

Density

Common Ground

Growing urban population

Issues and opportunities of density

Studies of density in general

Site experiments and analysis in 1:200 model



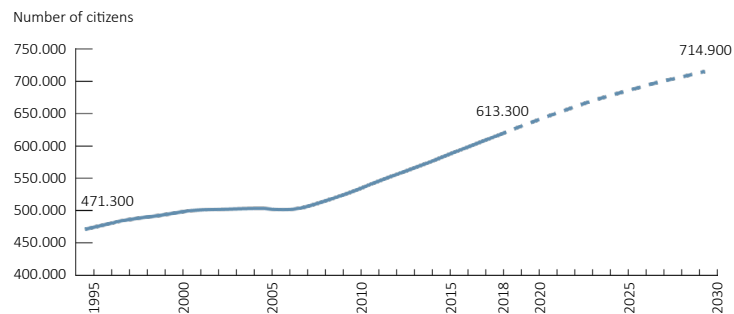
I will investigate the qualities and issues of increased urban density, as my project propose a new building in the void of Jagtvej 69. These investigations will unfold within this booklet and will draw inspiration from the work of Rudy Uytenhaak conducted in Amsterdam.

Historic map of Jagtvej, Nørrebro, Copenhagen

Expansion of the city

Copenhagen is seeing a continues growth in population, which in turn leads to an expanding need for new dwellings. This development will either push the city boundaries outwards or result in an increasing urban density – presenting different challenges and opportunities.

Population growth in Copenhagen from 1995-2018



Most notably within Rudy Uytengaak's research is the increase in space / person in the newbuild dwellings in Amsterdam throughout the last 100 years, which is central to his criticism of the erosion of the bustling city. Uytengaak argues that the exploding expansion of the city has eroded the urban potential – that the bustling city full of life and that proximity from balanced density is the secrete to prosperous cities. Through his research Uytengaak tries to prove that a continuous layered density is to be preferred over an urban strategy of continuing to build entirely new neighbourhoods on the edge of the city. This argument for urban denseness is to some extend in direct conflict with the works of David Harvey, Panu Lehtovuori and Marianna Mogilevich. Thus, the balance between programmed space and void becomes crucial.

Diagram source: www.kk.dk/sites/default/files/status_paa_kbh_2018_aug.pdf

What can be gained?

- Proximity
- Compression
- Relations
- Floor Space / m²
- Program Diversity
- Efficient & intensive use of Space
- Efficient use of resources

What might be lost?

- Green spaces
- Privacy & Intimicy
- Livability
- Daylight
- Free 'production of space'



This investigation of density will look at the gains, losses and methods by which a city can become denser, within the critical perspective of the 'production of space' and notions of 'place' (see program for theoretical explanation).

Current aerial map of Jagtvej, Nørrebro, Copenhagen



New York City - USA

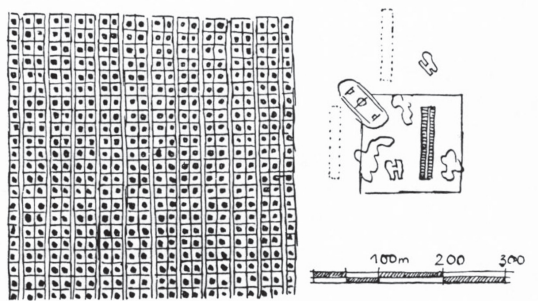


Kowloon Walled City - Hong Kong

How to densify the urban fabric?

There are two main tools that can be used to increase the density. Making the building volume deeper or higher. According to the studies of Rudy Uytenhaak the best results are achieved by a combination of the methods.

Uytenhaak builds on the work of Walter Gropius and Le Corbusier, both of whom investigated the relationship between mass and void. This led amongst other things to Le Corbusier's infamous *unité d'habitation*, which relied on stacking of dwellings transforming them into slabs and towers surrounded by a green landscape.

