



JASPER VAN BEUSEKOM
PIET DE KOK
VERA LENSVELT
CATALINA GORMAZ PEÑA

Final Presentation

Spacial Computing for Architectural Design
BK7083



Index

Context

- I - Getting Started
- II - Context
- III - Configuration
- IV - Procedural Model
- V - Designing

Introduction

I - Getting Started

- Rotterdam Site
- Innovative building design
 - Procedural generation
 - Design Requirements

Requirements

I - Getting Started

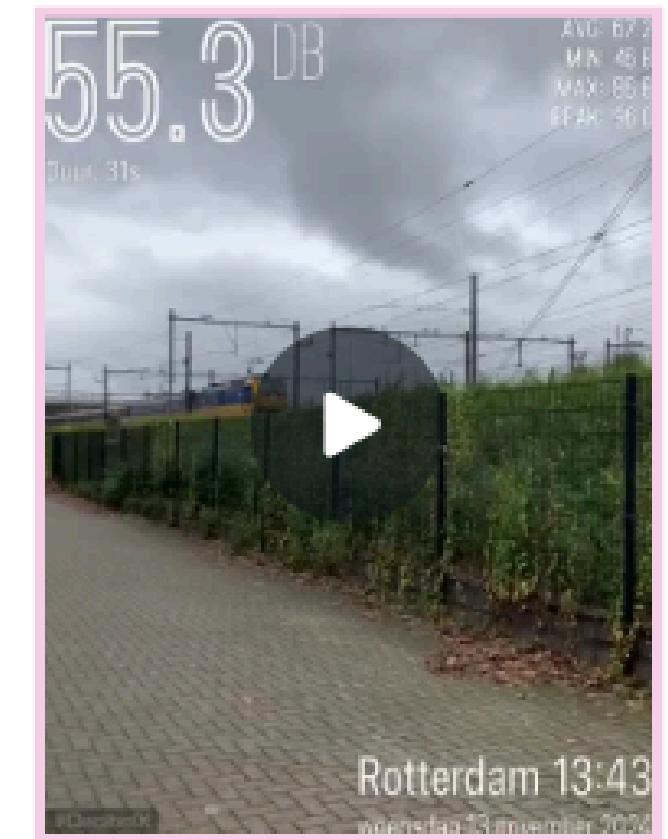
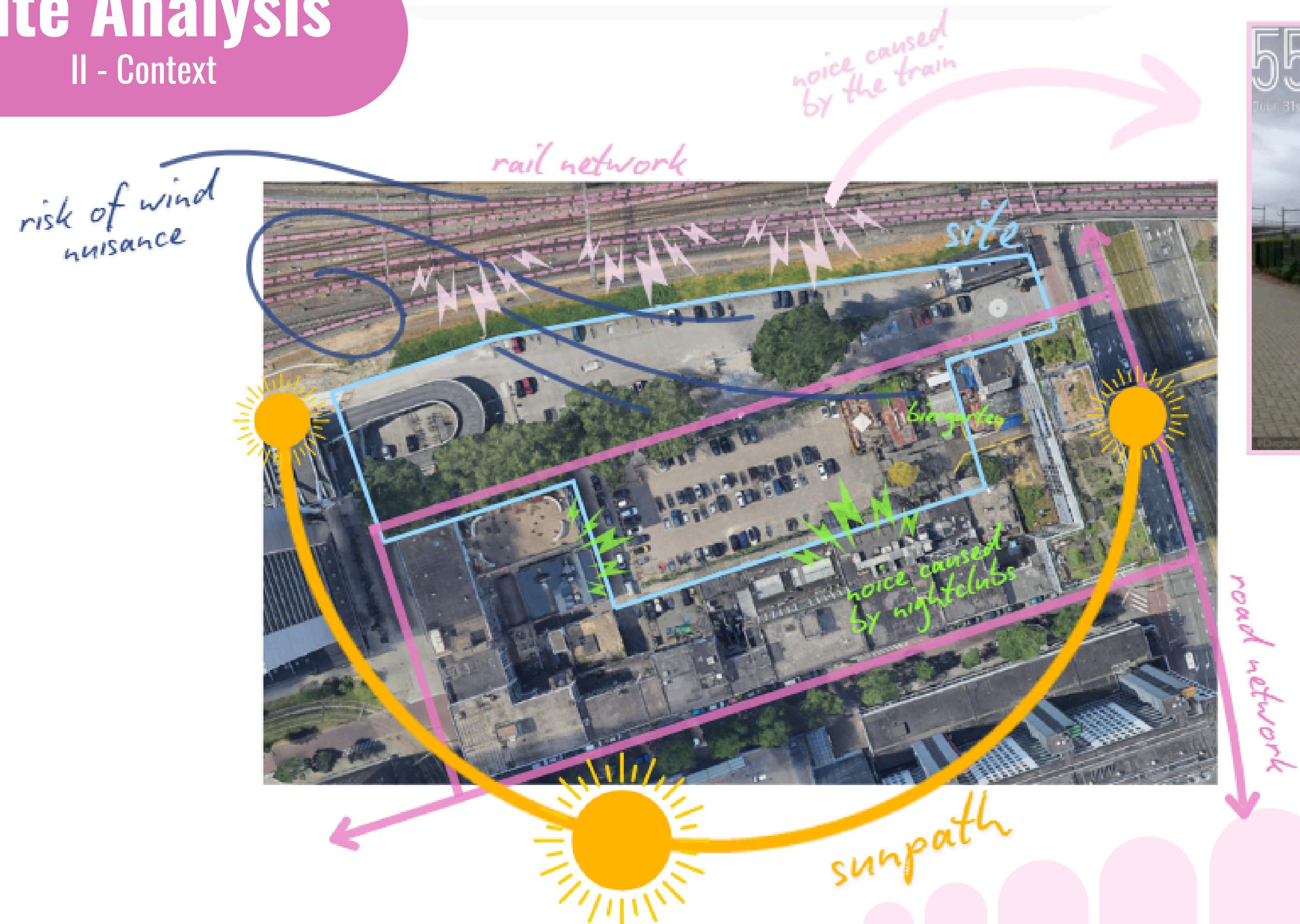
Student housing	400 units	Minimum of 25 m ² per student, windows with daylight, at least 5 m ² of outdoor space
Elderly units	200 units	Between 50 to 80 m ² , single leveled, accessible by elevator and wheelchair, exterior space with sunlight of min 5 m ² , assisted living units must be close to healthcare. Windows with daylight, housing larger than 40 m ² need at least 5 m ² of outdoor space
Start-up units	200 units	Windows with daylight, housing larger than 40 m ² need at least 5 m ² of outdoor space
Parking spots	car and bike	1.33 bike parking spot per resident, 0.8 car parking spot per dwelling (only accessible for residents) 10 bike parking spots and 4 car parking spot per 200 m ² of other programs (publicly accessible)
Greener	Approx. 8000m ²	Equals to the total surface of the plot
System for rain harvesting		At least be able to collect and store rainwater from the site/neighborhood, part of stores water should be reused by the building complex
Solar power		Enough capacity to light the public spaces
Public spaces		No blind facades on ground floor level, inner courtyards or corridors should be visible from at least a few dwellings

II - Context



Site Analysis

II - Context



Site Analysis

II - Context



User Scenarios

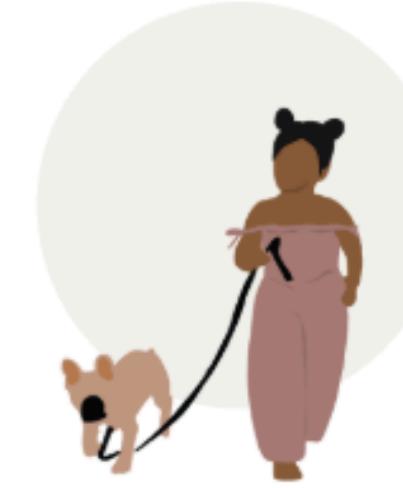
II - Context

- Student: Charlie
- Starter: Bas
- Elderly: Jan



Design Goals

II - Context



Create an integrated and active lifestyle for elderly

Communal spaces for students

Incorporate facilities for growing families

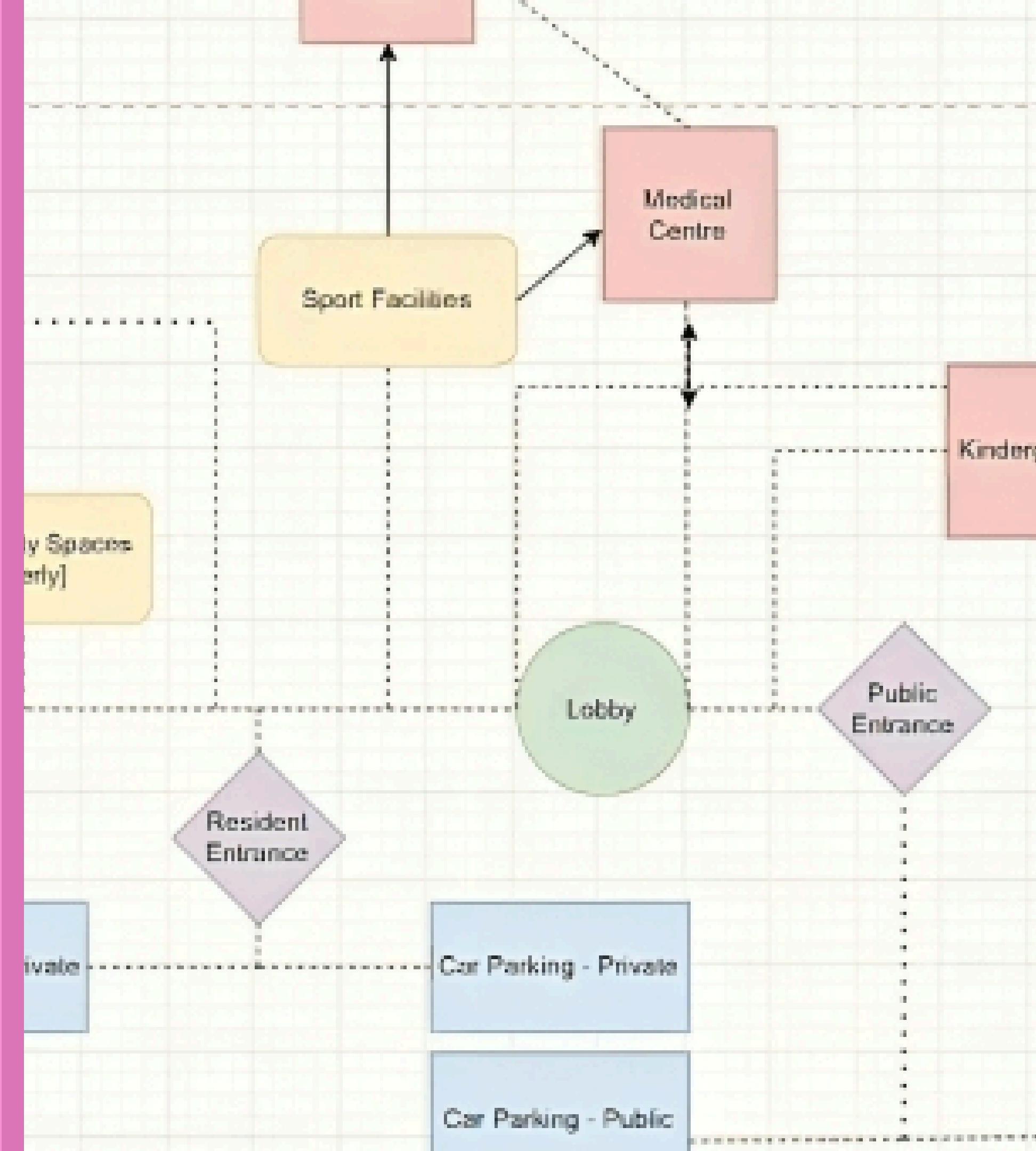
Provide 8000 m² of outdoor space

Functions

II - Context

- Elderly Housing
- Starter Housing
- Student Housing
- Bike / Car Parking
- Sport Facilities
- Kindergarten
- Garden
- Care Centre
- Physical Therapy Centre
- Working Spaces
- Art Studio
- Library / Cafe
- Elderly Community Space
- Starter/Student Community Space
- Laundry

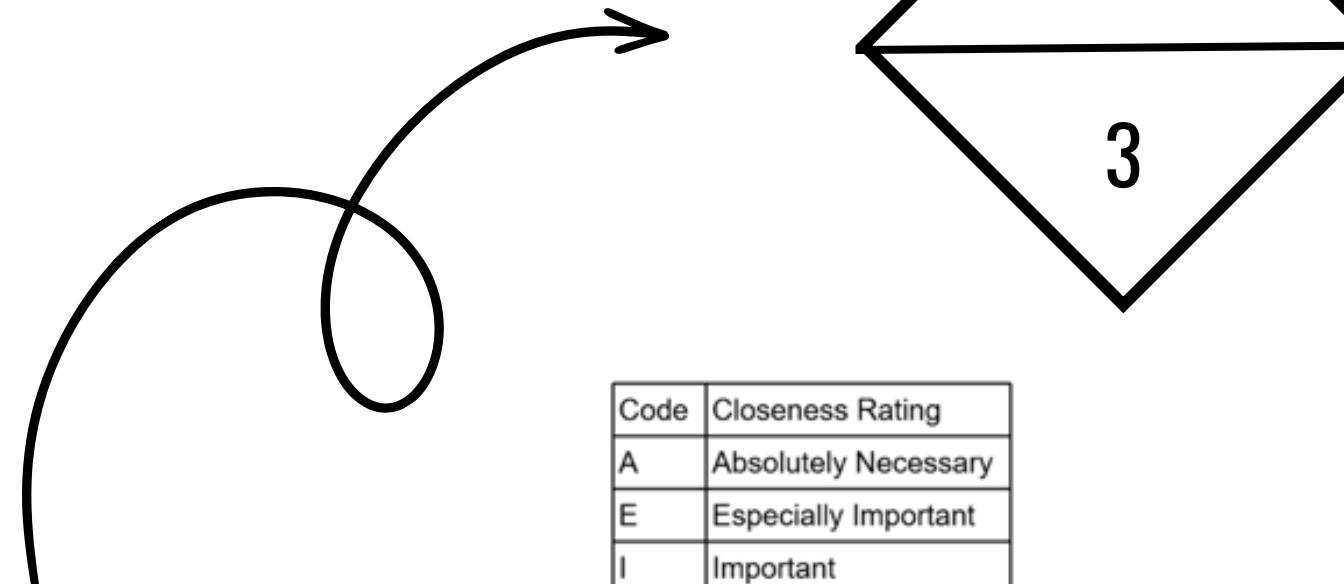
III - Configuration



REL Chart

III - Configuration

Student Housing	I
Elderly Housing	I E A
Starter Housing	E I O
Car Parking - Private	I O E
Bike Parking - Private	E I O X
Car Parking - Public	E I O U O I
Bike Parking - Public	E I O U O I E
Sport Facilities	E I O A I E O U
Kindergarten	E I A E O U O I O E
City Garden	E I A O U O I O E
Care Centre	A I E U O U O I O E
Physical Therapy Centre	E I O U O I O U O E
Working Places	E I O U X O I O U O E
Art Studio	O I E O I E
Library Cafe	E I O U O I O U O E
Community Space Student - Starter	E I O U O I O U O E
Community Space - Elderly	E I O U O I O U O E
Laundry	I

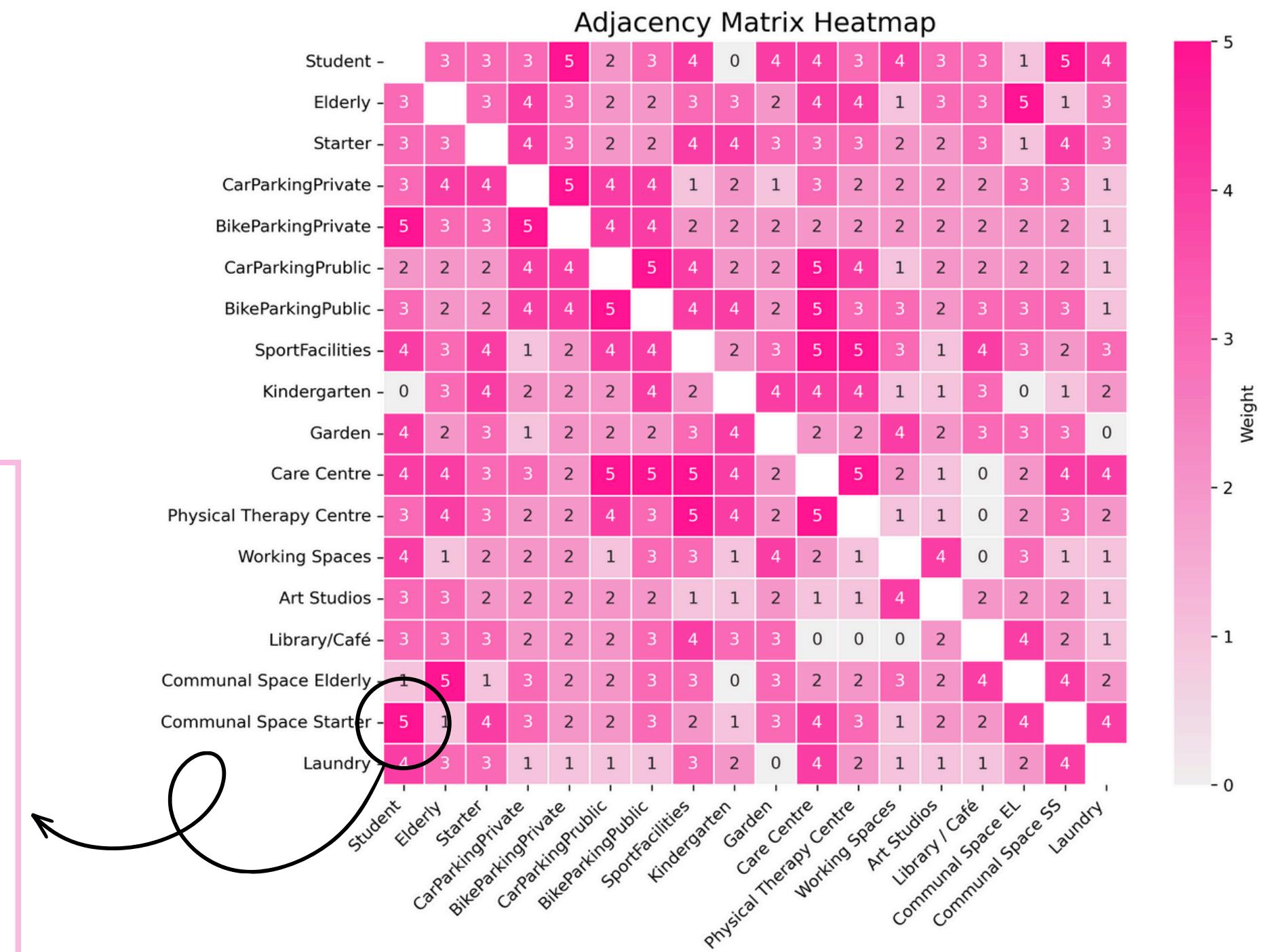
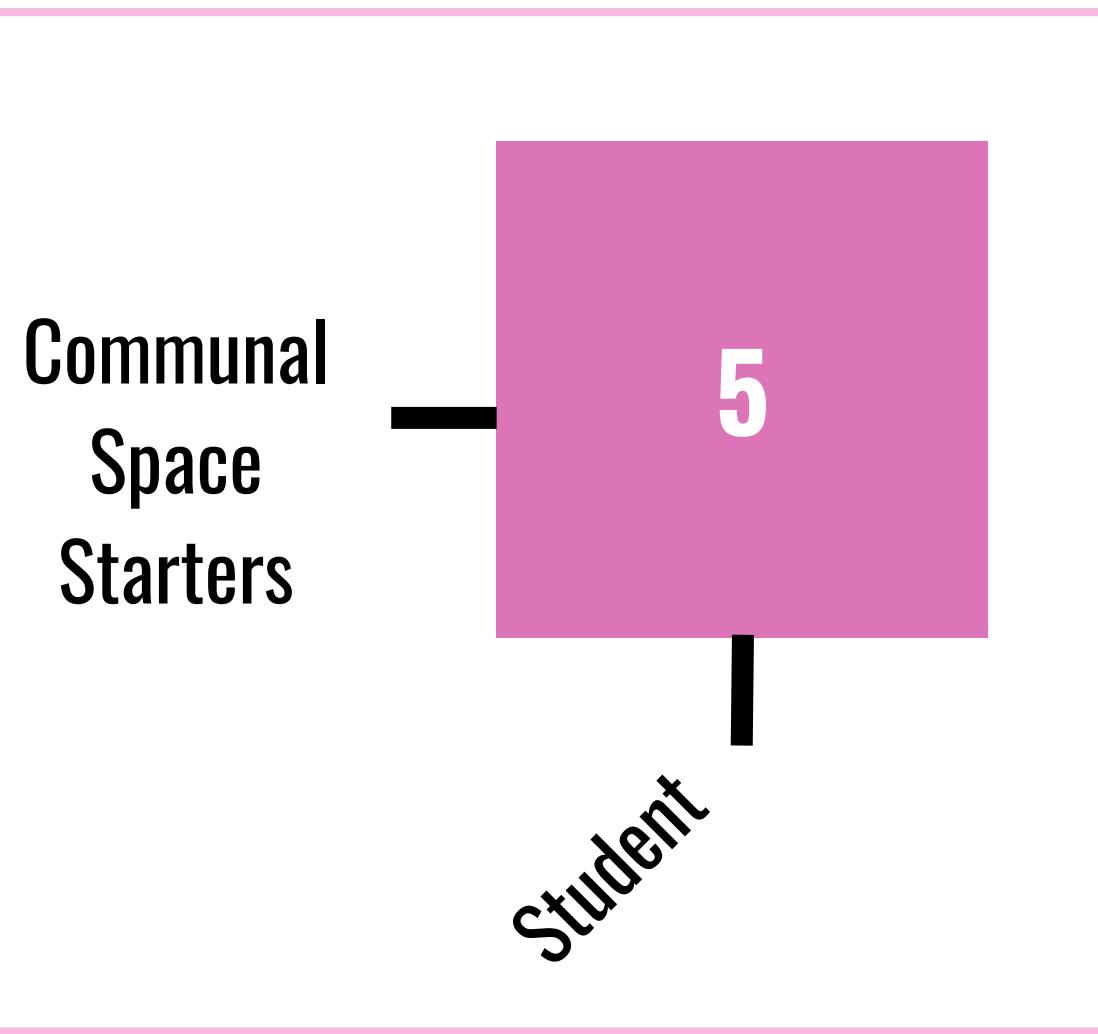


