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CITIES IN FLUX

In search for flexible solutions for the densification of the city

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“

I had never lived in a house before. Habitat was the first.

It was what it always imagined living in a house could be, and yet it wasn’t a house as we know it. There were things happening around us all the time. That mixture of being in the busiest, most crowded urban meeting place and, at the same time, a hundred feet away, going through a door and being alone in your house was an incredible experience.

Everything about it gave me the feeling of a house and yet it gave me all the other things I had always wanted in a house but never found in the isolation of the
anonymous suburb

”

Moshe Safdie (1973)

ABSTRACT

A study to the expected urban demographic flux was undertaken at the Faculty of Architecture, Urbanism and Building Sciences of the Delft University of Technology. It was investigated what the scale and scope of change of the habitation of the cities will be and what kind of new concepts are needed for the densification of our cities. In search for these concepts historical precendents were studied in case studies, in particular habitat 67 designed by Moshe Safdie. This case was chosen for its expressive and clear statement about high density living while maintaining spatial qualities and liveability within the living environment. It was concluded that; rather then a fixed *form,* Habitat 67 offers a *model* for the development of housing within high density urban areas.

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INTRODUCTION

It may reasonably be assumed that technology should have changed geography by now, by allowing people to live anywhere and still engage in the global economy. If technology was living up to its promise, more and more people should be moving out of cities to tele-work from charming small towns and lakeside cottages. Instead, we're streaming into the cities. In 2008, for the first time, fifty per cent of the world's population lived in urbanized areas and it is expected that the migration to the city will continue the coming decades. According to a report unveiled by the United Nations, seventy per cent of the world's population will live in urbanized areas in 2050 (UN, 2014). As already many cities have reached their borders of expansion, the question rises how will the urban fabric be able to accommodate this enormous move towards the city. How will it be possible to densify the city without giving in on spatial quality and liveability, which are already under pressure?

From the 1960s, many cities around the world witnessed an unprecedented economic growth and urban expansion, which created unusual pressure on architects to find appropriate solutions to the problem of overpopulation. As a result a movement in architecture called the Metabolism movement came into existence. A group composed of Japanese architects including Kisho Kurokawa, Kiyonori Kikutake, Fumihiko Maki and Masato Otaka, presented during the World Design Congress in 1960 a manifesto called "Metabolism: Proposals for a New Urbanism". The "Metabolists" held a vision "for cities of the future inhabited by a mass society, that was characterized by large scale, flexible, and expandable structures that evoked the processes of organic growth." Their work embraces the idea of cities "in flux": constant change and impermanence, according to the needs of their inhabitants. Many of their proposals incorporated technological advancements not of their time and capsule-like mega structures that could grow and shrink according to demand and necessity. Although the World Design Conference gave the Metabolists exposure on the international stage, most of their ideas remained largely theoretical. *The Capsule Tower* by Kisho Kurokawa is an example of a realized metabolistic structure. Consisting out of 140, 90 square foot living capsules which were detachable from two main concrete towers. It was possible to join smaller units to make bigger ones. It was expandable, upgradeable and repairable. Another building that shares a lot of

characteristics with the Capsule Tower is *Habitat 67* by Moshe Safdie. As a student Safdie felt an affinity with the Metabolist movement and applied many metabolistic principles into his master thesis, which was a proposal for a large-scale pre-cast housing unit. Born of the socialist ideals of the 1960s, Safdie's thesis housing project explored new solutions to urban design challenges and high-density living. His ideas evolved into a three-part building system, which pioneered the combined use of a three-dimensional urban structure, specific construction techniques (the prefabrication and mass-production of prototypal modules), and the adaptability of these methods to various site conditions for construction. Eventually Habitat 67 was chosen to be built at the Expo 67 World's Fair in Montreal as a great study in high-density prefabricated compact housing design, combining the benefits of suburban homes with the economics and density of urban apartments. Unlike Nakagin's Capsule Tower, Habitat 67 has not fallen into disrepair and is an established, popular residential complex to date.

As we are in urgent need to find solutions to the question how our cities can accommodate the future urban flux we may learn from intrepid pioneers like Moshe Safdie and Kurokawa and study their answers for architectures future. Therefore, this thesis explores if by rethinking developments of the past and combining them with modern technological innovations, new urban typologies for high-density living can be developed.

RESEARCH METHODOLOGY

To find an answer to the research question as stated in the introduction there are two sub questions formulated.

1. What is the urban design challenge for today?
2. Can new urban design solutions be found in the architectural works of the past developements.

The research methodology that is used to answer these sub questions, consists of case studies, literature study and interviews. The first part of this thesis describes the literature study that is done to investigate the future urban flux; what is the scale and scope of change of the habitation of cities and what are the demands and desires of modern society concerning its living environment? This part will also describe the relevance and useability of urbanisation ideas from past architectural movements for contemporary architecture, including that of the Metabolists and in particular of Moshe Safdie.

The second part of this thesis will focus on case studies. It will shortly describe the ideas of the Metabolist movement and their ideas for future architecture. The Capsule Tower, as an example of one of the few realized metabolistic structures, is investigated. Many 'metabolistic' principles are implied in the case and design of Habitat 67, by Moshe Safdie. Habitat will therefore be a major subject of interest and is elaborately documented. Both case studies will be studied on the question as for how the architect envisioned life within a dense urban context, what type of solutions were developed, how was this translated into construction and which aspects have stand the test of time and can be applied/integrated in the development of new urban typologies for high-density living? Interviews and discussions with actual inhabitants will contribute to develop a point of view within the discussion about high-density living and future cities. What kind of spatial qualities should be available within an urban high-rise and how should an urban high-rise be placed within its urban context?

Limitations within this research are that it preludes on future developments within society. It remains to be awaited if these developments will really occur. Therefore the relevance of this project may be determined by future developments and insights and rather than offering a fixed solution, aims to be a pilot study and a framework for future discussion.

RESULTS

HIGH DENSITY LIVING: THE URBAN DESIGN CHALLENGE FOR TODAY

Sub question 1: What is the urban design challenge for today?

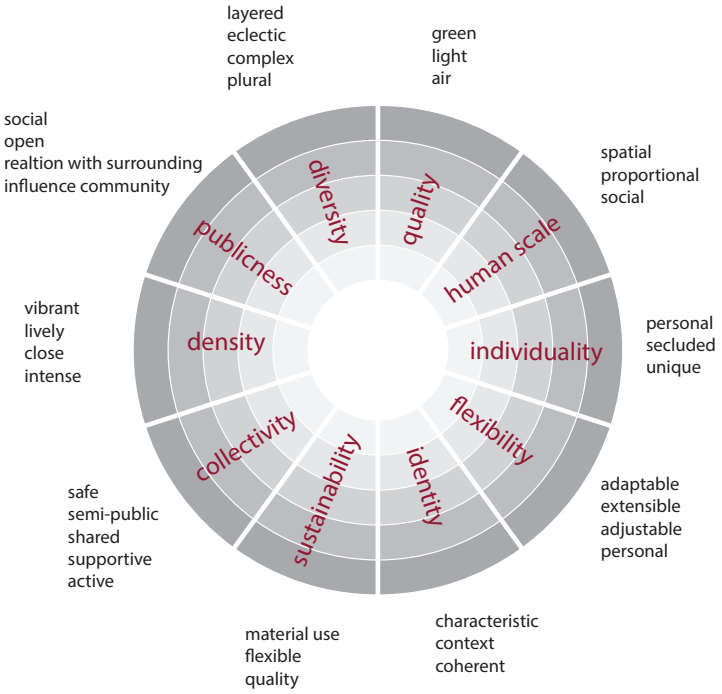
Globally, from the year 2008, more people live in cities then outside of them. The main driving force for people to move to the city has always been the fact that the best jobs are available in the most dynamic cities. However, to date, modern technology has given us the opportunity to work remotely and still be connected to the global economy. Yet, people are still choosing to fight traffic, pay extravagant housing costs and put up with a lot of people in crowded cities. This rises the question why do people keep going to the city? In *The new geography of jobs* economist Enrico Moretti argues that there is only one main reason for that; and that are the people themselves. As Moretti explains, in our old manufacturing-driven society we moved to where the factories were, which was near necessary resources (furniture factories near forests; steel plants near coal mines, and so on). In our postindustrial innovation economy face-to-face contact has gained great importance, since innovation needs intensive collaboration. Therefore people move to what are essentially 'idea factories': cities full of creative and interacting people. In addition, the city still offers the best opportunities for an education and career. This has always been this way, only the main difference with the past decades is that young people who first moved out of the city to start a family after completing their education, now stay in the city. Most of the Dutch cities have improved their physical and social environment. More and better facilities are available within the cities, and this has made the city the place to be for diverse target groups (PBL, 2015). This development has two major consequences. Firstly, it rises the demand for more houses in the city in general. The CBS has estimated that every year 70 a 80 thousand extra houses are needed, while the amount of houses built is significantly lower, being 45.000 to 50.000 houses per year. This gap between growth of households and the number of new houses that are realised will lead in 2016 and 2017 to a major discrepancy between supply and demand. (Cobouw, 2015) Secondly, it leads to a demand for a new housing-typology, that is flexible and can be adapted to multiple target groups of inhabitants. Thus, offering a living solution for both single house-hold as for (starting) families.

figure 3: the wheel of quality within a community
(own ill, based on the WHY Factory and MVRDV research: vertical village)

Space for innovation

This discrepancy between supply and demand and social change of the urban context– will offer an opportunity for architectural innovation. How can we generate housing for everyone, without giving in on spatial quality and liveability? How can we live in smaller places with more people and how do we keep our goals for sustainability in sight, when we need to built more and fast. New concepts are developed that not only change the functionality of the home but also the physical dimensions.

As a result of the rural to urban migration and urban land prices still rising, there is a growing demand for affordable, small dwellings. The type of residence that was referred to as a 'shoebox' a couple of years ago is now called a microloft and it's a worldwide hit. Despite its popularity, micro housing comes with the danger of becoming a provisional housing type, with little social value. This problem forms the starting point of a new concept of housing that is developed for central London which is called 'co-living'. This tries to seek new solutions for long standing ideals of living in community, while every inhabitant gets more 'living-quality' within less 'living-space 'and this all in central London. Co-Living properties combine compact private rooms and studios with amazing shared spaces and community benefits. The shared spaces and facilities including spa's, gyms, beautiful dining rooms, cinema screening rooms, bars, lounges, gardens and terraces - all within their home. In the Netherlands, these concepts too are being implemented in the development of cities, including Amsterdam. Here it is called the "friends concept". The basis of this concept is a three to four room apartments that can be shared by friends, with equally sized bedrooms, offering a solution to the growing amount of single-households in the city.



Densification, differentiation and communication

Given the limitations of urban space and increasing density of cities and the growing demands for flexible and in particular for numerically more living facilities within the borders of a city, new challenges for architecture are ahead.

To date, the common floor plan is almost exclusively designed for the needs of a family, even in new developments. In the near future however, a variety of lifestyles impose an imperative for specialized floor plans. Flexible types of living space will offer the opportunity to react to changing life circumstances, by relatively simple means. In addition, this issue needs to be paralleled by architectural solutions for further 'densification' of an already dense urban living environment. There is a need for concepts that offer models for the development of cities without giving in on differentiation, flexibility and individual expression, models that are in sharp contrast with the many ad hoc container solutions that appeared over the past decade.

In view of these demands, the urban design challenge of today can be summarised as follows: it concerns the densification of our cities in combination with differentiations of the built

LEARNING FROM HISTORY

Sub question 2: Can new urban design solutions be found in the architectural works of the past developements?

The tension between individuality of the home and collective aspect of the community has been a topic of interest for architects for decades. It became a core value within Moshe Safdies design of Habitat 67. *"How to maintain the identity of the individual – of the family – within the collective and the community. How to address both yet give each identity. This has led in our projects to the fractalisation of the building mass, breaking it up with a sort of intra-penetration of outdoor and indoor spaces, ensuring major exposure of surfaces to light."* He has executed this concept in several building typologies, that allow for maximum permeability of each dwelling, while achieving extremely high density- often by stacking. The latter has additional wider-scale urban benefits through the activation of the ground plane with mixed-use typologies and pedestrian plazas for communal benefit.

