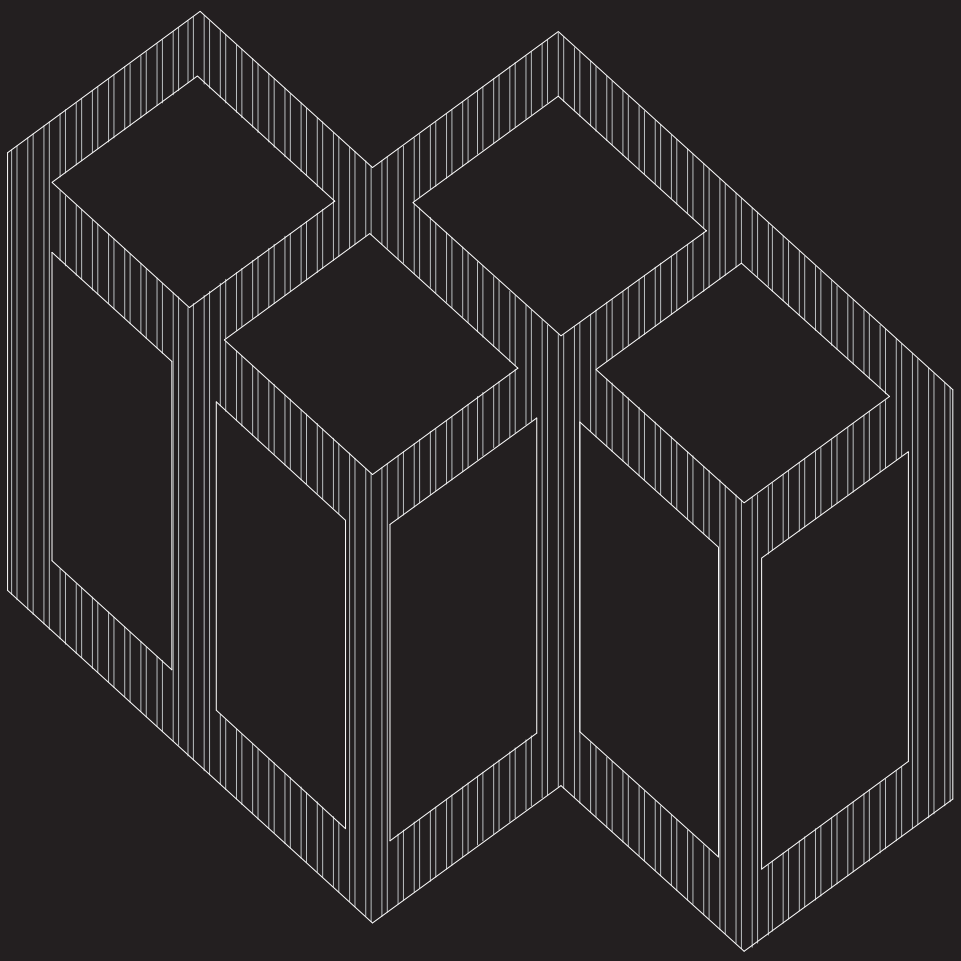
Smartbox

-Reused container for a student dormitory
ni the city of Hamburg-



MASTER THESIS

SMARTBOX: REUSED CONTAINER FOR A STUDENT DORMITORY IN THE CITY OF HAMBURG.

STUDENT: Laura Sottosanti

SUPERVISORS: Prof. Dr-Arch. Orio De Paoli, Dr-Arch. Joachim Reinig.

Master Program: Architecture for the sustainability Design
POLITECNICO DI TORINO

CONTENTS

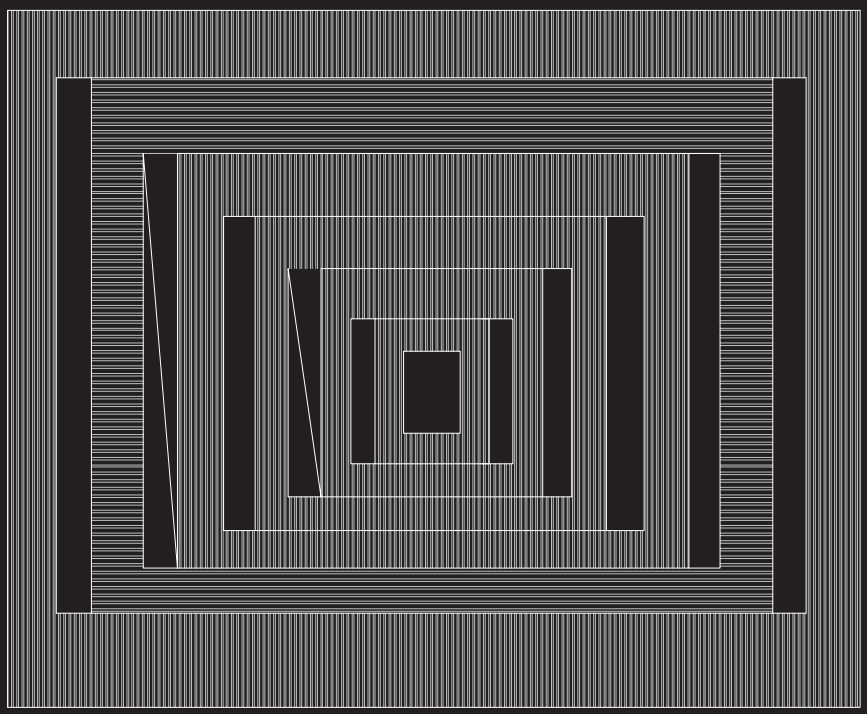
0. INTRODUCTION

"Waste isn't waste until we waste it." W. Addams

This thesis project derives from my internship experience in Hamburg. Thanks to a scholarship abroad, which later became also a scholarship for thesis abroad. I had the opportunity to produce the project presented here. During my stay in the city of Hamburg at Plan-R Arkitekten studio, I had the opportunity to receive a special assignment: in November 2017 the company *"SANI"* that owns and works with container contacts my boss, Joachim Reining, to ask how to invest their containers already used by the time in a housing for refugees in the Hamburg, which will have to be dismantled within two years as a temporary residence. The idea of the studio, based on the primary need of the city actually to have low cost accmodations, is that a student dormitory project, using precisely re-used containers. From this moment on my task is to taking care of the project ideas and development. The theme has thrilled me so much that together with my professor Orio De Paoli at Politecnico and the Arch. Reinigh in Hamburg, I decided to continue the work on the project as my MA thesis. The use of the container in the construction world in recent years, derives and is driven by the main reason that we are talking about elements that are found in a large quantities completely abandoned. Reusing an available abandoned container means both making something nice for the environment through the reciclyng of something that otherwise would be wasted, but also, under an economic aspect means a smart investment because of its competitive market price, about 1.500 Euros compared to the 7.000 needed to buy a new one, that will need in any case to be modified and readapted later to be used into the construction field.

The future scenario in which oil will be over, is an inevitable reality to which we are approaching the more and more rapidly. This pushes to have a forward-looking vision on alternative solutions, which allows the use of renewable resources. The rationalization of resources also imply looking at what already exists, finding elements normally labeled as "waste" with the potential to be exploited for a smart recycling and reuse.

New scene-arios



1. NEW SCENARIOS IN ARCHITECTURE

TO SUSTAINABILITY THROUGH REUSING

The rapid changes that affect the society whre we live, in the economic, social and environmental aspects, can not be reflected in the field of architecture. Today, in fact, the contemporary project is asked to combine three important requirements, namely:
1-Environmental sustainability.
2-The rationalization of resources.
3-Attention to changes in housing conditions currently in place.
Environmental sustainability is a parameter that increasingly determines our choices: the society of consumption, and the hyperproduction associated to it, puts a strain on the planet's ecosystem, increasingly burdened by the high ecological footprint of contemporary lifestyle. The awareness of the need of a rethinking of lifestyles, involves the construction of the use of renewable sources and the reduction of consumption, both in the implementation and management phase. Researches in the field of clean energy show that by improving the relationship between production and environment does not necessarily worsen the lifestyle of individuals. The building, intended as a real organism that relates to the surrounding environment, has many advantages from the exploitation of natural energies. Adopting design solutions that improve the performance of the building envelope, in addition to solar and wind energy collection systems and water treatment and recycling contributes not only to an immediate economic response - in terms of energy consumption - but also to the improvement of the quality of life within the building itself, as well as the preservation of natural balances. Reconnecting with what has just been said, it is clear that today there is an essential need for a more rational use of the resources available.

Fig.1 The Hamburg Harbour and one of its containers ship

Fig.1

This practice, once was almost exclusive of Third World countries and the most disadvantaged ones, now it is widespread in the Western world too. Here, of course, recycling takes on more the connotation of a fashion for artists and creatives, than a necessity derived from the almost total lack of means. However, the fact that we start to consider concretely the possibility of reusing elements that have not yet reached the end of their useful life, is an absolutely positive factor. Also in the architectural field, the signs of an "ecological spirit" are beginning to manifest, marked by the recycling and optimization of existing resources and materials, rather than the creation of new elements. These operas can be considered architectural "manifestos" of this ecological spirit. However, they have the effect of sensitizing the population and the designers, with buildings that are sometimes utopian,but which draw attention to important themes with which all architects must begin to confront themselves. Looking at the existing and finding in it new opportunities can mean not only using waste materials to turn them into new objects and products - with functions that are totally different from the original ones - but also designing the existing city, revisiting the abandoned places, such as the industrial suburbs, for example. Taking into account the fact that in Italy, according to ISPRA, 14,000 m2 of free land are urbanized every day, to the detriment of precious green and wooded areas of vital importance from the landscape and ecological point of view, it is clear that the time has come It stops this rush to overbuilding. Instead, preferring interventions on the built and the existing city. A new scenario that is opening up for architecture is therefore that based on the hybridization of the building process innovation -promoting a new approach to design

and new use and management of buildings. The architectural project must in fact compare, as well as with the topics just discussed, also with the significant mutations that are taking place in the building field from the point of view of the users. In fact, even if the new construction interventions are growing in terms of numbers, this does not explain how the dissatisfaction of the expectations of citizens in demand of an home remains. The problem, therefore, can not be the lack of housing itself, but the lack of an 'adequate' housing, able to meet the current and future needs of users. Today's user has changed from the past, both as "type" and as "request." Who today is looking for an house wants it to respond appropriately to a series of requests ranging from comfort, low expenses, to pay attention for the environment by using clean energies. Since the end of the twentieth century, significant changes have occurred in the structure of society and therefore of users, with a consequent change in demand that, however, has not been reflected in the design field. As the first factor of change we must highlight the disappearance of the traditional family unit, today's families are different than in the past, both in terms of number and composition, the activities of individuals and the new way of living and using the living spaces have also changed. The computerization of the society has changed the way people relate, has shortened distances and has changed the way people occupy the spaces of the house. Moreover, the contemporary economic crises with its destabilizing effects on the job's World created also new groups of youngs, which are afflicted by the precariousness, have big difficulty entering the construction market.

Fig.2/3 Avarage of Home buyers in Italy in the 2017 trends and in the 2012 trends according to Tecnocasa Studies Office

All the considerations made so far lead to the observation of the need for a renewal of the sector, especially in our country that shows a significant delay compared to other European nations. We must therefore start to rethink the homes making them more efficient in management, more responsive to the needs of new users, more responsive to the environment, and to exploit the benefits that derive not only from recycling, but also from prefabrication and other strategies that lower costs.

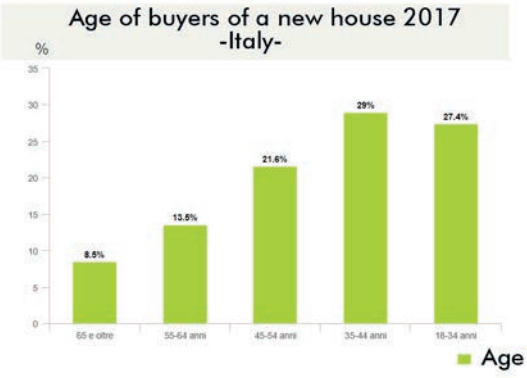


Fig.2

From 2012 to 2017 the average age of those who buy a house has increased. According to an analysis carried out on a sample of the sales that the agencies affiliated to the Tecnocasa Group made, in Italy it was found that the average age of buyers in 2012 was 39.4 years old and in 2017 41.6 years old. The percentages of buyers over 45 years old have increased. This is compatible with the trend of the real estate market in recent years, which has seen a greater difficulty in accessing credit from the bank especially among younger people, often due to job instability, but also new behaviors that increasingly see them prefer to rent instead of buying. The increase in the higher age brackets can also be explained by a return to buy an house as investment or to buy an house for the holidays, both kind of investments types that tend to be purchased later in a life time when there are greater economic certainties.

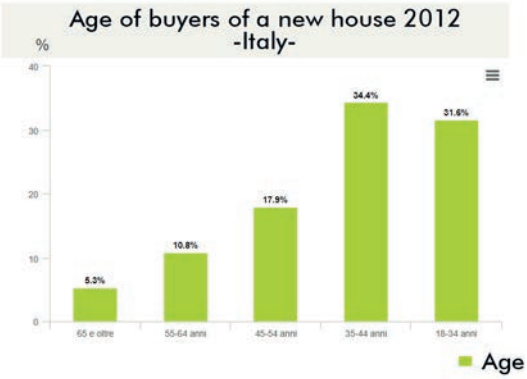
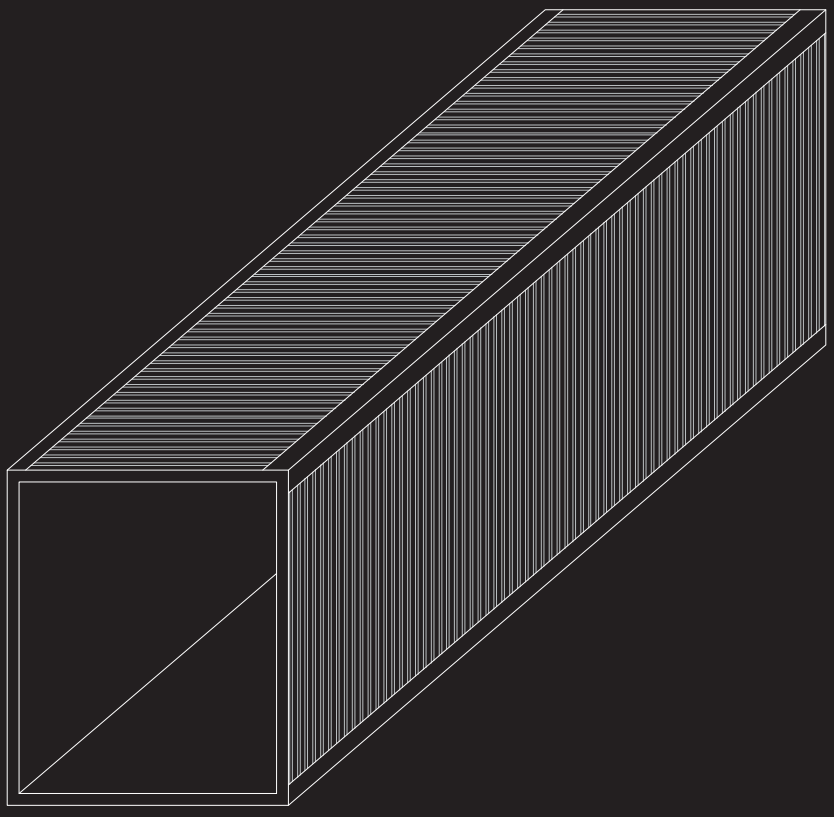


Fig.3

Contai-
ner



2. THE CONTAINER - A SILENT RESOURCE

Fig.4 overlapped containers Fig. 5 transportations of goods before the invention of the container object

Despite having its origins in the late 1780s, the standardization at the world level of containers and its equipments was one of the most important innovations that occurred only in the 20th century. However, since 1830 railways in various continents, were used for transporting containers that could easily be transferred to ships or barges. These were originally used for coal transportation and were open boxes made of wood or iron. Since 1900, however, the use of closed containers has been adopted in order to move goods on road and rail transit. In 1920, the railway Clearing House has standardized a container calling it RCH whose dimensions were 5 'and 10', it was made of wood and it didn't allow overlapping. From 1926 to 1947, in the United States, the North Shore of Chicago and the Milwaukee Railway invented vehicles useful for loading and unloading goods on the platforms between the two cities. These new systems soon spread throughout the North America given their indispensable usefulness. The next step took place towards the end of the Second World War, when the United States Army began using special containers to accelerate the loading and unloading of transport ships. The army used the term *"Transporter"* to identify the containers used to ship goods for the officers' houses in the field. The Transporter was a reusable container of 2.60 m long, 1.90 m wide and 2.08 m high made of rigid steel. Subsequently, in 1952, the army began to use the term *"CONEX"*, short for *"Container Express"* to indicate the new containers for the transport of engineering supplies and spare parts shipped by rail and then by ship to Japan and Korea. Thanks to this type of transport, shipping times halved and during the subsequent wars, such as Vietnam most of the supplies and

Fig.4

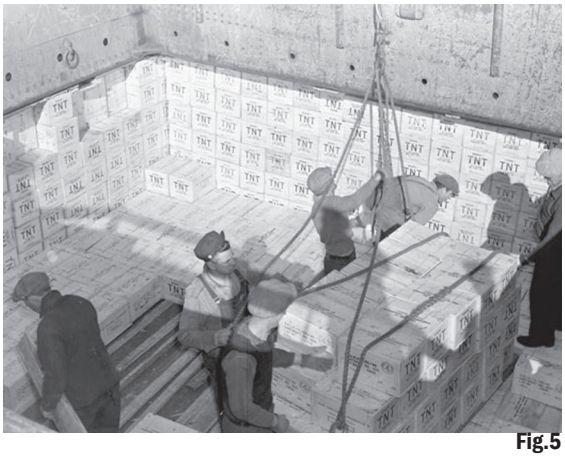


Fig.5

materials were sent with the CONEX. Since it was invented, the container has undergone some changes and has been perfected to become the container that we all know today and which is recognized by the international transport system and the ISO standard. Sending goods in containers has played a crucial role in the global market because delivery times have decreased considerably also considering its rigidity and ease of transport with any type of vehicle, allows it to arrive and be placed anywhere in the world.

The container possesses the qualities of the "perfect" construction according to Vitruvius: stability and endurance (firmitas), functionality (utilitas) and beauty (venustas). The link with architecture is obvious and the architects have made their commitment to find architectural solutions where the cost-benefit relationship is advantageous. The construction with containers has a lot of advantages thanks to the ease of transport, the modular system and the fact of being prefabricated products supplied in large quantities. Designers have taken these containers as something necessary for re-use and savings given the contemporary time in which these characteristics are fundamental. This potential system have not yet had the great success in the context of the large-scale design because they are seen as elements for projects for small and especially temporary works. This is a characteristic that is not to be underestimated because is a great disadvantage and a limit for the diffusion of this way of building.

2.2 DEVELOPMENT

The architecture of containers represents a kind of revolution that the architects have exploited only in recent years. The compact and robust cases, which resist seismic movements, fire, weather and many other types of inconveniences, are spatially suggestive - they can be seen as spaces for multiple use. This vision is even more evident in the countries of the Third World where, spontaneously, they have already turned into shacks, warehouses and shelters for those in need. Initially, containers were more typical of architectural and artistic manifestos than of actual architecture and had a great conceptual power, enhancing characteristics such as mobility and cosmopolitan naturalness, spatial asceticism and minimalist interiors. Most of this kind of work were called “urban nomads” and increased their developed since the end of the 1990s. There is a large quantity of container all over the world, especially in Europe and North America, due to the exchange of artefacts between the West and the distant East, where most of the products of the world are produced. The West imports more than what it exports and the products travel in steel tanks and, to take back an empty container to its place of departure costs a lot, in fact it is cheaper to buy a new one in China, the country where most of the containers are loaded with goods for the western countries. The costs to move the containers from the place of arrival back to the port, are high and the result is that it is cheaper to buy new ones at a price around 5,000 euros directly close to the place where it’s needed. It happens so that in the ports of the western world a huge amount of empty containers are stacked on top of each other, remaining still and unused losing allthe advantages and reasons why they were created.

Fig.6 Instan Housing shelter made by Winfried Baumann for urban nomadism Fig. 7 Nomadic Musuem by Shigeru Ban, the 2014 Pritzker Prize winner

J.D. Smith, in his work of investigation on these objects for transport, in the text “Shipping container as constructive elements”, reports that there there are about 152,000 abandoned boxes in the ports of Great Britain and about 700,000 in the United States. This occupation of the land, pushes the managers of the ports, railways and roads, to try to sell the containers at low prices around 1,500 euros each one, to get rid of them and have back the space occupied. The architects are thus called into question of course for, driven also by their ethical point of view of architecture, developing projects and solutions that lead to the reuse of these rectangular elements. With the developments of the ISO container, solutions for advertising content, homes, offices, shops, public places and other uses. Very often , especially in the beginning, containers have been used to resolve emergencies or for armies, with the aim of being only temporary homes or offices. This led to a development of solutions many similar around the world with materials designed for a short term use at a low price. At the beginning it was thought that the best solution was using the container only by matching them on the ground,creating a series of horizontal units without taking advantage of its self-supporting skill; over the years it has been understood that the self-supporting skill of container is what makes them very fascinating under an architectonical point of view. In this way are been designed emergency shelters, schools, shops, clinics, urban and rural houses, community centers, laboratories, workshops, bridges, places for exhibitions, bars, stores, restaurants, hotels, kindergartens, university camps, museums and many other...

Fig.6

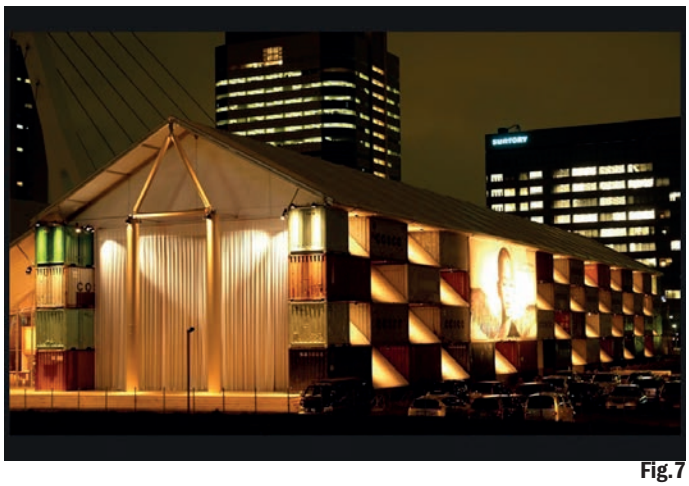


Fig.7

Thanks to developments in the design field, the developments of methods of production of materials, this type of construction is able to offer optimal solutions even on an aesthetical level, both in urban and suburban environments. In recent years, lots projects ideas have been proposed in order to find solutions that can be produced and inserted on the construction market. Adaptability, mobility, lightness, modularity and sustainability are all strictly connected criteria: in fact, the possibility of having modular structures reduces the production costs and its demountable aspect makes the system flexible.

2.3 TYPOLOGIES

From McLean's first modern container, the industry has grown considerably over the decades. The basic principles remained the same, but some improvements were made to make the container more stable, safe and controlled. It is indeed possible to find on the market a large number of types of containers, each one dedicated to a special type of goods or transport, still inside of unified construction rules. We can classify the containers in two large types, depending on the use for which they are prepared:

-**General Cargo Container**: basic type of container, for loads of non specific goods, transported with axle or pallets;
-**Specific Purpose Container**: container for specific and particular loads.

The first category, also known as *"dry cargo"*,presents three additional sub-categories:**1 OPEN TOP**: The roof panel is removed to leave the three side panels, the container floor and the double end doors. With this leaving the container an open top - you can then apply a roof that can be removed as/when needed. The removable roof on an open top container can either have a hardened roof or a tarped roof. The temporary roof is attached to the side panels and removed for filling through the roof rather than the double end doors for larger or heavier items. **2 PLATFORM/FLAT TRACK**: These contaiers have three panels - the container flooring, a front panel and a back panel. They are often used in transport, import and export of industrial products and machines, vehicles, construction materials, concrete pillars, steel beams, profiles and wooden logs. The advantage lies in the fact that this type does not present the classic box-like structure with fixed walls and supporting structures. The two sides are longer in steel than we usually find in the closed box containers categories.

Fig.80 Open-Top container
Fig.9 Platform/ Flat Track
Fig.10 Reefers Container
Fig.11 Tank Container

3 CLOSED VENTILATOR: it is a very particular category and not always available, i's used when the cargo to be transported must be protected from humidity.

The second category includes:
1 REEFERS CONTAINER: they are thermal containers characterized by an internal insulation of doors, roof, floor and walls. This is to keep the conservation of food products and perishable goods; high insulation helps to limit the temperature changes inside the contaire.
2 NAMED CARGO: These are containers used to transport goods such as cars, other vehicles, livestock and poultry.
3 DRY BULK: These particular types of containers are used where no external packaging of products is required, as for wheat and other dried food.
4 TANK CONTAINERS: Finally, this last type incorporates a cistern inside it, for the transport and distribution of dangerous liquids, gases and chemical products.

Although in this great variety of types, containers are always supplied with dimensions ruled by an ISO standard written in the '70s, with the aim to unify the container market so that it can be transported all over the world.

Fig.8

Fig.9

Fig.10

Fig.11

2.4 ISO 6346

The advantage that has made the container the most widely used transport system in the world lies in the fact that it can be easily loaded, unloaded, moved, stacked, transported and monitored easily and efficiently, in any country. The standardization made the delivery of goods over long distances even between the various continents easier and faster than ever. Between the end of the 60s and the early 70s, a set of requirements was formulated, and they ended up in the ISO 6346 standard, which defined the standard terminology, the dimensions and the markings of the containers, unifying the production on a worldwide scale. From the point of view of identification, the ISO 6346 standard establishes a visual identification system for each container that includes a unique serial number that tells about: the owner, the country, the size and type and category of equipment. Each code consists of 4 uppercase letters, 3 for the *"owner code"* and 1 as *"category identifier"* assigned by the owner; 7 numbers, 6 digits assigned by the owner and 1 single digit of control. This way each container has a unique 11-digit code required for constant monitoring during its movements. Where the category identifier can be:
J: detachable freight container related equipment
R: reefer (refridgerated) containers
U: freight containers
Z: trailers and chassis

Fig.12 Container sizes
Fig.13 Example of identification code
Fig.14 Identification code on a container

The ISO 6346 also applies to the standard dimensions of the container. Regarding the length, it individuates five possible choices:
- 20' shipping container (6.1 meters)
- 40' shipping container (12.2 meters)
- 45' shipping container (13.7 meters)
- 48' shipping container (14.6 meters)
- 53' shipping container (16.2 meters)

The most common containers on

The most common containers on the market are 20', 40' and 45'. The width and height of the container are more strictly expressed due to transport restrictions, the containers must be able to pass under the railway tunnels, be loaded on wagons and trucks and not exceed the width limits given by the road code. The unified width is therefore 2.44 meters, while the height is equal to 2.60 meters. In addition, in recent years a type of container with a bigger height has been created: *"high cube"* container. It reaches 2.90 meters, and also recognized by the ISO standard, in fact all the container measurements listed above are also produced in the equivalent high cube version. The following is a summary of the measures for the most common types (container 20', 40') in their standard versions and the high cube ones. As you can see, the container remains substantially unchanged, but the vertical increase of just one foot allows a significant increase in the internal load capacity of the container. The ISO containers are made of aluminum and steel, although now they are also largely made entirely of Corten, which is a type of material that resists rust. The union between a container and another takes place through two elements: corner blocks and twistlocks. A twistlock is the male part of the attachments and consists of a pin that is inserted in the corner block that by rotating on itself, allows the elements to be fastened, it is inserted into the side holes of the blocks.

Fig.12

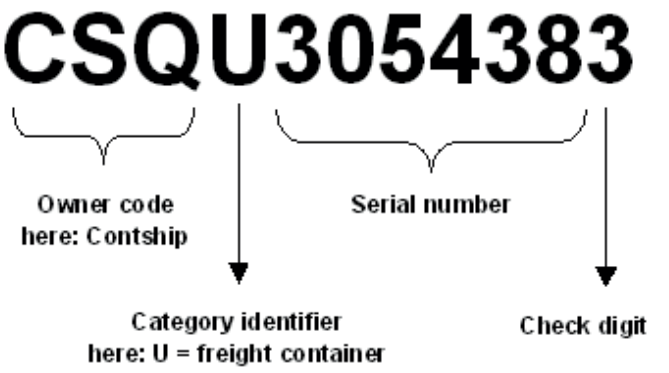


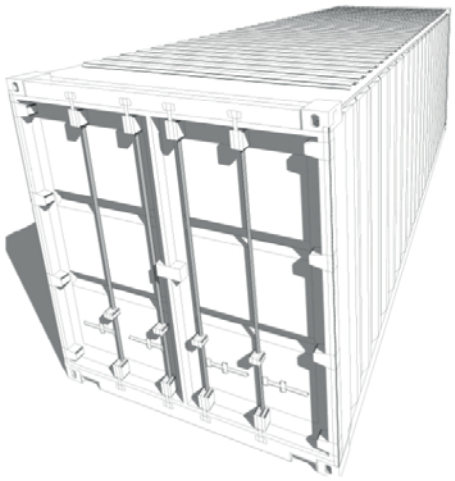
Fig.13

Fig.14

Fig.15 Standard Shipping Container Dimensions
Fig.16 Example 20ft container
Fig.17 Example of 40ft container

Standard Shipping Container Dimensions						
Container Type	External Length	Internal Length	External Height	Internal Height	External Width	Internal Width
20ft Shipping Container	20ft (6.09m)	(6.01m)	(2.59m)	(2.39m)	(2.44m)	(2.34m)
40ft Shipping Container	40ft (12.18m)	(12.11m)	(2.59m)	(2.39m)	(2.44m)	(2.34m)
20ft High Cube Shipping Container	20ft (6.09m)	(6.01m)	(2.90m)	(2.69m)	(2.44m)	(2.3m)
40ft High Cube Shipping Container	40ft (12.18m)	(12.11m)	(2.90m)	(2.69m)	(2.44m)	(2.34m)

Fig.15



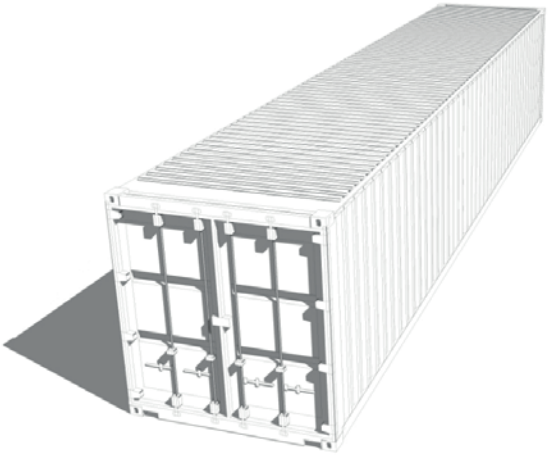


Fig.17

2.4 COMPONENTS

If apparently the container looks like a simple metal box, in reality it is made up of specific parts. The carrier element of the container is a steel frame, consisting of uprights in the 8 corners and lower and upper longitudinal and transverse beams. This structure alone is enough to guarantee the stability and the load-bearing capacity of the container. The floor, walls and roof have the function of transferring the weight of the load onto the supporting structure and protecting it from the outside, in fact they are the less resistant parts of a container. With reference to the schematization shown, it has been chosen a standard container as a reference, as it is the most interesting type for the purposes of its conversion into a residential module. All the concepts reported can be applied even to high-cube containers.
-**CORNER POST**, vertical components of the frame, located at the corners of the container jointed with the corner blocks and the floor structures.
-**CORNER CASTINGS**, located at the corner of the container to allow lifting, handling, stacking and fixing actions. The corner blocks are empty inside and have an elongated hole on the three external faces. These are the hooking points for handling and fixing for transport.
-**HEADER AND SILL,** they constitute the entrance portal, as horizontal frame and a threshold on the floor level.
-**FRONTED FRAME**, it is the structure at the front end of the container, (opposite to the door side). It is made up of upper and lower bars connected to the front uprights and corner blocks.
-**TOP RAIL,** longitudinal structural elements located on the upper

Fig.18/19 Container components, axonometry views

part of both side of the container.
-**BOTTOM RAIL**, longitudinal structural elements located on the lower part of both sides of the container.
-**CROSS MEMBERS,** series of cross beams (placed approximately 12 inches apart from one another), connected to the lower side rail and an integral part of the flat support frame.
-**FLOOR**,it is usually composed of steel beams with an overlying plane in wooden planks.
-**ROOF**, excluding open containers, regular container have flat or corrugated steel sheet roofs, welded to the frame members.
-**SIDES & FRONTS**, the walls and cover are made of steel or aluminum corrugated sheet, or made in protected wood with plastic or aluminum foil.
- **DOORS**, the doors can be made of plywood inside with steel or aluminum cladding, or with a combinations with glass fiber. Hinged doors have plastic or rubber gaskets as a seal against water infiltration.
-**SECURITY SEAL**, used in combination with the locking mechanism is used to seal containers for security purposes. These gaskets are numbered and often equipped with a code.

