TECHNISCHE UNIVERSITÄT WIEN

DIPLOMARBEIT

OIKIZO
URBAN CELLULAR STRUCTURE

ausgeführt zum Zwecke der Erlangung des akademischen Grades einer Diplom-Ingenieurin unter der Leitung von

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ABSTRACT

Meine Diplomarbeit „Oikizo" befasst sich mit der Gestaltung zukünftiger urbaner Systeme und der Frage, wie Städte durch eine Änderung des von uns gelebten Systems durch eine neue prototypische „urbane Zellstruktur" erweitert werden könnten. Der Titel "Oikizo" stammt vom altgriechischen Verb οικίζω (oikizō) und leitet sich vom Substantiv οίκος (oikos), "Haus", "Zuhause" oder "Lebensraum" ab. Ziel des Projekts "Oikizo" ist es, den NutzerInnen die Möglichkeit zu geben, ihren Raum mit einer "urbanen Zellstruktur" zu besiedeln, die die Form einer teilweise selbstorganisierten und anpassungsfähigen Zellstruktur hat. Diese sind an jede andere Zellstruktur, wie ein Mat Bulding, angedockt und knüpfen Beziehungen in Gruppenformen, entwickeln und prägen das Gesamtbild. Das Projekt beginnt im kleinen Maßstab einer Smart Living-Wohnung und erstreckt sich über den mittleren Maßstab eines großen Büros, kombiniert mit dem großen Maßstab eines Gebäudes und endet mit dem verhältnismäßig größten Maßstab eines Viertels. Diese neue Struktur wurde als Überlagerung der Raumstrukturen für alle urbanen Lebensräume geschaffen: Wohnen, Arbeiten und Gemeinschaftsaktivitäten. Der vorgeschlagene Entwicklungsort für das neue Raumgefüge ist der Westbahnhof in Wien. Als lebender Organismus wird dieses Projekt im Eisenbahnbereich weiterentwickelt und ausgebaut, indem Nachbarschaften in verschiedenen Phasen geschaffen werden.

ABSTRACT

My Thesis "oikizo" deals with how future urban systems can be designed and how the cities could expand, by changing the system that we live, with a new prototypical "Urban Cellular Structure". The title "oikizo" is the ancient Greek verb οικίζω (oikizō), meaning to settle and is derived from the noun οίκος (oikos), "house", "home" or "habitat". The objective of the project oikizo, is to give the ability to the uses to settle their space, with a "Urban Cellular Structure", that has the form of a partially self-assembled and adaptable cell structure, that are docked to each other as a mat-building that establish relationships in Group Forms, and develop and mound the image of the whole. The project is starting from the small scale of a smart living apartment, extended to the medium scale of a big office, combined into the large scale of a building, ending to the extra-large scale of a neighborhood. This new structure was created as a superimposition of the spatial structures for all urban spaces of life: housing, work and community activities. The proposed place of development of the new spatial structure, is the Westbahnhof railway station in Vienna. As a living organism, this project will be developed and expanded in the rail area, by creating neighborhoods in different phases.

ACKNOWLEDGEMENT

Beginning the idea of the thesis two years ago, the idea matured in the years through this university lessons, and is completed in this book. Architecture to me is an accumulation of one's experiences, either in space or in life, and the only way to form one's own theory is through many discussions and debates between different perspectives.

Many thanks to my supervisor Mr. Christian Kühn, who led me into the deepening of the theory. A great gratitude to my supervisor Mr. Martin Haller, who has always motivated me to hold on to reach what I wanted, even when the process was long.

Gratitude to my family. I am profoundly indebted to their unrepayable support.

An immense gratitude to my friend Thanasis Sotiriou. I'm deeply in owe to his unconditional support and his company all the way through the tough final completion of my thesis.

This book is dedicated to my father.

INTRODUCTION

Problems and its setting |

Methodology of Research

In this brief introduction, the background and the basic intention of this work are explained, thus providing a concise introduction.

My thesis deals with the question of how Vienna's urban growth can be handled. The building structure of the city of **Vienna** has currently shown significant shortcomings due to the need to provide accommodation in a population that is radically expanding. In addition, is dealing with the available space for different uses. Although numerous empty office buildings were available for the accommodation, they could not yet be adapted for residential use due to their monofunctional design despite the available large amount of space. The urban spaces between the monofunctionally planned buildings rarely fulfill this requirement at the present problem, and the buildings themselves hardly ever do.

Metabolism could be an answer to the today's arising problems. Thinking of the cities as an organism that are growing, adapting, changing shape and form, this approach will be analyzed in this research, backing up with new sustainable approach available today.

Goals
Analyze, how future/upcoming urban systems can be designed and how the cities could expand, by changing the system that we live, with a new prototypical "**Urban Cellular Structure**". The title "**oikizo**" is the ancient Greek verb οικίζω (oikizō), meaning to settle and is derived from the noun οίκος (oikos), "house", "home" or "habitat". The objective of the project oikizo, is to give the ability to the uses to settle their space, with a "Urban Cellular Structure", that has the form of a partially self-assembled and adaptable cell structure, that are docked to each other as a **modular building system** that establish relationships in **Group Forms**, and develop and mound the image of the whole. The project is starting from the small scale of a smart living

– apartment, extended to the medium scale of a big office, combined into the large scale of a building, ending to the extra-large scale of a neighborhood. This new structure was created as a superimposition of the spatial structures for all urban spaces of life: housing, work and community activities. The proposed place of development of the new spatial structure, is the Westbahnhof railway station in Vienna, which currently mainly consists adjacent monofunctional buildings. As a living organism, this project will be developed and expanded next and above the rails by creating neighborhoods in different phases.

Methodology
My aim is to critically examine the notion Structuralism and Metabolism through the rereading of theories and products such as terms, models, projects and buildings. And how did they translate to the built environment and the use of space and infrastructure? This research is made, to better understand the metabolism ideas and strategies, which in turn will be reflected in the architecture and thus possibly contribute to shape today's society.

Then, follows a wide-ranging research that considers Vienna and its today problems. Based on all these research, the theory of the architecture and the place of consideration, an architectural project will be created and designed followed after the steps of Project goals, Methodology and Design concept.

Delimitations
It is based on the information provided in the literature and articles, it excludes any liability. All rights to the photographs are property of photographer.

CHAPTER I
SITUATION ANALYSIS

History and background research

In this section, the current situation is illuminated and it comes to a digression into the past, which significantly determines the future course of the work.

1. RULE – BASED DESIGN

The world we are living in structured. Every one of the terms referring to order and structure is associated with the active shaping of the human environment. The Roman *regula* (German *Regel*) was initially the lath or slat that had been used as a ruler, as a measuring stick, before it became the abstract rule. The Latin *ordo* advanced from the row of threads in a loom to sequence and finally to order as such. *Structura*, too, was the masonry and consequently the entire building. The mason in ancient Rome was therefore a *structor,* because he fit together the bricks to form a wall according to a specific set of rules. All three key terms mentioned above come from the field of building construction. This is not surprising, seeing that building is the oldest and most comprehensive manual skill and craft for shaping the world.

It is part of the architectural theory that the structural principles used in building were originally copied from nature. We first experience structure as a physical space and this is why structural thinking is the original domain of the discipline of architecture – which spaces space.[1]

> *"Structuralism is the belief that phenomena of human life are not intelligible except through their interrelations. These relations constitute a structure, and behind local variations in the surface phenomena there are constant laws of abstract culture."*
>
> -   Simon Blackburn

2. STRUCTURAL THINKING

We have seen that structural thinking and acting is inherent to architecture. In the 1960s structuralism was firmly established in the humanities as a scientific method, and its significance was generally recognized. In the 1970s the term was also introduced in architecture. In the 1970s the intellectual environment of structuralism was giving hope that the design process could be objectified and was possible to master the world. But the world proved too complex to be controlled by means that were available at the time. In the end the utopia ideas were driven out and an era of pragmatism followed. Then in the 1990s a new generation of architects with a new set of tools took something on which was founded earlier, referred to in the 1970s as structuralism and described today as rule-based parametric or algorithmic design or even neo-structuralism with digital imprint.

If we examine the buildings and urban planning projects of the 1960s and 1970s that meet the criteria of structuralism, result a very diverse picture, showing an almost worldwide dissemination of the structuralist phenomenon. Just as in the humanities, there are **different structuralisms** in architecture as well. The essential difference can be seen less in the appearance of the projects than in the basic philosophical position of the creators. There is the anthropological orientation of Aldo van Eyck, the technological focus of Eckhard Schulze-Fielitz, the specific philosophy of metabolism in the work of the Japanese metabolists or the pop-cultural use of plug ins in the work of Archigram. [2]

As we have seen the structural approach is inherent to architecture, then the structuralism of 1960s and 1970s has an impressive tradition. A representative example is the work of **Le Corbusier,** in which the idea of primary and secondary structure had been present from the modular Domino House construction system, the module of the Immeuble Villa, which is combination with other various structures can be stacked into different types of houses to various projects for mat-building, to his last, purely structuralist project for the hospital in Venice, in 1964.

The earliest center of structuralist theory and practice in architecture can be found in the Netherlands in the late 1950s in the magazine *Forum*. **Team 10**, critical of **CIAM** and closely associated with the *Forum,* was involved in the development of structuralist thought. There is evidence of connections to the metabolists in Japan, to the high-tech pop scene in England, to the situationists, to Moshe Safdie's Habitat, to Le Corbusier office, and numerous further connections.

Aldo van Eyck was without doubt the central figure in the early days. As an active member of Team 10 and one of the editors of the magazine *Forum,* he gave Dutch structuralism an ethnological and anthropological orientation. **Piet Blom**, as a student of van Eyck had already started to extend the repertoire of structuralism with his Noah's Ark Project. He used a modular approach to avoid any hierarchical dominance. These structures of multiplicity followed van Eyck's concept of the city as a big house, with many rooms. **Herman Hertzberger**, still the face of Structuralism today, with the administration building for Centraal Beheer in Apeldoorn, archieved the second most important projects of structuralism in the Netherlands.
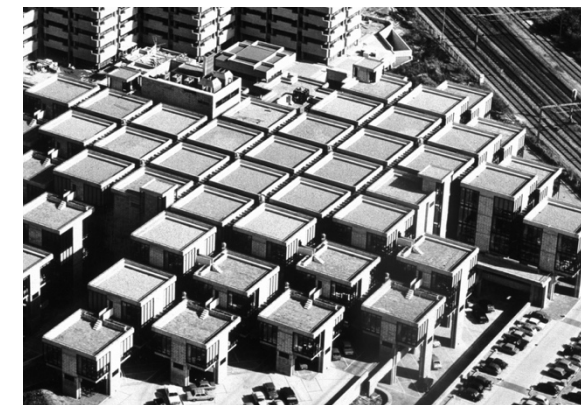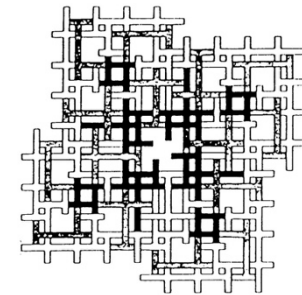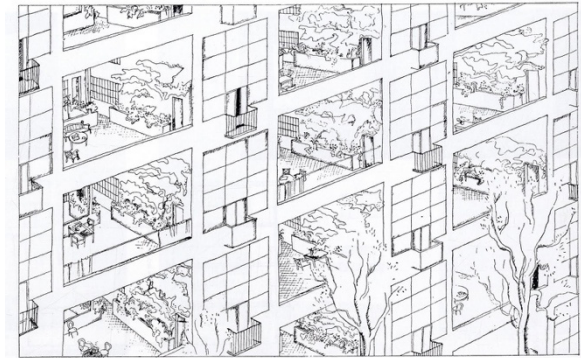

Fig. 1 Le Corbusier, Immeuble-Villa, project, 1922
Fig. 2 Piet Blom, Noah's Ark project, plan of a district unit, 1961-62
Fig. 3 Herman Hertzberger, Centraal Beheer offices, Apeldoorn, 1968-1972

Team 10 members **Alison and Peter Smithson** experimented with layering of various types of transportation, visible in their contribution to the competition "Hauptstadt Berlin" in 1958. **George Candilis, Alexis Josic, and Shadrach Woods** executed the mat-building of the Free University in Berlin(1963-1973) as well as the Toulouse-le Mirail development (1961-1974) with its stem structure. A connection can also be established between these architects and Le Corbusier in his late structuralist phase. Team 10 member **Stefan Wewerka** designed residential developments of linear rows, and the structuralist idea was widespread in urban planning competitions in the Federal Republic of Germany during the 1960s and 1970s.

In the 1960s and 1970s, the **utopian movements** were touched by the structuralism. The Plug-In City(1962-1964), by **Archigram** member Peter Cook, was an iconic character of structuralism. At this time the high-tech pop architecture made use of the structuralistic principle to combine concrete bearing structures with industrially prefabricated residential cells. The **Japanese metabolism**, was based in a different philosophicy but structurally had the same results, for example in the Nagakin Capsule Building by Kisho Kurokawa (1970-1972). The Italian group **Archizoom** had other goals and intended endless artificial landscapes on the basis of structuralism.

In the special category of the spatial cities of the "flying carpets", belongs the poetic drawing of the Ville Spatiale by **Yona Friedman**, show a primary spatial framework with flexibly inserted residential cells suspended above the site. This utopian idea was very pursued in Germany in particular.[3]

It is also important to review the research projects from this period, *A Pattern Language* by Christopher Alexander. A system of patterns that form a complex primary structure. This book was a base to my analysis of the large scale – combinations of patterns between the buildings that create communication and livability, that leads to a bigger system of patterns used to the extra-large scale of the neighborhood.[4]

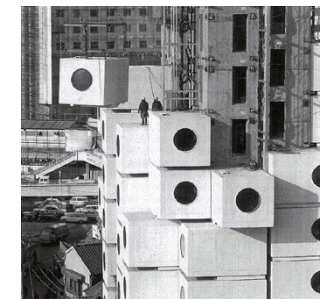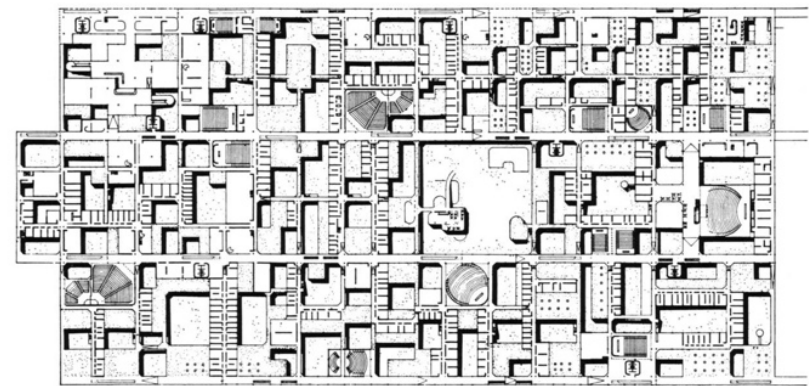A deeper analysis of the Metabolic Movement is following, to understand the different philosophy.

Fig.4 Candilis, Josic, Woods, Free University in Berlin, 1963-1973
Fig. 5 Kisho Kurokawa, Nagakin

Capsule Building, 1970-1972

3. BIRTH OF A MOVEMENT

3.1. CIAM

The **Congrès internationaux d'architecture moderne** (CIAM), or International Congresses of Modern Architecture, was an organization founded in 1928, at the Chateau de la Sarraz in Switzerland, by a group of 28 European architects organized by Le Corbusier, Hélène de Mandrot (owner of the castle), and Sigfried Giedion (the first secretary-general). CIAM was one of many 20th century manifestos meant to advance the cause of "architecture as a social art", responsible for a series of events and congresses arranged across Europe by the most prominent architects of the time, with the objective of spreading the principles of the Modern Movement focusing in all the main domains of architecture (such as landscape, urbanism, industrial design, and many others).

As society became more industrialized, it was vital that architects and the construction industry rationalize their methods, embrace new technologies and strive for greater efficiency. At this early stage the desire to re-shape cities and towns is clear. Out is the "chaotic" jumble of streets, shops, and houses which existed in European cities at the time; in is a zoned city, comprising of standardized dwellings and different areas for work, home, and leisure. In 1933 the Athens Charter set down the primary functions of urban planning, to rigid functional cities, with citizens to be housed in high, widely-spaced apartment blocks, and green belts would separate each zone of the city.[5] Furthermore, the insistence on rectangular structures has resulted in plenty of SLOAP[6] which cannot be used for much. CIAM held its final meeting in 1959 after which the Smithson's and their allies attempted to take Modernism forward on new tracks with Team X.

Fig. 6 Otterlo **Meeting 1959 (also CIAM ‹59), organized by Team 10, 43 participants. Meeting place:** Kröller-Müller Museum, located in the Hoge Veluwe National Park. Dissolution of the organization CIAM.

3.2. **TEAM X**

Team 10, was a group of architects and other invited participants who assembled starting in July 1953 at the 9th Congress of the CIAM and created a schism within CIAM by challenging its doctrinaire approach to urbanism. The members exposed, discussed and analyzed architectural problems, so that their writings were not dogmas, but ideas and opinions. The group's first formal meeting under the name of Team 10 took place in Bagnols-sur-Cèze in 1960. On the core group of the seven most active and longest-involved participants in the Team 10 were, Jaap Bakema, Georges Candilis, Giancarlo De Carlo, Aldo van Eyck, Alison and Peter Smithson and Shadrach Woods.[7] They referred to themselves as "a small family group of architects who have sought each other out because each has found the help of the others necessary to the development and understanding of their own individual work."[8]

From the eighth congress of the CIAM questions posed to the functionalist model, which flows into the ninth CIAM crisis and preparing for the tenth of an alternative proposal to be made by the new generation of architects. In the tenth CIAM these architects introduced concepts like "human association", "cluster" and "mobility", with Bakema encouraging the combination of architecture and planning in urban design. This was a rejection of CIAM's older four function mechanical approach and it would ultimately lead to the end of CIAM.[9] Kenzo Tange was invited to the last meeting of CIAM '59, he presented two theoretical projects by the architect Kiyonori Kikutake: the Tower-shaped City and Kikutake's own home, the Sky House. It was the first time that Metabolist movement was presented internationally.