His Habitat 67 was designed for the World Expo in 1967. It became a model for future urban living, where corridors became streets, providing wide views and contact with nature. The major issue he wanted to solve was *"to achieve the quality of life in the densities, which are prevailing today".* With the expected demographic flux towards the city and the wish of families to stay in the city., the main question of Safdie still remains and even gains importance. In this millennium, the ideas that were so exciting to a young Safdie, like prefabrication and density, are suddenly fashionable again. Even the aesthetic that emerged from Safdie's nonlinear thinking, or " fractalized" as he himself would call it today, is becoming fashionable again (see Bjarke Ingles). Therefore this chapter will investigate if new urban design solutions can be found by investigating the model Safdie has developed. First, however, a short description will be given about the Metabolism Movement and the Capsule Tower, since Safdie implemented many of the design principles in his design for Habitat.

figure 4: advertisment for habitat 67 (Allis Chalmers, 1967)

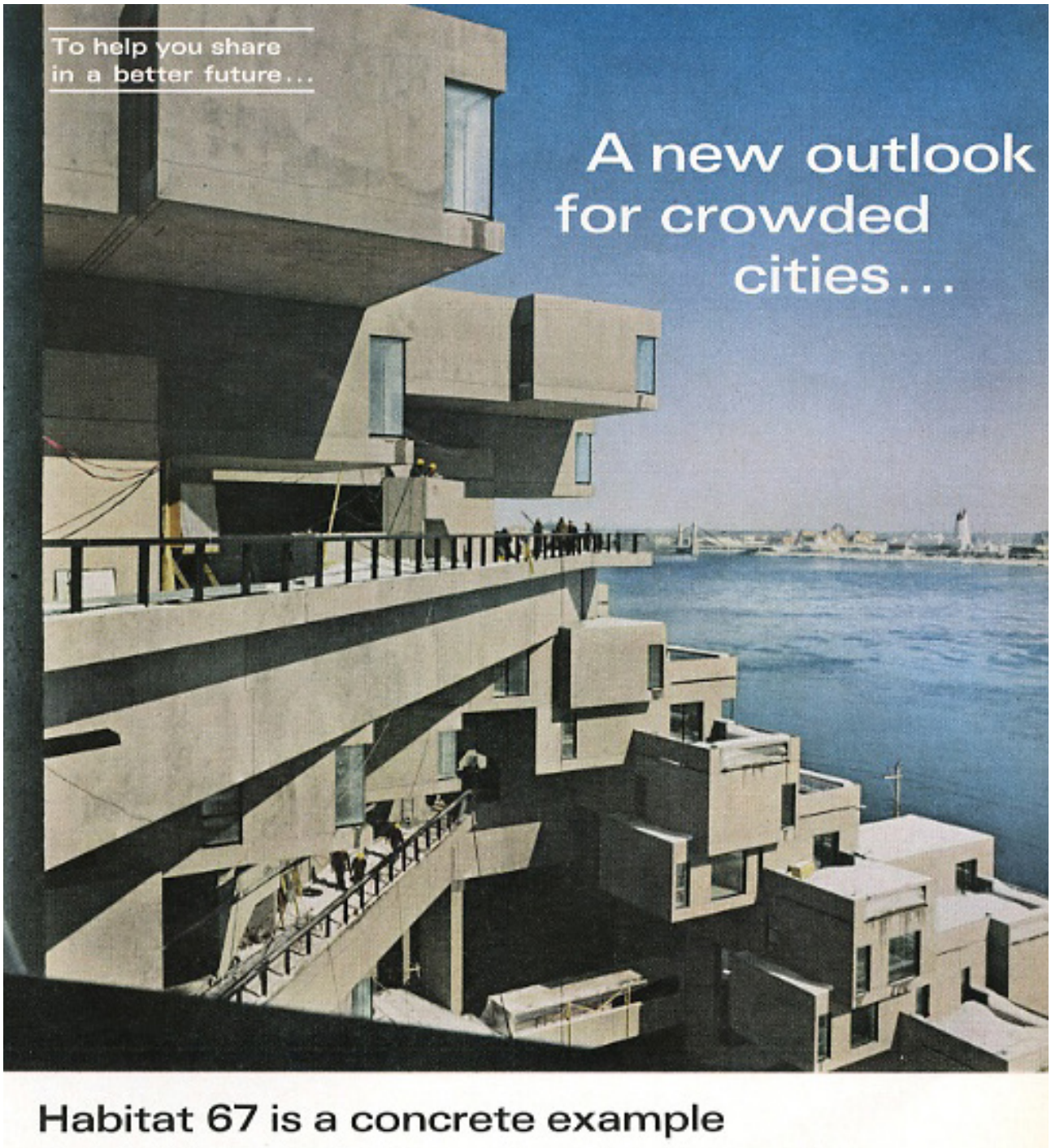
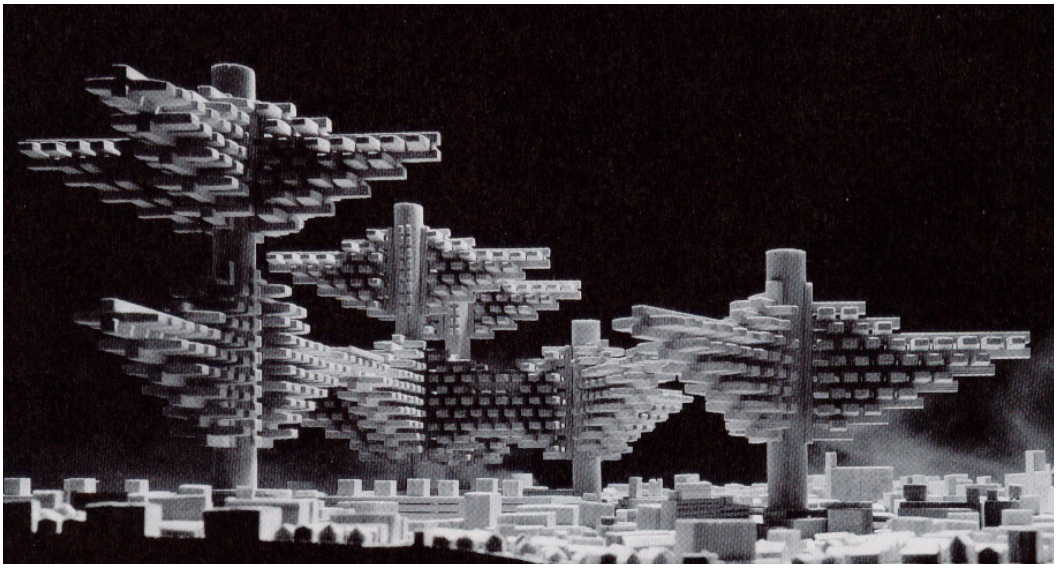


figure 5: visionar projects of the Metabolism movement and Archigram
5.1 Arata Isozaki, clusters in the air (1960)
5.2 Kenzo Tange, Master Plan, El Metabolismo
5.3 Kenzo Tange, Yamanashi Press and Broadcasting Centre
5.4 Peter Cook, Archigram The Plug in City

The Metabolism movement

The Metabolism movement was launched in 1960, when a group of young architects and designers published their radical manifesto "*Metabolism: the Proposals for New Urbanism*" at the World Design Conference in Tokyo. The name of the group, metabolism, indicated the idea of city – a particular biotechnical notion of the city- the "city as an organic process".

Their vision "for cities of the future inhabited by a mass society," resulted in the design of capsule-like mega structures, that could grow and shrink according to demand and necessity. Structures designed to responding to the urban conditions, characterized by rapid expansion and unpredictable change. The Metabolist thus, moved away from he Modernist approach to plan a complete city environment in view of its physical destination. Instead, the Metabolists called for patterns "which can be followed consistently from present into the distant future." In their theoretical urban projects, the metabolists often envisioned the sea and the sky as human habitats of the future and proposed that a city would grow, transform and die in the way like an organism. In order to accommodate the growth and regeneration of the modern city, they proposed a system of urban design distinguishing elements of permanent duration and of transient temprary duration. The metabolism designs were often characterized by the combination of a mega structure, serving as a permanent base, and numerous individual units, attached to the mega structure, but subject to more frequent replacement. For instance, the Nakagin capsule tower featured numerous standardized capsules (housing units) bolted on a core. The core serving as the main structure. Through their schemes, the Metabolists aspired to re-structure the rapidly expanding cities. With the extensive employment of mega structural strategy in architecture and city design, Metabolism was often associated with other avant-garde movements in the 1950s and 1960s, such as Team 10 and Archigram in the Great Britain. These architect-urbanists shared an interest in three-dimensional urban structure as the framework of urban growth and transformation as well as an ambition of revolutionizing the way the modern city was built and operated. It was not surprising that, due to their utopian nature, only very few of their mega structural projects were realized. Almost all of the metabolism grand urban plans remained on paper. The architects only managed to incorporate their concepts of metabolic city in a small number of building projects such as Tange's Yamanashi Press and Broadcasting Centre built in 1967, and Kurokawa's nakagin Capsule tower.



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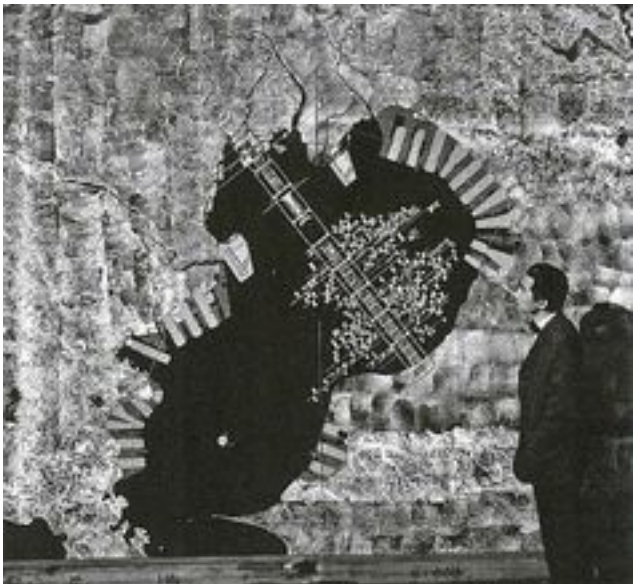

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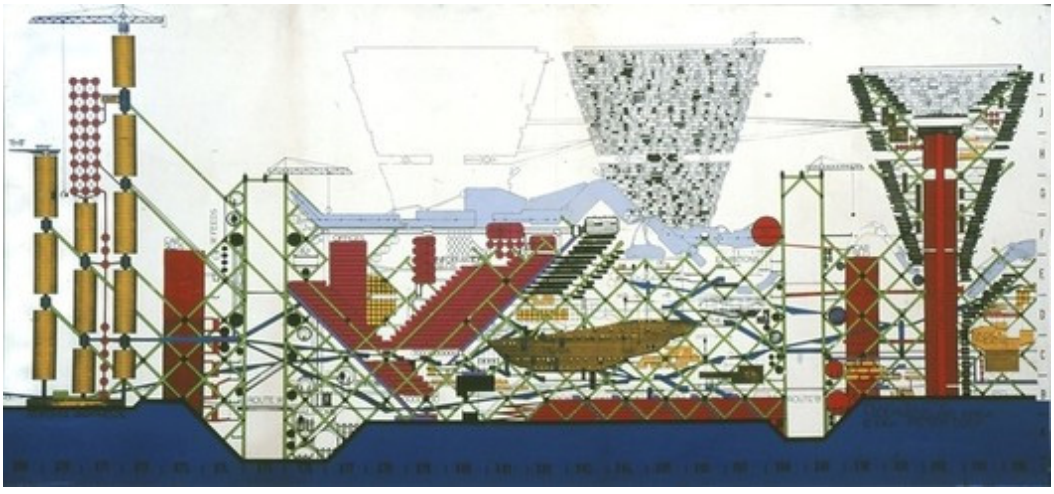


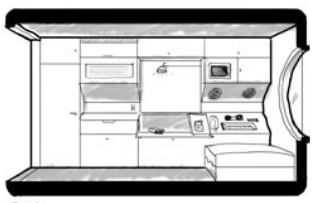
5.4

figure 6: capsule
6.1 long section
6.2 short section
6.3 top view
6.4 short section

Capsule Tower

When Kisho Kurokawa imagined the city of the future, he saw people ever more on the move, a society changing faster than ever before. Working in Tokyo in the 1960s and 70s, the architect designed an apartment building that would keep up with that future. The main goal of his design was to restore the number of housing units in the city centre of Tokyo, in a period that over 3 million people were traveling more than an hour to get into downtown Tokyo for their work. Therefore, the intended use of the capsules was for single bedroom dwellings; studios for far commuting businessmen and short stay hotel rooms. The location of the Nakagin Building at the heart of Giza central business district made it very suitable for this purpose. The idea of impermance and movability-originated from the Metabolist's concept of the city and influenced every part of the design and construction of the Nakagin Capsule Tower. According to the different "metabolic cycles", Kurokawa divided the building into three basic components: the permanent structure (two ferro concrete shafts), the moveable element (144 capsules) and service equipment (utilities). They were designed based on different life spans. Kurokawa envisioned that the main shafts would last at least sixty years, while the capsules would be due for replacement in twenty-five years. He noted that the life span of the capsule was not a mechanical one, but rather a social one. The capsules are arranged around the towers in a seemingly random pattern suggesting an on going process: the shaft could grow and more capsules could be piled up.

