

# Het Gebouw

Syed Baqir Ali Kazmi

&

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# Design Goals

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# Design Goals

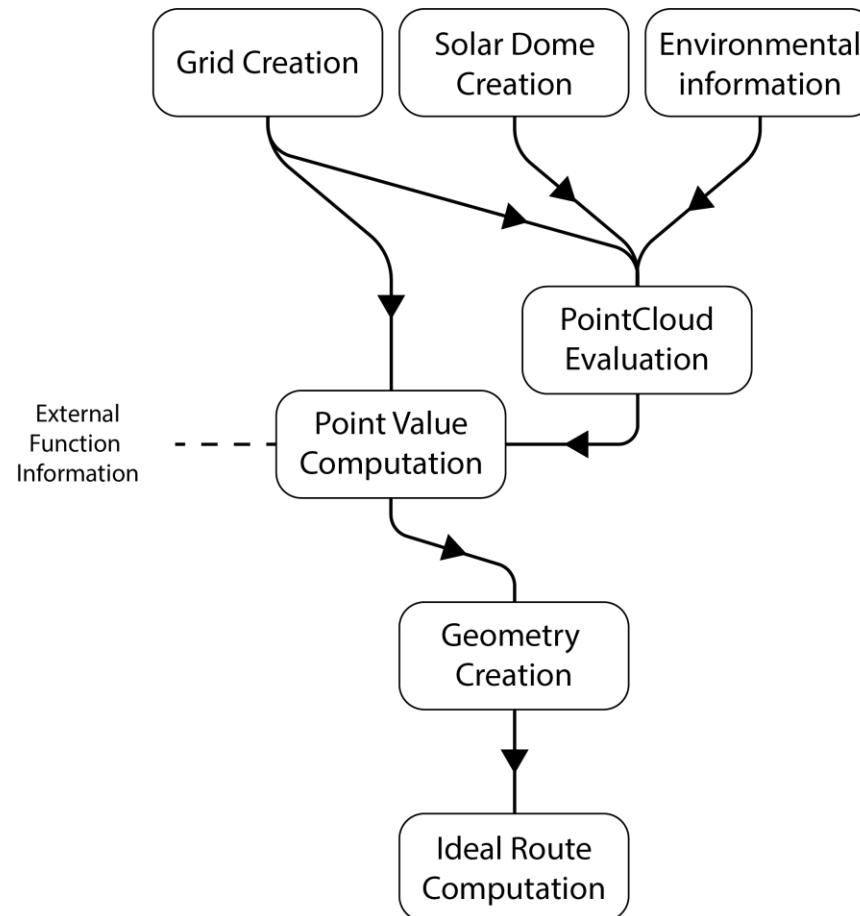


# Design Goals

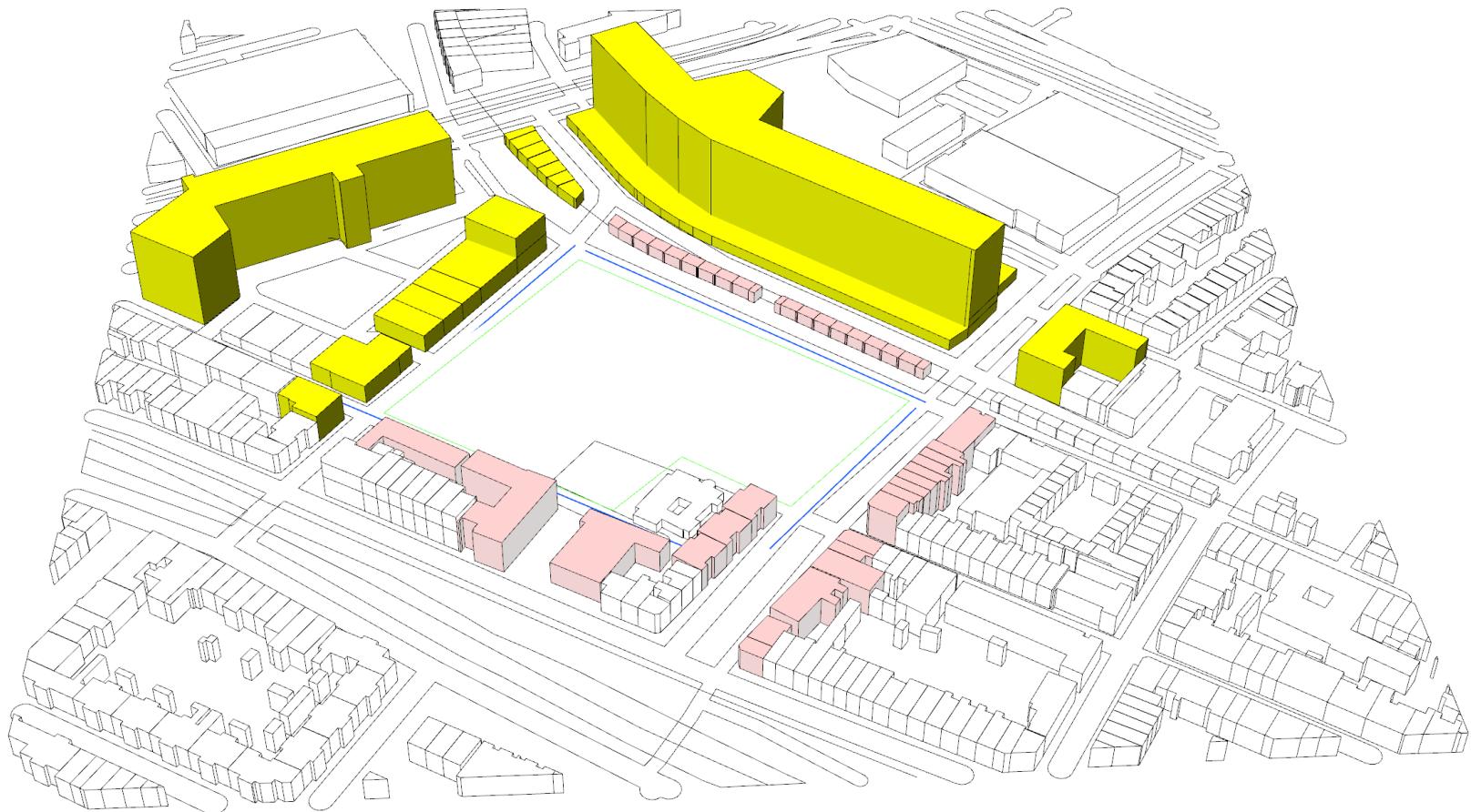


foto: Aerophoto

# Overall Program

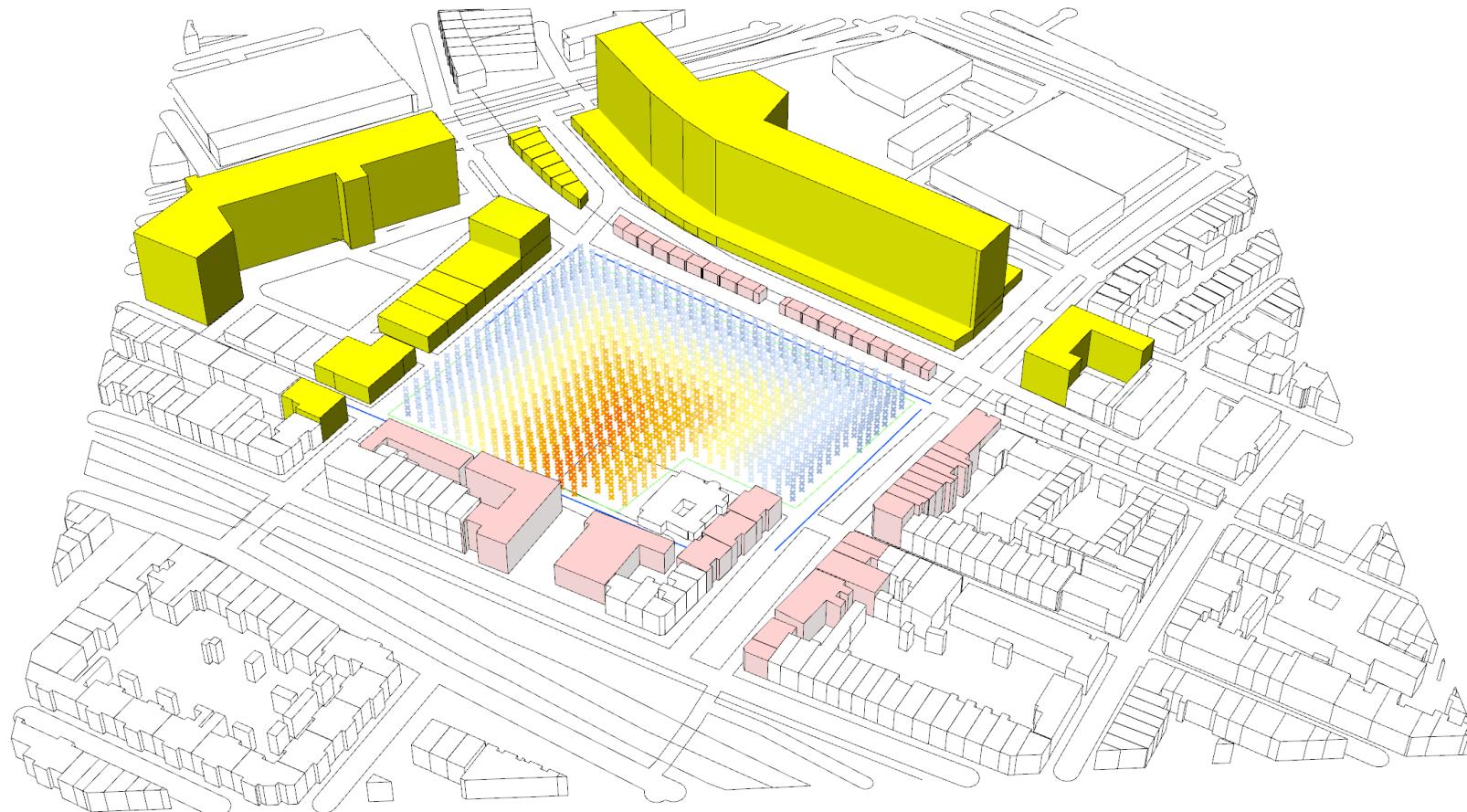


# Environmental information



# Point cloud Evaluation

- Road Distance Evaluation
- Traffic Evaluation
- Noise Evaluation
- Building Distance Evaluation
- Solar Casting Evaluation
- Solar Receiving Evaluation



