3 ways were built

NAME: green large way

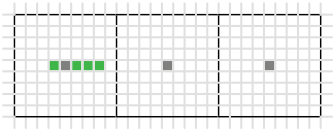
ID: #16

FUNCTION: circulation

KEY:



GROUND PLAN:



RESOURCES:

4 green res.

GAINS:

1 urban res.

4 gold

DESCRIPTION:

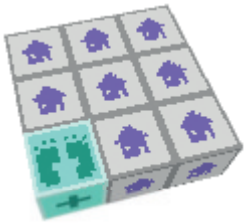
availible, when 3 ways were built

NAME: urban small industry

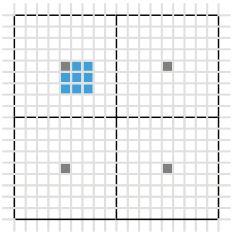
ID: #17

FUNCTION: production of urban resource

KEY:



GROUND PLAN:



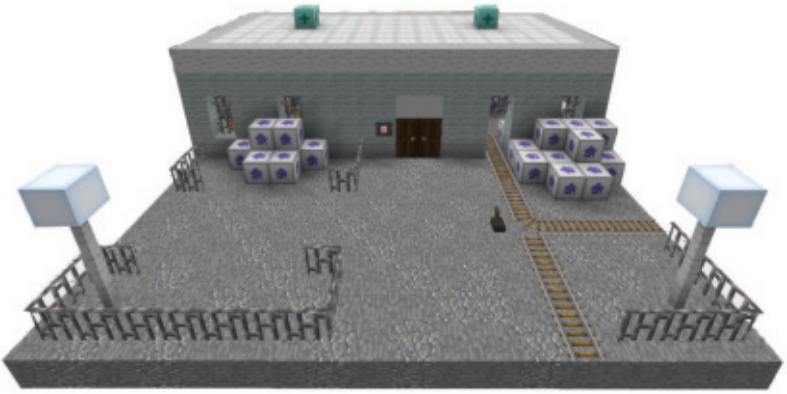
RESOURCES:

8 urban res.

GAINS:

40 urban res.

5 gold



DESCRIPTION:

availible, when urban resources drops the first time below the amount of 15

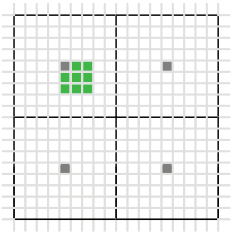
NAME: green small industry

ID: #18

FUNCTION: production of green resource

KEY:

GROUND PLAN:



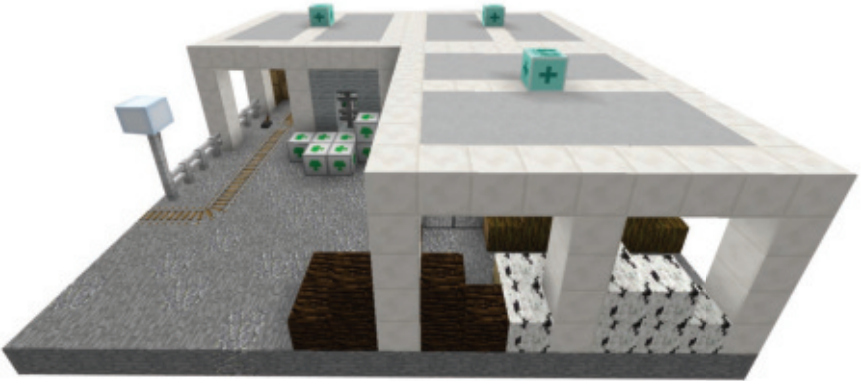
RESOURCES:

8 green res.

GAINS:

40 green res.