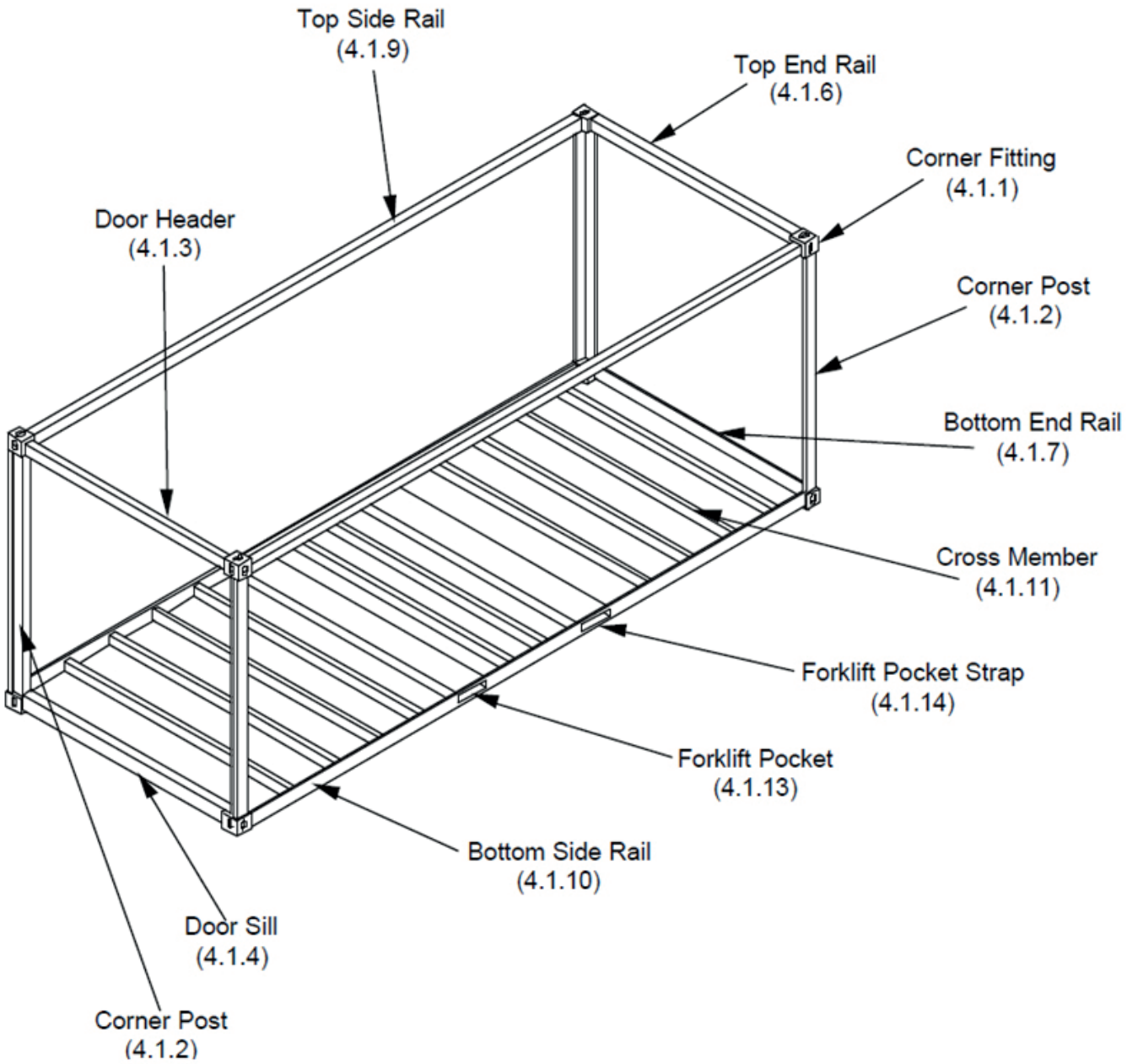

Top Side Rail
(4.1.9)
Top End Rail
(4.1.6)
Corner Fitting
(4.1.1)
Door Header
(4.1.3)
Corner Post
(4.1.2)
Bottom End Rail
(4.1.7)
Cross Member
(4.1.11)
Forklift Pocket Strap
(4.1.14)
Forklift Pocket
(4.1.13)
Bottom Side Rail
(4.1.10)
Door Sill
(4.1.4)
Corner Post
(4.1.2)

Fig.18

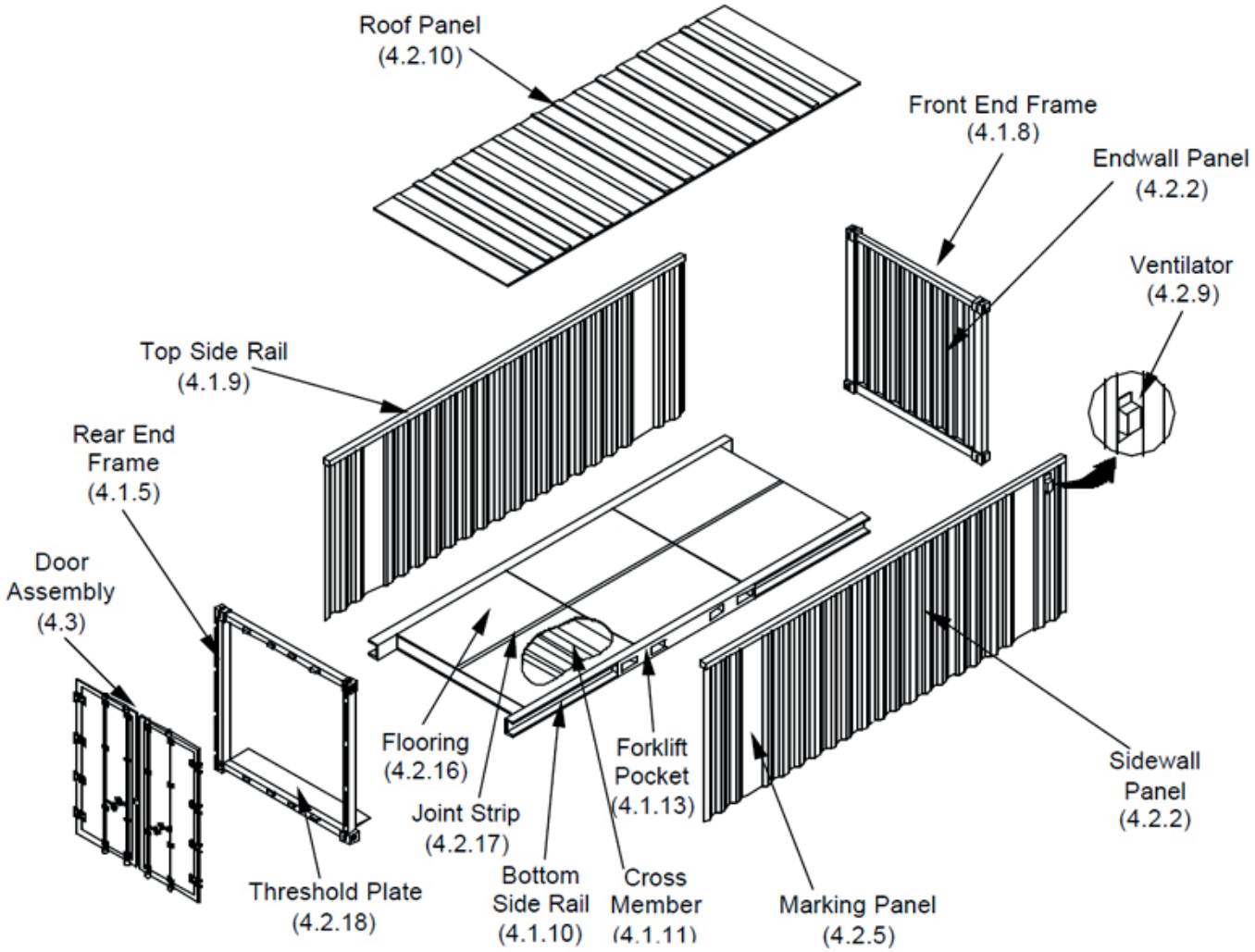

Roof Panel
(4.2.10)
Front End Frame
(4.1.8)
Endwall Panel
(4.2.2)
Ventilator
(4.2.9)
Top Side Rail
(4.1.9)
Rear End
Frame
(4.1.5)
Door
Assembly
(4.3)
Flooring
(4.2.16)
Joint Strip
(4.2.17)
Forklift
Pocket
(4.1.13)
Sidewall
Panel
(4.2.2)
Threshold Plate
(4.2.18)
Bottom
Side Rail
(4.1.10)
Cross
Member
(4.1.11)
Marking Panel
(4.2.5)

Fig.19

2.6 ADVANTAGES AND DISADVANTAGES

Making architectures using containers has many advantages, but also some disadvantages, the advantages mainly concern:
1 WORLDWIDE DIFFUSION: The container is now present all over the world and is a known technology. It has become the main way of storing and transporting goods, it is easily available and in large quantities. Its ISO standardization gives the possibility of finding the same element with the same dimensions and characteristics in any part of the world. Therefore, with due modifications relating to the environmental and social context in which it is built a project realized with the containers is adaptable to any place.
2 POSSIBILITY OF RECYCLING: The strength and durability of the container ensure that it is in perfect condition even after its commercial use. In addition, transport costs often make it more convenient to continue to import new containers full of goods, rather than circulating the same empty spaces. Thus, the suburbs of the cities are filled with container storage places, which are stacked on themselves without being used. Giving new life to this silent resource, therefore, allows not only to find a new building material, but also to solve the problem of many cities that face the problem of the management of unused containers.
3 PREFABRICATED, COMPACT AND ROBUST: the container is a standardized item produced according to precise rules and subjected to lots of checks. So it is already certified under the point of view of security and resistence. It is designed to carry heavy loads and to support the weight of other overlapped containers, it is also a perfect structural element, with a maximum weight sustainable from acontainer is usually around 180 tons.

Fig.20 Container Advantages

Its compactness makes it easily movable and facilitates its modularity. **4 MODULARITY AND RAPIDITY OF CONSTRUCTION**: The standard dimensions of the container and its parallelepiped shape make construction operations very simple. In fact, only one container can make a minimum accommodation, and more modules can be placed side by side or overlapped to build larger homes that vary depending on the number of occupants and their needs. By using the container as a building block, the construction of an entire building is quite rapid. Even if you want to obtain particular compositional and aesthetic results, the possibility of stacking a very large number of containers with the help of a crane in a few hours makes it possible to immediately get a structural skeleton, on which to operate with further adjustments. ***5* TEMPORARITY OF INSTALLATION**: The container makes it possible to design buildings that can be used even just temporarily. As emergency modules, trade fair pavilions or holiday homes. Its easy transportability makes it possible to create an ideal mobile home that can be installed as desired at any site and then removed without damage to the environment. In fact, with a view to complete reversibility of intervention, in the case in which the module is completely decomposed into its constituent parts, the steel structure can still be recycled. **6 DURABILITY**: the container also allows the construction of very durable structures. It is indeed a very resistant and durable element, precisely because of the necessity that underlies its production. For the transport on ships and trains, in fact, the container must be absolutely waterproof, treated with special paints to prevent rust.

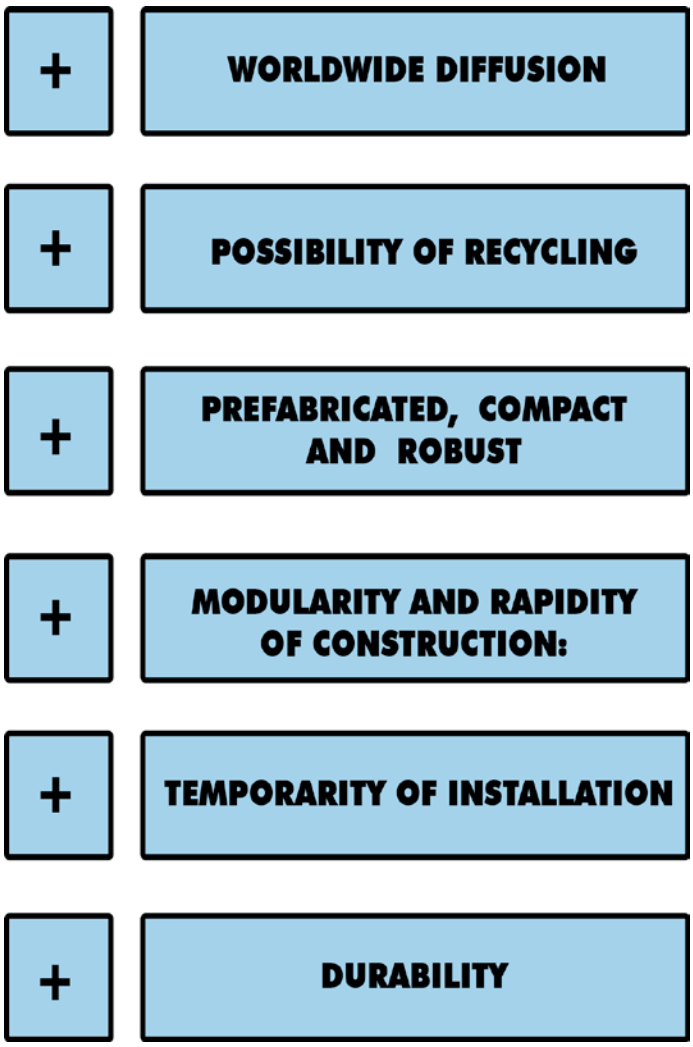


Fig.20

DISADVANTAGES

As we have seen, the advantages of the container are severals. However it also has some disadvantages, which is important to take into account when approaching the use of this element. **1 COST**: During the construction of a container house, an important cost element is getting the raw material: the container. Its cost varies depending on the size, the manufacturer and the market conditions. A new 20' continer fluctuates between $3,000-$3,500, while a 40' one can cost as much as $5,000- $7,000. However, using recycled containers the savings are considerable. A 20' used container costs around $1500, while a 40' recycled one stands at $3,000-$3,500. In addition, even lower prices can be obtained by purchasing a large number of containers. **2 LOW THERMAL AND ACOUSTIC INSULATION**: By being essentially a steel cage, the container has very low thermal and acoustic insulation performance which are not acceptable for living standards. Therefore, in the construction of buildings, one of the very first absolutely essential operation is to provide an insulating covering that solves the problem, internal or external (insulation). Under the point of view of performance, the second solution is certainly the best, however, under the aesthetic point of view, we must accept the compromise of the loss of the characteristic external finish of the metal sheet. **3 ADJUSTMENT COSTS**: These costs are related not only to the thermal and acoustic insulation treated in the previous point, but also to all the operations necessary to the assembly of the various elements of the house. Especially when approaching several modules, for example it is necessary to eliminate some con-

Fig.21 Container Disadvantages

-tainer wall, or to cut the doors and windows into the sheet. Even the electrical installation is a bit more complex due to the presence of the cross-members inside the floor and in the external steel structure, a detailed study is necessary case by case. Last, but not least, another adjustment cost is the internal height of the container. This is 2.35 meters in standard containers, which is absolutely not enough for a house. The possible solutions can be two: to modify the container by raisinig it up to the desired height using steel edge beams, or use a high cube container, which allows without modification to reach the internal height of 2.70 meters.

4 AESTHETICS AND PREJUDICES: The container in the common opinion, is still linked to emergency homes used all over the world after earthquakes, without aesthetic value and/or home comfort. However, over the years this stereotype has been knocked down by the achievements of many architects all over the world, which have succeeded in giving value to this type of architecture.

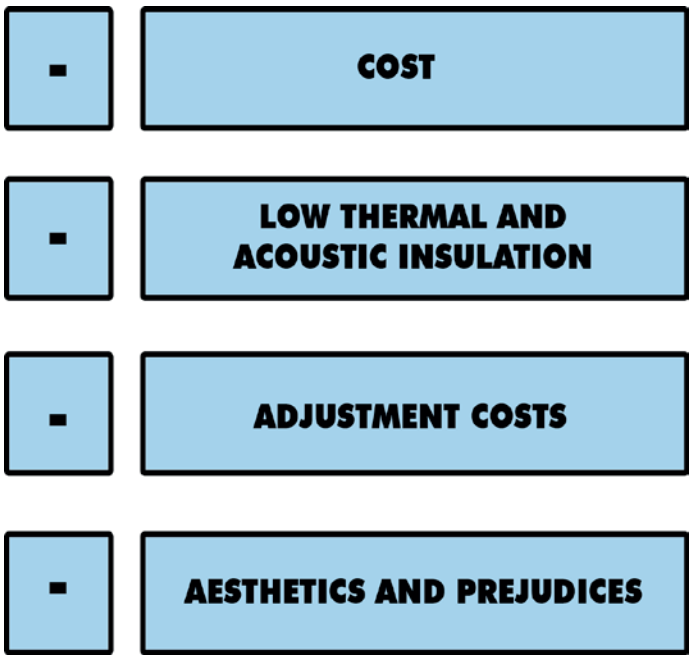


Fig.21

2.7 ASSEMBLY METHODS

It was considered appropriate to conclude this paper on the container object, with a brief analysis of the assembly possibilities that it offers to the architect who wants to try to use it as a design system. Although in fact, the principle is to use a sort of "lego brick": the types of structures that can be created can be divided in four macro categories.
1 SELF-SUPPORTING (STACKING): This first type is a solution that allows to create buildings that develop in height. In fact, the containers are lined up on each other, side by side, the same way they are transported on commercial ships. The solidity of the system is ensured by the use of "twist lock" connections, which are inserted in the corner blocks.
2 CARRIED (GRID): This second system is also ideal for the construction of buildings with vertical development. Here the containers do not carry each others, but are inserted as capsules inside a supporting structure. The structure is made with steel pillars and beams or reinforced concrete, it can be made specifically for the project or already existing. It is possible to operate exploiting old existing but abandoned buildings that present a supporting structure of this type, such as the old industrial buildings. The possibility of using a separate supporting structure also allows to leave some empty spaces, creating terraces or gardens belonging to the houses, as well as re-entrant or projecting volumes.
3 LOAD-BEARING (COVER): This type of realization concerns fixing individually the container to the ground, creating courts or buildings in line of just one single level, with coverage, that can hold onto containers or be self-supporting. The cover creates spaces for relations. This solution is interesting

Fig.22 Self supporting container scheme
Fig.23 Carried (Grid) container scheme
Fig.24 Load-bearing (Cover) container scheme
Fig.25 Horizontal combination container scheme

-merations with horizontal development.
4 HORIZONTAL COMBINATION: As in the previous case, the containers are arranged on one level, lining them directly on the ground the blocks can be joined horizontally to form larger buildings, but there are no connection in height. This is certainly the easiest and quickest way to intervene (it is in fact typically used for emergency situations) but it is also the one that gives the worst architectural performance and liveability, because as the isolated dwellings are simply placed side by side, without differentiating spaces or creating common areas.

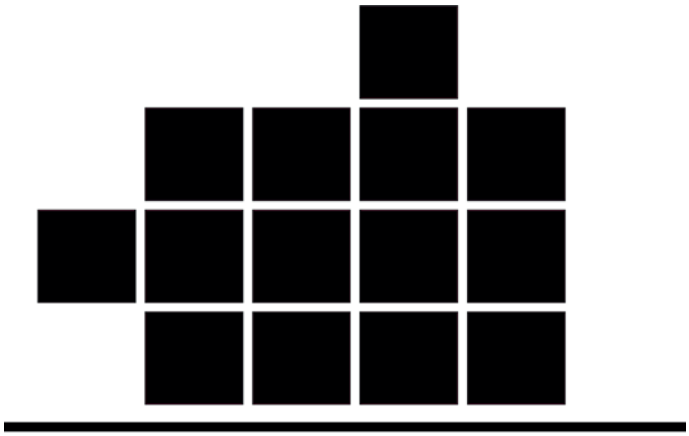


Fig.22

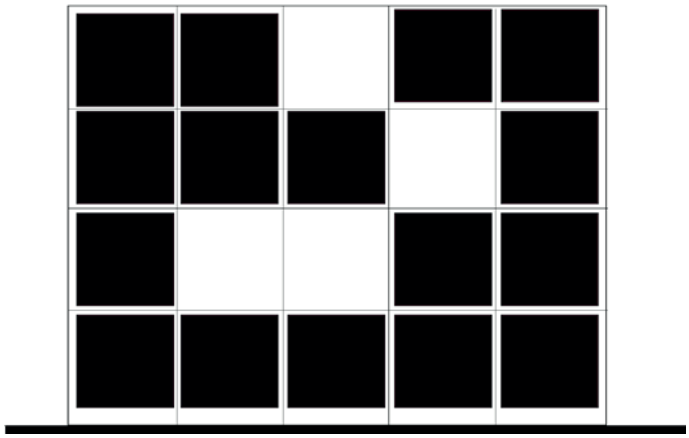


Fig.23

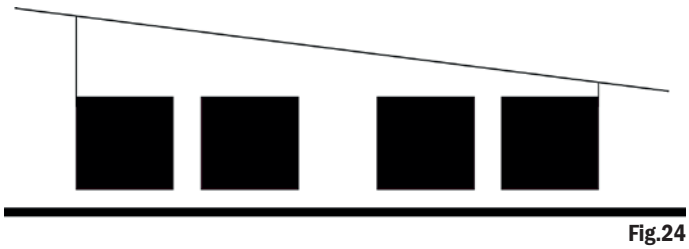
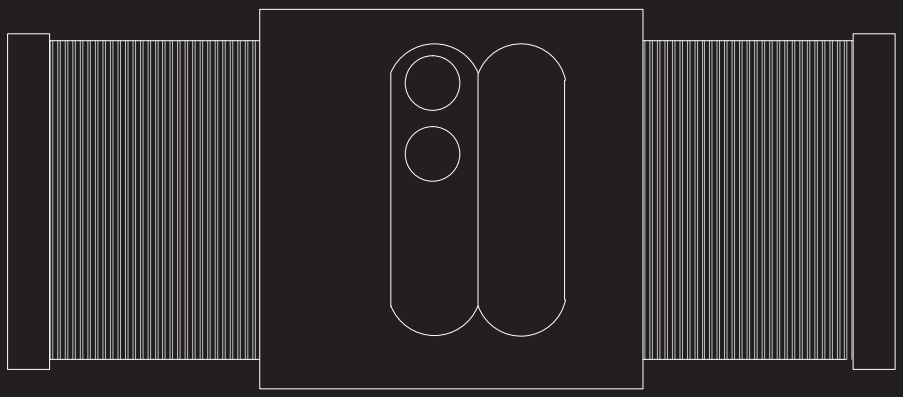


Fig.24

Fig.25

Forerun-
ners



3.GROUND-BREAKING

3.1 TEMPORARY HOMES BETWEEN '50S AND '70S.

The theme of transportability has already been studied in the first half of the twentieth century by architects such as Le Corbusier, Gropius and Aalto, who are approached on one hand by research in the field of housing industrialization, on the other due to the contingent need for residences easily transportable and mountable for the millions of homeless people caused by the Second World War. A more "popular" attention for the nomadic home comes only later, with the liberal and revolutionary ideals of the hipie culture of the 60s and 70s. Thanks also to the increasing technological and industrial progress that begin to affect every aspect of everyday life, The architects of the time test themselves in the field of mobile homes, which precisely because of their temporariness allow greater margins of experimentation and innovation. The design of temporary construction, which had had a constant development in the years of the Second World War, did not stop with the end of the war and the end of the residential emergency caused by it. On the contrary, the architects are now orienting themselves on the theme of temporary use items for different functions, from holiday accommodation, to student accommodation and so on. From the '50s to' 70s there is a development in this direction almost everywhere, promoted in particular by a growing interest in alternative forms of life, which look to the centennial American culture nomad. For example, in the case of the married students housing of P. Rudolph (1967), the house consists of an ingenious box-shaped vehicle, able to triple its volume once installed. This is thanks to a system composed of three panels on each side (which make up the covering and the floor of the expanded module); theexpansion can be done manually, without having to use mechanical systems.

Fig.26 Married student housing, University of Virginia, Charlottesville, Virginia. Mobile unit. Section by P. Rudolph.
Fig.27 Tilted Box, Kisho Kurokawa, 1972, it won the first prize at the Misawa international competition for prefabricated houses.
Fig.28 Extension phases of Mobile House by A. Rosselli
Fig.29 Prototype of the Mobile Home at MoMA, New York 1972

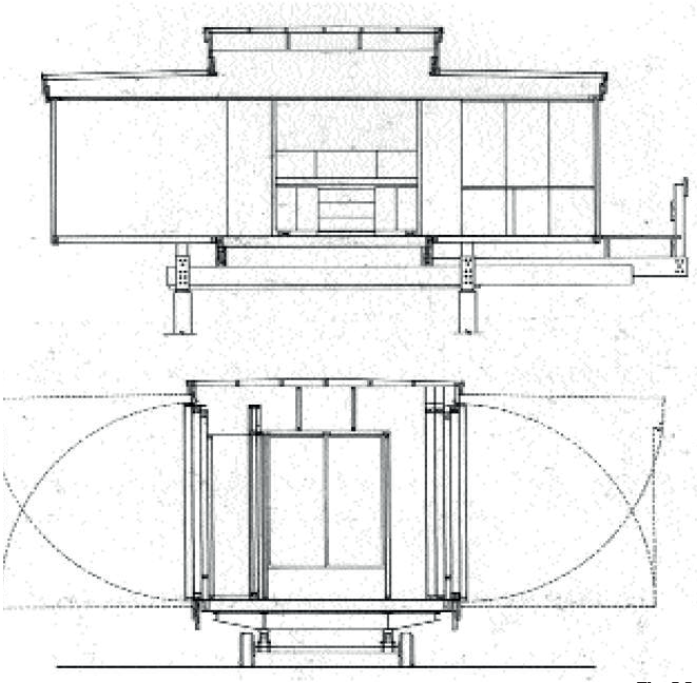
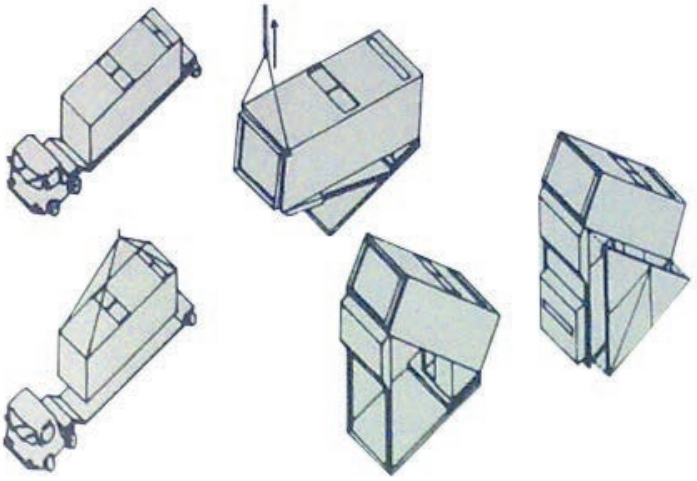


Fig.26



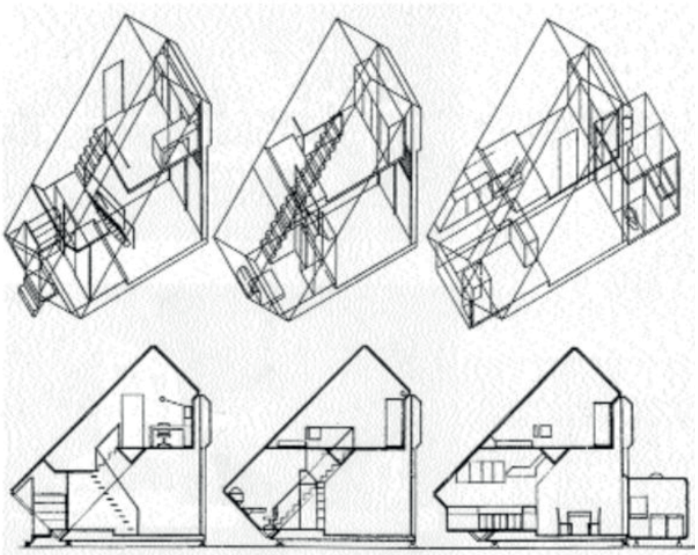


Fig.27

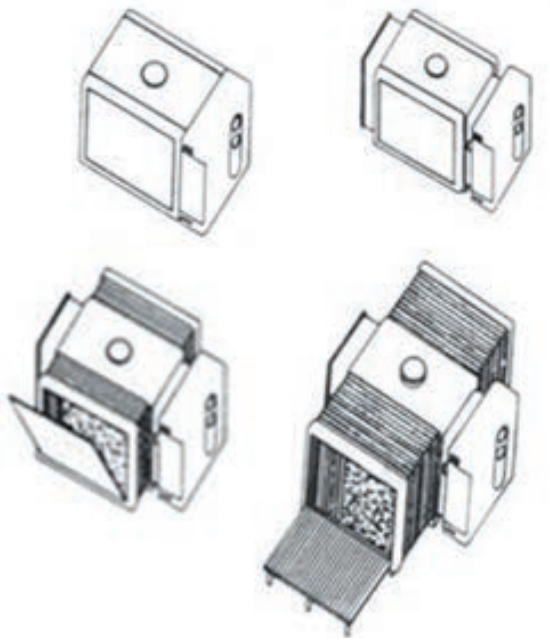


Fig.28

The tilted house by K. Kurokawa pushes the evolution of the module to an even higher level. In this case too, architect use a “containerized” module, which can be transported on site through a truck and lifted with a crane. Once the extensive operations consisting of a series of chain overturns is done, a doubled volume is obtained compared with the beginning one. In the Italian scenario, the telescopic extrusion system is the center of theproject by A. Rosselli: in 1972 Rosselli designed a mobile cell that can be decomposed into a few large prefabricated portions, which expand according to the four main directions thanks to the folding floors and walls bellows in plastic fabric. Only two people, without the aid of mechanical means, are able to modify the basic dwelling; inside hidden furniture and curtains make the space adaptable to the different needs for day and night. All these projects start from a basic object that has a compact and parallelepiped shape, which can be a real container of the time or a containment volume for other elements. The japanese architect Toyo Ito has focused his design research mainly on the topics of the rarefaction and dematerialization of buildings, to achieve lightening and abstract effects. The house is no-

longer synonymous with staziness, dwelling rooted to the ground, where to deposit day after day the signs of our life. The traditional house gives way to precarious structures to be installed in any place, homes for the non-contexts, for the present, of short duration, destined to be consumed like any other object, homes to be nomads. The House of the nomad woman, designed by Ito in 1985, is a tent resting on a mobile and lightweight structure, which can be installed in any corner of contemporary megalopolis. The traditional house loses any meaning and turns into a nomadic tent, the pao. Inside there are only a few objects, essential to satisfy the irrepressible needs of our physicality: sleeping, eating, washing. True life takes place elsewhere, along with others, in places of work, entertainment and sport. The designers have shown, more or less, the will to act on this starting element, often expanding its volumes and habitable surface. The prototypes and achievements of those years demonstrate a strong focus on the quality of living in these homes, even though they are temporary homes. The houses often show the ability to dialogue with other units to create larger housing connected with the surrounding environment, thanks to openings and terraced spaces. These projects show that the potential of the container type had already been noticed half of a century ago and the designers had through experimentation and innovation experienced to making of these elements as comfortable homes. The debate between the will to maintain the compactness of the basic form not to alternate the transportability and the possibility of an economic prefabrication, and to modify it to counteract its restricted internal dimensions, is still active today and has not found a univocal solution.

Fig.29

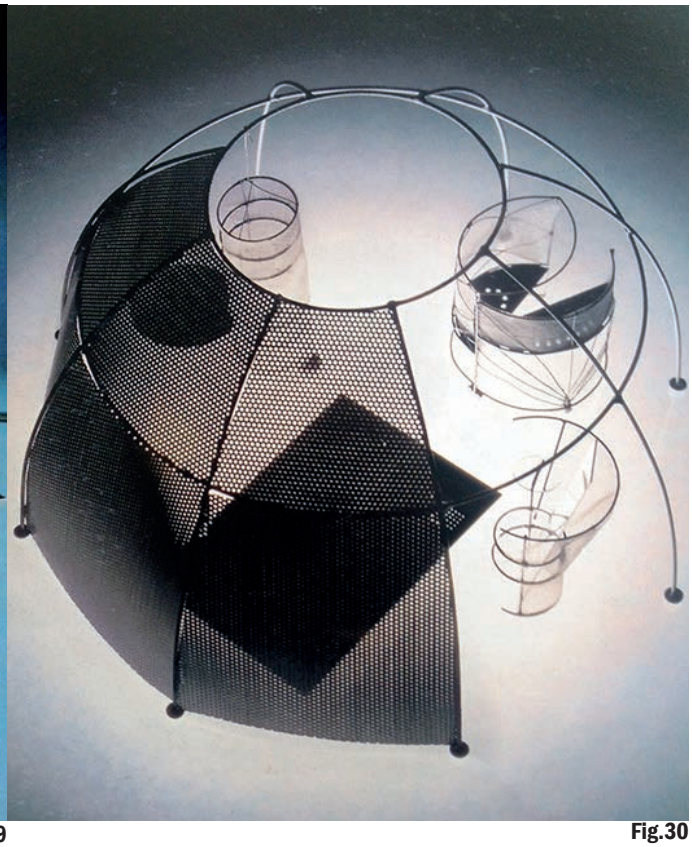


Fig.30

Fig.31

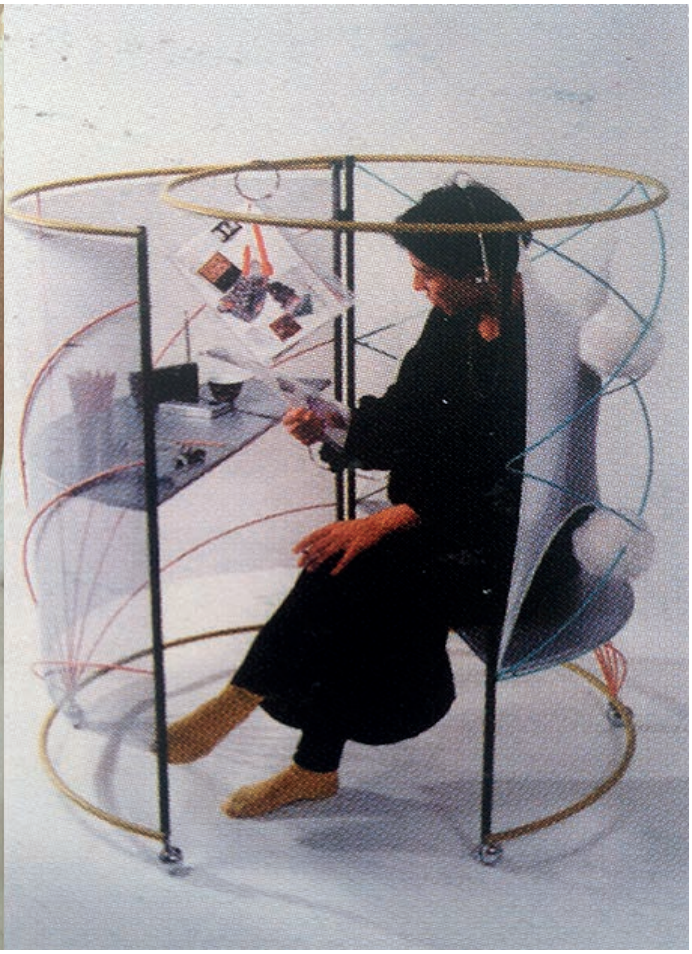


Fig.32

3.2 HOUSING THE EMERGENCY

Fig.30 "Insecurities: Tracing Displacement and Shelter" Exhibition at a MoMA, New York, Photo by Jonathan Muzikar , 2016. Fig.31-33 Zanuso Unit for FIAT-ANIC, 1972. Fig.34-37 Shigeru Ban,

Recent data from the United Nations indicate that today more than 60 million people worldwide are refugees, asylum seekers or displaced persons. Until not long ago, the borders were traceable and recognizable. Today, many territories of sea and land obscure this division determined by external forces. How can we consider living in a state of constant movement or trying to escape? Refugee camps, emergency camp, once considered temporary, are becoming a permanent condition. They are places to examine, where human rights and urbanization processes are closely linked. The container is te very first used elments for housing the emergency since decades. There are those who promote the use of compact buildings, industrially and prefabricated products, which can easily reach the emergency sites and be installed in a short time, providing "ready" homes. The container is obviously an answer to these questions. Currently, unfortunately, the push of research has stopped and the container are converted into homes with very few changes. It is precisely these current housing containers that have given birth to the prejudice installed in the population, for which container houses are translated into emergency slums, with very low performance and architectural quality. However, during the '70s many architects got involved in order to make these living modules efficient and comfortable, obtaining results of great interest. Unfortunately, the lower economy of the unmodified container and the blindness of a political class not very inclined to innovations, have stopped the innovative, leaving most of the models on paper or as prototype. Here is the analysis of two projects, which considered very interesting for the use made of a ba-

Fig.30

-sic module similar to the container. The first example is the emergency unit for Fiat-Anic, designed in 1972 by M Zanuso. The house, initially contained in a compact block, “comes to life”, transformed into an organism capable of generating space. The inhabitant can install it in one place, modify its configuration, and, when new needs arise, reduce it in compact form to carry it with himself elsewhere. The Zanuso unit is presented as a rigid plastic box: the steel supporting frame is in fact covered with melamine formaldehyde panels. Inside there is a fixed block of services, while the kitchen and the room can slide on side platforms, consisting of doors, in this case, the module is designed ad hoc and is configured as a design object, but it is easy to understand the images as the need for transport and movement have brought the designer thinks about a very simple basic configuration. The designer also puts a lot of attention to the pos sibility of urban composition that the module can offer, as the will is not to create a single module but a proposal that can define the real neighborhoods in case of need, always keeping in mind the relationships that the object will establish with the environmental context.

Fig.31

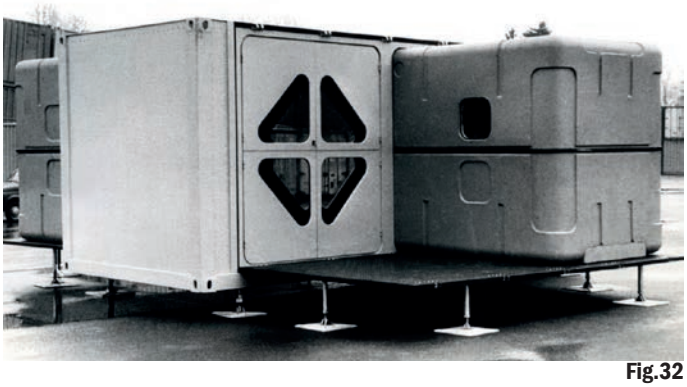


Fig.32

Fig.33

The projects analized so far showed an intention towards the possibility of realizing high quality transportable houses that are able to fit harmoniously into the context. The container has several advantages, making it one of the most used components in the emergency field, first of all the easy transportability and the speed with which is possible to create a temporary settlement for displaced people. For example, the Italian Civil Protection has been using this type of solution, which makes it possible to transport “already ready” dwellings to the disaster site, which are immediately ready for the installation of the occupants. However, the container has received and receives many criticisms, especially for the lack of comfort that this solution often offers and for being a solution used everywhere, at any latitude and in any context, without respect or adaptation to local characteristics. It is easy to understand how these homes have not entered the heart of the affected populations. If, however, it is possible to maintain the temporary character that remains one of the basic conditions for temporary emergencies and if, above all, the design of these settlements is well designed and not a last-minute solution, so in this case the containers can bring to results of great interest. Shigeru Ban, who has been working with poor and recycled materials for many years, shows how the combination of containers can create a real neighborhood, with comfortable homes and public spaces in which to recreate the life of the community from the catastrophe. The intervention produce absolutely non-permanent solution and therefore demonstrate the real possibility of exploiting this resource to produce economic houses awaiting the reconstruction of the city without urbanize new territories in a definitive way.

