Grajaú for the next generation

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Master graduation project

Global housing, repair and consolidate
06-07-2023

Tutors.
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Introduction

Architecture, and in particular dwelling, concerns itself with the everyday living environment, and the interaction between people and this environment. Dwelling is in this sense both personal and a field of expertise. Both a field of study and a place for everyday living. How can a designer deal with the distance from the eventual users of the designed space. To hold a grip on the design is to forgo the change of appropriation, adaption and continual growth. To let loose of the project after the design however puts it at risk of losing some of its qualities, hurting the people in the end.

A balance between these opposing ways needs to be found to create a good living environment for many generations.

Designing for the global south brings a host of design concerns. Some of these are specific for the southern condition, the majority condition, but some are also very applicable in a northern or even Dutch context. Some of these concerns are:

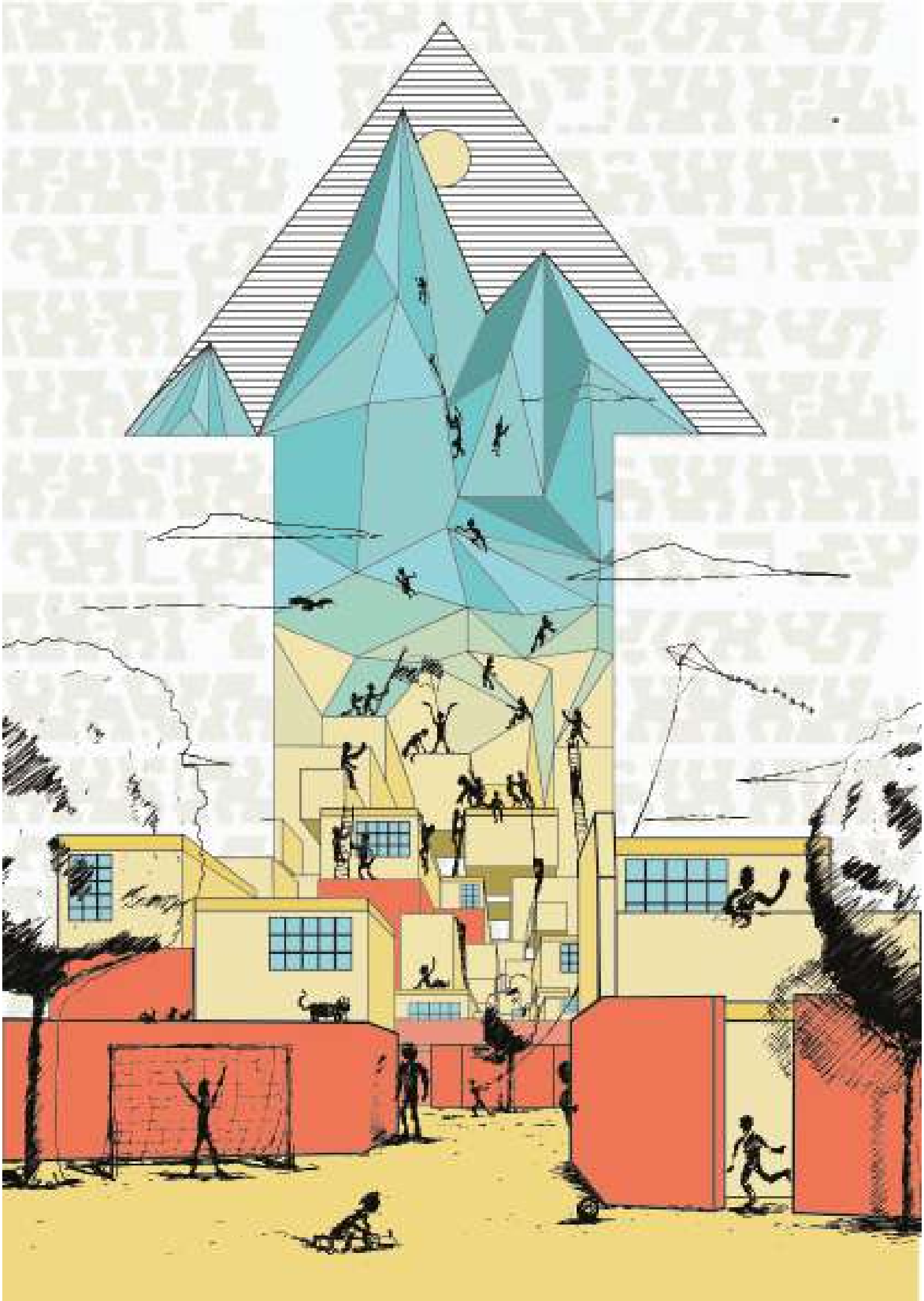
Efficiency	Identity
Density	livability
Affordability	Economy
Malleability	Quality
Public good	Private profit

For each of these also a balance needs to be found to provide a good living environment for many generations to come, and protect and serve nature, economy and culture. An understanding of the Global south is necessary.

Part of what convinced me to pursue this field of Architecture for my graduation from the TU Delft was the elective, conveniently named, Global Housing studies. An introductory course in the many great examples of dwelling from the global south, the theories behind these types of architecture and the ways of adaptation and projection into a new design .

The course was structured around three main principles: Incrementality, typology mix and clustering. With the first principle I was introduced in ways one could deal with the aforementioned dilemma of change and control. Incrementality provides the owners with the possibility to adapt, grow and appropriate the design towards their own desired end. The project of Aldo van Eyck, a name that will recur in this report, in Previ, Lima, is a great example of how the possibility of incrementality can help a faction of the local population work and grow their way to higher living standards. The local population will take it upon themselves to organise as small scale contractors, helping next-door or next-street neighbours with their own home extensions Moreover, when continual physical growth of one's dwelling has the benefit that people have to move house less often, making people stay, and grow together.

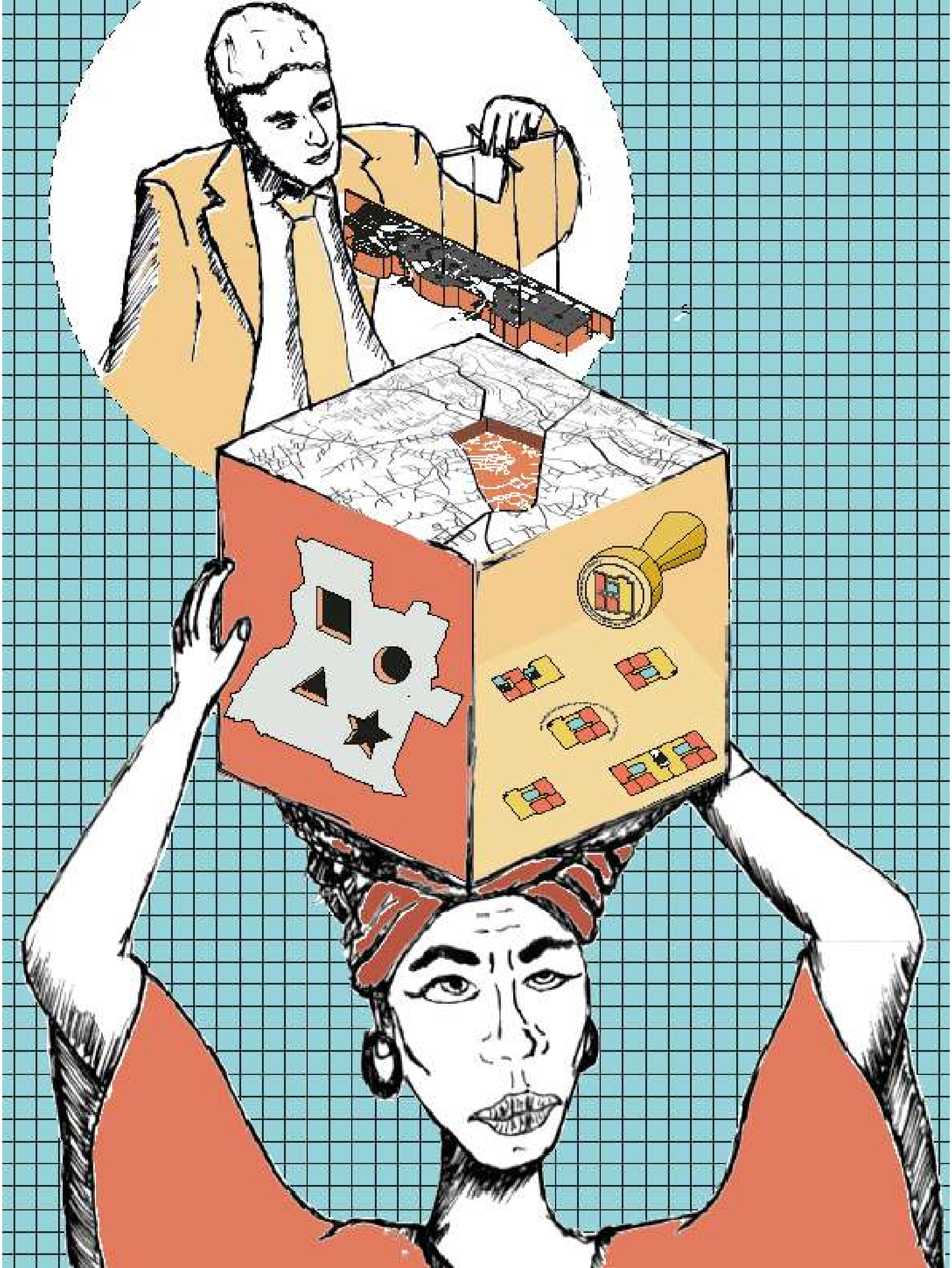
A poster to depict our interpretation of the Previ Lima project in combination with the principle of incrementality.



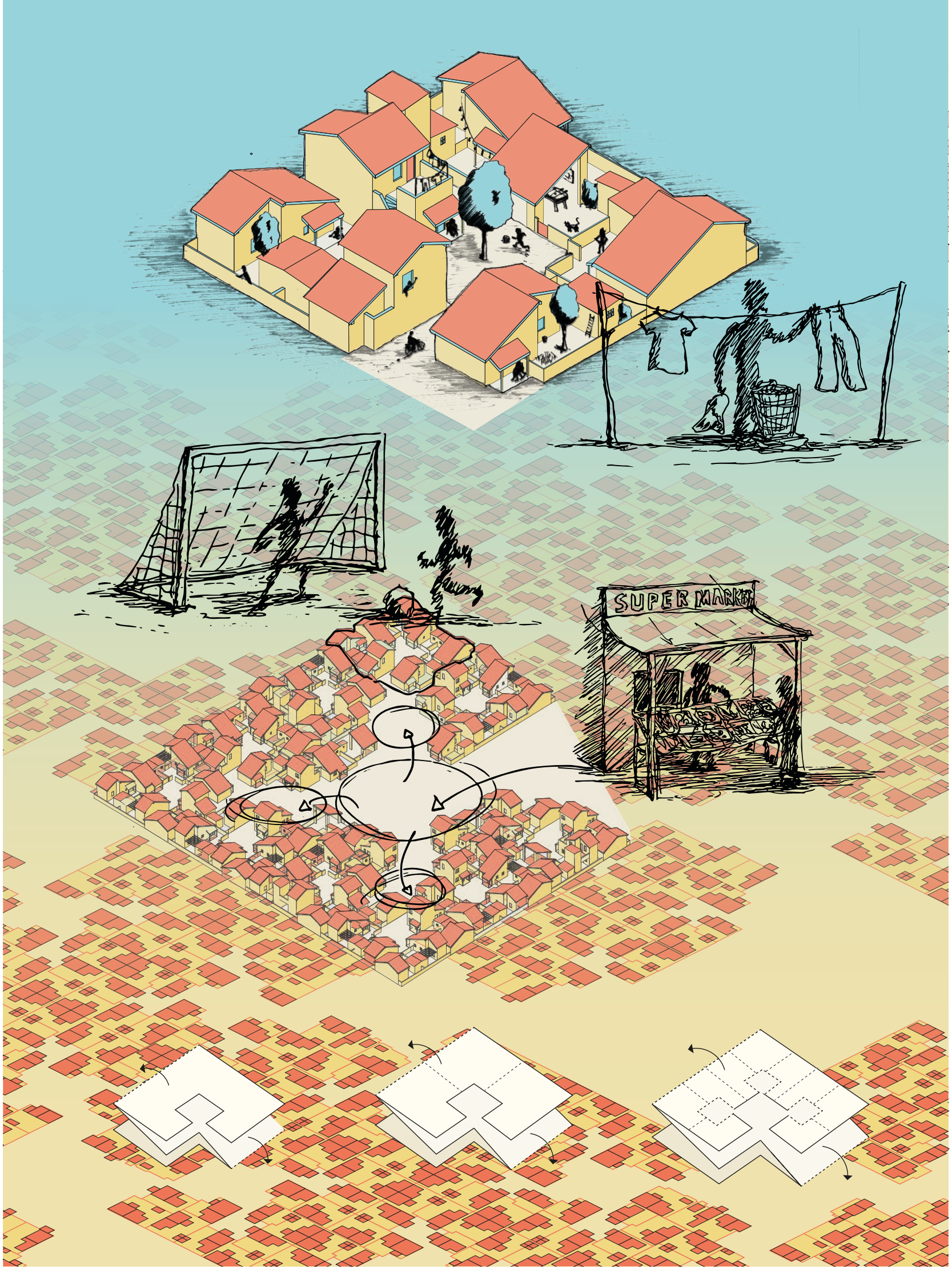
The second principle from the global housing course was: Typology mix. This entails that a variety of different dwelling typologies within one scheme provide the opportunity for different income groups and different social groups to live amongst each other. In theory this will lead to more communication between social groups and thus less segregation on a whole. The poster on the right depicts our critical interpretation of the way a housing project in Uíge, Angola by the architect Jaime Lerner put this principle in practice. The project, named 'Ciudad Horizonte' seems to implement a variety of housing typologies on the outside, but consist of almost identical floor plans on the inside. This means no opportunity for 'real' mixing of social groups is provided, thus our critical poster of the Architect (on top) imposing his design on the backs (head in this case) of the local population, without a real mix of typologies and without the participation of the local population.

The notion that the mixing of socio-economic groups provides a harmonious living environment between those groups can be called into question. Later in this report I will shortly go into the theoretical debate between Richard Sennett and Bart van Leeuwen on this topic.

Here I can also give credit where credit is due and name Ruben Verboom and Nienke Kloostermans as the co-creators of the three posters on these three principles.



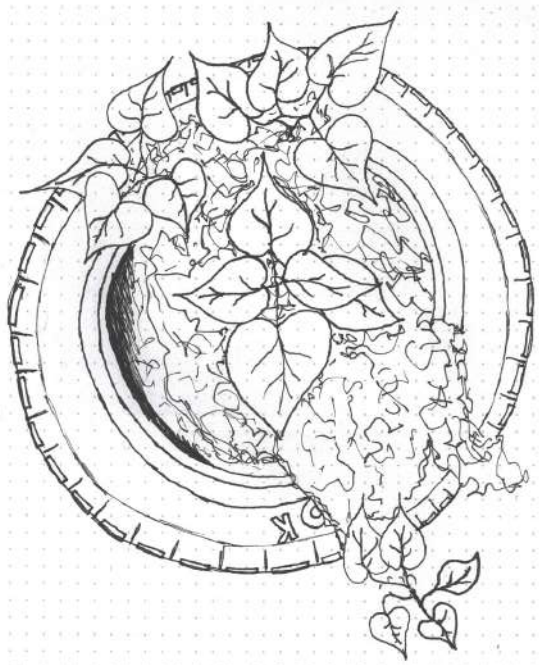
Clusterin The final principle studied in the global housing studies course is ‘Clustering’. This principle deals with the question of how to provide a diverse living environment from simple and standardised elements. By merely copying and pasting the same dwelling, block or slab, a monotony of special environments can be created. I think most of the readers of this book can imagine the Bijlmer project in Amsterdam, and how the endless copying of the same floor plan in both horizontal and vertical ways created a monotonous, sterile and almost un-human living environment. Although copying of standard elements is of great utility in the effort to achieve affordable housing, a strategy is needed to prevent this copying from resulting in monotony, Clustering is such a strategy. The poster on the right shows our depiction of the clustering strategy in the urban scheme of the Belapur housing project in Mumbai, India designed by Charles Correa. This project manages to create a diverse landscape with different scales of urban conditions, with each their specific function and quality. The smallest clustering of 7 dwellings provides a nine by nine metres courtyard for household activities and meeting place for direct neighbours. One scale up and spontaneous play amongst children happens while in the biggest scale shops and other bigger activities take place. This project will come back in this report as a source of inspiration.


SUPER MARKET

In any Architecture project, a field trip is standard practice. To experience the place in real life gives one a huge amount of information. Often this information does not consist of the facts and figures one can also find online, but about the intangible aspects of life in a certain location. Results and influences from a field trip are therefore harder to quantify and take the shape of design intuitions, expressed later in the process. This field trip enriched my understanding of the ways of living in Sao Paulo greatly. The opportunities we had in visiting and interviewing local inhabitants was a great and rare source for the development of the project. Besides the work for my individual project, the field trip was also a time for bonding with the fellow students and the teachers. New friends were made, and new adventures were added to our lives.

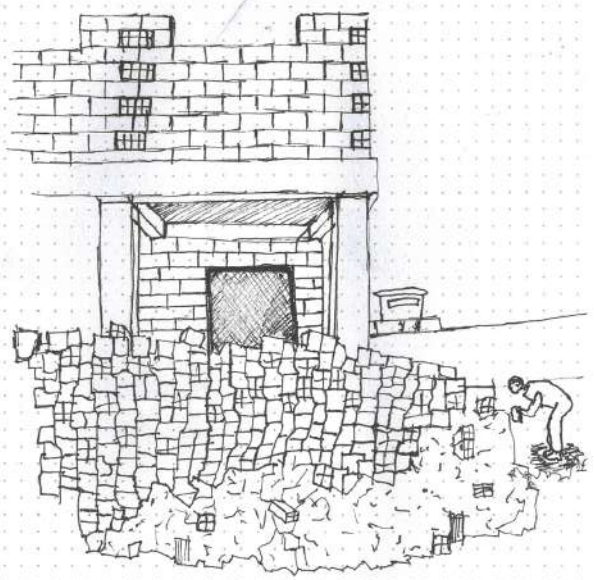
One of the immediate analisis outputs from the field trip was ‘the book of patterns’. This small booklet was made to illustrate our observations in Sao Paulo. Recurring patterns throughout the city and its periphery where the daily life habits were described though five different lenses. To the right you can see the drawings I made for the observations from the perspective of the material lens.

REUSE OF MATERIALS



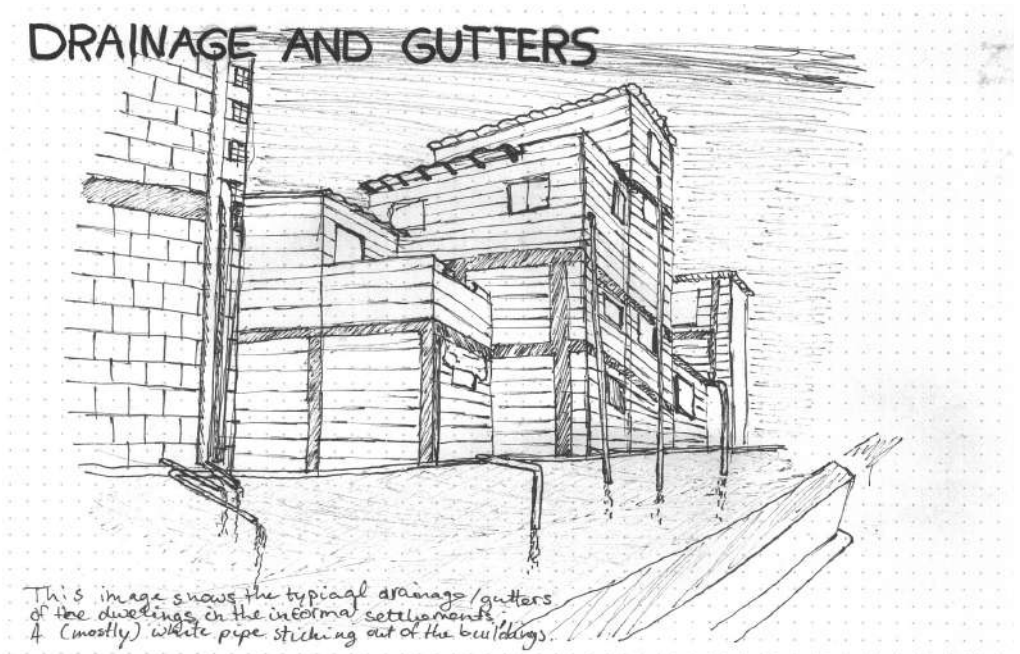
Citizens of informal settlements are doing the most with what they have by reusing materials in unusual ways. This illustration shows a tire made into a planter.

TYPICAL CONSTRUCTION METHOD



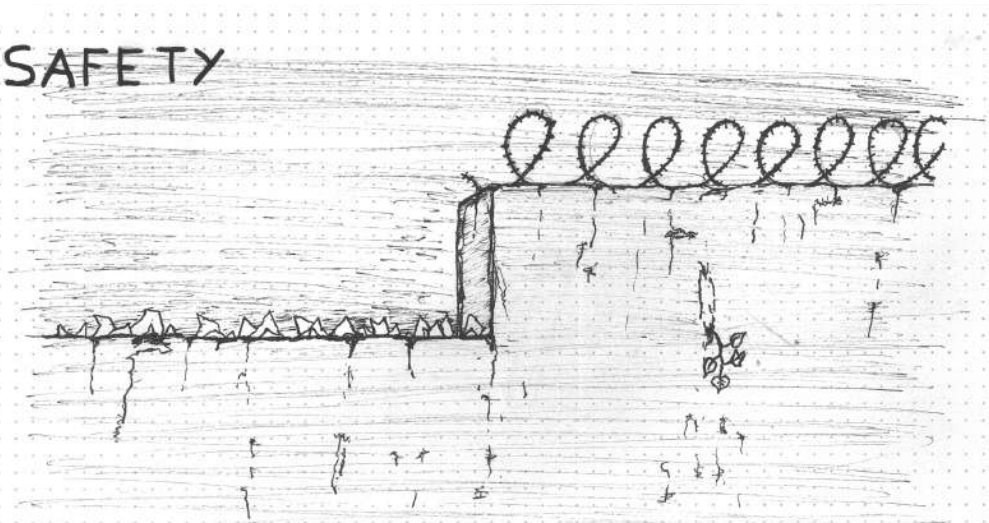
Most buildings in the informal settlements have a typical construction method: concrete pillars (reinforced) and concrete beams. Between the pillars, the walls are built up with an orange hollow brick. Whe another level is stacked on top, ~~a lot~~ most of the time a slight overhang is used to enlarge the ~~pf~~ floorplan.

DRAINAGE AND GUTTERS



This image shows the typical drainage/gutters of the dwellings in the informal settlements. A (mostly) white pipe sticking out of the buildings.

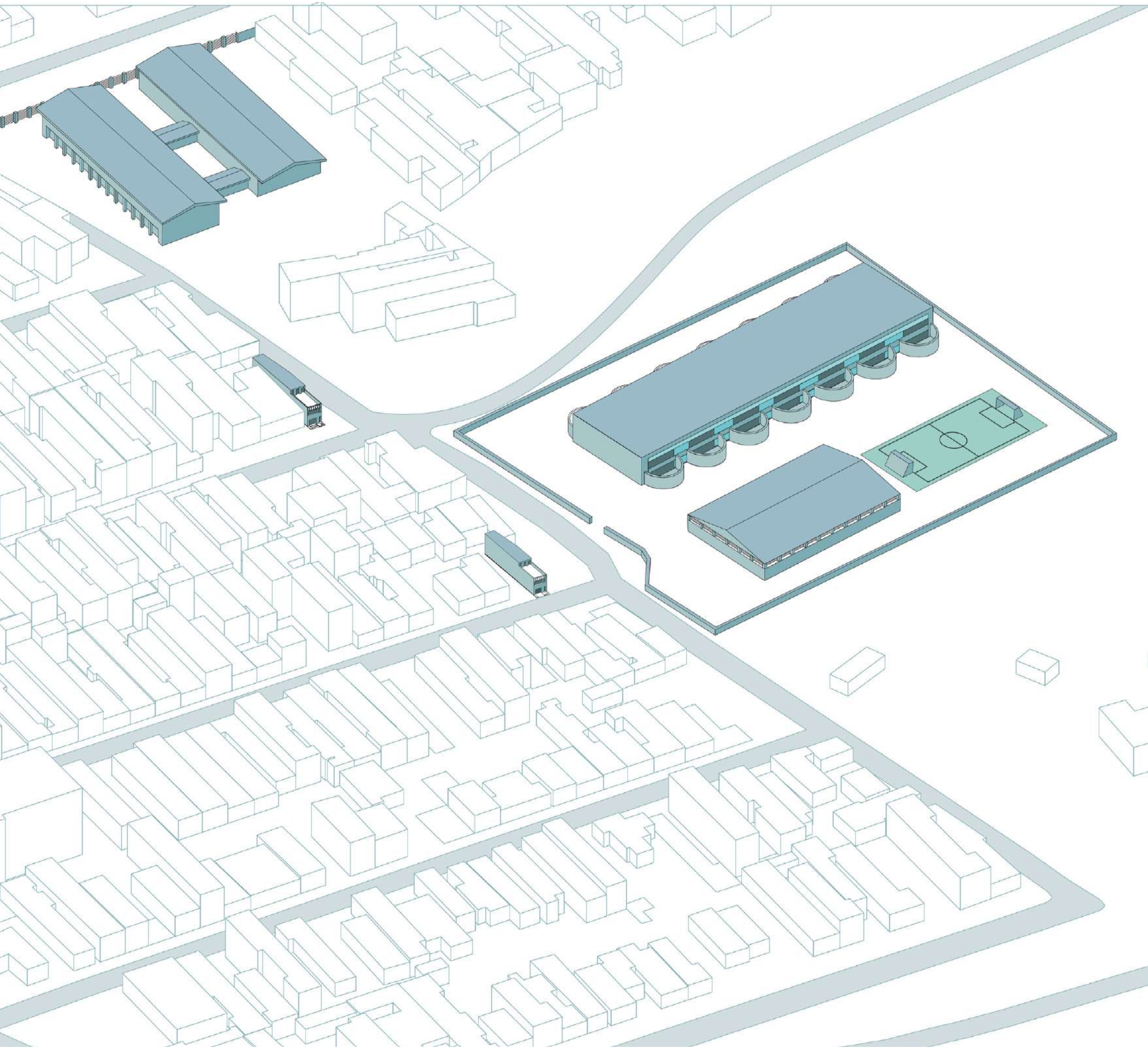
SAFETY



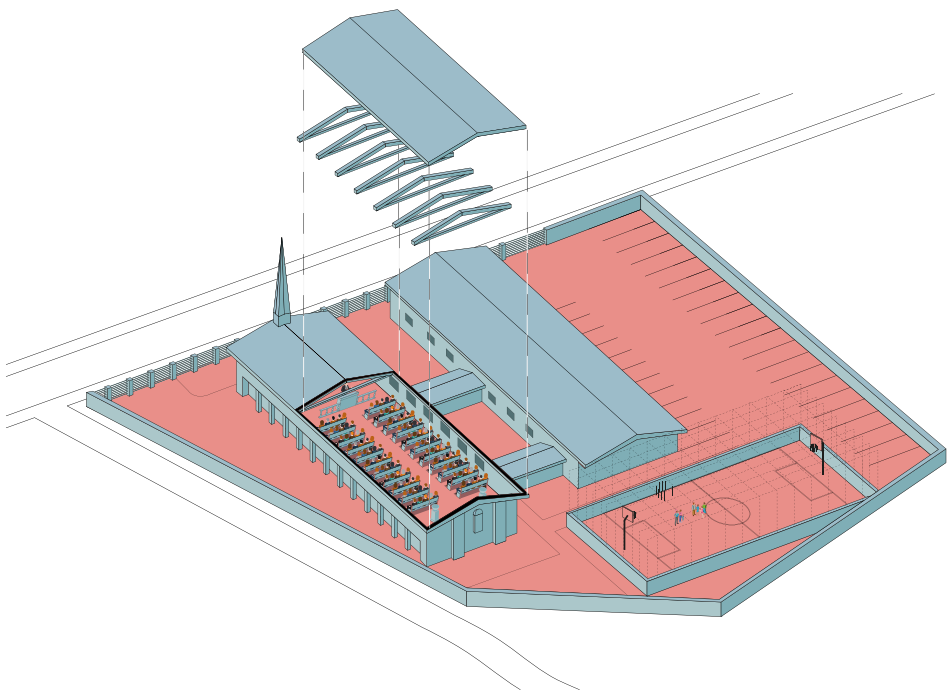
To provide safety, some dwellings have a type of protective structure in front of them, with a differentiating topping. Some of recycled material such as broken glass, some with a twisted barbed wire as shown in the illustration

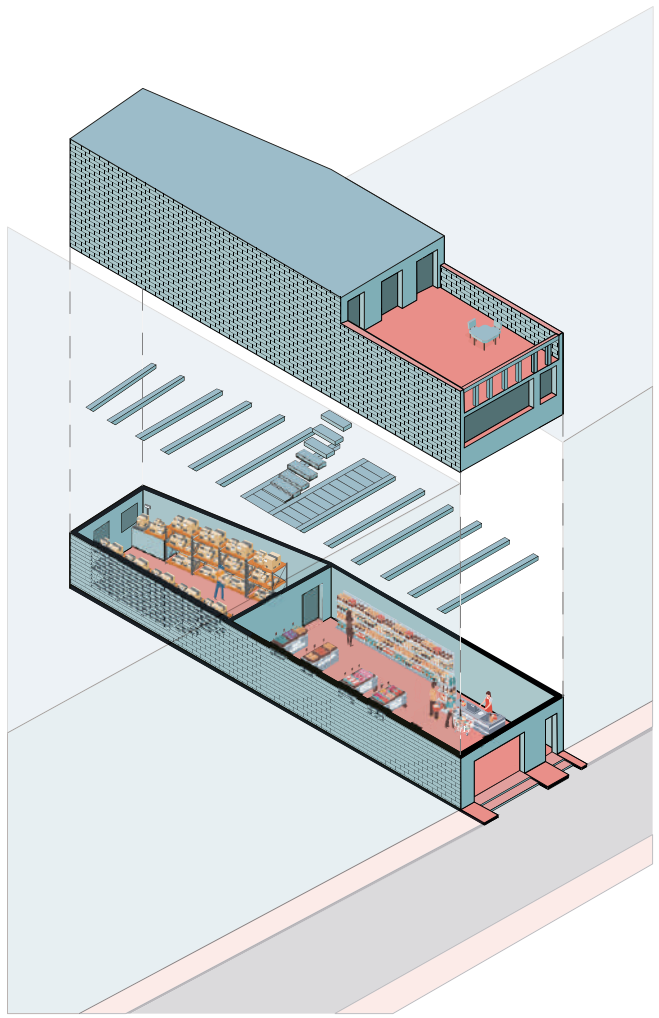
Back in the Netherlands, serious analysis work started. In small groups we started to analyse typical patterns of urban and architectural elements. The direct surrounding of our chosen site was analysed and a mental map of the inhabitants of the neighbourhood was created. What were the important urban and architectural elements? What gives this part of the city its character? What are the elements that make people feel at home in this place? The answers to these questions made us better able to respond to the direct surroundings, to adapt to current patterns and practices and to separate the weeds from the chaff when it comes to current ‘ways of living’ in this city.

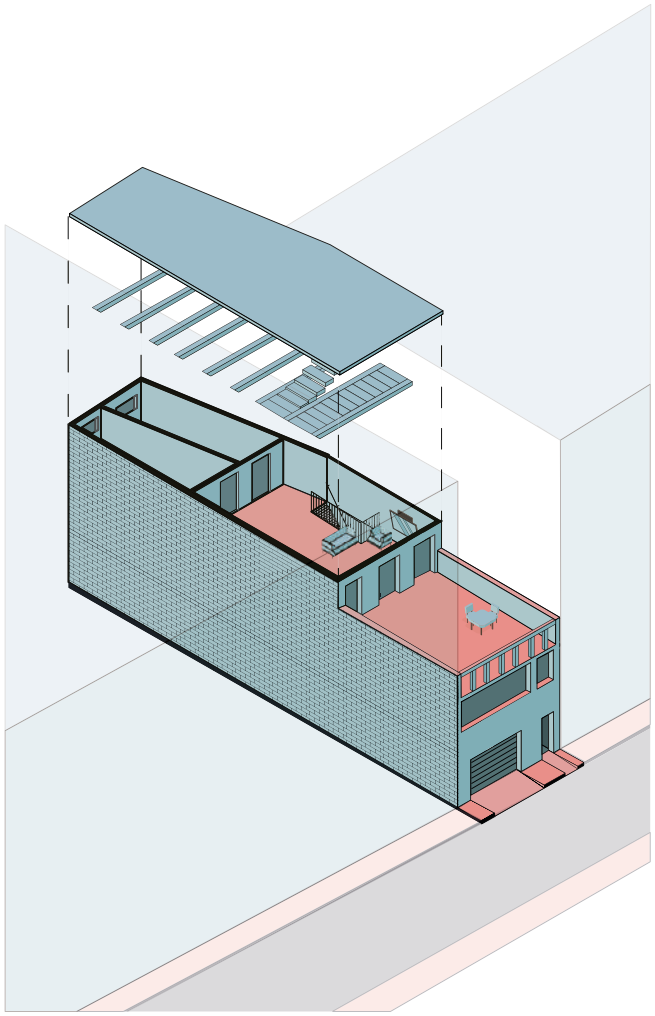
To the right you can see the mental map of the site my project will be designed on. It shows elements like a big school, church, a typical dwelling and a dwelling and show combination.

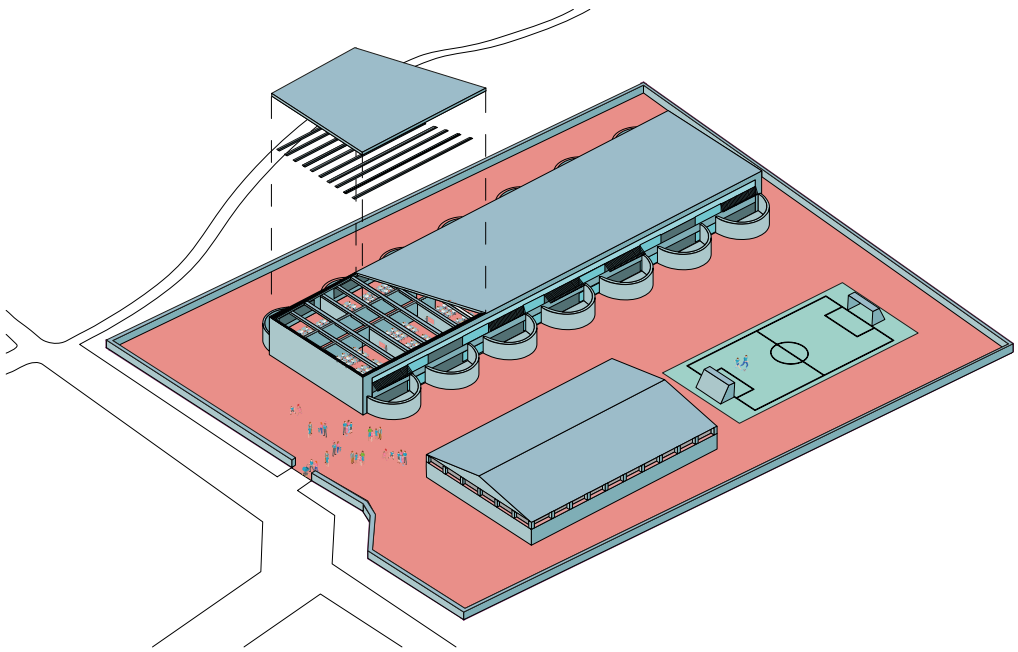


To the right you will see the four architectural elements mentioned above in greater detail. An exploded view of the church, school, dwelling, and shop show the inner workings of these places. It informs, not only of matters of construction, and placements within the city. But also about community, togetherness, and the everyday patterns of the way of life. In a sense it is part of an ethnographic study of the everyday life of the average person in the surrounding neighbourhood of Grajaú.

