

NEIGHBOURHOOD

A tectonic elevation of A7

Abstract

This report accounts for the master thesis of MSc04 group 8, Architecture & Design at Aalborg University. The thesis is a critical comment regarding the demolition of thousands of functional dwellings initiated in connection with The Ghetto Package of 2018.

The project regards the renovation of Block A7 and its inclusion in a defined, social neighbourhood with focus on phenomenological experiences in the everyday life. The project is designed with a tectonic approach where we, as architect-engineers, comprehend the synergy between contemporary technological knowledge, the social- cultural- and political-agenda, and the architectural task of creating a space that through spatial-, plan- and atmospheric means that enriches the everyday life of people.

This thesis addresses the varying need for privacy in the different functions spanning from neighbourhood to home. This task is solved through parametric, tectonic design that involves, and thereby socially elevates, the unemployed residents of the new neighbourhood.

The project is based on theory regarding the historical context of Gellerup, modernism and its architectural influence, how sustainability in its many nuances is affecting the building industry today and how the neighbourhood can be the catalyst for the good everyday life.



001. Photo Demolishen of block A11 in Gellerup in 2014

Motivation

Issue

The world is currently experiencing an ecological crisis. The global average temperature has risen by 1 degree since pre-industrialization, and as a result we are experiencing increasing sea-levels, more frequent extreme weather and the extinction of thousands of animal species (IPCC, 2018). At the current rate, we will have 140 million climate refugees within the next 30 years (World Bank, 2018). We need to act before it is too late.

Possibility

The building industry provides the physical structure of our society and is responsible for 39% of the worldwide CO2 emission (Abergel et al., 2017). There is a huge potential to influence the outcome of the ecological crisis by changing how we build, and when to build. The whole industry is currently transitioning into a new approach, based around the term sustainability. Slowly moving away from a “take, make, dispose” philosophy, we still recognize a lack of perspective in the current development, with focus fixated on CO2 footprint in new construction, instead of social impact and longevity.

Looking in a broad perspective 4,7 percent of all Danish housing is vacant (EjendomDanmark, 2019), with 3086 units in Aalborg alone (Nordjyske, 2020). Despite this, the Danish building industry initiated the construction of 27.134 housing units throughout 2019 (Danish Statistics, 2019). Instead of focusing solely on environmental impact of new construction we must utilize our current built environment.

Scene

In 2018 the government initiated “The Ghetto Package – a united Denmark without parallel societies. No ghettos in 2030 (from now on shorted as TGP2018)” which states that a maximum of 40% of a declared tough ghetto can be social housing (VLAK-Government, 2018). This has resulted in the impending destruction of 1000s of functioning apartments. (Schütt, A., 2019). One of the areas where this is most severe, is Gellerup situated in the suburbs of Aarhus. Originally built as a prestige project for Brabrand Boligforening in the late 1960s (Brabrand boligforening, 1973) it has since spiralled into the third largest tough ghetto in Denmark with 900 of the original 2400 apartments set to be demolished.

With this project we ask ourselves; By examining the role of the architect-engineer in the 21st century, is it possible to develop a new methodology for undertaking the increasingly complex building task? A methodology for designing sustainable housing through an interdisciplinary approach, while still emphasising core architectural values. Is it possible to use this methodology to transform a part of Gellerup from socially disadvantaged society into an attractive neighbourhood?

Project title Neighbourhood - A tectonic elevation of A7

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002. Photo Collerup aerial view 1975



Prologue

Context

From the beginning of WWI to the end of WWII Denmark experienced a 1,5 million population increase, from 2,75 million to 4,25 million (Danmarks statistik, 2019). Combined with low building activity during war times, scarcity of resources, rationing in the after-war years and a lack of skilled labourers, a severe nationwide housing shortage emerged (Møller, 2019).

Combined effort

To respond to this increased pressure on the building sector, the government funded multiple initiatives during the 50's and 60's, and thus a national coordinated approach between politicians, architects, engineers, entrepreneurs and manufacturers emerged. The initiatives ranged from the establishment of the State Building Research Institute, the development of industrial production of concrete-assembly-modules to a standardization of kitchen modules (Møller, 2019 p.247).

"The increased wealth puts pressure on the building sector, that cannot keep up. Building prices grow. The society needs more buildings of every sort (...) behind all this lies the main target: A larger production in the building sector through increased productivity."

-(Nissen, H., 1966 p.5)

These are the introductory words in the first edition of "Practical module design" from 1966 by engineer Henrik Nissen. The above all goal of the effort is crystal clear, to increase productivity to respond to

the large demand. The book is a result of the government funded initiatives, serving as the first national textbook on standardization of module dimensions.

The coordinated approach to the development of new building methods, combined with the increasing economic prosperity of the late 50's and start 60's (Henriksen 2006) and the creation of the national building fund (Bech-Danielsen 2017) started to profit in '64 with a 53% increase in completed residential construction compared to '63.

One of the main contributors to this significant development was the assembly regulation of 1960, which provided economical subsidies to the constructing of 7.500 concrete module assembled dwellings, making it economical viable to experiment with this new industrialized approach to construction.

Construction boom

The overall result of the industrialization and optimization of the Danish building sector was a tripling of yearly completed residential housing from '58 to '73 (Danmarks statistik 2019), and in 1974 the term "byggeboom" (translation: Construction boom) was coined. (Ordnet 2020)

A significant part of the newly built housing, was social housing blocks, supported by the national building fund and designed as assembly buildings. Built in the suburbs of major cities, one only has to look at the names of these projects (The Brøndby Beach

Parks, The Forest Park) to understand the developers dream of providing an alternative to the dense, dark and cold 1-bedroom apartments in inner-city backyards.

Problems arise

It is rather ironic that the year most housing was erected in the history of Denmark was the same year as 20 years of record-breaking growth in Danish national wealth came to an abrupt halt. (Danmarks statistik 2014) In 1973, the year of the oil crisis, 55.566 homes were completed, more than double the amount built in the busy year of 2018. (Danmarks statistik 2020)

The new social housing projects was predominantly large 110+ square meter apartments to accommodate for the 50's and 60's demand for family dwellings. However, due to the economic upturn throughout the 60's a simultaneous building effort in the construction of thousands of single-house suburbs had been taking place. This meant that the resourceful families that could afford to live in the large apartments, suddenly had two options. Increasing inflation and tax exemptions meant that owning property became cheaper and thus the resourceful families largely ended up opting for the privately owned suburban single house. (Bech-Danielsen 2017)

Thus, a large stock of the social housing dwellings was oversized and too expensive for small families. Vacancy problems arose and the problem was so se-

vere, that social housing organizations began to rent out apartments with locked rooms to minimize the rent (Rasmussen 2014).

Negative spiral

In the subsequent decade the vacancy problems, paved way for housing of "Guest Workers" mainly arriving from Turkey. However, problems would continue as a series of building defects started to emerge as a result of lacking experience in construction of assembly housing.

The early modular building projects was technical engineer experiments on a large scale, where new production methods were applied for the first time. As a result, several errors occurred in the buildings, often related to the modular concrete elements, where displaced reinforcement and leaks in the envelope were among the common errors. The number of defects were on such a large scale that a building damage fund was created by the Danish government in 1986 to economical support the repairing costs. (Landsbyggefonden 2017)

This discouraged further potential resourceful tenants and drove down the rental prices, and thus a negative spiral had emerged. In 1985 the government established Winther-committee released a report concluding that "the social family housing had shifted from providing society with high quality housing, to providing housing for the weakest in the society." (Bech-Danielsen 2017)

"By investigating the dimensions of rooms and building elements you will often find that a series of important dimensions are repeated. (...) Repetitions lead to a smoother work process and project planning. (...) The repetition of similar dimensions provides the opportunity for an industrialization of the production. (...) The principle on its own is neutral; if used with talent the results will be good. If misused it can lead to monotony and uniformity."

- **Nissen**, H., 1966 p.7

Money talks

What started as a response to the national increasing demand for more housing, ended being constructed at the worst possible timing, with 20 years of prosperity being replaced by economic crises within 5 years of the completion of over 100.000 apartments. The industrial means and overshadowing efficiency goal at the time had made its mark architecturally, and already in 1972 the word “beton-slum” (translation: concrete slum) appeared in the Danish language. (Ordnet 2020)

In the aforementioned “Practical module design” by Nissen, an, in retrospective, ominous quote stating the importance of repetition as a tool to enhance production appears:

“By investigating the dimensions of rooms and building elements you will often find that a series of important dimensions are repeated. (...) Repetitions lead to a smoother work process and project planning. (...) The repetition of similar dimensions provides the opportunity for an industrialization of the production. (...) The principle on its own is neutral; if used with talent the results will be good. If misused it can lead to monotony and uniformity.”

– (Nissen, H., 1966 p.7)

In the quote Nissen addresses one of the essential critics that the module design field have been dealing with from the early pilot projects to present projects. By focusing exclusively on technical and economical solutions you neglect spatial and social expressions.

This shows how a misunderstood methodology can lead to failing the task that you are responsible for

as an architect: to design buildings where people can thrive. We see the same happening with (social) housing projects today, where scale, materiality and spatial understanding is below the standard that architects should deliver.

In conclusion, the social housing failure of the building boom was created by several factors. What we find alarming is how the current building industry likewise are focusing on quantity rather than quality, evident in the 3086 vacant dwellings in Aalborg alone (Nordjyske, 2020). A large portion of these are newly built apartment complexes, built according to the latest building regulations, and thus, sustainable in an isolated environmental sense. As such, we believe it is time to take a step back and assess sustainability in a much wider perspective.



003. Photo the newly constructed Gellerup, 1972

Defining sustainability

Sustainability as a holistic term

The global and modern definition of sustainability is given by the UN Brundtland commission, in the report "Our Common Future" from 1987. The commission was formed by UN in 1983 in an attempt to unify environmental concerns and global development (Brundtland G. H, et al, 1987).

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"
- (Brundtland G. H, et al, 1987, pp. 51)

The report defines the term sustainability as a holistic concept through the three aspects: social-, economical-, and environmental sustainability (World Commission on Environment and Development. 1987).

We find Brundtland's definition dated. The term sustainability originates from "to sustain", which directly translates to an effort of slowing down the contamination we put out in the atmosphere. In the present environmental crisis, sustainable development should not suffice by simply not compromising the ability of future generations to meet their own needs. It is time to develop a regenerative approach to our ecological system. Thus, we define sustainable development in the 21st century as: development that elevates the abilities of future generations, giving them a better platform for their lives.

Environmental focus

Today the current global ecological challenge has

evoked a public discussion of sustainability in all sectors of world, including architecture. In these discussions, the term sustainability has often been presented as a matter of environmental matters alone. As when Housing minister Kaare Dybvad explained what he would include in a future strategy for sustainable construction:

"My task in the spring is to create a national strategy for building sustainably, to ensure that we realize all the great ambitions we have, both in relation to climate issues, recycling of materials and embedment of CO2 in the individual building parts."
- (Kaare Dybvad, Housing minister, 06/11/19)

The present discussion of sustainability tends to favour the environmental aspects represented from a scientific point of view, with argumentation based on measurable data.

This is influencing the building industry. There are architecture companies that solely focus on scientific augmentation and presents it as an environmental agenda, while overlooking core architectural aspects (Hvejsel, MF & Beim, A 2019). We believe that we, as architects, should never forget our core competences, the spatial-, social- and cultural dimensions in our work.

Between 2012-18 the global number of verified EPDs (Environmental Product Declaration) for construction products has increased with 1000% (Anderson, J. 2018). It is more frequently seen that building certifica-

tion is a prerequisite in the architect project description. In many companies, the building certifications have gone from being evidence of sustainability to becoming the primary design driver, to get an advantage in architectural competitions. We believe this is perfectly fine, if this design driver still gets assessed in a holistic manner together with the classic architectural and engineering competencies.

However that is not always the case. In 2018 SBI collaborated with GXN and analysed 10 different certifications from around the world in the report "Guide to Sustainable Building Certifications". The analysis categorizes the certification criteria into 13 aspects within the three sustainable dimensions presented by the Brundtland commission. In the report, architecture is reduced to just one of the 13 aspects, and is defined as; "Create design quality in the aesthetics and spatial planning. Ensure access to attractive outdoor areas. Contribute to existing environment." The analysis concludes that on average the architectural aspect only accounts for 5% of the evaluation criteria, while the criteria's related to environmental aspects account for 52% (SBI, GXN. 2018).

Sub-Conclusion

Looking at the problems in the large social housing projects from the '60s and '70s in Denmark, it is clear how cultural-, spacious- and social aspects can affect the sustainability of the building, ultimately leading to TGP2018 and how subsequent transformation or demolition results in a poor economical- and environmental outcome. Therefore, the existence of TGP2018 serves as an example, stating the importance of addressing sustainability in design as a complex interdisciplinary concept where the solution may not appear sustainable viewed from an isolated point of view. We be-

lieve that architecture must not be reduced to a sub-category in the certification evaluation but should rather be the end-synergy between measurable sustainability aspects and the spatial- cultural- and social needs.

We are moving from a take-make-waste consumer culture towards a service based circular economy (culture), with focus on designing waste out of the system (Macarthur, E, 2020). The emergence of a global sustainable agenda, encompassing not only the building industry, but the entire society, is presenting architecture with a challenge;

How does architecture respond to a new geopolitical-, social- and cultural agenda, while remaining true to the core values, and specifically in our case, what is the role of the architect-engineer in this new paradigm?

To answer the question, we must look towards the most significant paradigm change in architecture, which came in the beginning of the 20th century and is today known as modernism. Interestingly the radical ideas of this period are often put to blame for the social issues of the large social housing project. (Schou, S., 2017). To understand we must look closer at this period, which started with the familiar question: How does architecture respond to a new geopolitical-, social- and cultural agenda?

Towards a new architecture

The crisis of style

When the industrialization of the 19th century changed the structure of society permanently, a crisis of style emerged in the architectural discipline. (Hvattum 2013) Maybe most evident in the contrast between Joseph Paxtons crystal palace and the neo-gothic architectural exhibition by Augustus Pugin it hosted as part of the 1851 great exhibition (Frampton, K., 1995). Suddenly it became apparent that the classical Vitruvian romanticised use of ancient architectural orders did not respond to this leap in modern technology.

During this crisis, a German architect and theorist would take the first step towards a new architectural paradigm. Gottfried Semper (1803-1879) released his seminal book "The four elements of architecture" in the same year as the great exhibition in crystal palace. With this publication he sought to give an anthropological explanation to the origins of architecture, focusing on the primitive hut. Dividing the architecture into the four elements: Hearth, mound, enclosure, and roof, he thereby cultivated a new understanding of the constituting elements of architecture (Beim A. 2014), linking the construction together with architecture as inseparable parts of a whole, where architecture could only evolve through constructive innovation. (Kenneth, F. 1995)

Semper however did not manage to translate his theoretical framework into his architectural practice and the challenge of responding architecturally to the modernization of society would have to wait another 50 years.

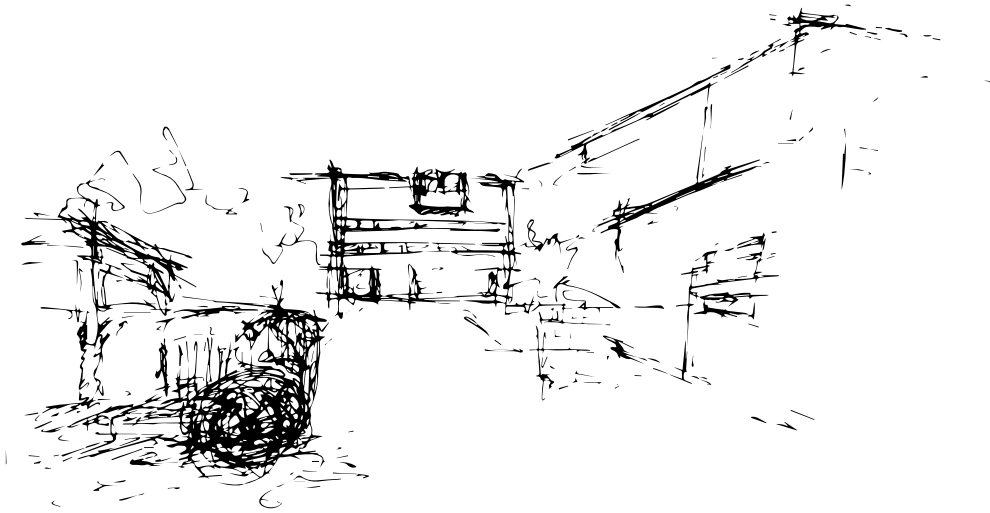
Industrialization of architecture

In 1923, the perhaps most influential modernist of them all, Le Corbusier, published his seminal book *Towards A New Architecture*. Stating that the world had been transformed beyond recognition both in appearance and function because of the machine, while the architectural practice remained unchanged. (Corbusier, L. 1923) Believing that the dwellings of the time were unworthy of living in and that they ruined the health and morale of the residents, he called out the need for an architectural revolution:

"The American engineers overwhelm with their calculations our expiring architecture. (...) The great problems of modern construction must have a geometrical solution. The great problems of tomorrow, dictated by collective necessities, put the question of "plan" in a new form. Modern life demands, and it is waiting for, a new kind of plan both for the house and for the city." - (Corbusier, L., 1923, p. 45)

Le Corbusier endorsed the "harmony" engineers achieved in their use of mathematic calculations based on natural laws, (Ibid. p.15) and believed it was time to put forward the problem of the house and deal with it as both architect and engineer. (Ibid. p.17) He believed that in this problem solving, the house should be seen as a machine and developed in the same problem-oriented logic as the plane (Ibid. p.4)

He expected this to manifest itself in the creation of a mass-production spirit and expected it would arrive in the mass production house. The machine would



004. Drawing Villa Stein & Le Corbusier's own Avions Voisin C7

be as beautiful as the tools and instruments that had appeared through the industrialization (Corbusier, L., 1927).

The planned city

It is within this framework his more controversial city planning ideas was put forward. In the same manner as he proposed to define the problem of the house, and engineering a solution for it, he likewise expressed the need for a rational approach to city planning. Addressing the contemporary unplanned towns as an evil, in which a foul confusion of streets full of noise, petrol fumes, dust and airless unhealthy courtyards, damaged the moral of its residents. (Ibid. p. 57-61)

He highlighted how the new industrial districts was the most noble quarters of the city as they had been rationally planned based on a clearly defined logical problem. Experimenting with the idea of likewise designing towns with a purely problem based machine development methodology he proposed a city of distinct function separation. With districts distributed by function, and a clear separation between the main arteries of infrastructure, supply, and people. Stating: "Cafés and places for recreation would no longer be that fungus which eats up the pavements of Paris" (Ibid. p.60)

He proposes a planning where the same density is achieved through great blocks of houses stretching

along arterial avenues, with a vertical arrangement of dwellings and offices, providing ample light and fresh air for every window and large green areas stretching along its base, removed from the noise and pollution of the car.

Spatiality

Despite the very functional approach of defining a problem statement of the house, and town, modernism did not only revolutionize the industrial nature of building, but also the atmospheric experience. With the new possibilities gained from the plasticity of reinforced concrete, and a radical new understanding of what a house is, spatiality likewise became a new central concept of the discourse. As Adolf Loos describes:

"My architecture is not conceived by drawings, but by spaces. I do not draw plans, facades or sections... For me, the ground floor, first floor do not exist... There are only interconnected continual spaces, rooms, halls, terraces... Each space needs a different height... These spaces are connected so that ascent and descent are not only unnoticeable, but at the same time functional" – (Loos, A., 1930)

Legacy

Starting as a break with two millennia of archaic architecture based on the virtues of antiquity, the early purist modernism must be seen in its cultural context, where a revolutionary approach served as a statement, a beginning of an experimental approach to find an answer to the question posed by the technological evolution. As Le Corbusier acknowledges in *Towards a New Architecture*:

"A Period of 20 years is beginning which will be occupied in creating these bases. (for architecture) A period of great problems, a period of analysis, of experiment, a period also of great aesthetic confusion, a period in which a new aesthetic will be elaborated." p.64

Blaming modernism for the problems with Danish social housing seems to be an one-dimensional take on what created these socially troubled areas, as the notion of a machine to live in and the search for an international style completely independent from site or regional location was long replaced before the Danish building boom. Likewise, the already existing bad examples of early projects for instance Pruitt-Igoe would have served as warnings at the time. (Guardian 2015) Instead an interesting quote from Arkitekten in 1961 comes to mind:

"A moral, or worldview, has been instilled within architects to put quality, function and culture as the first and foremost requirements, and if the industrialization can simplify this task it is favourable. However, opposite the task architects ought to do, one finds the construction market and manufacturers. If these powerful forces start an industrialization without architects being involved there will be a danger of quantity, economy and speed replacing our first and foremost requirements causing great harm to the result."

– (Lose translation, Hansen, H. H, Arkitekten, 1961 p.2)

When the current building industry is confronted by the same task of responding to new geopolitical-, social- and cultural agenda, we are likewise in danger of neglecting core values in the architect-engineer discipline. Thus we find that it is our role as master-students not yet influenced by the economic power of the industry, to emphasize a broad perspective. Instead of a primary focus on constructing new housing with circular initiatives such as design for disassembly and life cycle assessment, we must also assess the built environment and try to improve it. With the historic knowledge on the social housing boom, it is time to investigate further and understand the problems of the large social housing plans.



005. Photo Ministry of Housing christmas card, 1972



006. Photo Gellerup 1972



The fundamentals of a good life

Urban criticism

The economic growth and housing shortage after WWII became the catalyst for an industrialized building process, not only in Denmark, but across the western world. (history, 2020) The highly functional urban strategies started to be implemented, however the vast modernist-inspired plans quickly proved to have issues. The architecture was monotone, the large recreational areas was uninhabited, and the separation of the various types of infrastructure had a negative influence on the residents ability to meet and develop social bonds.

This criticism is supported by one of the early critics of the urban development: American journalist Jane Jacobs, who accounts for her opinion in her seminal book "The Death and Life of Great American Cities" from 1961. she was frustrated with how these anti-urban biases of misunderstood modernism became the mainstream U.S. political consensus on how to design cities themselves (Jacobs, J., 1961).

Criteria of a neighbourhood

There clearly was a missing link between this urban strategy and the human needs in an urban context. Our opinion on the matter is, that the urban strategy lacks identity. People need an urban environment that they can belong to and be socially associated with. We think that the answer can be found in the concept of neighbourhood. So, what are the criteria for a well-functioning neighbourhood? For this we look towards Danish architect Jan Gehl.

The street

Both Gehl and Jacobs agree that infrastructure of an area is significant for the success of a neighbourhood. Stating the need for a street structure extending as a continuous network throughout a district, to ensure that districts are not enclosed and distanced from the rest of the city. Gehl found that children would rather play in the streets and near the entrances of dwellings instead of the designated playgrounds, that often are found in the green spaces of residential areas. The reason for this is the lack of visual contact of people and traffic, which children are often curious about. Gehl's investigations show that people attract people and that new activities begin in the vicinity of events that are already in progress (Gehl, J., 1971).

Developing social bonds

We know that the social culture is key in a neighbourhood. But how do the residents meet and develop social bonds? According to Gehl, the social structure is supported by establishing a social hierarchy of communal spaces in a neighbourhood, which should span from the private home, its housing group, the neighbourhood to the public city. These spaces should exist both in- and outdoors and their functions can be divided into daily necessities and optional activities.

The daily necessities, such as taking down the trash, parking your bike or picking up your mail, must be located in a manner that the residents meet each other. Through continuous interaction the residents will develop social bonds and thereby find common interest. This will encourage them to take up optional activities,



007. Photo Bo bedre, 1973

which could be the founding hobby clubs, playing ball games or cooking meals together. The main reason for the communal spaces is to create platforms where optional activities can take place, as desired by the residents. Both daily necessities and optional activities must be spanning across all levels in the hierarchical structure to encourage the communal life in a neighbourhood (Gehl, J., 1971).

Sub-conclusion

The layout of infrastructure along with social hierarchy of spaces, daily necessities, optional activities and the design of communal functions are key for a well-functioning neighbourhood. But how do you design such a neighbourhood?

Designing a neighbourhood

A neighbourhood should provide a feeling of belonging and by that responsibility for the residents, which spans across age, income and family situation. We believe that the way to strengthen a neighbourhood is to provide quality through spatial programming of daily necessities and optional activities.

The communal optional and necessary spaces must be influenced by our phenomenological understanding of materiality and spatiality as architects, drawing parallels to the spatial (elaborate) work of Le Corbusier and Adolf Loos. When taking down the trash, the residents should want to stay for a minute and converse with their neighbour because of the spatial qualities for instance found in atmospheric play of daylight, tactility of the materials and integration of urban furniture. These meetings will eventually develop friendships and initiate the use of optional activity spaces. But where should the communal functions be placed, what is the size of a neighbourhood and how should it be organized?

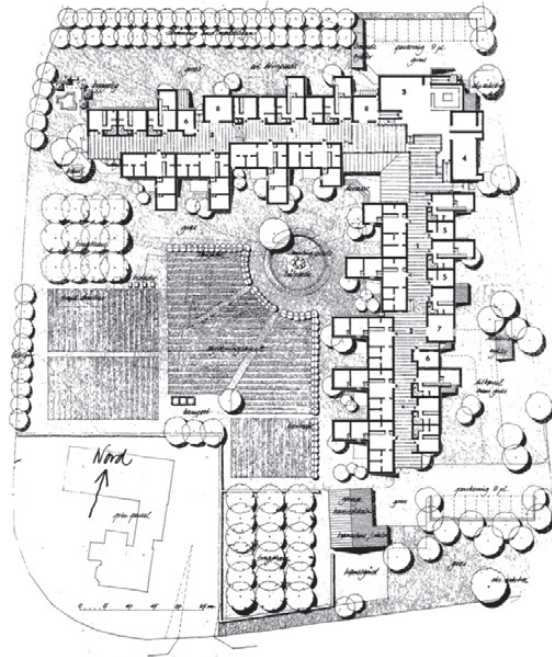
Organisation of a neighbourhood

In the pursuit of alternatives to the block projects, SBI launched an idea competition in 1972 regarding dense-low housing construction systems. Vandkunsten won the competition with their manifest-like proposition named "Project 35", regarding social residential neighbourhoods developed in collaboration with local residents with respect of the existing social-, historical and site-specific context. The residents were spanning between all age groups along with economical- and family situations. Vandkunsten defined the aver-

age need for space pr. individual to be 50m². There was focus on the communal spaces and every resident gave up a percentage of private space for the greater good of the neighbourhood. The percentages varied from 10% for the one-person dwellings up to 30% for households with 15 residents (SBI, 1972).

We know that the fine balance between private and public is an important factor when working with residential architecture. Not only the location of the various functions around the four walls of the dwelling, but also the interior rooms' orientation towards the surrounding context. In a neighbourhood, the surrounding context is the community that you are a part of. That brings us to the question: What is the appropriate amount of publicity for each of the functions in a neighbourhood and how should these be orientated?

If we look towards Project 35, the functions are placed after a clear definition of a private backside and an open frontside. The social functions such as entrances, kitchens and living rooms are all located towards the life of the social spine that binds together the neighbourhood, while the private functions, such as bedrooms and bathrooms, are facing away. The communal functions are located along the infrastructural path that connects the entire neighbourhood, so that they are exposed to most residents possibly. There is focus on the division of public and private and of the community that unfolds across building scale and personal zones. The planning of the interior functions of each dwelling allow for casual, social meetings across all age-spans in the neighbourhood.



008. Plan Jystrup Savværk, 1983 (Vandkunsten 2020) 🌐

- | | |
|--------------------|---------------------------|
| 1 - covered street | 5 - supplementary room |
| 2 - sandbox | 6 - laundry |
| 3 - communal house | 7 - wood workshop |
| 4 - storage | 8 - craft and sewing room |

Another important aspect is the size of the housing groups. How large can each housing group be, before the residents start to feel distant to their neighbourhood? Gehl's studies show that housing groups of 15-30 dwellings and neighbourhoods of 4-6 housing groups has proved to work best. Within this spectre is the best foundation for the community and its democratic processes, both in the individual housing groups but also on a neighbourhood scale (Gehl, J., 1971).

The neighbourhood

We believe that it is important to design the communal spaces in every hierarchal step, from neighbour to neighbourhood, in a way, which generates social bonding and thereby strengthens the neighbourhood.

We find that the answer lies in turning necessities into quality spaces, where the community can grow from. A housing project developed with the social interaction of residents as the main spatial design driver, instead of time- and cost-efficiency, is an investment that pays off long-term.

When transforming the building mass of the 60's social housing plans a focus on the spatial possibilities for new social interactions and a clear definition of the various communal steps from neighbourhood to home must be considered top priority. So how do we, as architect-engineers integrate this approach into our complex design task?

Sustainable architecture?

Interdisciplinary approach

The sustainable agenda in architecture calls for an interdisciplinary approach. By defining sustainability as a holistic field across social, environmental and economic aspects, there is a need for including methods from other disciplines. For an architectural interdisciplinary approach, it is important to understand that methods from other disciplines are at once necessary and insufficient by itself for the architectural design. (Leatherbarrow, D. & Wesley R. 2018)

The early social housing buildings are good examples of failed interdisciplinary approaches where the architectural aspects were oppressed in favor of industrial efficiency, with the result of buildings lacking spatial and social quality.

How do we define architecture?

We believe architecture must be understood as a spatial and cultural discipline articulated through construction. By using this definition, we move into a tectonic understanding of architecture. Kenneth Frampton defines tectonic as the poetics of construction on the front-page of his seminal publication; *Studies in tectonic culture* from 1995.

We see the very essence of architecture as construction, without it, it wouldn't exist. It would merely be compositions on a canvas, failing to resist gravity and create space. Construction in this context is a complex size extending beyond the load bearing construction. The theorist Semper emphasized that architecture and construction was part of the "act of becoming", where tools, materials and procedures were consid-

ered equally important. (Beim A., 2014 p.23) A position that becomes increasingly interesting in the 21st century as the link between material, tools and procedures constantly evolve through our age of digital fabrication. Thus, it is no longer as simple as constructive innovation creates a need for architectural evolution like Le Corbusier proposed in *Towards a new architecture*. Rather it is the tool innovation, especially computational-, and procedures emerging from this that drives architectural evolution. (Ibid p.23)

In its essence, tectonics represents the utilization of construction as an integrated part of the architectural space, where constructive innovation and, equally important, tool innovation drives architectural evolution forward. Hereby not stating that architecture cannot begin with an artistic idea, and then develop in a close interplay of construction and tools. But in the absence of an articulation of this interplay we believe architecture fails to become more than stage dressing.

Longevity

As stated in a previous chapter we define sustainable development as development that elevates the abilities of future generations, giving them a better platform for their lives. As elevation is measured over time, consequently, it is important to question what is the timeframe from which we design the construction?

Question of reuse of materials has extended the timeframe for which we measure materials lifetime. Instead of viewing materials as static elements that equals the construction's life time, circular economy presents an

economical model were materials loops across the construction life time. The circular economic model is presented in architectural context in the two publication "Building a Circular Future" by GXN and "A change-maker's guide to the future" by Lendager Group. As a solution to material recycling, design for disassembly is presented as a strategy to design elements for their future use. (GXN, 2019)

But considering how much materials, tools and procedures change, how can we be sure the buildings bricks of today will be an efficient construction bricks in the future? Isn't a constructing design with a robustness that allows maintenance and transformation a better way to extend the lifetime?

Rønnow Architects publication "Bæredygtig Byggeskik" (Sustainable Construction Practice) addresses material lifetime in a different perspective than circular economy by focusing on the construction's longevity. As architectural specialists in renovation and transformation of regional constructions, Rønnow Architects utilize their work experience to investigate the sustainable approaches of the existing build environment. Rønnow Architects highlights robustness, patina, textuality, maintenance and cultural value as core values for buildings longevity. (Rønnow Arkitekter, 2018)

In a social disadvantaged area where the resources are scarce, we believe longevity of the construction is of even greater importance. As less maintenance can be expected, due to lack of resources, a sustainable

construction must be designed robust enough to resist weather and damages to perform as intended. In these areas, the most sustainable solution might not be carbon emission low material, but the material that despite absence of maintenance patinate to continually provide the settings of a good everyday life.

The last value that "Bæredygtig Byggeskik" highlights is cultural value, explained as architectural experience. Cultural valuation is difficult to determine, but we believe it is a very important factor in the willingness to maintain and transform a construction. Thus, a direct factor of a construction's lifetime and sustainability. We believe the architectural experience of a space is determined by the social, atmospheric and cultural aspects. It is created through the close interplay of architectural idea, constructive means and tools.

Looking at the buildings on the "Ghetto list", from which most is set to be demolished, they are constructed with robustness, care for their patina and with possibility for maintenance. However, we consider many of these projects to lack of architectural quality and find this as the reasons for a public interest in their demolition. Despite their "demolition labels" could a transformation that establish architectural quality change the public opinion of the Ghettos? Could we with a tectonic approach to transformation revitalize our existing built environment?



009. Photo Graffiti on the former youth housing, Gellerup



A tectonic transformation

Relation to site

One of the most famous critiques of modernism is put forward by Robert Venturi in his warning against “The tyranny of space” in his postmodernist publication *Learning from Las Vegas* (1972). Here he criticizes modernism for its idolization of the concept of space. Looking at the international style and preference for reinforced concrete, the critique is quite understandable, presenting the questing: how much is spatiality worth if it is alien to the site?

It is quite evident that the question of site has been neglected in numerous of the Danish social housing projects, both in terms of natural topographical features and integration as part of the remaining urban context. The question presented here is whether the spatial success is evident at all, with the lack of communal spaces in between the home and overall urban plan.

When transforming in such an area the question of spatiality and place reoccurs. In her essay “The tyranny of the place” Mari Hvattum criticizes the absolute focus on site that has since emerged in the wake of Venturi.

Looking at one of the famous site sensibility publications, *Genius Loci* by Christian Norberg-Schulz (1980). For him architecture had a healing potential, in the sense that by visualizing the genius loci and thus translating the natural place into cultural form, architecture could help to create a meaningful world. The problem of this idolization of site is the static understanding of place as something “completed”. Thus, architecture becomes something that illustrates pre-existing con-

ditions, not a creator of new ones. As Hvattum states “Places do not create architecture, at least not by themselves. Often the opposite is true: architecture creates places”
- Hvattum, 2009.

Within this quote lies the essential opportunities of transforming neglected architecture: not by design with a central focus on the genius loci as a static natural state, but by using architecture to evolve the genius loci for the inhabitants.

Formal intention

Thus, in our approach to a site which contains both cultural- and architectural heritage but likewise a need for a new identity of place, we are presented with a design dilemma: Continuity or contrast? Within this question lies the question of form. Like the crisis of style throughout the late 19th century, we are challenged with adhering to-or challenging the formality of existing style while possessing new tools. In our case, it is a question of adhering to the architecture caused by the 60's industrial means for efficiency.

In this case it becomes relevant to go back in time, to try and understand the original intentions of the project. What did the architects of the time try to achieve, and how did the efficiency of the industry change that? Can we somehow provide a 21st century continuation of the social- cultural intentions, with all the knowledge that we have gained since?

By describing this continuity, we begin to discuss ar-

chitecture as an organism, as something that exists in time and has a narrative. As opposed to the modernist idea of seeing the unplanned parts of society as an evil, we see it is a natural cultural outgrowth of the ground. Not necessarily because each part of the town is designed as a translation of what was previously there, as stated by Christian Norberg-Schulz, but because it has grown over time through contemporary societal- and cultural need and thus gives a glimpse of history. A natural grown town becomes a root system of different intentions, and that creates identity.

When 2400 dwellings get planned by one architect, and placed on a field, that system becomes a plantation, without a story. When that plantation fails at its function, we suggest that we plant new seeds around the strictly aligned trees and slowly let the plantation become part of a natural growing root system.

We propose to save the blocks and by doing so, starting a new narrative, not necessarily adhering to old form but beginning to convert the plantation to a diverse root system.

Perspective

Prologue

Historical context

Defining sustainability

Contemporary context

Towards a new architecture

Architectural context

The foundation of a good life

Urban context

Theoretical base

Defining a neighbourhood

approach to the good home

Sustainable architecture?

approach to sustainability design

A tectonic transformation

approach to transformation

Position

Methodology

Theory conclusion

Neighbourhood

A neighbourhood should provide a feeling of belonging and by that responsibility for the residents, which spans across age, income and family situation. The residents must be given the platform for optional, social activities but cannot be forced to use it. We believe the answer lies in providing quality through spatial programming of daily necessities by implementing a social hierarchy of communal spaces, that spans across all levels in the hierarchical structure, to encourage the communal life in the neighbourhood. These shared spaces must be influenced by our phenomenological understanding of materiality and spatiality as architects. The planning of the interior functions should allow for casual, social meetings and the division of public and private spheres, for both residents and community, must unfold across building scale and personal zones and thereby embrace and underline the importance of the everyday life in a neighbourhood.

Sustainability

We believe Sustainable development must be defined as development that elevates the abilities of future generations, giving them a better platform for their lives. In the current ecological crisis, it is important to understand sustainability in a holistic manner, consisting of both social- economical- and environmental aspects. Within the building industry this not only applies to new construction but first and foremost to how we utilize the existing environment. It is important to understand the interdisciplinary approach needed for creating holistic sustainable architecture, where a solution might appear unsustainable in an isolated

sense but acts as an integral part of the combined solution. Sustainability housing is first and foremost housing where people thrive, and thus the environmental sustainability must not become the sole design driver. Still, the carbon footprint and lifetime of the materials used, are a significant part of designing a holistic sustainable solution. But again the broad perspective must be stressed, and the social- and economical- context of the project has a significant influence in what defines a sustainable material in each specific case, meaning that a durable material with a large carbon footprint can be the more sustainable solution in certain cases.

Methodology

Modernism was a reaction to an architectural consensus that did not respond to the development and technology of the society. The present ecological crisis has generated a need for sustainable development and architecture need to respond to these new demands. A holistic view on architecture and sustainability is needed. It calls for an interdisciplinary methodology.

Architect-Engineer

Engineer science has through computer simulation and data accessibility created new tools to solve aspects of the sustainable demands and increasing complexity of construction. We need to take advantage of these tools and processes using a critical and reflective approach, in order not to step outside the field of our discipline.

With an education positioned in the interdisciplinary field between architecture and engineering, our approach to designing reflects an engineer's scientific based search for solutions and the architect's knowledge of atmospheric-, social- and cultural aspects in the development of design. The best solution is not necessarily the one that is scientifically optimized, but also the design that enriches everyday-life experienced as measured by human senses. That leaves us with a rather complicated question: how can we navigate between the methodologies of these two disciplines?

Could a methodology to an interdisciplinary approach between engineering and architecture be found in the tectonic approach?