Code	Closeness Rating
A	Absolutely Necessary
E	Especially Important
I	Important
O	Ordinary Closeness
U	Unnecessary
X	Avoid Closeness

Code	Reasoning
1	Social
2	Efficiency
3	Noise Pollution
4	Function
5	Healthcare
6	Aesthetic
7	Safety

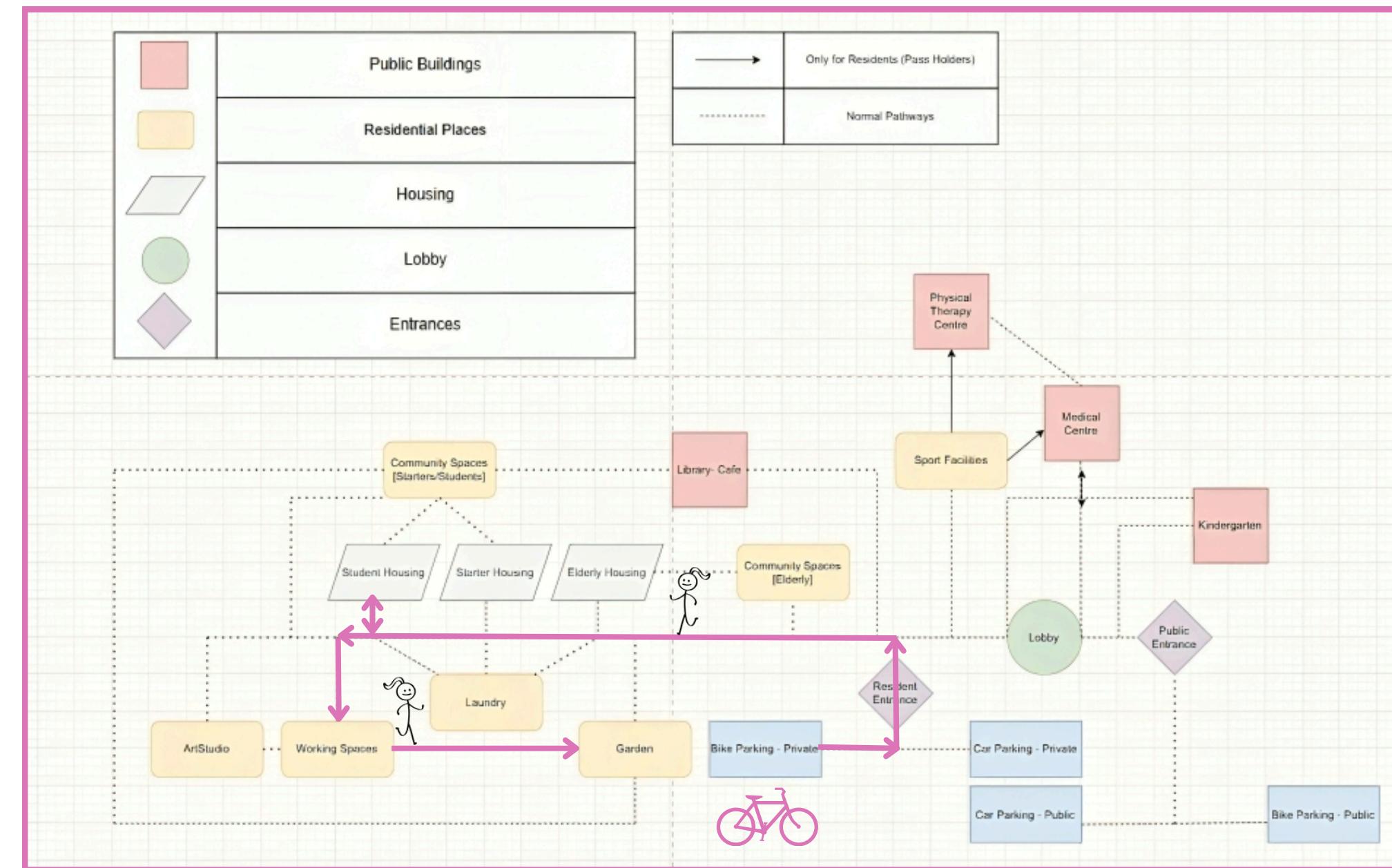
Adjacency Matrix

III - Configuration

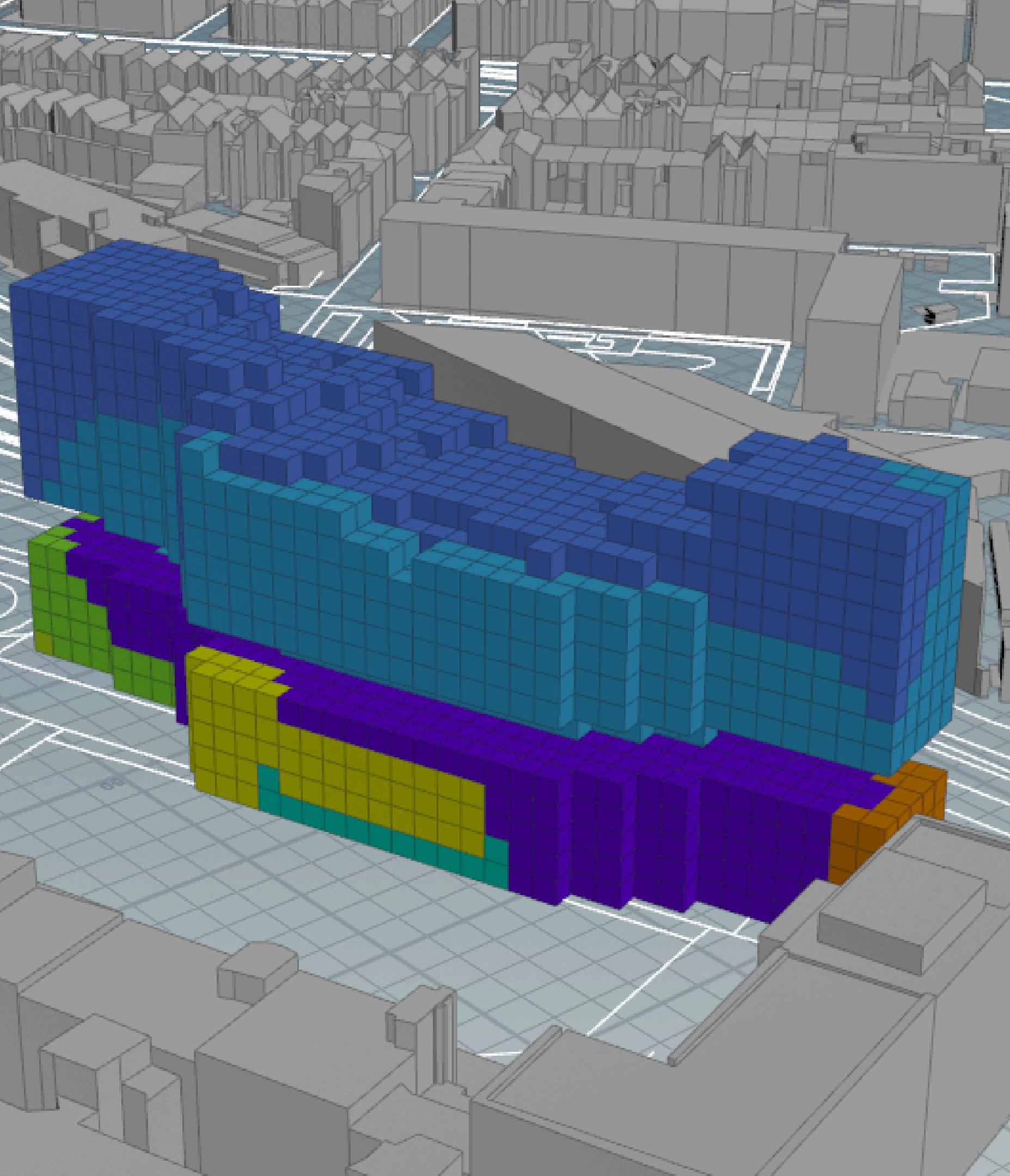


Metro Network

III - Configuration



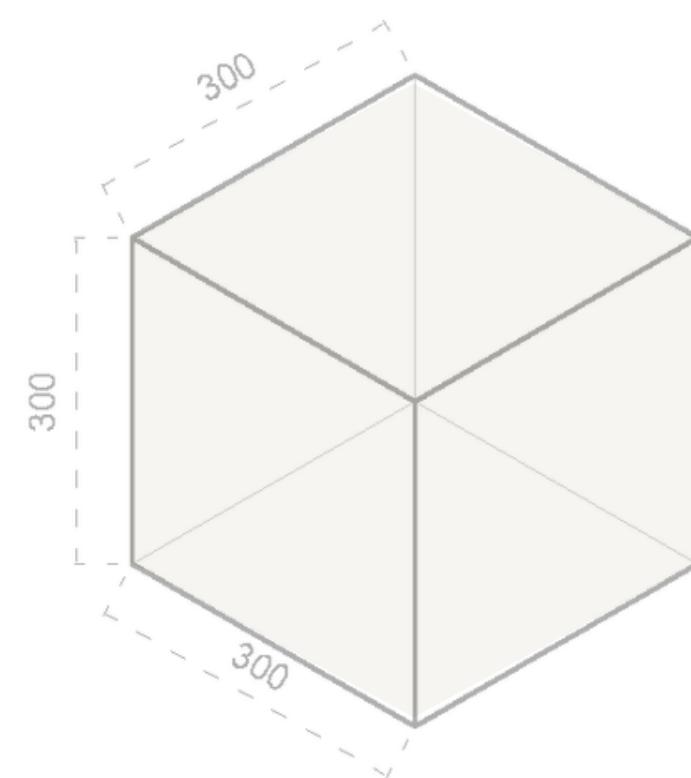
IV - Procedural model



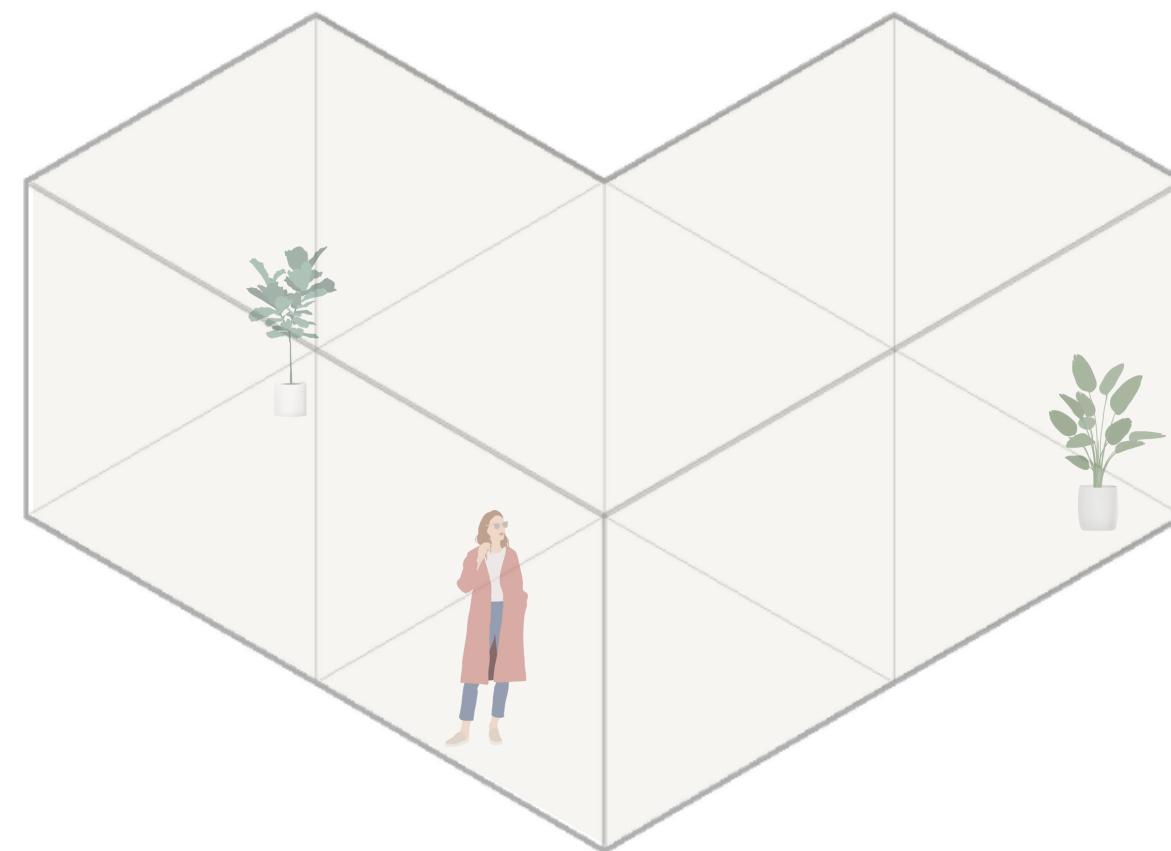
Voxelisation

IV - Procedural Model

- Using a grid
- Benefits
- The model
- Voxel size

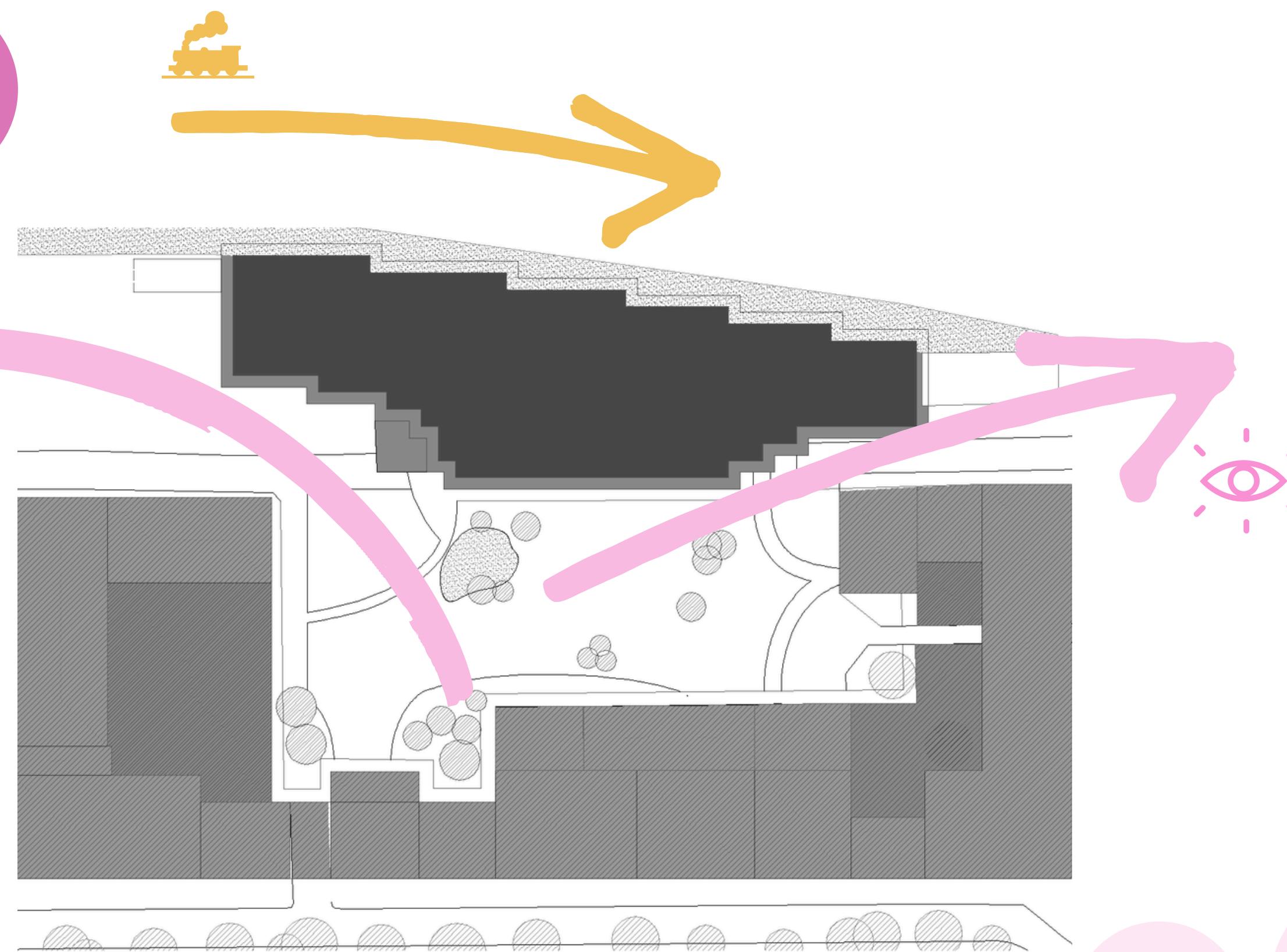


Example of aleatory configuration of a room
(27m²)