5 gold



DESCRIPTION:

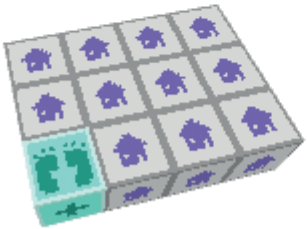
availible, when green resources drops the first time below the amount of 15

NAME: urban large industry

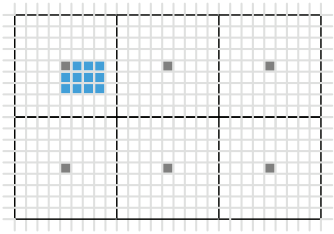
ID: #19

FUNCTION: production of urban resource

KEY:



GROUND PLAN:



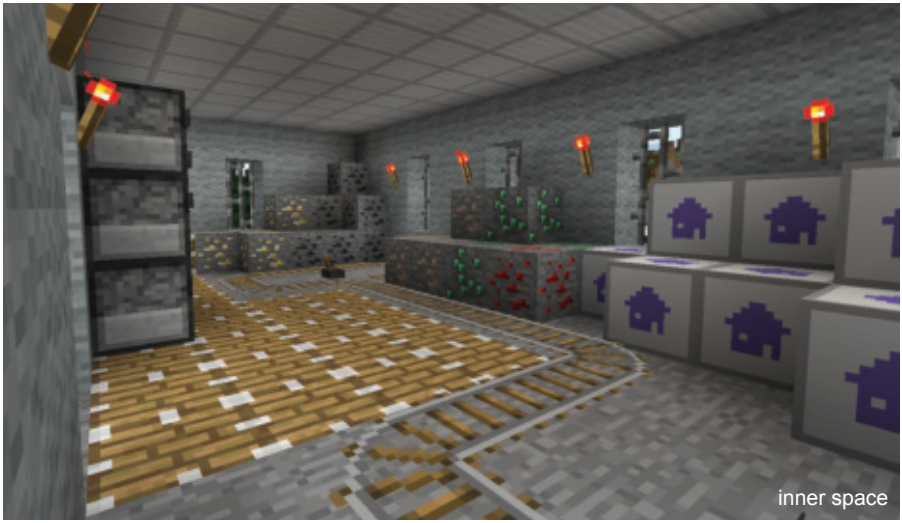
RESOURCES:

11 urban res.

GAINS:

60 urban res.

15 gold



inner space

DESCRIPTION:

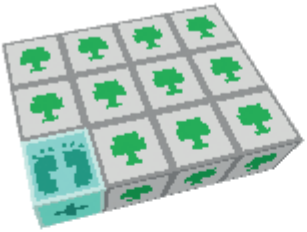
availible, when 3 industry were built

NAME: green large industry

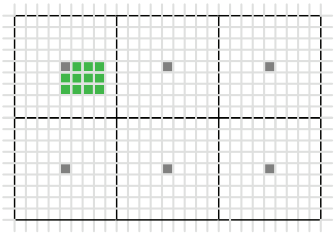
ID: #20

FUNCTION: production of green resource

KEY:



GROUND PLAN:



RESOURCES:

11 green res.

GAINS:

60 green res.

15 gold

inner space

DESCRIPTION:

availible, when 3 industry were built

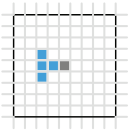
NAME: urban small infrastructure

ID:
#21

FUNCTION: ensures electricity supply

KEY:

GROUND PLAN:

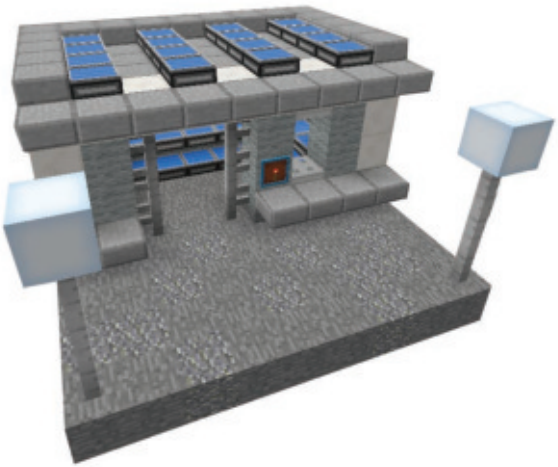


RESOURCES:

4 urban res.