# Point cloud Evaluation

Road Distance  
Evaluation

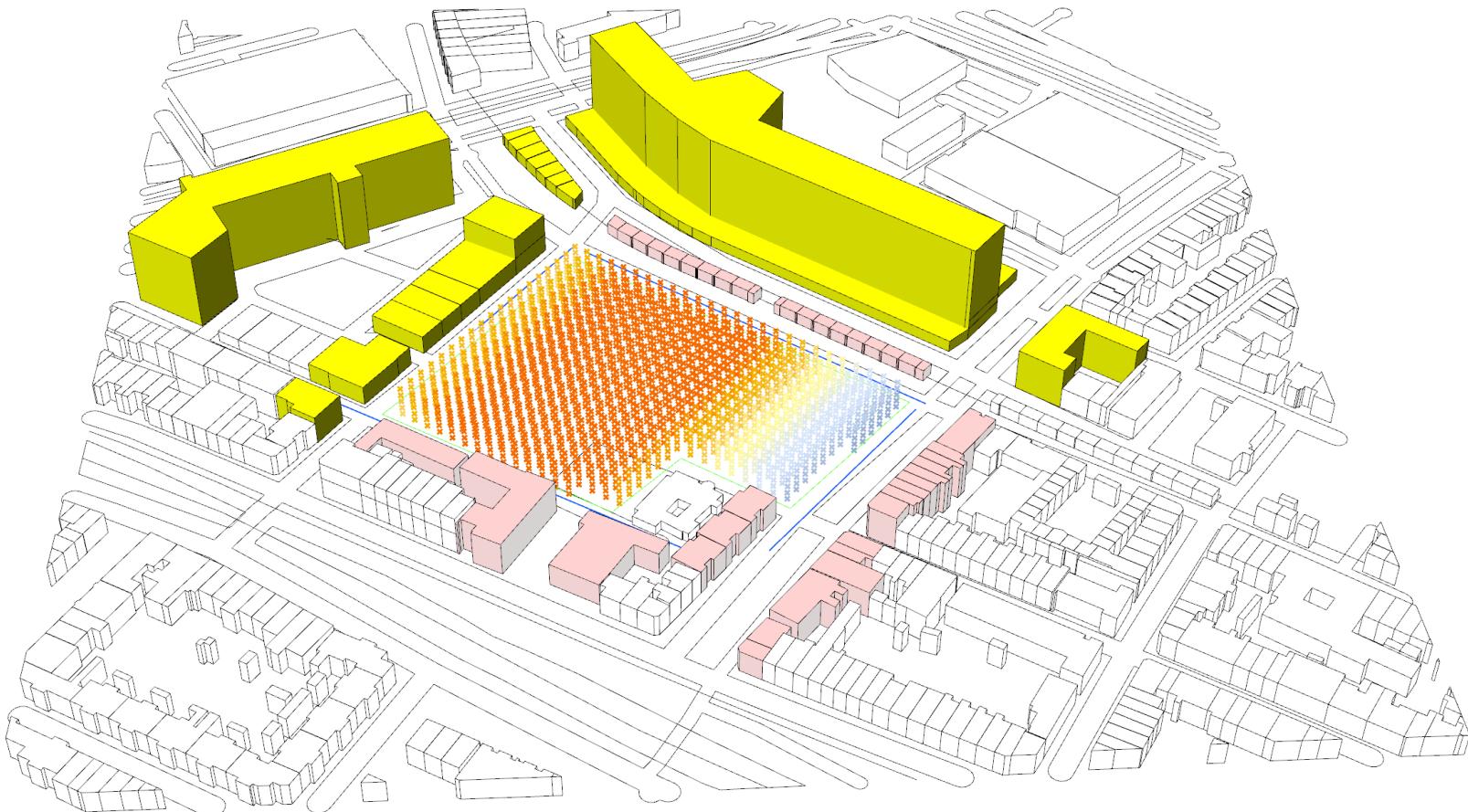
Traffic  
Evaluation

Noise  
Evaluation

Building Distance  
Evaluation

Solar Casting  
Evaluation

Solar Receiving  
Evaluation



# Point cloud Evaluation

Road Distance  
Evaluation

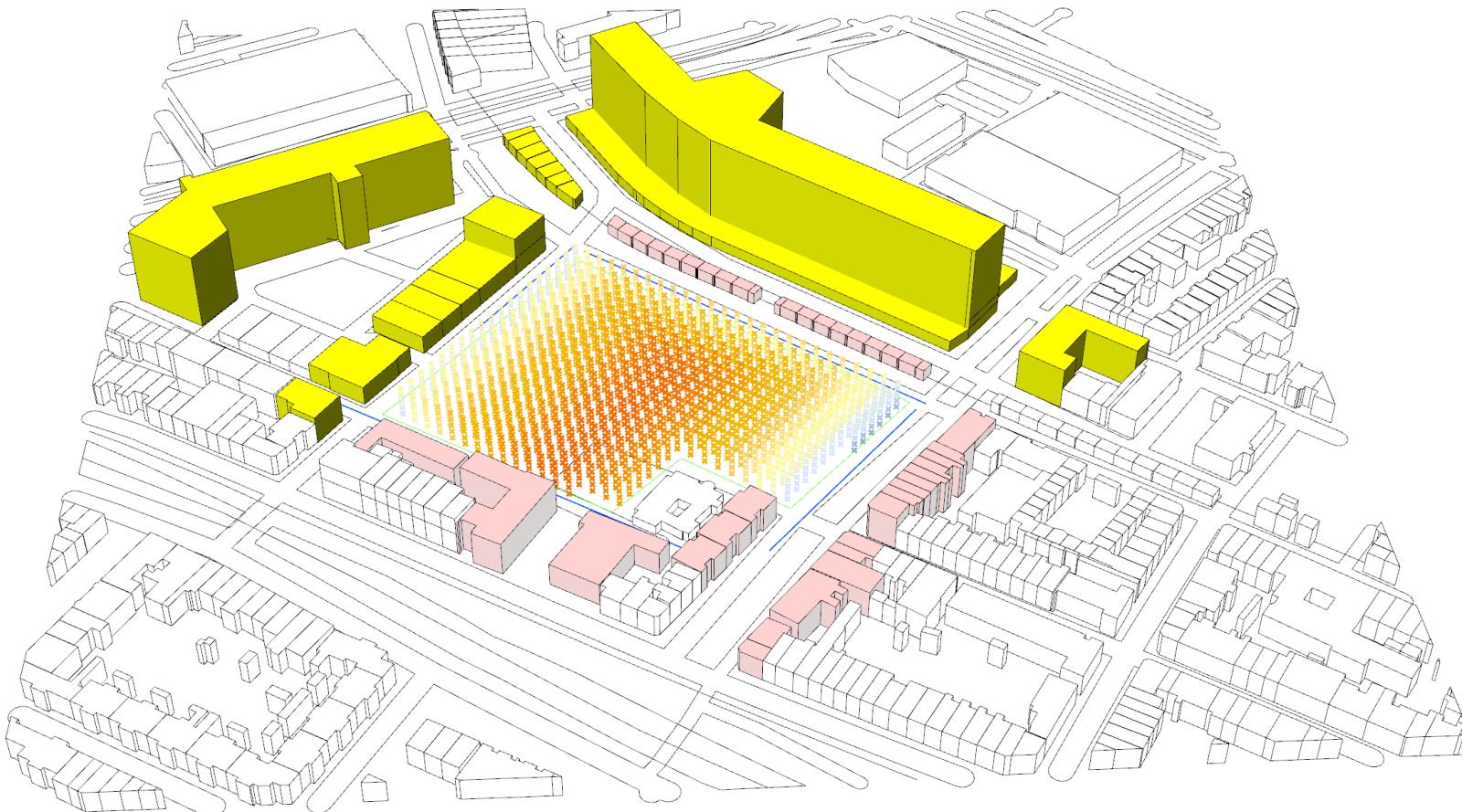
Traffic  
Evaluation

Noise  
Evaluation

Building Distance  
Evaluation

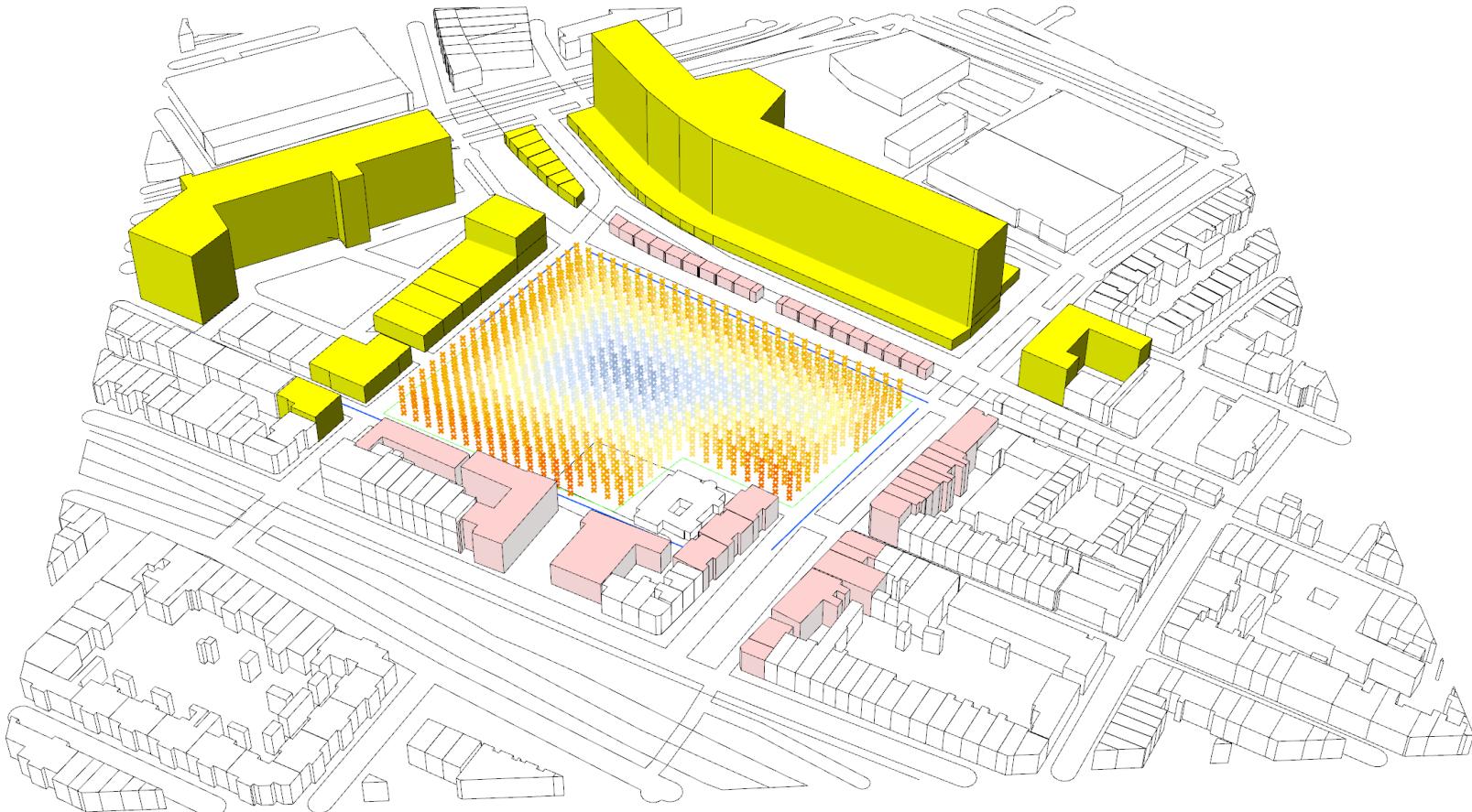
Solar Casting  
Evaluation

Solar Receiving  
Evaluation



# Point cloud Evaluation

- Road Distance Evaluation
- Traffic Evaluation
- Noise Evaluation
- Building Distance Evaluation
- Solar Casting Evaluation
- Solar Receiving Evaluation