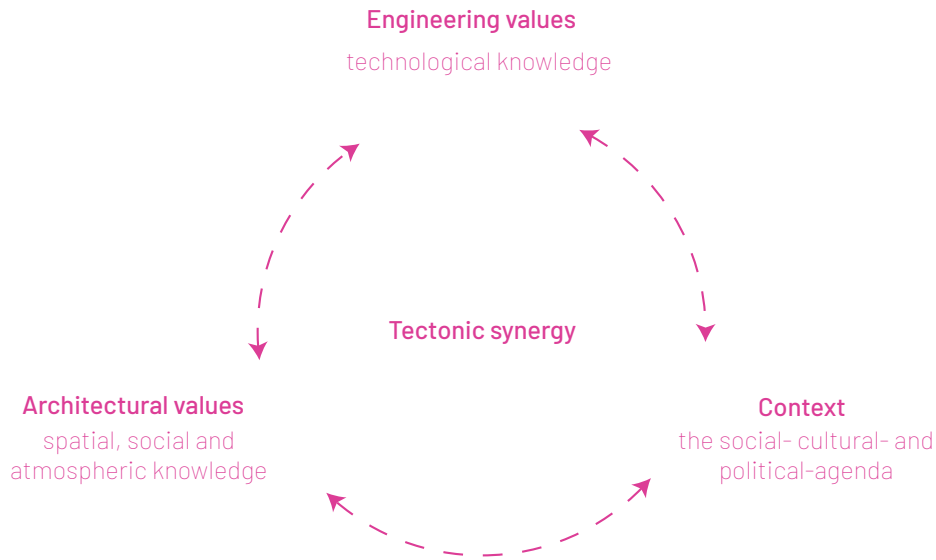
Tectonic approach

We see a tectonic approach as the synergy between contemporary technological knowledge, the social-cultural- and political-agenda, and the architectural task of creating a space that through spatial-, plan- and atmospheric means enriches the everyday life of people. Thus, the methodology intertwines the architectural core-values and engineering core-values, in a synergy where the technological means adds value to the architectural needs, and vice-versa.

When we describe the need for a holistic sustainable approach it is because we observe a tendency towards a methodology where measurable environmental sustainability becomes the sole architectural need, leading the technology means not to answer the spatial and social needs of the users, putting the future success of our built environment in danger. Expanding the terminology beyond construction and architecture, the tectonic approach may likewise be understood as the synergy between built environment and society. Understanding the psychological framework of a society where people thrive and using this as needs to inform the means of the built environment.

Position

As the technology of the 21st century accelerates the manufacturing power of the world, the complexity increases. In several fields, specialists have become the keyword. But what happens when tasks become fragmented into a numerous small highly efficient boxes? We have already discussed how architecture risks to be devalued in the pursuit of a more environmentally sus-



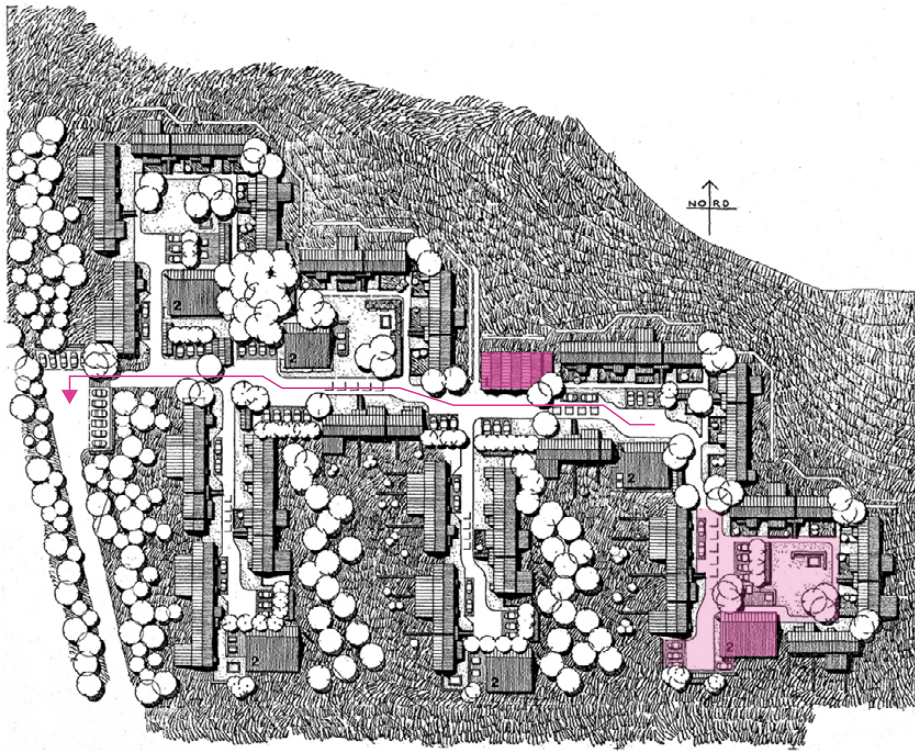
010. Diagram Tectonic synergy

tainable industry, ultimately falling short of the initial goal: sustainability. In the increasing age of complexity, the need for management of the overall information flow with broad perspective has increased. Making the generalist increasingly valuable.

Here the unique properties of our education find its position in the industry. An architect engineer has the possibility of viewing the industry in a broader perspective, and by doing so it has the potential to navigate in the complex matrix of the industry. Our methodology utilizes a tectonic approach to building without conforming to style or design manifests when navigate the complexity. Through in-depth analysis and theoretical investigation, the methodology strives to assess the problem field in its cultural- social- and political context and arrive at a solution through a continues interplay of disciplines. With the architect-engineer background this process does not require a ping-

pong process between individual specialists within the adjoining disciplines but allows for the separate tasks to be developed with underlying knowledge of the remaining disciplines. For this to take place in an organized manner, a constant awareness of the design driver is important, as it is through this consideration that the interdisciplinary approach sustains a holistic overview. Thereby, it must be said, the methodology isn't as much a utopian design dream of being able to solve everything at once, but rather the acceptance of the human mind's need to compartmentalize, but importantly with the experience of all the disciplines in the back of mind.

Before diving into Gellerup, with the methodology in mind we will go through two reference projects, that serves as examples of sustainable neighbourhood and tectonic approach to transformation.



011. Plan Tinggården, 1978 (Vandkunsten 2020) 

-  Main road
-  Courtyard
-  Communal house
-  Community center

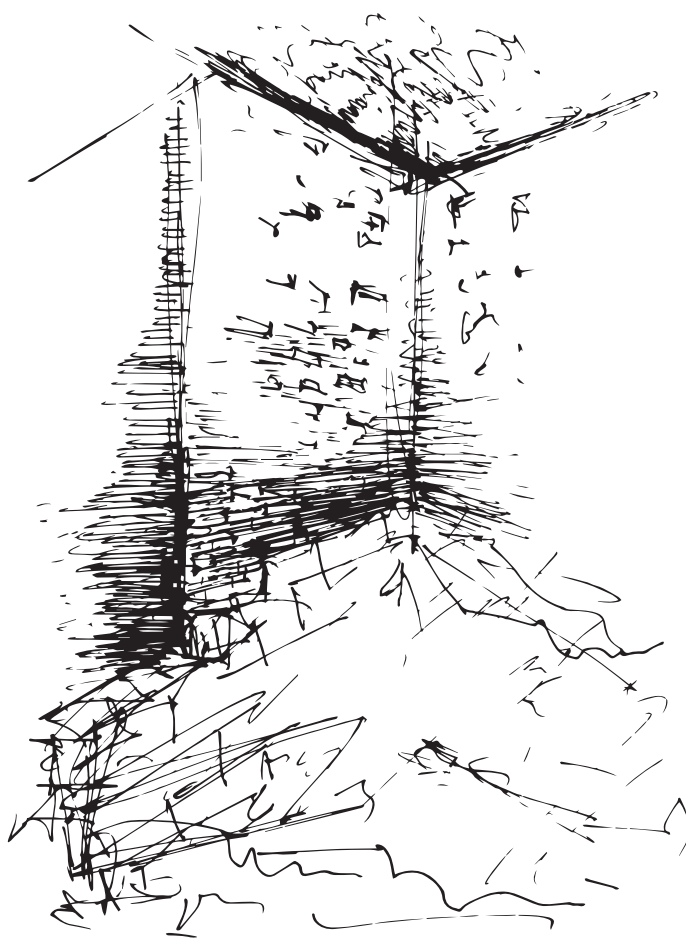
Case study – Tinggården

Tinggården is the result of Vandkunsten's "Project 35". It consists of 78 social housing units distributed in six housing groups. Each dwelling is centered around a communal square with a community house. The entire neighbourhood all share a community center, which is located on the main street. The dwellings are relatively small with an average of 78m², however, the communal areas and houses in Tinggården consist of 10% compared to the usual 3% in social housing (SBI, 1972). We find Tinggården to be a strong example of a well-functioning neighbourhood with a clear hierarchy of communal spaces.

The private spheres of Tinggården spans from the private home, its dwelling group, the neighbourhood to the public city. The communal spaces have a hierarchy. The family meet in their living room; neighbours meet in their front garden; the residences meet in their communal house and in the courtyard it is located in; the entire neighbourhood meet on the main road and in the community center (Gehl, j., 1971).

The social structure is supported by these communal spaces, both indoors and outdoors. The daily necessities are located in a manner that the residents meet each other, which is around each of the communal houses. Through continuous interaction the residents will develop social bonds and thereby find common interest. This encourages them to take up optional activities, which takes place in their shared courtyard, the communal house, the streets and in the private front gardens.

The neighbourhood have implemented both daily necessities and optional activities that spans across all levels in the hierarchical structure, which encourages the communal life in the neighbourhood. Each set of neighbours, each stairwell, each courtyard and each neighbourhood all share communal spaces varying from small and private to large and public so that all social spheres from home to city is covered.



012. Photo Kolumba museum, Peter Zumthor

Case study –

Kolumba museum

The Kolumba museum by Peter Zumthor is a good example of a tectonic approach to transformation. Zumthor's material knowledge of the bricks technical, structural and atmospheric abilities, result in a design where the wall becomes more than an envelope between in and out. Providing atmospheric quality in the interior space – by architectural means in the envelope

Despite a brick's immediate appearance as an enclosed and solid material, Zumthor's addition from the inside appear as a light and structural material where the roof seems to be hovering above the ruin. The small openings between the bricks diffuses the sunlight and create a sensitive light on the inside, that emphasizes the sensorial experience of discovering the remains of the old ruin.

In the assembly between the added and the original buildings, the brick is used as a filler that saturates every gap and creates a unified volume. The materiality of the light gray Petersen tegl does not try to replicate and blend with the material of ruins and thereby erases the traces of the history of the building, but rather empathizes its scars.

The design of the sensorial light and the empathizing of the historical layers emerges from a tectonic knowledge of materials. An understanding of how bricks are bonded and how this can be utilized to create a sensitive light inlet. An understanding of the bricks strength and how it can be broken in to customize sizes to act as a filler.



013. Photo West facade of block A7



Gellerup, from cranetracks to ghetto

Dreaming big

The story of Gellerup is a story of ambitions, dreams, good intentions, economic failure and social decay. The plans for Gellerup began in the start of the 60's when the newly formed Brabrand housing association bought a large plot of land outside Aarhus. At the time the national effort towards an efficient solution to the housing shortage starting to profit, with the the assembly regulation of 1960 occurring just two years prior. The ambitions for Gellerup was thus influenced by the economic prosperity and evolving industry. The design by Knud Blach Petersen and Mogens Harbo was presented to the public in 1964, and consisted of around 6000 dwellings, gathering national attention as it was to become the largest social housing project in Denmark. (Jyllands-Posten, 1964)

The prettiest town in Denmark

The construction began in 1967, with the initiation of the first phase, "Gellerupparken" consisting of 1776 dwellings. During construction the national attention continued, and in 1970 BT named the "ultra-modern" Gellerup-plan the prettiest town of the year, highlighting the separation of pedestrians and cars and the numerous recreational options for the residents. (BT 1970)

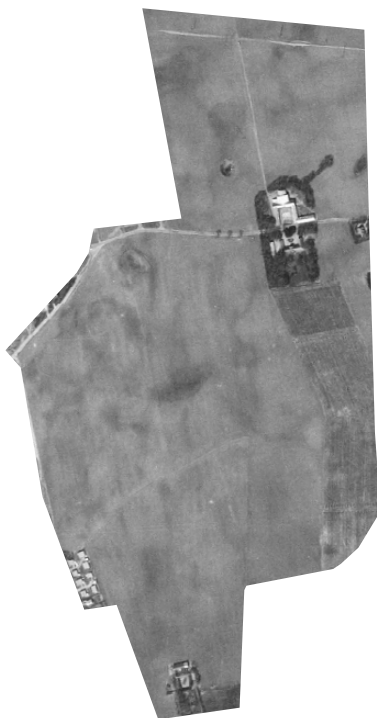
Among the options was, public education institutions, an indoor swimming pool, tennis courts, football courts, a theatre, youth clubs and a large indoor shopping mall featuring "rolling sidewalks". (Høghøj 2018)

Fading

The concrete blocks were not praised by everyone however, and throughout the 70's, which was marked by the end of economical prosperity and return of unemployment, the public image of Gellerup started to fade. Economic problems within Brabrand housing association meant that the third stage of the plan was cancelled in 1976. National attention to Gellerup resumed in 1978, but this time in a completely different light. The area was featured in the Danish Radio tv-broadcast "kirkeligt forum". The broadcast presented the newly built Gellerup church from 1976, but featured a side story, heavily criticizing the area. The broadcast began with closeup images of the blocks, while the speaker recited anonymous statements:

"Gellerup, no-one wants to live there, if they aren't forced to. If you park your car in Gellerup, remember to lock it, even though you will be gone in 5 minutes. A woman doesn't walk alone in Gellerup at 10pm. Gellerup is the first place the police search after a major coup or theft." (Danmarks Radio: En Kirke i beton, 23.10.1978, 00.01.52 – 00:02:33 min)

This marked the beginning of the stigmatization of Gellerup as concrete slum, and during the subsequent decades the reputation of Gellerup would never be restored. Failing to attract the middle class, Brabrand Housing Association had to rent the apartments to people on social security with financial support from the municipality. Further vacancy problems made way



014. Aerial photo A field outside Aarhus, 1966 📍

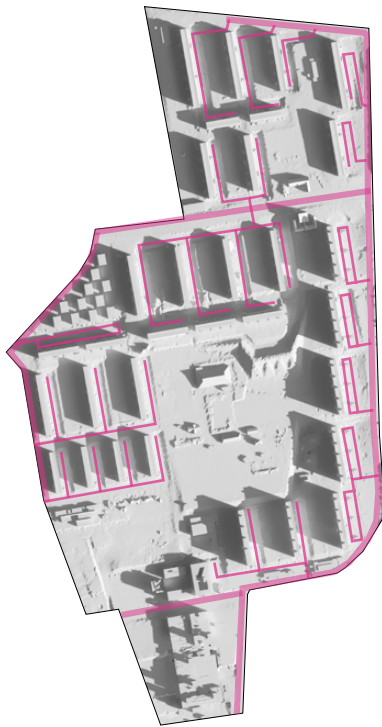


015. Aerial photo 2400 new homes, 1974 📍

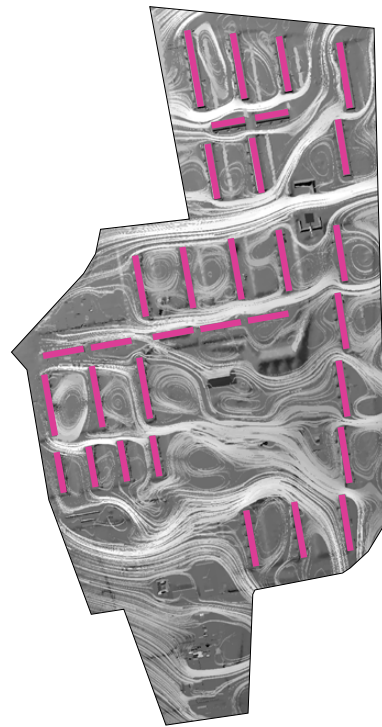
for housing of guest workers, and the waves of refugees arriving to Denmark throughout the 80's and 90's. With a demography consisting less and less of ethnical Danes, Gellerup became subject of the integration debate of the 90's. The area was marked by theft and vandalism and in 2003 it became so severe, that the bridge connecting City Vest to Gellerup was enclosed in a wire fence to stop people from throwing stones at moving cars and busses beneath it. (Aarhus Stiftstidende 2016)

The cry for help

Finally, in 2006 Brabrand Housing association released the report "Siteplan Gellerup" stating that the integration effort in Gellerup had failed, and that the association would go bankrupt in trying to maintain the housing. Something had to be done. (Jyllands-Posten 2006)



016. Analysis Shadows 20/3 at 08.00



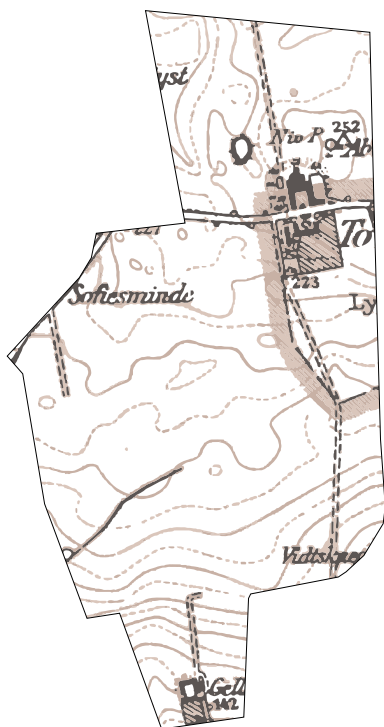
017. Analysis Wind from west

Daylight and recreation

Knud Blach Petersen and Mogens Harbo's vision for Gellerup is quite clear in the original plan, which remained until 2011. The whole area is a green island, with car infrastructure located in the vicinity, and evenly distributed blocks, distanced to minimize shade. The distance shows how daylight was processed as a quantitative phenomenon, with focus on maximization.

Wind tunnels

A neglected aspect of the sustainable home is visible. A consequence of the open masterplan is the creating of wind tunnels. A simulation of the wind from west, which is the most common wind-direction in Gellerup based on the average yearly basis, highlight this issue. The long, unbroken stretches of building blocks cause the wind to channel between the blocks with only a few elements to break and slow down the wind, creating strong velocities in the process. Wind plays an



018. Illustration Topography 1901



019. Illustration Crane tracks

important role in the human perception of wellbeing when moving through a space. The strong wind causes discomfort in Gellerup's urban environment, which we have experienced first-hand during our site visits.

Landscape of crane tracks

The means to realize the vision was the potential of the new industrialized building processes. The machine was embedded in the design on every scale from bolt to urban landscape. The illustrations of the topography

from xx and xx show the radical landscape change conducted by the construction of Gellerup. Cranes were the keys to success for the new construction-method back in 1967. Rails were laid out in front of each upcoming block, with tracks parallel to the building. Subsequently the tracks were turned into parking areas in front of each block, meaning that 50 years later, the crane tracks are still dominating the landscape.

Transformation of Gellerup

The beginning of a transformation

As a response to the awareness of Gellerup's poor condition, presented in the report "Siteplan Gellerup", Brabrand Housing Association launched the project "PLUSPLAN for Gellerup" in 2007. The project became the beginning of a collaboration with Aarhus Municipality, with the aim "to transform the area from an isolated island, to an open, attractive and mixed part of Aarhus." (Århus kommune pp.7, 2019)

The collaboration resulted in the strategy, "Helhedsplanen", presented to the public in 2011. Helhedsplanen from 2011 suggested to construct new infrastructure, establish neighborhoods and move public workspaces and institutions to Gellerup. Only a few blocks were selected to be demolished to make way for the construction.

The development of Helhedsplanen was well in progress when prime minister at the time, Lars Løkke Rasmussen, stated in his new year speech in 2018, that parallel societies in Denmark has got to come to an end. According to him, people with the same problems that lived together would create a negative spiral they could not get out of (Rasmussen, L. L., 2018). The initiative to end this spiral were presented in an updated and more restricted ghetto package.

Though Ghetto Package 2018

(TGP2018) In order to understand the current situation in Gellerup, one must look closer at the specifics involved in the government proposal of TGP2018 and the subsequent agreement with the Parliament in May 2018.

The agreement states that a social housing area consisting of at least one thousand apartments will be designated a socially troubled area, if it meets at least two of the following criteria:

1. More than 40% of the residents between 18 and 64 are unemployed and not in education.
2. More than 60% of the residents between 30 and 59 only has primary education.
3. The average gross income for taxable residents between 15 and 64 is below 55% of the average for the region.
4. The number of adult residents convicted of violation of the penal code, firearms act or executive order of euphoriant substances are above three times the national average.

If a socially troubled area is subjected to a further fifth requirement it is considered a Ghetto:

5. More than 50% of the residents are immigrants and descendants from non-western countries

If an area has been considered a ghetto for a minimum of 4 consecutive years, it is deemed a "tough ghetto". The government enforce that the municipality of a defined tough ghetto is required to create a development plan, which decreases the amount of social family housing to under 40% by 2030. 15 areas in Denmark are currently defined as tough ghettos, Gellerup/Toveshøj being the third largest on a national scale. (Transport og boligministeret 2019).

There are four possibilities when decreasing the amount of social housing in a designated tough ghetto:

1. Building new, increasing the population density of the area.
2. Changing ownership by selling social apartments to private investors.
3. Transforming social apartments into youth- or elder housing.
4. Demolition.

In case 2-4 the result will require the current residents to be evicted. As part of TGP2018 rules the municipality must relocate the evicted residents to an area outside the ghetto, but within the municipality. While, in case of ownership change by sale, the municipality must relocate the residents within the same area.

Aarhus municipality intensify the ghetto boundary

Back in 2007, when the project for physical change of Gellerup was started, the amount of social housing in Gellerup was at 91% with a total of 2.400 apartments. With the increased density achieved by the current phase of the Helhedsplanen, the percentage of social housing is nearly 40%. However, it was politically decided by Aarhus Municipality, to restrict the boundaries of the ghetto zone, by excluding much of the new construction in the unoccupied boundary areas of Gellerup. (Århus kommune 2019) Thus, forcing a further decrease in the amount of social housing.

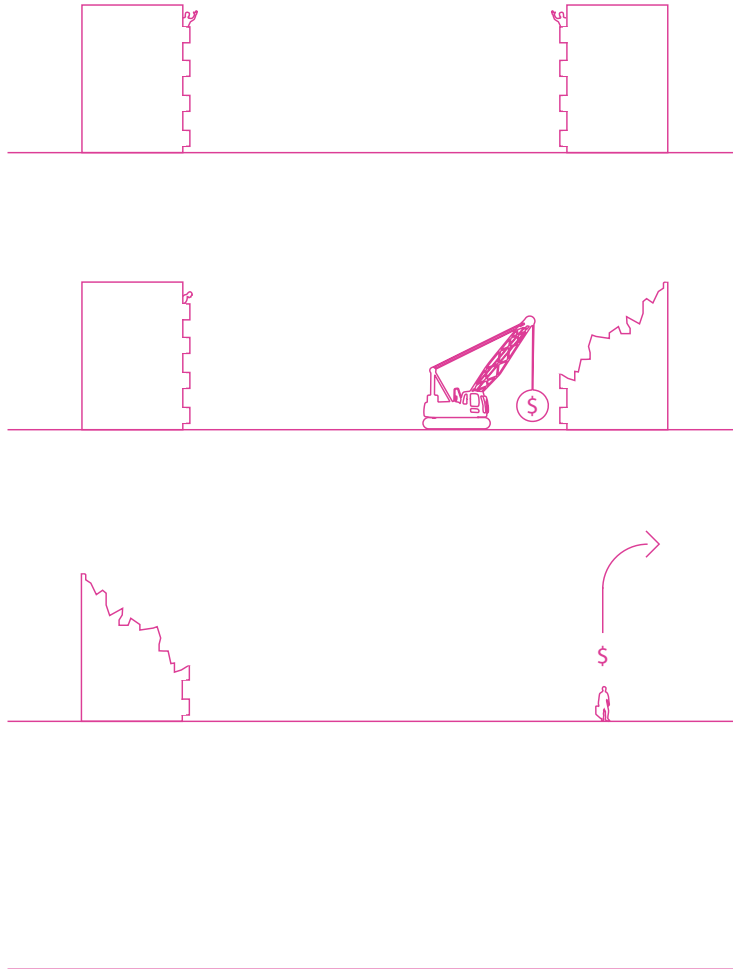
Consequences of the governmental sanctions

Originally, Brabrand housing association attempted to

sell an 8-story housing block to a private developer as a pilot-project, but it proved to be difficult. The problem with this strategy is that the tenants have a right to buy their apartment back for an amount proportional to the value the rent is calculated by. Forcing a potential investor to sell a large portion of the apartments for under the market price, and therefore loosing profit. (Jensen, R. Q., 12.03.2020)

Thus, a mix of demolition and adding new buildings has been used as the key tools to decrease the amount of social housing below 40%. At the current state 5 blocks, corresponding to 336 apartments, have been demolished while 7 blocks, corresponding to 400 apartments, are up for demolition. The future for another 200 apartments have not yet been specified. Of the original 2400 apartments, around 900 will disappear, and 1000s of residents will be forced to relocate to another area within the municipality.

There are not enough social housing units in the municipality to accompany this relocation. In order to meet the requirements, the municipality of Aarhus have allocated 120 million DKK to build one thousand social housing units during the next decade, which will accommodate the evicted residents (Vores Brabrand, 2018).



020. Diagram Strategy of weeding

Strategy of weeding

Social effect of eviction

Is there evidence that the eviction will have a positive, social effect on people? A note by SBI made for Housing Companies' National Organization attempts to provide knowledge of the effect of unwillingly eviction in relation to the legalizations of TGP2018. SBI finds that the possible outcome will be a re-concentration of social disadvantage in the newly built social housing areas. The relocation will not lead to a social mix, but be a direct replacement of social disadvantaged with social functional groups in the vacated area (SBI 2018). SBI concludes:

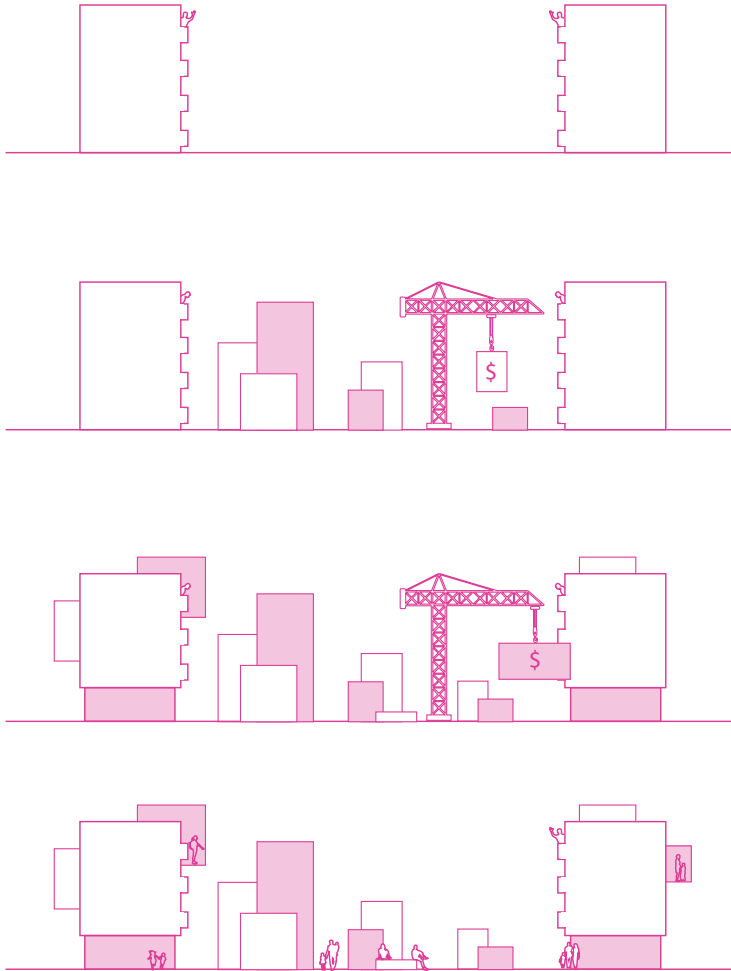
"One thing is what we do to remove the social disadvantaged housings we currently have identified; another issue is how we within the same strategy ensure that we do not create tomorrows social disadvantaged housings." (SBI. 2018. P. 19)

Social, economic and ecologic negative outcome

To sum up the current strategy for Gellerup: The municipality will demolish 900 technically well-functional apartments with ample space and light, and in the process evict hundreds of families. During the demolition period the remaining residents, that are expected to be integrated and elevated socially, will be first-hand witnesses to evictions of their neighbors, knowing that they might be next in line. In order to find homes for the evicted families, new resources will be used on building a second generation of social housing, now in separate areas, but with the same political- and societal- context defined by housing shortage and low budget. Possibly, causing tomorrows social disadvan-

tagged housings, as the SBI note implies. Back at the original site, the outcome will be a ground zero with no traces of the cultural- and architectural heritage of one of Denmark's most debated housing areas.

The current strategy in Gellerup seems to be substituting the existing residents with people on a higher social level. This strategy will have negative effect in all terms of sustainability: There will be economical and ecological costs by unnecessary new construction and there will be no prospect of social elevation for the existing residents. It, more likely, seems to be a strategy to once for all erase a chapter of Aarhus' city development. It is not possible to tell if the strategy will succeed, but if one were to weed the unwanted plants of the garden and plant new species, the roots of the weed often survives in the dirt and slowly arise from the soil over time - and the problem have not been solved.



021. Diagram Strategy of planting a seed

Strategy of planting a seed

Social effect of physical change

Is it proven that physical changes can lead to social elevation? A study by Copenhagen Municipality and the Danish Academic Architectural Association from 2014 investigate the relation between physical change and social effect based on analysis of international data. The report is often mentioned in social disadvantage transformation project including Gellerup's Helhedsplan. The report proves how structural physical change, in combination with social interventions, change a social disadvantage housing district. Proving a positive effect on the original residents' income level, security, trust, pride and quality of life, which results in an image-improvement of the residential area (Københavns kommune, Akademisk Arkitektforening 2014).

Minority and social effect

Copenhagen Municipality and the Danish Academic Architectural Association reach another important discovery in the process: A socially disadvantaged housing zone will achieve a positive social effect from physical change, without changing the share of minorities (Københavns kommune, Akademisk Arkitektforening 2014). In relation to this discovery it is relevant to question why ethnicity is used as a parameter to identify social disadvantaged housing zones and why eviction and distribution of minorities are used as a solution.

Planting a seed

We suggest a strategy where transformation is used as a tool to elevate socially disadvantaged people and strengthen their neighborhood, rather than a tool to

relocate people and their history. By sowing new seeds in the uncultivated plots, it is our belief that the garden will grow in unity and thereby enrichen the all plots in the garden. Our task is to design the uncultivated plots of the garden and make sure that the new species do not deprive the original flowers but improve their life-conditions.

The gap between the building blocks of Gellerup consist of wide unfurnished spaces, intended to be occupied by the residents. It is unfortunately occurring as a no man's land due to its size and lack of spatial intentions. Like Brabrand boligforening originally suggested in their "plusplan" from 2007 we propose adding housing in the gaps with new types of ownership. By doing so we want to create housing options for socially resourceful residents and provide the spatial boundaries for a neighborhood with possibilities for social mixing and development. The added construction should be utilized through a tectonic approach to meet the current lack of streets and venues, and thereby create better conditions for everyday life to unfold for all residents. With the added housings, the TGP2018 requirements will be met, maintaining a home for the all the original residents in the neighborhood. The money that was intended for demolition of blocks along with erection of the new social housing must be spent on improving the existing blocks. The funds given with TGP2018 is an opportunity to sow new construction in an uncultivated plot, that can enhance quality of the neglected blocks and in unity form a neighborhood that grows to elevate the everyday life.

A neighborhood in Gellerup

An approach to elevate

As a critique of the current ghetto transformation strategy in Gellerup, we propose a project that seek to answer how social housing blocks of the 60's, through added architecture, can develop into a sustainable neighborhood. Gellerup is by no means a new architectural problem, and there has been a continuous development of both infrastructural-, urban-, and renovation strategies since the early 90's. What we find alarming is how the "cry for help" by Brabrand housing association in 2006 has resulted in an approach where the blocks are either renovated in a minimal degree or demolished. The initial idea in the plus-strategy from 2007 of constructing Gellerup out of its social problems, by making urban breakthroughs and additional housing, is the most appealing of the propositions that has appeared through the years. In our approach we want to move past the simple urban volume studies and dive into the experimental design task of detailing the creation of a neighbourhood around an existing block.

Development plans of Dortesvej

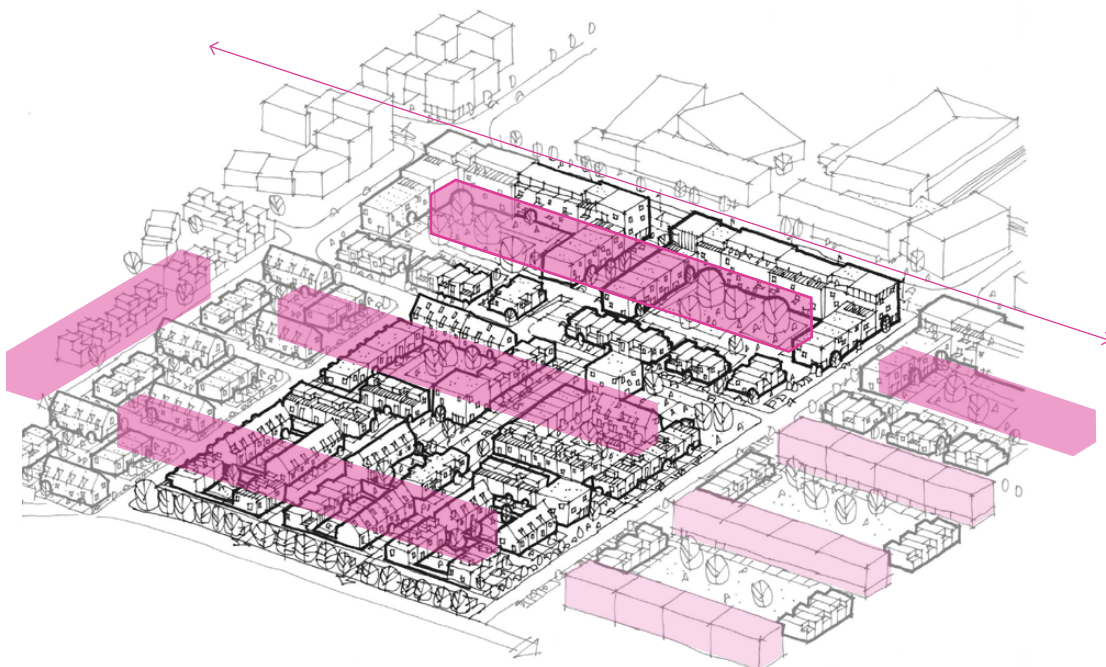
We have chosen to look at Dortesvej because it is situated just west of the identity-defining new main axis of Gellerup, Karen Blixens Boulevard and according to the latest development plan for Gellerup from May 2019, six of the nine blocks are set to be demolished, in order to create a new dense-, mixed-, urban area. Ironically, the six blocks set to be demolished at The Dortesvej District are the only blocks left that are situated along the new avenue, essentially resulting in a main infrastructural artery through Gellerup without any visual trace of the cultural or architectural history. The combined number of apartments to be torn down will be 312, with a total

area of 26.080m² and additional 6.520m² basement. As a substitute for the demolished blocks, the developments plan features new construction of 250 row-housing dwellings, 250 apartment dwellings and 5000m² of commercial space (Aarhus, pp. 33, 2019). Looking at the vision for the new Dortesvej District illustrated in the isometric sketch it is clearly inspired by the dense-low-building movement that arose from Jacobs and Gehl critic as a response to modernistic blocks. It is almost a direct copy of an archetypical row housing district anno 2020, pasted into the Gellerup.

A neighborhood in Dortesvej

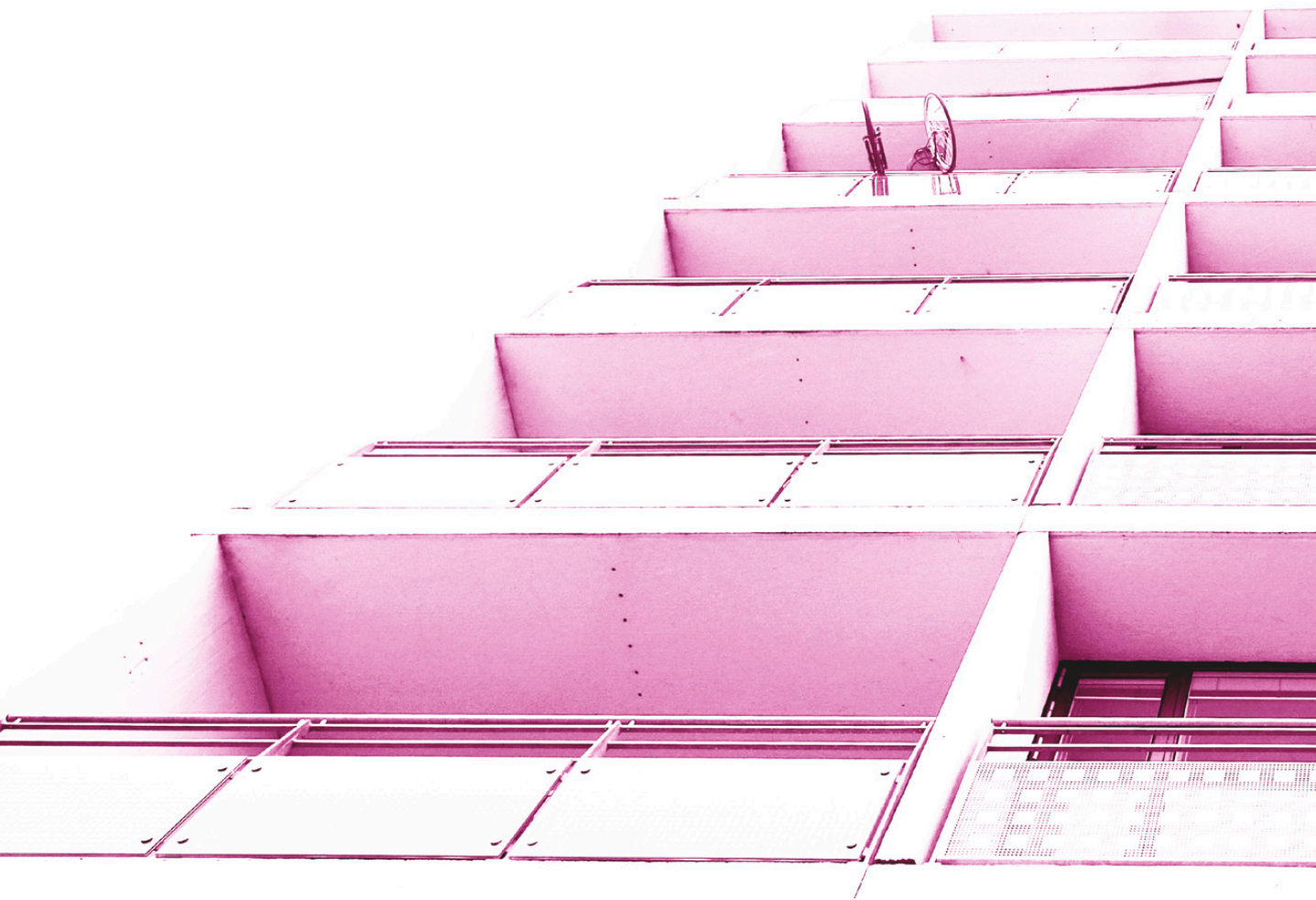
We propose to keep the six blocks and adhere to TGP2018 through method 1 – by increasing density. We will transform block A7 because it is situated at the border between the busy main boulevard with new cultural, commercial and educational buildings, and the more private residential quarter of the Dortesvej district. This provides an opportunity to both develop a sustainable neighborhood transformation principle, that can be used as a basis for transforming the remaining 5 blocks and develop a public frontside that matches the urban vision of the overall municipality development plan.