GAINS:

0 res.
8 gold



DESCRIPTION:
availible, when 10 houses were built

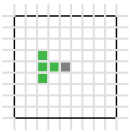
NAME: green small infrastructure

ID:
#22

FUNCTION: ensures water supply

KEY:

GROUND PLAN:

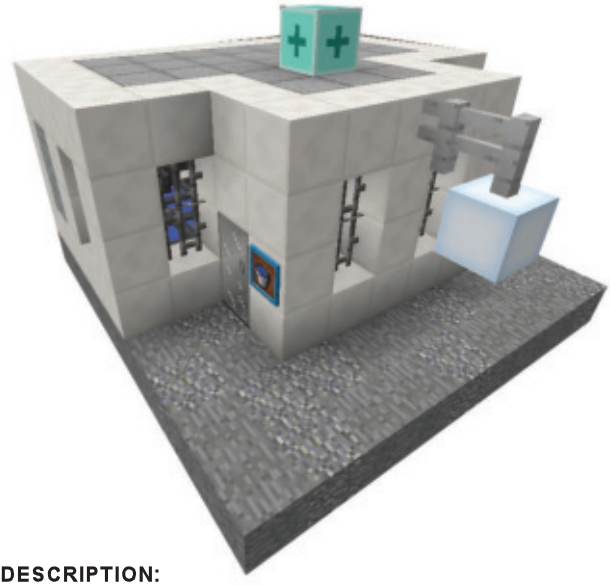


RESOURCES:

4 green res.

GAINS:

0 res.
8 gold



DESCRIPTION:

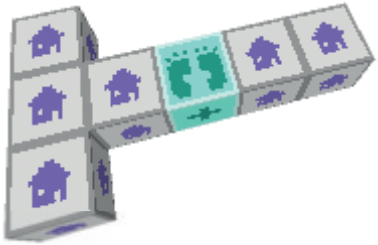
availible, when 10 houses were built

NAME: urban large infrastructure

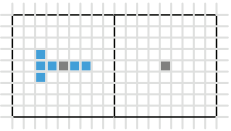
ID:
#23

FUNCTION: ensures electricity supply

KEY:



GROUND PLAN:



RESOURCES:
6 urban res.

GAINS:
0 res.
16 gold

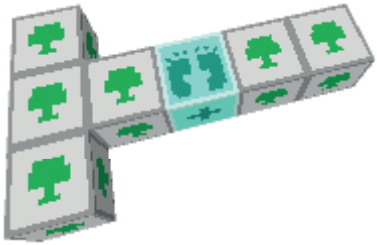
DESCRIPTION:
availible, when 3 infrastructure were built

NAME: green large infrastructure

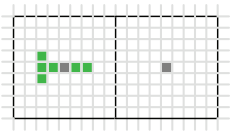
ID:
#24

FUNCTION: ensures water supply

KEY:

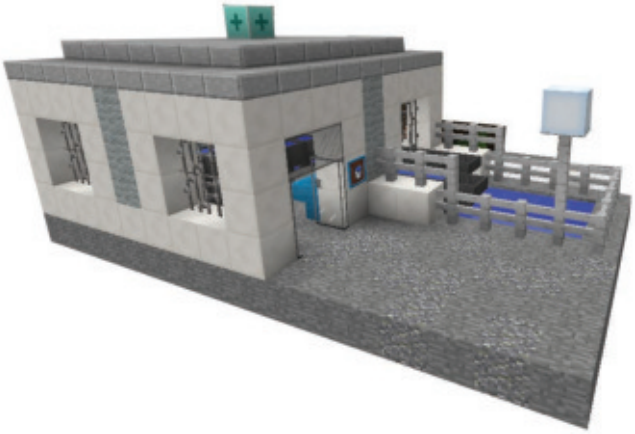


GROUND PLAN:



RESOURCES:
6 green res.

GAINS:
0 res.
16 gold



DESCRIPTION:
availible, when 3 infrastructure were built

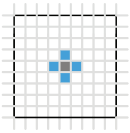
NAME: small square

ID:
#25

FUNCTION: circulation

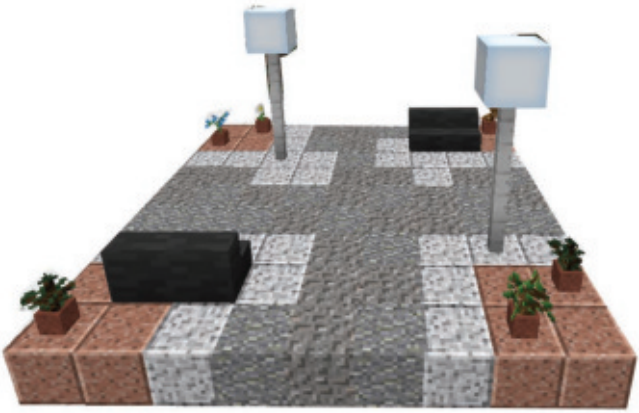
KEY:

GROUND PLAN:



RESOURCES:
4 urban res.