# Point cloud Evaluation

Road Distance  
Evaluation

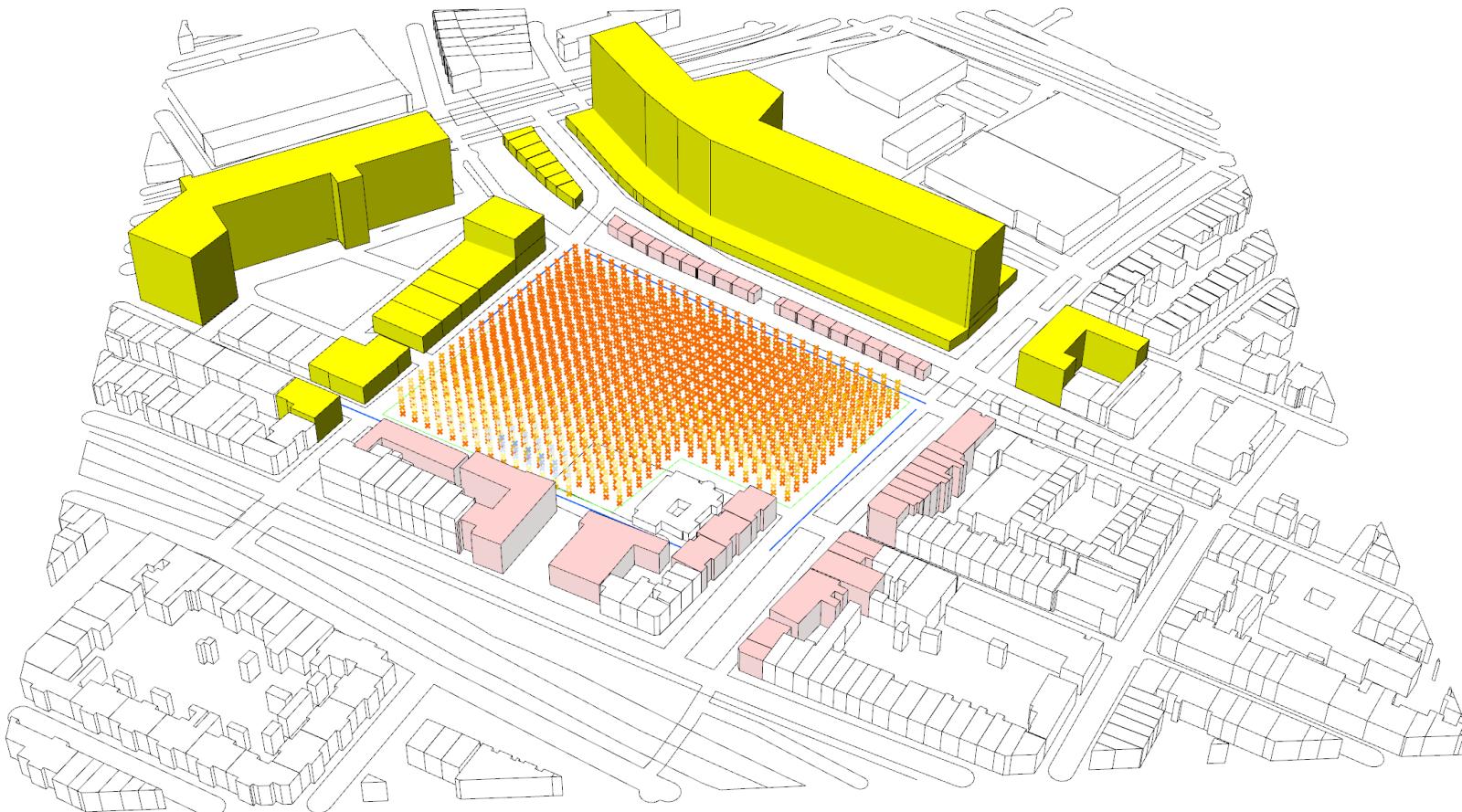
Traffic  
Evaluation

Noise  
Evaluation

Building Distance  
Evaluation

Solar Casting  
Evaluation

Solar Receiving  
Evaluation



# Point cloud Evaluation

Road Distance  
Evaluation

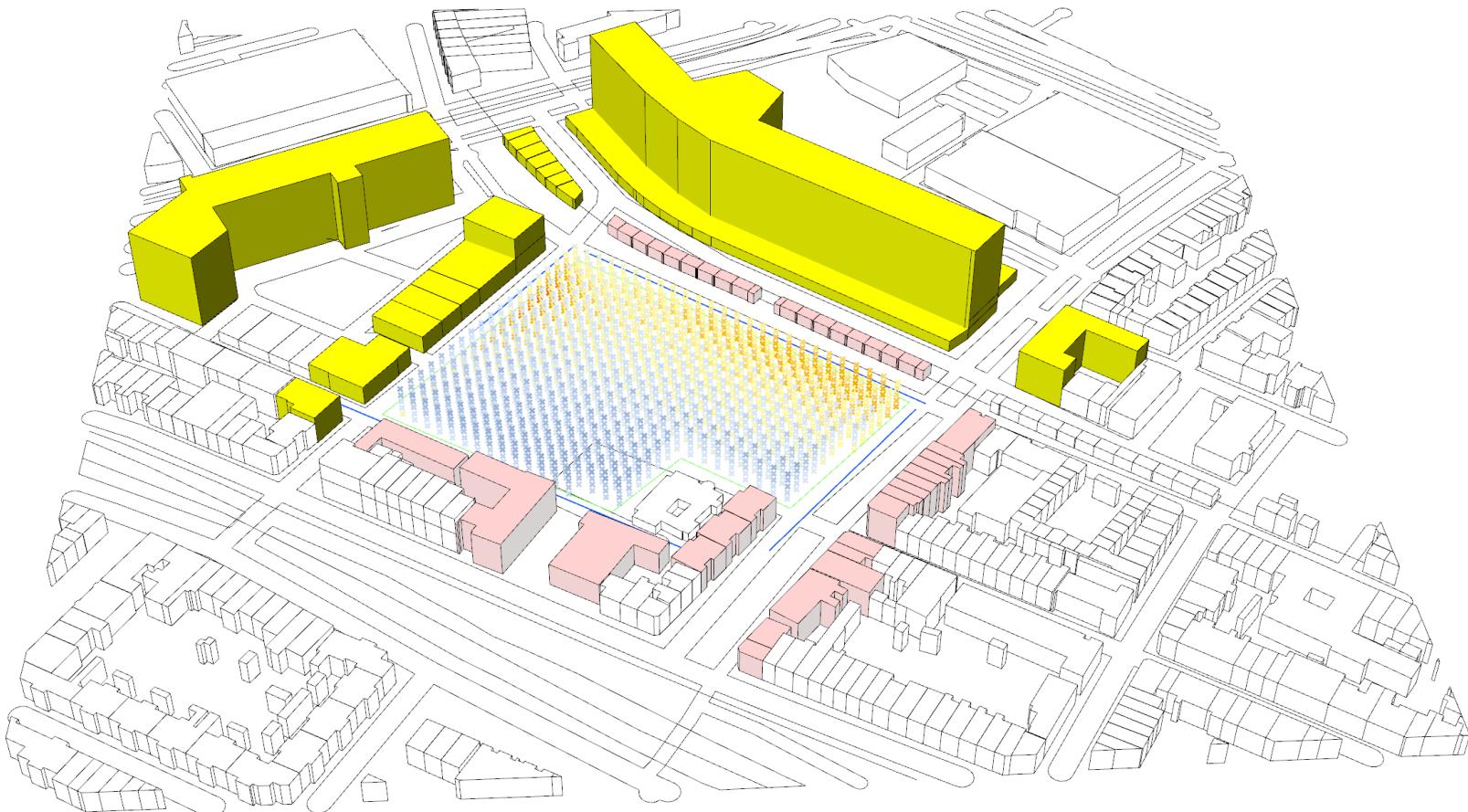
Traffic  
Evaluation

Noise  
Evaluation

Building Distance  
Evaluation

Solar Casting  
Evaluation

Solar Receiving  
Evaluation



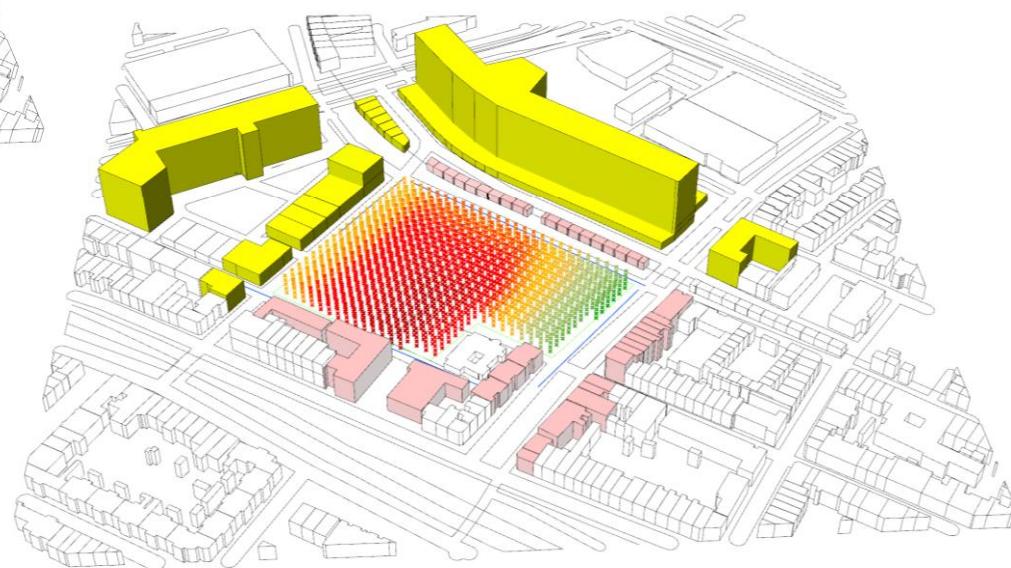
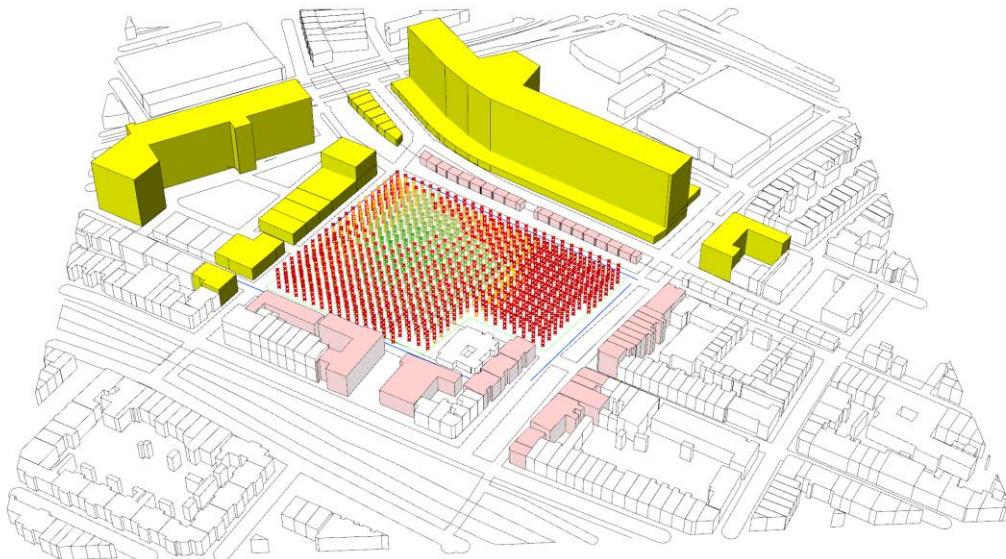
# Point Value Computation

- Formula for the livability index:

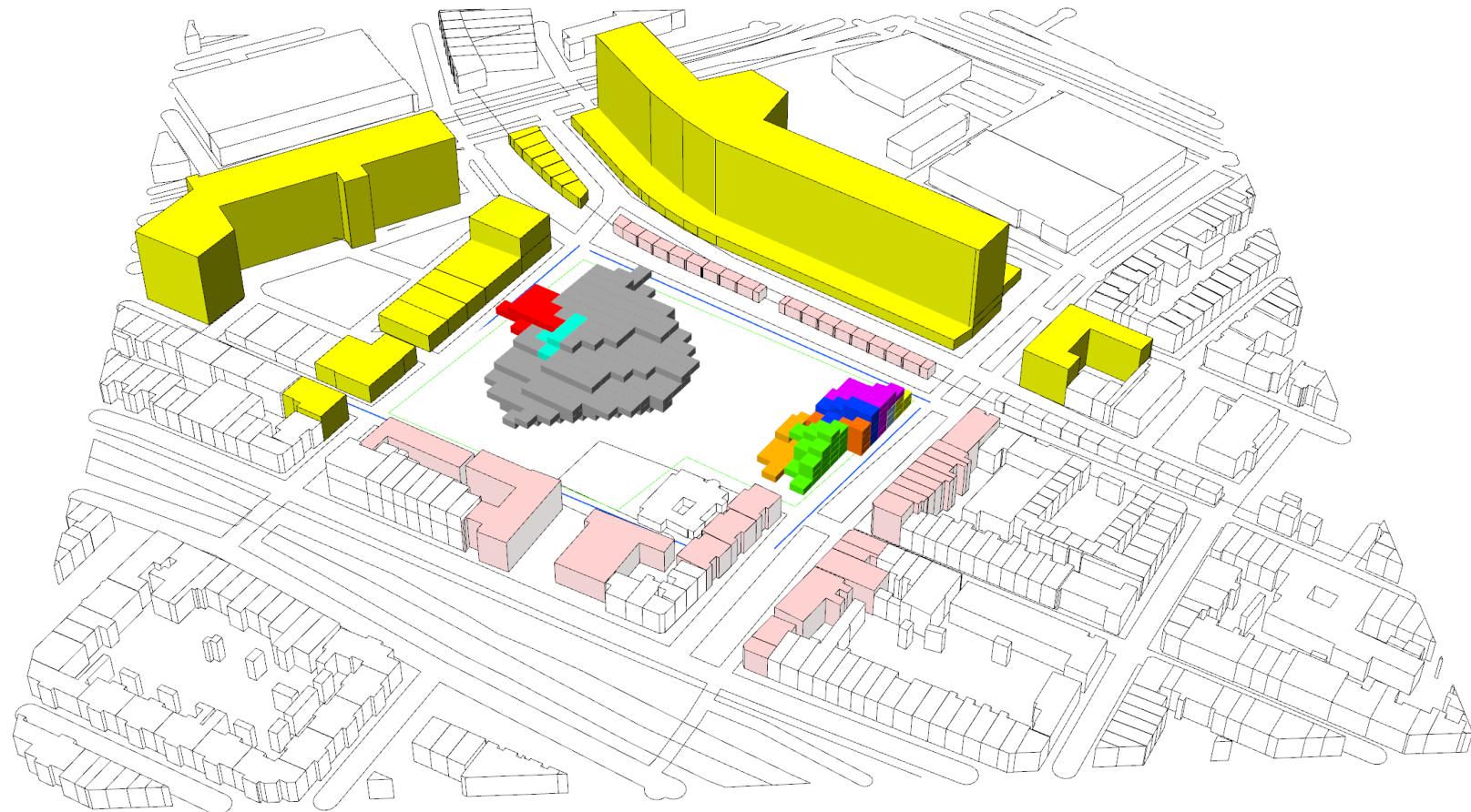
$$\text{RoadDistance} * w + \text{distanceValue} * w + \text{SolarValue} * w - (\text{NoiseValue} / 45) * w + 1.5 * \text{TrafficValue} * w$$

	RoadDistance	Ideal TrafficValue	Ideal Soundvalue	Ideal distancevalue	SolarBlockingValue	Ideal SolarValue	Area
Housing	1	-10	8	2	10	10	6600
Offices	3	0	4	1	10	5	305
Workshops & Fablab	5	5	1	1	10	2	430
Library	3	5	4	1	10	0	184