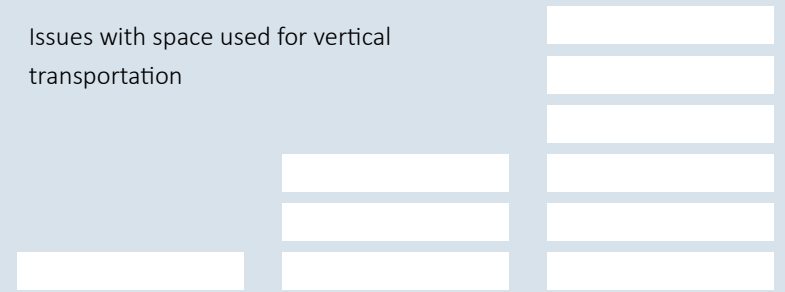


Central to Uytenhaak's understanding of density is his notion of floor space index (FSI), which he uses to determine how efficiently space is managed. The FSI is used to compare different typologies and specific places while also considering the relationship between mass and void.

Applying the methods Uytenhaak presents 3 basic typologies; the block, the point & the strip. These typologies are elaborated and exemplified on the next pages.

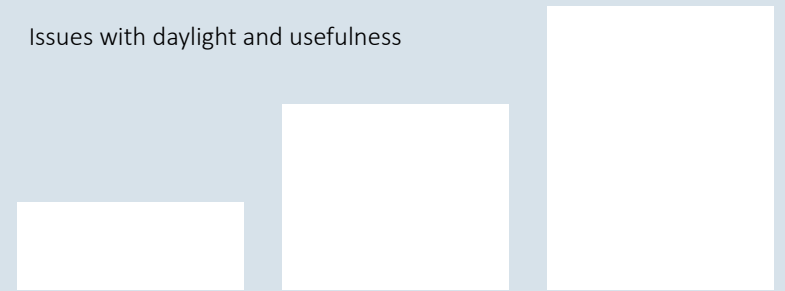
Initial concept sketch for *unité d'habitation* - Le Corbusier

Issues with space used for vertical transportation



Density by stacking

Issues with daylight and usefulness



Density by depth

Some simple guidelines can be taken into consideration when increasing the building density on the site. These may prove useful when dealing with the issues of light and privacy.

Block Typology – Hornbækhus by Kay Fisker (1923):

This classical urban housing typology is favored in Copenhagen. The building volumes follow the street at a depth usually allowing for the apartments to receive light from two directions, while also leaving space for an inner courtyard (these spaces were freed up as new housing strategies sought to create a healthier environment in Copenhagen).

Point Typology – Bellahøj Husene by Tage Nielsen & Mogens Irming (1950'ies):

This typology has been applied in two icon brutalist housing projects namely Bellahøj Husene and Brøndby Strand. In both cases these tower-projects have been used to create high density volumes in green park-like landscapes, while adding significant and monumentality to their respective skylines. They were very much inspired by Le Corbusier's unité d'habitation.

Strip Typology – Boligslangen by Domus Arkitekter & Arkitema (2006):

Following a similar ideal of view, daylight and green landscape as the point typology, this strip stacking has mostly been used in 2-3 story housing around Copenhagen. Boligslangen, which is situated in the fairly new neighbourhood of Ørestaden uses this typology to claim the wide open space, while still emphasizing the verticality of the landscape.



Issues of Light

Applying the basic tools of stacking or deepening the building increases the density of a place but presents a challenge of getting enough daylight into the building. The building itself sets a natural limit for the depth to which the light can penetrate. This determined by the ceiling height. These challenges escalate as one building becomes an obscuring for another building, either through an increased height or decreased street width. This effect is illustrated on the opposite side.

There are different ways to tackle the challenge of low lux levels (measurement of daylight) when increasing the urban density. Most of these require supplementary studies in volumetric positioning, materials, openings etc.

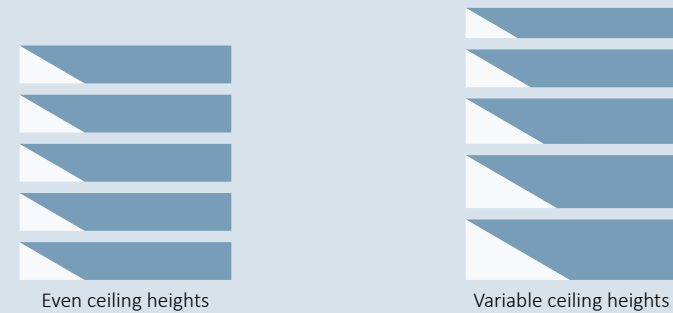
However, as a rule of thumb, the relationship between the volumes should allow for a 45° angle of obscuration, so that sunlight might stream into the bottom floor. This means that as the building becomes taller the distance between volumes becomes wider.

