

A Swedish granny flat

an exploration of what can be achieved within the new friggobod proposition
Master's thesis in Architecture and Urban Design

Fanny Ellsinger
Department of Architecture
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2014

A Swedish granny flat

an exploration of what can be achieved within the new friggobod proposition
Master's thesis in Architecture and Urban Design

Fanny Ellsinger
Department of Architecture
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2014
Examiner: Sten Gromark

A Swedish granny flat
an exploration on what can be achieved within the new friggebod regulation
FANNY ELLSINGER

© FANNY ELLSINGER, 2014.

fanny@ellsinger.com

Blurb, Inc.

Gothenburg, Sweden 2014

A Swedish granny flat

an exploration on what can be achieved within the new friggebod regulation

Fanny Ellsinger

Department of Architecture

CHALMERS UNIVERSITY OF TECHNOLOGY

Abstract

A proposal allowing permit-free additional back yard buildings intended for permanent living is out for consultation and is possibly adopted in Sweden on July 2, 2014. The idea of home-owners adding accessible dwelling units to their properties to host a relative or a student is a widespread phenomenon in residential suburbs around the world, but has not yet come to Sweden.

In my master's thesis project I wanted to get ahead of the building industry and propose my very own 25 sq. meter large accessible dwelling unit (also known as a granny flat) before the law was passed. I believe small structures like these often come as ugly looking pre-fabricated units that cannot adjust to their owner's need or to the condition of the property, and it has been my ambition to design a modular building system that is easily built, easily adjusted to prevailing circumstances and that offers a good living space for people in different stages of the life.

As a starting point I have been looking at built examples in Californian

suburbs and from that shaped an idea of the concept as well as what works in terms of small scale living within rather strict building regulations. I have from there gone over to exploring the architectural possibilities within the Swedish proposal and tried to stretch the design as much as possible within the given rules as a way to enhance living qualities in a small space. It has been important to keep the project low-tech and I have been using simple materials and basic building techniques as a way to stress that even though my structure may spread out over an entire back yard, it is secondary to the main building in its constitution.

I have tested my building system on a real property but the final product is not a fixed project, it is a modular system and its actual floor plan will be decided by each owner and each individual property. Finally, the way I wish to look at the project is as a contribution to the future Swedish housing debate.

Key words:

small-scale, friggebod, wood, student, granny-flat

Contents:

0

Why?

- 0.1 Background p.5
- 0.2 Purpose p.6
- 0.3 Delimitation p.7
- 0.4 Method p.8

1

What?

- 1.1 What is a granny flat? p.13
- 1.2 History of the Californian granny flat p.14
- 1.3 Investigation of Californian granny flats p.18
- 1.4 Conclusions p.38

2

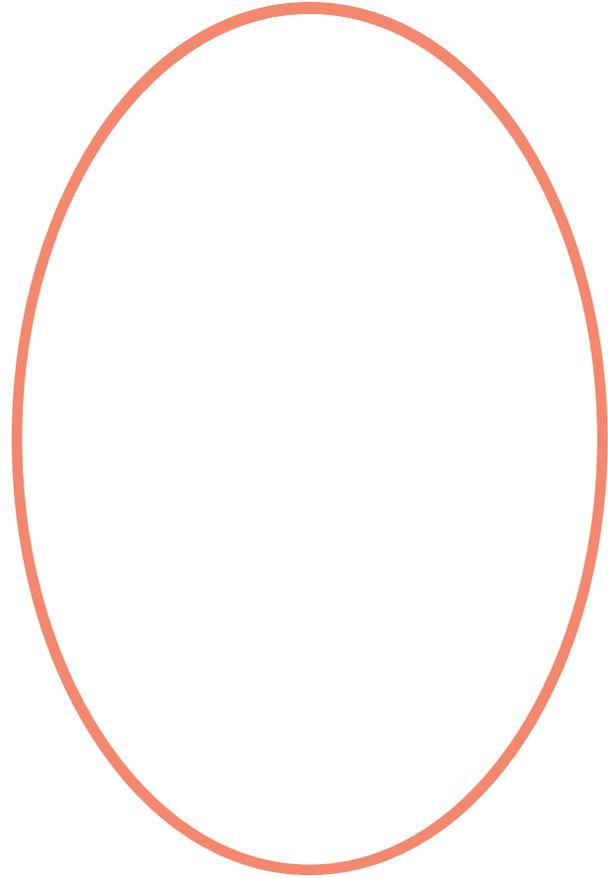
How?

- 2.1 About the extended friggobod- a Swedish proposal p.44
- 2.2 The work process p.46
- 2.3 The Fanny flat p.50
- 2.4 The parts p.52
- 2.5 Tested on a site! p.70
- 2.6 Model photos p.76

3

Evaluation

- 3.1 Discussion p.84
- 3.2 References p.86
- Appendix p.90



Why?



0.1

Background

Less than a year ago I had never heard of the term granny flat. The concept was not known to me, neither its prevalence around the world. I first came across the word while researching possible topics for a master thesis preparatory essay last semester and immediately found the granny flat idea ingenious. A granny flat, or an accessible dwelling unit, is a small home that is built in back yards of suburban homes, often housing an older mother-in-law or a child looking to live alone but in close proximity to their relatives. For the essay I weighed the pros and cons with urban versus suburban densification and came to the conclusion that although suburban densification is rather limited and in the hands of the individual homeowner to be realized, it holds a lot of potential. The granny flat concept primarily allows family members to live close together

but it also opens up possibilities for people who wish to rent (instead of own) a small suburban home in close proximity to work or school. I find the idea very human, humble even, and it made me curious to see what possibilities it can hold.

When it was time to start up the master's thesis project I was delighted to hear that a bill allowing permit-free additional back yard buildings for permanent living was being discussed and possibly passed in Sweden in the summer of 2014. And so the topic of my master thesis was decided: I was going to explore what is possible within that new Swedish granny flat regulation. Possibly also incorporating an investigation of "loop hole architecture" that I had been researching for the master thesis essay and still find highly interesting, somehow maximizing the allowed 25 sq. meters of building area into feeling more spacious.

0.2

Purpose

The Swedish housing shortage affects younger adults significantly, there is currently also a majority of older Swedes not being able to live in their homes anymore but not ill enough to get in to a retirement home. On top of this, there are fresh reports showing that the majority of swedes want to live in single-family houses and opposed to what most people might think, it is the youngest generations (aged 16-36) mostly wanting this type of living¹, and possibly also those less likely to have it. These facts stated, I believe that the Swedish accessible dwelling unit could be beneficial on a social plan by providing an additional home to family members such as older parents or young adults, they could also provide affordable living to students or people with lower income if rented out, and if so, an additional income to the homeowners. There are sustainable benefits to

the granny flat too, due to the fact that they work as suburban infill, unbuilt land and park areas can be saved, and by building on exploited land, there is no need to build additional infrastructure. The units also have to be relatively small and will therefore use less material while being built and less energy while being inhabited.

The project started out with an ambition to shine a light on smart-growth within the suburbs, a suburban infill project if you wish, promoting single-family housing, yet counteracting urban sprawl in a response to the habitually promoted urban infill project. The research part addresses this subject, but my proposal has however come to mostly explore what can be achieved architecturally within the rather limiting building regulations yet offer a decent living space for people in different stages of the life.

¹Länsförsäkringar nyhetsrum, Unga vill helst bo i villa.

0.3

Delimitation

This project will not discuss the pros and cons with urban densification versus suburban since that has been done in an earlier essay (see appendix). The project will focus on the proposed Swedish extended friggebod regulation and try to elaborate on what is possible within that proposition and at the same time be flexible concerning outer parameters such as property conditions and the need of the tenant.

The idea with adding an accessible dwelling unit to one's property is a widespread phenomenon in North America and the benefits there have proven to be many. For the research part I will therefore focus on the Californian ADU regulation and find inspiration in the Californian granny flat designs in relation to those regulations. I have chosen to focus on one state in one country in an ambition

to see how regulations and social aspects have had the building of granny flats differ from city to city within that state.

0.4

Method

Since a large portion of this project is investigative of how the granny flat has functioned in the areas where they have been built, I relocated parts of the project to California. I have been snooping around the Californian suburbs in search of additional dwelling to see how the Californian regulations have shaped their appearance. I have also, based on insights gathered in California, gotten an idea of what works in terms of granny flat regulations and how these accessible dwellings have been received in the neighborhoods.

In my own design it has been important to elaborate on what is possible within the proposed Swedish regulation and to then propose a conceptual idea, a module-based building kit almost, that stretches the boundaries for what a home can be and that would function in any surrounding where placed. It has

also been of importance to keep the project low-tech and I have been using simple materials and basic building techniques as a way to keep the costs down and to stress that even though my structure may spread out over an entire back yard, it is secondary to the main building in its constitution. The final product is not a fixed project, but hopefully a contribution to the future Swedish housing debate.





What?



1.1

What is a granny flat?

A secondary living space added to a property of a single-family house is what the term granny flat means, but the arrangement has multiple different names such as in-law unit, in-law suite, in-law, mother-in-law-apartment, auntie flat, uncle flat, bachelor flat, elder cottage housing opportunity (ECHO) housing, carriage unit, sidekick, secondary dwelling unit or accessory dwelling unit (ADU). Typically, this second unit includes sleeping and living areas, at least a simple kitchen, bathroom facilities, and a separate entrance, though the unit often shares parking areas and yard with the main building. The granny flats are most common in Australia, Canada, England, and the U.S.¹ and offers many opportunities for those who build them such as allowing an elderly parent to live independently on their child's property,

or by offering a home to an adult child or guests visiting from far-away, or serving as an extra income by renting them out, or serving as a home office. Since the granny flat has to be relatively small thanks to size-regulations and limitation of properties, they also become rather eco-friendly, especially so if built with green materials, the smaller sizes also allows more fun designs.²

The granny flat or accessory dwelling unit is not to be confused with the guest house that is not intended for permanent living, and does not require a kitchen or additional parking.³ The additional dwelling unit has a long pedigree in the U.S. The ADU:s are foremost widespread and loved throughout the Californian suburbs, the place where single-family houses rule and urban sprawl is at its peak⁴ and so I have chosen to focus on the Californian granny flat for the research part of this project.

¹Litchfield, In-laws, Outlaws, and Granny Flats, 3
²Ibid, 3-5
³Interview with Adam Villani, Planning Assistant at

City of L.A. Department of City Planning, 14-02-13
⁴Litchfield, In-laws, Outlaws, and Granny Flats, 3

1.2

History of the Californian granny flat

In 1860, roughly 80% of Americans 65 years or older lived in a house with their children or in a house next door. The parents would age in place and, in time, the next generation would inherit the property. At the time, most people were farmers and since the farms and ranches required lots of labor, even hired hands became part of the family, living in in-law units.¹

As North America became industrialized, farmers became factory workers, families got smaller, and the number of multigenerational households steadily declined for decades with one exception: The Great Depression. During that time, families would share houses, either to rent out their homes to make extra money or simply because they had lost their homes.²

After World War II, many towns passed laws to restrict or ban shared housing

or granny flats. The two most common reasons for such a law were that renters are noisy and cause property values to decline, there is however little evidence to support those claims, especially when property owners live on the premises.³ The percentage of multigenerational housing resumed to decline due to many reasons after World War II. The government subsidized loans to veterans, the land was cheap, the economy was booming, and the younger generation was eager to move out to the suburbs to start families, leaving elderly parents behind to be taken care of by Social Security, a 1936 invention. By 1990 only 15% of elderly Americans lived with their children, but this has been changing.

The percentage of multigenerational housing has increased and in 2008 the number was up with 12% from its lowest point.⁴ As the houses has been getting

larger, family sizes been shrinking and energy gotten more expensive, the ideal living arrangement has changed too and the trend with generational living seems to be on upswing again.⁵ The shift reflects not only elders moving in with their children, but also young adults who perhaps have never left home. One third of Americans 18 to 34 now live with their parents, this due to economic reasons, but also cultural, and spiritual; perhaps the shift is happening thanks to a greater awareness of sustainability.⁶

In California many residential areas have historically been zoned single-family, with cities prohibiting granny flats from being built in such areas. The number of shadow homes has however been rising from year to year since there has been, and still is, a screaming demand for housing in The Golden State. There is no reliable count of illegal

second units, but the Los Angeles Times reported that, in 1987, about 42,000 garages were sheltering about 200,000 people in Los Angeles County. It is possible that that number is even higher now given that housing production has failed to respond to population growth in the region.⁷ Since 1982 the state of California has proactively been passing laws encouraging accessory dwelling units in single-family neighborhoods. At the time, each city still had the mandate to prohibit ADU:s, which some of them did, so in an attempt to make all Californian cities equally welcoming towards granny flats, legislation was passed in 2003, reinforcing accessory dwelling units. The Assembly Bill 1866 legally permits second units on single-family lots big enough to hold them. The Assembly Bill further requires cities and counties to allow development of second housing units in single-family

and multifamily residential zones if the lot already contains an existing single-family dwelling and if the accessory dwelling is not intended for sale.⁸ Other than those general requirements, the regulations concerning granny flats differ from city to city throughout California.⁹

¹ Litchfield, In-laws, Outlaws, and Granny Flats, 8
² Ibid, 9
³ Ibid, 10

⁴ Ibid, 9
⁵ Ibid, 3
⁶ Ibid, 9

⁷ Cuff, Higgins and Dahl, Backyard homes LA, 10
⁸ Ibid, 7
⁹ Litchfield, In-laws, Outlaws, and Granny Flats, 11





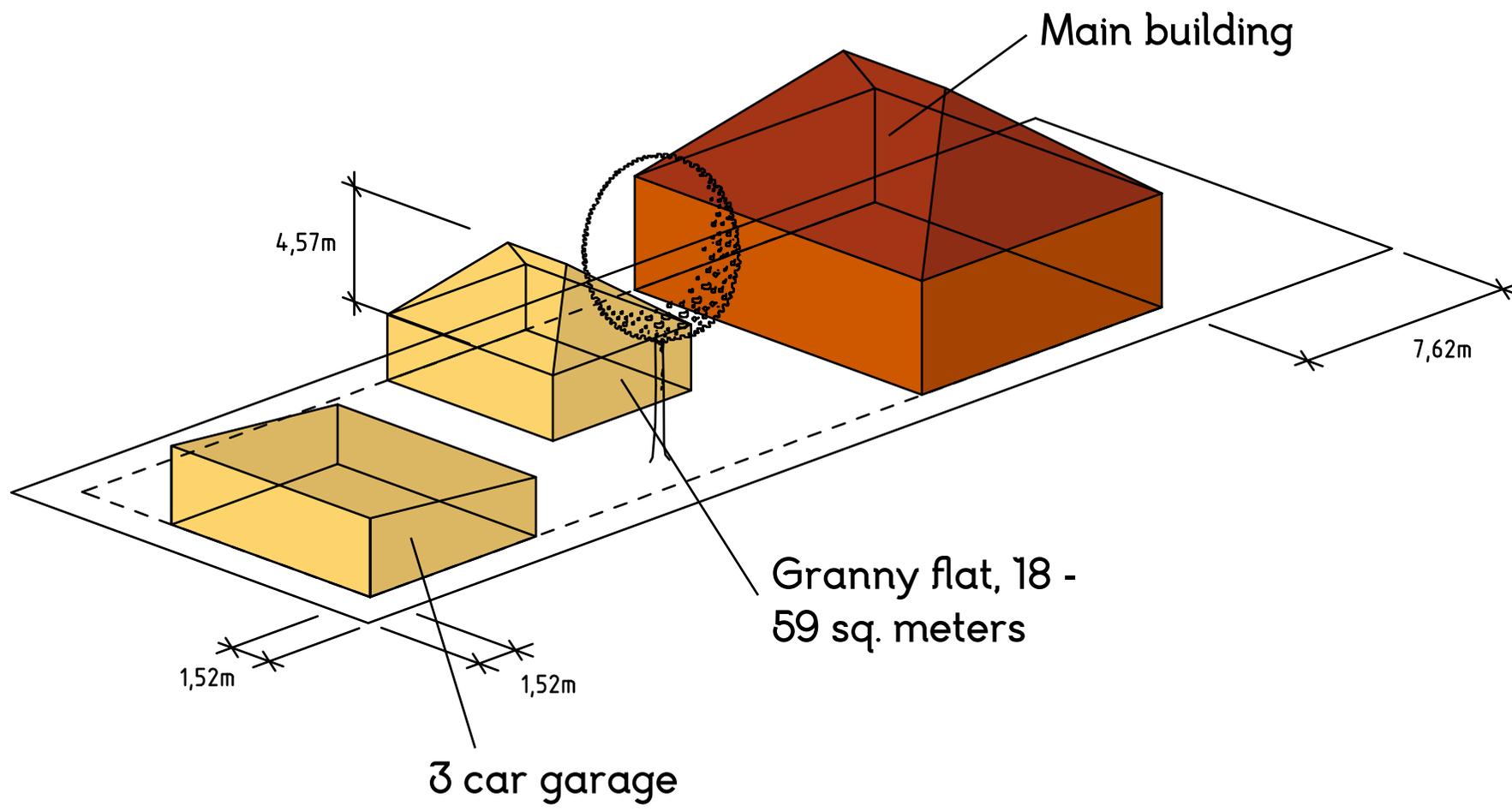
1.3

Investigation of Californian granny flats

There are different ADU rules applying to different Californian cities, the limitations illustrated here, is what is permitted in all cities due to the regulations passed in 2003. The following examples show different cities' approaches to the granny flat and then some good examples of them.

The rule:

A granny flat between 18 and 59 sq. meters, with a height of 4,57 meters is allowed. The granny flat can only be 30% of main building's size or cover 40% of the rear yard. The granny flat has to be placed 1,52 meters from the property borders. The granny flat has to have the same roof pitch as the main building. One extra car garage per tenant in the granny flat is needed.



West Covina, Covina & La Verne

I visited three planning departments of wealthier suburban Californian cities neighboring to L.A. city; West Covina, Covina and La Verne to get an overview of what the granny flat regulations might look like there; the regulations for building of granny flats are similar in all three cities. The most striking regulation to me is that every additional bedroom that the granny flat holds has to come with an additional parking garage. A real garage, with one roof and four walls, not even car ports allowed! So the main problem might actually be how to fit all those extra garages on the property, since single-family homes also have to have at least a two car garage.

The property has to be at least 7,500 sq. feet large in each of the cities to hold an additional dwelling, and the setbacks from property borders are also similar; the buildings have to

be at least 25 feet (7.62 meters) from the front property line and 5 feet (1.52 meters) from side and rear borders, the minimum distance from the unit to the main building/garage differs from 5 to 25 feet. The size limitations differ a bit from city to city, from minimum unit sizes of 200 sq. feet (18 sq. m) in West Covina and 500 sq. feet (46 sq. m) in Covina to a maximum unit size of 640 sq. feet (59 sq. m), but the unit size may never exceed 30% of the main building's area or 40% of the rear yard area. The accessory units cannot be taller than 15 feet in most cases, meaning one story or 4.57 meters. It is only allowed to have one additional unit on the lot, at least one of the units has to be occupied by the owners and the additional unit may not be sold independently of the existing single-family unit.

Finally the additional unit has to have a design that resembles that of the

main building i.e. similar façade and roof materials, same angle of the roof slope, and similar window placement and other architectural features. In La Verne it is sufficient if all of the façades facing streets or side borders have the same design, the façades facing each other could have different designs. Common for all three of them were that granny flat requests are fairly uncommon. Even though the passing of Assembly Bill 1866 made the backyard homes legal in all of California, the fees and hard regulations have made them somewhat harder for homeowners in those cities to build. The fee for the building permit alone is over \$ 3,000 in each city and in West Covina for example, all neighbors within a 300 feet (90 meters) range from the building has the authority to stop the project leading to very few backyard homes being built.¹

¹ Interviews with Ron Garcia; Planning Associate in West Covina, Vidal F. Márquez; Planning Aide in Covina, and Eric Scherer; Principal Planner in La Verne, 2014-02-06



Two La Verne granny flats; one finished and one in the making. They can mostly only be seen from an alley way behind the main building and due to the hard garage requirements, most homeowners combine the granny flat with the garages which make them all look like a three car garage.

Pacoima:

Since the regulations make it rather complicated and expensive building an ADU, there were not many granny flats to be seen in the wealthier suburbs of Los Angeles. This has led to granny flats mostly being built in low-income areas and without a building permit, where homeowners have no other option than to have their ageing parents living with them and neither will neighbors in those areas be as eager to oppose. In an attempt to see such an area, I headed for Pacoima.

Pacoima is a northern part of Los Angeles city where 85% of the 100,000 residents are Latino, a third of

the population is under the age of 18, and nearly 20% have incomes below the poverty level.

Pacoima exhibit high real estate prices and population pressure, and therefore a shortage of affordable housing. There are not many ADU building permits approved in Pacoima and there are no official numbers, but estimations say that over 95% of all properties hold an illegal dwelling unit. 80% of the 22,000 housing units in Pacoima are single-family dwellings and it is said that at least one fifth of the residents live in shadow housing.²

Pacoima struck me as a rather

nice little suburban town and to my disappointment I could not see one single granny flat, legal or illegal, at least not from the street. But that is the thing with granny flats in California; they rarely show from the main street and unique for Pacoima is that the lots are extra-long and with a covered fence facing an alley. In the back alleys however, I came across tiny buildings in almost every lot that seemed inhabited as well as garages whose windows displayed pretty crocheted curtains and

flowers. The buildings I could catch a glimpse of behind the high fences and brick walls were colorful and small, but looked rather temporary, worn-down and even dilapidated. Strolling through the alleys made me feel uncomfortable, the few people there stared at me and what sounded like huge dogs barked loudly till I surrendered and ran back into the safety of my car.

² Cuff, Dana and Dahl, Per-Johan. Rx for the R1: Sustaining the Neighborhood, 28

granny flats?