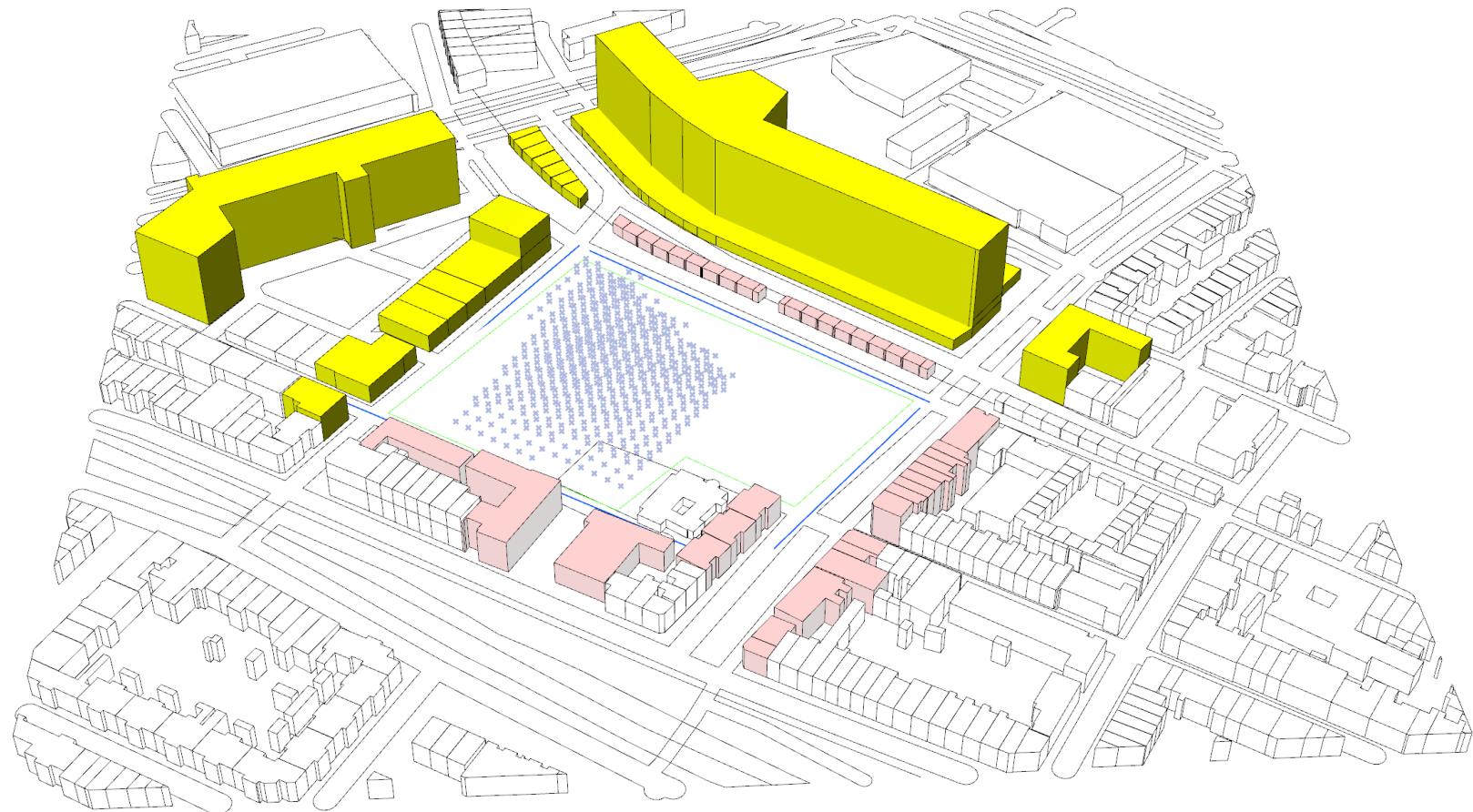
# Point Value Computation



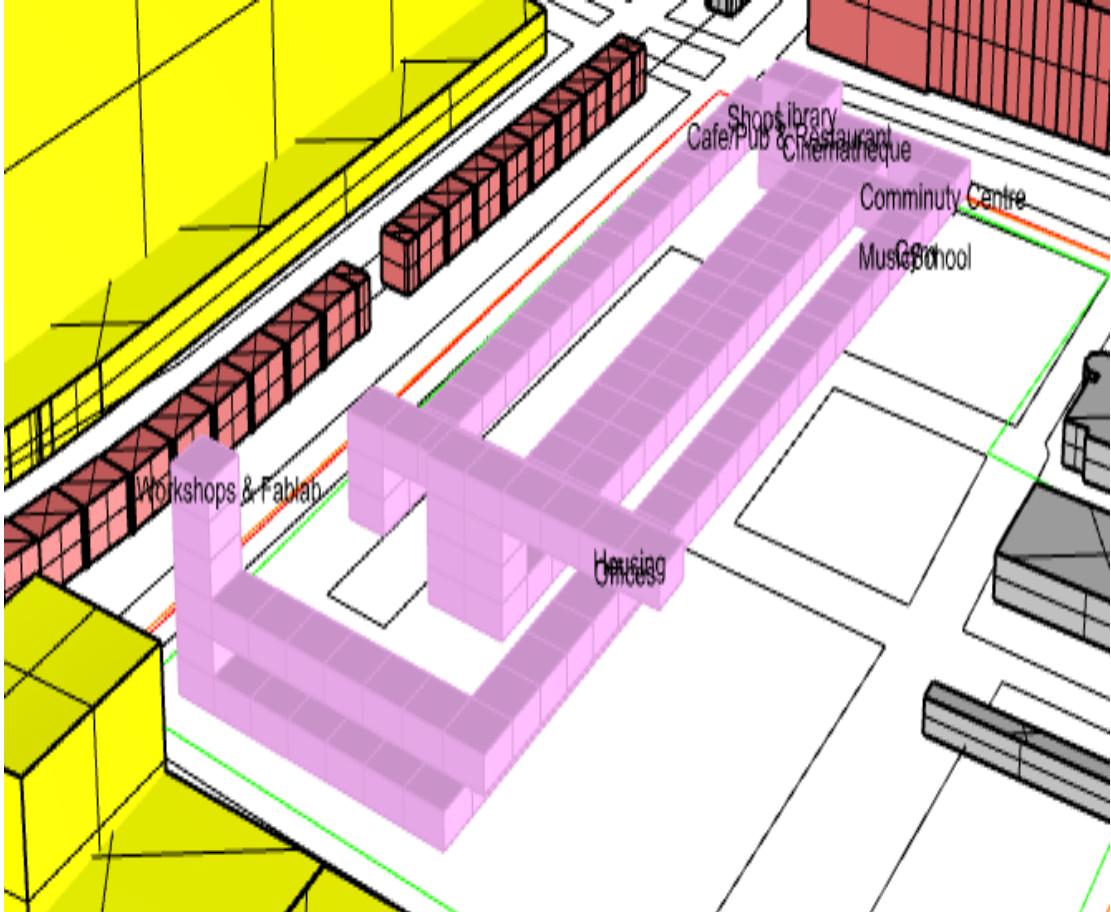
# Geometry Creation



# Geometry Creation



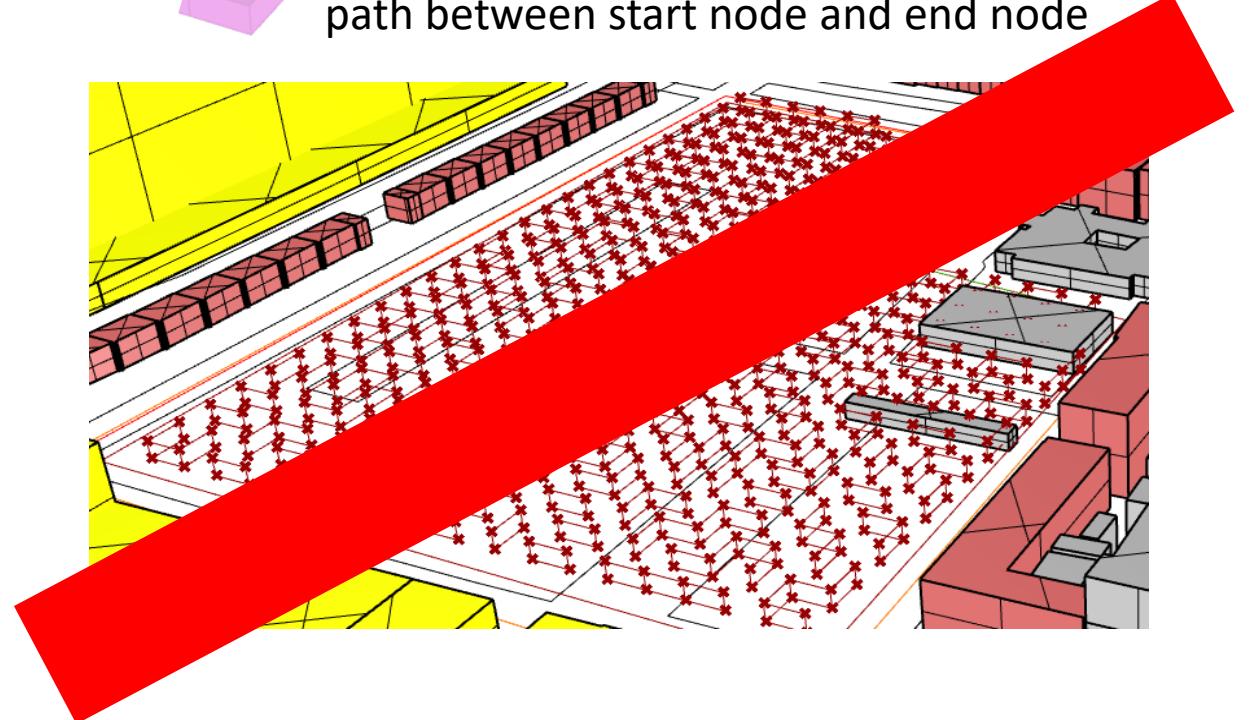
# A\* Algorithm



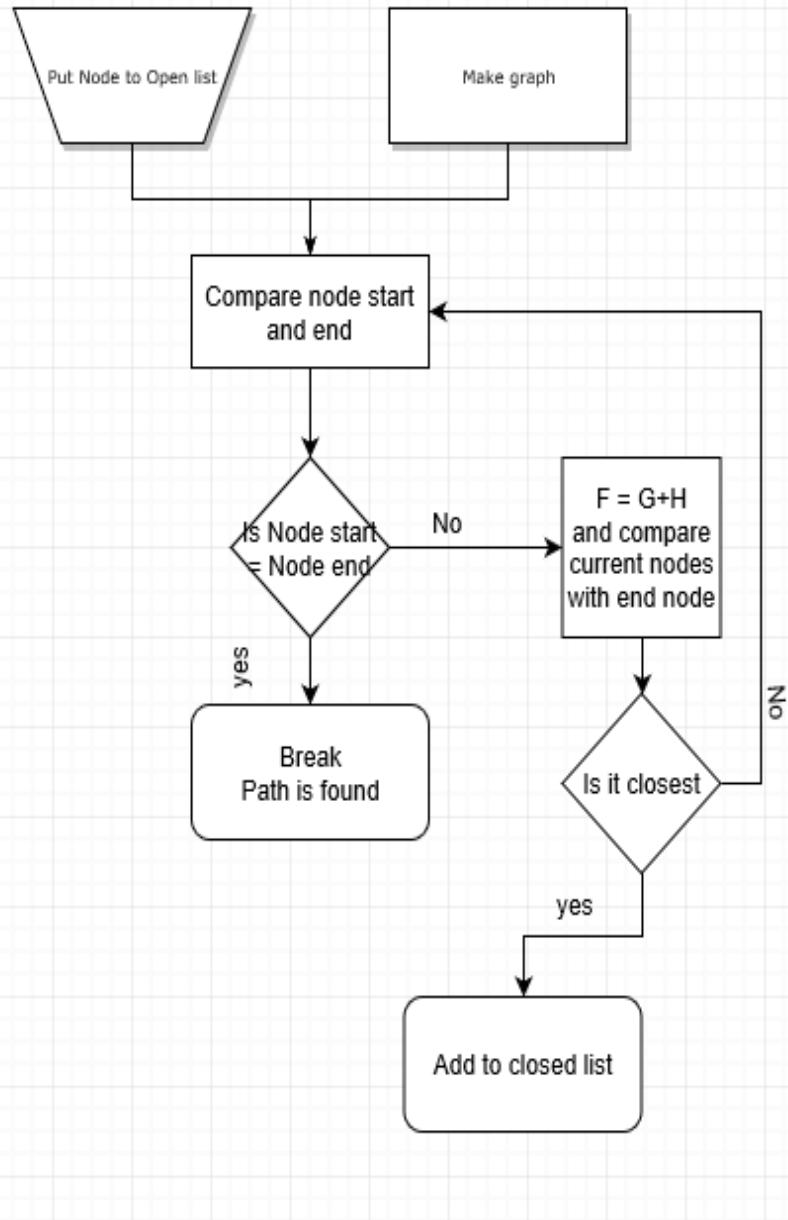
Ideal points (Best chosen points according to point cloud and Growing algorithm)



Nodes as purple voxels representing shortest path between start node and end node



# Path finding (A\*)



The goal node is denoted by `node_goal` and the source node is denoted by `node_start`

We maintain two lists: **OPEN** and **CLOSE**:

**OPEN** consists on nodes that have been visited but not expanded (meaning that successors have not been explored yet). This is the list of pending tasks.

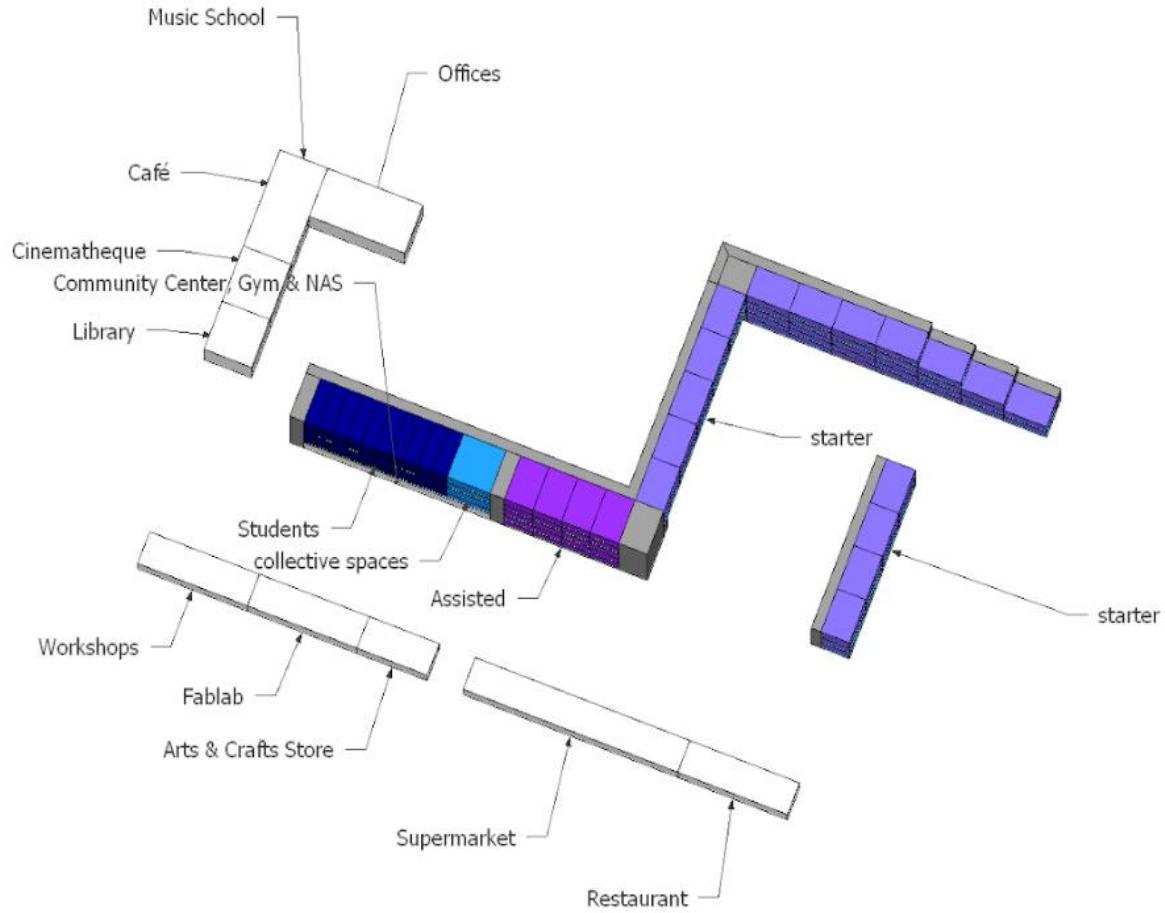
**CLOSE** consists on nodes that have been visited *and* expanded (successors have been explored already and included in the open list, if this was the case).

```

1 Put node_start in the OPEN list with  $f(\text{node\_start}) = h(\text{node\_start})$  (initialization)
2 while the OPEN list is not empty {
3   Take from the open list the node node_current with the lowest
4    $f(\text{node\_current}) = g(\text{node\_current}) + h(\text{node\_current})$ 
5   if node_current is node_goal we have found the solution; break
6   Generate each state node_successor that come after node_current
7   for each node_successor of node_current {
8     Set successor_current_cost =  $g(\text{node\_current}) + w(\text{node\_current}, \text{node\_successor})$ 
9     if node_successor is in the OPEN list {
10       if  $g(\text{node\_successor}) \leq \text{successor\_current\_cost}$  continue (to line 20)
11     } else if node_successor is in the CLOSED list {
12       if  $g(\text{node\_successor}) \leq \text{successor\_current\_cost}$  continue (to line 20)
13       Move node_successor from the CLOSED list to the OPEN list
14     } else {
15       Add node_successor to the OPEN list
16       Set  $h(\text{node\_successor})$  to be the heuristic distance to node_goal
17     }
18     Set  $g(\text{node\_successor}) = \text{successor\_current\_cost}$ 
19     Set the parent of node_successor to node_current
20   }
21   Add node_current to the CLOSED list
22 }
23 if(node_current != node_goal) exit with error (the OPEN list is empty)
  
```

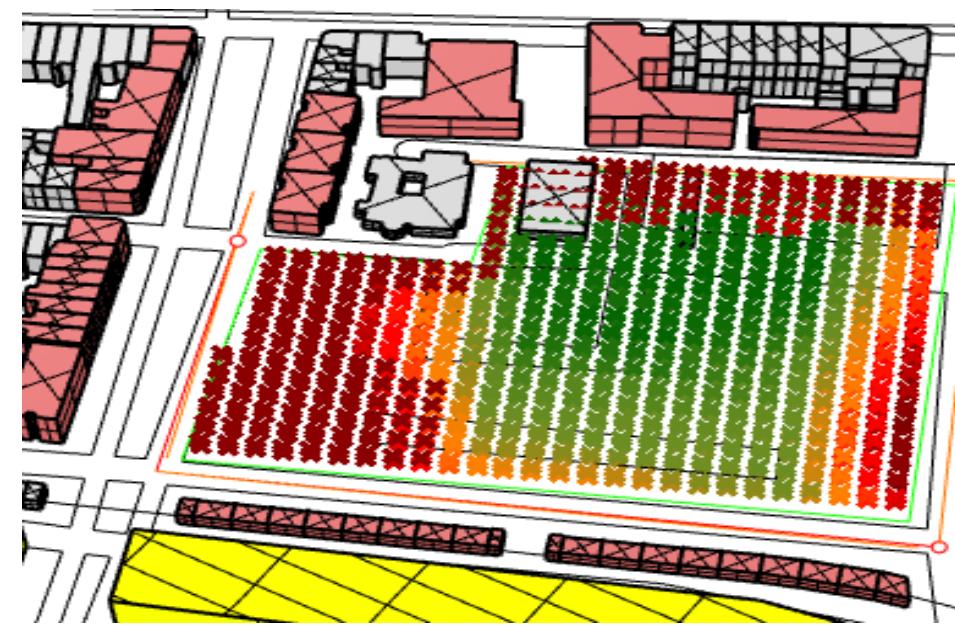
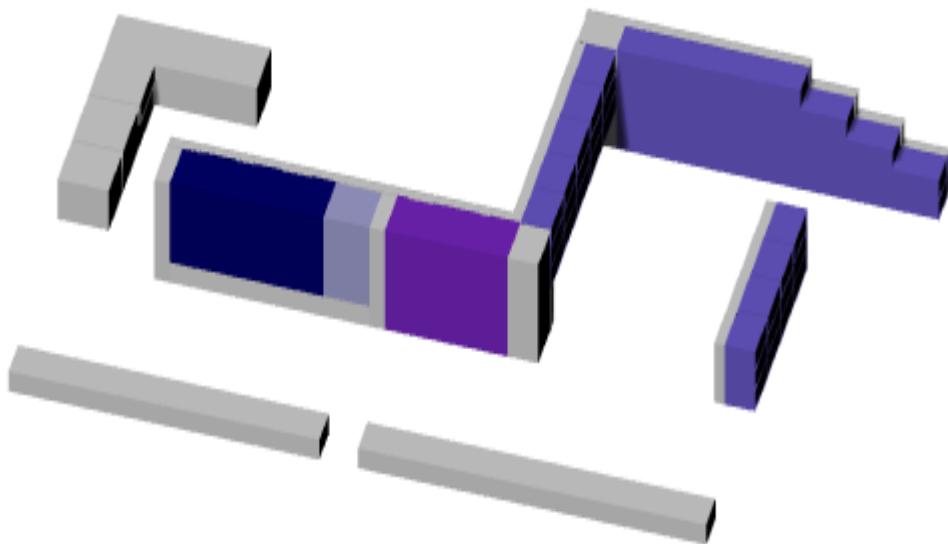
<http://mat.uab.cat/~alseda/MasterOpt/AStar-Algorithm.pdf>