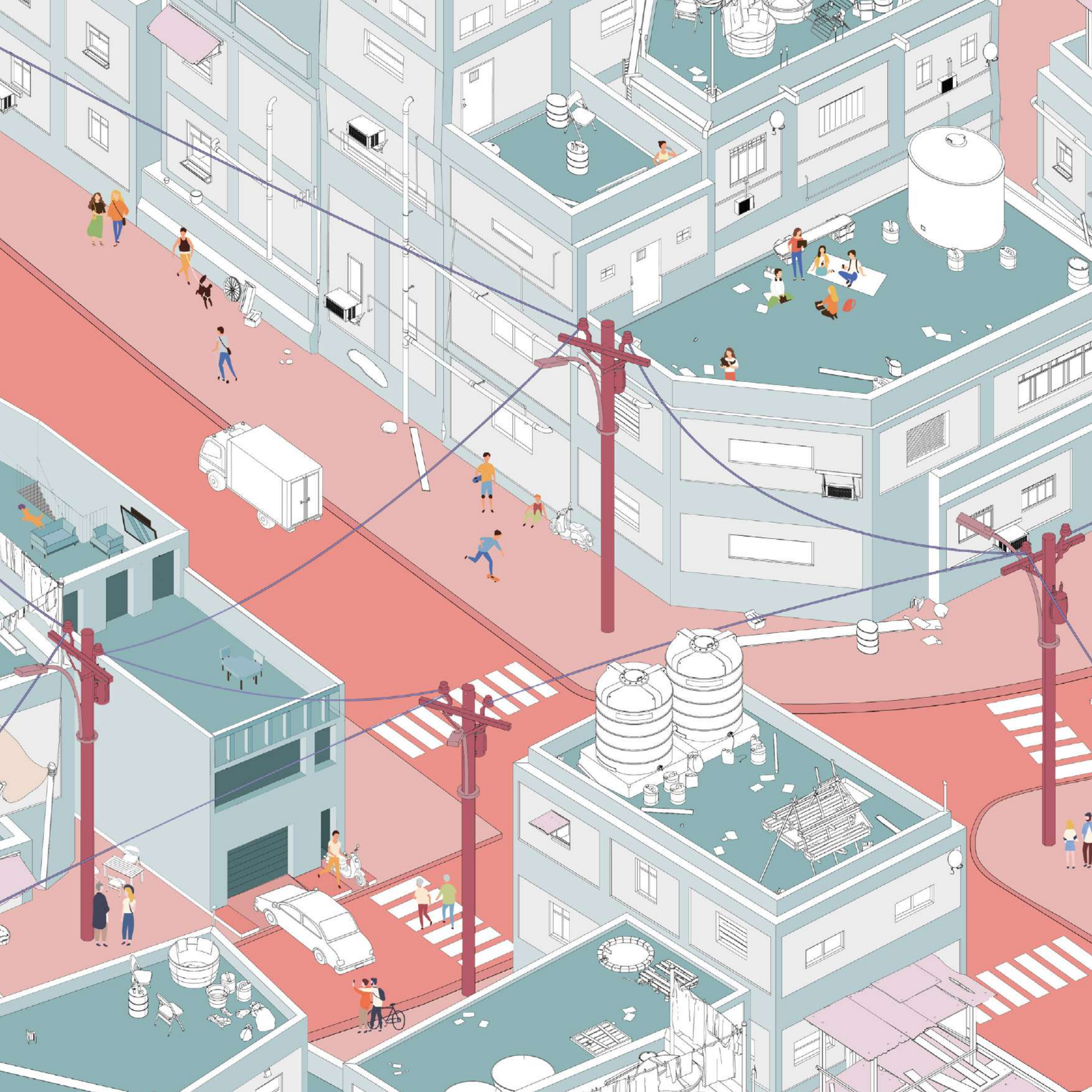




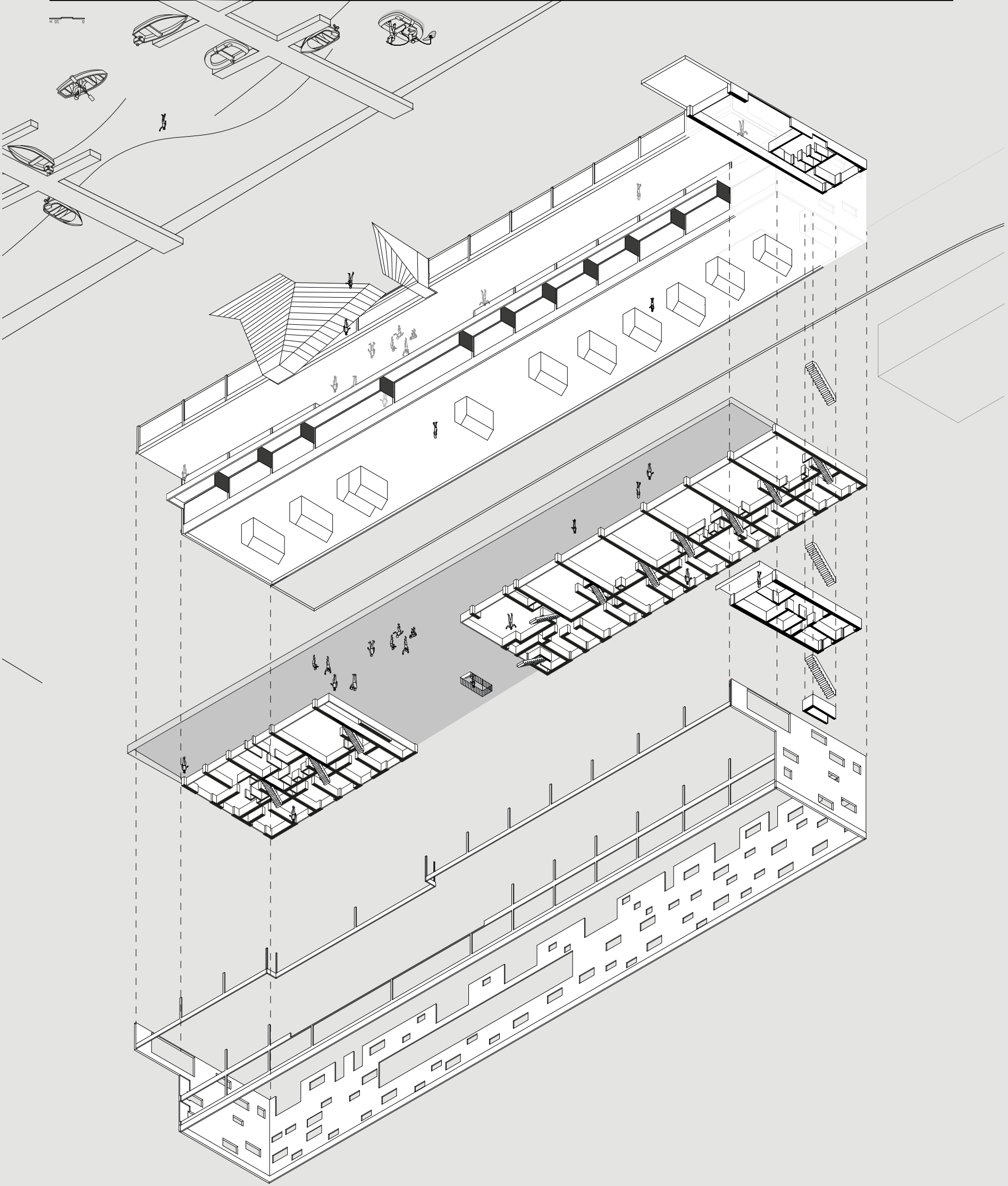




The drawing on the right shows a synthesis of the ethnographic studies performed in the small groups. This drawing shows many aspects of life in Grajaú, both social and material. This information is crucial in the design of a housing solution in this neighbourhood, or for any design anywhere for that matter. To design for a specific location is to interrupt the current status quo of this location. To do that in an insensitive way is to scar the urban fabric, the community feeling and the social cohesion. The modernist ideal of an 'international style' without adaptation to the specific material and immaterial needs of a certain location is, in my humble opinion, wrong. One always relates a part of his/her inner world to the material aspects of the immediate outer world. The history, tradition and existing patterns matter, and should be taken into account in the design process.



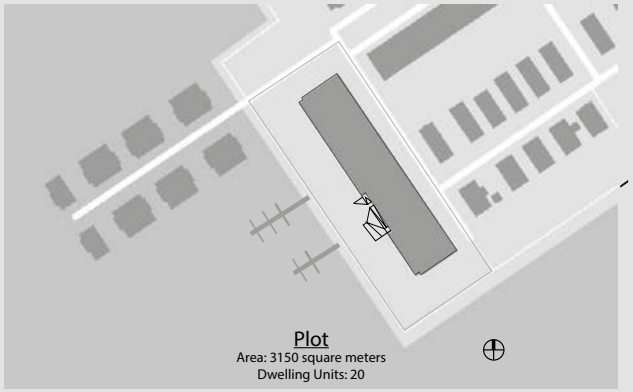
After looking at three principles for creating housing in the global south, I would like to contrast this with a Dutch project: Het Open IJnde. This project, although drawn from a drastically different place, does share some similarities and can inform design decisions for the global south. The project resulted from the expansion of Amsterdam into the water to the east. The man-made islands collectively named IJburg, were made to create new places for housing and other city functions. On the first Island on this new archipelago, 'steigereiland', the housing project of Open IJnde was created. The project is made in a non traditional way. Instead of an investor ----> builder -----> buyer configuration, this project works with a CPO. A CPO is in Dutch a 'Collectief Particulier Opdrachtgeverschap' which can be translated into 'Collective private commissioning'. In this scheme the role of the house owner or renter is more central and a buyer ----> investor ----> building configuration describes better how these projects come to be. The more active role of the house owner in the development is not strange for the southern condition. In the global south, house owners, investors and builders are often the same person or group.



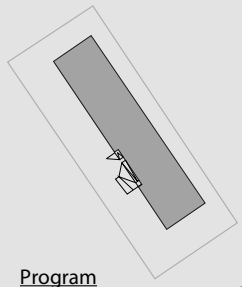
The building is a 80 meter long block, providing 20 houses in different configurations. A central void in the block provides a communal space with shared amenities such as a kindergarten. Most houses are connected with this shared void, making social interaction more likely. The drawing shows the void in grey, acknowledging that the void is the most important space in this project. Besides that the facade form a special function in the design. The backside, faced towards the rest of the neighbourhood is quite closed and forms a sort of wall. The front side on the other hand is fully open, opening up to the view of the water. The goal of providing the connectivity trough the collective space made of a puzzle in terms of housing unit placement.

Density: 63,5 dw/ha
Number of Dwellings: 20
FSI: 0,71
GSI: 0.5

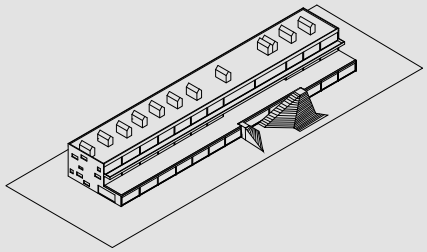
Neighbourhood



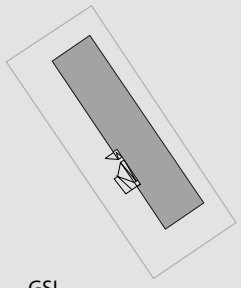
Plot
Area: 3150 square meters
Dwelling Units: 20



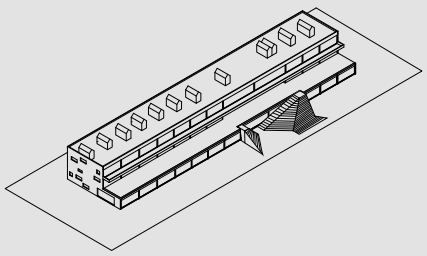
Program
Housing: 2240 square meters
Ammenities: 30 m2



FSI/FAR
0,71

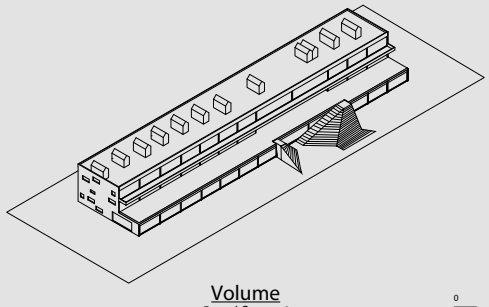


GSI
0.5

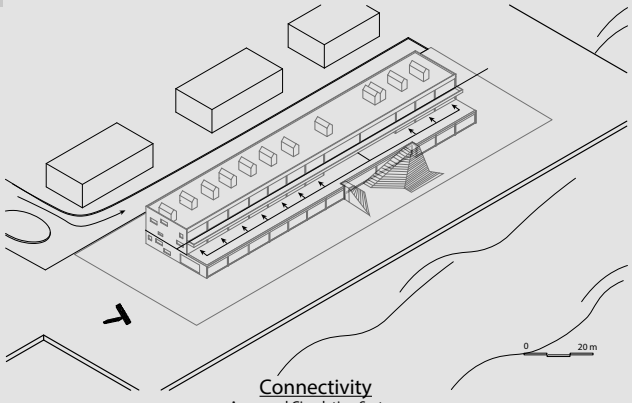


Density
63,5 dw/ha

Block

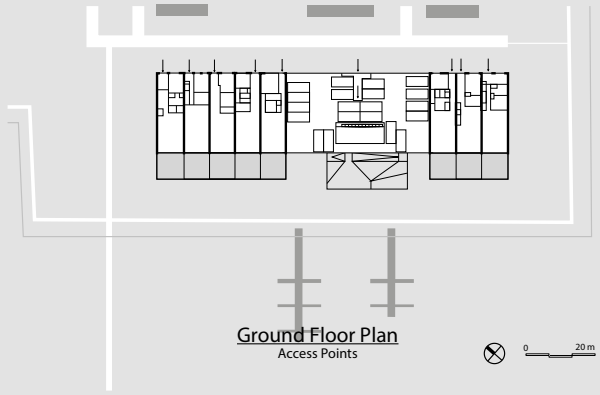


Volume
Groud floor + 2

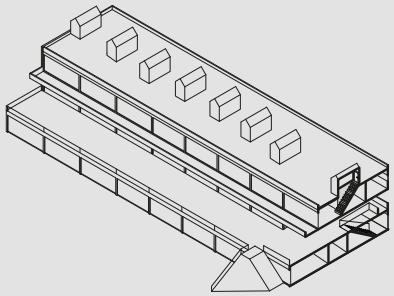


Connectivity
Acess and Circulation System

Typical Floor Plan
Dwelling Type Variations



Ground Floor Plan
Access Points

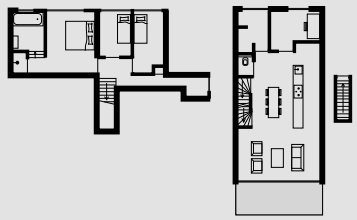


Section
Dwelling Types

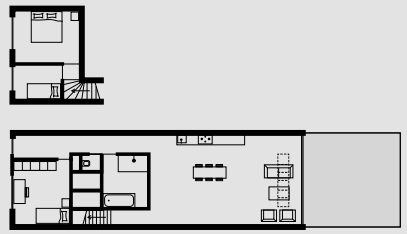
Unit

Dwelling Type 1
Area: 104m2

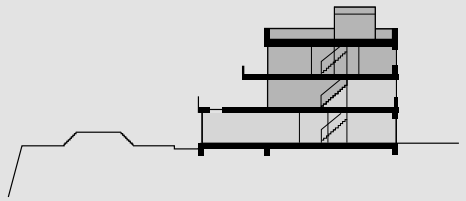
Dwelling Type 2
Area: 129m2



Dwelling Type 3
Area: 114m2



Apartment Type
Area: 117m2



Maisonette
Area: 117m2

Problem statement

Research and design.
Research and design are two fundamentaly linked parts of a whole, one can't be without the other. Research in architecture comes in many forms, whether it is on material matters, compositional, philosofical, it always supports the end goal, the design. In this report I will present multiple forms of research done to support the design. First of all research into the urban condition of the global south, Brazil and Sao Paulo is presented to form an understanding of the wider contect of the problem. Next the specific problem of the fostering living environment for children in explored, both steps are done with literature studies. The research continues with case studie analysis of housing projects and furter material on technical studies.

Questions of development, improvement and progress often seem questions for the next generation, and for good reason. The next generation forms an opportunity to break undesirable patterns, leapfrog a community forward and dream of better alternatives. Children are the face of the future, the persons of potential, the demographic of development. Taking care of the children quite literally means taking care of the future. According to the Community Safety and Crime Prevention Council (CS&CPC); Poverty, social environment and family structures are the leading causes of Crime. (Waterloo Community Safety and Crime Prevention Council, 2022) These factors seem to mutually support each other, lower income leads to higher family violence, crime and neighborhood danger. These factors make for a bigger change that children develop antisocial behavior (ABS). (Rand, G. 1984)

Brazil has one of the highest crime rates in the world, making stated concerns very relevant in this country. Between 1980 and 2010 the national homicide rate rose to one of the highest in the world. (Murray et al., 2013) When the dictatorship fell in 1985, hopes were that the crime rates would go down, but the opposite happened. No scientific consensus on the reasons for this expansion exist, but one hypothesis is that regular security policy was not able to keep up with the rapid development of crime. (Garcia et al., 2021)

Figure 4. Child with chickens. 1870-1930 Art from Alberto de Sampaio own picture: museo de football Sao Paulo

Patterns of destructive behavior keep repeating from generation to generation making sustainable change difficult.

As the current living environment lacks in some aspects to create a fostering living condition for the next generation of Grajaú, destructive behavior limiting patterns on part of some individuals impair communities in their efforts to move forward. As places are mostly designed for their numerous stakeholders, end users are often overlooked. If, through participatory design methods, those end users are taken into account, often one group remains overlooked, the young. Given the fact that young children are often not able to speak for themselves, and parents may not always be the best advocate for their rights as well, an outside force is necessary to protect the rights of the children and provide a suitable living environment for them. A thorough understanding of the ways of living of the Grajaú child lacks and therefore a good representation of the rights and needs of the children is more difficult.

Young adults, mostly men, form the biggest basis for problematic behavior in poorer factions of Sao Paulo's society.

As Brazil is challenged by high numbers of crime and homicide, generally speaking this behavior is mostly due to young men and this behavior can be a result of less than ideal childhood environments, it is an important issue this research should look into. (Beaver et al., 2014) Those from the Grajaú area, form a disadvantaged group in terms of education levels, making them 46% more likely to drop out of school as the result of a drop in economic means of the family. (Brazil Perspectives: Education | Copenhagen Consensus Center, n.d.) Ones dropped out of school, illiteracy makes young people less likely to be able to make a living in regular jobs, therefore alternative means of income generation need to be explored, leading some to illegal activities, crime and violence. Gang affiliations, traumatic experiences and desperation can lead people into substance abuse and worsen their situation. Although men might be the main problem here, women should not be overlooked. Their role in community engagement, family structures and education itself might prove insightful. Education is the basis for prevention, but for the relatively high level who are not in education alternative safety nets need to be provided so existing patterns of problematic behavior stop occurring.

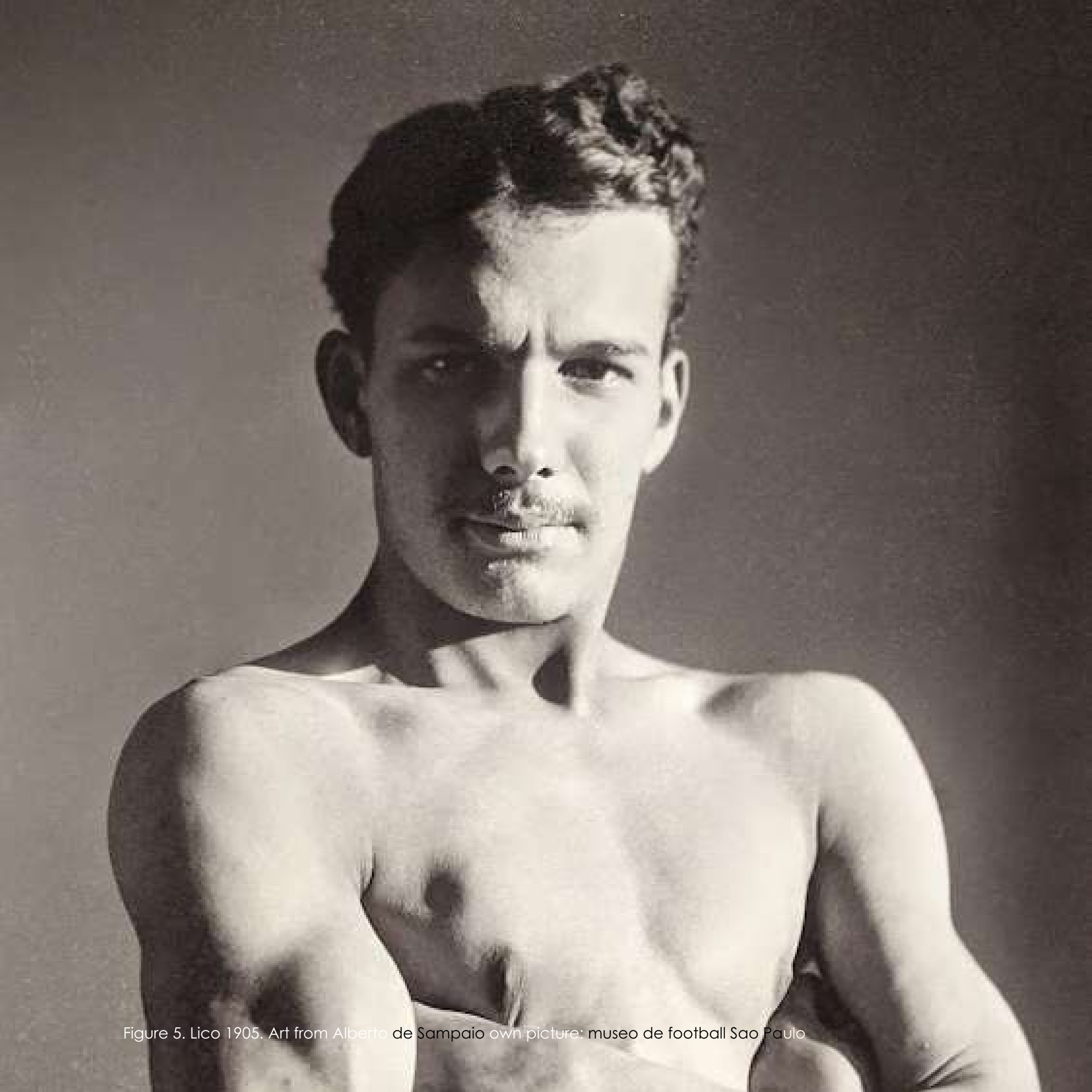


Figure 5. Lico 1905. Art from Alberto de Sampaio own picture: museo de football Sao Paulo

Research Question.

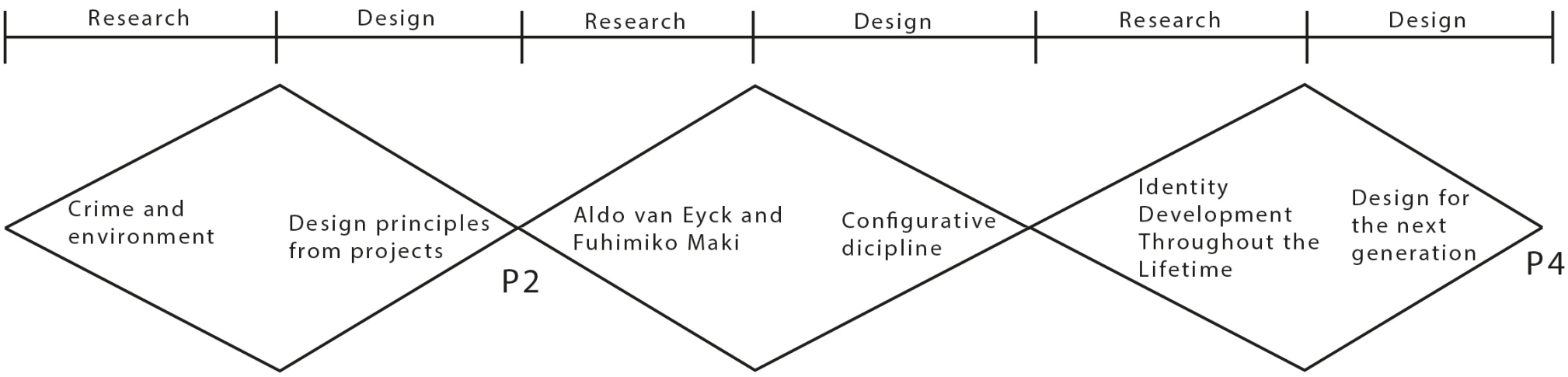
How can a new form of social housing provide a fostering living condition for the next generation of Grajaú?

This research question consists of three elements, first of all it speaks of a new form of social housing. This points to the intent of starting the design from anew and working on first principle bases. No existing housing scheme will be used as a fundamental basis for this project, jet many will be discussed and analyzed. This provides a design practice that is able to do away with existing patterns of living and introducing new ideas in the existing urban fabric. The other important term is 'social' housing pointing to the fact that the design solution should be working to help the local inhabitants of Grajaú, and therefore fitting their economic means. Secondly a fostering living condition can be explained as an environment which encourages the development of those it caters to. In this case development is focused on the educational and social aspects of the children of Grajaú. This is also reflected by the last part of the research question: the next generation of Grajaú. The target group for this research question consists of any child and adolescence under 25 years old in Grajaú.

Methodology.

The research question deals with two distinct problems. The first is how to create a new form of social housing in the neighbourhood of Grajaú. The second one is how to create a fostering living environment for the next generation of Grajaú. The methodological approach to answer these questions can be explained through the diagram on the page to the left. It shows how research and design have played their roles in the process of this project. The first stage of research was focused on the second problem described above. In this first stage I tried to get an idea on what elements of architecture and the living environment influence neighbourhood safety. What can architecture do to prevent the youth from seeking unlawful ways of income generation, commit crimes and become violent. Among others, sources like 'crime and environment' from George Rand and 'the sociology of housing' from Donald L. Foley informed me on this topic. The second stage was concerned with the first problem, How to create a new form of social housing in Grajaú. The writings of Aldo van Eyck, Fuhimiko Maki and other architectural theorists of their time helped me in this search. Sources like 'steps towards a configurative discipline' and 'in-betweenness' form Aldo van Eyck and 'Linkage in form' and 'On collective form' from Fuhimiko Maki guided me in this endeavour. To create a better answer on the second problem, I needed some more theoretical work. I had done studies in how a living environment can be safe for their residents and for children, but not in how it can be a fostering living environment. So a third stage got me into developmental psychology and sources like 'Piaget's theory of cognitive development' from W. Huitt and J. Hummel and 'Identity development throughout the lifetime, an examination of Eriksonian theory' by Justin T. Sokol led me to create a richer framework for architectural design choices that could lead to an answer to the question of how a new form of social housing can provide a fostering living environment for the next generation of Grajaú.

The following pages will explain how this methodology resulted in the design principles and finally the design itself. The three stages are represented by five chapters. Chapter one deals with stage 1. Chapter two, three and four deal with stage 2, and the final chapter deals with stage 3. After those chapters, all groundwork is done to build up my design and appreciate the full picture.


Research
Design
Research
Design
Research
Design
Crime and environment
Design principles from projects
P2
Aldo van Eyck and Fuhimiko Maki
Configurative dicipline
Identity Development Throughout the Lifetime
Design for the next generation
P4

Crime and environment

From the research on the relation between crime and environment I've deduced some guiding principles for my design work later in the process. The literature I have read on this subject is listed to our right. The design principles deduced from the literature can be broken into three categories, according to where they apply. In this case I have grouped them in the categories of Urban, Block and Dwelling. In the following pages the principles are explained per category.

- Curto, B. M: (2011). Environmental factors associated with adolescent antisocial behavior in a poor urban community in Brazil.
- East, L: (2006). Father absence and adolescent development: a review of the literature. 283–295.
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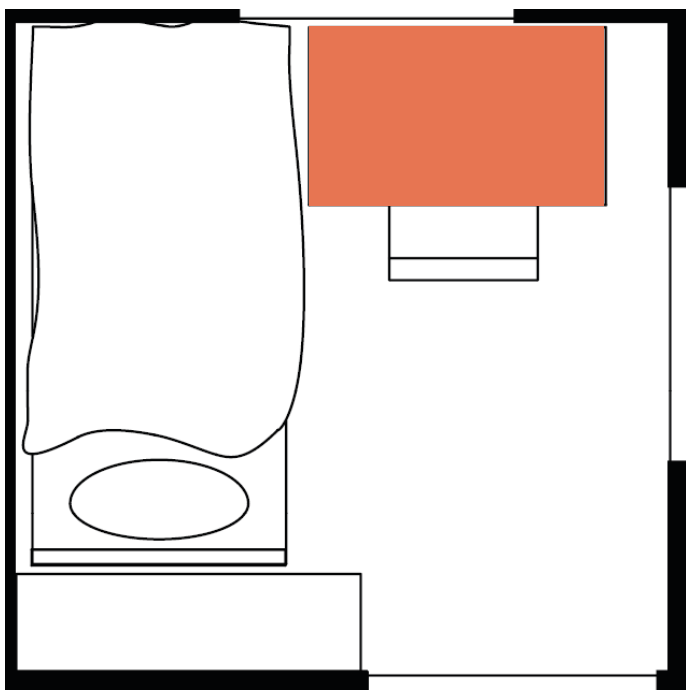
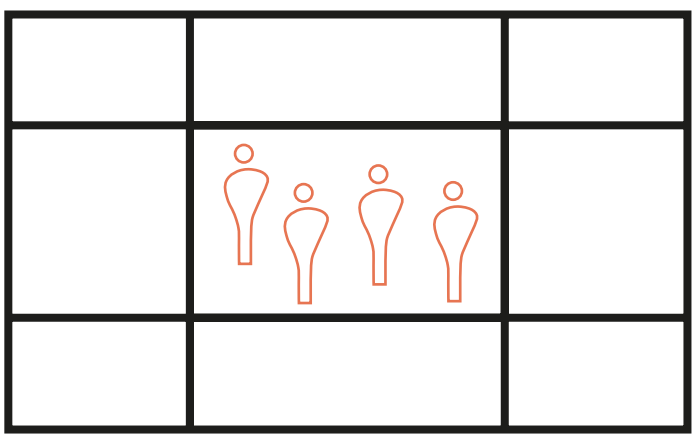
The literature informed me that Homeowners take more care of their dwellings and living environments. Maintenance, social bonds between neighbours and a preoccupation with the safety of their surroundings increase if people own their home. Besides that, home owning provides the opportunity of incremental growth through time and the individual expression by appropriation of one's living environment. My design will only feature home ownership.

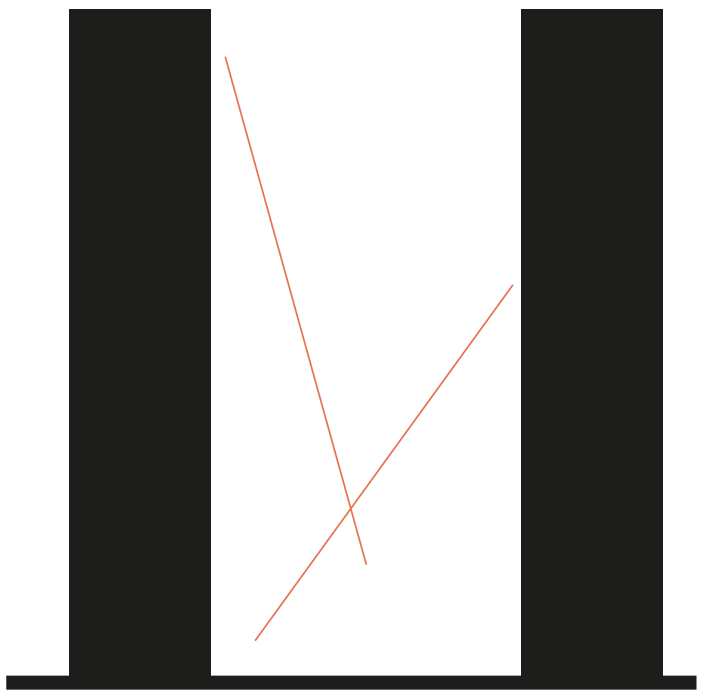
In this literature, not many design clues could be found for the promotion of educational results in children, but this was one of them. Providing a private desk for children to do their homework enables them to shut out from the hustle and bustle of the dwelling or neighbourhood and focus on their homework, giving a higher chance for their success in school. In my design every child will have a desk and closet in their bedroom to promote their educational work.



Fatherlessnes turns out to have a big negative influence on the development of children and a big contribution to antisocial behaviour among adolescent men. To promote fathers to stay involved after a possible separation from the family, dwellings for single person households need to be integrated in the block. These dwellings will not be an anomaly on the edge of the project, stigmatising the position of these single people and enlarging their distance to the rest of the family. They will be integrated.

To ensure safety on the streets and in the blocks without aggressive architectural measures like fences or guards, the concept of 'eyes on the street' is of great importance. This literature also showed that dwellings built far from the ground lose their connection with the ground and thus with what happens on street level. In this project, all blocks will thus feature both townhouses with a connection to the ground and apartments that can then be more detached.

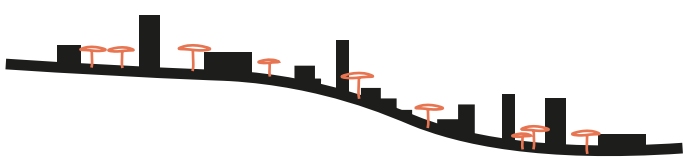


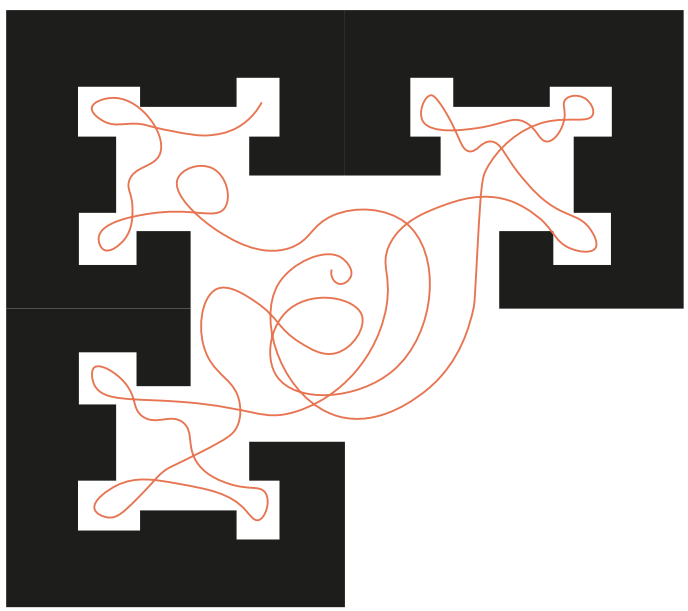


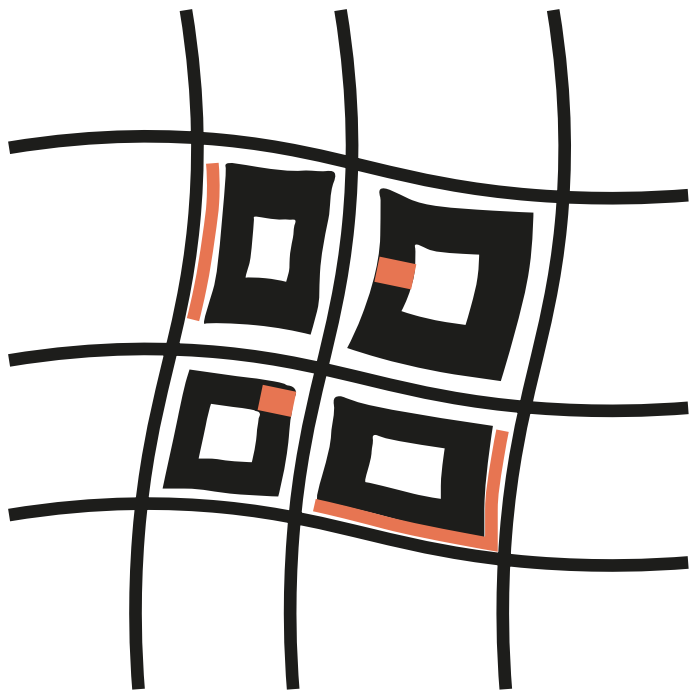
On the urban scale many design clues can be found in this literature. Some of them I've condensed in a sentence to paint a picture of the ideal urban condition according to this literature: Heterogeneous mixt neighbourhoods with visibility-preserving vegetation, high social control, collective maintenance and reduced cars. This sentence captures five principles to inform the design process. My project will incorporate these five principles in it's urban design.

On the specific topic of a 'fostering living environment for the next generation of grajaú'. Literature convinced me to view the neighbourhood as a child-relevant space , with ample opportunity for play and personalisation. Thus not merely making a child friendly space, where elements like traffic and industry are removed to ensure safety for children, but making a child centred place. Focussing on this goal can result in a great living environment for all generations.

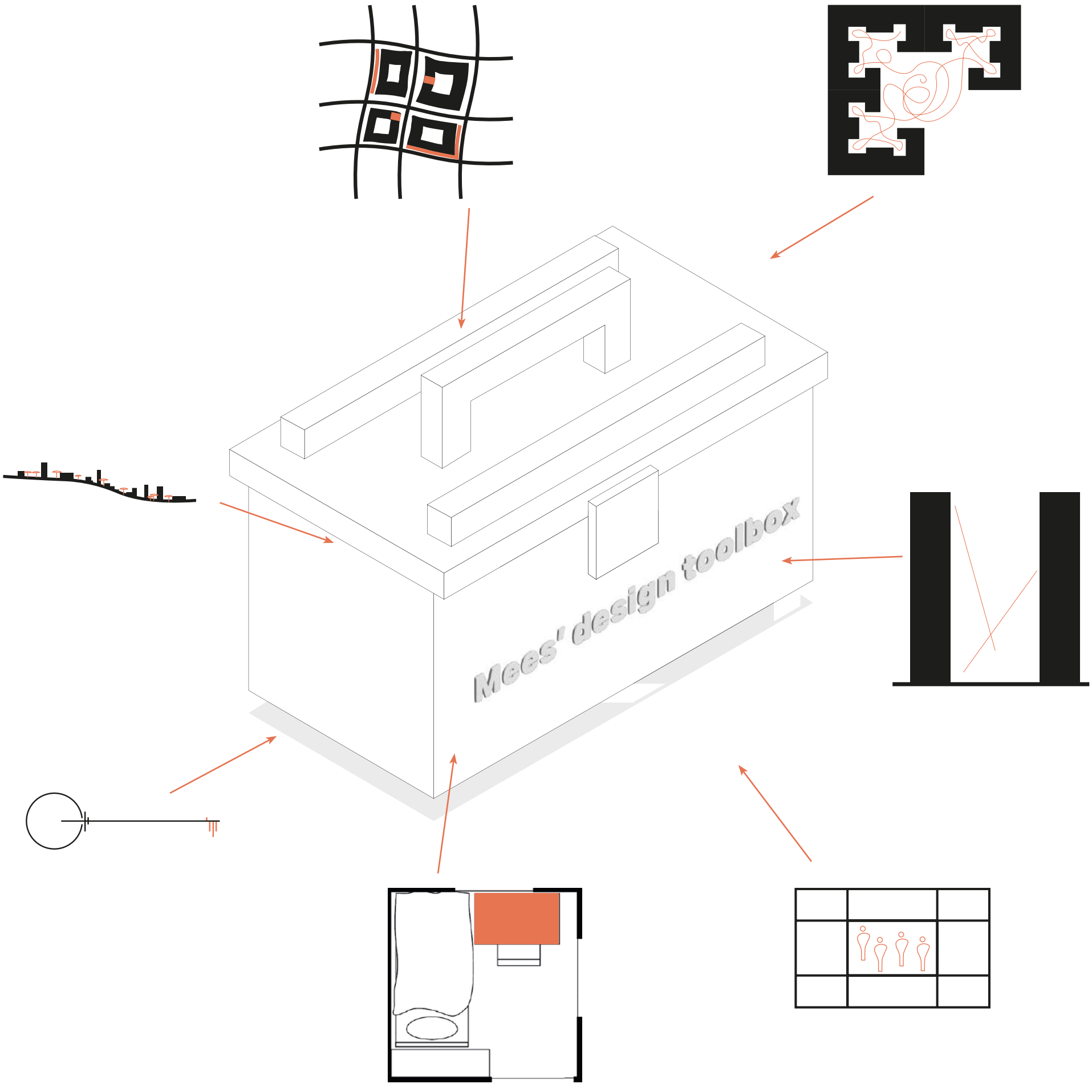
A warning from the literature is to be aware of dead zones and around shops. It is vital to take special care for the safety at places where the 'eyes on the street' effect is reduced because it is located at the edges of the scheme. My design will open up these edges, enlarging the households that can keep eyes on these places. Besides that the plan will put all shops and businesses front and centre in the urban plan, making them safer from robberies and breaking in.







Design toolbox.
Reading, analysing and studying in a design process only makes sense if the learned facts about a certain topic can be translated into workable design principles. You might call these principles tools that can later be used to construct the right design. Collecting these tools in a toolbox and keeping track of the build up tools within this toolbox helps the reader of this document understand and appreciate the design choices made later on.


Mees' design toolbox

Order and Chaos

Aldo van Eyck has whiten a lot on the balance between two modes of building and thinking wich I will talk about in two categories: order and chaos. The first one describes the way the configuration of smaller units can provide coherence between different scales of the plan. This is often mentioned in the light of 'identity', a coherent identity unites citizens under a common roof, gives structure, rigidity and ultimately order.

The second one is chaos, the alterations in the above mentioned identity, common roof, structure, rigidity and order, is chaos. Alternability of the overarching idea is vital to make it flow and grow with the natural and human environment it finds itself in.

Order.
Aldo van Eyck states: 'It is now possible to invent dwelling types which do not lose their specific identity when multiplied, but, on the contrary, actually acquire extended identity and varied meaning once they are configured in a significant group', as on how to accomplice this feed he elaborates: 'real city identity elements should be represented through the layers of configurations and multiplications', 'The ideal is not a system but a kind of master form which can move into every new stage of equilibrium and yet maintain visual consistency and a continuing order in the long run'. It is hard to fully understand what Aldo van Eyck sees as the difference between a system and 'a kind of master form'. The theories of Fumihiko Maki on group form will inform us better later in the story. In general Aldo van Eyck talks about the importance of identifying devices in the following way: 'The time had come to invent new significant identifying devices that perpetuate in a new way the essential human experiences the old ones provided for so well. At the same time the new must provide for equally essential experiences the older ones no longer provide for, or never did.' Here he mentions the old devices that bound us together, think of religion, national pride, family structure, factors that are now mostly let loose and are replaced by individualism. Aldo van Eyck also points to the role of public functions within a city to encourage a greater appreciation of the overall order of the neighborhood. he states: 'Each multiplicative stage should therefore achieve its appropriate identity by assimilating spontaneously within its structural pattern those public facilities this stage requires and wich inseparably belong to it.' He elaborates further that: 'It may sound paradoxical, but decentralization of important city-scale elements will lead to a greater appreciated overall homogeneity. Each sub-area acquires urban relevance for citizens that do not reside there. They will induce citizens to go to parts of the city otherwise meaningless to them.'