3.3. **WORLD DESIGN CONFERENCE (WoDeCo)**

It was proposed from the Japanese Committee, rather than a four yearly International Design Conference in Aspen it should be held in Tōkyō as its first setting in 1960. In 1958 they formed a preparation committee led by Junzo Sakakura, Kunio Maekawa and Kenzo Tange. After the last meeting of CIAM '59, Tange left for Massachusetts Institute of Technology to begin a four-month period as a visiting professor, therefore he recommended his junior colleague Takashi Asada to replace him in the organization of the conference.[10]
The young Asada was charged by Tange to gather a group of young architects for the WoDeCo. He invited two friends to help him: architectural critic and former editor Noboru Kawazoe, and Kisho Kurokawa who was one of Tange's students. Through them more talented designers came to help, including: the architects Masato Otaka and Kiyonori Kikutake, the designers Kenji Ekuan and Kiyoshi Awazu, and Fumihiko Maki a former undergraduate student of Tange. This group of emerging talents would became Metabolism.[11]

Asada engages politician, bureaucrats, business leaders, journalists, and academics; by night, creating a new avant-garde. The group was looking for solutions to urban crises caused by Japan's explosive economic growth and how this could be reconciled with its shortage of usable land. They turn to the traditional Japanese architecture, were they get inspired by examples like the cyclical rebuilding of the Ise Shrineand and the modular growth of Katsura Detached Palace.[12] They worked in coffee shops and in Tokyo's International House, to produce a work that they could publish as a manifesto for the conference.[13]

The conference ran on May 11-16, 1960 and had 227 guests, 84 of whom were international, including the architects Louis Kahn, Ralph Erskine, B. V. Doshi, Jean Prouvé, Charles Correa, Paul Rudolph, Peter and Alison Smithson, Raphael Soriano and Minoru Yamasaki. Japanese participants included Kunio Maekawa, Yoshinobu Ashihara and Kazuo Shinohara.[14]

3.4. **THE METABOLISM NAME**

In a gathering in the build-up to WoDeCo Kawazoe, Kikutake, and Kurokawa realize the need to name their nascent group. Kawazoe was talking a lot about shinchintaisha at the time, which means "regeneration" or "replacement of the old with the new." He found the term shinchintaisha in the Japanese edition of Friedrich Engels's Dialectics of Nature. Engels writes how, with recent scientific discoveries in nature, "all rigidity was dissolved, all fixity dissipated, all particularity that had been regarded as eternal flux and cyclical course." The Japanese meaning of the word has a feeling of replacement of the old with the new and the group further interpreted this to be equivalent to the continuous renewal and organic growth of the city.[15] He was looking for something new they could put forth at the design conference, it needed to be a word that would resonate internationally. Kikutake finds the English equivalent: "metabolism"; understandable around the world and completed it with an "ism" at the end. Kawazoe agrees to the name, but remains unsatisfied since it signifies adaptation to change but not to growth, propagation or metamorphosis, which the Metabolists also investigate.[16]
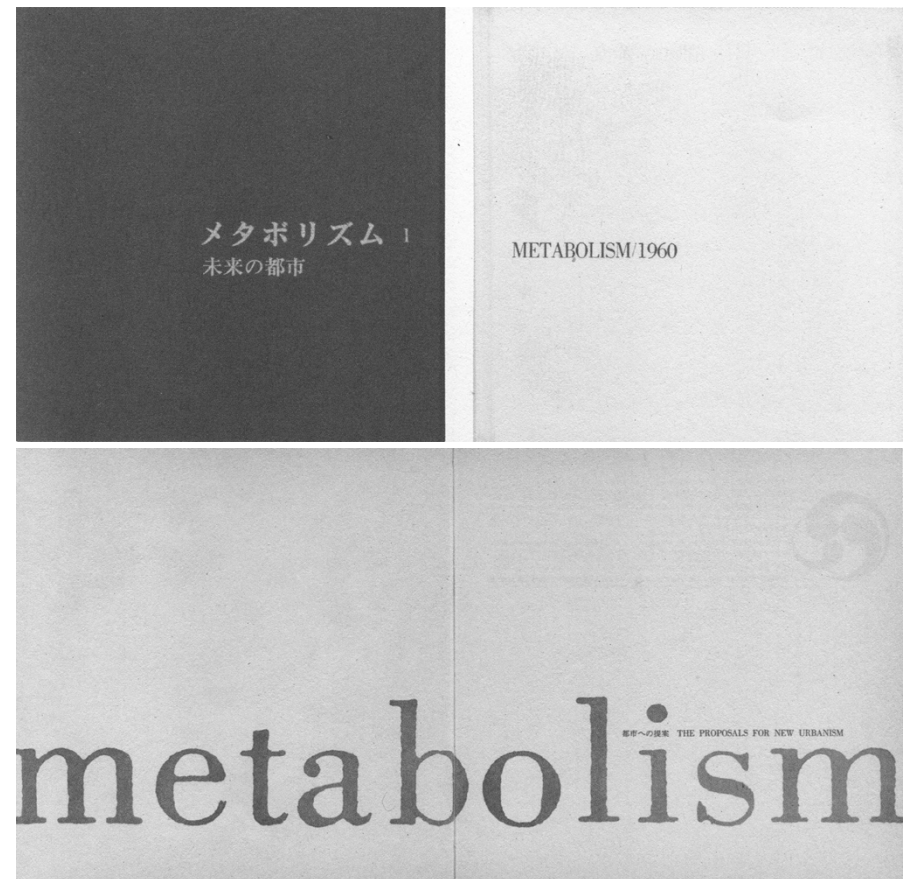
Fig. 7 Metabolism/1960 [Tokyo 1960]

3.5. **METABOLISM 1960**

The group's manifesto Metabolism: *The Proposals for New Urbanism* was published at the World Design Conference. The 89-page book was printed in an edition of 2,000 and sold at the venue of WoDeCo, announcing Metabolism to an international audience;[17] The book has never been reprinted again.[18] The manifesto opened with the following statement of Noboru Kawazoe, introduction to *Metabolism 1960*:

> *"'Metabolism' is the name of the group, in which each member proposes further designs of our coming world through his concrete designs and illustrations. We regard human society as a vital process - a continuous development from atom to nebula. The reason why we use such a biological word, metabolism, is that we believe design and technology should be a denotation of human society. We are not going to accept metabolism as a natural process, but try to encourage active metabolic development of our society through our proposals."*
> [19]

This introduction gave *Metabolism 1960* the feeling of a manifesto, though it was never explicitly described as such. The publication included projects by each member but almost 40 percent of the content was dedicated to work by Kikutake[20] who contributed essays and illustrations on the "Ocean City". Kurokawa contributed "Space City", Kawazoe contributed "Material and Man" and Otaka and Maki wrote "Towards the Group Form". Awazu designed the book and created a logo and Kawazoe's wife, Yasuko, worked on the layout.[21]

Unlike the more rigid membership structure of Team 10, the Metabolist's saw their movement as an organic form with the members being free to come and go, although the group had cohesion they saw themselves as individuals and their architecture reflected this.[22] Tange remained a mentor for the group rather than an "official" member. The projects, were theoretical designs dealing with the issue of accommodating a population that was growing into millions, by using sites that had not been considered before like the ocean or the sky.

Ocean City

Kikutake's Ocean City is the first essay. It covered his two previously published projects "**Tower-shaped City**" and "Marine City" and included a new project "Ocean City", that was a combination of the first two. The first two of these projects introduced the Metabolist's idea of "artificial land". Kawazoe referred to "**artificial land**" in an article in the magazine Kindai Kenchiku in April 1960. In responding to the scarcity of land in large and expanding cities he proposed creating "artificial land" that would be composed of concrete slabs, oceans or walls (in which capsules could be plugged). He said that; if there is no ground to build on, Metabolism will adapt and build its own ground.[23]

For **Marine City**, Kikutake proposed a city that would float free in the ocean and would be free of ties to a particular nation and therefore free from the threat of war. The artificial ground of the city would house agriculture, industry and entertainment and the residential towers would descend into the ocean to a depth of 200 metres. The city itself was not tied to the land and was free to float across the ocean and grow organically like an organism. Once it became too aged for habitation it would sink itself.
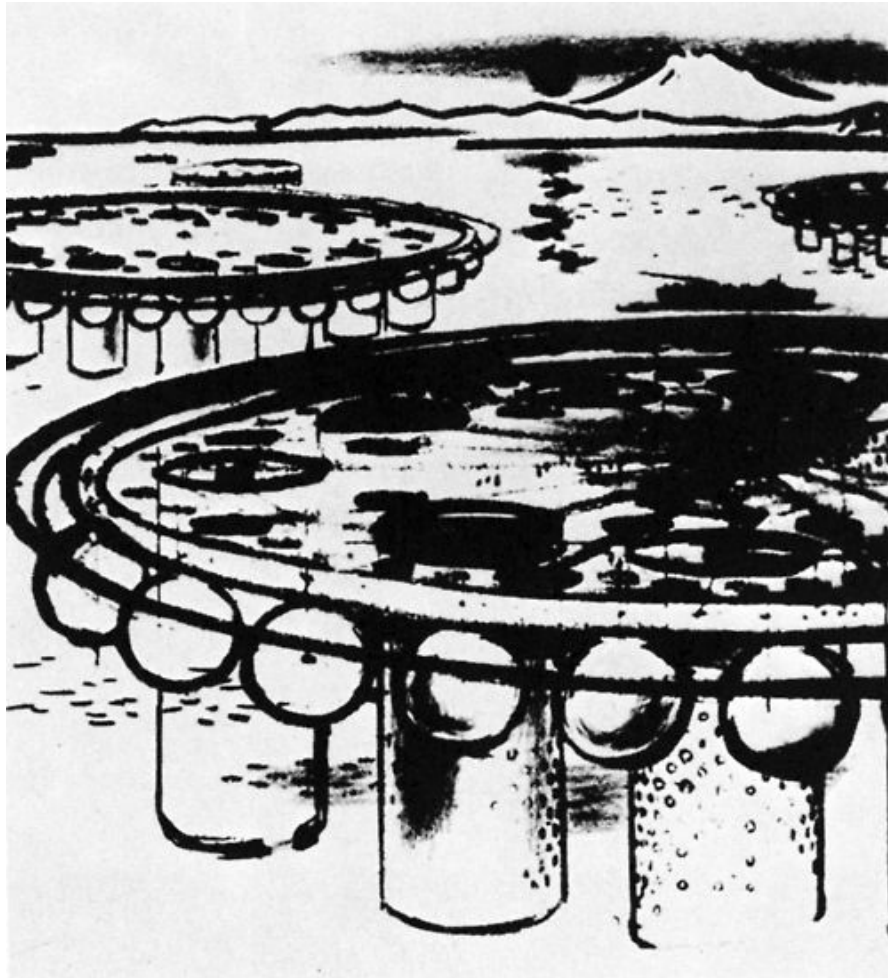
Fig. 8 Marine City sketch by Kikutake, 1958

Ocean City was a combination of both Tower-shaped City and Marine City. It consisted of two rings that were tangent to one another, with housing on the inner ring and production on the outer one. Administrative buildings were found at the tangent point. Kikutake envisaged that the city would expand by multiplying itself as though it was undergoing cell division. This enforced the Metabolist idea that the expansion of cities could be a biological process.

Space City

In his essay "Space City", **Kurokawa** introduced four projects: Neo-Tokyo Plan, Wall City, Agricultural City and Mushroom-shaped house. Kurokawa's **Neo-Tokyo Plan** proposed that Tokyo be decentralised and organised into cruciform patterns. He arranged Bamboo-shaped Cities along these cruciforms but kept the city towers lower than 31 meters to conform with Tokyo's building code.

The **Wall City** considered the problem of the ever-expanding distance between the home and the workplace. He proposed a wall-shaped city that could extend indefinitely. Dwellings would be on one side of the wall and workplaces on the other. The wall itself would contain transportation and services.

The **Agricultural City** is consisted of a grid-like city raised 4 meters above the ground, allowing agriculture and communal exist, safely and unimpeded on two separate datum. The **Mushroom Houses** would sprout from the ground and poke through the frame of Agriculture City. These houses were shrouded in a mushroom-like cap that was neither wall nor roof that enclosed a tea room and a living space.[24]
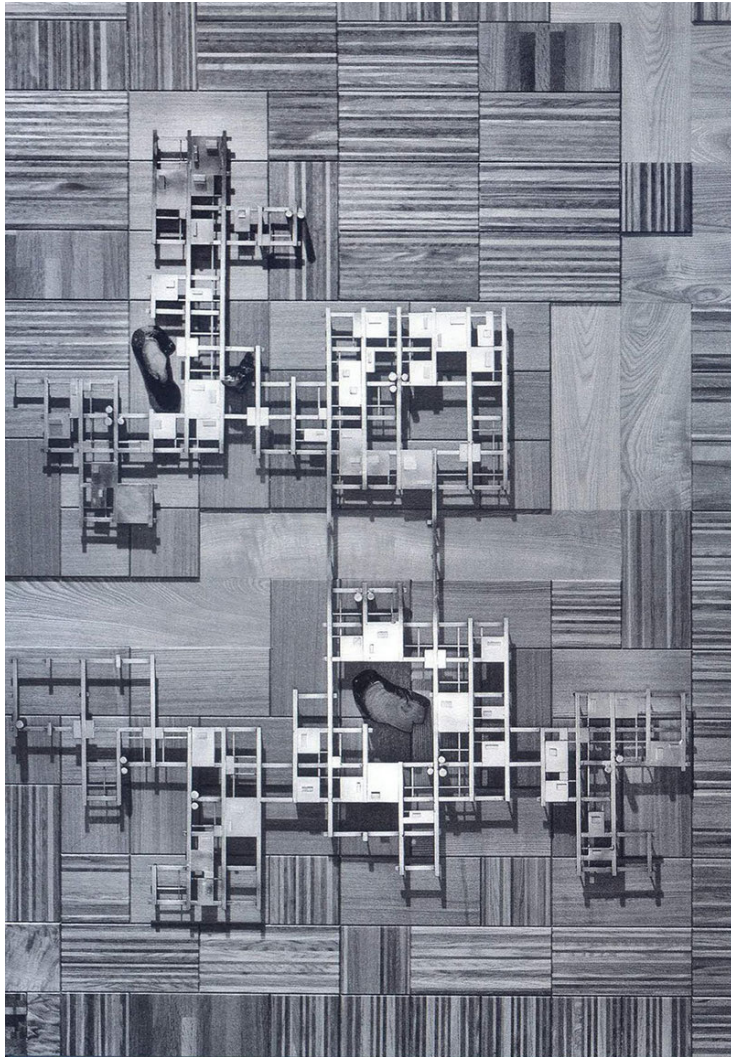
Fig. 9 Kisho Kurokawa , Agricultural City, 1960

Towards the Group Form

Maki and Otaka's essay **Group Form** was as an internal critique of the all-over aesthetic of the megastructures, they propodes a flexible form of urabn planning that can deal with the amazingly heterogeneous and rapidly transforming contermporary city.[25]

Otaka had first thought about the relationship between infrastructure and architecture in his 1949 graduation thesis and he continued to explore ideas about "artificial ground" during his work at Maekawa's office. Likewise, during his travels abroad, Maki was impressed with the grouping and forms of vernacular buildings. The first iteration of Group Form, containing a shopping city, offices and entertainment centers on a platform of artificial ground over Shinkuku station. The entertainment centers are in the shape of flower. Of one "petal" is missing, they write, it does not affect the overall form of the flower-the essence of Group Form. Although Otaka's forms were heavy and sculptural and Maki's were lightweight with large spans, both contained the homogeneous clusters that were associated with group form.

Material and Man

Kawazoe contributed a brief essay entitled I want to be a sea-shell, I want to be a mold, I want to be a spirit. The essay reflected Japan's cultural anguish after the Second World War and proposed the unity of man and nature.

4. SUMMARY

The WoDeCo became known for its discussions on urbanism, which continued the late CIAM debates but with an emphasis on Japanese topics, such as rapid population growth and the development of megacities. The launching of the Metabolist manifesto at the WoDeCo is widely seen as the presentation of the concept megastructure as a unique Japanese contribution to modern architecture. The word "megastructure" itself appeared for the first time in print in Fumihiko Maki's Collective Form.[26]

As a response to the actual issues, Metabolists developed the organic systems of network cities. With main problem the lack of comprehensive infrastructure in Japan, which was an obstacle to urban physical and economic growth; the increased mobility was propounded as a matter of individual freedom. They did not envision infill of streets and new public transportation systems to solve this task, but they elaborate entirely new forms of total organizations that went beyond the existing city. The focus was set on unifying all urban aspects into one big organism: all sorts of flows were enabled by a basic three-dimensional skeleton of long-term service structures, which held containers for various functional units of different life-cycles. These megastructures branched in a hierarchy from large traffic arteries and transportation lanes down to streets on the pedestrian level. They connected public and commercial facilities with housing, which was being organized on terraces of artificial land where the inhabitants could build their houses according to their taste. In this total scheme, everything was regarded as part of a flow, in a constant process of becoming and declining. Through the reorganization of space the entire landscape of planning and architecture was meant to change.

The Metabolist proposals have been accepted with great interest. At a time when the urban design profession did not yet exist in Japan, they responded to an urban situation characterized by a 'lack of infrastructure' and an 'absence of city planning,' with 'the will to plan'.

The political goal of Metabolist urban planning could only have meant the erasure of private land ownership and its total re-organization. The issue of 'freedom' however was frequently addressed in their projects, now focusing on the element of the individual cell, or the capsule, and on the new possibilities for mobility and change.

Metabolism was developed during the post war period in a Japan that questioned its cultural identity. Initially the group had chosen the name Burnt Ash School to reflect the ruined state of firebombed Japanese cities and the opportunity they presented for radical re-building. Metabolism is biological term, the expression occurred already in the urban sociologist Ernest Burgess' article 'The Growth of Cities', published in 1925 in the book, The City. Burgess used the term 'social metabolism' to elucidate the process of growth and transformation of cities. Beside its biological connotation, the term was often brought up in the context of Buddhist values, highlighting the pattern of death and rebirth. In this way, the metaphor 'Metabolism' carries both a universal scientific connotation as well as a Japanese spiritual one.

The core of Metabolism is the reorganization between society and individual. From the Metabolist's point of view the comprehensive planning would make people happy.[27] The dissolution of the city into 'cells' corresponded to the breaking away from patriarchal family structures

and the strengthening of the position of the individual in Japanese society. In their visionary proposals, Tange and the Metabolists took the specificity of the Japanese social and cultural context as their point of departure, but they also stressed that the emerging models were of universal validity and applicability.

Metabolism was also an expression of critique. Tange and the Metabolists criticized the entire Japanese planning system, in order to establish 'urbanism', a field that hardly existed in Japan at the time in the Western sense. Metabolism created an organic concept for imagining the regeneration of Japanese culture after the destructions and severe environmental devastations of fire bombings and two atomic blasts. It proposed, Japan as ground zero - a site of rebirth where culture would be regenerated from an underlying spirit of 'Japan-ness.' With this the Metabolists suggested an organic link between the individual and a fundamental cultural pattern.

5. MEGASTRUCURE VS GROUP FORM

In the publication *Investigations in Collective Form* in 1964, Maki publishes his research on 'group form', which contains an article written together with Masato Othaka and originally printed in the Metabolist manifesto. Maki distinguished three different 'collective forms', the **compositional** (the modernist space), the **megastructure**, and the **group form**.

The **group form** differed from the compositional in its way of relating the elements to the totality. Elements can be added and taken away from the cluster without destroying the balance of the whole composition as in a modernist ensemble. This consisted of a fixed number of certain elements according to the master plan principle, where the design process was clearly divided into a functional planning phase followed by the phase of erecting individual buildings.

The **megastructure**, on the other hand, was an open structure without a fixed concept of composition denominating the infrastructure, a man-made landscape, upon which all functions and elements of society grew and thrived. Here a 'master system' replaced the master plan. Maki saw the task of the master system in its adaptability to change to swing into place 'in ever new stages of formal and structural equilibrium,' preserving at the same time 'visual integrity'. **Group form** was rather based on a '**group program**' than on a determined plan, resulting in non-hierarchical collective forms, in contrast to the master plan and the master system. The layout of a group form al-

ways stayed dynamic and open-ended. Maki described its cluster-like arrangements with the words 'it is not necessary to limit composition to inorganic, geometrical, structural, or mechanical patterns. Rather group form is an intuitive, visual expression of the energy and sweat of millions of people in our cities, of the breath of live and the poetry of living. The group form is also a social process instead of a technological proposal, whereby group form surrenders to change rather than imposing mastery, and that asserts interdependence among disparate, even unfinished elements, rather than hierarchy and isolation.[28]
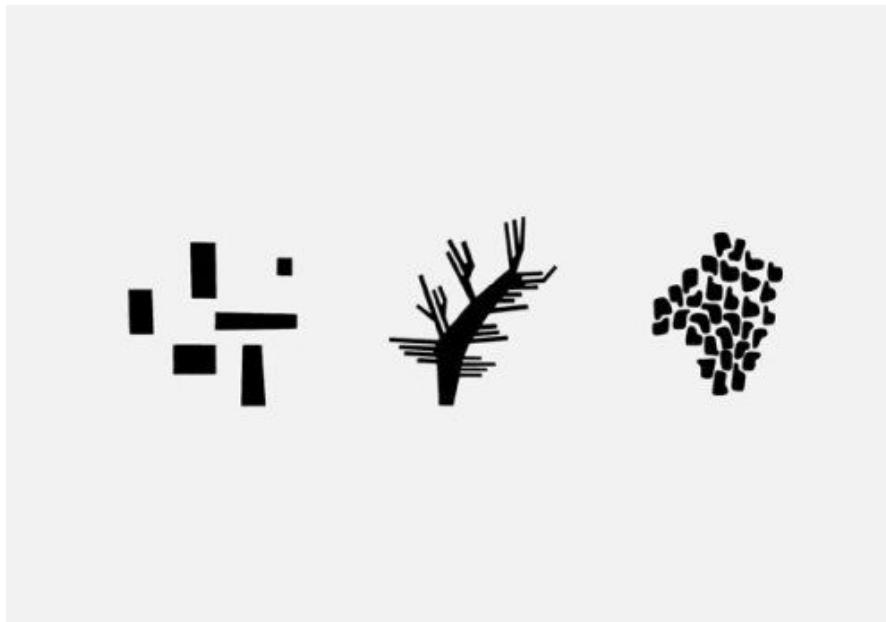
Fig. 10 Approaches to collective form. From the left to right, compositional form, megaform, group form

6. WHAT WE LEARNED FROM METABOLISM

Metabolism received as much media attention in the West as in Japan itself. However, Metabolism meant different things in the East and in the West. In Japan, the movement triggered an engagement with Japanese past culture and a departure from preconceived Western architectural conceptions. In the West, the Metabolist schemes triggered a new appreciation of visionary projects on grand scales, especially in Europe.