# Design

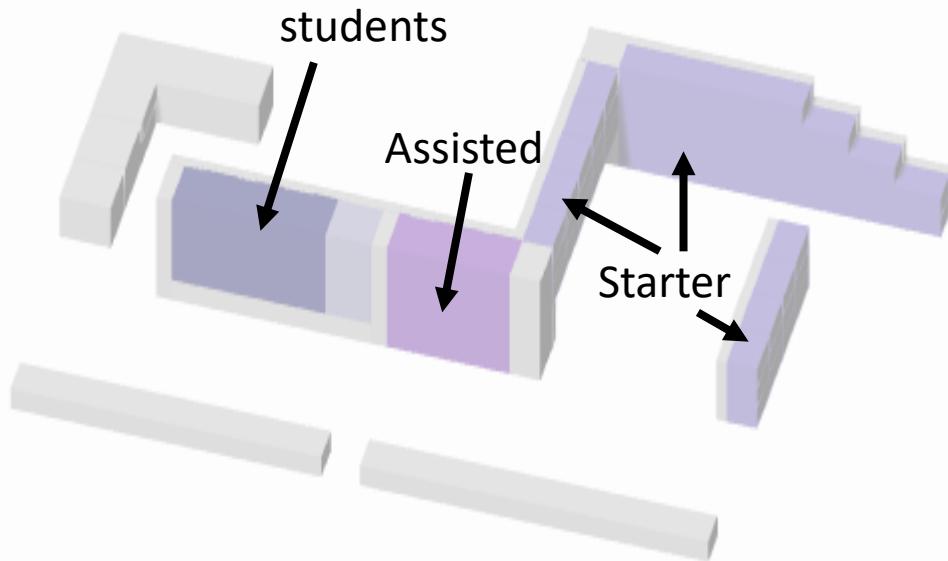


# Point cloud and Design

## Housing

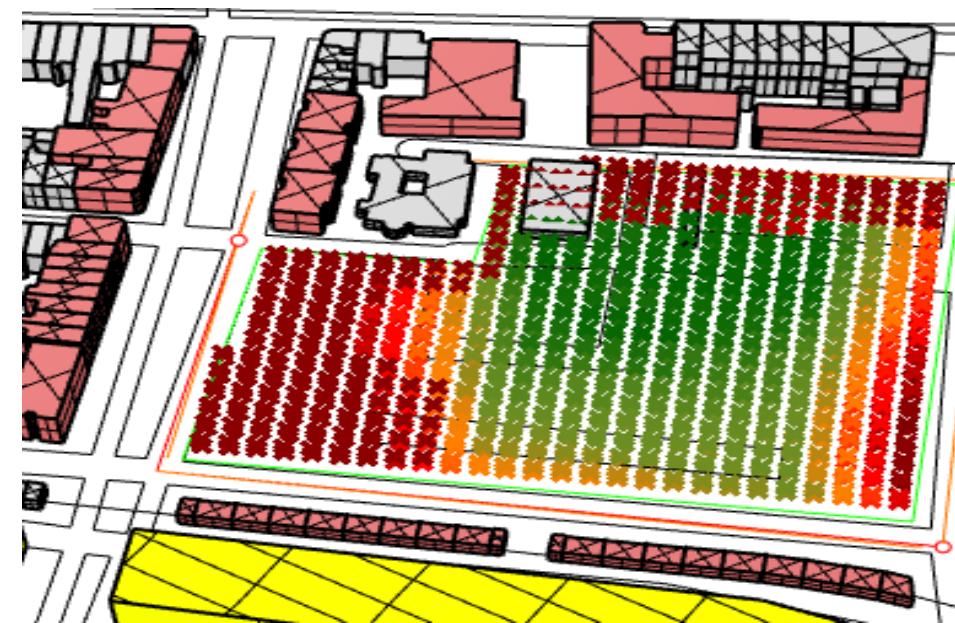


# Point cloud and Design



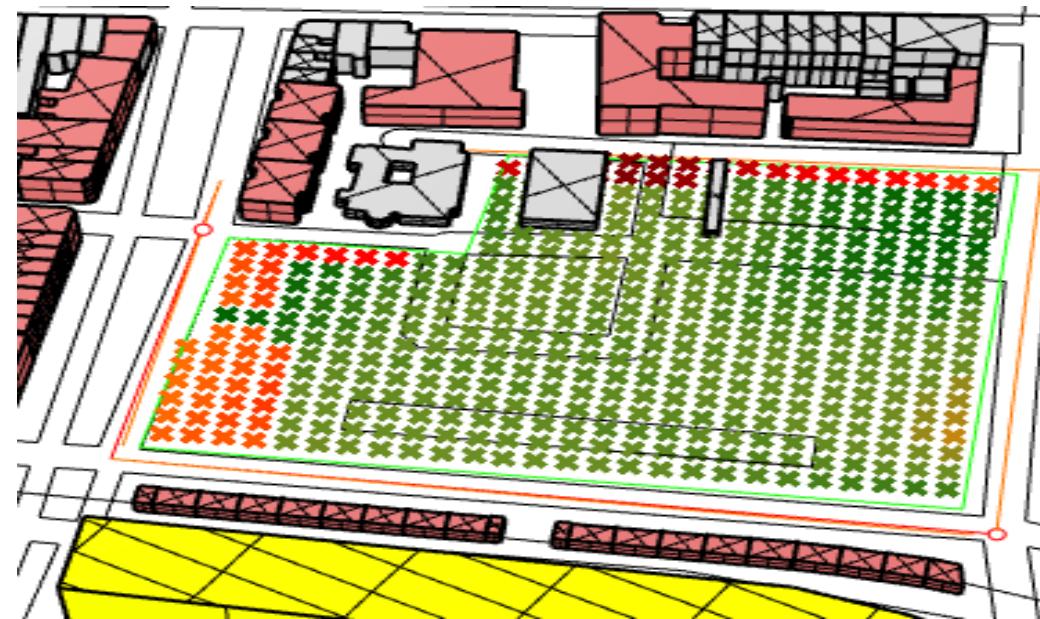
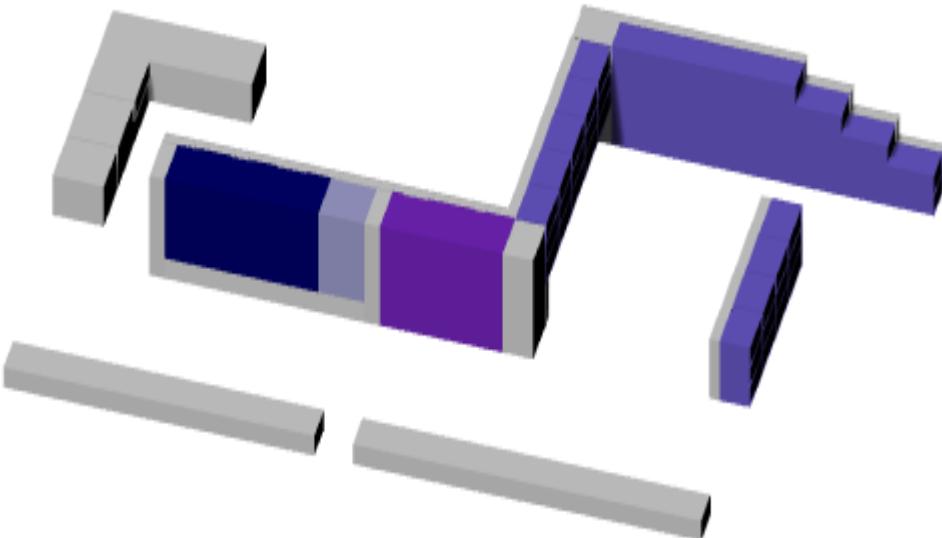
Groups	Areas (m <sup>2</sup> )
Starter housing	4000
Assisted	1000
Student	1000
Total	6000

# Housing



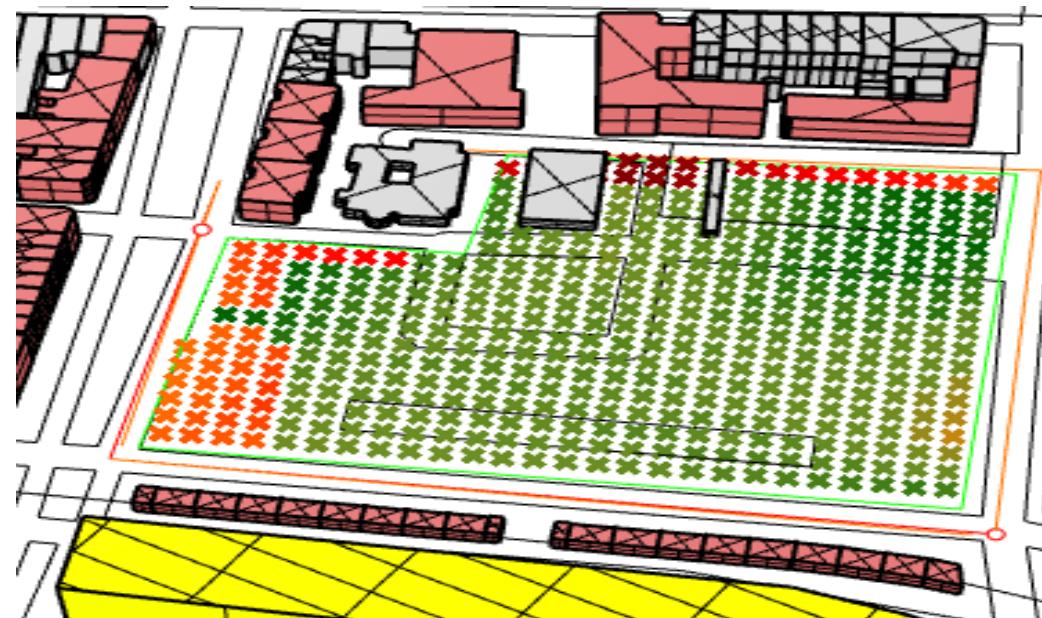
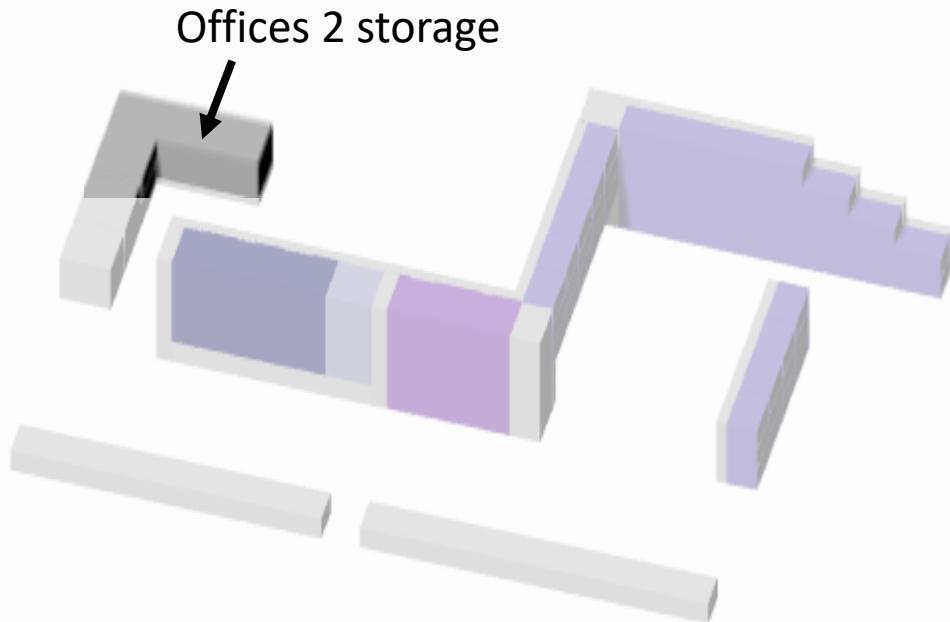
# Point cloud and Design