The main focus of the project will be divided in three scales: A neighbourhood scale regarding the hierarchal organization of functions from Gellerup to home. A detail design scale with focus on turning the necessities that make up the everyday life into quality spaces connecting the original residents with the new. And an apartment scale regarding the transformation of the original dwellings of Block A7 through processing of the envelope and stairwells.



022. Visualization Vision for Dortesvej, development plan, 2019

- Block A7
- Blocks set to demolished
- Preserved blocks
- Karen Blixens Boulevard



023. Photo Block B7



Analysis introduction

Through the next chapter we will analyze block A7 and its context. Using our methodology based on the interplay of architectural- and engineering-core competencies, we will assess the spatial-, social-, cultural-, structural-, and energy performance-aspects of the block. Going into this process with the theoretical and local historic foundation we have built, we hope to be able to decipher the issues of block A7 in an experimental way. Leading to new possible solutions for the design task of elevating the residents of Gellerup.



024. Plan 1:10.000 Development plan for Gellerup 📍

- Block A7
- Constructed projects of the Development Plan
- Future projects of the Development Plan
- New infrastructure

Gellerup after the Development Plan

Gellerup, an attractive district in Aarhus

Opposite is reputation, Gellerup today has the sport, culture, and educational offers, that should make it and attractive area. The structural changes of Gellerup, initiated by Brabrand Housing Association and Aarhus Municipality, has provided the area with a school, future light rail stop, daycare center and sports facilities along with attractive recreational offers within close range. A direct result of the transformation, that confirms the areas positive development, is a strongly increased interest from developers of buying land for private building projects within Gellerup. (Jensen, R. Q., 2020). The structural changes have created good condition for establishment of a Neighborhood and some attractive context to connect to.

A neighbourhood in the heart of the new Gellerup

One of the most comprehensive actions of The Development Plan has been the implementation of new infrastructure. The main feature is the establishment of a new main road through the center of Gellerup named Karen Blixen Boulevard, from which Development Plans actions are focused around. The boulevard is situated along the eastern façade of block A7, that we are to transform. Among the most prominent of the new project on the boulevard is The Culture Campus by Schmidt Hammer Lassen, that is expected to attract 600.000 yearly visitors. The functions will include various sport activities, a community center and a public bath titled "the world bath" that is yet to be designed. Block A7 is location along Karen Blixen Boulevard next to the new Culture Campus position it in the heart of the new Gellerup. The new context around Block A7 have large effects on the conditions of the apartment and calls for a transformation that enhances and develops towards the changes.

Linking the neighbourhood

Block A7's location provides the neighborhood we are to design with an attractive location, but also create issues for the privacy of the eastern rooms towards the Karen Blixen Boulevard and the sports Culture Campus, as the original Block is designed with large windows, based on an orientation towards a semiprivate parking lot. The transformation of the block needs to deal with emerged issue of exceeded privacy on the east façade. The new context around the new neighborhood also provide the site with an unresolved potential. Based on the expected number of campus visitors, there is great opportunity for establishing commercial functions at ground level along the boulevard. Transforming Blok A7 to fit public interests could make way for a new understanding and image of the blocks and their cultural history, as seen in projects as "Nordkraft" in Aalborg by CUBO or "Kulturværftet" in Helsingør by AART. Inviting the public inside the block through cultural offers or retail, could create a public understanding of the cultural value of the block, and help resolving the stigma of Gellerup and the blocks.

A possible addition could be to place the undeveloped World bath at ground floor inside block A7. Using the sensitive atmosphere of a bath, to sense the textile and light attentive architecture of the blocks in Gellerup. It is important that the commercial functions are not based on public interest alone but becomes daily optional destinations where the residents of the neighborhood can gather and benefit from. To design a neighborhood according to the residents daily optional and necessary activities it is important to question, who are the current residents of the neighborhood?

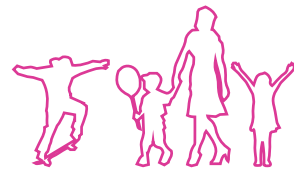
Social weaving

Well documented housing area

Gellerupparken has since the beginning been subject to a lot of public discussion as well as social investigation. Thus, the social weaving of residents in Gellerup are well documented through statistics, analysis and interviews. This data provides an insight of the current residents' situation and must be utilized to learn about the people we design for.

The numbers

Statistics show that Gellerup has almost double the percentage of children compared to the rest of Aarhus, and that the children are struggling with educational-, crime- and health-related issues. Multiple factors are the reason for this, with the main statistical factor being that the adult population of Gellerup is two and a half times less self-sustained compared to Aarhus, resulting in a lack of role models. An upside of the high percentage of children is their ability to meet new people and start relations through outside play and sport. Thus, activating these children, by designing the neighbourhood where the surroundings allow for new relations to occur, and letting them become part of a smaller housing group, and a clearly defined neighbourhood is top priority. We will help by elevating the social structure through the addition of the housing and thereby strengthen the neighbourhood, giving the children the role models, they need. Another issue is the high adult unemployment rate, which naturally leads to less resources for the families. Can the architecture we create involve activating the unemployed in the local community, in order to begin a social elevation?



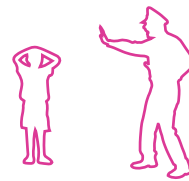
32% of the population in Gellerup is below 18 years old, compared to **18%** in the rest of Aarhus.



1/4 between 18-64 is self-sustained



3 times as many have not finished a youth education.



8 times as many children between 10 and 17 are involved in or accused of crime.



The average salary is **54%** of the national average salary



6 times as many are funded publicly because of health-related issues



Abdinasir chairman of the residents

There are 80 different nationalities represented in Gellerupparken. Abdinasir Jama Mohamed is a refugee from Somalia who came to Denmark with his family when he was six years old. He is now chairman of the residents in Gellerup, and he explains that it is obvious that some will not integrate as quickly and smoothly as the Danish government want them to. He states that there are problems regarding unemployment, crime and lack of education and criticize the municipality for tearing blocks down, relocating the residents away from their home and neighbourhood. He feels that the residents of Gellerup have not been allowed to be involved in the process of the new Gellerup (Agger, A., 2019).



Christian newcomer

Christian Toft Jakobsen, Josefine Østerby and their son, Theodor, moved into one of the new town houses, located in the bottom of the renovated block B4, in May 2019. They live on the first floor while the ground floor is dedicated to their industrial design business. They met critical scepticism from friends and family when they moved to Gellerup, but they have only been positively surprised. Christian and Josefine drink coffee with their neighbour at least once a month on their terrace facing the new park. The terrace is the platform for interaction between the residents of the block, where everyone greets each other. Christian explained how Josefine was invited to dinner several times by their upstairs neighbours, when he was away on a business trip. They have both been surprised by the generosity and hospitality of the foreign cultures that now is part of their everyday life. People are prejudicing Gellerup because of its reputation. Christian is certain that if more were to visit the place, they would find that it has unique qualities that cannot be found anywhere else in Aarhus.

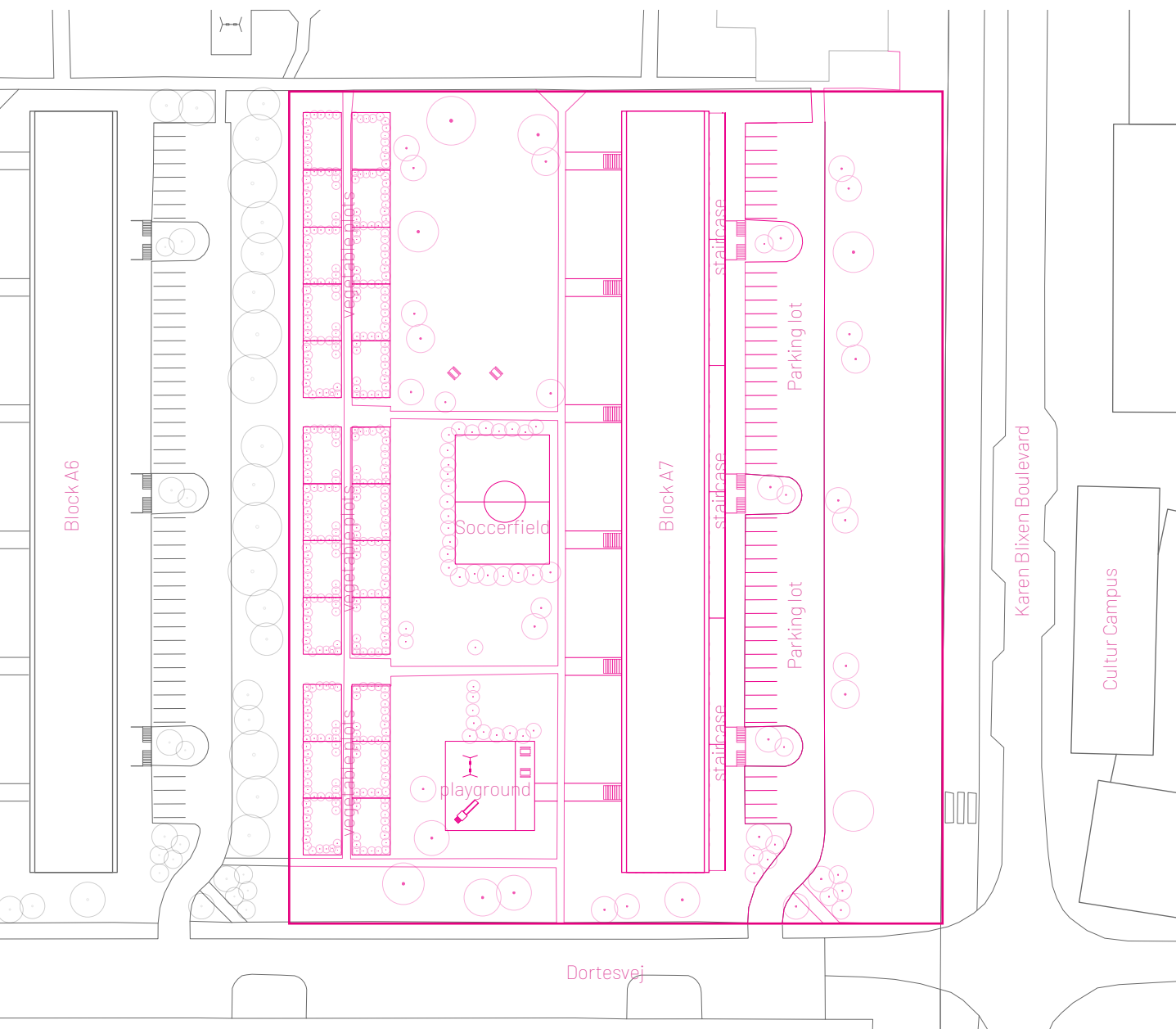


026. Drawing Social weaving in Gellerup

Intergration in Gellerup

The image of Gellerup is for many narrowed down to vandalism and crime. As accounted for above, that is only a small percentage of what Gellerup is. We want to be a part of re-branding Gellerup, embracing all its cultural differences. For many Danes the word integration has a negative ring to it. Every time we hear about integration it is through the media, and how people are failing to integrate into the Danish society. Immigrants have to learn the Danish norms and values in order to function in the Danish system. Maybe the Danes should also learn from the immigrants in order to expand their

global and multicultural understanding? What better way to exchange knowledge and create empathy then through relation? Could a neighbourhood that encourage meetings with the aim to create relations be part of the solution to integration? Gellerup, as a residential area in development, with its intercultural social weaving is an excellent place for this process to take place. We want to facilitate this process by transforming the existing block and create new dwellings, designed for meetings between original and new residents, through daily necessities.



027. Site plan 1:1000 Block A7

Elements of a neighbourhood

Necessary and optional activities

We believe the strategy to elevate the residents of block A7 is through a transformation to a neighbourhood. Thus, how does the existing block A7 function as a Neighbourhood? To answer this question, we need to investigate the buildings necessary and optional activities.

Looking at Block A7 the most obvious design strategies of the distribution of activities is the clear division between necessary and optional activities. The common area on the eastern side of the block is designed as an optimized machine for handling all the necessary activities in the most efficient manner. Whereas the west, is designed as a large urban area for recreation with plenty of space and daylight.

Observations of the every day

Observing the life and flow of people in the area the separation between necessary and optional activities does not seem to act as intended. More conversation, meetings and children play seem to happen on the pavement on eastern parking side, than on the greenery on sunny recreational west side.

An observation that supports Gehl's theory that activities occur around the human hotspots. Based on this observation, it needs to be specified if the necessary activities are fit to encourage the meetings.

Hierarchy

Another issue seems to be the lack of hierarchy between public and home that is needed for (genesis of)

smaller communities and extension of the boundary of the home. The activities are either placed as an all shared activity or closely connected to the private sphere. One large shared parking lot is directly connected to all the private apartments with the inside staircase as the only transition zone and possibility for interaction. Garbage is handled in a garbage chute one step away from the apartment. While every optional activity is disconnected from the daily flow.



028. Photo 1 View from Karen Blixens Boulevard



031. Photo 2 Dark concrete base with no optional possibilities



029. Photo 3 Pedestrian walkway



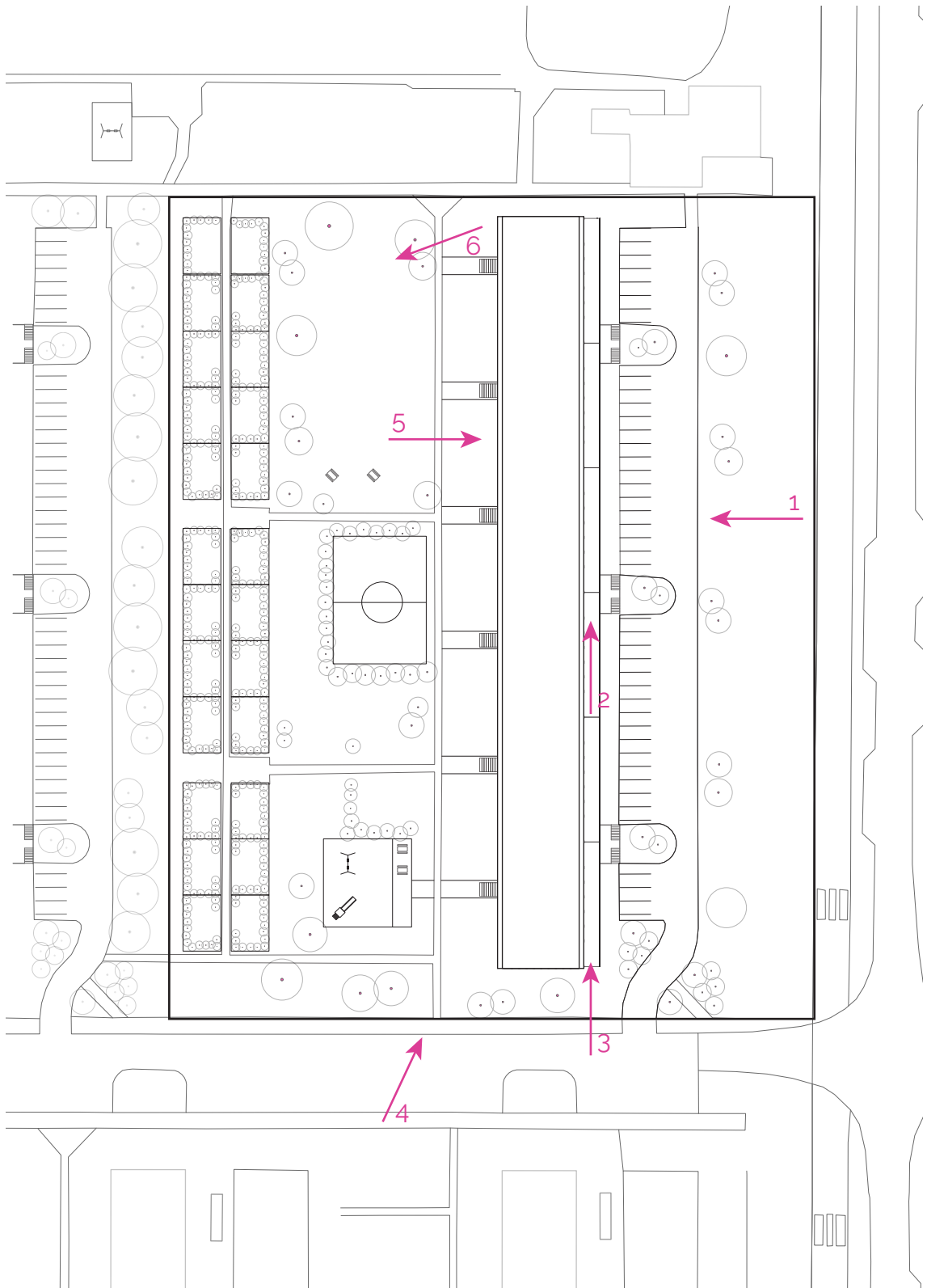
032. Photo 4 Level difference from street to courtyard



033. Photo 5 Curtains in windows to create privacy

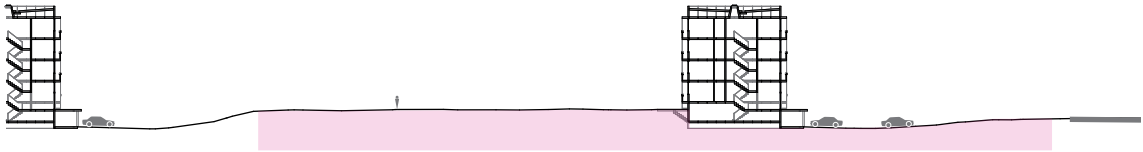


030. Photo 6 Uninhabited recreational area



Block A6

Block A7



035. Section 1:1000 Block A7

■ Boundary of our project site

Ground level and stairway

Looking at block A7 in section, one will find that the flat terrain in west of the block, excavated for the crane tracks of the original construction is still the dominant factor of the topographically landscape. The height difference between the front and back has the effect of amplifying the separation of the activities on the two sides. The level difference equals the height of a story and forms a 3 meter tall concrete base on the east side, only penetrated by the stairway entries. As previously stated, the hotspot for human activity is gathered around the base of the blocks.

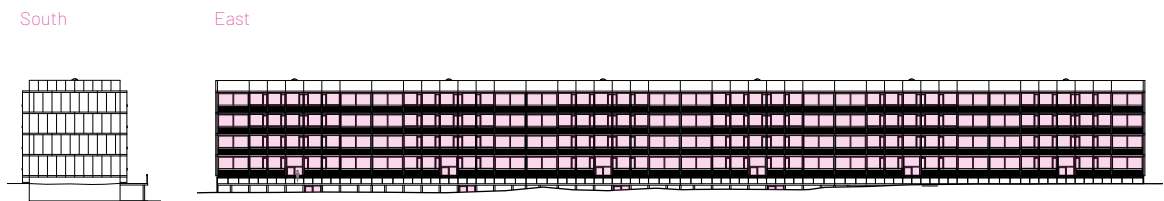
However, the base is not designed to welcome encounters offering no more than a sealed wall. The space, however, provide conditions that is not found in the surroundings. The space is narrow, it is the main artery in transfer between in and out and it is partly enclosed, forming shelter and outlook. Despite the qualities, the space lack many of the features that is found in the

recreational areas; daylight, greenery and furniture that encourage people to stay.

The base and stairways will be essential elements in the transition towards a neighbourhood. They need to be redesigned to facilitate optional activities along the everyday flow of necessary activities structured by a hierarchy. To establish the hierarchy a new infrastructure is needed. A new infrastructure that divide the activities of the daily flow across communities of a neighbourhood, a courtyard, a stairway, and a neighbour. These daily flows need to provide a better architectural experience then the existing enclosed concrete walls, they must be furnished to encourage people to stay.

1st floor apartments

Another feature of the base on the east facade is that it provides a distance between ground level and the lower apartments that improve the privacy inside apartments. On the west façade, the higher topogra-



036. Elevation 1:1000 Block A7

Window surfaces

phy creates a smaller distance between the public and the apartment. A half story stair is placed to provide direct access between the balconies on 1st floor and the recreational space. Based on the observed number of empty apartments on ground level, the lower apartments seem like the least attractive rentals, likely due to violated privacy. The lower apartments need a blurring of view towards the apartment or treated transition zone. A treatment of the transition zone could likely be an extension of the apartments in shape of a front yard/terrace. This would simultaneously help resolving the lack of ingestion of the recreation area.

Daylight and privacy

Based on the observed number of closed curtains at noon in February, there seemed to be an overall neglected need for privacy that precedes the need for daylight and view. The design of Knud Blach Petersen and Mogens Harbo's modular blocks in Gellerup was focused on creating light and large functional apartments. Through

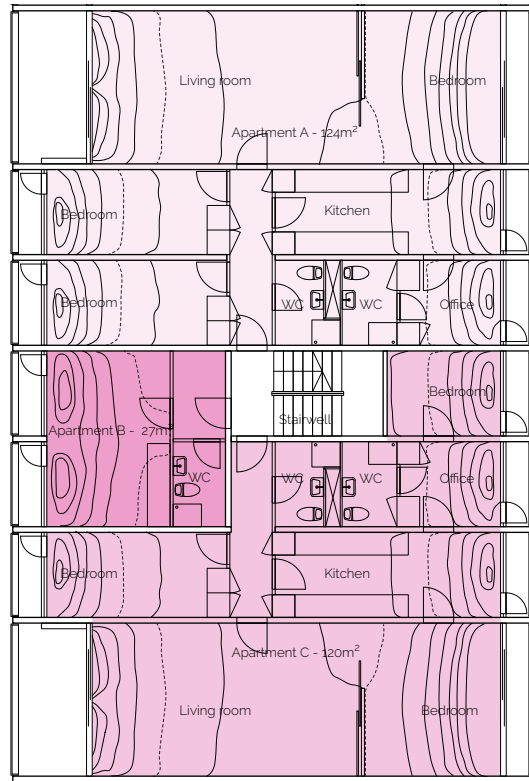
the thin concrete element structure, it was possibility to create large windows surfaces with wide views towards greenery. When looking perpendicularly onto the east and west facade the concrete structure starts to act as a frame, where the activity behind the glass, the life of the residents, becomes an exhibited piece. The newly added infrastructural breakthrough of Karen Blixens Boulevard and Culture Campus has caused additional exposure of privacy towards east.

Daylight is very important both for the energy consumption due to solar radiation and to the atmosphere and functionality of a space. But if the resident feels exposed and closes the curtains, the intended effect of the windows function will disappear. The light inlead towards east and west must in the transformation be treated to concern both atmosphere, function, solar radiation, and privacy.



037. Photo Closed curtains at noon in february





038. Plan furnishing and daylight simulation of apartments ☂

039. Apartment A - 124m²

040. Apartment B- 27m²

041. Apartment C- 120m²

----- 042. 2% daylight factor

Apartments in A7

Privacy

Block A7 is an interesting case because of its location just next to the new main infrastructural artery, Karen Blixens Boulevard, and the future culture campus. This, however, exposes the eastern façade, meaning that we face an issue of privacy for the residents that needs to be solved. Privacy is an issue that currently also exists inside the apartments.

As previously stated, the current residents cover up their windows with sheets to create privacy. We need to remember the cultural diversity of Gellerup. Some religions demand a higher degree of privacy than we usually design for, when working with residential architecture in Denmark. Another problem is that the current façade does not consider the functions of the rooms, as they all have large window surfaces.

We must differentiate between the function of every room and their varying need for privacy when designing the renovation, while taking the cultural diversity of Gellerup into account.

Qualities

There are three types of apartments on each of the four floors of every stairwell-module. Two of them are similar in size, meant for fitting a nuclear family, and one is small, meant to fit a single person. The apartments have a functional plan layout, where the kitchen serves as effective hallway space that feeds the residents into office and bedroom, which reduces the hallway space to only being at the main entrance. Harbo and Petersen furnished the apartments with storing space built into

the separating walls in the hallways and offices, and brought daylight into the bathrooms through windows above the bathroom doors. The effective use of square meters and built-in furniture is in our opinion qualities that should be preserved in the renovation. This decision is supported by current residents of Gellerup who has criticized Vandkunstens renovation of block B4 and B7, where they removed much of built-in storing space and furthermore replaced the sliding door, that separates the living room, with a solid wall and a glass door (Sigismund, B, 2018).

Stairwell

We have to criticize the stairwell that is an impersonal, uninhabited space without daylight. This space has been functionally optimized to be the quickest passage between home and car. The only quality is the visual expression of the honesty of the construction system of load-bearing walls and slabs that can be seen throughout the entire stairwell. This stairwell is exclusively dedicated to necessities, which is why we propose to incorporate optional activities throughout the stairwell. These new, communal spaces will require structural changes, in order to bring daylight and life into the stairwell.

The envelope

Our calculations show that the energy consumption is 95,5 kWh/m² pr. year, which is more than three times higher than the BR18 requirements, which need to be taken care of during the renovation. The obvious energy optimization would be to improve the insulation and replace the existing windows. This process will result

in an energy consumption of 67,4 kWh/m² pr. year. The reason for the high consumption is the excessive amount of overheating, because of the minimized heat loss. Concluding that the facades need a new design.

Daylight studies show that the conditions are almost identical at both ground- and top floor, with an average daylight factor of 2,1 for the apartments. This is quite unusual, compared to contemporary housing projects, and is the result of the visionary masterplan of Gellerup, designed for light and air.

The studies also show that the daylight factor of 2% is reaching deep within the apartment in every room, regardless of their function. It is our opinion that light conditions in a space should never be designed exclusively for quantitative daylight requirements of building regulations. The focus should be on the quality of the light and the phenomenological experience it produces. The atmosphere must be different between a bedroom and a kitchen, which we need to keep in mind when designing.

Balconies

Every room with exterior connection has a balcony. The balconies next to the living rooms are 2100mm deep, while every other is merely 900mm deep. Originally these were intended to ease the outside window cleaning, but this intention has been lost over time. Interviews with current residents taught us that the small balconies are too narrow to fit tables and chairs, so they are often used for storage and garbage instead. We should utilize these narrow balconies either by removing them and thereby create a larger room or by giving them a new function.

Renovation

We want to maintain the functional plan concept of the apartments and its built-in furniture, find new functions for the balconies and create life in the uninhabited stairwells. The renovated envelope cannot be a uniform element that is repeated across the entire façade. The design must differentiate between the function of every room and their varying need for privacy along with the phenomenological experience we want for these spaces.



043. Photo Kithcen in renovated Block B4

Potential structural actions

Potential structural actions

In the process of determining a strategy for the transformation of block A7, extensive research of the original construction documentation and drawings has been undertaken. In the following section, we will go through selected construction elements pointing to the transformation possibilities. In order to stay within the legislations of TGP2018 we will renovate the blocks in such a way, that the residents can stay for the entire duration, and not be relocated to other social housing areas in the municipality.

Structural behavior

Block A7 was built as part of the first construction wave in the creation of the Gellerup plan. 23 blocks were designed as part of this phase, making out the entire area below Edwin Rahrs vej. In order to maximize efficiency every block was based on the same basic modules: sandwich gable elements, reinforced concrete floor slabs, concrete loadbearing walls, reinforced balcony floor slabs, a narrow window section and a wide window section.

The blocks came in two heights, 4- and 8 stories, and in three length configurations; 4-, 5- or 6 stairwells. All the loadbearing walls runs transverse of the block, while longitudinal walls are light partition walls. This gives us the possibility to easily change the plans by moving the light partitions walls. While the loadbearing walls can be removed partly and replaced by beams and columns, it is a much more critical intervention and we will avoid it as much as possible.

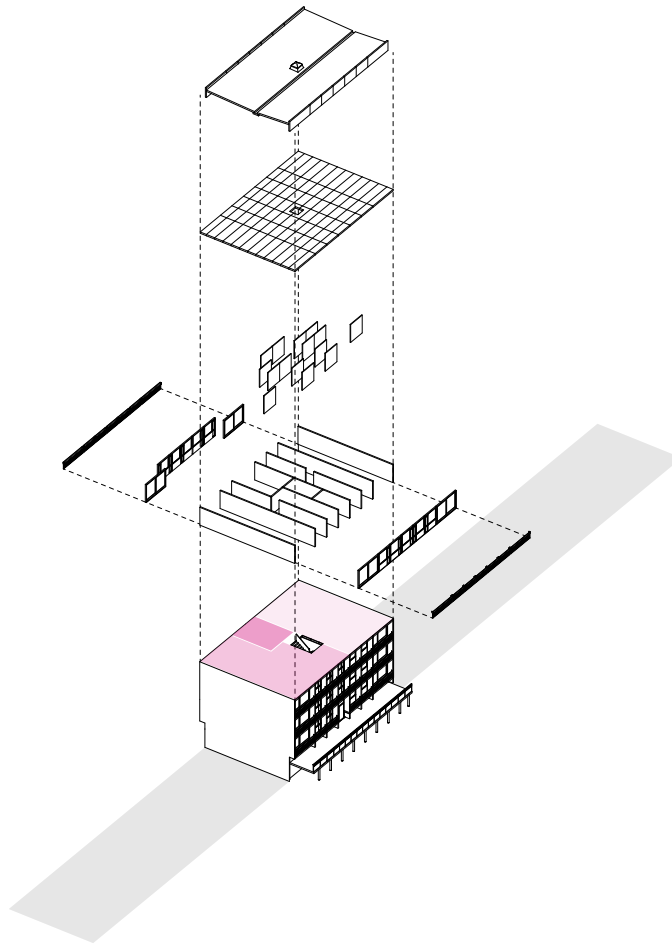
The 23 blocks are made up of a combined 113 stairwells, each containing the same three apartment types per floor, with the only difference created by the addition of an elevator in the 8 story blocks. In order to ease construction, the wall elements, floor slabs and gable elements in both the 4- and 8 story blocks are identical, resulting in a significantly over dimensioned loadbearing structure in the 4 story blocks. (Aarhus byggesagsarkiv, 1967) We will utilize this robustness in the manipulation of the structure.

Stairwells

The stairwells consist of a continuous 2400mm x 4500mm shaft running from basement to roof. The stair is a half-turn mono string design where both the stairway and landing are carried by a 200mm x 150mm reinforced concrete beam spanning longitudinal across the shaft. Both the individual steps and landings are separated from the walls of the shaft, and only connected through the reinforced beam. The design makes it possible to remove the entire stair by only severing the 16 connections between the beams and shaft. By removing the stair, it is possible to create an internal lightwell, change the design of the flow from public to private or create a 11-meter-tall skylight for the ground floor.

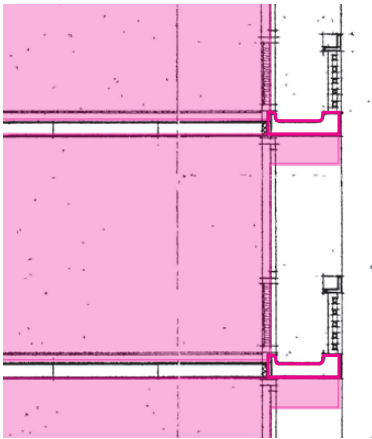
Balconies

The rectangular façade grid of balconies consists of two elements: The balcony floor slabs creating a horizontal line spanning across the entire length of the block, and the loadbearing walls extending out of the envelope, dividing the façade into 42 vertical lines.

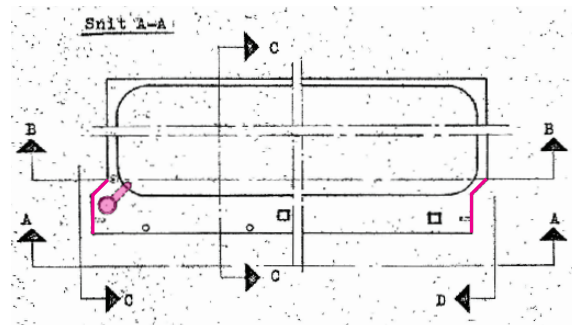


044. Isometric view One stairwell

- Apartment A - 124m²
- Apartment B- 27m²
- Apartment C- 120m²



046. Technical drawing Beams that support the balconies



047. Technical drawing Balcony element in plan and section

ciated with the rectangular façade grid and the amount of emphasis put into the detailing makes this for an important architectural- and cultural heritage, worth preserving.

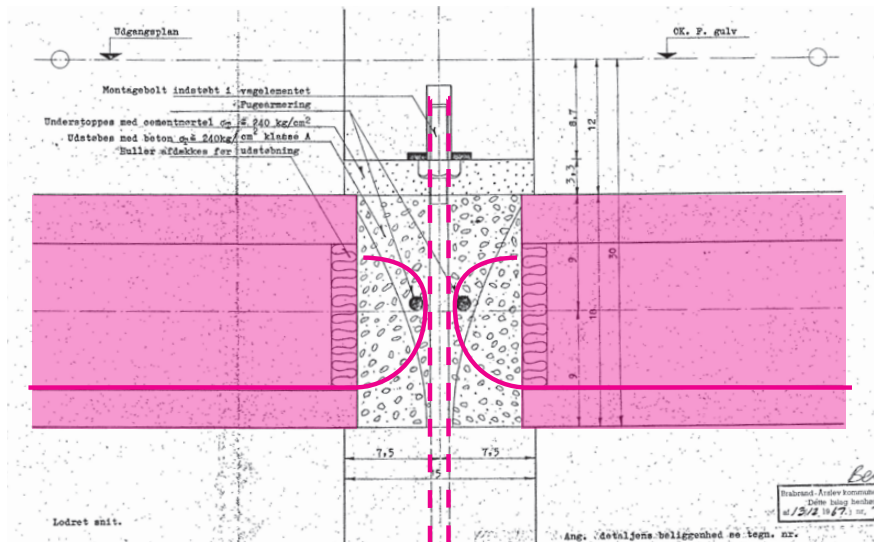
Breaking through floors

The internal floor is made up of 1200mm wide reinforced concrete slabs spanning either 2200mm or 4000mm depending on the width of the room. Each slab is supported by a loadbearing wall at each end. The joint between the wall and slab is made by connecting the reinforced bars to a transverse joint reinforcement bar with a 180-degree hook. After the floors on each side of the wall has been connected, the joint is filled with concrete to lock the joint. Embedded bolts from the supporting wall element extends vertically through the joint, and acts as guiding rods to placement of wall element on the next story.

Because of this joint it is only possible to remove floor slabs in a destructive manner, severing the reinforced bars and slowly grinding away the slab. In our approach we will do minimal changes to the floor, as it is simply too noisy, dirty when renovating in a manner where the residents can stay.

Façade elements

The Façade elements are prefabricated window sections that take up the entire space from floor to ceiling and wall to wall in every room towards the envelope. They are constructed with wood frames, and consists of two-layer glass, and smaller amounts of infill with 50mm insulation. In the task of transforming the block, there is a need for a more contemporary energy efficient solution. Removing the old windows introduces the challenge of keeping the envelope closed during the process, to allow the residents to stay. Because



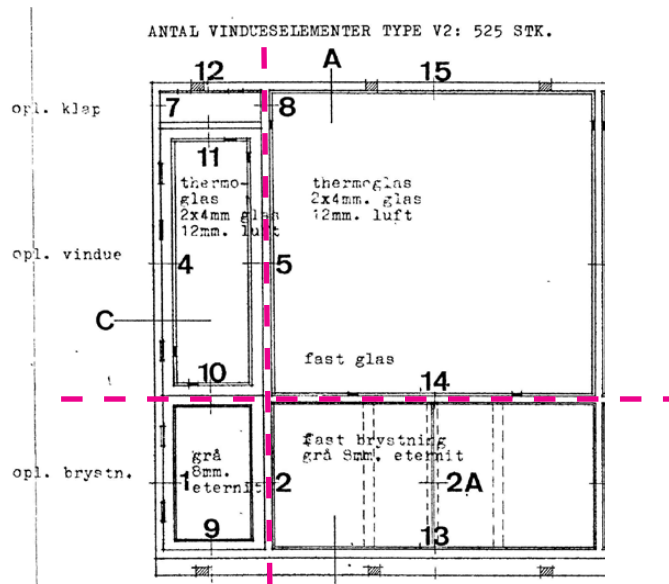
048. Technical drawing Connection of slabs

both old window variants are made up of multiple parts, we propose keeping them while placing the new climate screen outside the original windows, letting it act as a dust shield. With the new envelope in place it will be possible to afterwards disassemble the old windows, removing them from the inside.

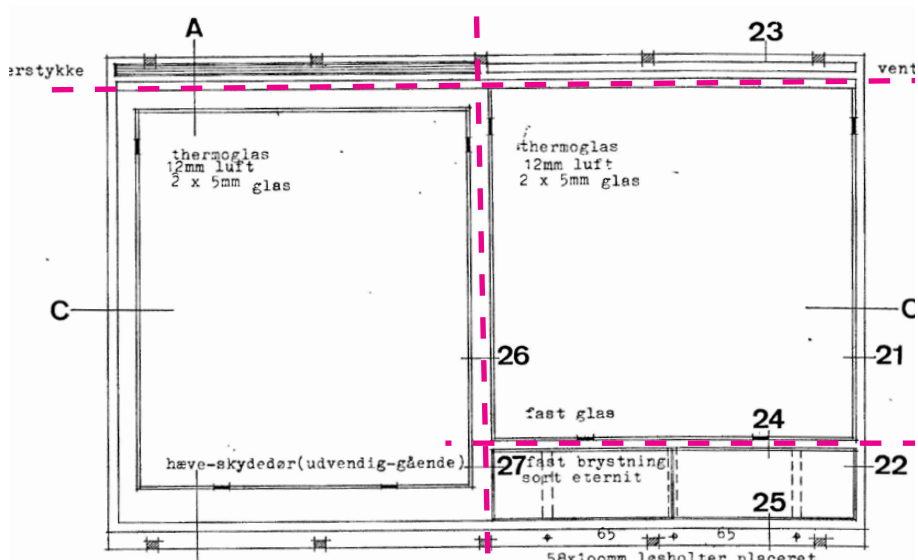
Basement

The foundation to the building is made up of shallow concrete footings placed more than a meter below ground level, and a continuous foundation resting on top of these. The foundation follows the loadbearing wall layout on the residential floors and means that

the internal walls dividing the basement are likewise placed in the same layout. Between the foundation the slabs rest on a layer of sand on the ground, making it possible to dig down underneath the basement floor, but only within the concrete footings.



049. Technical drawing Facade element of 2400mm module



050. Technical drawing Facade element of 4200mm module



052. Photo Balcony joint



053. Photo Wooden frames of the windows



054. Photo Gables of the block clad with painted zink in a renovation



055. Photo Polycarbonate covered with algae



051. Photo Concrete with cast of its wooden formwork

Materiality

As previously accounted for, we believe that longevity of a material is of severe importance, especially in a socially troubled residential area as Gellerup, as there will be less maintenance, due to lack of resources. A sustainable construction must be designed robust enough to resist weather and damages to perform as intended. So, how is the materiality of block A7 today?

Some of the materials that visibly have been affected by time is the wooden frames of the windows and sliding doors along with the polycarbonate roofs of the exterior stairwells. Even though the wood is partly sheltered by the balconies, the organic material naturally decays when exposed directly to the harsh, Danish climate. The polycarbonate is completely covered with algae, which sets a dystopian mood only emphasized by the sheet-covered windows in the background. This shows how important it is to choose the correct materials for the specific tasks, while always considering how they will be maintained in the built context.