Picture by: Huub Fenten

Chaos.
Since an architectural plan is ultimately lived in by humans, it needs to build for humans, that is, build for change. Aldo van Eyck doesn't see order and chaos as two opposing categories of which one is good and the other is bad, his view is that: 'One can not eliminate chaos through order, because they are not alternatives. Chaos is as positive as its sister order. We must seek order in freedom and freedom in order'. Although van Eyck speaks greatly of overarching identifying elements to create order in a neighborhood, he doesn't become overly strict and recognises that: 'individuality, freedom and spontaneity form an ever-strengthening antithesis to the control of technology'. Aldo van Eyck was a critic of the modernist, partly because of their lack of chaos and relation with human nature and the human scale, in this sense he knew how order in architecture can go too far. On the other hand of the spectrum, chaos can also go too far, Aldo van Eyck says this about it: 'The tendency to desire great neutrality for the sake of extreme transmutability is as dangerous as the prevailing urban rigidity from which this tendency springs as a reaction. Significant archetypal structures should have enough scope for multi-meaning without having to be altered. Beware of the clove that fits all hands and therefore becomes no hand.'

In October 2023, we visited Brazil to observe, study and learn from the current situation on site. The Visit broad us to many living environments completely new to me. The favela dwelling structures and urban configurations seem so foreign to a Dutch architecture student, but many elements are also familiar. The interaction between people, between themselves and between us and them feels warm. The shared struggle a lot of these people are forced to go through seems to result in closer social bonds. While visiting I noticed I was falling into the trap of romanticising this fact and looking past the facts of the lack of physical comforts and amenities we are so used to in the rich west. I think the benefits of the shared struggle are real, but an effort must be made to harvest these benefits without the lack of physical comfort and amenities these people face.

Picture by: Lores Dalla

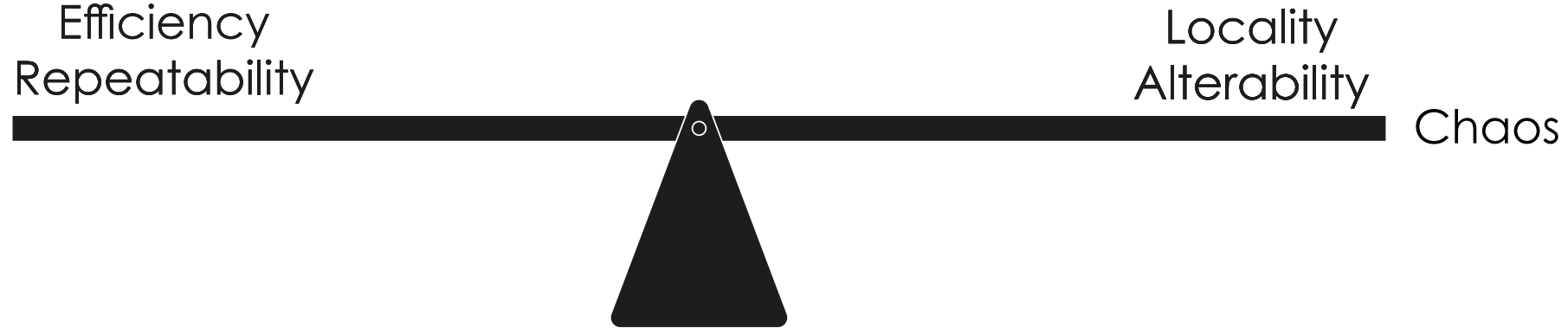
The problem statement stated above: ‘How can a new form of social housing provide a fostering living environment for the next generation’ can be split into two sub questions. The first one deals with the question of creating a new form of social housing in Grajaú, while the second one focuses on the topic of a fostering living environment for the next generation of Grajaú. It must be clear that these two parts are not standing apart and efforts in one will invariably influence the other. A good end result of the first part will in fact also be of good influence on the second, and vice versa.

The amount to which I am able to combine these elements of Order and Chaos into my project will in part determine the quality of the living environment of the local population. Furtheron in the book you can find that I studied multiple case studies in the global north and south to inform myself on ways these two categories can be represented in architecture and how they can inform my design choices. I think this pathway leads to a satisfying answer to the first element of the problem statement and research question: ‘How to create a new form of social housing in grajaú.’

Balance

Affordability
Efficiency
Repeatability

Order

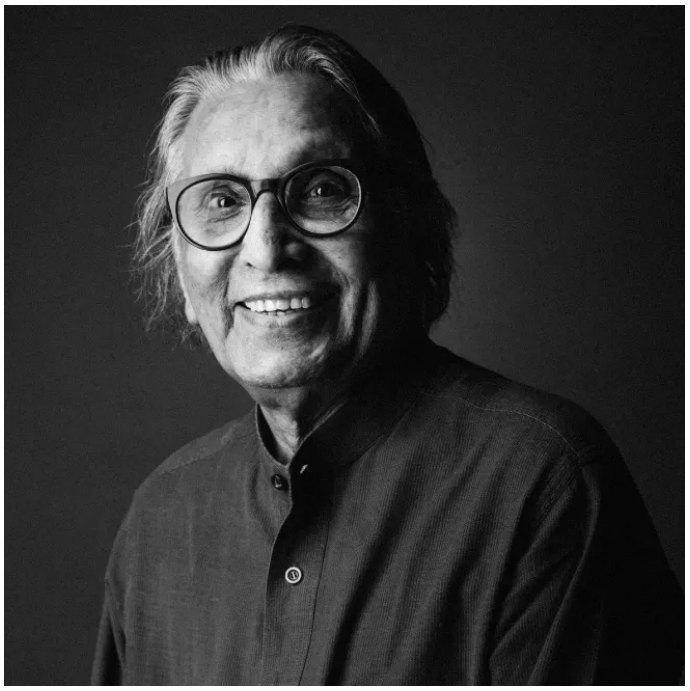


Diversity
Identity
Locality
Alterability

Chaos

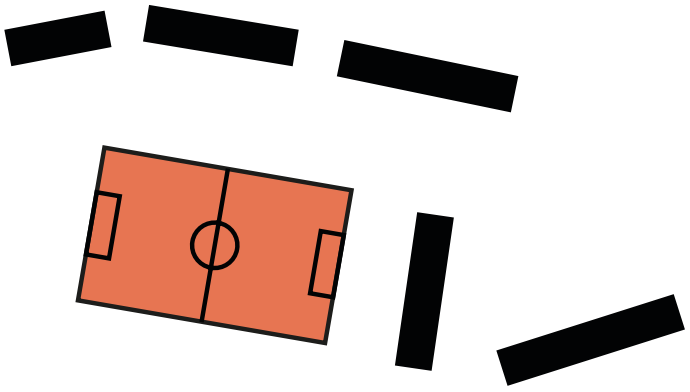
Case studies

To aid the transition from research to design, I planned a step in between to translate concepts found in literature to architectural expression, not by making this translation myself directly, but by making use of great examples of the past to inform me on architectural expressions. Since people can only look far because they stand on the schoulders of giants, I wanted to clime those schoulders and make use of earlier work. To the right you find four great architects whose work, amoung others, has informed me in my studies to design housing for the poor of the global south.



Balkrishna Doshi - Ricardo bofill

Charles Corrrea - Hector viglieccа

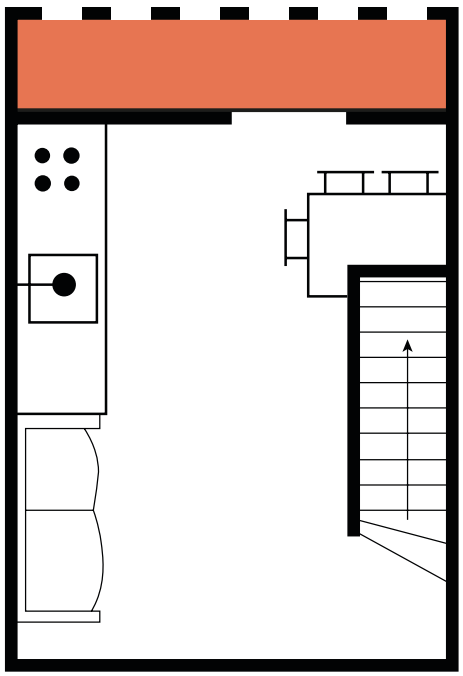


The Project Nova Santo Amaro is an example of a solution to a similar problem as I face in this graduation work. The project, which we visited while in Brazil, is placed within the existing favela structure and expresses a solution on how to house people that need to be evicted from their homes. Hector Viglieca made clever use of the sloped terrain, making him able to build in a higher density than otherwise possible.

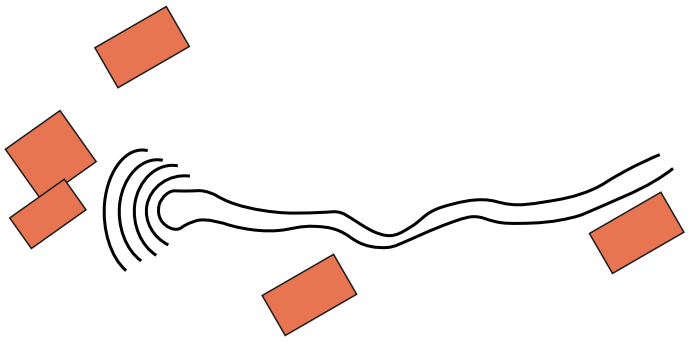
The two lessons from this project are to position the dwellings around the shared space, providing protection for this public space (right). Secondly to provide Cobogo facades to provide breathable laundry space behind a semi closed facade, removing the favella stigma.

Enclose public space

Intergrate washing room in floorplan



Novo Santo Amaro V Park Housing,
Hector Viglieca
Sao Paulo, Brazil

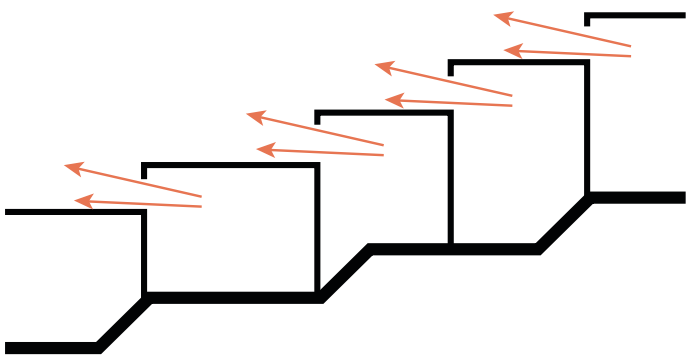


Intergrate public amenities in desgin

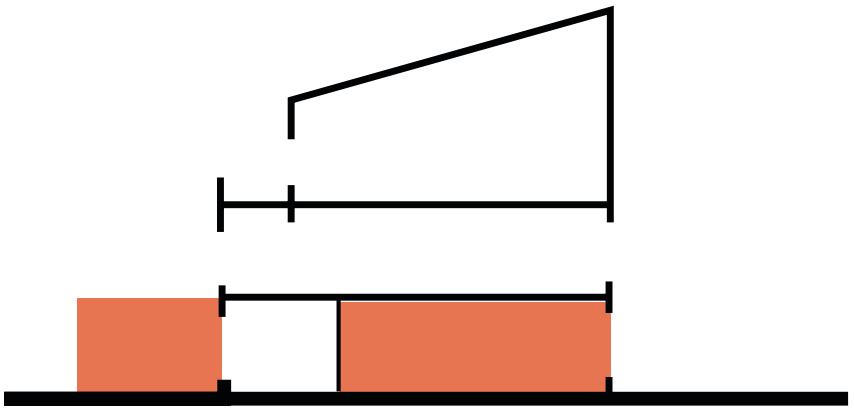
Comuna dom Helder, another project we visited in Brazil, was a great example of how community effort and bottom - up organisation could lead to a good living environment. This project started with the community, evicted from their former homes, rising up and fighting for a new place to live. The design reflects this in a way. The whole design is based on courtyard groups where dwellings come together and form shared outdoor space.

Two lessons from this project are to integrate public functions in the design, and not to let them be an afterthought. (left) Secondly, to see the sloped terrain as a feature, not a bug. Making use of it might prove to bring qualities otherwise not possible. (down)

Make use of sloped terrain



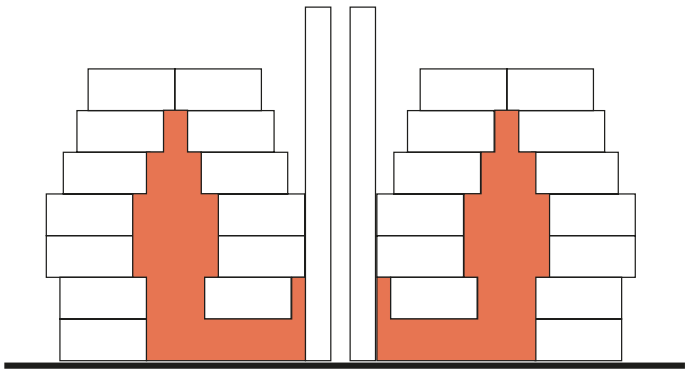
Comuna dom Helder camara
Sao Paulo, Brazil



Make space for safe incrementality

The third project from Brazil, Jardin Sao Francisco, managed to integrate a quality of favela dwellings not often found in top - down designs: Incrementality. Earlier in this report I reflected on incrementality and what it means in the context of the build environment in Brazil. In the case of Jardin Sao Francisco, the architect managed to make space for incremental growth, but in a safe way. By making the roofs sloped, the growth opportunities to the sky are limited, but the design allows for growth on the ground level so residents can make their structures grow with them. Making families able to stay where they are when they grow, and thus making the opportunity for long lasting social bonds within the neighbourhood bigger. (left)

Jardin Sao Francisco
Sao Paulo, Brazil

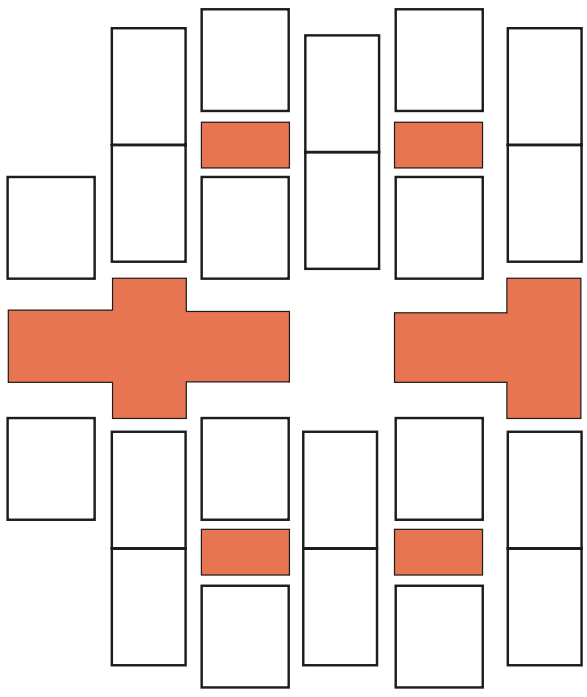


Stepping away from the projects visited in Brazil, we can look at other examples as inspiration. Walden 7 is a residential structure in Barcelona with a striking composition of forms, colours and textures.

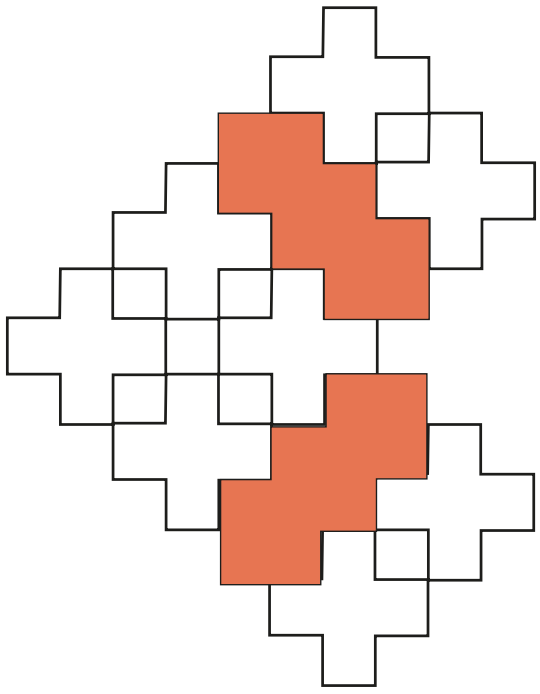
Two lessons form the project are that first: although the composition looks very diverse the basic elements from which it is made are the same, making it a good example how to get from simple elements, to diverse whole (left). Secondly that the high density residential tower has a lightness to it you might not expect. This is due to the various courtyards in the building, providing views, fresh air and social interaction within the structure. (down)

Diverse landscape from basic elements

Multiple courtyards create openness



Walden 7
Ricardo Bofill
Barcelona, Spain

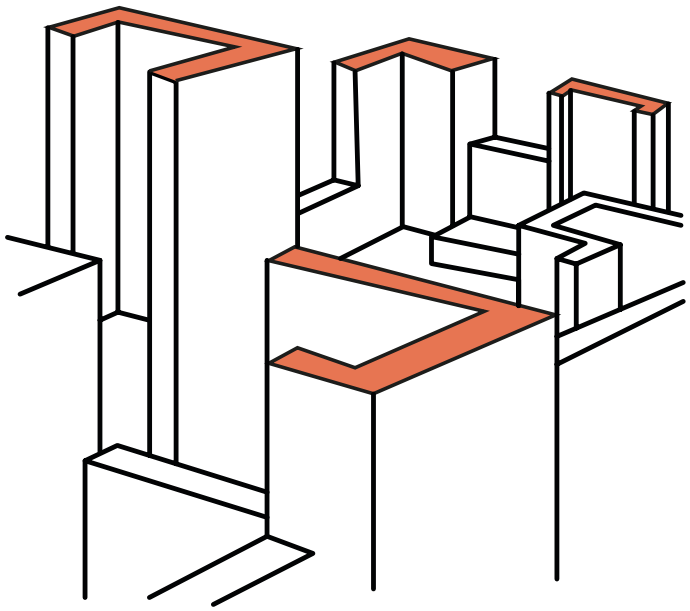


Another design, La Muralla roja, by the same Architect continues the striking visual language. This residential block has a fortress-like element, making it seem like a stronghold of social community. Although fortress-like, it is not unwelcoming, you might even call it cute.

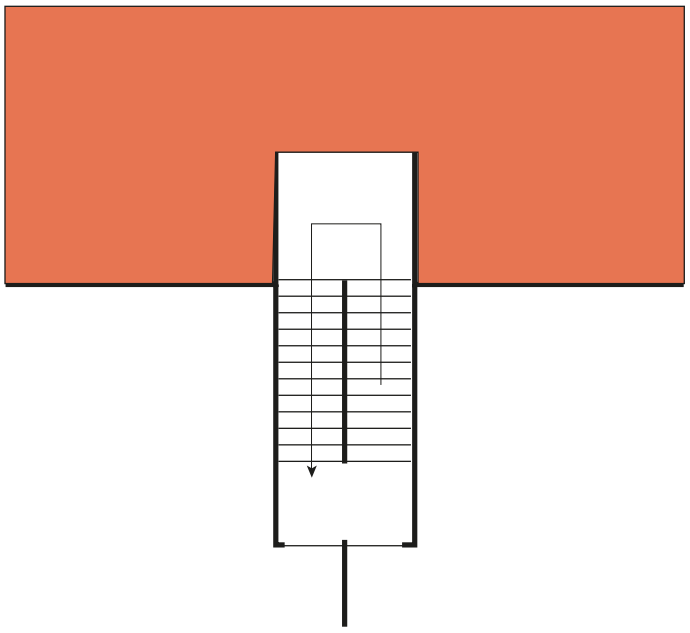
Two lessons from this project are firstly the way simple, geometric forms are placed around courtyards, providing air and community space. (left) Secondly the visual style of the ‘friendly fortress‘ makes for a very diverse and visually interesting living environment, while projecting a sense of internal cohesion and strength to the outside. (down)

Clustering around courtyard

Great visual language



la muralla roja
Ricardo Bofill
Alicante, Spain

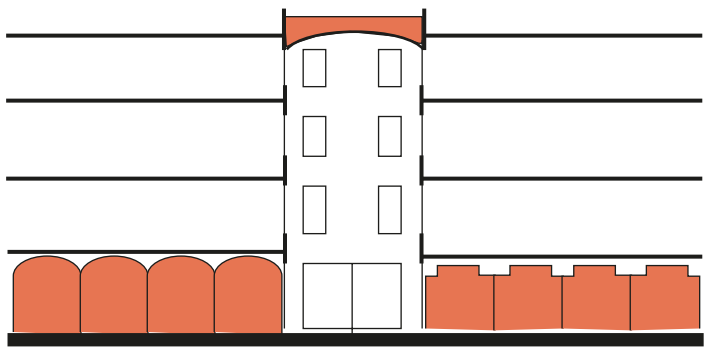


Visual connections trhough stairs

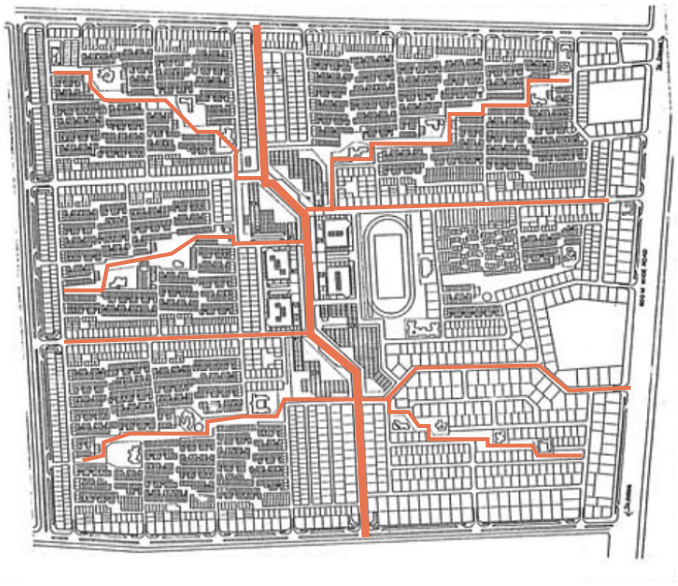
The Moroccan project of Dar Lamane is one I discovered in the elective course ‘global housing studies’. It showed me how small, carefully thought out, elements can bring character and quality to an otherwise straightforward design.

Two lessons for this project are the way residents would enter higher floored apartments. The external staircase was presiding outward on the street, making for small visual and social connections every time one goes up a flight of stairs. (left) Secondly, as already mentioned, the small elements by which the architect managed to bring character to the design. By changing the character giving elements per block, each had its own character (down)

Different identity per block



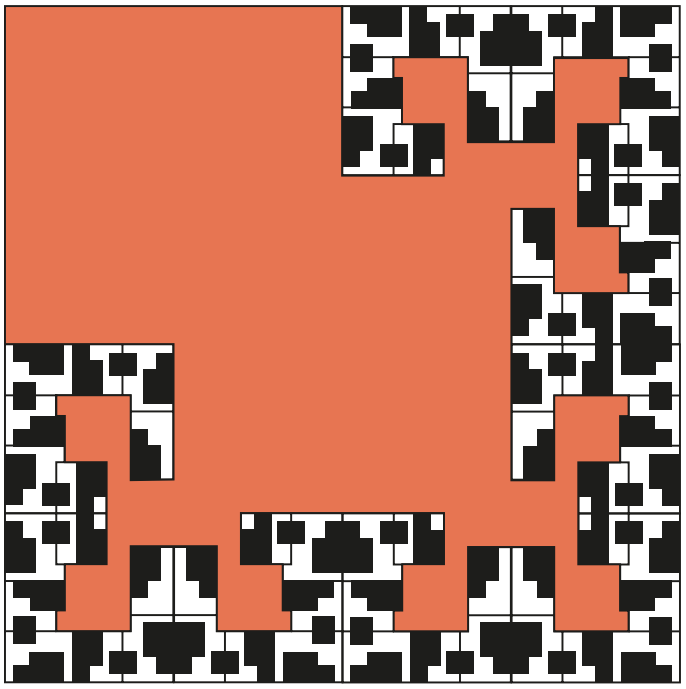
Dar lamane housing
Casablanca, Marocco



Hierarchy of urban conditions

The second project derived from the elective ‘global housing‘ is Aranya. This project, although never fully realised, forms as an inspiration on the urban level. The way the plan proposed to form a central spine in which public functions would be housed, branching of to smaller and smaller urban conditions brings many urban qualities. By providing a hierarchy of scales of urban conditions, one provides a diversity in possible urban social activities, relations and bonds.

Aranya townshio
Doshi
Indore, India

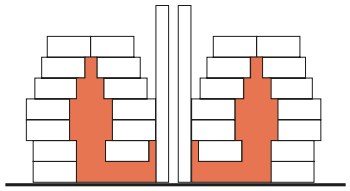


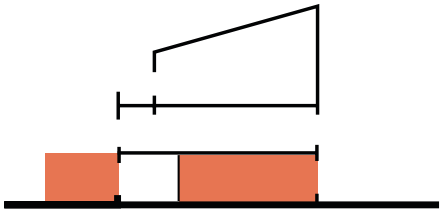
Hierarchy of public space

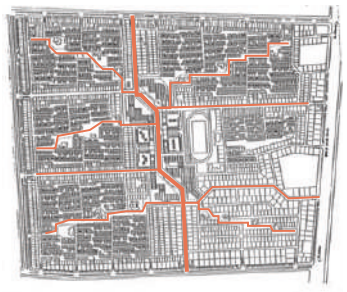
The last project, also provided to me via the aforementioned elective ‘global housing studies‘ is Belapur in Navi Mumbai. This project shows a great example of another pillar of global housing design, Clustering. By cleverly clustering basic units, one can again derive a diverse outcome. This then shapes a hierarchy of public spaces that can again inspire a diverse range of social activities, relations and bonds.

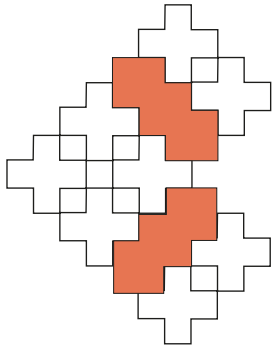
Belapur housing
Charles Correa
Navi Mumbai, India

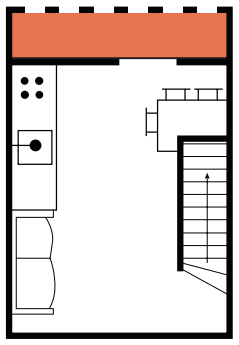
Stack that toolbox.
A second time we can deduce these principles and add them to the design toolbox.

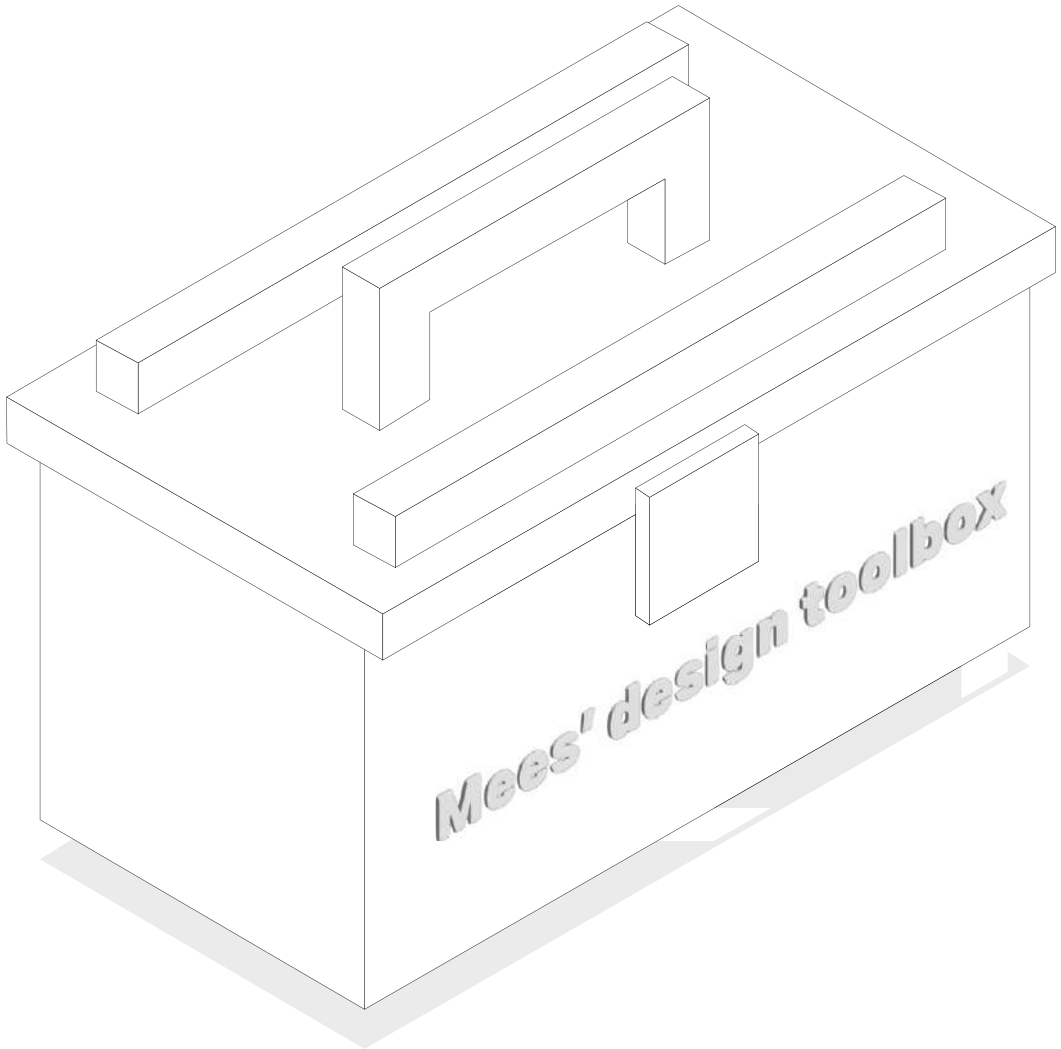


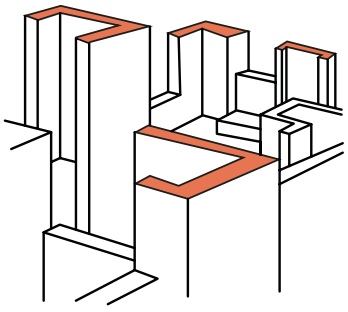


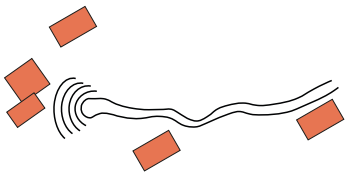


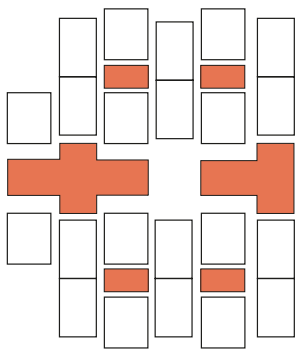


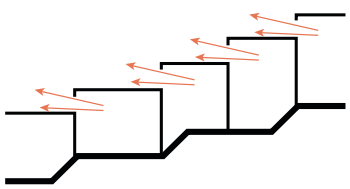


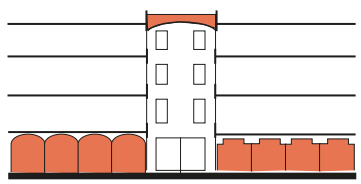

Mees' design toolbox

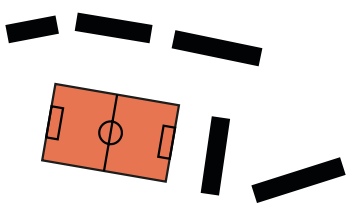


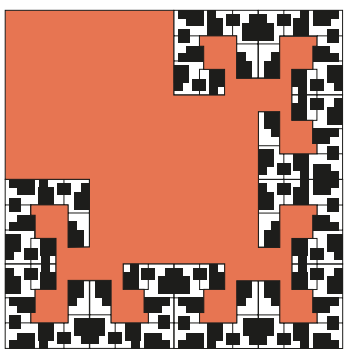


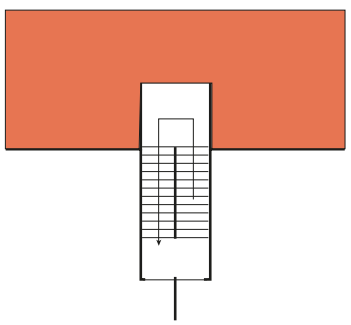












Configurative dicipline for the next generation of Grajaú

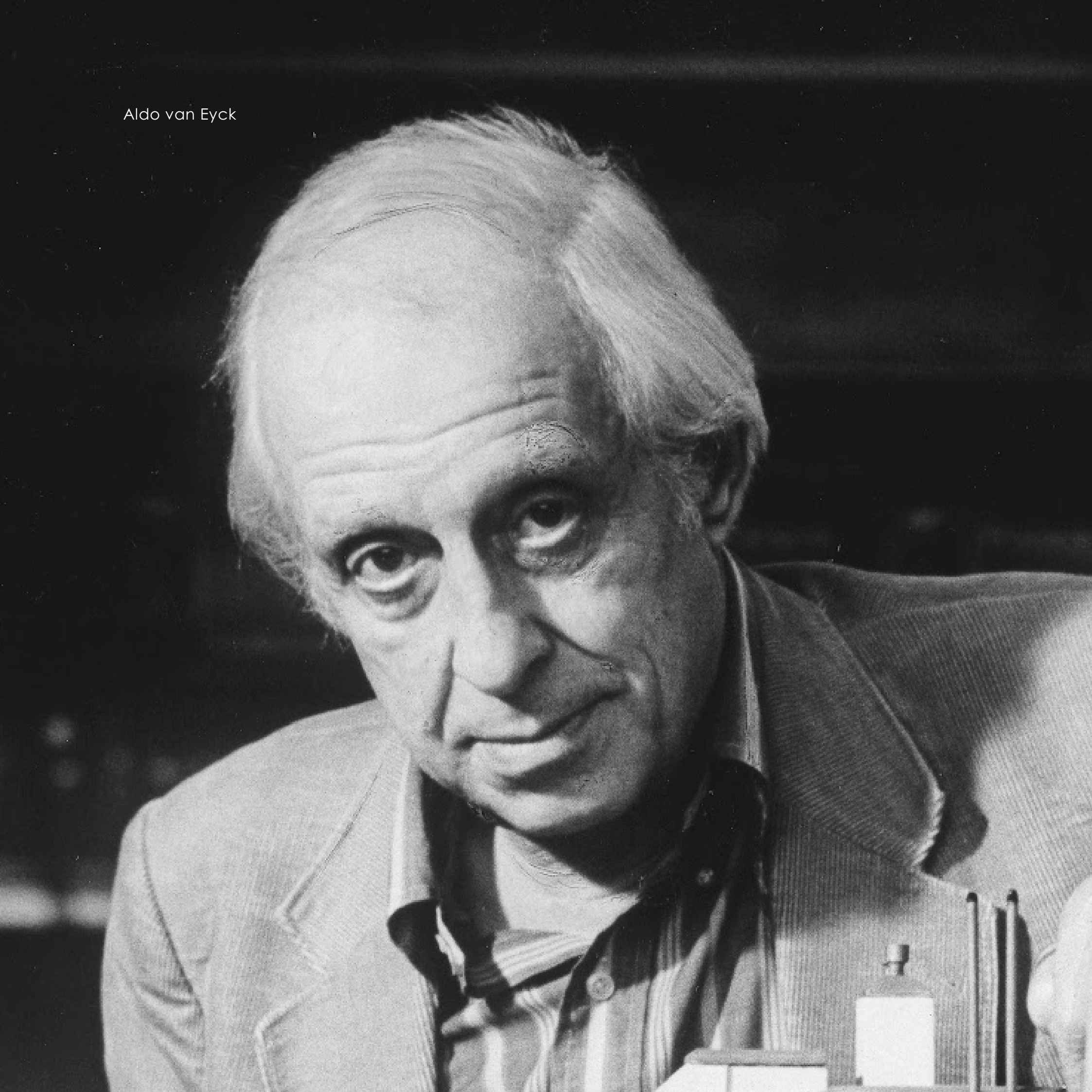
Structuralism in architecture emerged as a response to the prevailing modernist movement of the mid-20th century. It emphasized the importance of organizing architectural elements into coherent systems and structures, highlighting the underlying principles of form and function. By prioritizing the relationships between different components, structuralism aimed to create harmonious and meaningful built environments.

One prominent figure associated with structuralism is Aldo van Eyck. Van Eyck was a Dutch architect and theorist who played a crucial role in the development of the movement. He sought to challenge the rigidness of modernist architecture by introducing a humanistic approach that emphasized social interaction and the creation of meaningful spaces. Van Eyck believed that architecture should cater to the needs of individuals and foster a sense of community and belonging.

The aesthetics of number, another key aspect of this discourse, explores the visual and mathematical properties of numbers and their potential application in architecture. By employing mathematical principles, architects can achieve aesthetic harmony and order within their designs. The aesthetics of number can be seen as a bridge between the rationality of structuralism and the creative expression of architectural form.

The configurative discipline refers to the systematic exploration and arrangement of architectural elements to create meaningful configurations and spatial relationships. This approach focuses on the interplay between form, function, and user experience. By analyzing the organization of elements such as walls, columns, and openings, architects can create spaces that elicit specific emotional and sensory responses.

Aldo van Eyck



In his work Aldo van Eyck formulates ways to deal with the problem of how to build for the masses. How can one build efficiëntly, affordably and repetitively, without the project resulting in a monotonous living environment such as the modernists vision, perhaps best illustrated by ‘de bijlmer’ in Amsterdam. Aldo van Eyck took the structuralist approach of not looking at the object itself, but at its relation compared to its surroundings. or as he wrote in Shaping a new reality from in-between to the aesthetics of number : The culture of particular form is approaching its end, the culture determined relations has begun.’ In orchestrating the relations between objects carefully Aldo van Eyck hoped to find what he called the ‘aesthetics of number’. In the same texts Aldo van Eyck described this vision as follows: ‘components would be formed in such a way that their identity does not disappear in the process of repetition, but is confirmed and enriched in the very shape of the cluster they compose.’ Thus an effort needs to be made to protect the particularity of the small, when configured into the big. Factors like small and big, few and many, part and whole, open and closed, near and far, where opposing factors that needed to stand into relation with one another, or as Aldo van Eyck wrote: ‘the dialectic between these opposing factors was a necessary condition for the development of a genuinely contemporary architecture.’ In the texts ‘steps towards a configurative discipline’, Aldo van Eyck descipes that ‘the ‘right size’ in architecture is always both small and large, simple and complex.... and will always both embrace unity and diversity’ or in other words: ‘right-size will flower as soon as the mild gears of reciprocity start turning’. With this notion he meant the reciprocity of the building elements which come to stand in a relation with one another. Thus Aldo van Eyck formulated a vision for architecture that was: ‘Pholyphonal, multi rhythmic, kaleidoscopic and yet perpetually and everywhere comprehensible’, this vision he called the ‘aesthetics of number.’

Aldo van Eyck gives hints as to how this approach might benefit the next generation of grajaú. In the text ‘steps towards a configurative discipline’, Aldo van Eyck says: ‘we must do all that we can in our field to make each citizen feel why it is good to live citizen-like in a city built for citizens’.