Base Shape

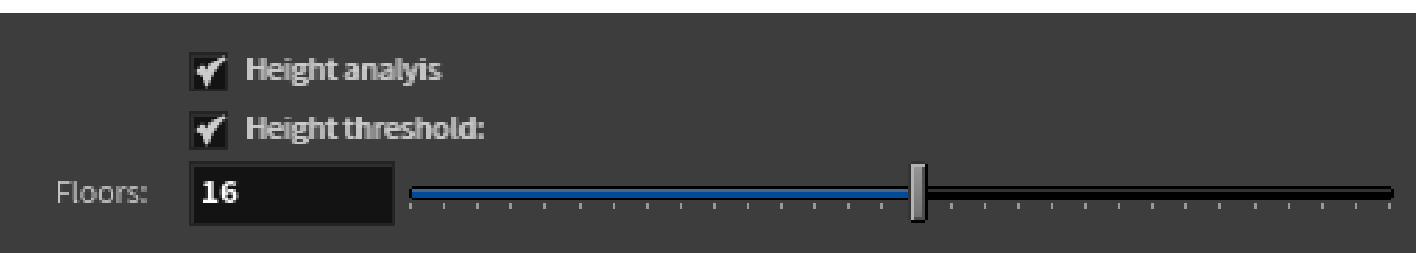
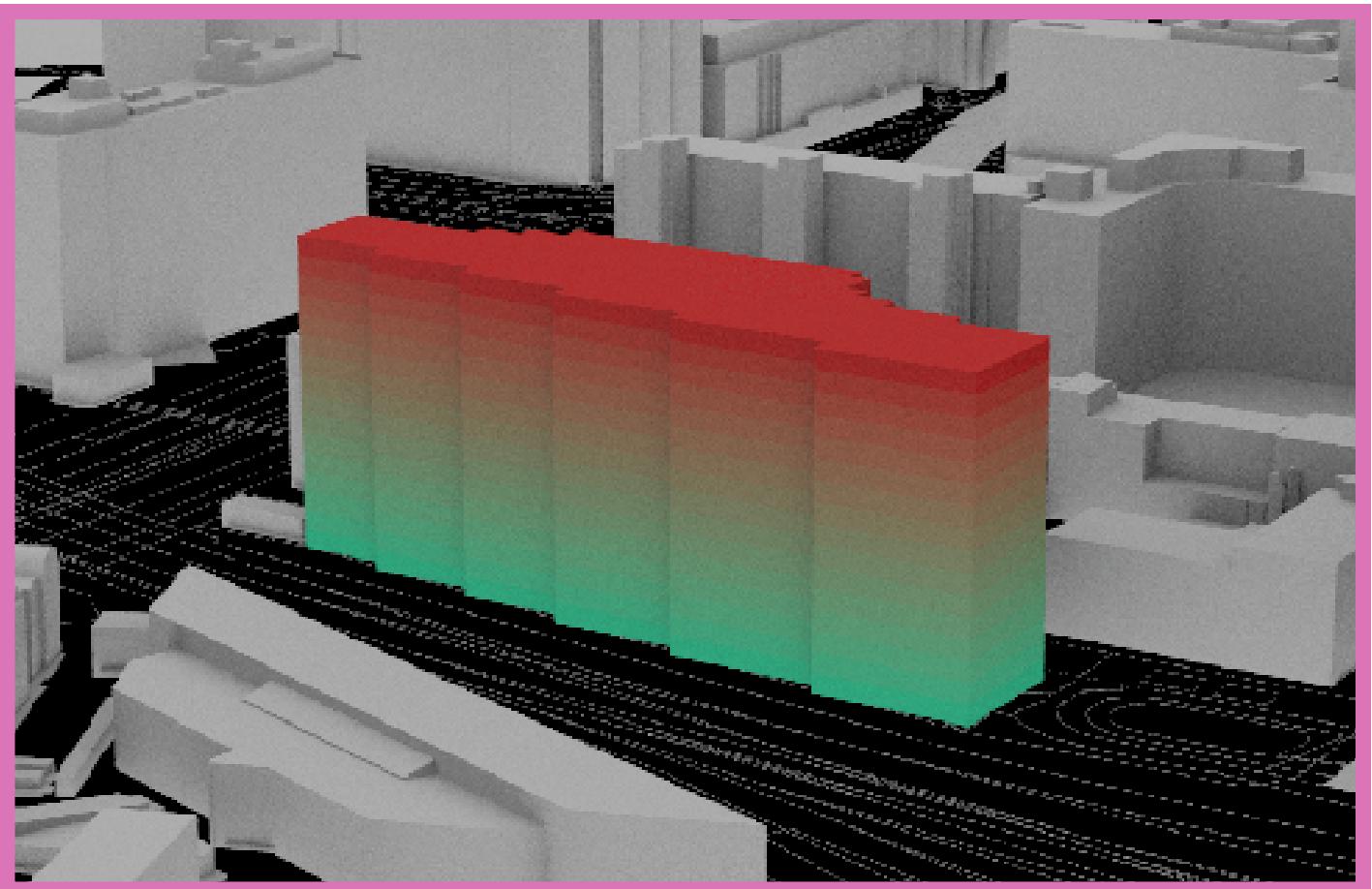
IV - Procedural Model



Height Analysis

IV - Procedural Model

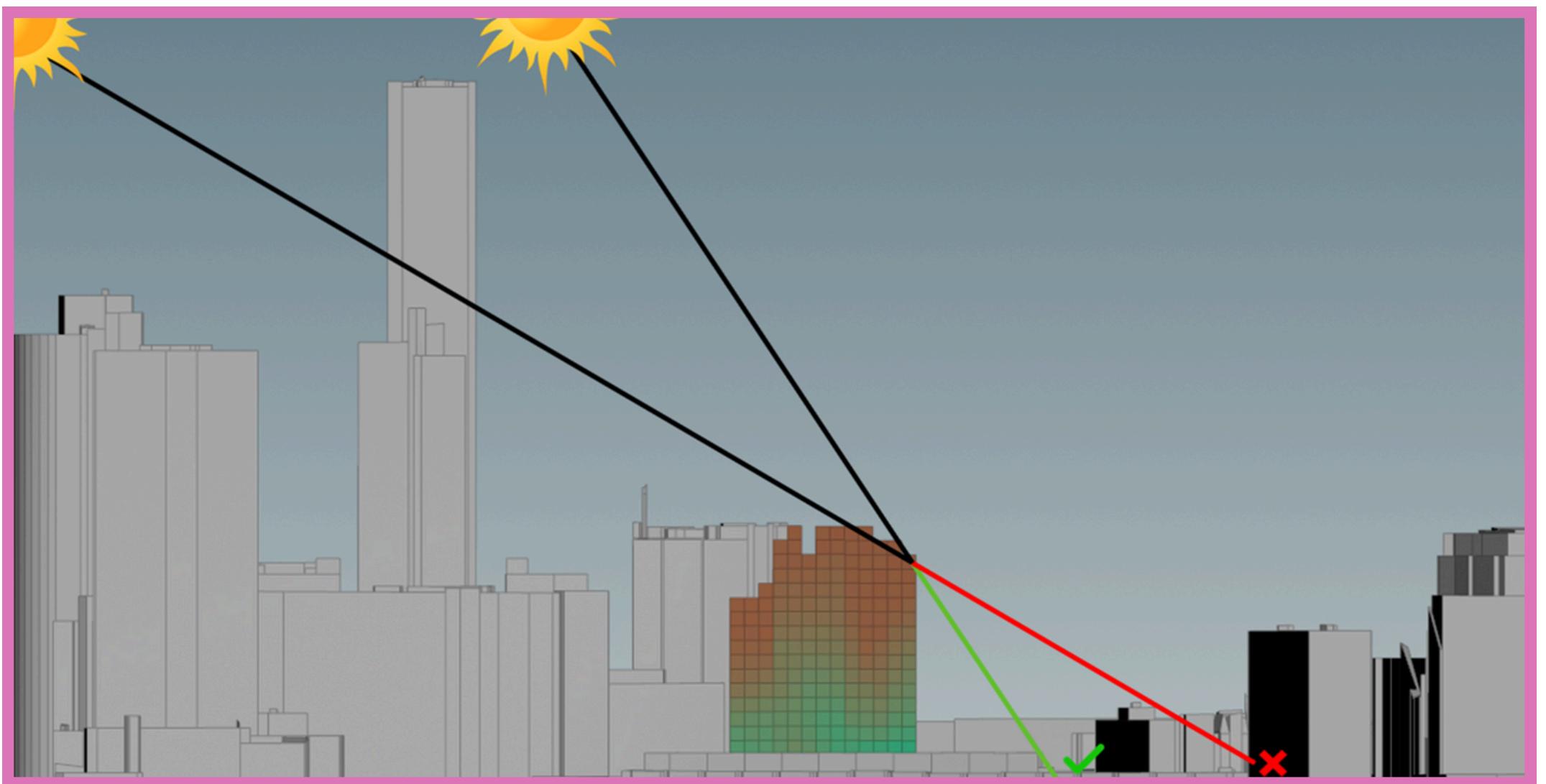
- Influences envelope and growing
- Based on y-axis

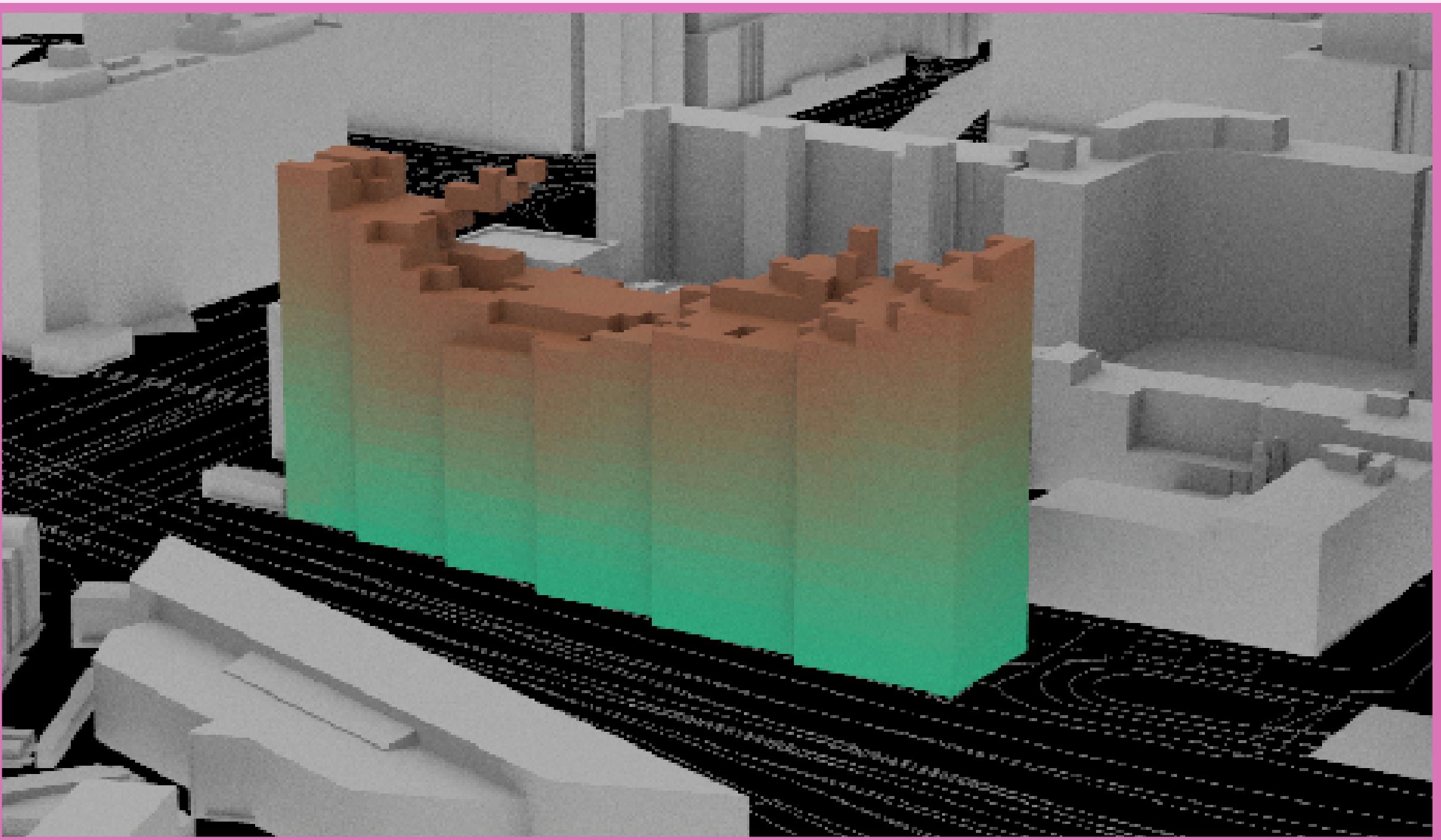


Shadow Casting

IV - Procedural Model

- Influences envelope
- Calculations
- Threshold





Shadowcasting analysis

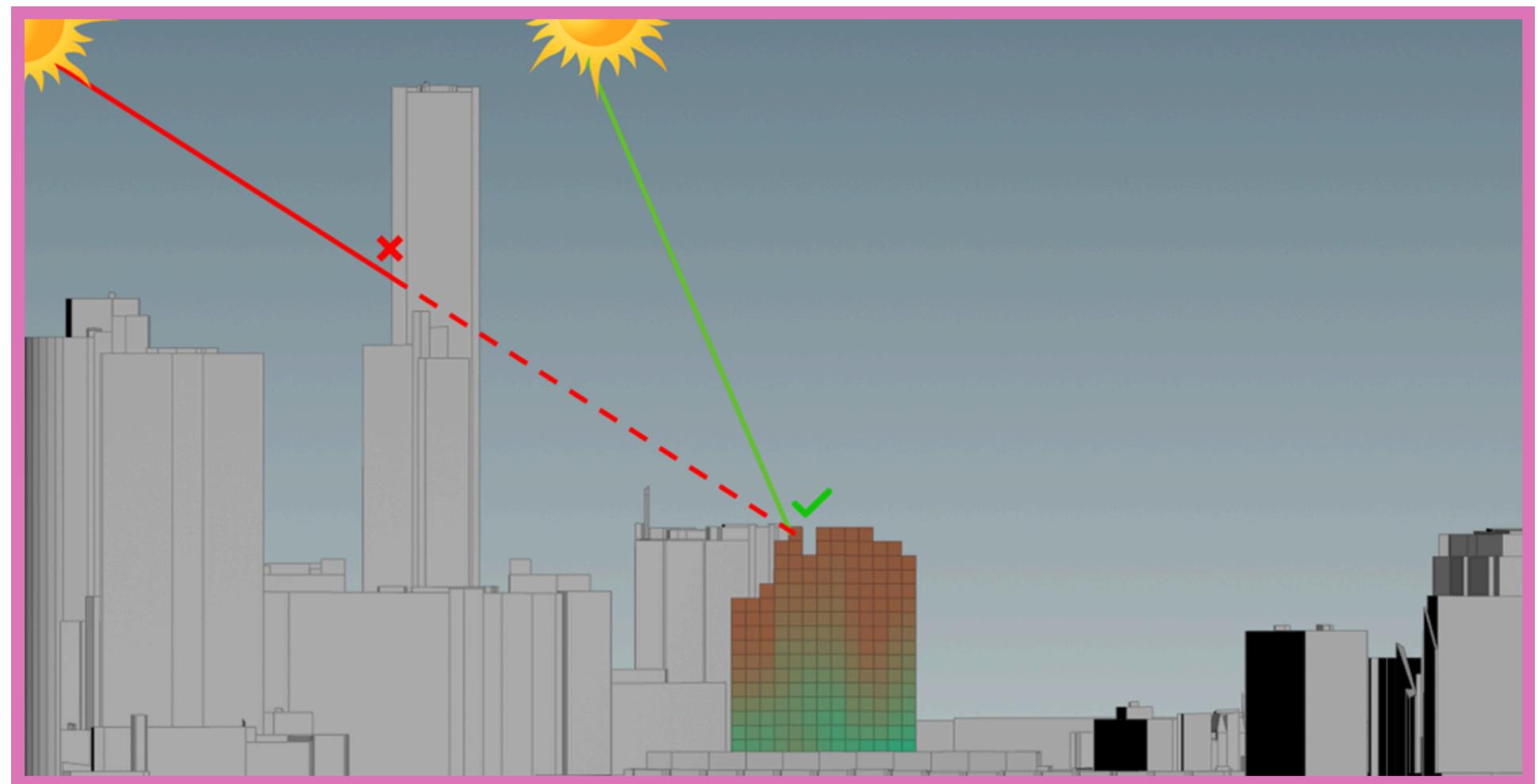
Threshold:

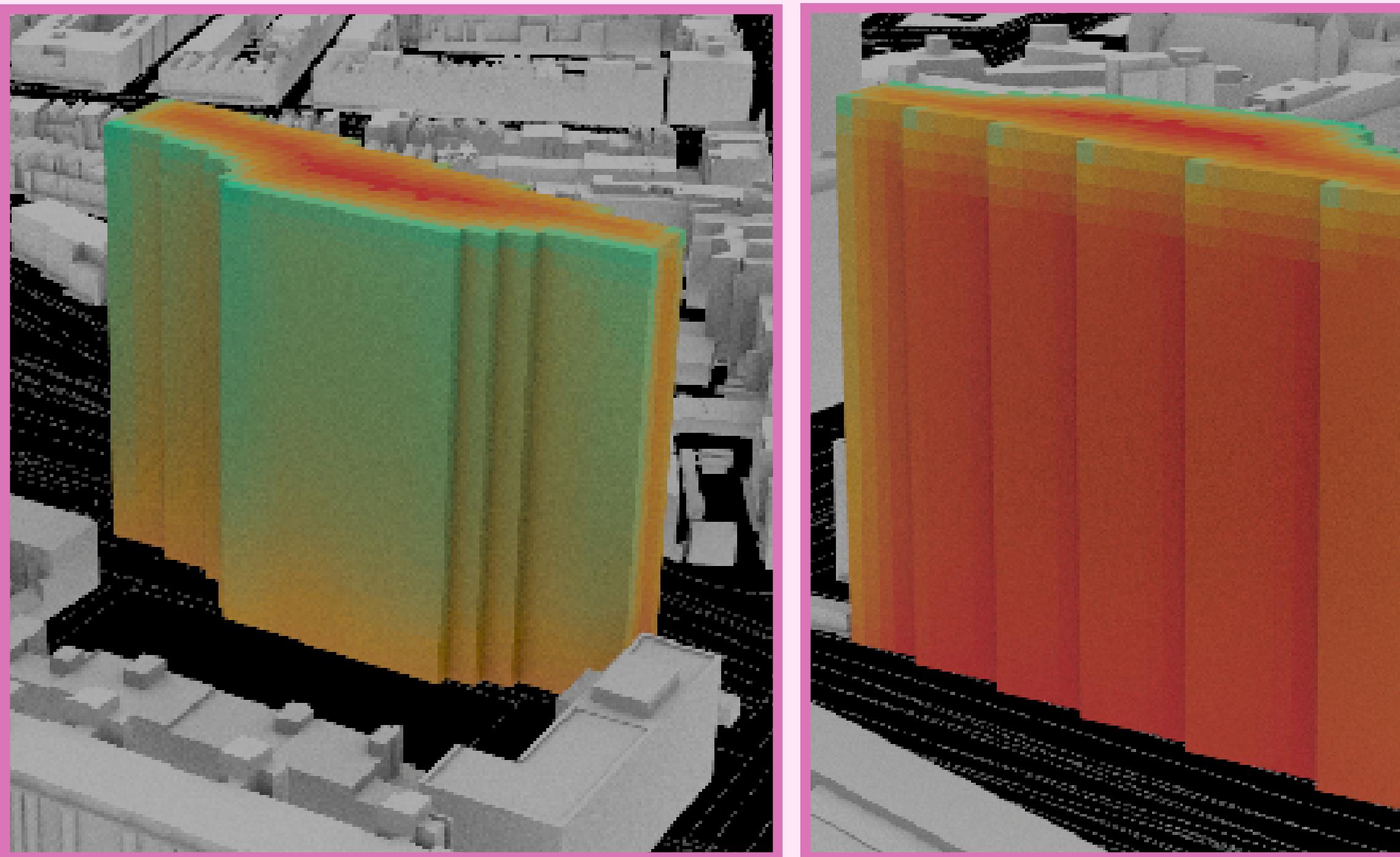
0.73

Sunlight Analysis

IV - Procedural Model

- Influences growing
- Calculations
- Falloff





Sunlight analysis

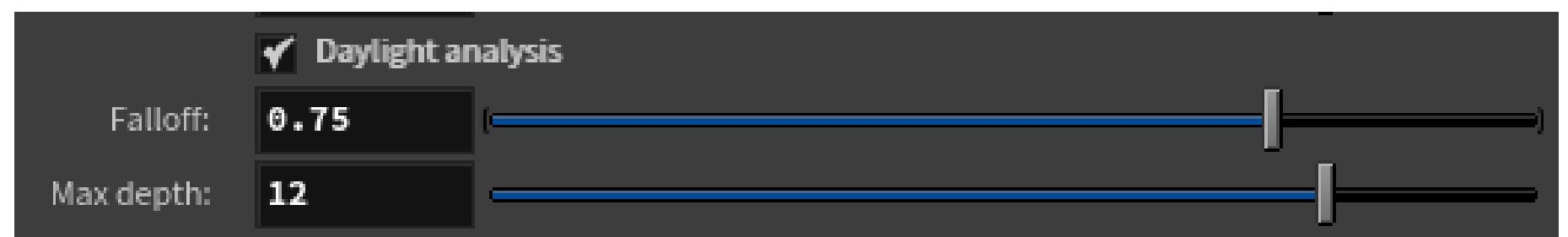
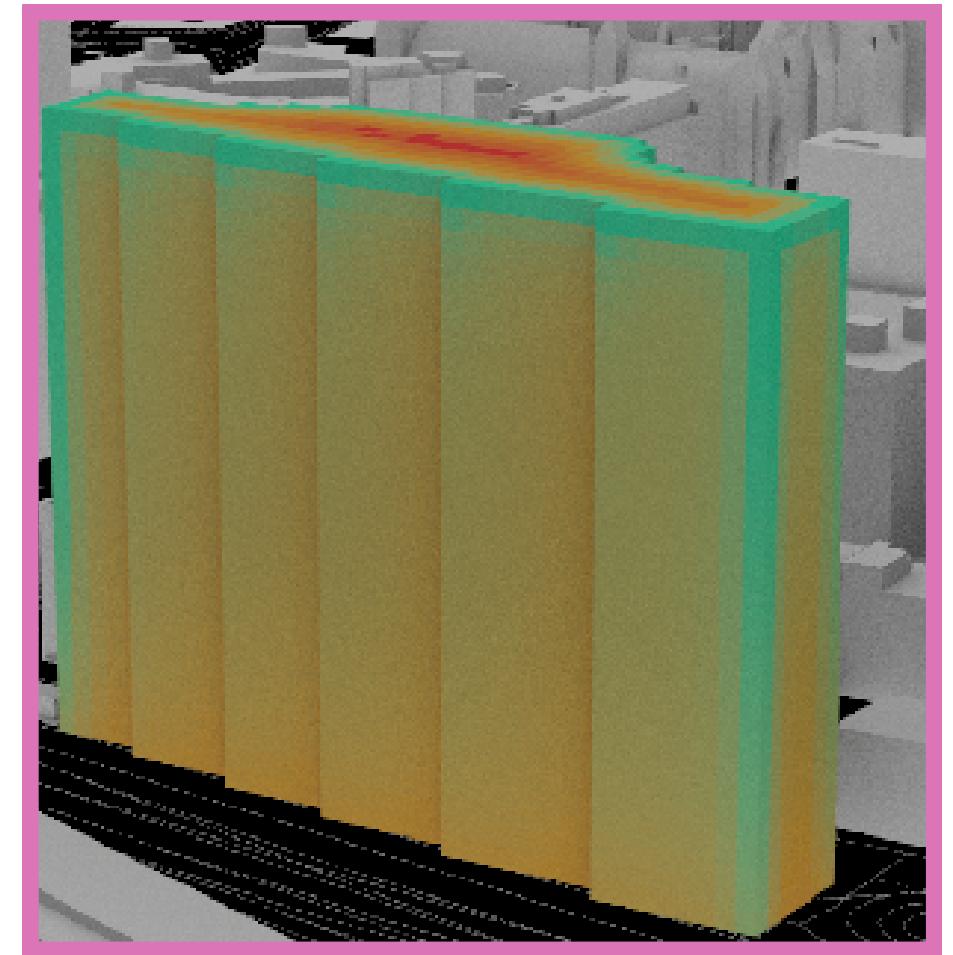
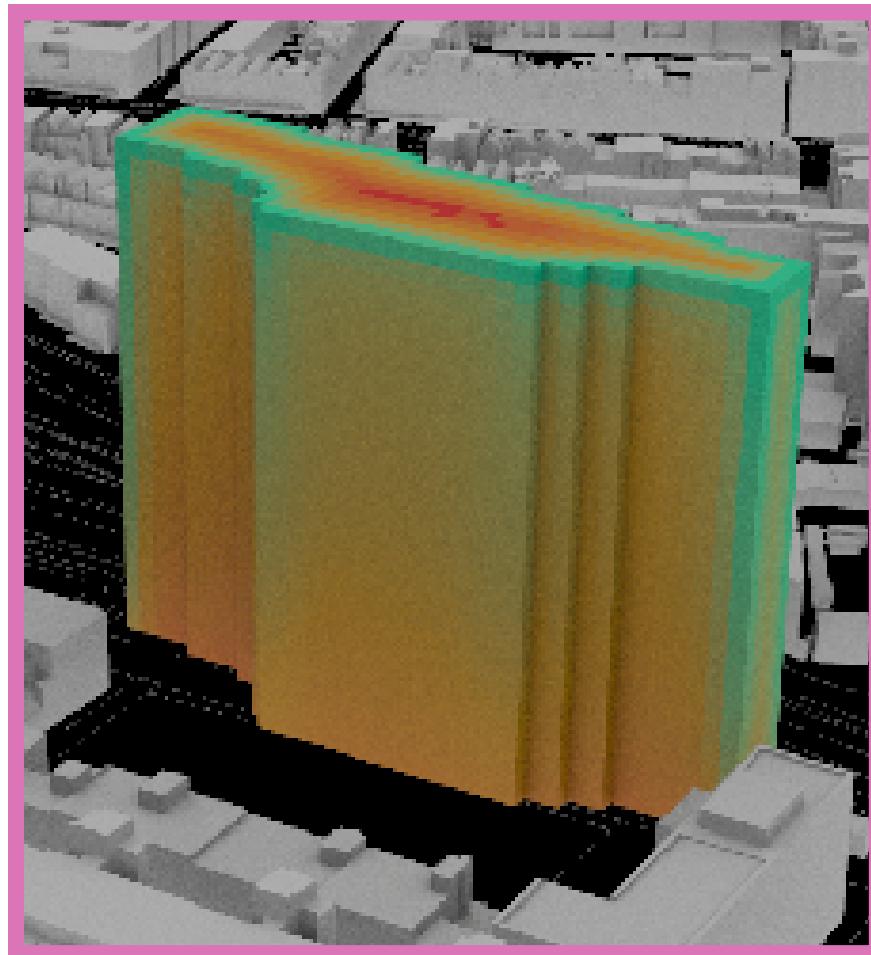
Falloff:

Max depth:

Daylight Analysis

IV - Procedural Model

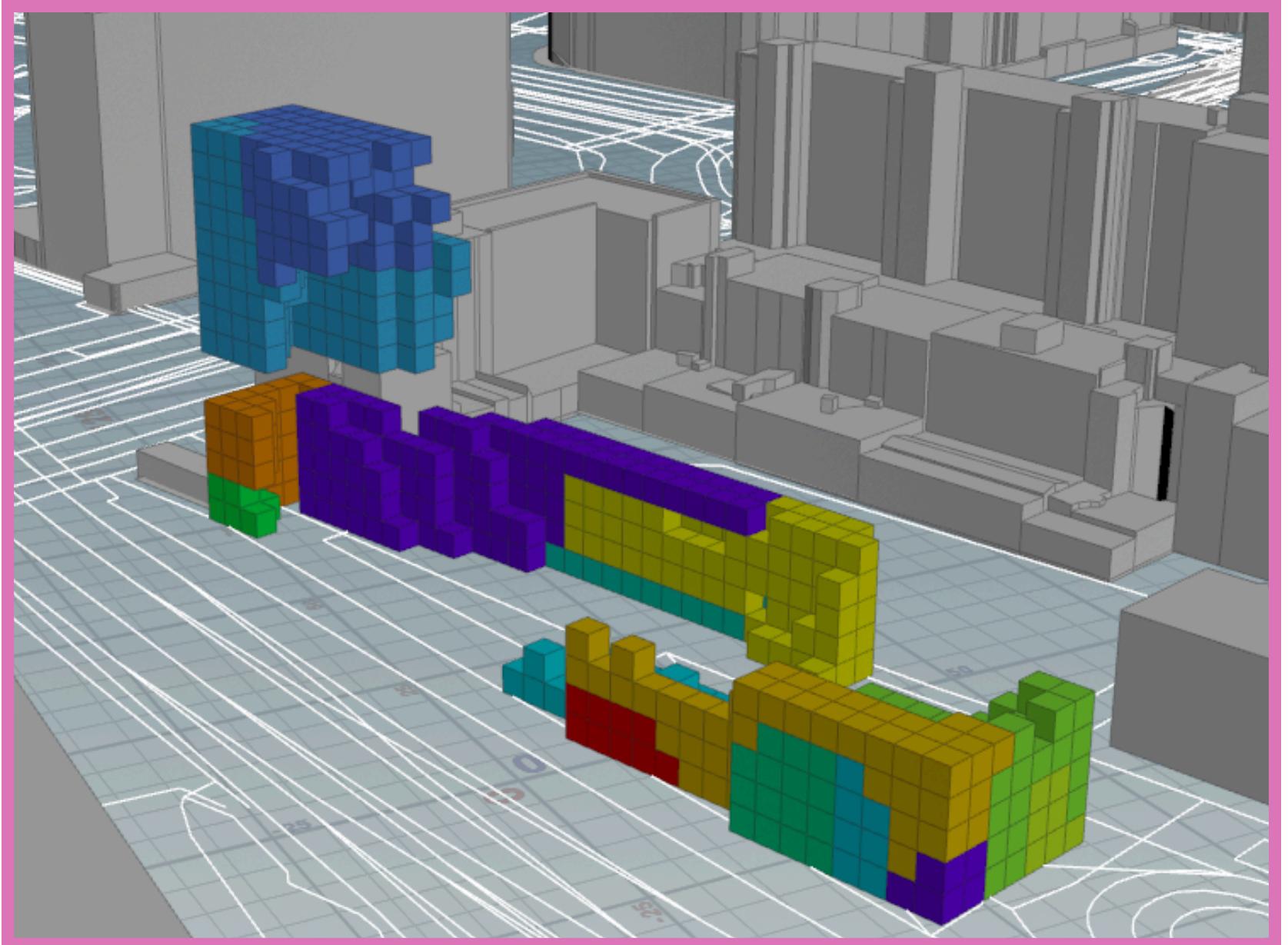
- Influences growing
- Similar to sunlight
- Falloff



Growing Algorithm

IV - Procedural Model

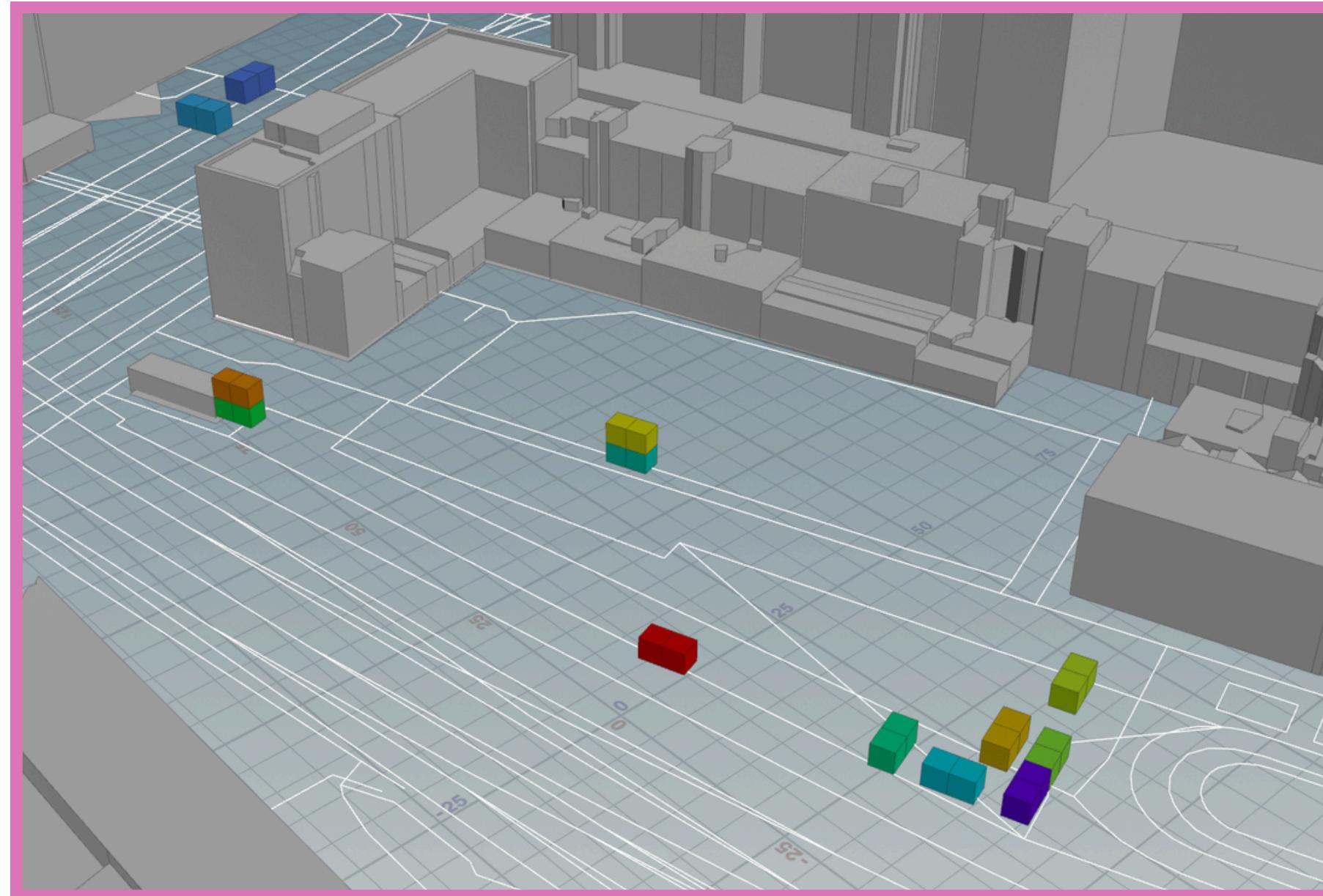
- Purpose
- Fitness
- Finding seeds
- Growing
- Features