The interior of the capsules was designed using industrial technologies. A variety of installations were built into an extremely compact space. The capsule was designed to be an extension of its user. Combining different activities as work, rest, eat and sleep, shower.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6.2


6.3

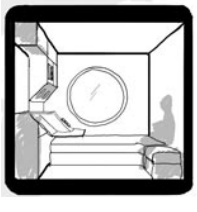

6.4

figure 7 (right) : exploded view of a the capsule

figure 8 (left) : current problems

8.1 capsules are not replaceable

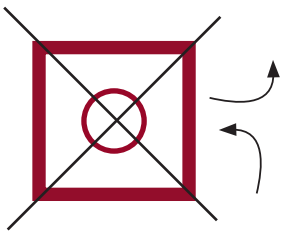
8.2 Asbestos

8.3 not earthquake proof

8.4 maintenance issues

Each capsule is tied to one of the concrete cores with only four high-tension bolts: two each on the upper and lower side. That means that every unit is removable and updatable, the capsule measures 2.3 m by 3.8 m by 2.1 m and is built of welded light-weight steel frames – identical to the structure and size of a shipping container – and covered with galvanized rib-reinforced steel panels finished with a coat of kentia glossy spray. There is a Plexiglas porthole window on each capsule.

The future of the Nakagin Capsule tower is insecure. Due to the lack of maintenance, the interior of the building is falling into disrepair. There is also growing concerns among residents about the healthy issue of asbestos used on the capsules as well as the buildings ability to withstand earthquakes. In addition, the capsules can only be removed when al the capsules above it are also removed. Last, there is a lack of spatial quality; the missing of public space makes the people living in it very solitary.



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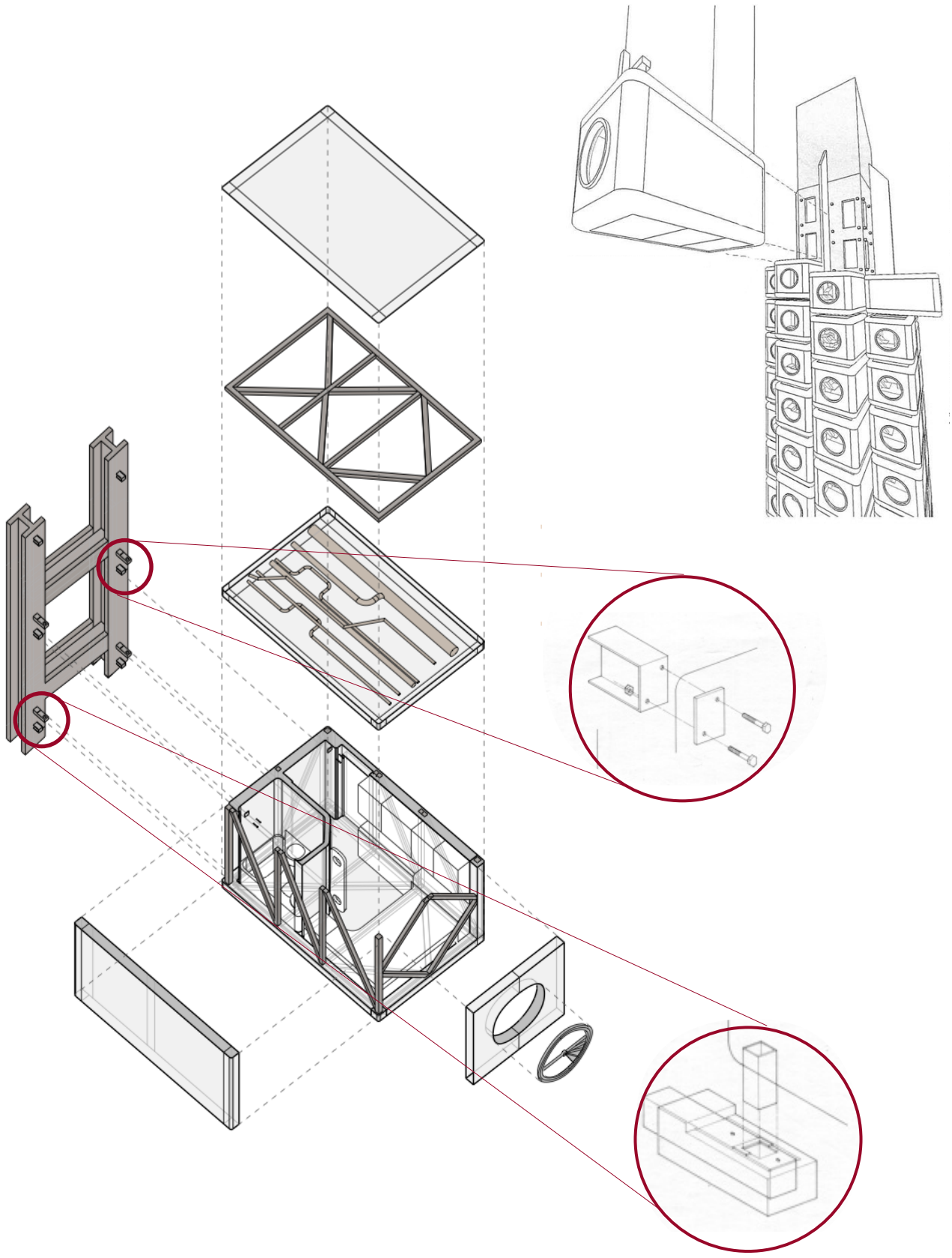


CASE STUDY HABITAT 67

Two concepts

(..)in the way that Habitat '67 is really two ideas in one. One is about prefabrication, and the other is about rethinking apartment-building design in the new paradigm. I'm a believer in the technology of prefabrication and the efficiency it can bring, but it's no guarantee of anything in terms of the quality of the environment. It depends on the design of the building. The 1960s were rampant with prefab buildings that were public housing projects of the worst kind. So I think it's important to separate the two concepts."

Born in Haifa, Israel, Safdie graduated from McGill in 1961. During his years there, he received a fellowship from the housing authority of Canada and travelled across the country to visit housing projects, public housing high rises in Chicago, New York and suburbs. The design of Habitat was Safdie's reaction on what he observed during that trip. He called it modern slums, where children were captured in their home and couldn't play outside. When he came back he wrote his thesis proposal in which he said: "*People want to live in houses. We have to build denser cities. We're building a lot of apartments. We need to reinvent the apartment to give every person the quality of life of a house in a high-rise building.*"

Safdie's thesis titled "A Case for City Living" described the design for "A Three-Dimensional Modular Building System". Originally, this design was intended as an experimental solution for high-quality housing in dense urban environments. Safdie explored the possibilities of prefabricated modular units to reduce housing costs and allow for a new housing typology that could integrate the qualities of a suburban home into an urban high-rise. His ideas evolved into a three-part building system. It was three-dimensional because it dealt with the three dimensional organization of an urban structure; modular because it was a construction system based on the use of repetitive three dimensional modules; and system because it was a system capable of application to various sites and conditions. It was generic, not site specific. With this idea of a three dimensional modular building system, he developed three possible systems, each with it's own geometry and structural system. The first being a system consisting out of non-load bearing, factory produced, modular units, placed within a structural frame. The second was a system out of load-bearing modules and the third was a pre-fabricated construction of criss cross pattern. Habitat was the further development of the second system. It was a model showing what a community of five thousand people would be like.

figure 9: Three systems

9.1 system A: non-load bearing, factory produced, modular units, placed within a structural frame

9.2 system B: Load bearing modules

9.3 system C: criss cross pattern of load bearing walls

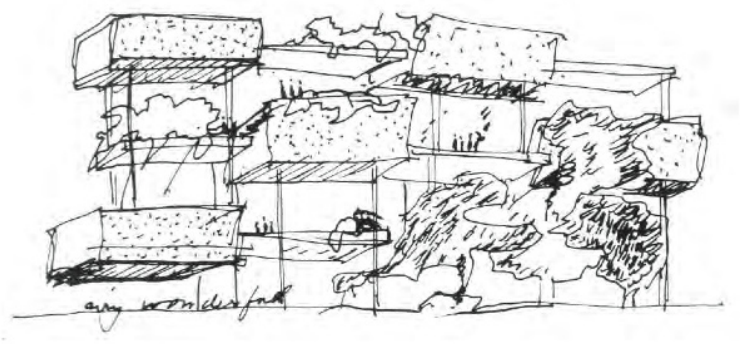


figure 9.1

figure 9.2

figure 9.3

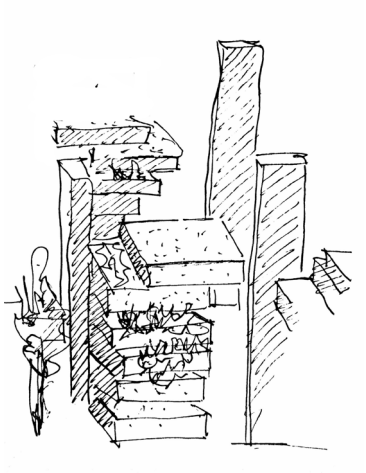


figure 10: Expo '67 field
figure 11: Site plan habitat 67

After graduating, when he was only 23 and interning in Louis Kahn's studio, Safdie's thesis advisor, Sandy Van Ginkel, invited him to submit his project for the World Exposition of 1967. This world's fair was set to take place in Montreal during the summer of 1967. Safdie decided to propose his thesis as one of the pavilions and began developing his plan. Safdie developed his original theories into a complete master plan, which contained shopping centres, a school, and 1000 housing units. The scheme was confirmed, but was ultimately reduced by the Canadian government to only 158 residential units.