The aim of the Metabolists was to solve the issues that came with the rapid growth of megacities in a scale that was never before seen. They addressed questions of land use in in cases of major disasters. They also addressed organizational, philosophical and political considerations about the structure of the society and the national identity and culture. The separation of public and private, making one part of the megacity an infrastructure at large and dissolving the other part into a micro landscape of cells, would mean a radically different conception of the city. It shows a population constantly on the move, freely connecting and disconnecting according to personal desires. This society was not bound to place; they could take place in megastructure and group form, symbolic images such as cycle and tree, and the idea of an underlying cultural code.

It is not about the aesthetics of the concept idea, above all, is the motivation behind it, and that is exactly the essential aspect. It is much more the ideology of Tange that persists, which inspires the next generation to think ahead, and certainly also a reason why the contemporary Japanese architectural scene moved into international focus. In

addition, it should be mentioned that the metabolists were formally separated more often than united, as all prefer different directions. Maki, for example, was in many ways the opposite of Kurokawa and Kikutake, he proposed megastructures and high tech visions but did not support Kurokawa's extravagant theories. So it was above all the collective ideology that was able to give their ideas more expression through the connection to a strategically valuable alliance.[29]

In order to process this ideology and re-develop concepts that form the basis for the further work, the background and the way of thinking of the Metabolists is further analyzed.

7. CONCLUSIONS OF THE RESEARCH

The situation analysis shows, that the previous findings give us a clear image from the history of Structuralism and Metabolism, how the generations influenced one another and created different projects with the same base of structure seen from a different perspective. Influenced by these projects and theories I will produce a project in Vienna. For this reason, in the next step, the goal of further intensified research is about the city of Vienna.

CHAPTER II
PROJECT ANALYSIS

Data, facts and case studies
This chapter deals in detail with the city of Vienna and the problems
in the architecture and urban field.

1. VIENNA

1.1. Data, facts and background information about Vienna

The city of Vienna is the capital of Austria. It is the 7th-largest city by population within city limits in the European Union and the second largest in the German-speaking world. Vienna is host to many major international organizations, including the United Nations. As a former imperial royal residence, Vienna is one of the most visited tourist cities in Europe with its historic city center, which was designated a UNESCO World Heritage Site, and is one of the cities with the highest quality of life in the world.[30]

Urban area
The total urban area covers 41.487 hectares, of which 35,9% is built-up space, with 14,4% traffic space and 49,6% green space. The Danube flows through the city from the north. The Danube flows southeast passing through Vienna.[31]

Population
Since 1991, the city's total population has grown from 1.564.051 to 1.888.776 – an increase that almost equals the entire population of Brno. With an average population density of 46 people per hectare, shows that the population of the city is growing steadily. The growth population since 2008 is +217.555 (+13%) and since 2017 is +21.194 (+1,1%). The Austrian capital has successfully developed from a shrinking city on the fringes of Western Europe into a vibrant EU metropolis

at the heart of the continent.[32]

The population forecast in 2016 had assumed that by the year 2022 Vienna would break the two-million-population barrier. The revised forecast does not see this scenario until 2026. For comparison: Prior to the great refugee movements, Statistics Austria calculated in 2014 that by 2029 Vienna would again have two million inhabitants, the number of Viennese residents could rise to 2.04 million by 2034, an increase of 15% compared to 2014. However, this could happen sooner since the publication of the study shows that the population has already grown faster than expected in the last two years.[33] According to this prognosis, Vienna would again reach a population that already had it after the growth phase owned in the 19th and early 20th centuries. The city experienced rapid growth at that time. The number of inhabitants within the borders soared from 150.000 to 2.000.000 from 1815 to 1910. The forecasts are based on assumptions about birth rates, deaths and life expectancy as well as international immigration. The latter is the main reason for growth in Austria, said Dr. Konrad Pesendorfer, one of the General-Directors of Statistics Austria. According to long-term forecasts, Austria will grow to ten million by 2080. "If we had no international immigration, we would be in 2080 with just over 6.6 million inhabitants," said Dr. Konrad Pesendorfer.

The population distribution for 2018 by sex is 48.7% men and 51.3% women. The multiple births are 3.3% of total births 2016, which is high in comparison value for 1986, 1.9 %. With Vital statistics 2017 having a positive sign of + 4,152, and the life expectancy in 2016 for women and men around 80 years old, are showing a very good mix of ages. Regard to nationalities, 70.4% were Austrians, 12.7 % European and 16.9 % from other countries. As of 1 January 2018, Vienna was

home to people of 181 different nationalities. With an In-migration of 98,926 people and Out-migration 82,135 people for the 2017. About the Education, Vienna is the largest university city in the German speaking countries, with a total number of students 194,154.[34]

Economy

In 2017, Vienna recorded 9,035 business start-ups, which is 1.2% more than in 2016. Also, more international companies set up business in Vienna, than in all other federal provinces of Austria added together. With the top 3 countries of origin of new international businesses in Vienna been Germany (51), Switzerland (17) and China (13). The economic effects of new international businesses has a 537 m. investment volume and created 1,087 new jobs. More than a quarter of all people working in Vienna commute into the city rather than living there. From the 965,369 employed, 73.1% live in Vienna and 26.9% commute into Vienna. 2017 also marked another record high in the number of tourist overnight stays, which has doubled since 1990, which brought Vienna to the 9th place with 16,423,533, higher than Munich. With 31.4% visiting from EU, Switzerland and Lichtenstein, 20.1% from Germany, 18.2% from Austria and some percent from USA, Chinese region, Russia, Arab countries and Japan.[35] The Viennese hospitality sector has an accommodation capacity of approximately 66,000 hotel beds, with a room occupancy of around 76%.[36]

Population density

Vienna has an average population density of 46 people per hectare. The residential areas have a share of the total district area, of 25.4% in Vienna overall, 14.5% in Leopoldstadt and 60.9% in Josefstadt. The average housing space per resident is 35m2, and the average number of residents per apartment are 2.07.[37]

The pressure on the cities is low in Austria in relation to the currently living population. The degree of urbanization, an indicator of how much of the population lives in the city, is comparatively low, 30.1% of the people live here in the city. In France, it is 45.3%. In the UK almost 60%, in Spain over 50%. Comparatively few also live in cities in Germany, 36.1%. Unlike in many other European countries, the proportion of tenants in Austria is above average, 45% of households live in tenancies. Around one third of the housing market falls on the capital Vienna.[38]

Residential

The current rents (2017) in the free housing market, the social housing offer not included, are in Vienna at 8.76 to 11.07 euro per square meter.[39] In comparison, Vienna is therefore on average more expensive than Berlin, 5.5 to 10.8 euros, and cheaper than Munich with 10.6 to 15.6 euros per square meter. The price difference between Vienna In any case, according to the trends, Berlin will become smaller, as the Vienna square meter price rose by 4% between 2012 and 2017, while the Berlin price rose by 25% in the same period.
This development highlights the importance of regulating and relaxing the rental market by increasing housing supply.[40]

With the construction of apartments per 1,000 inhabitants, Austria has a good average rate of 7.8 percent. In France it is only 6.4 percent. At 5.2 percent, Hungary is one of the countries with the fewest apartments per inhabitant. In the neighboring Czech Republic, the intensity of housing development is at 7.2 percent, similar to this

country. In Germany the development is similar.[41]

On the one hand, this strong growth is due to the geographic and historical situation of Vienna as a link between Western and Eastern Europe and, on the other hand, to the fact that housing is cheaper than other major cities. The active housing policy in Vienna, which uses public money to build and promote housing, gives the city a head-start in European comparison and can actively intervene in the housing market and counteract rising prices. In cities like London, Paris and Munich, low-income people are being forced out of the city, as the high rents and cost of living are no longer payable. Berlin's growth will also weaken as rents rise significantly and the city is not the economic center of Germany.

1.2.   Urban development areas

The city of Vienna has defined target areas in urban development in order to meet the requirements of growth. These relate, on the one hand, to the construction of living space and, on the other hand, to the revaluation and creation of public space, the restructuring of commercial areas and the renovation of existing areas. These target areas were developed in 2014 and include green areas along the Gürtel, the Danube Canal, the Danube Region of Leopoldstadt, the Erdberg Mais-Aspanggründe-St.Marx, the main railway station in Favoriten, the center and other areas of Floridsdorf, some parts of Liesing, the center of Kagran and in addition to Aspern-Seestadt some areas along the U2.[42] In some projects the focus is on the construction of new residential areas, another focus will be on the existing urban area. Most projects

are located in eastern and southern Vienna. These include in the 10th district the project of urban development in Rothneusiedl, in the 22nd district Seestadt Aspern, the EUROPAN 9 project, as part of a European competition initiative and the cooperative planning procedure for the area Raffenstättergasse and another EUROPAN project in the 23rd district. Geografically outlines the major projects on the former railway areas of the Nordbahnhof, Nordwestbahnhof and Sonnwendviertel.[43] These areas are in the densely built-up area in contrast to the previously mentioned areas. They are examples of how infrastructure can be rebuilt by restructuring the infrastructure, but the land is irreversibly lost for a possible renewed need for rail infrastructure.

1.3.   New development opportunities

Either the expansion of the built-up area of the city will be necessary - create new neighborhoods, or new ways of housing extension must be found. To enlarge the city by installing more land in the surrounding area is questionable for several reasons. On the one hand, building new city districts at first glance may be more favorable in terms of construction costs because of moderate land prices, but on the other hand, the share of infrastructure costs such as public transport, schools, childcare facilities and canal, water and electricity should be added. Another ecological problem of the extended city is that the longer distances do not only mean extended public transport, but also mean the increase in individual traffic.

Therefore, other solutions must be found to create new living space while increasing the urban quality. One possibility is to use the po-

tential of not yet finished attic floors. In this way, it is hardly possible to create living space that is located outside of the high-priced segment, since the construction costs for loft conversions fees are very high. Potentials are also in the opening of vacant and unused apartments. Estimates suggesting vacancies of 30,000 to 100,000 unused dwellings have shown new research in recent years. The result was around 35,000 unused apartments, 25,000 of these belong to the so-called mobility reserve, a constant number of housing, which means the removal and housing searches through a reserve to facilitate free-standing living space. Some 10,000 more have been vacant for more than 2.5 years, or have no resident. However, due to the ownership of these properties, it is very difficult, if not impossible, to resort to these reserves.[44] The empty spaces, which could be used for residential purposes, are not only the unused apartments, but also the ground floor zone. While not every ground floor zone is suitable for residential use, the combination of "work & home" as so-called "home-office", can make the living on the ground floor act as an advantage.

1.4.   Multiple use and restructure

Despite these potentials, a new construction must confront the population growth. A sustainable consolidation, which creates affordable living space, must take place on areas that have not yet been built or can be restructured; areas that remain into the city. As the land of the existing parks and green spaces, have to remain in order to maintain the quality living balance, there are potentials on transformation of the traffic areas. Traffic tends to consume immense ground. Although they are important for public and private passenger transport and

traffic, they also prevent non-motorized traffic and are obstacles in the city. Not all of these areas can be transformed into living space, but potentials for increasing urban quality of life can be researched and exploited. Especially railway lines can offer in inner city an extended use by offering housing opportunities.

The existing track systems can be reduced by a denser utilization and area can be gained. This would also be an advantage in terms of urban planning, as railway lines cut through neighborhoods and form barriers. In addition, the large railway areas offer no possibility to stay or extended use of the area could increase the quality of life. Former railway areas, such as Nordbahnhof, Nordwest-station and the Sonnwendviertel are and have been redesigned.[45] In addition to these unused areas, which have been reclassified as building land, it is also possible to continue to use railway tracks that are still in use. As the examples of Franz Josef Station and the Althangrund show, the railway and other functions can coexist.[46] These are overbuilt railway areas, on which the building complex of the former University of Economics and other office buildings stand. Following this example, other areas can be redesigned and improved, and not only can urgent needed living space be built, but also the green part of the city can be increased.

1.5.   Development of traffic areas

In Vienna, a few examples show how traffic areas can be overbuilt and new land can be created. Although the focus has been on office spaces, these show clearly the possibilities of the theses areas.

The today's **Franz Josefs station** was planned by an architect community, who belonged among other things Karl Schwanzer and Harry Glück, and built 1978. The essential part is that it is not rail traffic but the office buildings above them. The structure of the railway line runs to the university center Althanstraße, and is defined as a city development area of the city of Vienna. Another development of the Vienna subway station, is the **Meidling Hauptstrasse**, it was built at the end of the 1970s and renovated and rebuilt in the course of the 2000s. In the ground floor zone of the business center exits the underground station, bus stops, several snack bars. On the upper floors there are office rooms, parking lots and a gym. One of Vienna's most important public transport with S-Bahn and U-Bahn stations, the **Wien Mitte station** has also been reconstructed. The railway lines have been in operation since 1899, and as early as 1957 one of the first shopping centers in Vienna was built on the covering slab. Since the 1990s, today's development has been preceded by a much criticized planning process, including that of UNESCO. The realized project has a parking garage and 150,000 square meters of gross floor space, of which around 30,000 square meters are shopping center and approximately 60,000 square meters are office space.[47]

1.6. International pioneers

In addition to the Viennese examples, there are numerous international projects that show the potential of additional use of traffic areas and show how these different types of use can be combined.

A good example of overbuilt railroads is New York. The world's largest

station by platforms, **Grand Central Terminal** in New York City with 44 platforms, is mostly underground, which is why the total area of this station is hardly noticed. The construction of Grand Central created a mini-city called the «Grand Central Zone». The underground area extends roughly over three by seven blocks and is surrounded by several skyscrapers, this area included the Biltmore, Barclay, Park Lane and Astoria Hotels, luxury apartment houses along Park Avenue, and various new office buildings.[48]

The **Jardin Atlantique** is a public park and garden located in Paris, on the roof that covers the tracks and platforms of the **Gare Montparnasse railway station**. Since 1994, this is a 3.5 hectare park is open to the public, the green area is located in the densely populated area, thus providing a recreational area for the approaching Paris population instead of simply covering the tracks. The garden is supported by twelve pillars, and seventeen meters above the street level. Large ventilator shafts for the station are placed around the garden, and the announcement of the trains departing can be heard in the garden. Cubes of stone filled with earth contain five hundred trees. The garden is surrounded by office buildings, some tennis courts and a small museum.[49]

Folly for a Flyover was assembled by a team of volunteers over the course of a month, using reclaimed and donated materials. This project of the London architectural collective Assemble was built under a highway bridge. Even if it was planned as a temporary building for a summer, this small building, which served as a cinema, event venue and café, shows impressively, as with small ones Intervened away from large-scale urban development projects, the potentials of a non-lo-

cation were utilized and over a period of nine weeks, 40,000 visitors were able to offer a new space for social interaction without hindering the traffic on it.[50]

1.7. The railway area

In order to create a project without boundaries some parameters as surface area, possible building heights, urban development situation, surrounding building density and accessibility are important points to integrate into the urban environment. The Westbahnhof railway station in the area that the project will be established.

Westbahnhof, 1150 Vienna

The largest railway area is between Westbahnhof and Johnstrasse. This area has around 150,000 square meters and is ideally suited to creating living space due to its proximity to the center.[51] The area is bordered by the Felberstraße, the Schmelzbrücke and the Avedikstraße. The part adjacent to Felberstrasse, an elongated part of the property between the road and the railway with a surface area of around 70,000 square meters, is no longer needed for rail transport due to infrastructure optimization by ÖBB. The buildability is currently being reviewed for a competition. However, the plans of the ÖBB do not go far enough. It is therefore necessary to plan a large-scale project and to think of a large structure created along the route without substantially preventing the operation of the existing infrastructure of ÖBB.

After the current information about Vienna, as the problems of population growth and the poor use of space are underlined , are resulting a necessary and urgent expansion of the city within the city, without been extended beyond its boundaries. Expansion over the existing rails is not new to architecture and has proven to have many advantages. How could it be used in Vienna? And in which area? After the above analyzes, as has been shown in the past, the area of Westbahnhof station which is located in the Rudolfsheim-Fünfhaus, the 15th District is a very interesting area for further analyzing, using and expanding, not only because of the large size of the unused tracks but also because of its strategic position on the map and its connection with the city. For a better understanding, follows a thorough analysis of this area.

2. Rudolfsheim-Fünfhaus

2.1. Data and facts about the 15th district

In the central Vienna, west of the "Innere Stadt"-the center of Vienna, is the Rudolfsheim-Fünfhaus, the 15th municipal district of Vienna. It borders with the following districts, in the east with the Neubau and Mariahilf, in the south with Meidling and Hietzing, in the west with Penzing and in the north with Ottakring. The eastern border is along the Gürtel **beltway (**Neubaugürtel, Mariahilfer Gürtel and Sechshauser Gürtel). The Gürtel **(literally Belt) is a substantial city road of** Vienna, running 13.1 km parallel to the Vienna Ring Road, it encompasses the inner city districts and follows the route of the former Linienwall **outer fortification.**

Urban area

Rudolfsheim-Fünfhaus covers an area of 392 hectares, 0.9% of the total area of Vienna and, with 78,999 inhabitants(2017), is home to just over 4% of Vienna's total population.[52] The district is the smallest in terms of area outside the belt and, except for the Schmelz and Auer-Welsbach-Park, has few public greens. Of the total district area around 55% are construction areas, 35% are traffic areas, 9% are green areas and 1% water.[53]

Topography

The district area rises from south to north and from east to west. The lowest area of the district territory is located at the intersection of Sechshauser Belt and Ullmannstraße with an elevation of 184 meters. The highest point is at the crossing Johnstraße and Hütteldorferstraße with an elevation of 240.6 meters.[54]

Demography

According to the statistic of 2016, 48% of the district area occupies residential areas housing 38,569 inhabited apartments, which in turn are inhabited by 76,320 people. In percent, this means that not quite 1% of the Viennese urban area is home to more than 4% of Viennese citizens. An apartment has an average of about 61 square meters, which is the 15th district of Vienna 16% below the average. The average age of 38.6 years makes it the district with the youngest population, with a balanced ratio between men and women. Rudolfsheim-Fünfhauser has the fewest cars in Vienna at 0.29 cars per person. Ranked by municipal districts, the inhabitants' net annual income is lowest at € 16,766 and only 80% of a Viennese average salary.