Another way to improve the daylight situation is to arrange the ceiling height in such a way that the lower levels of the building has a higher ceiling than the upper levels. This makes it possible to increase the amount of daylight.

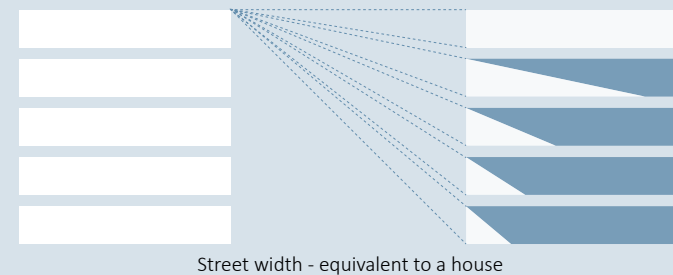
Finally, skylights and courtyards can be used to punctuate the building mass and allow for more daylight to enter the building. This will decrease the density, but may prove a useful tool to make the building more useful in terms of program diversity and livability.

The negotiation of daylight is further explored in the 'Light' booklet.

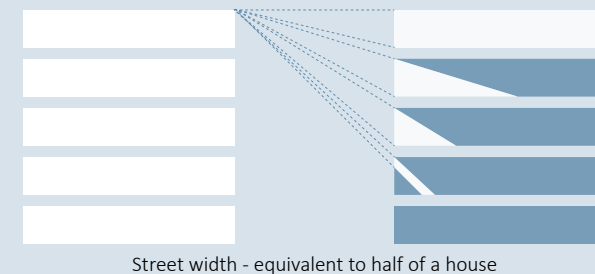
Daylight situation as the ceiling height obstruct the light penetration.



Daylight situation with a 45° angle of obstruction from neighbouring building.



Daylight situation with a 45° angle of obstruction from neighbouring building.



Basic principles of daylight and density.

In his design of the VM Houses, Bjarke Ingels solved the issue of light while providing a scenic view of the surrounding landscape. However, as the final solution was a floor to ceiling glass façade covering the double height apartment, the inhabitants were robbed of their privacy. Their façade and interior has melted together to become an unobstructed scene to their daily lives.