[1]www.Shigerubanarchitects.com

Fig.34

Fig.35

Fig.36

Following the earthquake that hit Japan in March 2011, architect Shigeru Ban built a residential neighborhood, also equipped with services and public spaces, in the city of Onagawa, using recycled containers as a constructive element. In order to solve the problems caused by the presence of a non-flat land, a load-bearing structure allowing the stacking of 20' containers on three levels, realizing real residential blocks. Inside, the residences consist of airy and well illuminated spaces equipped with shelving, and storage cupboards, objects and food supplies, which were assembled when the project was completed by more than two hundred volunteers. *"The use of recycled containers allows a series of advantages[1]: a) Shorten the construction period,b) Wide interval can provide parking area, community facility and privacy of families, c) Placing containers in a checkerboard pattern and create a open living space in between, d) Exellent seismic performance, e) Can be used as a permanent apartment".* The housing units, depending on the number of associated containers, vary in size from 19.8 m^2 for one or two people to 29.7 m^2 for three or four inhabitants, up to a maximum of 19.8 m^2 for more than four people .

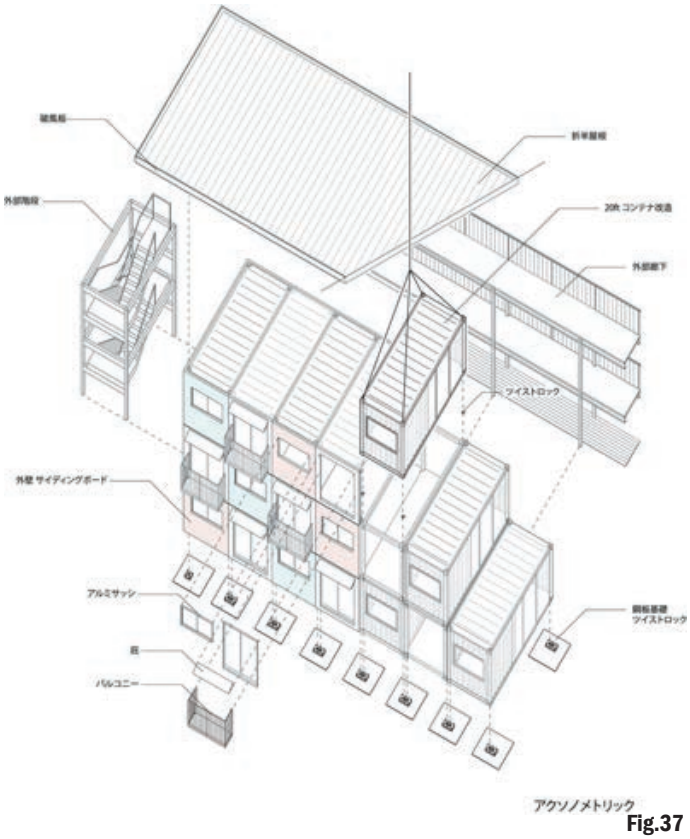


Fig.37

3.4 THE JAPANESE METABOLISM MOVEMENT

Fig.38 Current view of the Nakagin Capsule Tower Fig.39/41/42 Originally published in Domus 520/March 1973 Fig.40 interior view of the capsule design

The Metabolism, a movement of Japanese architects whose manifesto dates back to 1960, has regained a place of prominence in the urban and architectural debate of the Eastern area and more. In all the architectural conventions carried out recently, there has been a great interest in the principles of metabolic architecture. In our contemporary society, where paradoxically, constant and uncontrolled urbanization has been accompanied by the loss of decision-making power of urban planning, reviewing the metabolic principles can be useful in the East as in the Wes. It is in fact impossible not to control the changes taking place in contemporary cities, characterized by intense urbanization. The metabolic architecture published its poster in 1960 at the World Architecture Conference held in Tokyo, had its development between the '60s and '70s. In Japan in which, after the war, optimism and trust in the future were reformed, architecture is characterized by the fusion between modernist abstraction and the interest in biological and natural processes. Just as ecology is the science of relations between the organism and the world around it, so the metabolists refer to relationships and interconnections between things. Architecture combines the two personalities of man and time, divided between reason and emotion, between feeling and trust in technological rationality. Metabolists seek a fusion between tradition, technology, man and nature. This present, however, also offers increasingly urbanized cities, where the building land decreases while the population is constantly growing. Referring to time, as all living beings must do, architecture modifies and adapts itself and can even "die" once its effective usefulness is over. As a result of these theories of change and im-

Fig.38

-permanence, which are characteristic elements of Japanese culture, the metabolic proposals are based on concepts such as adaptability, mutation, growth but also transience, temporariness and useful life. The ever-changing and dynamic natural organism becomes a model in the construction of architectures. As an example, it is interesting to analyze the Nakagin Capsule Tower, by Kisho Kurokawa, one of the most emblematic buildings created by the metabolic movement. In common with other projects, the tower has the basic principle of superstruture, to which many prefabricated units are attached. The basic structure follows the principle of theoretically unlimited helical growth, so that the building assumes the qualities of adaptability and flexibility not present in the conventional skyscrapers of the period. Originally the tore was designed as an hotel destination, for businessmen who when arrived in the city for work, were looking for convenient housing situations. Thus, the macro structure is generated by the assembly of many single capsules, as basic housing units, made with a steel structure, then sprayed with anti-rust paint. The capsule, which measures 8x13 feet, contains inside a bed and the bathroom, but can be aggregated to other capsules to obtain larger homes. These modules, which arrive on the site already built, are then mounted on a reinforced concrete supporting structure and connected through the central “core”, that contains the vertical connections.If on the one hand this building celebrates the perfect organization and the possibility given by the prefabrication of housing modules, the excessive control of every detail that composes them in the design phase, deprives the occupant of the possibility of making that a personal space. The metabolic project is therefore concerned with equipping each level of the housing hierarchy, not only housing, but also the entire urban unit, with mechanisms able to dialogue with higher levels and to function as part of a whole.

From here it is easy to understand how the capsule-house is increasingly connoted as an equipment for the man, more and more distant from the house as it is understood in the traditional sense. As in the society that inhabits the towers with unlimited growth, so in our system the relationship is no longer ruled by the traditional family but by the individual, who converses with a group, which in turn dialogues with the community. Even in the housing project, the target is always made up of individuals, rather than families, who have diversified interests and needs that want to see reflected in the home as well. Today's users requires, however, unlike the hyper-controlled cell of the metabolic unit, an home in which to recognize oneself, absolutely customizable. To take back the ideas of those years in full and without actualization, today would be meaningless. However, a critical review of the past, aimed at extrapolating the best aspects. The concept of organic "patterns" that refers to the plant and animal world, for example, has come back into vogue as a principle of urban definition, also thanks to the potential of mathematical control offered by design assisted by mathematical software. Furthermore, it is important to begin to consider the relationship between the parts and the whole, as in the current cities that seem to implode on themselves, the study of the physical parts that make up the urban nucleus and the relationships between them, is an essential step to design transformations and evolutions.

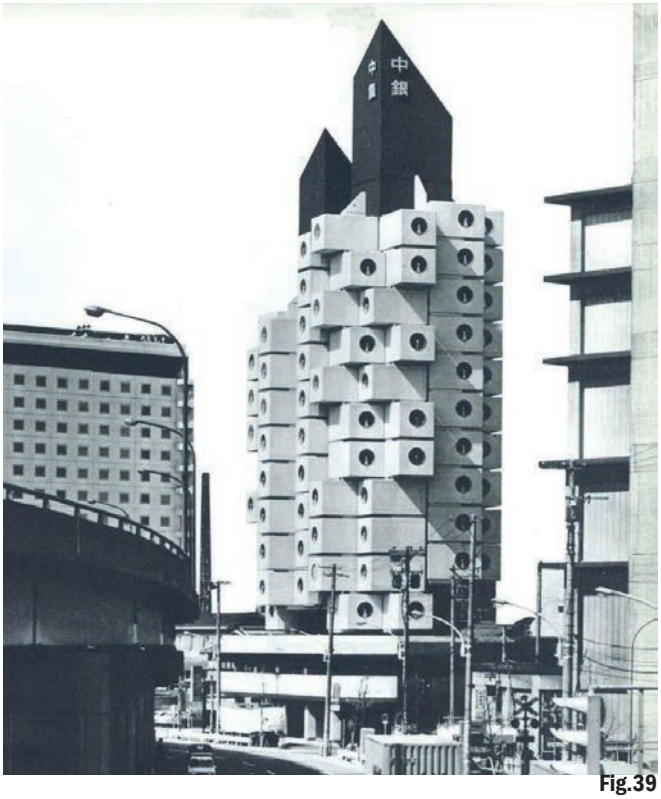


Fig.39

Fig.40

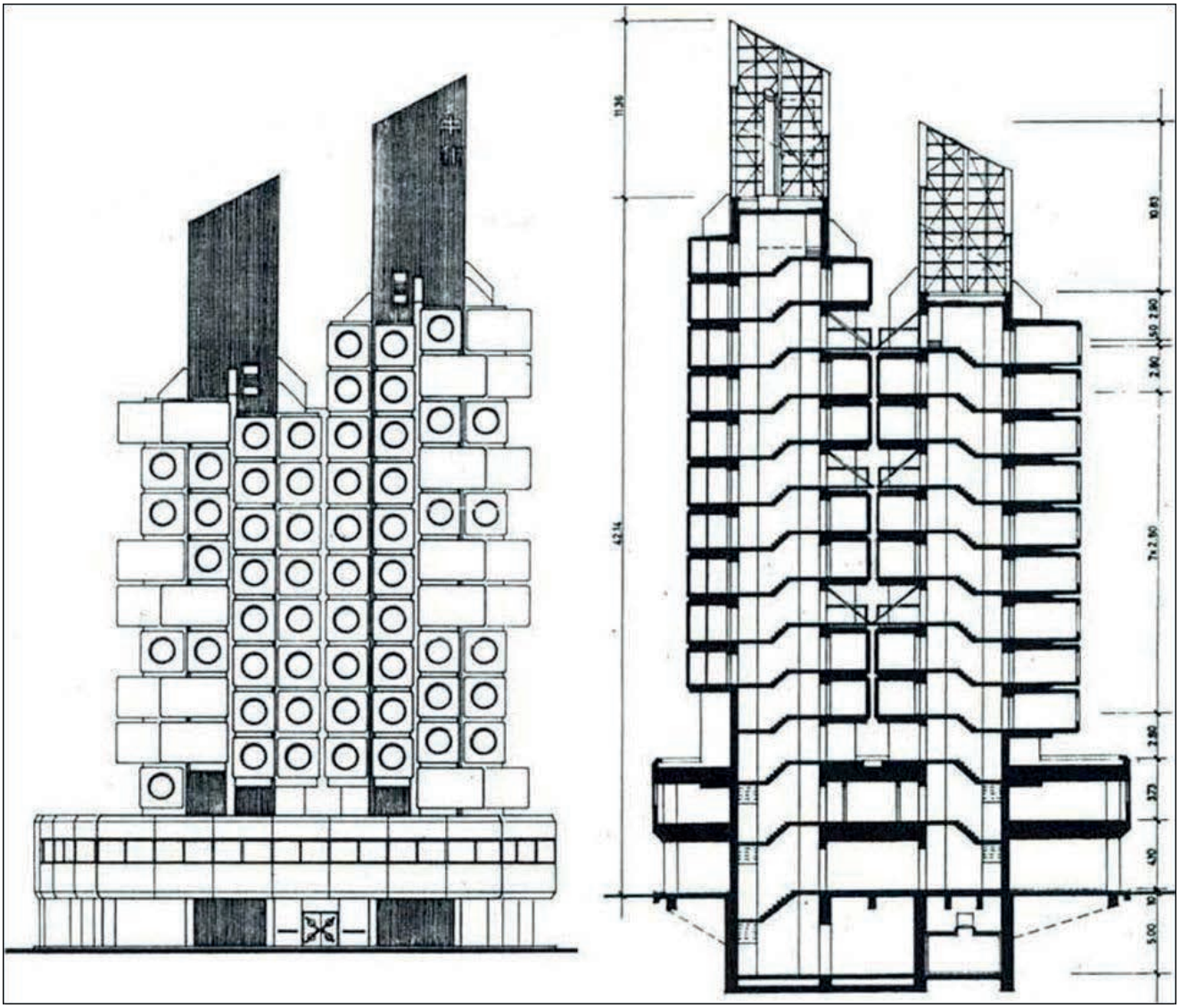


Fig.41

Fig.42

3.5 CONTAINER BECOMES A TREND

The first to have sensed the architectural possibilities of the container, certainly driven by the necessity and the ancestry of alternative solutions, were the inhabitants of Third World realities, in which the containers were transformed, spontaneously, into shacks, warehouses and shelters. In fact, the container makes it possible to build a shelter in self-construction, without needing a great knowledge of the building sector. Later, however, thanks to the use of more and more precious materials, and to the attention reserved to the container by the Design world and a growing interest of an elitist public, the container has unveiled all its potential, both to make the hypothesis of its ever more considerable future use plausible. The first design experiments with the containers have turned to the object as it stands, to the container as a single steel box. The architects initially focused on adapting the spaces of a residenial apartment into a single box.These achievements are distinguished by a life, quite comfortable, but minimal, which takes place inside the unusual home. The house-container of the beginning, is therefore reduced, with the exception of the small bathroom, to a single rectangular environment, in which all the possible activities of the inhabitants must be managed inside the box, from socializing to eating and resting. In the fig. 43 we can see the project named “Future Shack” by Sean Godsell, which is one of the very first experiment made with containers: in fact the idea is from 1985, and the realization is from the 2001. After the first, visionary, micro-housing experiments, often mobile, made with containers, architects, widen the panorama of achievements by taking some steps forward:they start to associate more modules, to improve the aesthetic and functional quality of the projects, the volumes expand and even the clientele widens.

Fig.43 Future Shack, Sean Godsell Architects, 1985
Fig.44 Container project at Cove Park, Scotland by USM LTD architects 2002.

In this phase of evolution, in fact, more and more architects and designers experiment with containers, creating homes and studios of considerable luxury, so that having a house made with recycled containers becomes a trend, especially among those who are looking for products innovative, unusual and with an environmental perspective based on the recycling of existing resources. Once the possibility of using the container to create buildings has been established, the achievements in this field are multiplied. Initially we find quite simple projects, which begin to associate two or more containers to increase the space available to the user without however reaching considerable dimensions. Then, the container is associated with additional spaces that are created empty spaces that are created by the non-contiguous positioning of various elements: it is built with containers and containers, creating patios, windows, and external areas of the house. The advantage of using an inexpensive and recycled element to create the structure, allows more expenses and freedom in the care and interior design, which become less and less rustic. As for the external aspect, the architects decide the road: in some cases the visible steel is maintained, sometimes painted from the starting container. In high cases it is covered with materials of different kinds, so as to lose any reference with the object of departure and the house, apparently, does not differ from a house built according to more traditional construction processes. These houses are so successful that some design studios dedicate a permanent part of their professional activity to designing in this sector, creating real catalogs in which the customer can choose and compose their home according to their tastes and needs.

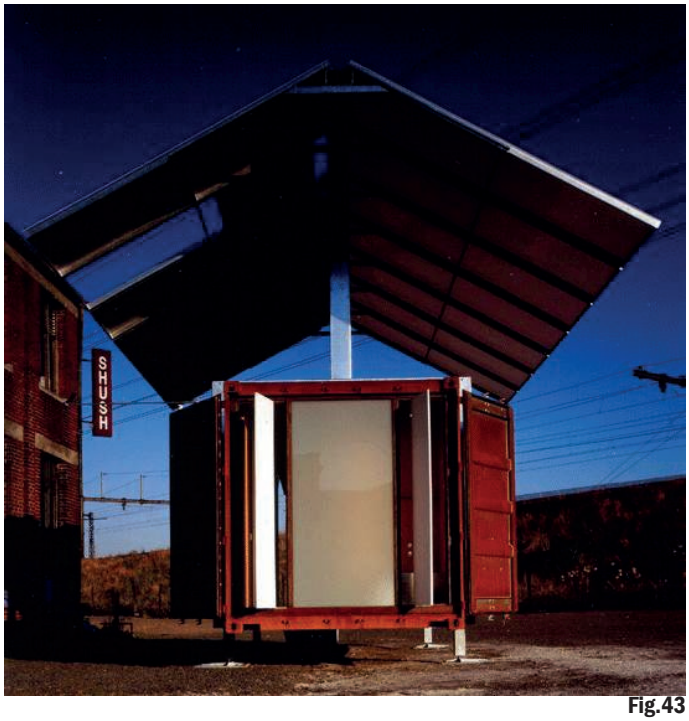
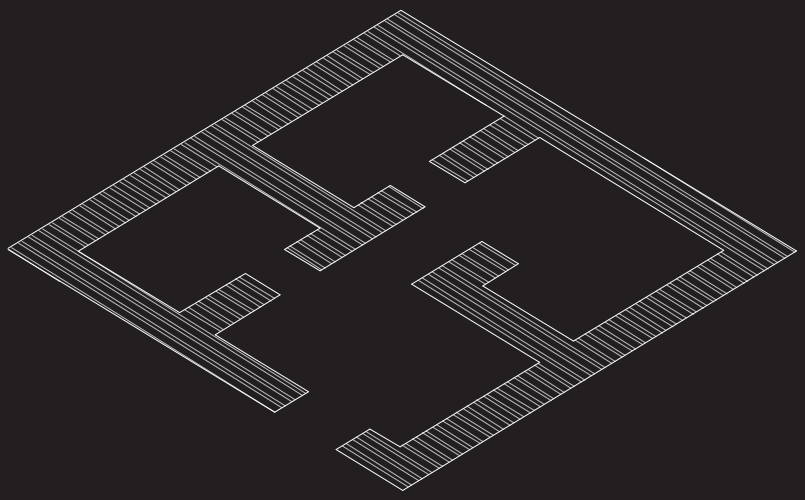


Fig.43


Fig.44

Case Studies



00

3. CASE STUDIES

4.1 BUILDING THE TIME - LA CASA DE MADERA

Function: Students dormitory
Architects: Lundgaard & Tranberg Architects
Location: Copenhagen, Denmark
Project Year: 2005

As said in the introduction phase the architectural design has in reality always and in any case to do with time and space. Space of the built and space in which it is built and time understood as the life of the building. The complexity of the phenomena of transformation of society and of today's world imposes the variable time as one of the essential characteristics of any process of development. It is necessary to overcome the principles of permanence characteristic of the traditional architectural culture, taking into consideration the precariousness of the time in which we live. Contemporary architecture is confronted with the time dimension: the more the project and the built space are able to refer to this dimension, the more architecture will receive a value, that of its adherence to the real needs of its eventual transformability. This concept is perfectly expressed by the project "la casa de madera" by Enric Miralles. In 1996 the Barcelona architect was commissioned to design a wooden house in an orchard near Copenhagen. The project was developed with his wife, the architect Benedetta Tagliabue, and the result was a house that came to reflect the life of a family. Although the death by cancer did not allow the young architect to build the house, in the 2001, a wooden version of the house was installed in the Diagonal Mar Park of Barcelona, among some pergolas full of birds, as projected by Miralles. The ancient tradition of building tiny houses as "cabins" in the orchards located on the outskirts of cities still survives in Denmark. These groups of houses are called *"Kolonihaven"* and their only function is to protect their owners from the cold and the rain when they spend their time in nature.

Fig.45 Series of thoughts and sketches that explains the poject by Miralles and Tagliabue Fig.46 Drawing made by Le Corbusier in the book "Le Modulor 2", 1955 Fig.47 Floor plan by Miralles and Tagliabue Fig. 48 Installation of a prototype at Parque Diagonal, Barcelona, 2001 Fig.49/50/51 Maquettes of the projects by EMBT Fig.52 Casa Kolinihaven by Miralles and Tagliabue Fig.53 Picture of children playing in the installation at Parque Diagonal

[2] "la casa se convierte en un calendario" from "Cases Impropies" (MACBA, 2001)

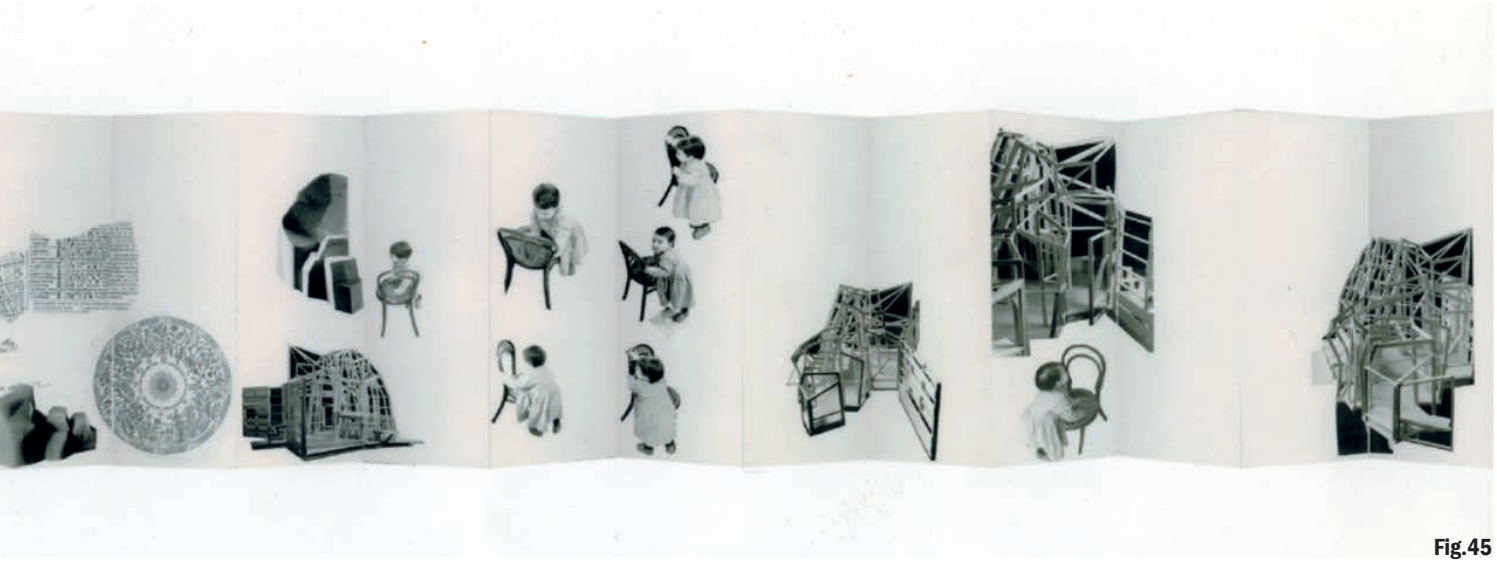


Fig.45

The new Kolonihavens are the works of fourteen prestigious architects who were invited to build the different refuges with the only condition of not exceeding 10 m^2 of surface. The couple Miralles and Tagliabue generated their project starting from their interest in collecting the passage of time. From that starting point, the architects explained, *"the house becomes a calendar"*[2]. It is a place to feel, to spend time looking at nature, while children play and parents talk around a table. In addition to the drawings and models, the couple of architects illustrated their explanations through a German almanac that shows the flowers of the different months of the year, with their flowering periods: chicory on the mornings of February, water lilies on June, marigolds during the days of September and carnations opened throughout December. The passage of time is also recorded in the house plan. Enric and Benedetta gave their little daughter a miniature chair and the girl began to play with it by moving and using it to take her first steps. As if these movements could be imprinted on the ground, the parents generated the plan of the house from them. The volume of the wooden house kind of wrap, exactly as a dress does, both the movements of the girl with her chair and the adults sitting at the table. At this point, the architects extracted from Le Corbusier's book, *"The Modulor 2"*, the drawing where a girl asks an adult to play with her, inviting him to enter through a small door into the world of its size: *"P'pa, viens joues chez moi! ..."* (Fig.46) From this point the house varies in height. It has a very low ceiling in the children's room, which grows in height in the adults' living area. This variation of scale creartes two entrances to the house, one of those is a miniature door for the girl. The house is constituted by three volumes gradually arranged from lower to higher height and amplitude. Therefore, the house, seen through its section, insists on capturing the passage of time; the house grows with the inhabitant, from his childhood until he becomes an adult. The central theme of this type of tiny shelters is the passing of life. Its function is precisely that, and not much more. This is the type of project in which, in reality, the architect is commissioned to describe how he sees life goes by. Perhaps for this reason, Enric Miralles included his daughter in the development of the house in Kolonihaven. He recognized her as a contributor and wrote his name on the long list of collaborating members of the project. As it is shown in the figure 52 the circle drawn in the plan represents the movements of the inhabitant, and it configure the edges of the area, and its possible way to grow.

Fig.46

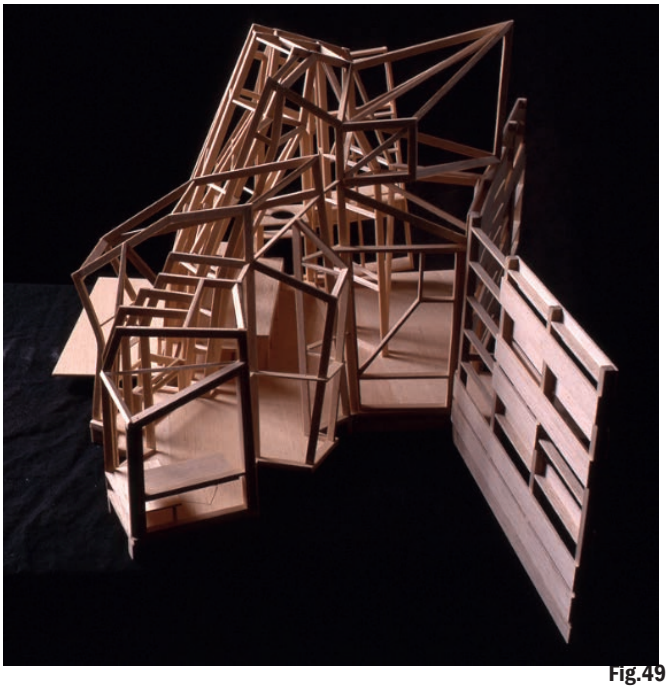


Fig.49

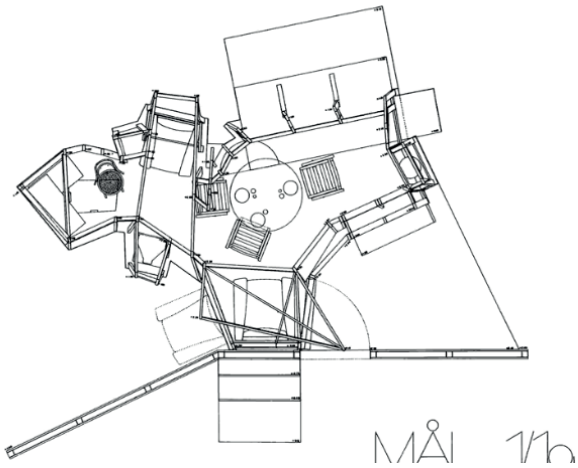


Fig.47

Fig.50

Fig.48

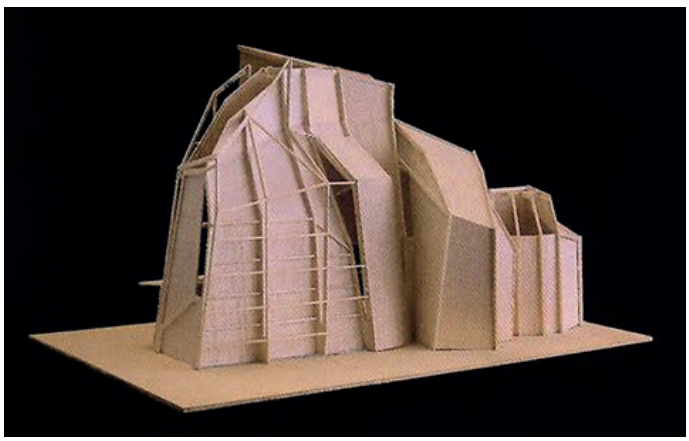


Fig.51

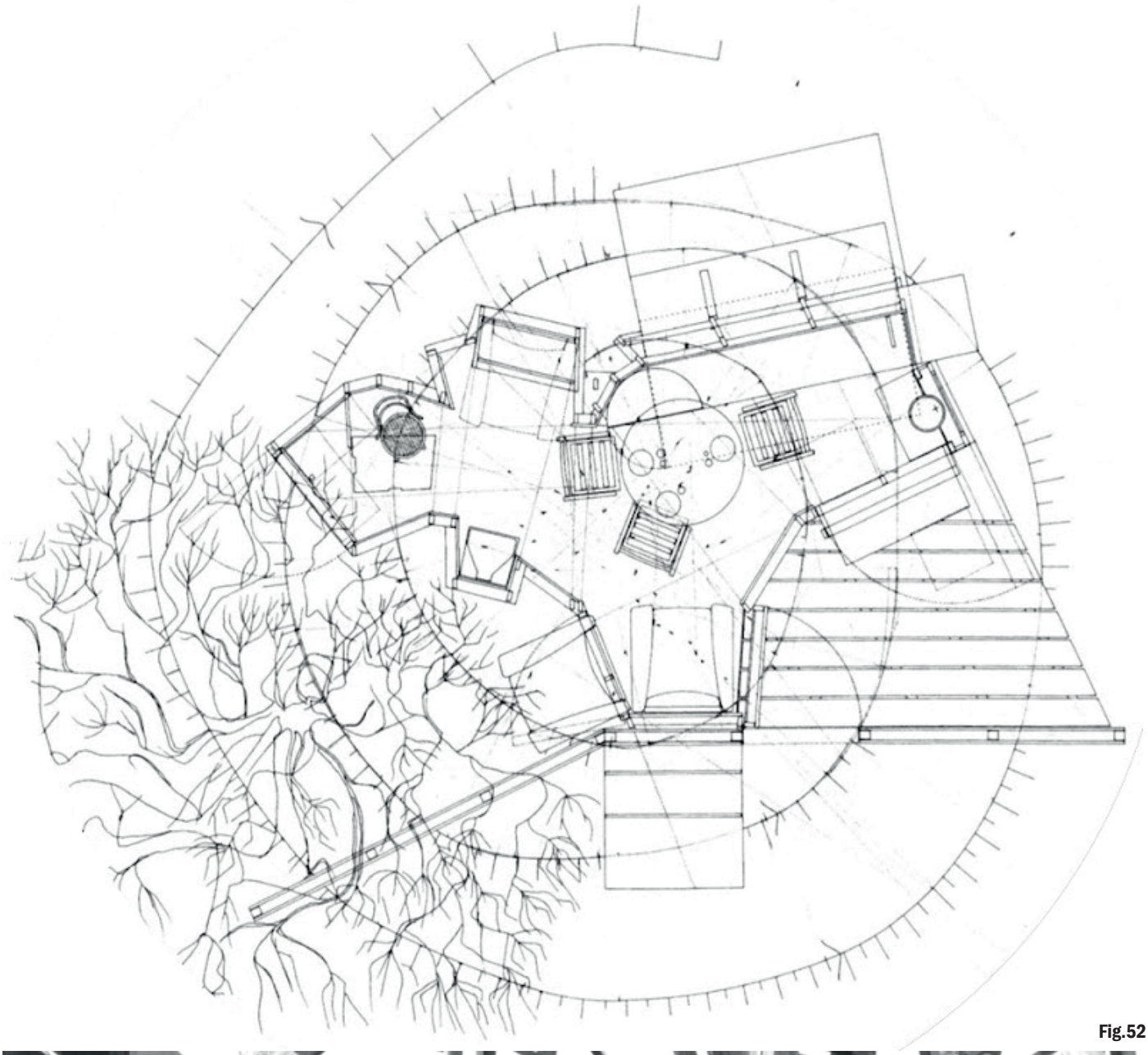


Fig.52

01

4.2 NOMADIC MUSUEM

Function: Museum
Architects: Shigeru Ban Architects
Location: New York, United States
Project Year: 2005

In the 2000, Gregory Colbert, author of the *"Ashes and Snow"* travelling exhibition of photography, asked the help of architect Shigeru Ban to create an ecological, sustainable, innovative space, that could be shown and brought around the world. This is how the Nomadic Museum was born, after a deep study, that started its journey in the abandoned Molo 54 on the Hudson River in New York, subsequently reached several ports in Worldwide. The building consists of 148 containers given to the artist on loan and reusable at the end of the event. TAlthough the configurations changed across the various locations, the basic components of the structure remained identical. Exterior walls consist of a checker-board stack of shipping containers, with the spaces between the containers occupied by sloping sections of white PVC. The internal structure is formed by triangular supports of cardboard tubes (fig. 27), which unload the weight on columns of the same material. The columns are 11 meters high. The internal space, that could be considered as a central nave ,consists of a wooden walkway that goes in the central part, between the columns, while the rest of the space, the aisles are occupied by river rocks. Among the columns, thanks to the use of thin cables, were placed handmade prints on Japanese paper, by the artist Gregory Colbert. The atmosphere created by the cardboard columns, the arrangement of the steel containers and the carefully arranged lights give the visitor the impression of moving into a cathedral erected only for art. The architect despite the use of containers, managed to create a visually mystic space, through the walkway, the columns and the domain of the images.

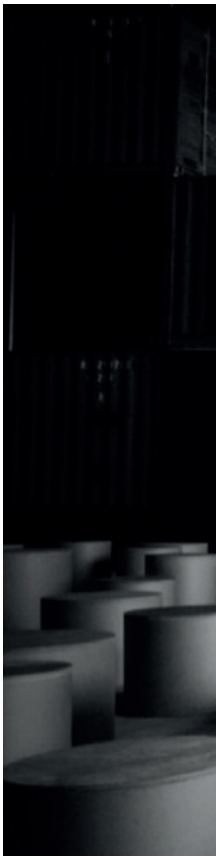


Fig.26 Aisle of the Nomadic Musuem, NY
Fig.27 Entrance to the Musuem
Fig.28 Central Nave
Fig.29 Ashes and Snow exhibition particular
Fig.30 Exterior view of the Musuem

Fig.26

The containers indeed don't reduce the interesting experience of the interior space that has been created. The idea of using containers was born from the fact that they can be borrowed from wherever the museum will go, managing to considerably reduce the costs of moving the exhibition as it will be shipped to the new destination. Only the 37 containers that actually contain the works will be kept, while the rest can will be taken on the spot. Over the years the museum has already touched the cities of New York, Tokyo, Santa Monica and many others. The musuem, even if not a fixed one but itinerant is always managing to achieve the purpose and giving the desired sensations and sought by the artist and architect. In fact, in this case more than ever the use of containers in an itinerant nomadic museum acquires a symbolic meaning, and at first sight we can understand the inspirational concept.

Fig.27

Fig.28

Fig.29

Fig.30

02

4.3 PLATOON KUNSTALLE

Function: Art Gallery
Architects: Graft Architects
Location: Seul, South Korea| Berlin, Germany | Mexico City, Mexico
Project Year: 2009

Platoon Kunsthalle opened its doors on 19th July 2012. It is set up in Berlin as a space for subculture in Europe and the global creative network of Platoon art collective. Its programmatic orientation towards cultural movements beneath the radar creates a dynamic space where new ideas are born and presented. Platoon cultural development was established in 2000 in Berlin. It runs diverse culture and communication projects in cooperation with an international community of 6,500 creatives from all different professions. The sister-venue platoon kunsthalle in Seoul, South Korea opened in 2009 and functions as the Asian headquarters of Platoon. The Kunsthalle is not about entertainment. the program provides a communication platform for anybody interested in subcultural creative fields like street art, graphic design, fashion, video art, programming, music, club culture, political activism etc. Also in here the container is used as a symbol as a Manifesto: The Kunstalle is built of ISO cargo containers, as icons of a flexible architecture in a globalized culture, the stacked containers form a unique construction that can be rebuilt anywhere else any time. As Platoon Kunsthalle is located in the heart Berlin as the confrontation of subculture with the close-by design houses, commercial galleries and brand stores creates a tension and interaction between the two worlds. It provides showcases of underground artists, studio residencies and a fine selection of cutting-edge stage performances to introduce the energetic potential of subculture. Subculture at platoon Kunsthalle is presented in different formats like exhibitions, movie nights, concerts and multimedia performances, workshops, discussion panels and special events.