GAINS:
2 green res.
1 gold



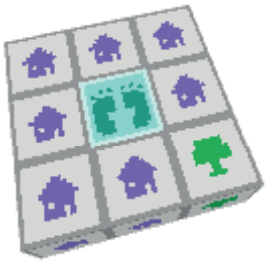
DESCRIPTION:
availible, when 6 ways were built

NAME: large square

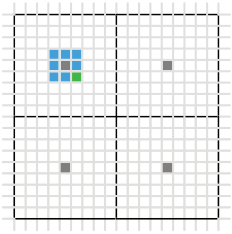
ID:
#26

FUNCTION: circulation

KEY:



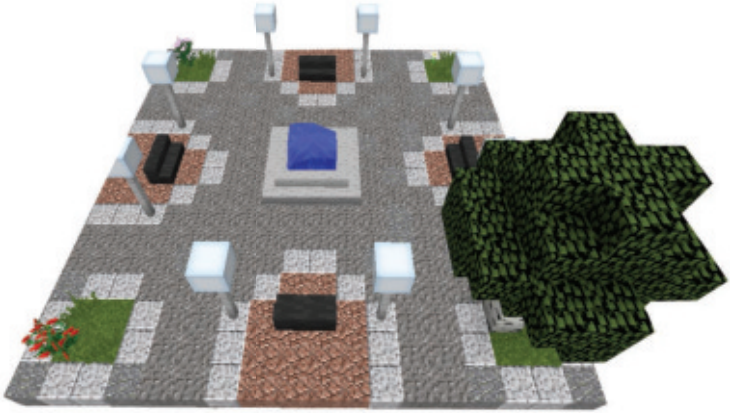
GROUND PLAN:



RESOURCES:

7 urban res.
1 green res.

GAINS:
5 green res.
3 gold



DESCRIPTION:
availible, when 3 ways were built

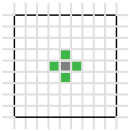
NAME: small park

ID: #27

FUNCTION: ensures fresh air supply

KEY:

GROUND PLAN:



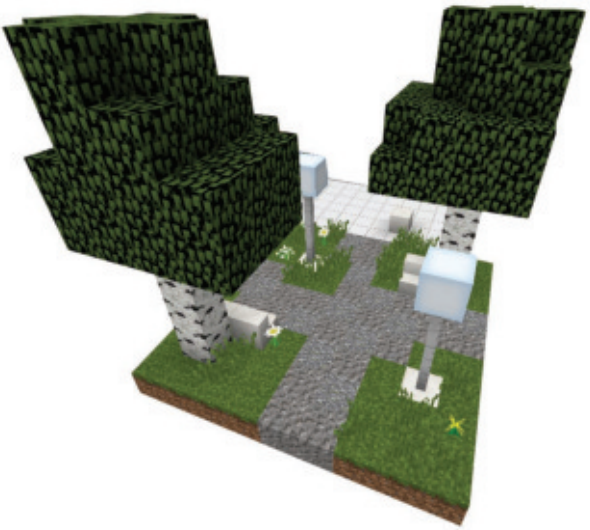
RESOURCES:

4 green res.

GAINS:

2 urban res.

1 gold



DESCRIPTION:

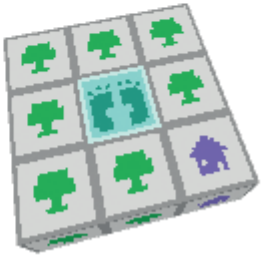
availible, when 4 houses were built

NAME: large park

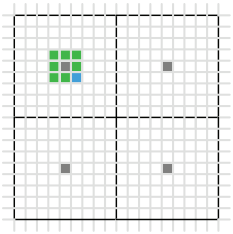
ID:
#28

FUNCTION: ensures fresh air supply

KEY:



GROUND PLAN:



RESOURCES:

7 green res.
1 urban res.