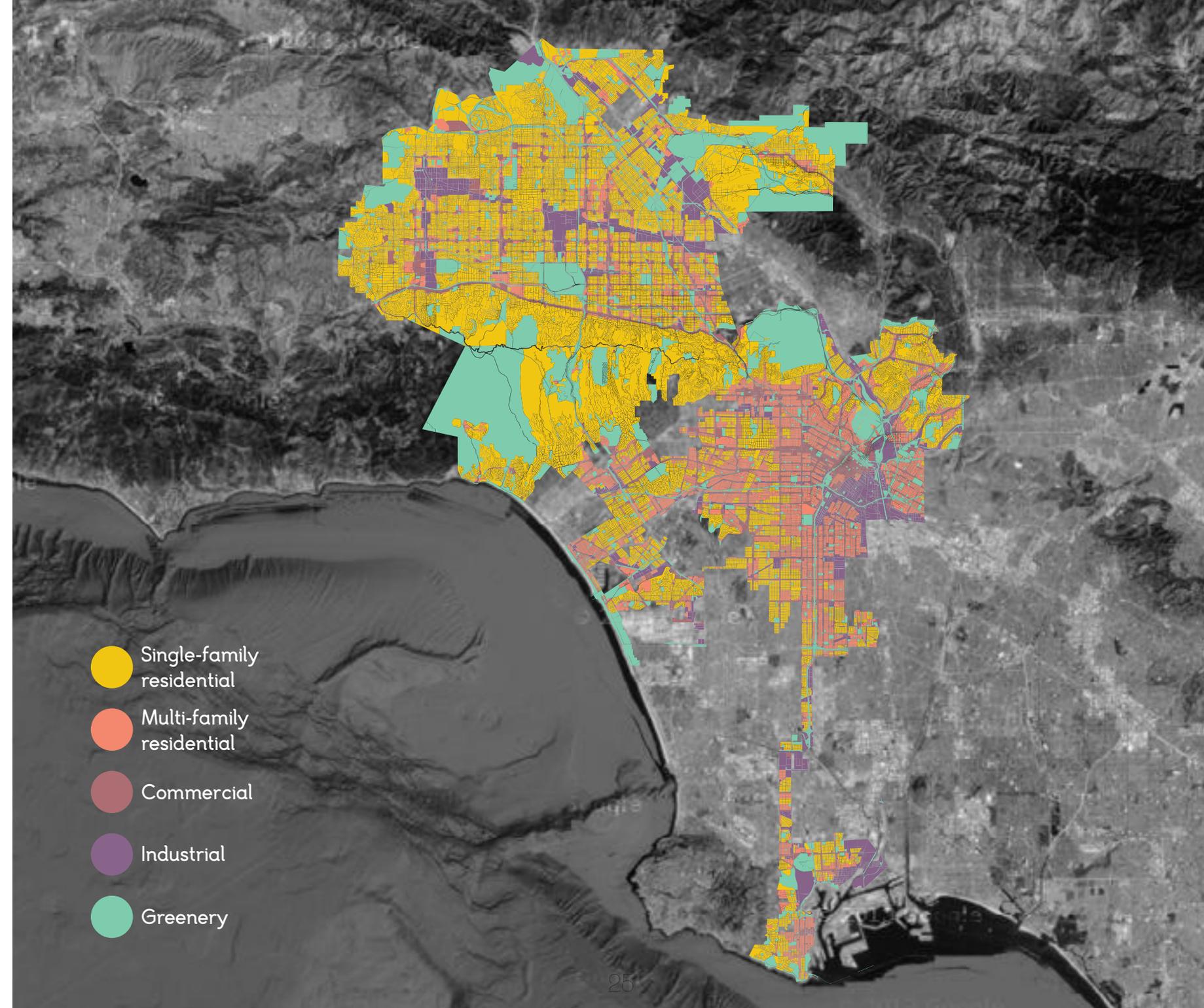


After visiting both wealthy and poor Californian suburbs, I headed for the planning department of Los Angeles to see if the city handled the granny flat regulations differently. Some of the regulations were simplified compared to those of the three suburban towns previously mentioned, for example the neighbors have little say in the building

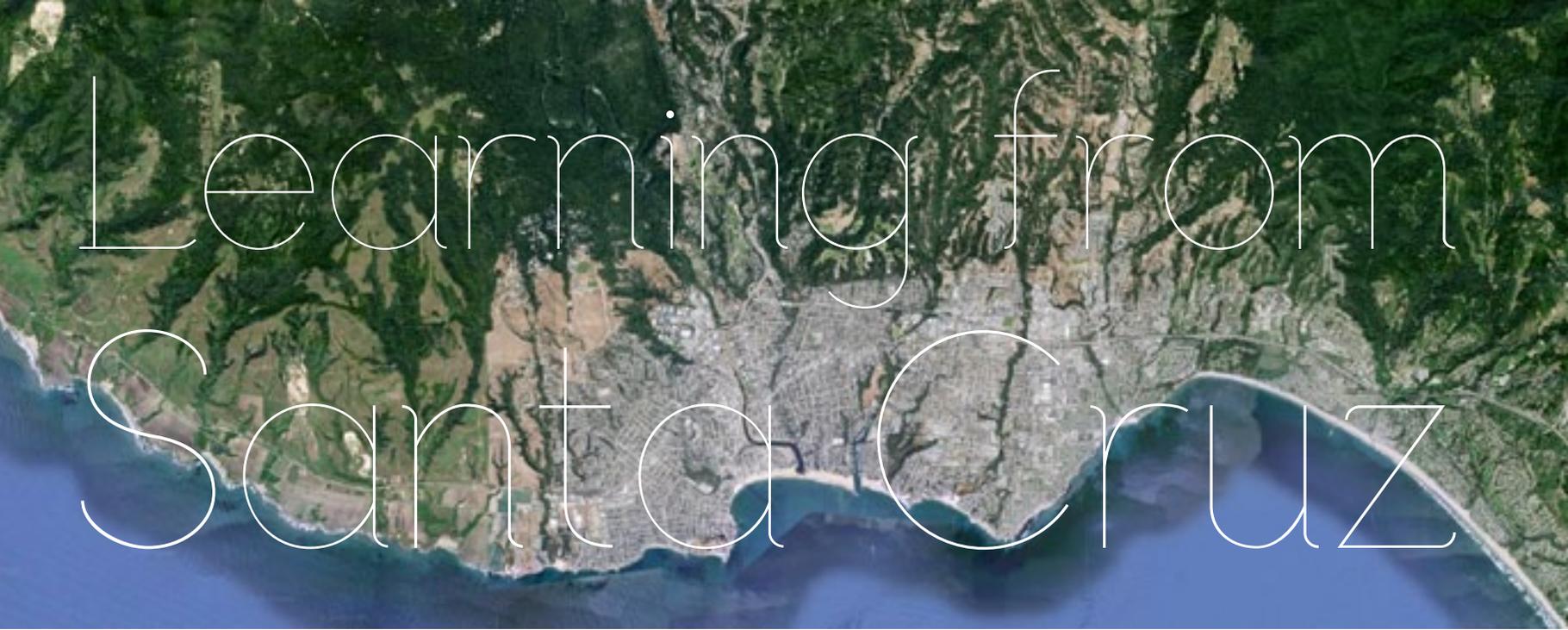
of an ADU, and no built in garage is needed. The striking difference was that the building of accessory units seemed to be fairly common in L.A. city, especially in the southern parts of the city where the lots are larger. The planners were however not too content with the regulations since accessory dwellings are not rent controlled and mostly work as a way for home owners to earn vast

sums of money by benefiting from the massive housing shortage in the city.³ I have experienced this myself, as a part of the research I thought I should live in a granny flat for a while, looking into that I realized that many of them had highly interesting architecture but cost \$150 and up per night, so I sadly had to get those thoughts out of my mind.

³Interview with Adam Villani, Planning Assistant at City of Los Angeles Department of City Planning, 2014-02-13



- Single-family residential
- Multi-family residential
- Commercial
- Industrial
- Greenery



Santa Cruz is a Californian seaside city about 470 km north of Los Angeles that has to be mentioned while researching Californian accessory dwellings. Residence prices in Santa Cruz are among the highest in the country and only 6.9% of the city's 60,000 inhabitants can easily afford a home in the city. Santa Cruz is popular thanks to its scenic location and proximity to San Francisco and Silicon Valley. Due to the limited amount of land within the city and an effort to preserve its surrounding green-belt, the house prices have been sky rocketing. I headed for Santa Cruz to talk to the Housing and Community Development

Manager for the City of Santa Cruz; Carol Berg. In 2003 the city of Santa Cruz adopted a new ADU ordinance in order to preserve the greenbelt, white accommodating new growth, promoting public transportation, and increasing the amount of affordable housing and she is the person behind that ordinance.⁴ It all started out in 2002 when the City of Santa Cruz got a grant from the state of California that was meant to help lessen the amount of pollution in the city. There was currently a law in the city allowing ADUs, but the regulations were tough, and not many were being built, at least not legally. Carol Berg saw

an opportunity to create more homes in the city that was already exploited to its maximum, the solution became housing infill and since the city consists of single-family buildings, infill meant accessory dwelling units. In 2003 when the Assembly Bill 1866 was passed in California, Santa Cruz had already set a good example as of a community that promoted the ADU. The city had established an ADU development program with three major components; technical assistance, a wage subsidy and apprentice program, and an ADU loan program, but primarily; the city had made the regulations for building of ADUs simpler.⁵ The simpler regulations

meant that the minimum required lot size for building an ADU is 5,000 sq. feet instead of 7,500, the setbacks from property lines or the distance to the main building are 3 feet instead of 5, and no covered parking is needed, it is primarily the removal of the covered parking requirement that has made the biggest difference for homeowners. Furthermore, the city are granting loans for those who want to build an ADU, it also pays for technical assistance⁶, and it has streamlined the permit process, reduced fees, created manuals that walk homeowners through the development process, lowered the criteria on drawings (not even an architect is needed) and

has created a set of 7 prototype plans which, if followed, will result in an automatically approved in-law unit. I asked Carol Berg if there were any problems passing this law and if neighbors have been worried, since this seems to be the biggest problem with a similar law in Los Angeles, but she said no. Berg thinks this has to do with the fact that Santa Cruz is smaller and that all of its inhabitants were aware of the housing shortage, there has been no had been multiple surveys on the topic, but not a single one of them showed a decline in property prices, she thinks this might be thanks to the home owner occupancy regulation that requires the

home owner to live in one of the units on the property. The 7 house prototypes that the City of Santa Cruz designed to make it easier for its inhabitants to build an ADU were not the expected success. Approximately 200 of the building manuals were sold, but only 3 of the prototype ADUs were built. Berg thinks this has to do with the fact that prototype buildings are not customized to fit every property and people bought the manuals to understand the regulations and to get inspiration, but that they wanted to design their own accessory dwelling. Other matters that made building of the prototype ADU



harder are the requirement on them to resemble the design of the main building and the location of windows and doors that cannot overlook neighbors' properties. Berg said the city had good intentions offering different prototype buildings to the public, but that they at the time did not have a full understanding of the public demand. The city had relatively large plans for the ADU prototype program, a collective of women had been assigned to build the prototype ADUs in an attempt to have females performing typically male jobs, but since few prototypes were sold, the plans fell through.

There has been a large increase

in the building of ADUs in Santa Cruz. Before 2002 the city permitted 4-5 ADUs per year and after the easing of regulations that number has increased to 40-50 per year which is better than the goal of 30 annually permitted ADUs. Carol Berg has no data on how the ADUs are being used, but she tells me stories of how elderly people have built their own granny flats, renting out the main building to either their children or to university students, allowing themselves to afford to age in the city that they love.

The ADU development program has made Santa Cruz winner of numerous awards and has been used as

a model for many other communities, so as a last question I asked Carol Berg if one could consider Santa Cruz to be the most ADU friendly city in America but she shook her head;

- I think we have made it pretty easy for home-owners to build accessory dwelling units, but we don't have the perfect layup yet. Actually, this summer some adjustments will be made to the ADU regulations allowing illegally built accessory units to become legal, increasing the safety for as well tenants as landlords, and the regulation of a 3 feet minimum to property lines will also be removed. So you see, there are still many aspects that could be better...⁸

⁴ U.S. Department of Housing and Urban Development. Accessory Dwelling Units: Case Study, 3-4

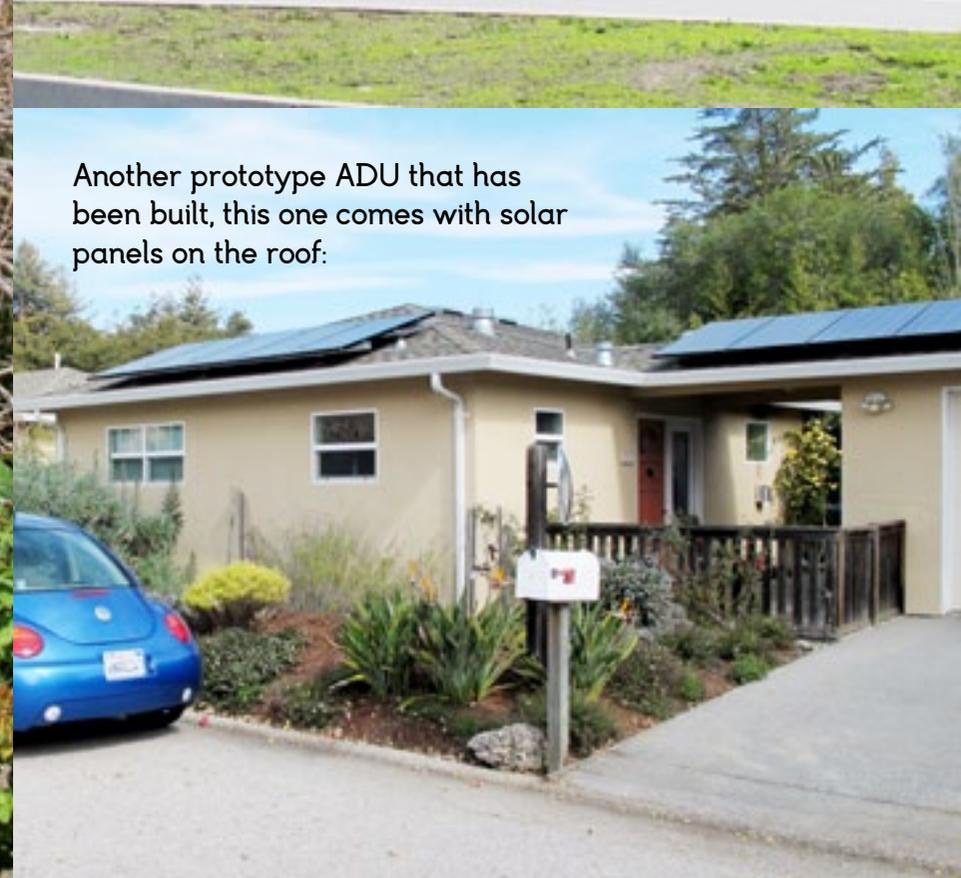
⁵ Interview with Carol Berg, Housing and Community Development Manager for the City of Santa Cruz, 2014-02-25

⁶ City of Santa Cruz. Accessory Dwelling Unit Manual, 3-4

⁷ Litchfield, In-laws, Outlaws, and Granny Flats, 10

⁸ Interview with Carol Berg, Housing and Community Development Manager for the City of Santa Cruz, 2014-02-25

One of the few prototype ADUs that was built in a Santa Cruz back yard. This one actually works as a real granny flat and is inhabited by the owner's mother.



Another prototype ADU that has been built, this one comes with solar panels on the roof:



Granny flat inspiration from around California:

The 2-4-6-8 House is (left) situated in Venice, Los Angeles, and was designed in 1978 by Morphosis Architects. It can be seen from a back alley is a one volume detached studio above a two-car garage that is being used for residential purposes. The architects describe the building as a reflection of the joyful street life known for Venice and the studio express itself in its variations of window sizes, this is also where it takes its name. The unit is a simple cube with pyramidal roof and the exterior is clad in grey asphalt letting the windows bring the colors to the building, within the space ventilation and heating are manually operated and therefore begs to be played around with.⁹

The Palms Residence is (right) situated in Venice, Los Angeles, and was remodeled and given an in-law unit in 2009 by Daly Genik Architects. The main house is joined by the smaller accessory unit placed above the garage because the clients wanted to accommodate their growing family and frequent in-law visits. The addition is facing the street in a reversal of the more common relationship between main and guest house found in this neighborhood, both units are facing a lush courtyard accentuated by a folded aluminum armature façade, the metal screens work as coolers for the buildings in the summer time and is made possible by the regulation that says that only façades facing streets or

neighboring properties has to be of the same material. The roof holds solar collectors, supplying the house with hot water and radiant heating in the floors.¹⁰

⁹ Morphopedia, 2-4-6-8 House.

¹⁰ ArchDaily, Venice House / Daly Genik Architects.





This granny flat is actually one I found online looking for accommodation, which they rented out for the modest price of \$400 a night. It is placed in Los Feliz, a wealthy neighborhood east of

Hollywood and designed by interior designer Alexandra Angel and it placed in her own front yard. The main building is an old farmhouse and dates back to 1890, therefore the granny flat has been

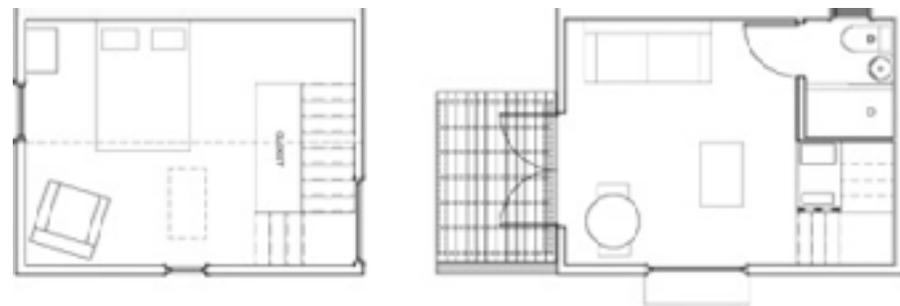
given a barn-like exterior to match the main house in an historic sense.¹¹

¹¹ Apartment Therapy, Alexandra & Elliot's 1890's Farmhouse.

Here is another great example of a granny flat, it was designed in 2008 by François Perrin of Air Architecture and is situated in Brentwood, Los Angeles. The unit is designed for a Buddhism expert and is built to host visiting scholars. The building has a wood frame structure, as usual in California, with a façade made of polycarbonate-clad timber. The clear plastic skin creates an optical illusion in the sunlight, making the building almost disappear creating minimal impact to the existing house and neighborhood. The building aims to be self-sufficient through its solar panels and wind turbines and it is using an air insulation, which is a void in between the wood frame and the translucent skin, to protect the Buddhist collection from both cold and heat. The materials and building techniques are local (redwood and wood framing) but since the project is a prototype for an habitat the client intends to build in Sri Lanka and Taiwan the design also works with local materials and techniques used there.¹²

¹² Dezeen, Guest House for an Anthropologist by Air Architecture.





This granny flat immediately caught my interest; it is small, but holds many functions and has a high level of detailing. The tiny house is designed by the designer duo Tolya and Otto Stonorov who built it in their own back yard in Oakland, close to San Francisco, where an old barn was situated. I e-mailed the couple to see if I could possibly come visit them, unfortunately they had sold it and moved to Vermont, but Tolya was happy to answer the questions I had. The granny flat is located in the northeast corner of a long and narrow lot which helped simplify many design choices, the two sides that stood on the property lines could not be changed, so the new entrance would have to face the street, which would provide privacy if the unit was be rented. The last façade could be filled with large windows and window seats preferred by the couple.¹³ Since the granny flat was limited by its 12 by 16 feet footprint, the downstairs area became a multipurpose room with a kitchenette built into the stairwell wall and a bathroom hidden in the same wall, the built-in parts were necessary in order to keep the in-law unit look organized. The upstairs area became the bedroom, this room also holds the cleverly built-in concept, but here it consists of wardrobe spaces. The designer duo lived in this granny flat while restoring their main building and

it worked incredibly well, at least for a while. Tolya Stonorov said that the only thing they would have designed differently is the kitchen sink that they custom poured out of concrete and became very narrow and incredibly hard and therefore quite unforgiving to any dish that happened to drop. She also added that the building lacked a small full height closet for a broom or similar, but except for that the space worked excellently for two grown-ups and a small child. Tolya and Otto Stonorov designed and built another granny flat in Alaska a little while later. In the designing of that building, they took sustainable architecture further, it is a passive-solar low energy project that uses local resources and the harsh climate as a foundation for the design concept.¹⁴

¹³ Litchfield, In-laws, Outlaws, and Granny Flats, 141-144

¹⁴ Stonorov, Tolya; Assistant Professor of Architecture, School of Architecture and Art, Norwich University. E-mail. 2014-03-04. <tolya@stonorovworkshop.com>

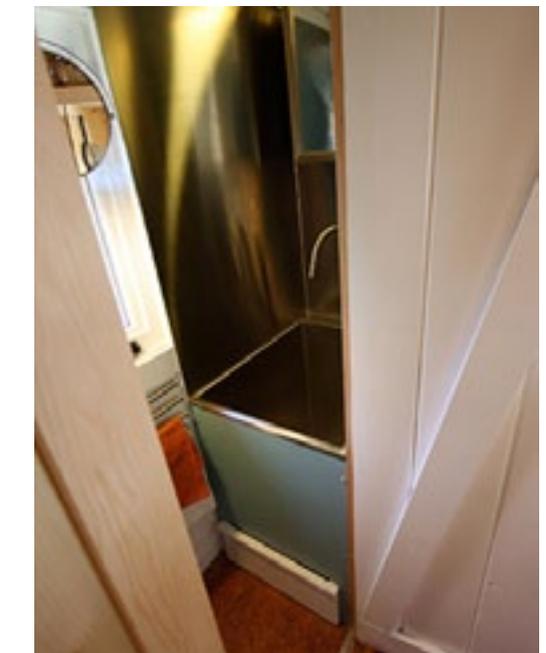




Jay Shafer is a true inspiration when it comes to tiny dwellings. He built his own first tiny house in 1998 and has since then also been selling his own tiny house designs to people also looking to live compact and at the same time been speaking out against the legislation ban on small homes in the US. Shafer has spent the years since 1998 refining his designs to be able to produce high-functioning tiny dwellings that are full of clever inventions. Shafer's success on the field later made him found the Four Lights Tiny House Company in Sonoma, California, that sell dwellings between 9 and 27 sq. meters, many of the homes permanently attached to trailers for mobility.¹⁵ What appeals most to me is Shafer's idea of getting rid of all the space in a home that one does not need and only build the areas needed. He is however stressing the importance of not building dwellings too small, because that is not durable in the long run.¹⁶

¹⁵ Four Lights Tiny Houses

¹⁶ Wachtmeister, Microtopia



1.4

Conclusions

Examples from California clearly show that home owners do build accessible dwelling units in their back yards (especially if the regulations are simple), and I cannot see why Swedish home-owners would not be just as eager to do so if presented with the possibility.

This is however exactly what has been stirring up the debate in Sweden. Some people are worried that a society of secondary living units will create a group of “secondary inhabitants”. Another worry is the risk of all home owners going crazy building tiny structures up until the point where suburbia is transformed into a township-looking area. I do not primarily see the granny flat proposition currently being processed by the Swedish Parliament as a way to solve the Swedish housing shortage or as a way for the municipalities to escape

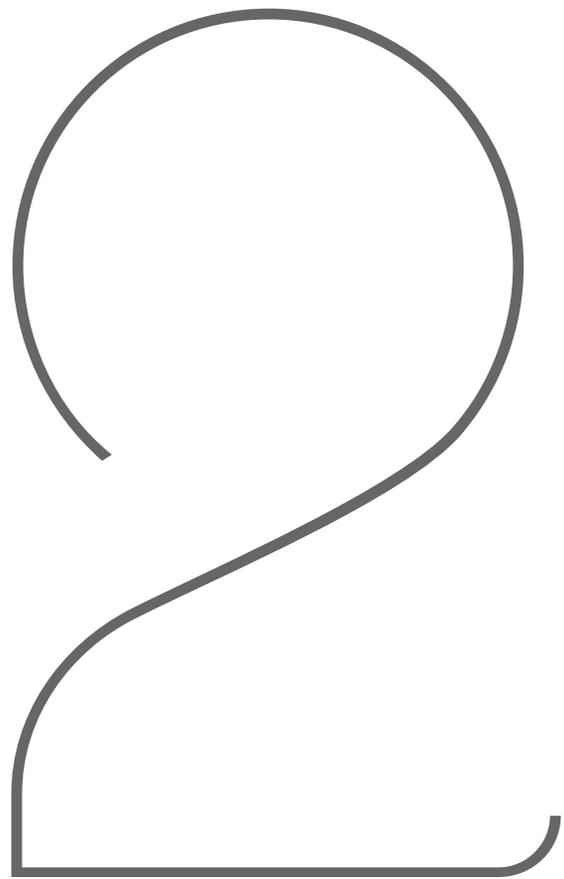
their duties towards their inhabitants. For me, this is a way of bringing families closer together, enabling the care for an ageing mother or help out a child wishing to live away from home but in no position to do so. The proposition is about empowerment for home-owners, it is an opportunity, not an obligation. I do however understand the worry about a suburbia full of prefabricated accessory dwellings that all look pretty much the same; a smaller interpretation of a traditional villa, unable to adapt to neither site conditions nor its owner’s needs and without much architectural ambition. But instead of moping, I figured I should propose my very own granny flat with a design that is diametrically opposed to that image.