Fig.31 Platoon Kunstalle
Fig.32 Office detail
Fig.33 Groundfloor-detail of the open space
Fig.34 Entrance- Cafeteria
Fig.35 Grond floor plan
Fig.36 First floor plan
Fig.37 Second floor plan

Fig.31

-cial events. It consists of 34 containers, each with a length of 40‘. Only the containers on the ground floor and those connecting the 1st floor have functions as Toilets, Cafeteria, Storage and Escapes Routes. The third layer containers are reinforced in order to support for containers working as roof. On the ground floor 4 of the 6 containers are used to create a closed environments. For the front façade, the containers are placed next to each other’s and fitted with a window in order to obtain the effect of a glass wall. The second floor is characterized by a meeting room connected to a container designed as an office and a container as an archive The escape route passes from the office container up to the fire escapes.

Fig.32


PLATOON
KUNSTHALLE

Fig.33


KUNSTHALLE
SOFTS 2,00
ESPRESSO 1,50
KAFFEE 2,00
2,50
BIER 2,50
WEIN 4,00
SPRITZ 4,00
SCHNAPSE 2,50

Fig.34

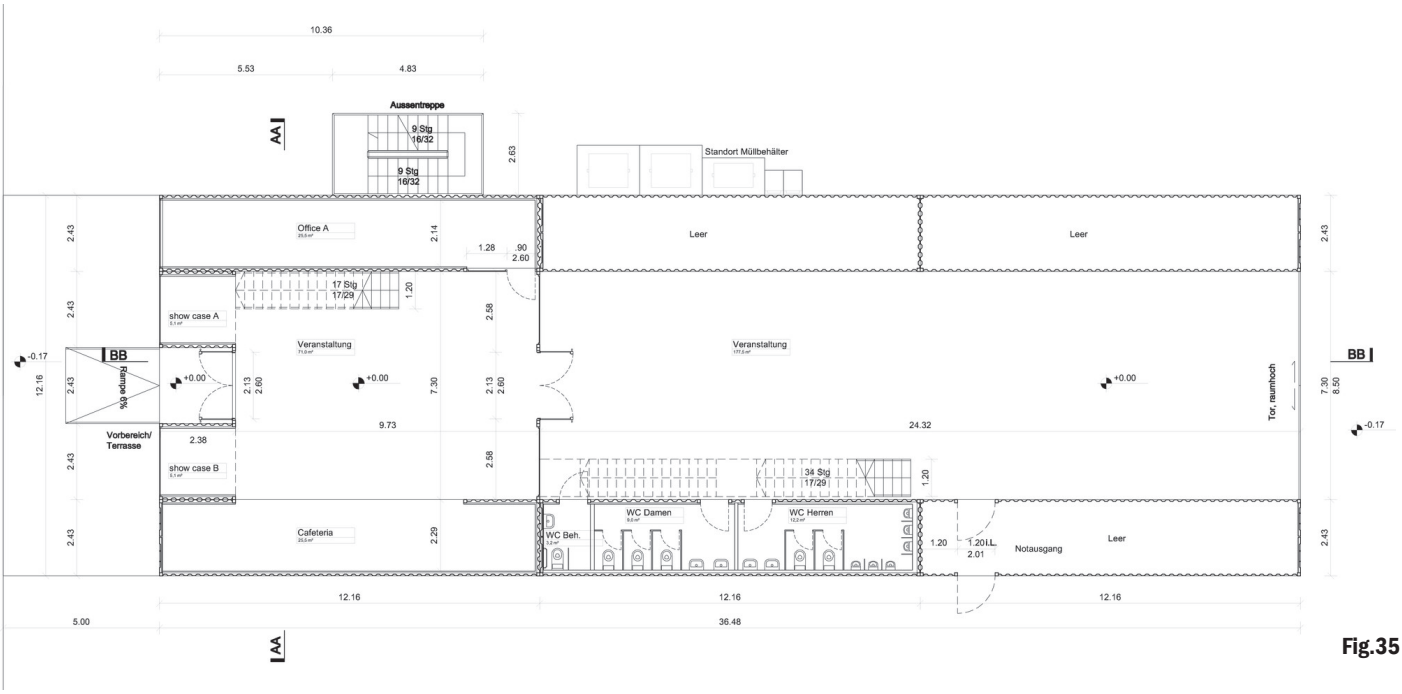


Fig.35

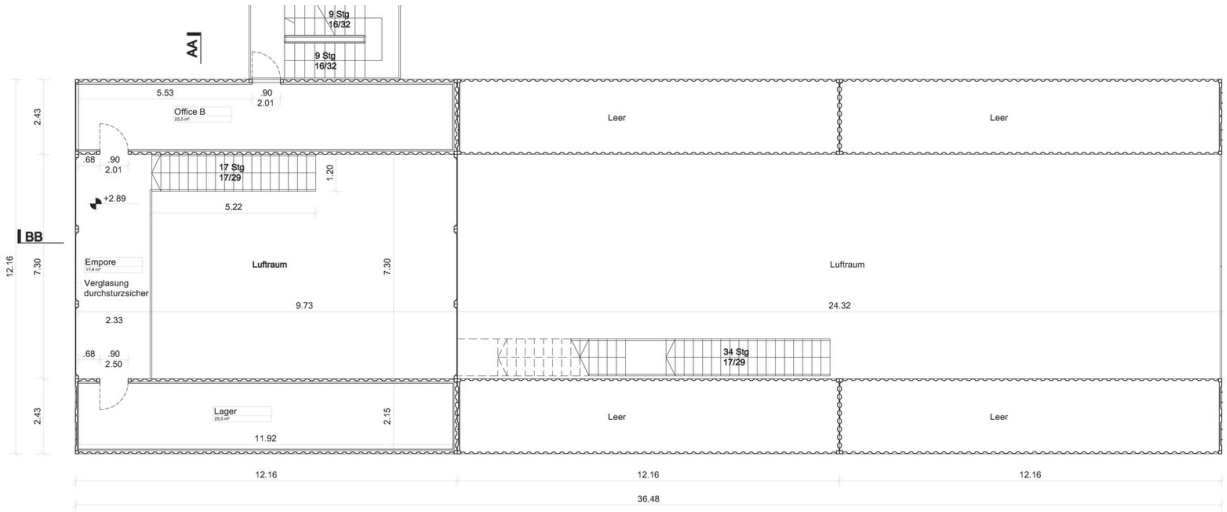


Fig.36

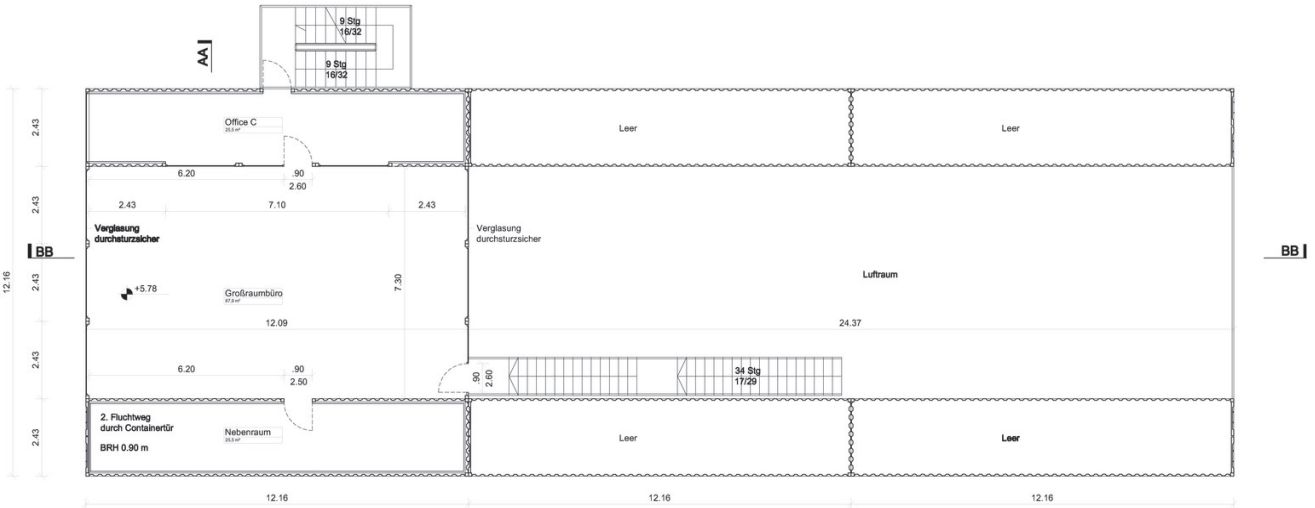


Fig.37

03

4.4 ETSAV STUDENTS HOUSING

Function: Students dormitory
Architects: H Architects, dataEA
Location: Barcelona, Spain
Project Year: 2011

The project is the result of a competition made from the ETSAV university (Escuela Técnica Superior de Arquitectura del Vallés) won from H Arquitectes and DataAE. The competion asked for a students dormitory realized with preformed concrete module. The winners modiefied the module and made it became an open space with exposed concrete. The project is formed from two parallel to street blocks layed out over two floors and separated by a central atrium. For a bioclimatic purpose. The architects came up with a program that permits intense connections among the users both individual and group level, owing to the interior flexibility of the apartments and the potential use of the atrium as an event space. The project banks on industrialized construction by using just one housing module type made of preformed concrete without partition walls. Each unit has just the necessary fixed elements, simplifying finishing and installations. Most of the components are installed and assembled by dry-build systems so every module and its finishing can be dismantled and reused or highly recyclable. The building is layed out over two floors in order to take advantage of the existing topography making accessible entrances without the need of using elevators and to reduce a 50 percent of square meters in corridors and stairs. The central atrium is covered in order to create an intermediate bioclimatic space that makes increase the energy efficiency of the building and, at the same time, economizes the building enclosure. The cycle of life analysis demonstrates that this project saves up to 50 percent the energy associated to construction materials and a 70 percent the energy demand in respect to standard buildings according to CTE regulations.

Fig.38 Interior Façade
Fig.39/40 Detail of the unit
Fig.41 Detail of the atrium
Fig.42 Exterior façade particular
Fig.43 Atrium-Stairs particular
Fig.44 Roof and corridor of the interior façade
Fig.45 Groundfloor
Fig.46 Firstfloor

Fig.38

The project is made of 62 units which are 5x11,2 m each. In the exterior part the façade is made with sheet metal cutted for openings for windows (fig.42). A pergolato of climbing plants made up with steel cables works as a screen from sunlight. The interior façade is made with dark veneer sheet of plywood and big windows. A part of it sustainn the power cables needed in the unit. The roof is designed to create the right amount of shadow during the day. Each unit can be desssembled and reassembled in other projects.

Fig.39

Fig.40

Fig.41

Fig.42

Fig.43

Fig.44

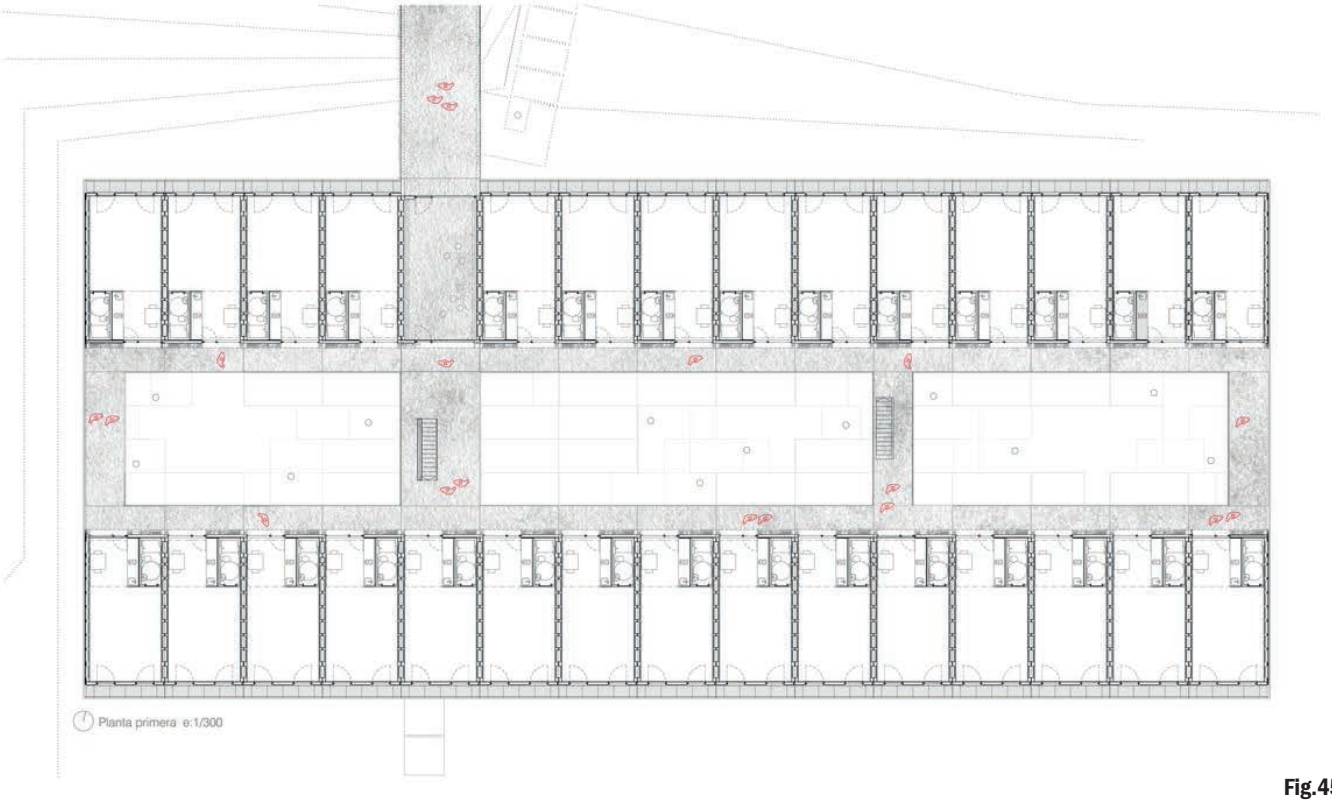


Fig.45

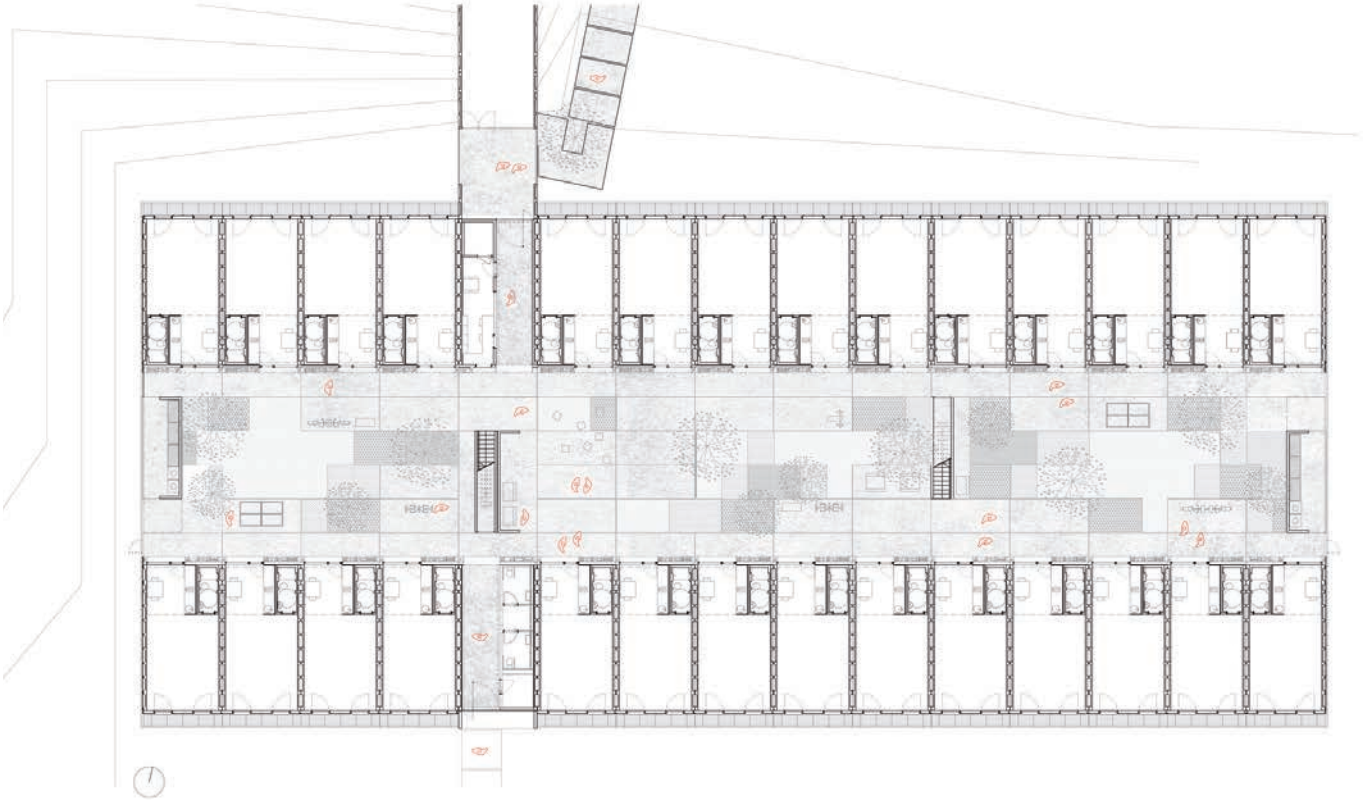


Fig.46

04

Function: Students dormitory
Architects: Holzer Kobler Architecturen
Location: Berlin, Germany
Project Year: 2014

EBA15, named after its address: Eichbuschallee 51, in the Berlin borough of Treptow-Köpernick, is a students housing made of two almost parallel bar-shaped multi-container blocks, named Frank and Johnny by the architects, that when fully completed will stretch back from the road across the 10,000m2 site, with a third block, Nelly, stretched alongside them at a slight angle. The intention has been to give them an immediate sense of interacting characters lying alongside each other on the site, making more of a sense of place, especially for students who will also be interacting with each other, and creating their own temporary sense of home there. More than 420 container modules are stacked onto each other into three long volumes to make up the student dormitory. The CORTEN steel shipping containers, which are shifted slightly towards the outside and inside, produce a characteristic architecture and create at the same time a space for a lively and vibrant new form of cooperative living. The High Cube Containers 40' are prefabricated as a modular systems. The units can be connected into primarily single, but also double and double mini units. The open air spaces, and the access galleries between the buildings, form the heart of the ensemble. The communicative in-between zone is a place of meeting and exchange that serves as a common balcony at the same time. The compact central building divides the site into two open spaces of different character. Not only are there activity and sports areas, but also a green oasis of spacious lawn and trees. As Holzer Kobler CEO Philip Norman Peterson explains, the arrangement of the three blocks plays an important part in the shaping of EBA51, not as a collection of individual units but rather

Fig.47 Front façade particular
Fig.48 Structural detail
Fig.49 Details of an apartment
Fig.50/51 Interior unit particular
Fig.52 Roof detail
Fig.53 Render of the project

[2]UncubeMagazine, 23 Sept 2015

Fig.47

into an integrated community: *"the aim was to generate a density within the city with this container project as opposed to a "villa model" of singular housing. In doing so we thought we could generate very clear spaces which could then be occupied by different functions."*[2] The project has been nominated for the Mies van der Rohe Award for European Architecture in 2015.

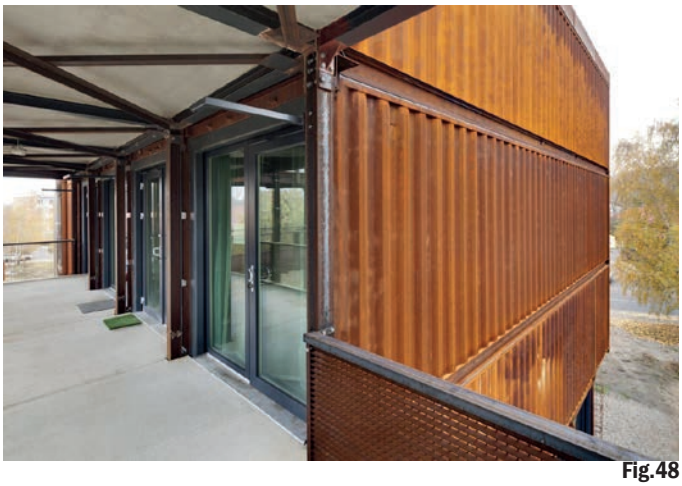


Fig.48

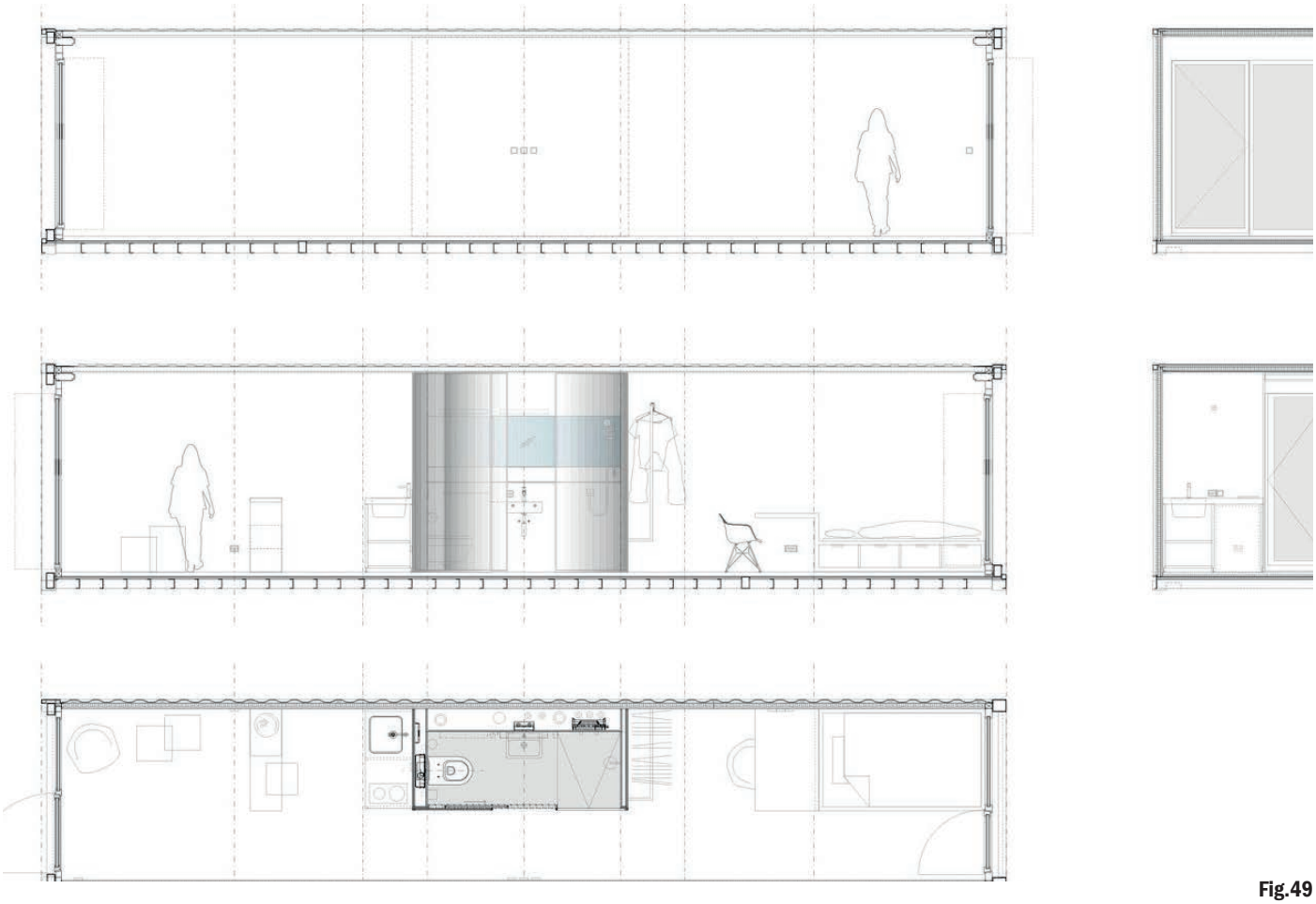


Fig.49

Fig.50

Fig.51

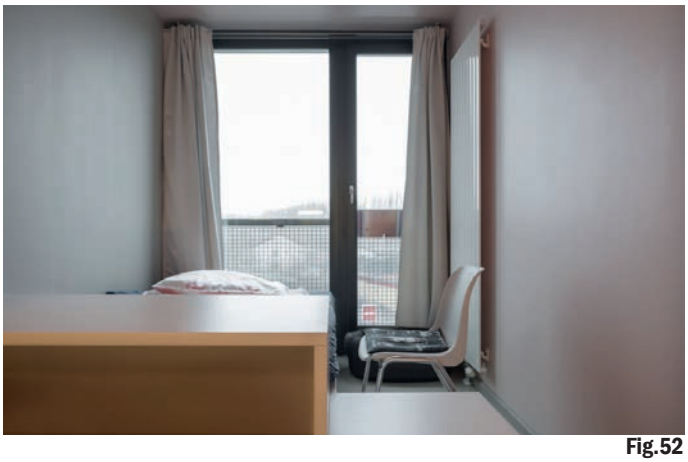


Fig.52

Fig.53

05

4.6 TIETGEN DORMITORY

Function: Students dormitory
Architects: Lundgaard & Tranberg Architects
Location: Copenhagen, Denmark
Project Year: 2005

The Tietgen dormitory project was made possible by a donation from the Nordea Denmark Fund. The intention of the donation was to make true the realization of 'the dormitory of the future' through a clear and visionary architectural idea. Housing approximately 400 students, it is to be a reference project of international format. The site is located near Copenhagen University in Ørestad North, a recently planned neighbourhood characterized by flowing canals and a consistent, rigid building structure. The simple circular form of the Tietgen Dormitory is an urban response to the context, providing a bold architectural statement in the newly planned area. The project's dynamic, sculptural expression is created by the contrast of the building's overall form with the expression of the individual programmatic elements. The building's circular form-symbol of equality and the communal is contrasted with individual, projecting volumes expressing the individual residences. The principle inspiration for the project is this meeting of the collective and the individual, a characteristic inherent to the dormitory building type. The cylindrical volume completes itself and orients itself around the inner courtyard. The upper levels are organized with residences along the perimeter with views to the surroundings, while the communal functions are oriented toward the inner courtyard. The communal areas find expression as dramatic, projecting forms pointing inward to the courtyard. The residences are of various depths in a changing tact, giving the outer contour its characteristic crystalline expression. The unique identity of each individual residence thus revealed, and the potential urban monumentality of

Fig.54 View of the Tietgen dormitory
Fig.55 Layered building of Toulu
Fig.56 Floorplan
Fig.57 Courtyard
Fig.58 Particular of the movement of modules on the interior façade
Fig.59 Interior detail of the unit
Fig.60 Sketch of the unit system

Fig.54

the cylindrical form is neutralized. At ground level the courtyard is accessed via open passages, which in turn give vertical access to 5 building sections. On each floor, each of the 5 section consists of 12 residences organized around a communal area and kitchen. Facilities common to the entire dormitory are grouped at ground level. The Tietgen Dormitory takes its form after the traditional circle-shaped Tulou-buildings (fig.55) from the Chinese south-east as a symbol, but also very functional grip, of both the common and individual life lived in a small village. The dormitory holds 7 floors, intersected by 5 vertical sections, both visually and functionally dividing the building into sections that serve as passageways across the floors and provide access to the external, central courtyard. Cafe, party area, study and computer rooms, garages, laundry room, and meeting rooms in addition to bicycle parking are placed on the ground floor. On the other floors housing units unfolds, each containing 12 extremely comfy, single or double rooms, 360 in all, common kitchen, lounge, terraces and utility room. The housing areas face the street upkeeping the privacy in the rooms, while the common facilities overlook the enclosed courtyard linking the smaller resident groups through a glance into each other's common facilities.

Fig.55

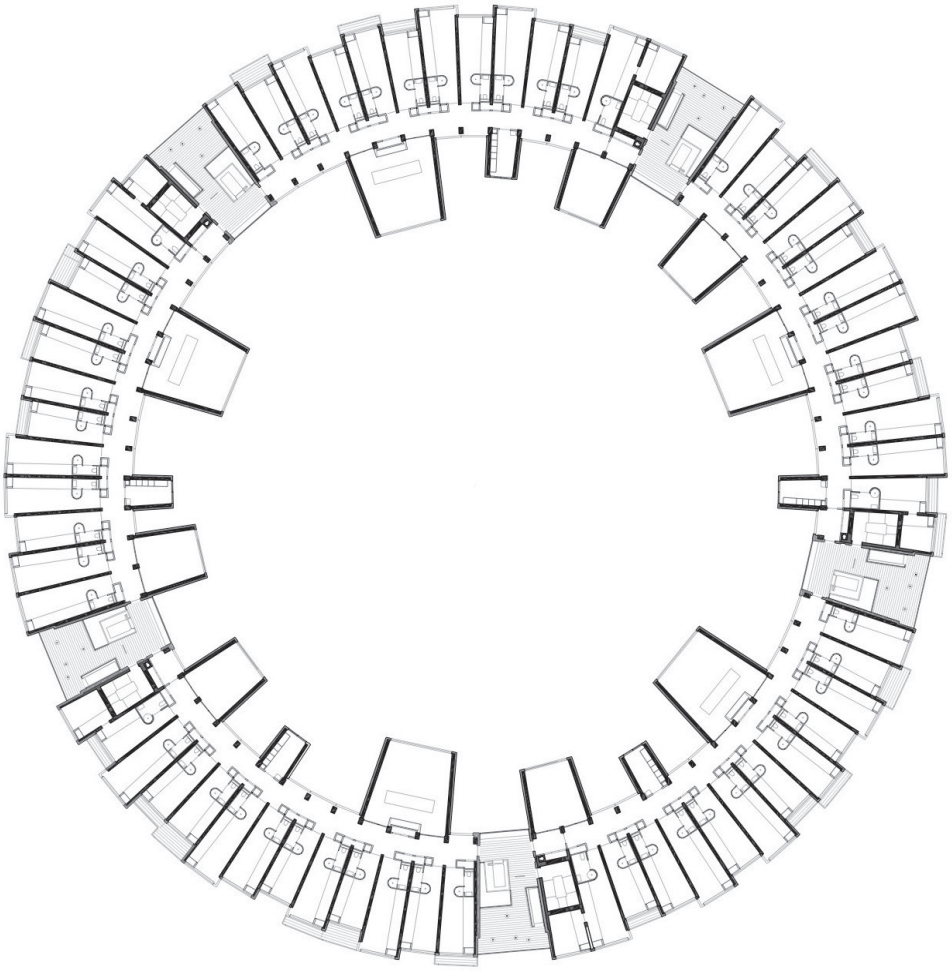


Fig.56

Fig.57

Fig.58

Fig.59

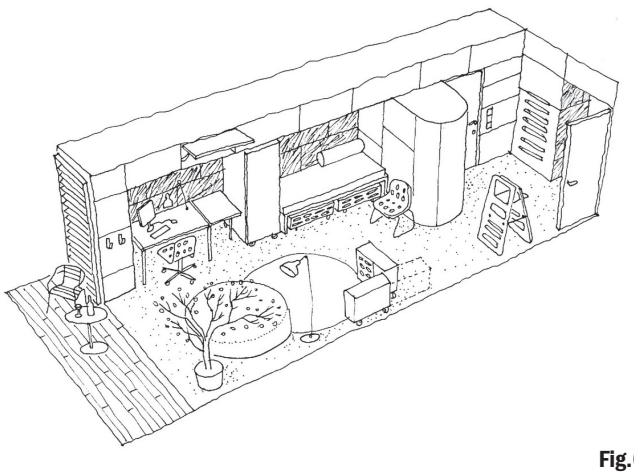


Fig.60

90

Function: Students dormitory
Architects: BIG, Bjarke Ingels Architects
Location: Copenhagen, Denmark
Project Year: 2016

The start-up Urban Rigger has thought about how to solve the problem of the lack of accommodation for students by creating a group of student students floating at the port of Copenhagen. A welcoming and comfortable place, accessible and convenient for reaching the university. To put Urban Rigger's idea into practice, the Bjarke Ingels Group, which designed a system of 9 floating circle containers able to create 15 study residences that frame a central garden used as a common meeting place for the students. The property is spread over 300 m2 of housing, 160 m2 of communal courtyard, Kayak area, barbecue area as well as 65 m2 rooftop communal terrace. Downstairs 12 storage rooms, technical room and fully automated common laundry. The standardized container system that performs this function has been designed to greatly reduce the costs of transporting the various elements by land, sea or air, to any destination in the world, through a complex network of operators. This system offers an extremely flexible type of accommodation. Urban Rigger is a system based on the composition of basic modules made up of containers for the transport of goods that, repeated, can be connected to form a set of residences integrated by common services and connecting elements. The prototype now docked in the Bay of Copenhagen is a working example of this basic module: assembled and set up in a Polish factory, consists of six containers on two levels, grouped around an open central space and supported by a floating concrete platform armed. It is able to accommodate 12 students, making available to each private space, a standard mini-apartment with bed, bathroom and small kitchen,

Fig.61 View of the Urban Rigger dormitory
Fig.62 Areal view
Fig.63 Particular of the glass and the courtyard
Fig.64 Second floor plan
Fig.65 The complex
Fig.66 Particular of a bedroom

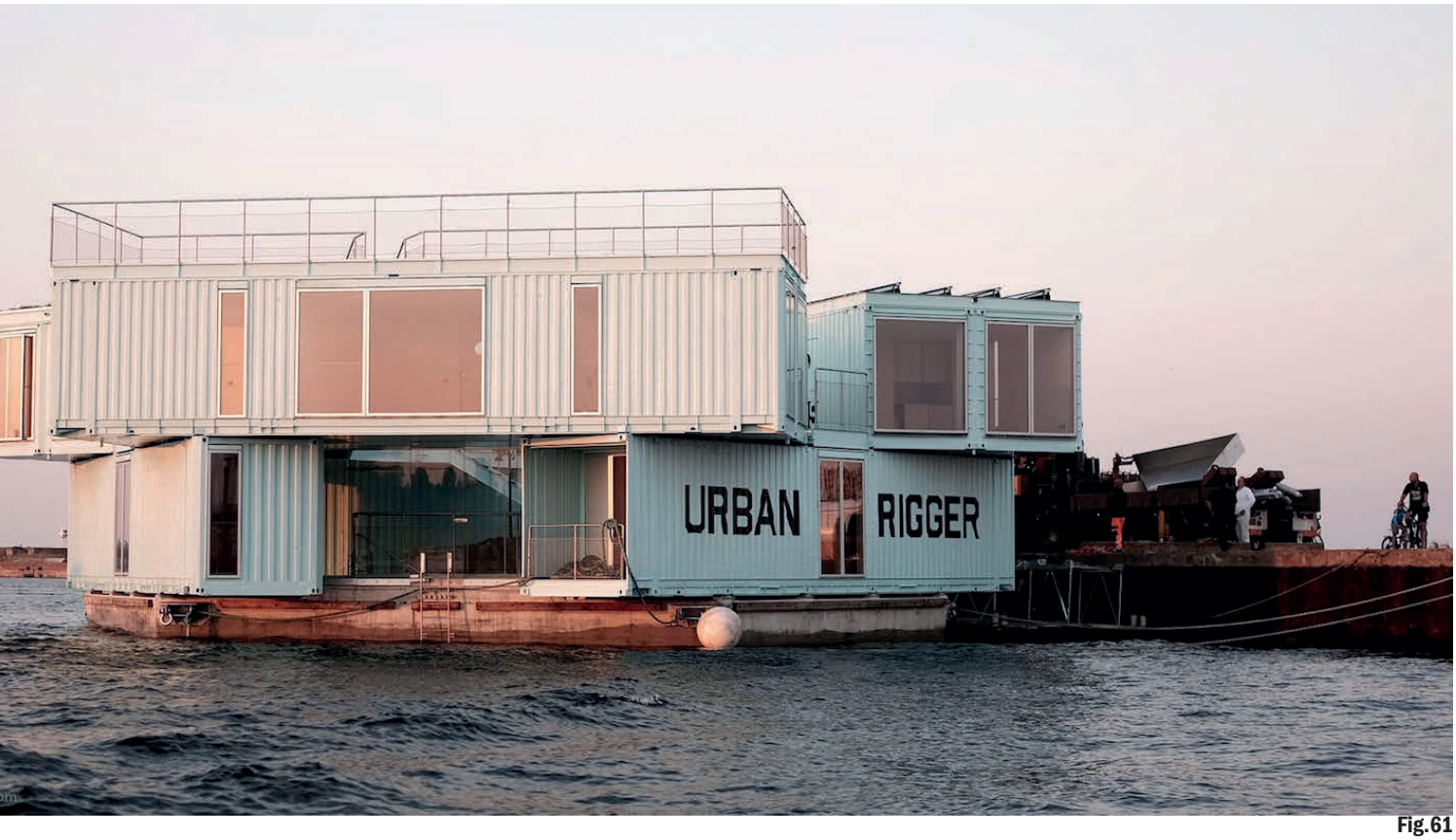


Fig.61

and shared spaces, such as the central inner courtyard, a terrace built on the flat roof of one of the upper containers, BBQ area and a trampoline on the water. All containers are fully furnished and illuminated by large full-height windows that also have the function of opening panoramic views of the surroundings and have a cost per square meter content, between 600 and 700 euros. While the container sheets are thermally insulated by an airgel developed by NASA, renewable sources provide the energy necessary for their operation and air-condition the interiors of the small community thanks to heat pumps and cooling units installed in each container. All are equipped with hydronic radiant floor panels and a heat recovery ventilation system. Since 2013 Urban Rigger has managed to find the support of important sponsors: in addition to Big, who is also a 10% shareholder of the startup, they are supporting the project each for their own business areas, the Danish Grundfos, a leader in the pumping, and Danfoss, a multinational specialized in the preparation of innovative air conditioning systems, the German Miele, Hanwha Q cells, producer of photovoltaic systems, and the engineering company Niras.