The galvanized steel in the very same stairwells look unharmed by environment, even though they were both implemented at the same time, which is the same case for the steel used on the balconies for both stairs and rails. The gables of the block were clad with painted zinc in a renovation in 1985. These have been re-painted several times since then, in different colours, which is shown by the parts of off-peeled paint. The colored zinc plates are an example of how easily an attempt to embellish the blocks without the correct understanding of the environment can aggravate the construction by enhancing the perception of the decay. Overall Met-

al, because of its robustness, is working in this environment, while at the same time underlining the industrial beauty of Gellerup. However, the tactility of metal can also occur cold and rough in the environment and must be used carefully.

The material that encountered the most is pre-cast concrete. Despite immediate association to the material as a cold and heavy material it appears different in the context of Gellerup. The thin structure and composition of the construction makes the material appear light. While the cast of the wooden formwork creates a warm tactility in relation to the industrial material palette in Gellerup. Over the years algae have become visible on the white concrete surface. We witnessed the high-pressure cleaning process of concrete façade during a site-visit, washing away dirt and algae. The façade was left clean with the cast of the wooden formwork, used for the casting process almost 50 years ago, but still with subtle factions of details that narrate the age.

Living on a construction site

One and many Gellerups

Gellerup has been in constructional development for years and the end seems to be in the far future. How does that affect the residents to be living in constant development? The Anthropologist student Jonas Strandholdt Bach's Ph.D dissertation "One and many Gellerups" from 2019 regards how ongoing transformations in Gellerup affect the resident's lives and perceptions of the future.

When an area is transformed, people often only consider the before- and after scenarios: The time of initialization of the transformation and the time it will be finished. There is a massive period of construction noise, mud and broken infrastructure in between. The current residents feel that they are left in the dark when it comes to information regarding the construction, and thereby feel neglected in the process. The deadlines keep postponing and it is frustrating for the residents. Especially because other areas of Aarhus, for instance Aarhus Ø, is developing much quicker than Gellerup.

In order for a resident to tolerate construction mess, there need to be a reward in the relatively near future. If there is no visible deadline for the project, it becomes an issue of construction mess instead of a rejoice for the future (Bach, J. S, 2019). Deniz explains his disapproval of the situation:

"They've removed everything, and they're digging right now in all sorts of places; they haven't finished A and then they jump to Z, you know; they jump around and they remove all the memories and the childhood memories we've had (...) People are starting to grow tired of

them digging up everything and earth everywhere and mud everywhere and we have to go one way and the other in all of Gellerup to get to one place" – Deniz (direct translation, *ibid*, p. 107)

In general, though, the residents are overall positive towards the development of Gellerup. They hope that the project will succeed and that Gellerup will become a better place to live. When people were asked whether they would like to move away from Gellerup, the general answer was no. The reason was mainly that most of their social relations were in the area. Some of the resourceful families in Gellerup dream of owning a house with a private garden. This have compelled some to move away from Gellerup, because that typology is not to be found in Gellerup (*ibid*).

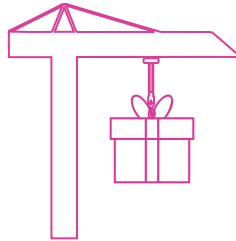
Inconvenience

As defined by Jonas Strandholt Bach, the residents often feel overlooked in the building process. Combined with the demolition of old blocks and relocation of residents, this enhances an "us and them"-effect, resulting in a bad onset when construction has finally finished.

Sustainable architecture in these areas is therefore not only a matter of a well thought end-design, but also the process between the before and after. Thus, a well-designed neighbourhood with focus on social enrichment and longevity might still be unsustainable from a holistic point of view, simply because of the initial negative response towards the development. How can the order and conduct of the construction period be designed to enhance the transformation?



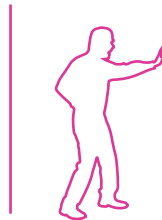
056. Photo Leftover pipes from building process of block B7



Phase 1 Construct the residents reward early to gain embracement of development



Phase 2 Empower the unemployed residents though building the process



Phase 3 Involvement of residents insure protection an appreciation of construction

The need for a, machinery dependent, dirty and noisy construction process is and will always be unavoidable. This goes for every site under construction, whether it is a tough ghetto or new high-class penthouses. It is an accepted inconvenience when moving to an urban area in development. But what if the development is forced from the outside? The perceived intention of the construction is very influential. If the construction, then on top of the expected inconvenience is facing multiple delays and changing priorities, it might become more than an inconvenience. This is often the case, and evident in Bach's report. So, what can be done?

One strategy could be to constrain the construction to be within certain time frames, in order to decrease the perceived noise. In some areas this prolonged effort might be the most desirable option for the residents, but would logically be a more expensive option, due to the cost of running a construction site. In relation to a socially disadvantaged area, where the number of unemployed residents is significantly higher, this effort might have the opposite effect. To an unemployed resident, construction work only within working hours would result in the same harassment but be experienced as an extension of the construction period.

Strategy

A better solution could be to establish an order of operation that allows for individual projects to be completed along the way. For instance, by constructing the new common house first, the residents will begin to experience the reward of the transformation and see the remaining construction in a different perspective. A key element for the possible success of these initiatives, and thus the resident's embracement of the overall development, is the utilization and ownership feeling of these early projects. How can the adaptation of these early functions be successful?

Empowerment

The initial projects could be constructed with the aid of

local residents, of which, as stated previously, numerous are unemployed.

Empowerment is social strategy and an active learning process that creates personal growth along with increased self-control and -confidence, which is used for personal development in the social sector. The goal is for the citizens to improve their confidence and thereby support the citizens' own responsibility in solving individual problems.

This happens through mastering skills that is achieved by actively attending and influencing communities or organizations in the surrounding society. The citizens are often hired as employees at a workplace, for instance a local construction site (Berliner, P., 2016).

Studies show that using this strategy in socially disadvantaged areas increase the community-spirit of the neighbourhood. It has also proved to reduce vandalism, as the vandals does not destroy something that is created by their fellow residents. The physical result of empowerment is important, but it is often the empowerment-process that creates changes for the individuals, which can elevate socially troubled residents out of unemployment (ibid).

The non-profit employment organization GESA in Austria have good experience with empowerment. They develop social housing where they involve unemployed citizens in the process. The work is always supervised by professionals to ensure the quality of the product. The empowerment-programs often lead to apprenticeships or unskilled work opportunities for the participants (GESA, 2020).

Constructed with the aid of local residents will not only provide the residents with a better experience of the overall construction in Gellerup, but though empowerment also function as a catalyst for social and personal growth for the residents. Providing them with new, social functions, a feeling of ownership of their neighbourhood and an involvement in the overall construction flow.

Analysis conclusion

The residents of block A7 has an overrepresentation of social disadvantaged and are part of a public discussion of parallel society with lack of integration. We believe creating relations between resourceful newcomers and original residents through a neighbourhood is the solution level out the parallel society. To form a neighbourhood, it is necessary with a new infrastructure that establish a hierarchy between neighbourhood, courtyard, stairway, neighbour and home, in a flow of mixed optional and necessary activities. Curtly the block is designed with a separation between the necessary activities on the east façade, and the optional gathered in the recreational area on the on the west side of block A7. The various spaces of necessary activities in block A7 are designed for fast transition and lack the spatial gesticulation that encourage people to stay.

The neighbourhood we are to form is situated in the heart of the new Development Plan. The development plan has created a new context that a transition of Block A7 must response to. The increased public flow along Karen Blixen Boulevard provide a possibility for including commercial functions that can improve the neighbourhood, but also issues for the privacy of the apartments. The response must regard a transformation of the apartment windows facing east, the concrete base at ground level and the eastern urban area in font of block A7.

The apartments in A7 are well designed with built in furniture and functional synergy between rooms. We find that much of the original apartment planning is worth

retaining, but find it necessary to renew the envelope due to energy transmission, solar heat gain, embracing of room function, atmosphere, view and visibility. The new envelope should be constructed on the outside of the existing, that will function as a protection shield and envelope during the construction. Generally, the repetitive structure of block A7 is constructed robust, dimensioned for the double number of floors, providing multiple opportunities for structural actions.

The construction period of the transformation will be of great importance for the neighbourhood to succeed. There must be an order of operation with an early reward for the residents, to ensure a positive attitude to the transformation. Furthermore, the construction phase must be used as empowerment of the residents outside the labour market by involving them in the construction of their neighbourhood.



057. Photo Balconies on west facade of block A7



Problem

How do we create a new type of neighbourhood, that through its construction process, spatial organization and common spaces provides a foundation for change? A physical transformation that improves life on Dortesvej, situated in Denmark's third largest "tough ghetto", empowering the residents and simultaneously attracts additional residents?

How do we transform the existing social housing, respecting the original qualities of the blocks while changing the preconceived idea of Gellerup? Working with a building mass that is both stigmatized and architectural heritage, can we transform the blocks with respect to the identity and cultural legacy of Gellerup, while simultaneously providing the foundation for a new image? Can these two visions even overlap and create a synergy together?

How do we build additional mass to shape the neighbourhood, while allowing the co-existence of the original blocks and additional buildings? Allowing hierarchy between home and neighbourhood, transition between in- and exterior along with spatial experiences and public interiors that satisfy the human diversity of Gellerup while creating spatial and phenomenological value from structure, furniture and material?

Through a new sustainable methodology, what role does the architect-engineer play in the design of this neighbourhood? Can a tectonic approach and computational tools provide the foundation for a design that is both rooted in a structural understanding of the existing blocks, phenomenological spatial experiences and social interrelations?

	Squaremeters (netto)
72 Renovated dwellings	
24 Apartment type A	124 x 24 = 2976
24 Apartment type B	27 x 24 = 648
24 Apartment type C	120 x 24 = 2880
Sum of renovated dwellings	= 6504
38 Added dwellings	
12 4- room apartments	85 x 12 = 1020
11 5-room apartments	105 x 11 = 1155
11 Row houses	150 x 11 = 1650
4 Town houses	110 x 5 = 440
Sum of added dwellings	= 4265
Community	
8 Garbage stations	20 x 8 = 160
8 Bicycle parking	25 x 8 = 200
4 Communal houses	105 x 4 = 420
1 Community center	= 200
1 Workshop	= 40
Sum community	= 1020
Public square	
1 Worldbath	= 690
1 Café	= 175
1 Greencocer	= 175
1 Bakery	= 80
1 Gallery	= 55
10 Start-ups	14 x 10 = 140
Sum public square	= 1315
Total	= 13104

Room programme

The room programme accounts for the renovated dwellings of Block A7, the added dwellings, their shared communal functions and the public square.

The shared, communal functions are sub-divided into a neighbourhood hierarchy ranging from home to neighbourhood:

110 homes	(1 dwelling)
55 neighbour couples	(2 dwellings)
10 Stairwells	(11 dwellings)
2 Courtyards	(56 dwellings)
1 Neighbourhood	(113 dwellings)

The average amount of residents pr. dwelling is set to 2,5 resulting in 275 residents in the new neighbourhood.



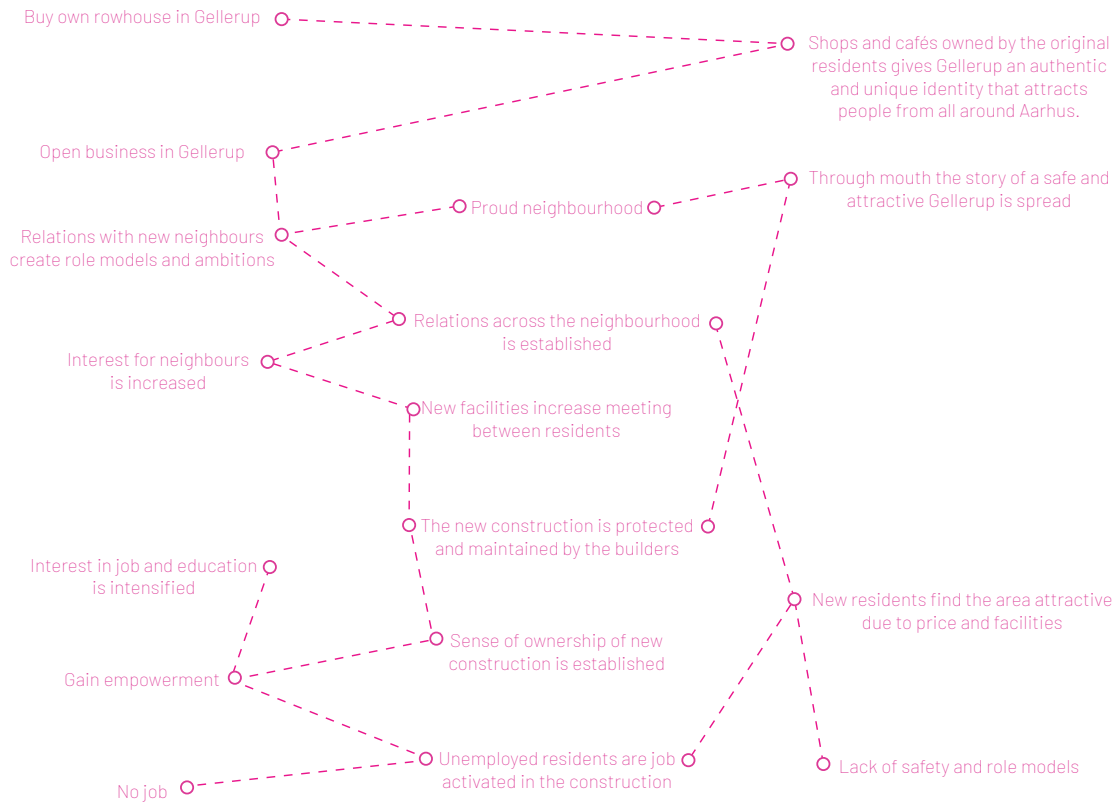
...to social functional



...to a Neighbourhood



...to a proud identity



Individual journey from social disadvantaged...



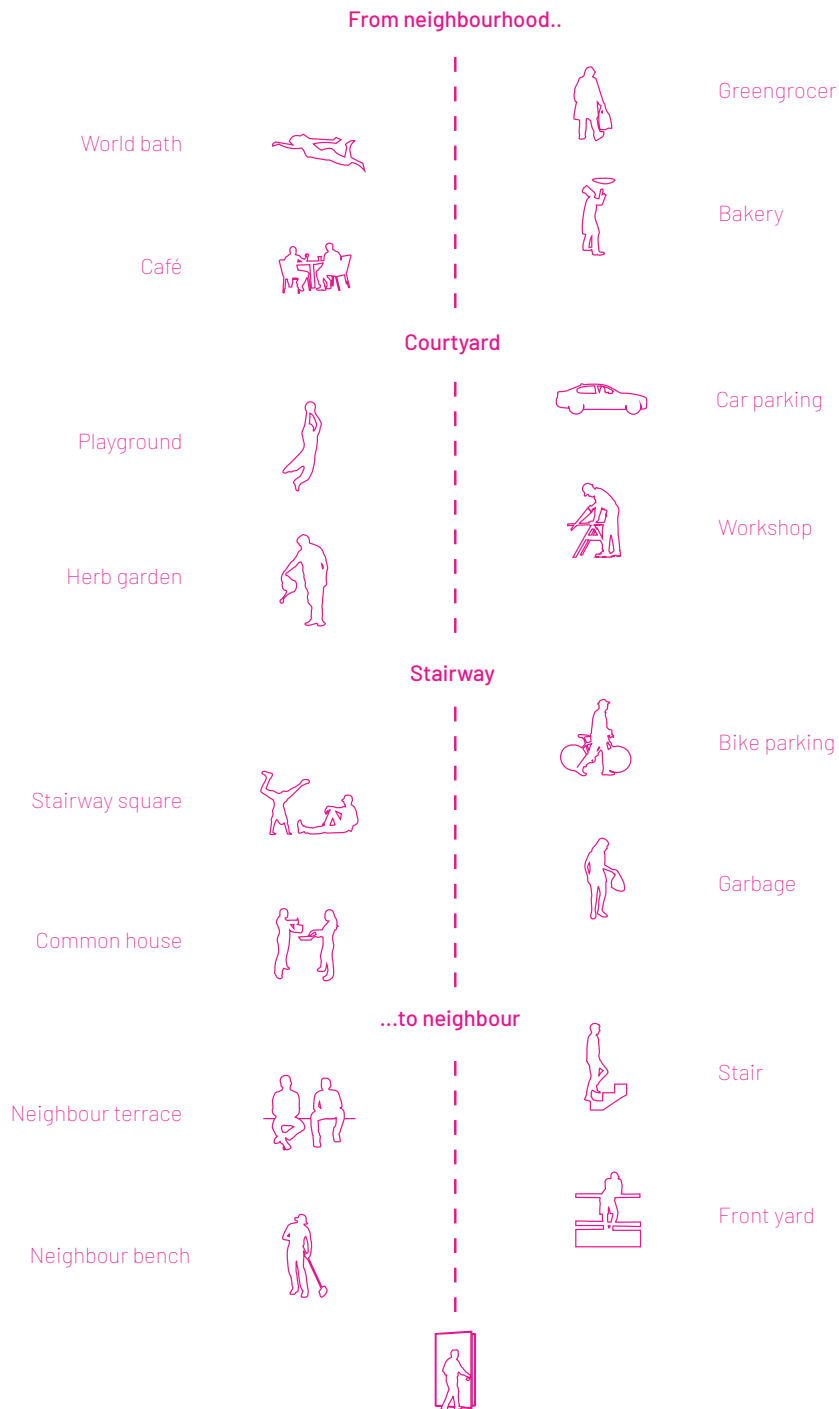
Community journey from a housing complex...

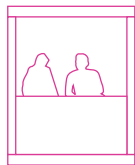


Reputation journey from an outcast...

058. From neighbourhood to neighbour

The design needs to facilitate optional activities along the everyday flow of necessary activities. In order to provide communities of different scales, ranging from neighbourhood to stairway, the activities must be structured by a hierarchy. A new infrastructure facilitating the hierarchy and providing spatial quality that encourages people to stay is needed.





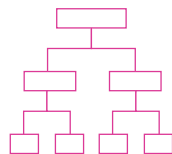
Criteria 1 The residents must be able to stay in their current dwellings through the transformation.



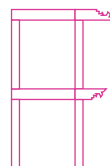
Criteria 2 The building process must follow a strategy that from the beginning create value for the original residents.



Criteria 3 The project must allow for empowerment of the residents by activating them in the building process.



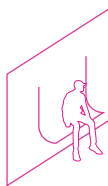
Criteria 4 New infrastructure must establish a clear hierarchy of privacy levels ranging from apartment, neighbour, stairwell, courtyard, neighbourhood to Gellerup.



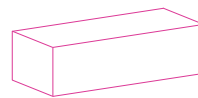
Criteria 5 The structural changes of block A7 must be based on the original structural documentation and the opportunities the concrete-assembly-construction provides for addition or deconstruction.



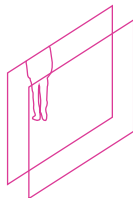
Criteria 6 Necessary utilities must be quality spaces that encourage contact between new and original residents, and placed near spaces that allow for optional activities, facilitating continuous interaction.



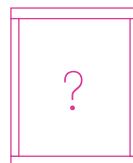
Criteria 7 Quality spaces for the everyday life activities is designed by applying a tectonic approach to transformation.



Criteria 8 The material palette for the new construction must be selected based on longevity in terms of robustness, weathering and minimal maintenance.



Criteria 9 The existing envelope must be replaced but function as a dust and noise shield in the building process of the new envelope.



Criteria 10 The new envelope and light intakes must be designed to enhance the rooms specific function, through atmosphere, heat gain, daylight, view and privacy.

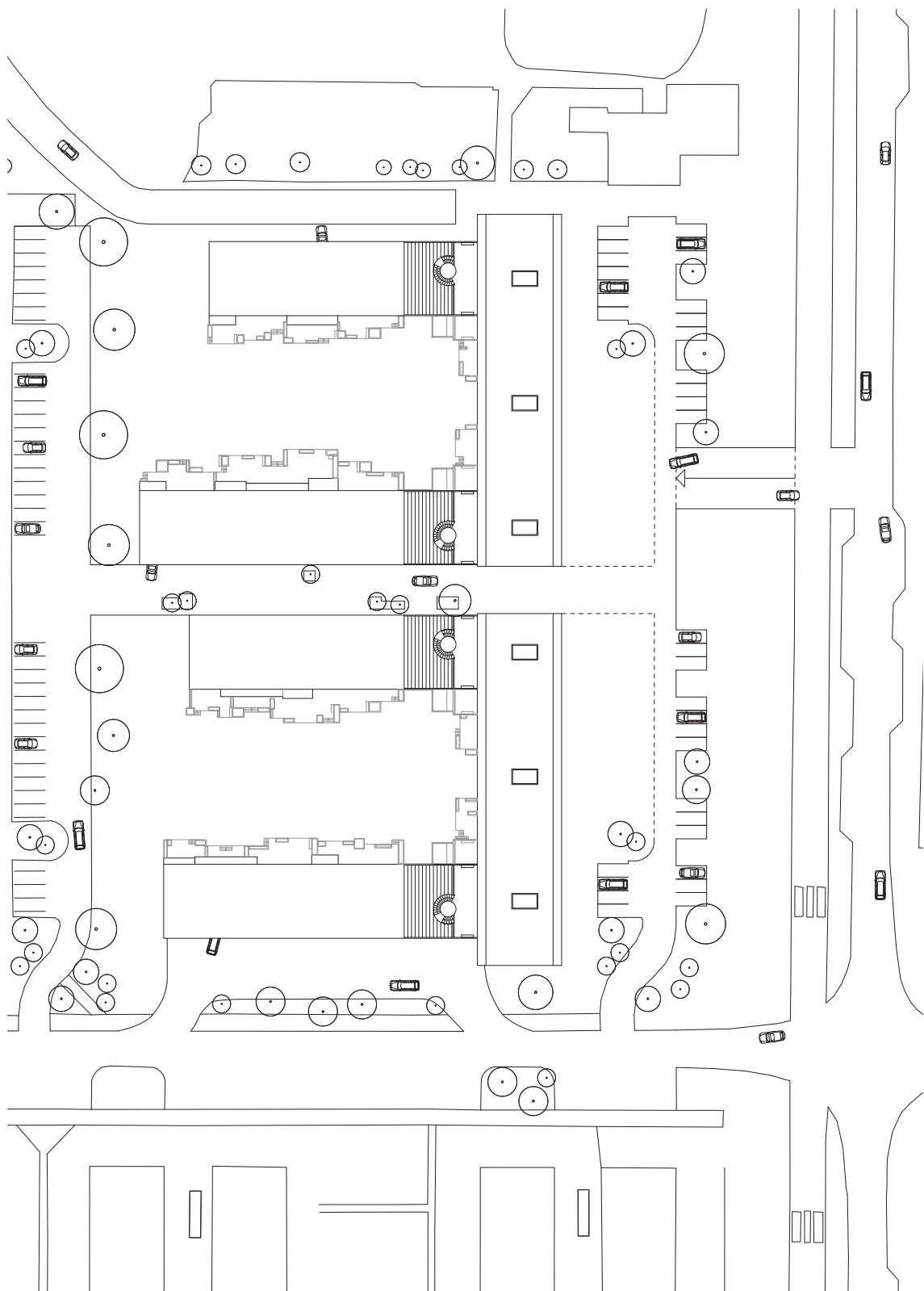


059. Visualization east facade towards Karen Blixens Boulevard



A neighbourhood in Gellerup

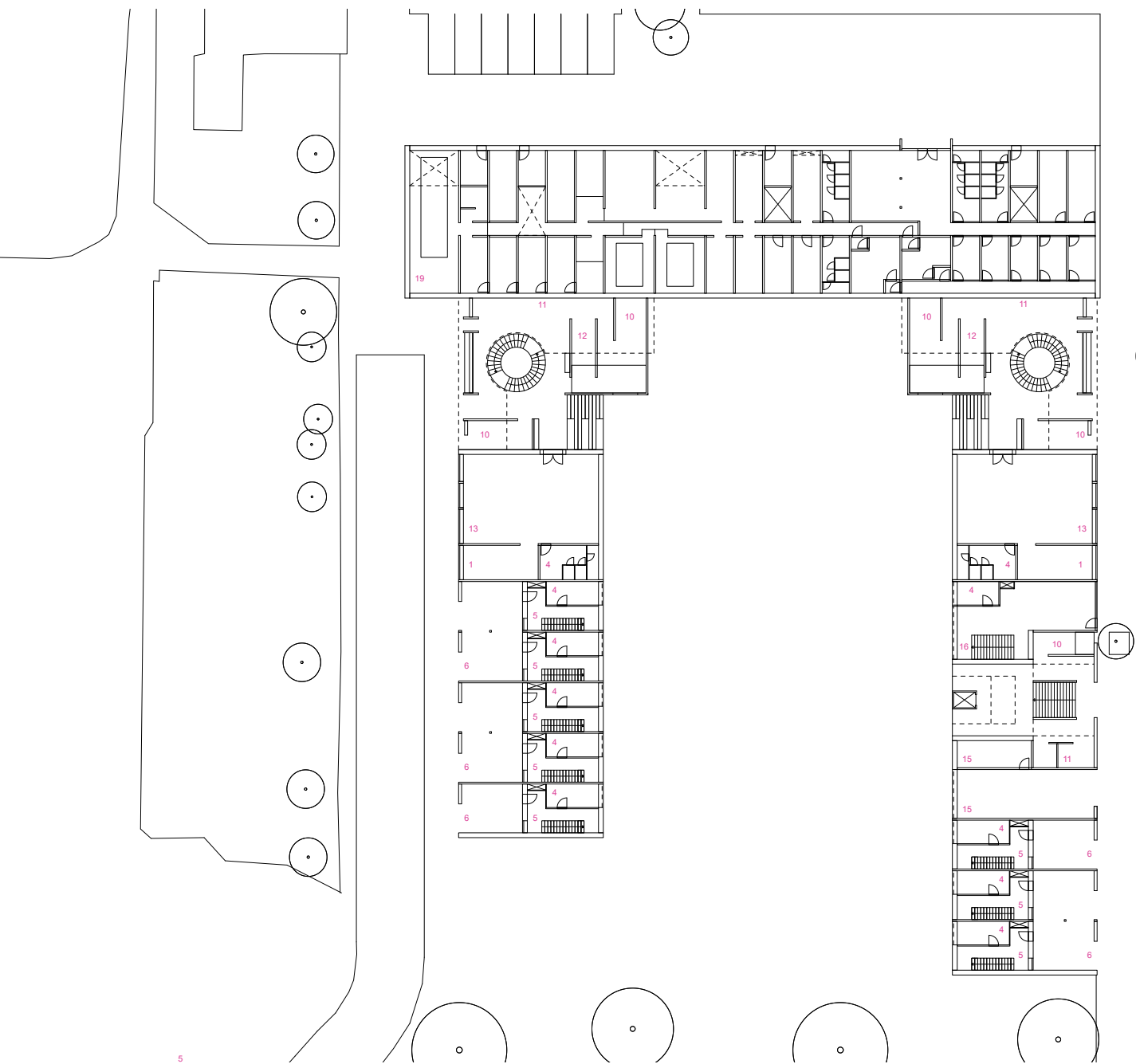
Block A7 is uniquely placed along the new infrastructural main artery Karen Blixens Boulevard and just opposite the newly renovated urban park and the future culture campus. The block has been divided in order to connect the new neighbourhood with the rest of Gellerup. This structural intervention breaks down the scale of the building, while making it possible to orientate the various functions with respect of all the hierarchical steps of communal spaces from neighbourhood to home.





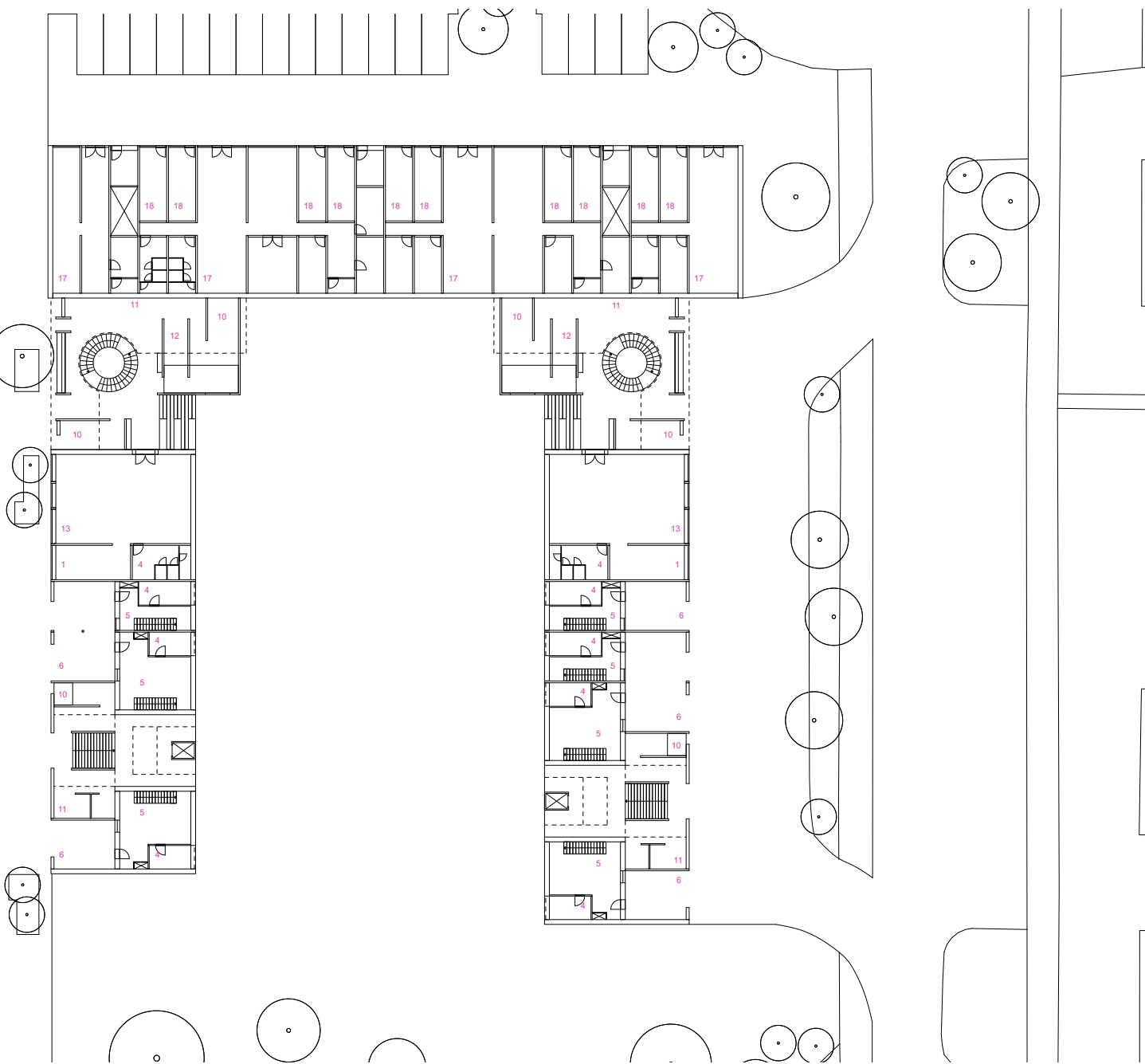
061. Visualization Courtyard





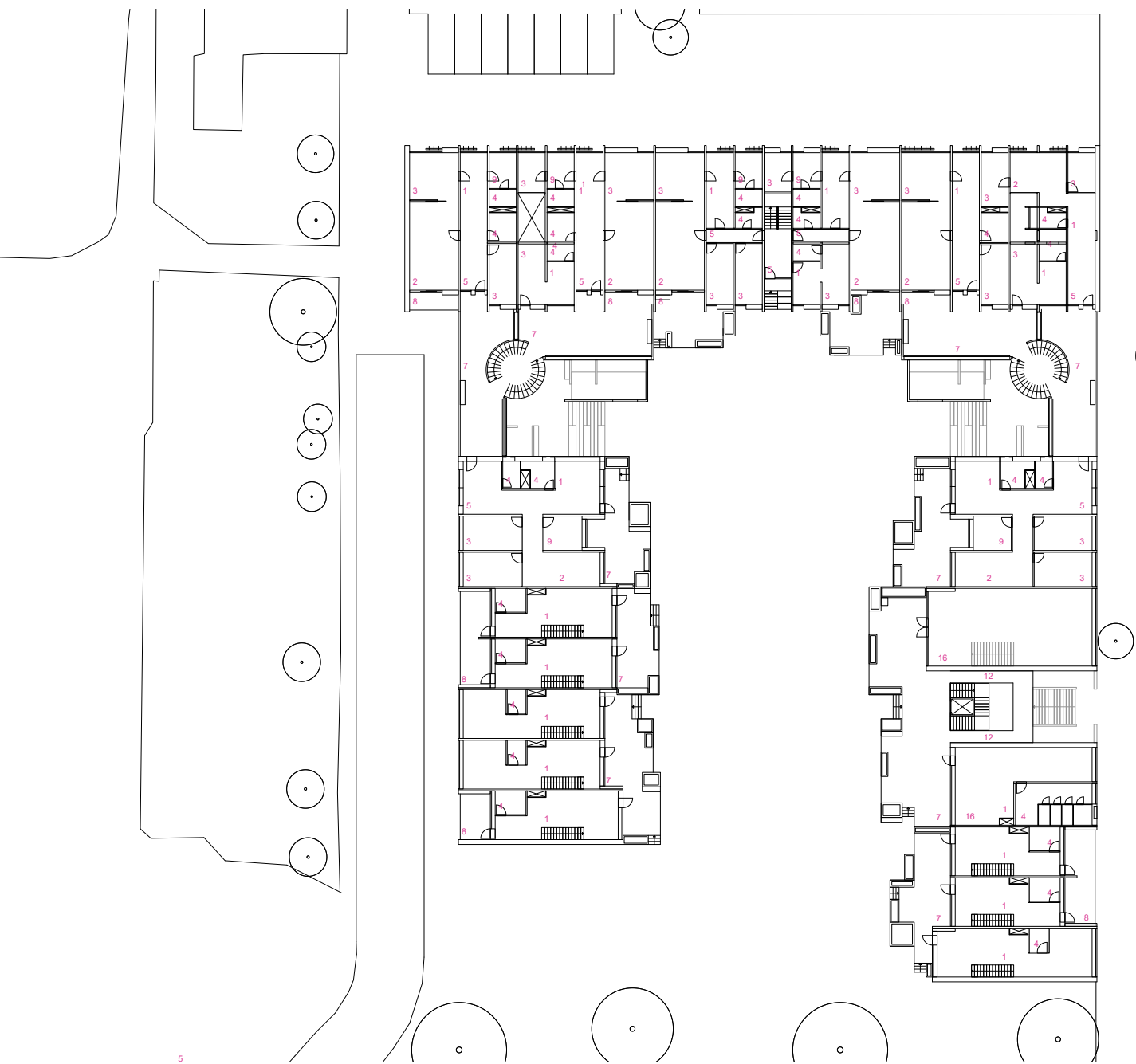
062. Ground floor 1:500 The neighbourhood

- | | | | |
|-----------------|-------------|----------------------|-----------------------|
| 1 - kitchen | 6 - garage | 11 - bicycle parking | 16 - community center |
| 2 - living room | 7 - terrace | 12 - mailbox | 17 - commercial |
| 3 - bedroom | 8 - balcony | 13 - communal house | 18 - start-up |
| 4 - bathroom | 9 - office | 14 - shared seatings | 19 - world bath |
| 5 - entry | 10 - trash | 15 - workshop | |



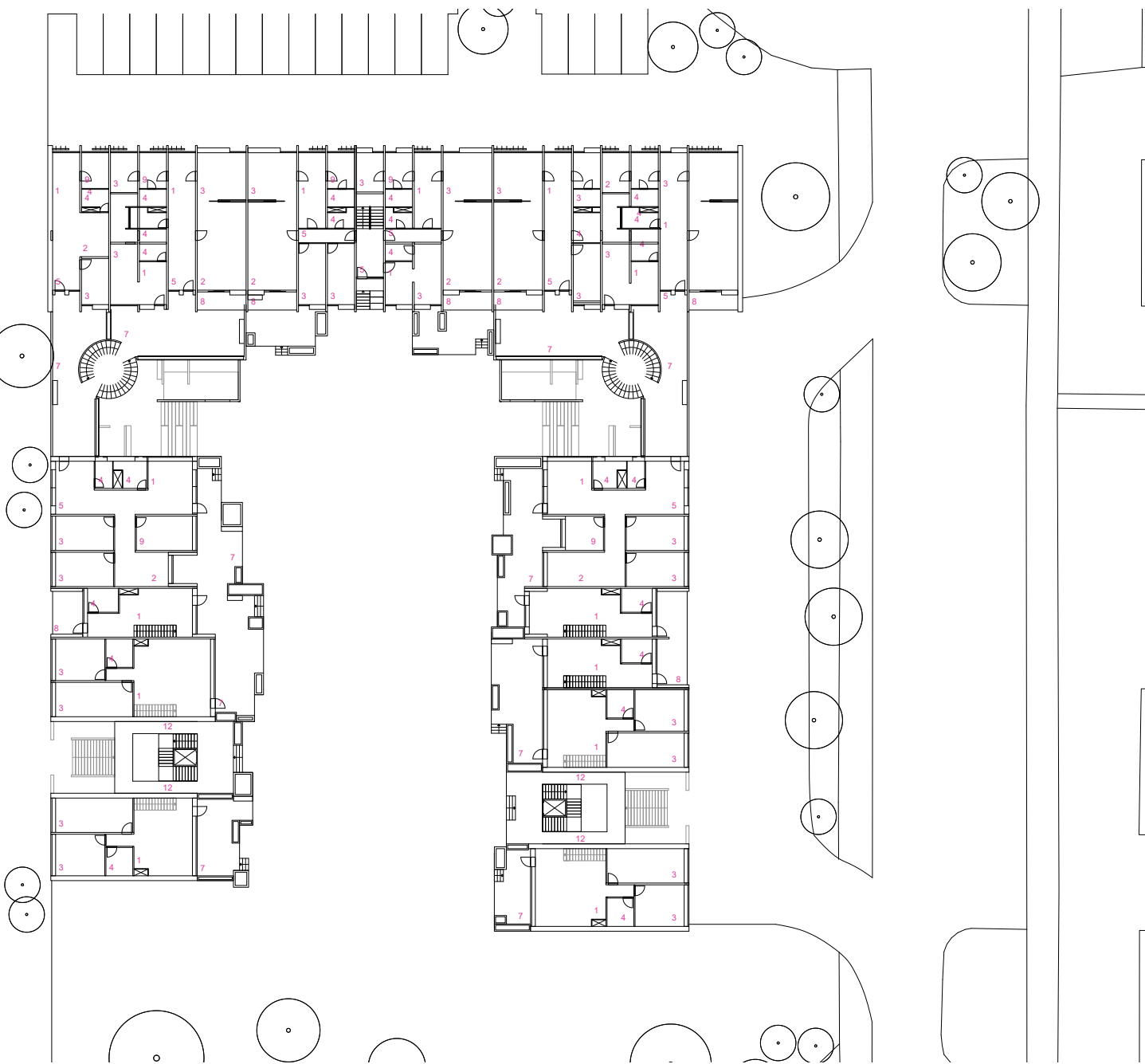
Activating the base

The basement of the original blocks has been given new life with commercial necessities, start-ups and world bath, which orientates the public base to the square facing Karen Blixens Boulevard. The large communal functions are located on the neighbourhood streets, creating awareness and interest for the fellow residents when optional activities take place.