GAINS:
5 urban res.
3 gold

DESCRIPTION:
availible, when 3 parks were built

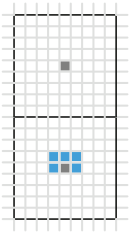
NAME: urban food production

ID:
#29

FUNCTION: allows player to harvest food

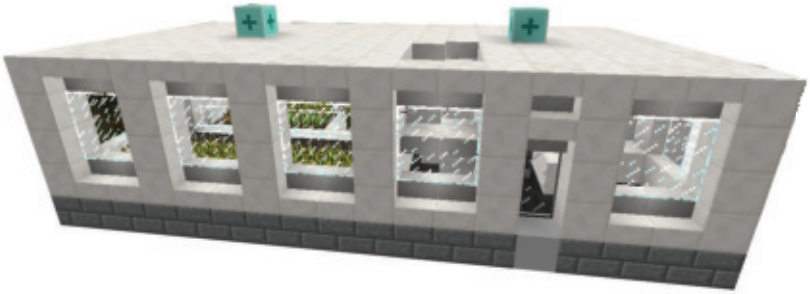
KEY:

GROUND PLAN:



RESOURCES:
5 urban res.

GAINS:
0 res.
5 gold



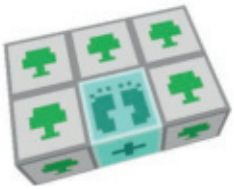
DESCRIPTION:
availible, when 15 houses were built

NAME: green food production

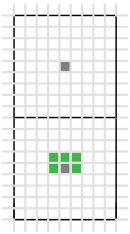
ID:
#30

FUNCTION: allows player to harvest food

KEY:



GROUND PLAN:

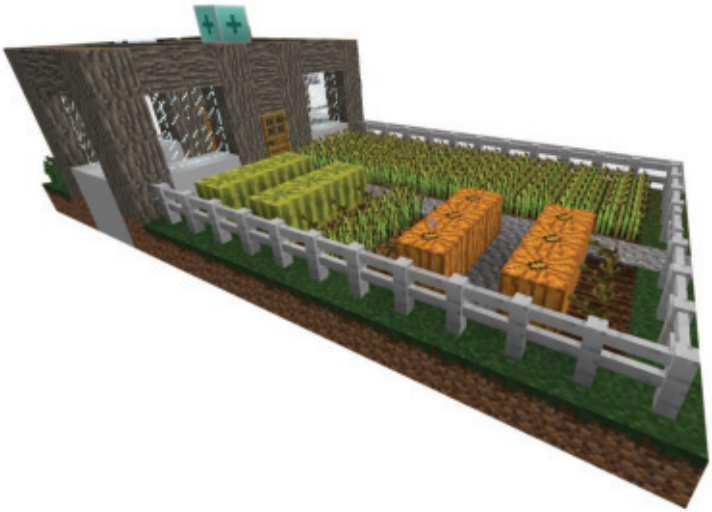


RESOURCES:

5 green res.

GAINS:

0 res.
5 gold



DESCRIPTION:

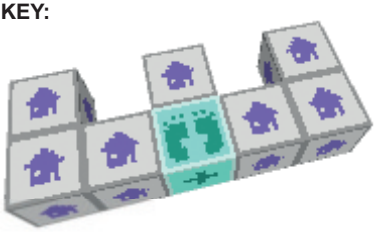
availible, when 15 houses were built

NAME: urban animal farm

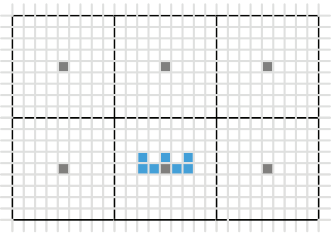
ID: #31

FUNCTION: allows player to breed animals

KEY:



GROUND PLAN:



RESOURCES:

7 urban res.

GAINS:

3 green res.