Aldo van Eyck

Metabolism, a post-war architectural movement in Japan, sought to address the challenges of rapid urbanization. Fumihiko Maki, a prominent Japanese architect, played a central role in this movement, advocating for flexible and adaptable structures inspired by biological processes.

Born in Tokyo in 1928, Maki was a key member of the Metabolism Group, a collective of architects, engineers, and designers who envisioned buildings as living organisms capable of growth and evolution. Maki's work focused on integrating technology and innovative construction techniques to realize the principles of Metabolism.

One of Maki's notable achievements is the Nakagin Capsule Tower, completed in 1972. This iconic Tokyo building embodies the Metabolism movement, featuring modular design and prefabricated capsules that provided flexible living spaces. The concept behind the tower was to create easily replaceable or updatable units that could adapt to changing needs. Maki's architectural designs are characterized by meticulous attention to detail, a harmonious relationship between built structures and nature, and a commitment to sustainability. In recognition of his contributions, Maki received the prestigious Pritzker Architecture Prize in 1993.

Fuhimiko Maki

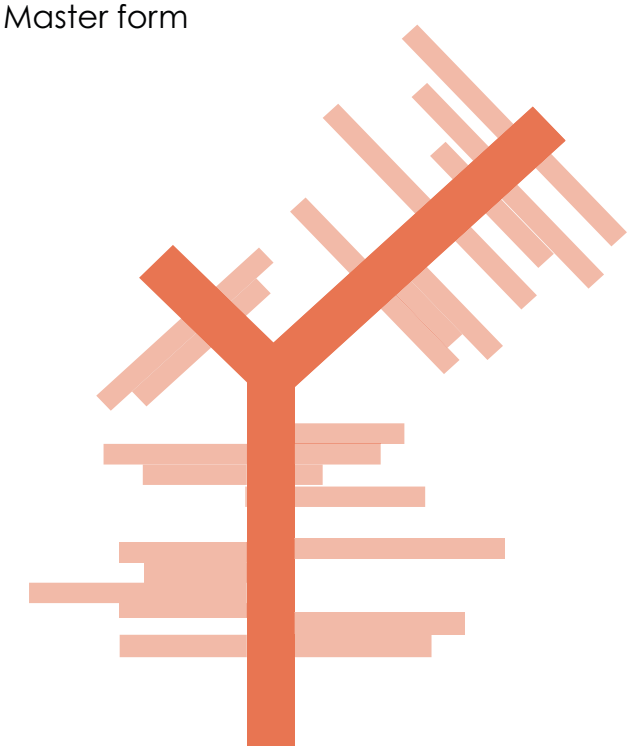
Maki tries to deal with some of the same issues as Aldo van Eyck, the title of the following paper by Jennefer taylor alludes to that case: ‘Strategy for bigness, Maki and groups form’. Here she states that ‘Maki’s concept of group form emerges as a possible strategy for accommodating the notions and realities of the growth of the urban intrusion’. Maki viewed the ideal way to deal with the balance between order and chaos as described above as a ‘rational open-ended planning approach to accommodate the dynamics of the changing city.’ With this the coal was to ‘humanize bigness’ and Maki embedded this dynamic way of thinking by changing the name for a ‘master plan’ to a ‘master program’. His way of thinning can be seen in the brother context of ‘metabolism’ which ‘though technological in its parts, was inspired by biological growth with an evolution and replacement.’ Aldo van Eyck might consider this way of thinking as crossing the line to ‘extreme transmutability’, Maki does state that: ‘collective form is however not a collection of unrelated, separate buildings, but of buildings that have a reason to be together’.

One might ask how Maki would define whether or not buildings have a reason to be together, or if architects have ways they can facilitate such a reason. Luckily Maki himself describes four ways in the paper Linkage in form. First Maki describes three different kinds of collective form, these are a composition, a megastructure and as third his own group form.

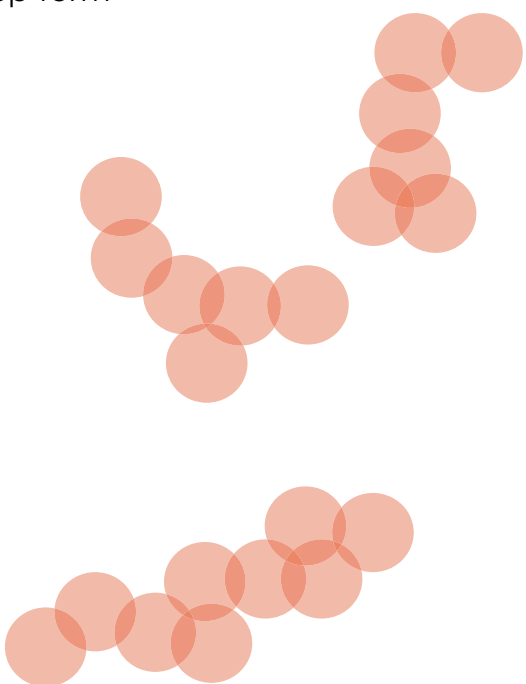
He describes a composition as a group of elements that are extremely linked by the way they are configured in relation with one another. Maki says the link is implied and therefore not very strong. In the second kind, the megastructure, the structure forms the link. All elements are clearly linked to the mega form, binding them all together, but making the parts relied on the frame to become the whole as well. The last one, group form, describes the way different parts can form a strong coherent whole, without needing a superstructure to hold it together. In group form the individual links between elements is what generates the system. A looser, more adaptable, more sustainable and decentralized way of organization that ensures individual transformation (chaos) and collective stability (order).

Composition

Master form

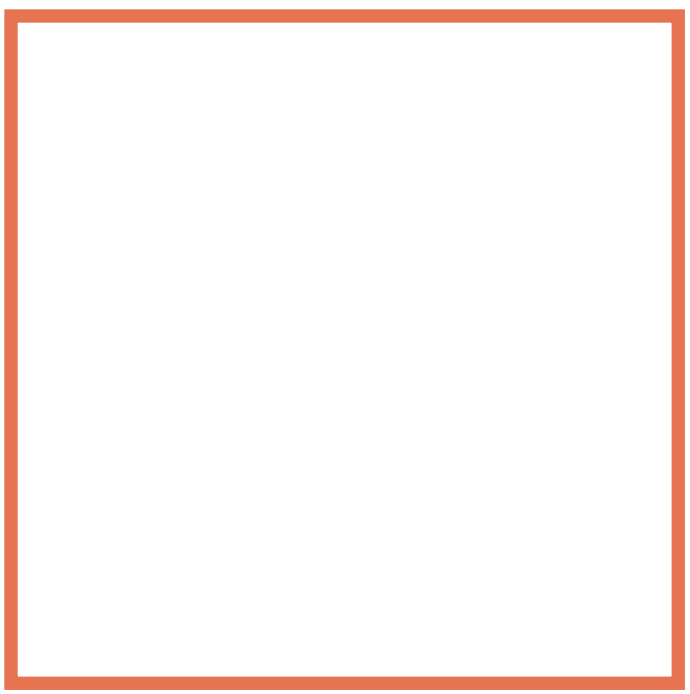


Group form



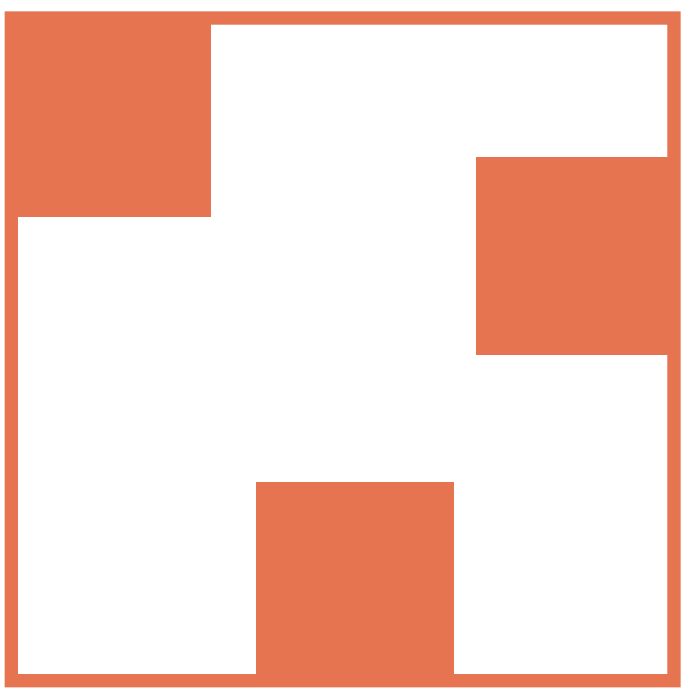
Maki then goes on to describe four ways in which parts in a group form can form links to generate the structure of the whole. These four ways are Mediate, Define, Repeat and sequential path.
Mediate might be understood under the term ‘in between space’ of Aldo van Eyck. It is the mediation between the one part to the other or to the outside that binds the parts together. Just like a typical Dutch ‘stoep’ binds a home to the streets, provides a mediation between inside and outside, public and private and part and whole.
The second one, define, can be best understood as a walled city. Defining the boundaries of a group of parts easily binds them together to a whole. This doesn’t have to be in the form of walls of course, but any way of defining the inside compared with the outside works.
In the third group form link repeat we can again see a parallel with the notions of Aldo van Eyck to repeat common elements in different places and scales. The aesthetics of number also works with the repetition of common identifying elements, binding a large series of parts into one whole. The last group form link is a sequential path. This can be thought of as a logical sequence of functions within a building of a city. Because the relation of the functional parts are placed in a logical sequence, they naturally stand in relation with one another.

Define

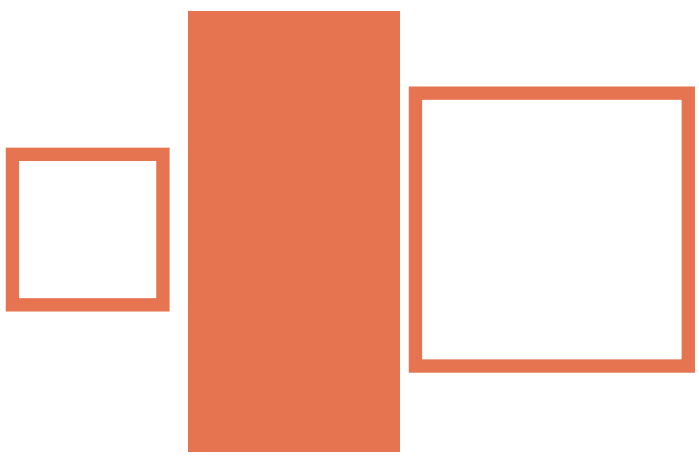


Sequential path

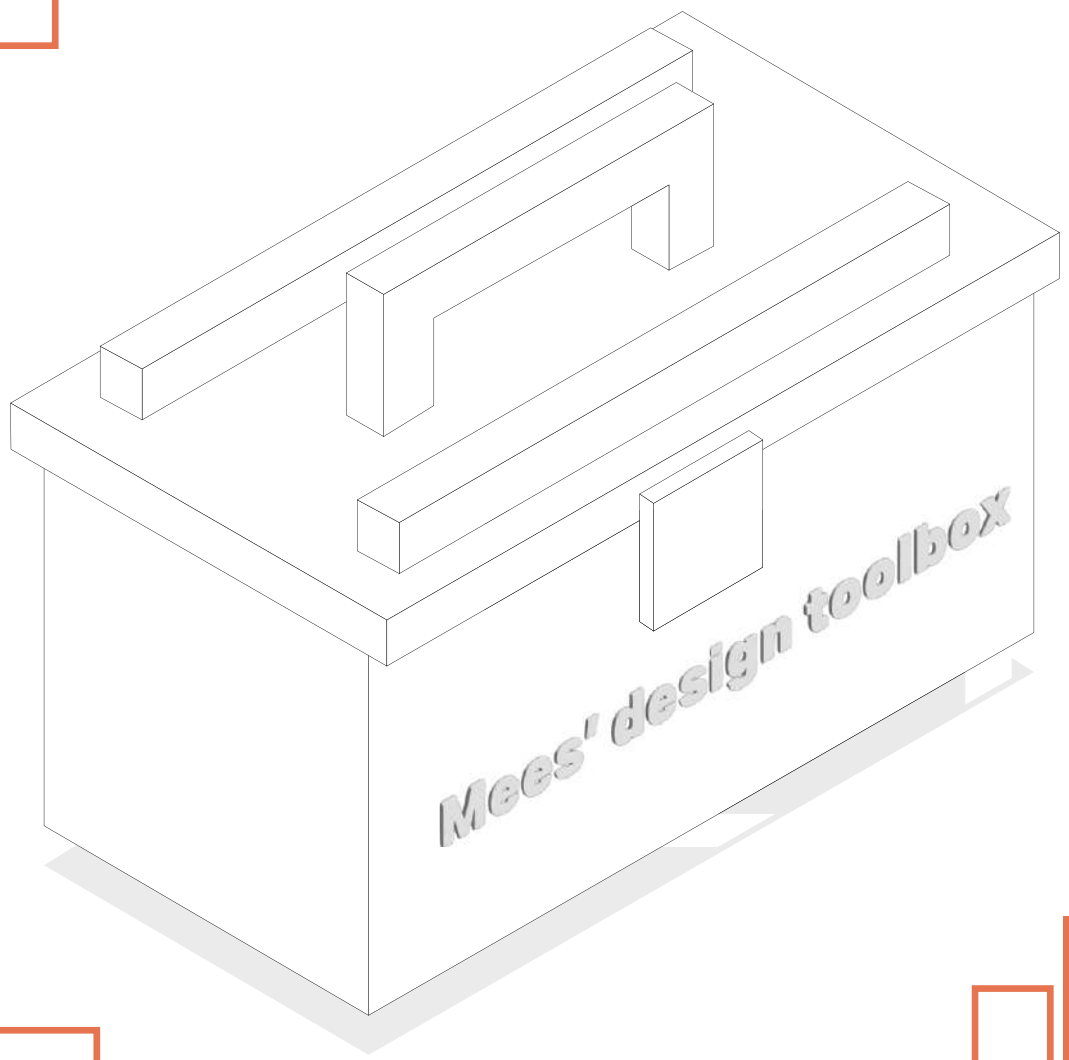
Repeat



Mediate



Stack that toolbox.
A third time we can deduce these principles
and add them to the design toolbox.


Mees' design toolbox

Developmental patterns

In theory and practice.

Jean Piaget, a big name in developmental psychology of the previous 100 years, argued that child development occurred in stages. Piaget pointed out five stages that follow one another, each stage is accompanied with a step in cognitive development of the child. The five stages are:

Sensorimotor stage (0–2 years old)
Preoperational stage (2–7 years old)
Concrete operational stage (7–11 years old)
Formal operational stage (11 years old through adulthood)

Like Piaget, Erikson also emphasized that children's development occurs through interacting with the external environment, but Erikson's stages focus more on societal influences. Both Piaget and Erikson emphasized that children are active participants in their world and that development occurs in stages.

Unlike Piaget, who focused on cognitive development, Erikson emphasized healthy ego development (Papalia & Feldman, 2011). Healthy egos are developed when people resolve specific personality issues at set periods in their lives. Specifically, each developmental stage is characterized by two conflicting personality traits, one positive and one negative. Successful resolution occurs when the positive trait is more emphasized than the other, resulting in the development of a virtue, which aids healthy resolution of subsequent stages.

Overall, Erikson proposed eight personality crisis, five of which occur before the age of 18:

Basic trust versus mistrust (0 – 12/18 months)
Autonomy versus shame and doubt (12/18 months – 2 years)
Initiative versus guilt (2 – 7 years)
Industry versus inferiority (7 - 11 years)
1Identity versus identity confusion (11 – 18)
(Nortje, 2023)

As a designer I can accommodate for the healthy resolution of these personality crises within the design of the living environment of the child. The Hierarchy of public spaces in my plan can be overlaid with the developmental stages.

0 - 2 years	2 - 7 years	7 -11 years	11 - 19 years
Sensori motor stage	Pre-operational stage	Concrete operational stage	Formal operational stage
Trust vs mistrust Autonomy vs shame	Initiative vs guilt	Industry vs Inferiority	Identity vs identity confusion

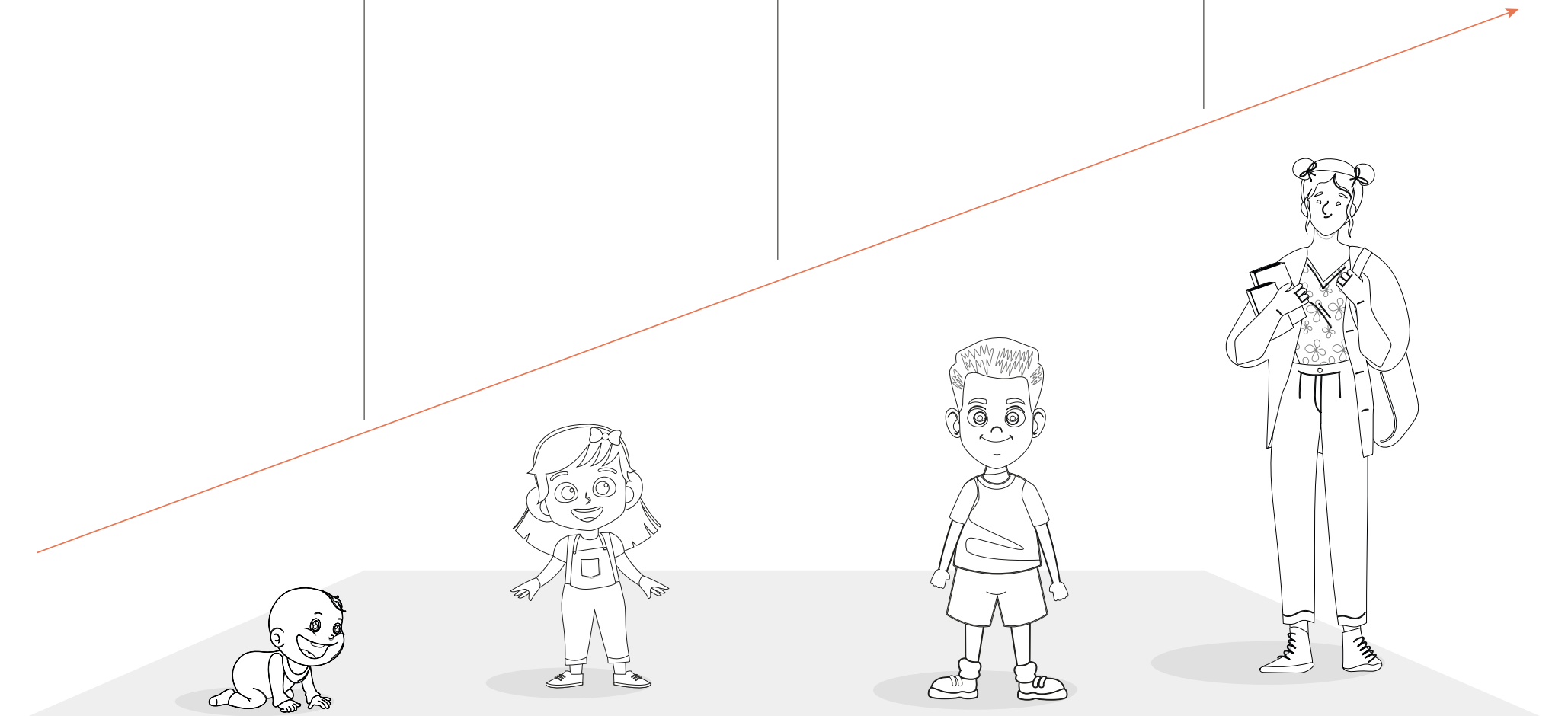


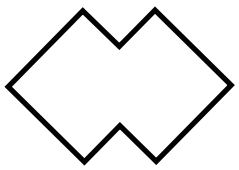
Image source: Freepik.com

Taking the resolution of these specific personality crisis as design goal, I can design specific elements per scale in my design. On the right page you see a list of design elements at each scale that are implemented in the final design of the dwellings and collective spaces.

0 - 2 years

Sensori motor stage

Trust vs mistrust
Autonomy vs shame

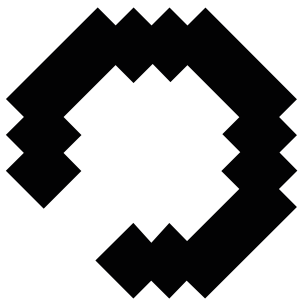


Safe home
Safe neighbourhood
Nursery furniture
Visibility through the house
Baby friendly bathroom
Curtains openable by child
Play courner
Soft floor
Storage

2 - 7 years

Pre-operational stage

Initiative vs guilt

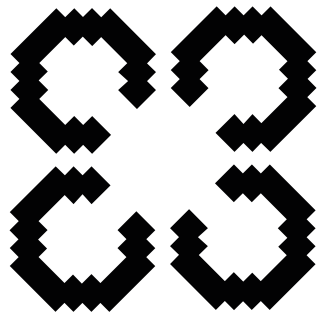


Cluster form
Car free zone
Eyes ond the street
Sandpit
use slope
intergrate water in cluster
swing
hobby and sport
playground

7 -11 years

Concrete operational stage

Industry vs Inferiority



Communal garden
'Free rein' zone for kids
school quided projects
Football field

11 - 19 years

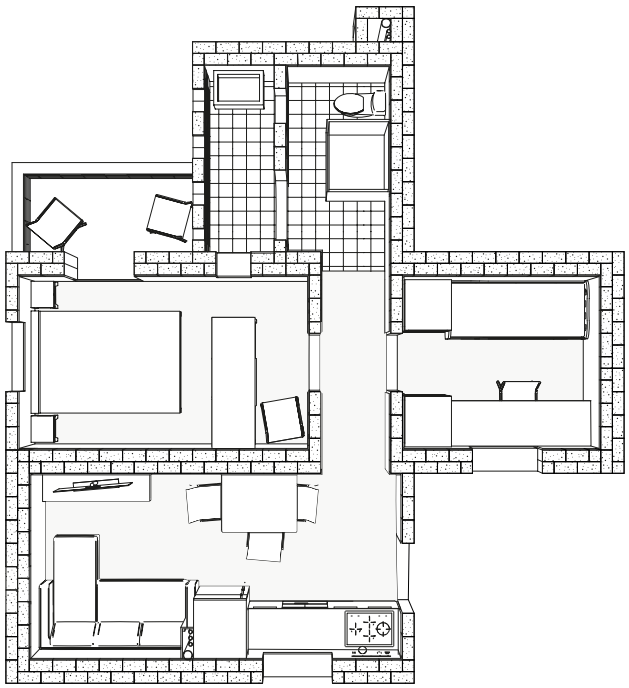
Formal operational stage

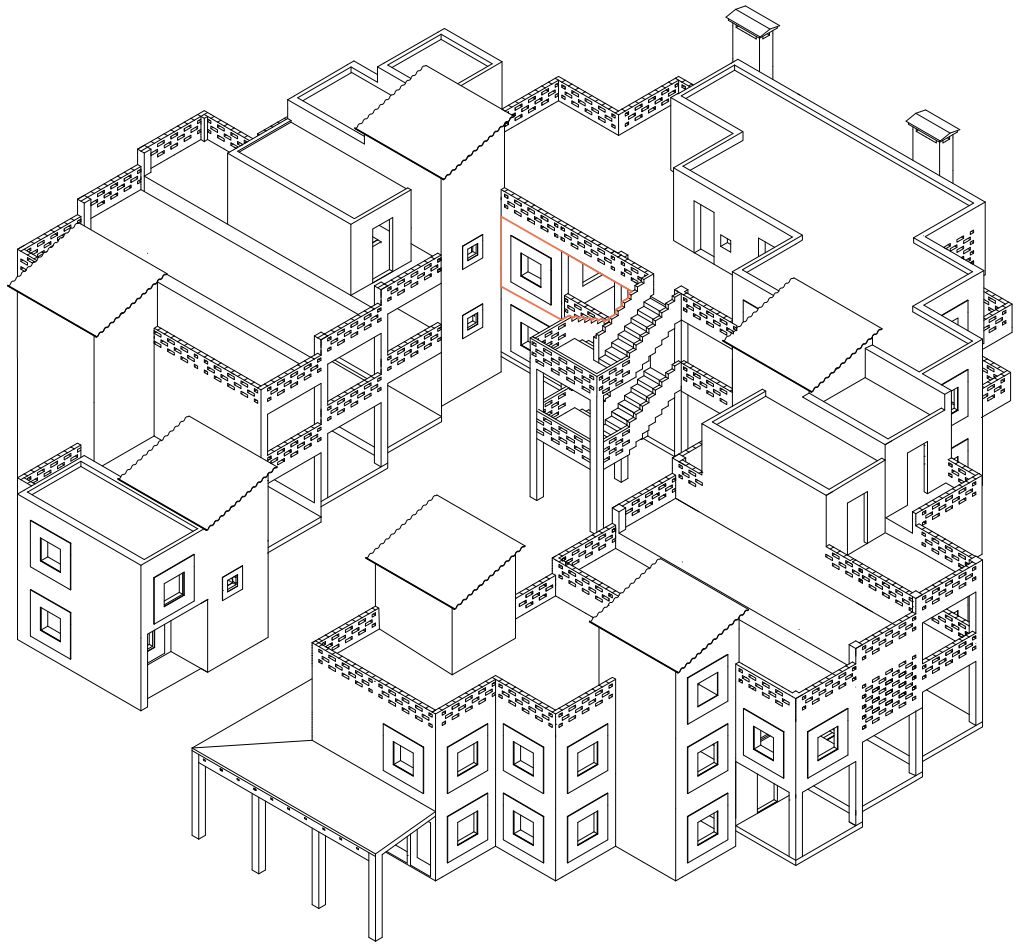
Identity vs identity confusion

Skatepark
Outdoor gym
Graffiti walls
Hangout place
Involve children in:
Maintenance
Kindergarden
Gardening
Incrementality building
School help

Dwelling typologies

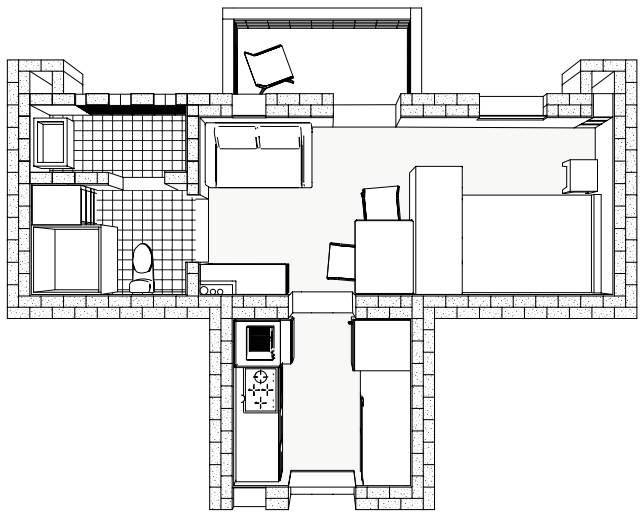
Apartment 1 39 m2 HIS 1 1:100

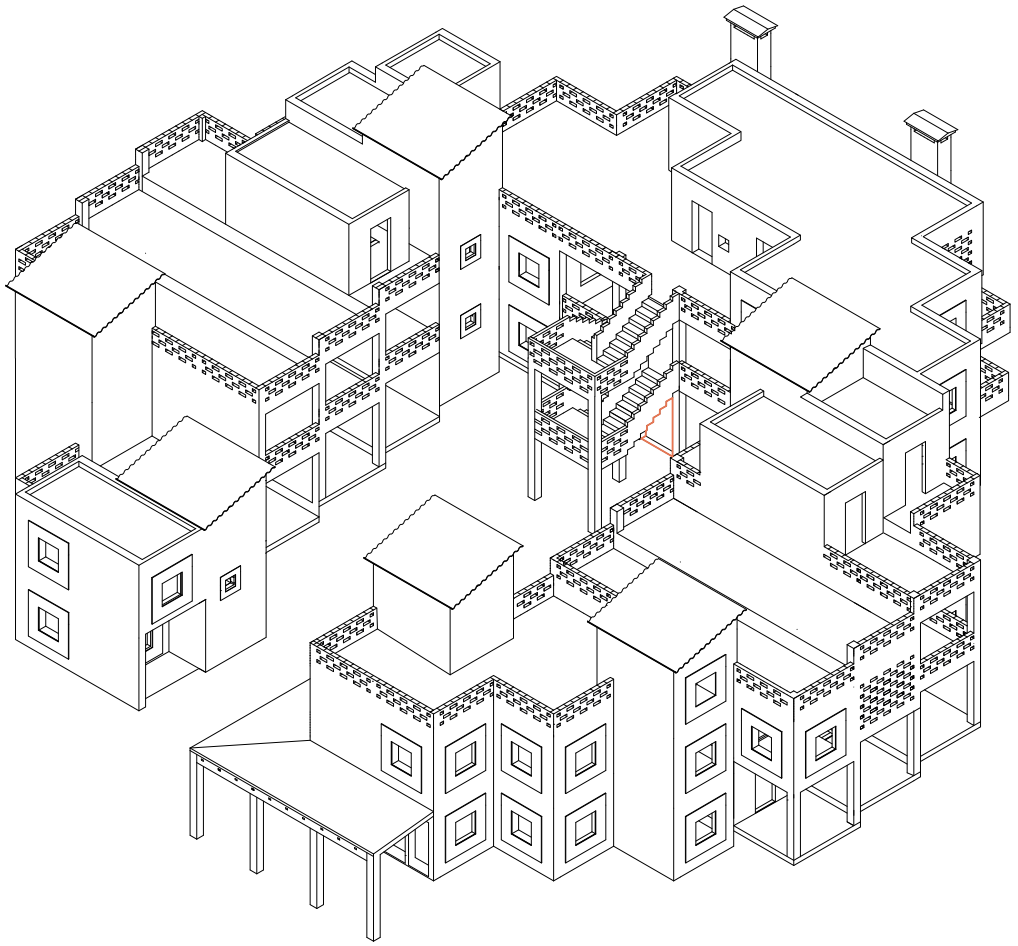




Apartment number one has 39 m^2 and is built for the HIS1 income group. This apartment has two bedrooms, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in all four directions, making natural ventilation great. Besides that, it is connected with the solar chimney for assistance with this natural ventilation if needed. The apartment is accessed via the outdoor staircase and shared walkway.

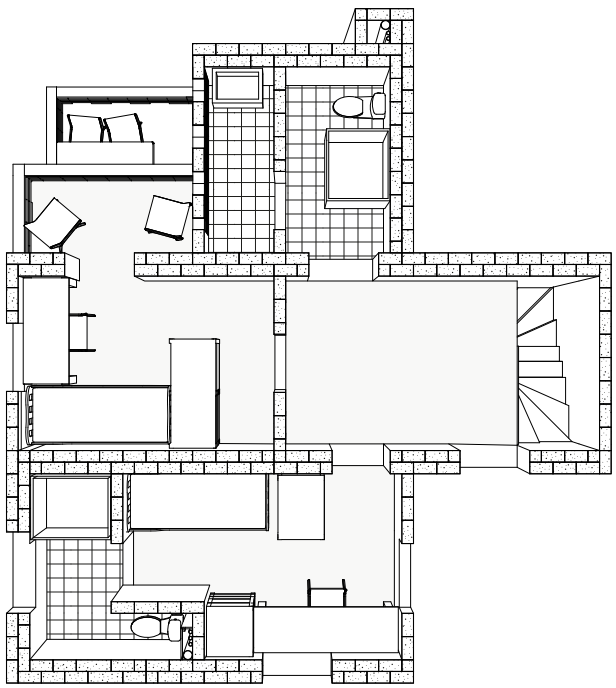
Apartment 2 26 m2 HIS 1 1:100

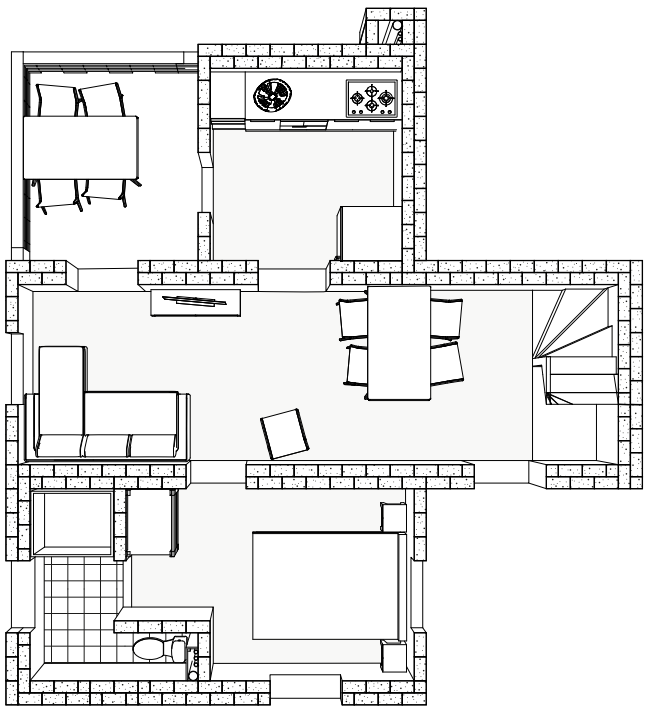


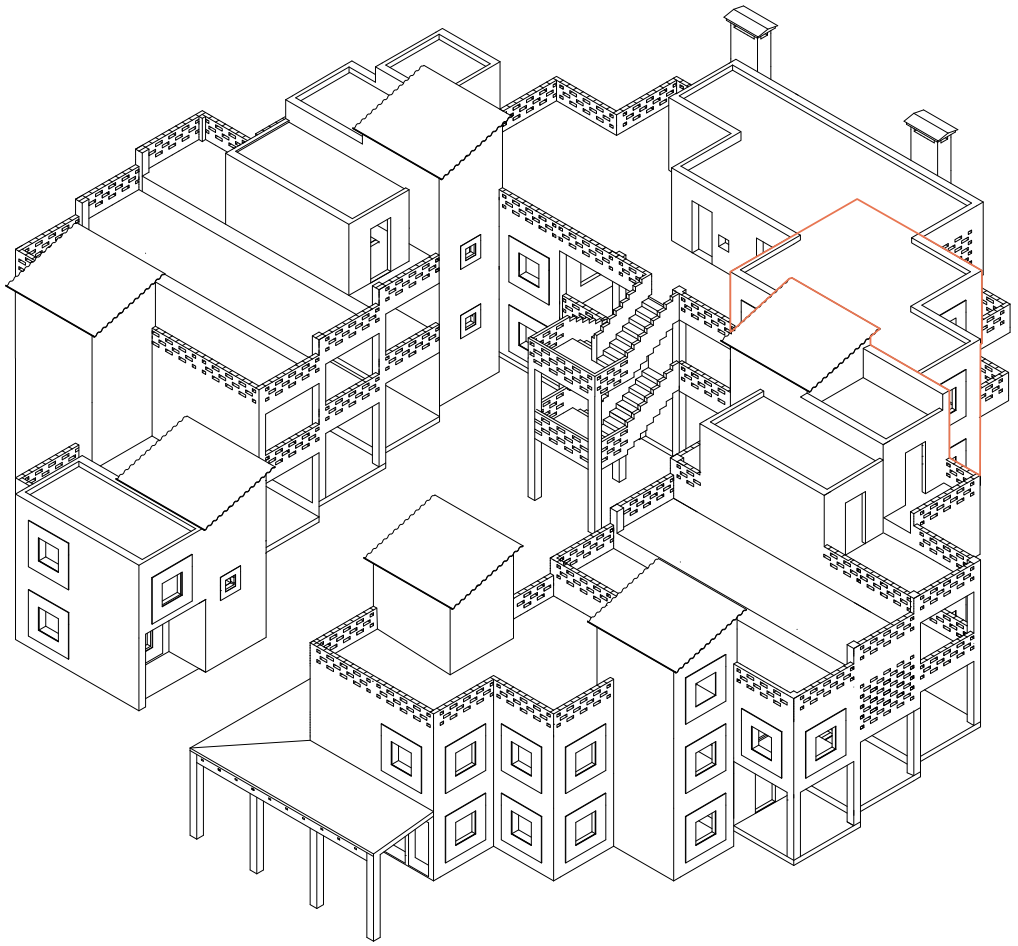


Apartment number two has 26 m^2 and is built for the HIS1 income group. This apartment has one bedroom, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in two directions, making natural ventilation limited. Therefore, it is connected with the solar chimney in both the bathroom and the bedroom for assistance with this natural ventilation. The apartment is accessed via the outdoor staircase and shared walkway. This type can be occupied by single parents, preventing them from separation from the rest of the family.

Maisonnette 1 78 m2 HIS 2 1:100

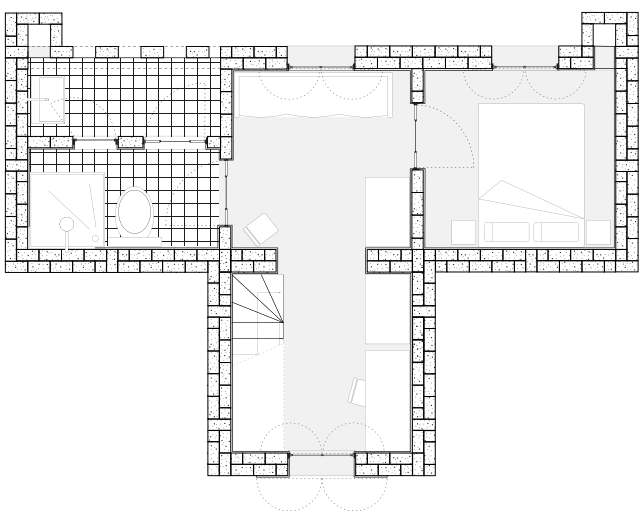


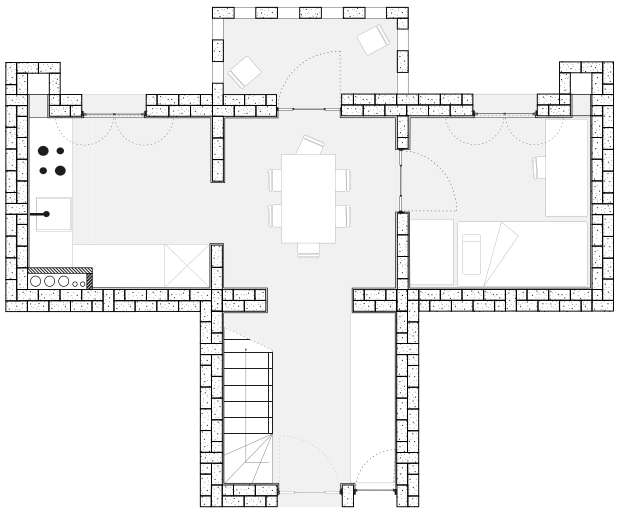


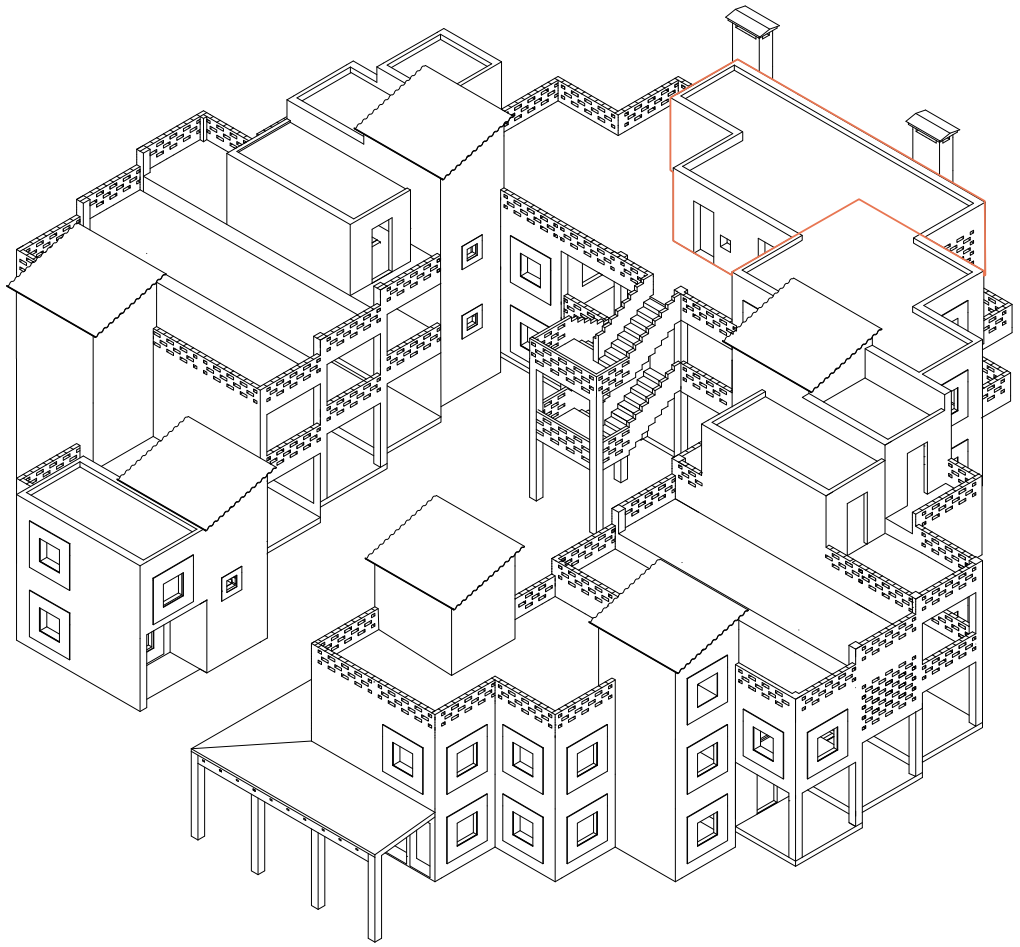


Maisonette number one has 78 m^2 and is built for the HIS2 income group. This apartment has four bedrooms, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in all four directions, making natural ventilation great. Besides, it is connected with the solar chimney in both the bathroom and the kitchen for assistance with this natural ventilation. The apartment is accessed via the outdoor staircase and shared walkway and is on the upper floor of the block.