The social aspects are of course of importance. As seen in California, the wealthier people could afford building elaborate architect-designed granny flats where guest from abroad could stay from time to time, whereas the poorer people were forced to rely on neighbors not raving and converted garages in order to host their extended families. It is my absolute desire that the Swedish accessible dwelling unit is not turned into a substitute for social functions. It should offer a possibility for people who wish to host family members, students, or people looking

to live cheaper in detached houses in suburbia, never become a must. I believe the municipalities need to be clear about that. The fact that the Swedish ADUs are exempt building permit will make them cheaper to build and since my proposal consists of a modular system I hope to further cut the costs enabling most home-owners to at least afford a granny flat.

I believe Sweden is a great country for a granny flat legislation. Even the largest cities in Sweden have relatively small city centers and suburbia of one-family buildings picks up as soon as the multi-family buildings end. This means that there are many residential areas in close proximity to central locations in Swedish cities which adds to the possibilities of the Swedish granny flat becoming a genuine alternative to the centrally located apartment. Most Swedes wish to live in residential areas, but these are also subject to criticism since they do not provide the level of sustainable living that apartments do, a densification of residential suburbia might help enhance sustainability in those areas and at the same time provide new dwellings for groups who have trouble finding affordable housing and at the same time add more life to suburbia.



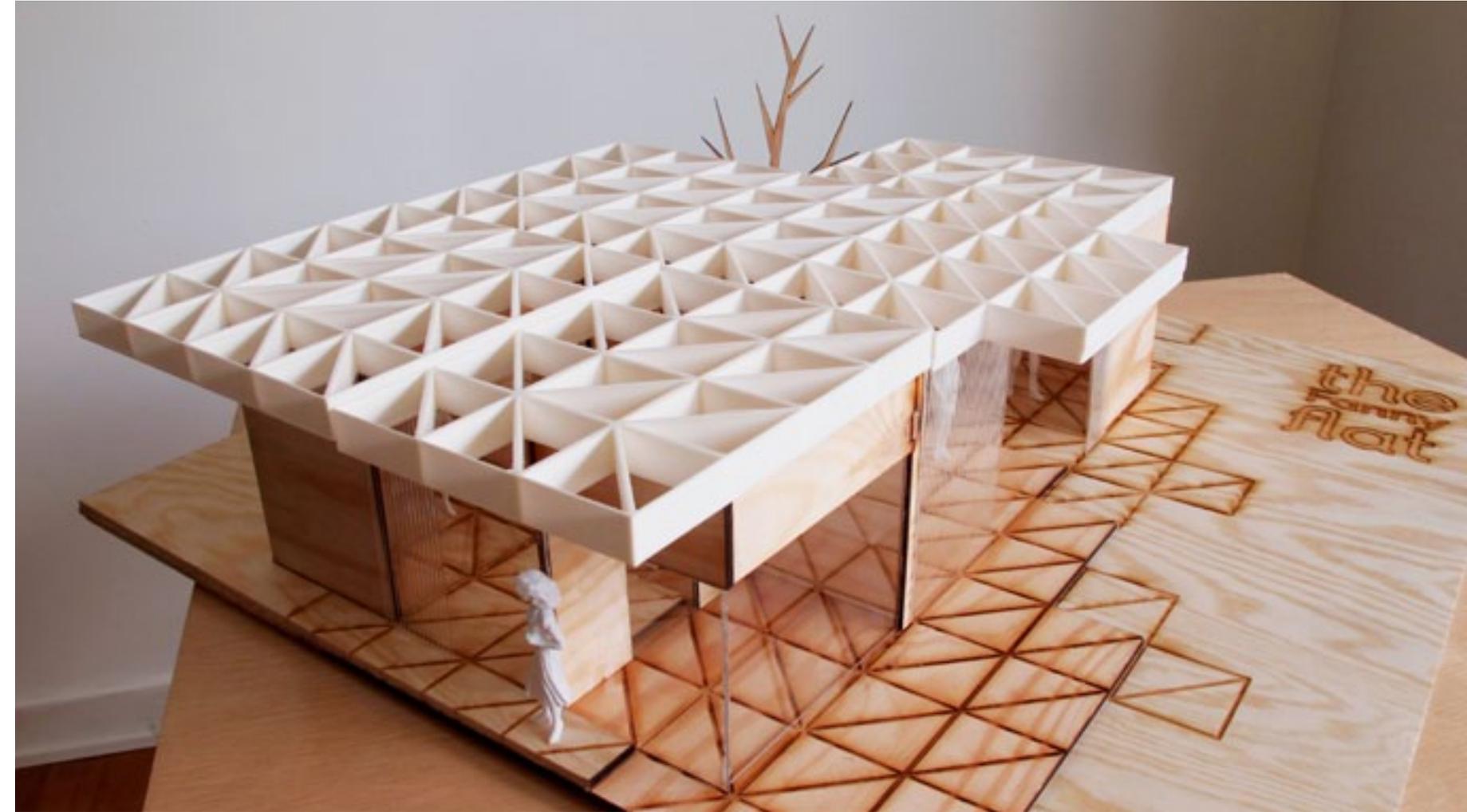


How?

the Fanny flat

In my granny flat proposal I wish to elaborate on what is possible to do within the rather limiting building regulations proposed by the Swedish government. I want my granny flat to offer an adequate living space but still question general notions of what an accommodation can be. I wish to offer a granny flat concept that will work with different properties and tenants. And last I wish to come up with a relatively cheap construction idea.

Overall, I wish that my proposal can be as humble as I find the idea of the granny flat. Humble to the site, humble to the neighborhood, humble to the tenant, and humble to the environment.



2.1

About the extended friggobod - a Swedish granny flat proposal

In 1978 legislation was passed by the Swedish government allowing homeowners to build a maximum of two detached buildings on their property whose combined area did not exceed 10 sq. meters and whose purpose were not intended for accommodation. Homeowners did not need to apply for planning permission for those buildings, hence the immediate success, and so the friggobod was born! In 1987 the regulations were softened a bit, now allowing the buildings to be placed closer to the property border than the previous 4,5 meters, if the neighbors agreed, and it also became legal to stay in them overnight. In 2008 the combined area for the buildings was expanded to 15 sq. meters and the former regulation about the maximum of two buildings was removed.¹

On July 1st 2014 a new regulation may

pass in Sweden, allowing 25 sq. meters large additional dwellings to be built on properties and whose purpose may be permanent housing. The previous permission to build a 15 sq. meter large friggobod will still apply allowing homeowners to build up to 40 sq. meters of additional buildings on their property.²

The additional housing units will still need to be situated at least 4,5 meters from the property borders (unless neighbors agree to have it built closer to their properties), the maximum permitted height for the dwellings will be 4,0 meters³ and the additional dwellings will need to meet the requirements of good form, color and material stated in the Planning and Building Act.⁴ Since the buildings will be used as independent housing units, they will have to meet the requirements concerning accessibility, if the dwelling units will be used as student or youth housing they need only to meet the lower accessibility requirements of the Planning and Building Act.⁵

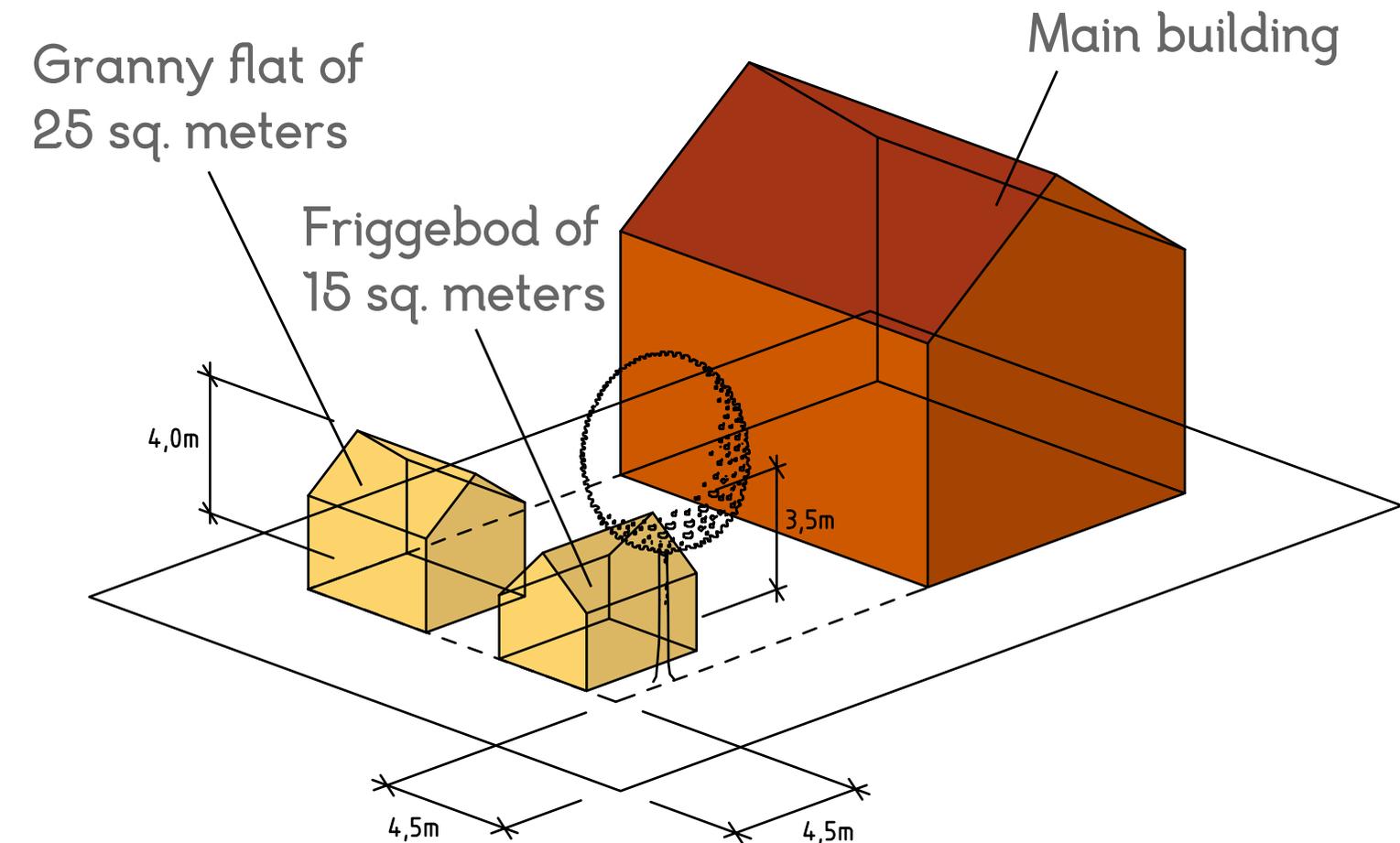
The buildings cannot be used for other purposes than as a complementary building or as a second dwelling⁶ and the building of this additional dwelling will not give homeowners right to divide their property in two at a later stage.⁷

The Swedish National Board of Housing has written a report on what might

be the outcome of the additional housing legislation, highlighting both the advantages and disadvantages that might come out of it. Among the advantages are the increased freedom for homeowners to decide and build smaller units on their properties without having to seek for planning permission, the possibility of more homes being built, and an increase in demand for smaller dwellings that will lead to higher revenues for businesses in the architecture/construction industry.⁸ The disadvantages are the possibility of neighbors being negatively affected, of neighborhoods being drastically changed, of historical environments being damaged and of increased burden on the infrastructure.⁹ Later on in the report, it is however stated that since most suburban properties today are relatively small, there would be constraints to how many additional dwellings could be built in an area¹⁰ and that one additional person living on every suburban property probably would not affect the infrastructure since different family constellations are counted for in infrastructure calculations.

The report finally stresses the major possibility with the additional dwelling unit; the fact that the community will benefit from allowing these units because housing is of significant public interest.¹¹

The rule: a 25 sq. meter large and 4 meter tall additional dwelling unit can be added to any single-family property without a building permit. The old rule allowing an additional 15 sq. meter large unit still applies. The units has to be placed 4,5 meters from the property borders.



¹ Boverket. Uppdrag att föreslå ytterligare åtgärder som kan undantas från kravet på bygglov - Friggobodar mm, 13

² Ibid, 10
³ Ibid, 47
⁴ Ibid, 57

⁵ Ibid, 58
⁶ Ibid, 45
⁷ Ibid, 57

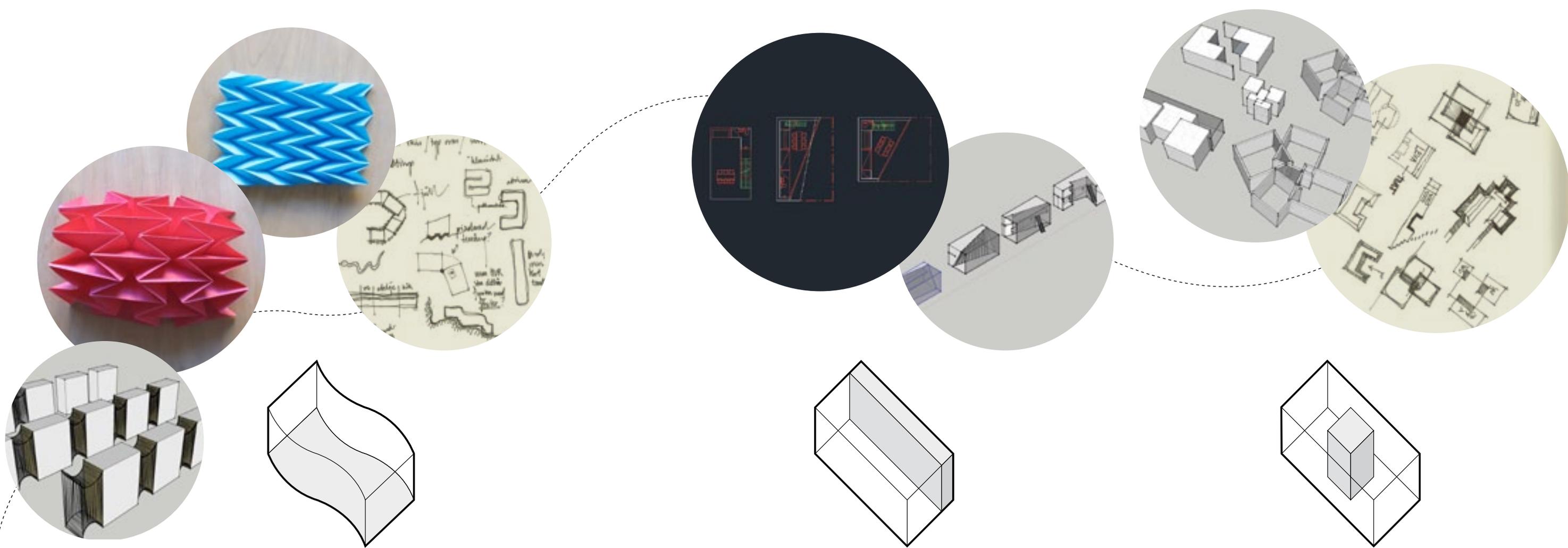
⁸ Ibid, 53
⁹ Ibid, 54
¹⁰ Ibid, 49

¹¹ Ibid, 56

2.2

The work process

I spent a lot of the time in this project just sketching on different possible designs for my granny flat, this is why I contribute an entire section to that process. At the end I realized that I had taken at least one thing from each step in the process into my final work and so the process itself becomes important in order to see what has shaped the final design.



Snake

My initial ambition has followed me throughout the entire process; I was tired of modular buildings that always look the same; a smaller interpretation of a traditional villa, unable to adapt to neither property conditions nor the owner's needs. So, the first plan was to introduce a set of small units, from which the owners could pick and choose accordingly to their needs and then combine those units with a flexible material, creating a sort of snake-like building that would coil up on the property and which nature also would help create outdoor rooms.

Wall

The snake idea fell through because the units turned out to be too small, the structure too narrow and the units too hard to combine. One thing that followed me into the next design was a function wall that I introduced in the snake building, a function wall that followed on one side throughout the whole building as a way to make the interior coherent and the small space feel organized. I was working with a box-like building at this stage, using the maximum allowed height (4 meters) of the building, but it was once I introduced the atrium in the building that it became interesting.

Atrium

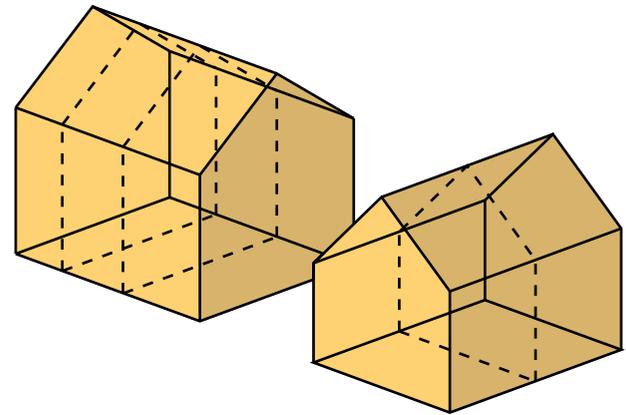
I knew that if I wanted to make the 25 sq. meters feel as large as possible I should use the outdoor area as much as possible. I however needed to make the outdoor space feel like it belonged to the building and was not just a part of the back yard, hence the atrium. As it turned out, making an atrium in a building this small, is hard, so the atrium had to move out and pierce the façade.

2.3

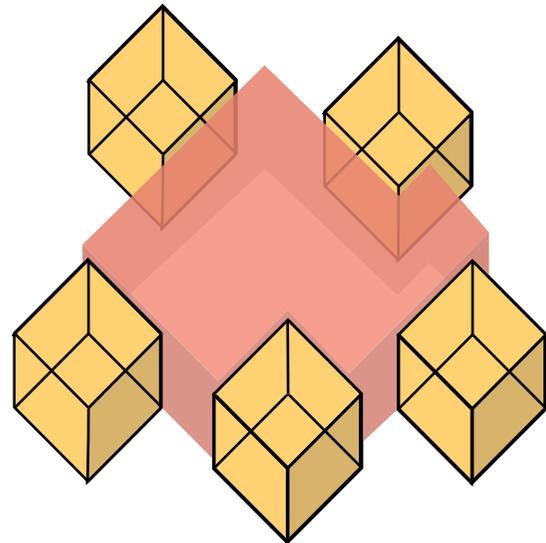
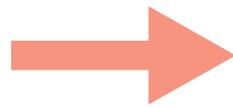
The Fanny flat

Some of the best examples of granny flats that I saw in the U.S. were those who had used the rather strict building regulations as a way to enhance the design instead of limiting it. In my proposal I wish to approach the future Swedish granny flat regulations in a similar manner. Since the maximum allowed building area is 40 sq. meters (ADU plus friggebod) I wish to divide that space into a variety of different smaller units that can be placed apart from each other on a property. By doing this, I avoid the feeling of

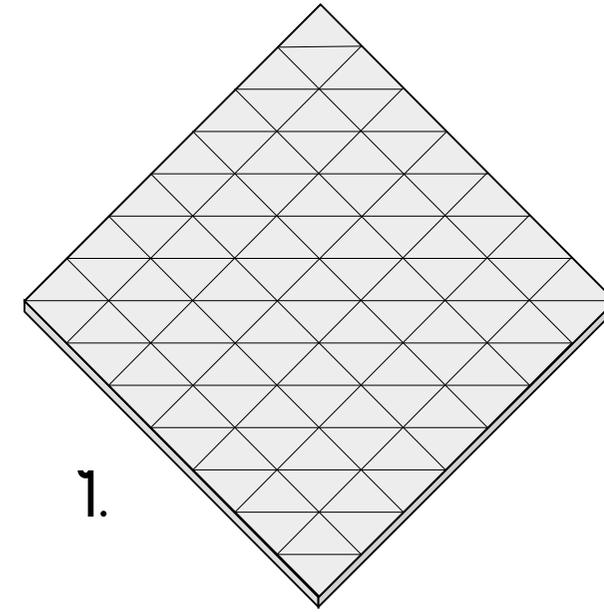
one granny flat unit that seems out of context on the property. This approach also takes the property's terrain and vegetation into consideration. By creating an atrium in between the units, there is the chance to have a secondary living space since the buildings later will be wrapped with a plastic shield that works as a climate shell, making the atrium livable but not counted for as built area. The units will allow homeowners to pick and place the units in accordance to their needs as well as the characteristics of their property.