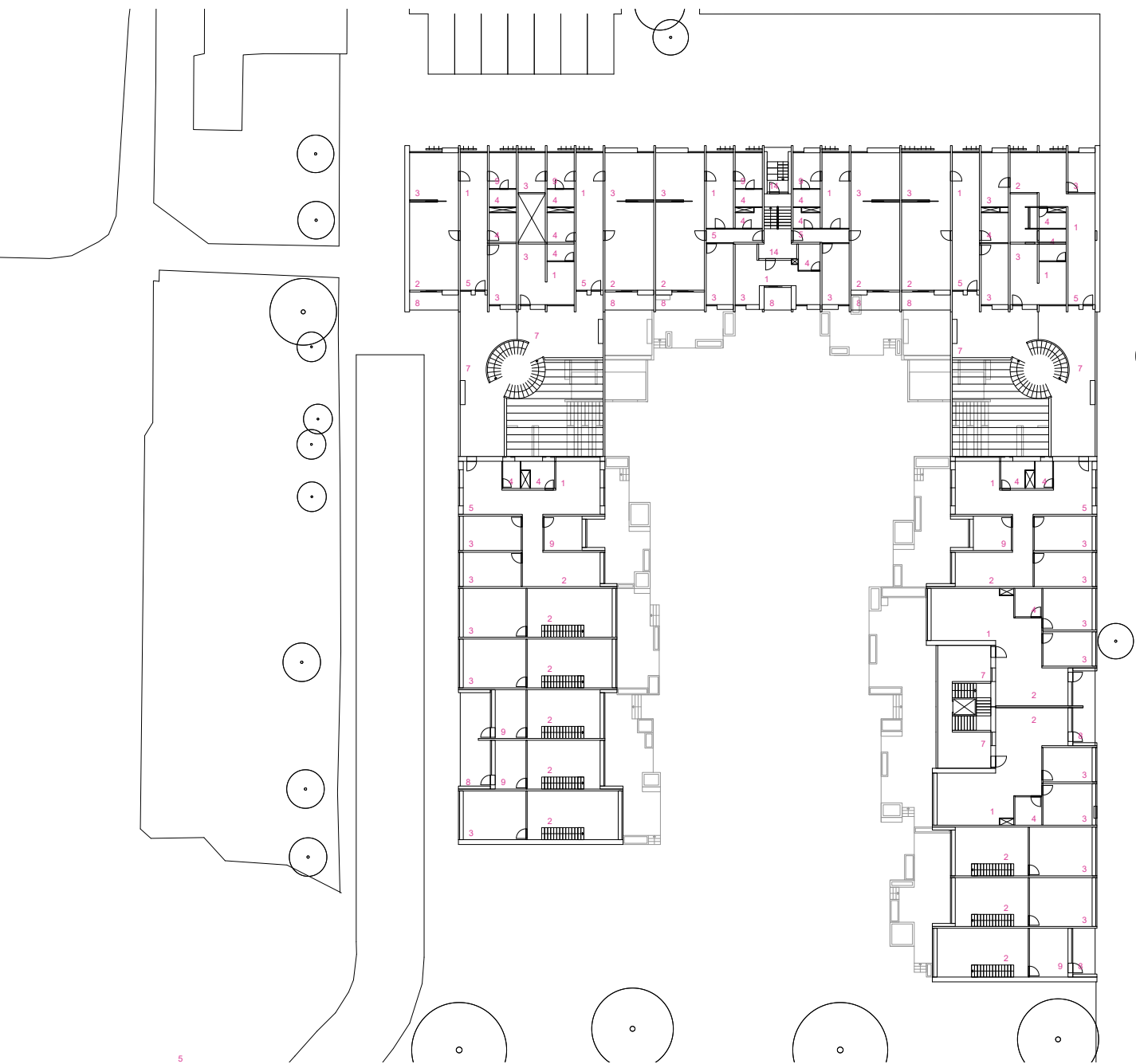
063. 1st floor 1:500 The neighbourhood

- | | | | |
|-----------------|-------------|----------------------|-----------------------|
| 1 - kitchen | 6 - garage | 11 - bicycle parking | 16 - community center |
| 2 - living room | 7 - terrace | 12 - mailbox | 17 - commercial |
| 3 - bedroom | 8 - balcony | 13 - communal house | 18 - start-up |
| 4 - bathroom | 9 - office | 14 - shared seatings | 19 - world bath |
| 5 - entry | 10 - trash | 15 - workshop | |



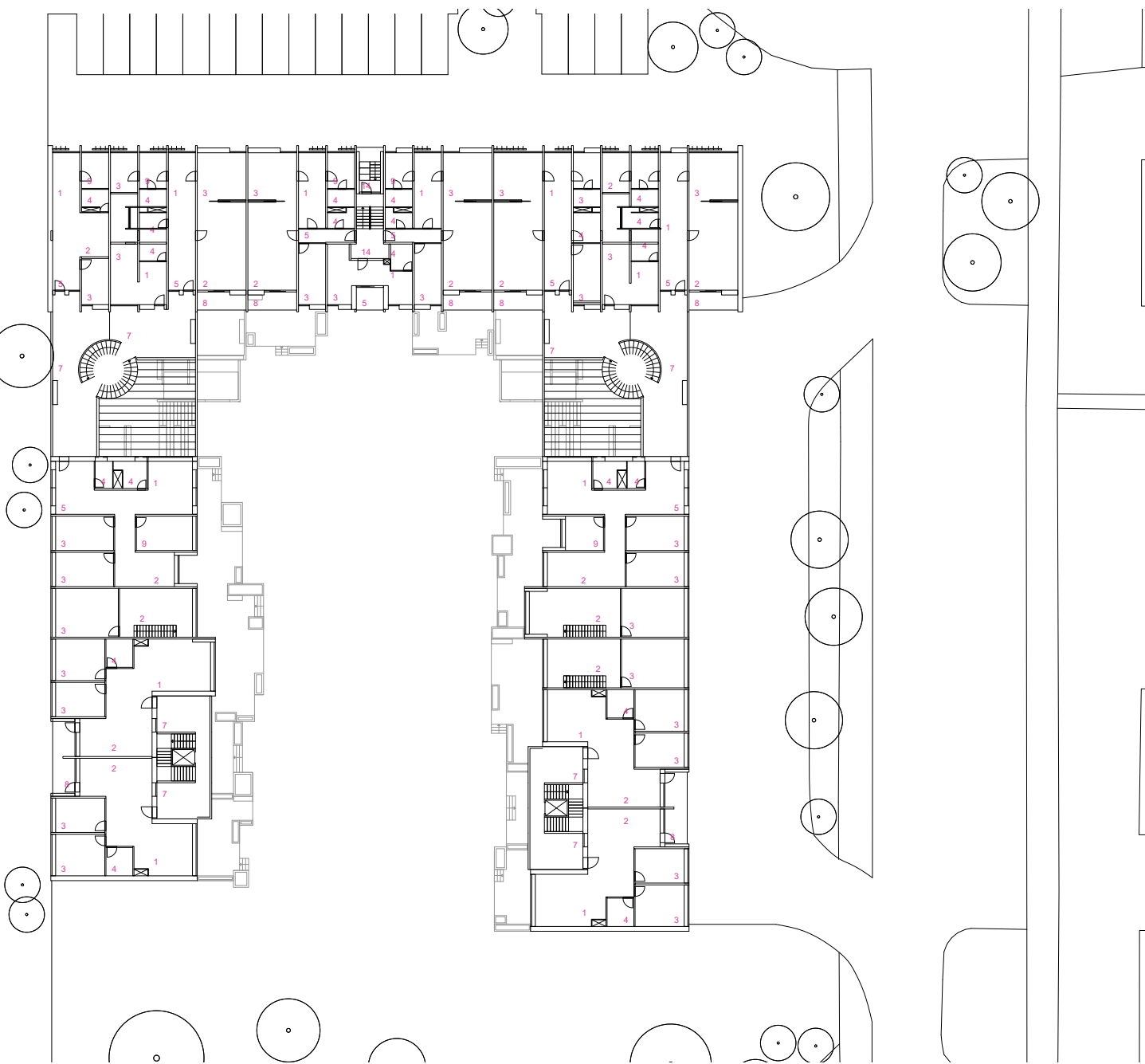
Hierarchy of shared spaces

Location and orientation define the hierarchical steps from home to neighbourhood. Neighbours share terraces or balconies; stairwells share necessities and the entire neighbourhood share courtyards and community center. The terraces act as transition zones between home and community, where playfully arranged flower beds subtly divide the private spheres.



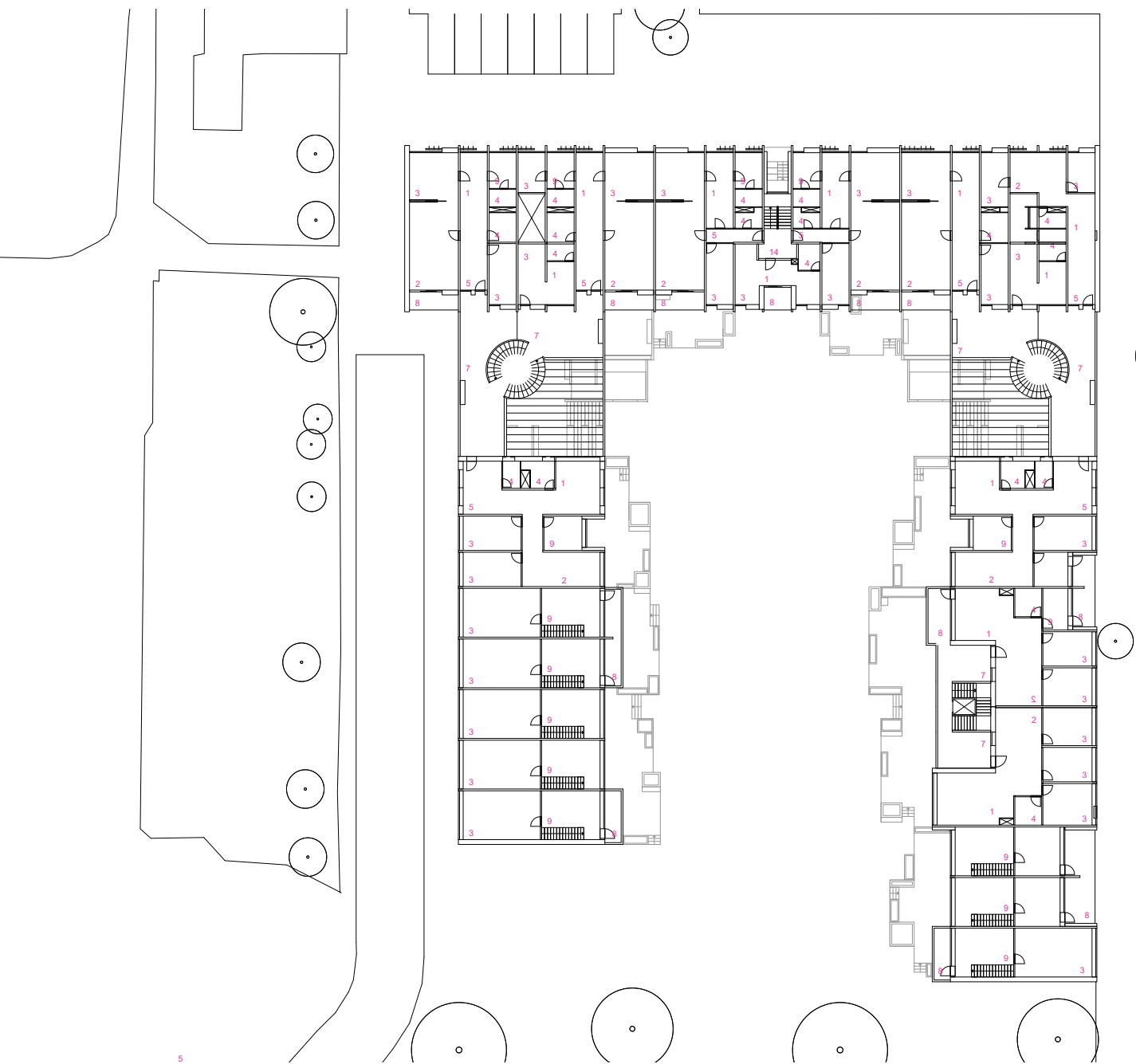
064. 2nd floor 1:500 The neighbourhood

- | | | | |
|-----------------|-------------|----------------------|-----------------------|
| 1 - kitchen | 6 - garage | 11 - bicycle parking | 16 - community center |
| 2 - living room | 7 - terrace | 12 - mailbox | 17 - commercial |
| 3 - bedroom | 8 - balcony | 13 - communal house | 18 - start-up |
| 4 - bathroom | 9 - office | 14 - shared seatings | 19 - world bath |
| 5 - entry | 10 - trash | 15 - workshop | |



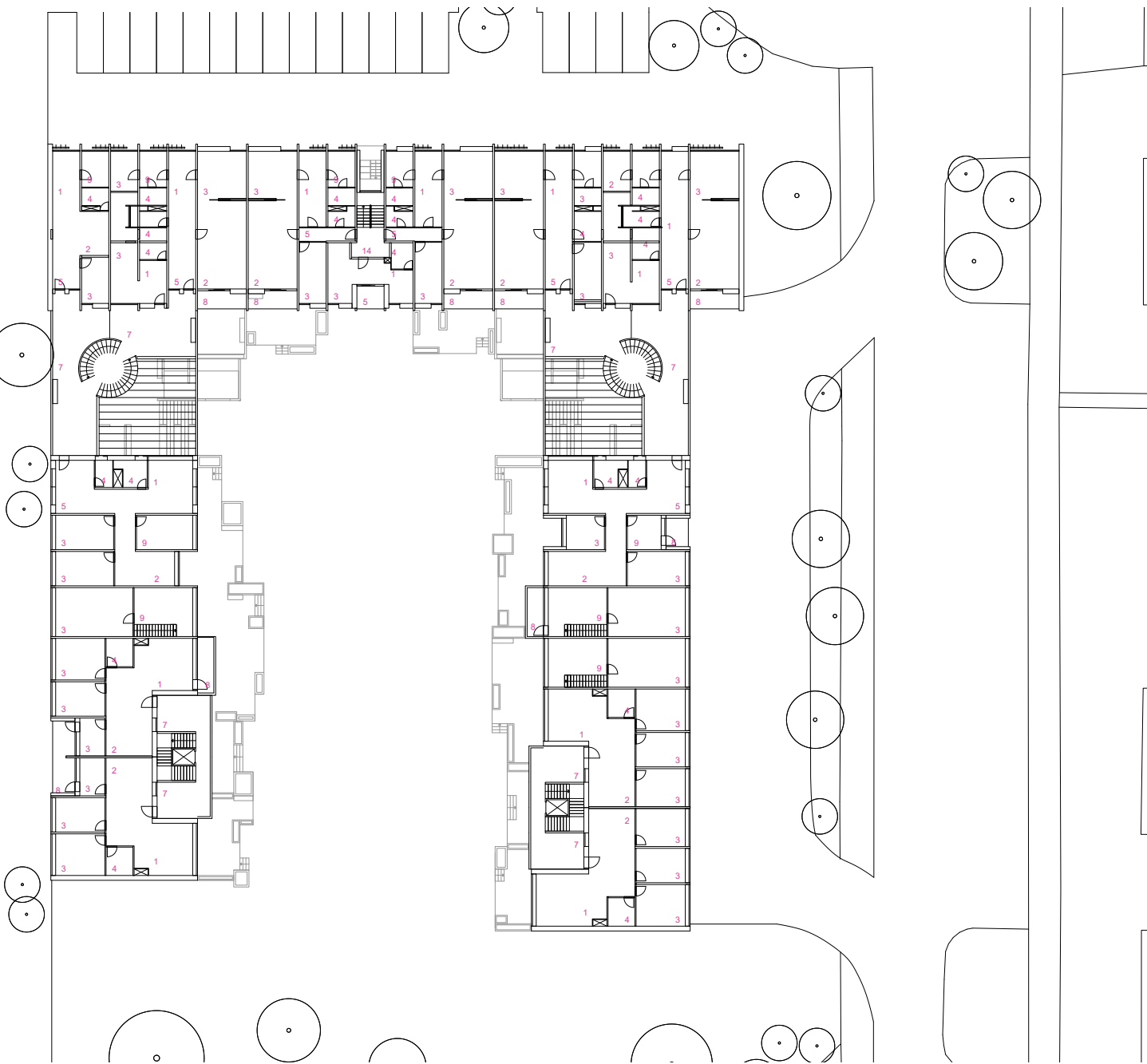
The everchanging courtyard

The inner façade of the new housing is offset in order to create private spaces and zones for the residents, while providing shelter from sun and wind, creating micro-climatic hotspots that vary throughout the year, resulting in a dynamic arrangement within the courtyard.



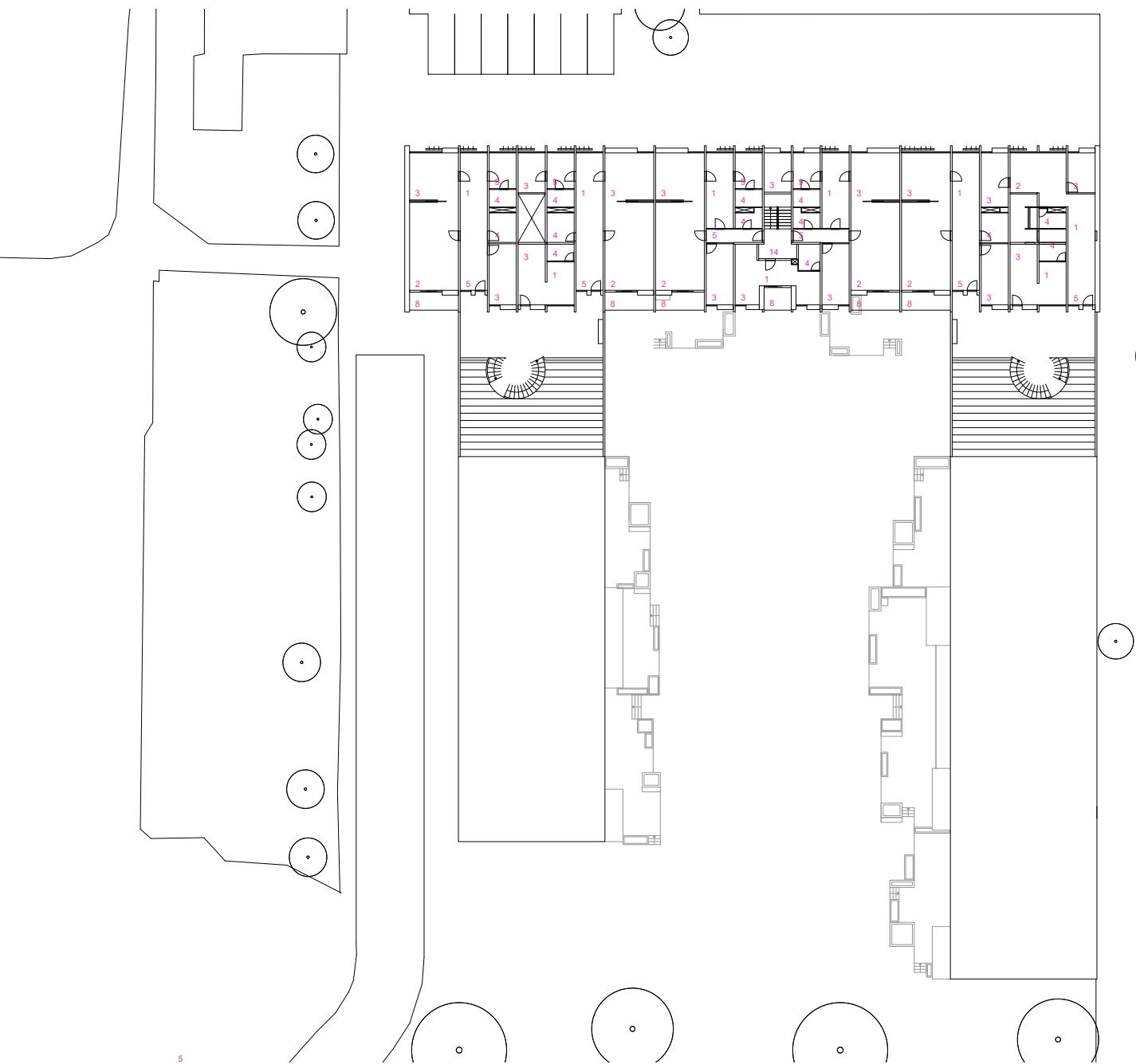
065. 3rd floor 1:500 The neighbourhood

- | | | | |
|-----------------|-------------|----------------------|-----------------------|
| 1 - kitchen | 6 - garage | 11 - bicycle parking | 16 - community center |
| 2 - living room | 7 - terrace | 12 - mailbox | 17 - commercial |
| 3 - bedroom | 8 - balcony | 13 - communal house | 18 - start-up |
| 4 - bathroom | 9 - office | 14 - shared seatings | 19 - world bath |
| 5 - entry | 10 - trash | 15 - workshop | |



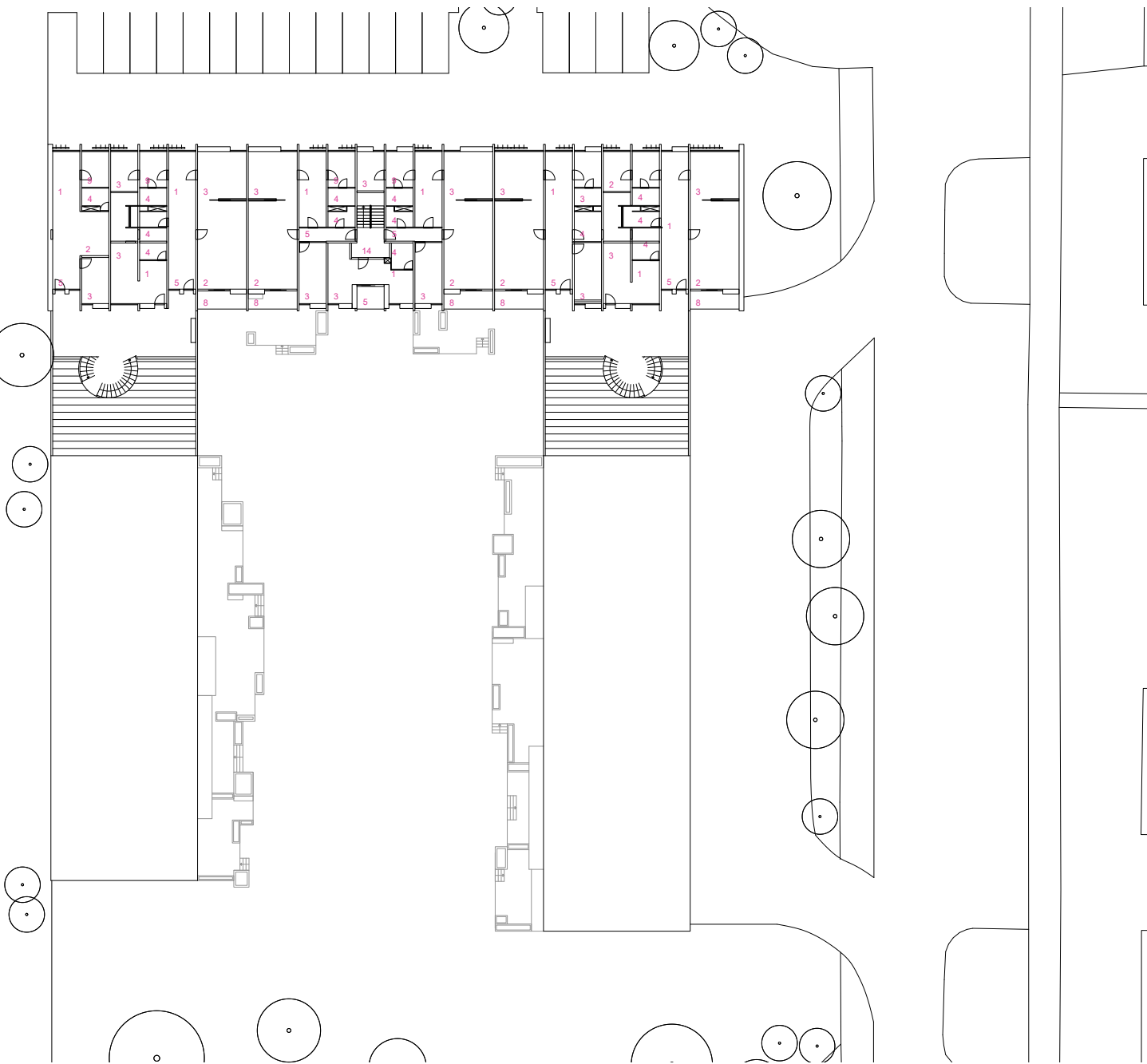
The daily flow

The external stairwells are connected to a variety of necessity-functions in the base, connecting the horizontal flow from street to home. The flow continues vertically, where every floor consists of shared terraces between new and original residents. The functions of the dwelling are situated so that there is a clear public side, facing the courtyard, and a private back side, facing the streets.



066. 4th floor 1:500 The neighbourhood

- | | | | |
|-----------------|-------------|----------------------|-----------------------|
| 1 - kitchen | 6 - garage | 11 - bicycle parking | 16 - community center |
| 2 - living room | 7 - terrace | 12 - mailbox | 17 - commercial |
| 3 - bedroom | 8 - balcony | 13 - communal house | 18 - start-up |
| 4 - bathroom | 9 - office | 14 - shared seatings | 19 - world bath |
| 5 - entry | 10 - trash | 15 - workshop | |



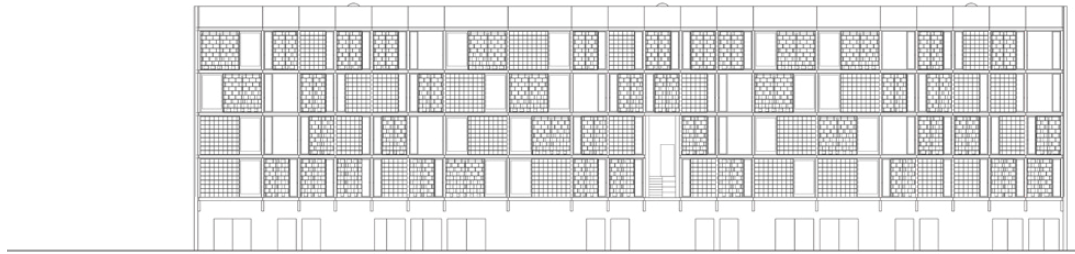
Re-thinking circulation

The renovated apartments all have visual connection to the courtyard, since every apartment is now provided with a courtyard-facing terraces. The plan-layout is developed with minimal interference to the original layout. The most radical changes are the new entrance location. as the apartments are connected to the new circulation system, which brings possibilities with the original stairwells that is now un-used.

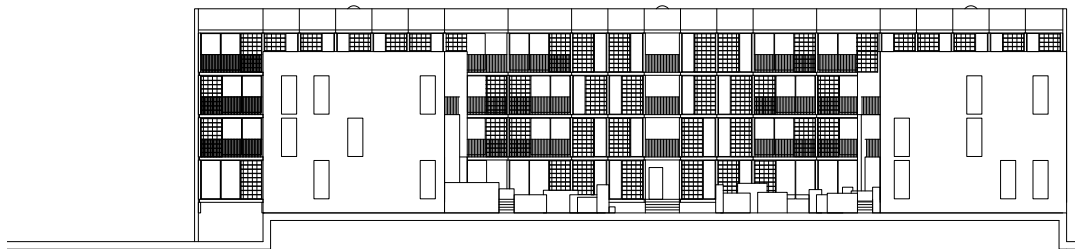


067. Visualization East facade towards Karen Blixens Boulevard



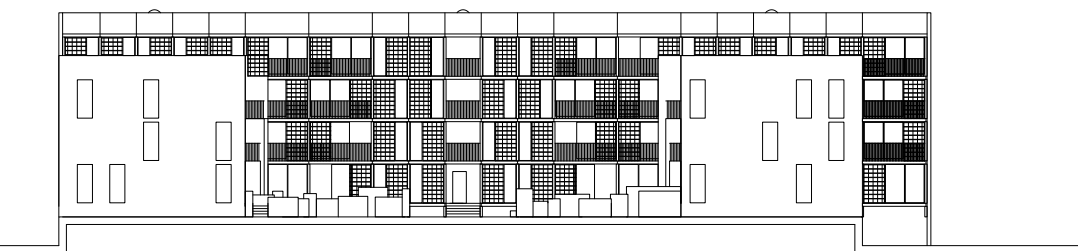
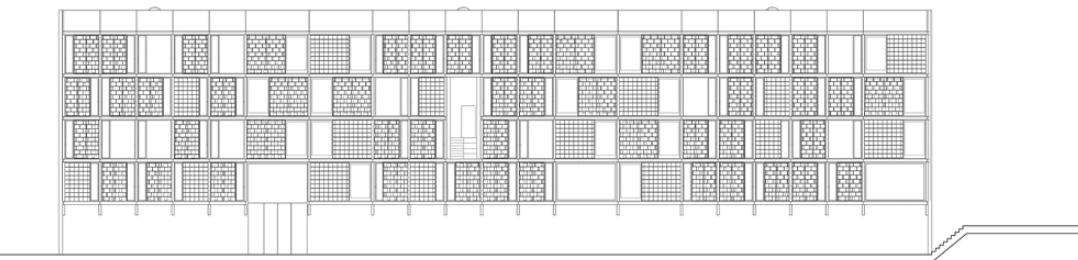


068. Elevation east 1:500 The neighbourhood



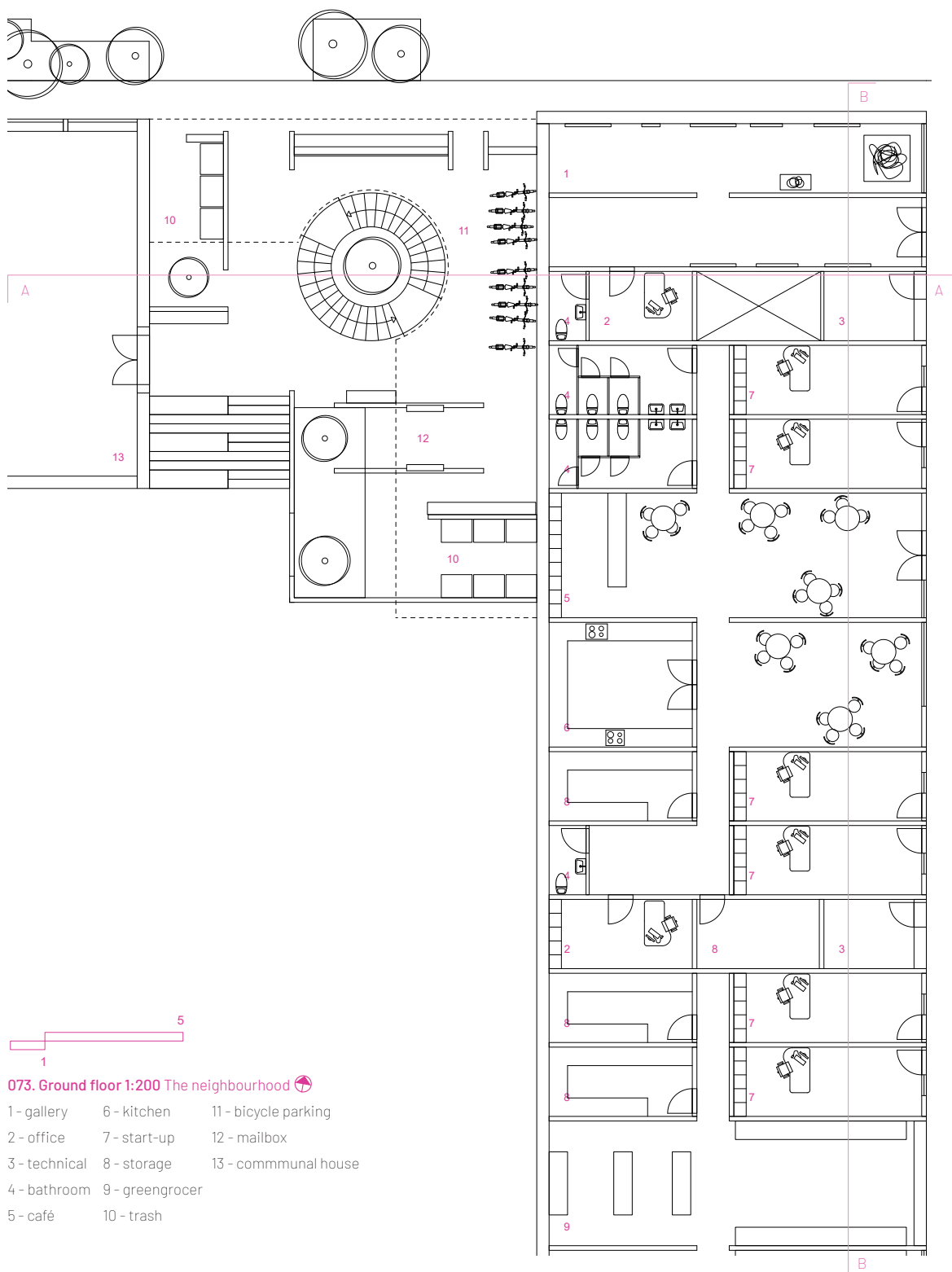
069. Elevation west 1:500 The neighbourhood



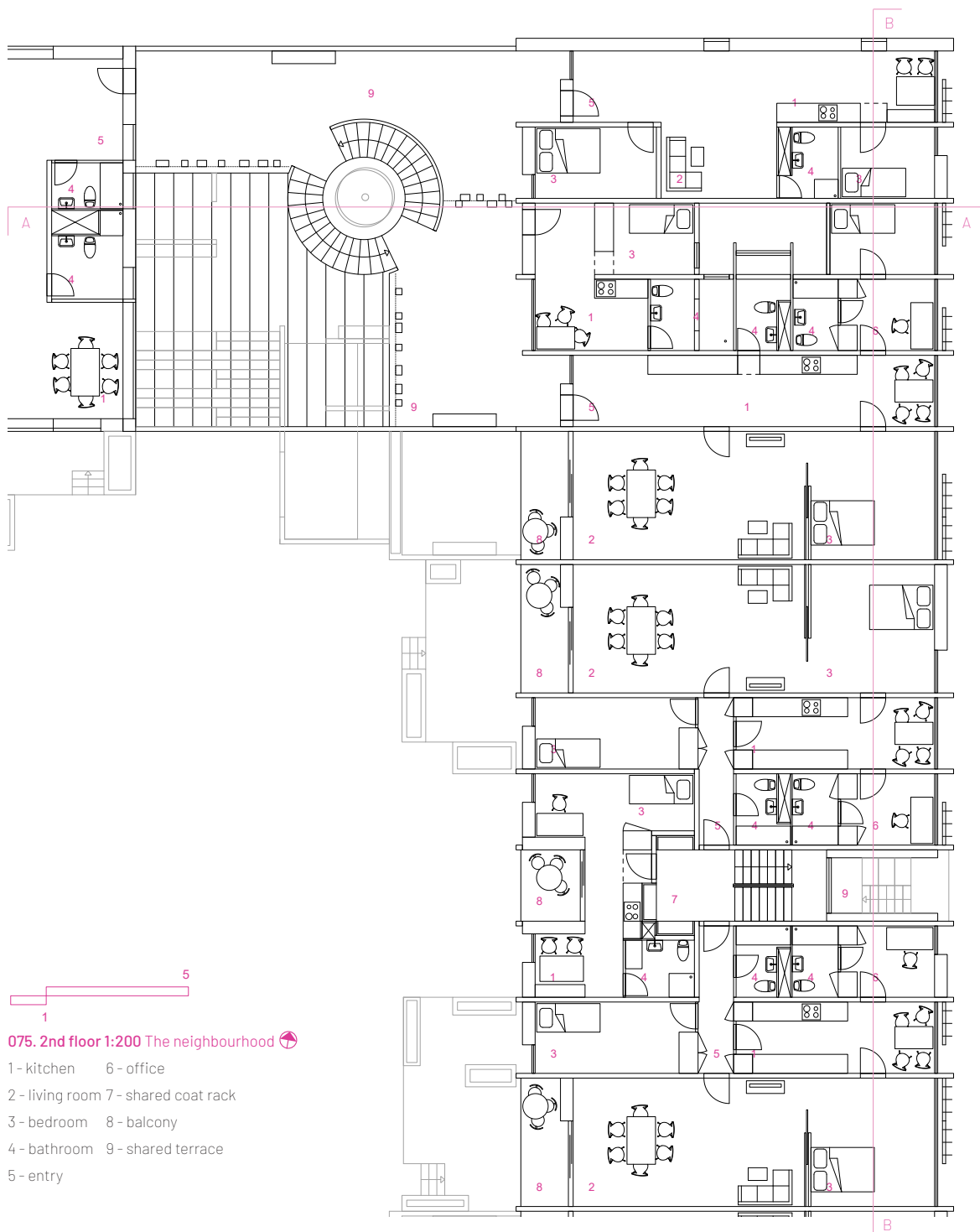












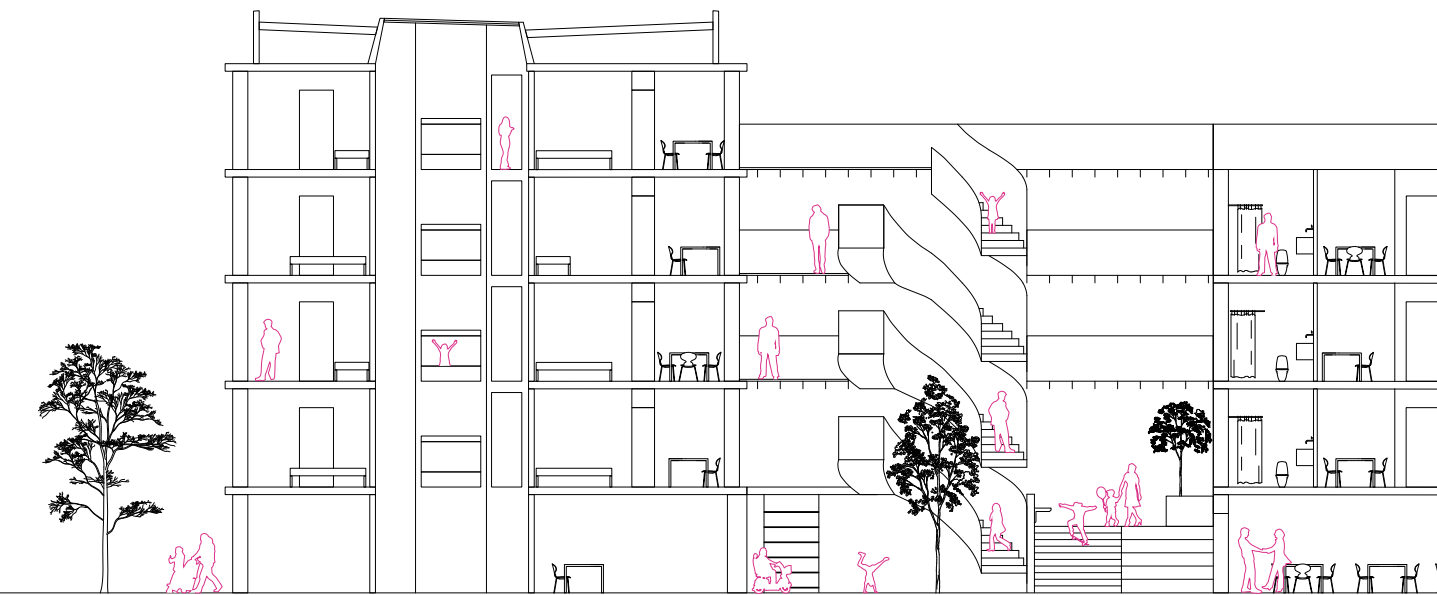
075. 2nd floor 1:200 The neighbourhood

- 1 - kitchen 6 - office
- 2 - living room 7 - shared coat rack
- 3 - bedroom 8 - balcony
- 4 - bathroom 9 - shared terrace
- 5 - entry