Maisonnette 2 52 m2 HIS 1 1:100

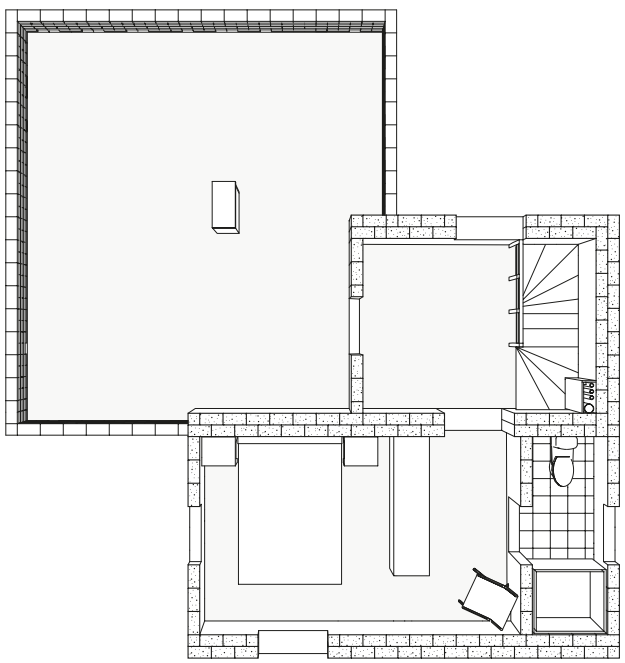


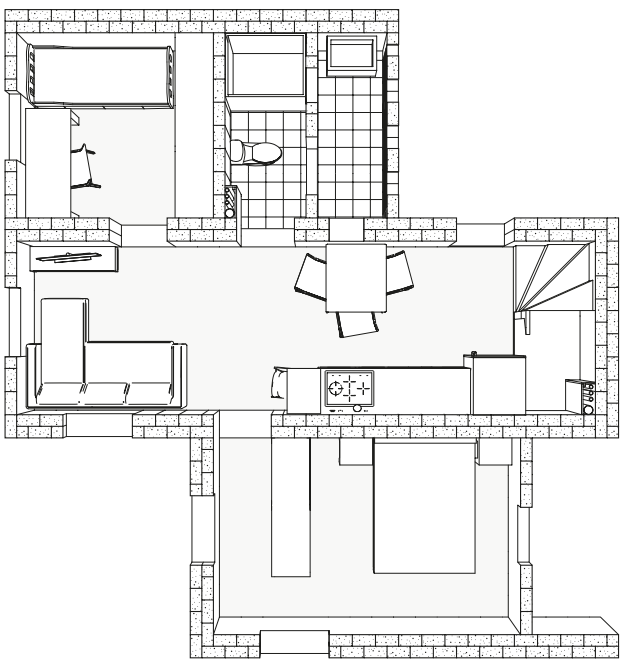


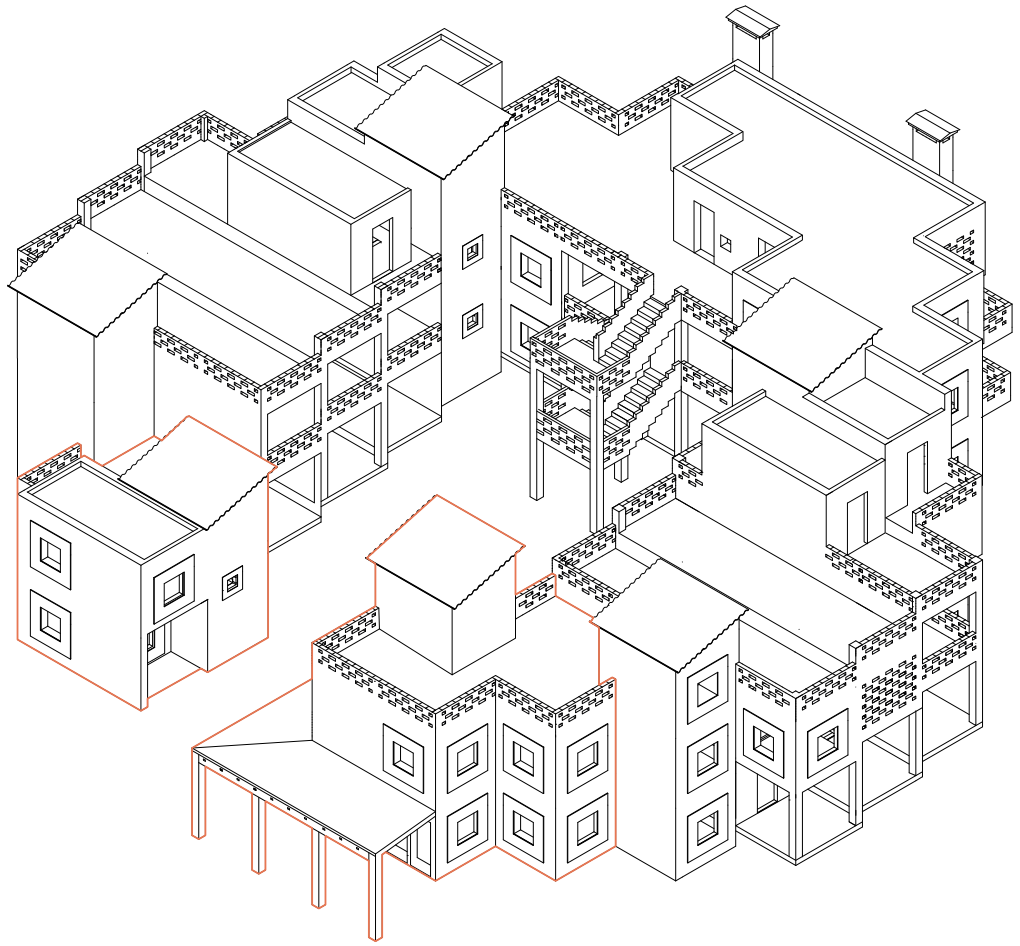


Maisonette number one has 52 m^2 and is built for the HIS1 income group. This apartment has two bedrooms, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in two directions, making natural ventilation limited. Therefore, it is connected with the solar chimney in the bathroom, kitchen and both bedrooms for assistance with this natural ventilation. The apartment is accessed via the outdoor staircase and shared walkway and is on the upper floor of the block.

Townhouse 1 73m2 HIS 2 1:100

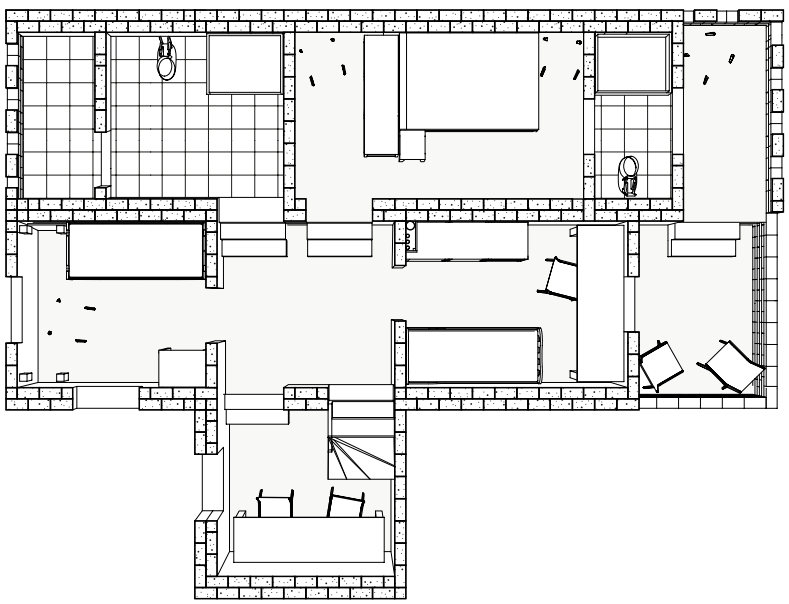


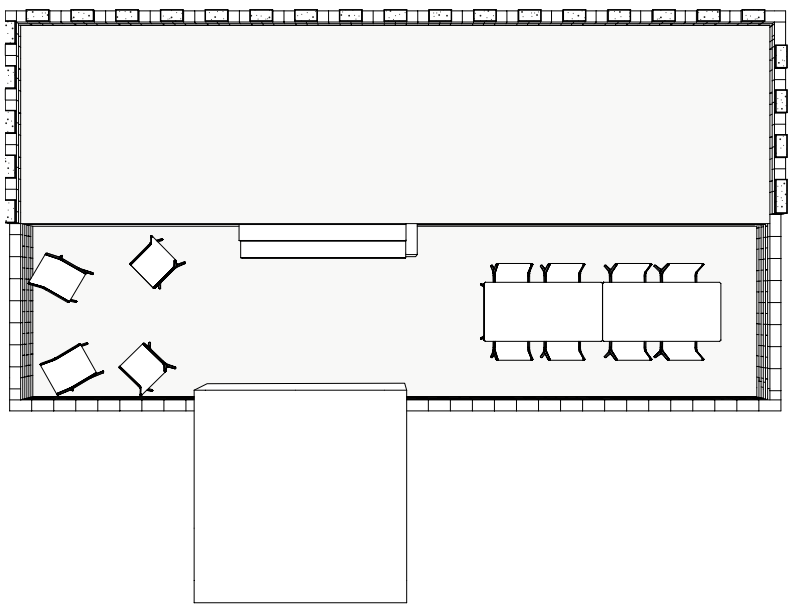


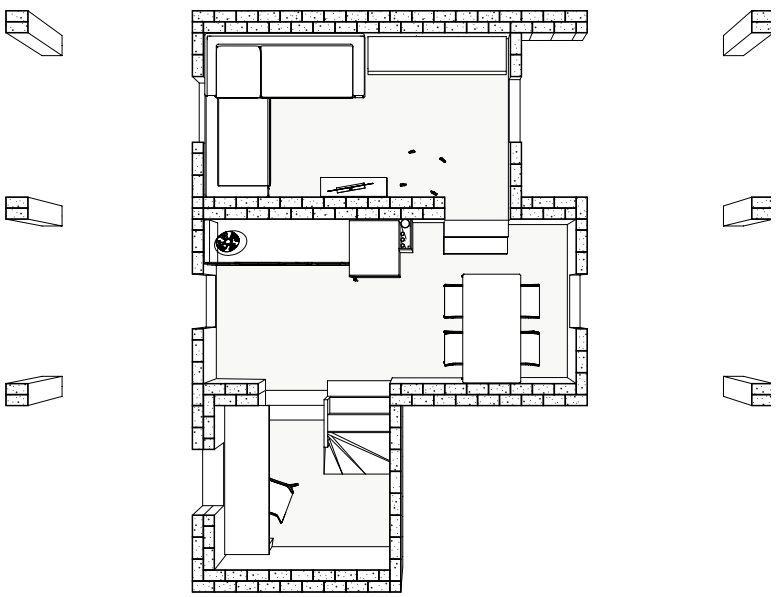


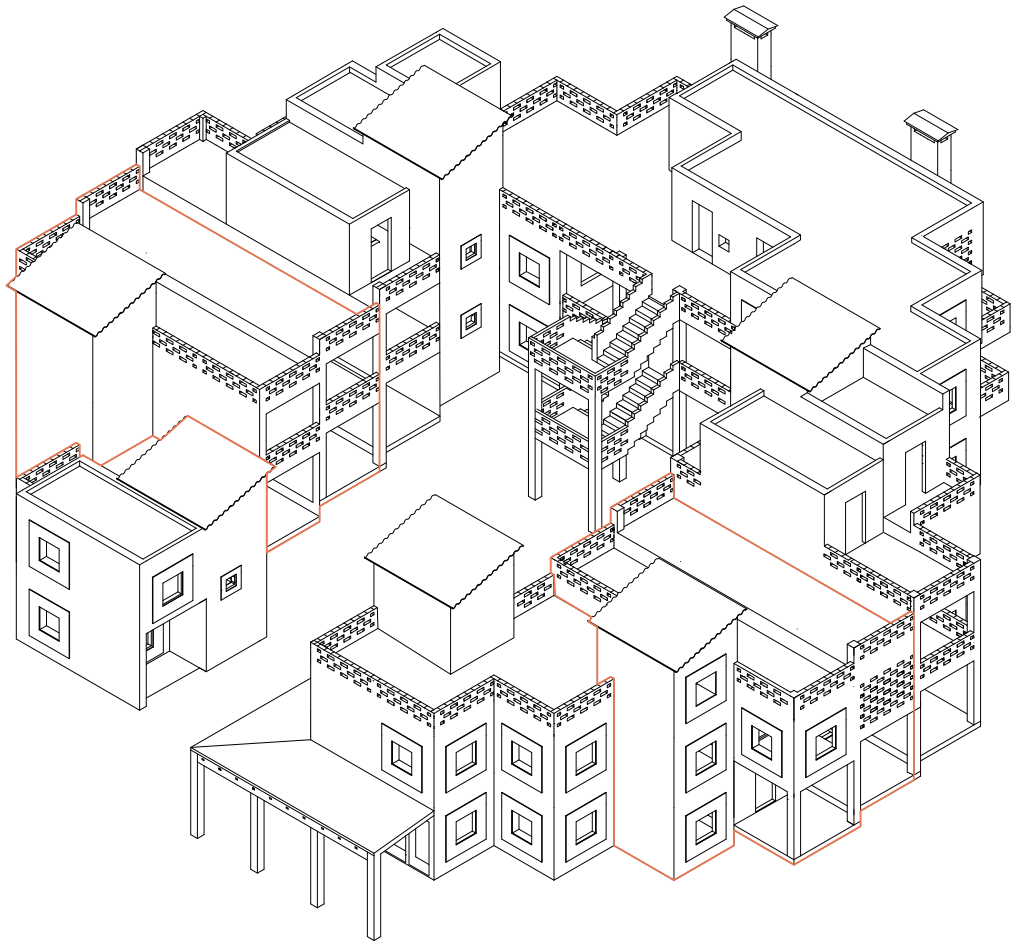
Townhouse number one has 73 m^2 and is built for the HIS1 income group. This townhouse has three bedrooms, a big kitchen, living room, bigger bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in all four directions, making natural ventilation great. Since the townhouses go from floor to sky, they can create natural air draught by opening a window on the upper floor.

Townhouse 2 80 m^2 HIS 2 1:100



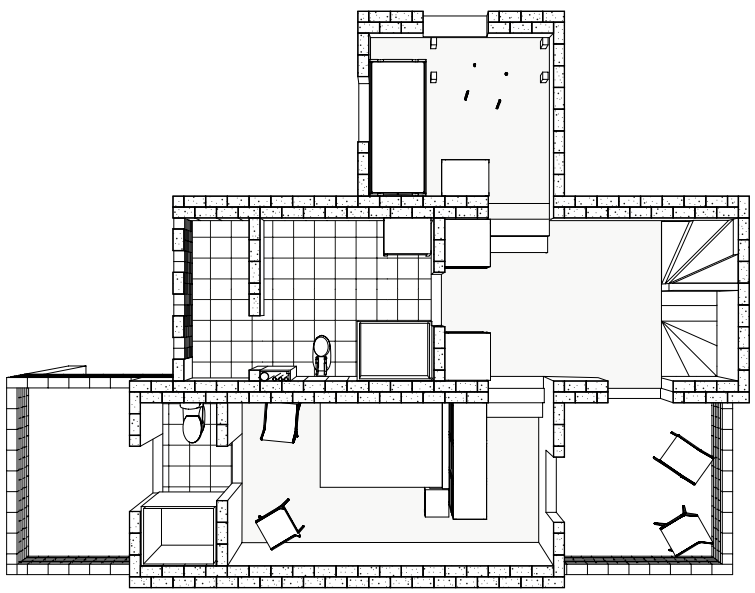


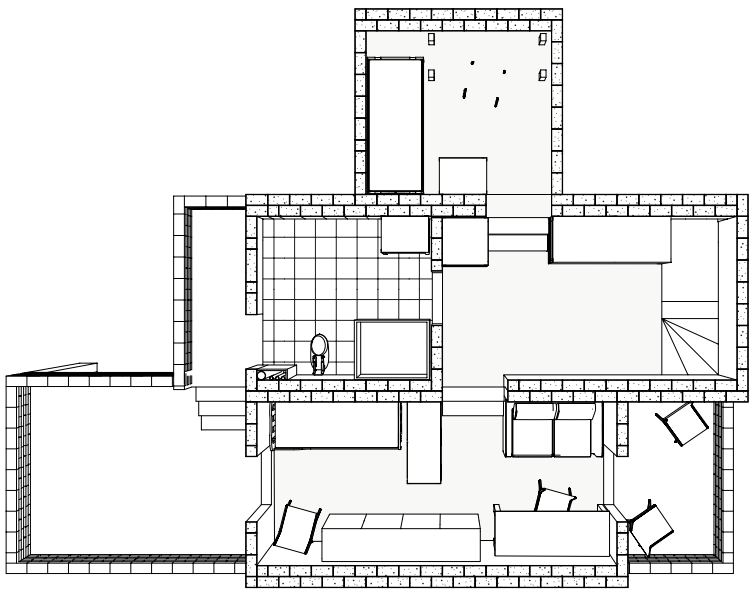


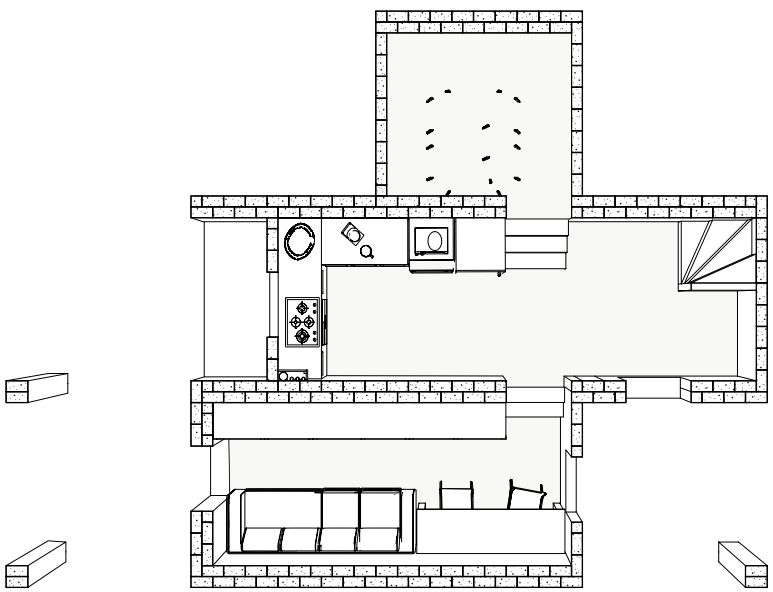


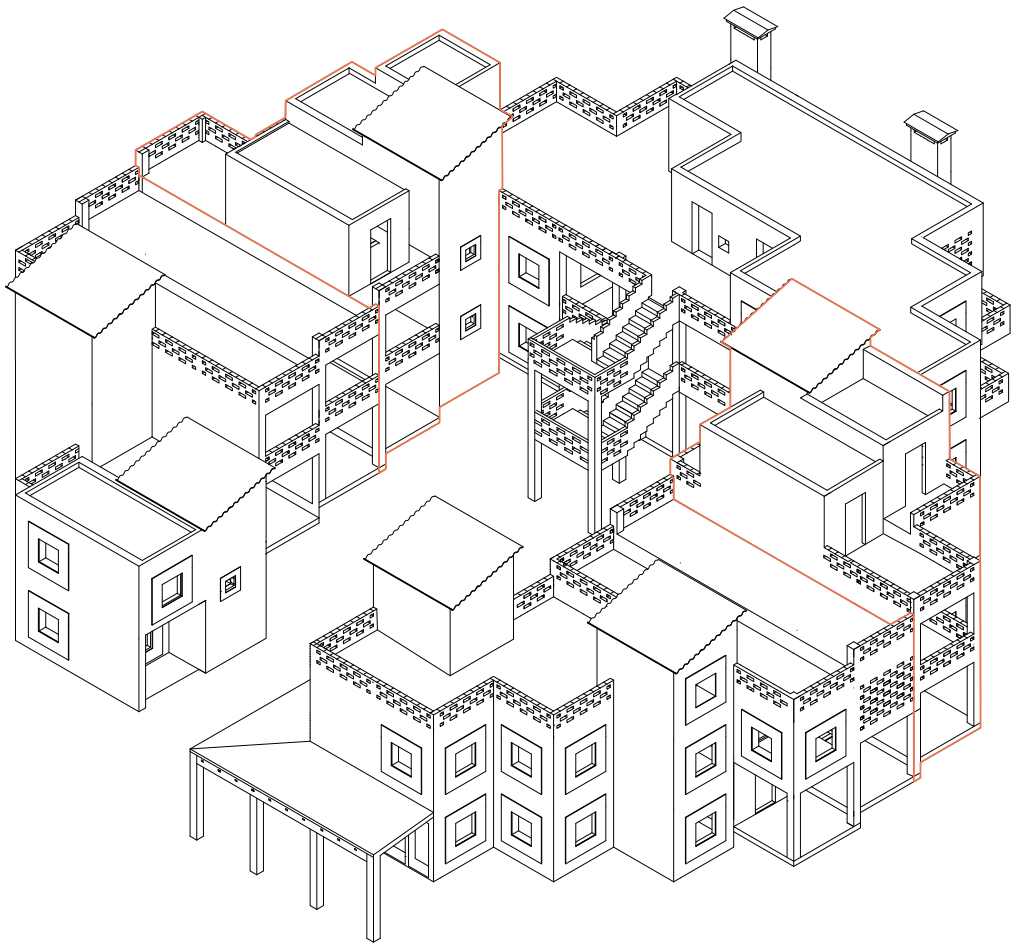
Townhouse number two has 80 m^2 and is built for the HIS2 income group. This townhouse has three bedrooms, a kitchen, living room, bigger bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in two directions, making natural ventilation limited. However, the townhouses go from floor to sky, so they can create natural air draught by opening a window on the upper floor.

Townhouse 3 123 m2 HIS2 1:100





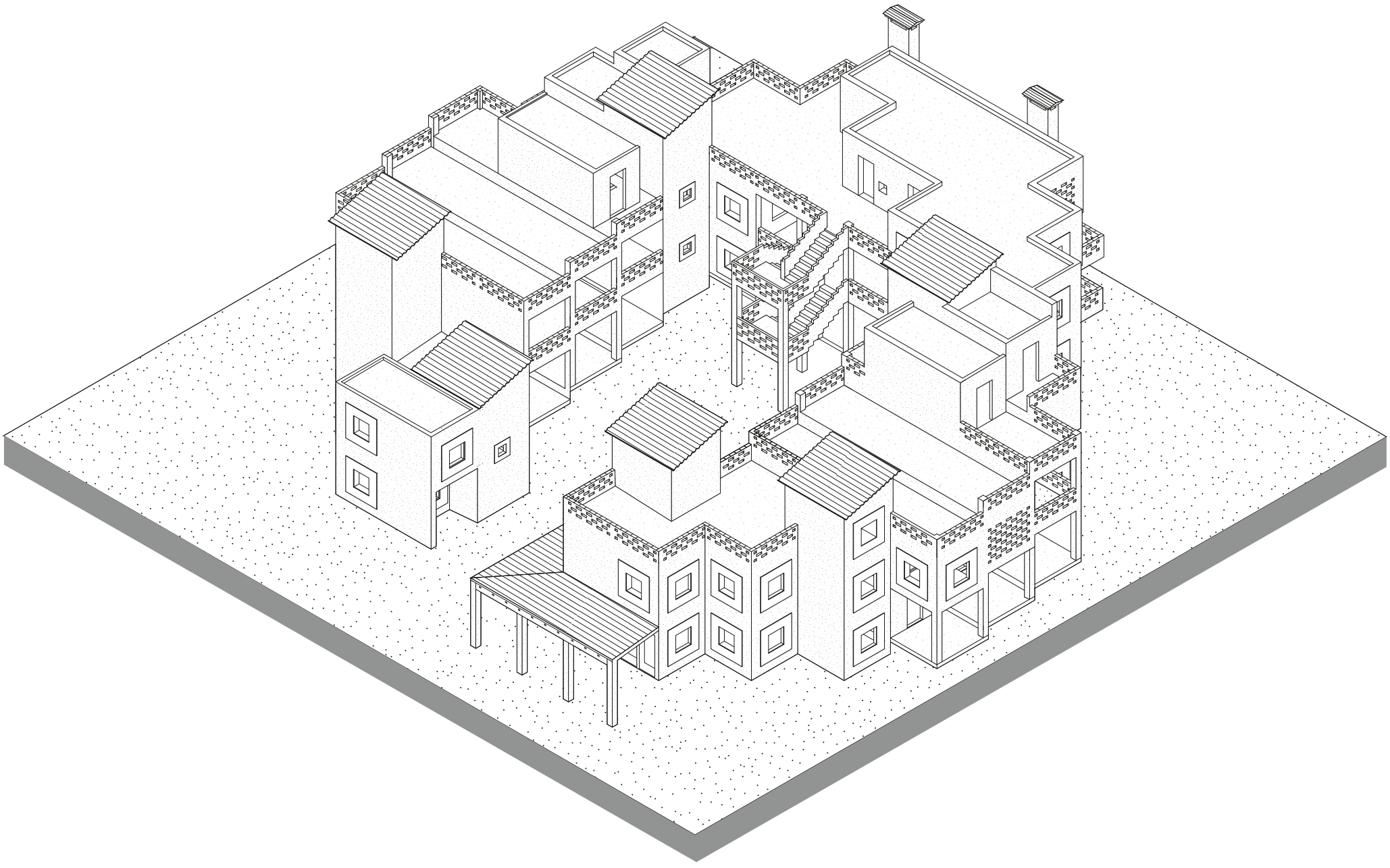




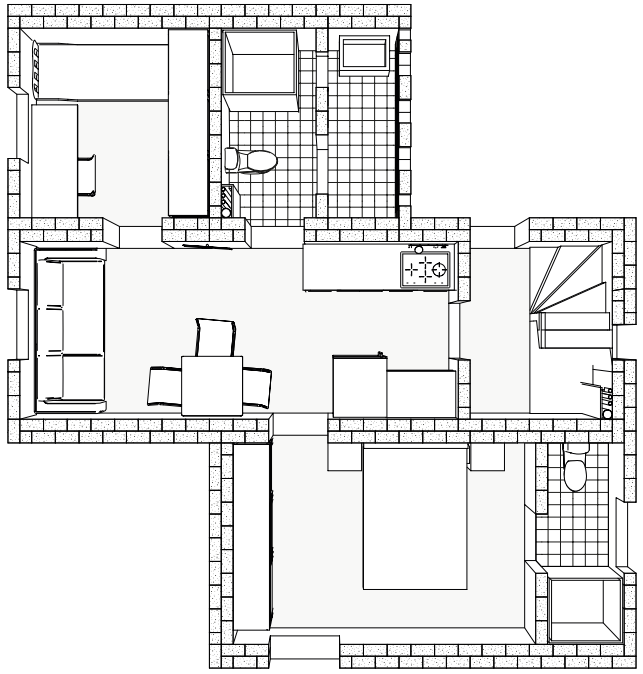
Townhouse number three has 123 m^2 and is built for the HIS2 income group. This townhouse has four bedrooms, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in all four directions, making natural ventilation great. Besides the townhouses go from floor to sky so they can create natural air draught by opening a window on the upper floor.

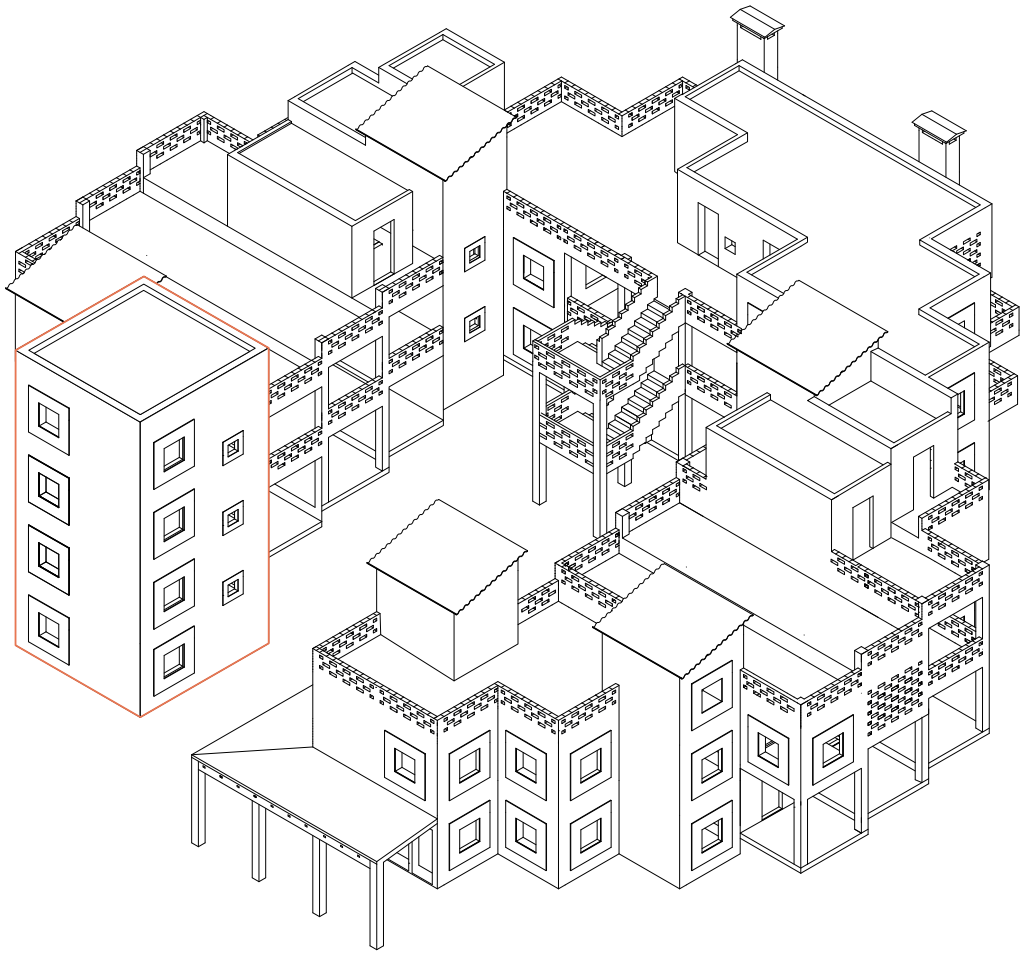
The block configuration is made by clustering 9 units in a circle form. Creating a courtyard inside. 6 townhouses and 3 apartment units are clustered, these apartments are stacked with the maisonettes on top. This creates a cluster of 15 dwellings or about 45 people. The height of the townhouses and the amount of floors the apartments are stacked is determined by the dominant wind direction and far stretching view, not obstructed by other buildings who are positioned downhill.

Two variations of the block are designed so the change in height on the site can be responded to by the block whether its opening is facing down, or the side where the apartments are.



Tower apartment 39 m2 HIS 1 1:100

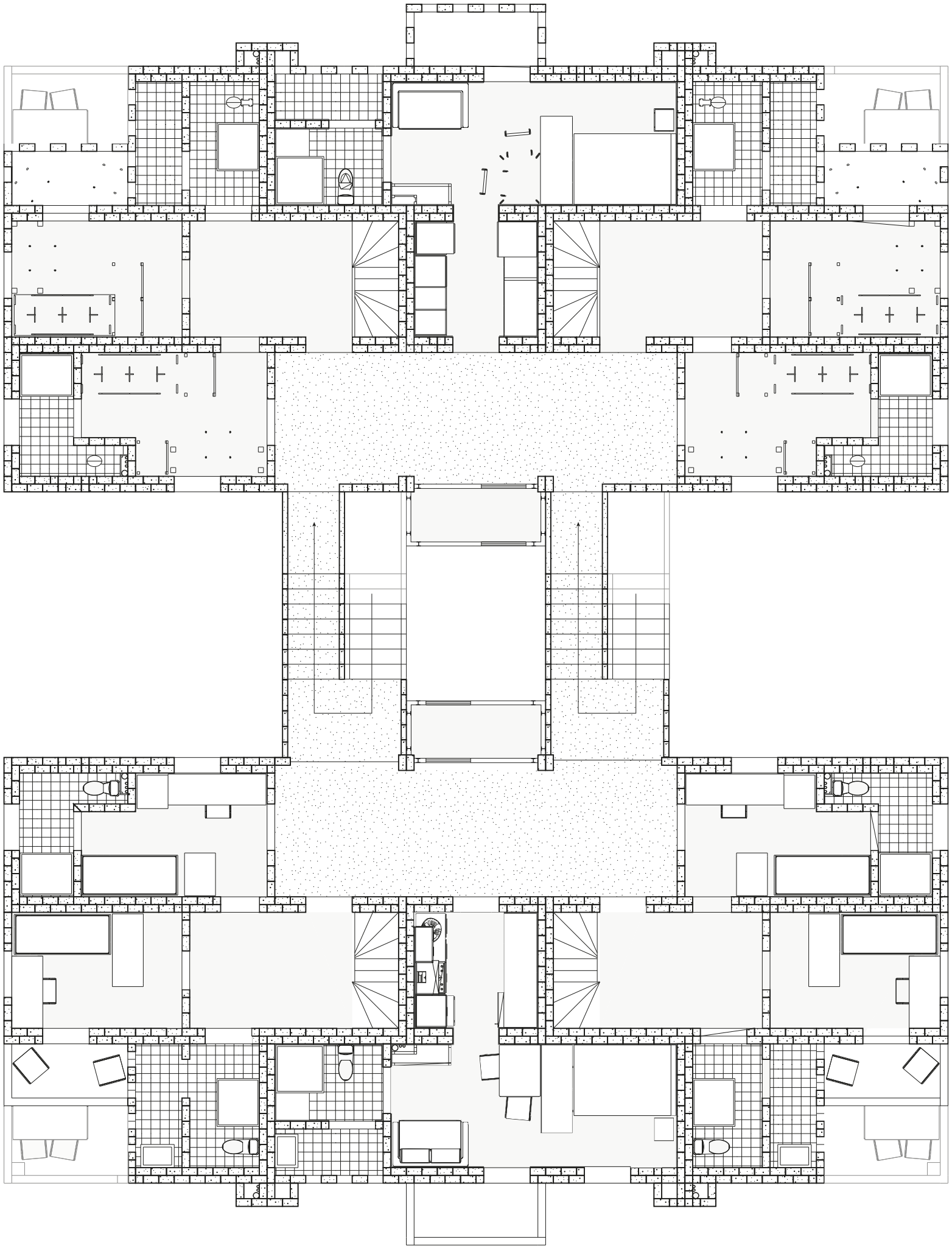




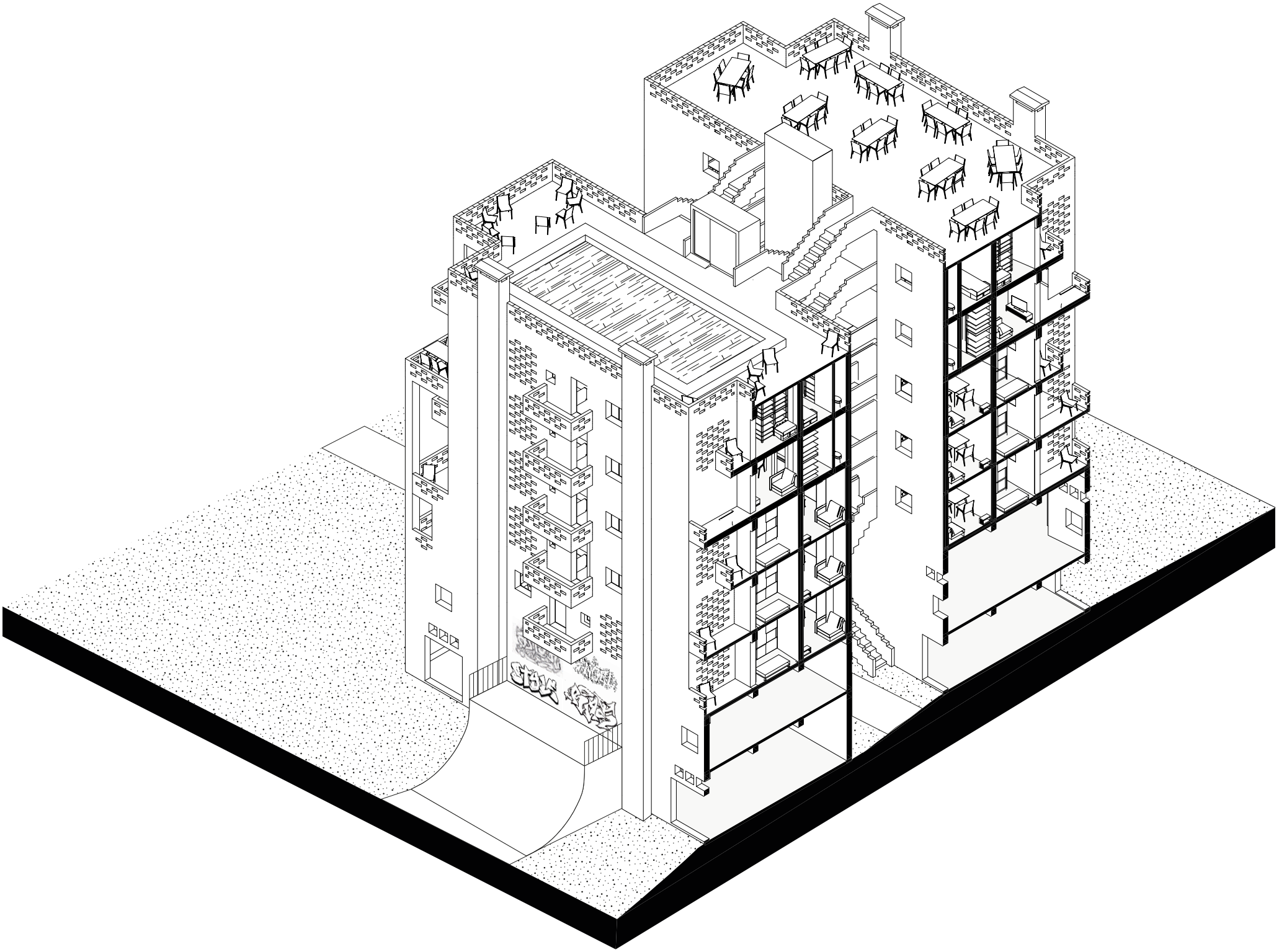
The tower Apartment has 39 m^2 and is built for the HIS1 income group. This apartment has two bedrooms, a kitchen, living room, bathroom and separate washing room behind a half open cobogó facade. This apartment has windows in all four directions, making natural ventilation great. The apartment is accessed via an internal staircase.