8 gold

DESCRIPTION:

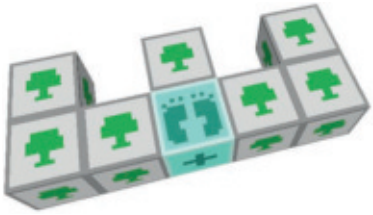
availible, when 28 houses were built

NAME: green animal farm

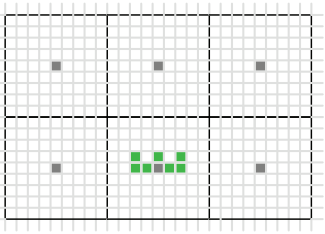
ID: #32

FUNCTION: allows player to breed animals

KEY:



GROUND PLAN:



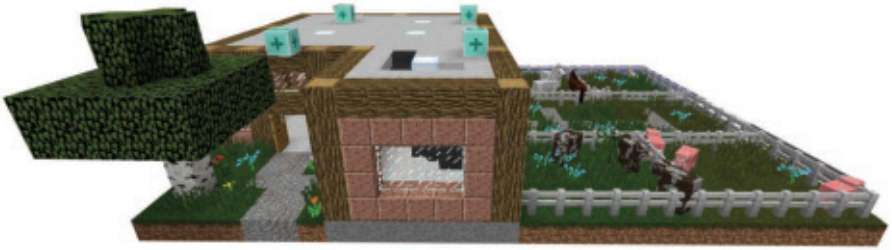
RESOURCES:

7 green res.

GAINS:

3 urban res.

8 gold



DESCRIPTION:

availible, when 28 houses were built

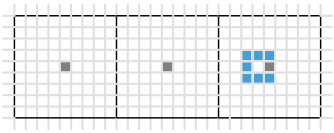
NAME: urban storehouse

ID: #33

FUNCTION: allows player to store items

KEY:

GROUND PLAN:



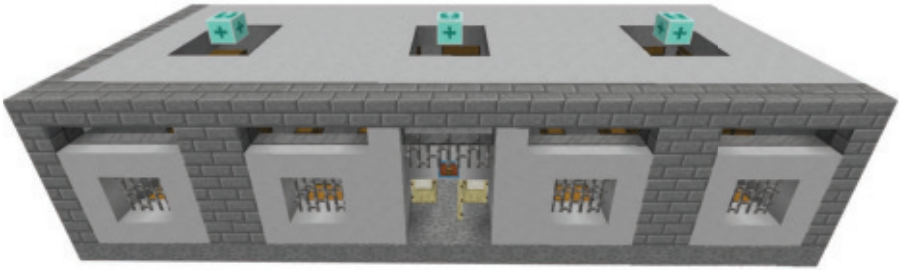
RESOURCES:

7 urban res.

GAINS:

1 green res.

4 gold



DESCRIPTION:

availible, when 20 houses were built

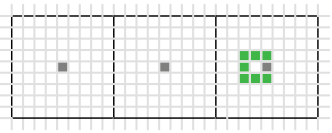
NAME: green storehouse

ID: #34

FUNCTION: allows player to store items

KEY:

GROUND PLAN:



RESOURCES:

7 green res.

GAINS:

1 urban res.
4 gold

DESCRIPTION:

availible, when 20 houses were built

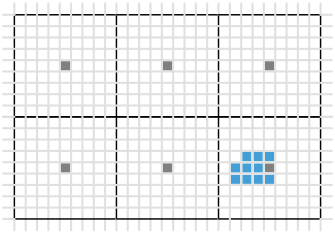
NAME: library

ID: #35

FUNCTION: allows player to upgrade items

KEY:

GROUND PLAN:

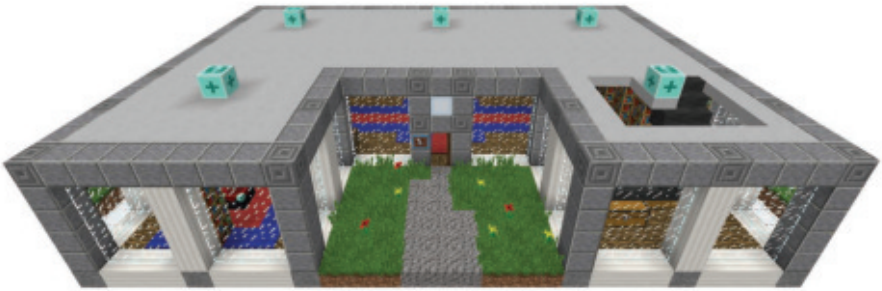


RESOURCES:

10 urban res.