The district recorded constant population losses in the 20th century. Between 1961 and 2001 alone, the population has fallen by 31%. However, the past decade was marked by a positive population trend, which could continue in the future. Between 2014 and 2034, however, population growth will still be well below the Vienna average of 15%. With 4%, the population in 2034 could only be about 3,000 people higher than today. Unlike in many other municipalities, the population increase is borne equally by birth and migration surpluses. Such a demographic com position also leads to a higher proportion of persons with a history of migration. In a district comparison, the share of those born abroad is relatively strong at 47%. This population weight is likely to remain almost unchanged in the coming years. By the mid-2030s, a decline is predicted for the 15- to 44-year-olds, which may be due to housing and habitat use of young families. In all other age groups, the number of inhabitants is increasing, with 76% expected to be the biggest increase in the over-75s group.[55]

Urban development

The majority of the approximately 3,100 buildings are residential buildings. Of the approximately 2,700 residential buildings, almost 1,700 were built before 1919, around 700 between 1919 and 1991 and 300 after 1991. The total number of apartments is almost 41,500, of which about 17,300 single-person households.[56]

The building structure in the northern part of the district has a rasterized dense block construction. An exception are the small garden settlements as well as the sport facilities on the Schmelz, which are on a former place of the imperial army, also the Vienna Stadthalle breaks the raster with two large parks surrounding it. The area south of the

Felberstrasse, south of the Westbahn station rails, has an older and less strict structure, but is also dominated by block developments.[58]

3. Wien Westbahnhof railway station

Wien Westbahnhof (Vienna West station) is a major Austrian railway station, the original starting point of the West railway (Westbahn) and a former terminus of international rail services. In 2015, its role changed with the opening of Vienna's new main station (Wien Hauptbahnhof) and Westbahnhof now is mainly a commuter station and the terminus of private rail operator WESTbahn's intercity service from Salzburg. At the same time, the frequency of fast regional service along the West railway was increased. Locally, Wien Westbahnhof is served by S-Bahn-line which is the suburban rail rapid transit network extended beyond the borders of the city and the underground (U-Bahn) lines. As some facilities of the station are no longer needed after its demotion, a reduction in the station's size is to be expected and concepts for the utilization of the surplus space are already being considered.[57]

3.1. Urban analysis

The majority of the buildings is dominated by a building typology, there are two types of house construction the mixed construction areas and residential areas. The area of Westbahn is characterized in the north with construction class III (in the narrow streets) and IV (in the main streets), which means 9-16 meters and 12-21 meters height. In the south prevails the construction class III (9-16 meters), furthermore there is a long building facing the rails with class V (16-26 meters).[58] Only this residential building "Riegel"(Latch) stands out, especially as it is situated near the rails, in front of this big void, with a slim but high volume. Also the District Museum Rudolfsheim-Fünfhaus, which a construction class IV (12-21), stands out. A different typology has the residential building "Boomerang", with its unique form mediates through its curved shape between Gasgasse and Zwölfergasse and at the same time creates a widening of the crossing area.[59] To the east, the Westbahnhof railway station building and other buildings like the office building "Wolkenbügel", which its clearly differentiated in its design vocabulary, forms the extension of the "bar" and is intended to become the landmark of the area, all of them border the main street of Neubaugürtel in front of Europaplatz. To the west begins the journey of the railways, extended in length with a large width cause of the many railways, which greatly reduces when it changes level and extends up to an altitude as one railway.

The houses are, as usual in Vienna, also here have a typology of a rectangular shape with a courtyard in the middle, following the given raster of the area. The road network including sidewalks follows the void of this raster.

3.2. Building Site

While standing in the Neubaugürtel street, through the impressive glass facade of the Westbahnhof building, one can see the sky continues behind the terminal above the rails, creating a visual connection

with the city. From the Schmelzbrückenrampe, one can see the 6 rails running parallel to the Felberstrasse and the Zwölfergasse, and stop at the rear of the building. Behind the imposing building of Westbahnhof, lies an oblong area of about 44,000 m² which separates the area into two with the railway lines running westward. Beside this property is occupied by parking facilities and train preparation spaces. The Felberstrasse makes a bypass to connect to the plot, this street acts as access and creates an entrance to it. Thus, the property is opened visually from three sides, but is only opened to the small road.

3.3.   Urban context

A tour in the neighborhood gives a sense of what is being provided nearby. The area is divided into two different neighborhoods, the north and south area with the railways splitting them. The east and the west sides are zones of motion, roads of increased circulation traffic, on the one side the Viennese Gürtel beltway and on the other the Schmelzbrückenrampe bridge connecting the north and south sides above the rails. The number of restaurants and local suppliers is somehow limited, and grouped in different areas. The BahnhofCity Wien West, is a shopping center in Vienna's Westbahnhof, a large scale multi-storey space that offers shops and gastronomy on approx. 17,000 m²., with access to the trains and subway. The Felberstrasse is a street with medium dense traffic, the groundfloors don't provide any shops, is a neglected road, with a single sidewalk, the one that is adjacent to the tracks is from soil, thus preventing the pedestrians from coming very close to the boundaries of the rails and the ÖBB buildings. The Zwölfergasse is in a lower height from the Felberstrasse,

a wall of 2m height defines the railway area, creating a border and reducing the visual contact. Some art studios on the street level try to create an alternative character to the area. Between the Zwölfergasse and Gasgasse, a new modern complex of residential buildings and the OeAD-Guesthouses has been established, in a triangle form with strong architectural elements which define and delimit the private, public and semi-public and give a character to the area. The District Court (Bezirksgericht Fünfhaus) near it continues with the same architecture language. In the Langauergasse is a small park with a connection to the subway and trains though the underground, as there is no direct access, because of the long line form building that separates the road from the trains. At the end the imposing building hanging out facing the Gürtel defines the airspace and closes the block. On the way through the area we meet, different people in the separated neighborhoods, on the north only few people are walking mainly men, on the south families and radiant young and old people.

Neubaugürtel

Felberstrasse

Schmelzbrückenrampe

Fergasse and Gasgasse
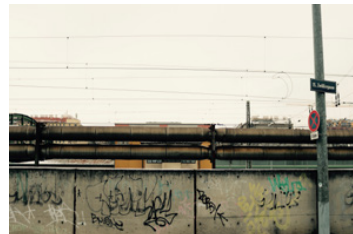
4. **Conclusion of the research**

After the research and the visits in the area are completed. Further work is now focused on the development of the Project "oikizo". The project aims to work strongly with the local context and issues in the exciting environment of Westbahn, but above all the needs and concerns of the people of the city, the future users, who make the project a public concern with a high collective interest share. However, this architectural platform also demands a solution with a strong character and a certain expressiveness in order to respect its effect on space and symbolic importance.

Urban Analysis | A new Concept

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A New Concept
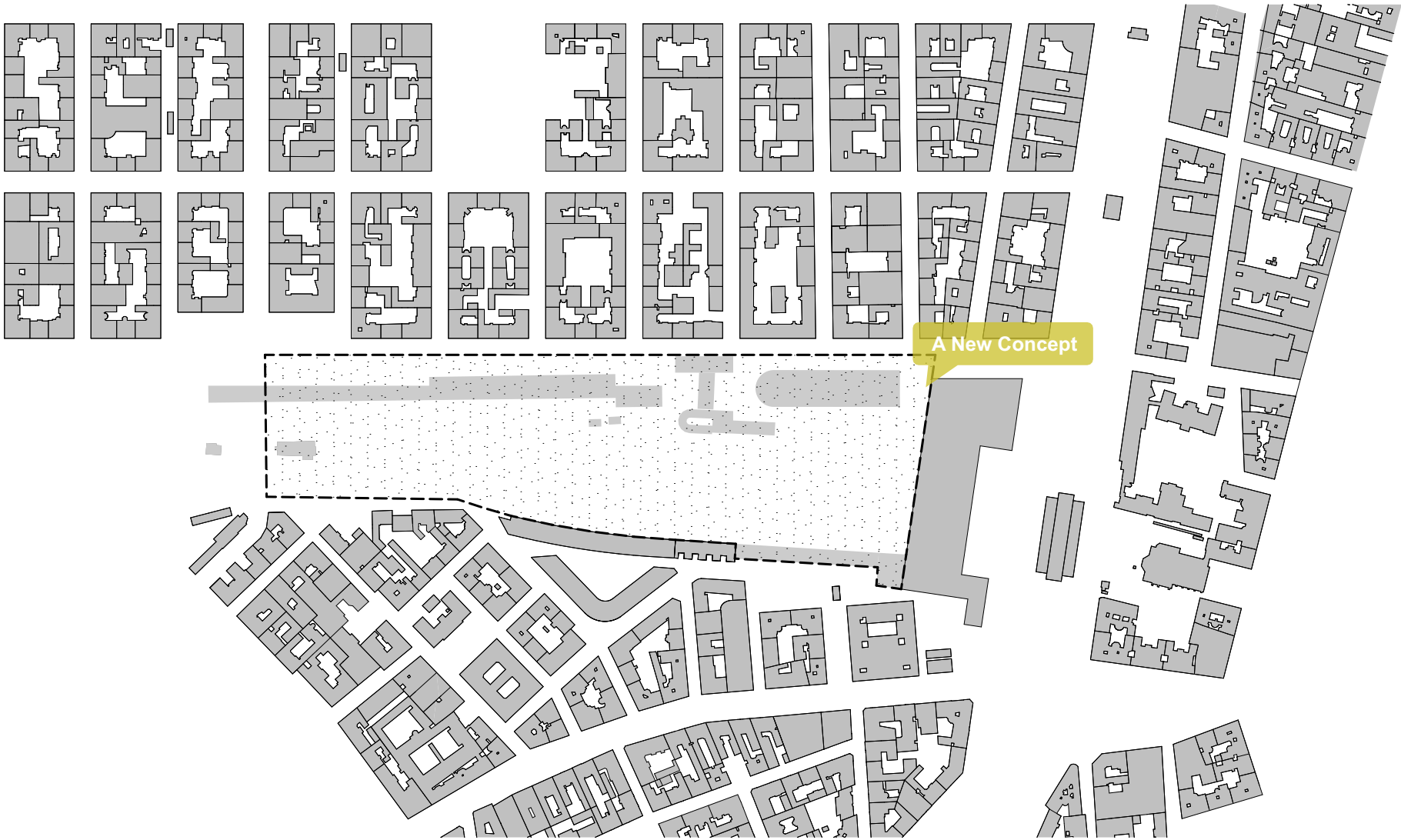
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Green Spaces

Urban Analysis | Zones

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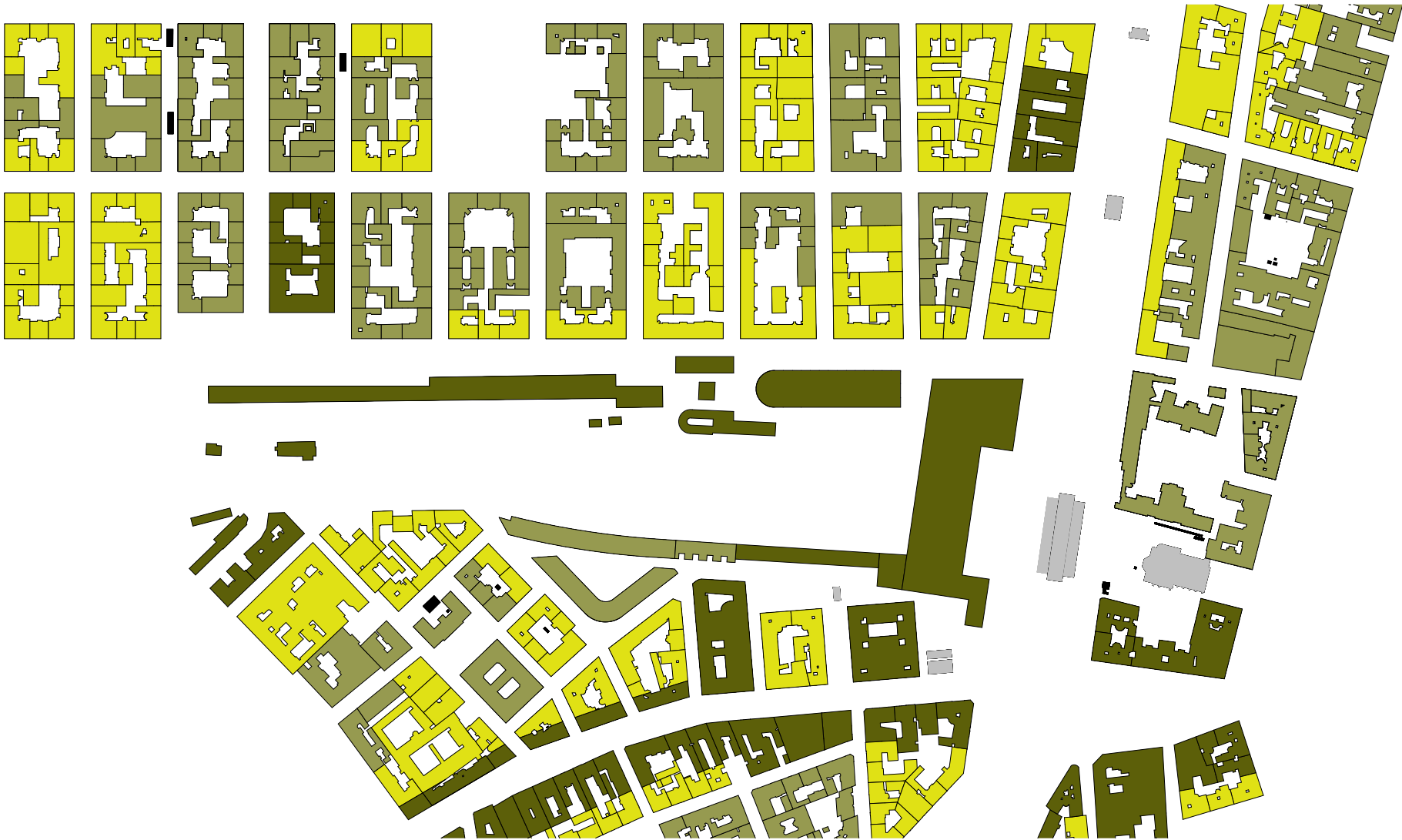
Residence   Mix-use   Business

1:5000

ÖBB Warehouse

Parking Garage

ÖBB & Stores

ÖBB Offices

Storehouse
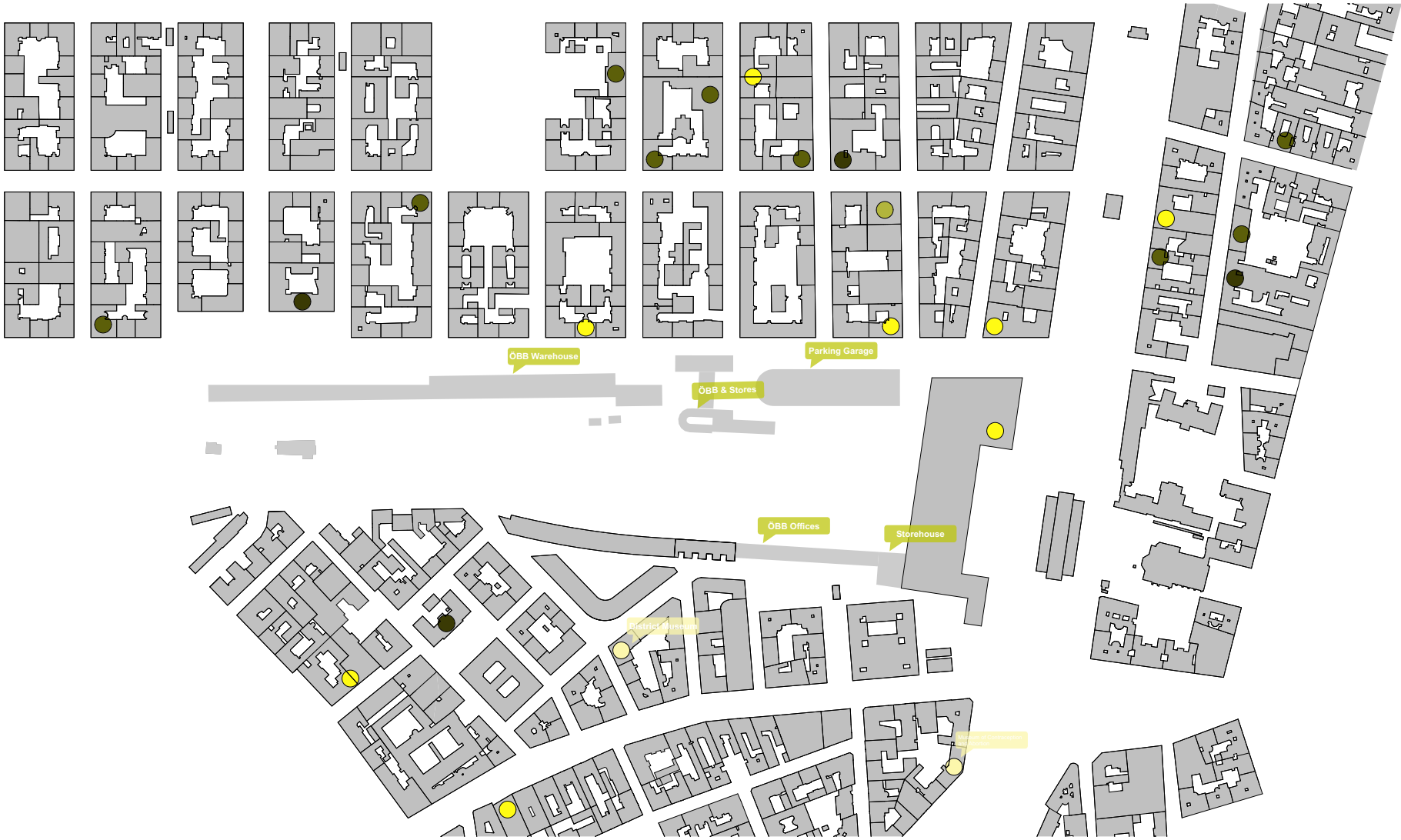
	Hotel		Museum		Kindergarten		School		University

1:5000   N

U Metro Station   ————   **Tram&Train Lines**

● Stations   ————   **Bus Line**

                   ————   **Metro Line**

■ **Different Building Typologies**

CHAPTER III
PROJECT GOALS

Goals and genesis of the conceptual guide
On the following pages, the core objectives of the endeavor are explained and the step-by-step presentation of the basic concept for the design phase takes place.

1. OIKIZO

The title "**oikizo**" is the ancient Greek verb οικίζω (oikizō), meaning to settle and is derived from the noun οίκος (oikos), "house", "home" or "habitat". From this verb also grew other words like the noun, οίκισις (oikisis), meaning "building", "housing", "habitation", and especially "establishment of a colony, a settlement , or a town" (already in Plato), or "filling with new settlers", settling", "being settled". With this verb I underline the creation of spaces that started out from the individual and his needs, starting from the I to us. The individual that becomes a part of a group.

The term "ekistics" was coined by Constantinos Apostolos Doxiadis in 1942. The word is derived from the Greek adjective οικιστικός more particularly from the neuter plural οικιστικά. The ancient Greek adjective οικιστικός meant: "concerning the foundation of a house, a habitation, a city or colony; contributing to the settling." It was derived from οικιστής (oikistēs), an ancient Greek noun meaning "the person who installs settlers in place". This term influenced my work and from theoretical aspect had the same considerations.

The notion of "**oikizo**" implies that understanding the interaction between and within human groups—infrastructure, agriculture, shelter, function (job), in conjunction with their environment directly affects their well-being (individual and collective). The subject begins to elucidate the ways in which collective settlements form and how they inter-relate. By doing so, humans begin to understand how they fit into a spaces.

2. URBAN CELLULAR STRUCTURE

The idea is to create a new prototypical "**Urban Cellular Structure**" system, that has the form of a partially self-assembled and adaptable cell structure, that are docked to each other as a **Mat Building** that establish relationships in **Group Forms**, and develop and mound the image of the whole. The project is starting from the small scale of a smart living – apartment, extended to the medium scale of a big office, combined into the large scale of a building, ending to the extra-large scale of a neighborhood.