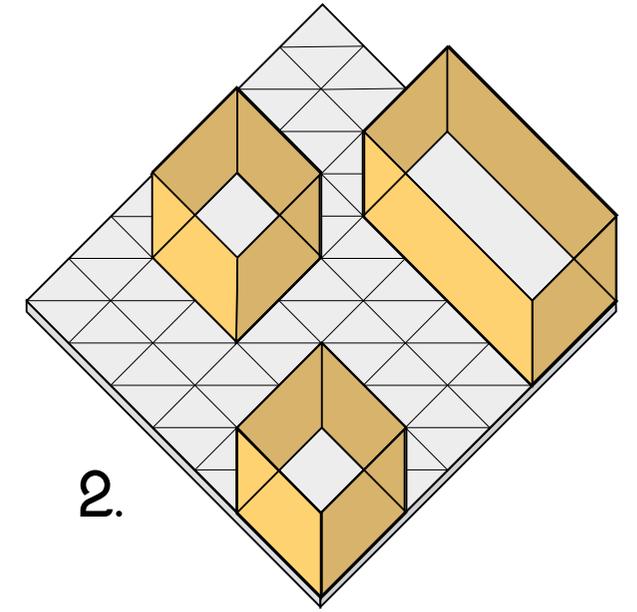
25+15 sq. m



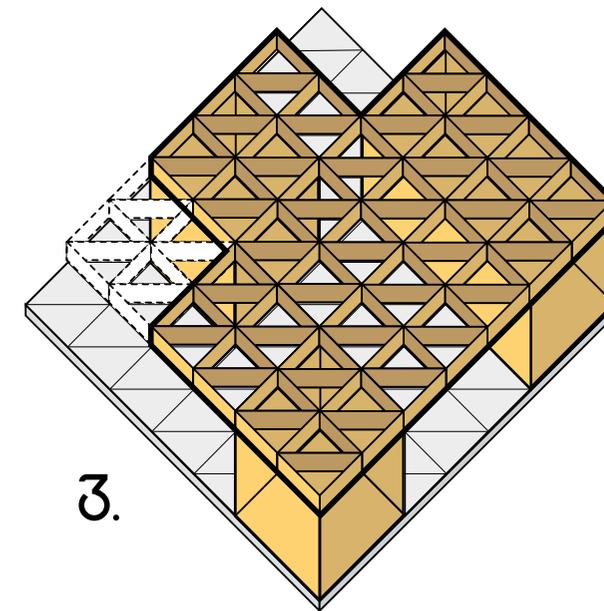
5 x 7.3 sq. m



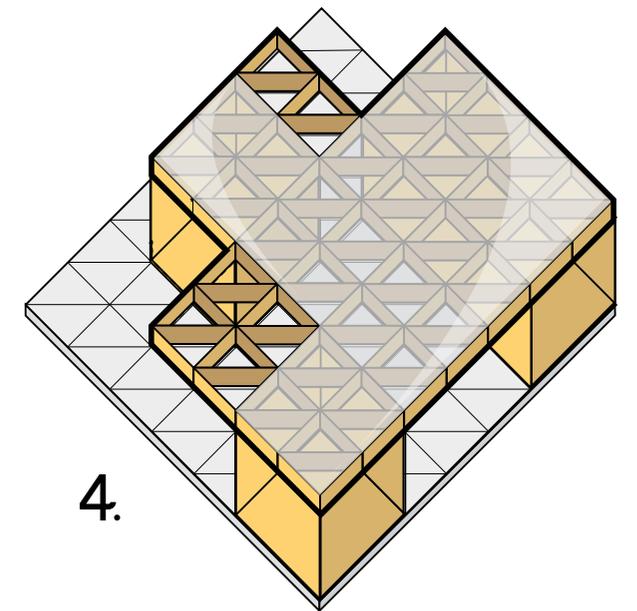
1.



2.



3.



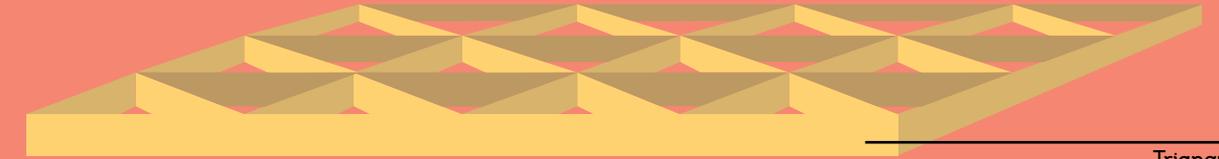
4.

2.4

The parts:



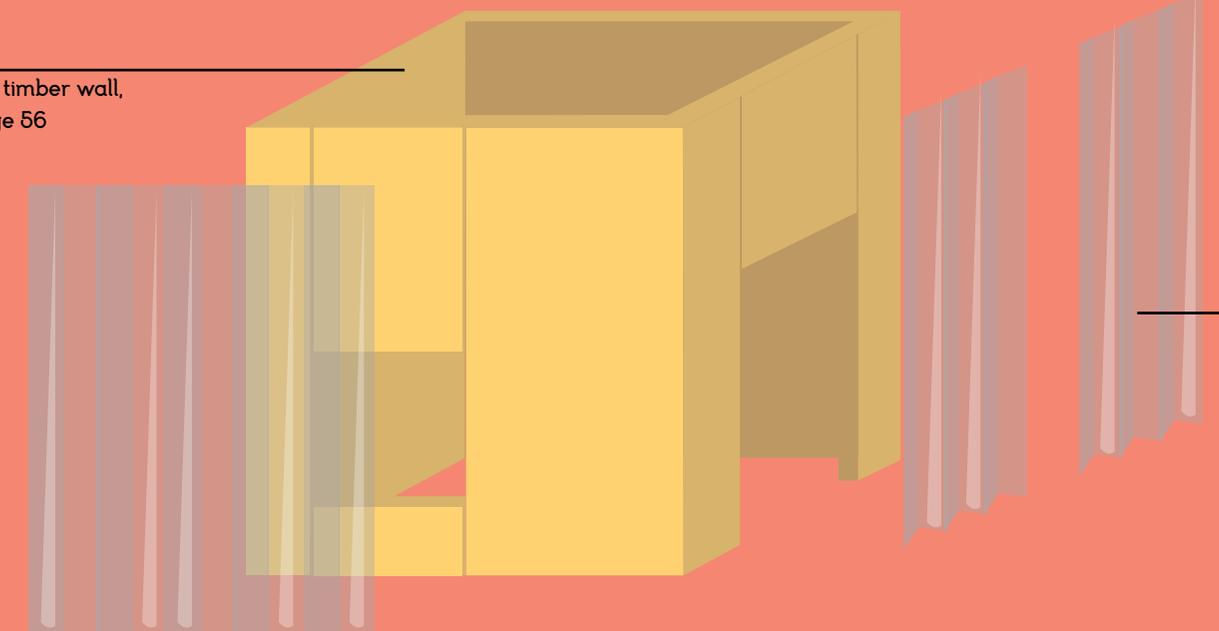
Roof
Polycarbonate sheet,
more info on page 59



Roof
Triangular wood frame,
more info on page 58



Walls
Cross laminated timber wall,
more info on page 56

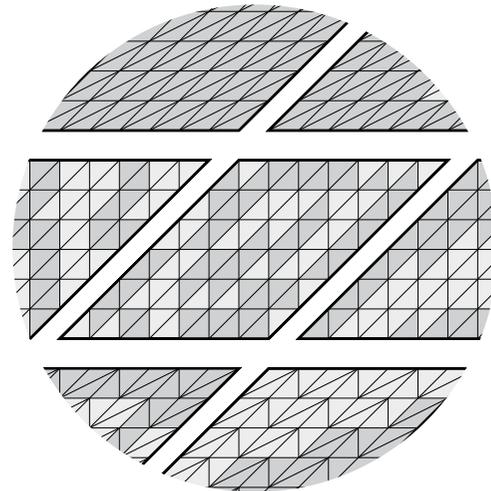
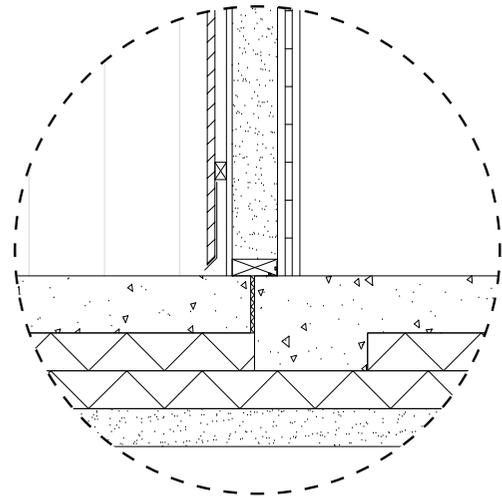
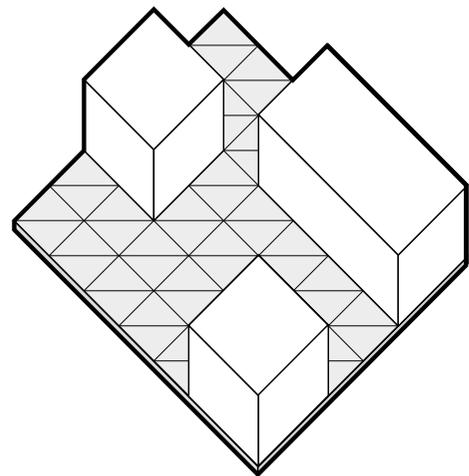
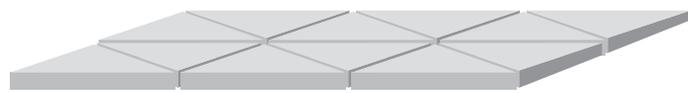


Curtain
Polypropylene curtain,
more info on page 60



Floor
Triangular concrete floor tiles,
more info on page 54

The floor



Groundwork

The first thing that happens is the ground getting covered with a large concrete slab where the units are going to be situated, and concrete tiles on all other areas. The tiles are smaller and will allow greenery and trees to be incorporated in the design. The slab and tiles will even out the ground, but also create steps if needed.

Function

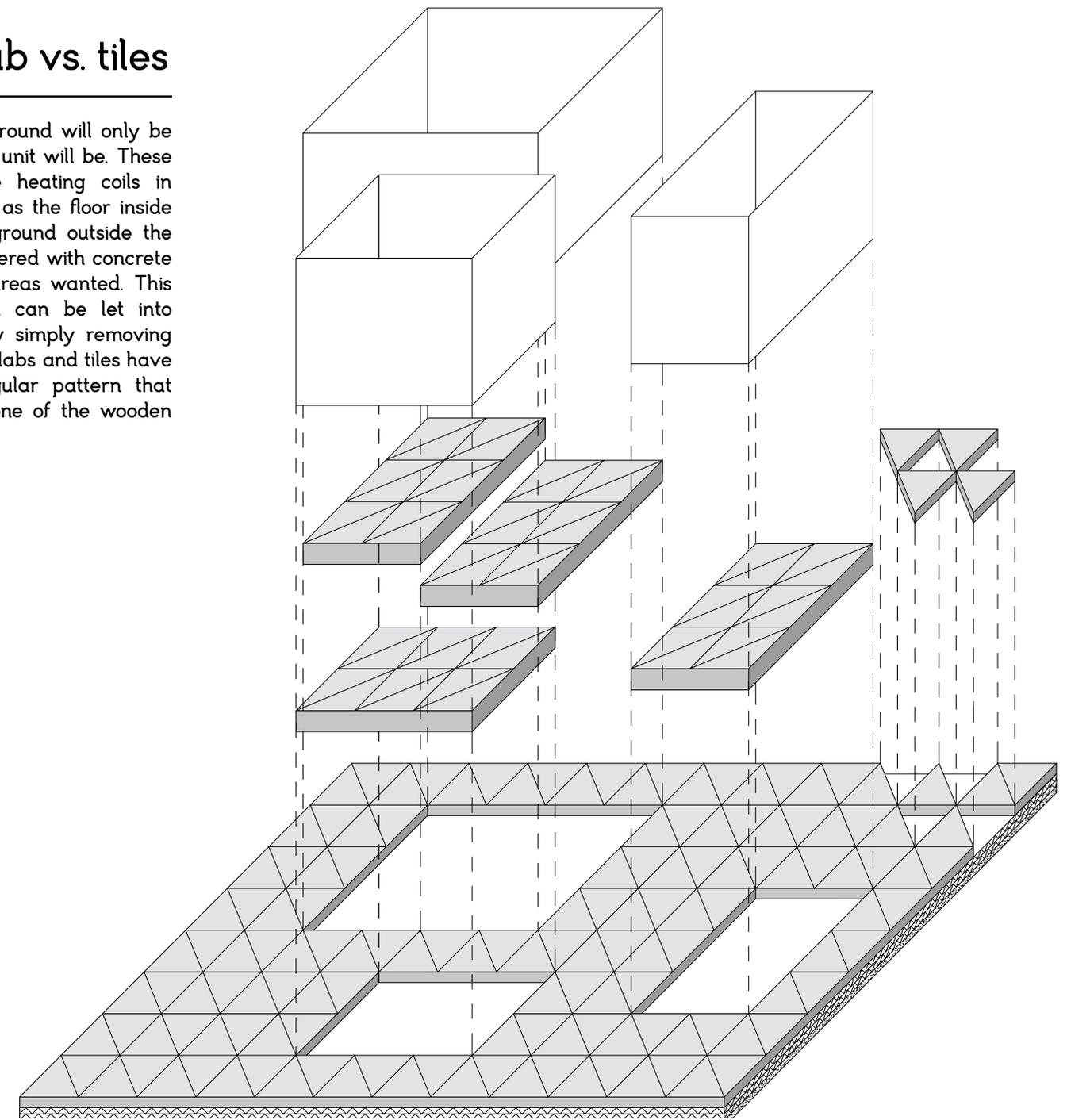
A three layer cross laminated timber wall is added first and screwed to the concrete slab. After this the wood fiber insulation and the cladding will be added to the outside of the structure. The concrete slab will be the floor both inside the units and the concrete tiles will be the flooring in the atrium.

Shape and size

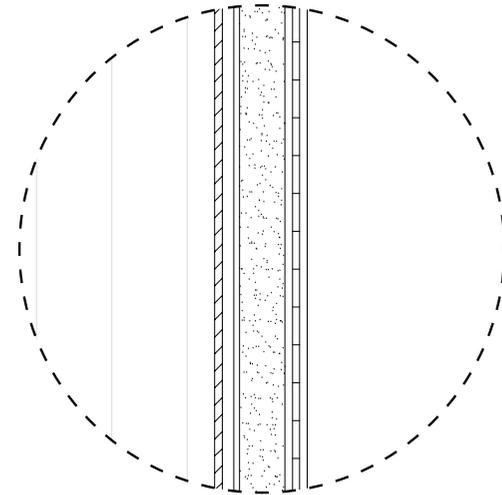
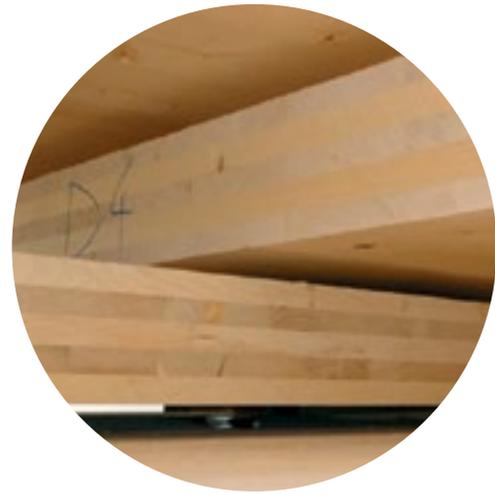
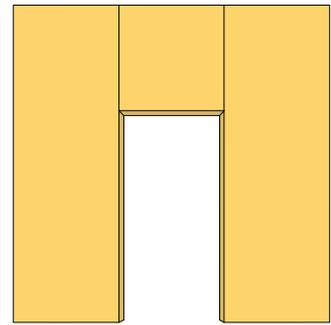
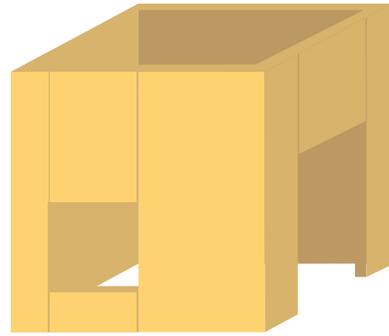
The slab and the tiles have a triangular pattern, and two triangles combined measures 1,1 x 1,1 meters. The units will fit perfectly to this pattern that takes its reference from the lattice roof construction.

Floor slab vs. tiles

A slab on the ground will only be placed where a unit will be. These slabs will have heating coils in them and work as the floor inside the units. The ground outside the units will be covered with concrete slabs in those areas wanted. This way, vegetation can be let into the structure by simply removing some tiles. The slabs and tiles have a similar triangular pattern that resembles the one of the wooden lattice beams.



The walls



Module walls

The cross laminated timber walls of the modules will be the supporting structure and are built off-site and transported to the site as one piece with the maximum height of 2,95 meters. The home-owners will by this point have chosen from various different unit designs and decided on a suitable placement of them.

Material

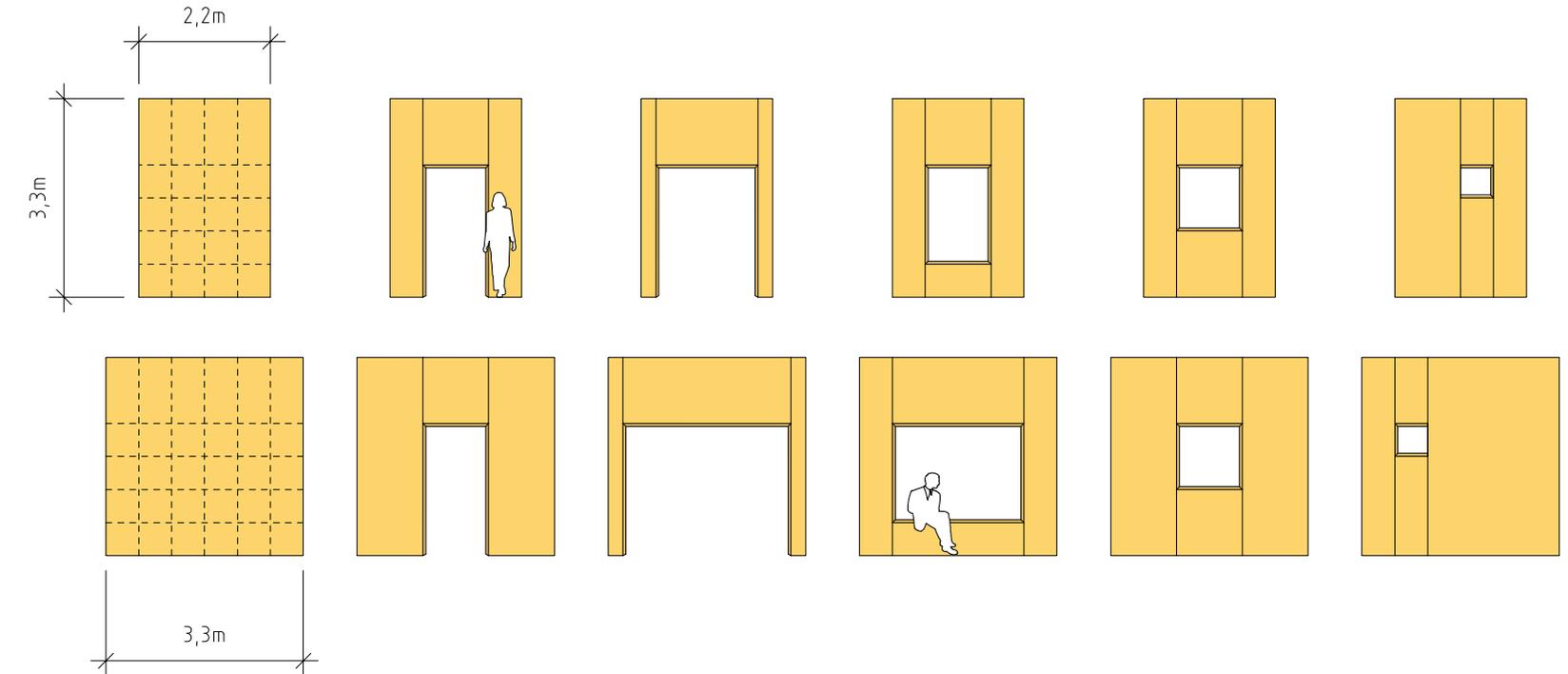
The solid wood walls will consist of three-layer cross laminated timber and are insulated with a wood fiber insulation to keep the structure as natural as possible.

Shape and size

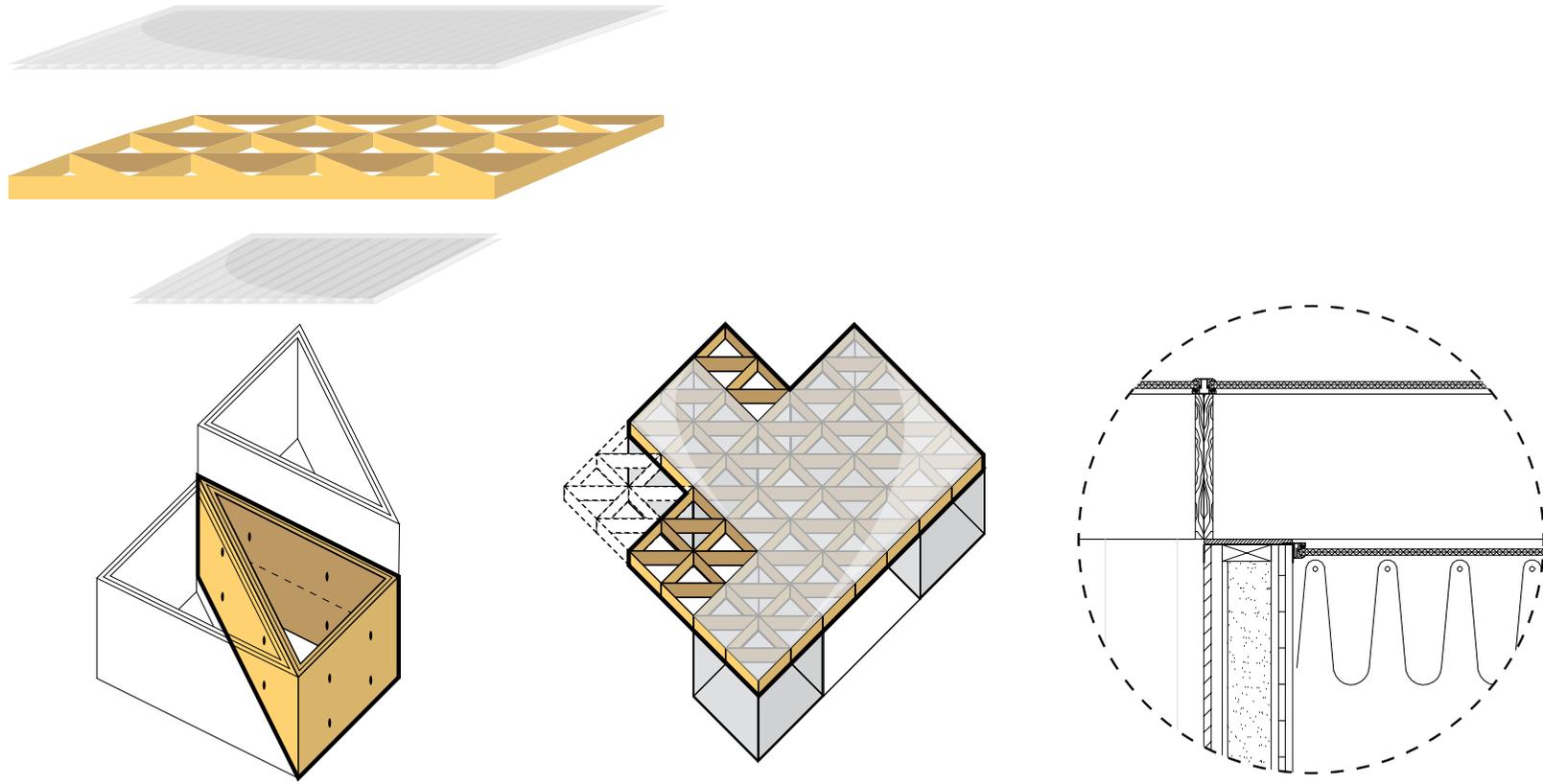
The walls will come with different cuts in them, some will have room for large sliding doors, some cuts perfect for sitting, and some with room for small windows.

The unit walls

The unit walls come in two lengths; 2.2 and 3.3 meters. They are all 3.3 meters high to fit into the modular system even vertically. The openings will fit into that modular system as well. It is up to the home-owner to decide what walls they want and what directions the openings are going to face. Some of the openings function as seating and they will create a natural connection between the unit and the atrium.



The roof



Construction

The roof consists of marine plywood lattice beams. Each triangle has the same dimensions as the floor tiles and are 400 mm high, providing a steady roof, cohesion for the units and a sun screen.