**Offices**



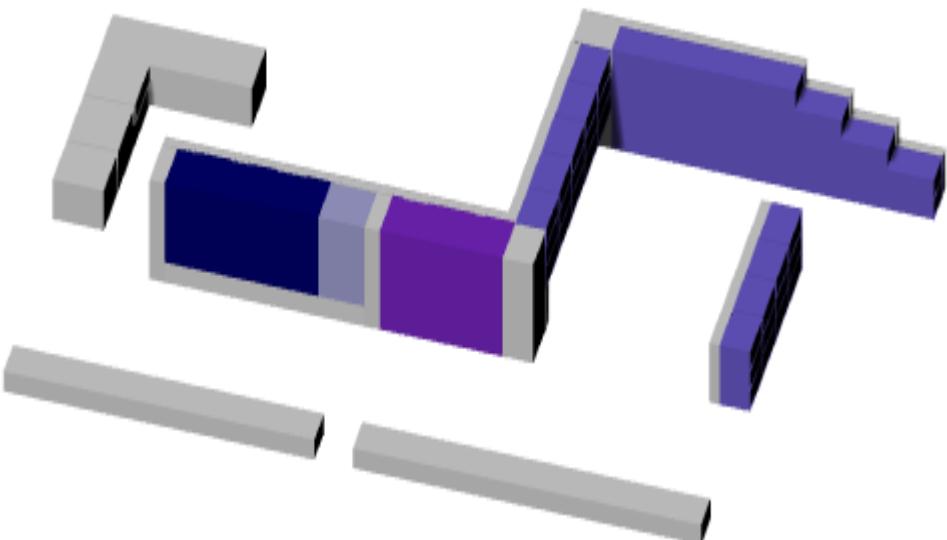
# Point cloud and Design

**Offices**

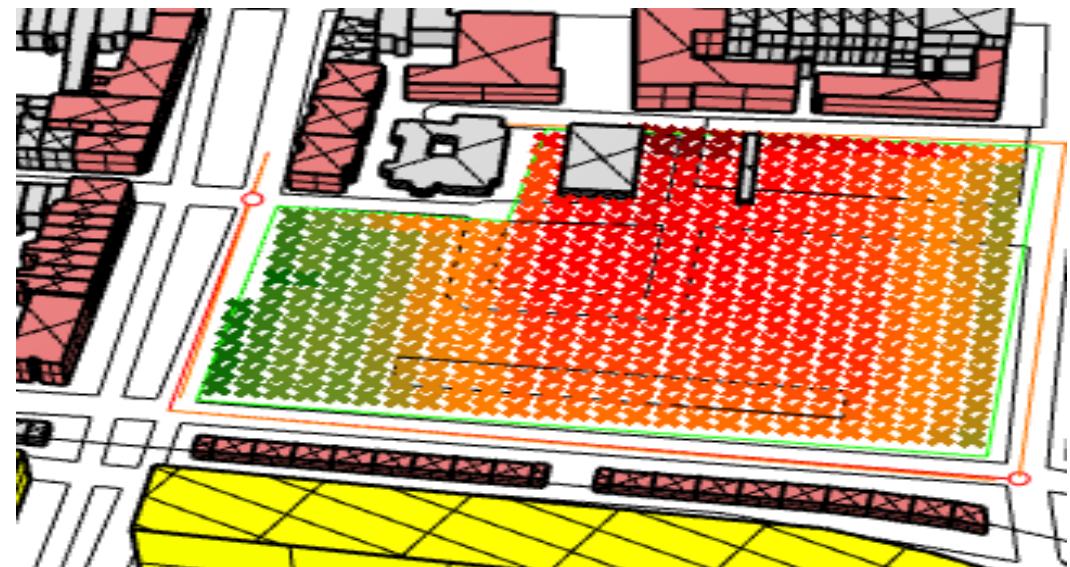


Group	Area (m <sup>2</sup> )
Offices	400

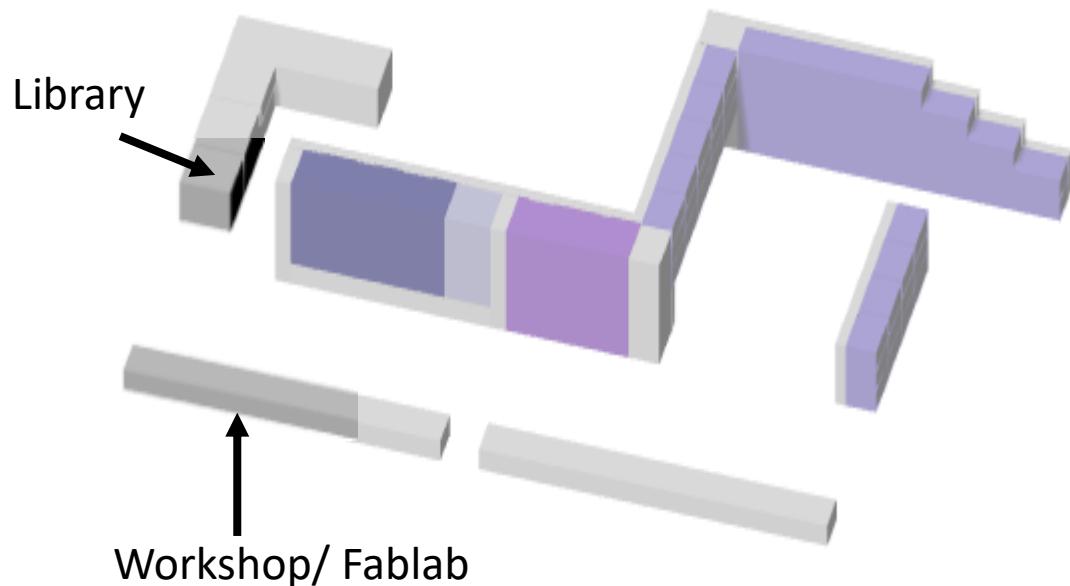
# Point cloud and Design



# Workshop/fablab Library

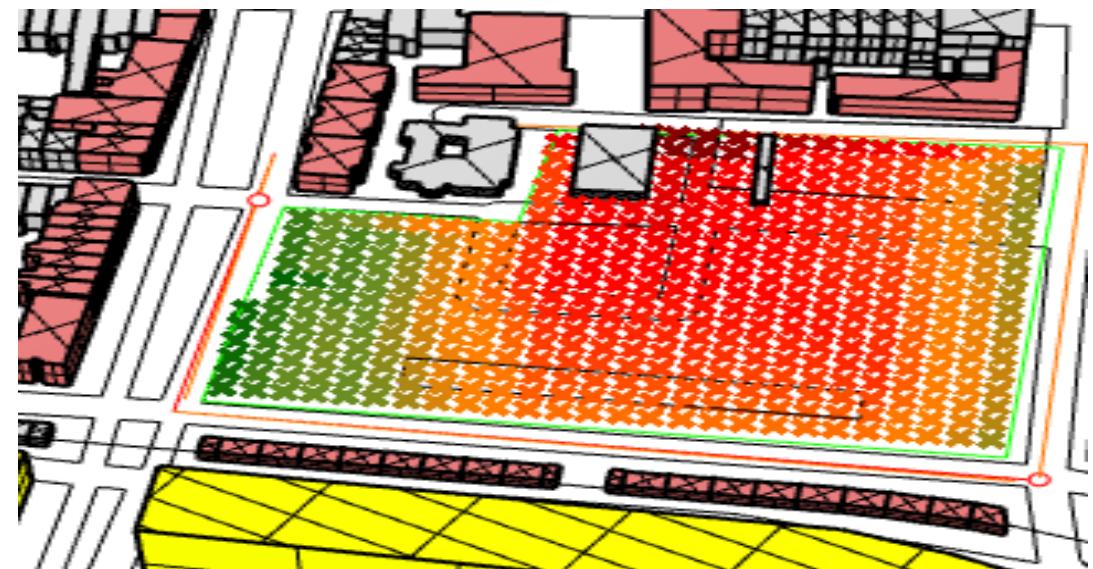


# Point cloud and Design



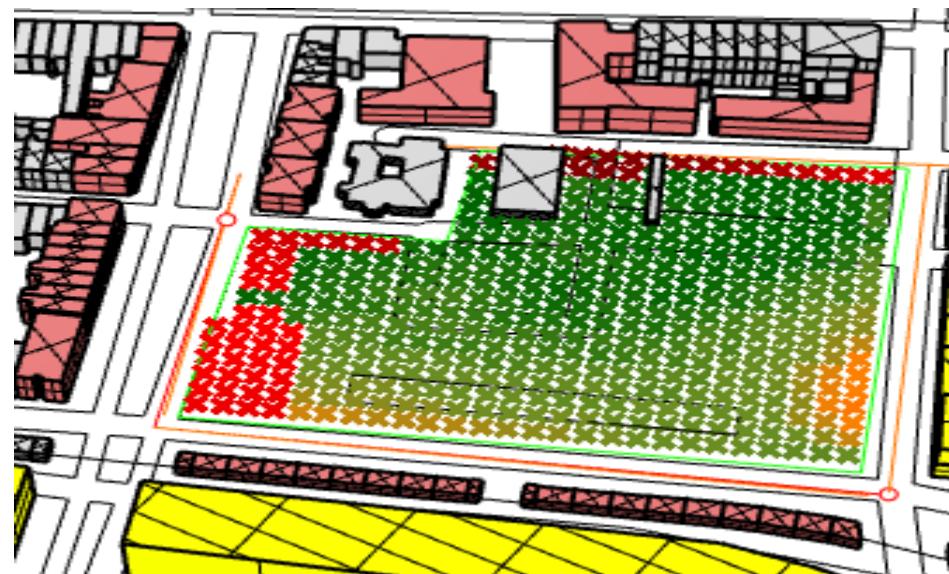
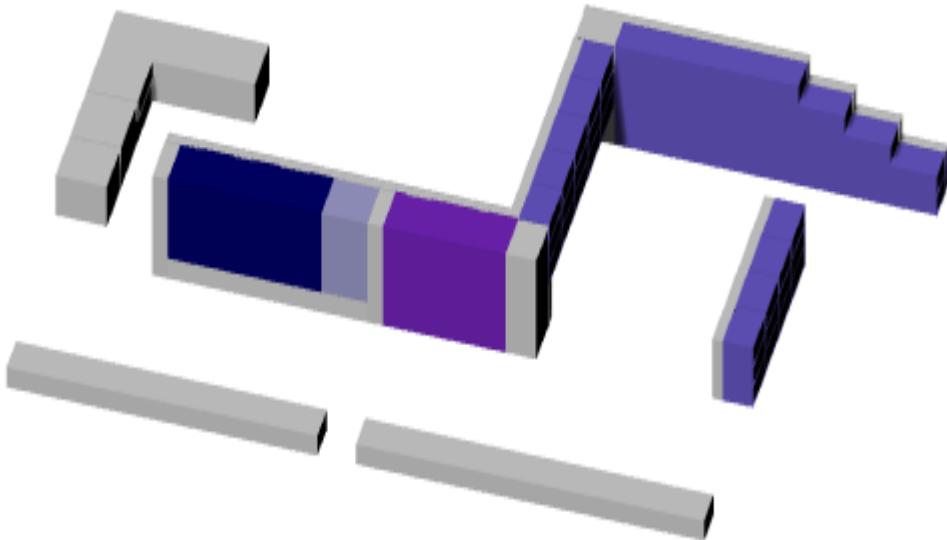
Groups	Area (m <sup>2</sup> )
Workshop	150
Fablab	150
Library	200
Total	500

## Workshop/fablab Library

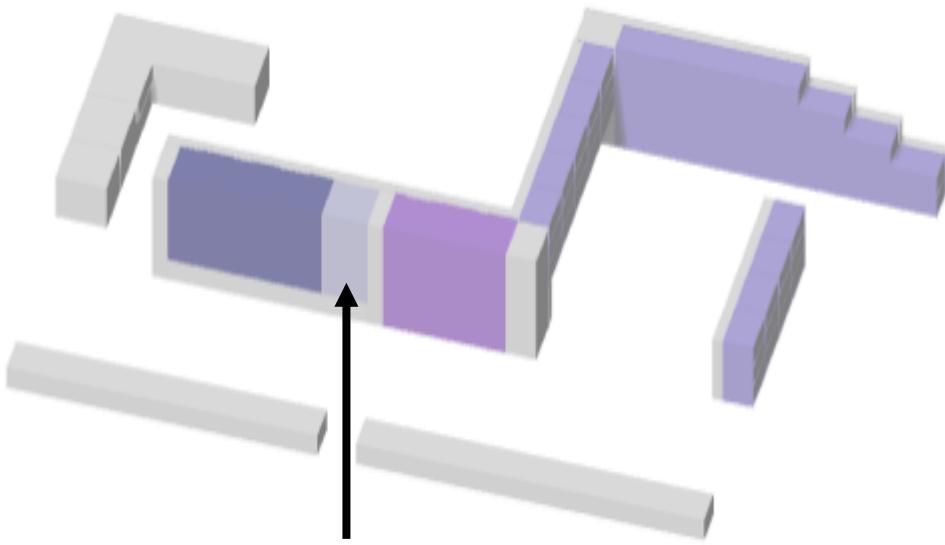


# Point cloud and Design

# Community centre



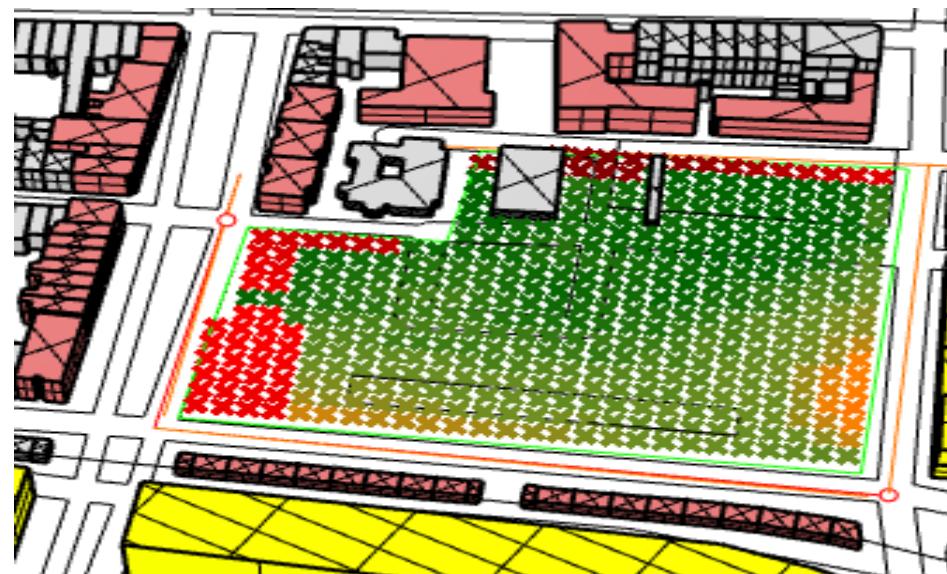
# Point cloud and Design



Community center / Gym

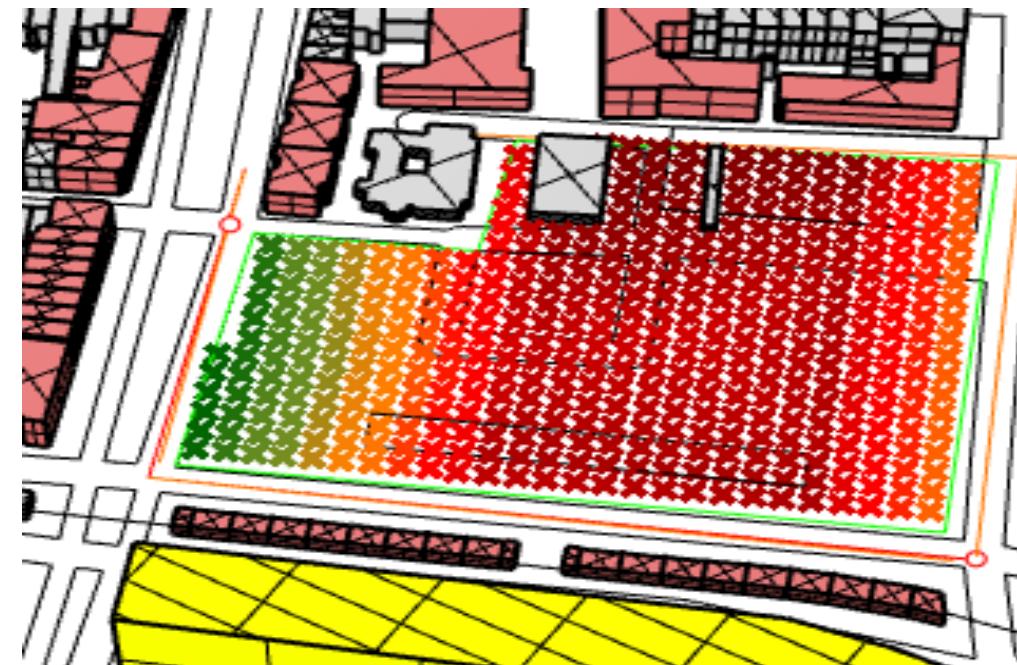
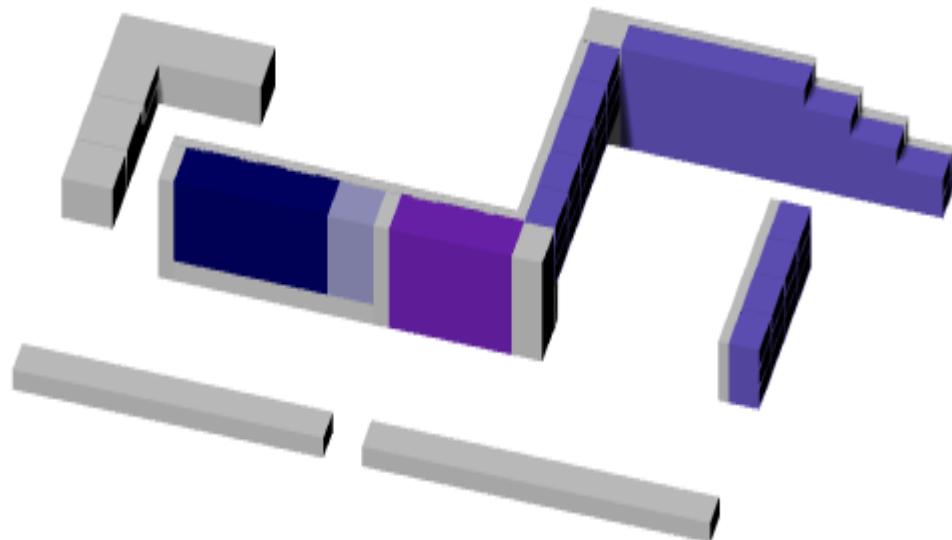
Groups	Area (m <sup>2</sup> )
Community center	140
Gym	180
Total	320