3. GROUP FORM

Influenced by the analysis of Maki, who distinguished three different 'collective forms', the **compositional**, the **megastructure**, and the **group form**. As is analysis earlier, **Group form** was rather based on a '**group program**' than on a determined plan, resulting in **non-hierarchical collective forms,** in contrast to the master plan and the master system. The layout of a group form always stayed dynamic and open-ended. The group form is also a **social process** instead of a technological proposal, whereby group form surrenders to change rather than imposing mastery, and that asserts interdependence among disparate, even unfinished elements, rather than hierarchy and isolation. The theory of group form, affects the project in how all this Clusters-Buildings are connected.

4. A PATTERN LANGUAGE

The research projects, *A Pattern Language* by Christopher Alexander., as mentioned before also influenced the project. As his system analysis started from the individual and his needs and spreads into bigger patterns of the society.

5. KEY POINTS

The goal of this project is to make possible to create **high density** forms, that all kind of uses can adapt to it. The sector **flexibility** and **variability**, as well as the quality of the movement and the spatial arrangement, as well as the question of the privacy of public areas, are important keys to the project.

6. A METABOLIC SYSTEM

The area is used to attract new residents or temporary users, as the user can choose the size of the house on his own and expand it. Through the years, the spaces we use are changing as our life is changing. Starting as a unit, as a student, getting a stable job, a better salary, create a family, the members are increasing, and then once again starts the same circle, with a reduction of the members. The spaces we use should change as we change, as our needs change as a natural evolution. The house follows that evolution.

In the spirit of successful social and economic integration, it is important to keep up with the spirit of the times and, for example, give support and space to new business models. The same expansion structure system is used for all the uses.

The aim of the Project *oikizo* is to create a living space into the city, which sees itself as a social space, in which technology, innovation, as well as social amusement and culture and education space are part of it. This neighborhood will have a representative character of symbiosis which reflects the overall concept.

The basic intention is to create a platform that appeals to all layers of society - in a sense a prototype as well. A public house that absorbs public space, and creates a new one. The creation of a space and program for a society beyond the private. A house for everyone and almost everything. A symbiosis space where each single member is appeared by the personal advantage.

1 room

2 rooms

3 rooms

4 rooms

5 rooms

6 rooms

50m²

65m²

80m²

95m²

100m²

110m²

130m²

Culture

Retail

Sports

Gastronomy

Education

Business

senior

student

traveler

single

co-parent

couple

2nd kid

1st kid

Residence
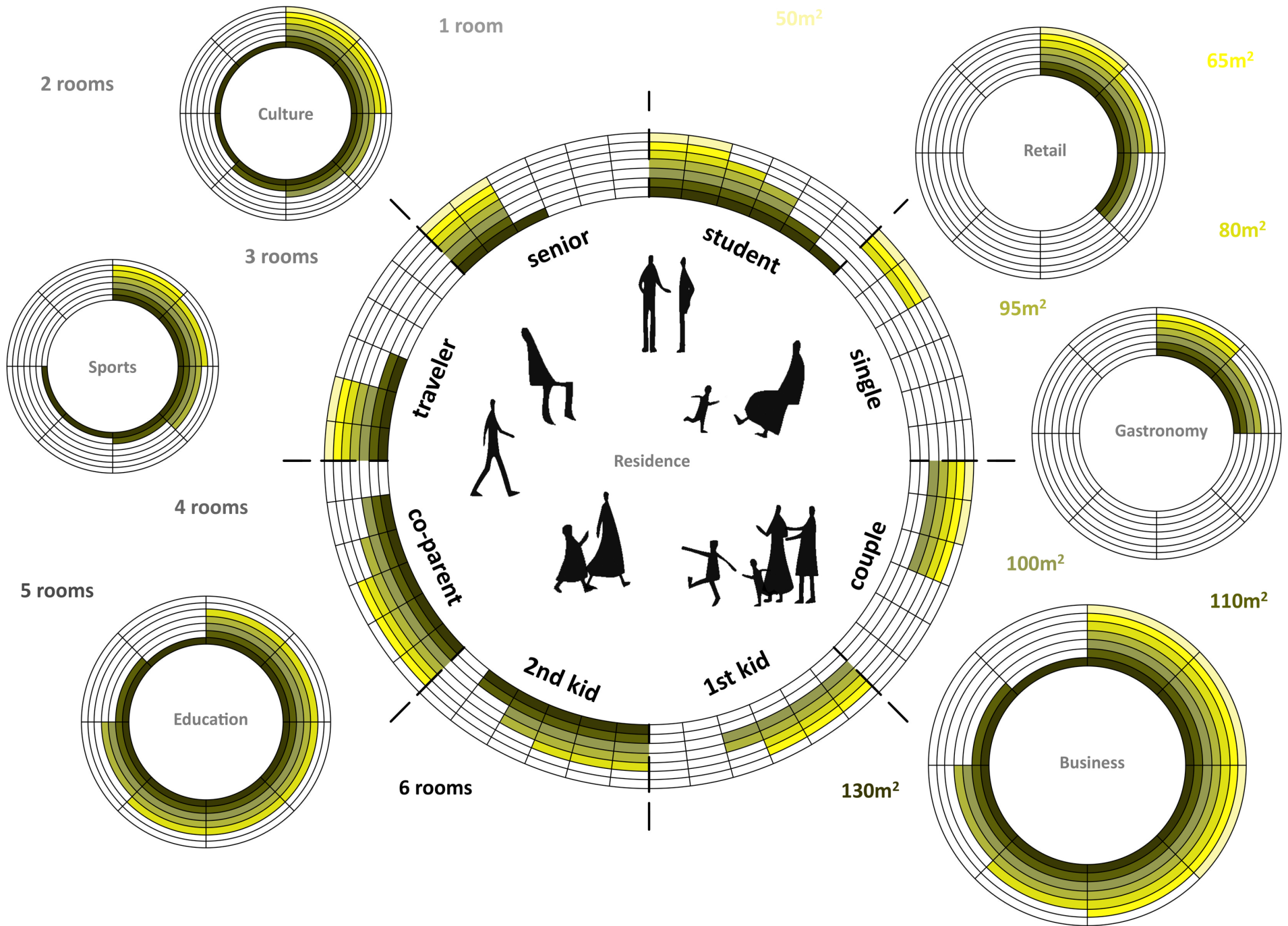
CHAPTER IV

DESIGN

Design phase

The storytelling of the project
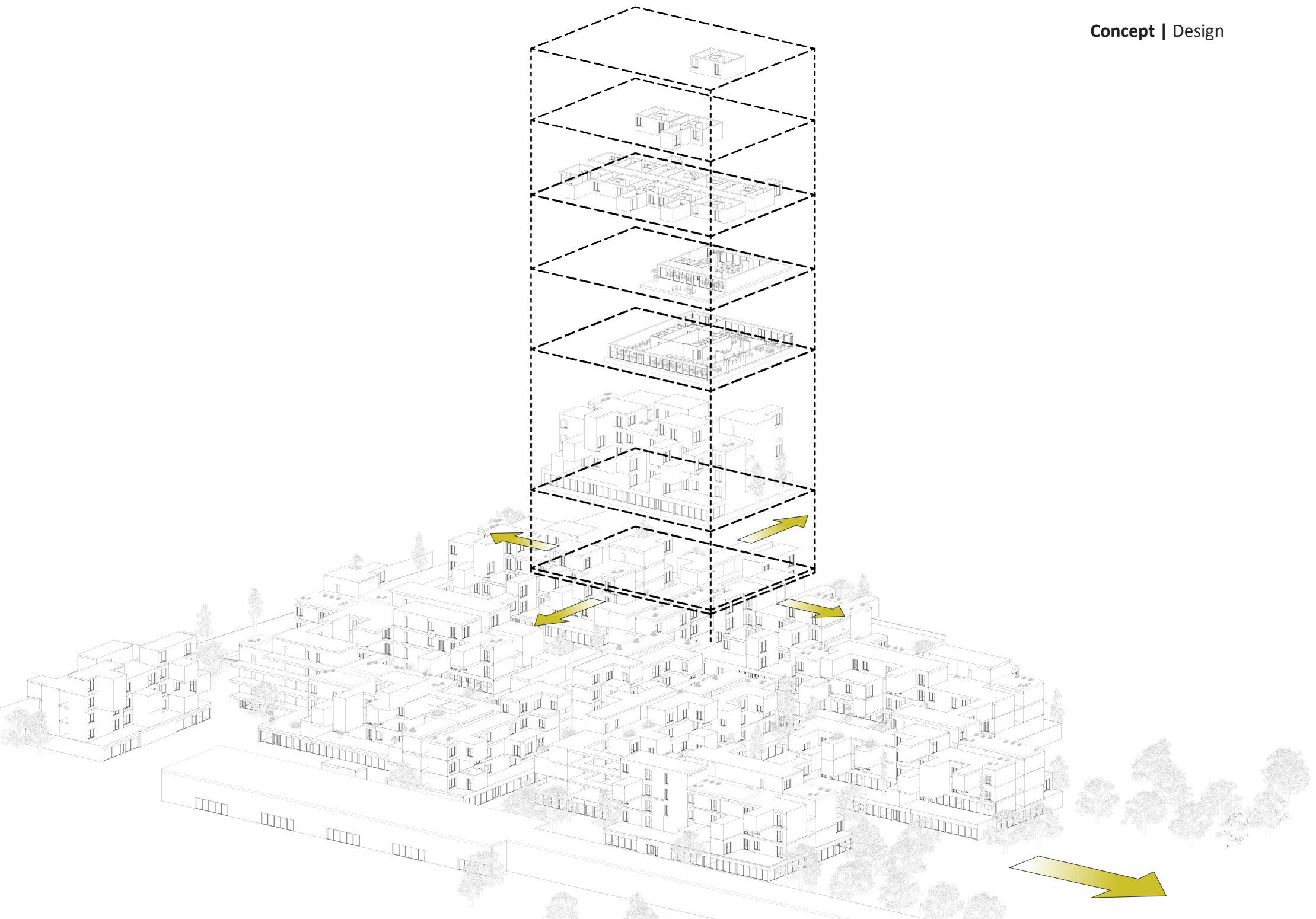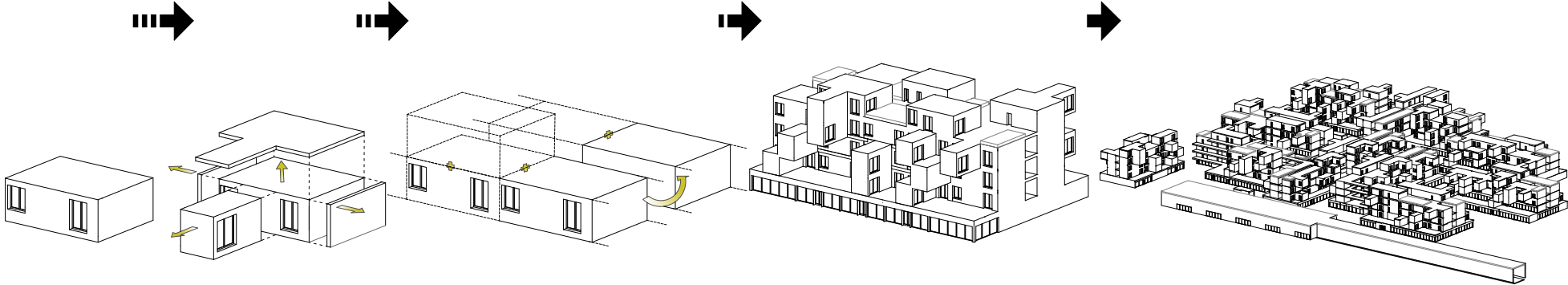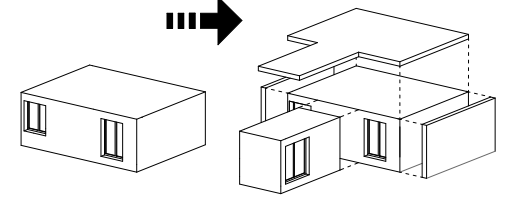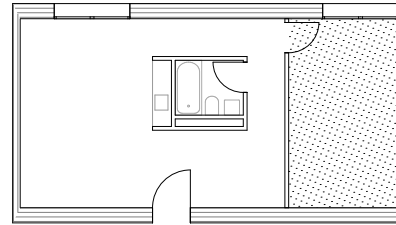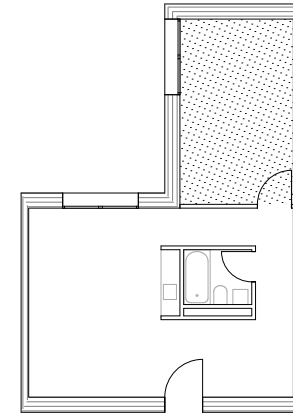
1 room

50m²

50m²

2 rooms

80m²

3 rooms

15m² 15m²

15m² 15m²

50m²

50m²

65m²

50m²

4 rooms

80m²

65m²

65m²

80m²

1:30
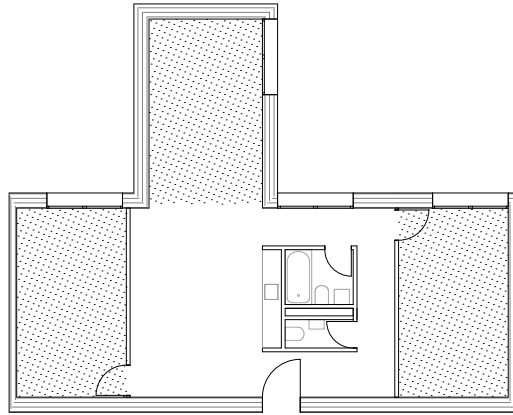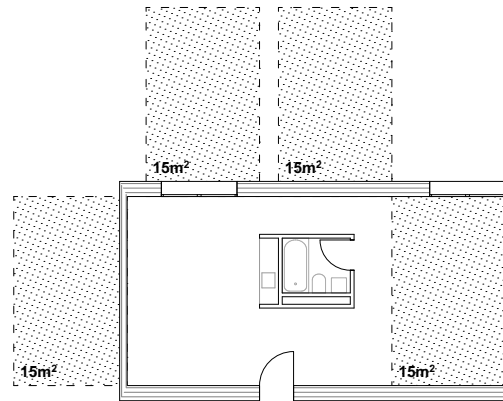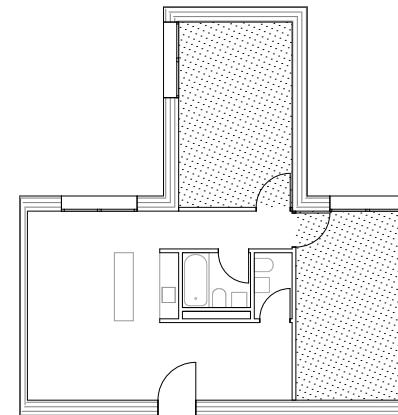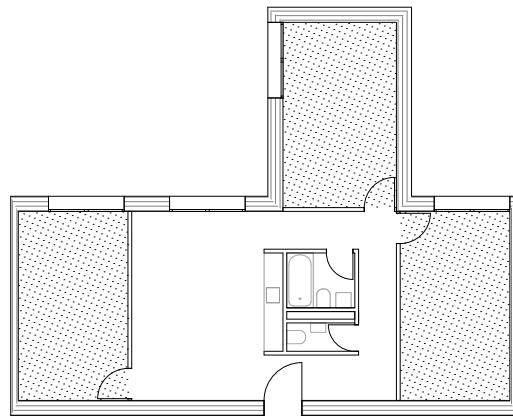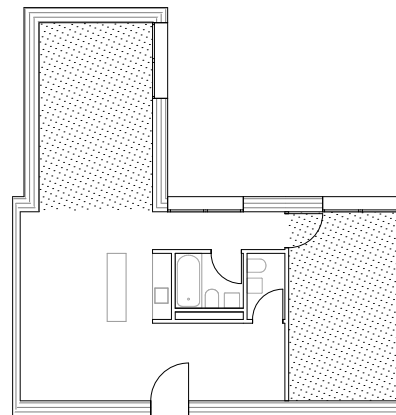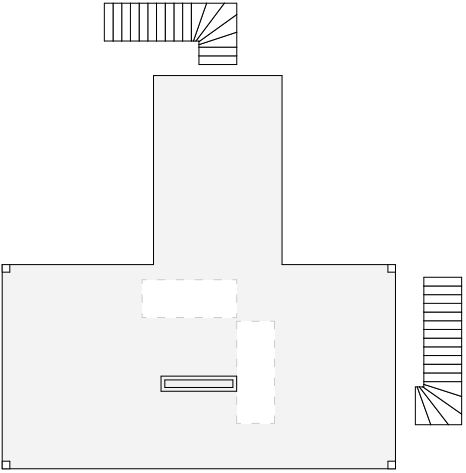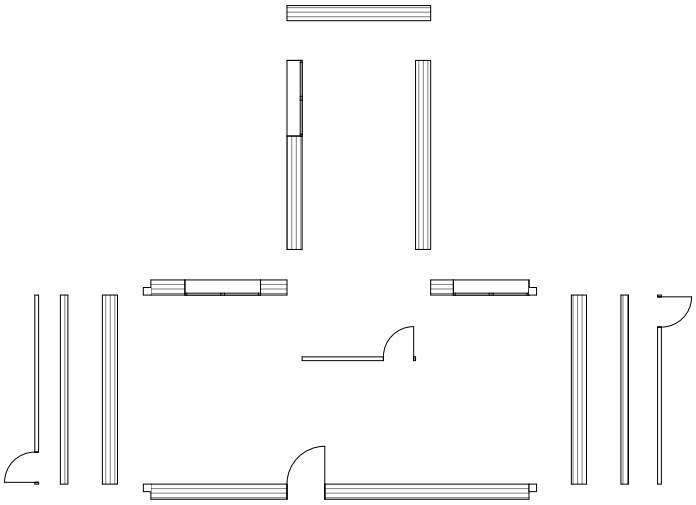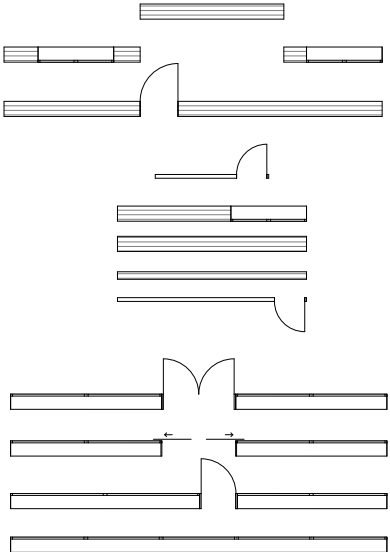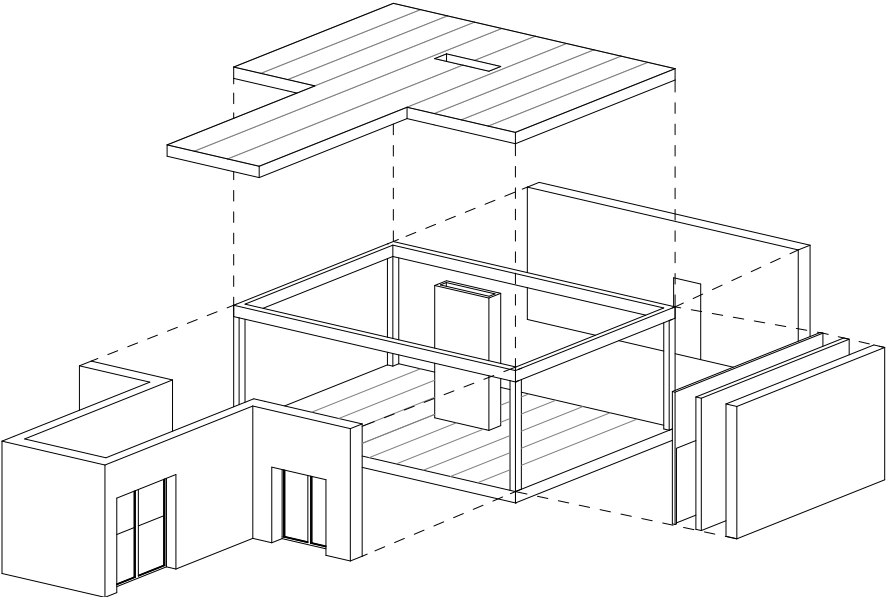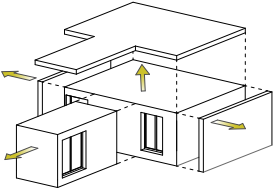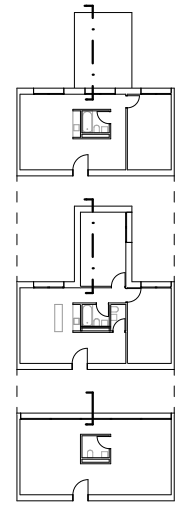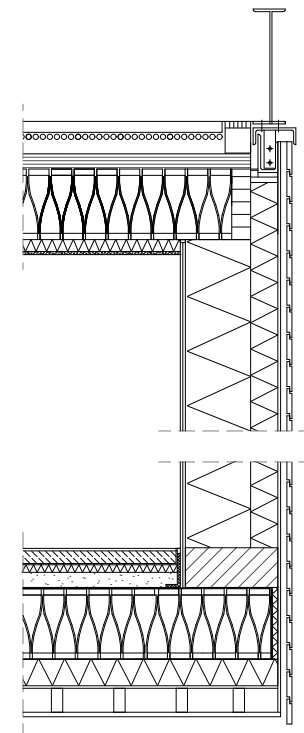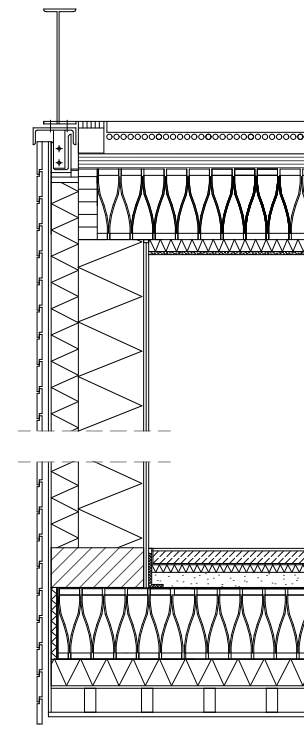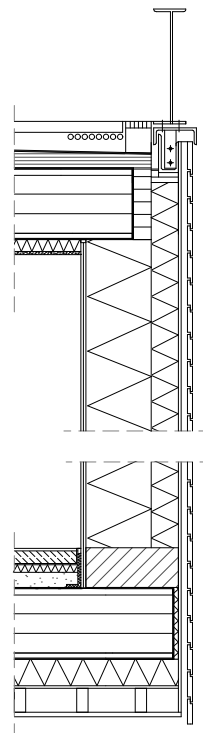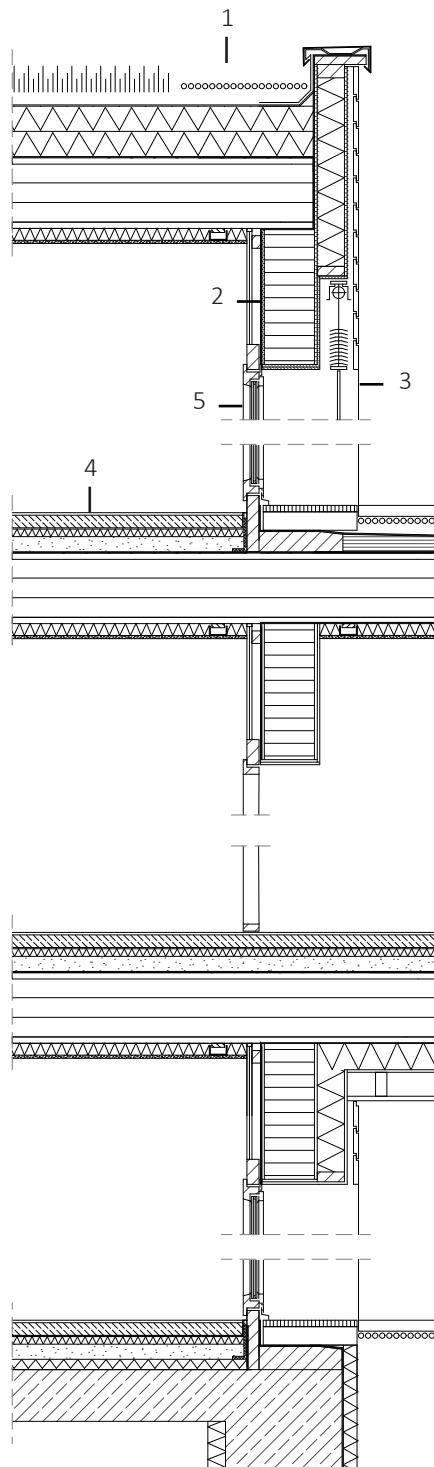
1 Roof structure:
   Extensive greening 80mm
   Drainage web 20mm
   Polymeric bitumous web
   Mineral wool thermal insulation in
   incline 150-200mm
   Laminated timber ceilings 180mm
   Mineral wool insulation 30mm
   Plasterboard 2X 12.5mm