GAINS:

4 green res.
10 gold



DESCRIPTION:

availible, when 35 houses were built

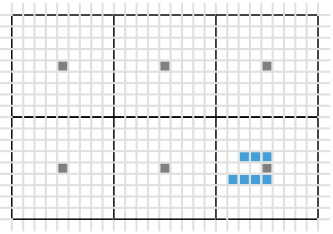
NAME: brewery

ID: #36

FUNCTION: allows player to brew potions

KEY:

GROUND PLAN:



RESOURCES:

7 urban res.

GAINS:

1 green res.
20 gold

DESCRIPTION:

availible, when 40 houses were built

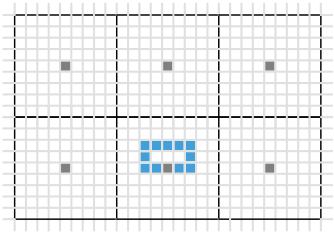
NAME: shop

ID: #37

FUNCTION: allows player to buy resources and see supply status

KEY:

GROUND PLAN:



RESOURCES:

11 urban res.

GAINS:

6 green res.

30 gold

DESCRIPTION:

availible, when 5 modules were built

contains also the trading-NPC

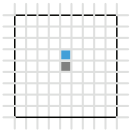
NAME: 1 up

ID: #38

FUNCTION: raises spawnblock by one level

KEY:

GROUND PLAN:

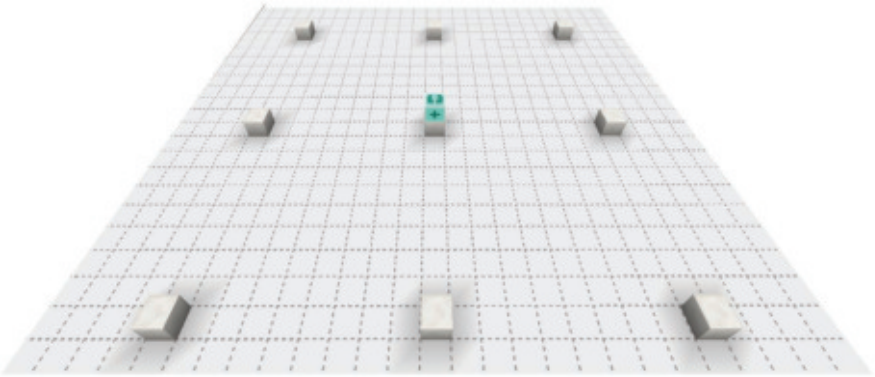


RESOURCES:

1 urban res.

GAINS:

1 urban res.
5 gold



DESCRIPTION:

availible since tutorial

Gives the player the possibility to solve uneven terrain problems.

NAME: teleporter-module

ID: #39

FUNCTION: sets startpoint of building area: places a teleporter and spawnblocks

KEY:

RESOURCES:

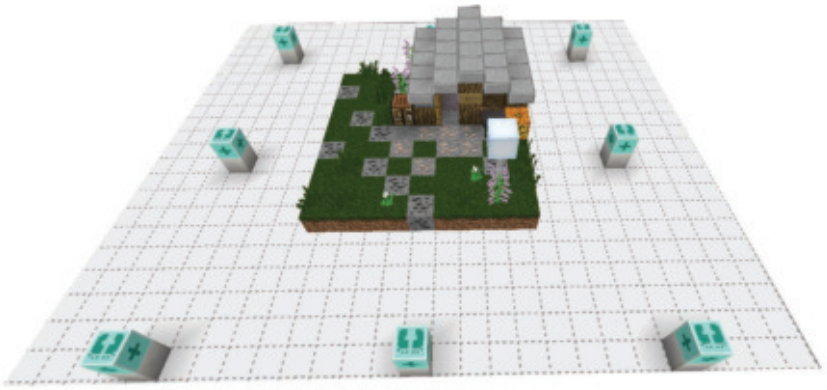
1 teleporter-block

GAINS:

30 urban resource

30 nature resource

50 gold



DESCRIPTION:

Placing one of the teleporter-blocks anywhere on the map will create a new building area with the teleporter-module in the middle, that allows to teleport between the start area and the different building areas.