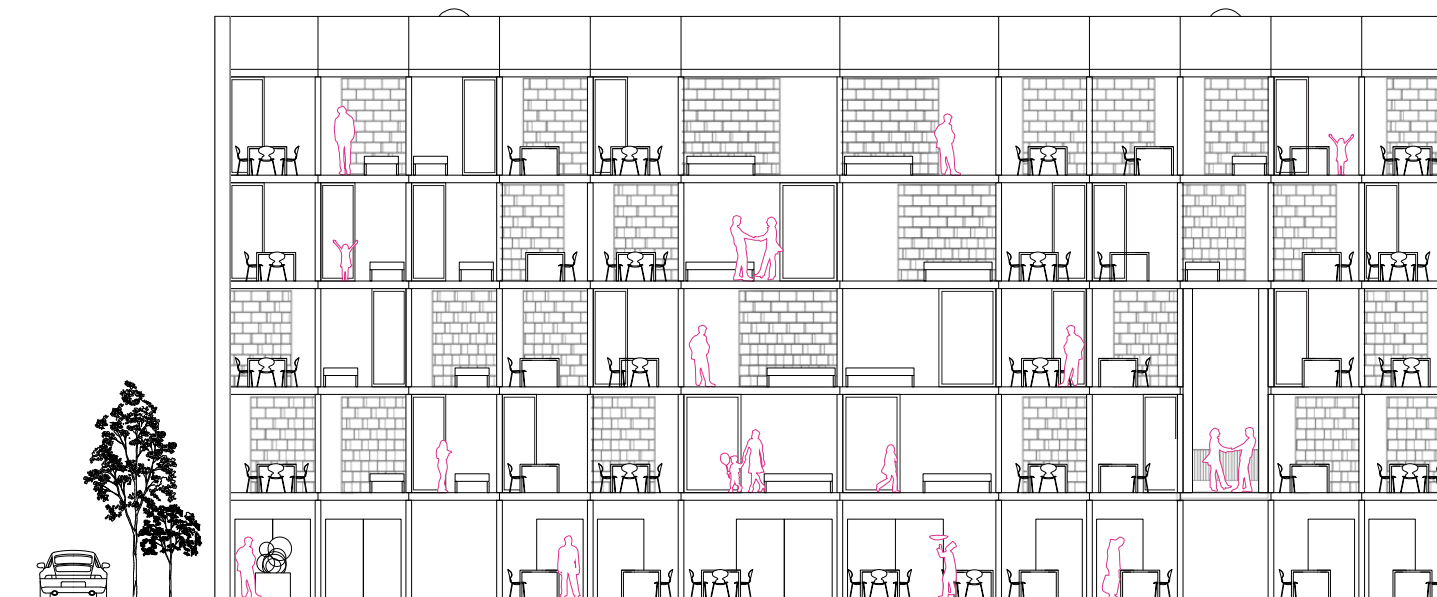


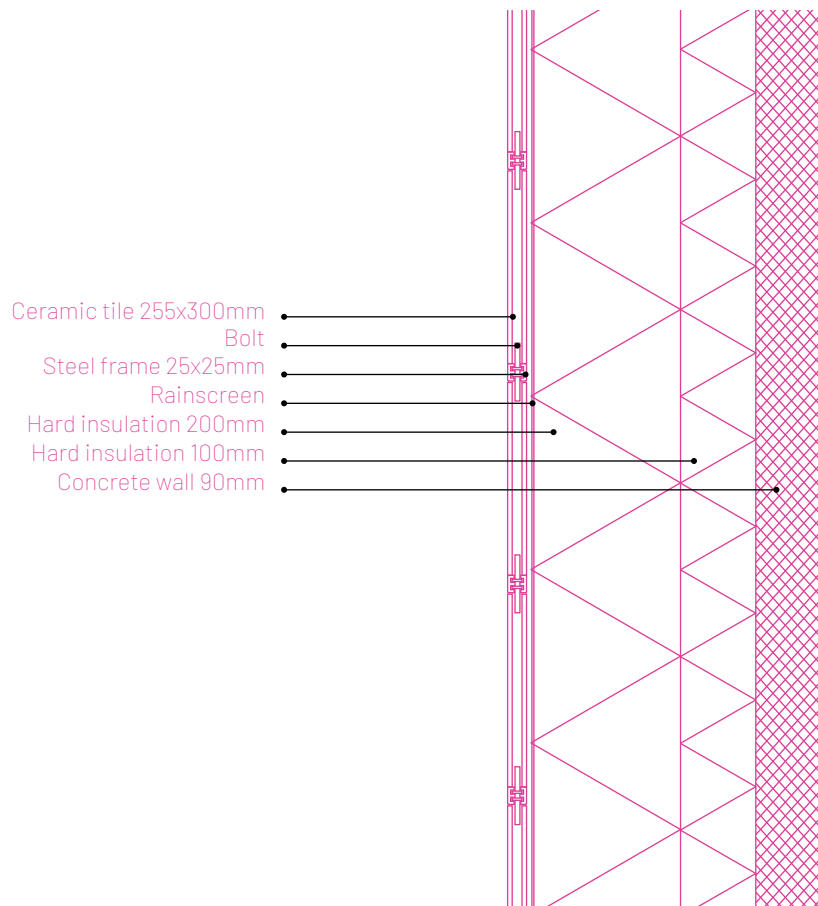
077. Visualization Apartment C bathroom



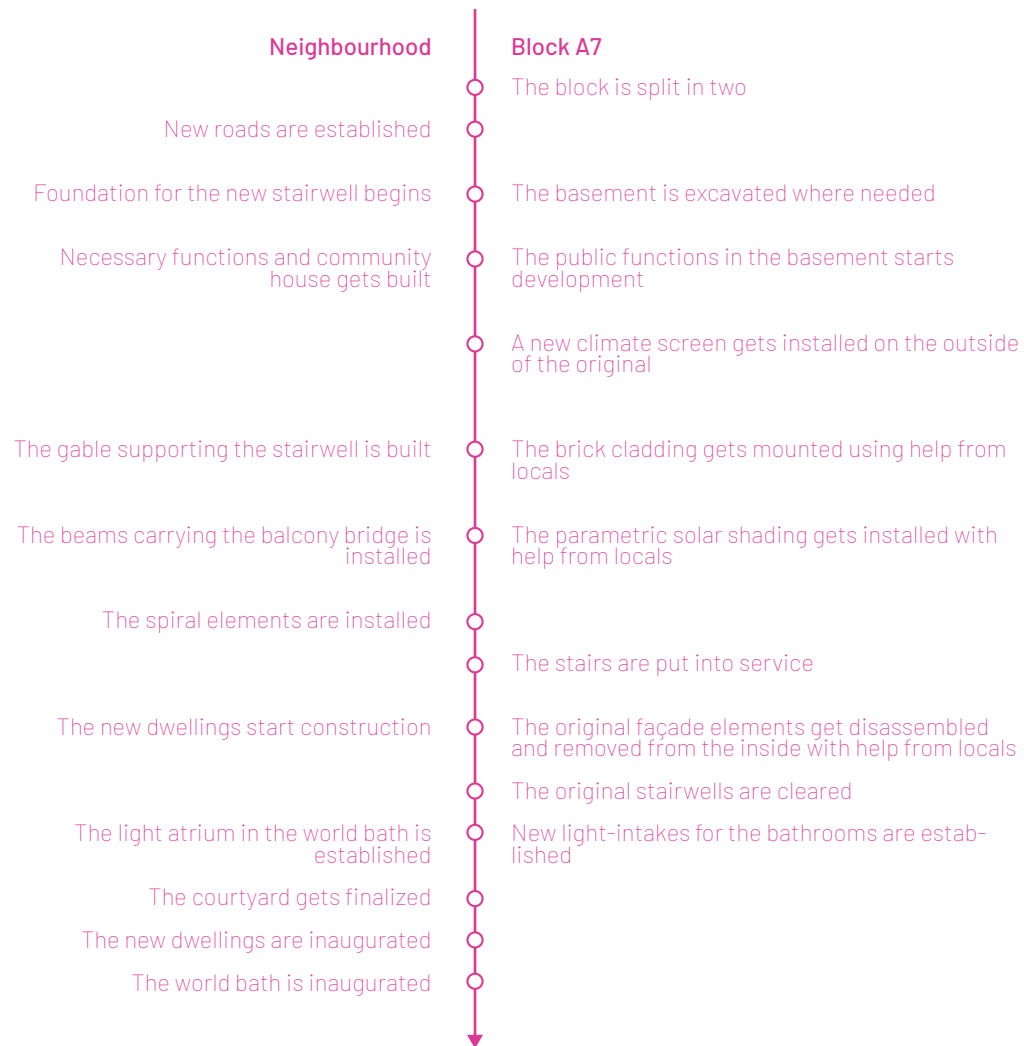








081. Detail drawing 1:10 The envelope

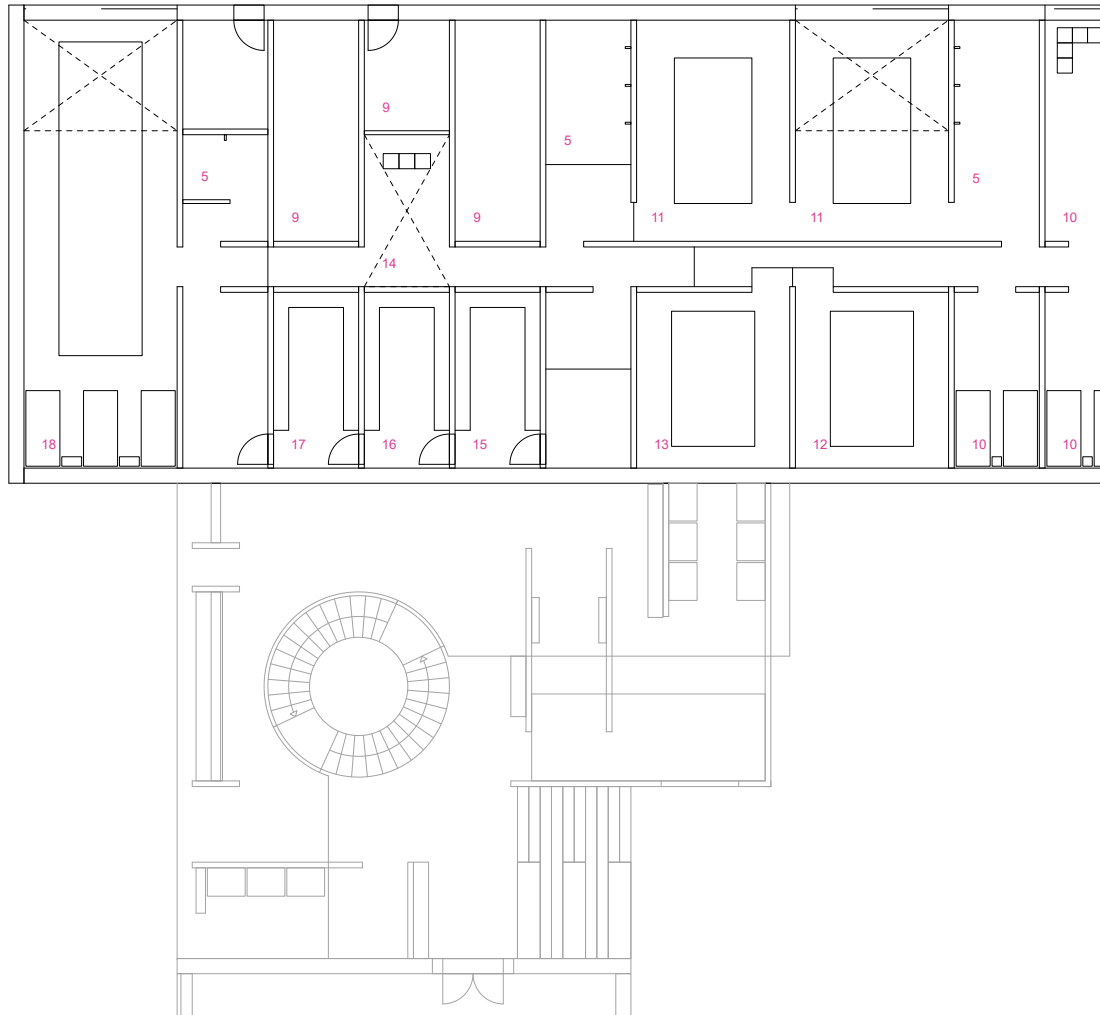


082. Diagram The building process

World bath

Public baths are in many cultures a regular, daily necessity. Implementing the world bath in the existing block embraces the cultural diversity of Gellerup and highlights the potential and quality of the robust architecture. The sensitive atmosphere of the bath emphasises the tactility of the concrete, giving a new phenomenological perspective on the concrete blocks. The bath is publicly accessible and will be used by visitors as well, acting as an important step in the process of elevating the reputation of Gellerup.

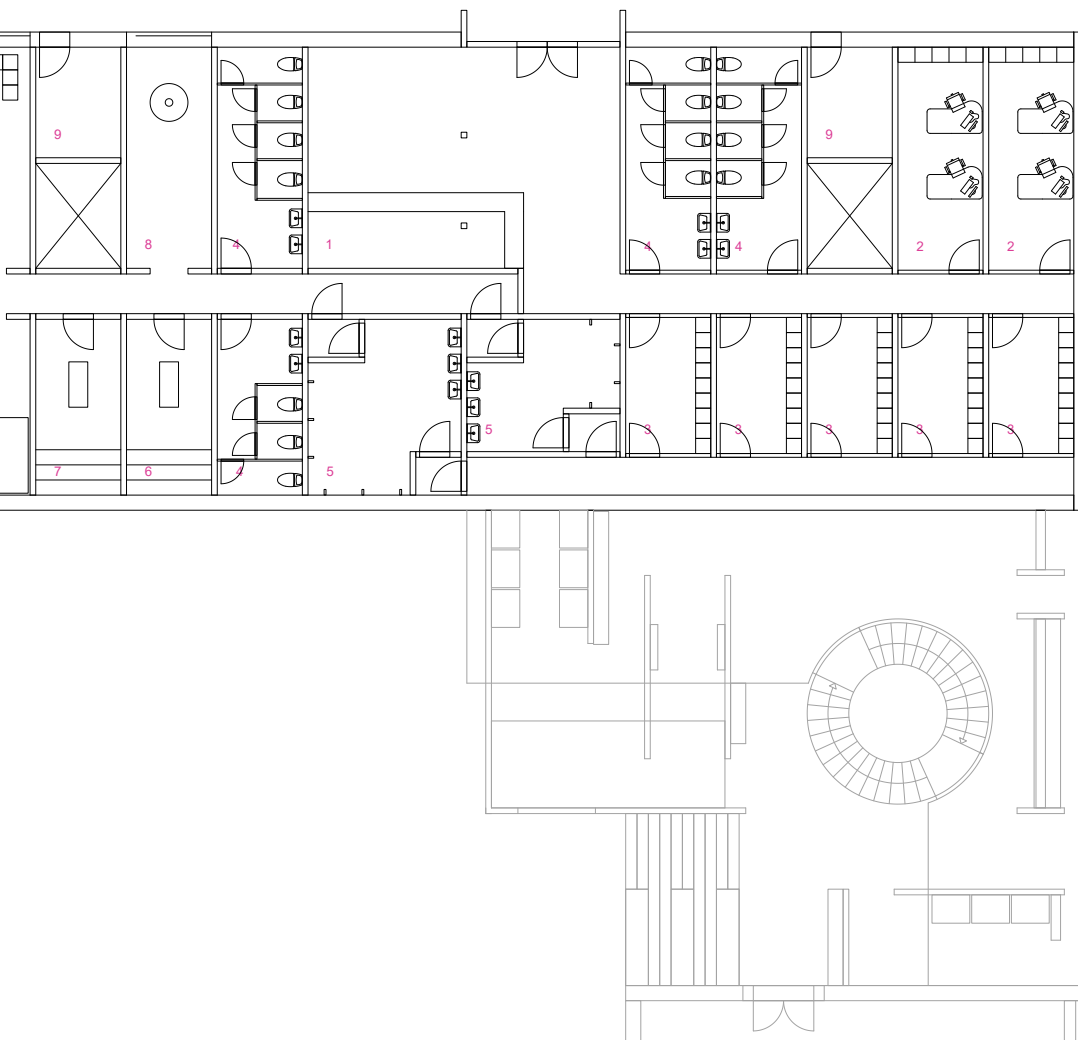




084. Ground floor 1:200 World bath



- | | | | |
|-------------------|--------------------|---------------------|---------------------|
| 1 - entrance | 6 - sauna 80° | 11 - turkish bath | 16 - steam bath 40° |
| 2 - office | 7 - sauna 95° | 12 - pool 40° | 17 - steam bath 43° |
| 3 - dressing room | 8 - water fountain | 13 - pool 15° | 18 - activity pool |
| 4 - bathroom | 9 - technical | 14 - atrium | |
| 5 - shower | 10 - comtemplation | 15 - steam bath 37° | |





085. Visualization World Bath atrium



Design process

The following section will go through key parts of the process towards the final design.

It is important to note the non-linear nature of the process, where multiple loops and ramifications has developed simultaneously with the evolving stages of the theory and analysis, and as such has both influenced and been influenced by the theoretical foundation for the project. While the design ramifications have in periods been undertaken separately, they have at different times reconnected and influenced each other changing the course of action. Through a constant monitoring and awareness of the hierarchy of design drivers we have sought to lead the process with a holistic view on the main task.

In the simultaneous process of designing and adding the final touches to the method that acts as a design foundation, the theoretical- and design discipline has at times overlapped, resulting in a nonlinear chronology from theory through site, analysis and design process. The organization of these sections has thus been an active design choice, where the close connection between analysis and initial design phase has resulted in an extended analysis section. Thus, in certain early design process discussions, proposals appear that seem illogical with the analysis and program in hindsight but are used to give a better overview of the steps involved in our process. Likewise, we have organized the different design tasks as linear as possible, but because of the nonlinear nature, there will be several jumps throughout the section.

Infrastructure of the neighbourhoods

Problem

The infrastructure of a neighbourhood must establish a clear hierarchy of privacy levels ranging from apartment, neighbour, stairwell, courtyard, neighbourhood to Gellerup. The blocks in Gellerup currently lack this segmentation and mainly offer activities on two levels; the privat home and block A7 facilities.

Design drivers

1. Hierarchy of privacy levels
2. Orientation of blocks
3. Immediate value for residents
4. Structural possibilities

Design

The changes are developed for the entire Dorthesvej-area, in order to create a coherent infrastructural system. There is a need of densification of the area along with the new infrastructural system, in order to create the neighbourhoods that Gellerup need. The increased density should bring the qualities of dense-low housing streets, while the new volumes and infrastructure should define a clear hierarchy of communities from neighbourhood to home.

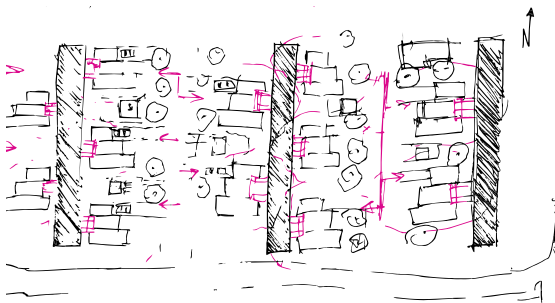
An investigation of a new road system in-between the blocks proved to feel cramped and ended up taking away much of the daylight of the original blocks. We needed to take more drastical manners into use and created roads that cut through the blocks, connecting the area directly to Karen Blixens Boulevard. Our investigations of the original construction show that we can remove the living room modules from the apartments,

which is similar to what Vandkunsten did in their renovation of Block B4 “the port to Gellerup”.

The issue is now where Block A7 should be penetrated. A7 consist of six stairwell modules and the cut had two possible outcomes: penetrate between module two and three, or in the middle. The first outcome created an undefined open courtyard facing north, while the defined courtyard reminded of the existing un-inhabited spaces of Gellerup. The second outcome left us with two courtyards more likely to be inhabited. Therefore, the penetration should be in the middle.

Evaluation

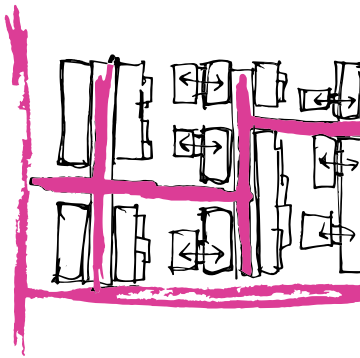
The current gathering points in A7 is primarily between the parking lot and stairwell. A new road structure attempts to divide the social zones from home to Neighbourhood into smaller communities. The new intersecting roads should be designed to contain the necessary functions and optional activities. The outline for an new infrastructure is now set, but how do we create the volumes that facilitate a hierarchy and orientation of the neighbourhood?



086. Sketch Roads in to break down the scale



090. Street view Street in front of original block



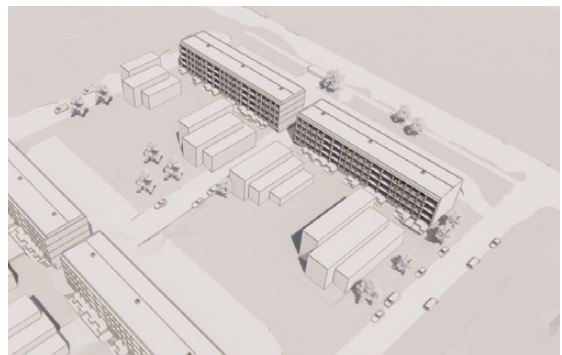
087. Sketch Structural changes



091. Aerial view Dorthesvej



088. Aerial view Structural change off-center



089. Aerial view Structural change middle

Community orientation

Problem

The new housings are an important factor in the design of daily flow of the neighbourhood. The design of the new housing must be as an arm attached to the body, that perform the actions or in other words the necessities of the body. How do we create the volumes that facilitate our requirements for the neighbourhood?

Design drivers

1. Flows of the everyday life
2. Location of necessities
3. Spatial experience of courtyard

Design

The necessities are currently located in the basement of A7, except for parking, that is on the parking lot east of the block. We need to drag the necessities out of the basement and into the daylight, in order for create the qualities we want. The newly implemented streets should also serve as parking, in order to blur the strict function-divided system that exist today. The new necessity-hotspots should be where the neighbourhood casually meet in the everyday life. These hotspots should be located in the volumes that we add. We initiated three volume concepts to figure out which would solve our problems the best. How would it work to scatter the new housing as individual point-houses?

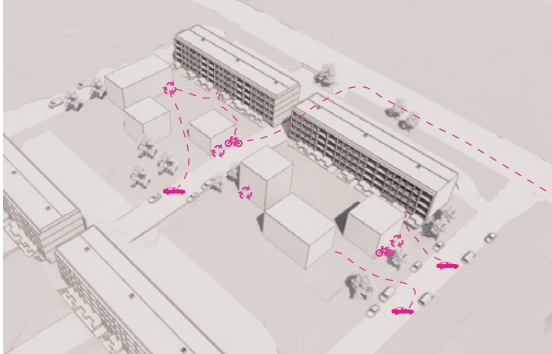
This created a new shape-language in the area, which is interesting compared to the rigid block. The necessities were located at the base of the point-houses, creating a landscape of necessities and optional activities in the courtyard. There was an issue of integrating

the original residents with the new necessities, since the point-houses were too individual. It is important that the residents feel they belong to their recreational space, which is why there needed to be clearer boundaries. This led to volumes parallel to the block, that clearly defines a courtyard that the new and original residents share.

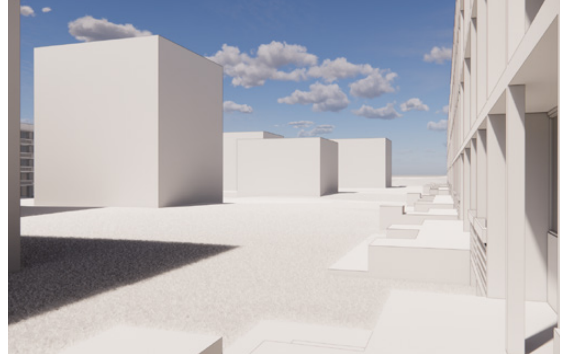
The new infrastructural system allows for everyday life to be unfolded on the streets. The parallel blocks do not activate the streets in an optimal way. The courtyard in between will furthermore be shaded in the afternoon, because of the volume spanning from north to south. This led to new volumes orthogonal to block A7 and parallel to the infrastructural changes, allowing for the life to be unfolded. This furthermore allowed for light to enter the courtyards, while still defining the courtyards for its residents.

Evaluation

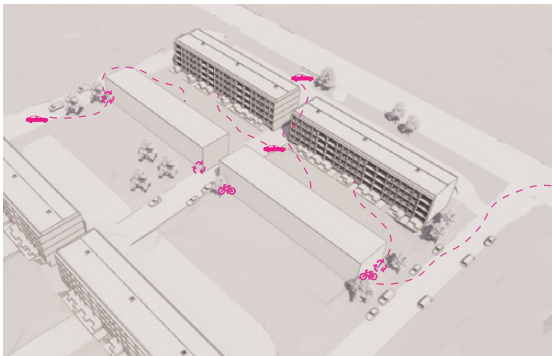
The point-houses had a certain quality because of the difference compared to the monotone, original Gellerup. This playfulness should be implemented within the overall shape of the added volumes, creating volumetric variation that benefits the functions of the new rooms and spaces. How do we make sure that these volumes provide meetings between the new and original residents to develop social bonds?



092. Aerial view Individual volumes



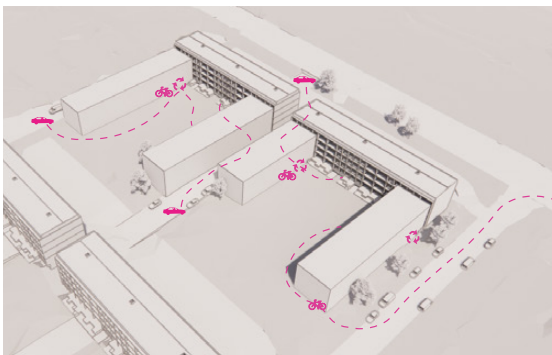
095. Street view Individual volumes



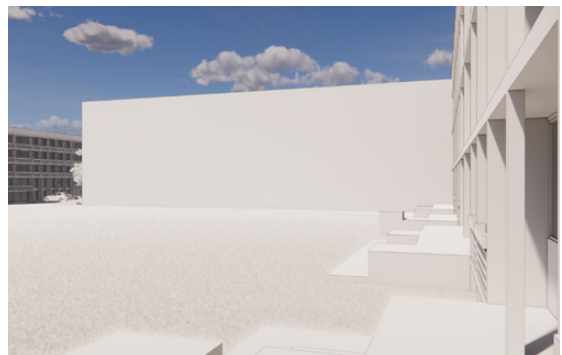
093. Aerial view Parallel volumes



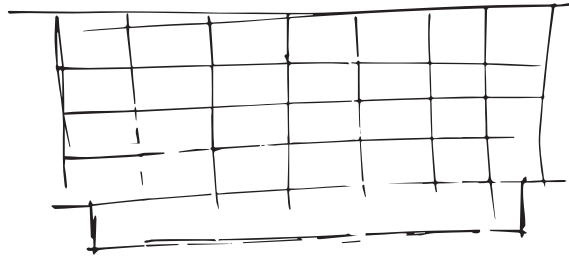
096. Street view Parallel volumes



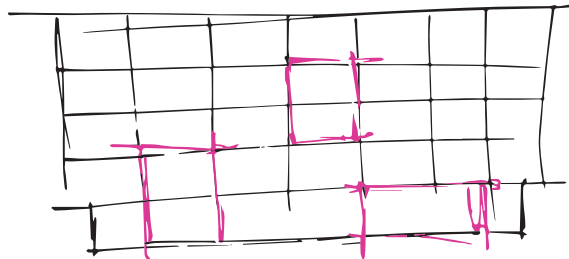
094. Aerial view Orthogonal volumes



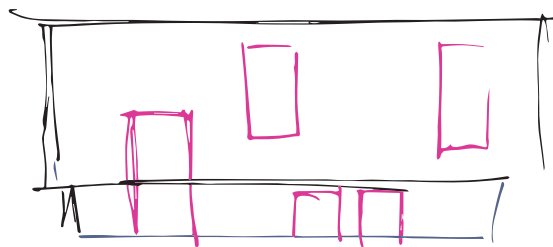
097. Street view Orthogonal volumes



098. Drawing The original block A7



099. Drawing Necessary and optional activities becomes expression



100. Drawing The new housing as a translation of the concept

Architecture that gathers people

Problem

With an outline for a new infrastructure, how do we design the necessary functions along the hierarchy that encourage people to interact and gather?

Design drivers

1. Encourage meetings
2. Enhance the hierarchy
- 3 Tectonic relation to block A7

Design

Looking at block A7 towards the eastern front side, there is a vertical division between a public base and a private body above. As discussed in the analyse chapter we encourage the division, as it creates privacy for the apartments and make space for neighbourhood activities at ground level, where the community life can be gathered around the daily flow. However, the base in the block are a repellent surface designed for efficient transition of the necessary functions and lack the spatial quality that encourage people to stay. To form a neighbourhood the architecture must provide enjoyable spaces for the daily activities, that invites and put attention to interaction.

Block A7's rigid and repetitive rhythm of balconies form a rather monotone expression with few variables along the way for the senses to investigate. However, the simplicity of the expression, makes it easy to drag the intention to where the rhythm is broken. As the structural analyse specified it is possible to remove the horizontal concrete slabs without harming the structure of the building. We suggest opening the base and remove

horizontal slabs where necessary and optional activities is situated. Thus, the activities become the building expression and the exceptions in the rigid structure forms spaces to explore.

The new housing forms an infrastructure that creates a hierarchy in the neighbourhood. They must be perceived as the attached arms that complete the body, by performing the actions that the body were not capable of performing without it. These activities placed along the new housing will thereby facilitate necessities for both the original residents and the new. In a similar manner as the transformed block new housing will consist of a community-oriented base where the openings that breaks the rhythm forms the spaces for necessities of the neighbourhood.

Stair concept

Problem:

The connection between the original block and the new arms needs to facilitate the hierarchy of necessities from communal house to meeting in neighbour-pairs. We suggest remove the old stairwell within the block at each corner and establish a new shared stairwell that provide access to the 12 original apartments whose stairwell it replaces, as well as the new apartments close to the original block.

Design drivers:

1 People flow – neighbor meeting, 2 privacy, 3 shade cast on building

Design:

Numerous systems were tested and evaluated based on their ability to solve the flow of people in a way where the new and old residents meet each other, both through daily necessities and shared balconies. In the

process of flipping the stairwell from inside to outside the original apartments we likewise need to solve the plan in a way that provides quality. Thus, in the initial investigation we compare the effect the stairwell has on the daylight within the original apartment.

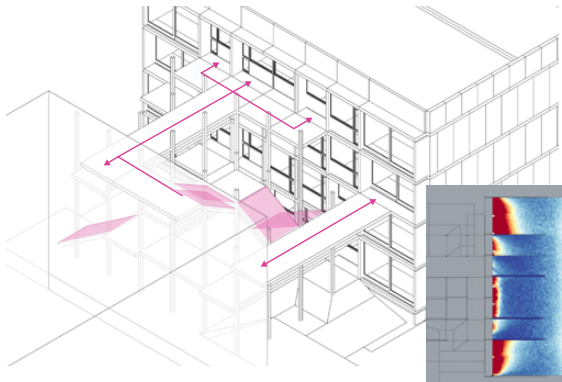
Evaluation

The double spiral in concept 5 provides the ability to place two landings for each floor, meaning that when the resident step outside the stair they are at their own private balcony shared with only one neighbour. Furthermore, the connection between the two is based on sound rather than line of sight. The shade cast on the building is a between the worst and best examples and can be justified by the distribution of room functions within the dwelling. Lastly the double spiral becomes the statue signaling the new social connection of the community.

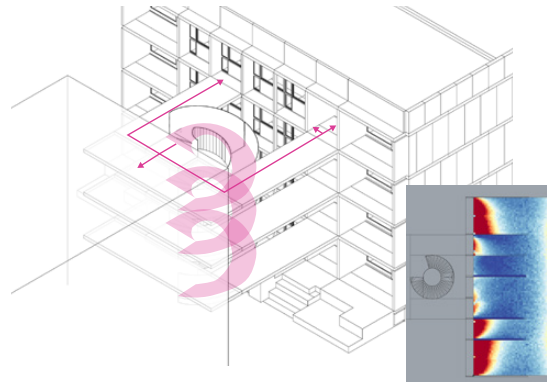


101. Model Stair concept 5, double spiral

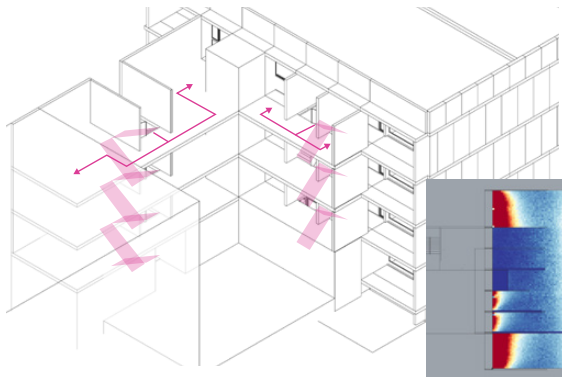




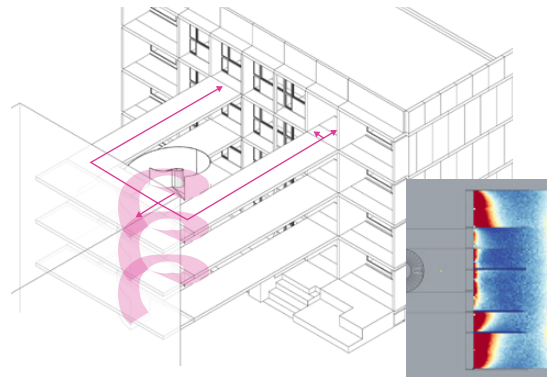
102. Isometric Stair concept 1 - 1,42 daylight factor



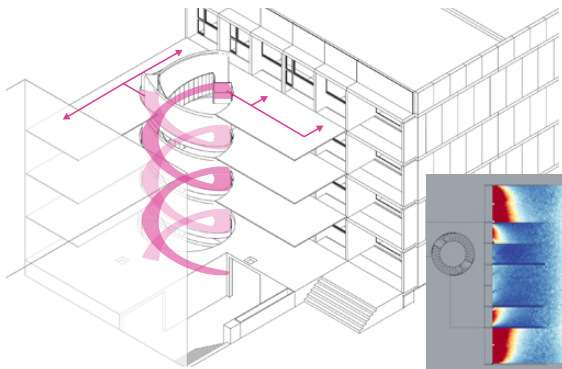
105. Isometric Stair concept 2 - 1,49 daylight factor



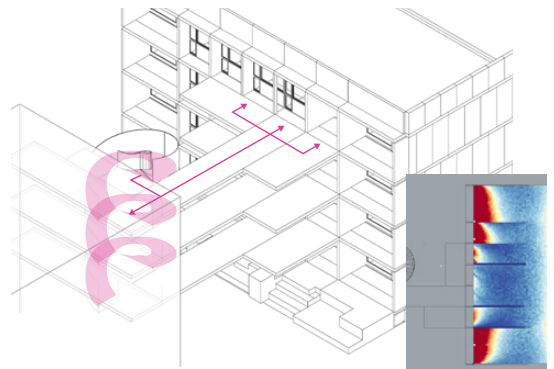
103. Isometric Stair concept 3 - 1,42 daylight factor



106. Isometric Stair concept 4 - 1,51 daylight factor



104. Isometric Stair concept 5 - 1,46 daylight factor



107. Isometric Stair concept 6 - 1,52 daylight factor

Construction concept

Problem

In order to carry the stairwell structure two concepts has been investigated. Being the only direct connection between the new dwellings and the original block, the articulation of the joint becomes essential for the overall architectural-tectonic appearance of the project. In the evaluation the following drivers were considered:

Design drivers:

1 Tectonic relation to block A7, 2 shade cast on building, 3 Empowering building process,

Design

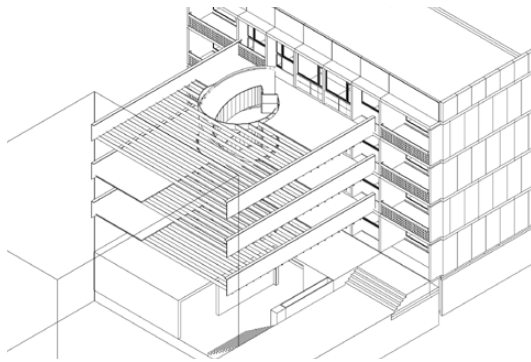
The original idea was a lightweight post and beam structure independent from the two building masses on either side. The structural appearance would be an abstract translation of the vertical and horizontal lines in the original block, but in contrast through slender wood structure opposed to the over dimensioned concrete construction. The main problem with this design is the somewhat chaotic appearance while the wood construction is vulnerable when exposed to weather.

The second idea was a steel bridge construction span-

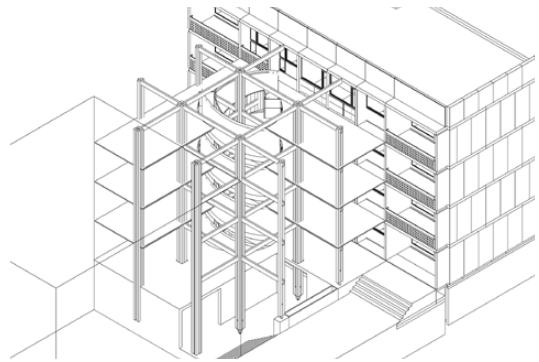
ning between the two buildings, providing a direct contrast as a spanning structure against the compression concrete. Bridging the new and the old, while giving a less obstructed expression due to the lack of beams and columns.

Evaluation

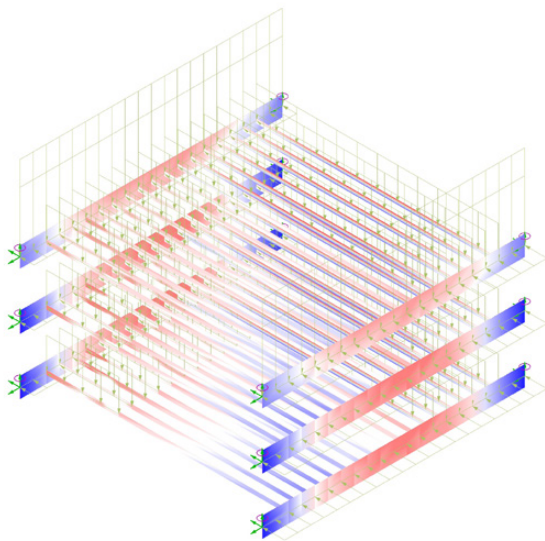
The bridge works as a symbol for the joint effort where both the original- and new residents lift each other and the area. The unobstructed view and the tension between the two type of construction makes this the most interesting proposal. Likewise, the lack of columns provides more daylight for the balconies.