montreal's Harbor

figure 10

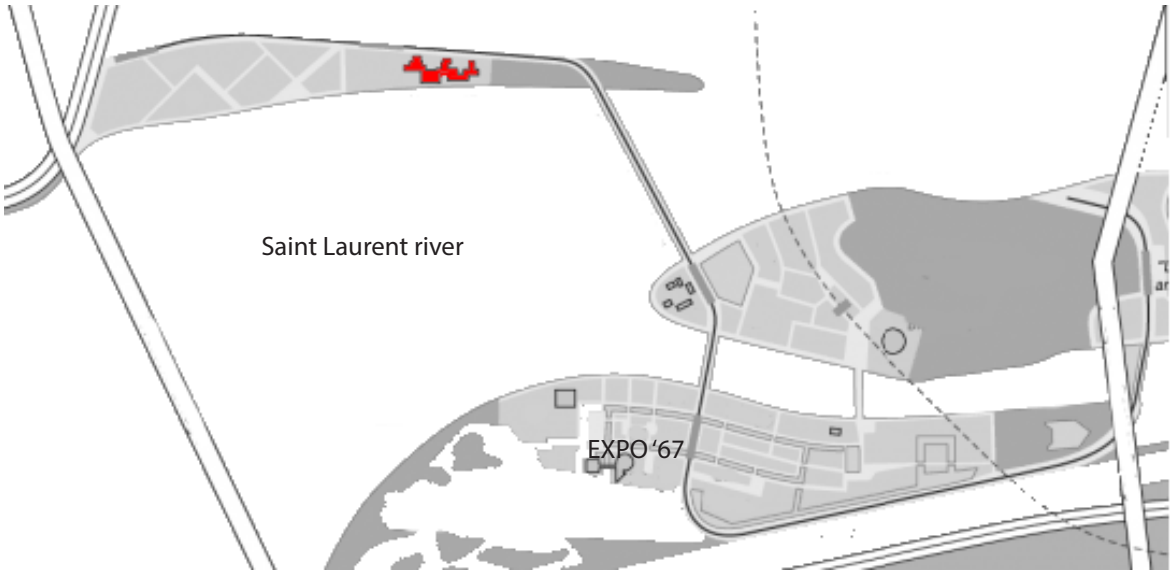


figure 11

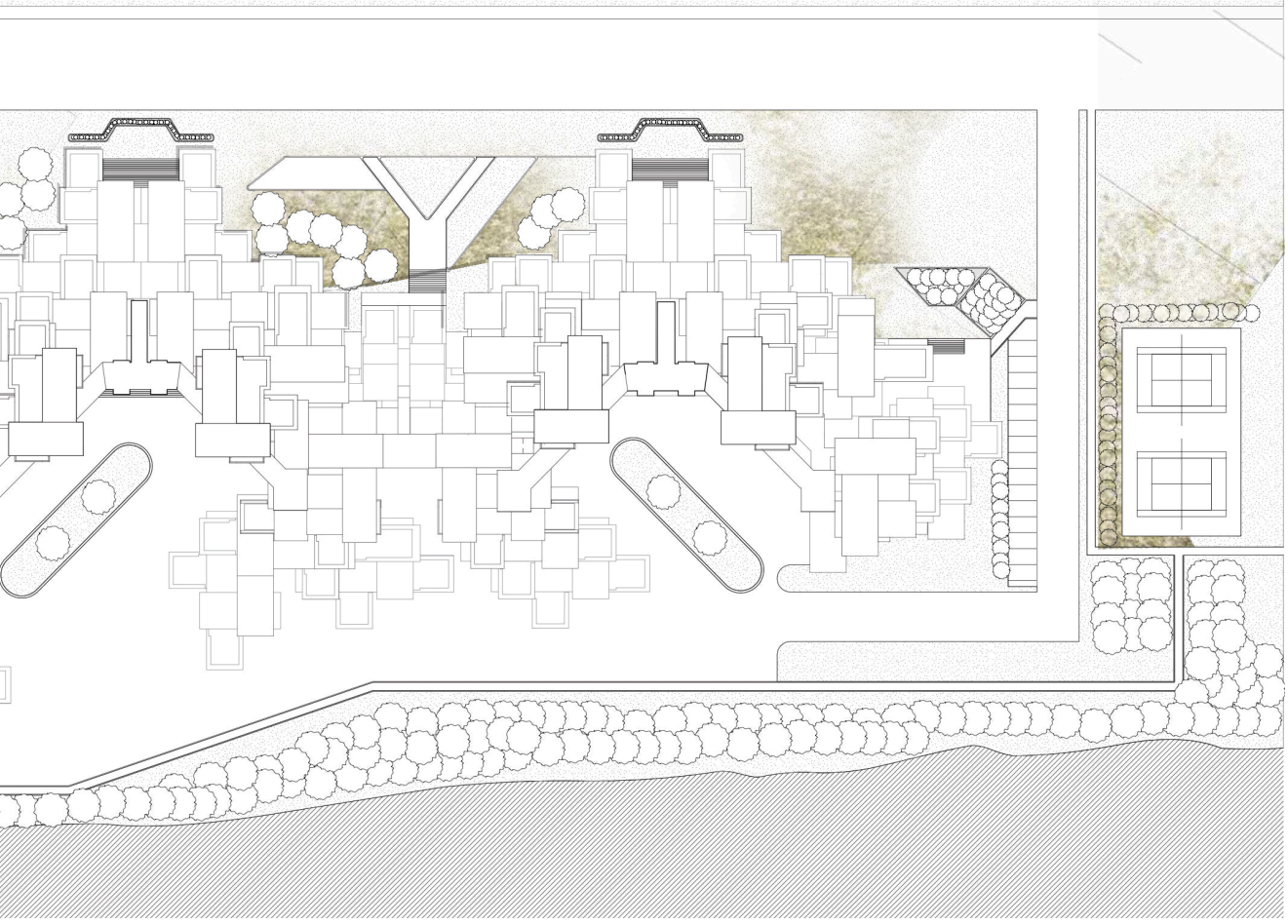


figure 12:
12. 1: The 15 different typologies show variants of a box, two or three boxes, each forming a system for a completed residential unit or two units together. The apartments are very spacious and because of the modular design the overall design of the structure is very flexible.
12.2 : layering scheme of the boxes

concept 1: Habitat 67 and pre-fabrication

The 158 living units that together formed Habitat 67 were constructed out of 354 identical modules (referred to as boxes). These boxes were completely prefabricated. Safdie had developed one standard box that was measuring 11.73m * 5.33m * 3.05 m, had a floor area of 62.52 m2 and a basic volume of 190.69 m3. These boxes were subsequently stacked in various combinations and connected by steel cables. By stacking them Safdie was able to create variants of mega structures. He combined three to four standardized boxes to apartments, resulting in about 15 variations (figure...) The basic modules are combined and rotated in order to create unique exterior spatial conditions. The size of the units is between 60 and 160 m2. There are apartments with one to five bedrooms. The apartments are very spacious and flexible and have a minimum of a terrace of nearly 30 m2. The apartments are laid out on two levels and by the forward and backward jumping the basic elements arise spacious terraces or "gardens" for each apartment. If the roof of one residence is not covered by a residence above, it becomes either a deck or a walkway for the spaces above. The different individual residences were combined into a grand scheme. The layering of this scheme is shown in image 12.2. The load transfer between apartments is most intense at ground level and de- creases as each stacks upon another. For the complete structure all of the building's components—the modules, the walkways, and the three elevator cores—were load-bearing and worked together to form "a continuous suspension system."

With the modular/cell structured design Habitat 67 echoes the Metabolism concept of architecture, as discussed before. Safdi felt an affinity with the idea that buildings should be designed as living, organic, interconnected webs of prefabricated cells. But where the capsule tower is individual and misses the function of community habitat strongly builds on the idea of a community, Therefore habitat is still a popular residence up till date while the nagakin capsule tower has been fallen into disrepair.

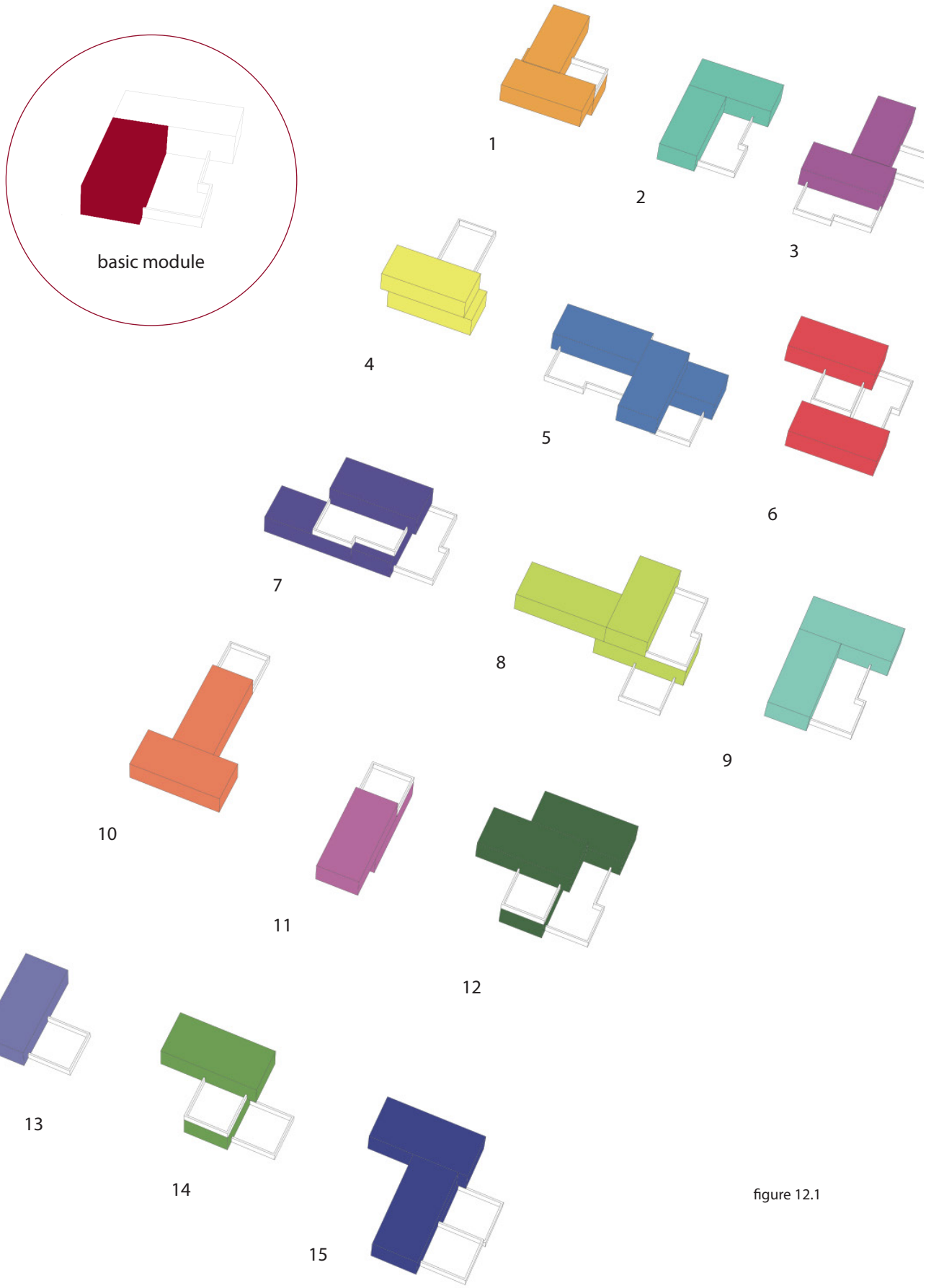
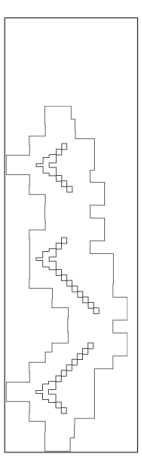
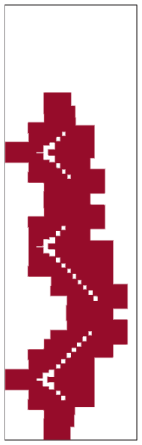
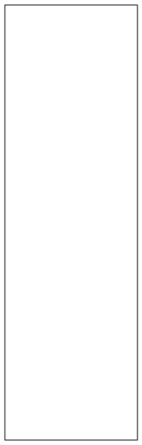
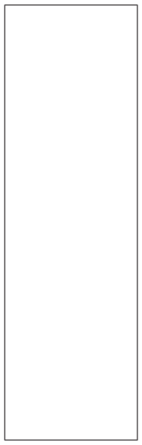
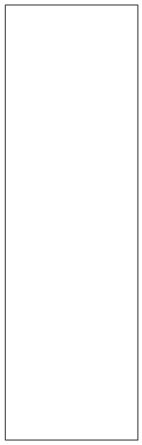
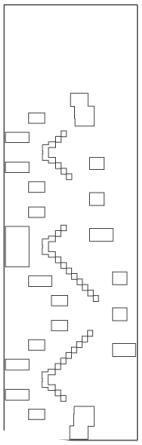
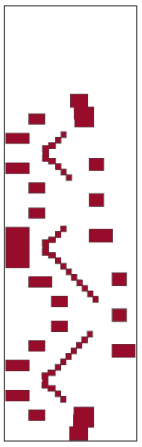
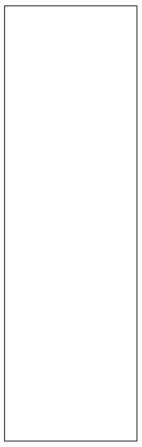
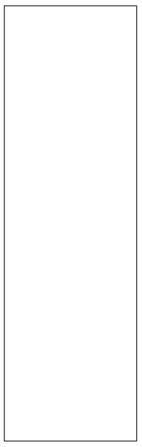
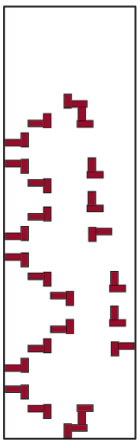
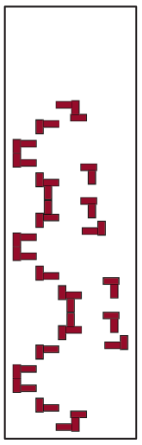
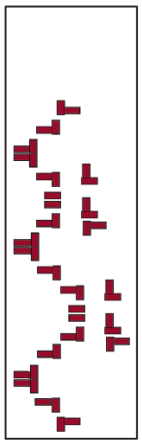
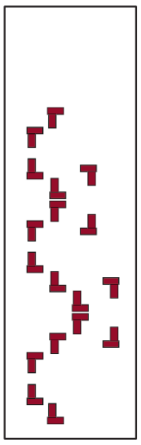
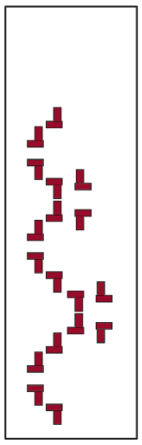