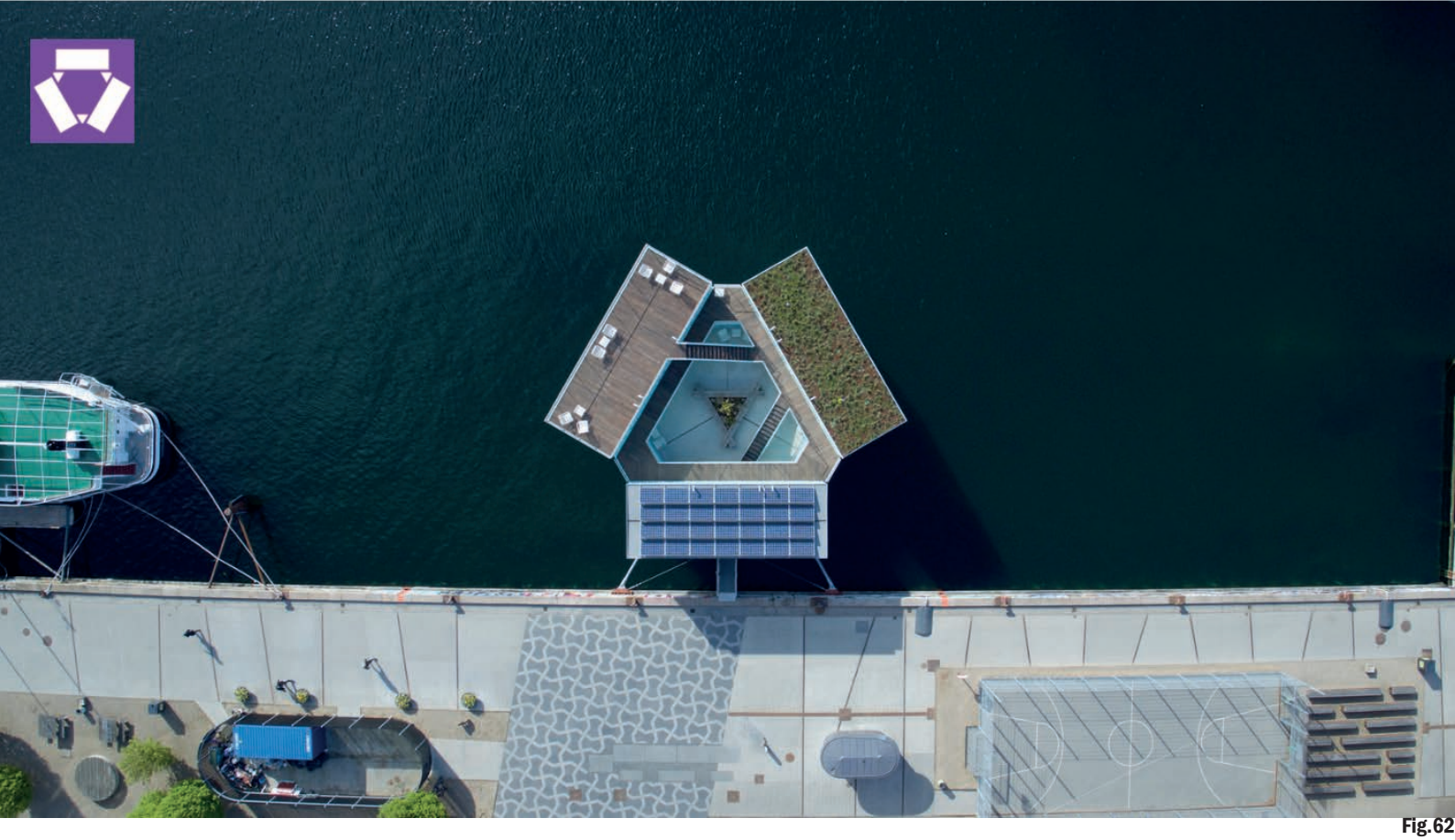


Fig.62

Fig.63

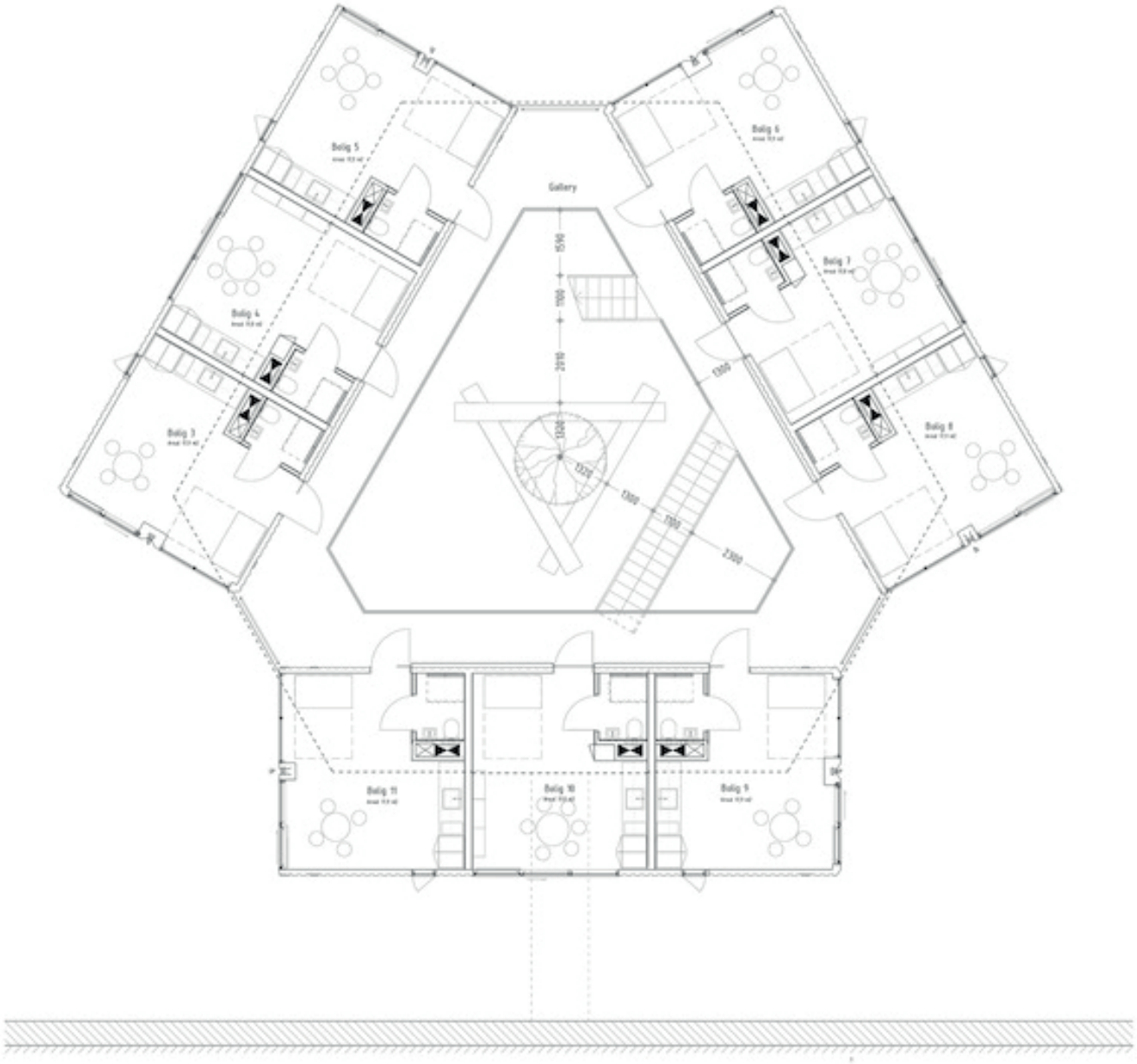


Fig.64

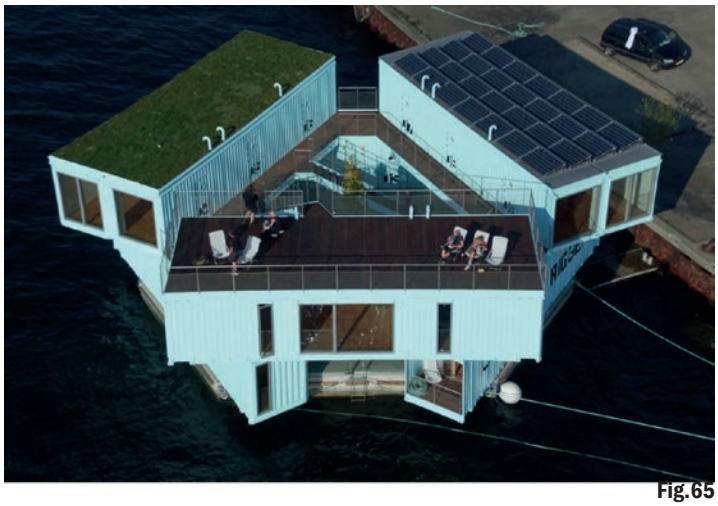
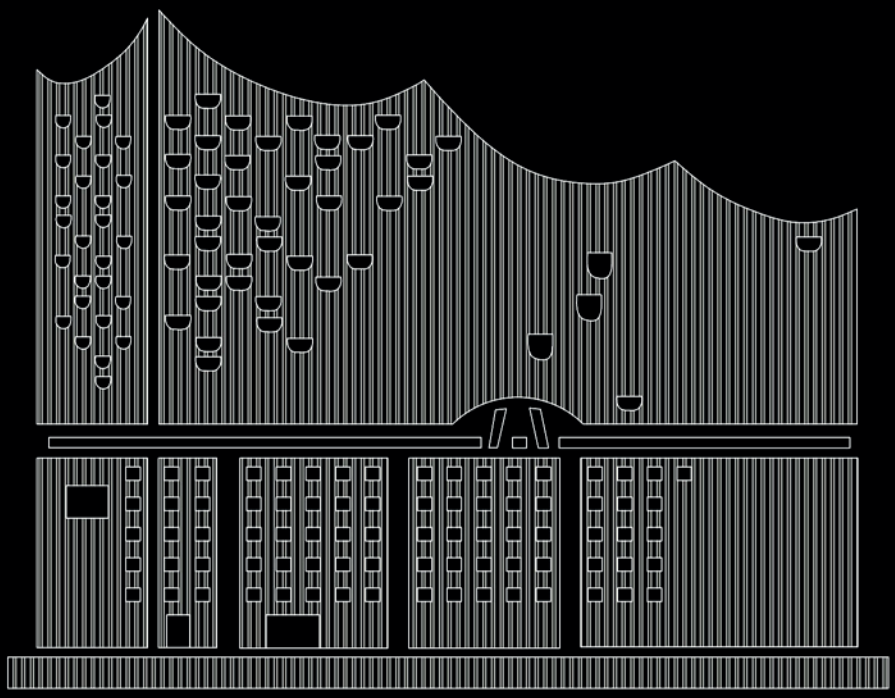


Fig.65

Fig.66

Ham-
burg



5.1 GERMANY SCENARIO

Germany is a country with a tradition of landscape protection that has its origins also in the political and cultural movements linked to Romanticism in the second half of the nineteenth century. Today it is a country that places itself on the international scene as a reference point for climate protection and energy saving policies, capable of guiding European policies towards sustainable development prospects. In 1990 the German federal Government introduced a program to reduce CO2 emissions. From that moment the attention to the clima has become a crucial aspect for the german policy, going to influence the management of the environmental, economic, research sectors and in a relevant way also that of building. The country is in a condition of strong housing shortages: it is estimated a shortage of 300,000 homes. The forecasts of the real estate market in Germany up to 2025 reveal that in the face of a new migratory flow of 200,000 people it will be necessary to build 256,000 apartments per year. The themes of environmental respect and adaptation to climate change are combined with the needs of a large housing supply generated in recent years by the increasing immigration in the country. Germany is committed to addressing the problems of the current city in a joint manner, adopting an approach that encourages research and ensures a constant dialogue of issues that simultaneously involve the world of companies engaged in the construction sector, local and local and federal governance and research institutions. The goal is to develop a real “culture of building”, and through it to educating the population to make the concept of sustainable building their own.

[3]www.bundesregierung.de

On an international level, Germany is considered one of the leading countries in the protection of the climate and in the development of renewable energy. In 2011 Germany, first among the industrial nations, decided to abandon nuclear power. In the global context, the federal governance is also actively committed to protecting the environment, developing strategies that respect the climate and cooperating in the energy sector. Germany has one of the top places in the global efficiency index in the fight against climate change since 2011, published each year by the Germanwatch climate protection association. Germany has been following a program for years that combines climate protection and environmental protection in a sustainable way. This strategy follows a program that is based on enhancing the energy efficiency of resources, with the increased exploitation of renewable energy. The development of new energy technologies is thus supported both at the supply level (using the renewable energy) and at the level of demand, where energy is consumed. On 29 April 2016 the German Environment Ministry laid the groundwork for the development of the climate action plan for 2020. The program's objective is a reduction in gas emissions by 40% compared to the level recorded in 1990. The climate protection program currently adopted by Germany, guarantees a 33% reduction in emissions, generating an annual economic growth of 1.4%. The achievement of the goals set for 2020 requires measures to reduce 85 million tonnes of CO2. Among the measures that the country intends to adopt to solve the climate problem is the strengthening of interventions in the sectors of buildings, transport, agriculture, widespread industry. Construction is a relevant example. The aim of Germany is to implement a widespread strategy of energy redevelopment of public and private buildings. The possibility of intervening on the existing finds here concrete opportunities for support from the government, both in economic terms and in terms of knowledge as well as advice for all the actors involved in the sector. In fact, the German government is actively engaged in the rehabilitation of the existing building stock, promoting rehabilitation programs and technical support every year. One of these is the CO2-GEBAUDESANIERUNGSPROGRAMM, a program in force since 2006, which provides loans for 1.6 million euros and which already generated a cycle of investments for 118 billion euros. *"What is financed? The new KfW promotion applies to -solar thermal collector systems up to 40 m2 of gross collector area -Biomass plants with a nominal heat output of 5 kW to 100 kW -Heat pumps with nominal heat output up to 100 kW."*[3] Thanks to the Building Renovation Program it has been possible to restructure about 3 million buildings, including 1400 municipal structures, allowing the achievement of objectives at the same time to protect the climate, provide affordable housing and create new jobs. There is a specific willingness on the part of the central government to intervene on the inner city, redevelop it, to obtain new spaces and make up for the demand for housing and affordable costs even for the lower sections of the population. The model of large suburban residential settlements, the Siedlungen,

has been abandoned, which for nearly fifty years has characterized almost all social housing projects in Germany and which today represent a settlement instrument no longer sustainable, both from the environmental and social point of view. In 2014, 150 million euros were allocated for the rehabilitation of existing urban areas for the stabilization and enhancement of economically and socially degraded urban areas.

5.2 HISTORY AND URBAN DEVELOPMENT OF HAMBURG

Fig.67 View of Hamburg today
Fig.68 1842, Illustration of the Great Fire, particular from the harbour
Fig.69 1842, Illustration of the Great Fire, particular of the city center with Saint Michael Church's Bell Tower
Fig.70 Picture of Hamburg in the 1890
Fig.71 Hamburg in 1651
Fig.79 The harbour today

Hamburg is the second largest city in terms of population with 1.8 million inhabitants. Since its origins, the town has developed along the Elbe river and today its port is the most important in Germany and one of the largest in Europe. The city has its origins back to the early years of the ninth century, and owes its development to the port first thanks to commerce, later, during the twentieth century, for its war importance. During the second world war the port area underwent numerous bombings that almost completely destroyed it and began a period of loss of importance of the entire city itself. The city will have to wait for the collapse of the wall and the reunification of Germany in order to once again aspire to have a primary role in the naval trade. Since the 1990s the port has been moved to the south bank of the Elbe, leaving the Hafencity area. Hamburg is a city-state, situated along the banks of the Elbe river, in the north-west of Germany between the Lower Saxony Lander and Schleswig-Holstein. It covers an area of 755,264 km, and among the metropolises of the world it boasts one of the highest works of average surface area for ab. 30 m2. 14% of the metropolitan area is destined for parks and gardens, while 8% consists of canals and water basins, data that over the years have led to the definition of a providential limit of productive and settlement extension, dictated by the strong commercial and industrial vocation of the city The original nucleus of Hamburg, Hammaburg, corresponding to the current Altstadt (old city) is mentioned for the first time in 831 as the residence of Archbishop Ansgar, who gave Hamburg its name and that even today, in the form of an icon

Fig.67

stylized, decorate the city coat of arms. The location of the city on the northern border of the empire of Charlemagne was too insecure and exposed to change. In the period up to the year 1139 the city was in fact destroyed and rebuilt nine times. It was proclaimed an Imperial Free City in 1189 by Frederick I, known as Barbarossa. After a brief intermezzo during which the city was under the Danish rule. Initially, the settlement area was located on the left bank of the Alster not on the Elbe. It was in fact during the Middle Ages that the current area of the Neuestadt was artificially regulated and canalized. In 1321 it became part of the League of the Anseatic cities of Northern Europe, assuming in a short time also the role of the main commercial center. In 1510 it became a free imperial city and in 1558 the first German stock exchange was opened. The discovery of America and the routes to the Far East have definitively transformed the city and its port into a gateway to the whole world. Thanks to the enlargement and a deep transformation of the city, Hamburg remained immune from the devastation of the Thirty Years' War (1618-1648), thus being further developed in the Baroque age. During this period Music and theater opened all around the city. The Napoleonic occupation (1806-1814) ended this era. In 1815, once again free, Hamburg became part of the German League. In May 1842, the Hanseatic city experienced a catastrophe with disastrous consequences: The "Grosse Brand" (great fire) destroyed an urban neighborhood and deprived 20,000 people of their homes. The citizens of Hamburg used this event as an opportunity to give a new structure to the northern part of the city, rebuilding in neoclassicist style. For the construction of the new Rathaus the discussion went on for about half a century, above all to establish according to which architectural style the symbolic building of the city was to be built. After the decision was made in 1886, the great neo-Renaissance building was inaugurated in 1897, becoming one of the most majestic municipalities in Germany. This was the period in which Hamburg became a world-class city. The number of inhabitants tripled in 1900 to one million. As in all industrial cities, the urban area

was expanded and traffic systems and new infrastructures were set up. With the foundation of the German Reich in 1871 and entry into the customs unit, sea voyages and international trade increased exponentially, in fact the port area could continue to expand. In 1881 began the construction of the area of deposits, the Speicherstadt, a closed port and excluded from customs duties, which ended up transforming Hamburg into one of the largest places in the world for the storage and exchange of coffee, cocoa, spices and carpets. the port expanded to the southern shore of the Elbe and to the islands. The construction of the Nordostseekanal, 1895, further increased the importance of the port. From the imperial period until the beginning of the First World War in 1914, Hamburg has experienced a long period of strong growth. The face of the city has taken shape with the construction of numerous buildings such as the central station, the Art Nouveau-style Dammtor station, the Sternschanze Wasserturm and the covered markets of Deichtor. Even the port profoundly changed its characteristics: the thousands of trees and sails disappeared, leaving room for chimney-smokers and hundreds of steel cranes. After the Empire and after the First World War, in the face of new democratic conditions and extreme lack of accomodations, the topic of the day became the construction of popular housing. A belt of residential neighborhoods spread around the heart of the city. One of the promoters of this substantial construction activity, Fritz Schumcher, the director of the office responsible for constructing public buildings, designed almost all the muni-

Fig.72 Hamburg in 1842 before the Great Fire
Fig.73 Map of Hamburg, Altona-Ottensen and Wandsbek, 1900
Fig.74 Superposition of the plans of 1800 and 1990
Fig.75 Hamburg in 1960
Fig.76 Hamburg the city in 2010
Fig.77 Hamburg today
Fig.78 The harbour destroyed during the 1948

-cipal schools and other infrastructures. The dominant convention of the use of brick meant that the different styles at that time in use - expressionism, traditional style, modern functionalism - could unite and give life to harmonic neighborhoods. Meanwhile, in the center of the city the famous residential district of Kontor arose, with its Expressionist klinker facades and with its grandiose Chilehaus as a symbol. In the Hanseatic city, the architectural phase in the National Socialist period after 1933 left fewer traces than in many other German cities, despite the fact that Hamburg was considered one of the four cities of the Fuhrer. Particularly important for the history of the city was the 1937 law on the “Great Hamburg”, as a result of which the towns of Altona, Wandbek, Harburg-Wilhelmsburg and other small communities of the surroundings were brought together. During the Second World War Hamburg, which was the most important port city in Germany, was one of the main objectives of the Allied air strikes. Whole parts of the city have been canceled. Half of the houses were sunk in the rubble and 80% of the port was destroyed. After the war there was a rapid economic miracle that brought with it the strengthening of shipyards and the development of the oil industry, the food and tobacco industry and the birth of a new center of German publishing. The settlements built between 1946 and 1956 were signs of the atmosphere of change that showed its effects even beyond the city of Hamburg.

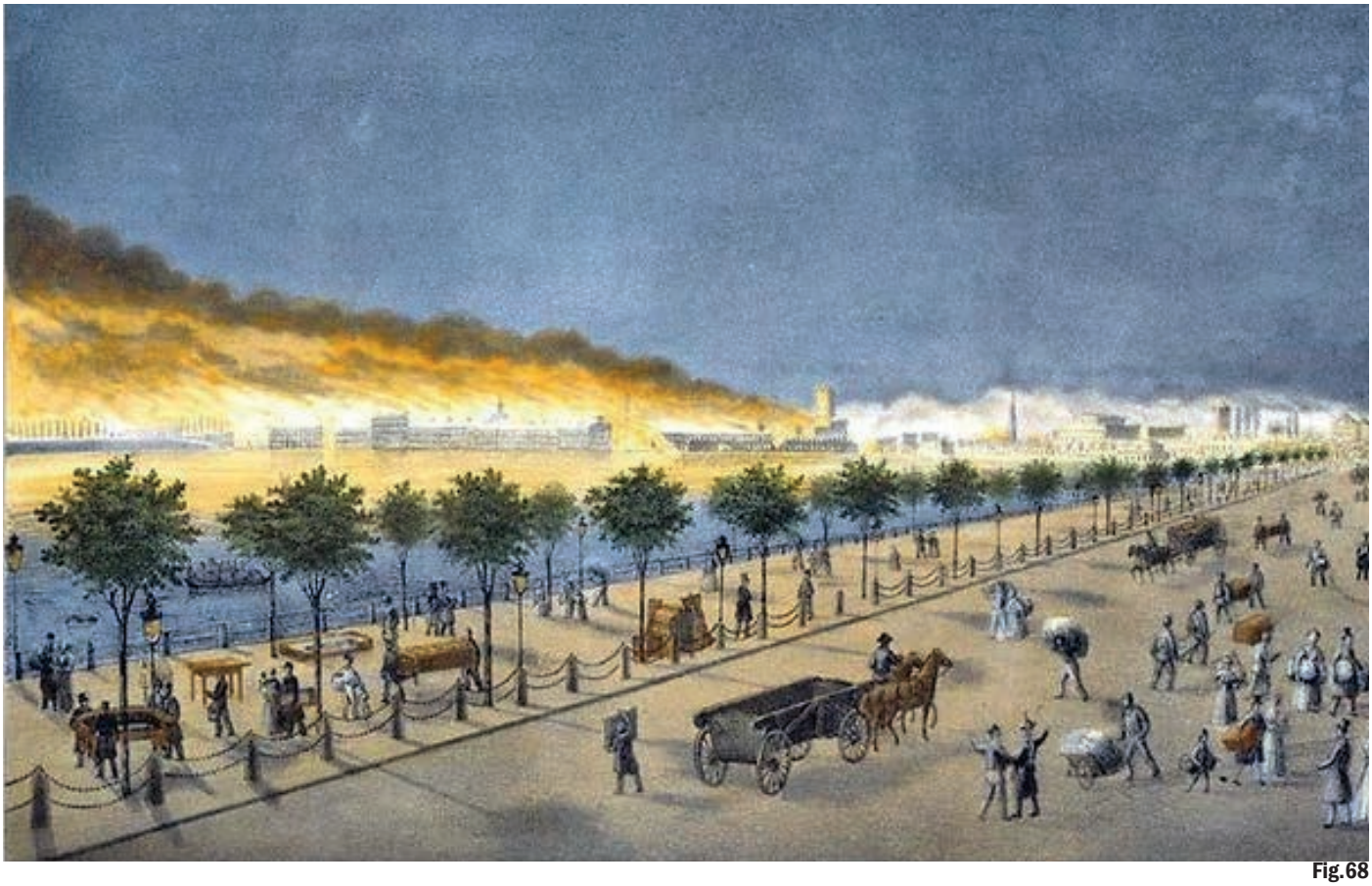


Fig.68

Fig.69

Fig.68


Grundtriß der Edlen
Weitberumbten
Statt
HAMBURG.
Anno 1632

Fig.71

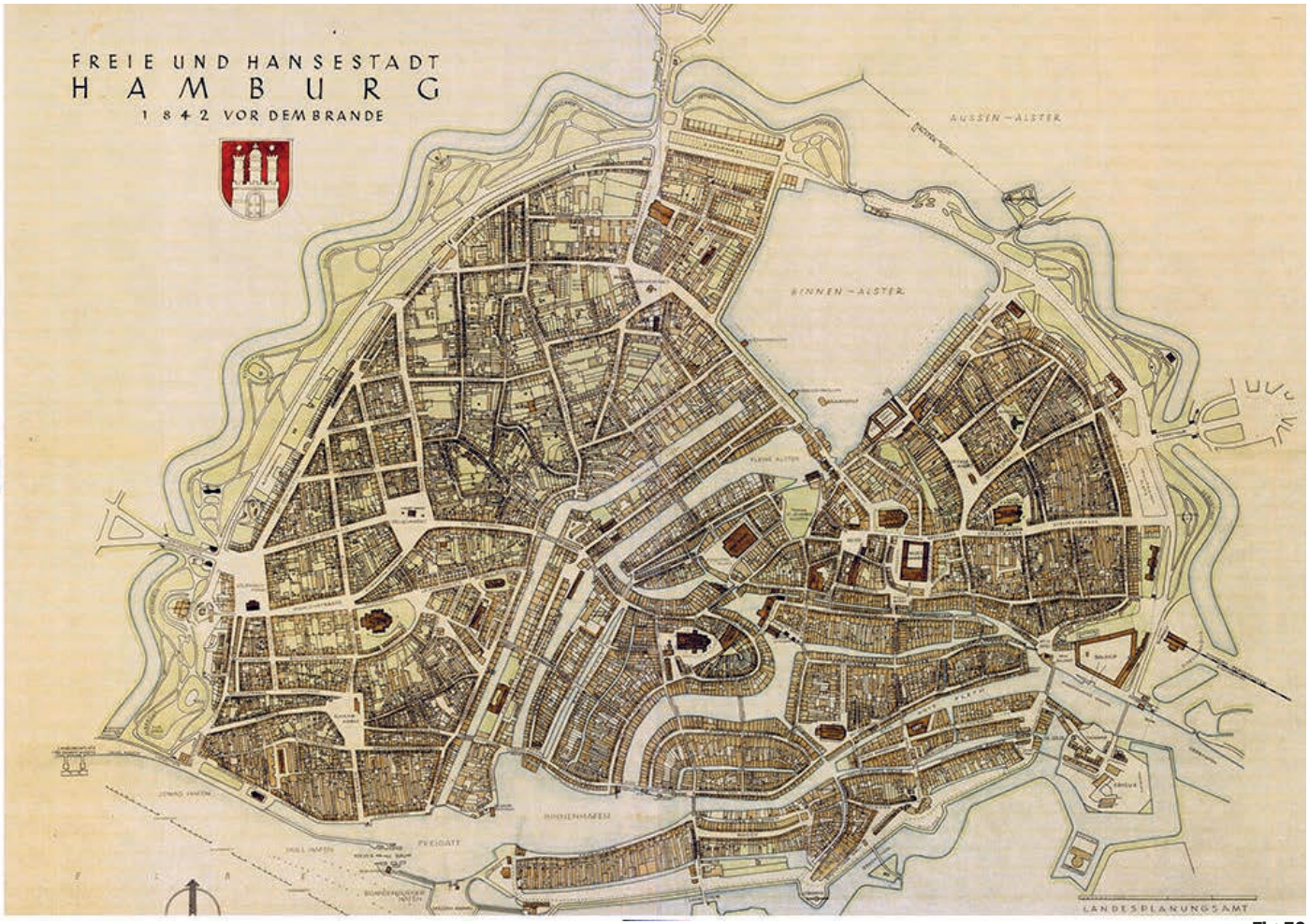

FREIE UND HANSESTADT
HAMBURG
1842 VOR DEM BRANDE
AUSSEN-ALSTER
BINNEN-ALSTER
LANDESPLANUNGSAMT

Fig. 72

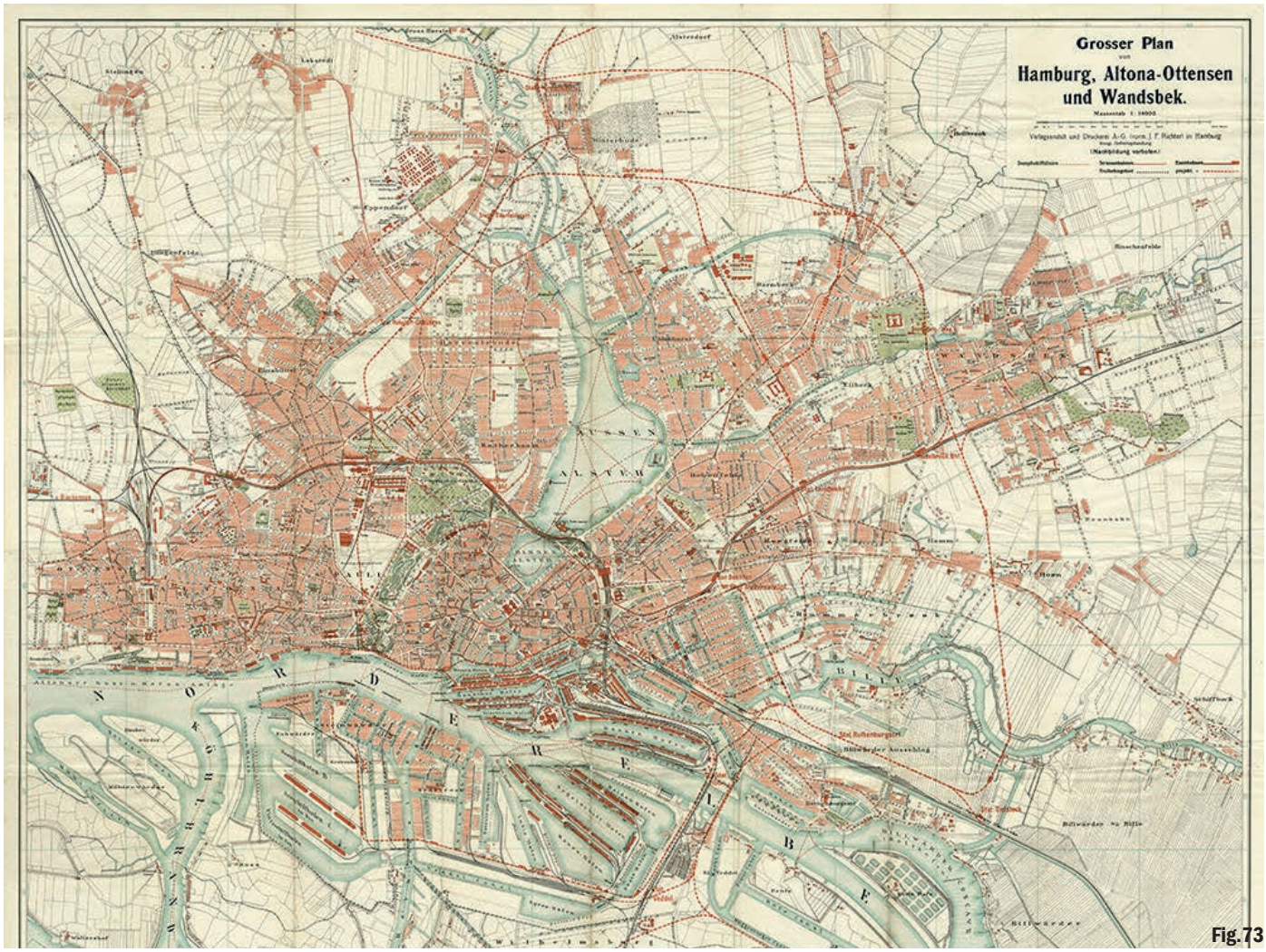

Grosser Plan
von
Hamburg, Altona-Ottensen
und Wandsbek.