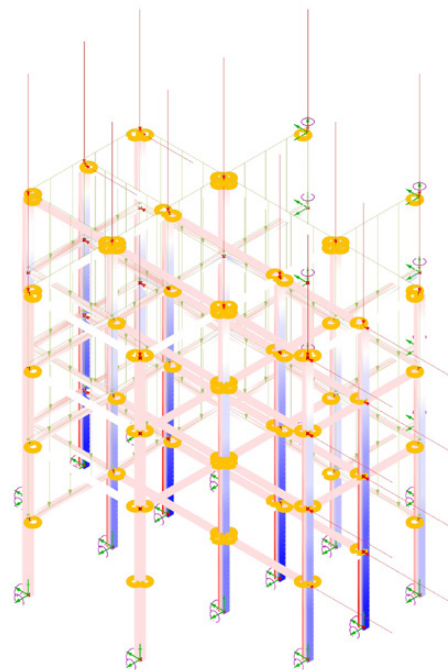
108. Isometric Bridge construction



110. Isometric Post and beam construction



109. Isometric Bridge construction



111. Isometric Post and beam construction

Shared stairwell - Original structure notes

Problem

With the balcony construction decided, the spiral stair needed to be detailed next. The most important factors in the decision is the ability of the stair to act in connection with the bridges and provide stabilization against lateral buckling of the beams. Architecturally the articulation of this connection and force distribution between the two had to be clear. Finally, the ability to both create visual connection between the residents as they ascend the stairs was considered.

Design drivers:

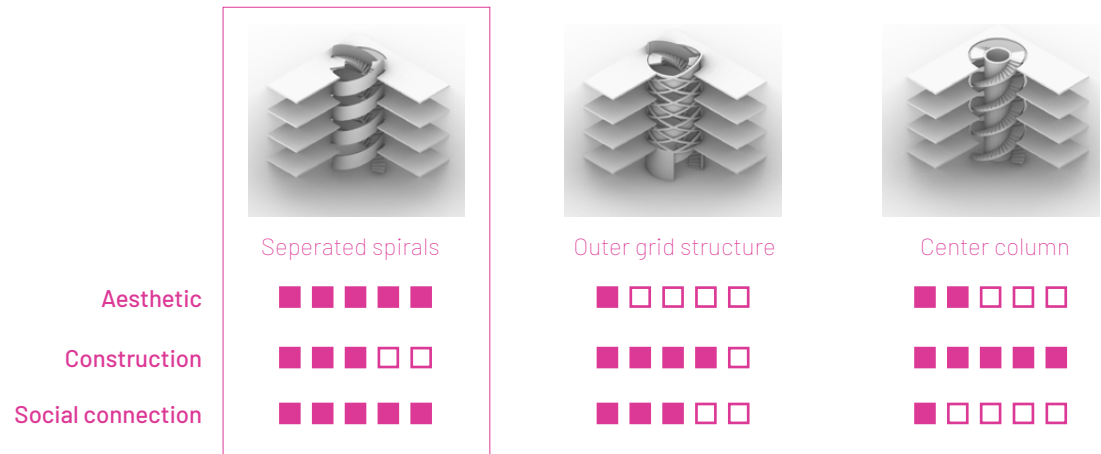
- 1 Construction ability
- 2 Tectonic relation to block A7, 3
- Visual connection between residents

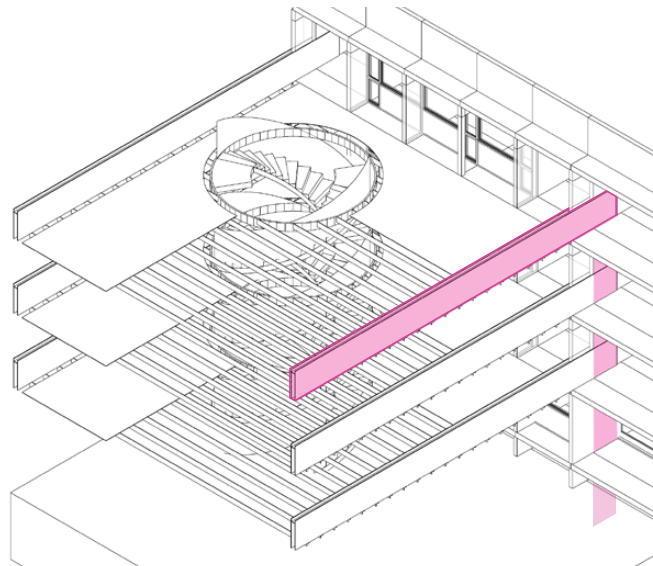
Design

Three variants were tested. In the first each part of the spiral was separate and carried in the top and bottom

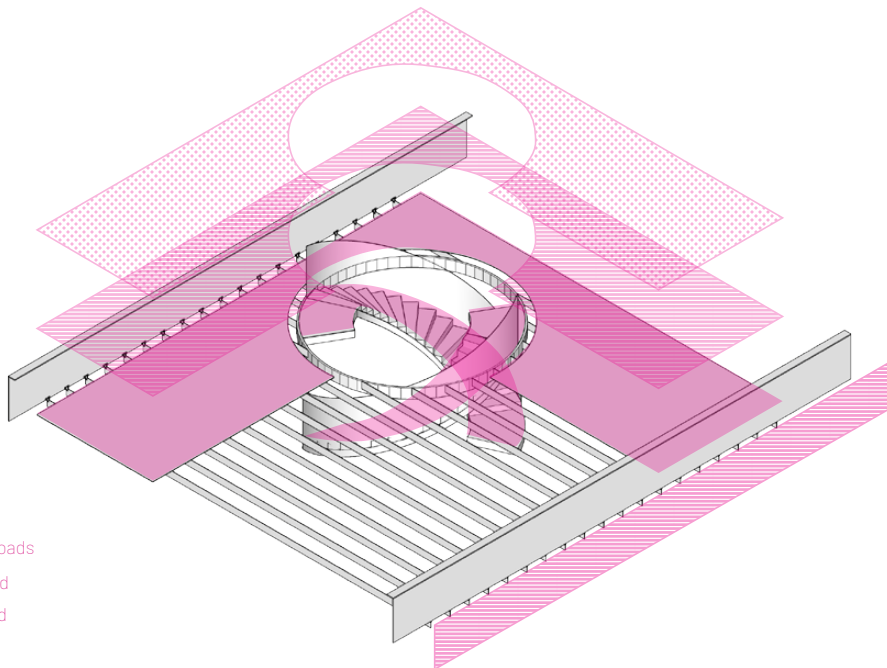
by the adjoining balcony bridges. In this way the stair becomes a simple multipart structure, that can easily be transported to the site. The center of the double spiral remains open, allowing visual connection in-between, and because the stairs connect the balcony bridges vertically, they are stabilized. However, the bridges have to carry the load of the stairs and its occupants.

The second idea was a exterior grid structure, making the stairwell self-carrying. The grid could likewise be utilized to stabilize the bridges, but the joint between the two would be complex. Lastly a central column with the stairs revolving around was tested. To articulate the self-carrying nature of the stair a small gap would be implemented in the meeting between balcony and stair, make them two completely separated systems.





113. Isometric Critical elements



112. Isometric Loads

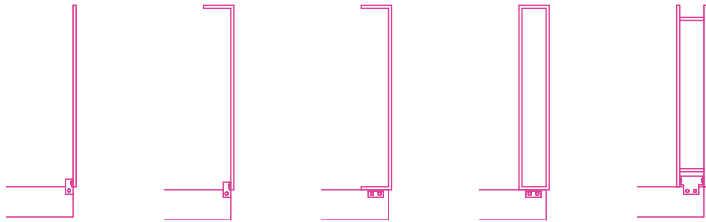
-  Snow load
-  Wind load
-  Live load

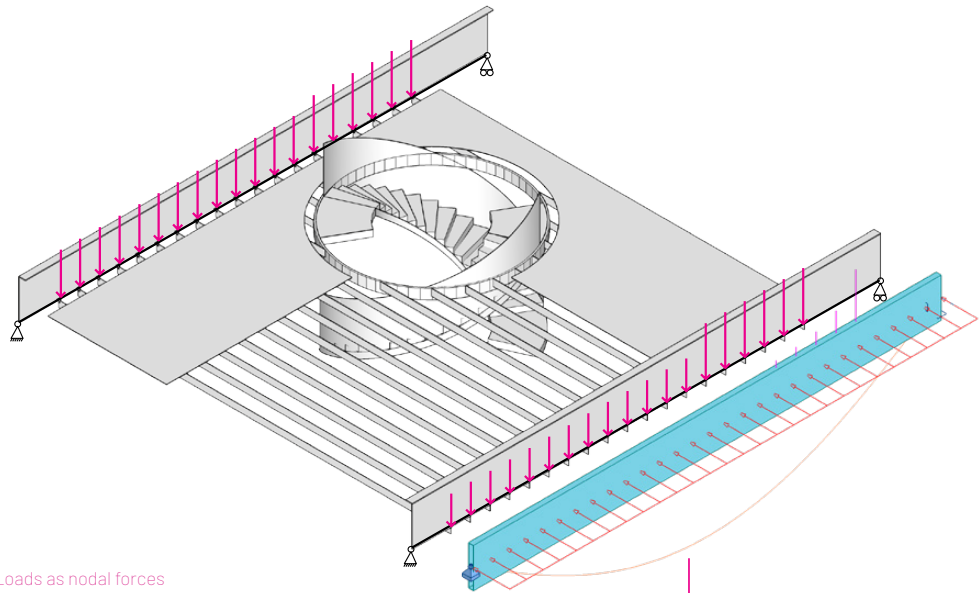
Shared stairwell - Structural optimization

The shared stairwell situated between the new housing and old block, will span as a bridge structure between the two. Spanning 12 meters, a large beam is required to carry the loads, and duo to the need for railing, the beam will be shaped in a way that acts both as railing and provides enough support. The critical beam will be the one at the top floor, as it is subject to more severe wind- and snow loads. The loads have been determined through Eurocode 1, and consists of balcony live load, bridge self-weight, wind load, snow load and stair live load and self-weight. The loads have been distributed based on area and divided into nodal forces affecting

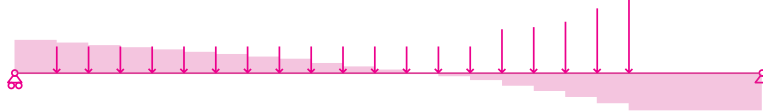
the two beams at the nodes where the underlying beam structure carrying the balcony floor is joined with the beams.

The nodal forces are set to act in the bottom of the beam, as the underlying structure is attached below the beams. The stair structure is carried by the bridges and act as stabilization of the structure, as it connects the three bridges vertically. Thus, each beam is defined to be braced against lateral buckling along the bottom at each node where the underlying structure is connected. With the setup completed, several steel sections were investigated in Autodesk robot:

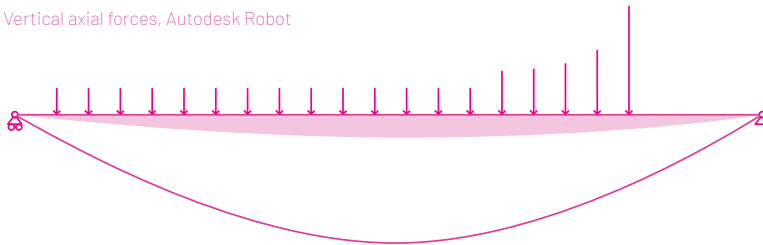
						
Thickness	20mm	20mm	20mm	10mm	10mm	10mm
Ratio	12,33	3,34	1,46	0,49	0,49	0,57
Weight	2660kg	2940kg	3230kg	2940kg	2990kg	2820kg
Displacement	154mm	24mm	13mm	15mm	15mm	16mm



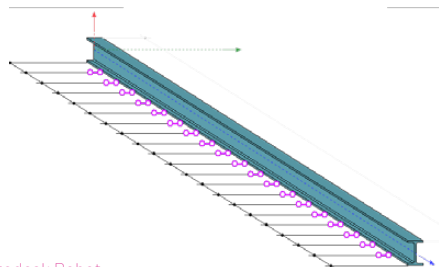
117. Isometric Loads as nodal forces



116. Force distribution Vertical axial forces, Autodesk Robot



115. Force distribution Bending moment, displacement, Autodesk Robot



114. Isometric Lateral buckling bracing, Autodesk Robot

Shared stairwell – Carrying the bridge through the original block

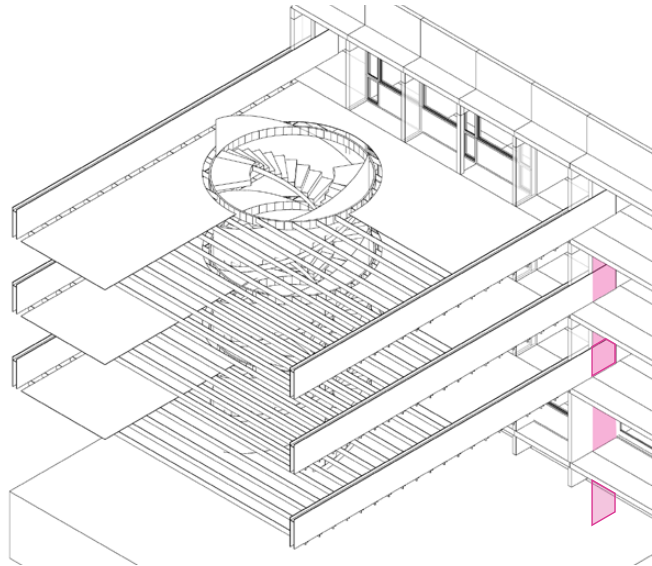
With the section for the beam selected, next step is to test if the original block can carry the load of the three bridges and connected spiral stairs. The force each beam affects the wall with is equal to the reaction force at one end of the beam in Autodesk Robot, and thus found in the previous analysis. Two critical parts of the old construction are investigated; the 2nd floor wall carrying the concentrated load of the bottom bridge joint plus the load from the above bridges and floors, and the basement wall carrying the combined load of both structures.

As the outer balcony structure in the original block is cantilevered from the building, the beams must go within the envelope, and connect to the inner wall in order to distribute the forces vertically. The joint between the beams and the walls are a large central bolt in order to avoid transfer of bending moment. The bolt is defined as a solid steel cylinder and investigated through robot as a beam supported in the center, with a nodal force equal to half the vertical reaction force of

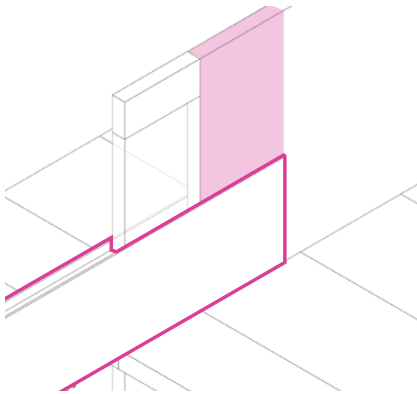
the beam at each end.

From the original structural documentation of the block, we know the load of each construction element including live load, wind load and snow load, and the strength of the concrete used. Thus, we can calculate the structural behavior of the two selected walls. The full calculation can be seen in appendix 1. First, the basement wall is analyzed. Because of the over dimensioned structure that can carry 8 floors, the added weight of the bridge is not an issue. Next is the 2nd floor wall. First the ratio of the wall with the added above loads, and the area of the joint subtracted is calculated. Then an iterative process begins where the size of the joint is calculated. Using robot to analyze the steel bolt by itself, and then the concentrated force of the joint is calculated against the part of the wall that carries it. Finally, the ratio of the top part of the wall carrying the above floors, and the part carrying the joint is put together. By using this method a central joint of 75mm is found:

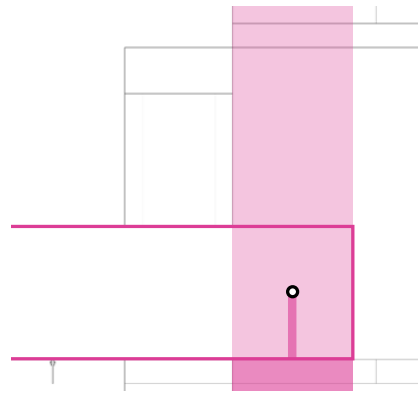
Joint width	118. 50mm	119. 60mm	120. 70mm	121. 75mm
Joint ratio	122. 1,55	123. 0,94	124. 0,59	125. 0,48
Support ratio	126. 1,14	127. 0,95	128. 0,817	129. 0,76
Combined wall ratio	130. 1,35	131. 1,17	132. 1,03	133. 0,98



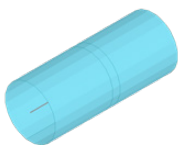
136. Isometric Critical wall section



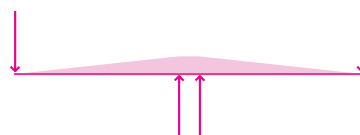
135. Isometric Wall section carrying bridge



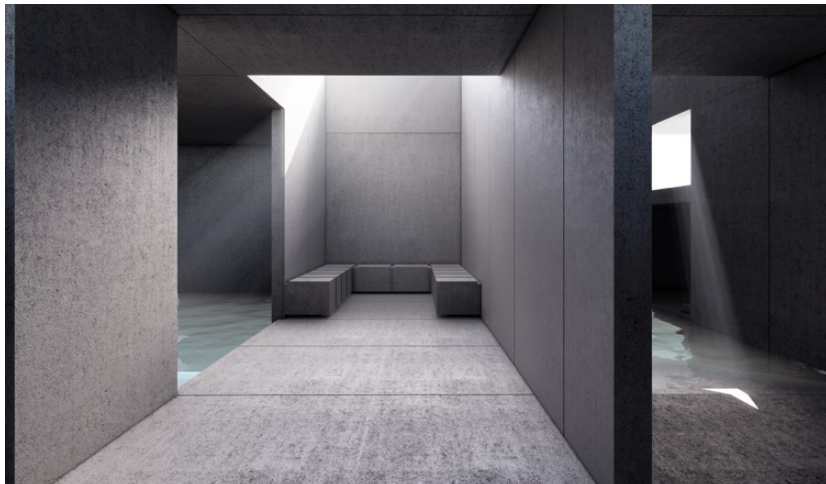
138. Section Critical wall section, forces from above floors and joint



137. Isometric Steel joint, Autodesk robot



134. Force distribution Steel joint, supported by concrete wall



139. **Visualization** the new housing as a translation of the concept



140. **Visualization** Light inlead change the perception

World bath as a gathering necessity

Problem

How can we form a relation between the neighbourhood in Aarhus, where visitors and residents meet through an everyday activity?

Design drivers

1. Encourage meetings
2. Enhance the hierarchy
- 3 Tectonic relation to block A7

Design

Baths are in some of the eastern cultures cultivated almost as a regular necessary activity. In that regard the Development Plans suggestion of a construction of a world bath seems to be highly relevant, as an activity that would benefit both residents and visitors. We see the world bath as a mean to generate a relation between Gellerup in Aarhus. A relation that could make way for a new understanding and image of Gellerup in its qualities as a neighborhood. Thus, the world bath must be situated in the original block, to highlight the transformation potential and quality of the robust architecture. Using the sensitive atmosphere of a bath, to sense the textile and light attentive architecture of the blocks in Gellerup. Furthermore, the world bath must be situated as part of the resident's necessities to form meetings between residents and visitors.

As an investigation it was examined how the existing concrete structure inside A7, could form sensorial experience only by adding water and light instead, to determine how it would fit for the purpose. The presence of water seemed to create a sensibility that high-

lighted the surrounding construction. Furthermore, it was investigated how breaking the rhythm of the modular structural system, could create spaces with attention to the unusual. Attention to the characteristic of the room. In a simultaneous process with the structural analysis of block A7 and the apartment plan development, it was investigated how removal of various concrete elements influenced the participation of the space. As an example, how the removal of the stair could transform the staircase to a light atrium.

Evaluation

The world bath inside the neighbourhood could make way for a new understanding of Gellerup, through the sensitive atmosphere of the bath and by interfering with a necessity of the everyday life of the Neighbourhood. Through the studies of the spatiality inside block A7, it was acknowledged, how the construction could form sensitive atmospheric condition for the bath.

Stairwell communities

Problem

How do we create quality in the stairwells that are not replaced by spiral staircases? The stairwells are currently designed to be the shortest route from car to front door. How do we implement optional activities and drag daylight into the stairwell, so that it encourages meetings between its residents?

Design drivers

- 1 Constructability
- 2 Design for social meetings between neighbours
- 3 Complexity of construction
- 4 Spatial quality
- 5 Functional flow

Design

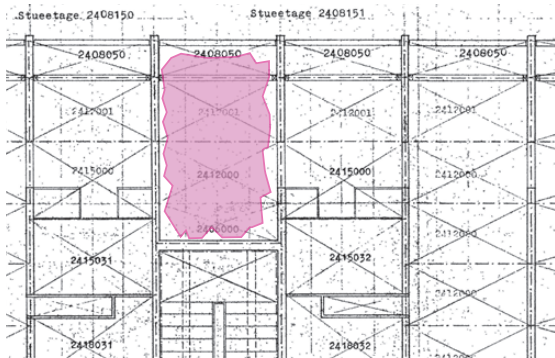
The only way to bring daylight into the stairwell is by breaking holes in the wall. The structural analysis proved that it is possible to manipulate the slab. When looking at the plan layout, the best solution is to open the staircase eastwards towards the square. This will remove the small bedroom of Apartment C, which is a spareable function. This creates the opportunity for creating a shared terrace, which is the platform for optional activities where the residents of the stairwell can enjoy the morning sun.

An issue is that the current stairwells are uninhabited. We suggest dragging out closets for jackets and shoes along with built-in benches, in order to drag life into the stairwell.

Evaluation

The structural changes are quite severe when breaking holes in bearing walls and removing slabs. The process will be noisy and dirty, as the reinforced bars has to be severed and the slab grinded away. The decision is justified by the value it provides to the residents, that now have a platform for optional activities and daylight in their stairwell.

It is important that there are communal functions in every step of the hierarchy. The new, shared furniture will be where neighbours sit down to tie their shoes before leaving the stairwell together.



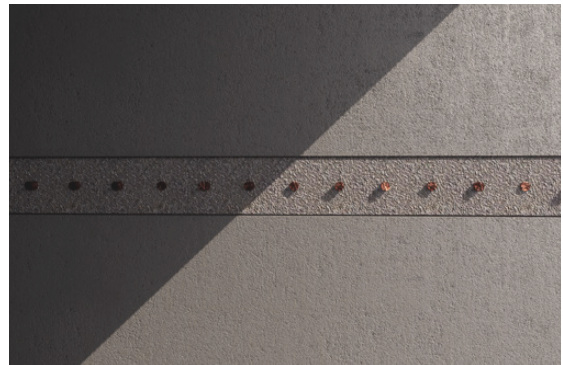
145. Plan Small bedroom of Apartment B will be removed



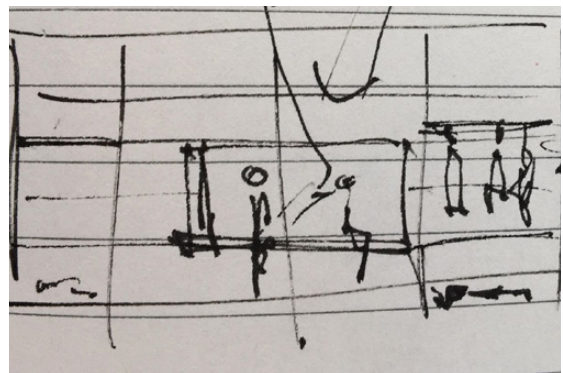
141. Render Entrance from courtyard



142. Render Shared seating area towards the busy square



144. Street view Raw appearance of re-bars



143. Sketch Neighbours sharing furniture outside their apartment door

Apartment renovation

Problem

The circulation system presents a new flow for the original apartments with different entrances than before. How do we place these entrances and how does it functionally affect the apartment layout? The current rooms of the apartments are multi-functional, which in our opinion decreases their quality. How do we define spaces, in order to create the atmospheric qualities that relate to their individual function?

Design drivers

1. Create rooms with defined functions in order to design those spaces with their specific atmospheric qualities.
2. Functional plan layout.
3. The life of the residents should be disturbed as little as possible during the renovation.
4. Structural changes should be within reasonable difficulty.

Strategy

We need to re-think the plan layout in order to facilitate the new flow. A quality from the original plans is the built-in furniture, which should be implemented and developed in the renovated apartments as well. There will be a focus on the specific function of a room and how it is spatially perceived. This is presented through plan drawings and spatial visualisations through the next four spreads, each with a different angle on the problem and a conclusion of the result.



146. Photo Hallway in renovated Block B4

Apartment renovation - the open kitchen

Design

The functions of the current apartments are clearly divided. Do we need to open up the spaces in order to create a coherent apartment? This can be achieved by breaking down the wall between kitchen and living room, creating an open kitchen and a clearly defined hearth of the dwelling.

The narrow, un-used balconies should be utilized. This can be done by either moving the envelope outwards to create larger rooms, or by moving it inwards, creating larger balconies.

The current bathrooms are enclosed and dark. As a solution, we extended a bathroom to the envelope, in order for it to get more natural light.

Evaluation

The utilization of the balconies along with bringing daylight into the bathrooms are qualities that we have to develop further.

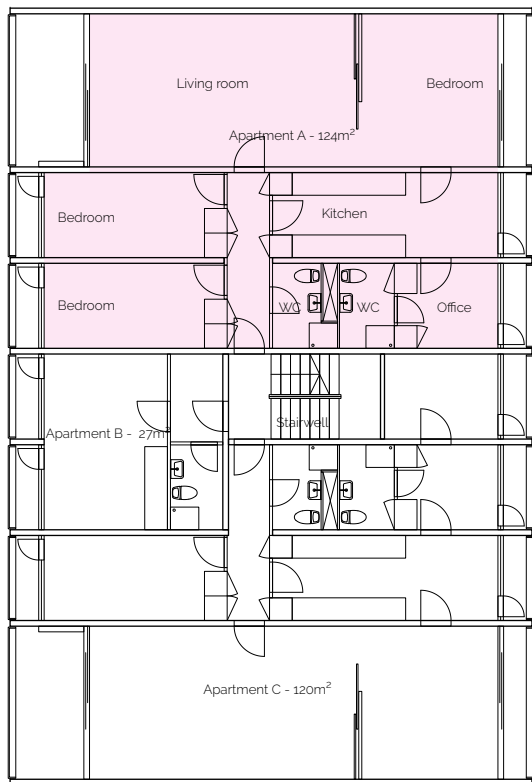
The structural changes of this renovation are quite severe, requiring removing large parts of the load-bearing wall between kitchen and living room. This will be both expensive and intrusive on the family that lives in the apartment. Is there way to make fewer disruptions during the renovation?



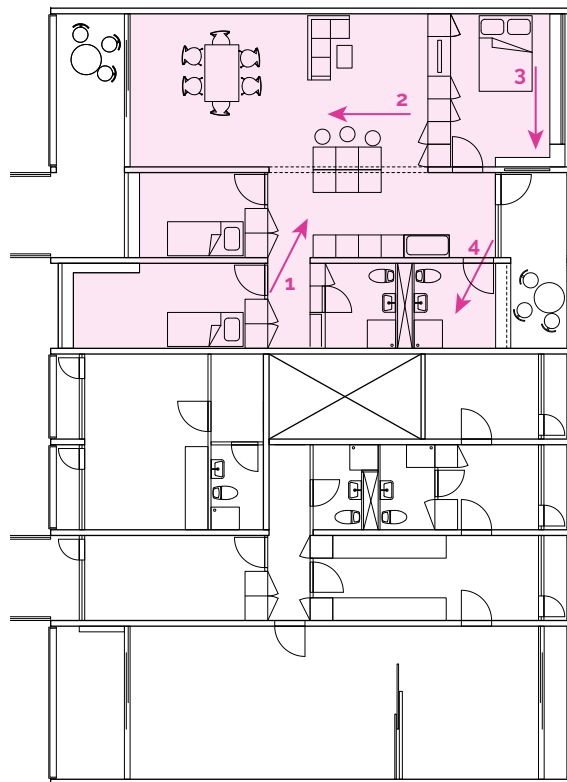
147. Render Open kitchen



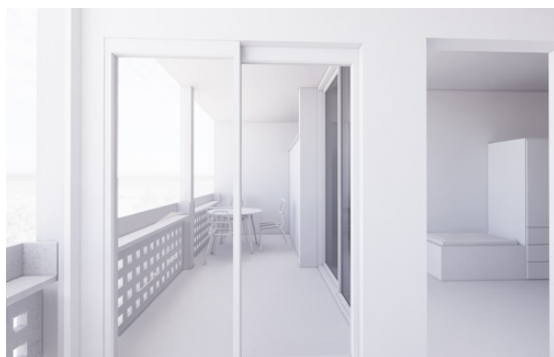
148. Render Living room



151. Plan Original 1:200



152. Plan Modified 1:200



149. Render Balcony



150. Render Bathroom

Apartment renovation – the corridor

Design

The load-bearing walls that are structurally difficult to manipulate spans from one façade to the other. Is it possible to solve the plan mainly by relocating the space-dividing walls?

A distinctive element of the original plan layout is that the kitchen that also serves as active hallway space is located at the very center of the apartment. Can this be taken to the next level by extending the kitchen to go from one façade to the other, functioning as the main artery of the dwelling, feeding the residents into all the adjacent rooms?

Evaluation

The corridor creates a clear definition of an apartment-core that connects all flow in the household. It is a quality that there is visual contact throughout the entire apartment when you enter the front door. Furthermore, this solution is an acknowledgement to the original, functional plan layout.

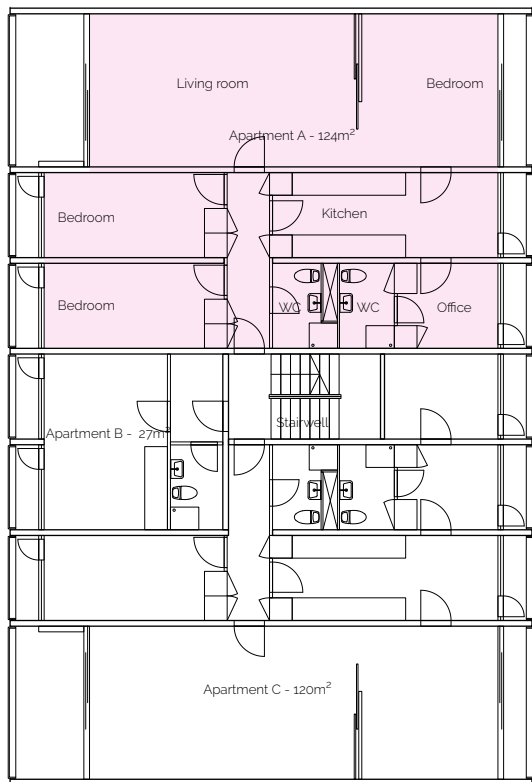
The corridor will be the plan concept throughout the renovation. Though, there is an issue in the apartments that had their living room-module removed due to the infrastructural change of implementing the new road system. How can these apartments be solved?



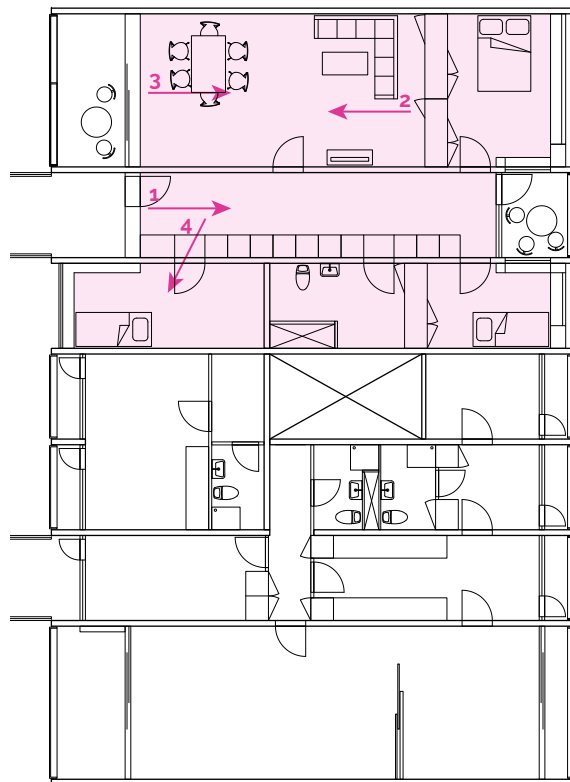
153. Render Corridor



154. Render Living room



157. Plan Original 1:200



158. Plan Modified 1:200



155. Render Living room



156. Render Using the wall as furniture

Apartment renovation - the cut

Design

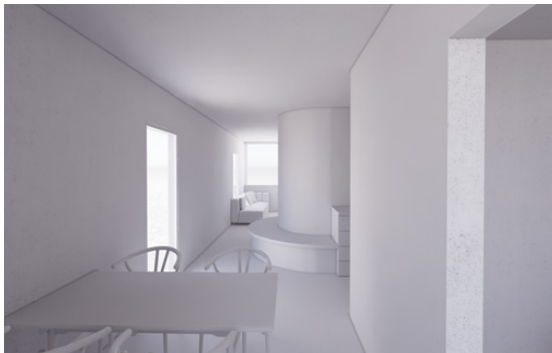
The apartments that are affected by the infrastructural changes will have their living room and master bedroom removed. As we have stated previously, the quality of an apartment is not the number of square meters, but rather the quality of them. The cut makes it possible to implement windows in the gable, which creates a unique opportunity to follow the life on the re-designed public square, while bringing additional daylight into the kitchen and living room.

The new spiral staircase is the symbol of a changed block A7, where residents are socially elevated in their new neighbourhood. Can the same organic shapes be brought into the apartments as well? This is imple-

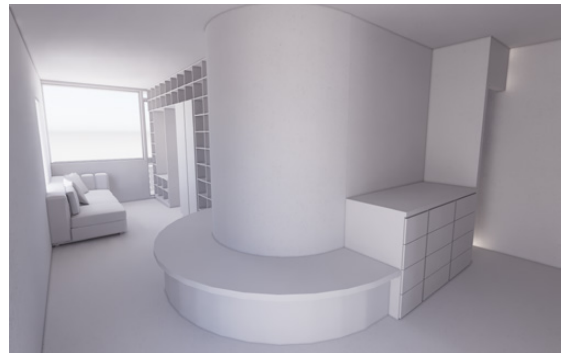
mented in the re-designed bathroom, where the curve creates a subtle separation between living room and kitchen.

Evaluation

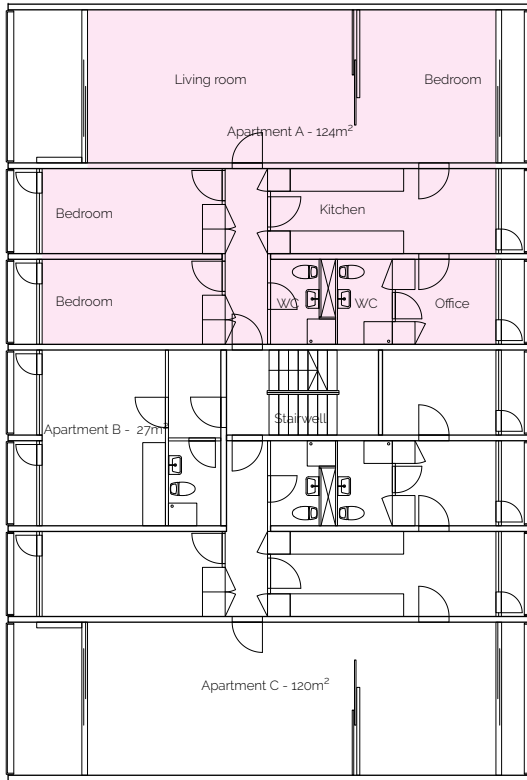
The space-dividing furniture serves a functional purpose, but the structural changes in the load-bearing walls it requires does not make it up for the function. Maybe the circle can be brought to use in another aspect. Furthermore, the only bathroom in the apartment has no natural daylight. The new spiral staircases release the function of the original stairwells. Can they be utilized in order to bring light and spatial quality to the dark bathrooms?



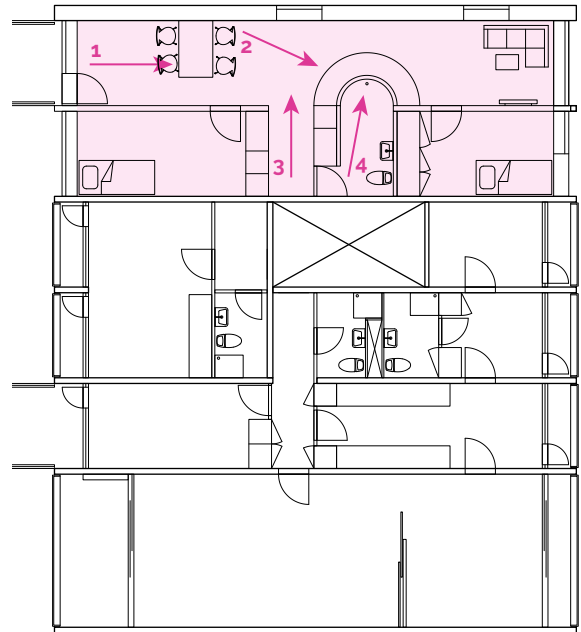
159. Render Entrance



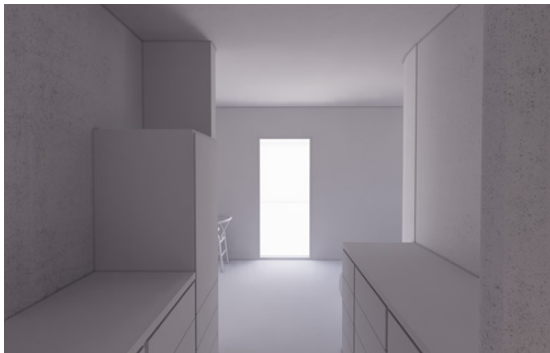
160. Render Living room



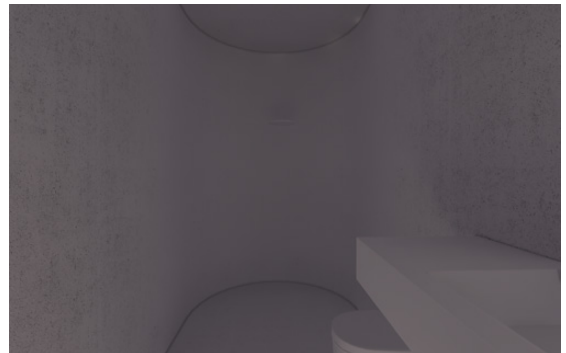
163. Plan Original 1:200



164. Plan Modified 1:200



161. Render Kitchen



162. Render Bathroom

Apartment renovation – the atrium

Design

We know from the constructional analysis that the stairs can be removed from the stairwells. It is therefore possible to create a lightwell from the ceiling all the way through to the basement.

The apartments already have openings towards the atrium where the front doors used to be, which can be used for windows. Privacy is a core design driver when designing bathrooms, which is why it is never possible to look from one bathroom to another. The only visual connection through the atrium is in Apartment B, between bedroom and bath, that after our renovation is fit for a couple.