Polycarbonate roof

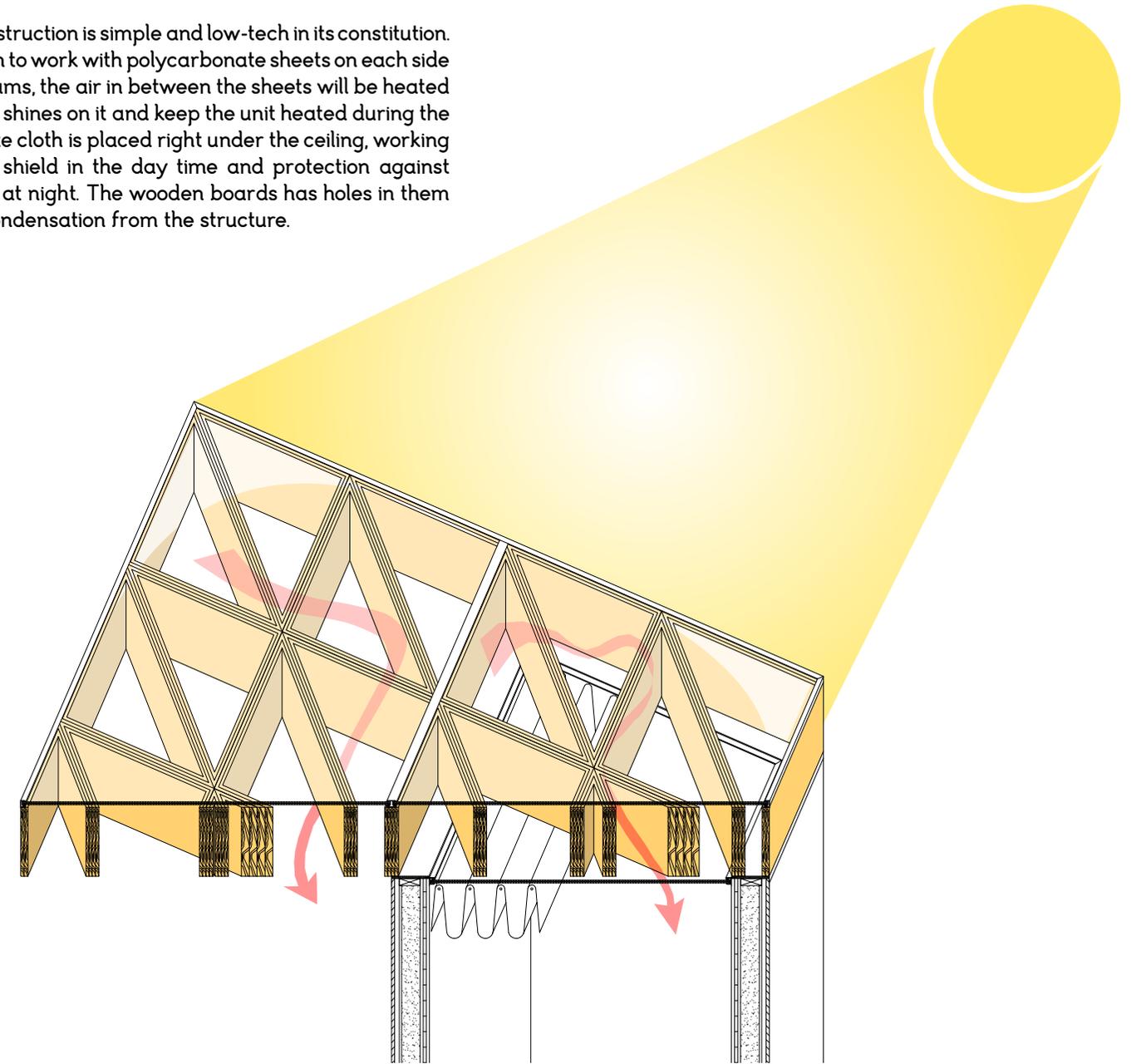
Polycarbonate sheets are added to the structure. The areas in need of heating are all covered with this plastic both on top of and under the triangular plywood lattice beams, the area in between the units will only have a polycarbonate sheet on top of it to keep the rain out.

Joining

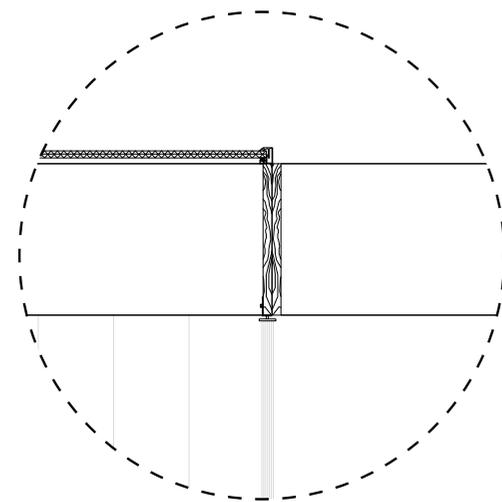
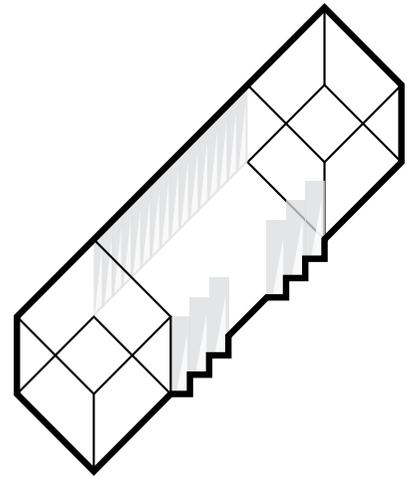
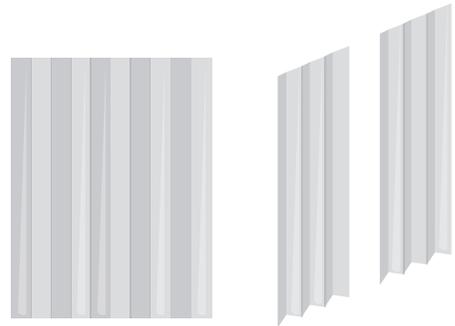
The Polycarbonate sheets will be placed over and under the wooden framework, this will create a space in between them that will work as insulation, this hot air will be distributed to the space in between the units, to keep them warm.

The heating system

The roof construction is simple and low-tech in its constitution. I have chosen to work with polycarbonate sheets on each side of lattice beams, the air in between the sheets will be heated once the sun shines on it and keep the unit heated during the day. A climate cloth is placed right under the ceiling, working as both sun shield in the day time and protection against thermal loss at night. The wooden boards has holes in them to release condensation from the structure.



The curtain



Placement

The curtain walls will be placed between some of the units so that they create an enclosed area in the middle. This area will become the secondary living space, probably not as used in the winter as during the warmer months of the year.

Material

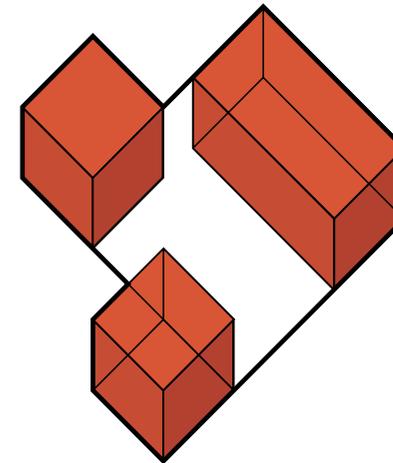
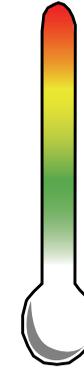
The curtain consists of polypropylene that is translucent, double-skinned, has a high-density and is both rigid and insulating.

How it works

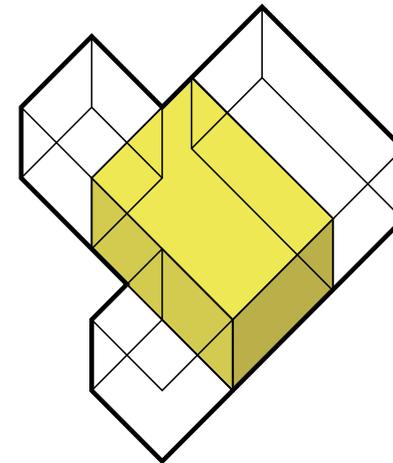
The polypropylene curtain will work like blinds, that can easily be shifted from open to closed.

The climate zones

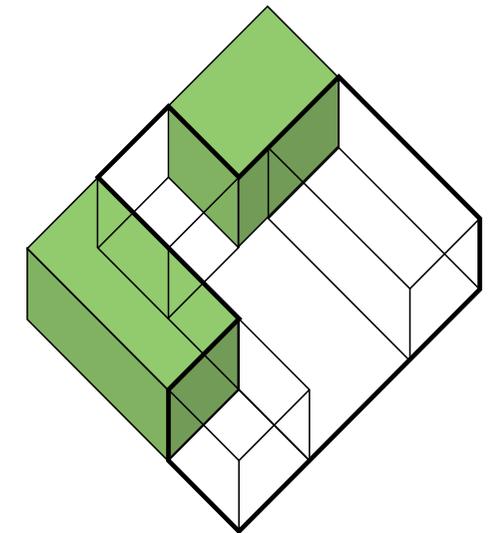
Due to the different components in this design, there will be different climate zones. Inside the units there will be an ordinary indoor climate, heated partly through the roof construction and the heating coils in the floor. Between the units, in shelter of the roof structure and the curtains, there is a second climate zone that will be heated accordingly to the seasons. The third zone is the area outside of the curtain, shaded from the sun by the roof construction, otherwise unprotected from the weather.



Units



Atrium



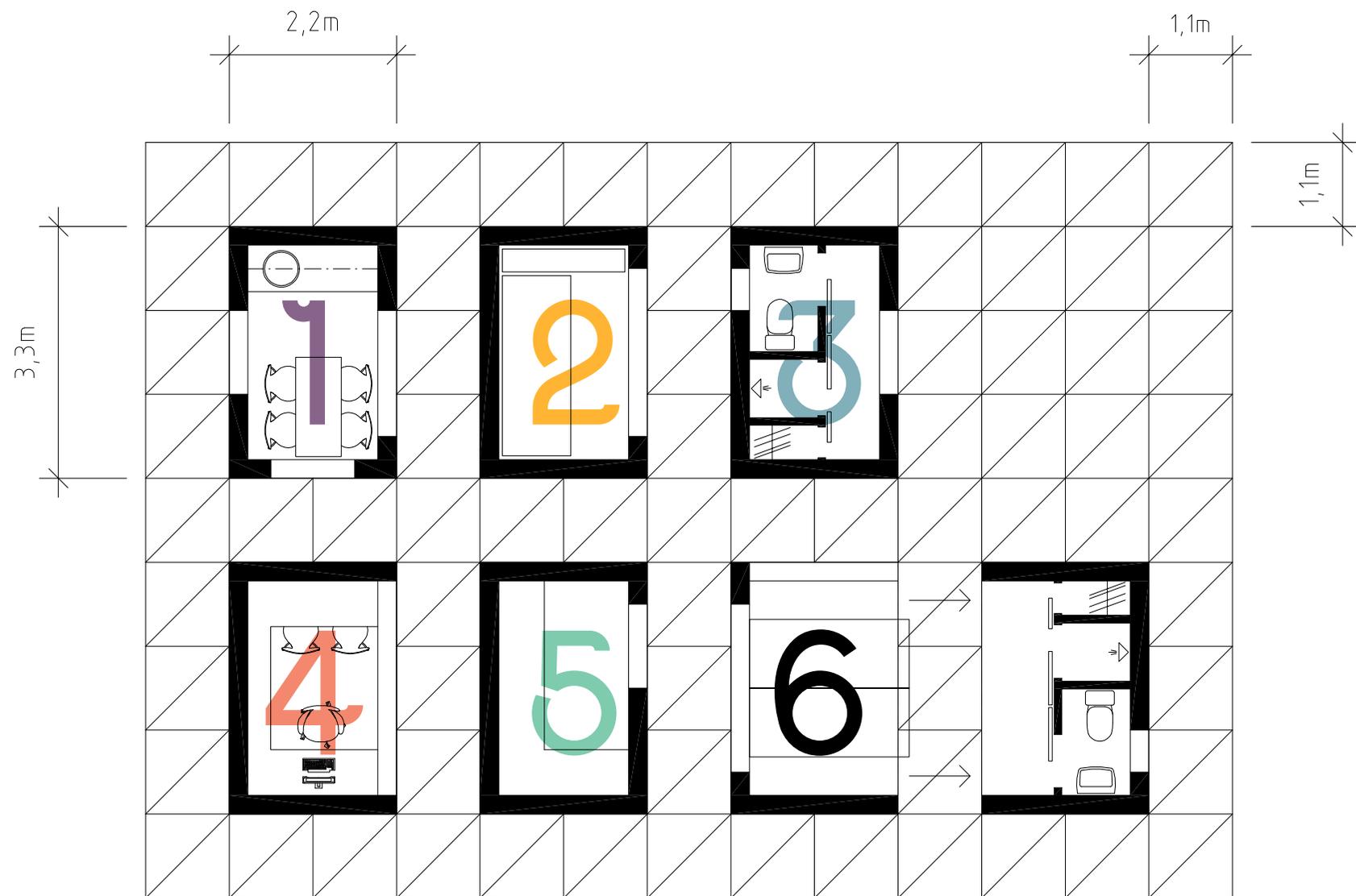
Outdoor

The units

The modules are 2,2 x 3,3 meters large which make them approximately 7,3 sq. meters each, in this way three of them can

be combined into the new granny flat and two of them combined will count for as a friggebod. Five units combined into a Fanny

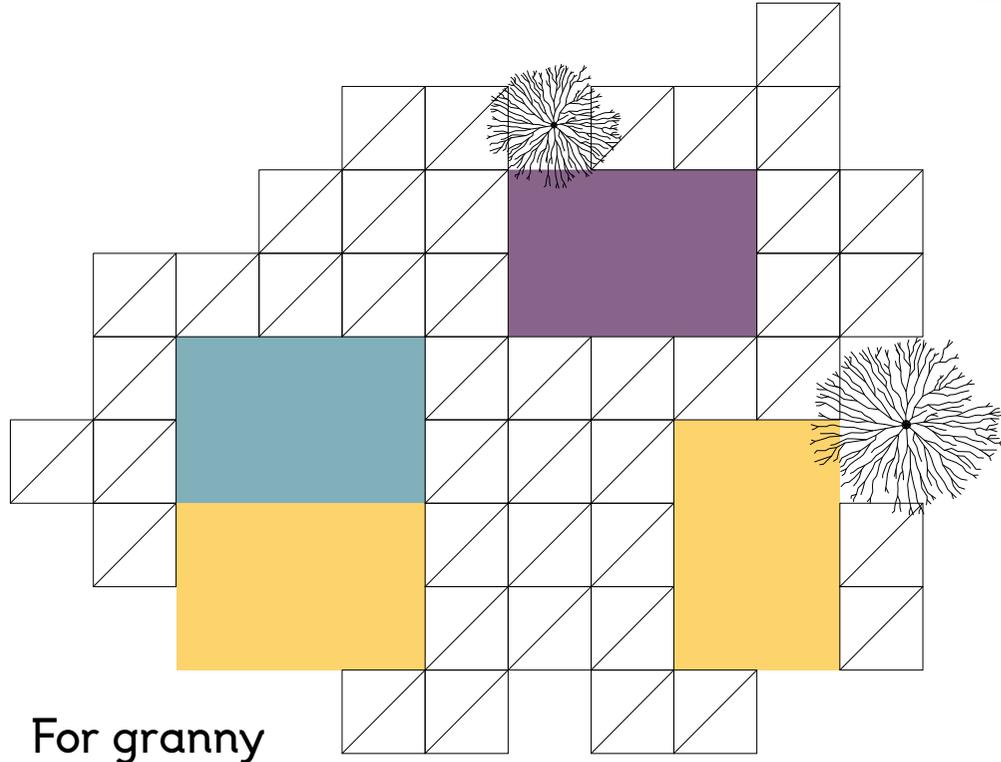
flat will be the maximum amount allowed on one property and create a rather large home!



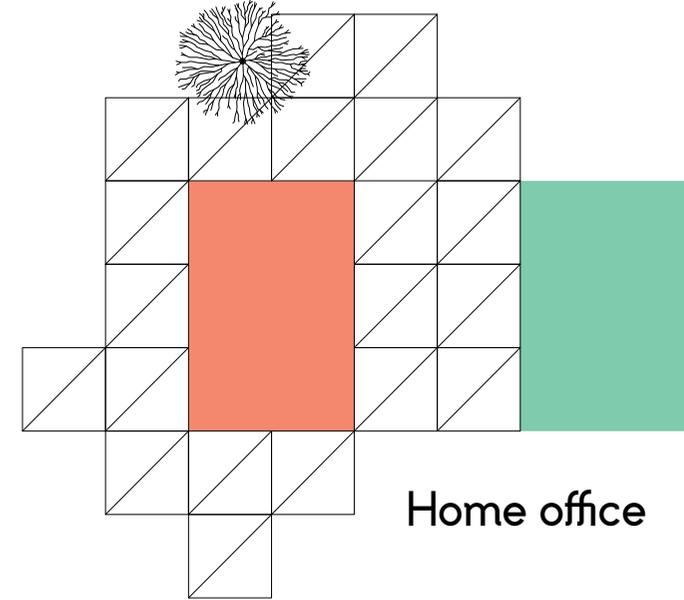
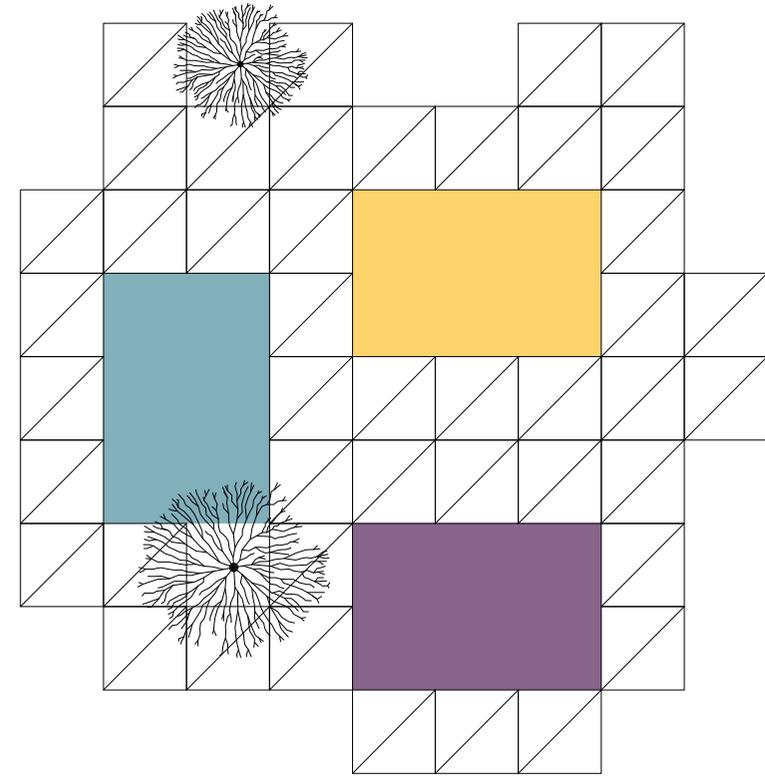
The situations

Shown are some possible situations that might call for a Fanny flat and ways in which the units can be placed to suit the user and their needs. There is the oldest child, looking to live away from the family, but not too far away. There is the young couple that might also be children of the property owners, struggling to find an inexpensive living. There is the student that the Fanny flat is being rented out to. There is the home office that the home owners have built to avoid long commutes. And finally; there is a granny flat.