Tower Typology

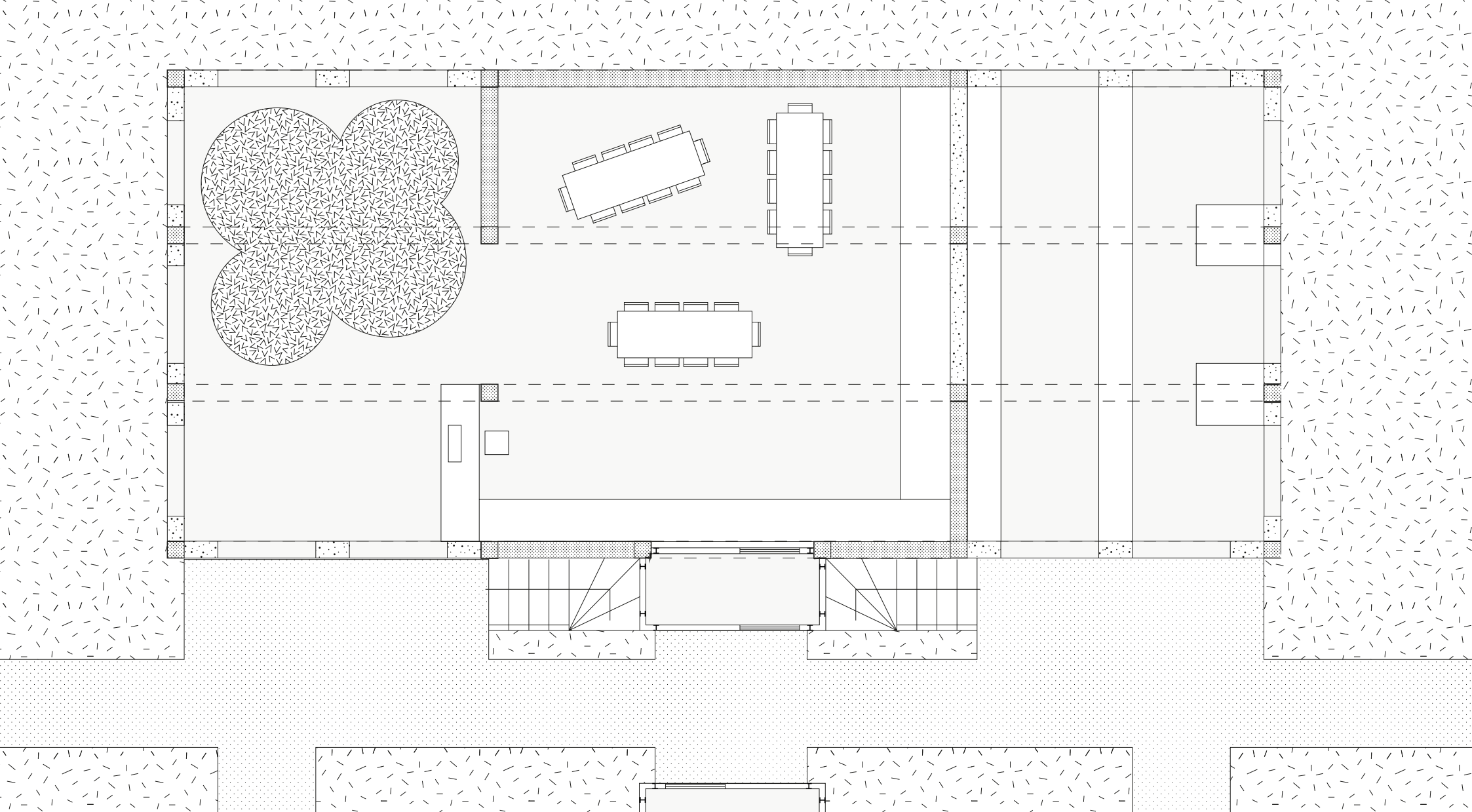
Besides the cluster block, this project has another typology, the apartment tower. The apartment tower houses apartment number one and two as well as maisonette one and two at the top. The tower reaches a height of 8 floors and is equipped with two elevators. The basic form of the units is preserved and the tower has an open courtyard between its two halves so natural ventilation can still be enjoyed. The tower is also rotated 50 degrees to make it fit in with the rest of the urban plan and to position the gap between the two halves of the tower to catch the predominant wind flow from the east.



The tower in the section shows how the two halves are shifted in the vertical direction by half a floor. This is done to ensure the tower adapts to the sloping terrain, making excavation works less heavy. Another benefit is that the external staircase can now reach each floor by one crossing, effectively providing a double staircase for the better flow of people and fire safety. The tower itself does provide other functions as well. On the roof one finds a public pool and terrace space to enjoy the views. In the lower two levels multiple collective functions are housed. Private outside space is provided for the residents by balconies at the backside of the dwellings.

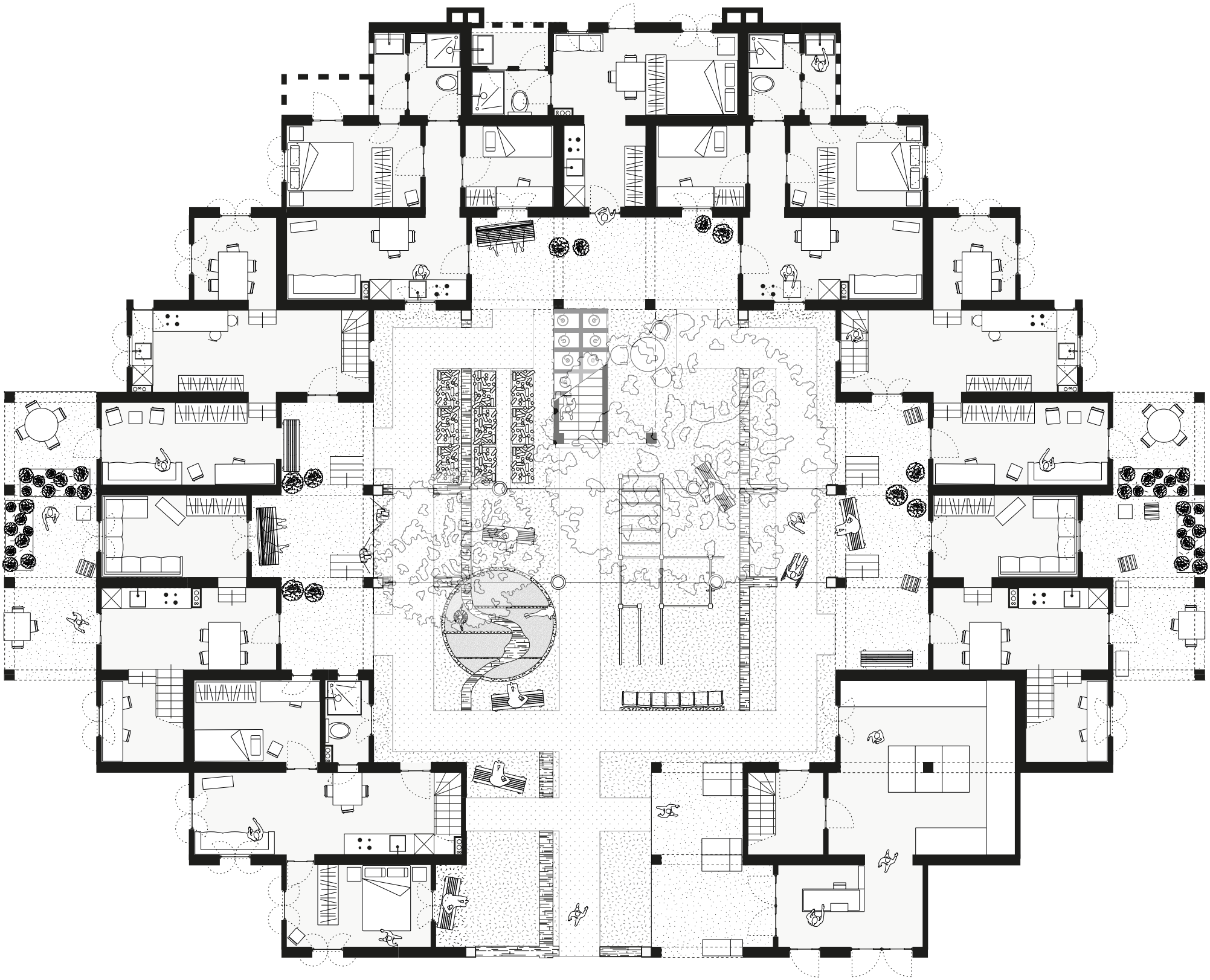


The lower two floors of the tower typology house functions to cater to the new inhabitants of the project as well as the current residents of the neighbouring houses. To cater to the children specifically one finds a kindergarten, small scale school and youth ‘hangout’ with skatepark in and next to this tower. Other functions are a bigger sized supermarked or other business like a hairdresser or car mechanic. Other than the concrete stabilisation walls needed for the rigidity of the tower construction, the walls are made of the same CEB material, making them alterable over time to change with the changing needs of the neighbourhood.



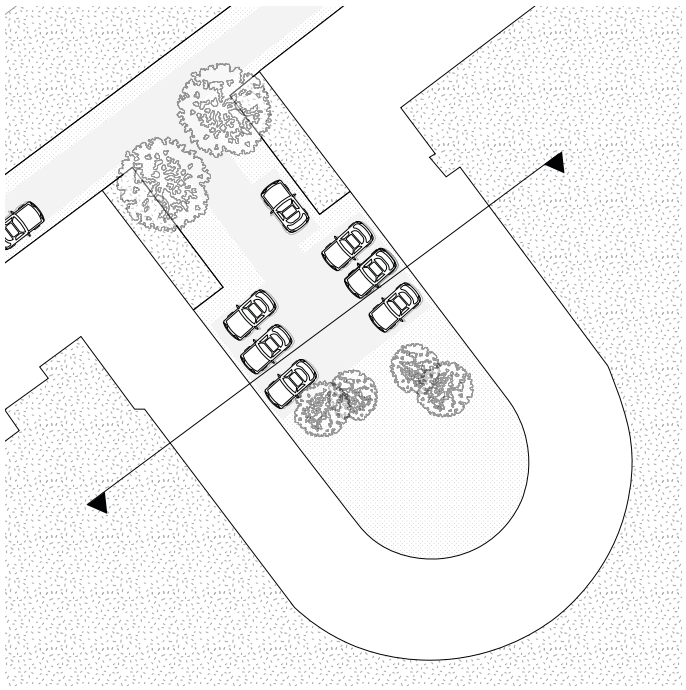
Cluster typologies

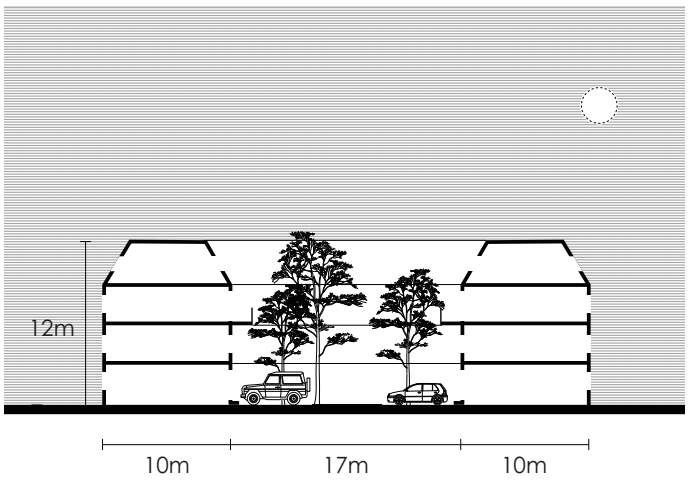
The main block is made by clustering 9 plots together and forming a courtyard within. This courtyard has the size of 13,5 by 13,5 metre (+ 180m^2). Within this cluster design elements are put in place to ensure the safety of children and to create a fostering living environment. Safety is mostly provided by the fact that 15 households have multiple windows and doors directed towards this courtyard. These 15 dwellings house up to 40 people. The developmental stage and personality conflict put central in this scale is the preoperational stage with the initiative v.s. guilt conflict. Measures to promote initiative in children between the age of two and seven are put in place. Quite simply this means, measures for play are put in place. In the floorplan you can see a sandpit, climbing frame, swing and a small community garden. This is mixt in with seating arrangements for the rest of the family and neighbours to promote involvement, while reducing the risk of overprotectiveness.



The section of the cluster shows the quality of the enclosed space within. The ratio of building height and distance between buildings is crucial in determining the balance between enclosed, or cramped. The section also shows the way the cluster adapts to the changing typography.

During a design process, one had intuitions on the atmospheric qualities of their design, however, these intuitions need to be tested. This can be done in multiple ways, more drawings or renders. Or one can compare the conditions of one's design with the real world. Walking around Delft I found multiple places that resembled the dimensions of the cluster just designed. With a comparison on cluster size, dwelling height and dwelling number, one can inform one's intuition and this comparison can now also be used to inform the reader on the intended quality.

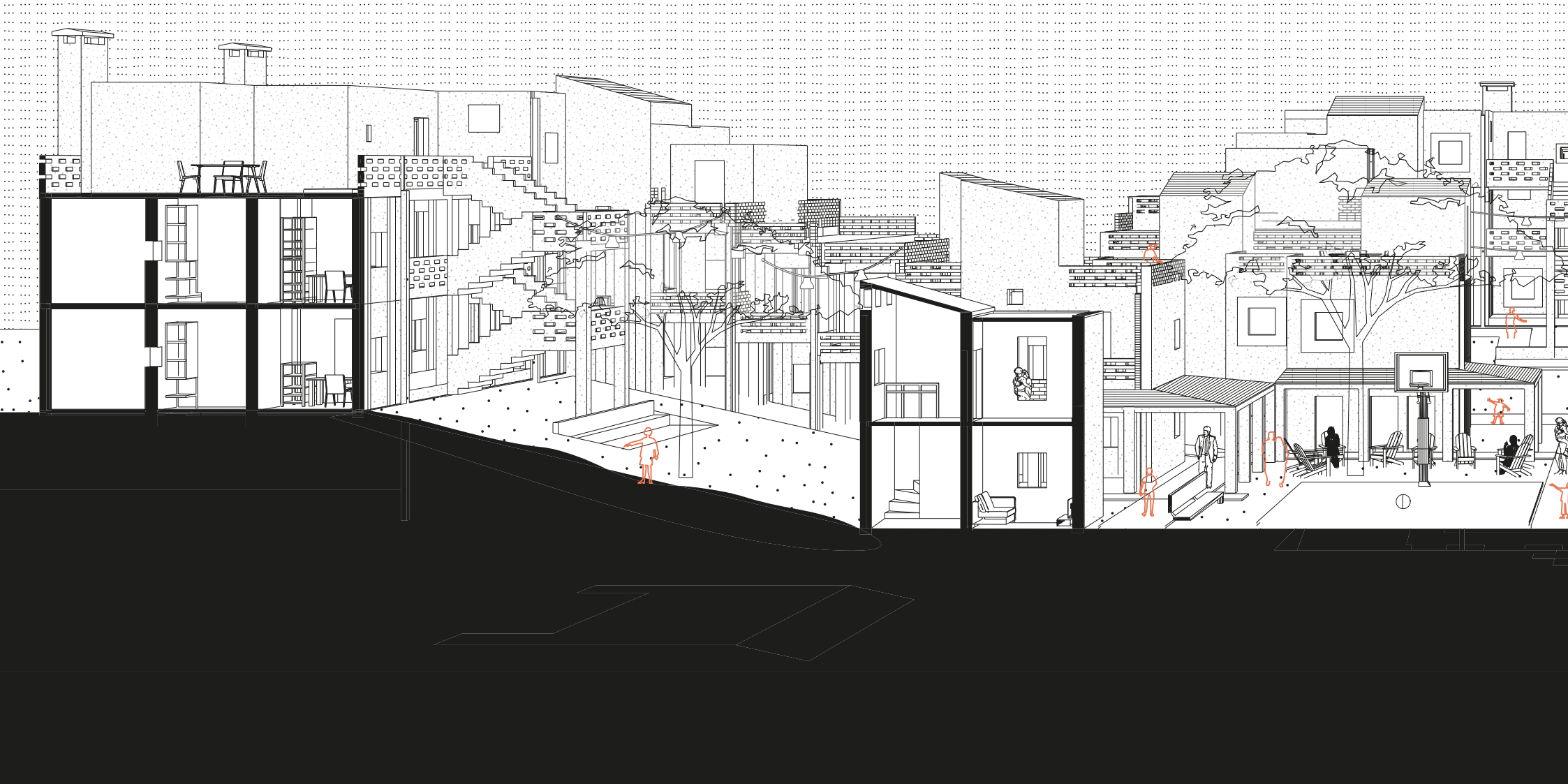





16-TB-RX

Zooming out, we can see how multiple blocks come together to form the next scale in the hierarchy of public spaces. Here 4 clusters join to form another open courtyard inside. This courtyard has the size of 24 by 24 metre (+ 576m^2) and bigger activities can take place here. A population of up to 160 people surrounds this square and more come in and out to visit the shops. The developmental stage central to this scale is the concrete operational stage in which the personal conflict Industry v.s. Inferiority is taken care of. In this conflict children can undertake actions on the medium to long term. Children start to see long term consequences of certain actions and patterns and are able to take small responsibilities. In this scale, the public space can still be used for play, now more complicated and involving longer term strategy and teamwork, like a football match. Besides that, different small projects can be started, by initiative of the school on site, the surrounding clusters, or spontaneous projects by children themselves in the ‘free zone’. These activities will be placed in the middle, with a ring pathway around it where neighbours walk towards the shops in this, or the next cluster. Ample greenery and trees shelter this square from the sun, and seating is placed so residents can enjoy the playful and industrious activities of the children of the neighbourhood.

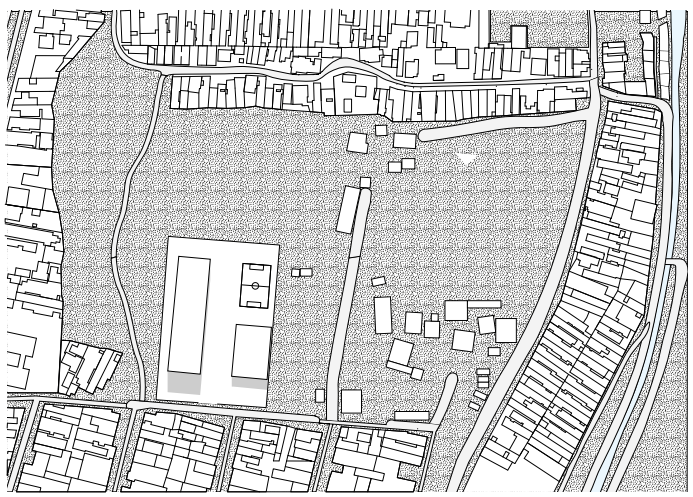
The section of the multiple clusters shows a bigger townsquare. This square is level, making it suitable to house other activities like a football game. On this square the community of four clusters can come together to enjoy life in a more urban setting compared to the calm and enclosure of the small cluster



Masterplan

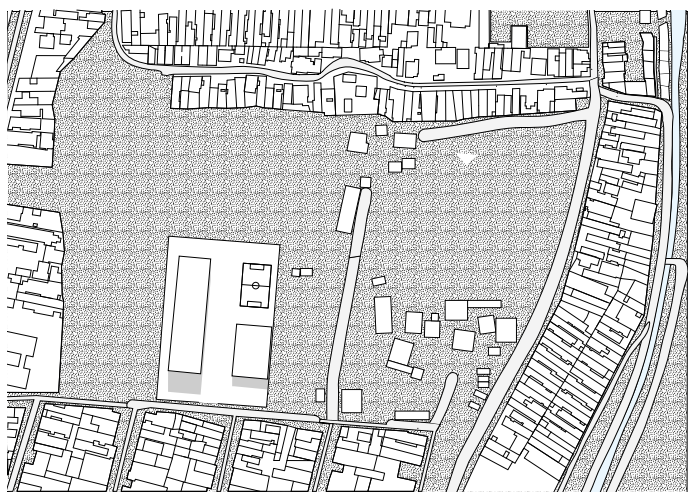
Zooming out one more time, we get to the masterplan. To the right you see the location in its current condition. The site is surrounded by favela dwellings. Those on the east side are destined to be demolished because of their precarious location close to the water. This water, on the east side of the site, leads directly to the Billings reservoir, one of two big water bodies providing fresh water to a big part of Sao Paulo. Towards the north from the site, the land is surrounded by water, making the site the beginning of a small peninsula. All around this peninsula favela dwellings are at flood risk, being built too close to the waterbody. In total about 630 dwellings need to be evicted, and another 22 businesses. The masterplan will house all these people, and more. The site is placed on steep terrain, leading from its highest point in the west, 40 metres down to the water on the east side. On the site one can now find a big school and a small horse farm and other small buildings.

Masterplan current situation



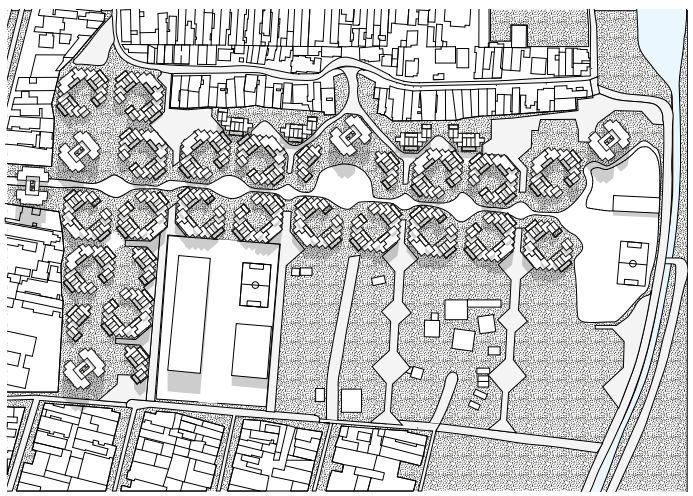
Before the first demolition can begin, social relations in the existing situation are researched, so replacement can be done with minimal disruption of social bonds.

Masterplan demolition for phase one



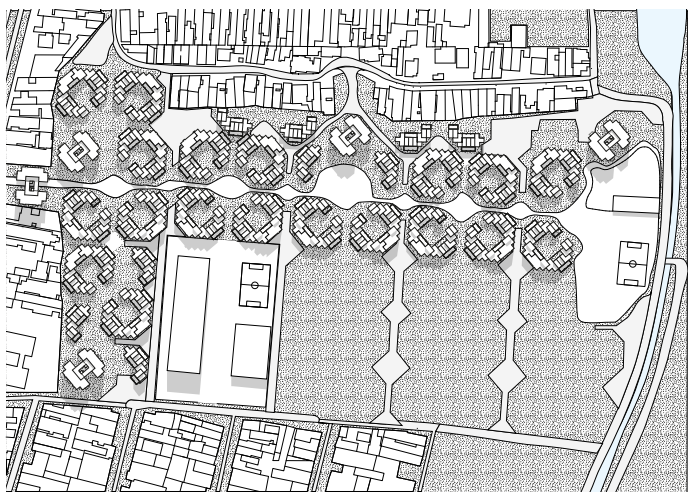
The first demolition consists of the temporary eviction of 8 houses and one business, this business is already for sale, and the people will be rehoused in phase 1.

Masterplan construction of phase 2



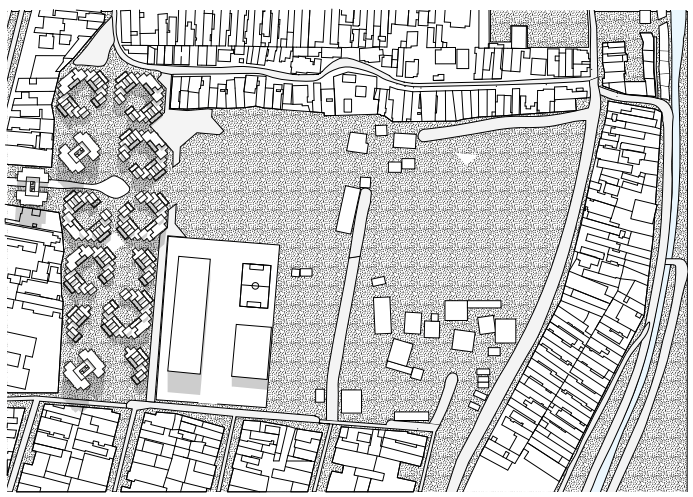
Phase two is built, finishing the spine with commercial functions and linking the neighbourhood to the waterfront.

Masterplan demolition for phase tree



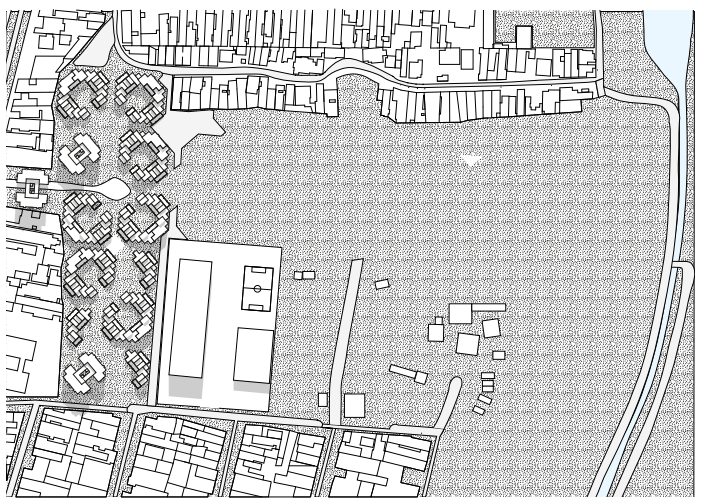
Preparations for the final phase are made. Optimalisation of the building methode and a higher skilled workforce will speed work up.

Masterplan construction of phase one



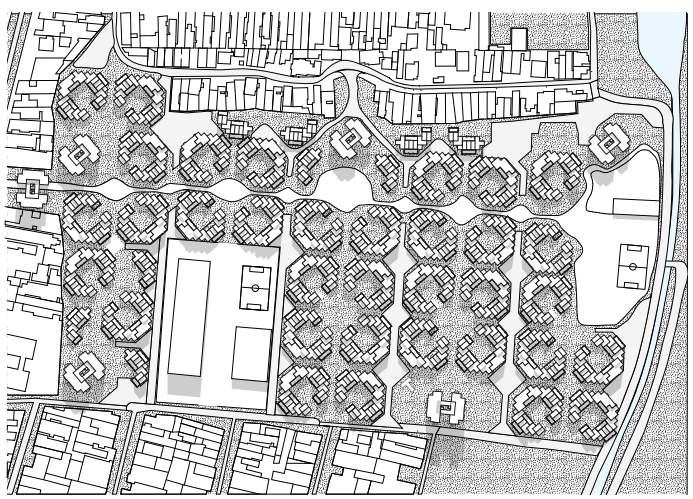
No construction of phase 1 can begin, providing 72 townhouses, 14 maisonnettes and 69 apartments, enough to house the 82 to be evicted households.

Masterplan demolition for phase two



Now the dwellers of the flood prone favela area on the east side of the site have moved into phase one, demolition and preparation for phase two start.

Masterplan construction of phase three

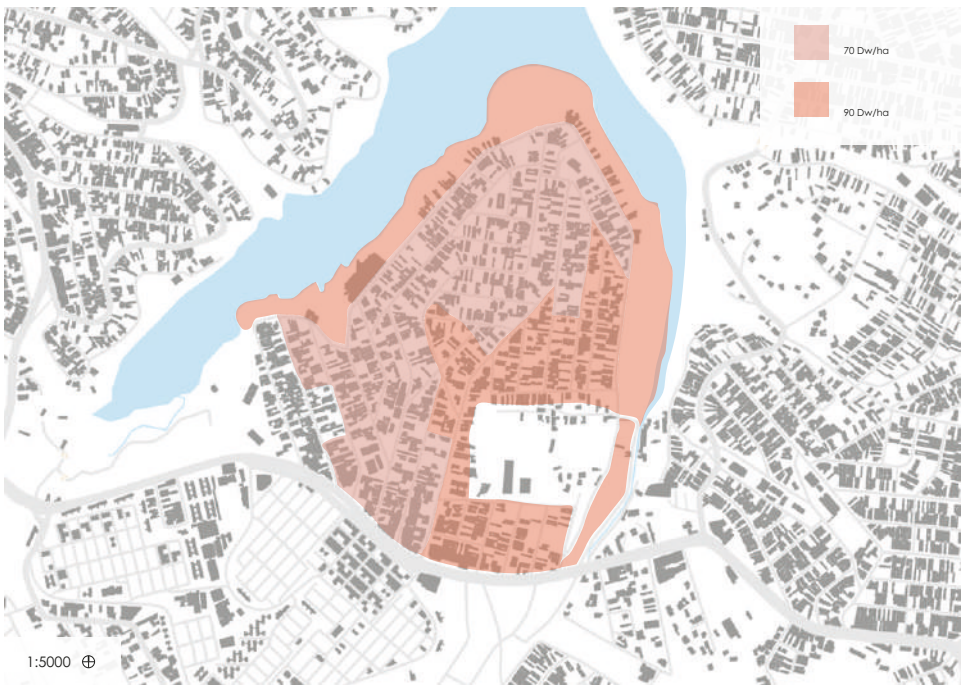


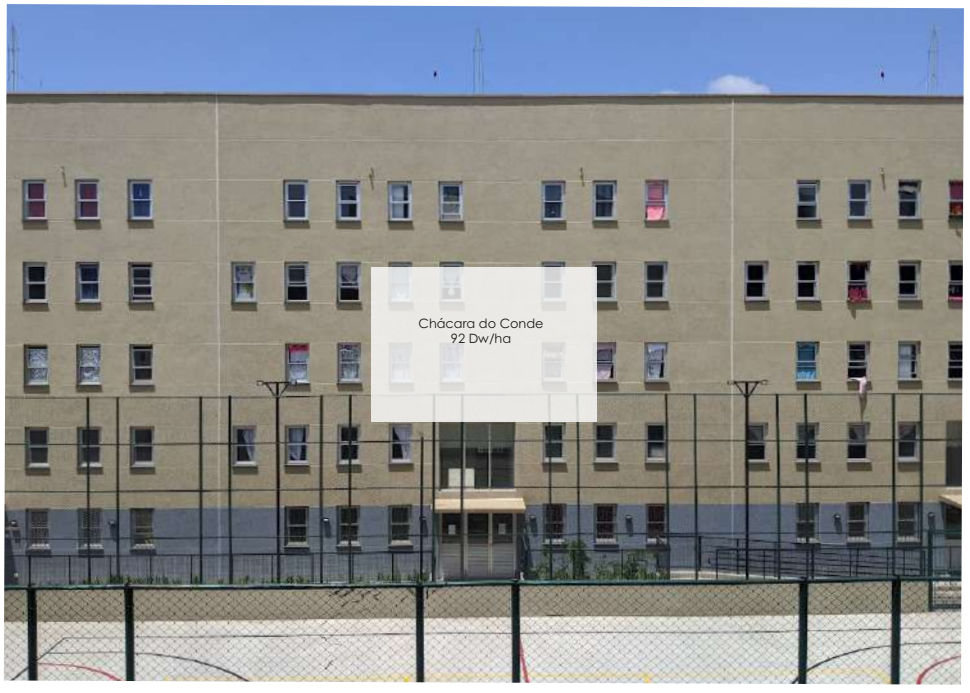
The building phase of the project is done. In total 709 dwellings are built. providing a home for almost 2500 people (709 x 3,5)

The masterplan shows how 34 clusters, 6 towers and 8 townhouse rows come together to fill the plot. The masterplan is made of the basic grid of the clusters, with exceptions at multiple places. The towers, which also house amenities in the two lower floors, are placed at the boundary between the project and the surrounding neighbourhood. The towers are also located in such a way that all paths between the clusters have a tower at the end as a visual recognition point in the neighbourhood.

Furthermore, the masterplan provides a car free walking possibility from each place in the project to each other, without crossing a road. This is done using the redburn principle, connecting all the green areas to create a seamless park to live in. The central spine west to east of the project connects all arms that go from north to south. The spine is the direct link from the hearth of the peninsula to the waterfront, which will be transformed into a park. Other anomalies and the big school, which remains in location and function, and the open space down by the water.

The result of this masterplan is the ability to house around 2280 people. This is based on the amount of dwellings (579) times the average amount of people per dwelling in Sao Paulo (3,95) (https://globaldatalab.org/areadata/profiles/BRAr120/) These people are housed in a setting with an urban density of the whole master plan of 99.8 dwellings per hectare. This is higher than the density of the surrounding neighbourhood (70 to 90 dw/ha) and higher than the reference project of Chacara do Condo (92 dw/ha). This means, that the project is able to house more people in the same area, and is thus, in part, an economically more interesting option. Developers and governments can look at this project and see an actual alternative to the current 'solution' offered.





579 Dwellings

244 Apartments HIS 1
231 Townhouses HIS 1 and HIS 2
104 Maisonnettes HIS 1 and HIS 2

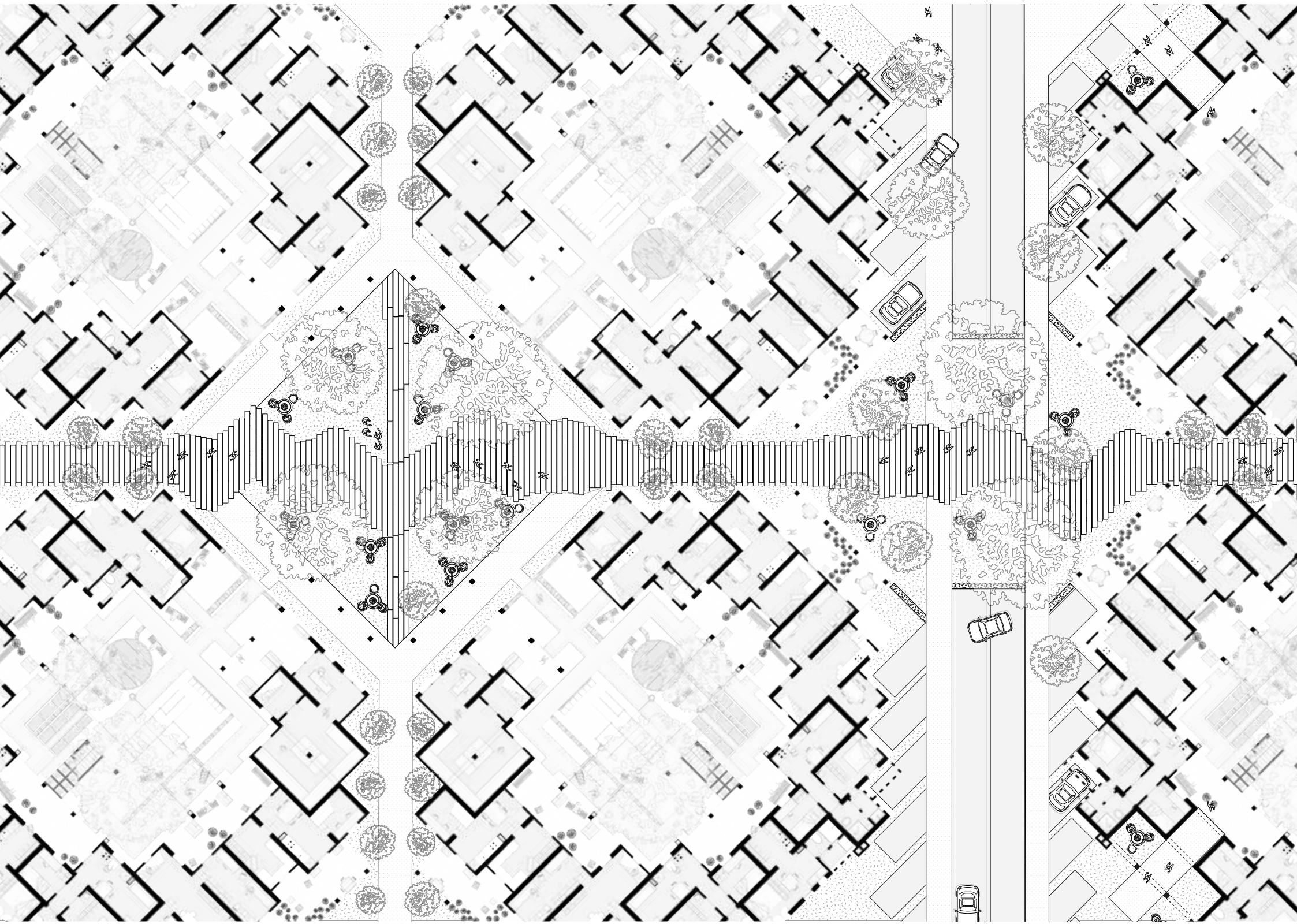
99,8 Dwellings / ha

GSI: 0,29
FSI: 0,86

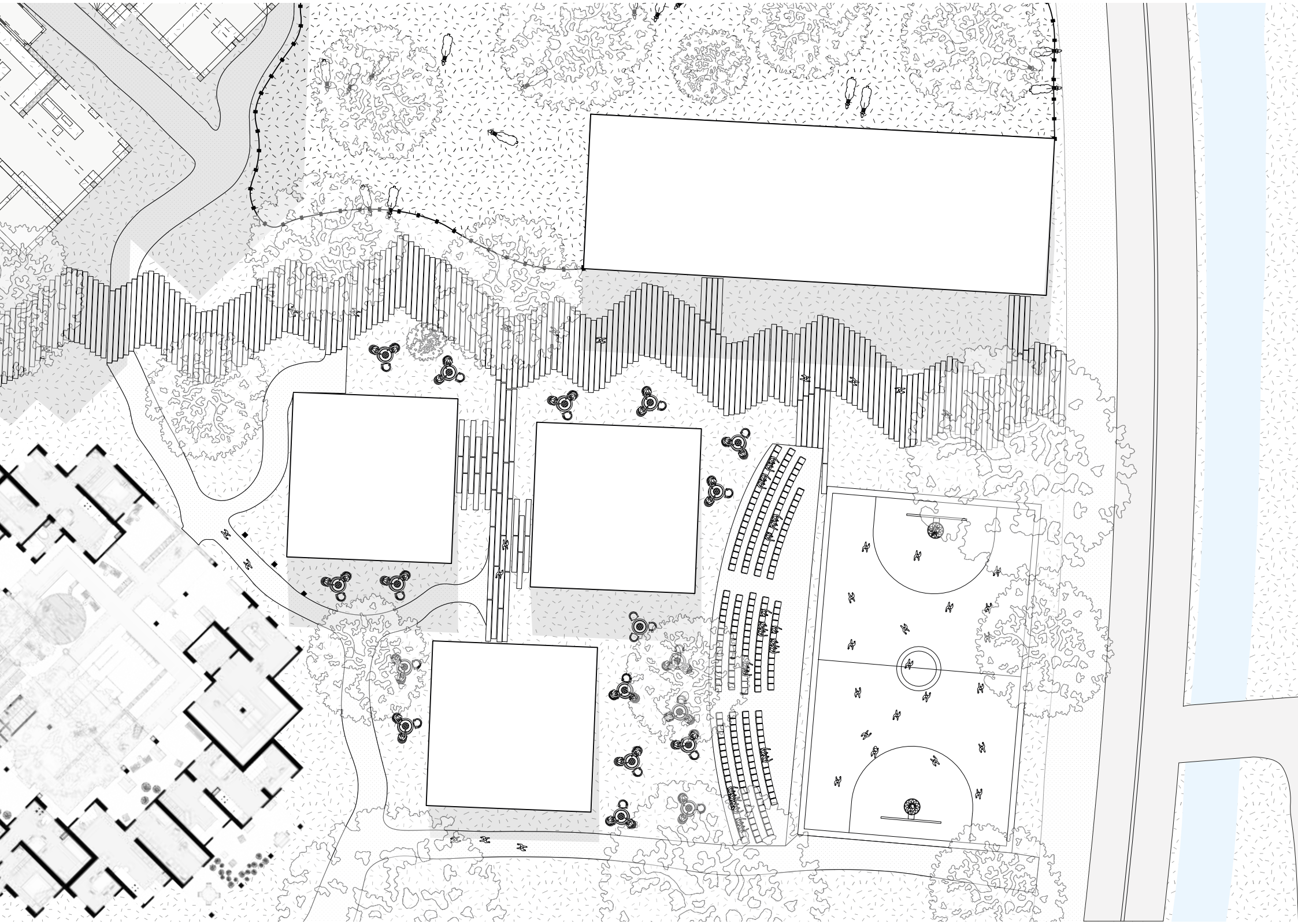
Edge cases

Zooming in on the masterplan we get a better idea what the living environment is like. It takes us fomr the abstract to the more tangible, from the practical to the social. The following pages show four zoomed in views of the masterplan.