Growing Algorithm

IV - Procedural Model

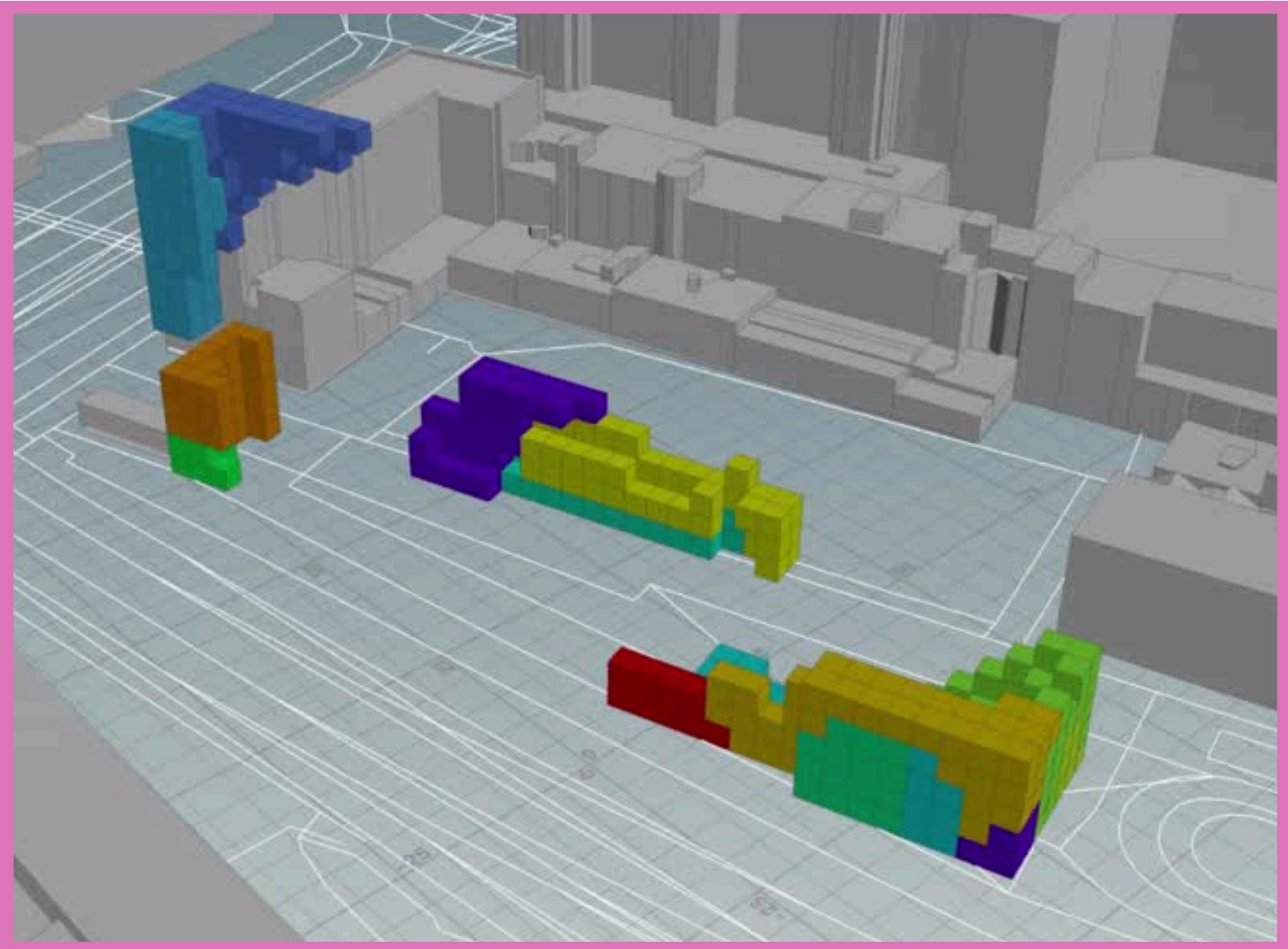
- Purpose
- Fitness
- Finding seeds
- Growing
- Features



Growing Algorithm

IV - Procedural Model

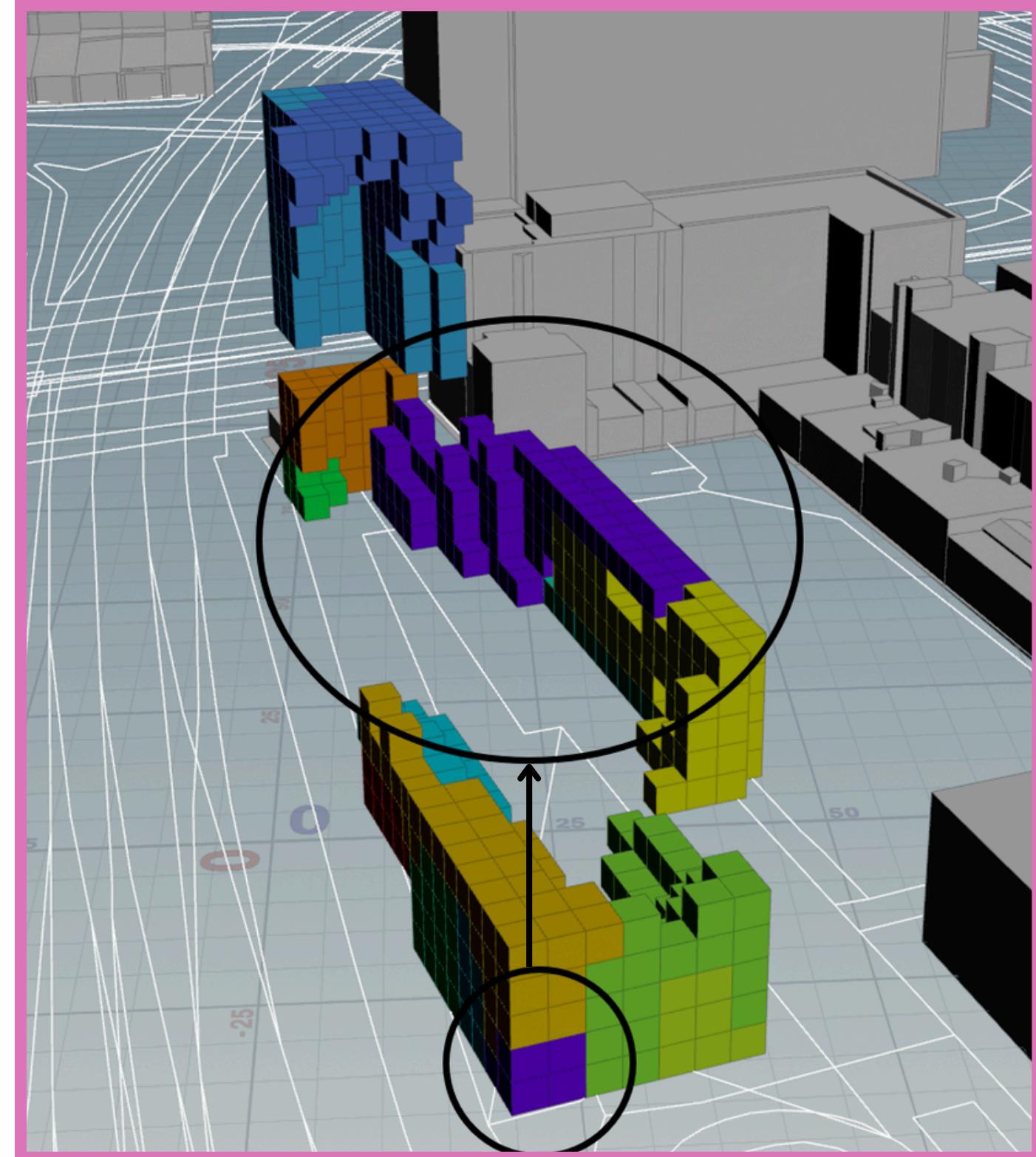
- Purpose
- Fitness
- Finding seeds
- Growing
- Features



Growing Algorithm

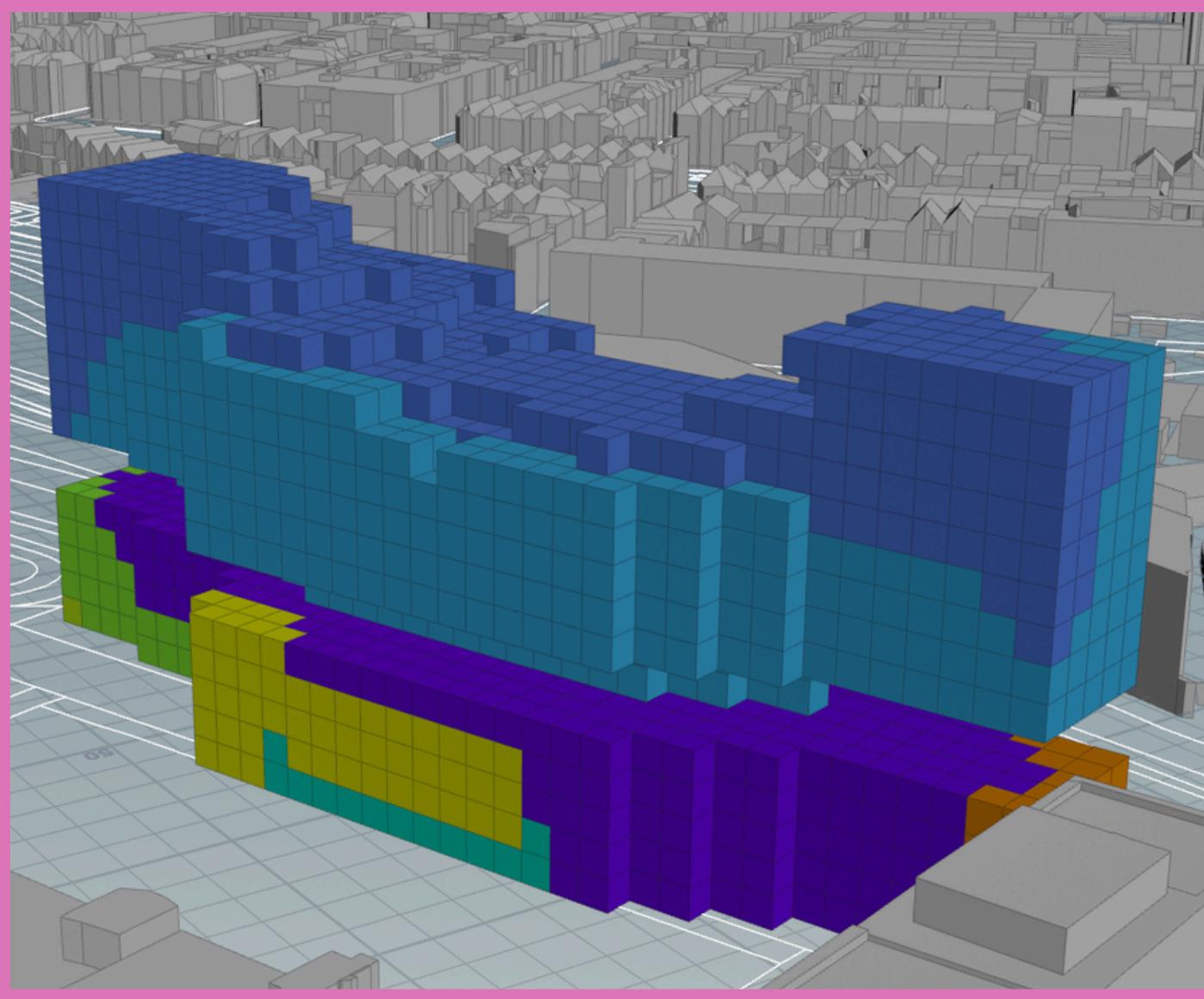
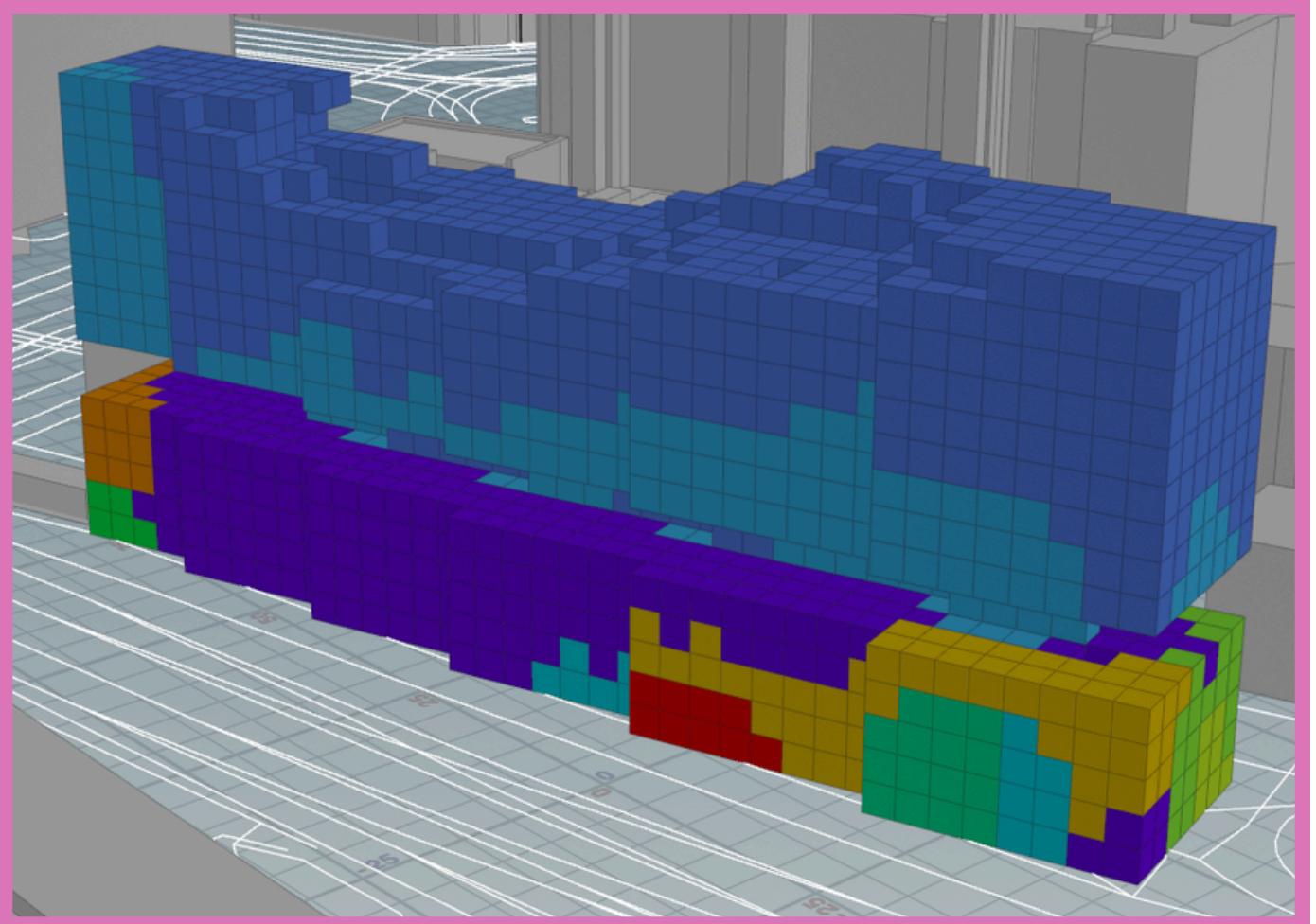
IV - Procedural Model

- Purpose
- Fitness
- Finding seeds
- Growing
- Features



Final functions

IV - Procedural Model



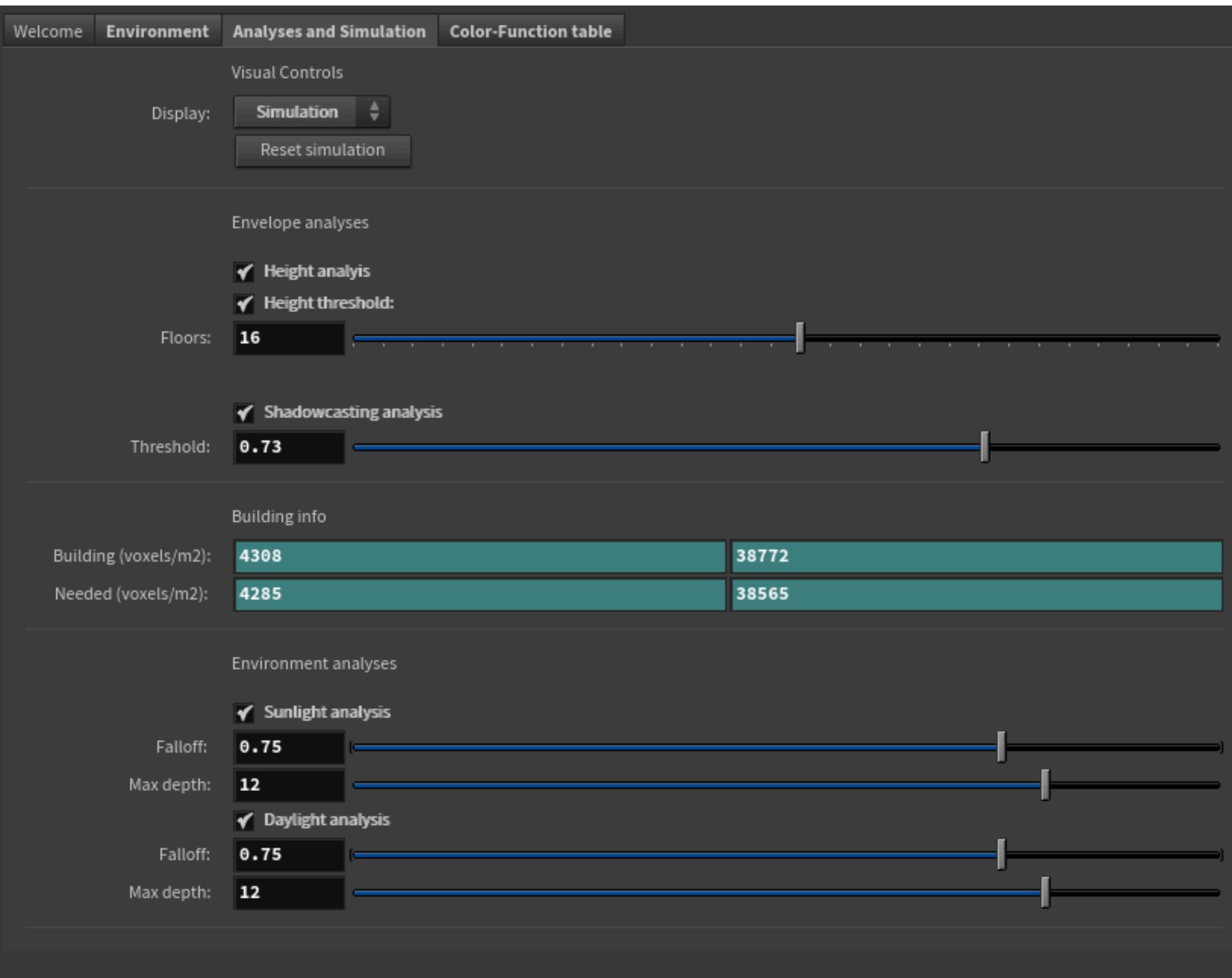
student_housing	
starter_housing	
elderly_housing	
sportfacilities	
kindergarten	
care_centre	
physical_therapy_centre	

working_places	
artstudios	
library_cafe	
community_spaces_student_starters	
community_spaces_elderly	
laundry_room	