2 Ledge from glued laminated timber

3 Wall structure:
   Fibre cement plate 11mm, painted
   Wind resistant paper
   Plasterboard 15mm
   Wooden holder 180mm
   Mineral fibre board 180mm
   Plasterboard 15mm
   Vapour barrier
   Mineral wool insulation
   Plasterboard 2X 12.5mm

4 Floor assembly:
   Parquet 10mm
   Screed 50mm, PE-foil
   Sound insulation 30mm
   Gravel 65mm
   PE-foil
   Kielsteg Bauelement 280mm
   PE-foil, Spring clamp/thermal insulation 47mm
   Plasterboard 12.5mm

5 Terrace door, nordic pine 68mm

Cell| Horizontal Expansion
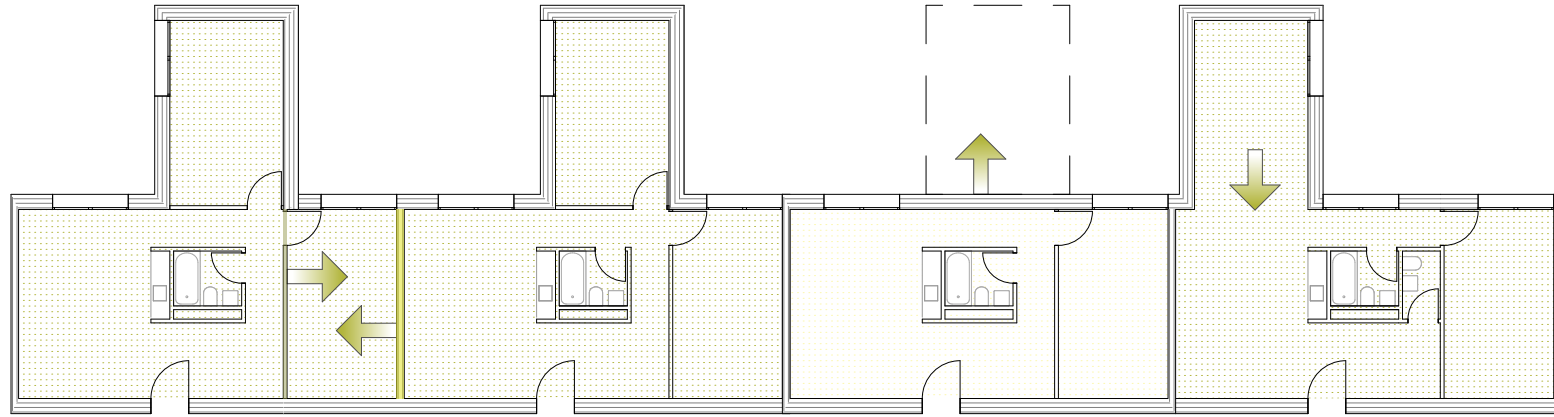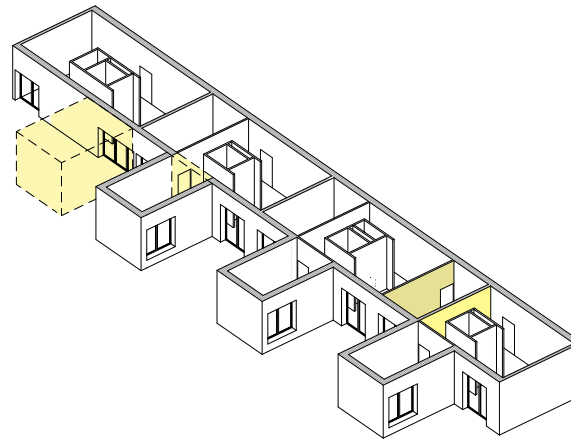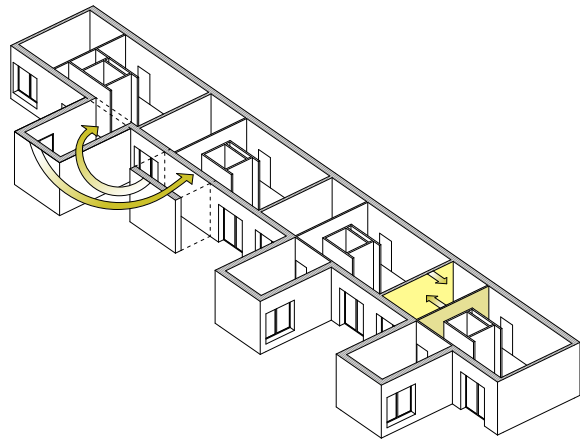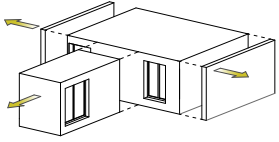
65m²   65m²   50m²   65m²

50m²   80m²   65m²   50m²
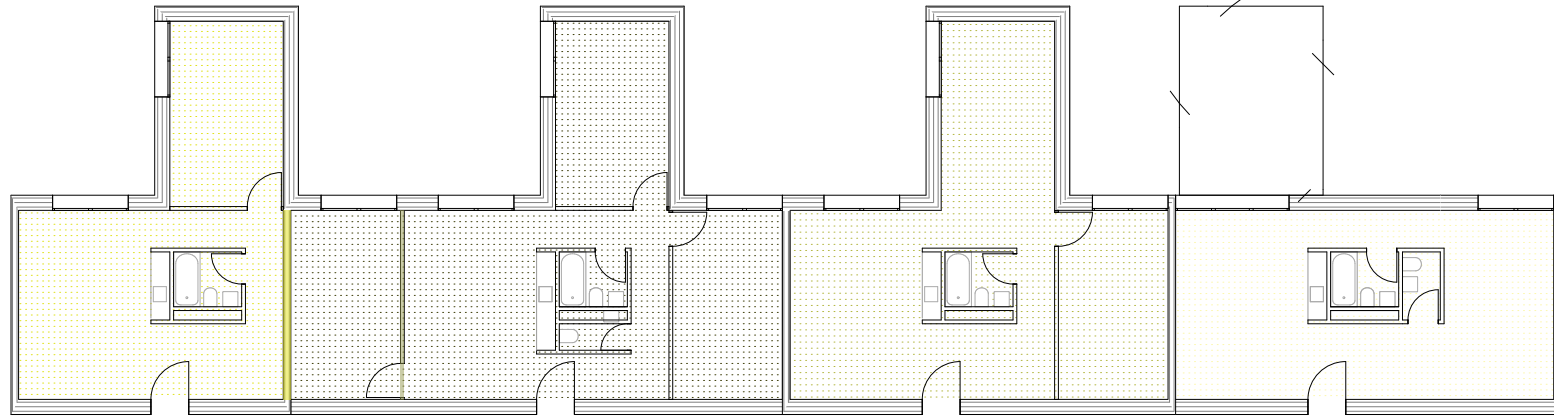
50m²   80m²   65m²   50m²

65m²   65m²   50m²   65m²
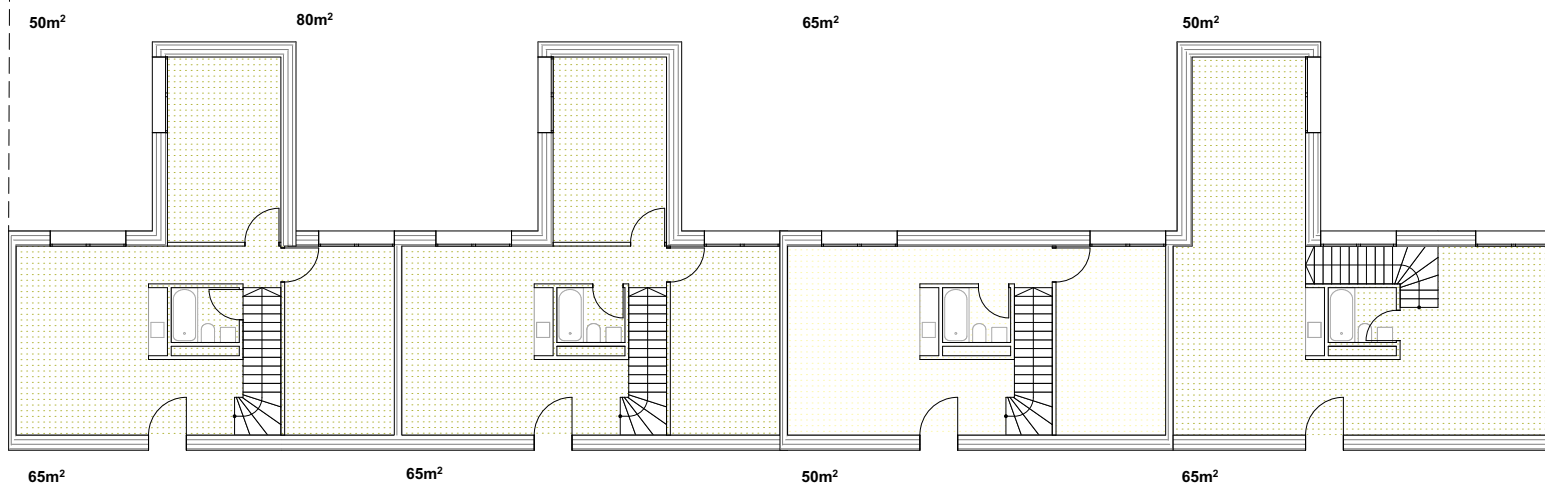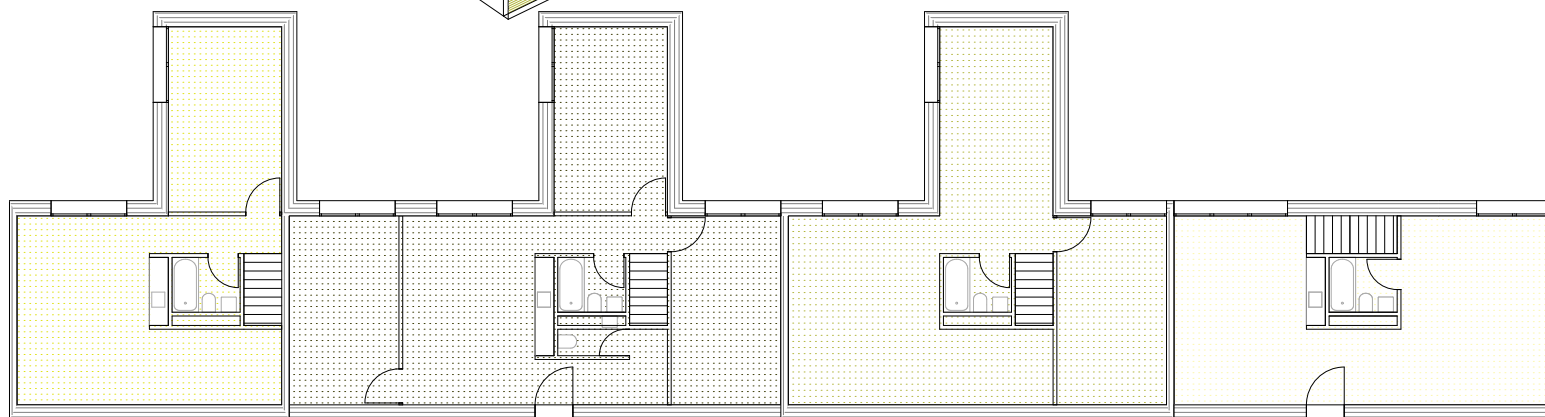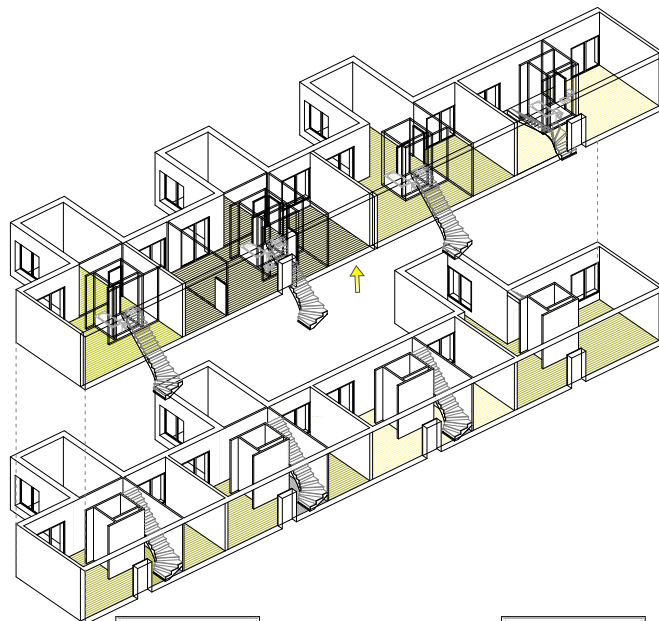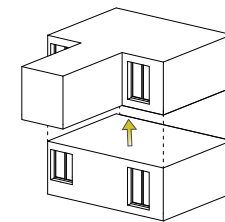
Floor | Possibilities