figure 12.1

	topview	01	02	1st pedestrian street	2nd pedestrian street
parking					
service					

	02	03	04	05	06
housing					

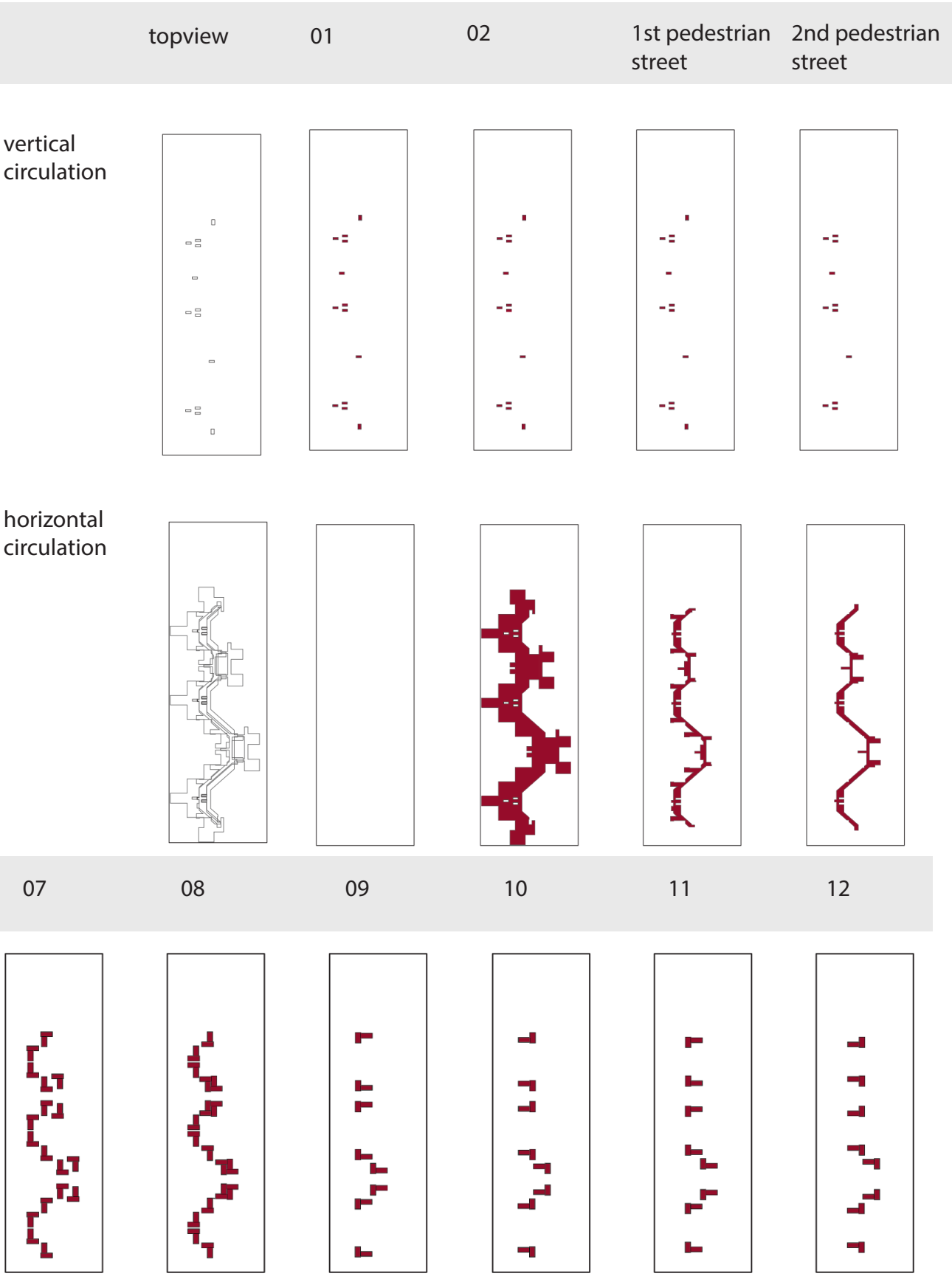

topview
01
02
1st pedestrian street
2nd pedestrian street
vertical circulation
horizontal circulation
07
08
09
10
11
12

figure 12.2

figure 13

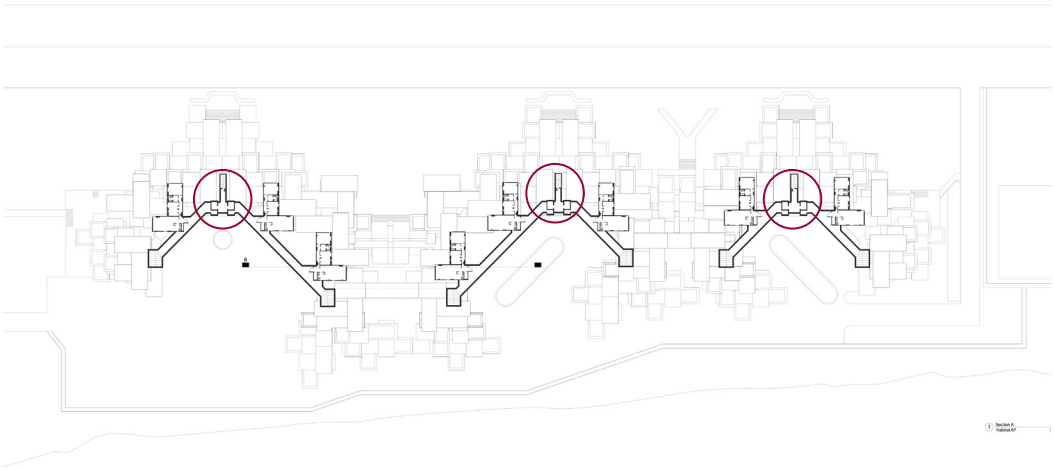


figure 14

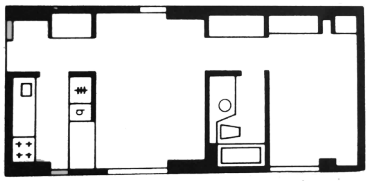
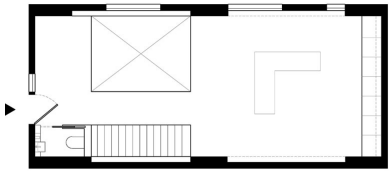


figure 15



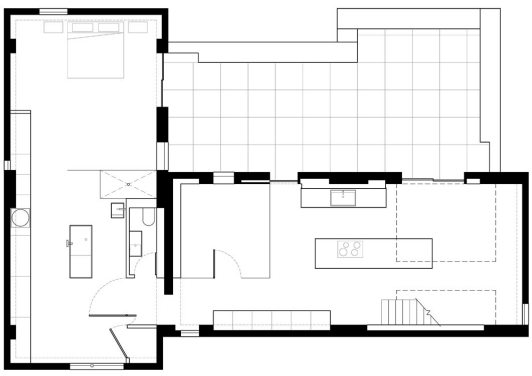


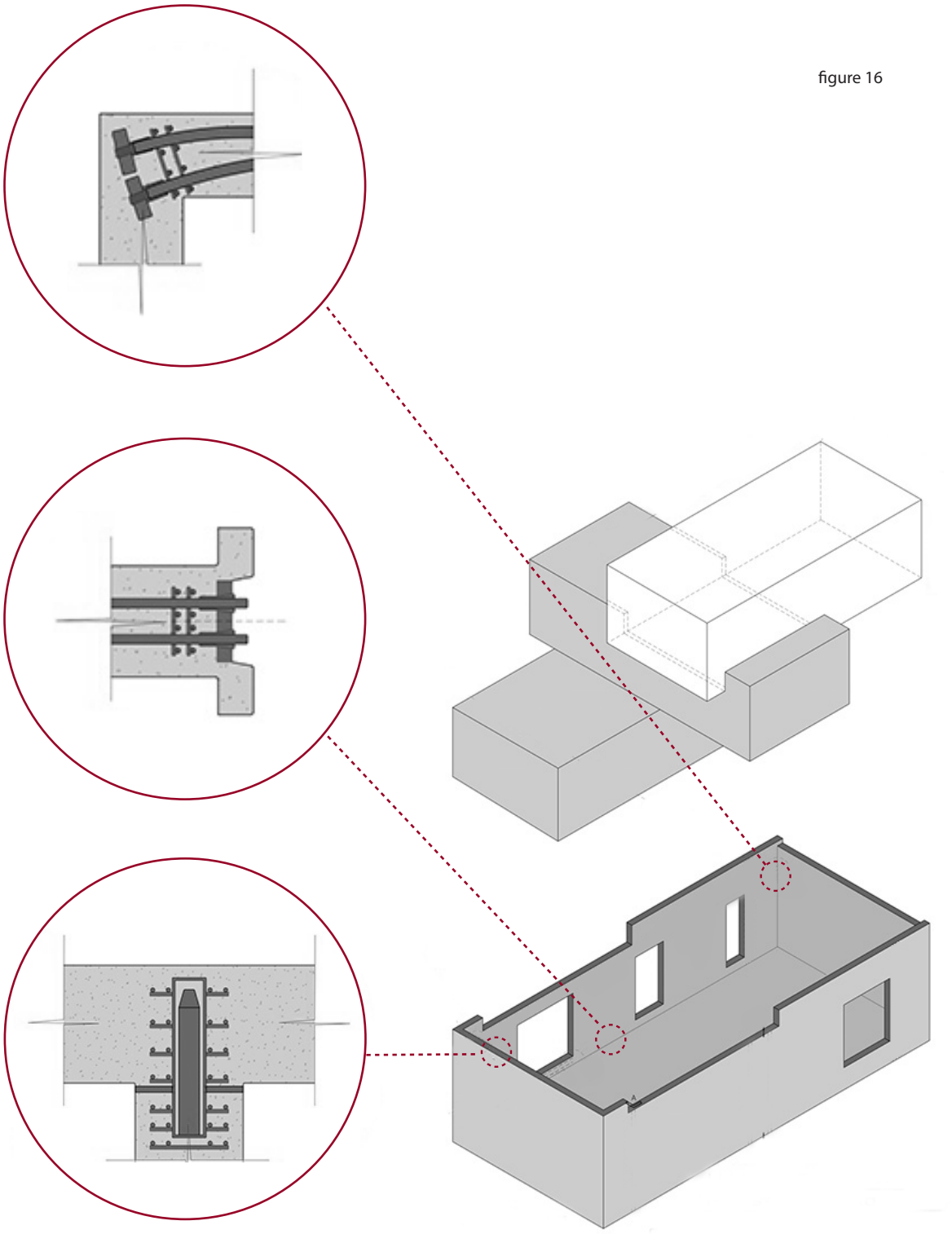
figure 13: floorplan second pedestrian road with the three elevator cores.

figure 14: basic one bedroom apartment

figure 15: variation on the two/three bedroom apartment

figure 16: interlocking system and connection details

figure 16



results

The prefabrication process of the 90-ton boxes took place on-site. The basic modular shape was moulded in a reinforced steel cage, which measured 38 x 17 feet. Once cured, the concrete box was transferred to an assembly line for the insertion of electrical and mechanical systems, as well as insulation and windows. To finalize the production, modular kitchens and bathrooms were installed, and finally a crane lifted each unit to its designated position

The on-site prefabrication system should have reduced the cost of production, an integral part of Sadie's vision for creating an affordable housing complex. Unfortunately, due to the reduction of the project's mass scale, costs were much higher than expected. However, though Habitat failed to strike a new wave of prefabrication, it succeeded in creating a new housing typology that is both effective and site adaptable.