For a 17-year old youth



For granny



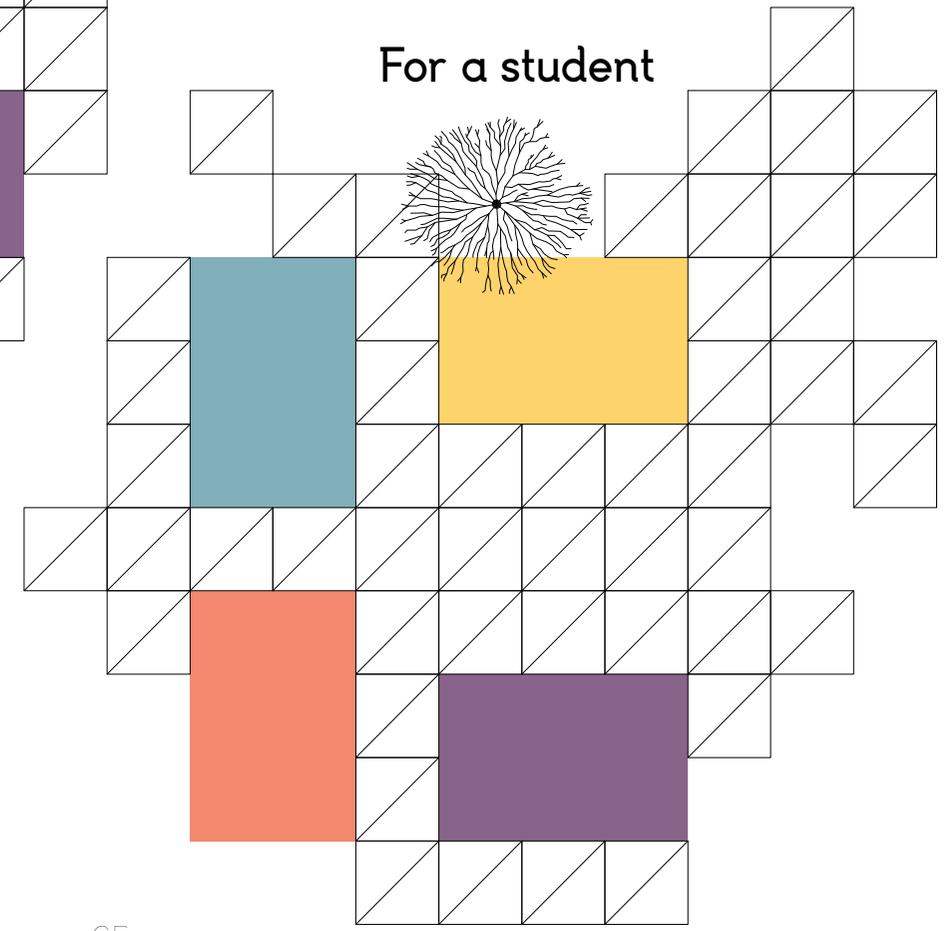
Home office



For a young couple

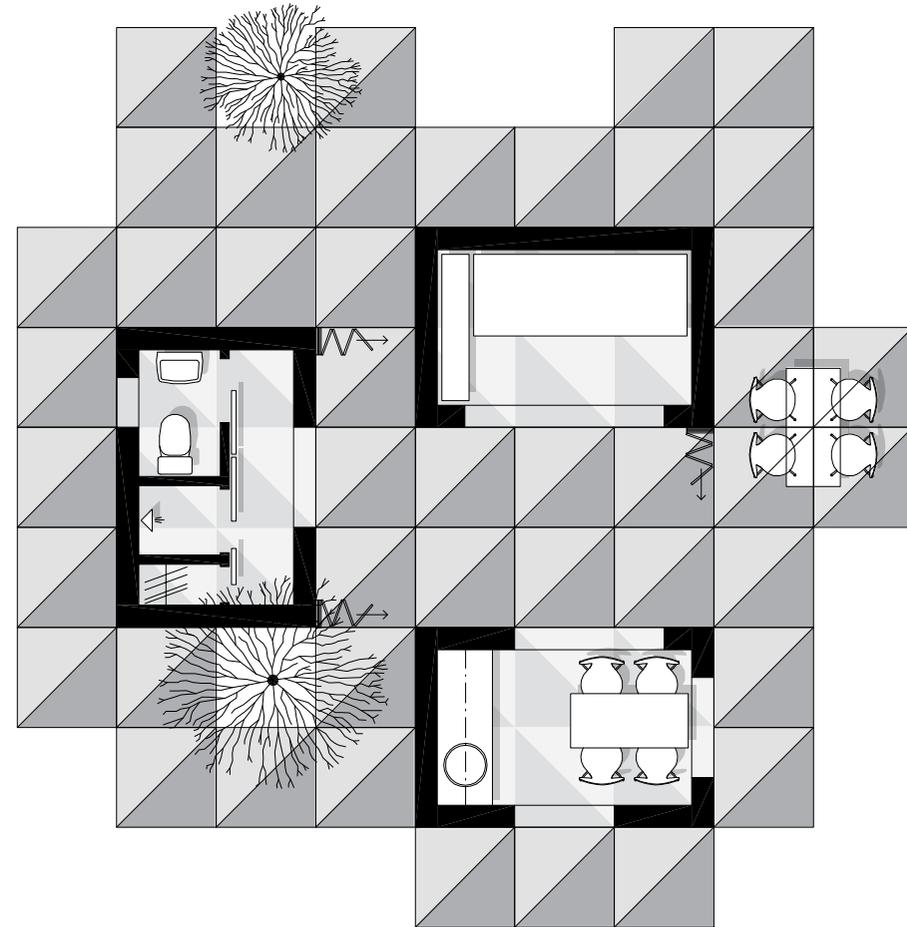
- Kitchen
- Living/Guestroom
- Bathroom
- Study
- Workshop

For a student



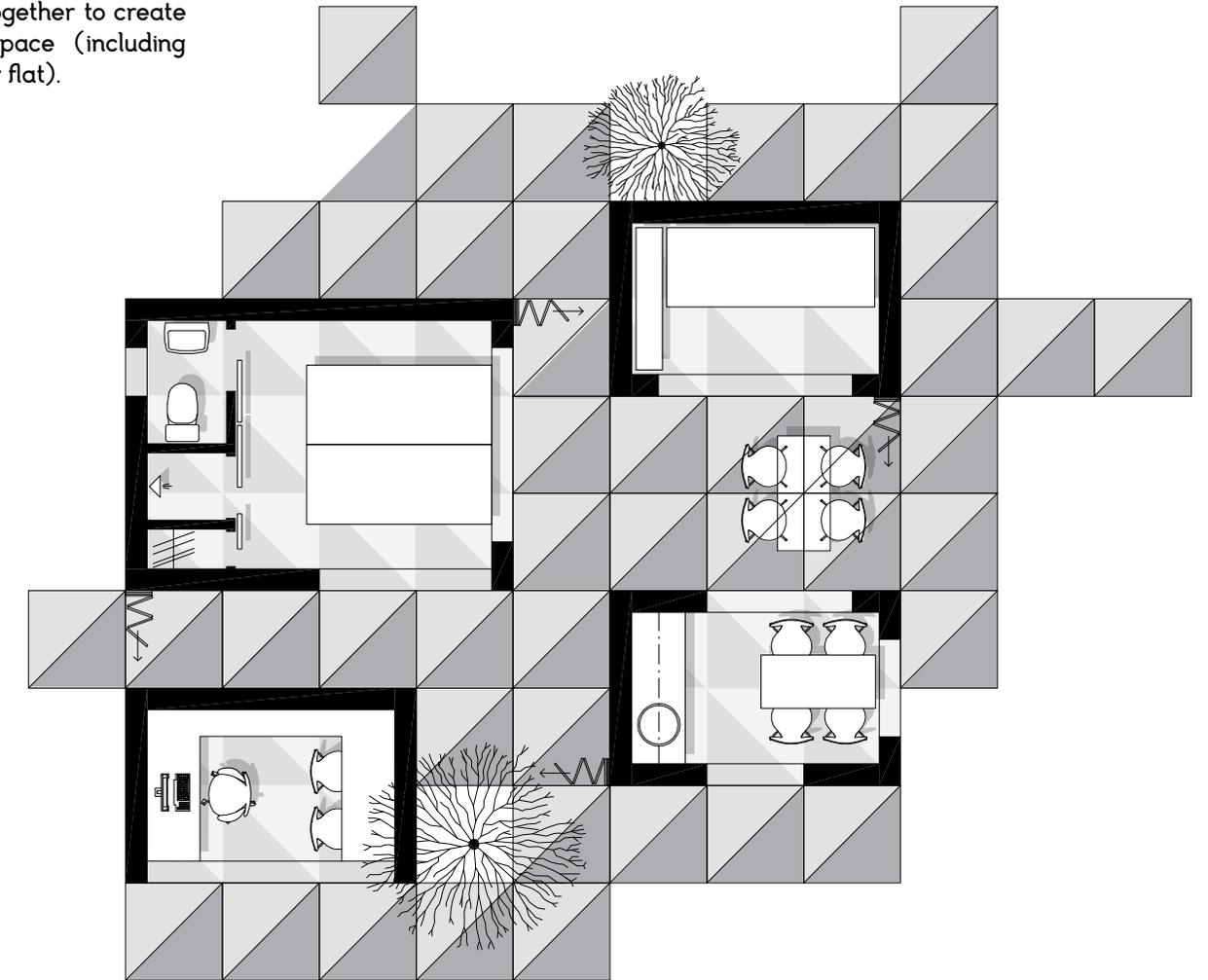
For a 17-year old youth

The 17 year old can create a great living by just combining three of the units and using the space in between as an extra space. The units combined will not be larger than the allowed size for the granny flat.



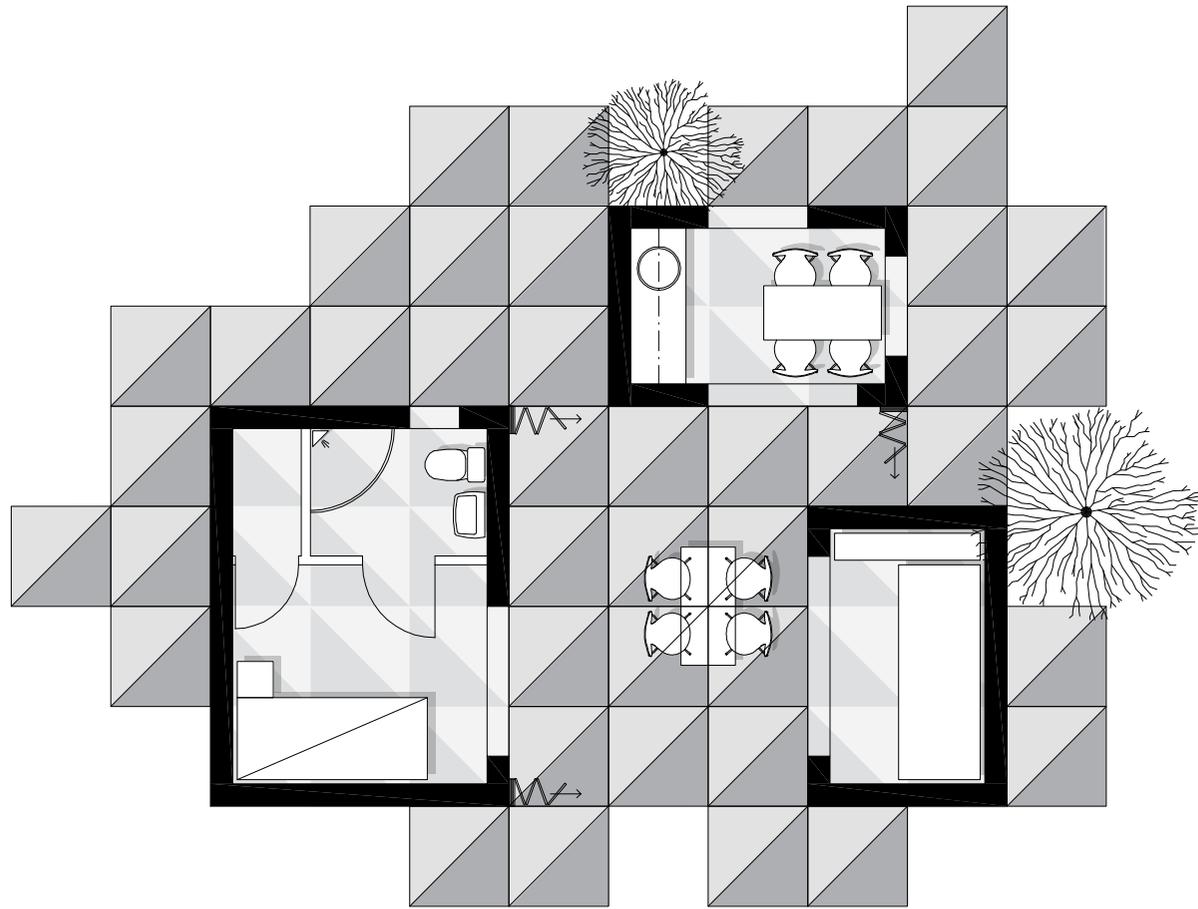
For a young couple

The young couple will need a little more space and especially a larger bedroom. They have also gotten a studio to be able to work or study from home. In this example five units have been put together to create the maximum allowed space (including both friggebod and granny flat).



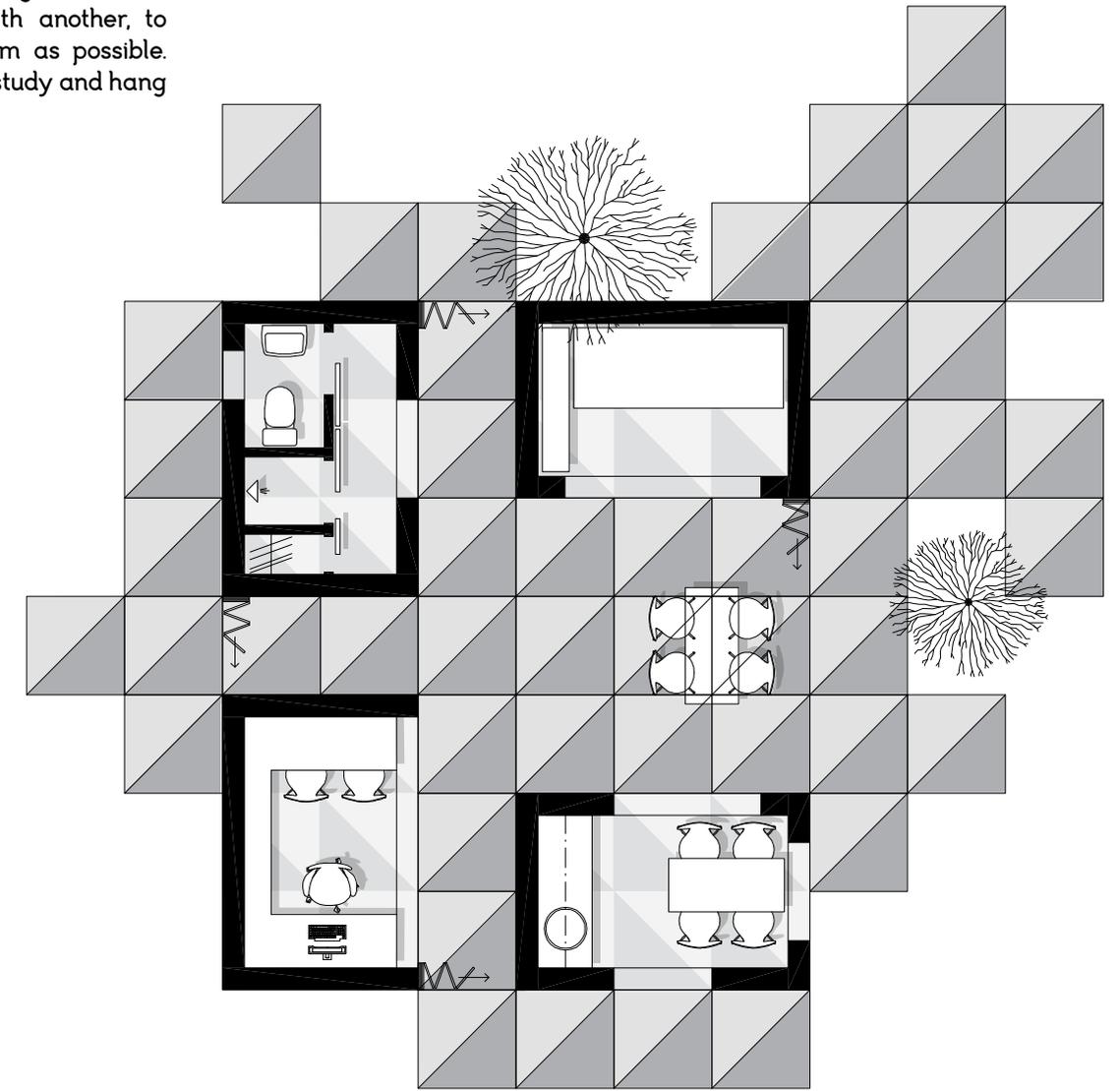
For granny

Granny has been getting a larger bathroom unit combined with the bedroom so that she does not need to get out of the bedroom unit to use the bathroom. She has gotten space to cook and read and a large atrium to use when the weather allows.



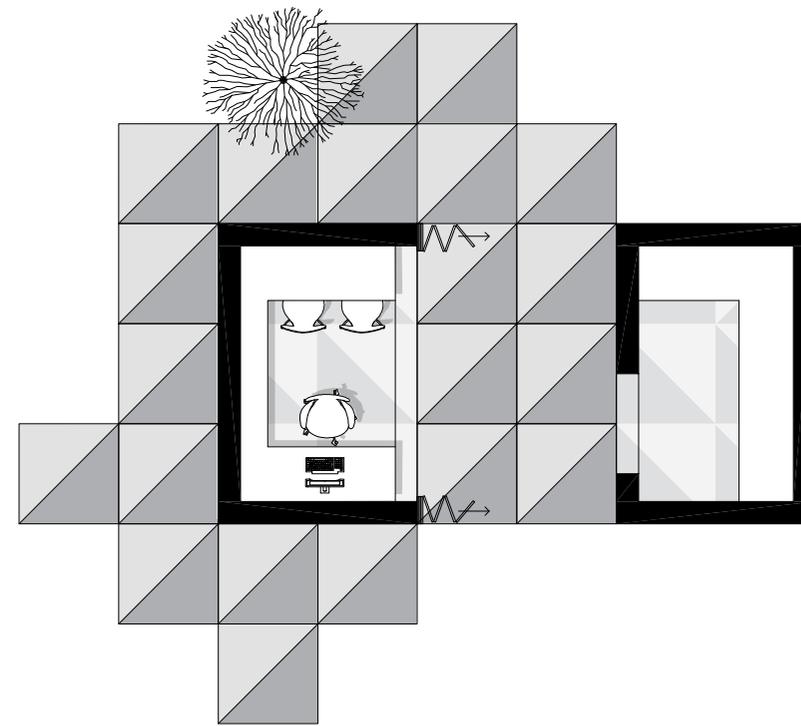
For a student

The student has been getting four units, none of them combined with another, to create as large of an atrium as possible. There are plenty of areas to study and hang out with friends.



Home office

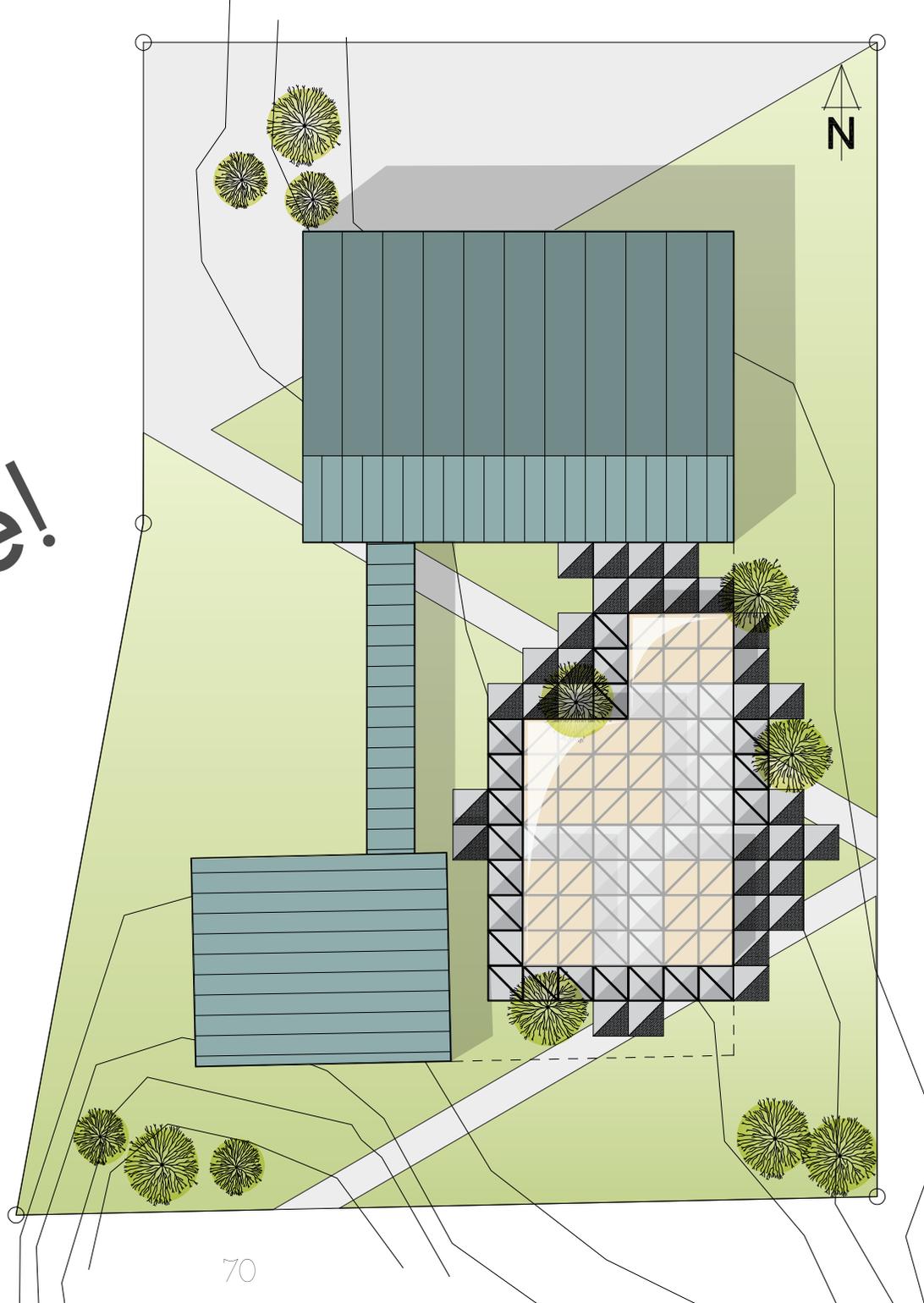
Two units have been combined to create a simple home office, they will together not be larger than what a friggebod can be.



2.5

Tested
on a site!

One of the possible properties in Johanneberg with a Fanny flat placed in its backyard. The amount of allowed units is maximized due to the size of the property.



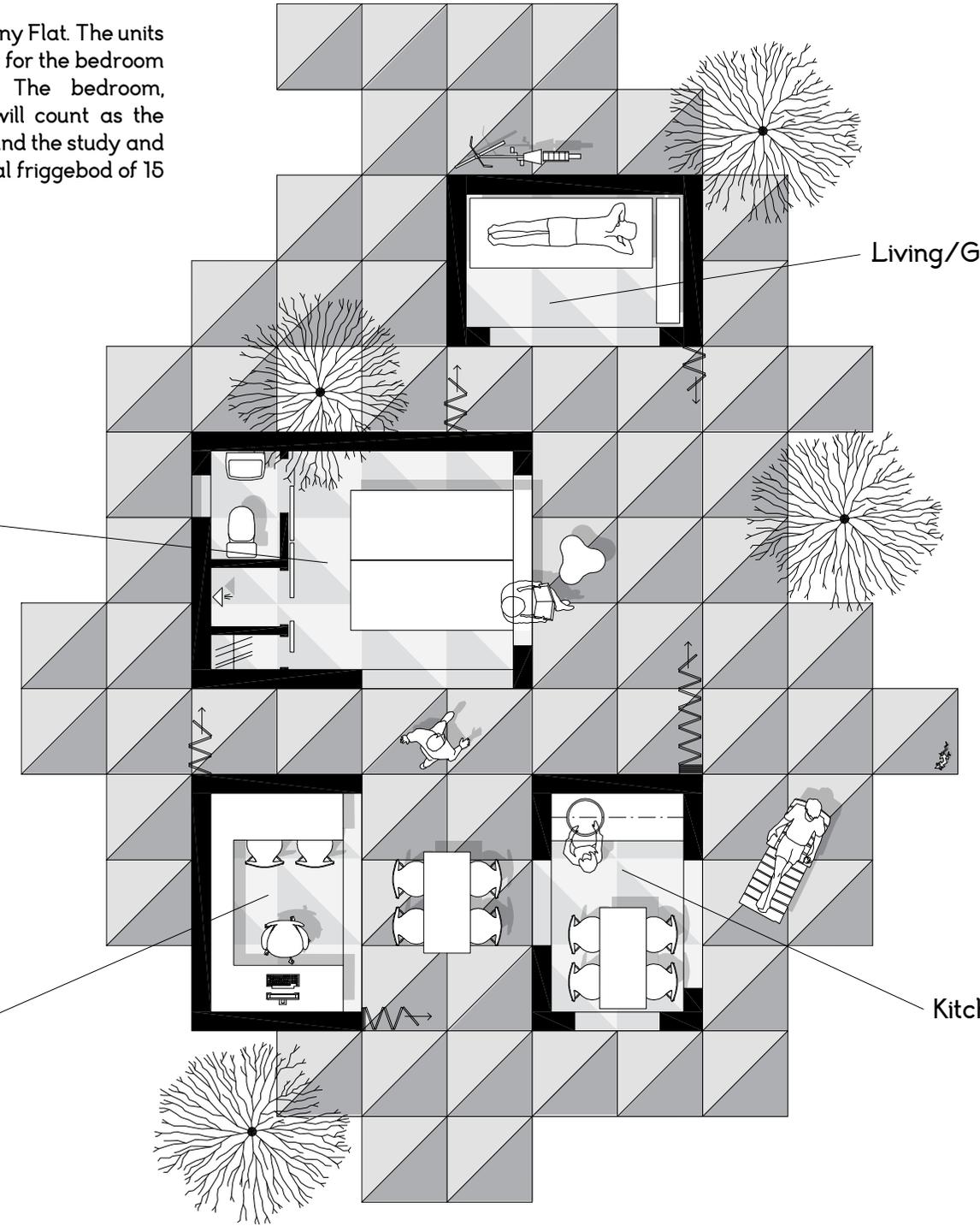
Possible floor plan for the Fanny Flat. The units all work free-standing except for the bedroom that combines two units. The bedroom, bathroom and the kitchen will count as the granny flat of 22 sq. meters and the study and living room will be the optional friggebod of 15 sq. meters.