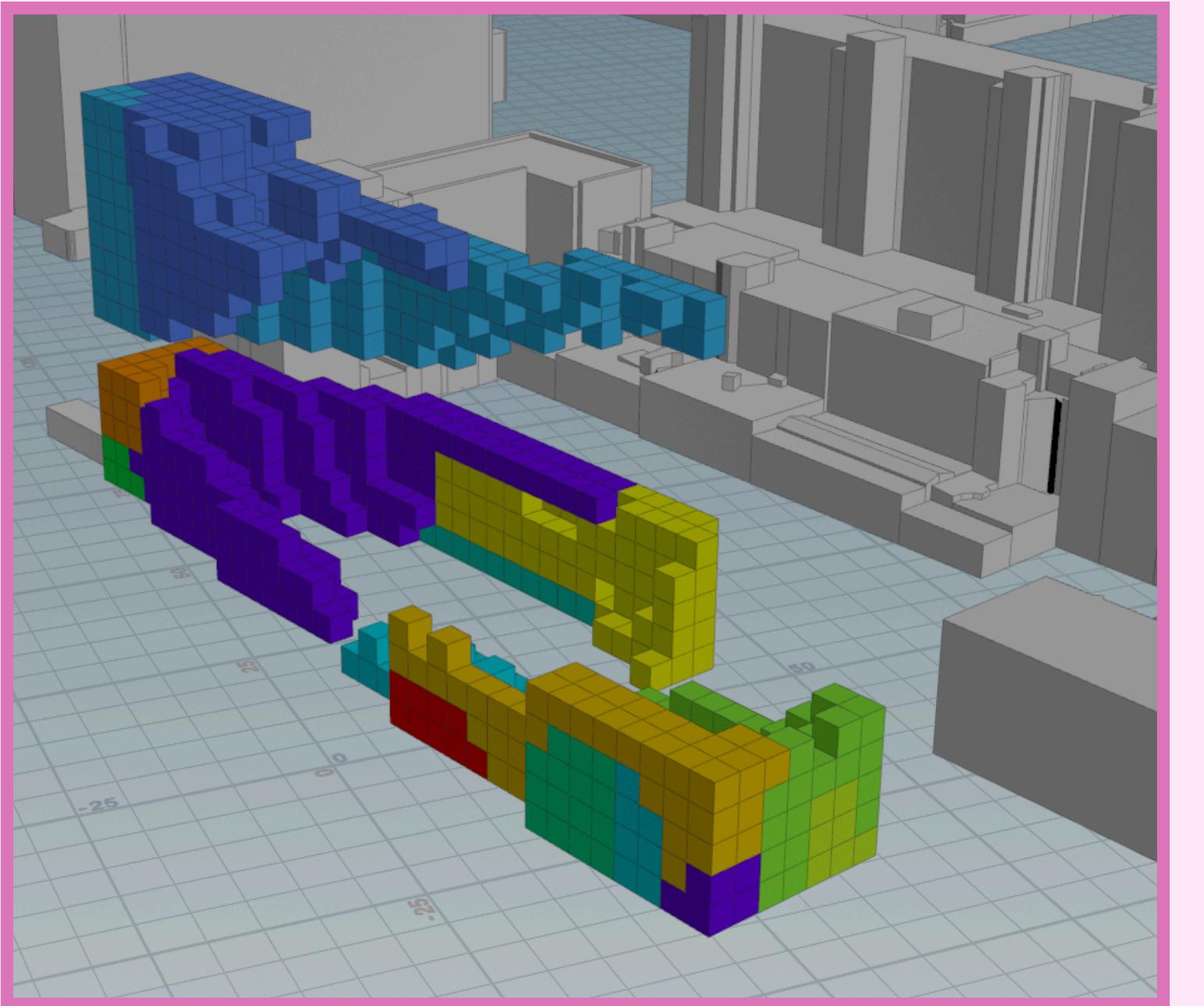
Procedurality

IV - Procedural Model

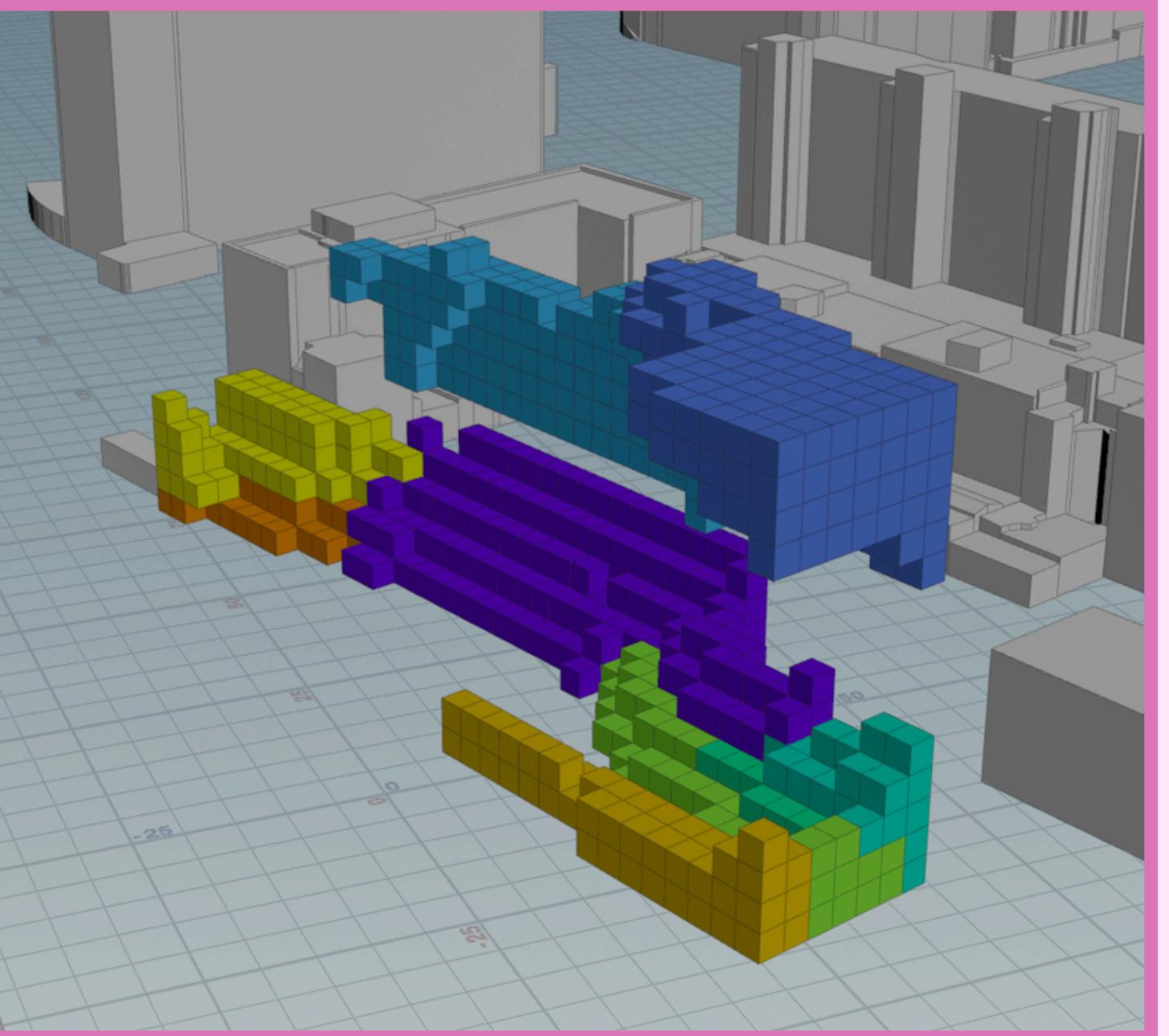
- Control panel ->
- Adding analyses and functions



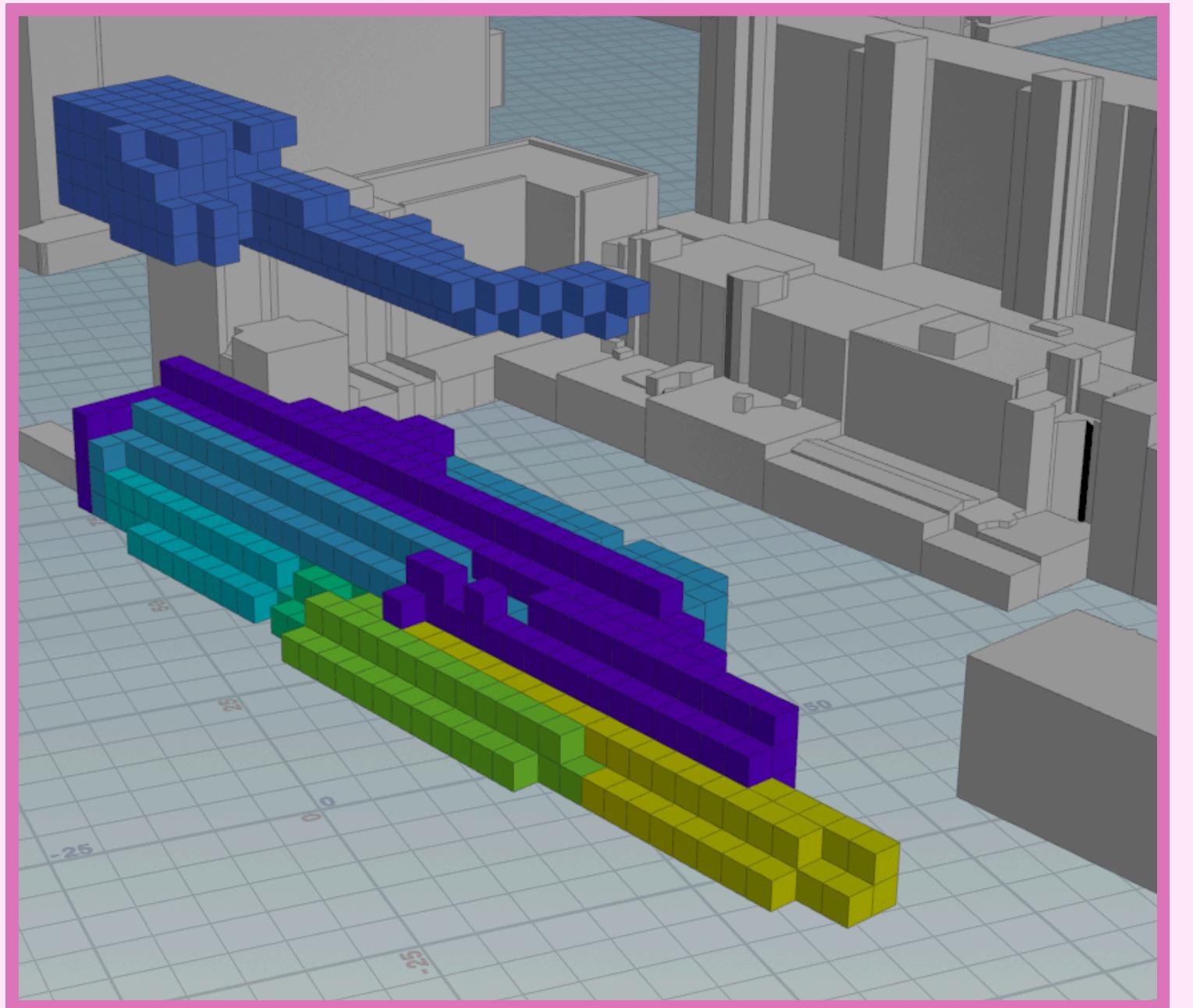
Normal



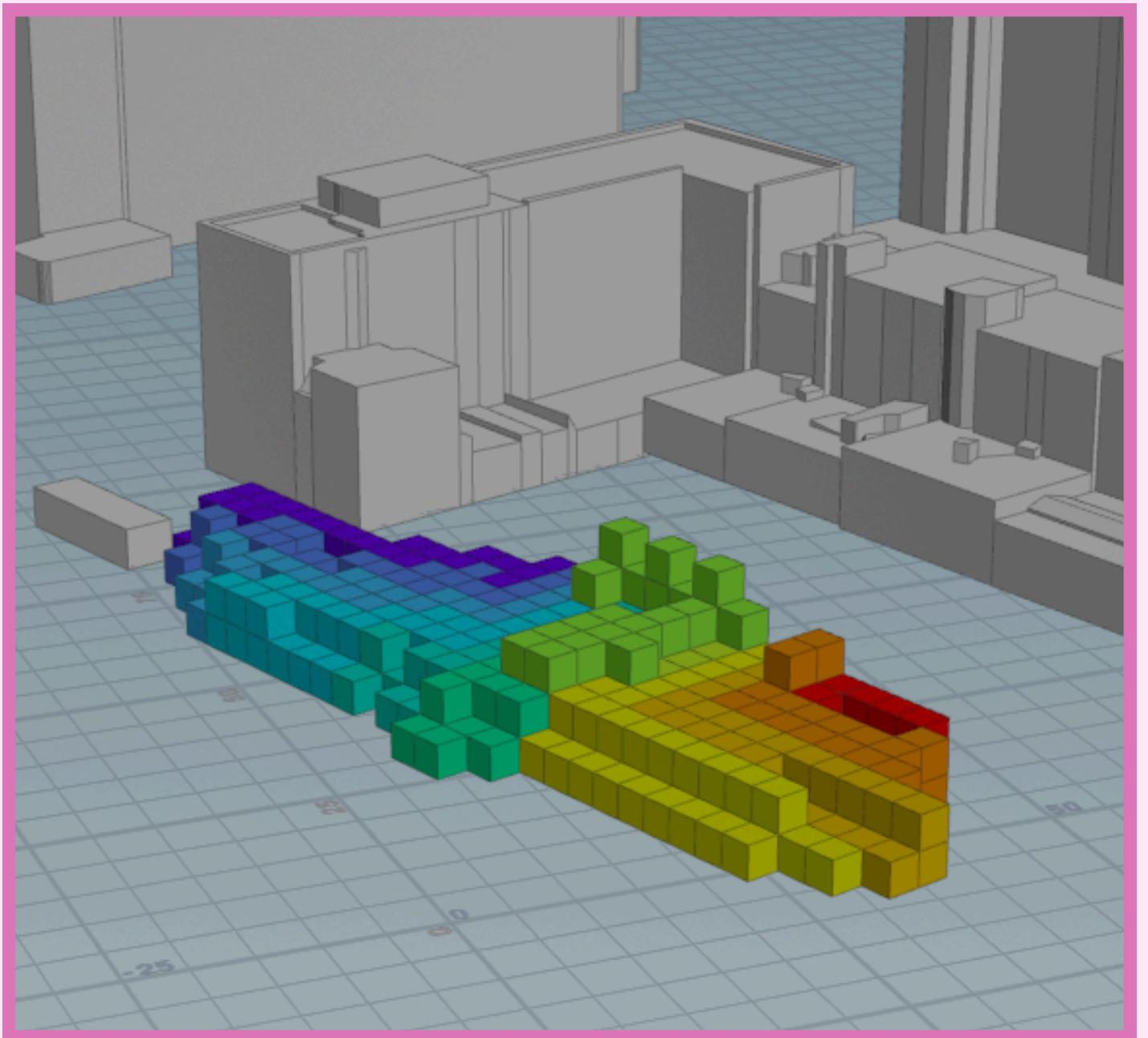
No day/sunlight



No day/sunlight



No analyses

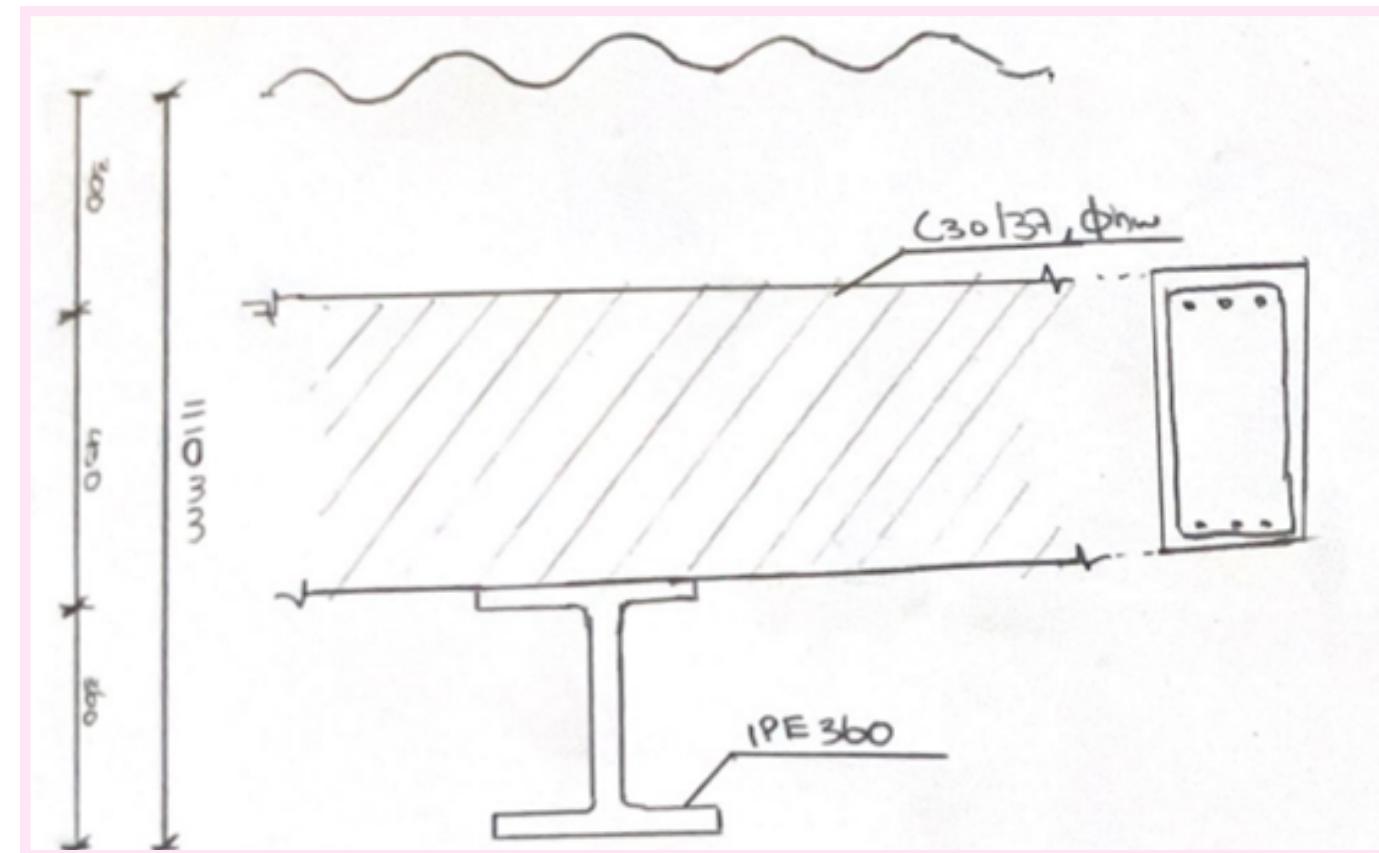
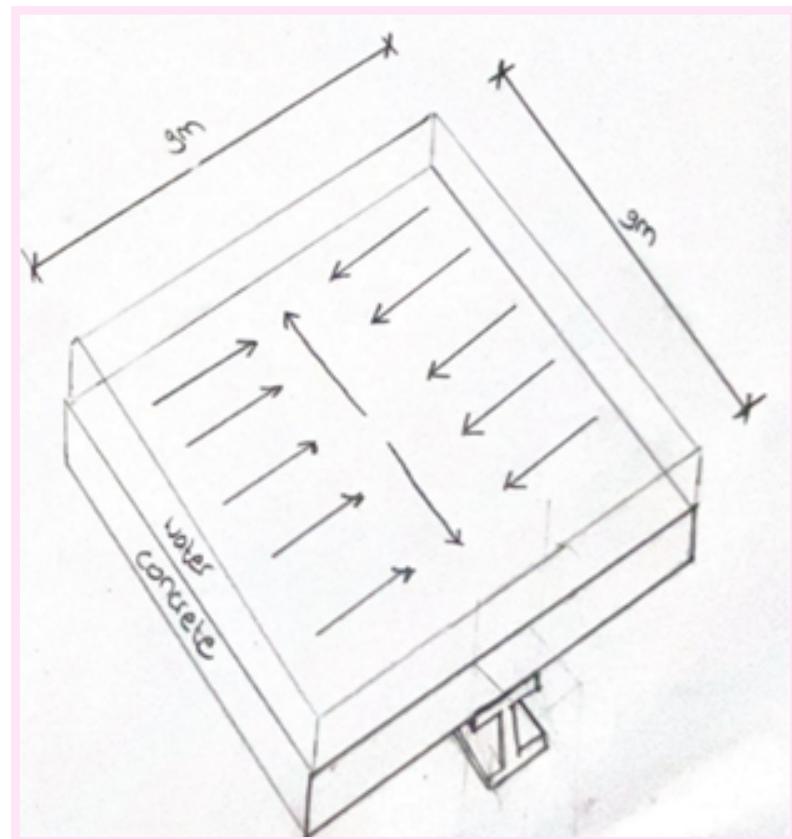