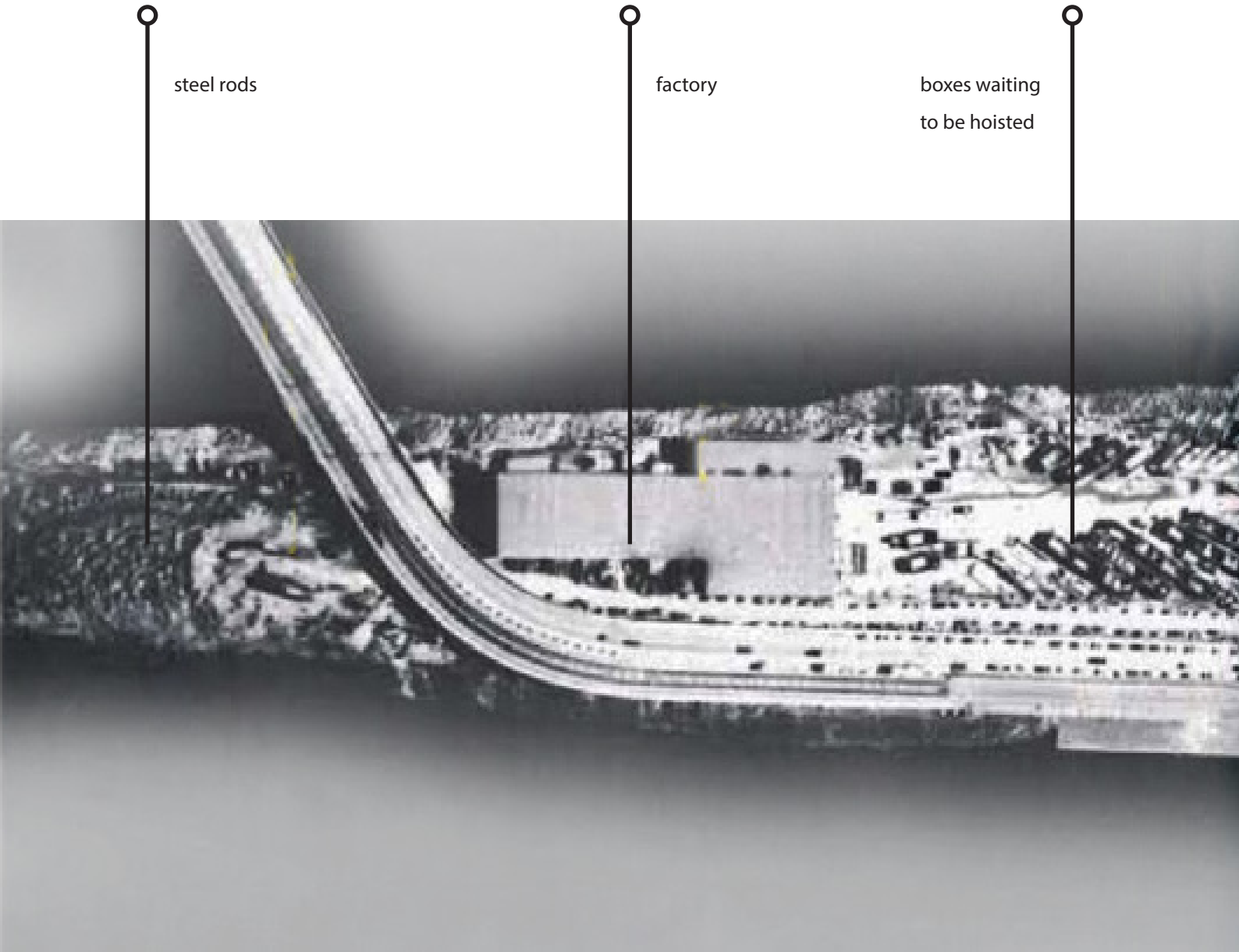


figure 17: Assembly line on site prefabrication

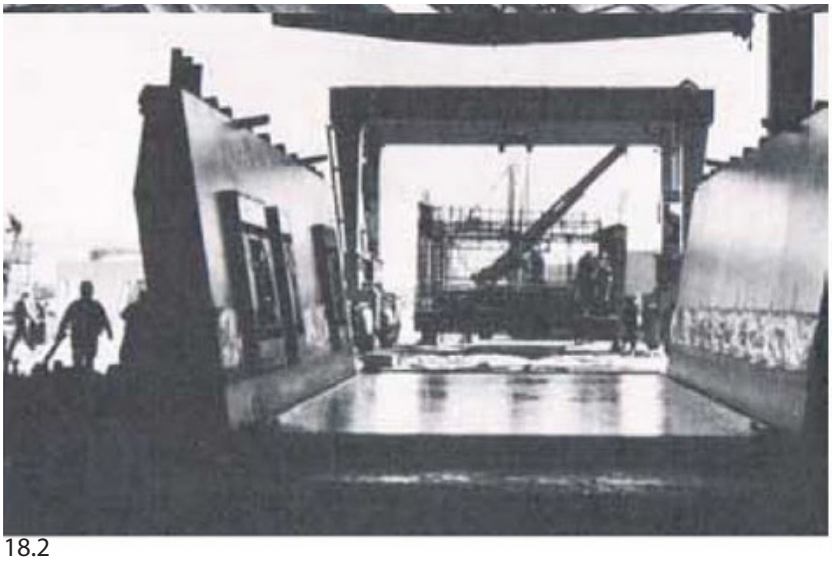
site assembly

prefabricated kitchen and bathroom units

18.1

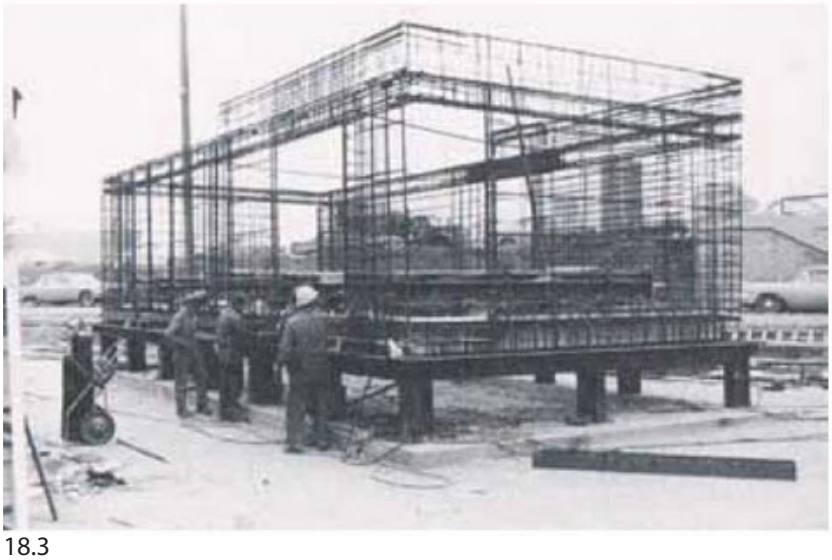
18.4

18.5

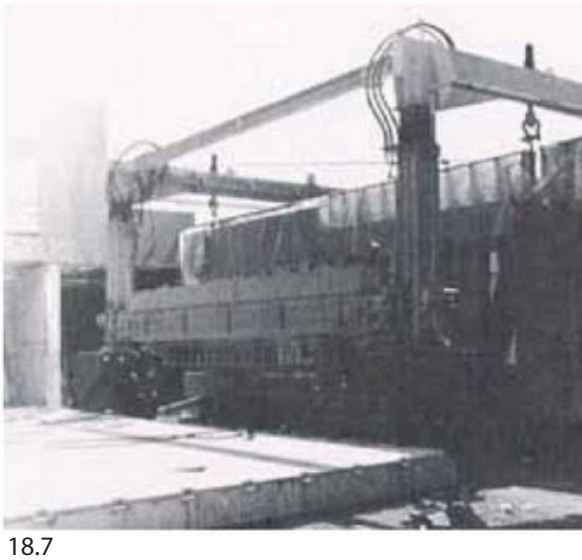


18.2

18.6



18.3



18.7

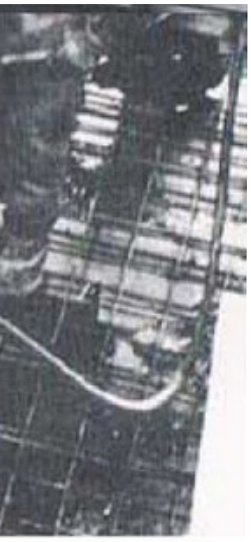


figure 18: prefabrication process

18.1 Making the box / preparing the reinforcing panels
18.2 Assembling the reinforcing steel cage
18.3 moving the cage into the molds
18.4 placing the inner mold
18.5 pouring concrete
18.6 pouring floor slabs
18.7 Module with its temporary polythelene roof is moved to assembly line

Concept 2: Habitat and rethinking the apartment building

By stacking concrete "boxes" in variant geometrical configurations, Safdie was able to break the traditional form of orthogonal high rises, locating each box a step back from its immediate neighbour. This ingenious method provided each apartment with a roof garden, a constant flow of fresh air and a maximum of natural light: qualities which were unprecedented for a twelve story apartment complex. Safdie described this concept using a metaphor of a tree - a natural form that has evolved to achieve maximum surface area for light and air to each leaf. Fractalisation of the building mass". This resulted in a new typology that combined urban housing with suburban qualities, extending the limits of the living unit to semi-public spaces and creating social fabrics between neighbors. Further Safdie's scheme a very good circulation and on strategic places balconies that added visual extensions. Creating a garden was an extension of the greater plan to make apartment habitation more like life outside the city. Safdie modeled Habitat as an affordable, egalitarian housing unit reminiscent of Arab villages and the hills of Haifa, where he was born and raised. He hoped that his design would give families a sense of belonging, identity, and individuality often lacking in crude block apartments sprouting elsewhere. Habitat sought to mix residential, commercial, and institutional uses to create a more vital neighbourhood, and to provide the amenities of the single-family home in a form adaptable to high densities and constrained budgets. An interview with an inhabitant of Habitat showed that it is still a very popular residential complex. Safdie's concept from apartments for everyone has changes into luxurious apartments. Most of the apartments consist now out of at least three-four connected blocks.

figure 19

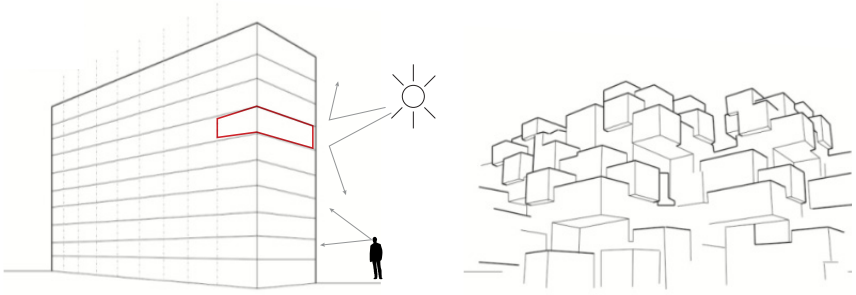


figure 19: changing typology of the apartment building

figure 20: pedestrian streets and public plaza

figure 20

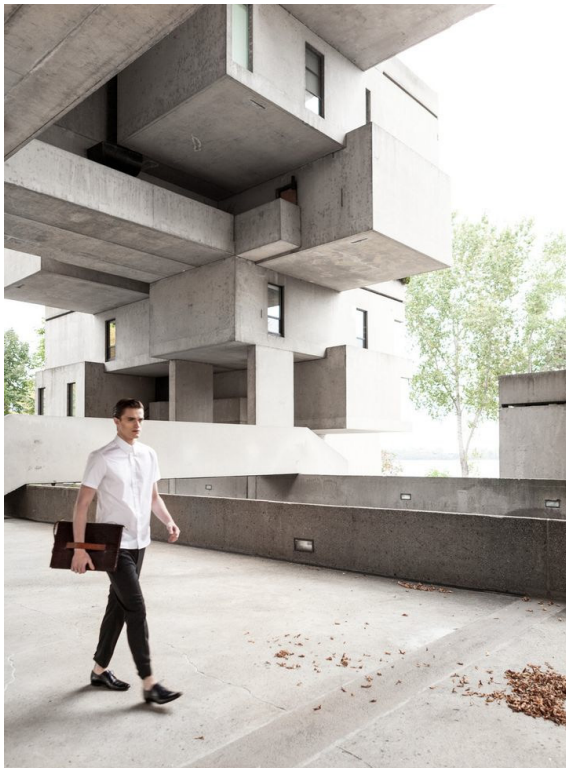


figure 21: section Habitat 67

figure 22: three dimensional model of Habitat 67 (black circulation, grey modules)

vertical circulation

The vertical circulation was regulated by three elevator cores. The elevators stop every four floors, serving the horizontal pedestrian streets. Access to the houses is directly off these pedestrian streets, sometimes being one level above or below the walkway. The streets are continuous through the project, and there are play areas for children along them. The top eleven floors consist of housing, the second floor shelters a pedestrian plaza complete with walkways and bridges, while parking facilities and a road system connecting the service areas are on the ground level.