# Community center



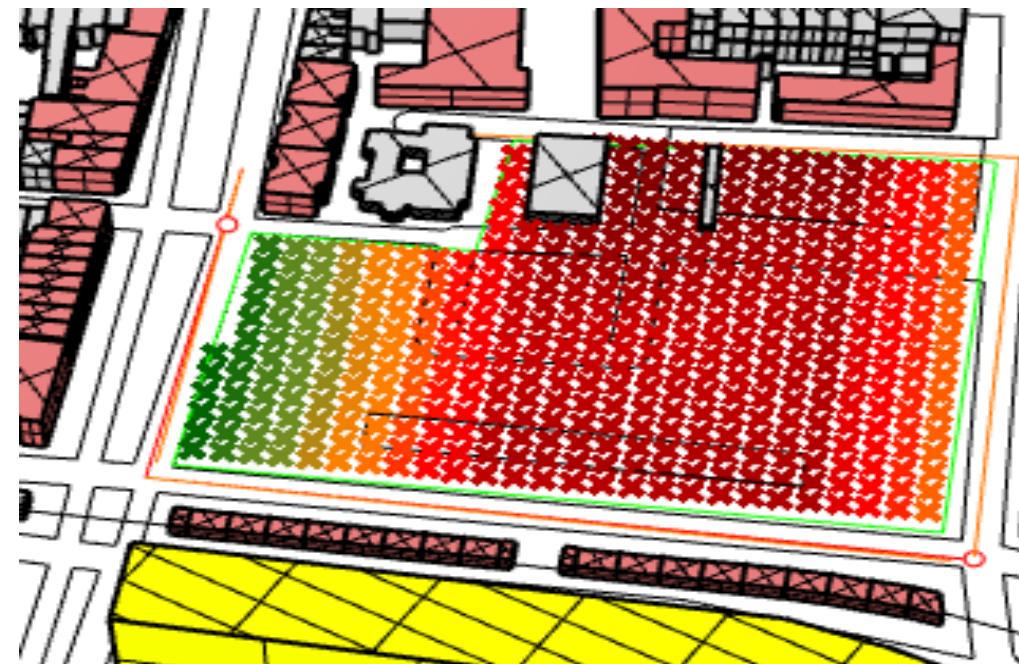
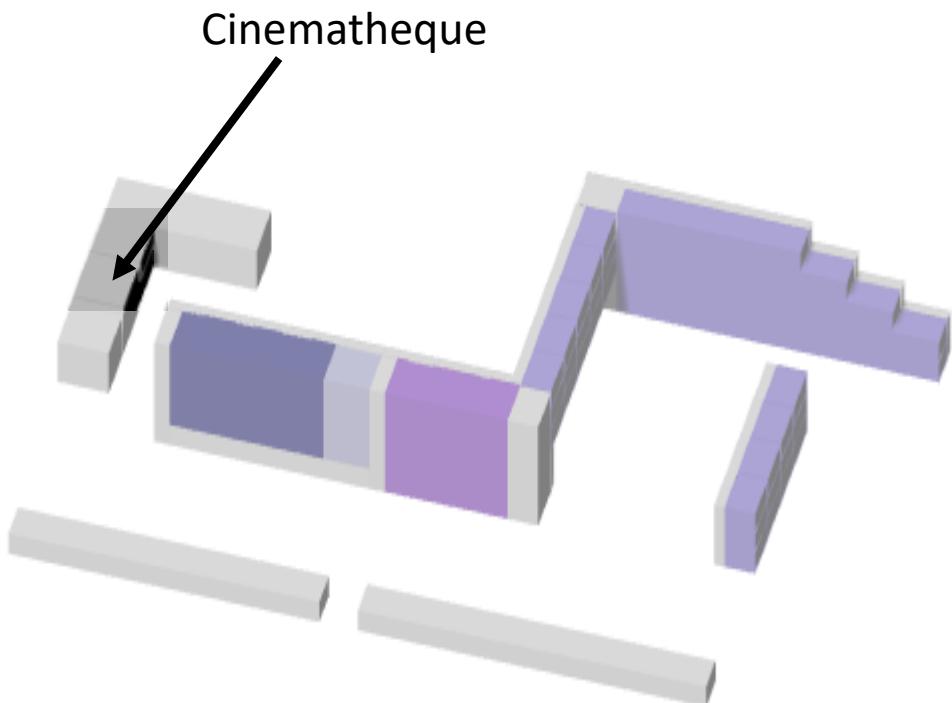
# Point cloud and Design

## Cinematheque



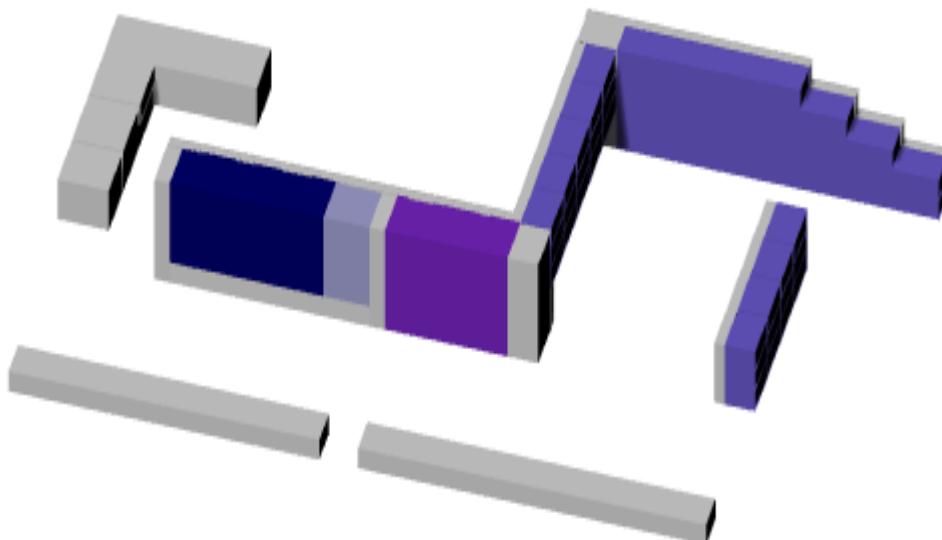
# Point cloud and Design

## Cinematheque

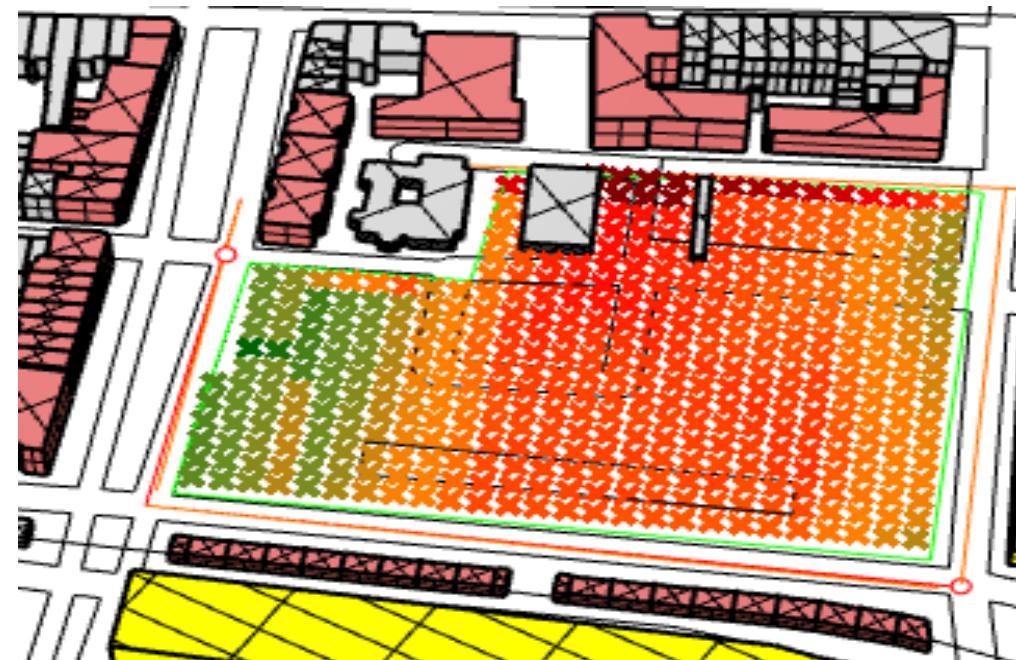


Group	Area ( $m^2$ )
Cinematheque	215

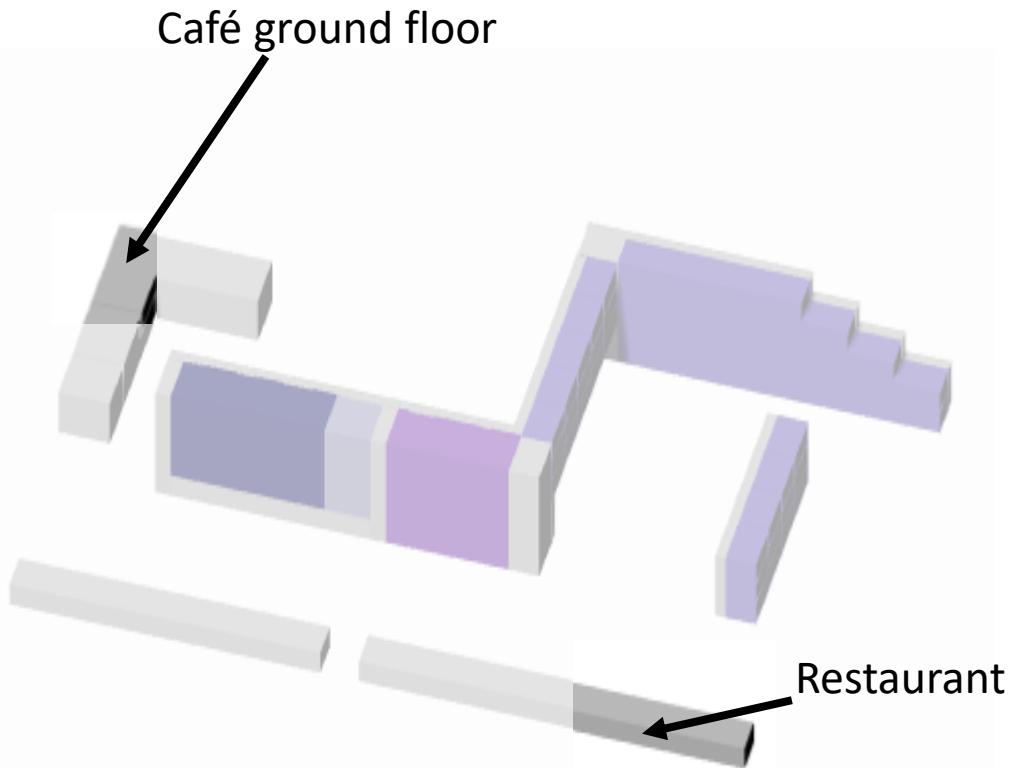
# Point cloud and Design



# Café/Pub & restaurant

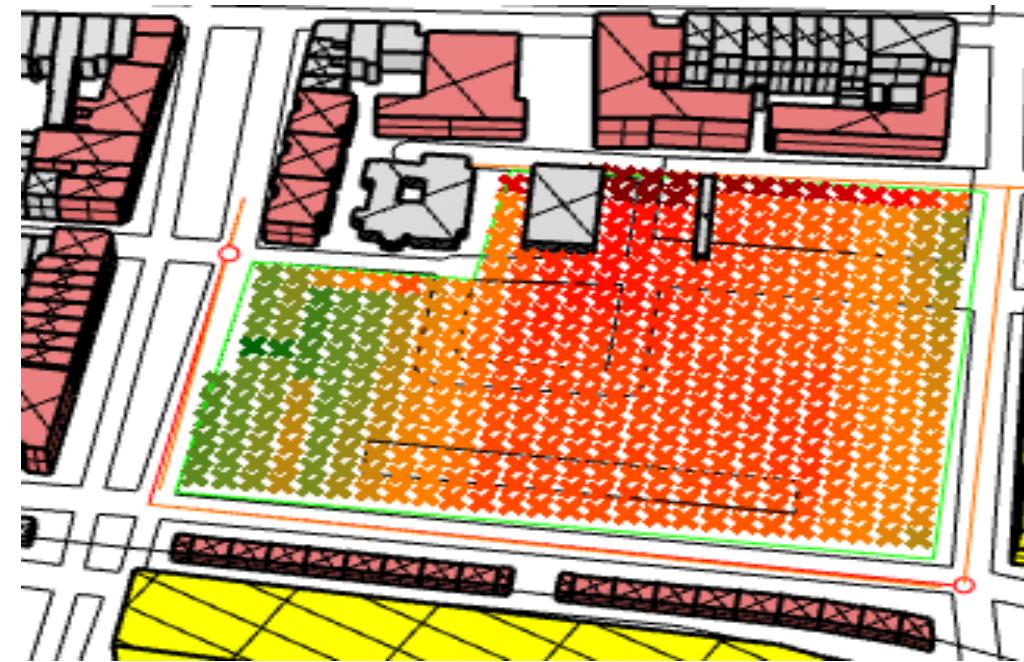


# Point cloud and Design



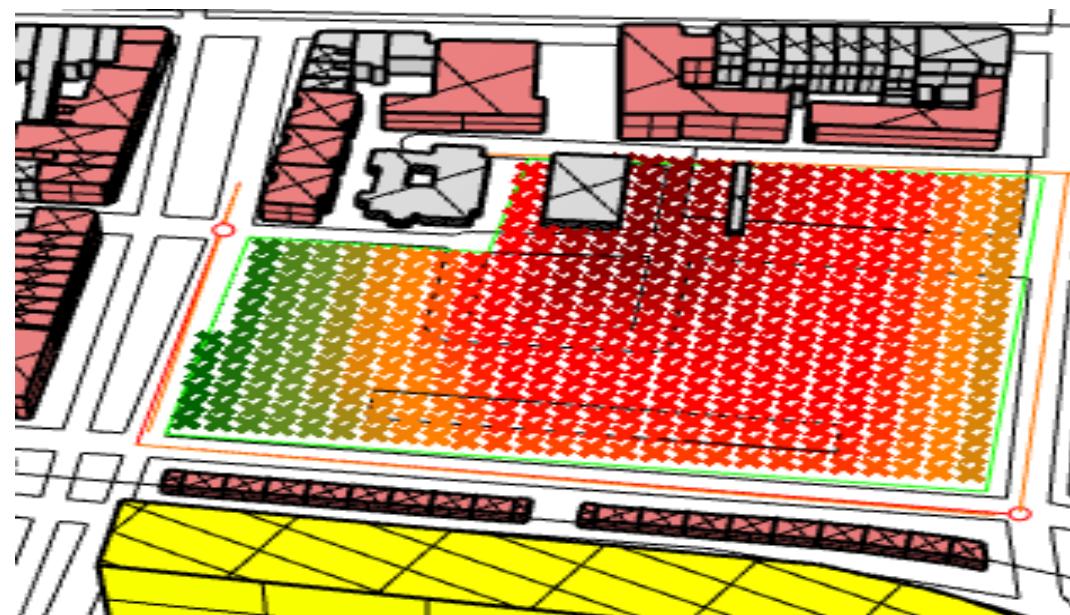
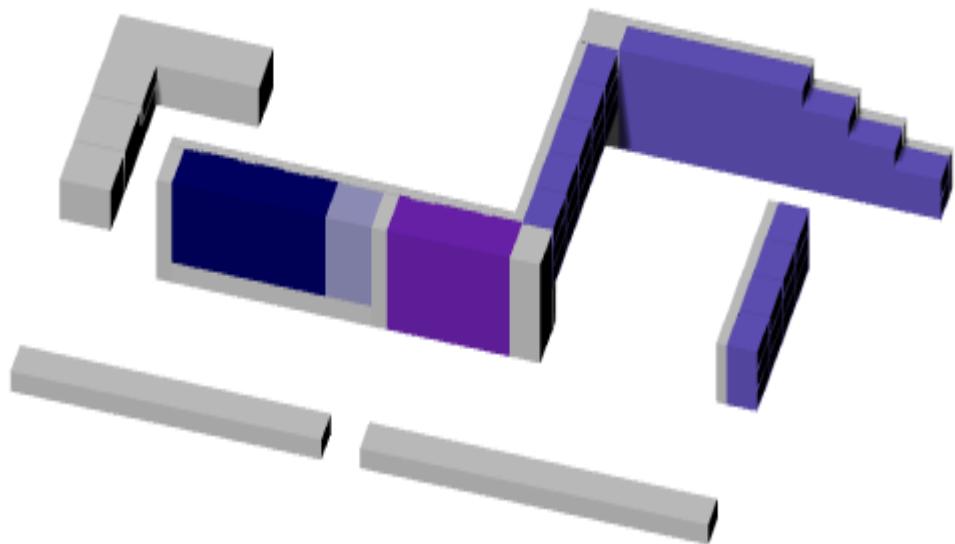
Groups	Area (m <sup>2</sup> )
Café	80
Restaurant	150
Total	230