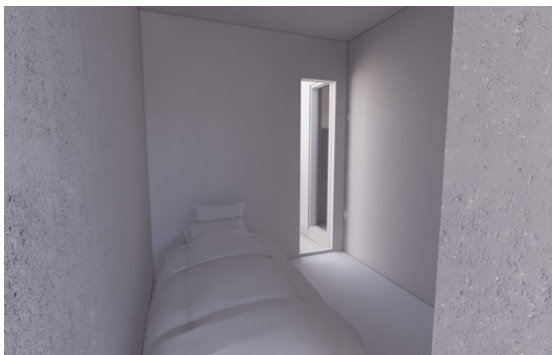
We want to emphasize the life in Block A7. This is exemplified by shadows that will be cast on the northern wall of the atrium, reminding the residents of the life that surrounds them, without violating their private

spheres by direct visual contact.

We also believe that the bathroom is an important necessity of the family, that too often is low priority in the architectural design. Similar to the necessities of the neighbourhood, could a bathroom be a gathering point in the daily necessity of the family. Where the experience of brushing teeth could enrichen the everyday life?

Evaluation

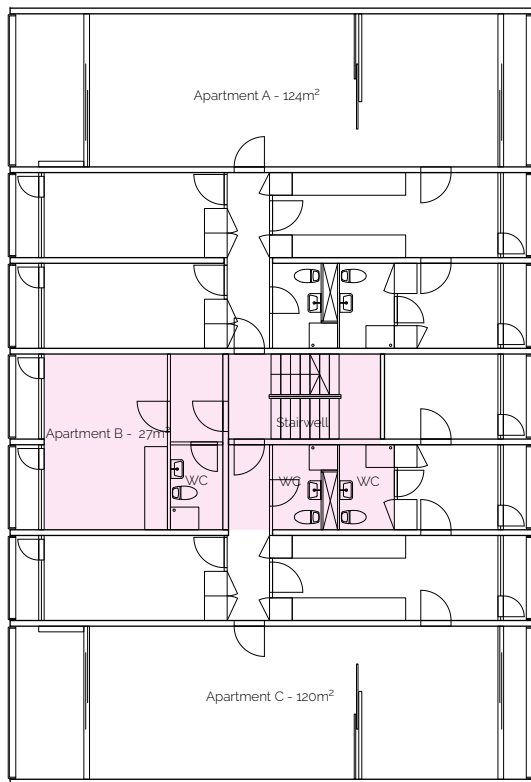
The bathrooms will not achieve an average daylight factor of 2%, but that does not matter. It is the quality and not the quantity of light that defines a space. The bathroom is a personal space that serves well to be dimly lit. The natural light emphasizes the tactility of the concrete modules that run throughout the atrium, which the residents can enjoy while contemplating in their bathtub.



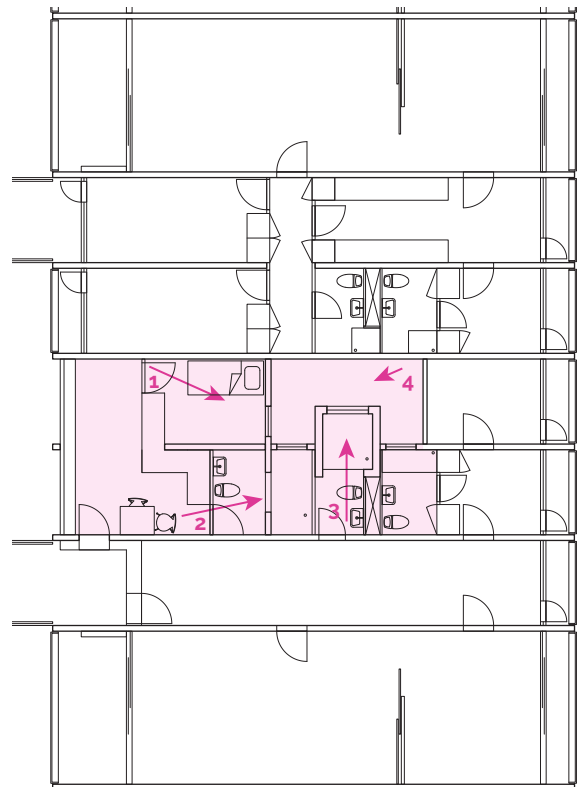
165. **Render** Visual connection from bedroom to shower



166. **Render** Shower entrance



169. Plan Original 1:200



170. Plan Modified 1:200



167. Render Bathtub



168. Render Former stairwell serves at atrium

Envelope renovation - energy estimates

Problem

The envelope of the original block is outdated, the narrow balconies are impractical, and the daylight maximized without any regard to the function and privacy of the room. In the process of transforming the area it becomes obvious that the envelope needs to be renovated by addressing the above concerns. First step was to investigate the impact on energy consumption, radiation heat gain and daylight factor at an overall volume level to determine a strategy.

Design drivers:

The design drivers for the process in hierarchical order was the following:

1 Energy, 2 Radiation, 3 Daylight

Design:

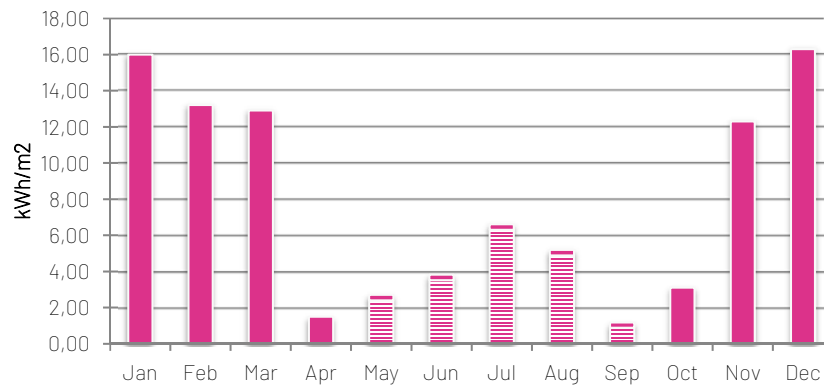
Step one was to do an energy calculation on the original block utilizing Building Energy 18 (BE18). This evaluation determined that the original block has a total energy frame of 95,5 kWh/m² pr. year, 3 times as much as the energy frame from the building regulations of 2018 and double the amount for a renovation class 1 certificate. Looking closer at the numbers, the most significant energy consumption is the need for heating due to the excessive heat loss.

By installing new low energy windows and adding extra insulation to the gables, roof and basement the energy frame falls to 67,4 kWh/m² pr. Year, just within of the renovation class 2 certificate. Looking closer at the numbers, the most significant energy consumption is now overheating, due to the low transmission loss.

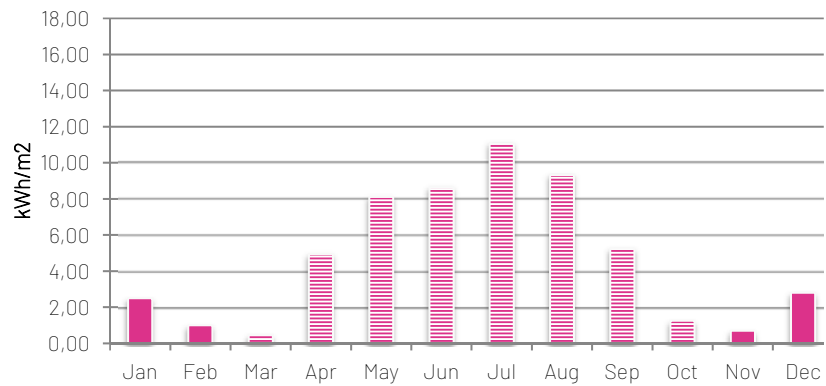
As stated in the analysis, the urban plan and panoramic windows in every room is a result of a quantitative approach to daylight, with focus on maximization. In our transformation, we want to create quality light-in-lets, that take the specific room function into account, both in terms of privacy, which time of day the room is in use and what kind of light; direct or diffuse needed for the function. This approach likewise gives us the possibility of decrease the window area of the block, both minimizing heat loss and overheating.

Evaluation

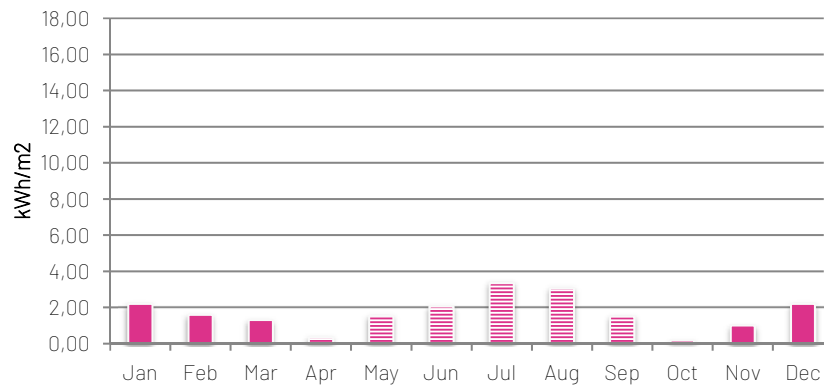
Numerous amounts of infill, and shading types was tested until the energy level got to an acceptable level. The final graph on the next page show the balance between heating and overheating for a renovation where the window area towards west has been decreased by 50% and shading elements has been added to each window on the east façade, for an energy frame of 31,4 kWh/m² pr. year.



171. Energy consumption Original block ■ Room heating ▨ Excessive room temperature



172. Energy consumption Low energy envelope ■ Room heating ▨ Excessive room temperature



173. Energy consumption Shading and infill walls ■ Room heating ▨ Excessive room temperature

Envelope concepts

Problem

With the decreased window area and added shading we move beyond volume studies in order to investigate the options for achieving less energy consumption. Moving towards a more detailed solution, several additional parameters comes into play.

The structural capabilities of the original balcony define how much additional weight can be placed outside the original envelope. As the investigation is the first step in determining the new façade expression on the block, aesthetic considerations regarding the articulation of the original façade subconsciously comes into play. It is something that we need to acknowledge in our decision making, because it is highly influential in the direction put forward. Thus, in the forward investigation the ability of the façade to create a new face of the block, lifting it from its stigmatized monotony while not erasing the architectural heritage will be a highly

prioritized design parameter. Within this parameter tactility and durability of the materials likewise is important, in order to achieve a long-lasting outcome of the transformation. Finally, the possibility of including the residents in the process is something that needs to be considered in the choice of detailed solution.

Design drivers:

The design drivers for the process in hierarchical order is the following:

1 Energy, 2 construction ability, 3 aesthetic, 4 Empowerment

Design:

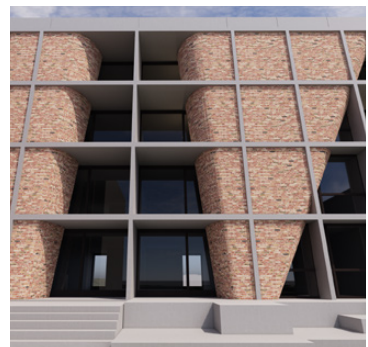
The added envelope structure can be achieved in numerous ways. As the original structure is still load bearing, and the vertical lines are exposed in the façade, we find it important to emphasize the in-fill nature of the



174. **Brick Infill** Distance to next deck



175. **Brick Shade** Open bonding



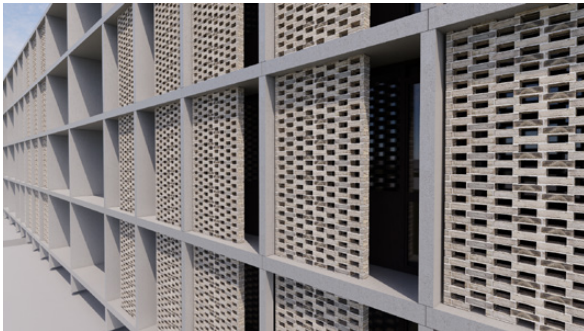
176. **Brick Infill** Extending beyond rectangular grid



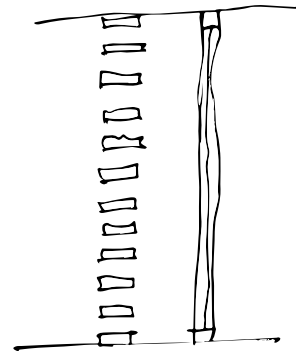
177. Shading Moveable steel shutters



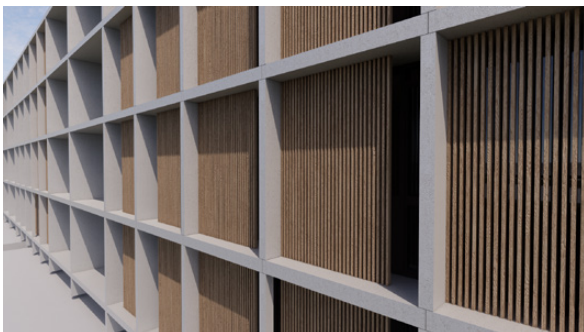
178. Detail Moveable steel shutters



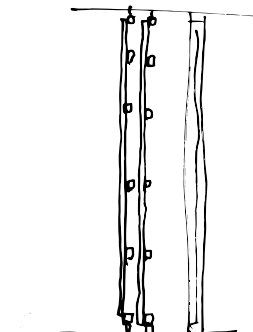
179. Shading Bricks open bonded



180. Detail Bricks open bonded



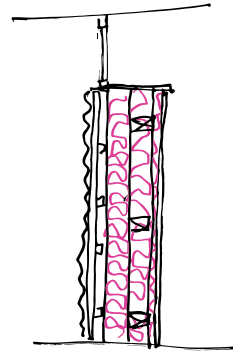
181. Shading Wood lamella shutters



182. Detail Wood lamella shutters



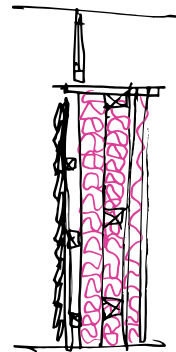
183. Infill Steel cladding



184. Detail Steel cladding



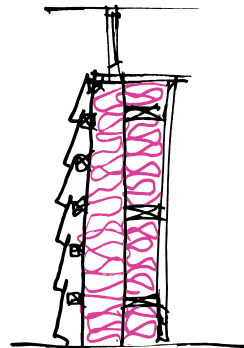
185. Infill Wood cladding



186. Detail Wood cladding



187. Infill Ceramic shingle cladding



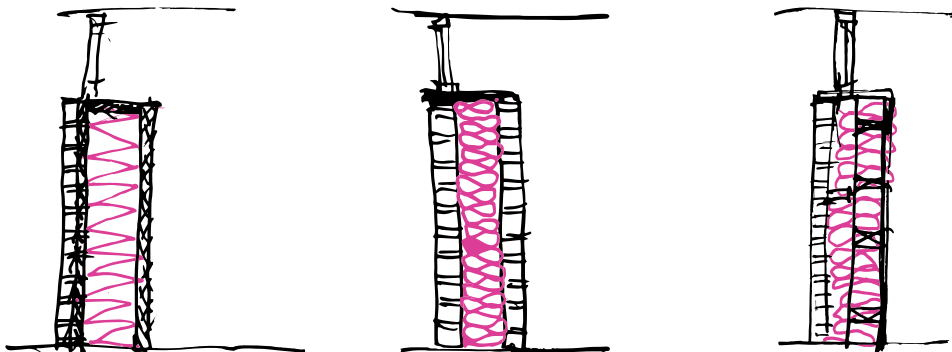
188. Detail Ceramic shingle cladding

wall. This can be done either by materiality or by creating a gap between the top of the wall and the next concrete deck. Early concepts involving shapes spanning across the rectangular grid of the façade, was considered atectonic as it appeared loadbearing.

Evaluation

The use of bricks as both in-fill cladding and shading element was chosen because of its ability to provide robust, tactile and most importantly warm materiality to the plasticity of the concrete blocks. Because the walls are not load bearing a regular bonded brick was deemed atectonic. Instead we will investigate a system where the brick is visibly a cladding on the infill walls, and simultaneously has diverse shading capabilities. The new envelope will be placed 100mm outside the old, allowing for that to work as a dust shield during

construction. By placing the envelope, a little further towards the edge of the balcony we completely remove the access to the narrow balconies and concentrate the outside space on original deep balconies facing west. This means that even though we place additional mass on the cantilevering structure that carries the balcony, we don't apply excessive load because the balcony liveload is no longer present.



189. Detail Bonded brick walls

Configurable system

Problem

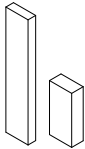
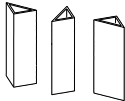
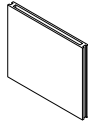
Moving beyond the need for infill and shading in an energy sense, an investigation into a configurable ceramic cladding system that can achieve diverse spatial qualities within the different rooms through diffusion and orientation of light began. Because of the parametric nature of the room specific task of controlled shading, the assembly method becomes an important part of the system. We propose to use the 21st equivalent of the highly modern building process Gellerup originally was created with, and suggest this is achieved by using robotic fabrication of the façade systems.

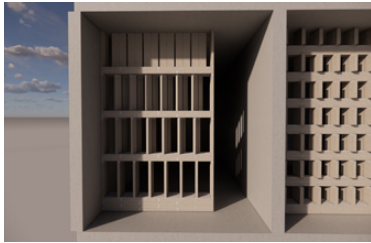
Design drivers:

1 Parametric possibility, 2 Robustness, 3 aesthetic, 4 Empowerment

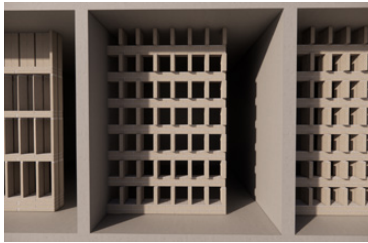
Design

In the process of investigating systems, we looked towards the Cobe project: Tingbjerg Library, which uses a ceramic cladding of long hollow lamellas. (Cobe 2020) The production of these are using a method called extrusion, where clay is pressed through a hole shaped as the desired section. By using this production method, we came up with a couple of new systems that could be used as a standard for using the tactility and robustness of the brick, but in a shape that allows for a more tectonic and flexible assembly. (NBK 2020) In our decision of system, the construction process and its ability to empower the residents through small work tasks was also considered. As we ourselves has worked with robotic fabrication during the master, we know there is a simple task in feeding the robot with each next brick. The idea of allowing the unemployed resident to be a robot-manager could be a powerful way of empowering.

	 Regular bricks	 Triangular ceramic tile	 Ceramic tile
Parametric options	■ ■ □ □ □	■ ■ ■ □ □	■ ■ ■ ■ □
Robustness	■ ■ ■ ■ □	■ ■ ■ □ □	■ ■ ■ □ □
Aesthetic	■ ■ □ □ □	■ ■ ■ □ □	■ ■ ■ ■ □
Empowerment	■ ■ ■ □ □	■ ■ □ □ □	■ ■ □ □ □



190. Stacked Kolumba bricks



201. Stacked Regular bricks



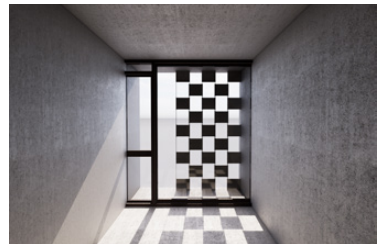
191. Interior Kolumba bricks



194. Suspended Ceramic tile



195. Suspended Ceramic tile



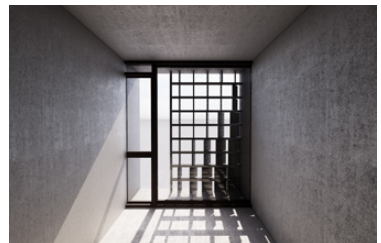
196. Interior Ceramic tile



199. Steel frame Ceramic tile



200. Steel frame Ceramic tile



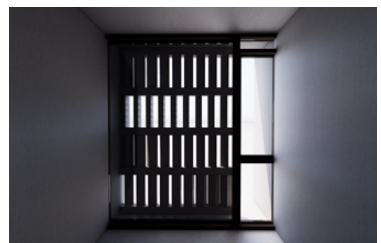
197. Interior Ceramic tile



192. Stacked Triangular ceramic tile



193. Stacked Triangular ceramic tile



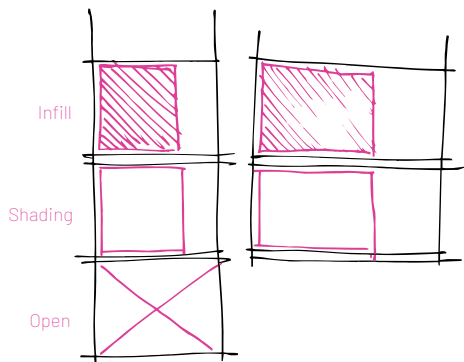
198. Interior Triangular ceramic tile

Parametric optimization

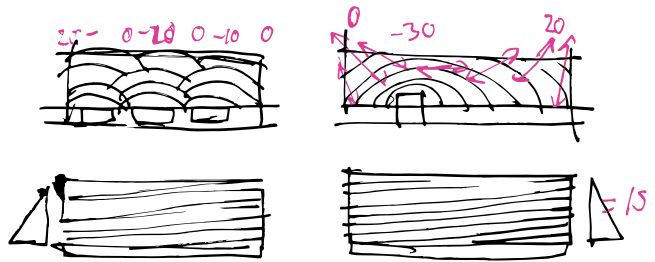
Problem

Finally, the configurable system is defined, and the optimization of the façade can begin. It is quite important to understand the individual parameters, their hierarchy and influence on each other in the creation of the optimization system. First, the spatial experience in each room type must be addressed, so the energy optimization provides spatial- and atmospheric quality in addition to better energy performance. Because this approach would create an optimal solution for each room function, and the room function distribution are the same for each floor, the entire façade would end up clearly separated into multiple vertical ribbons. Thus, a second parameter comes into play, establishment of façade variation to combat the stigmatized monotony of the original block.

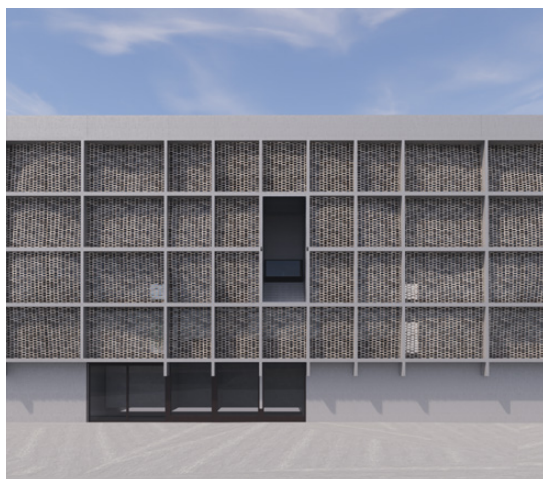
Then comes the question of daylight and privacy, which greatly varies based on room function and location in the façade. First, there is a horizontal distribution of privacy based on the distribution of public functions towards the square, for instance there will be more people going towards the entrance of the world bath and thus more need for privacy for the adjoining apartments. Then there is a vertical distribution of privacy as an apartment on the 4th floor is less subjected to exposure, but at the same time the need for daylight is distributed reverse of this. The balance between the two is greatly influenced by the first two parameters and is dependent on decisions made by us rather than generated by the parametric tool.



203. Variety Types of openings



202. Privacy Horizontal and vertical facade privacy parameters



205. Parametric Full pattern



206. Parametric 2/3 pattern



204. Parametric Infill and shading



207. Parametric 2/3 pattern shifted

Design drivers:

1 spatial quality, 2 aesthetic diversity, 3 daylight, 4 privacy

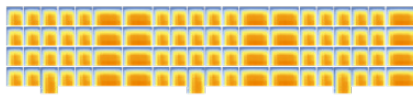
Design:

The process becomes a balance between generating shading elements that gradually rotate more and more towards the bottom, while rotation them away from the public functions in the façade. Afterwards the in-fills was introduced in a select number of rooms which function allow for less light in take. Likewise, shading elements gets removed in select rooms where the function allows for more exposure, allowing for a more diverse façade expression, and unique atmospheric experiences from apartment to apartment.

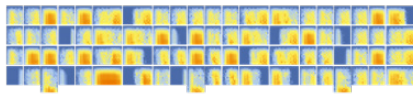
Thus, the system is computationally based on daylight and privacy and then manipulated according to less measurable architectural values, such as spatial quality and diverse façade expression, overwriting the lower ranked design drivers.

Evaluation

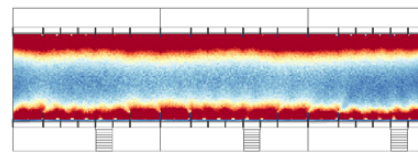
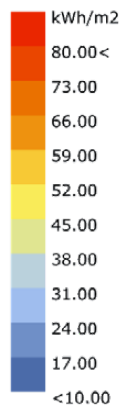
After this was done for an entire façade the design was tested and validated using radiation and daylight simulation, before the start of second loop with adjustments based on experience from the first loop. Ideally this process could continue through several iterations, but time considerations in the overall schedule of the project came into play, and the façade was decided after the second loop.



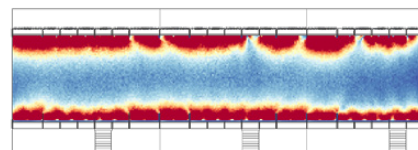
210. Radiation Original envelope



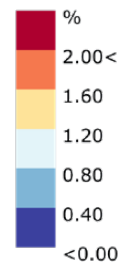
208. Radiation New envelope



211. Daylight groundfloor Original envelope



209. Daylight groundfloor New envelope





213. Kitchen Panoramic window



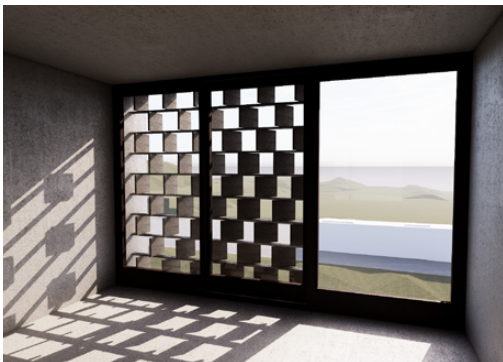
215. Kitchen Shallow angle diffusion



214. Bedroom Medium angle diffusion



216. Bedroom Infill wall



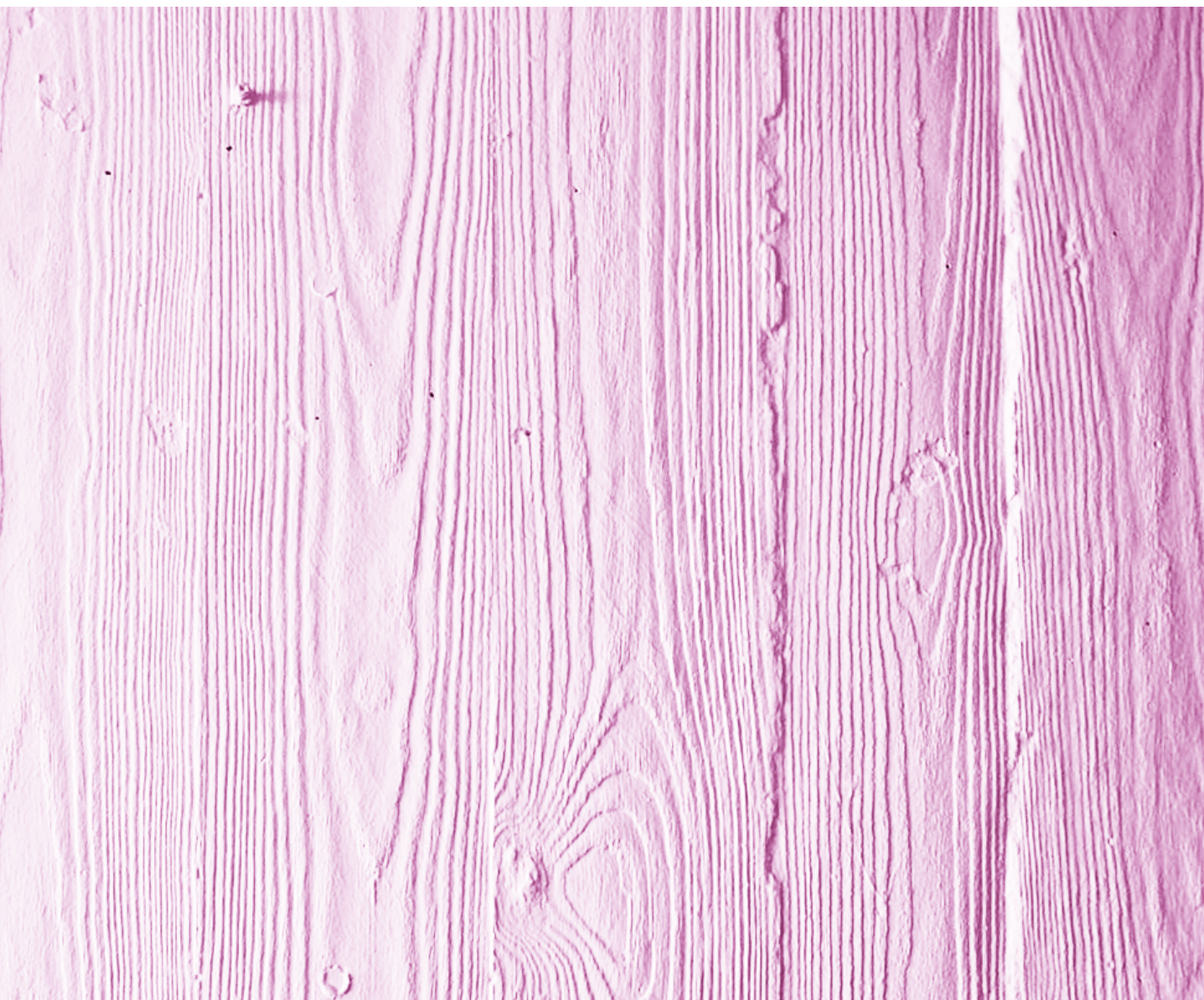
212. Bedroom Steep angle diffusion



217. Bedroom Infill wall



218. Visualization Concrete formwork block A7



Conclusion

Sustainability must elevate

The world is currently experiencing an ecological crisis of which the building industry is responsible for 39%. This demands new, sustainable solutions. It is important to understand sustainability in a holistic manner, consisting of both social- economical- and environmental aspects. We believe sustainable development must be defined as development that not only sustains but elevates the abilities of future generations, giving them a better platform for their lives.

Utilize the build environment

The Ghetto Package 2018 declared 1000s of functional buildings to be demolished where 900 dwellings are in Gellerup alone. Our solution is to utilize the built environment we already have, instead of building new. This thesis regards the renovation of Block A7 and its inclusion in a defined, social neighbourhood with focus on phenomenological experiences in the everyday life. The project is designed with a tectonic approach where we, as architect-engineers, comprehend the synergy between contemporary technological knowledge, the social- cultural- and political-agenda, and the architectural task of creating a space that through spatial-, plan- and atmospheric means enriches the everyday life of people.

Form neighborhoods

A neighbourhood should provide a feeling of belonging and by that responsibility for the residents, which spans across age, income and family situation. We believe the answer lies in providing quality through spatial programming of daily necessities by implementing a so-

cial hierarchy of communal spaces, that spans across all levels in the hierarchical structure, to encourage the communal life in the neighbourhood. This thesis focuses on the flow of the everyday, which is emphasized by implementing necessity-hotspots where original and new residents can meet and develop social bonds in order to elevate the socially disadvantaged.

Encourage meetings

The current orientation and openings of the blocks causes issues regarding privacy in Gellerup and especially in Block A7 situated parallel to the new main infrastructural road Karen Blixens Boulevard and the future Culture Campus. The privacy issues are solved through a parametric, tectonic design involving, and thereby empowering, the unemployed residents of the new neighbourhood. The new parametric envelope around the outside of the neighbourhood, has large openings where the daily activities take place. The opening emphasizes the daily activities of the neighbourhood and repeal the monotone expression of the block.

Construct with the residents

The building process is planned to finish the core elements of the neighbourhood first, in order to give the current residents value in the construction process as early as possible. Furthermore, the renovation is designed to cause as little inconvenience as possible for the current residents. As the resident will stay in their homes during the renovation, to make sure that none of the residents needs to be relocate based on the TGP2018 legislation and to take part in the process of forming a neighborhood.



219. Photo Model of the new Gellerup Park at the housing office in Gellerup, 1971



220. Photo Model of development plan at Brarand housing associations office in Gellerup, 2020

Reflection

Meta - the theoretic approach

Our design approach of creating a comprehensive theoretical foundation along with our own methodology has been completely new to us. The idea of trying to weave all the engineering competencies and computational tectonic design in a sustainable design task where the solution was found in the nuances of the everyday life rather than monumentality of a cultural institution has presented us with a completely different design process. Moving from a 20/80 division between initial programming and detail design, the process has ended being 60/40 between theoretical framework and actual design. Because of this division, the decision making in the design task has been undertaken with a much clearer understanding of which questions we sought to answer. More importantly, every time the design progress has come to a halt, the answer has been found through additional theoretical investigation. It has presented us with the challenge of daring to go backwards and search for the right question instead of treading water and ultimately veering off the path originally created in the program. In the end this has given us a more understandable decision process, but also less time for design. Accepting this and limiting the detailing of the final design to selected areas has been a vastly difficult challenge.

The next brick

The holistic approach to sustainable design, that we have sought to promote, and utilize is a complex task to bring to fruition. As we have emphasized in the design process, the design will always be driven by various drivers, that changes in hierarchy through the de-

sign loops. We tried to create a parametric approach in the shaping of the envelope to assess the design task with as many considerations as possible. The design loops created through this approach is a process without an end, there will always be room for additional improvement. As the ever-increasing complexity and possibilities of the architect-engineers tools drives the architecture forward, it also presents the challenge of knowing when to stop.

Here, in this strive to assess sustainable architecture in a holistic way, the process, and likewise the tools, must also be seen in a broader perspective. Put simply, time is money and the balance between the quality achieved by distilling the ratio between amount of diffuse light, shadow casts along the bedroom wall, and lines of sight and the cost of the consultant doing the optimization compared to the expenditure on materials is a difficult equation in trying to achieve the most complete solution.

In our design there is without doubt flaws and shortcomings, and that will always be the case, as evident in Gellerup. Therefore, we would like to point out the importance of learning from history. We believe it will become essential to investigate the buildings of yesterday and elevate them through transformation, where material longevity provides the foundation for the next layer of bricks.

Culture

Which position to take regarding the ethnic diversity of Gellerup has been a major challenge. It is something

that cannot be ignored in the process, and easily could have been a main parameter in the design. In our approach of mixing the residents with new resourceful role models, the future success is heavily influenced by the areas' ability to allow for the wide variety of ethnic groups to lift each other. We know that there is a stark contrast in the role of men and women in certain cultures and could have gone into detail with a design that allowed for gender specific necessity flows and activities. For instance, the World bath is designed to be equally used by men and women, but culturally a Turkish bath is a male dominated activity. However, we believe that a gender equal approach is a prerequisite in the 21st century.

In the design of the dwelling we are confronted by the same dilemma. For the Muslim ethnography, the dwelling is a breathing space where the women do not have to wear a veil. This in turn means that the building itself needs to be veiled, evident in the numerous curtains seen in Gellerup today. In the final design the new envelope has been designed with regards to the spatial quality, daylight, and privacy-level of the room specific function. For us, privacy is something entirely different, and never a complete veil of the room. Thus, we expect that curtains might still be part of the image of Gellerup. However, we believe that it is not the task of the architect to veil his building.

Corona

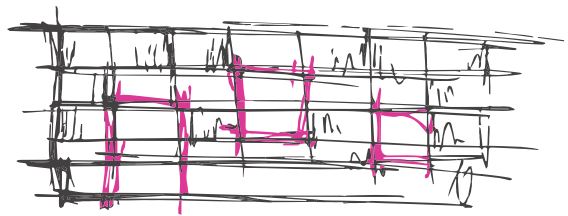
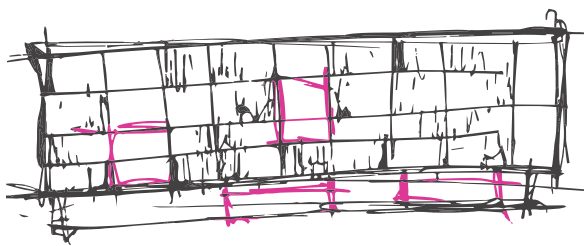
The economic conjectures are always rising or falling. When we began writing our project description back in November 2019, our focus was first and foremost the

disbelief we felt seeing the vast expansion of Aalborg around us. The clear focus on quantity over quality was so evident, and while the economy was still moving forwards there were rumours of an incoming low conjecture. Simultaneously news of thousands of empty dwellings began circulating and the irony of an ever-increasing sustainable agenda in the building industry and the construction of numerous new empty dwellings could not be ignored.

Now, half a year later an unpredicted global pandemic has turned the economy upside down, and a global recession to some degree seem unavoidable. What happens to all the empty dwellings during the next few years? Will we have ghost districts in the new development areas in the major cities of Denmark? Will the areas be stigmatized like Gellerup did? We sincerely hope not but cannot emphasize more clearly how important it is to build with a long-term perspective, and in a robust manner where the social wellbeing of the residents can thrive even if there is a recession.

Measuring architectural quality

If we are to convince contractors and building owners to go for quality over quantity, and not just in a material sense but also in the spatial qualities of the necessary tasks we need to be better at documenting the value created by architecture. We believe that there is a need for post construction analysis because it makes it possible to scientifically document the otherwise non-measurable aspects of architecture. Some firms have begun to use this method of validation as the Danish company AART, where the department AART+ ded-



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icated to post-analyze architecture was established in 2017. Likewise, Danske Arkitektvirksomheder made a publication in 2018 called "Arkitekt dokumenter din værdiskabelse" where they recommend that architecture firms become better at documenting the architectural value in order to improve trust and business (Danske Arkitektvirksomheder, 2018).

The direction of the industry is, especially in a country like Denmark with a large public sector, heavily influenced by the political discourse. Evident in the changes of direction the transformation of Gellerup has endured. The building industry, which ideally should be

focused on well-designed projects with minimal flaws and shortcomings, is challenged by the changes of direction that can happen every other year. How does the architect-engineer act in these discourses? We cannot dictate the direction of industry. It is not our choice where to build, or where the money flow goes. The sustainable holistic approach we have tried to promote through this thesis is dependent on the communication and shared vision between the many stakeholders. But, if we can document the return of investment in our design, we might get far.

Illustrations

All illustrations not listed below are own illustrations

001 Gunvald, S. B., 2017, <https://www.information.dk/moti/2017/04/arkitektur-vikler-gellerupparken-byen#kommentarer>

002 Århus Luftfoto, 1975, Den Gamle Bys billedsamling

003 Ryolf, O., 1972 Aarhus Stadsarkiv, <https://www.aarhusarkivet.dk/records/000241862>

005 Boligministeriet, 1972, Julekort

006 Bech, N., 1972, <https://arkiv.dk/vis/4473375>

007 Bo Bedre, 1973

008 Vandkunsten, 1983, <https://vandkunsten.com/projects/bofaellesskab-jystrup>

011 Vandkunsten, 1978, <https://vandkunsten.com/projects/tinggaarden>

014 Styrelsen for Dataforsyning og Effektivisering, <https://sdfekort.dk/spatialmap>

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