Fig. 73


Hamburg einst und jetzt
Außenalster
Binnenalster
Binnenhafen
Norderelbe

Fig.74

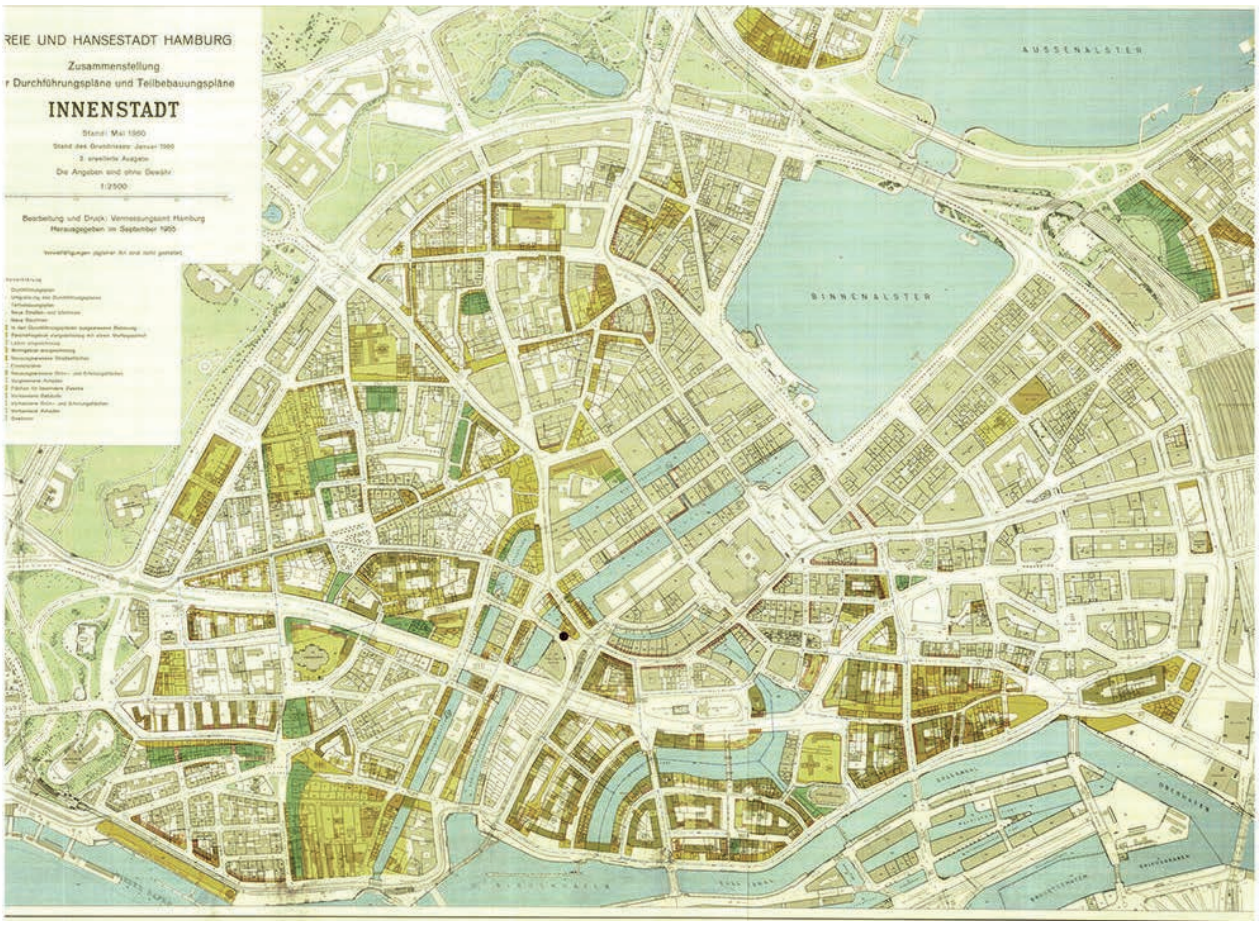

REIE UND HANSESTADT HAMBURG
Zusammenstellung
r Durchführungspläne und Teilbebauungspläne
INNENSTADT
Stand: Mai 1960
Stand des Grundrisses: Januar 1960
2. ergänzte Ausgabe
Die Angaben sind ohne Gewähr
1:2500
Bearbeitung und Druck: Vermessungsamt Hamburg
Herausgegeben im September 1960
AUSSENALSTER
BINNENALSTER

Fig.75

Fig.76

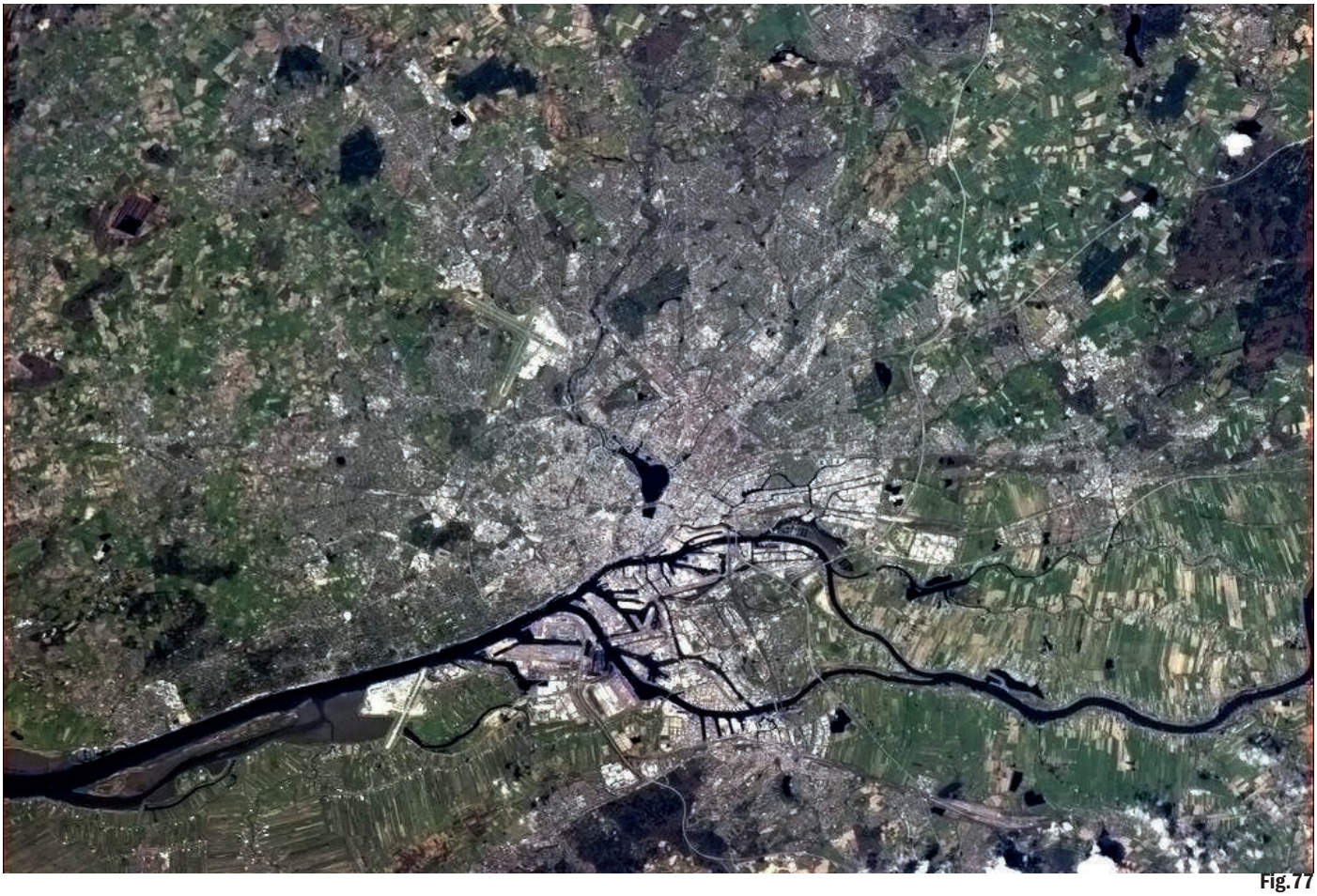


Fig.77

Fig.78

Fig.79

5.3 POPULATION GROWTH AND LACK OF ACCOMODATION

Hamburg vaunts a long tradition in the field of town planning. In his so-called Federplan ("feather plan") (fig.78) Fritz Schumacher traced the fundamental lines of the urban development of the city a hundred years ago; they still remain valid today. The basic principle of the Federplan was the idea of development along the chief urban axes, which today consist of the railway tracks and public traffic. This has, then as well as today, represented the principle of sustainable development of the metropolitan area. Already then the plan did not stop at the edges of the city, but considered the whole region, what today is called the metropolitan region ,formulating and illustrating, with considerable foresight, a vision based on intermediate development axes and spaces up to a regional level. *"Today we cooperate with the metropolitan region, with the municipalities and the provinces, and take care to ensure that the intermediate spaces remain free from new constructions, also for the future, by improving them and turning them into regional parks, allowing new projects to be developed along the railway lines, close to the stations of these lines, in such a way that the inhabitants can take full advantage of public transport."*[4] The goal that guide the town planning administration is "More city in the city", a very simple expression that is intriguing and elicits very ample consent: it means that they want more city in the city and not, on the contrary, more city in the country. It may seem banal but it gets the message across. If they manage to attain this goal, no new constructions will be permitted in green areas; instead, the existing urban issue will be densified while the landscape and the open

Fig.78 Frittz Schumacher Feather Plan 1900

[4]Wilhelm Schulte and Jörn Walter for www.area-arch.it

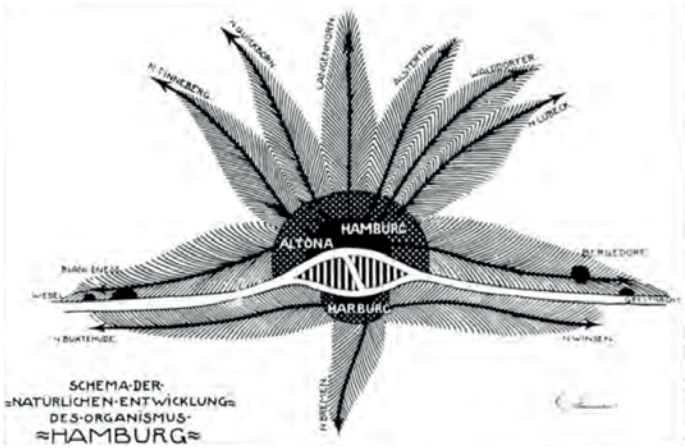


Fig. 78

spaces around the city will be preserved. This is easier said than done: whenever one wants to make the city more compact, there are inhabitants who already live in an area, who show little tolerance for transformations in their own neighbourhood. A dialogue with the citizens therefore also serves to promote this objective, and to convince them that "More city in the city" is the right approach, also in the long term. The second point is "Hamburg residential city", because it is necessary to make the environment more attractive, so that the citizens will not tend to move to the peripheral urban areas in the region, a phenomenon which has already characterized the Seventies, when one could buy a detached house at a much lower price there than in the metropolitan area. This exodus from the city has seen an inversion, because the social organization has changed: by now more than 80% of family nuclei in the city consist of one or two persons, who are naturally not potential buyers of one-family houses in green surroundings. In this sense, also the social transformations have contributed to the renaissance of the city. The third objective is to "rely on economic forces" and thus to reinforce driving sectors as the harbour, the aeronautical industry and tourism. he city is an increasingly vital space, and we must focus on preserving the urban quality and enhancing and upgrading the open spaces. This is what we are doing for instance through Business Improvement Districts (BIDs), which were first developed in America and have been introduced for the first time in Germany in Hamburg. By now there are 17 such BIDs in the city: it is a matter of shopping streets – not malls but open streets – which have not been renovated by the city, but by the private landowners. Extending outward through low-density residential neighborhoods with single-family units isolated the dilution of the city and the growth of the per capita area reached its peak in 1980. Since the eighties there has been a population transfer effect from the city center to the outlying areas. The process of suburbanization has continued to increase, but does not correspond to an increase in population. It is only since 1987 that the urban population in Hamburg has started to grow again. This produced, however, an increase in the built area comparable to the context of the fifties. The current configuration of the city as a whole shows an internal consolidation of the structure of the single parts of which it is composed, which have provided sufficient services to improve its livability and limit its interdependence with the main urban center. Since the 1990s, a general stabilization of the population in the inner city has taken place, although there has been an increase in single-family housing units. And this can

be interpreted as a new appreciation by the population of life in the city, possibly translatable at the level with interventions of redensification of internal urban areas. In keeping with the trends of the last few years of the entire German federal state, the city of Hamburg is also in a state of strong demographic growth. It is expected that in 2030 the metropolis will reach the number of two million inhabitants. With more than 1.7 million inhabitants, and therefore 36,000 more than the 2011 census, the city now touches a new demographic peak since 1969. This generates a strong housing shortage. The central question today is to understand how to manage urban growth that is strictly necessary today in terms of sustainability, avoiding over-exploitation of the land but intervening with growth from within. According to the census made by the city of Hamburg in 2011 the number of existing residences amounted to 924,596 units. Most of the housing units, 738,347 units, are located within condominiums. Moreover, unlike what traditionally happens in our country, about 75% of the houses in Hamburg are rented and in particular 87.4% of these are located within condominiums. The metropolitan area of hamburg has stood out in the last twenty years in the European panorama for its programmatic commitment to a complete sustainable reconversion of its urban territory. The strong point of the sustainability policies implemented by the local administrations is the ability to combine multiple aspects within a collaborative work and to match the action for the protection of the territory with a relapse in economic terms on the whole urban system. A physical rehabilitation operation of the territory is accompanied by the commit-

-ment to make these new spaces redeveloped accessible to all. The city has to deal with the unstoppable mechanisms of high demand for the rent that the redevelopment policies have resulted, with a consequent expulsion from the city center of the most vulnerable sections of the population. In Hamburg, between 1990 and the beginning of the 2000s, as a consequence of the intense process of redevelopment starting from the port areas, widespread phenomena of gentrification occurred, especially in the central areas of the city. Today the declared goal of public administrators is to avoid doing simple city marketing operations and to make Amburg attractive only for well-to-do people, taking into account that in the medium term this great process of urban transformation will bring about 250 thousand new inhabitants into the city and about 70 thousand visitors per day, but rather to act as a laboratory of sustainable and experimental urban living in the adoption of new forms of architecture, economically innovative. The city has a total of 28 parks and nature reserves around the city walls, 20% of the city's surface is covered by greenery and there are many urban transformation projects oriented towards eco-sustainability and energy saving.


Genuss erleben. Flensburger.
Genuss erleben. Flensburger.
Genuss erleben. Flensburger.


Bei den Mühren

5.3 HAFEN CITY

It all began in 1991 when the current mayor, Henning Voscherau, unofficially commissioned a study to deepen his knowledge about the transformations of the port edges of the historic city. The port has historically followed a development along the north bank of the Elbe, subsequently also expanding in the southern areas of the city following the spread of container transport. The port spaces adjacent to the historic city were therefore unsuitable for operations with containers and then disused, the description required by the mayor in fact served not to unleash the opposition by the port industry and, in the event of acquisition, not to increase the prices of companies and buildings in the above areas. Most of the areas were already owned by the city of Hamburg, but the numerous buildings and infrastructures in them belonged to private companies, later bought by the Hamburger Haen und Laherhausgesllschaft mbH (now HHLA Hafen und Logistik AG), a subsidiary company founded in 1995 and completely owned by the Hanseatic city. The political legitimacy to remove the current Hafencty area from the Port of Hamburg was provided by the simultaneous creation of a special fund under public administration to maintain the current structure of the city + port. Infatt, the financing of the new Altenverder container terminal was transferred to this fund, where it was initially expressed the intent to contribute with the financing through the sales process of the areas. The development of Hafencity and the establishment of a special public fund were therefore approved not only to finance the construction of the Hafencity area with

Fig.79 Areal view of Hafen City
Fig.80 EMBT Project for the public space of Hafen City
Fig.81 Picture from the pedestrian path to the Ephilarmonie
Fig.82 Masterplan

its associated infrastructure, but also for the new port area in Altenwerder, for which it had not been initially allocated no funds from the city. At the end of April 1999 a competition was launched for the first master program of the Hafencity and after an intense initial period between 1997 and 1998 in which the authorities of the city of Hamburg and the GHS (Gesellschaft fur Hafen und Standortentwichlung) performed numerous studies of the area, the winner was announced in October 1999. An international jury decreed Hambubrgplan as winner, a study born from the collaboration between the Danish Kees Christiaanse and the German studio ASTOC. The masterplan was then approved by the Hamburg Senate on 29 February 2000 and subsequently shown and submitted to the public discussion through a series of performances, exhibitions and other events. The main foundations of the masterplan were the interaction between existing buildings and water, the elevation of buildings as a concept for flood protection, the public character of the ground floor functions, the functional mix of buildings. The new district within the city center should not only be a futuristic vision for Hamburg but also had to develop a model for the 21st century European cities. At the same time the masterplan was flexible enough to adapt to any future eventuality and variation in order to be able to adapt to changes that could compromise development.The project, designed by the Dutch-German consortium Kees Christiaanse/ ASTOC in 1999, expanded the central area of Hamburg in 40% and transformed this unused storage area. This renovation kept in some cases the building typology of brick warehouses, but preparing them to accomodate other purposes. Looking to combine concepts of economic, social and environmental development, HafenCity includes mixed-use areas, such as housing for 4000 people, 45,000 offices, restaurants, a university, cultural facilities, parks and public areas. However, there has been criticiscm regarding it as elitist district, given the cost of the departments that are located in this area. The canal area is marked by the longitudinality of the space that visually opens to the river. It is also notable the recovery of old brick warehouses and public buildings or offices, in a fashion that was pioneered by the project of Puerto Madero in Buenos Aires, Argentina. Some sculptural elements are references of the industrial past of the area. One of the most celebrated contributions HafenCity is its public space, designed by Spanish firm EMBT .The design exploits the interface between the city and the water, establishing various levels of contact and accessibility. It is noteworthy that the Elbe river floods two or three times a year, and for that reason the design should provide security for the people and structures.

Fig.79

Fig.80

Fig.81

Fig.82

5.4 IBA HAMBURG

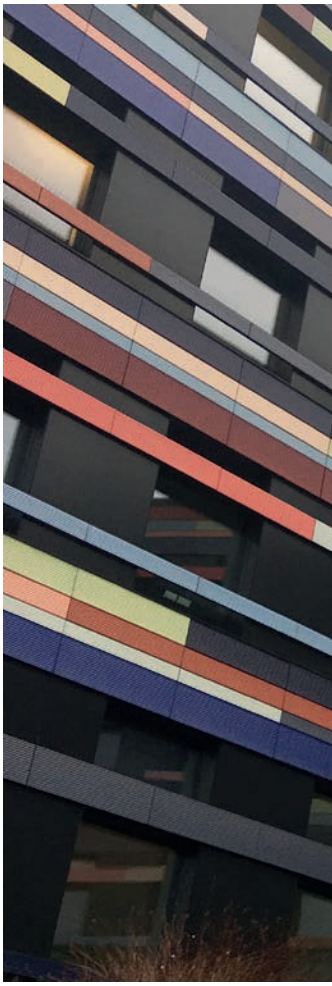


Fig.84 Ministry of Urban Development and Environment in Willhelmsburg
Fig.85/86 Energy Bunker
Fig.87 Container project during IBA
fIG.88 Piled up Containers in Willhelmsburg

Exhibition like the Building Exhibitions that involve a large scale are like urban laboratories for a limited period of time and, allowing experimentation, are also among the most influential tools available to planners. The greatest impact of a Building Exhibition is given by the examples of new construction models. In seven years between the end of 2006 and 2013, the IBA Hamburg International Building Exhibition has developed and completed a total of 70 projects, 63 of which are buildings that include residential blocks, innovative case studies, sports facilities, educational centers, homes for the elderly, cultural centers where creatives and residents can express their skills, special cases like the Energie Bunker (fig.84), parks and open areas. All these projects give shape to the southern part of the discussion at a regional, national and international level, a long-forgotten area, the district of Whilemsburg, the motto of the IBA is in fact “Leap across the Elbe”, or the leap beyond ‘Elba. IBA Hamburg has given ample space to new ideas and new answers dictated by the future needs of the buildings. In this context, 7 IBA criteria of excellence were outlined to ensure high-level planning and architectural quality: The criteria are -pecuiarities; IBA specificity; multi-talent (versatile); effectiveness; process capacity; presentable; feasibility. Each IBA project must therefore respond to these aspects in order to be considered an effective intervention within the project area. Being a municipal corporation, the IBA in Hamburg uses a holistic approach to local development with the creation of both innovative residential districts and sustainable business areas. All de-

Fig.84

-partments and organizations are involved and work side by side maintaining close contacts and efficient exchanges of information and communications. Currently the city of Hamburg works in cooperation with the metropolitan region, with municipalities and provinces, so that the intermediate spaces remain free of settlements in the future, carrying out redevelopment interventions such as regional parks, allowing the settlement development to take place along the railway tracks and close to the stops of these lines so that the inhabitants can make the most of public services. In accordance with these principles, new guidelines have been developed, summarized in five integrated objectives, for development planning to reach the widest possible consensus not only for the current political government to reach all the inhabitants of Hamburg. The guiding goal is “More city in the city”, an expression that expresses the desire to search more cities in the city and not the other city in the countryside. Through this objective, green areas should not be allowed, preferring to thicken the existing urban fabric and preserve the landscape and the open spaces within the city. In practice it is not easy because wherever you want to compact the city, there are already inhabitants who do not willingly tolerate transformations in their neighborhood. Dialogue with citizens therefore also serves to promote this goal and to convince them that “More city in the city” is the right path, even in the long term.

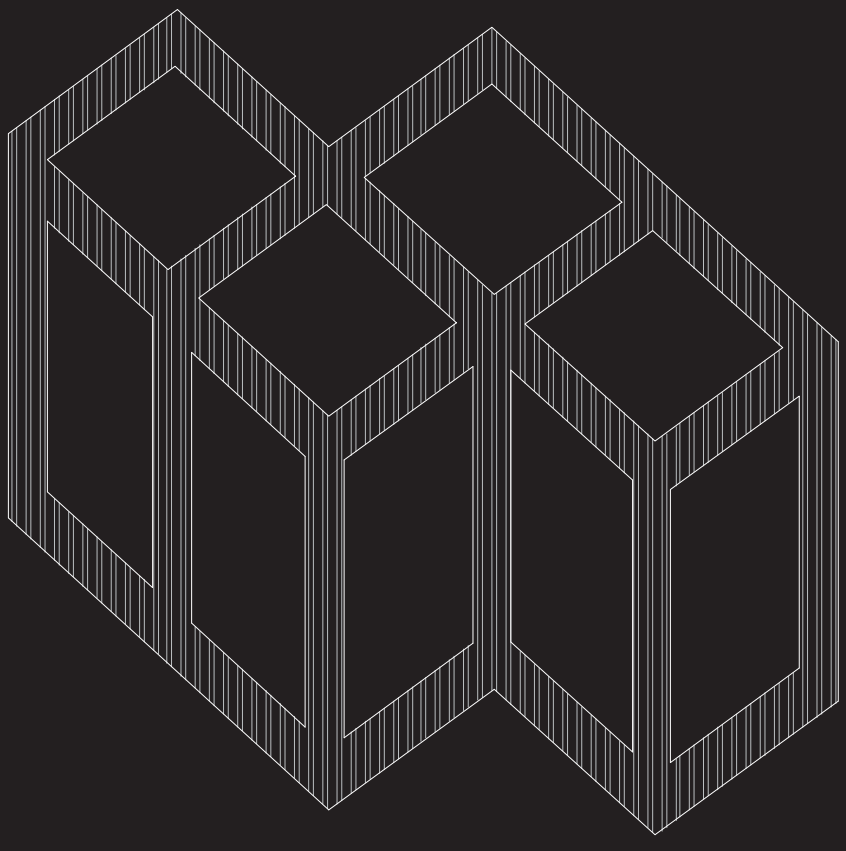
Fig.85

Fig.86

Fig.88


Fig.89

The Project



6. THE PROJECT

6.1 KAROLINENVIERTEL

In the 1980s and 1990s, Karoviertel was a rather run-down neighbourhood where students and working class citizens lived in poorly maintained Gründerzeit and Jugendstil houses. Gentrification brought about a more inviting housing situation. As part of a careful urban renewal process that has been practiced for many years, the former “poor neighborhood” has now established a multicultural mix of immigrants, locals, fashion shops, art galleries and design. The now commonly used name Karolinenviertel is only used since several decades for the northern part of St. Pauli. Until the 1960s, however, it was the terms “slaughterhouse district”, “North St. Pauli” given that in th district there was the slaughterhouse of the town, became now a very famous music club. In post-war history in Hamburg, there were also repeated considerations to completely demolish the district in favor of an extension of the adjacent site of the “Hamburg Fair” or the construction of a large hall for sporting events. The buildings of this district are practically not modernized. Many of the long-time residents and numerous companies have moved from the district. These were two main groups: migrant workers, mainly from southern and south-eastern Europe, from Turkey and the Mediterranean countries, and young people, mostly students, who did not want or could not pay expensive rentals. They do not follow particular urban interventions because the administration considered the inhabitants temporary groups, which would have spent only a few years in the neighborhood.

Fig.90 View of the district today Fig.91 The Rote Flora theatre. It has been squatted since November 1989 Fig.92 The Feldstrasse Bunker is a former WWII anti-aircraft bunker which hosts a music venue, a large music store, and there are plans for an urban rooftop garden.

Fig.90

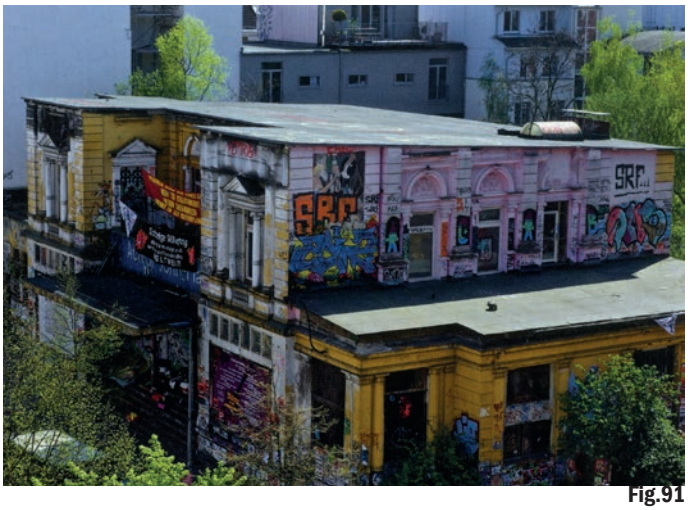


Fig.91

Fig.92

6.2 SITE

Fig.93 Collage of the characteristic of the area made up all in once -selfproduced image Fig.94 Pedestrian crossing on the Metropolitan tracks Fig.95 Urban Garden spontaneously born in the area site Fi.96 View of th e city just after crossing the pedestrian bridge.- Fig.97 Planimetry of the current state Fiig.98 Project concept idea

Both Karolinenviertel and Sternschanze districts are separated from what was the ex-slaughterhouse of the city, and from the U3 underground tracks with the nearer stop in Feldstrasse, just a haundred meters below. A narrow pedestrian bridge connects the two neighborhoods at this point (fig.94). There is an idea by the University of Architecture in Hafen City to invest in this area due to the low cost of the land and the proximity with the centre and trendy area. The intervent concept consist n closing the area to traffic, and planning a resindence above the tracks that would significantly increase the presence inhabitantsin the neighborhood. Marketstrasse is the main street in Karolinenviertel The Hafen City project intend to stress the presence of the morning market, through a commercial floorplans suitable for attracting inhabitants. The area is a mixture of colorful activities and inhabitants thanks to the presence of artists, designers, artisans and fruit and vegetable retailers. It occured to me the right place where to experience something new. The choosen area is a green area that presents a 2300 m^2 , we can define it as a remnant, because, there is no continuous flooring in good condition, nor the vegetation is cured. There are no playground areas except for a children's slide, but there are several benches. A characteristic of the area struck me particularly, because in a small corner at the beginning of the "square" there is a vegetable garden managed by a group of inhabitants organized independently (fig.95), it is a ridiculous thing considering that the total area of the garden will be 15 square meters, compared to an area with a huge unused area. This observation was one of the main ideas of the project. There is the will to maintain this natural aspect of the area, which the local inhabitants have silently expressed as necessities, but enriching and stren-

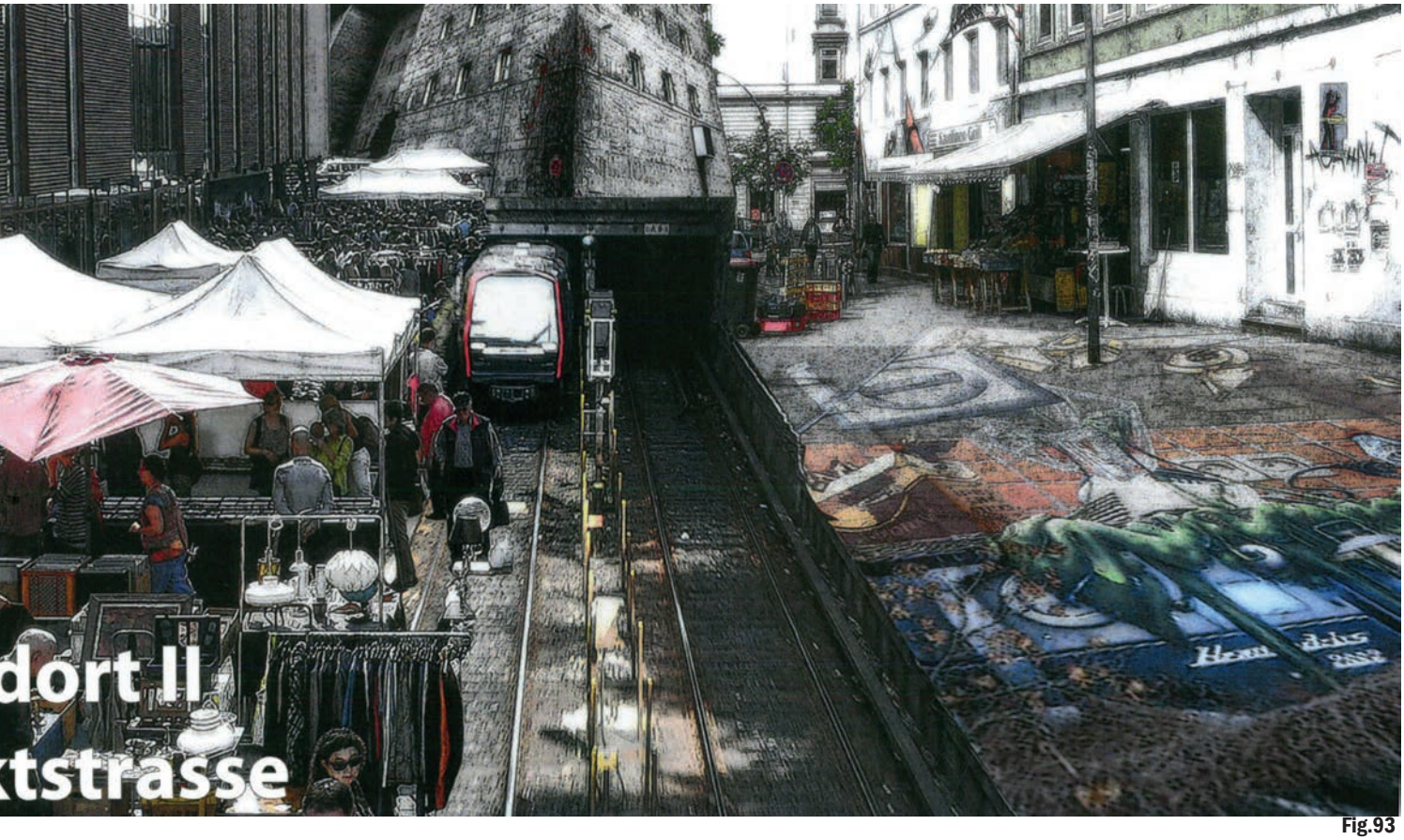


Fig.93

-gthening it. Hence the decision to avoid planning the whole lot but to stay only on the edge of the same lot, so that the entire central area can be destined both to students for whom the project of university residence is designed, and to citizens. Therefore there is the will to maintain the natural entrane to the area also in the design.As shown in the diagram fig. 98 the inspiring ideas is not to fill the entirely lot, but to reserve the central space to use it as an urban garden, also, there is the will to respect the axes connections already existing on the site, and to stress them even more through the volume of the project itself. The axe that goes from the pedestrian bridge, andthe one from Marketstrasse both ending up on the area, continue inside the same area through openings on the ground floor.

Fig.95

Fig.94

Fig.96

Fig.97

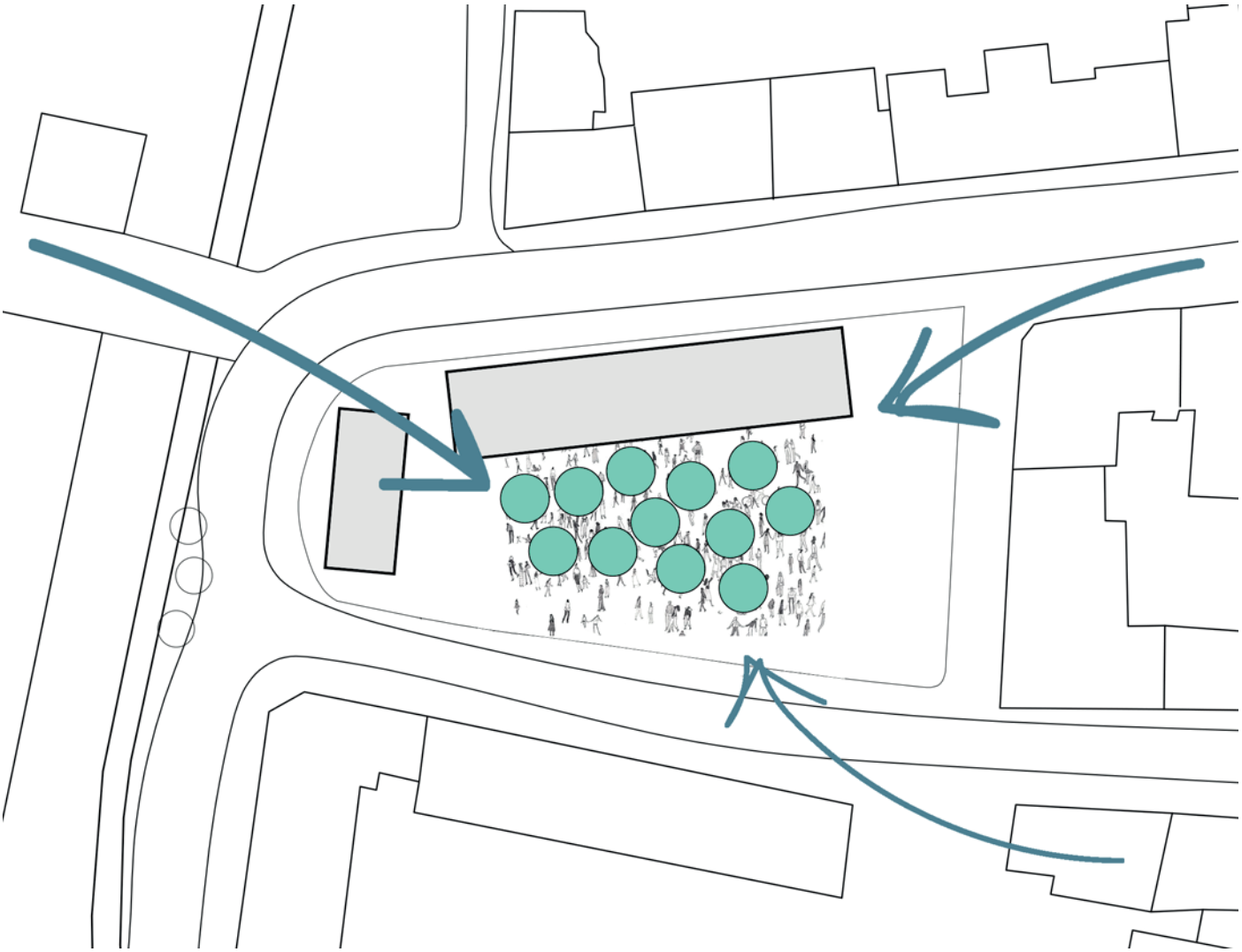
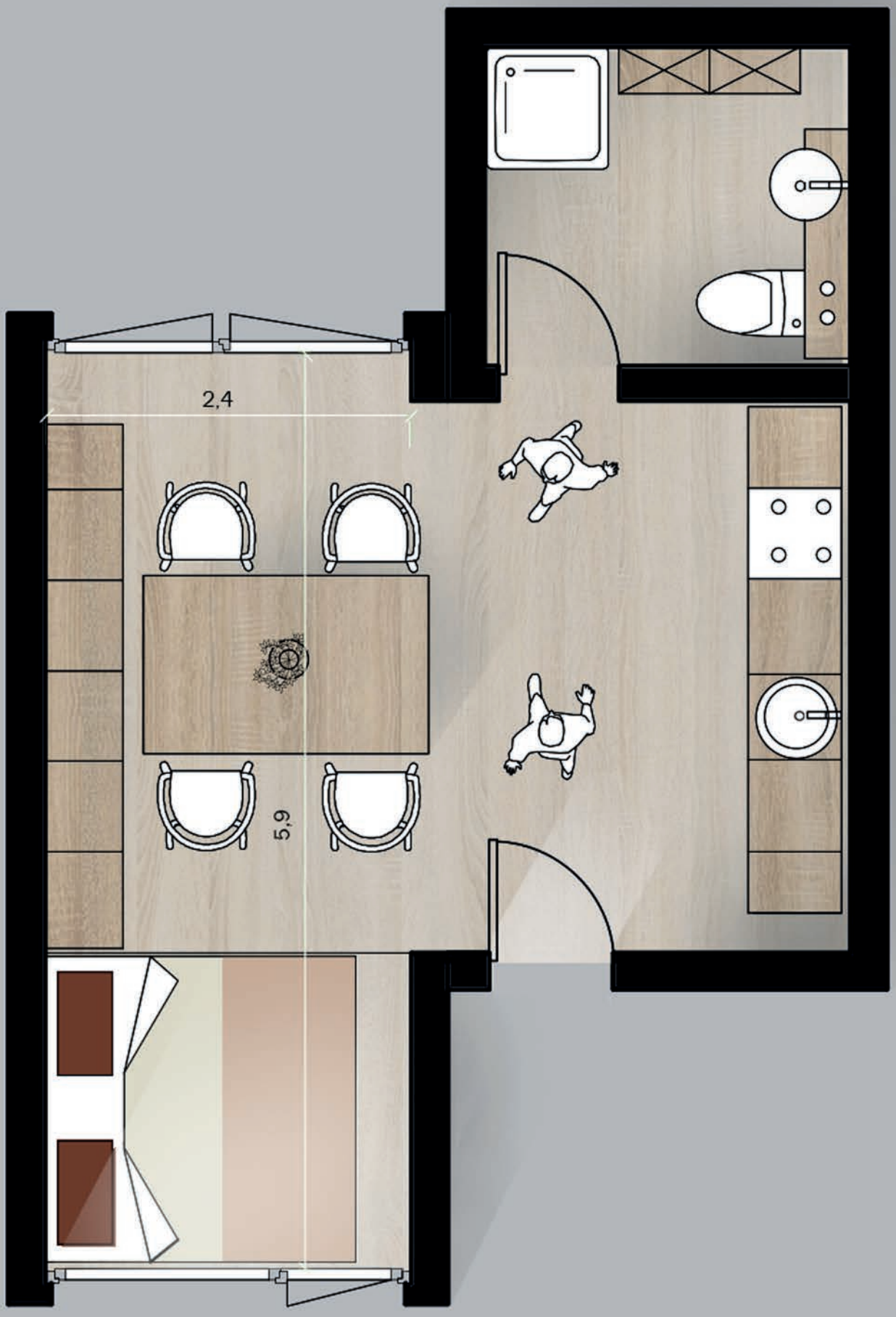


Fig.98

6.3 THE PROTOTYPE

Before starting designing the dormitory I focused on my attention on the module, the Unit. The intention is to give democractically to each tenants the same kind of space, and to keep it to more spacious possibly in order that each one can personalize it the way it prefers. Of course is taken into account the fact that by sharing the unit the rent prices falls down, in fact the dormitory project will have for each floor both a solution for a single tenant and both a shared solution. The intention is to keep it simple and easy to understand by its inner components, thinking for example of self maintence. It's a 29,5m^2 unit, designed to be home also for the future occupants, that could be for example single, or couple . That's another reason why the inner space is designed to satisfy and to be adapted to a generic user, looking at the unit in its utility also after the temporary use of it in a student dormitory. As a response to the global lack of homes, with this project I am exploring new ways of designing and living in the city. Students are up to live simply and to embrace the brend news, living in compact private spaces with simple amenities. As a private sanctuary for them to charge up. The huge space given to common area in the projet ,is precisely thought on the student himself/herself, and their way of life. The following sketches will give an idea of the thoughts behind the design, which came out from the will of empathize also the natural light instead of electricity, and to let natural ventilation get inside the environment. The choice of wood is to give to the space a natural feeling, the bed is thought also to be used during the day thanks to its width, a coffered structure let the user save space for living.