5

2,5

5

5

5

2,5

5

13,3
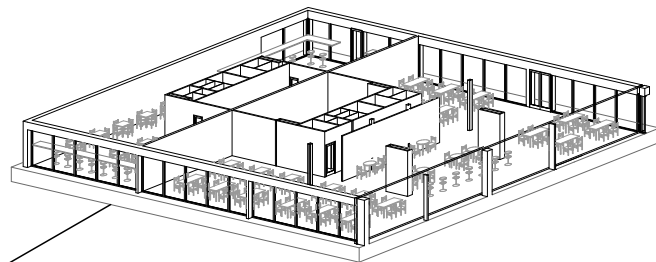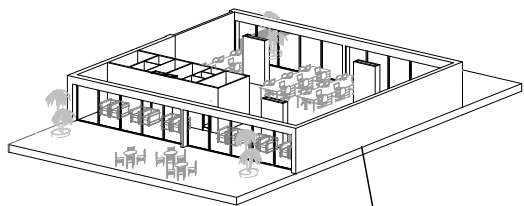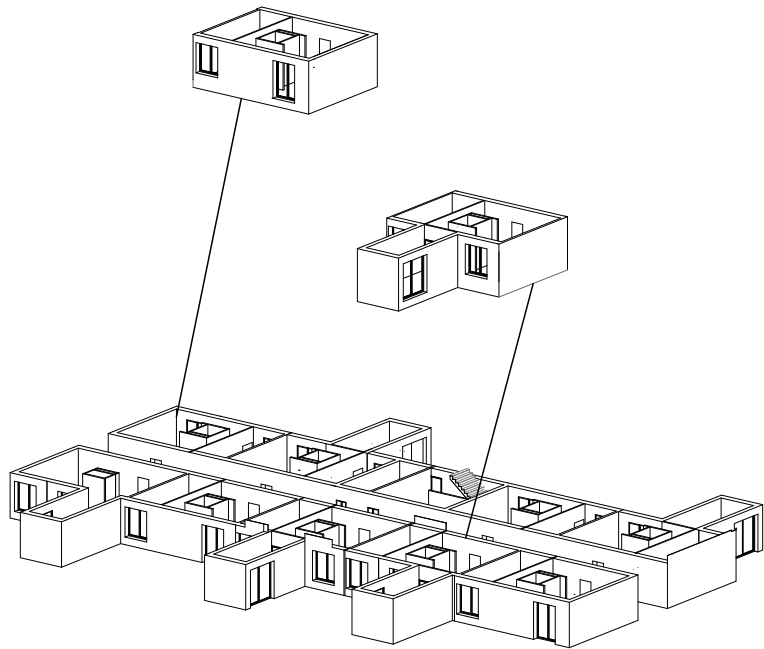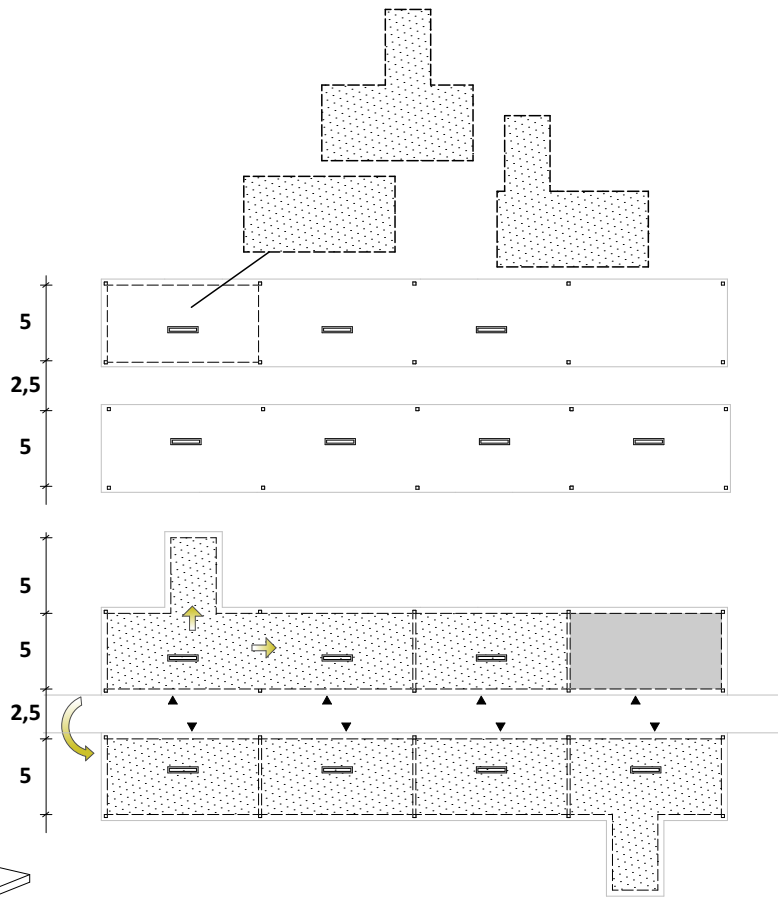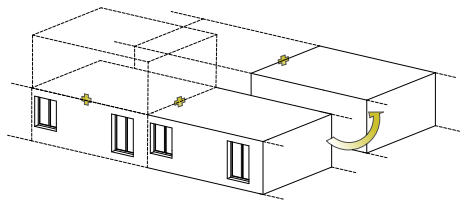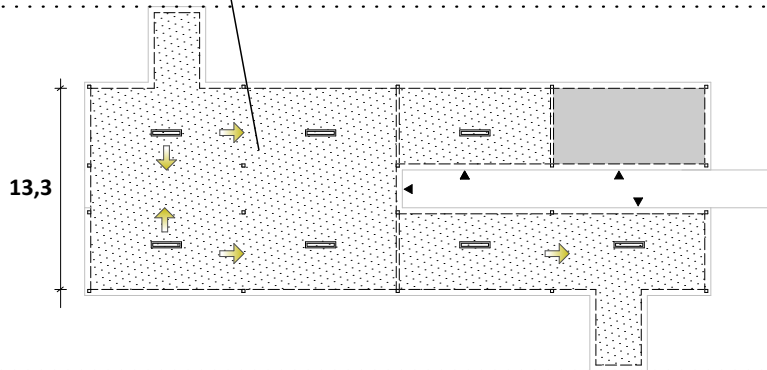
max extension

Possibility for extension
1st Floor - 4th Floor

24,1
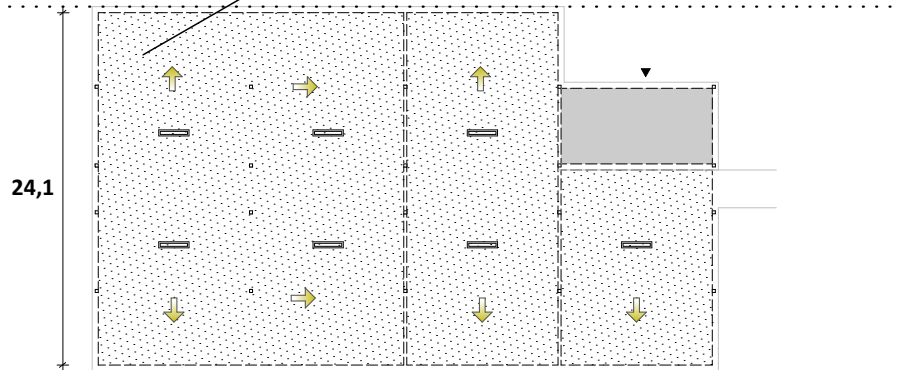
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Possibility for extension
Ground Floor
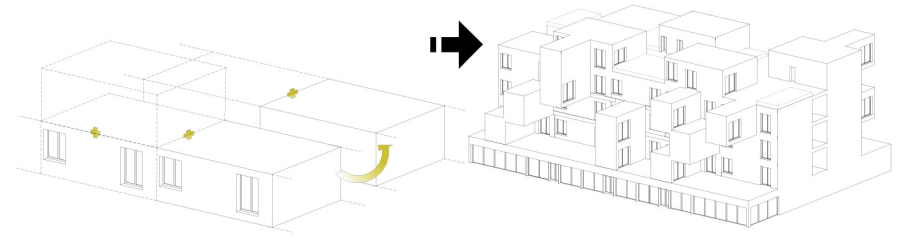
Staircase & Circulation   Common open space   Garden

Residence   Business   Other

Building| Typologies

Building | Axo
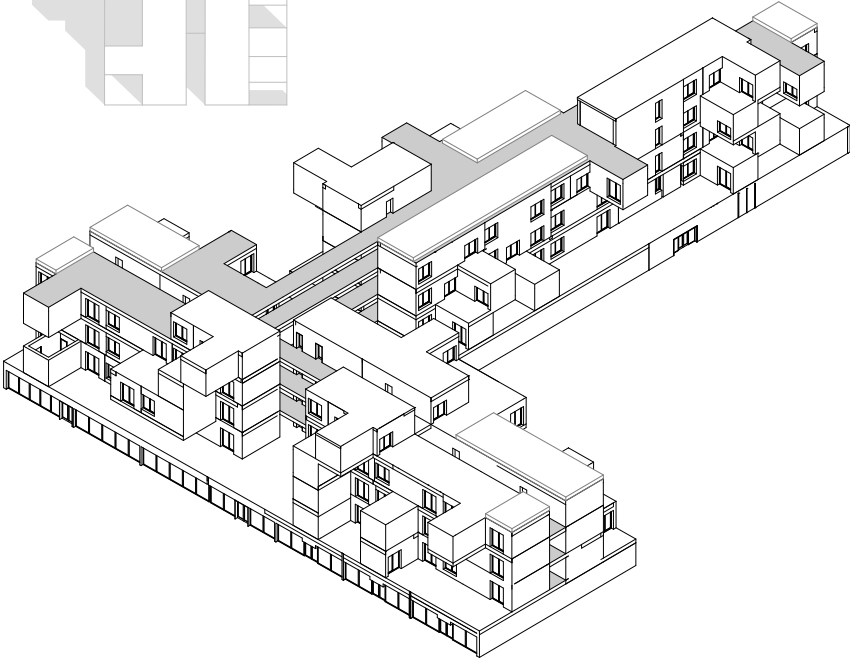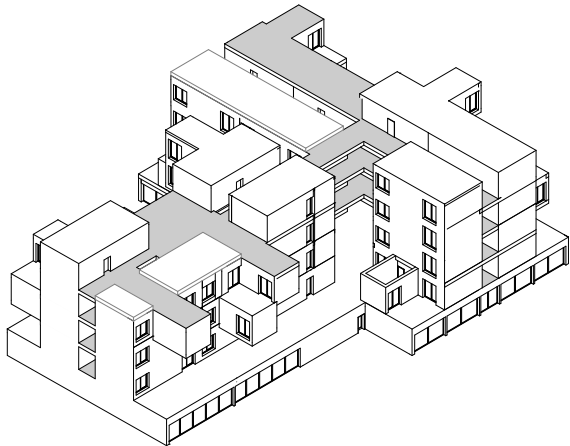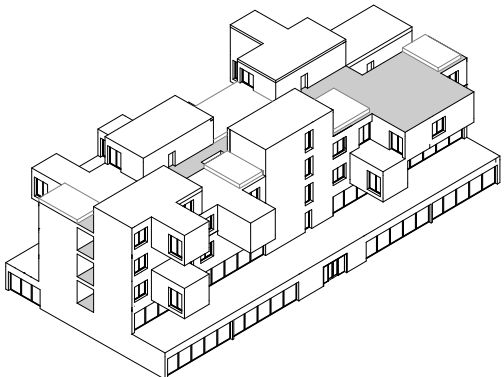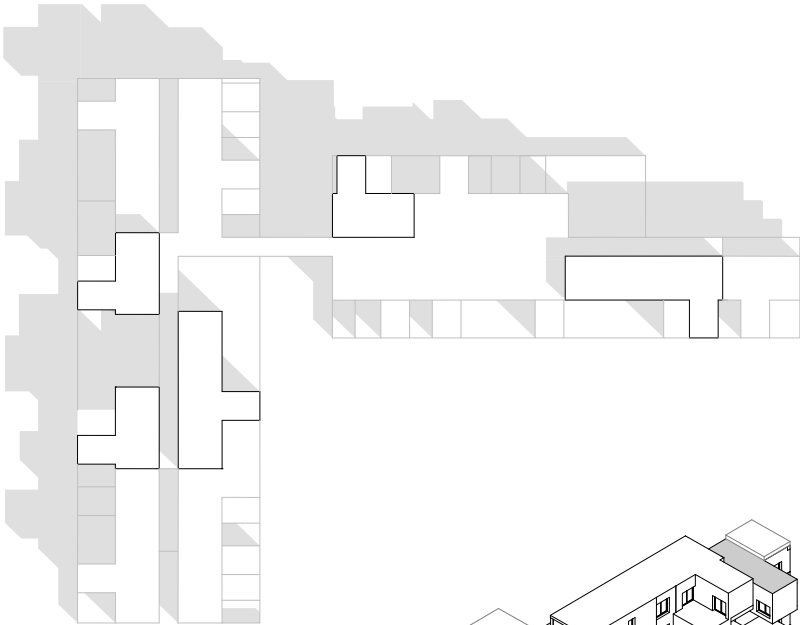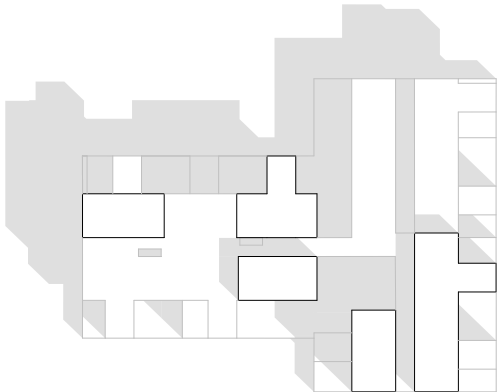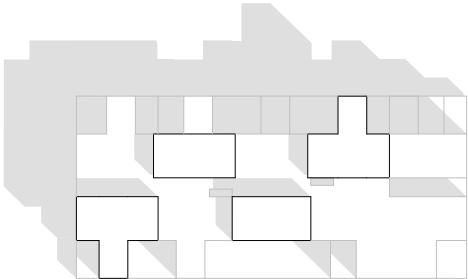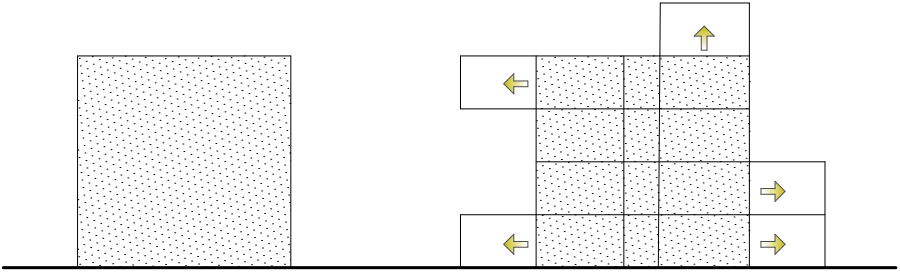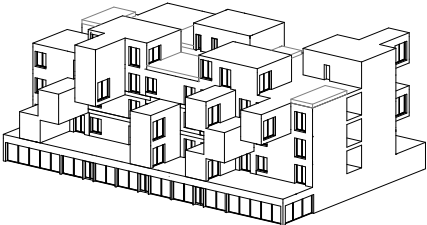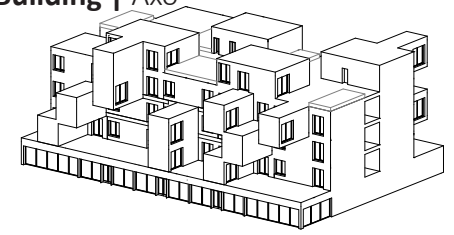
Staircase & Circulation   Privat open space   Common open space   Garden