Bedroom

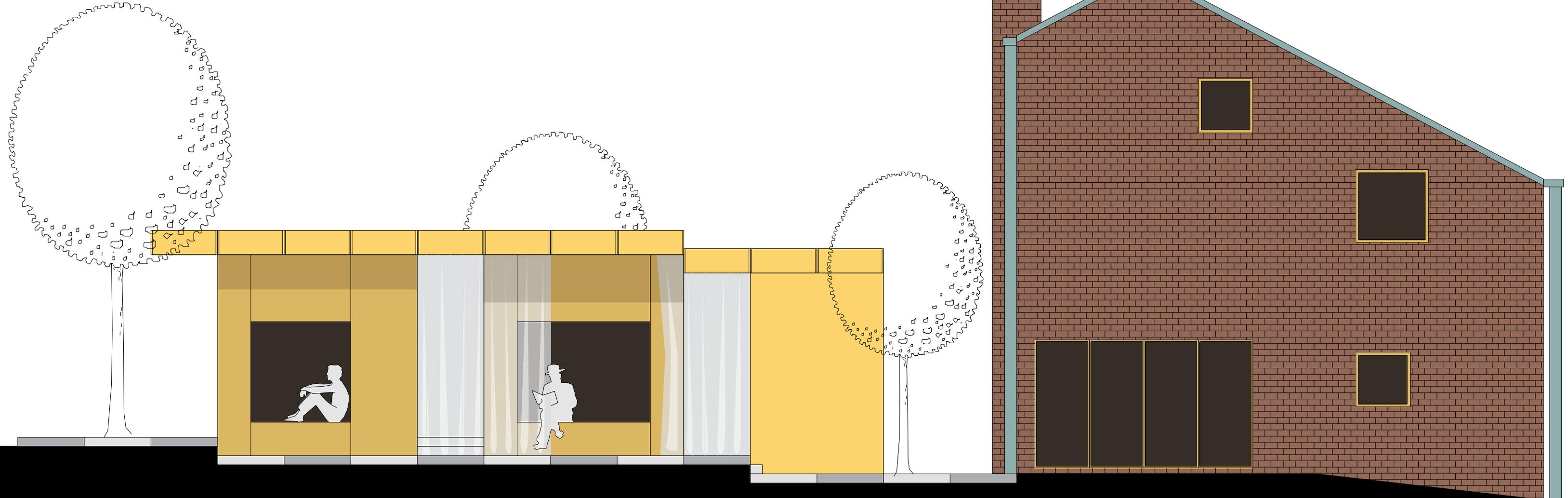
Study

Living/Guestroom

Kitchen



Here is the Fanny flat placed in its natural habitat. In designing a module-based building kit that allows the homeowner to adjust it to their need and property I hope to stretch the boundaries for what a home can be. It has been of importance keeping the project low-tech and I have been using simple materials and basic building techniques as a way to keep the costs down and to stress that even though my structure may spread out over an entire back yard, it is secondary to the main building in its constitution.



A section cut through two units, the concrete slab on which they stand upon and the triangular wooden roofing, with the polycarbonate sheets covering the units and the areas in between them.

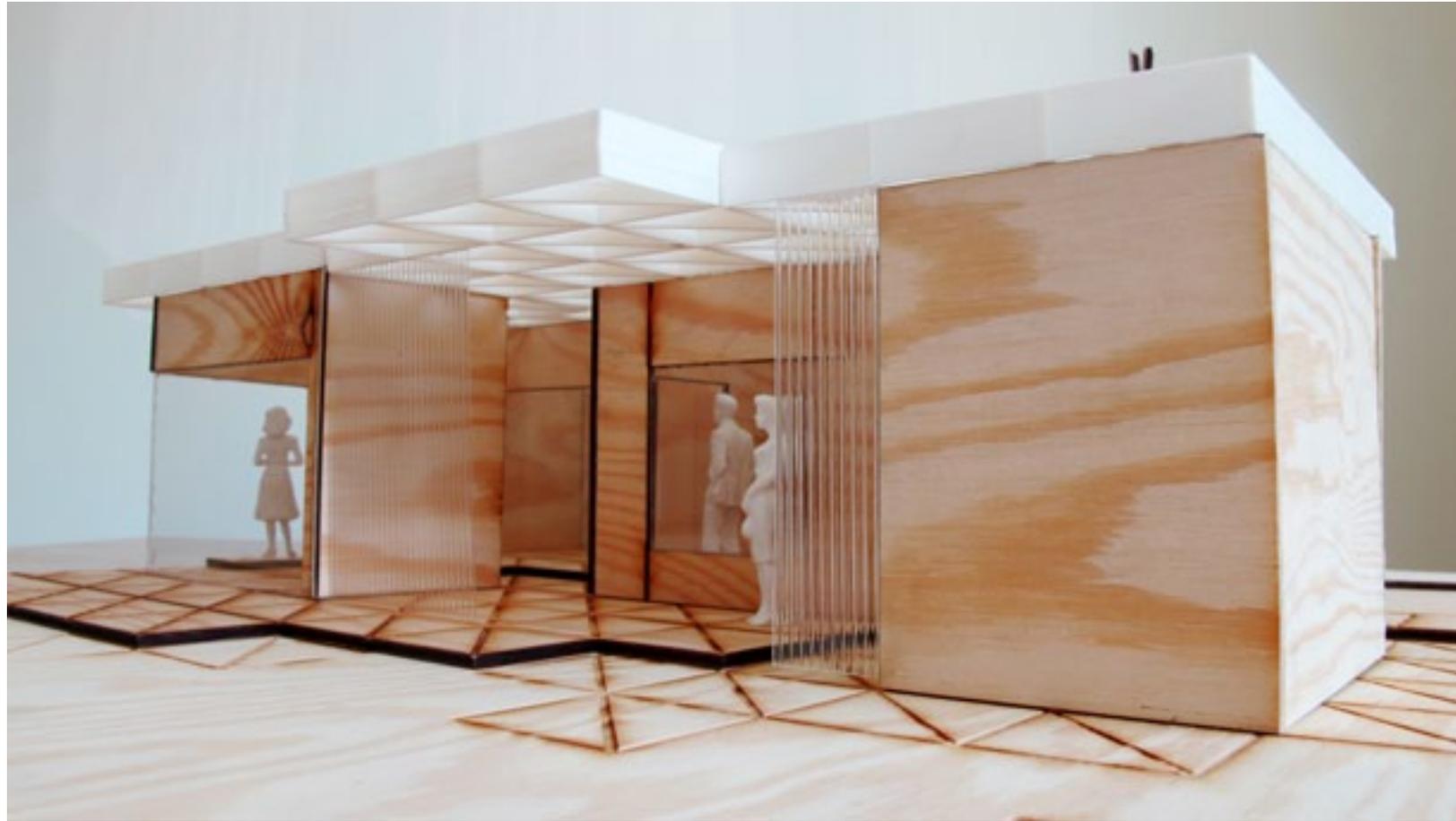


2.6

Model photos







3

Evaluation

3.1

Discussion

I am positive towards the new proposed extended friggbod legislation. Not only do I bring the positive experience from California with me, I am also confident (after the excessive period of sketching on different solutions) that this small dwelling can add something great to the Swedish suburbs. New housing solutions will appear, more people will see themselves living closer to school or work, families will be able to live closer together, and the sparse Swedish suburbs will be densified. I am aware of the fact that the granny flat will not solve the housing shortage, but neither do I think it should. It is still up to politicians to make that happen.

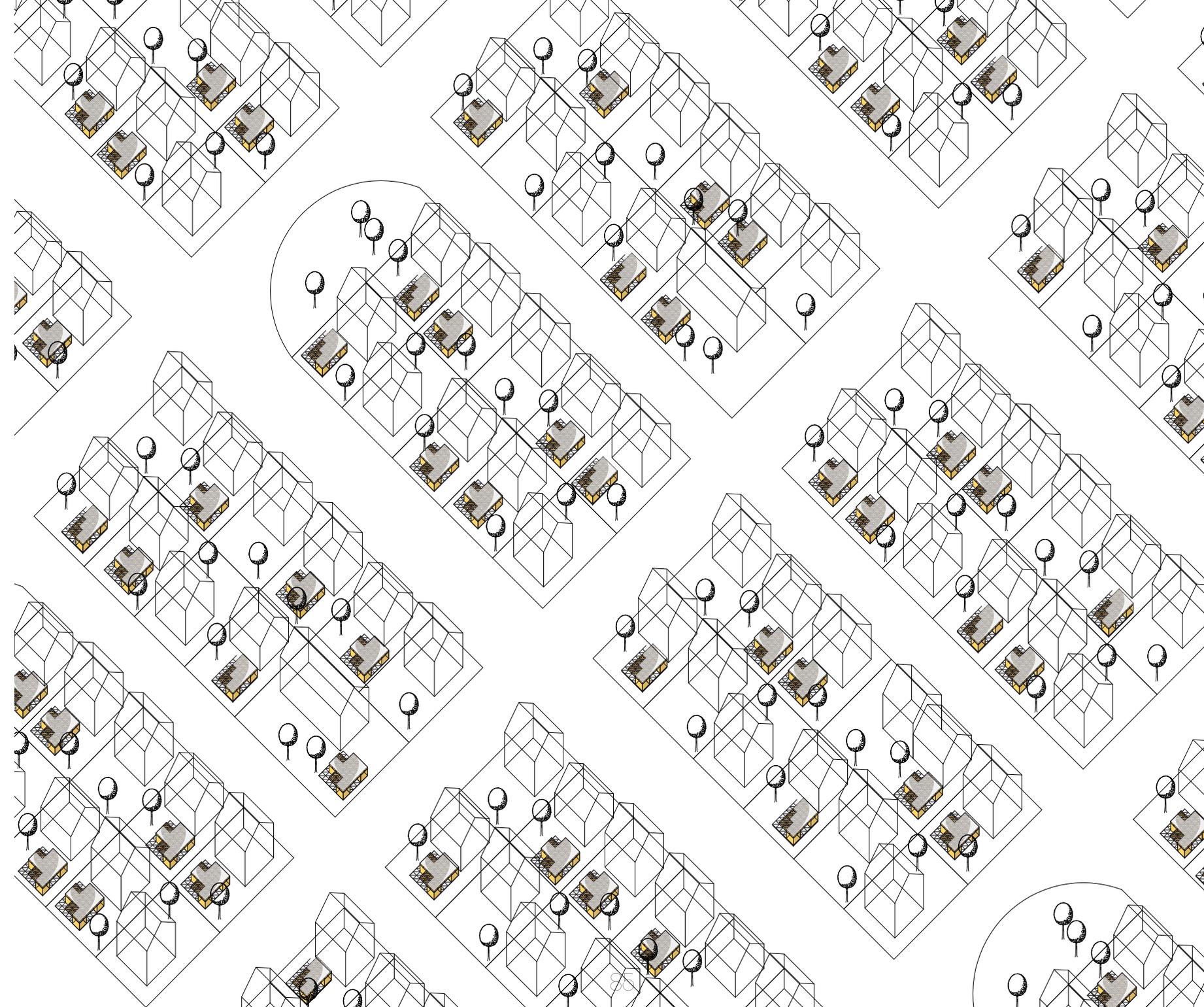
In my own design I have chosen to give the home-owners tools to create granny flats in relation to their needs and the sizes and shapes of their properties. I am providing a modular system that

will work on every property (as long as there are 7 sq. meters left over) as a way to offer a structure that is adjustable but also rather inexpensive. The Fanny flat is low-tech in its constitution but also beautiful in its simplicity. I believe that if this structure is going to wind up in every back-yard throughout the entire suburbia of Sweden, it should adorn the areas and I think it will.

In Santa Cruz, one of the most granny flat friendly cities in California, an estimated 1% of all inhabitants lived in granny flats. It is therefore important to look at the phenomenon for what it is; an opportunity for the individual homeowner to host an in-law or to make extra money. I do however believe that the introduction of new compact living units will spark a movement of smaller dwellings around the country making more people aware of which spaces they need and which they do not need, which possibly could lead to people moving in to smaller spaces, smaller homes being built which, in the long run, could solve parts of the housing shortage. It is also my hope that more swedes will start using outdoor rooms for certain functions in the home. There are many fabulous seasons in this country, seasons worth experiencing even in the home. I have for a long time sought after more atriums in Swedish architecture, seems I could not help

but design one in this project. I have hopefully also integrated the units with the atrium in between them, making it an obvious part of the building.

Overall, we are moving into a time of more conscious architecture. I believe this project is a nice little contribution to that trend. The Fanny flat uses simple materials and building techniques. It shows that not all areas in a home need to be heated and it creates parts of its own heating through sunlight. Finally it is small, the most important part for a sustainable living unit and on top of this it utilizes existing infrastructure. I cannot help but stress this again: the granny flat is such a humble concept in so many ways and I believe it is here to stay.



3.2

References

(Oxford system)

Books:

Cuff, Dana, Higgins, Tim and Dahl, Per-Johan. Backyard homes LA. Los Angeles, CA: cityLAB, 2010.

Litchfield, Michael. In-laws, Outlaws, and Granny Flats. Newton, CT: The Taunton Press, 2011.

Parliamentary publications:

Rapport 2013:35. Uppdrag att föreslå ytterligare åtgärder som kan undantas från kravet på bygglov – Friggebodar mm. Stockholm: Boverket.

Report 2008. Accessory Dwelling Units: Case Study. Reston, VA: U.S. Department of Housing and Urban Development / Office of Policy Development and Research.

Internet sources:

Apartment Therapy, Alexandra & Elliot's 1890's Farmhouse. 2012. <http://www.apartmenttherapy.com/alexandra-and-eliots-1890-farm-164093> (2014-03-03).

ArchDaily. Venice House / Daly Genik Architects. 2011. <http://www.archdaily.com/147096/venice-house-daly-genik-architects/> (2014-02-05).

City of Santa Cruz. Accessory Dwelling Unit Manual. 2003. <http://www.cityofsantacruz.com/Modules/ShowDocument.aspx?documentid=8875> (2014-02-11).

Cuff, Dana and Dahl, Per-Johan. Rx for the R1: Sustaining the Neighborhood. 2010. http://citylab.aud.ucla.edu/files/byh/CUFF_D AHL_PEN%5b1%5d.pdf (2014-02-11).

Dezeen, Guest House for an Anthropologist by Air Architecture. 2008. <http://www.dezeen.com/2008/01/10/guest-house-for-an-anthropologist-by-air-architecture/> (2014-03-04).

Four Lights Tiny Houses. 2014. <http://www.fourlightshouses.com/> (2014-03-12)

Länsförsäkringar nyhetsrum. Unga vill helst bo i villa. 2013. <http://nyhetsrum.lansforsakringar.se/2013/07/12/unga-vill-helst-bo-i-villa/> (2014-02-03).

Morphopedia. 2-4-6-8 House. 2010. <http://morphopedia.com/projects/2-4-6-8-house> (2014-02-05).

Television:

Wachtmeister, Jesper. Microtopia – a documentary about micro dwellings, downsizing and living off the grid. Stockholm: K special, SVT. 2013. <http://www.svt.se/k-special/microtopia> (2014-02-17).

Appendix

Appendix:

The master thesis preparatory essay written in the beginning of the 5th year.

Densification

- the contextual impacts of urban and suburban densification



Definition

Finding a good definition on densification is hard no matter how much one searches the web or browses through architectural magazines and books. One thing is on the other hand clear in all of the searches related to "densification", and that is that the text written on the subject is predominantly positive. This got me thinking about the credulity with which we look at this phenomenon and what the possible downsides with densification may be.

I managed to find an objective definition on densification at last and it reads as follows: **"The increased use of space, both horizontally and vertically, within existing areas/properties and new developments, accompanied by an increased number of units and/or population threshold"**.¹ The European Commission further defines a highly dense area to contain more than 1500 inhabitants per sq. km.²

I will in this essay examine the concept of densification and its consequences on urban and suburban contexts.

The current situation

The number of urban residents in the world is growing by nearly 60 million per year at the moment; this change is mostly taking place in developing countries, but even in the high-income countries, the urban population is increasing.³ In Sweden there is a shortage of residential buildings in the largest and in the growing cities. 65% of the swedes live in an area with a shortage of residential buildings, compared to 5% who live in areas with an excess of residential buildings,⁴ due to this, the largest cities in Sweden are currently being densified.⁵

I have come across very few documents on this matter of house shortage that does not promote densification of urban areas as the solution. There seems to be an overall belief among city planners in Stockholm⁶ as well as in Göteborg⁷, and Malmö⁸, that densification is needed in order for the cities to grow in a sustainable way.

Methods of densification

The most common ways of densifying an urban area are either building on plots that are not built upon, i.e. parking lots, courtyards, empty plots, or tearing down older low-rise buildings to free up space. Transforming of industry and harbor

¹ City of Cape Town, Cape Town Densification Policy, p.7

² European Commission, Cities in Europe – the new OECD-EC definition, p.2

³ WHO, Urban population growth

⁴ Boverket, Bostadsmarknaden 2012–2013, p.16

⁵ Boverket, Kommuner som har aktuell policy/strategi för förtätning av tätorterna

⁶ Stockholms Stad, Stadsbyggnadsstrategier

⁷ Göteborgs Stad, Kraftsamling, miljö- och förtätning av staden i fokus för framtidens stadsutveckling

⁸ Malmö stadsbyggnadskontor, Så förtätar vi Malmö!

areas into residential areas or adding extra storeys to existing buildings are also common ways of densification. Methods of densification less common are building roofs over existing roads and adding buildings on top of that, or building on water, or filling up the water with landmass in order to get more ground area.⁷

Incremental densification on the other hand, is a small-scale densification that has a relatively low impact on the character of an area, which means the subdivision of a residential property or construction of a second dwelling.¹⁸ An example of this could be the possibility of adding an additional dwelling unit to one's back yard.

Advantages of densification

There are reports showing that the denser the city, the less energy intense it is, meaning that people who live in dense urban areas are more likely to walk, bike or use public transportation as a way of traveling, instead of by car.¹¹ Another benefit with densifying urban areas is that nature and agricultural land outside of the cities can be saved instead of built upon, leading to shorter food transportations. It may also be cheaper to build on land already provided with facilities, roads, and public transportation networks. New economical values can be created through densification since the building opportunities are increasing within a given area. Densification could also (re)create a mixed city by adding functions previously lacked in the area or by adding functions that provide the inhabitants with a safer and better connected neighborhood.¹²

Disadvantages of densification

Many people wish to live in a low-dense city accordingly to Gunilla Belander who has been doing research on the topic for Swedish *Boverket*. Another argument for not densifying a city is that ecocycling in those areas is easier. The major argument against a densely populated city is that it will most likely experience more congestion due to increased traffic which leads to an ineffective energy consumption which leads to poorer air quality, a noisier city, and reduced accessibility for the inhabitants.¹³ Densified cities will also experience a greater pressure on facilities such as preschools, schools, and hospitals. The capacity on existing water sewage and electricity systems may also be found insufficient and there might be a larger usage of the green areas, which might then be subjected to greater wear.¹⁴

The character of the city and the spatial scale might be subject to change in case

⁷ Malmö stadsbyggnadskontor, *Så förtätar vi Malmö!* p.4

¹¹ City of Cape Town, *Cape Town Densification Policy*, p.7

¹² Newman, P. and J. Kenworthy, *Sustainability and Cities: Overcoming Automobile Dependence*

¹³ Malmö stadsbyggnadskontor, *Så förtätar vi Malmö!* p.5

¹⁴ Belander, Gunilla, *Blandstaden - ett planeringskoncept för en hållbar bebyggelseutveckling?* p.20

¹⁵ Malmö stadsbyggnadskontor, *Så förtätar vi Malmö!* p.5

of densification reads a Malmö City Planning Office report on densification, it may also result in reduced accommodation grades, such as a reduction of views and daylight and an increase of transparency. Historical values linked to the urban character may also be lost.¹⁵

Compilation of concerned subjects

The complexity of the process

Densification of an already dense urban area will be more complex than building on untouched ground, this because densification more directly will affect a large number of residents and functions in their daily habitat. Neighbors are almost certain to worry about a possible depreciation of their homes which makes open, participatory oriented processes into a necessity in these cases. The building process is also more complex in an urban area since the surrounding area needs to be functioning as usual in the meantime.¹⁶

Equality

High dense areas show signs of being more equal as a society. A neighborhood that offers a variety of apartments and functions contribute to the equality between people of different gender, age and background.¹⁷ On the other hand, new dwellings, added to an urban area can be expensive due to urban renewal and gentrification, which could lead to displacement of the disadvantaged out of the core and inner districts.¹⁸

Traffic/Noise

A denser population will inevitably bring more traffic. The ideal is that a densification in the built environment will increase the level of public transportations, but also contribute to adding functions that was previously missing in the area and therefore lessen the distance it takes for a person to get there, this is absolutely necessary for the densified city to function.¹⁹

As far as the noise problematic, there is (at least in Sweden) a lower requirement for blocking out noise in extensions of existing buildings than it is on newly built ones.²⁰ There seems to be no problem getting centrally placed apartments (even though exposed to noisy streets) sold, which may show that the noise is not considered a big problem. An increasing number of families with small children are also moving to more central locations, contributing to more children than ever

¹⁶ Malmö stadsbyggnadskontor, *Så förtätar vi Malmö!* p.5

¹⁷ *Ibid*, p.5

¹⁸ Belander, Gunilla, *Blandstaden - ett planeringskoncept för en hållbar bebyggelseutveckling?* p.10

¹⁹ Skovbro, Anne, *Urban densification: An innovation in sustainable urban policy?*

²⁰ Boverket, *Tillämpning av riktvärden för trafikbuller vid planering för och byggande av bostäder*, p.20

²¹ *Ibid*, p.10

growing up in noisy areas.