Zooming in into the masterplan we can see multiple edge cases. These are the places the standard grid and repetition fade into alternatives and the adaptation to the surrounding area. Here we see the standard clusters around the main spine of the neighbourhood. The spine leads from west to east from the entrance of the neighbourhood to the waterfront and park. The whole way is uninterrupted by car traffic and is therefore the ideal place for spontaneous urban activities like marketplaces, public gatherings, street vendors and performers.



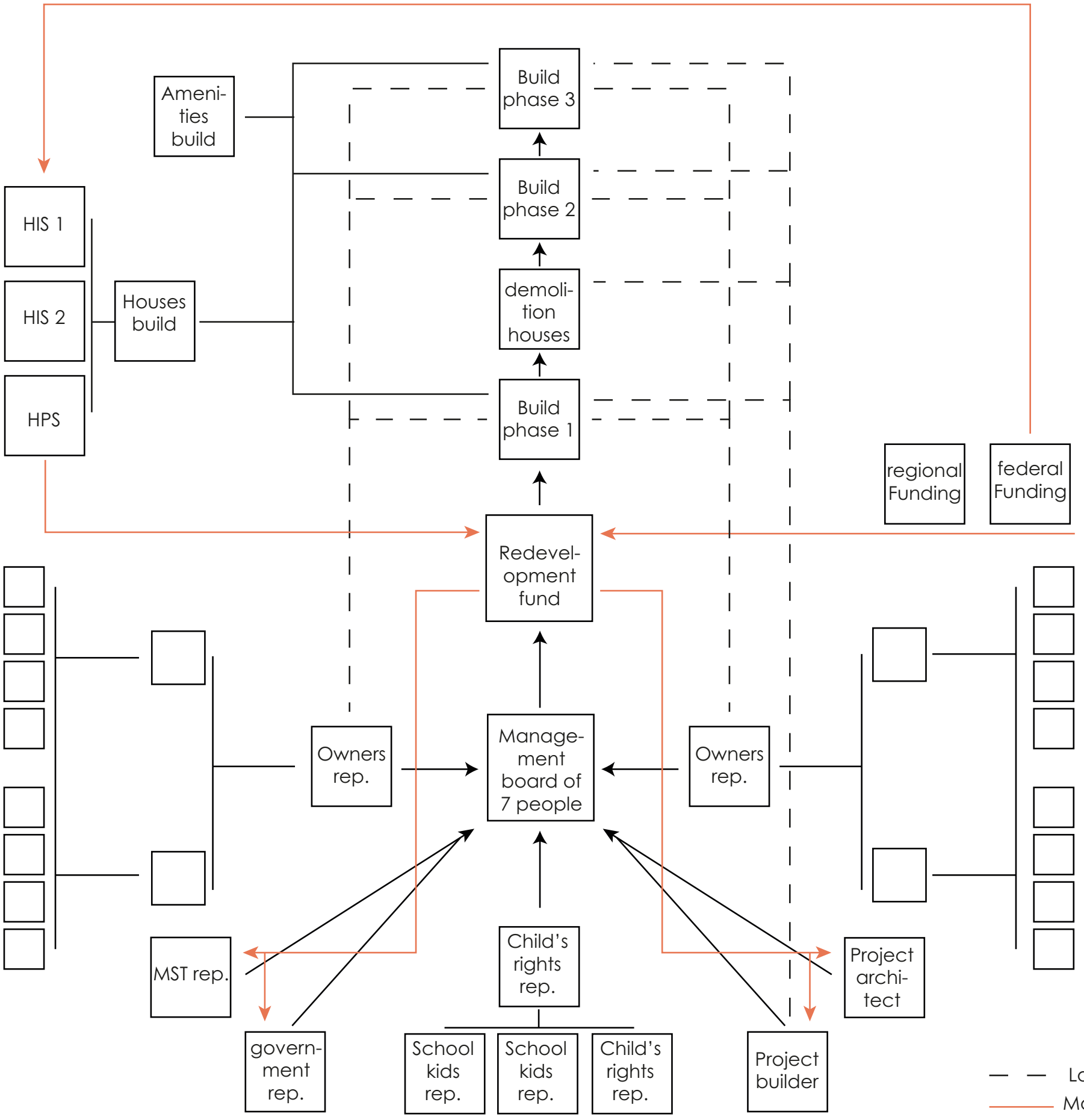
Following the spine downhills, to the east, we meet the water. At the water a big clearing is made, both to step back from the possible flooding zone, and to create a park. Here residents find a place of peace and relative quiet in the big city. The small horse ranch that's already on the site is relocated to this area to function as an extra amenity within the neighbourhood. The horses can be useful in the emotional development of dysfunctioning young adults and kids, contributing to the fostering living environment.



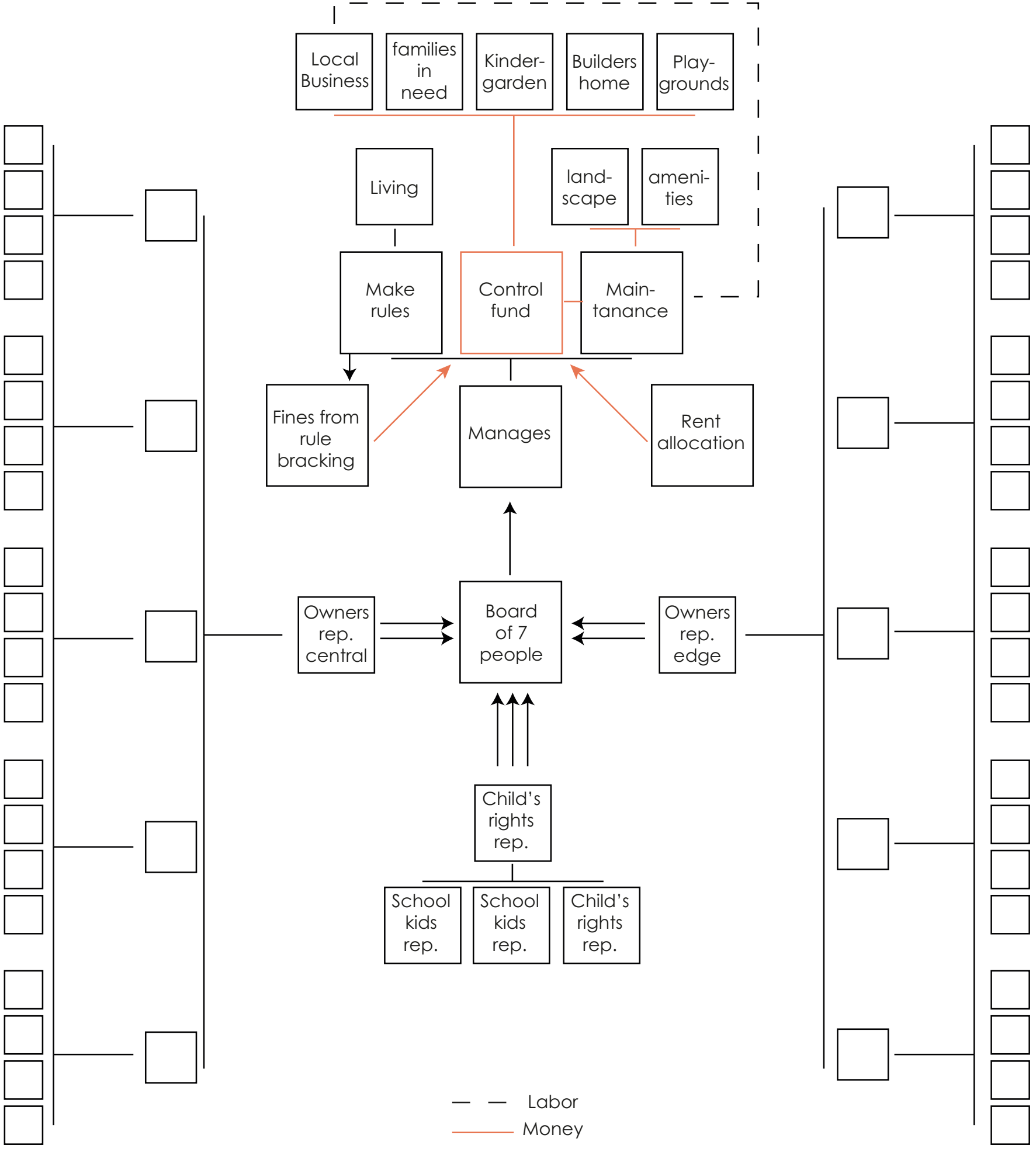
To the south of the master plan, where the project meets the surrounding favela's, we find a strategy for connecting the two. The project is in many ways a different world compared with the surrounding urban condition. The ways the two meet, points out one of these differences. The normal road of the favela to the south doesn't continue, but stops to find the beginning of the park like walkways. This immediately supports the notion that this place is not meant for driving, not for rushing through, but for living in. One can park the car, and enjoy this part of Grajaú by foot.

Socio-economic sustainability

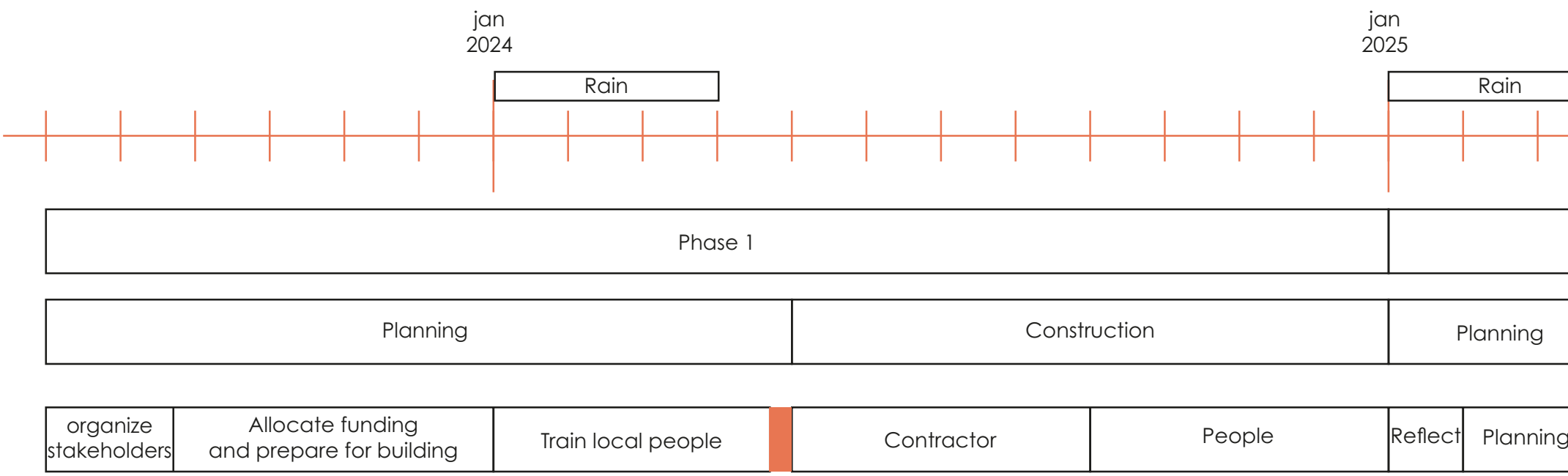
The construction of a large scale housing project knows many stakeholders and roles. The diagram to the right shows some of them and how they relate.

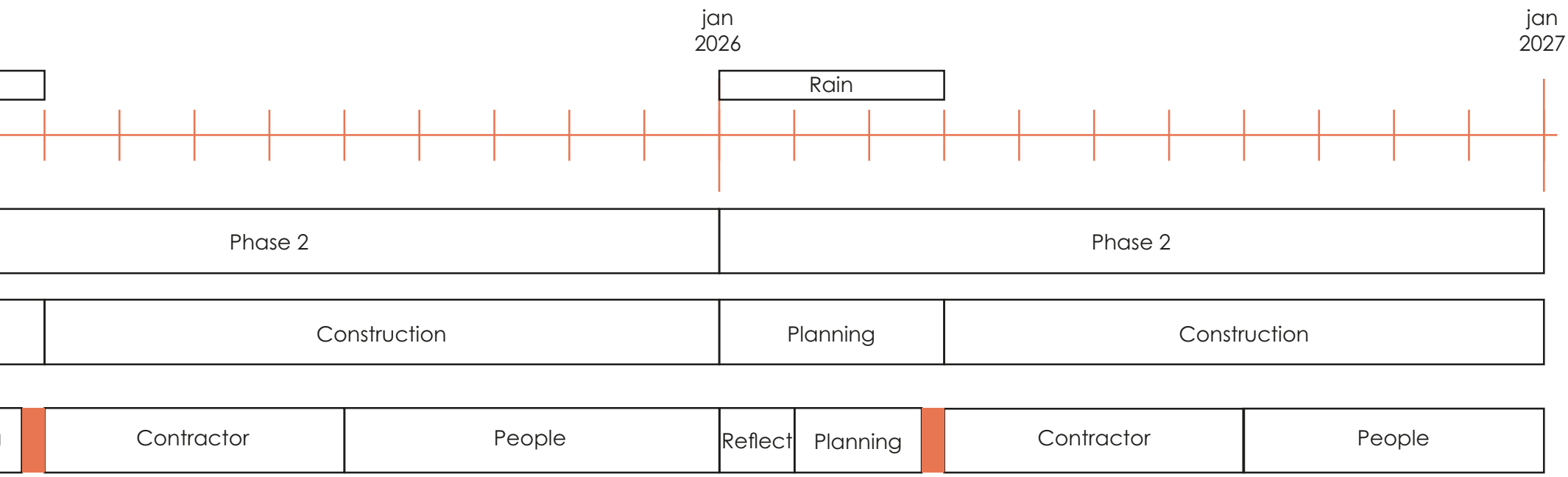

Ameni-
ties
build
Build
phase 3
Build
phase 2
demoli-
tion
houses
Build
phase 1
HIS 1
HIS 2
HPS
Houses
build
regional
Funding
federal
Funding
Redevel-
opment
fund
Owners
rep.
Manage-
ment
board of
7 people
Owners
rep.
MST rep.
Child's
rights
rep.
Project
archi-
tect
govern-
ment
rep.
School
kids
rep.
School
kids
rep.
Child's
rights
rep.
Project
builder
Labor
Money

= After construction is completed, the neighbourhood needs to be managed. The nature of the many common areas and communal outdoor spaces asks for an organised, bottom - up management system. In this way all residents' needs are represented, and the longevity of the projects is ensured.


Local Business
families in need
Kinder-garden
Builders home
Play-grounds
Living
land-scape
ameni-ties
Make rules
Control fund
Main-tanance
Fines from rule bracking
Manages
Rent allocation
Owners rep. central
Board of 7 people
Owners rep. edge
Child's rights rep.
School kids rep.
School kids rep.
Child's rights rep.
Labor
Money

A rough planning is made for the development of the project. One can note that the first preparation period is quite large, this is to ensure the local people can be educated in the construction method and skills needed for the project. Furthermore one can note that a reflection period is planned between the phases, this is to ensure adaptations to the design can be made if lessons from previous phases inform the designer to do so.




jan
2026
jan
2027
Rain
Phase 2
Phase 2
Construction
Planning
Construction
Contractor
People
Reflect
Planning
Contractor
People

This project provides 709 new homes, but also 40 to 80 new businesses. These are integrated in the clusters and provide the possibility for local residents to start and run small businesses without the need to travel by car. The figure of 40 to 80 businesses can be explained by the fact that more businesses can be started then initially provided. The first and last townhouse in a cluster are both suitable for usages as a business, but half of them are initially designed as such. The management of these businesses might prove vital in their success and the further success of the neighbourhood.

A Dutch concept might help here. The ‘bedrijven investeringszone (BIZ)’ (translated: Business investment zone (BIZ)) is a concept in which self management by business owners is supported. Other than a yearly struggle to change matters of public space, promotion or advocation of interests, the BIZ is a yearly plan for multiple businesses to bind each other to a plan. The masterplan is divided into two BIZ zones, making a satisfying plan for all businesses per zone more likely.

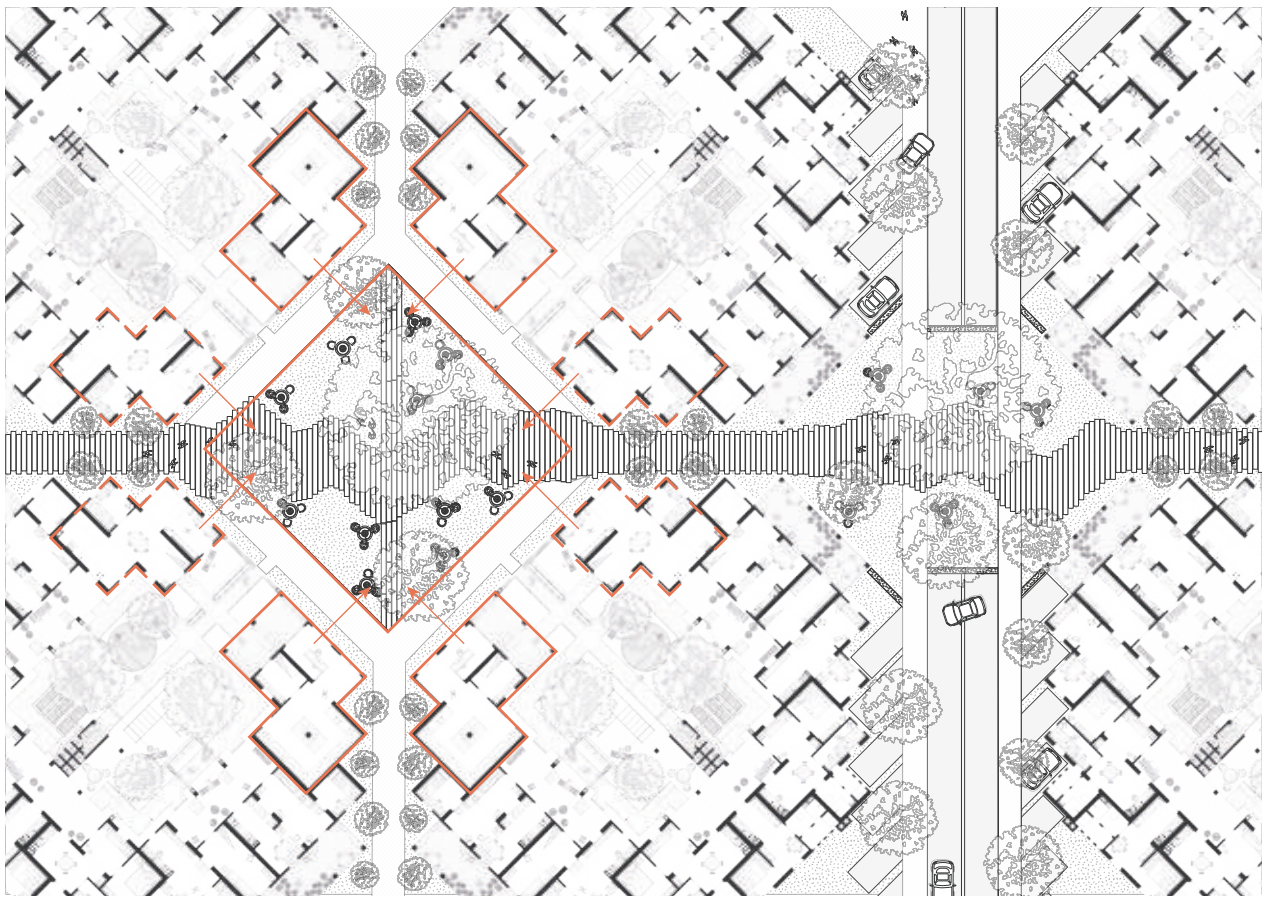
Define BIZ boundary

Collect wishes and needs

75% Majority vote of 20 businesses

'Business investment zone' Plan

- Public space
- Promotion
- Advocate interests



Technical design

The main building material for this project is CEB, Compressed earth blocks and the load bearing walls will be made of stabilised compressed earth blocks, which at a 10% cement to the block to give it great load bearing capabilities. CEB are made from the earth already on site, this earth is excavated to create level terrain for the foundations to be poured. With a press, this earth is compressed into blocks by a motorised press during the construction years, lateron residents can use a manual press to build blocks needed for incremental growth. The output of a motorised press (800 to 3000 blocks per day) is at least more than double that of a hand operated one (300 per day). The most common dimension used is 29,5 x 14 x 9 centimetres, this standard element will also be used in this design.

The following overview shows some performances of the CEB compared with Fired bricks and Concrete blocks.

Performances	CEB	Fired brick	Concrete block
Compressive strength	1 to 4 Mpa	0.5 to 6 Mpa	0.7 to 5 Mpa
Thermal insulation	0.81 to 1.04 W/m^2 C	0.7 to 1.3 W/m^2 C	1 to 1.7 W/m^2 C
Density	1700 to 2200 kg/m^3	1400 to 2400 kg/m^3	1700 to 2200 kg/m^3

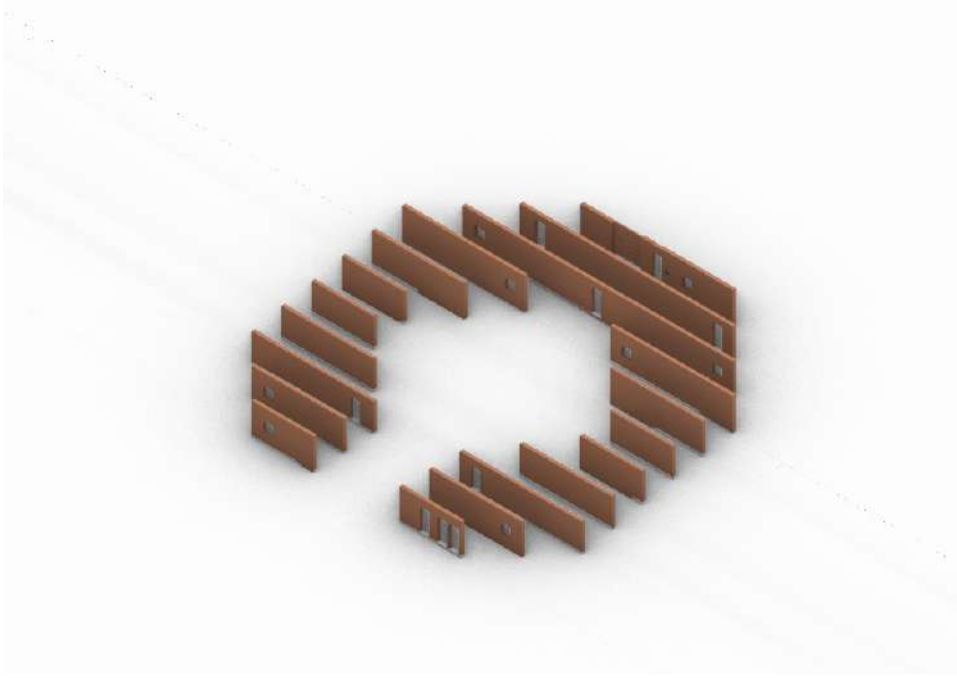
source: Guillaud, H., Joffroy, T., Odul, P., Salazar, O., Idelman, P., Ruault, M., Rivière, R., & Norton, C. (1995). COMPRESSED EARTH BLOCKS: MANUAL OF DESIGN AND CONSTRUCTION. Deutsche Gesellschaft Für Technische Zusammenarbeit. http://craterre.org/diffusion:ouvrages-telechargeables/download/id/d60df2b065dd431cbace3b26ff529f8a/file/

1. empty plot

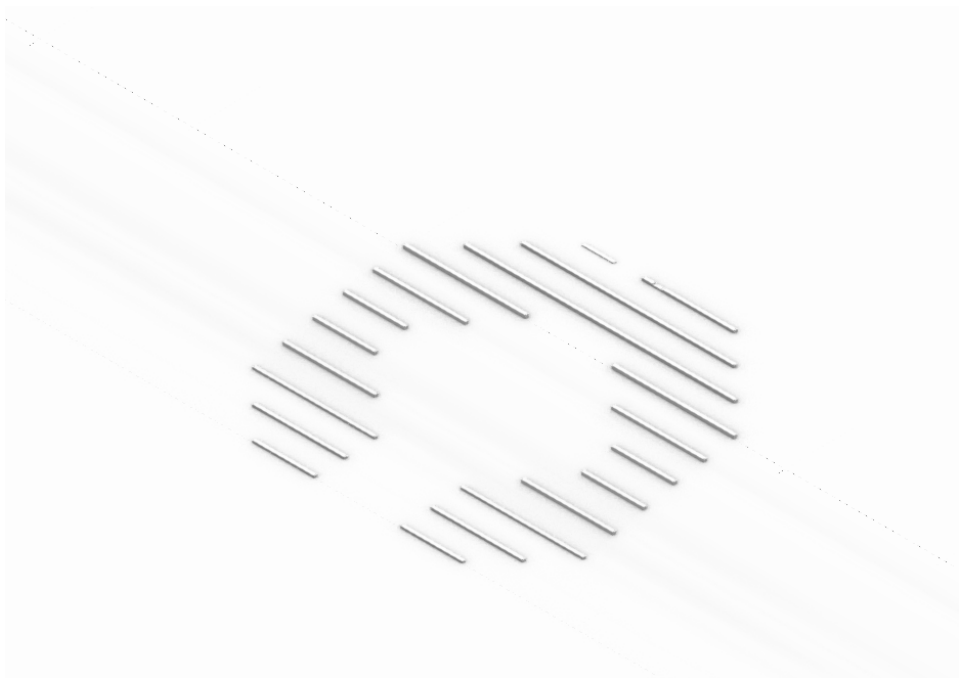
In building on a sloped site, excavation needs to happen. This work tends to be expensive due to high man hours and expensive equipment use. To minimise excavation works, the design of the cluster slopes with the terrain, making the need for excavation far less. The material excavated will be used to create the CEB blocks the buildings are made of, decreasing cost of material and transport. After a terraced terrain is provided, the foundations and connections to water and electricity are prepared. These first three stages are the job of the big contractor, because high skill and bis machinery prevent the local population from working in these stages. From here the local population takes over, drastically decreasing the cost of construction.

4. Load baring walls

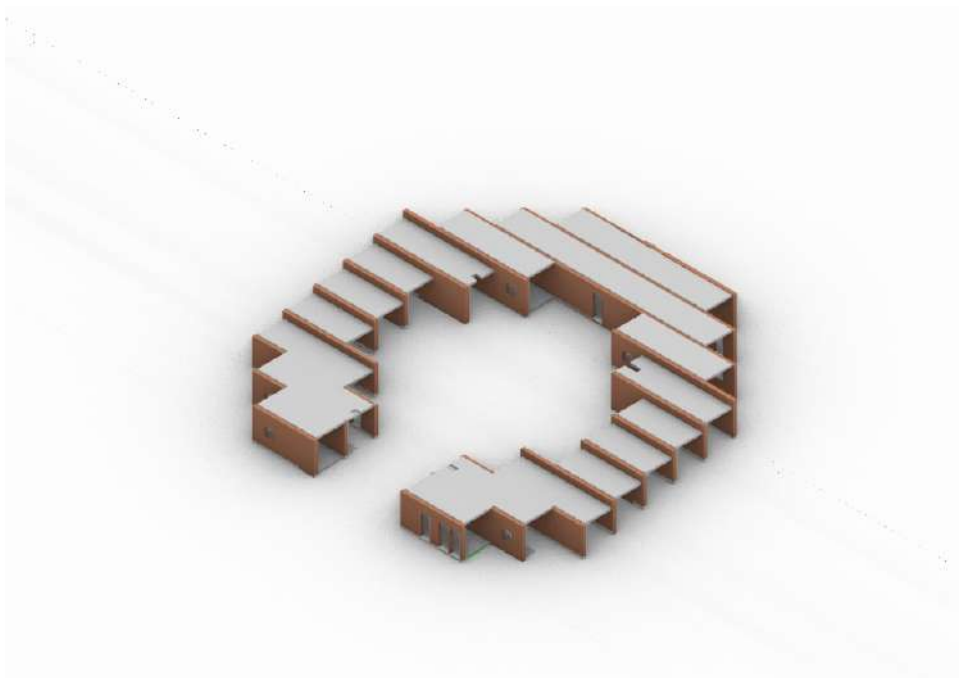
The building is designed with load bearing walls of a double layer CEB, the unit dividing walls are also double layered, serving as stabilising walls and providing soundproofing between the residents' individual dwellings. These walls are put up first, ensuring a solid structure during construction (4). The floors span from load bearing wall to load bearing wall and are put in during the building of the walls themselves to mitigate the different heights of the individual floors. The floor system is a joist and hollow brick construction, well known in the favela building culture. (5). Repeating this process, the local population can build up all walls and floors.



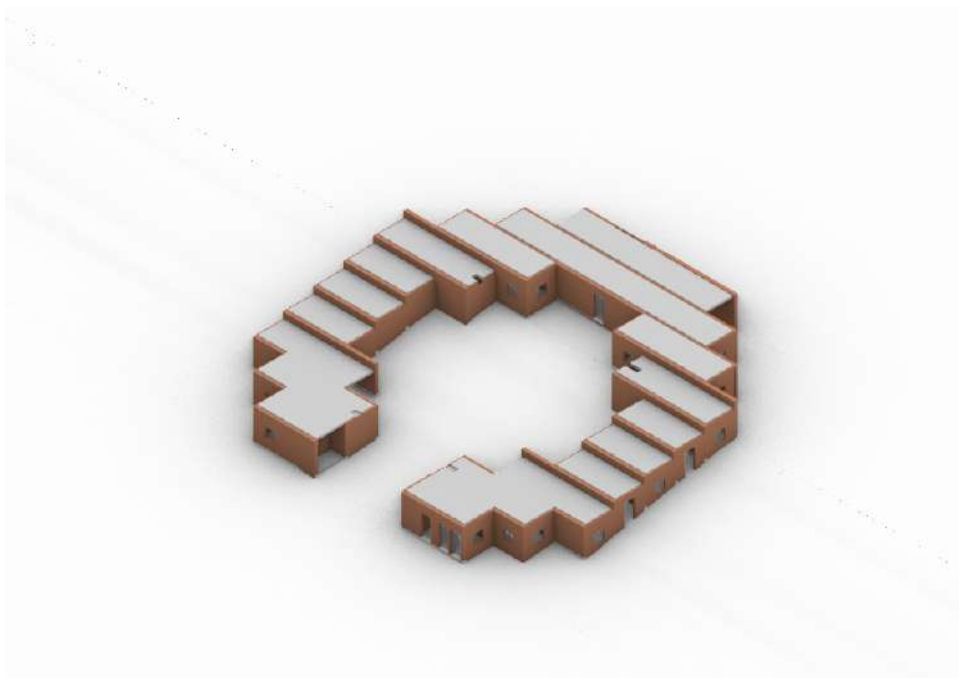
2. foundation



5.Floors

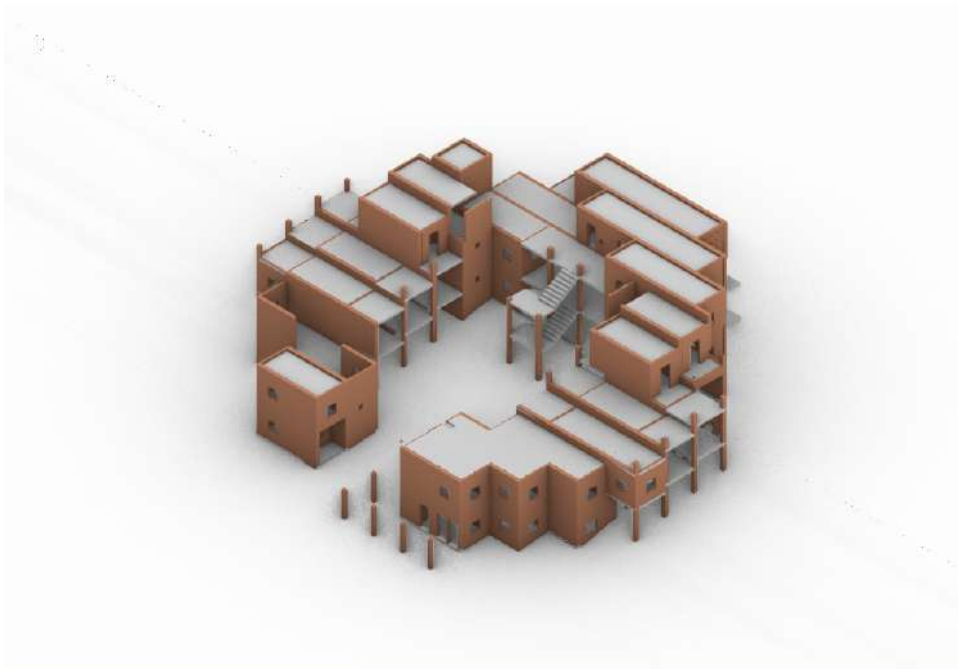


6.Other walls and floors



7.Stairs and terraces

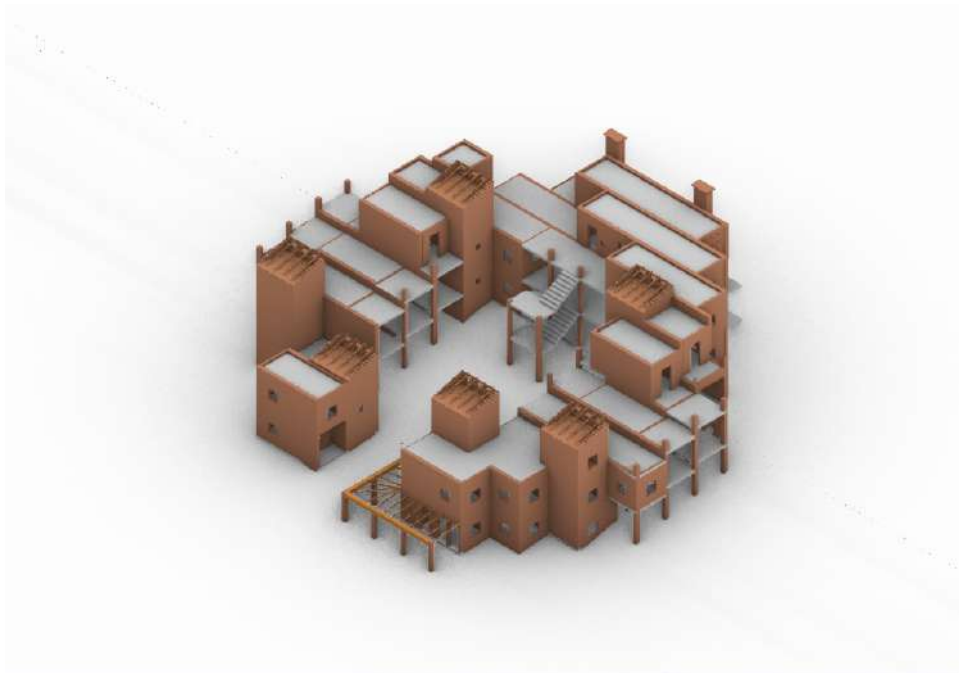
With the main structure built, the construction of balconies, columns and roof excess ways can take place. Other details such as the stucco finishing around windows, terracotta tiling at balcony and roof edges are installed to protect the horizontal phases of the CEB blocks against direct rainfall.



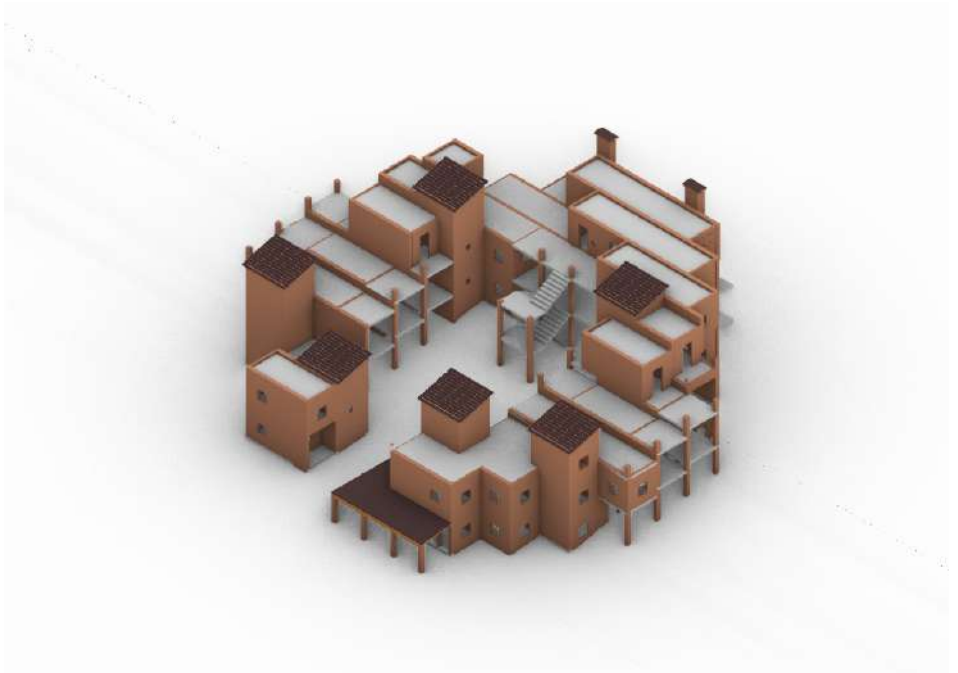
10.Project finished

The water drainage system is installed and the interiors of the dwellings are finished, in the formal sense, the project is finished. This structure however will not stop growing after the project is finished, incremental growth by the local population will take over. Here two stages are shown, although these are arbitrary moments in the further development of the cluster, the aesthetic quality is not arbitrary. Furtheron in the report it will be explained how the technical design helps people in their incremental growth, but ensures the use of the same materials, ensuring a coherent visual image though the stages of incremental growth.