figure 21

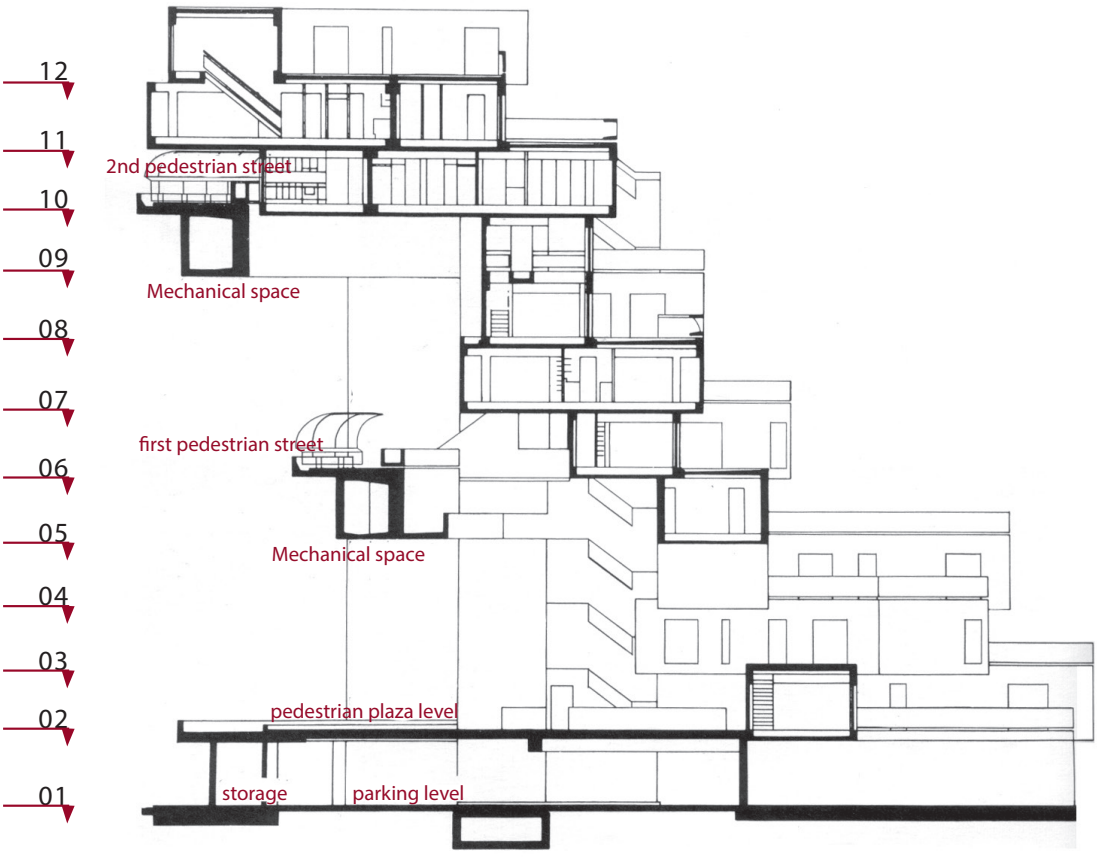
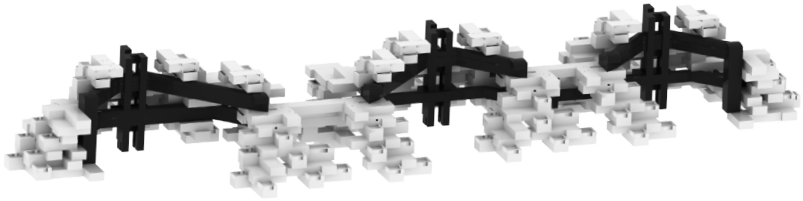


figure 22



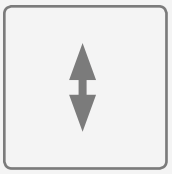
STATISTICS

level 01/ basement Floor	Parking	12.712,4	m
	Storage	4.578,7	m
	Vertical infrastructure	178,3	m
level 02/ Ground Floor	Housing	3.000	m
	horizontal infrastructure	8.048,7	m
	Vertical infrastructure	178,3	m
FIRST INTERMEDIATE STORY			
Level 03	Housing	3.125	m
	Vertical infrastructure	178,3	m
Level 04	Housing	3.000	m
	Vertical infrastructure	178,3	m
Level 05	Housing	2.250,	m
	Vertical infrastructure	178,3	m
FIRST PEDESTRIAN STREET			
Level 06	Housing	2.250	m
	Horizontal infrastructure	1,971,4	m
	Vertical infrastructure	178,3	m
SECOND INTERMEDIATE STORY			
Level 07	Housing	2.250	m
	Vertical infrastructure	178,3	m
Level 08	Housing	2.250	m
	Vertical infrastructure	178,3	m
Level 09	Housing	1.000	m
	Vertical infrastructure	178,3	m
SECOND PEDESTRIAN STREET			
Level 10	Housing	1.000	m
	Horizontal infrastructure	1,676,5	m
	Vertical infrastructure	139,7	m
THIRD INTERMEDIATE STORY			
Level 11	Housing	1.000	m
	Vertical infrastructure	139,7	m
Level 12	Housing	1.000	m
	Vertical infrastructure	139,7	m

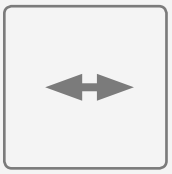
41,6 %

23,9 %

3,9 %



8,6 %

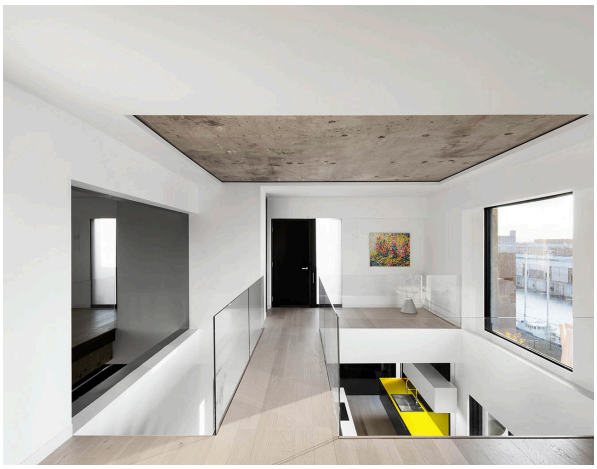


22,0 %

residential density:
0,023 person/m2

net dwelling area (~)
108,5 m2

dwelling density
0,006 dwelling/m2



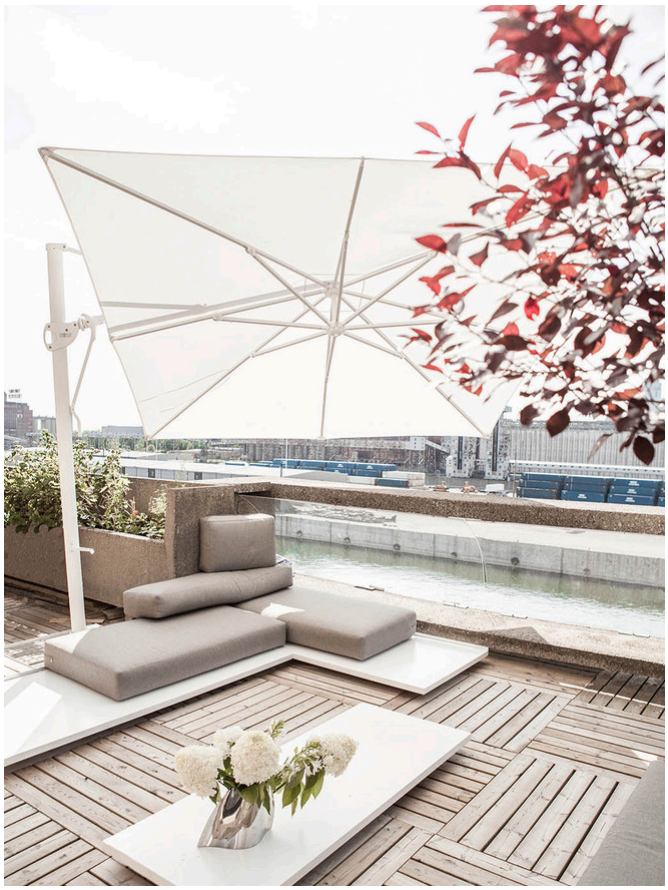
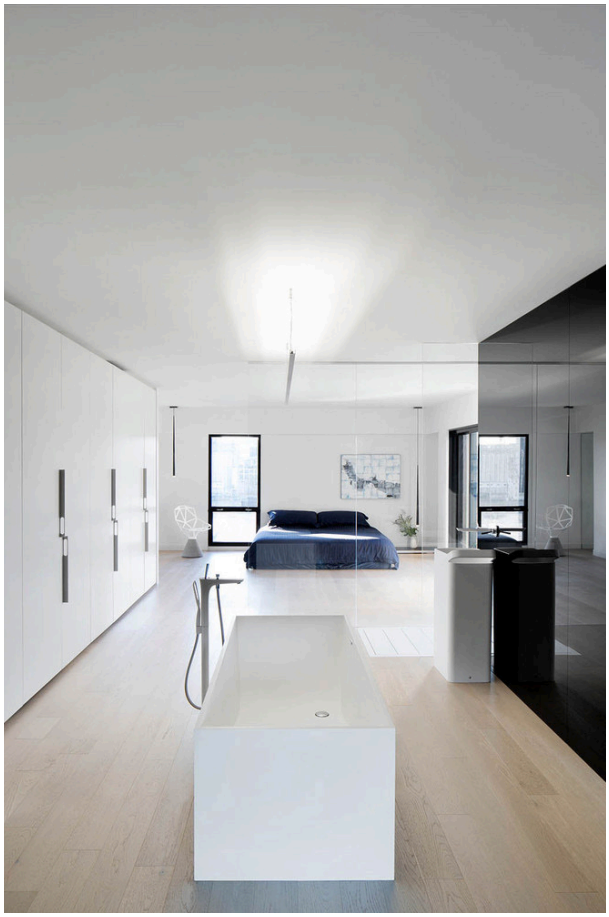


figure 23: impression of current state of a renovated luxerious apartment Habitat 67

Architects:	StudioPractice
Location:	Montreal, QC, Canada
Conception:	Marie-Pierre Auger Bellavance
Lighting Designer:	Gorgin Fazli
Project Year:	2015



CONCLUSION

To conclude, considering the demand for houses in the city, this thesis focussed on what kind of concepts are needed to give an answer to this demand. Therefore, first was explored what the future demographic flux to the city will be. The results showed that in the Dutch urban context 90 per cent will live in urbanized areas in 2050, globally this will be 70 per cent. In the Netherlands this growth is mainly caused by the growth of single households and the number of families that stay in the city. To date, the common floor plan is almost exclusively designed for the needs of a family, even in new developments. In the near future however, a variety of lifestyles imposes an imperative for specialized floor plans. Flexible types of living space will offer the opportunity to react to changing life circumstances, by relatively simple means. In addition, this issue needs to be paralleled by architectural solutions for further 'densification' of an already dense urban living environment. There is a need for concepts that offer a model for the development of cities without giving in on differentiation, flexibility and individual expression, models that are in sharp contrats with the many ad hoc container solutions that appeared over the past decade.