When speaking of densification, it is often said that new dwellings should be placed in close connection to existing public transportation nodes, if this can be realized and contribute to a decline in trips by car, the noise levels would not have to increase. It is therefore important that densified areas are equipped with efficient public transportation as well as bike lanes and proper sidewalks.²¹

Environment/Sustainability

The environment of a place (unchanged in its size) will be affected by more people and functions added to it. Most concerns about the environment during a densification process are those of what the additional traffic might do to it. The fact is that the urban sprawl witnessed in most cities in the last decades has actually increased the level of car traffic. The establishing of external shopping centers has changed the amount of traffic within the city as well as in the outskirts. It is the hope of Boverket in their report on transportation patterns that new shopping patterns will develop in the cities where densification is possible so that the shopping will be taking place closer to home with a reduction of car traffic and air pollution as a result.²²

A more effective system regarding technical supply is more easily maintained in a dense city, for example, long-distance heating. The report from Boverket state that stopping the expansion of cities would save a lot of nature and farmland surrounding the cities, while it also state that bringing a stop to densification would help maintain and develop existing urban green space, which could provide opportunities for local recycling solutions in close proximity to people's homes.²³

Green areas

The Nordic cities are relatively green and are more or less held together by a web of private and public green spaces. Recent research shows the importance of the green spaces both from a sustainable and a multifunctional aspect; recreationally, ecologically, culturally, socially, biodiversically, and in an order to provide a rich flora and fauna, as well as a way of improving air quality and dispose of surface water. During the last decades, the share of unsettled ground in the Swedish cities has been reduced through either densification or a change in land use.²⁴ People in favor of densification at the Yimby network claim that it is the paved surfaces that disappear during densification²⁵, but even those surfaces have sometimes proven to be useful for the citizens through play and physical activity.²⁶

²¹ Boverket, Tillämpning av riktvärden för trafikbuller vid planering för och byggande av bostäder, p.20-21

²² Ibid, p.21

²³ Boverket, Miljöinriktad fysisk planering, p.28

²⁴ Ibid, p.31-32

²⁵ Johansson, Hannes. Förtätning till varje pris?

²⁶ Malmö stadsbyggnadskontor, Så förtätar vi Malmö! p.6

Economy

Every new construction, or densification process, regarding buildings or infrastructure have proven to have a significant effect on the value development and usability on the city as a whole. Many cities are therefore looking to improve their old building stock in order for the city to gain a better reputation.

Building on existing buildings could be a relatively cheap way of densifying a city and with a smaller construction company building, the price has been proven to be lower and more reasonable. In Sweden, large construction companies are in the position of power, but these companies have such high overhead costs that it is not profitable for them to build smaller projects²⁷, which usually makes the building cost, and naturally also the rent, on these kinds of new dwellings extremely expensive, something that has not seemed to scare people ways from moving in to these homes, at least not in central Stockholm.²⁸

A plot ratio is often being used as a tool to measure how well an area is being utilized, i.e. the relation between the gross area of a building and its size-rate footprint. The higher the plot ratio, the higher the land price will be. A high plot ratio will enable more homes or facilities to rent or sell, which in the long run will save farmland and other valuable areas around the city. This tool is however a blunt instrument and can differ due to how many sq. meters one allows the building's footprint to read as. High-rise buildings will shade its surroundings more and require larger courtyards, leading to a larger distance between the buildings which enlarges the size of the city as a whole, showing that tall buildings not necessarily means a more effective way of land use. To get a true idea of the actual plot ratio, it is better to also calculate surrounding streets and squares as part of the footprint.²⁹

Comparison of densification methods

Coming to a conclusion on how densification actually affects an area is a matter of looking at real, built, examples of this. I am going to evaluate the urban densification in the city of Copenhagen and the incremental densification of low-dense American suburbs.

The densification of Copenhagen

The metropolitan area of Copenhagen has shown a trend of residential concentration during the last two decades. New dwellings in the 1990s were built somewhat closer to the city than in the precedent decades, this was also the case for the workplace development. During the last decade, a higher share of new

²⁷ Bellander, Gunilla. Blandstaden - ett planeringskoncept för en hållbar bebyggelseutveckling? p.57

²⁸ Arntsd, Lennart. ...men här byggs nya lya-bostäder

²⁹ Malmö stadsbyggnadskontor, Så förtätar vi Malmö! p.6-7

dwellings and offices has been built empty plots in the central municipalities of Copenhagen, there has been a shift from suburbanization to reurbanization.³⁶

These changes have been possible due to a change in the Danish planning legislation that took place in 1992 and enabled high density development again. There had been a threshold in building densities during the 70s and 80s in order to increase living conditions in central urban districts by securing green areas, light and air quality but also to promote decentralization of urban growth. The threshold had led to a decrease in densities in urban districts which in 1992 was going against the Danish reading of the Brundtland report of 1988 and their idea on sustainable urban development through densification. The reason for the change in planning legislation was mainly the possibility to create a more efficient infrastructure by creating a shorter distance between urban functions in an attempt to decrease the energy consumption. In Copenhagen, this led to many new offices building being centralized around metro stations. Secondly, it was important to halt urban sprawl and its negative effect on the social and economic development of central urban areas that were experiencing social segregation and financial problems. The idea was to create a more diverse social life by adding better local service and higher population densities. Finally, the change of the legislation was a wish from the conservative government to liberate planning legislation, by making it a local task and not general national issue.³⁷

The Copenhagen district of Østerbro has in the past decade experienced the highest level of building activity of all Copenhagen districts. The building activity has led to an increase in population density in the district by 5.9% with the majority of newly built flats being larger than those in other Copenhagen districts, leading to people from a high-income group to move here, although there is a need in the area for housing for elderly, students, kindergartens, etc. according to the municipal plan for Copenhagen. This is however in line with what the municipality of Copenhagen wish for the area, and so the social housing project in this area has also been stopped.³⁸

Though many people claim that they want to move into a city to be able to live without a car³⁹, there has been an increase in travel by car and a decrease in the use of public transportation in Copenhagen since the densification process began. There has however been a strong growth in bike use and these changes due to the construction of new highways and improvements of roads, both for cars and bikes.⁴⁰ Copenhagen has also made considerable investments in a new Metro⁴¹, but the increase of centrally located workspaces and the fact that people from high-income groups, who are not willing to give up their usual transport behavior, have moved into the city could also have contributed to this change in transportation patterns. Lifestyle is an essential factor in environmental issues, and the question is however these groups would have had a lower volume of transportations if they

³⁶ Xue, Jin et al. The challenge of sustainable mobility in urban planning and development: a comparative study of the Copenhagen and Hangzhou metropolitan areas, p.10-11

³⁷ Skovbro, Anne. Urban densification: An innovation in sustainable urban policy?

³⁸ Ibid

³⁹ Ibid

⁴⁰ Xue, Jin et al. The challenge of sustainable mobility in urban planning and development: a comparative study of the Copenhagen and Hangzhou metropolitan areas, p.11

⁴¹ Ibid, p.13

lived in new housing developments in the suburbs.⁴²

In Østerbro, there has been a conflict between local and municipal interests, especially regarding the need for parks. The densification of the district has not caused a major loss of recreational areas, in fact, some of the re-developments have led to an increase in accessible green space, but some areas lack a near-by park and instead of building these, more residential buildings have been added, leading to a number of annoyed local residents.⁴³

The municipalities of Copenhagen experienced a considerable decline in population and therefore a loss in tax revenue during the recession of the 1960s, 1970s, and 1980s and there is still an ongoing competition between the municipalities to attract taxpayers and commercial activities and this goes hand in hand with the interests of densification.⁴⁴ In Copenhagen, the level of affluence is high and still rising, but there is currently a low growth in employment and population which has put growth creation on top of the agenda and the municipalities are not looking to densify more at the moment.⁴⁵

The densification of suburbs

There is currently a small-scale densification process taking place in American and Canadian back-yards, here is a closer look at that phenomenon.

An Accessory Dwelling Unit, or a *Granny Flat*, is a second dwelling attached to, or separate from, the main residence that houses one or more persons and enables cities and counties to approve such units in single-family neighborhoods.⁴⁶ The Accessory Dwelling Units can be found mostly in low-dense American or Canadian suburbs and have been a common element for decades, even though illegal in most cities until recently. They mostly provide temporary homes to seniors, young couples, working-class singles, and fledgling adults who look to rent affordable spaces in neighborhoods of detached houses. The legalization of the ADUs has progressed slowly, with legal barriers making the rules for building them obscure.⁴⁷ The major argument for this incremental densification of the suburbs, that the pro-ADU webpage accessorydwellings.org gives, is that it seems quicker for 50 home-owners to permit and build one ADU each than for one developer to permit and build a 50-unit apartment block.⁴⁸ The concept of legal additional dwellings is relatively new and is still being debated and evaluated, I will therefore look at the phenomenon of Accessory Dwelling Units, how it is being discussed and, in the cases where information is available, what it has contributed to in the suburbs of Portland, Oregon, since they state a good example.

The rules concerning ADUs differ from city to city.⁴⁹ In Portland, the rules are fairly generous, the ADUs do not require owner occupancy or parking provision

⁴² Skovbro, Anne. Urban densification: An innovation in sustainable urban policy?

⁴³ Skovbro, Anne. Urban densification: An innovation in sustainable urban policy?

⁴⁴ Ibid

⁴⁵ Xue, Jin et al. The challenge of sustainable mobility in urban planning and development: a comparative study of the Copenhagen and Hangzhou metropolitan areas, p.13

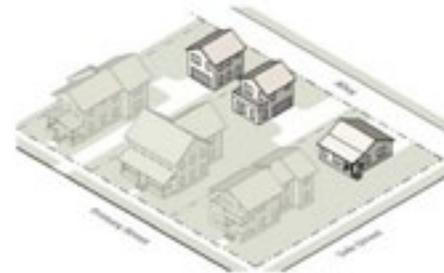
⁴⁶ State of California, A Guide to Planning in California.

⁴⁷ Durning, Alan. In-law—and Out-law—Apartments

⁴⁸ Brown, Martin John. Do lax "granny flat" regulations encourage absentee landlords? Some new evidence from Portland

⁴⁹ Selected Restrictions and Requirements for Accessory Dwelling Units (ADUs) in Cascadian Cities, p.1

like many other cities,⁴⁴ furthermore up to six unrelated people may live on one single-family lot.⁴⁵ Portland eased the restrictions in 2010 and has since then seen an increase in the ADU permit activity from 25 to 140 per year.⁴⁶ On the other hand, the legalization of ADUs has come with many design requirements; the ADUs need to include a private kitchen and bathroom, have closets in each bedroom, meet minimum requirements regarding sizes of rooms and windows⁴⁷ and will be closed by building inspectors if failing to do so. Some experts, like Alan Durning at the Sightline Daily, are dreading that the legalization with its accompanying rules will lead to a development where the poorest tenants will not be able to afford their previously rather inexpensive living.⁴⁸ However, ADUs do provide a less expensive housing option in favorable areas without a bigger change to the character of the area, and they do provide a practical housing for multi-



Picture of accessory dwelling units: <http://www.indyweek.com>

generational households, both for ageing parents and for children on their way to move out from their parent's home.⁴⁹

The benefit of adding additional dwellings to land that is already built upon is that the new residents will be able to walk, bike or use the existing public transportations when they

need to travel.⁵⁰ Since the construction of ADUs in Portland only goes up to a rough 140 per year, I have not been able to find any information on how the infrastructure is being affected. People not in favor of Accessory Dwelling Units, like the Californian blog Westchester Parents, claim that ADUs will bring additional cars to the neighborhood, and since up to six unrelated people are allowed to live on a site, it is expected that some of these individuals will have a car. Having that many cars parked in the streets is feared to lower the value of the existing homes.⁵¹

Looking at the ADUs from a sustainable point of view, it is clear that they provide a rather space-saving living, since they have to be rather small. The size makes them use less energy, material and waste during its construction phase⁵² and since the residential sector in the US is responsible for 22% of the total energy consumption per year⁵³, the smaller the space, the less energy it will use during its lifetime. It was actually stated by Oregon's Department of Environmental Quality that the best way to reduce energy consumption was to reduce the size of the

⁴⁴ Palmeri, Jordan. Zoning Regulations for ADUs in 55 West Coast Cities

⁴⁵ Durning, Alan. In-law—and Out-law—Apartments

⁴⁶ Palmeri, Jordan. Zoning Regulations for ADUs in 55 West Coast Cities

⁴⁷ City of Portland, Oregon, Accessory Dwelling Units (ADUs).

⁴⁸ Durning, Alan. Legalizing Inexpensive Housing

⁴⁹ Peterson, Kol. Why are ADUs such a good idea?

⁵⁰ Ibid

⁵¹ The case against Accessory Dwelling units and other growth tools

⁵² Peterson, Kol. Why are ADUs such a good idea?

⁵³ US Energy Information Administration, Annual Energy Review 2011, p.58

home.⁵⁴

The ADUs will bring more people to the cities meaning it will bring more tax revenue and more taxable income for a city,⁵⁵ therefore most cities are positive towards ADUs.⁵⁶ On a personal level, the building and renting out of an ADU are often a lucrative business for the home owners not only is there an additional income every month, the house itself will have an increased value at the selling point.⁵⁷ There has, for a long time, been difficulties with the financing of the ADUs, the American banks have not had a clear definition on what type of dwelling they are and have therefore not been able to lend homeowners the money to build them. The funding issue affected the city of Portland so much it led them to initiate a three-year moratorium for ADU charges in an attempt to increase urban density.⁵⁸ There is a fear among neighbors who oppose of ADUs that they will be rented out by absent land-owners as purely a commercial investment, furthermore there is a belief that absent land-owners will not be as eager to ensure that the impacts which result from the increase in the density of development will be manageable⁵⁹ and therefore the value on the adjacent houses will sink.⁶⁰



Picture of accessory dwelling units: Accessory Dwelling Unit Survey for Portland, Eugene, and Ashland, Oregon

Conclusion

To densify an already built area is always going to be difficult. When people find out that the area where they live is intended for densification, there will be voices raised on how that will impinge on the current residents daily lives and the qualities they have gotten used to in their neighborhood. It is important to show respect to the existing neighbors, but it should not prevent the experimentation of new forms of housing.

The arguments supporting urban densification pledge a whole lot of improvements that are seldom met. Comparing what the municipal plan for

⁵⁴ Palmeri, Jordan. Why Oregon DEQ loves ADUs

⁵⁵ Peterson, Kol. Why are ADUs such a good idea?

⁵⁶ The case against Accessory Dwelling units and other growth tools

⁵⁷ Peterson, Kol. Why are ADUs such a good idea?

⁵⁸ Fehrenbacher, Lee. Financing still a hurdle for ADUs

⁵⁹ Laurelhurst Community Club, Proposal to Legalize Detached Accessory Dwelling Units Citywide

⁶⁰ Nilund, SÅ kan villaförorten bli tätare, p.34

Copenhagen advocated, to what was actually built during the densification, is disheartening. It is clear that economic aspects often outweigh social aspects. Furthermore, most of the new dwellings built in dense areas are extremely expensive, leading to a certain group of people moving there, contributing even more to the segregated society that urban densification claim to counteract. The fact that car trips increased after the densification of Copenhagen only adds to the insight of who inhabits the new dwellings, and stresses the need for improvement of public transportations while densifying an area. I understand the concept of urban densification, many people do wish to live in city centers and are willing to pay for it, but for city planners to argue that densification is the tool for integration and sustainable growth is simply unsubstantiated.

The opportunities with small-scale densification are staggering. Where most cities talk about densifying of the urban areas, Portland is talking about densifying of the suburbs, it seems they have detected some extremely valuable approach to nongovernmental densification. The people in Portland seem happy to pay for and build Accessory Dwelling Units in their back-yards, not even thinking about the fact that they facilitate the public demand for more housing. I definitely prefer suburban densification over urban densification. Small-scale densification does not make a big impact on the neighborhood, it can halt urban-sprawl, it is more energy-efficient and therefore more sustainable, ADUs are simple and less expensive to rent since almost anyone can build them, and finally I find the concept very likeable, since it is in many cases a single home-owner looking to improve the lifestyle of an older or younger relative.

It is however important to understand that the suburban densification is allowed by the same zoning plan allowing urban densification, but that it actually not force it to happen. A mere 140 additional dwellings in people's back yards a year (as in the Portland example) will not solve the shortage of homes. There is something relaxed over this self-selected densification happening in the suburbs, but I do believe it requires as much planning as densification of cities does, at least if the suburbs are planning to significantly increase its population numbers. The urban-sprawl is in many suburbs a huge problem, and suburbia keeps expanding making distances grow longer, congestion grow heavier, and air pollution grow more dangerous. Concentrating the amount of people within those suburbs could help ease many of these problems. The car use in many American suburbs will not simply decline with the introduction of legal additional dwellings, rather the opposite. I can understand neighbor's worries about the additional cars, since public transportation is practically non-existing in the suburbs. It is therefore essential to provide the inhabitants with efficient public transportations and with an increase in population density in these former low-dense areas, there will now be a basis for this expanded public transportation network.

Sources (by the Oxford referencing system)

Electronic journal articles

Xue, Jin et al. The challenge of sustainable mobility in urban planning and development: a comparative study of the Copenhagen and Hangzhou metropolitan areas. *International Journal of Urban Sustainable Development* 3 no. 2 (2011) doi: 10.1080/19463138.2011.607166

Newspaper articles

Näslund, Elisabet. Så kan villaförorten bli tätare. *Arkitekten*. 2013-08

Web-based newspaper articles

Arnstad, Lennart. ...men här byggs nya lyx-bostäder. *Aftonbladet*. 2002-06-12. <http://www.aftonbladet.se/bostadinredning/article10284613.ab> (2013-09-24)

Brown, Martin John. Do lax "granny flat" regulations encourage absentee landlords? Some new evidence from Portland. *Accessory Dwellings*. 2013-05-29. <http://accessorydwellings.org/2013/05/29/do-lax-granny-flat-regulations-lead-to-absentee-landlords-some-new-evidence-from-portland/> (2013-09-05)

Durning, Alan. In-law—and Out-law—Apartments. *Sightline Daily*. 2013-03-07. <http://daily.sightline.org/2013/03/07/in-law-and-out-law-apartments/> (2013-09-05)

Durning, Alan. Legalizing Inexpensive Housing. *Sightline Daily*. 2012-11-05. <http://daily.sightline.org/2012/11/05/legalizing-inexpensive-housing-part-1/> (2013-09-05)

Fehrenbacher, Lee. Financing still a hurdle for ADUs. *Daily Journal of Commerce, Oregon*. <http://accessorydwellings.files.wordpress.com/2013/01/djc-financing-adu.pdf> (2013-09-23)

Palmeri, Jordan. Why Oregon DEQ loves ADUs. *Accessory Dwellings*. 2012-09-13. <http://accessorydwellings.org/2012/09/13/why-oregon-deq-loves-adus/> (2013-09-05)

Palmeri, Jordan. Zoning Regulations for ADUs in 55 West Coast Cities. *Accessory Dwellings*. 2013-03-08. <http://accessorydwellings.org/2013/03/08/zoning-regulations-for-adus-in-55-west-coast-cities/> (2013-09-05)

Peterson, Kol. Why are ADUs such a good idea? *Accessory Dwellings*. 2011-10-11. <http://accessorydwellings.org/2011/10/29/why-are-adus-such-a-good-idea/#more-316> (2013-09-05)

Selected Restrictions and Requirements for Accessory Dwelling Units (ADUs) in Cascadian Cities. *Sightline Daily*. 2013.

<http://daily.sightline.org/files/downloads/2013/03/The-ADU-Gauntlet-Scores-for-Cascadian-Cities-March-2013.pdf> (2013-09-23)

The case against Accessory Dwelling units and other growth tools. *Westchester Parents*. 2009-11-29. <http://westchesterparents.org/?p=2325> (2013-09-23)

Internet sources

Bellander, Gunilla. Blandstaden - ett planeringskoncept för en hållbar bebyggelseutveckling? 2005. <http://www.boverket.se/Global/Webbokhandel/Dokument/2005/blandstaden.pdf> (2013-09-19)

Boverket, Kommuner som har aktuell policy/strategi för förtätning av tätorterna. 2012. http://www.boverket.se/Global/Miljo/miljomalsenkaten/Resultat-fran-2012/Kartor-2012/policyfortatning1_13.pdf (2013-09-18)

Boverket, Miljöinriktad fysisk planering. 2000. http://www.boverket.se/Global/Webbokhandel/Dokument/2000/miljoinriktad_fysisk_planering.pdf (2013-09-19)

Boverket, Tillämpning av riktvärden för trafikbuller vid planering för och byggande av bostäder. 2004. http://www.boverket.se/Global/Webbokhandel/Dokument/2004/tillampning_av_riktvarden_for_trafikbuller_.pdf (2013-09-19)

City of Cape Town, Cape Town Densification Policy. 2012. http://www.capetownpartnership.co.za/wp-content/uploads/2012/10/City_of_Cape_Town_Densification_Policy.pdf (2013-09-12)

City of Portland, Oregon, Accessory Dwelling Units (ADUs). 2013. <http://www.portlandonline.com/bds/index.cfm?c=36676> (2013-09-23)

European Commission, Cities in Europe – the new OECD-EC definition. 2012. http://ec.europa.eu/regional_policy/sources/docgener/focus/2012_01_city.pdf (2013-10-27)

Göteborgs Stad, Kraftsamling, miljömål och förtätning av staden i fokus för framtidens stadsutveckling. 2013. <http://goteborg.se/wps/poc?urlile=wcm%3Apath%3Agoteborg.se%2FMedia%2Fpressmeddelanden%2F8d503a2e-54d7-42be-9fb5-bcfac7d808b&page=media.pressmeddelande> (2013-09-24)

Johansson, Hannes. Förtätning till varje pris? *Yimby Gbg*. 2011-01-17. http://gbg.yimby.se/2011/01/fortatning-till-varje-pri_2977.html (2013-09-19)

Laurelhurst Community Club, Proposal to Legalize Detached Accessory Dwelling Units Citywide. 2009. <http://www.laurelhurstcc.com/issues/Housing/DADUs.htm> (2013-09-23)

Malmö stadsbyggnadskontor, Så förtätar vi Malmö! 2010. <http://www.malmo.se/download/18.4d147ba1286e5bcbb4800055507/F%C3%B6et%25C%203%A4tning-PM.pdf> (2013-09-19)

Skovbro, Anne. Urban densification: An innovation in sustainable urban policy? 2001. <http://www.sbi.dk/aura/workshops/papers/workshop6/skovbro.pdf> (2013-09-23)

State of California, A Guide to Planning in California. 1990. http://ceres.ca.gov/ceqa/more/tas/Planning_Guide.html#glossary (2013-09-18)

Stockholms Stad, Stadsbyggnadsstrategier. 2013. <http://www.stockholm.se/Fristaende-webbplatser/Fackforvaltningssajter/Stadsbyggnadskontoret/Oversiktsplan/Stadsbyggnadsstrategier-for-hallbar-tillvaxt-/> (2013-09-24)

US Energy Information Administration, Annual Energy Review 2011. 2011. <http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf> (2013-10-27)

WHO, Urban population growth. 2013. http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/ (2013-09-09)

Secondary sources

Newman, P. and J. Kenworthy. *Sustainability and Cities: Overcoming Automobile Dependence*. New York: Island Press, 1999. Adapted from Hofstra University, The Geography of Transport Systems. 2013. <http://people.hofstra.edu/geotrans/eng/ch8en/conc8en/urbanenergy.html> (2013-09-11)

Picture sources

Geary, Bob. Meeting tonight: The new Raleigh zoning code and the problem of accessory dwelling units. *Indy Week*. 2012-08-27. <http://www.indyweek.com/citizen/archives/2012/08/27/meeting-tonight-the-new-raleigh-zoning-code-and-the-problem-of-accessory-dwelling-units> (2013-10-27)

Portland State University, Accessory Dwelling Unit Survey for Portland, Eugene, and Ashland, Oregon. 2013. <http://accessorydwellings.files.wordpress.com/2013/10/adureportfrev.pdf> (2013-10-27)