8. Roof structures



9.Roof excess townhouses, stucco, shutters



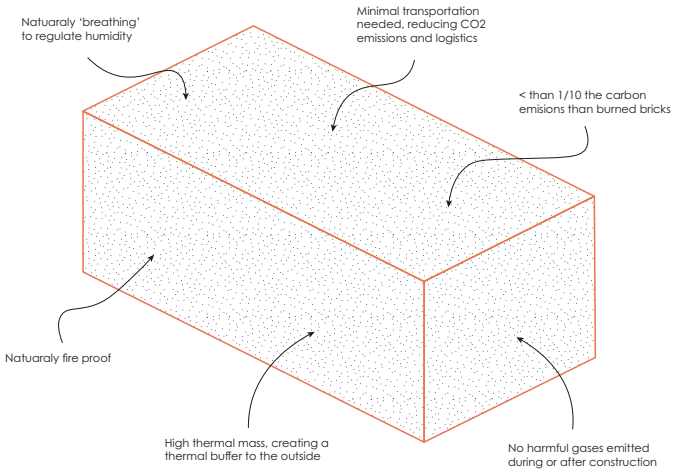
11. Incremental growth 1

12. Incremental growth 2

Passive climate measurements provide a healthy and pleasant indoor climate without the use of expensive and energy consuming things as air conditioning. A living environment provided for the poor of the global south should strive to offer a pleasant indoor environment against the lowest costs.

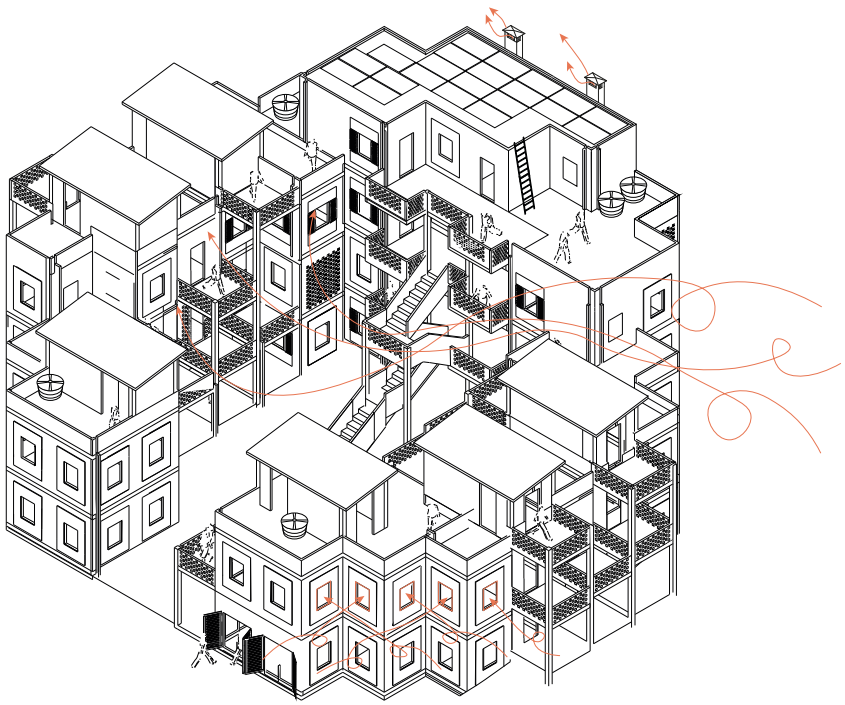
Here you see six measurements designed to reach that goal.

CEB Blocks and its benefits



CEB blocks have multiple climate benefits such as, high thermal mass, humidity regulating, fire proof, minimal transportation and low CO2 emissions in production.

Natural ventilation

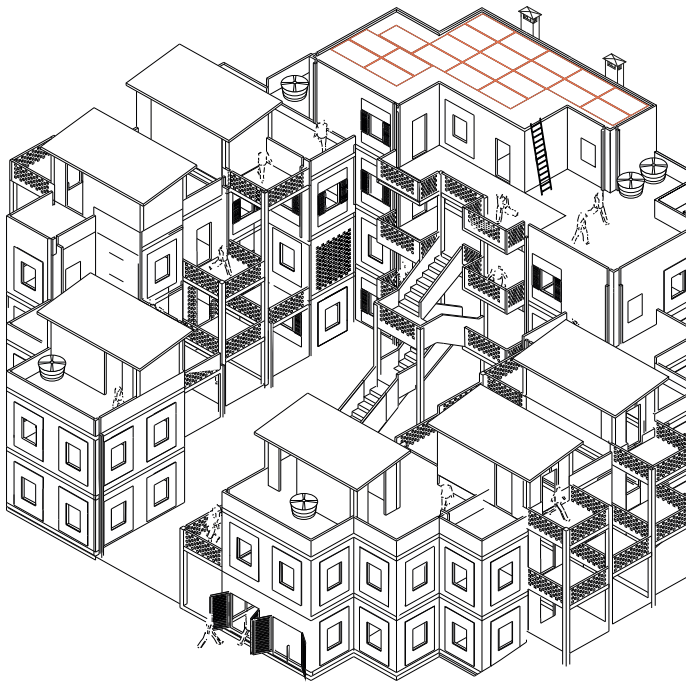


In São Paulo, the heat is the problem, and ventilation is the solution. Providing natural ventilation makes for cool indoor air and this has influenced the shape of the units, clusters and masterplan.

Greenary

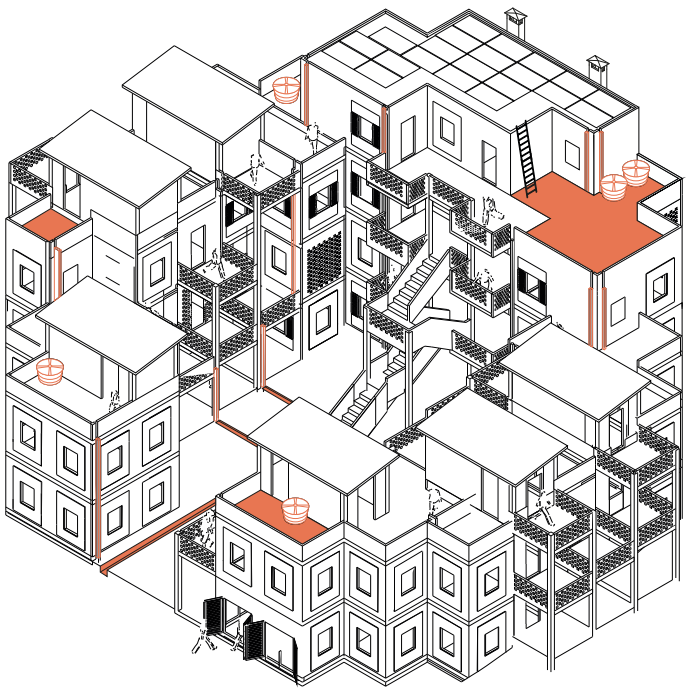
The cluster provides ample space for greenery. This in turn provides shading, cooling through moisture evaporation and a healthier air quality.

Enery production



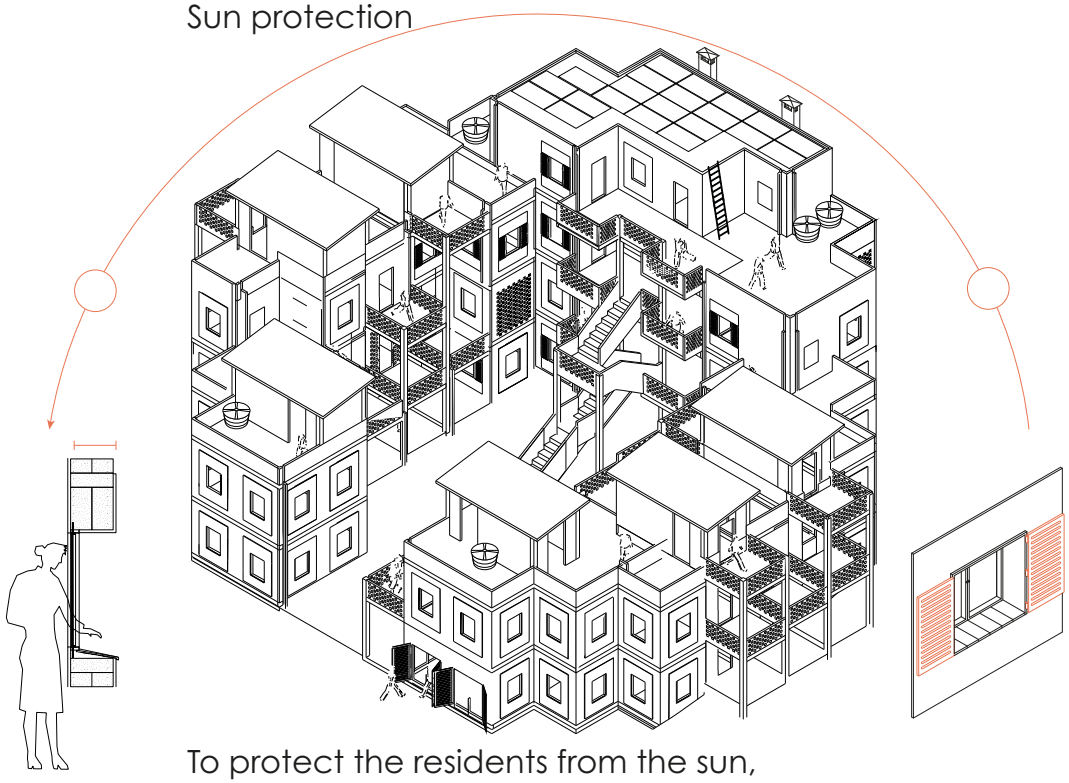
Though most roofs provide a social function and are reserves for further incremental growth, the roof of the apartments is not. These can be used to house PV panels, providing 13% of the energy consumption.

Water drainage and usage



The terraced shape of the block makes for the possibility to hold onto heavy rainfall on multiple terraces. This rainwater is collected and later used for the watering of plants.

Sun protection



To protect the residents from the sun, windows are detailed far back in the facade, creating a natural shade by the wall above. On the north and west facade shutters provide more protection if needed.

Solay chimney calculator

Gravitational constant	g = 9.8
Height difference	h = 1.8m
Atmospheric pressure	p = 100 kPa
Gas constand of air	R = 287 J/kgK
Outside temperture	To = 20 C
Temperture in solar chimney	Ti = 25 C

$$\Delta P(h) = \frac{ghP_0}{R}\left(\frac{1}{T_0} - \frac{1}{T_1}\right)$$

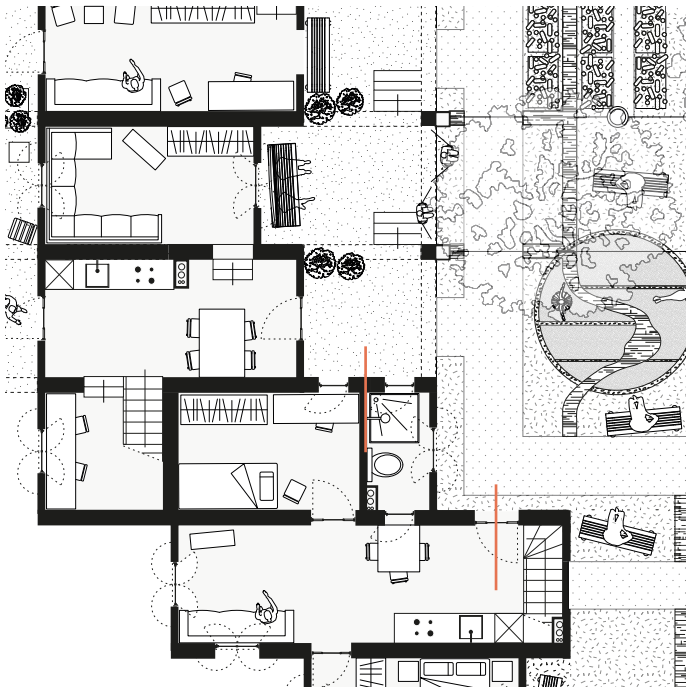
Pressure difference	DP = 61,46 Pa
discharge coefficient	Cd = 0.8
Inlet opening size	A = 0.09 m^2
Density of air	ρ = 1.2 kg/m^3

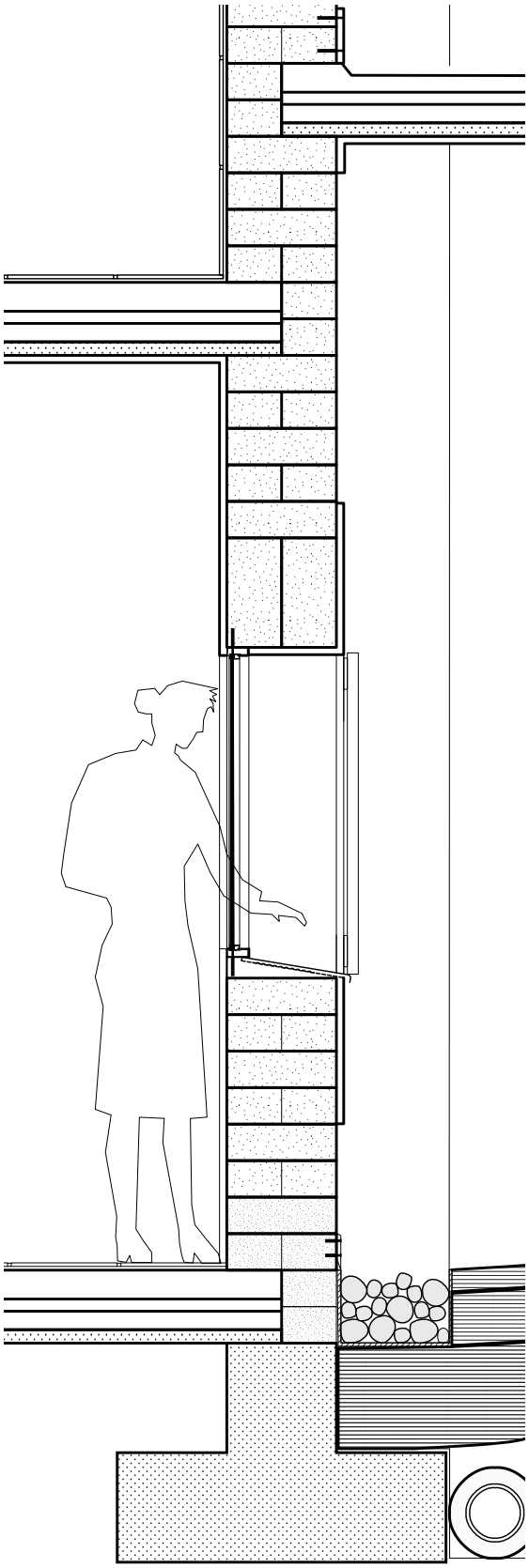
$$Q = C_d A_{eff}\sqrt{\frac{2\Delta P}{\rho}}$$

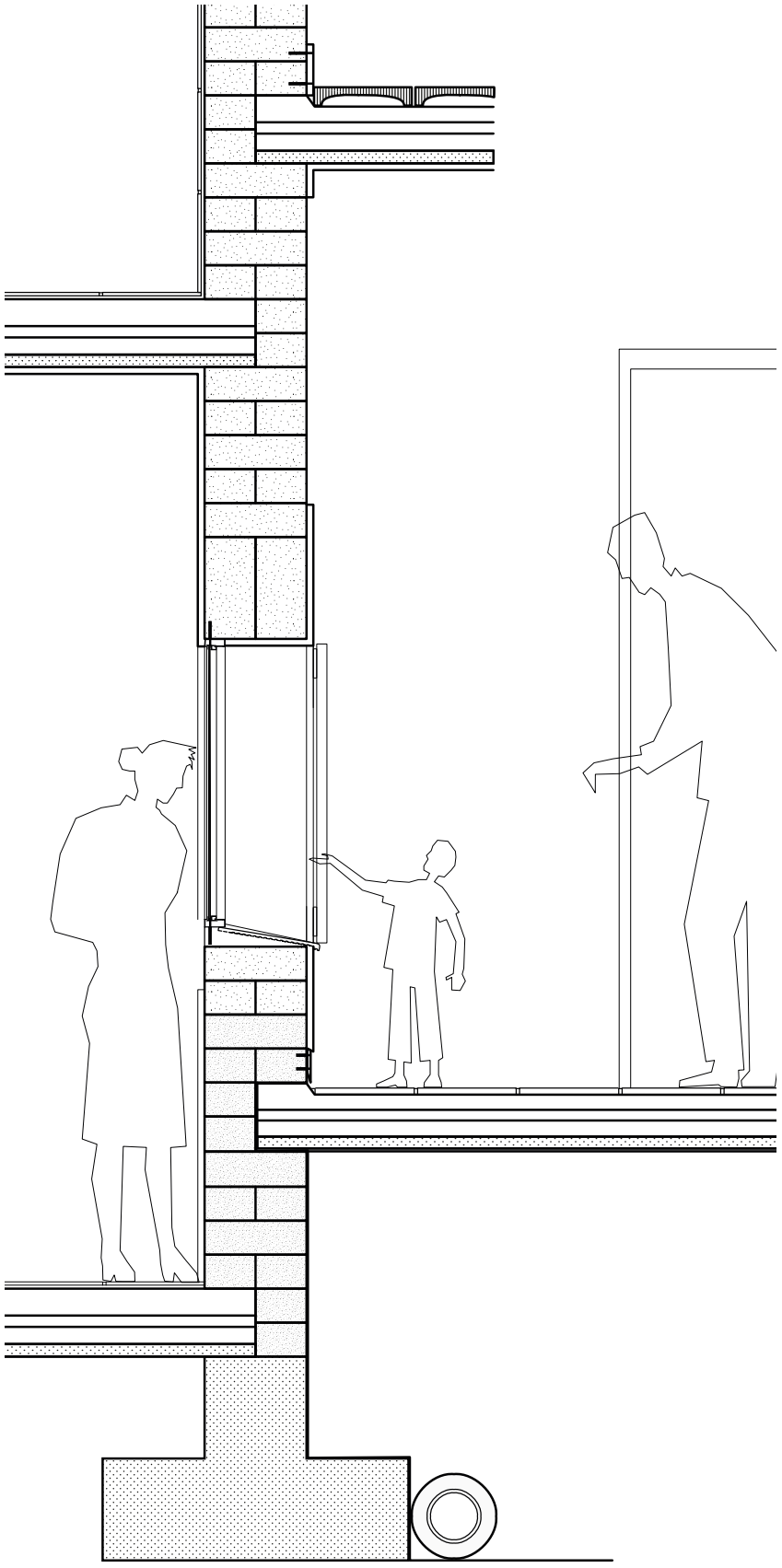
Airflow rate	Q = 72,8 m^3/h
Room Volume	V = 19.6 m^3
Air change rate per Hour	VV = 3,71 x/h

In these 1:20 details you can see how The load bearing walls combine with the floor to construct the building. The load bearing wall rests on a concrete foundation. After this the first few layers are made from burned brick to give extra protection against water leaking through the facade. The detail on the left shows how the sloping terrain ends at the facade with a drain, making sure the CEB are not exposed to standing water for a long time. In both details you can also see the detailing of the window in such a way that a natural shadow falls on the window by the thickness of the wall. The detail on the right shows how the design deals with the changing heights of the terrain. The changing floorheights

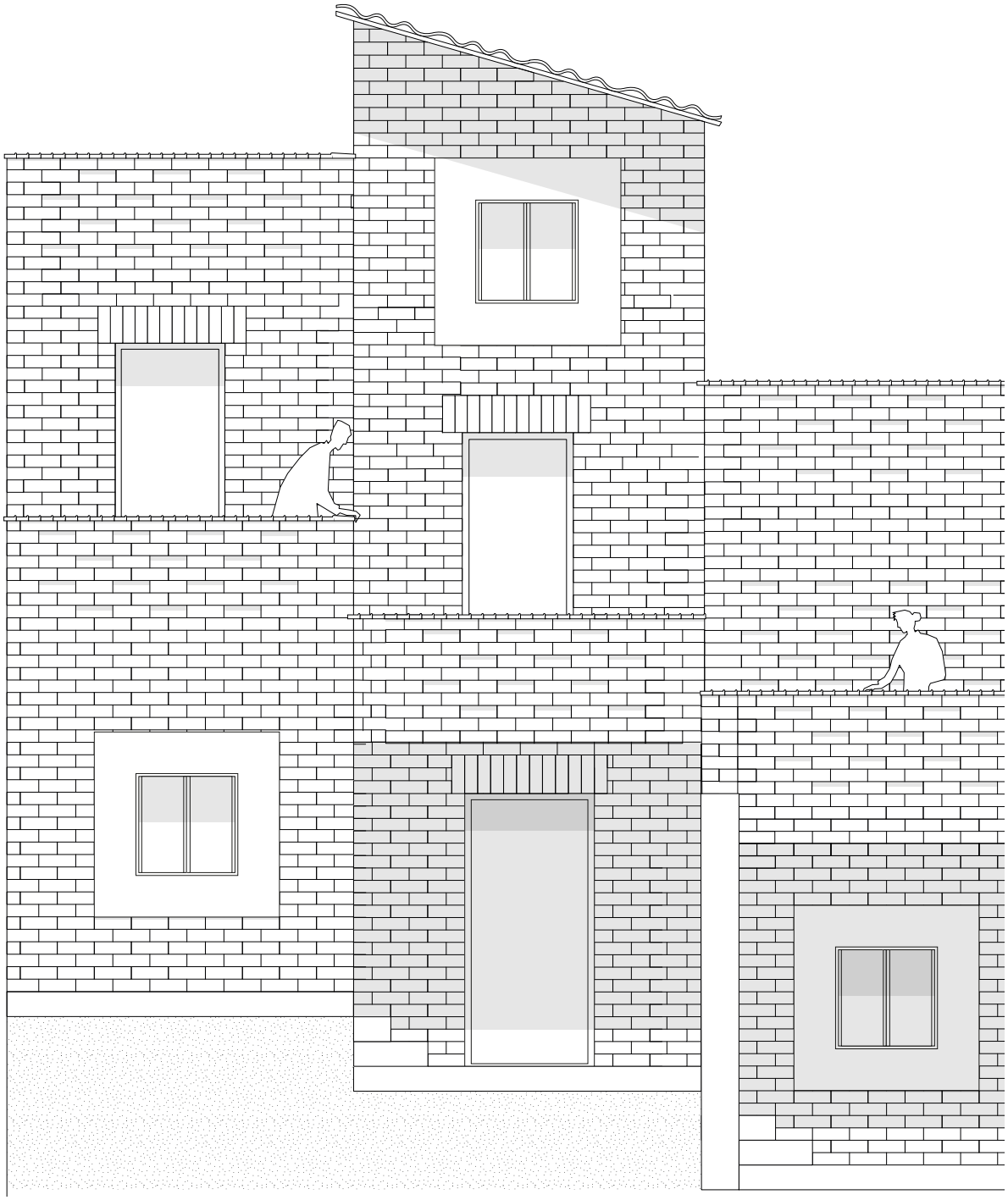
make for interesting interaction in which children are sometimes but face to face with adults, looking at each other as equals on equal height. The drawing on the right shows the location where these sections have been made.

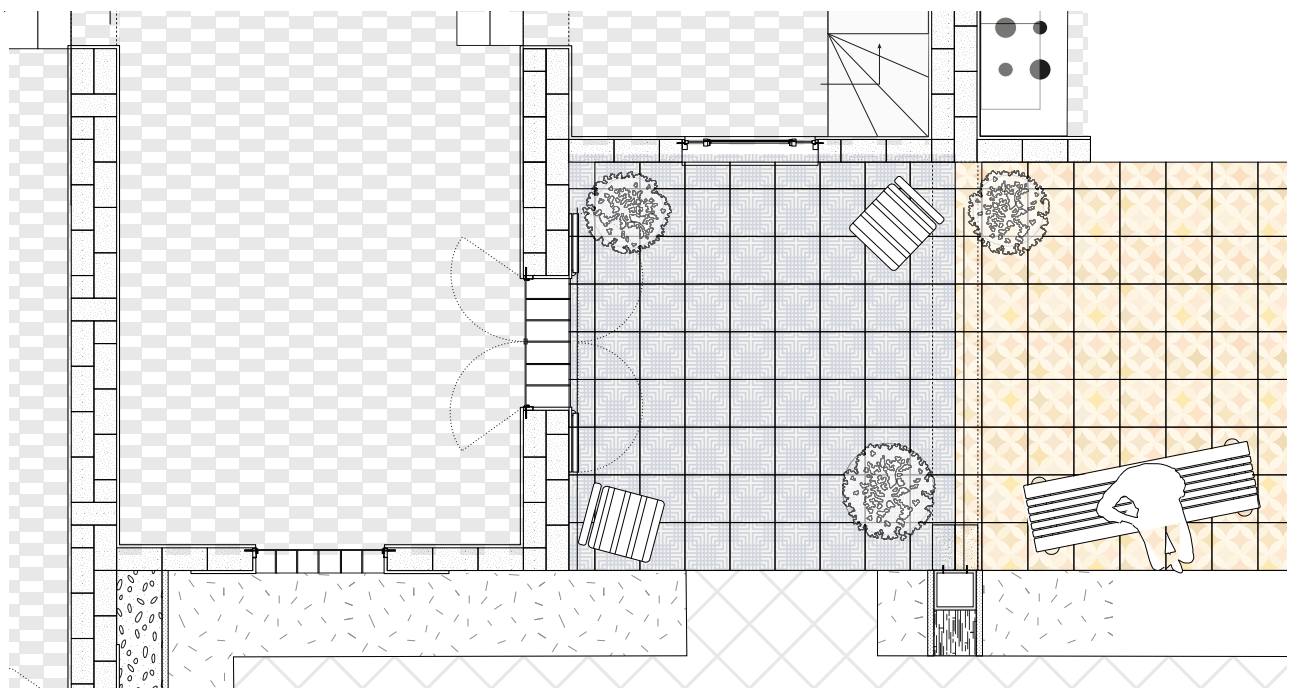






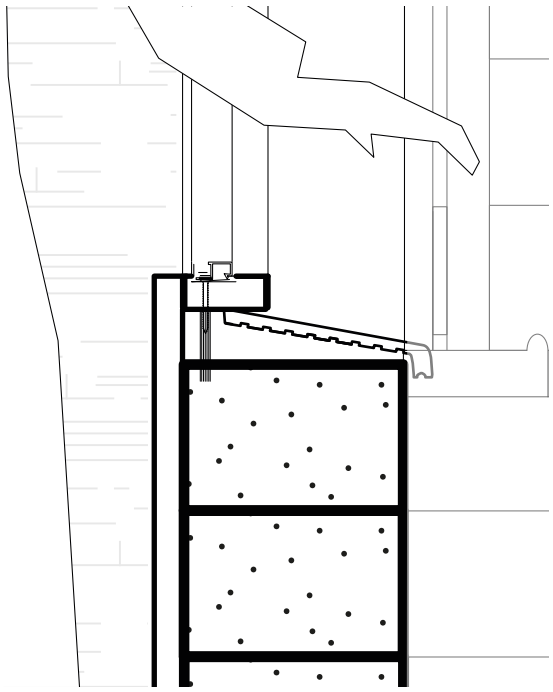
Another 1:20 shows the horizontal section with the corresponding facade elevation, on the next page you will find the corresponding section. This shows the quality of the facade design in a new way. The changing heights and dynamic arrangement of different rooms behind the facade make for a vibrant yet coherent facade design, combining the forces of order and chaos nicely. The horizontal section shows details of water management, as stated in the diagram on climate design two pages back. You can also see two different styles of floor pavement in this floorplan. Just like in the favela building culture, in my scheme the residents can tile their own terrace, making personal expression a designed element. These elements will enforce a sense of ownership, belonging and homecoming.



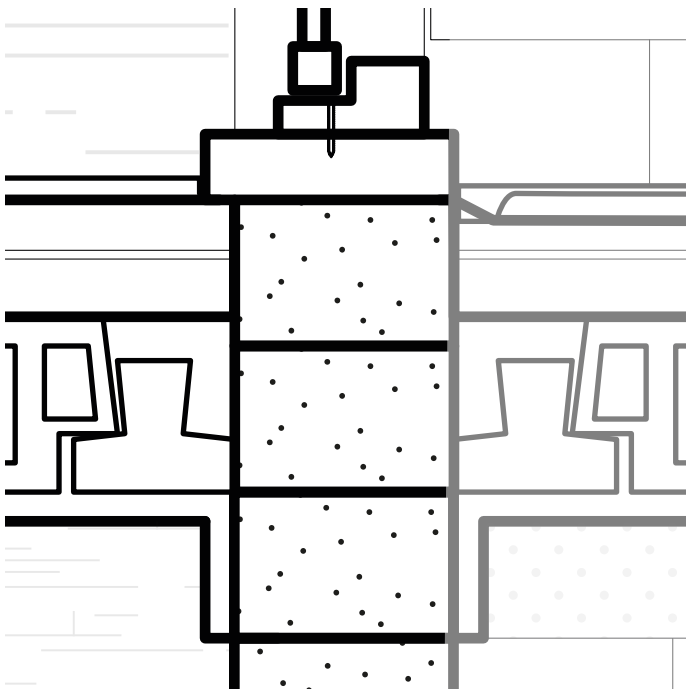


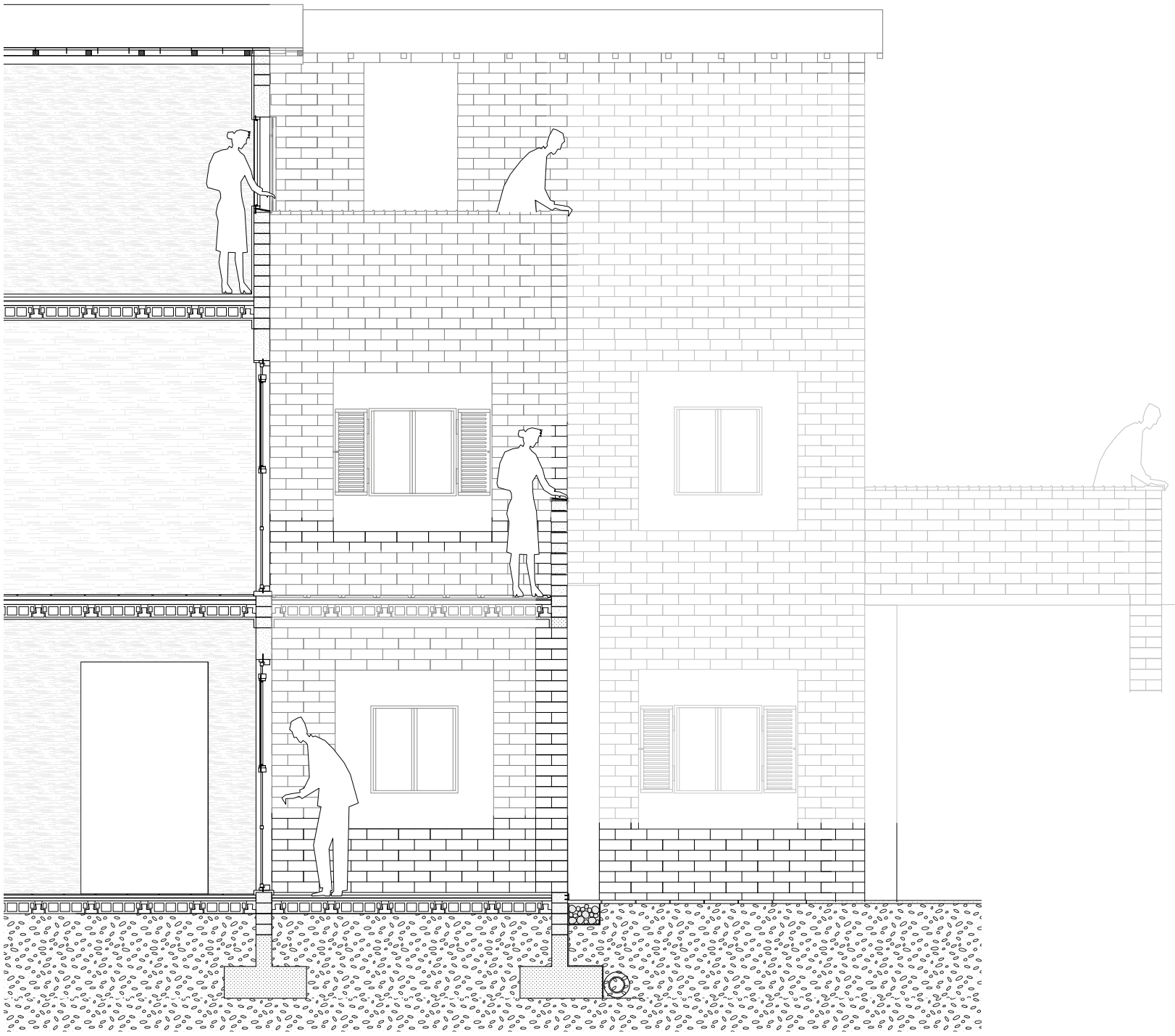
The corresponding 1:20 section is scaled down to 1:50 to show the full frame and show the relation from groundlevel to roofscape. Ones again we see a dynamic play of protruding facades, terraces and roof space. The facade this section looks upon are the facades of townhouse one, which does not change in height in order to make the ground floor, that can be transformed into shops, wheelchair accessible. Therefore we see a level roofscape.

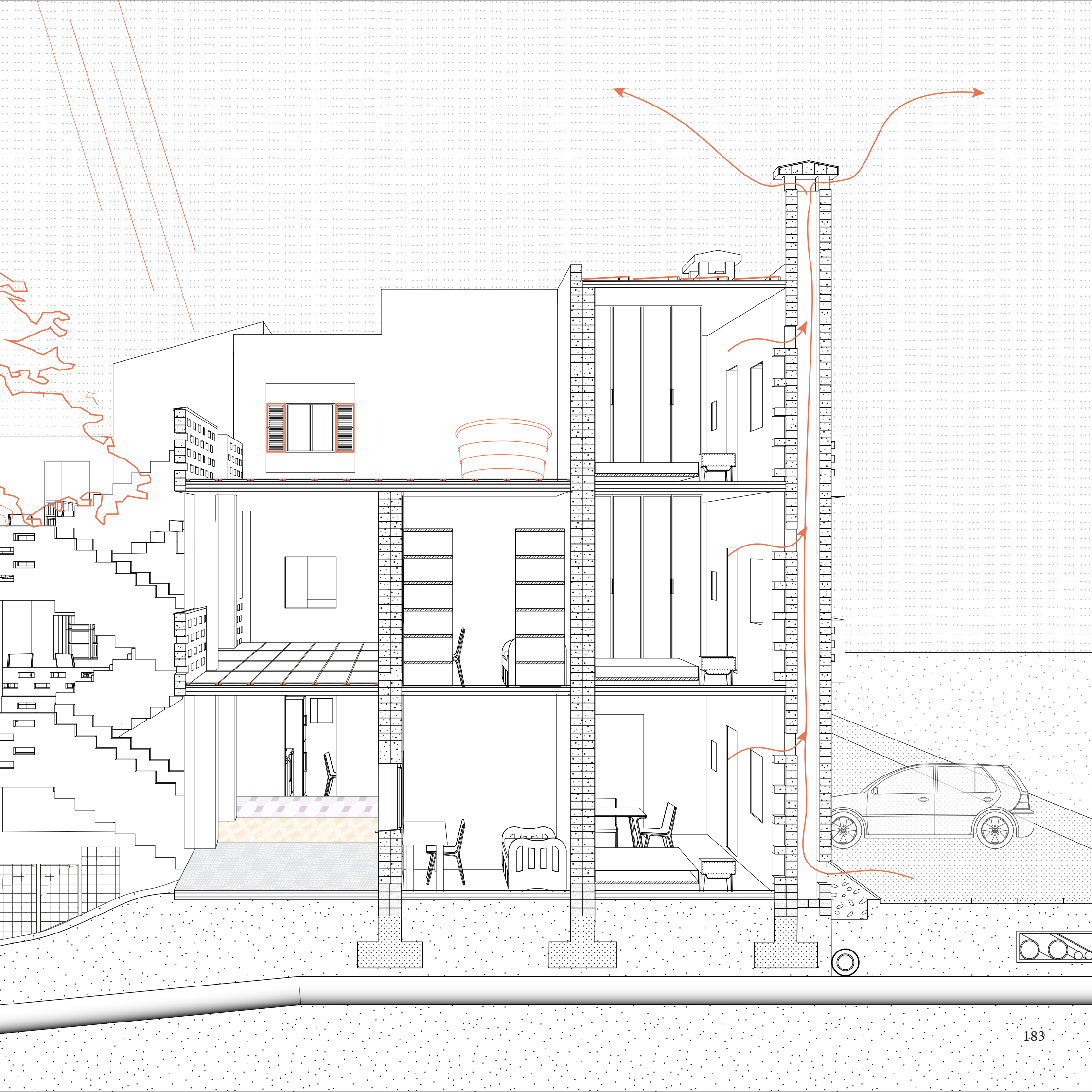
To the right you will see a 1:5 detail of the window connection with the CEB wall. The window sill is made from a terracotta , waterproofing the CEB blocks. These same tiles are also used on the edges of balconies and roof railings.



Below this 1:5 you will find another 1:5, this one of the floor connections with the CEB wall. This is the non load bearing wall, so the floor does rest on this wall, which gives us the opportunity to look at the floor system in the other direction. The floor is made from a Joist and hollow brick system, known and used virtually everywhere in the Favela's The concrete joists span 2,7 metres from CEB wall to CEB wall, hollow bricks are added between the joists and the floor is covered in a layer of concrete to solidify and stiffen the whole construction. The floor finishing depends on room function. Entrances, kitchens and bathrooms are paved, Living rooms and bedrooms are personal choice of the owner and the terraces are heighted tiles so they can store water under them in care of heavy rainfall.







Change

As mentioned before, the concept of incremental growth, though strange to the global north, is common in the global south. As a means for the local population to stay in their homes when the family expands, therefore making long lasting social bonds in the community more viable, it is a concept dear to me. Incrementality is one of those concepts embracing the ‘chaos’ of a vibrant living environment. Providing a framework to stimulate incremental growth while also restraining it from growing to be in conflict with other qualities.

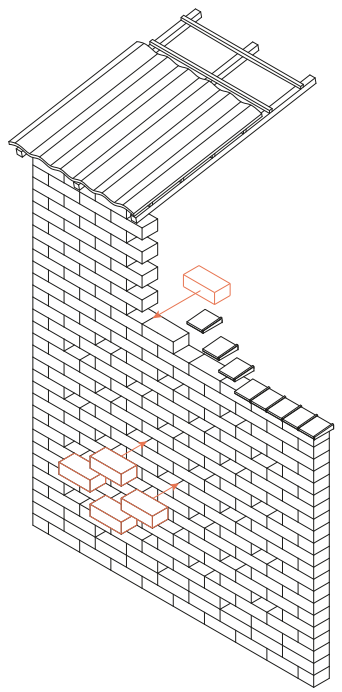
To ensure the qualities of a proper density, natural ventilation and open views, the incremental growth is restricted to the level of the pitched roof. Up to that level incrementality is made easy by making the cobogó facade and balconies easy to fill in with CEB blocks. The finishing of Terracotta tiles are easily removed to build on with CEB blocks.

Block finished as designed

Incrementality phase one

Incrementality phase two

Technical principles for incrementality.



FIM.