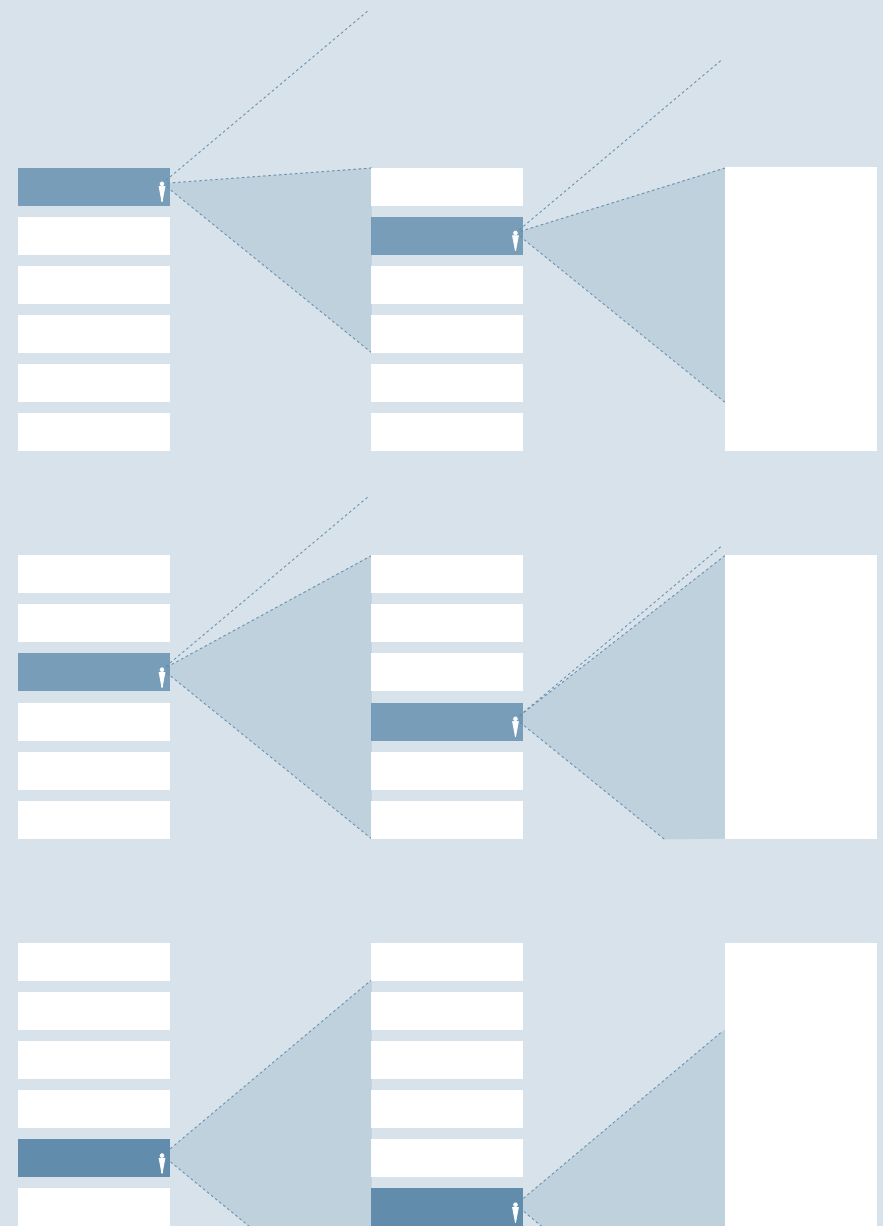
VM Houses - Copenhagen

Issues of Privacy

As the density increase, we move closer to each other and issues of privacy become more imminent. Our lives are affected by the views, noises, smells and random clashes between us and our neighbours. Thus, we develop different strategies to attain privacy and in the perspective of building mass and void especially the view from house to house becomes critical. This relationship between view and position within the house is illustrated on the opposite page. It becomes a balance between wanting to observe the immediate world around us while at the same time allowing for some level of privacy - between view and obscurity.

Some strategies such as curtains and shutters are used more widely than others, and it seems these strategies are an intersection between the interior and the exterior, where we manipulate our environment to attain privacy. But the issue of privacy should also be taken into account by the architect in his / her design of the volumes, spatial planning and openings.

The issue of density, privacy and daylight became central to the project. The balancing and negotiation of these considerations became engrained in the double façade and the different shared spaces through-out the project. (See more detailed studies 'Light' booklet).



Privacy situation with an 80° angle vertical field of vision to the neighbouring building.

Volume Studies - Site 1:200:

Initial considerations

Block Typology

Point Typology

Strip Typology

Public spaces - Plan

Affordable and profitable apartments - Plan

Initial considerations on square meters and tenancy.

The site of Jagtvej 69 is roughly 1100 m².

The plot will incorporate 3 tenant programs:

- profitable housing
- affordable housing
- municipality administrated space

25 % of the squaremeters must be used for affordable housing.

The plot ratio (bebyggelsesprocenten) for surrounding blocks in the immediate neighbourhood is between 220 - 325 % (according to Lokalplan nr. 405).

The maximum plot ratio for new build sites in Copenhagen is B5 185 %, this would be used in cases of station proximity, thus including Jagtvej 69 due to the new metro station at Nørrebros Runddel. Furthermore, the higher density would be almost equivalent to the surrounding blocks.

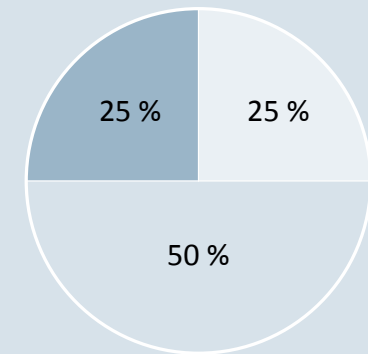
Upgrading from B4 to B5 adds another 385 m² of potential space to the site. This is equivalent to 19% of the total plot size.