V - Designing **'ARCOS'**

Water Harvesting

V - Designing

- Calculations
- Ponds
- Unity Check



Solar Panels

V - Designing

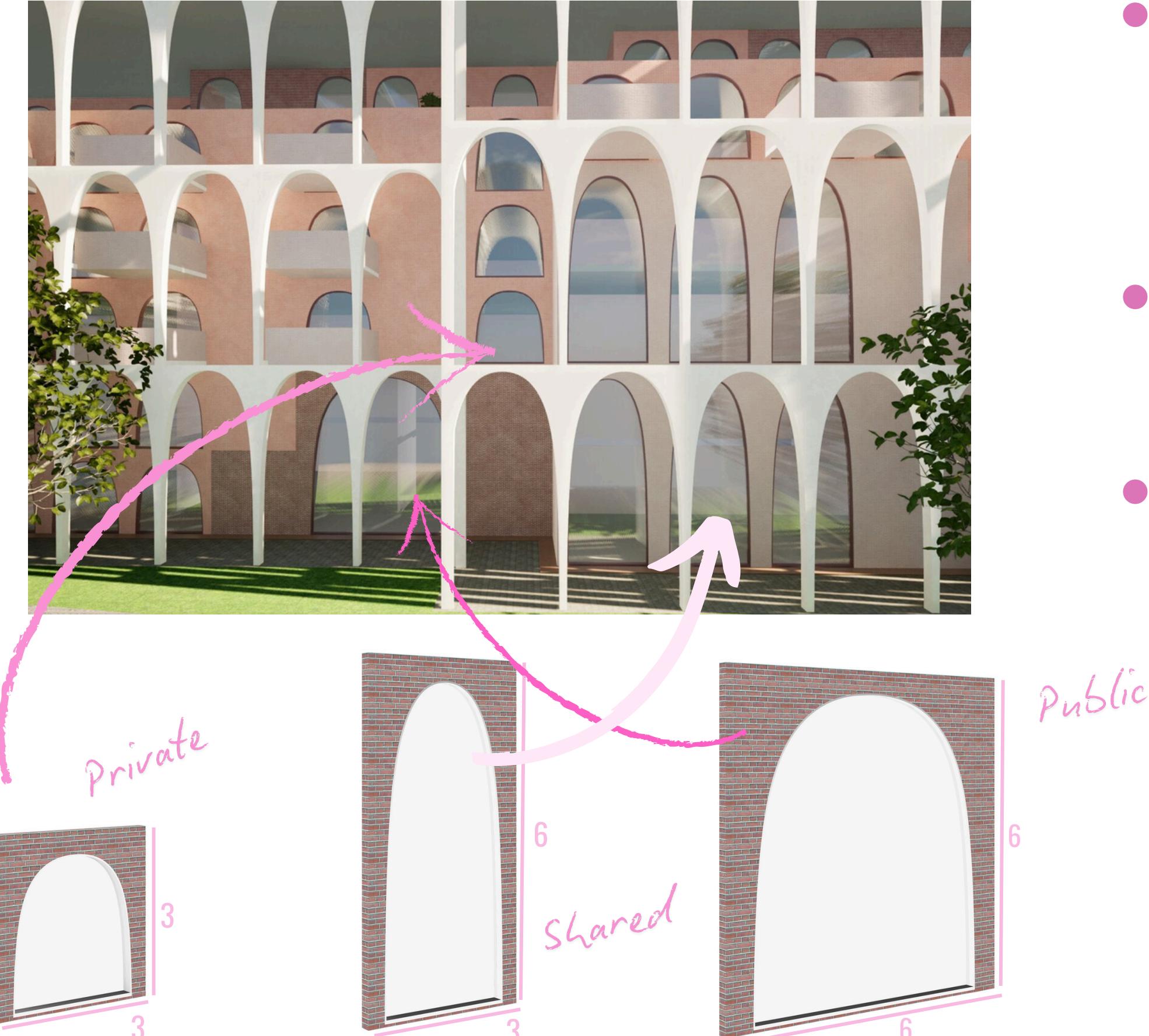
- How much Watt does a Light Bulb use?
- Average Solar Panel Production
- Solar Panel Area : 85 m²

Building	Area
Car Parking Private	16000
Bike Parking Private	2533.3
Car Parking Public	39.8
Bike Parking Public	99.5
Kindergarten	200
Care Centre	230
Physical Therapy Centre	60
Working Places	550
Art Studios	60
Library/Café	900
Community Spaces	800
Laundry	100
Total	21572.6 m ²

Design Principles

V - Designing

The Facade

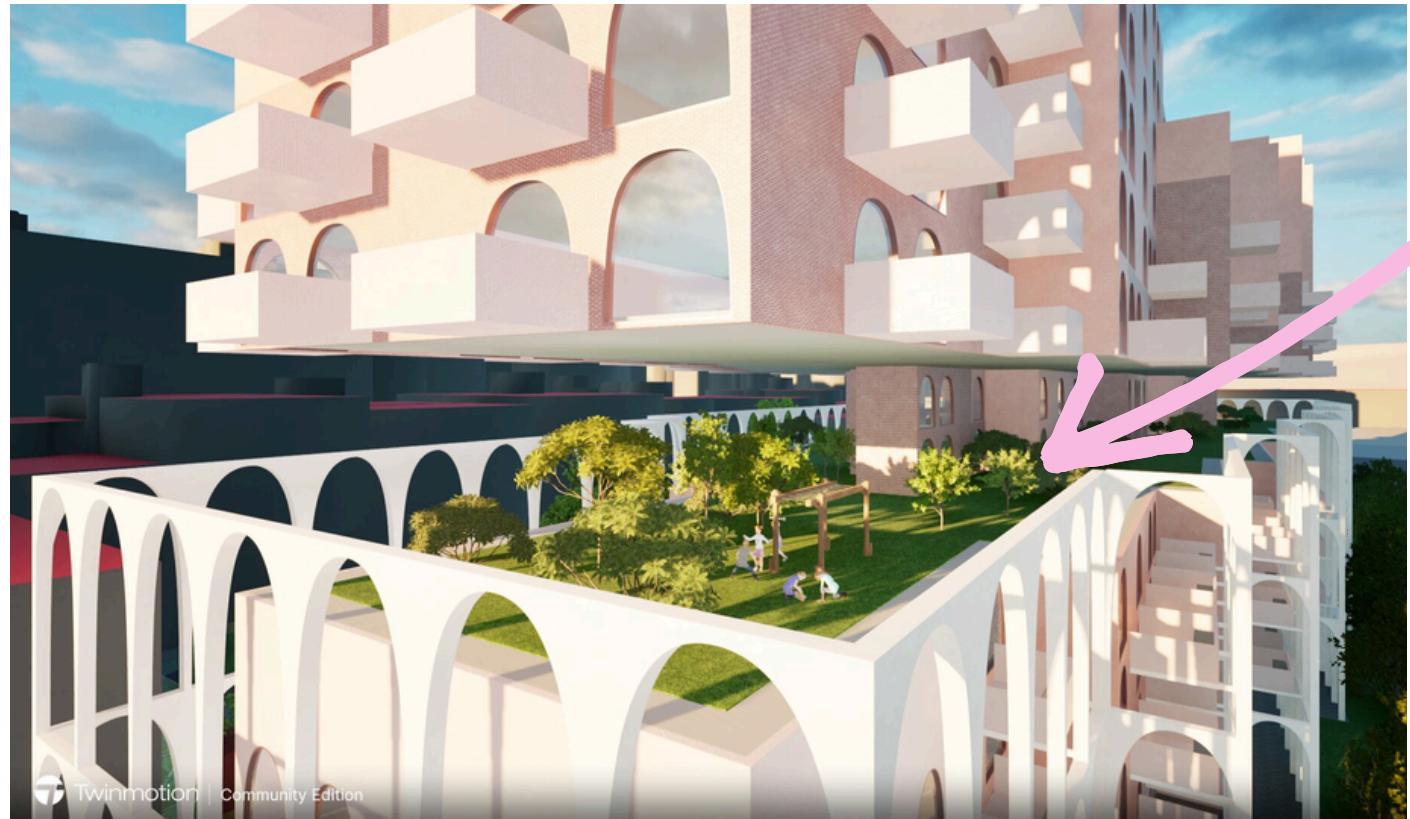


- 3 Types of spaces:
 - Private
 - Shared
 - Public
- Creating clarity for residents & visitors

- Materials:
 - Facade: Prefab facade with brick strips
 - Arches: Glassfibre Reinforced Concrete

Design Principles

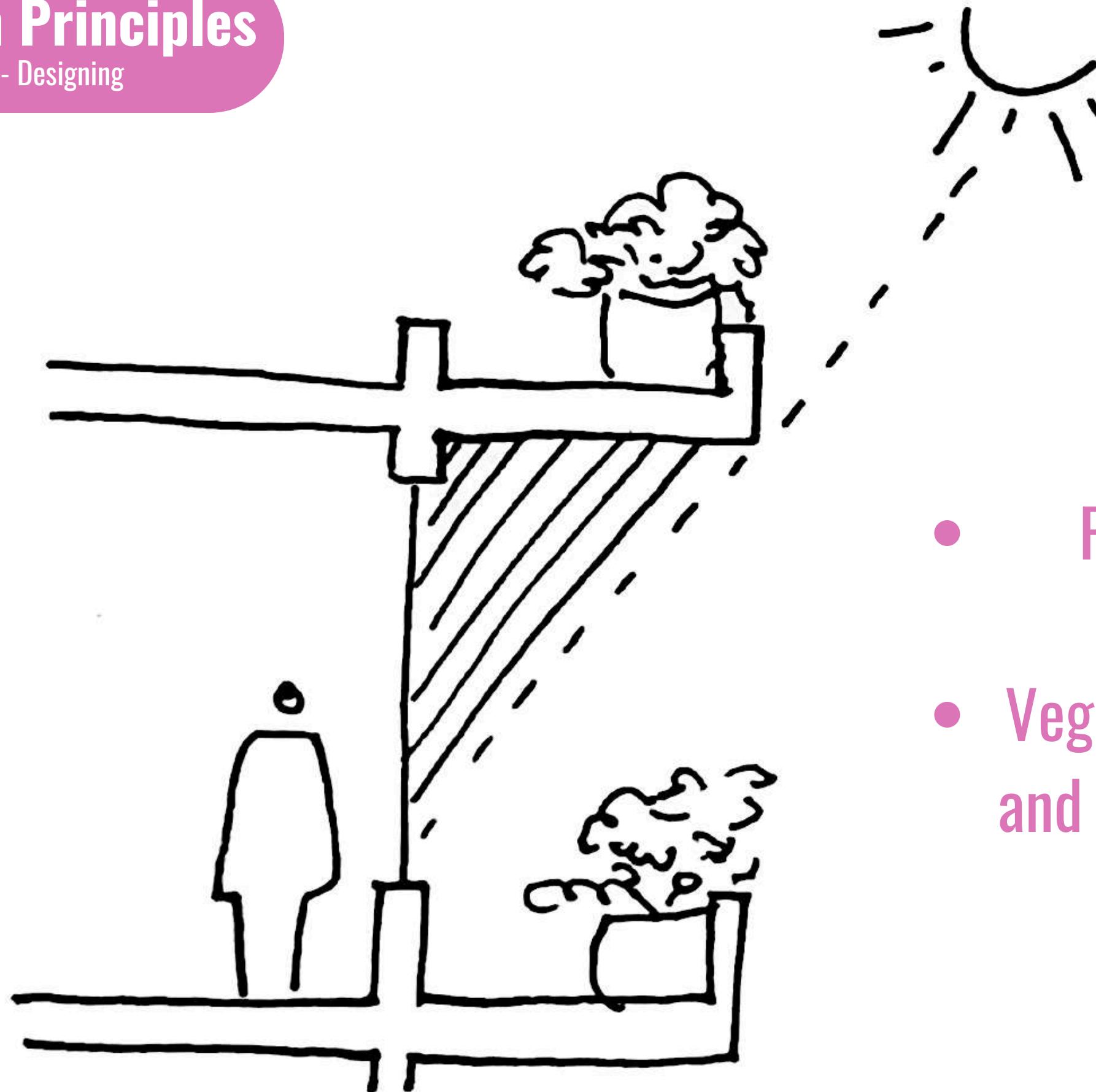
V - Designing



Enough green spaces:
City Garden
Balconies
Park

Design Principles

V - Designing

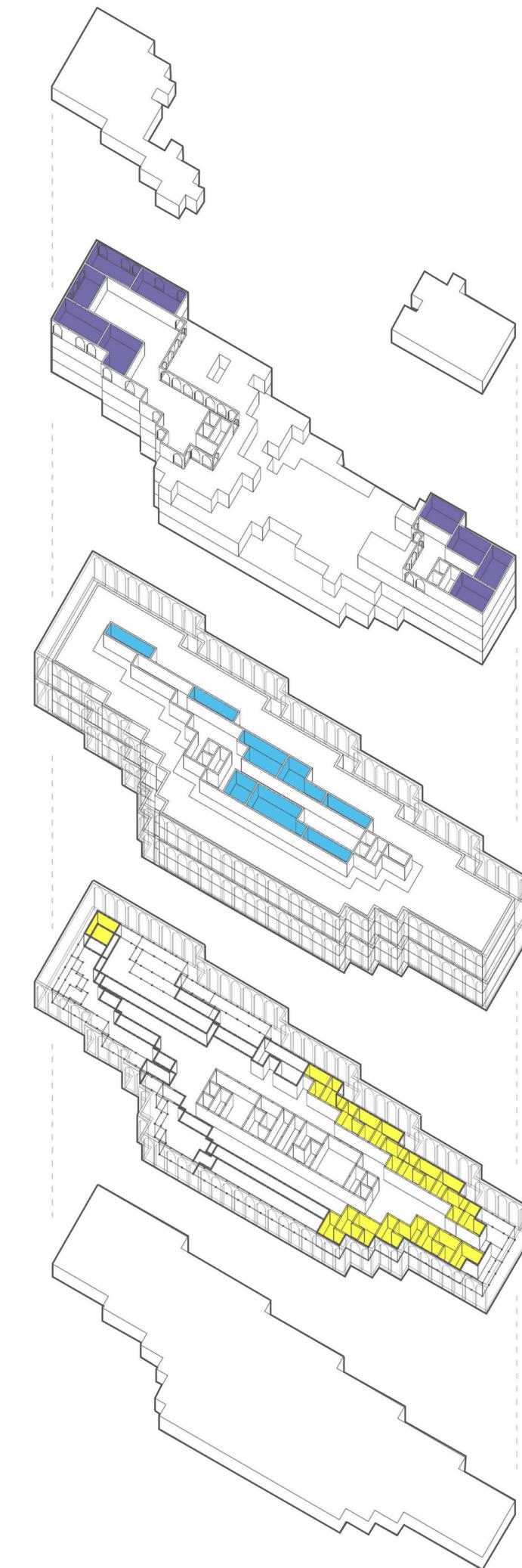
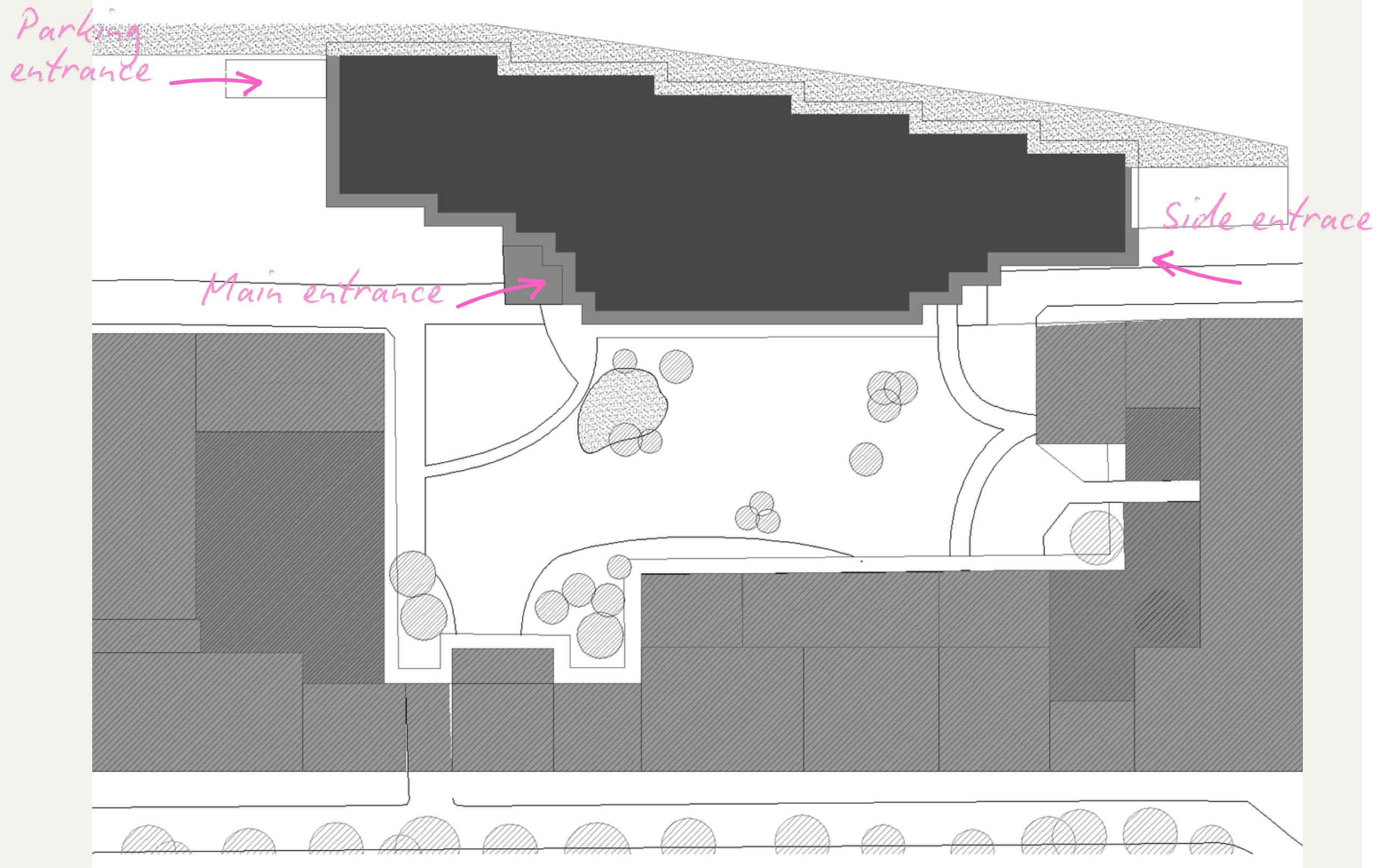


Balconies:

- Prevents direct sunlight to enter in summer
- Vegetation offers a slight sound diffusion and complies with green area per person.