Fig.99 Prototye plan
Fig.100 Sketch of the interior
Fig.101 Sketch of the bed structure detail
Fig.102 Sketch of the living area


2,4
5,9

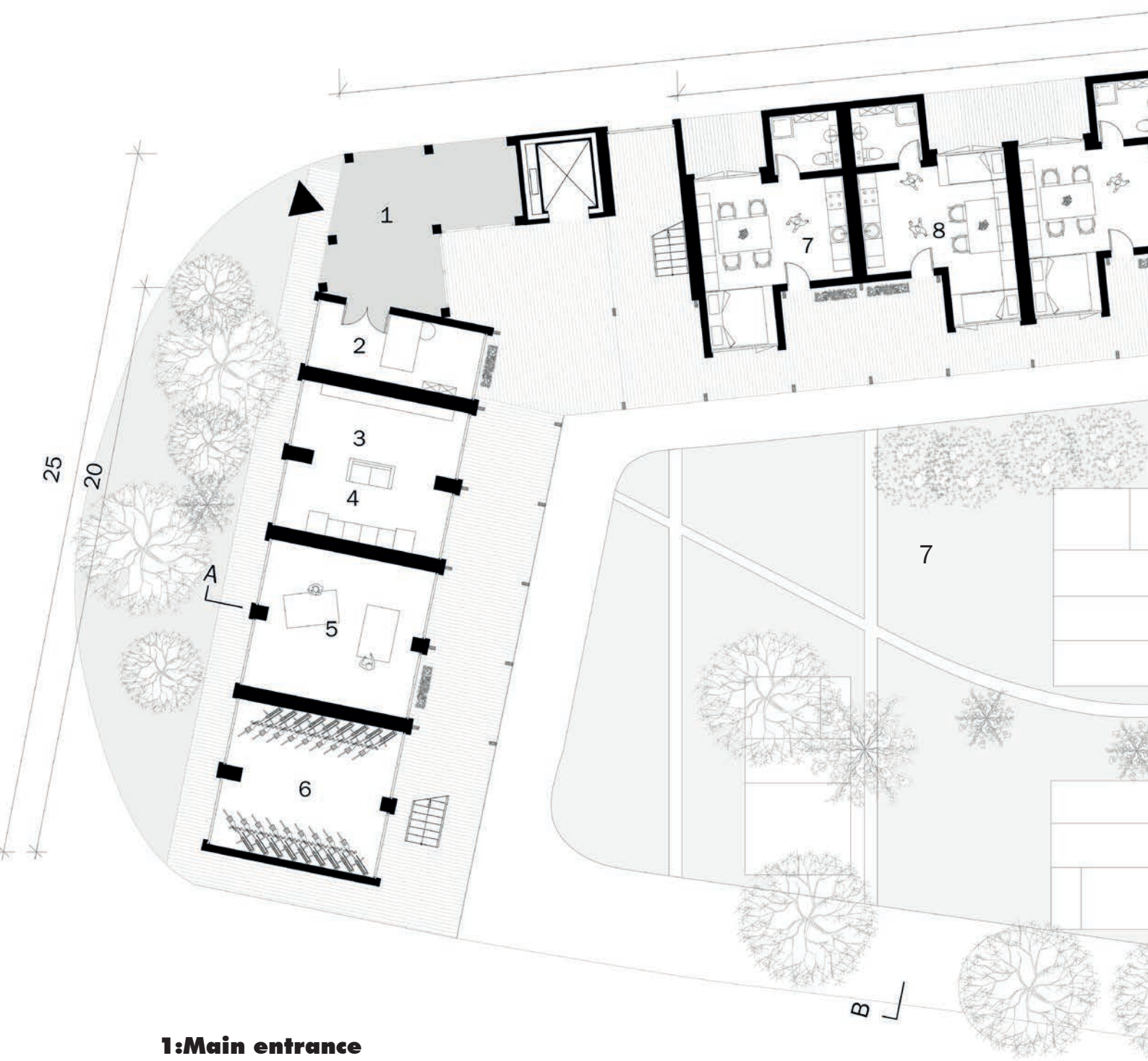

DESTROY ALL CARS
CATCHING FIRE
THE TIME THIEF
HERE BE MONSTERS!
DRAGONOLOGY

Fig.100

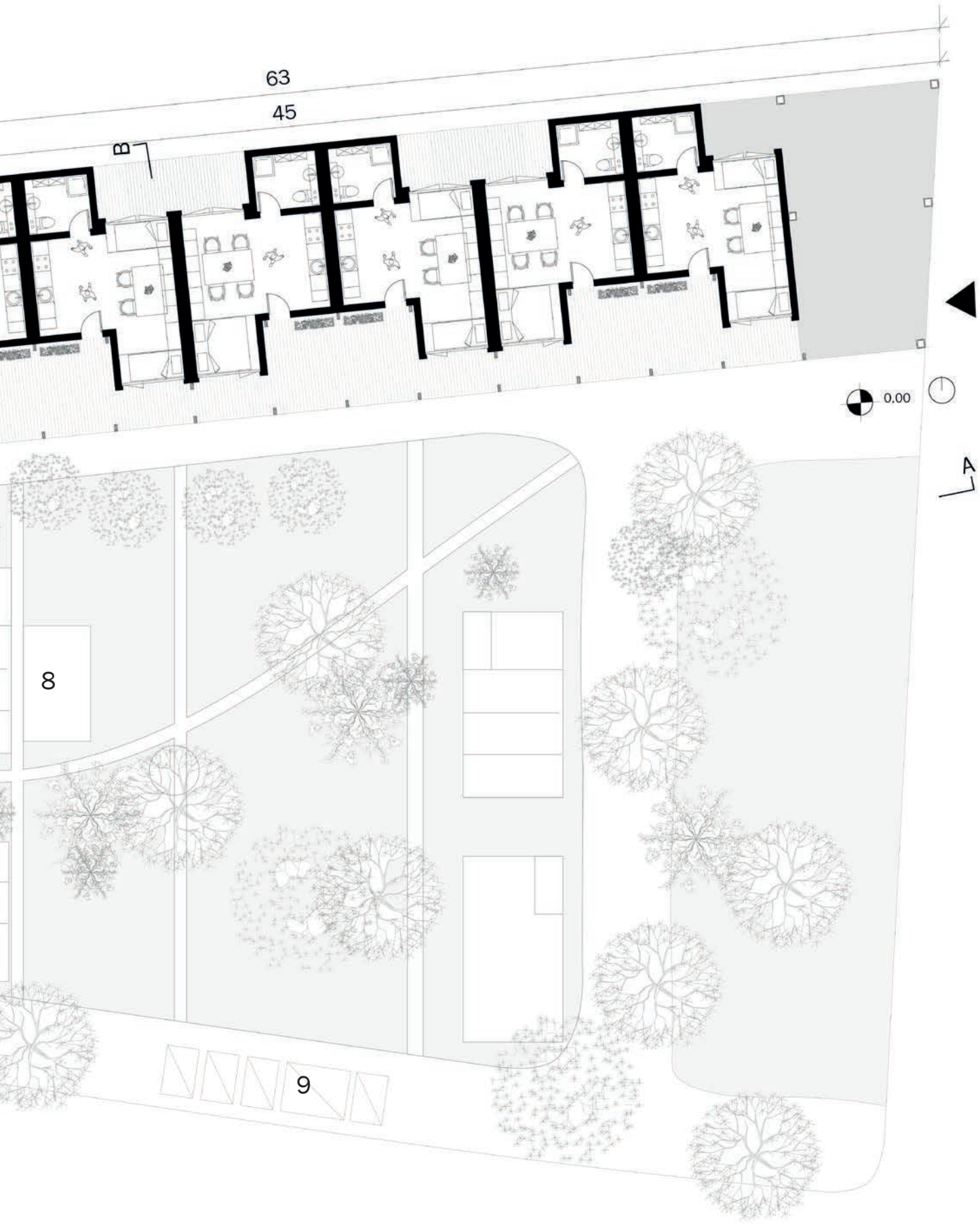
Fig.101

Fig.102

6.4 ARCHITECTONICAL SCALE



1:Main entrance
2:Reception
3:Mail boxes room
4:Laundry
5:Bicycle repairing workshop
6: Bicycle parking
7:Urban garden
8:Compost
9:Recycling



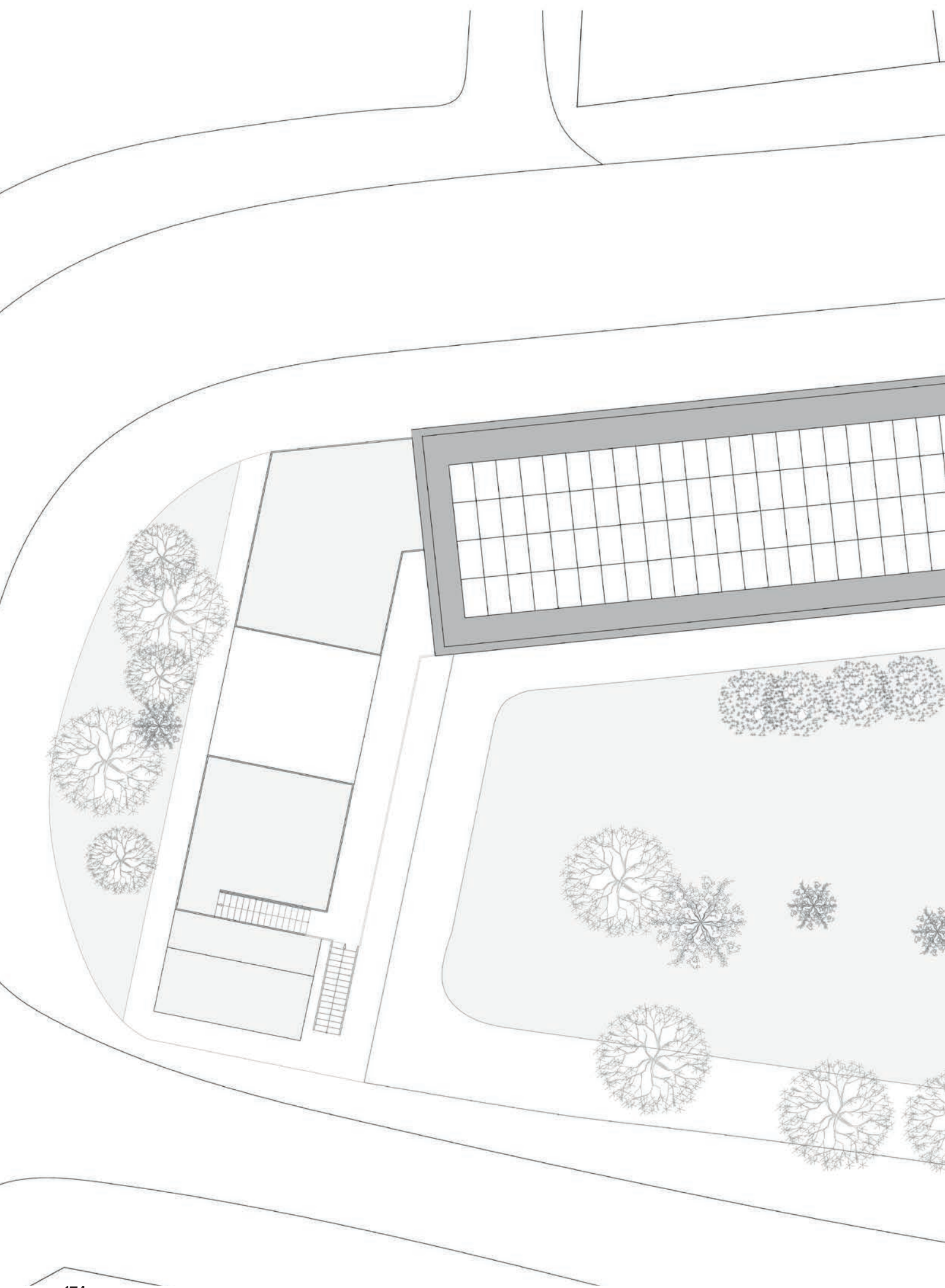
GROUNDFLOOR

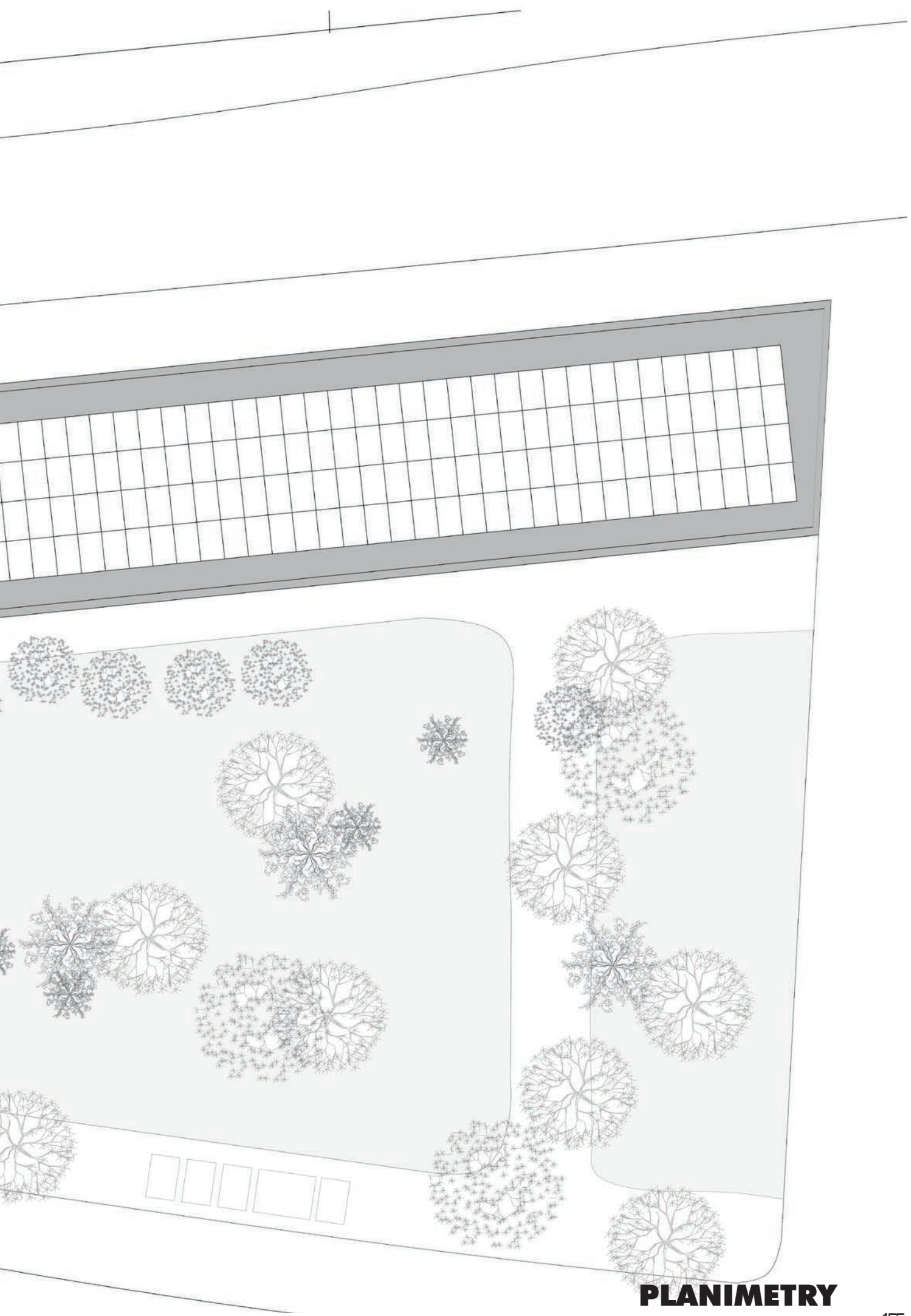
1:Common area & book crossing
2:Green house
3:Workshop
4:Study room

FIRST FLOOR

1:Barbecue area and open air cinema
2:Terrace
3:Study room

SECOND FLOOR

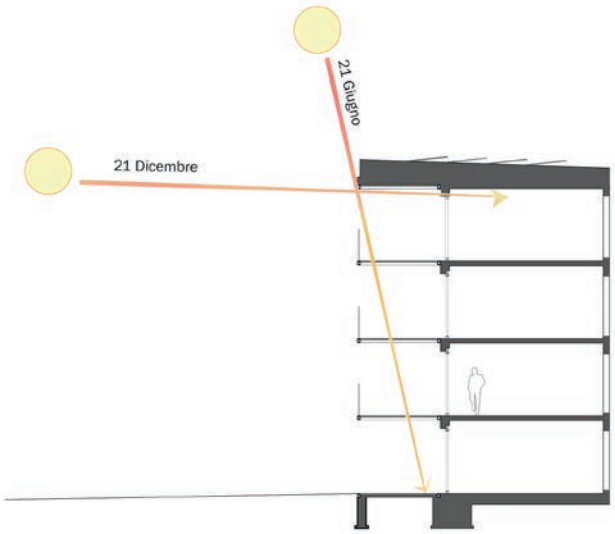


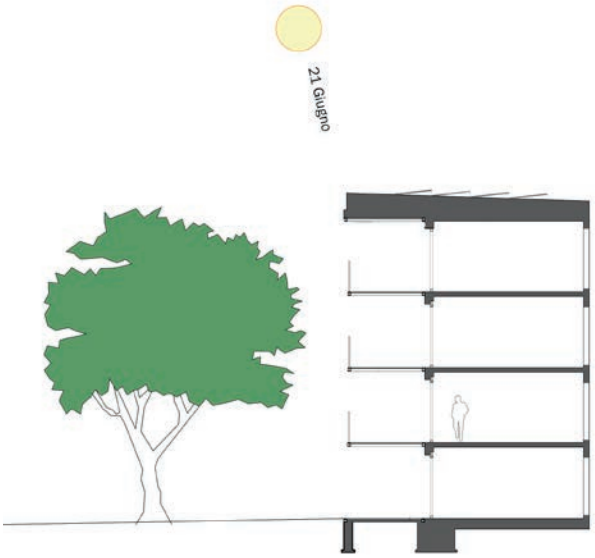


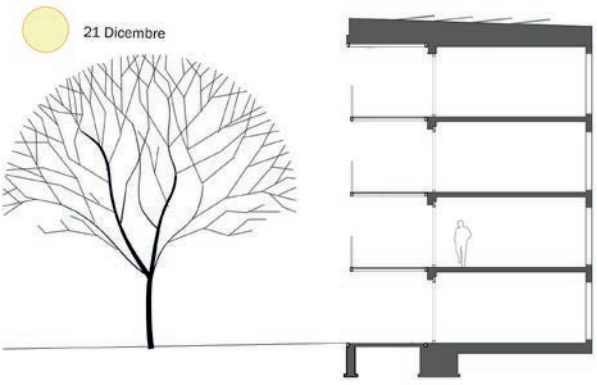
PLANIMETRY

SECTION-VIEW SUD SIDE

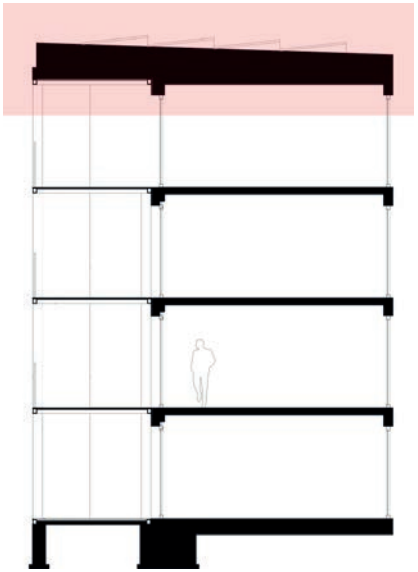
SECTION-VIEW EAST SIDE


21 Giugno
21 Dicembre

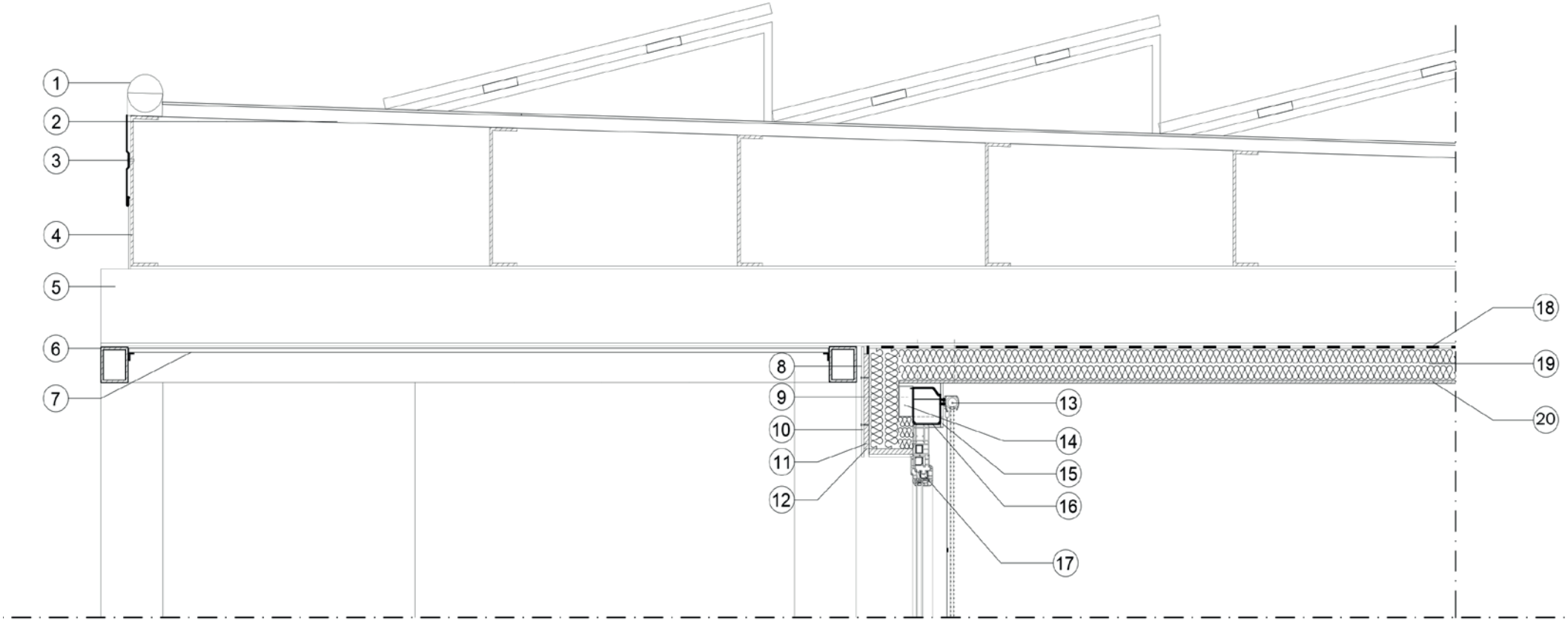

21 Giugno

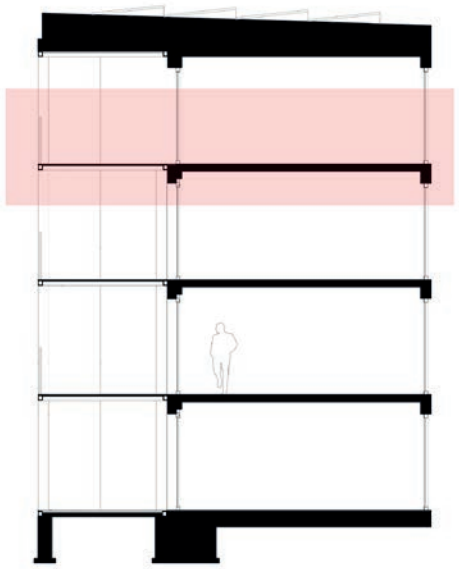

21 Dicembre

PROJECT VISUALIZATION

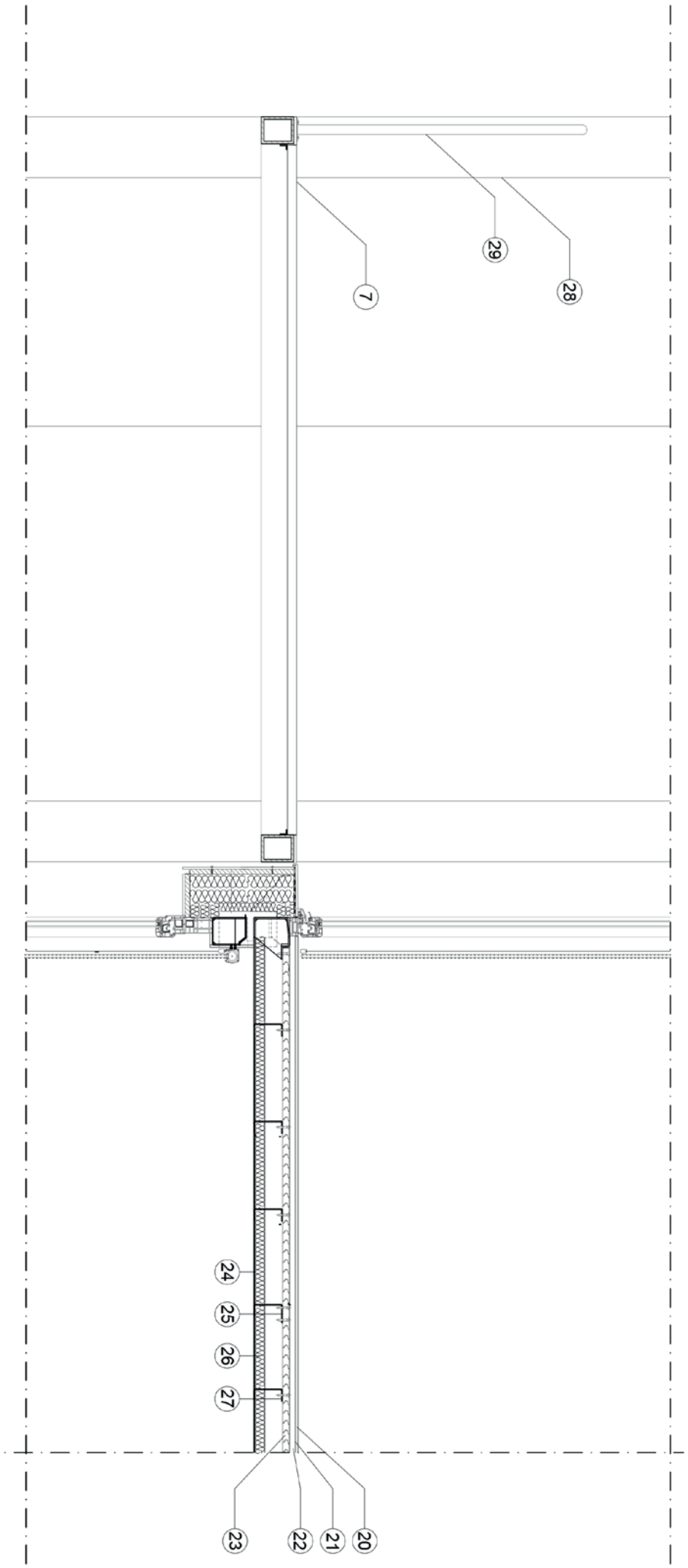


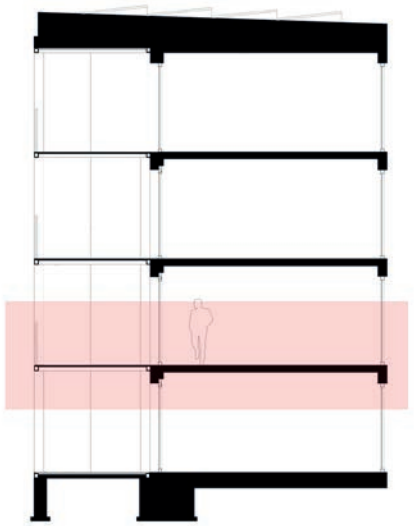
1: Collettori solari tubolari
2: Lamiera grecata
3: Scossalina metallica
4:Profilati metallici a “C” (Strato di pendenza)
5:Trave IPE
6: Profilato metallico
7: Legno teak
8:Pannello di rivestimento in fibrocemento
9:Piastra di fissaggio tra listello e scatolare metallico
10:Aggancio rivestimento tramite bulloni
11:Listello in legno
12:Griglia anti-insetti
13:Tenda a rullo
14:Scatolare metallico
15:Pannello di rivestimento interno
16:Rear header (elemento strutturale superiore del container)
17:Infisso in Corten
18:Impermeabilizzante
19:Isolamento termico (foamglas)
20:Tavolato in legno


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

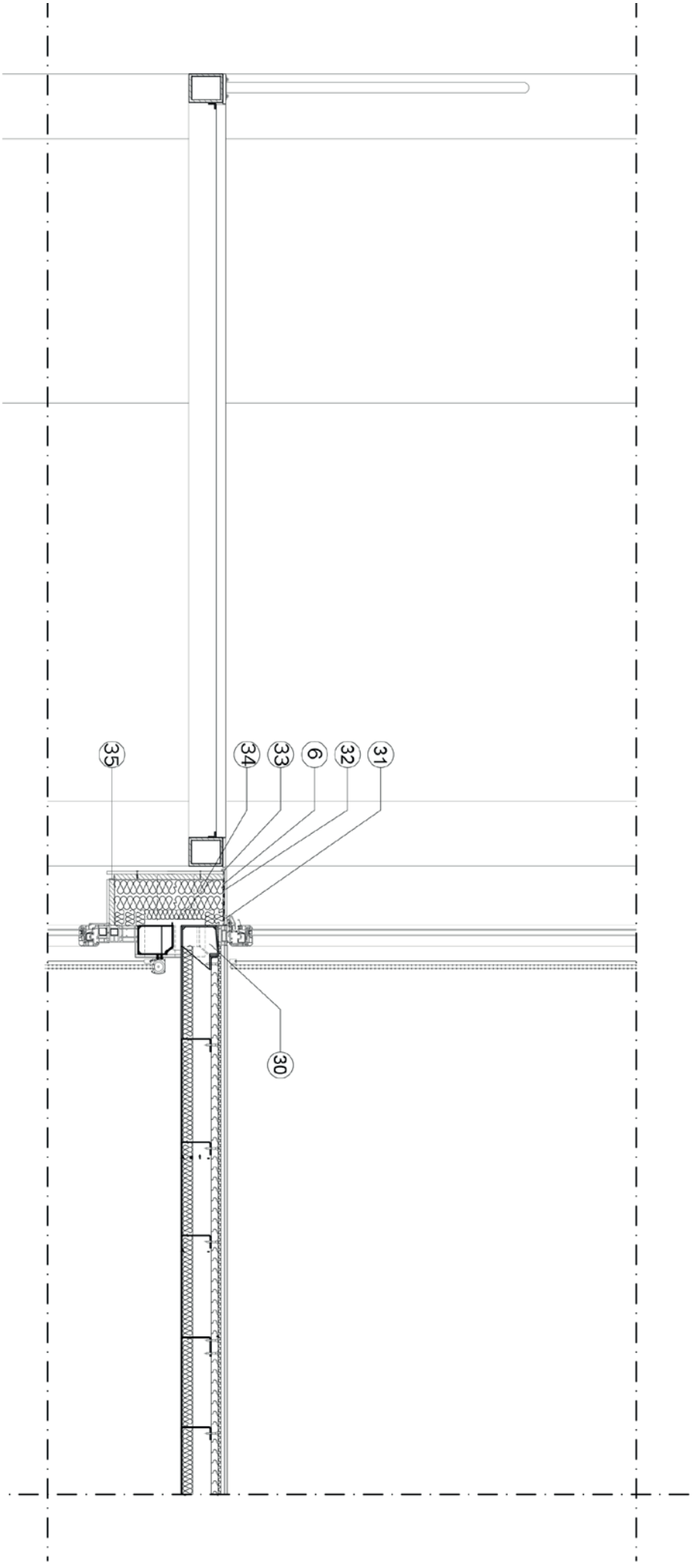


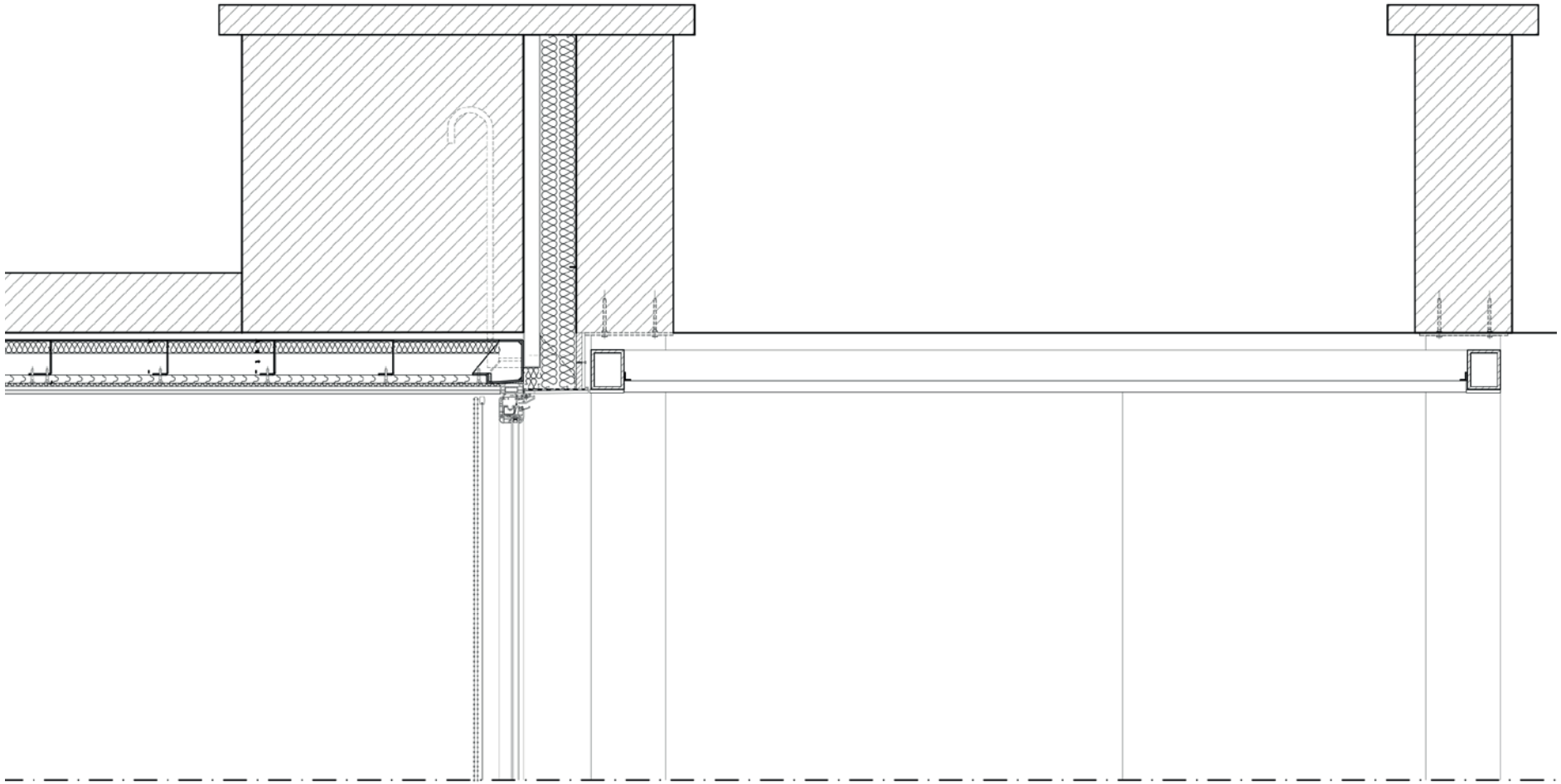
20:Rivestimento in legno (parquet)
21:Collante
22:Lastra in gesso Knauf
23:Pavimento ligneo del container
24:Soffitto in acciaio del container riverniciato
25:Outrogger large26:isolamento termico
27:Cross member
28:Colonna in acciaio 25x10cm
29:Ringhiera metallica imbullonata tramite piastra
7:Rivestimento balconata in legno da esterno teak


7
29
28
24
25
26
27
23
22
21
20



30:Door sill stiffener
31:Guarnizione
32:Soglia metallica
6:Impermeabilizzante
33:Gocciolatoio
34:Piastra di fissaggio
35:Squadretta metallica


35
34
33
6
32
31
30



7. CONCLUSION

In conclusion, we can reaffirm the concepts that have guided us in setting up the work defining the result: the environmental approach declined in very specific technological choices, the study of the sun path, the study of the use of greenhouses, the use of shading as passive strategy as the shading of the roof on the south façade and the shading of mobile screens in the façades facing West and East, have determined a physiognomy of the building. Furthermore, the project derives from a real need of the reference community, with expressed needs, which have been respected. Look at the amount of common spaces aimed at creating an interaction between the students, the presence of photovoltaics and solar collectors. The disassembly of all connection systems, such as balconies and staircases, but also the same classrooms, avoiding the use of welding but bolting in order to make the whole project demountable sustainable in the true sense of the word, from its beginning to its end. The thesis develops a possible use of the container carrying out a last generation technology, but it should not be seen as a final result, but as a beginning to reflect on the object of the container that will be certainly considered as an inner element of our cities from here forward.