Key figures

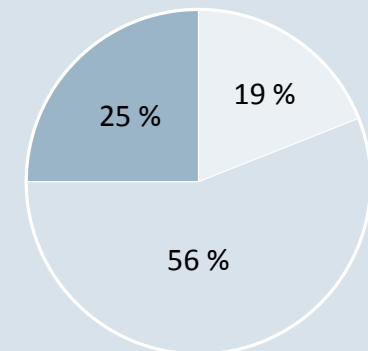
| | |
|---|---------------------|
| B4 plot ratio 150 % of 1100m ² : | 1650 m ² |
| B5 plot ratio 185 % of 1100 m ² : | 2035 m ² |
| Affordable housing 25% of 2035 m ² : | 510 m ² |
| Remaining space: | 1525 m ² |

Different configurations of space allocation is shown on the opposite page.

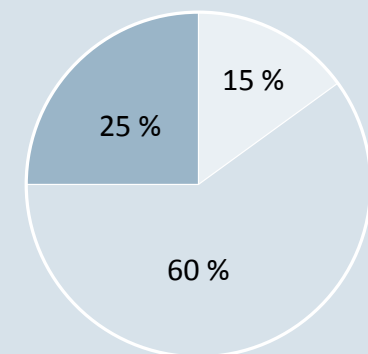
Profitable Housing: 1015 m²
Affordable Housing: 510 m²
Municipal Space: 510 m²