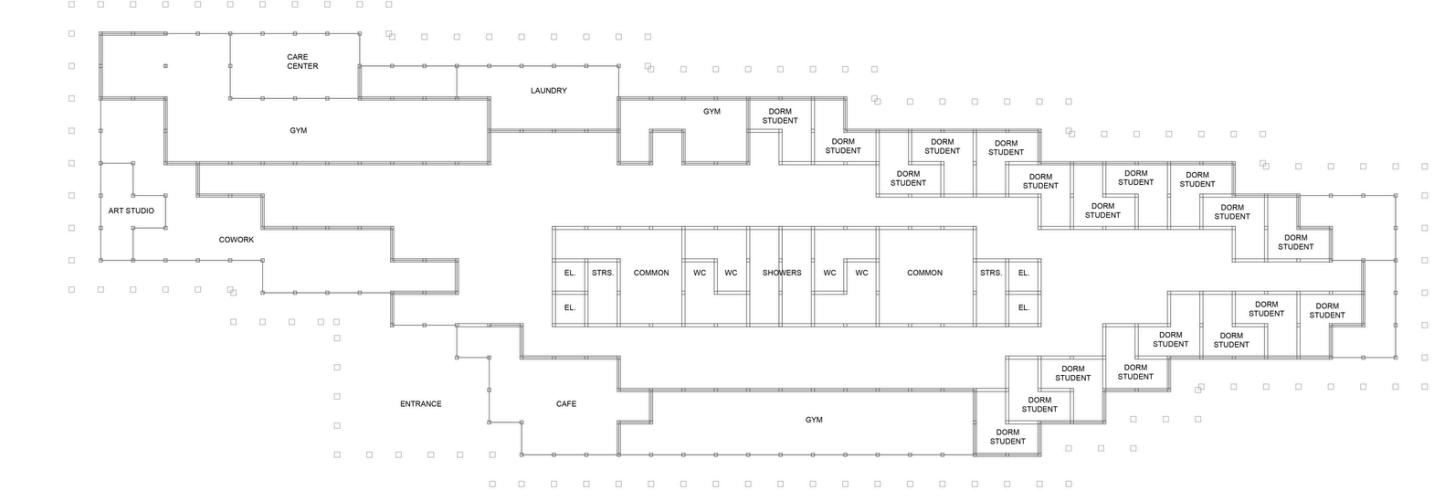
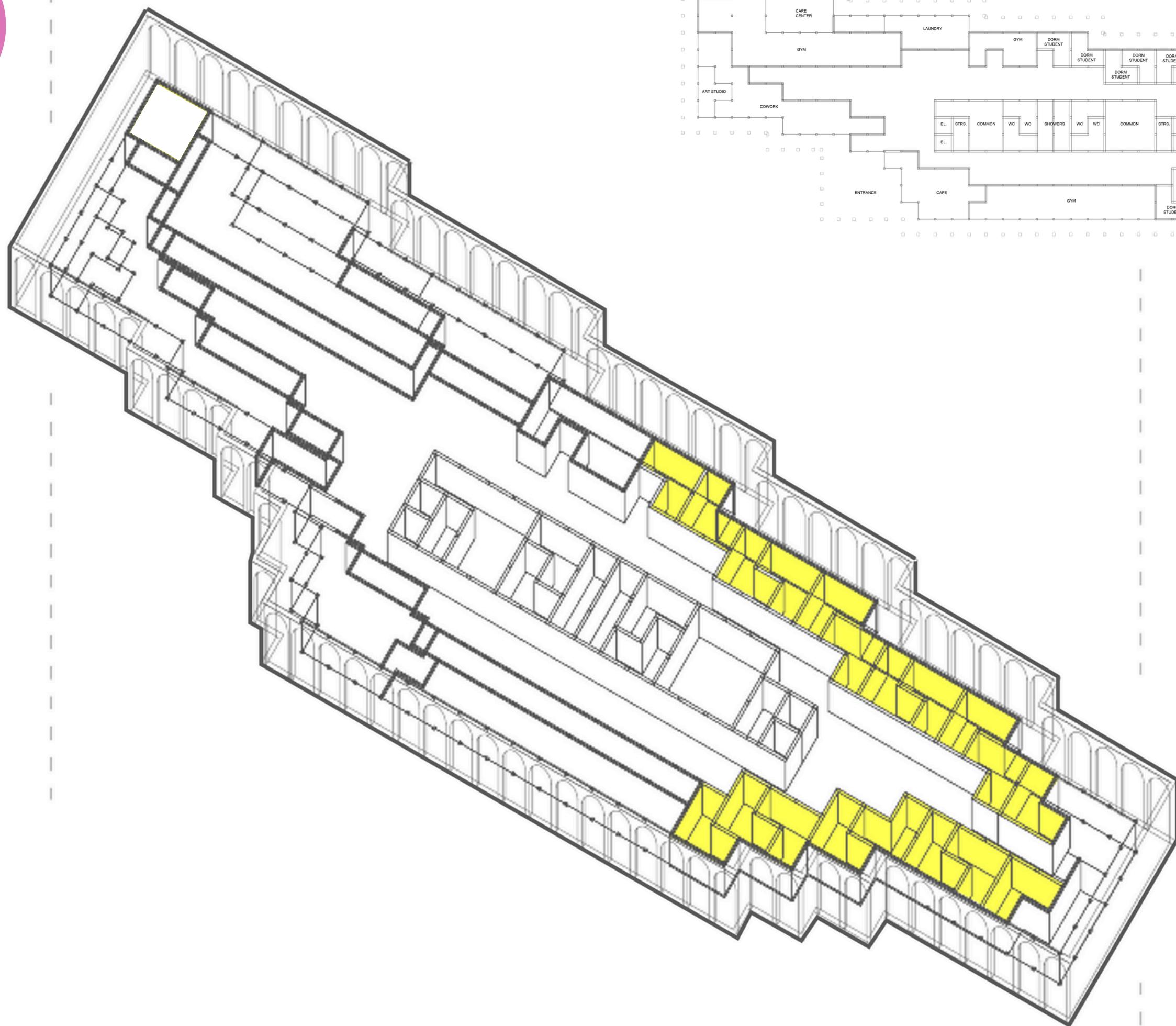
Floor Plans

V - Designing



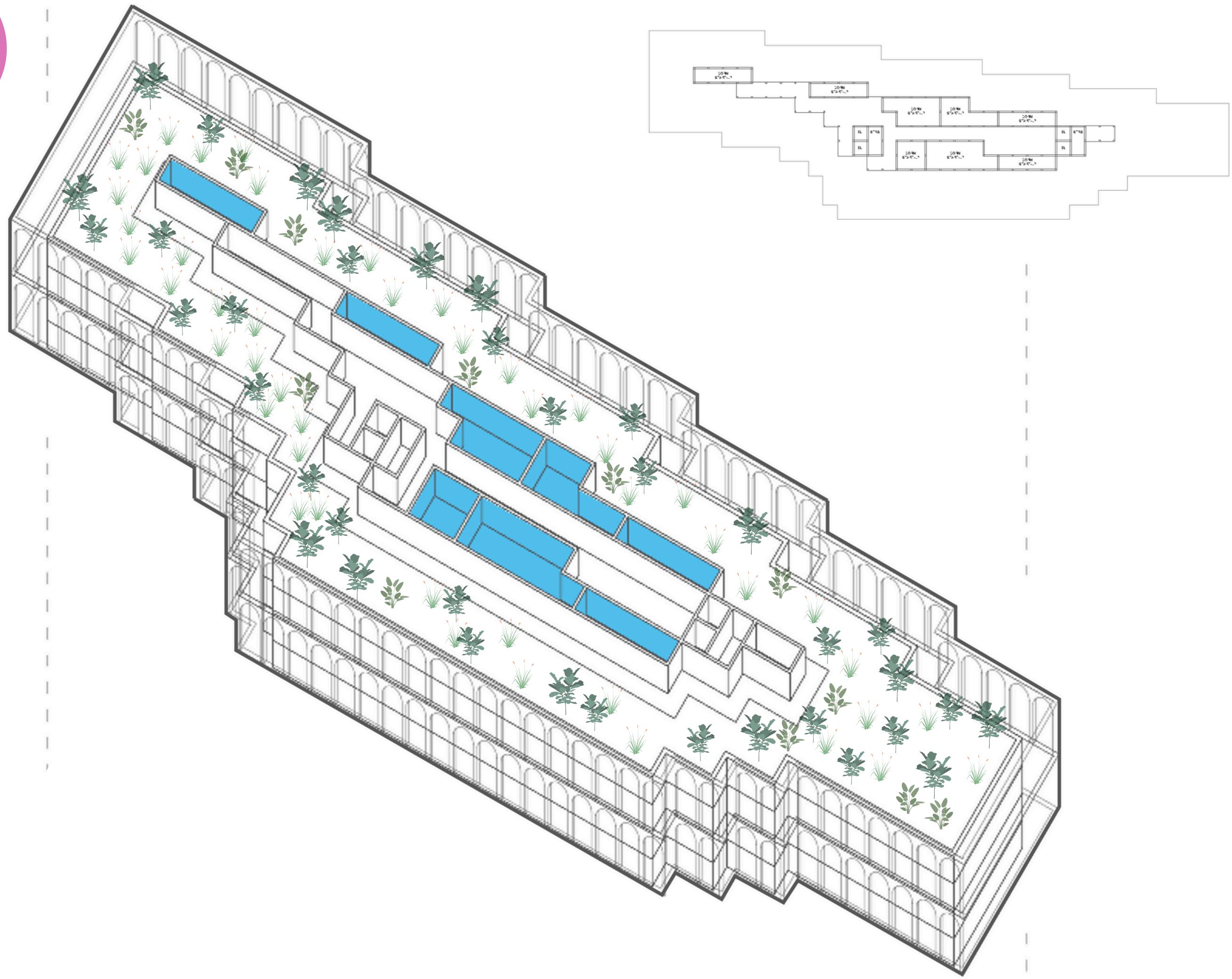
Floor Plans

V - Designing



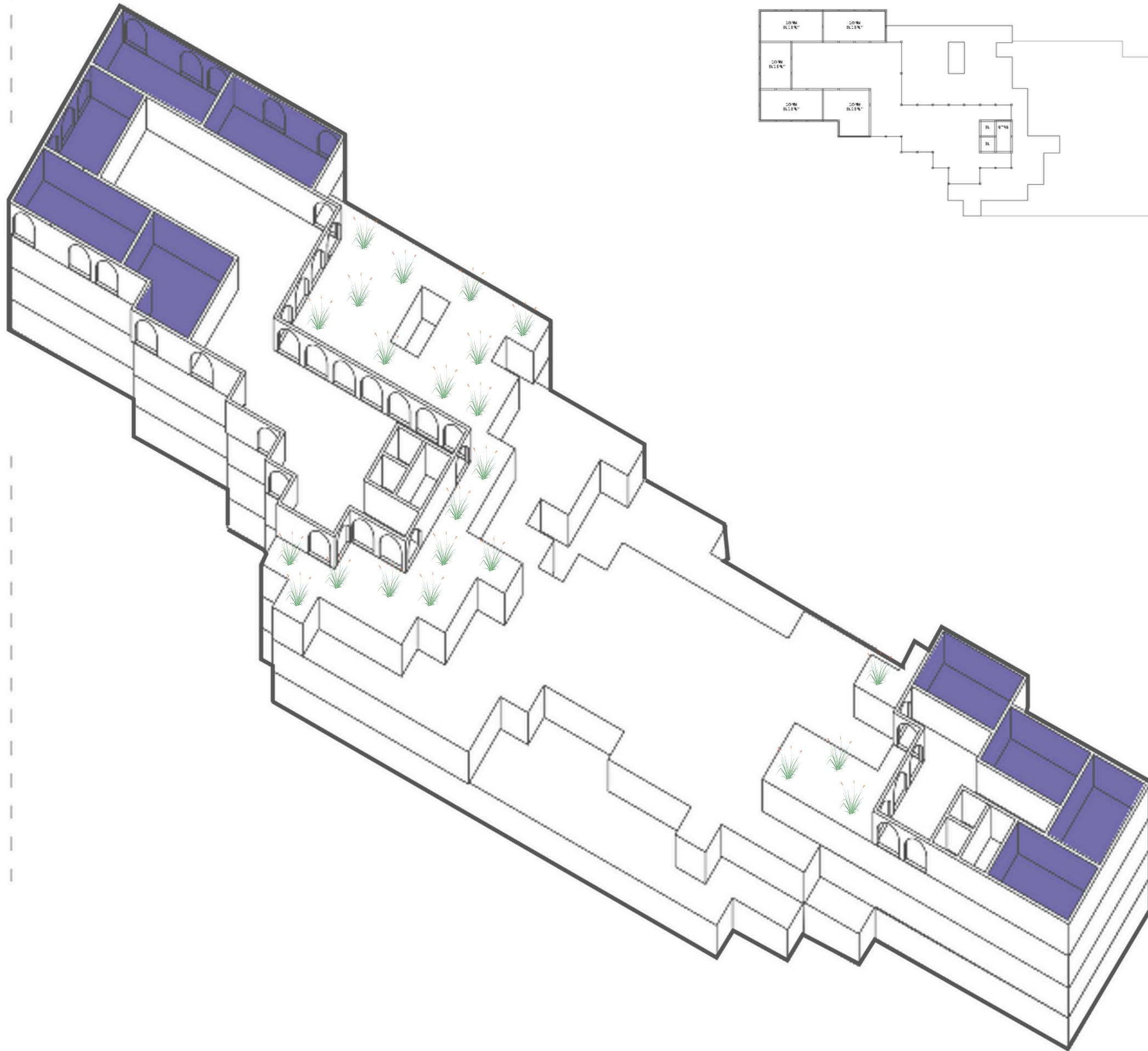
Floor Plans

V - Designing



Floor Plans

V - Designing



VI - Final product

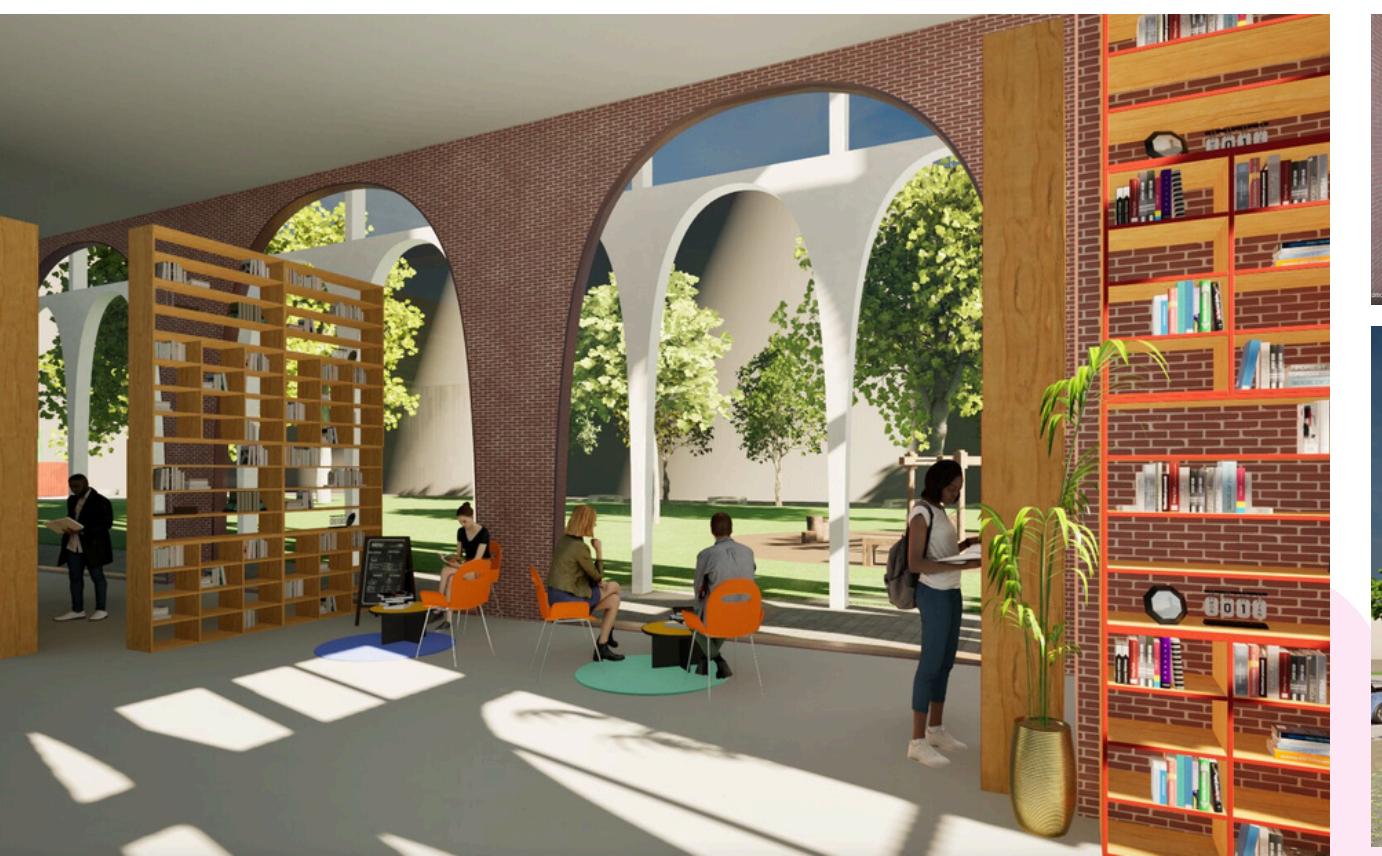


Renders

VI - Final Product



Twinmotion | Community Edition



41

User Scenarios

Conclusion

- Student:
- Starter:
- Elderly:

Charlie



Bas



Jan



let's take a
look at them



JASPER VAN BEUSEKOM
PIET DE KOK
VERA LENSVELT
CATALINA GORMAZ PEÑA

WITH SPECIALS THANKS TO:

- IR. HANS HOOGENBOOM
- IR. MONICA PALFY
- ÁKOS SÁRKÁNY

Questions