7. APPENDIX

The idea of this appendix stems from the desire to show a global work, from its beginning to its end. From the initial phases of approach to the container element, to its knowledge as a constructive system, to the definition of the goals, and the first project ideas, to culminate in the result of the Master Thesis Project. In this appendix will be shown the very first analyzes and ideas that led to the final result.

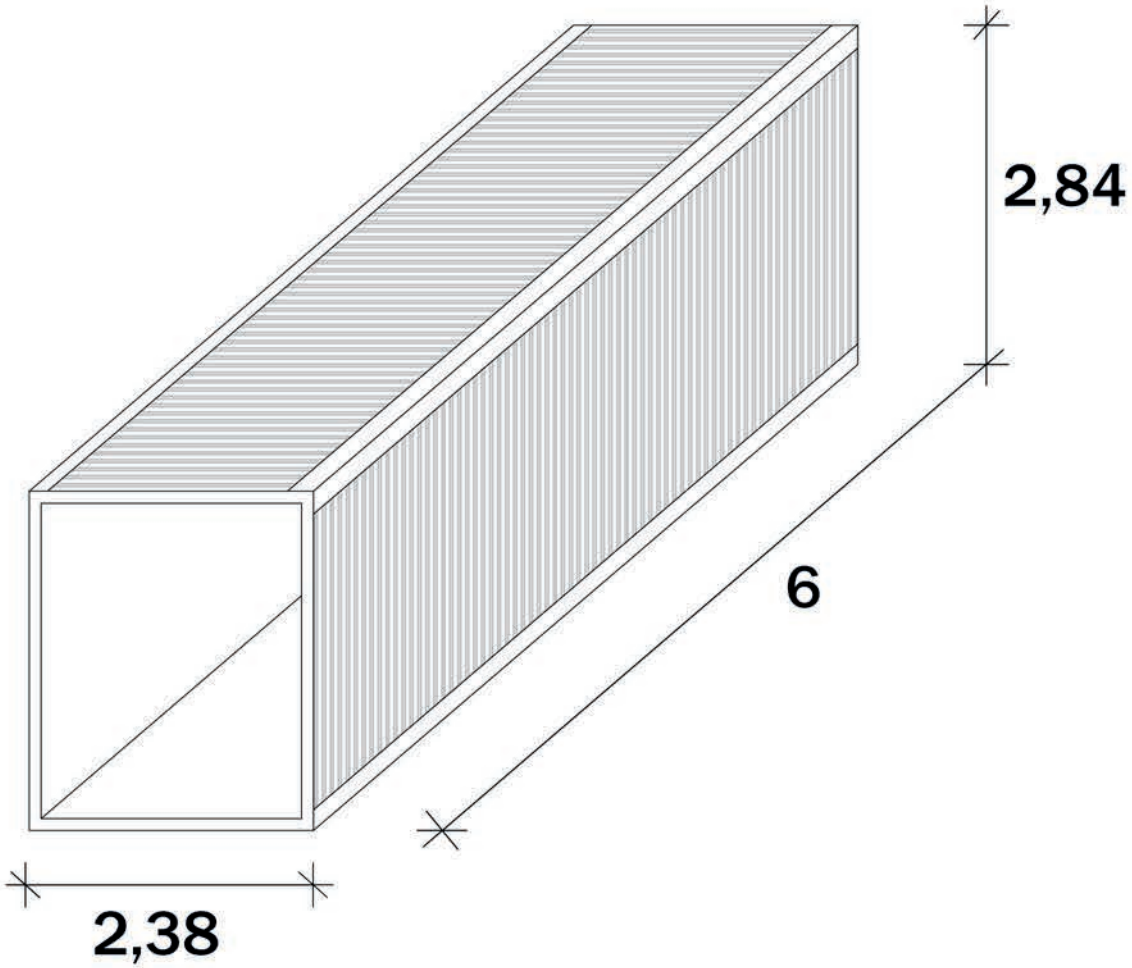
contai-
ners
dormitory.

- How to give low cost housing?
- How to make living cheaper?

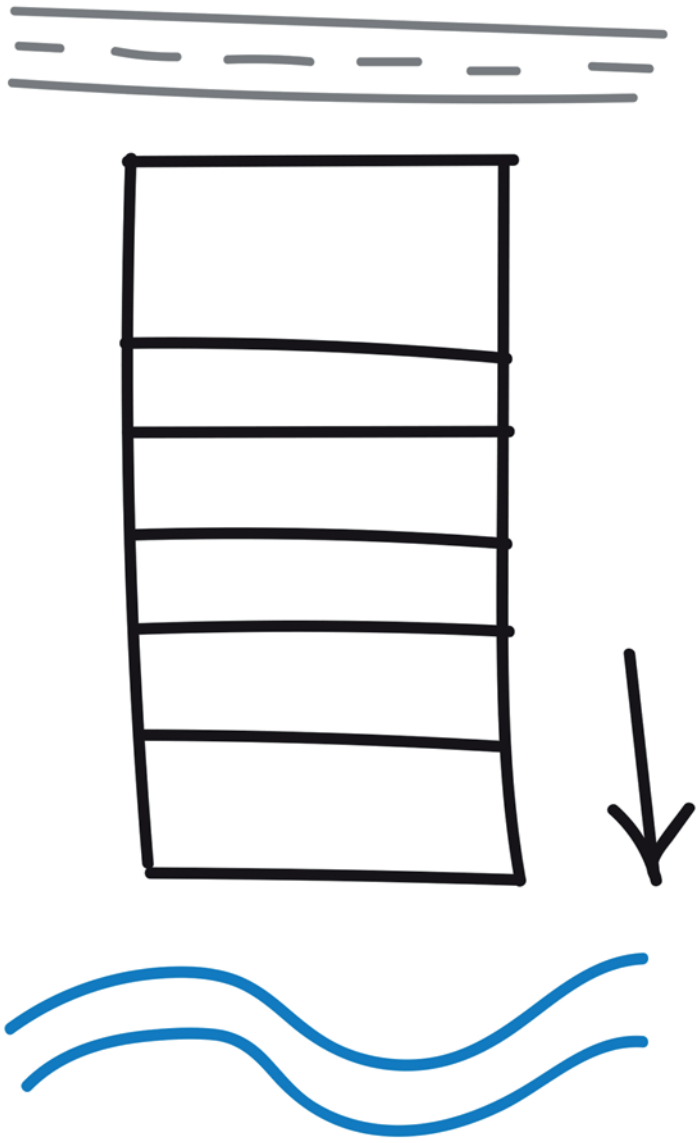
Users

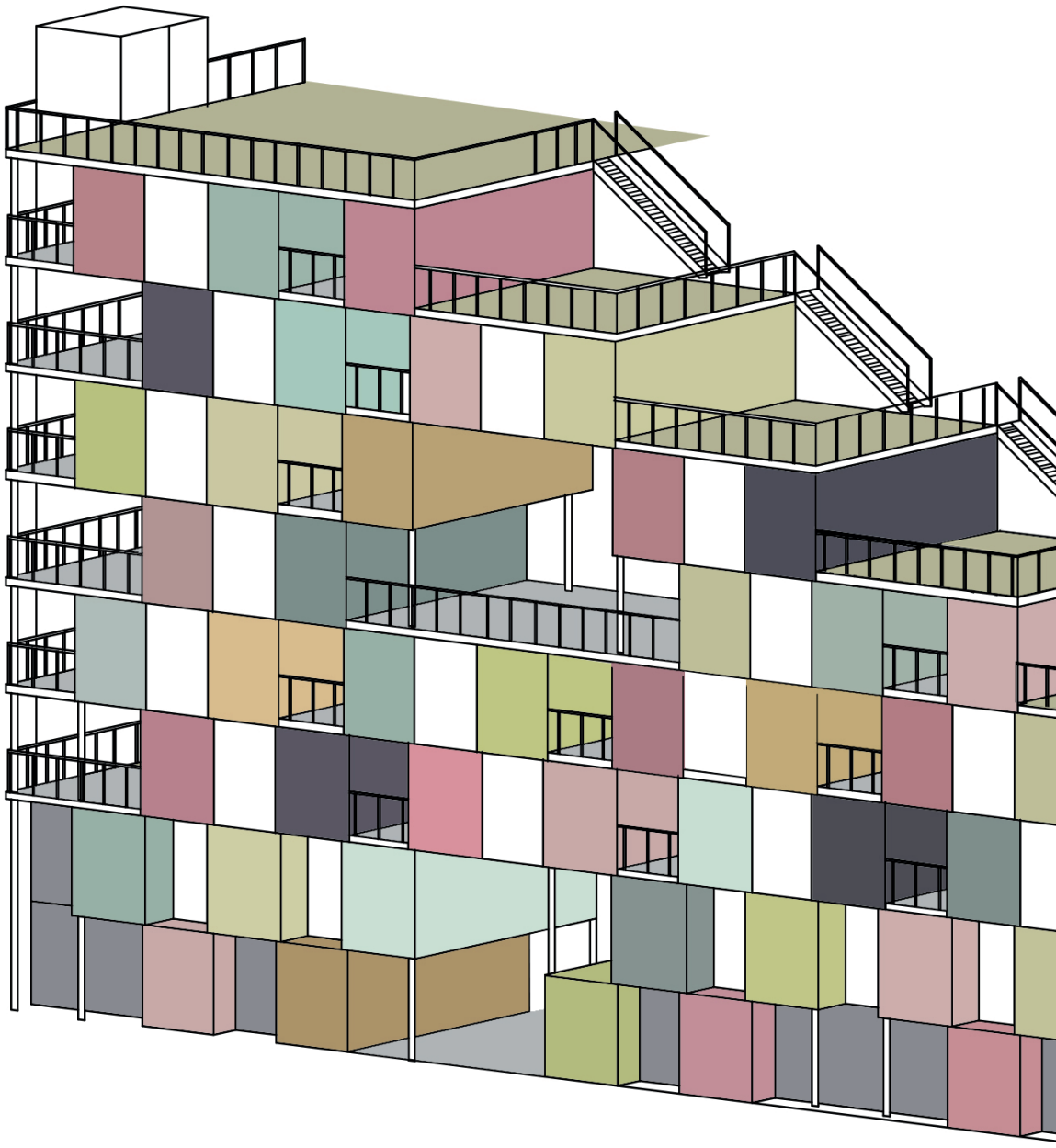
Students

Contai-
ner

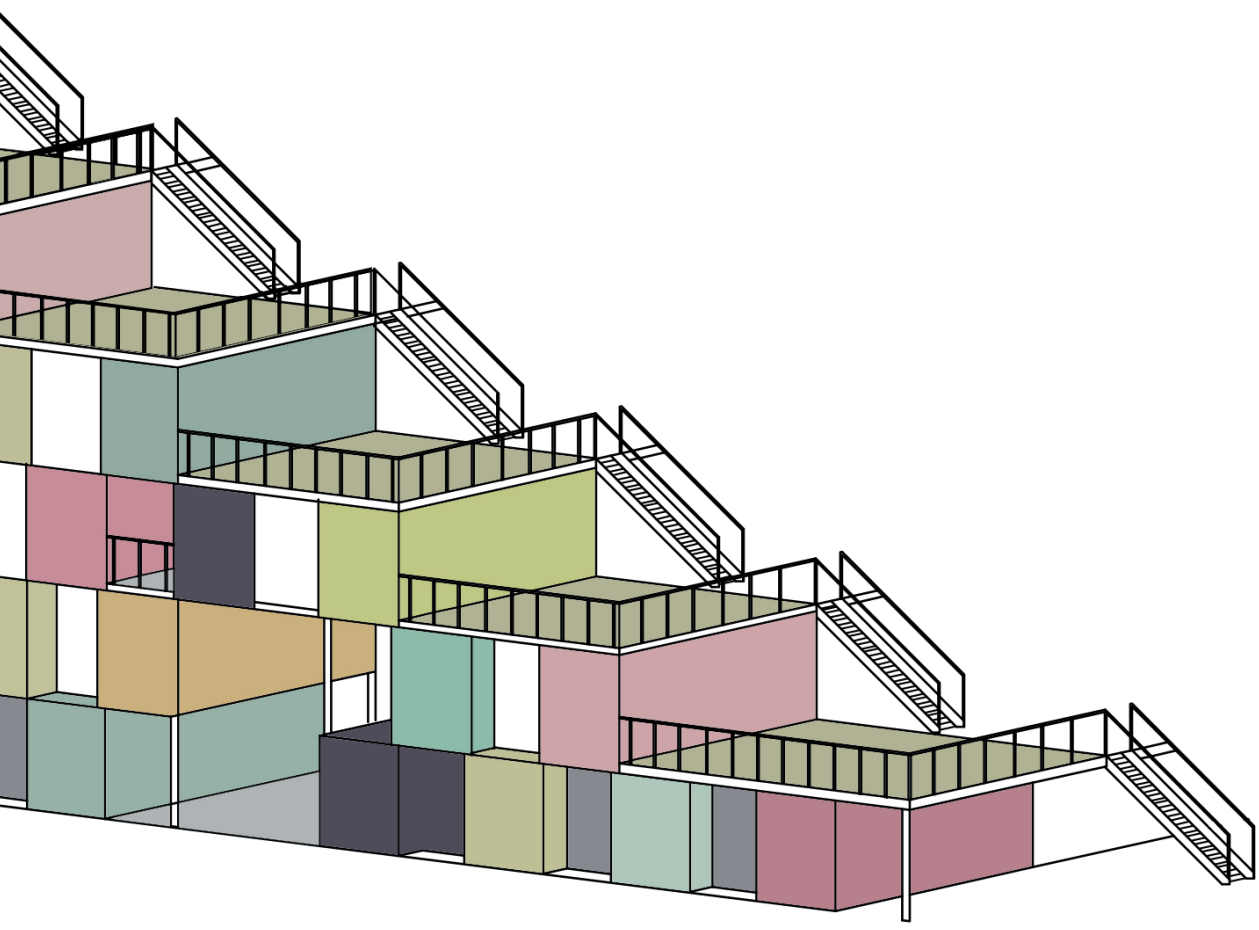


Orienta-tion

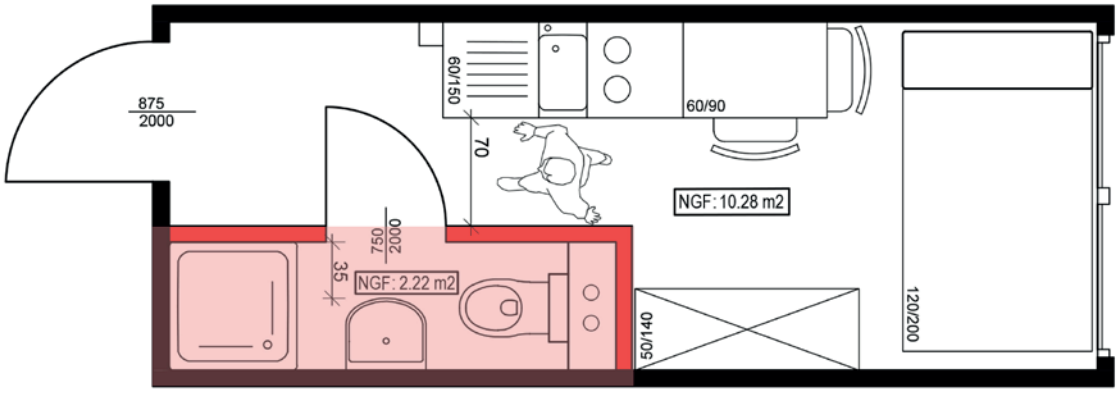




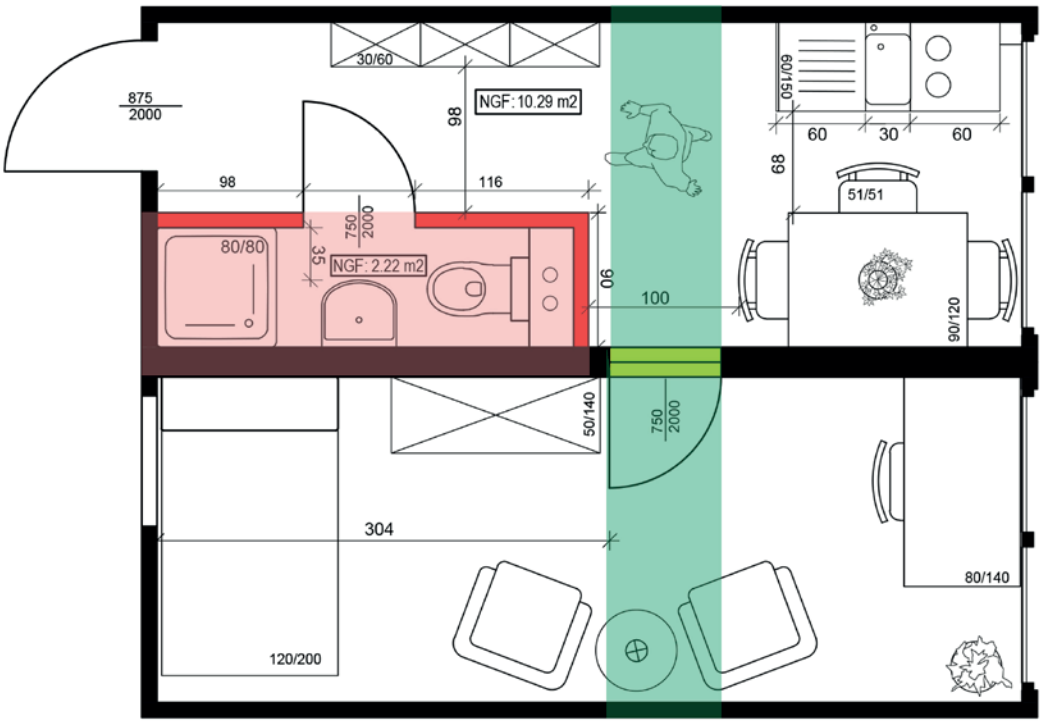
First Idea



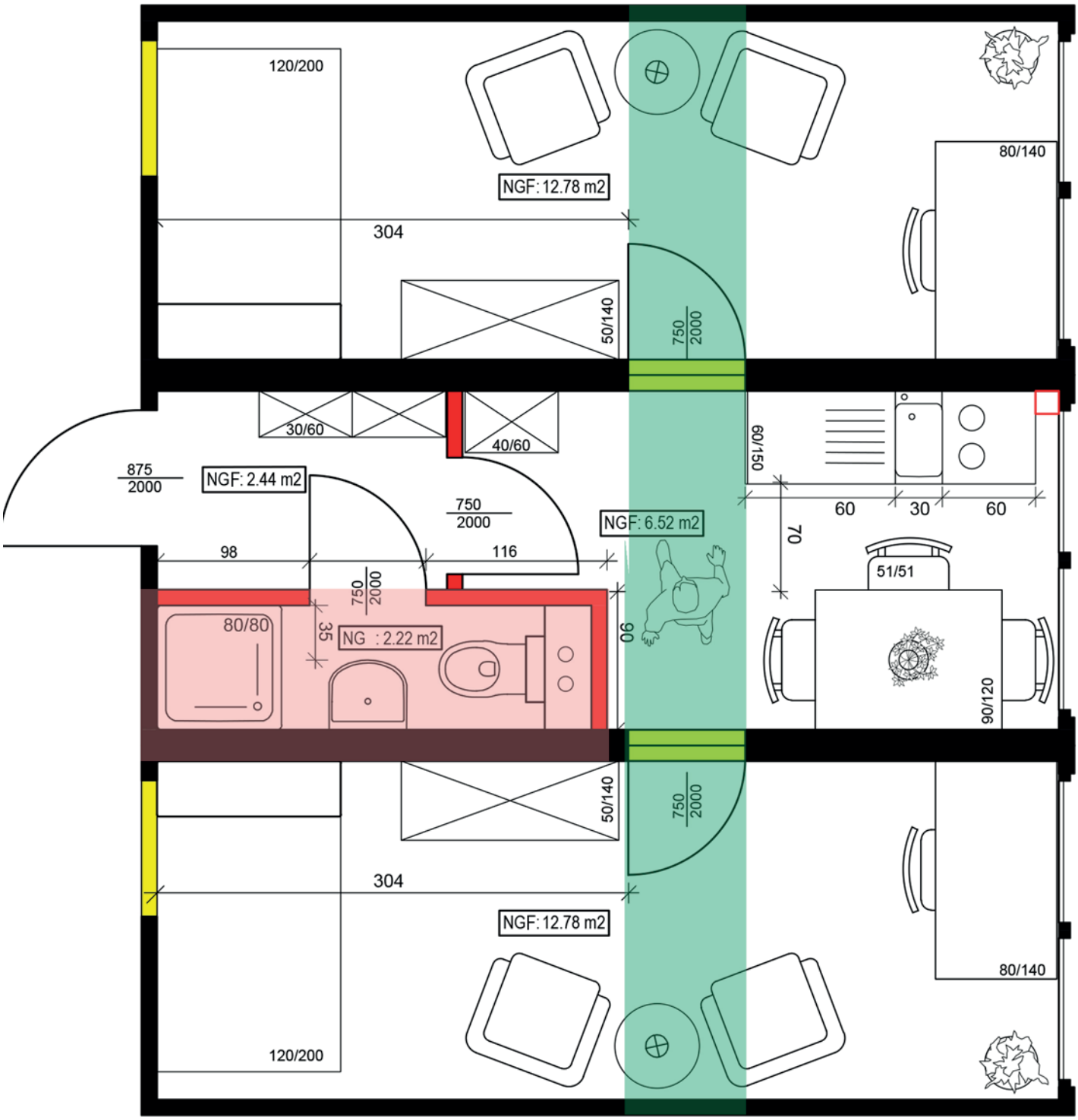
Units
Base typolgy



Units
Single typolgy

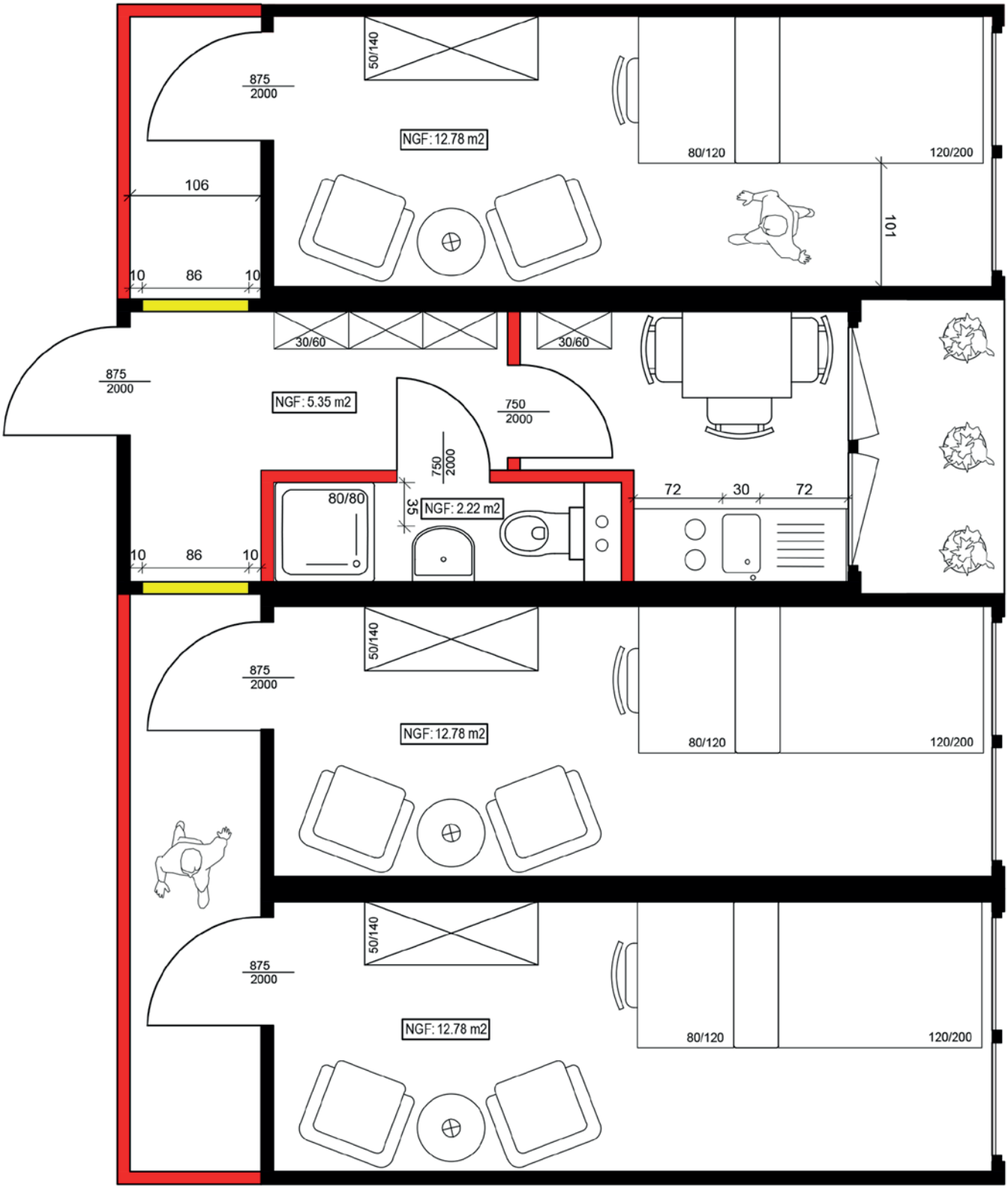


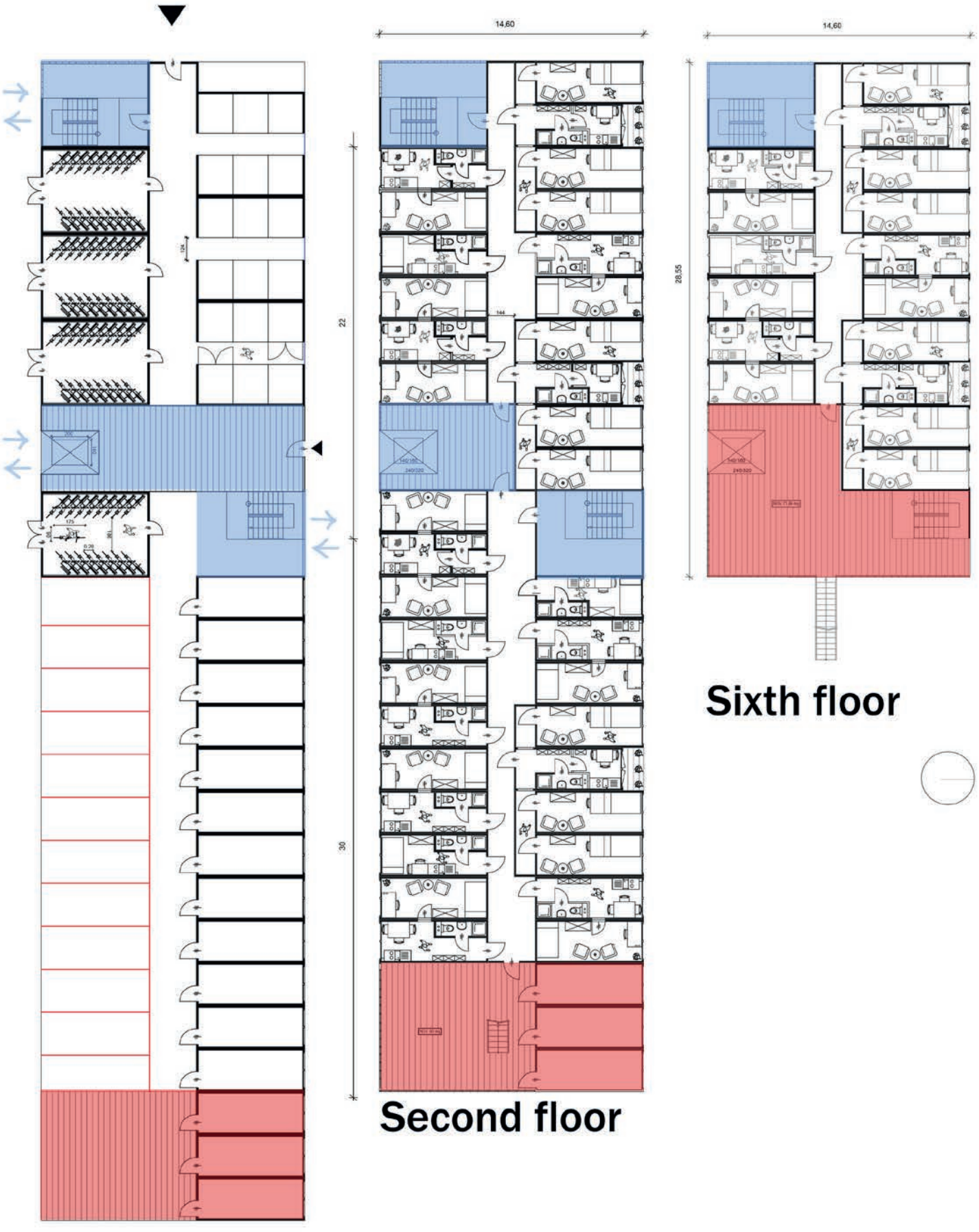
Units
Triple typolgy



Units

Quadruple typolgy




14,60
14,60
22
30
28,55
Ground floor
Second floor
Sixth floor
Up to 121

-Sill, Streng, Katthagen, *Modulare Strukturen im Kontext der dichten stadt,* Urban future*,* 2015,
-Tiziana Firrone, Sistemi abitativi di permanenza temporanea,Aracne Editrice, 2007
-Marc Levinson, *The box*, Priceton University Press, 2006
-Jill Herbers, *Prefab Modern*, Collins Design, 2006
-Jure Kotnik, *Container architecture*, Links Books, 2008
-Barry Bergdoll, *Home delivery: fabbricating the modern dwelling*, The Museum of Modern Art New York, 2008
- Jennifer Siegal, *More mobile, portable architecture for today*, Princeton Architectural Press, 2002
-Kotnik, *Container Architecture, questo libro contiene 6.441 container,* Links Books 2008.
-Craig Martin, Shipping container, London : Bloomsbury, 2016

4.2 SITOGRAPHIE

http://www.fronterad.com
jaumeprat.com/la-vivienda-difusa/
www.etsavega.net
www.holzerkobler.com
www.eba51.de
www.ltarkitekter.dk
www.harquitectes.com
www.platoon.org
www.containercity.com
www.m-house.org
www.spacebox.info
www.modern-modular.com
www.lightonthemove.com
www.urbangreenbuilders.com
www.liveng-box.it
www.greentainer.it
www.cargotecture.com
www.michieliarchitetti.it
www.newhouse.it
www.seabox.com
www.shelbox.it
www.edilportale.it
www.archiportale.it
www.europaconcorsi.it
www.archinfo.it
www.temphousing.com
www.lot/ek.com
www.hotelcontainers.com
www.weburbanist.com
www.fab-prefab.com
www.shipping-containers-housing.com
www.dataholz.com
www.mvrdr.com
www.architectureandhygene.com
www.atelierworkshop.com
www.sheltrarchitecture.com
www.archdaily.com

4.3 THESIS

-Marta Paselli, *Container da abitare,una sperimentazione progettuale nel quartiere San Salvario a Torino* ; rel. Orio De Paoli, Silvia Malcovati

-Amarildo Dhima, *Abitazioni estive a basso impatto ambientale nella città di Valona*; rel. Orio De Paoli

Maria Giulia Pagliero, *Container abitabile : progetto per un'unità residenziale temporanea*; rel. Matteo Robiglio ; correl. Guido Montanari

-Bruno Daghero, *Una corte di container: progetto di un isolato residenziale nel quartiere Casanova a Bolzano*; rel. Matteo Robiglio

-Maria Carmela Losciale, *L'intervento sulla città esistente : studio urbano della città di Amburgo e progetto di una sopraelevazione in legno*; rel. Gustavo Ambrosini, Guido Callegari

-Matthieu Hérin, *Due modelli di sviluppo urbano? : città intelligente vs città ecologica : riflessioni dei casi di Barcellona, Amburgo, Torino*; rel. Marco Santangelo