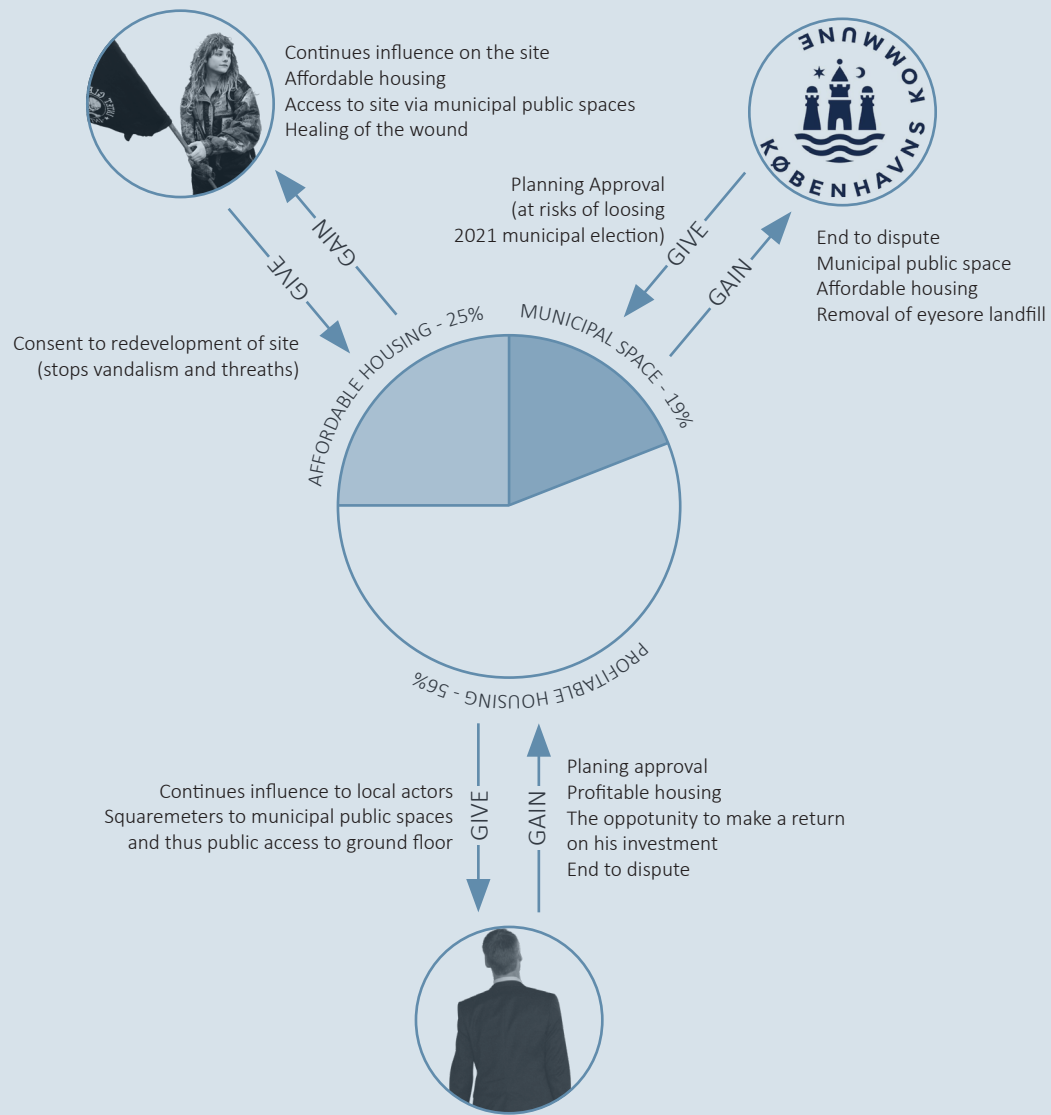


Profitable Housing: 1140 m²
Affordable Housing: 510 m²
Municipal Space: 385 m²

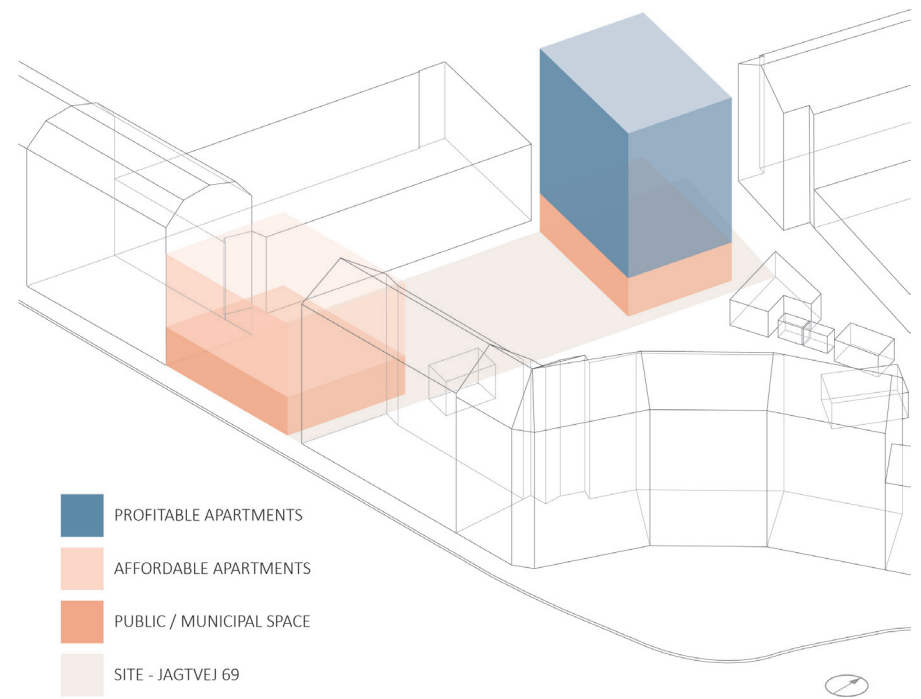


Profitable Housing: 1220 m²
Affordable Housing: 510 m²
Municipal Space: 305 m²





Trade-off for 3 main actors



Basic plot ratio allocation on site

Block Typology:

06.00

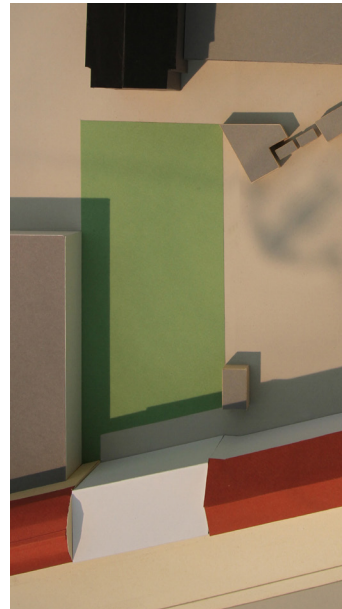
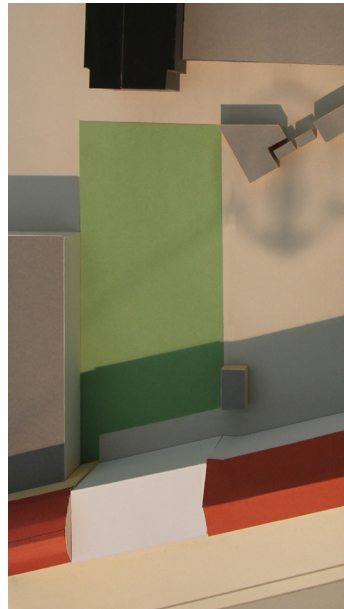
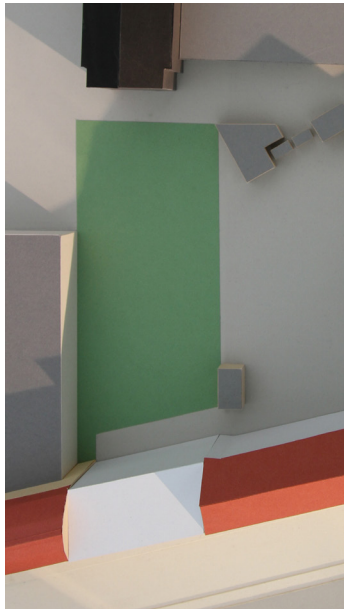
09.00

12.00

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Summer



Point Typology:

06.00

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Fragmented Point Typology:

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Split Point Typology:

06.00

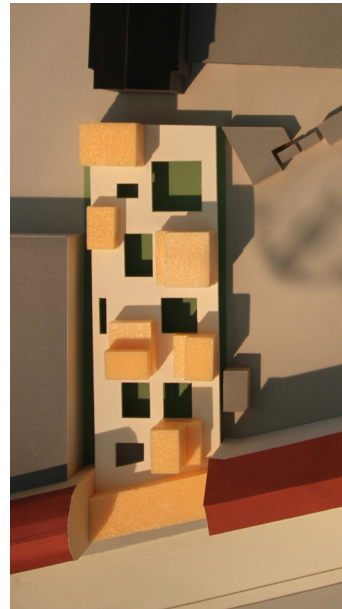
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Strip Typology:

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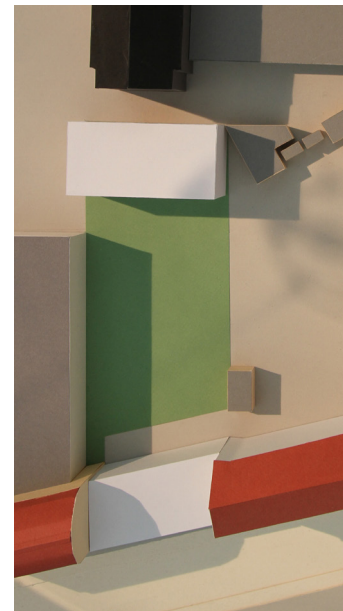
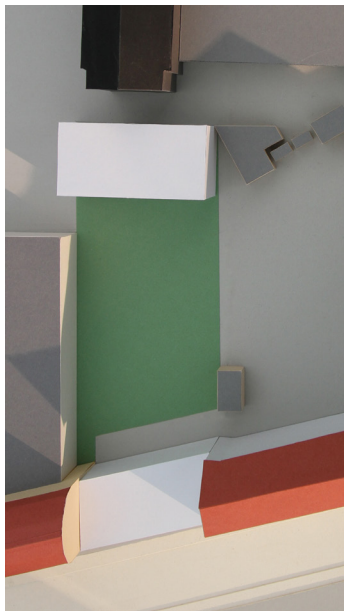
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Summer



Mix of Strip and Point Typology:

06.00

09.00

12.00

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Summer





Path

Public workshops

Coutyard

Community kitchen

Jagtvej



Path

Profitable apartments

Coutyard

Affordable apartments

Jagtvej