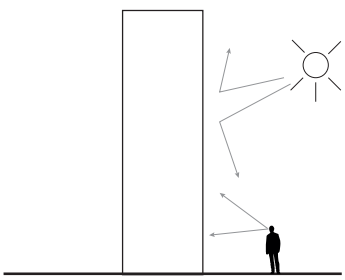
In view of these demands, the urban desgin challenge of today can be summarised as follows: it concerns the **densification** of our cities in combination with **differentiation** of the built environment and the stimulation of **communication** between its inhabitants.

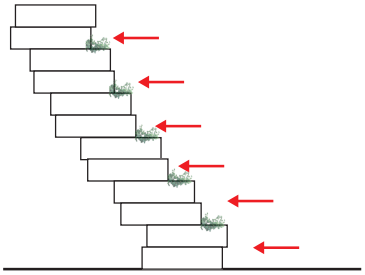
In search for these new models a case study was done on the design of *Habitat 67* by Moshe Safdie. This case study was chosen for its expressive and clear statement it made considering the question about how to create spatial quality within the densities that are prevailing today.

The model Safdie developed was about two concepts, the first being about prefabrication for reducing the housing costs and the second being rethinking the apartment design within a new paradigma. Safdies Habitat offered an answer for high density living in two ways. First, with the use of one singular module as basic building block the design of Habitat became highly flexible. Fifteen different apartments were generated starting from 60m2 uptill 160m2. Consequently, by stacking the boxes in a certain pattern residual space was generated that became public space where people could meet en children could play. The model of Safdie brought the qualities of a suburbanhome to the apartment building. This thesis will conclude that rather then a fixed *form* for the design of an apartment building, Habitat offers a *model* for the development of new apartment buildings where community is a core value. A model that is about the organisation of public, semi public and private space in one building and by the fractalisation of the building mass variations are possible and qualities as view, gardens and light are added.

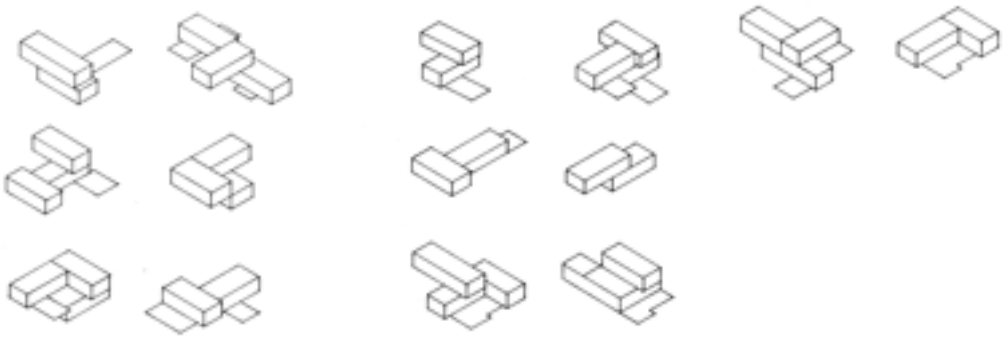
Habitat 67: a model for the flexible design of an apartment building

densification - urban high rise, with suburban qualitiesz

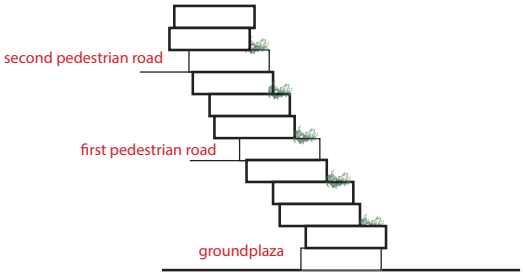




differentation - 15 types



communication - streets instead of corridors



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Websites

www.cbs.nl

www.pbl.nl

APPENDIX

Name: Edouard Le
M/F: Male
Age: 38
Education/Job: Motion Graphic Designer

Q *Which period of your life did you live in Habitat?*

A 2005-2014

Q *Why did you decide to move to Habitat?*

A For the architecture

Q *Why did you decide to move out of Habitat?*

A I wanted to live back downtown

Q *Can you give a general description of your experience of living in Habitat?*

A Fun experience, wonderful view, a bit far from the city and no commodity around

With the design of Habitat Moshe Safdie developed a new high density housing typology combining suburban and urban living. He wanted to offer a solution for maintaining the quality of life within the densities of today's cities. Habitat was al about contact with nature, gardens and streets instead of corridors.

Q *Does the design of Habitat offer a solution for maintaining the quality of life within an urban context? If yes, how? If not, why not?*

A I think the design is a bit too cold to have a good quality of life there. It often looks like living in a deserted town.

Q *What are according to you the strong points of the design of Habitat?*

A The cube construction allows you to have some room in your flat that doesn't touch to any neighbor rooms . This is good for the sound issue and intimacy. It feels like living in a house and not in a condo.

Q *What are according to you the failings within the design of Habitat?*

A Maybe too much concrete and not enough other materials?
It feels a bit like living in a bunker…

Q *Moshe Safdie designed communal spaces (streets instead of corridors).*
Is there a sense of community within Habitat and how is that established?

A Not that I've known of. Maybe I didn't feel part of that community if there is any.

Q *If not, what could be the reason for that?*

A I think, beside the tennis court, there is none shared space where people can enjoy hanging out together.

Q Which factors or design decisions help – according to you - in general (not specific for Habitat) to establish a sense of community within a residential building?

A Having commune spaces, like shared garden, pool or any other spaces where people can hang out together.

Q *For my thesis I'm exploring if it is possible to find solutions for the urban design challenges of today (overpopulation and lack of quality within the city) by reinterpreting the ideas of pioneers like Moshe Safdie and combining them with modern technological innovations.*

Which aspects of Habitat 67 have stood the test of time and can be used for new urban developments?

A I think the concrete cube stood the test of time. It doesn't look outdated and is a good way to build spaces.

Opinie

Spanning bevolkingsgroei en woningvoorraad

Vandaag, 06:00 0 shares

Het zal er letterlijk om spannen op de woningmarkt. Na het herstel van zware krimp, krijgt de markt nu te maken met een ware groeistuip van de bevolking.

De nieuwe CBS-prognose geeft aan dat het aantal inwoners in 2016 en 2017 jaarlijks met meer dan 100.000 zal toenemen, mede door de instroom van asielzoekers. Omdat de aanwas niet uit baby's bestaat, maar voor 4/5 uit volwassen immigranten en hun kinderen, ziet het CBS op korte termijn ook een bovengemiddelde toename van het aantal huishoudens.

Aanwas en vervanging

Dit jaar kwamen er bijna 70.000 huishoudens, oftewel potentiële woningvragers, bij in Nederland; in 2016 bijna 80.000 en ook in 2017 nog 70.000.

Daarna matigen de aantallen. Met andere woorden: de aanwas van extra huishoudens waarvoor een woning nodig zou zijn, loopt op korte termijn flink op. En dan tellen we niet eens de seizoenwerkers mee die officieel niet als inwoner gelden - en ook niet als huishouden tellen - maar wel ergens wonen.

Naast de bevolkingsaanwas zijn er woningen nodig ter vervanging van gesloopte huizen. De afgelopen tijd zijn jaarlijks 10 à 13.000 woningen aan de voorraad onttrokken. Meevaller: de

transformatie van gebouwen lijkt het verlies door sloop te compenseren.

Spanning vraag en aanbod

Al met al ontstaat op korte termijn jaarlijks een vraag naar 70 à 80 duizend extra woningen. Jammer genoeg pieken de bouwplannen aanmerkelijk minder. De realisatie van afgelopen jaren ligt een stuk lager, tussen de 45.000 en 50.000 nieuwbouwwoningen. In 2014 zijn er volgens CBS cijfers vergunningen voor 39.000 woningen afgegeven, woningen die in 2015 en 2016 gereed kunnen zijn. Ter vergelijking: in de topjaren, halverwege de jaren negentig, ging het nog om een niveau van circa 100.000 vergunde woningen per jaar.

Het kan niet anders of de spagaat tussen huishoudensgroei en nieuwe woningen leidt in 2016 en 2017 tot oplopende spanning in vraag en aanbod. Tenzij? Mensen passen zich aan, nood breekt wet. In turbulente tijden krijgen allerlei nieuwe ideeën kansen. Wat te denken van intensivering van bewoning: met meerdere huishoudens woonruimte delen. Dit is in onze grote steden al waarneembaar als leefvorm voor ‘Friends’.

Er wordt ook over gesproken om asielzoekers woningen te laten delen. En wat te denken van gescheiden vaders die samen in een eengezinswoning hun co-ouderlijke rol uitvoeren? Projectontwikkelaars verkennen de mogelijkheden van microwoningen, die per oplegger verplaatsbaar zijn. Voor seizoenmigranten zijn oplossingen als flexwonen nodig. De transformatie van gebouwen levert ook aardig wat extra woonruimte op, al zullen op een gegeven moment ook de overbodige kantoren op raken, temeer omdat er ook heel veel staan op plekken waar je niet wilt wonen!

Grijze singles

Op langere termijn speelt vooral de vergrijzing van de woonconsument en daarmee de vraag naar andere woonvormen. De huishoudensgroei betreft vooral het aantal grijze singles. In de jaren zeventig domineerden jonge gezinnen, maar dat zal opschuiven naar oudere woonconsumenten. Het aantal ‘jongere huishoudens’ zal tot 2040 zelfs sterk afnemen. Straks zijn er twee miljoen tachtigplussers, hoe willen die wonen? Steeds meer oudere alleenstaanden vergt onder andere meer drempelloze, aangepaste woningen, bij voorkeur in de buurt van voorzieningen. Ook eenzaamheid zal steeds meer een punt van aandacht zijn, net als kleiner wonen. Immers, wonen kost geld per vierkante meter. Alleenstaanden kunnen hun huur niet delen en zijn een groter deel van hun inkomen kwijt aan huur. Minister Blok suggereerde al dat corporaties ook kleinere appartementen en woningen zouden moeten bouwen. In Amsterdam en andere steden worden intussen de eerste micro-appartementen neergezet voor jonge alleenstaanden. Blijkbaar een gat in de markt.

Kortom: de turbulente ontwikkelingen op het snijvlak van bevolking en wonen zullen zowel op korte als op lange termijn nog veel nieuws (en werk) brengen voor de bouw.

donderdag 24 december 2015, 5:30 — 432 reacties

Wonen in stad alleen voor de 'happy few'

De gekte op de huizenmarkt in Amsterdam en Utrecht jaagt de gewone man de stad uit. Wonen in deze steden is financieel eigenlijk alleen nog maar bereikbaar voor de 'happy few'.

Daarvoor waarschuwt scheidend NVM-voorzitter Ger Hukker in een interview met De Financiële Telegraaf.

De NVM heeft vorige week in een speciaal onderhoud met het Amsterdamse stadsbestuur de noodklok geluid over 'de gekte' op de huizenmarkt, vertelt Hukker.

„Alleen de *happy few*, die worden gesponsord door vader en moeder en daardoor niet afhankelijk zijn van de ontbindende voorwaarden financiering, kunnen nog een huis in Amsterdam kopen. Dan vraagt een eigenaar 290.000 euro en dan maakt papa er 350.000 van. En zegt daarbij ook nog dat hij geen hypotheek nodig heeft. Als makelaars vinden we dat niet reëel. Maar het is niet te stoppen."

Ondertussen worden Amsterdammers de stad uitgejaagd, zegt Hukker. „Zij kunnen geen vierduizend euro per vierkante meter betalen."

Toch heeft ook de NVM geen antwoord op de ontwikkeling. Hukker: „Uiteindelijk is het gewoon marktwerking, heb ik tegen de wethouder gezegd. Het enige bluswater is extra woningen bouwen."

Eerder deze week waarschuwde Vereniging Eigen Huis ook al voor uitwassen van oververhitting op de woningmarkt in de Randstad.