METHOD - EDUCATIONAL APPROACH

Another goal of our game is that the player can learn about urban planning principles in a playful way. We started with a few principles, which can be added by the NPC-system. These principles orientate on known architectural theorems. If players follow the principles and hints from the NPCs, they receive rewards like gold.

All in all we focus on four points:

separation of functions
- to make a difference between the parts of the city
-> Industry-modules should not be directly close to apartments or parks (Athens Charter)

shading
- all modules should get enough light, air and sun (Athens Charter)

circulation
- all modules should be connected to a street or at least to a square/ park

individualism
- the player gets animated to shape the area around the houses and modificate the houses itself.

Because of our connection to the NPC-system through the website, it is possible to integrate new actual quests with educational contents.

METHOD - ANALYSIS OF GAMEPLAY

We plan to let the game being played by several people to record and analyse the results with the help of charts generated by the modules and the building area.
The idea is to create a programm, that contains amongst other things a matrix that saves the position of every spawn-block of the building area. After the game starts and the building area expands, the new spawned spawn-blocks will be saved in a growing matrix. Even if the modules rise up, they will be connected to it.This matrix can be used to save and get information about every module, which was placed by the player.
In addition to that information about the game balance is saved, like the percentage of the infrastructure or the moments, when the player enters the shop.
The visualized information will be shown and saved on a website, so that either the player can get additional information or we can analyse the urban development progress.

Visualisation of game-information:

3D map

- It shows the idea of the player, in which way he would build a city. It is important to observe, where the player chooses the position of the different kind of modules and their function. The height position of these modules is also interesting.
- Another function is to get a closer view of the ideas of the player how to connect the different parts of the city with street-modules or park-modules. It should also help the player to check where connections are missing.
- The city grows with the activity of the players. To show which part of the city was built first and to analyse the sequence of the growing of the city, they get different colours and brightnesses.

We can also compare the results with known city structures and search for new ones or deviations.

graph

To better analyse the game balance of the played game, the matrix is saving several information and visualize it in a diagram.

- % and amount of parks
- % and amount of infrastructure
- amount of industry
- moment, when player enters shop
- what and when is the player trading
- size of city

FUTURE WORK

necessary next steps:

- program the modification based on this booklet (grammar) and our vocabulary

- developing the website and its components (matrix and visualization for the analysis, NPC-quests for educational purposes, a tutorial)

future work
At this moment, Urban Mineopolis is designed as an urban planning game based on *Minecraft*, with still lots of possibilities to further develop this game. For future work, we can imagine the following things to do:

1. **larger vocabulary**: new modules and even new kinds of modules could be added, and modules could be designed for actual projects.

2. **new map** and new building area: suitable map could be introduced into the game.

3. **tutorial**: a simple and clear tutorial could be added in the game.

4. **multiplayer**: the game could be a multiplayer game, and more functions such as PVP system could be developed.

5: **module combination**: with better solution, different modules would be freely combined with each other. There would not be overlapping walls or circulation problems.

6. **adaptation to terrain**: modules would be able to adapt to all different kinds of building areas. Height difference could be solved easily.

7. more new functions: i.e. - undo function
- fast destroy function

NOTES

SOURCE DIRECTORY

background

http://www.20000blocks.com/play.html

references

Blockhood

https://www.plethora-project.com/blockhood/

Cities Skylines

http://www.playpcesor.com/2015/03/cities-skylines.html

Block by Block

https://sketchfab.com/models/ea3af1253ae641558c-2cb0ab37e55d6a
https://blockbyblock.org/portfolio-posts/dandora-nairobi-kenya/
https://blockbyblock.org/portfolio-posts/end-street-north-park-johannesburg-south-africa/

NPC

https://mods.curse.com/mc-mods/minecraft/225810-custom-trades-mod
(modified)

(all sources retrieved on 06.06.2017)

URBAN MINEOPOLIS