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N

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N

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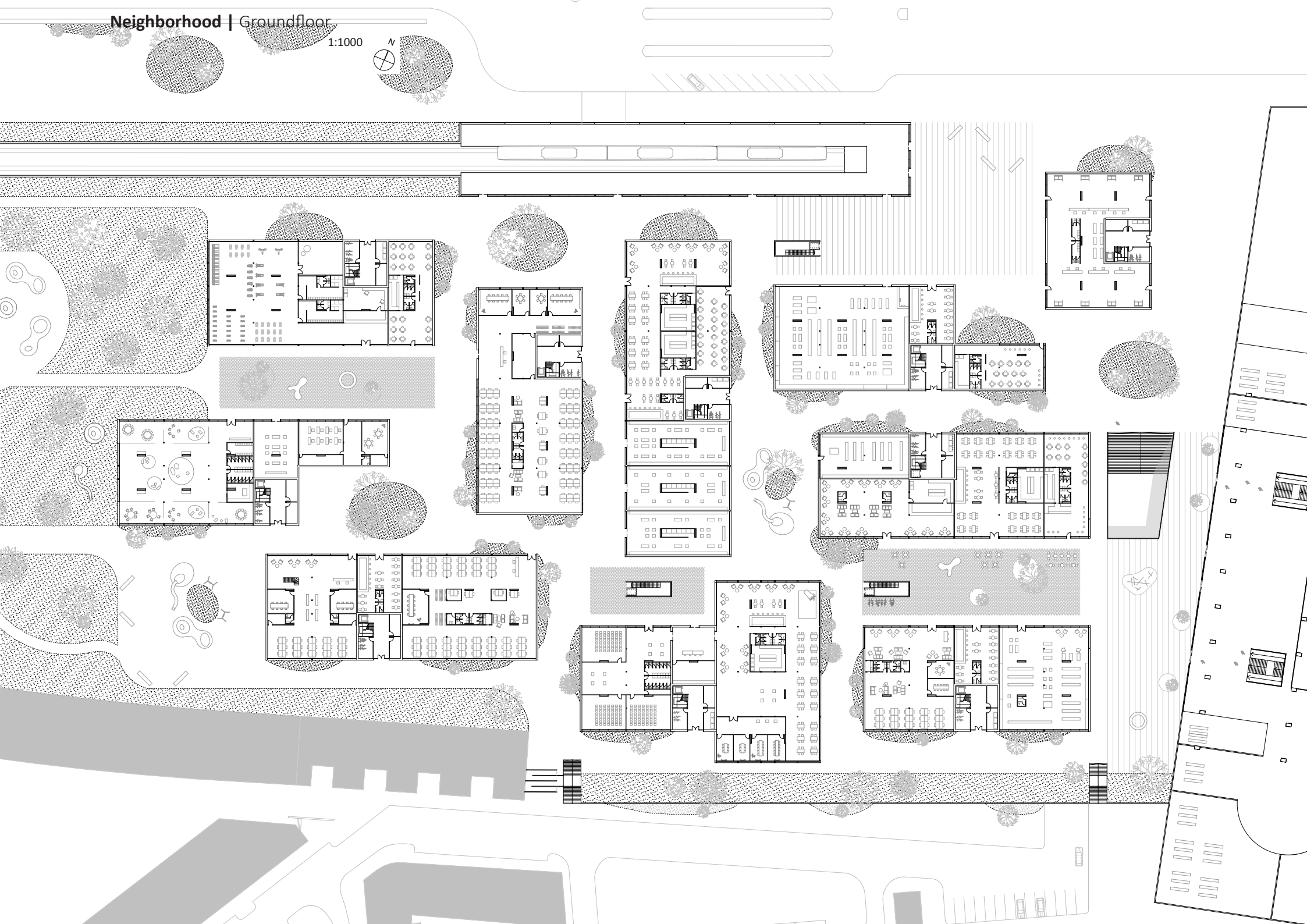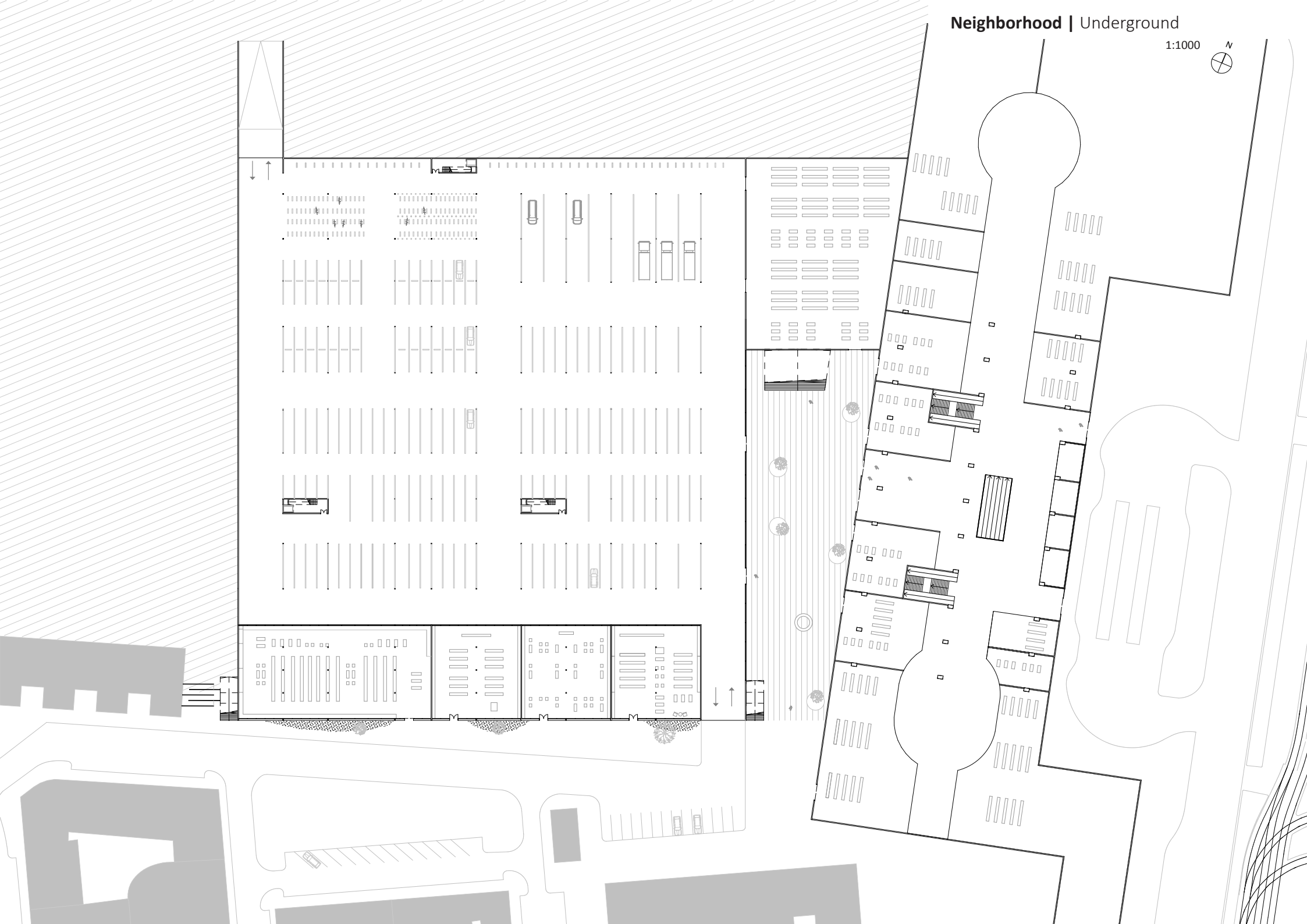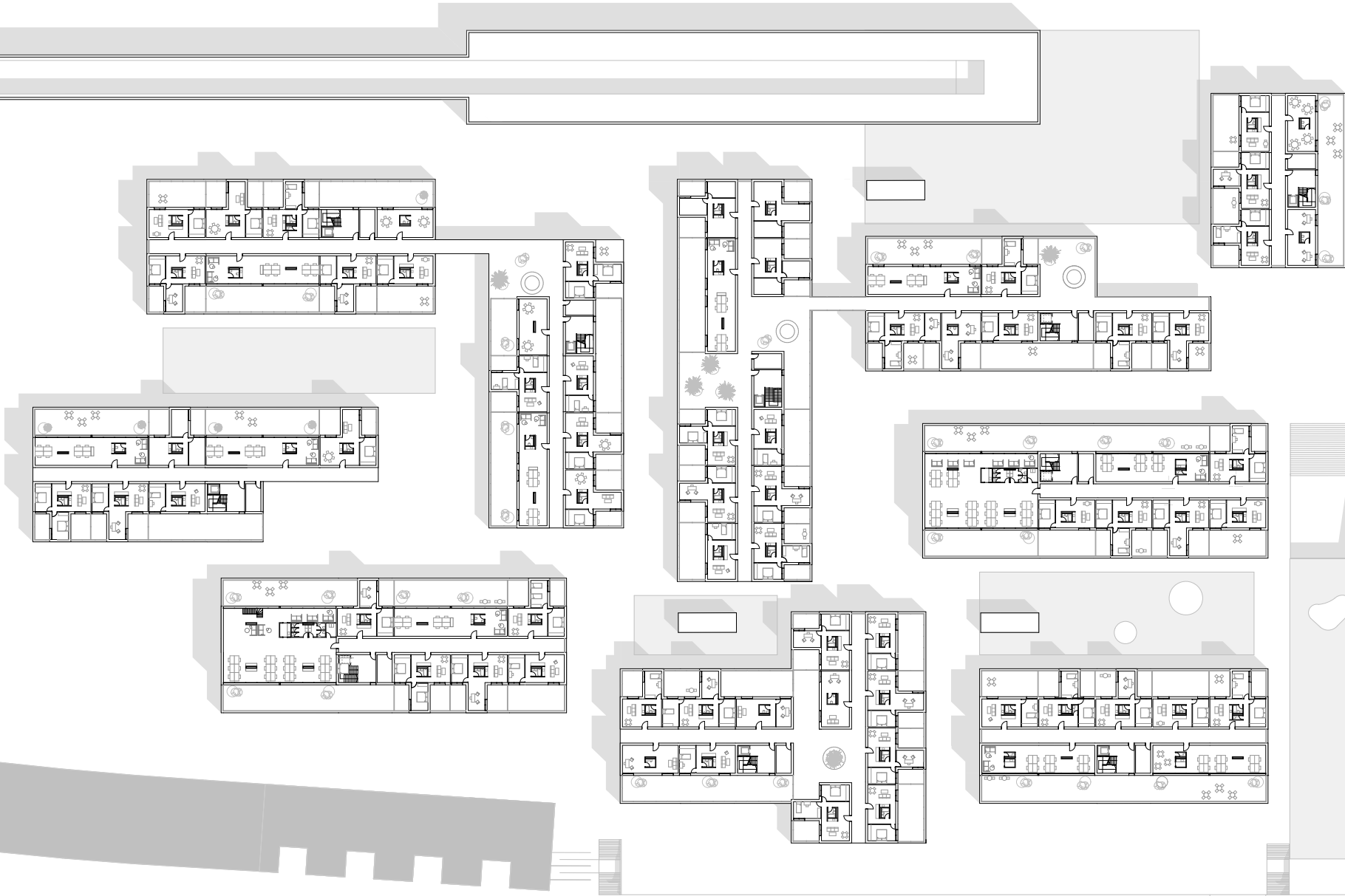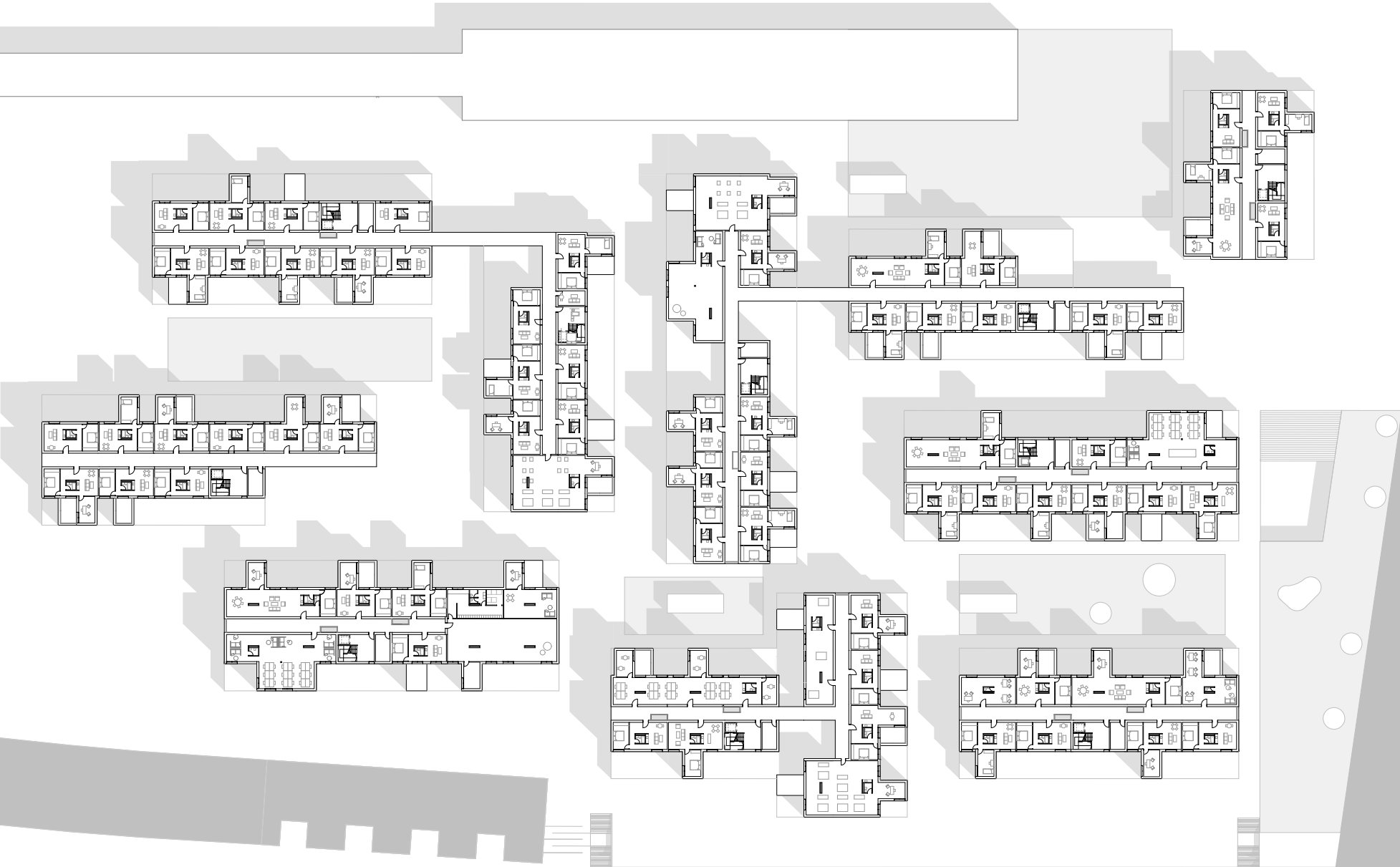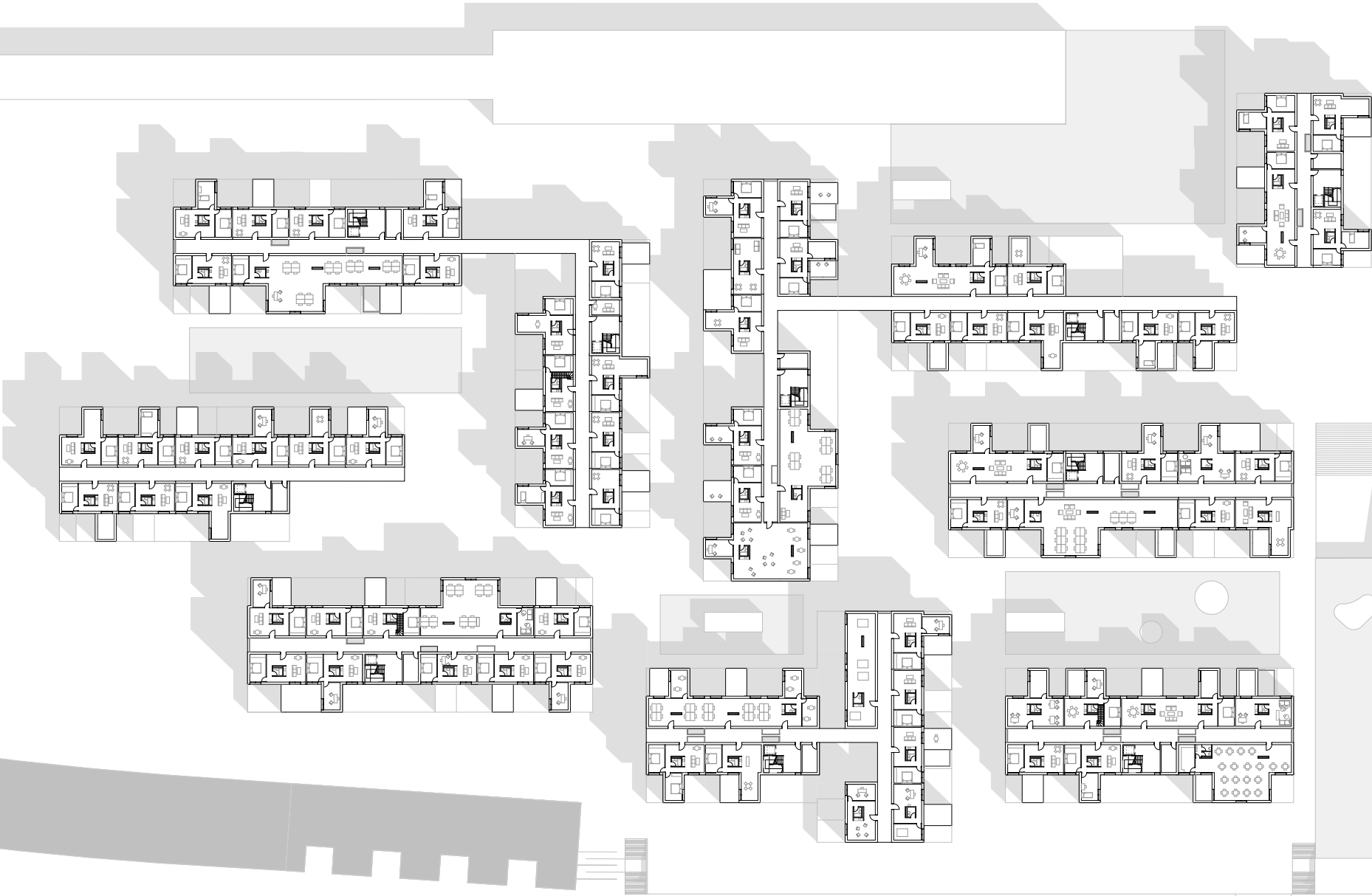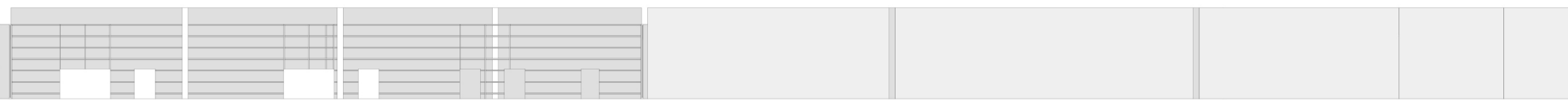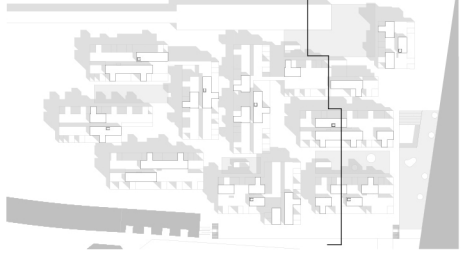
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CHAPTER V

CONCLUSION

Conclusion and summary

Conclusion of project

My thesis deals with the question of how Vienna's urban growth can be handled and how the common block building structure of the city of **Vienna** has currently shown significant shortcomings due to the need to provide accommodation because of the monofunctionally buildings.

The goal was to create a new prototypical "**Urban Cellular Structure**", that throught its **modular building system**, can create residential spaces for **all users** but also can create spaces for **all uses.** This building concept gives the opportunity to the users to be total free and can act on the building according to their needs for change.

This prototypical "**Urban Cellular Structure**", not only creates a better accommodation for all people and all uses but also from a social aspect creates neighborhoods, as a life changing system that can provide different residential spaces , with different squaremeters, with closed rooms or open spaces, with gardens or balconies. At the same floor or building can be all kind of uses, creating a livable building and a mixed use neightborhood. Creating a small society from the I to us.
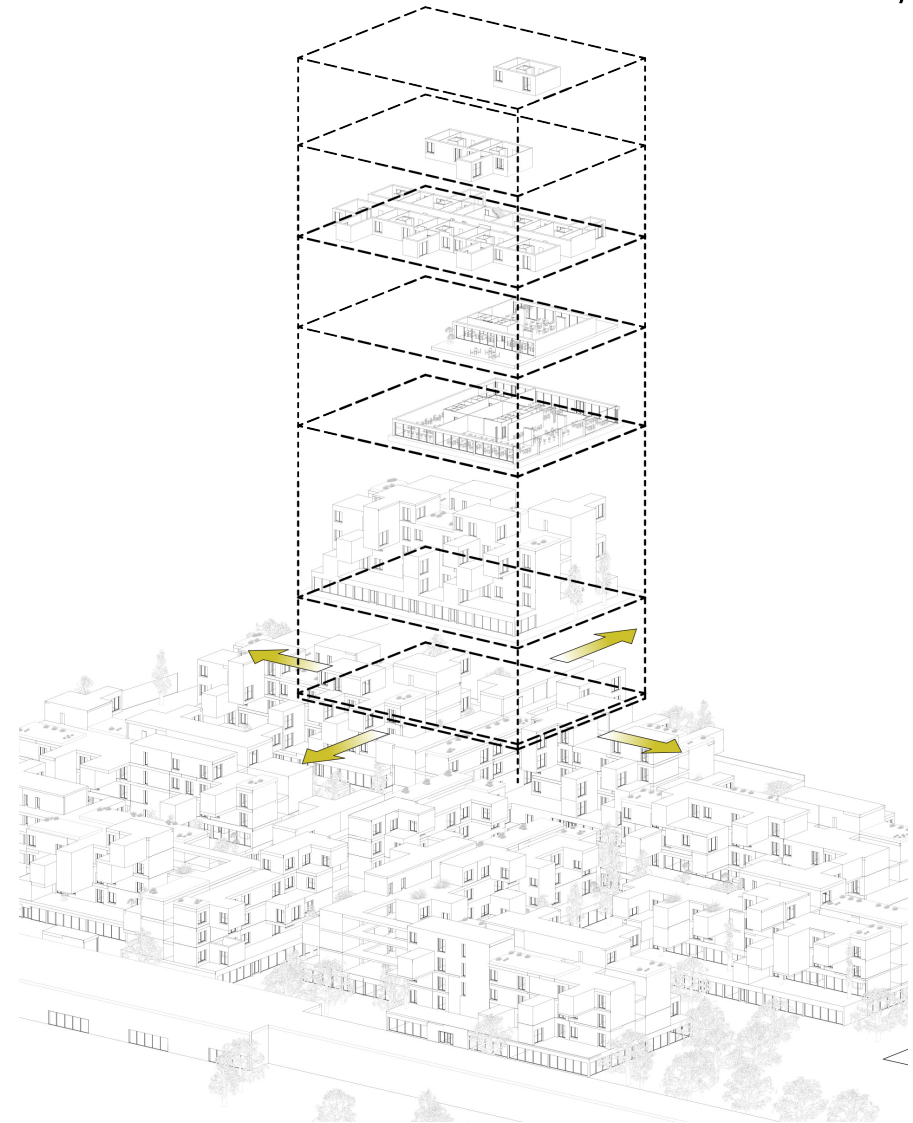
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41   Wohnkosten: So teuer ist Österreich im Europavergleich <https://www.trend.at/>

42   Zielgebiete der Stadtentwicklung <https://www.wien.gv.at/stadtentwick-lung/projekte/zielgebiete/>

43   Vorhaben und Projekte der Wiener Stadtentwicklung <https://www.wien.gv.at/stadtentwicklung/projekte/>

44   Die Ergebnisse der Wohnungsleerstands-Erhebung in Wien < https://www.wien.gv.at/>

45   <https://www.wikipedia.org>

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53   Magistrat der Stadt Wien, MA 23, 2016 Wien – Bezirke im Fokus. Statis-tiken und Kennzahlen. Rudolfsheim-Fünfhaus. 15. Wiener Gemeindebezirk. wien.gv.at/ < https://www.wien.gv.at/statistik/pdf/bezirke-im-fokus-15.pdf>, Statistik Austria, Volkszählungen, Statistik des Bevölkerungsstandes; MA 23, Bevölkerungs-prognose Wien. <https://www.wien.gv.at/statistik/pdf/bezirke-im-fokus-1-23.pdf>

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<https://www.wien.gv.at/presse/2004/06/22/postareal-westbahnhof-siegerpro-jekt-von-arch-kohlbauer>

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Unless explicitly stated separately in the work, the illustrations and graphics of this work are created by the author. © Alexandra Kostakos

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