## Café/Pub & restaurant



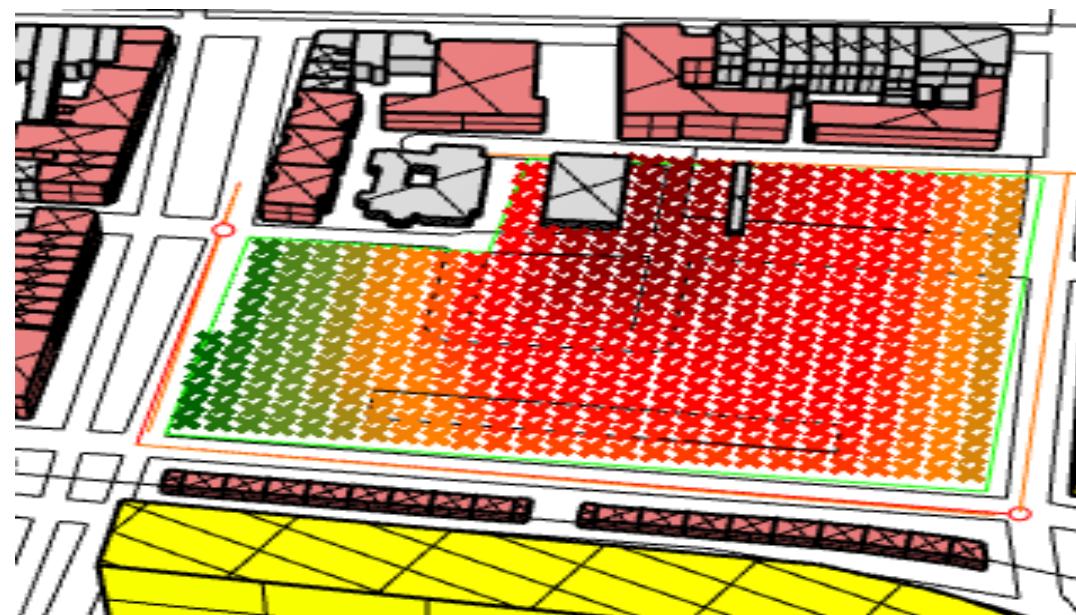
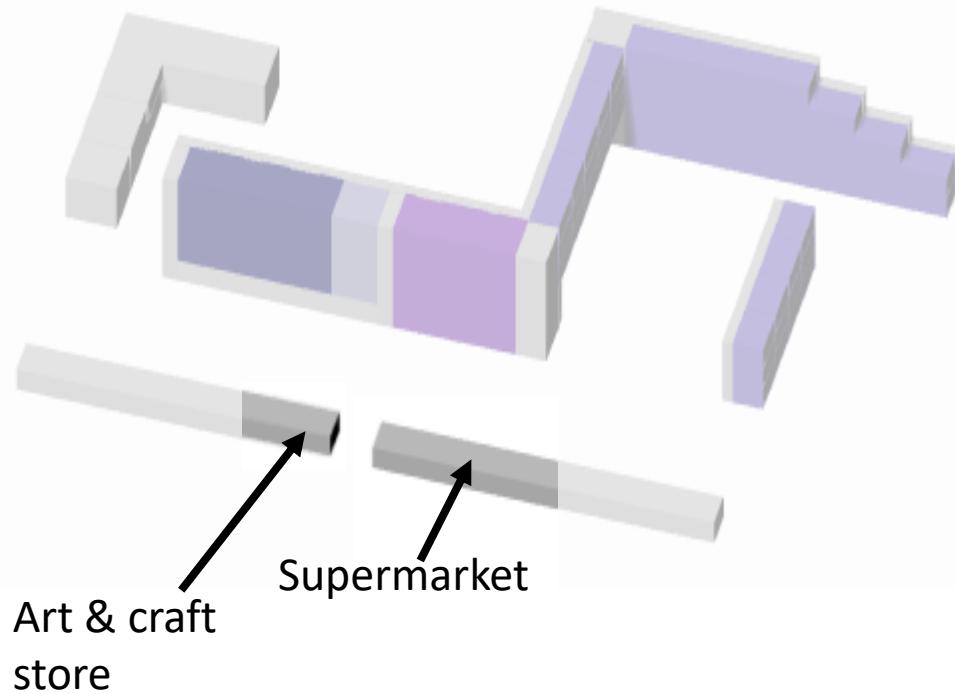
# Point cloud and Design

**Shops**



# Point cloud and Design

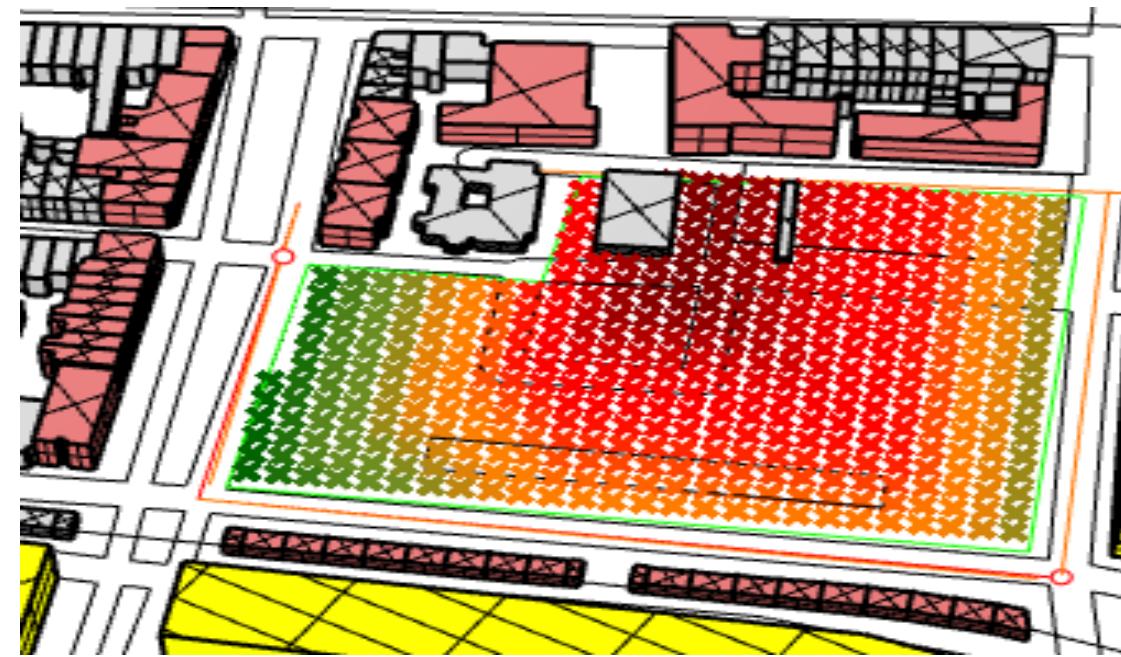
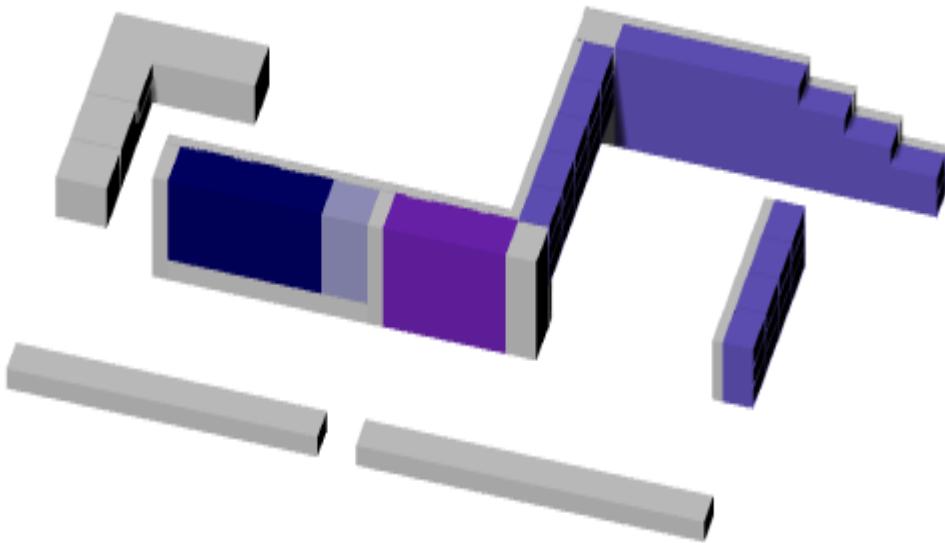
## Shops



Groups	Area (m <sup>2</sup> )
Supermarket	300
Art & Craft store	95
Total	395

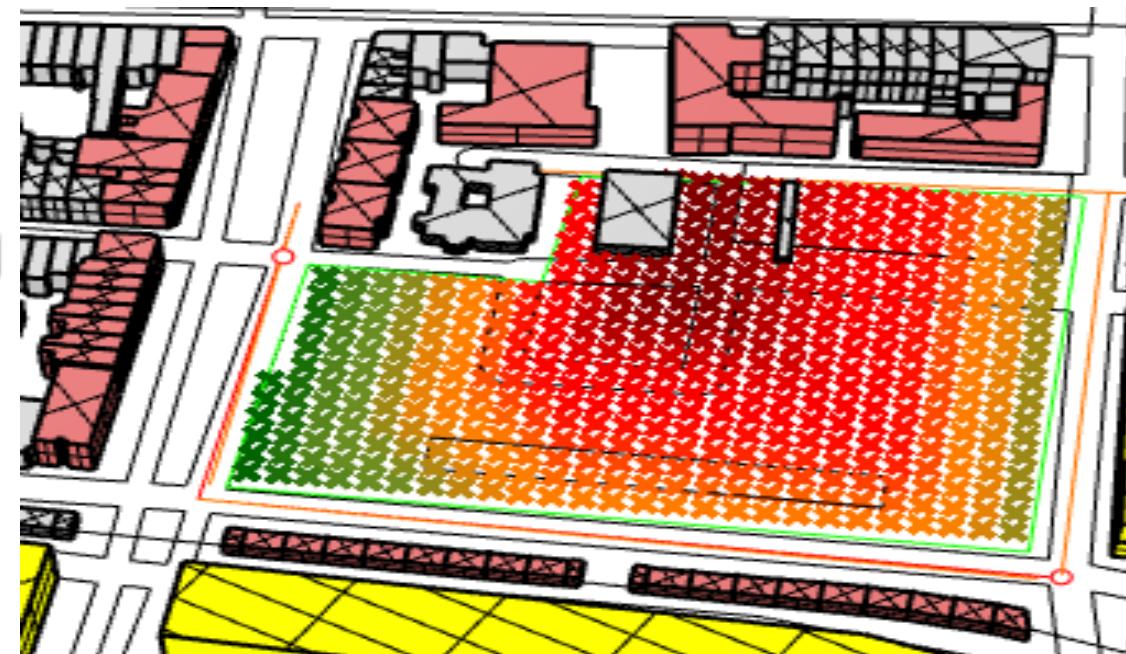
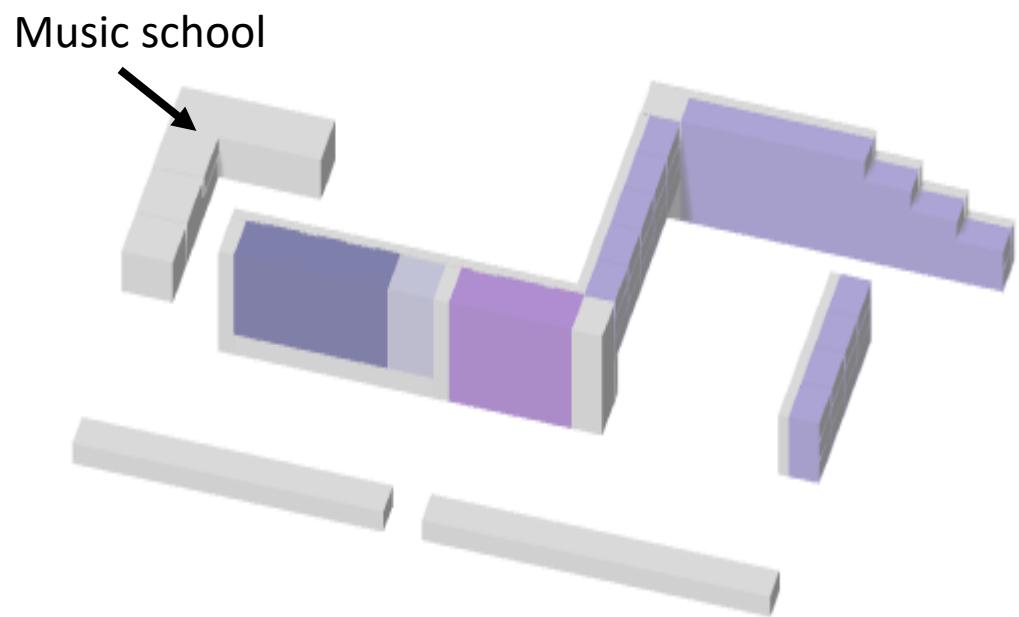
# Point cloud and Design

**Music school**



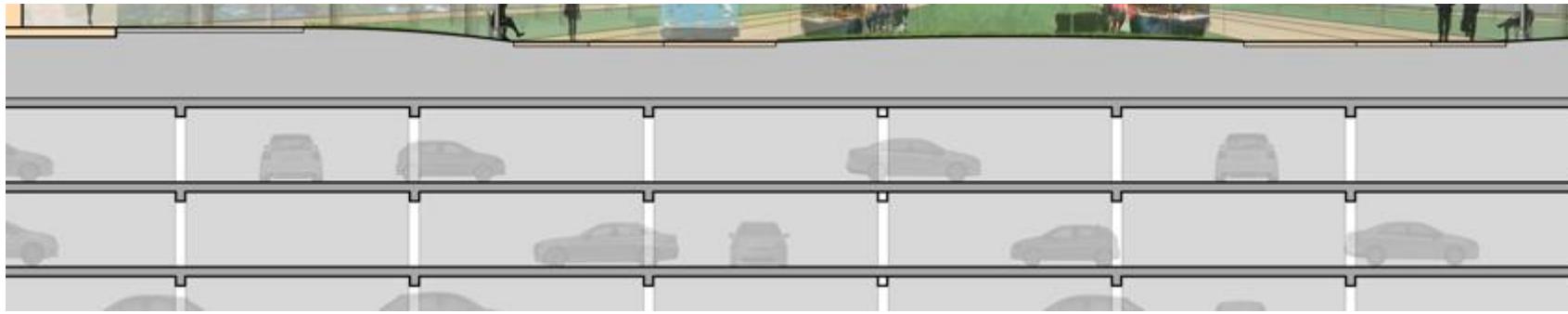
# Point cloud and Design

## Music school



Group	Area (m <sup>2</sup> )
Music school	200

# Underground parking



**Total: 60 units**

**Total area: 1500 m<sup>2</sup>**

# Checklist

Total Area = 18,560 m<sup>2</sup> => 50% of 18,560 = 9280 m<sup>2</sup>

Area build: 200 + 395 + 230 + 215 + 320 + 500 + 400 + 6000 = 8260 m<sup>2</sup> = 44% Area used

100 – 44 = 56% Green 

Student housing: 40 units 

Assisted living: 20 units 

Starter housing: 60 units 

Communal spaces 

(For underground parking see Program of Requirements)

Design goals qualitative and quantitative optimised (through point cloud and logical reasoning) 

Thank you for your attention