ECO COMMUNITY

Sustainable ecological residential community in Münster, Germany

MSc. Sustainable Architecture and Landscape Design
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POLITECNICO MILANO 1863

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ABSTRACT

We started our thesis with the main focus on sustainable architecture, with the goal of making a community designed to limit humanity's impact on the environment. We wanted to find an eco-friendly approach to modern-day building looking at every aspect of the planning and construction process, including the choice of building materials, and the integration of the built environment into the natural landscape. We wanted to respond with architecture to the needs and wants of users. The world is now in the midst of a climate change emergency, and many of the environmental laws that were passed in the last 50 years have been rolled back. This makes it even more imperative for designers, architects, builders, and consumers to demand better building practices to help combat the damage caused by one of the most polluting industries on the planet.

Germany is one of the world's most sustainable industrialized nations. The country does particularly well with regard to growth, employment, social security, and environmental protection. That said, we found Germany as the best choice to implement our idea in, the expected support for a project of this kind would be big. We wanted to add to the new practices and solutions and at the same time save the traditional aspects and make use of them in our project.

This thesis looks into the possibility of developing a sustainable ecological community that could be later on implemented in many other locations. We start off with this idea which ultimately would work as a precedent for the future growth of similar living solutions.

KEYWORDS: sustainable, ecoligical, garden city, co-habit, passive, architecture, urbanism, grid, stability, perserve, natural, green, urban farming, rain garden, green house, prefabrication;

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Finally, our deepest appreciation belongs to our families and friends for their encouragement, sacrifices and unconditional support throughout our studies with special mention to our two dear friends Anđelija Kuljić and Babar Khan.

Introduction
to Sustainability

Fig.01. Collage of sustainable elements;

The development of man, man's environment, and his way of life, during the 20th century, significantly changed the world around him. The development of all spheres of existence, including industry, has contributed to the pollution of the habitats of all living beings on planet Earth. These events were an alarm for the architects to do everything in their power to protect the human environment. In the midst of this, the notion of sustainable architecture, as well as sustainability in general comes as a savior. Sustainable architecture seeks to minimize the negative impact of buildings on the environment, all with the aim of achieving efficiency through different phases, such as materials, energy, living space.

Introduction
Sustainable Europe

COUNTRY	RANK	EPI SCORE	10 YEAR CHANGE
Denmark	1	82.5	7.3
Luxembourg	2	82.3	11.6
Switzerland	3	81.5	8.6
United Kingdom	4	81.3	9
France	5	80	5.8
Austria	6	79.6	5.4
Finland	7	78.9	6
Sweden	8	78.7	5.3
Norway	9	77.7	7.6
Germany	10	77.2	1.2

The world's ten most green, clean air, climate-conscious countries are all located in Europe. The 2020 Environmental Performance Index (EPI) grades each country on 32 key sustainability indicators. The EPI scores take into account the latest data on critical things such as air and water quality, waste management, CO2 emissions, and other public health factors. At the top of the eco-chart is Denmark, followed by Luxembourg, Switzerland, the United Kingdom, France, Austria, Finland, Sweden, Norway, and Germany.

Starting with Denmark as one of the more sustainable countries, they are leading in wind power, around half of the country's energy is sourced from wind turbines. The woodland areas of Finland cover around 70% of the country and the majority of that are protected to prevent deforestation and disruption of wildlife. Norway has one of the most efficient recycling systems, which incorporates composting. Switzerland has one of the most sustainable waste management programs in the world, while Sweden has the highest renewable energy usage and lowest carbon emissions,

However, Germany is one of the more sustainable countries in an industrial aspect. The country plans to reduce its greenhouse gas emissions by 55% in 2030. As well as this the country is introducing more renewable energy and has a strong recycling program.

Fig.02. Map of the most sustainable countries in Europe;

Introduction
Point of interest

The starting point of this project was Montenegro, the birth country of both authors and where most of our life was spent. It is located in South-Eastern Europe with 623.000 inhabitants which live on 13.912 km2. Diversity of geological base, landscape, climate, and soil, as well as the very position of Montenegro on the Balkan peninsula and Adriatic sea, created conditions for the formation of biological diversity with very high values, which puts Montenegro among biological "hot-spots" of European and world's biodiversity.

Italy for us represented the in-between country since the next step of our life in pursuit of a master's degree in Sustainable architecture and landscape design was spent here. Looking from a sustainable point of view Italy has invested heavily in renewable energy. The share of renewables in Italy's energy mix has shown a distinct upward trend from 6% in 2007 to 15%- around twice the G20 average- in 2014. However, it must provide clarity on how it will implement the EU-wide move to competitive bidding for large-scale renewables.

The last and final stop in search of the perfect place for our project was Germany. As already mentioned the country is in the top 10 most sustainable countries in the world and also a place where our adult working life is starting. The country does particularly well with regard to growth, employment, social security, and environmental protection. Germany wants to promote economic development that is socially viable and ecological – and of course to do so beyond its own national borders, too. After all, we can only achieve a sustainable future by working together, therefor we found this country as a perfect place for the implementation of our project of a Sustainable community.

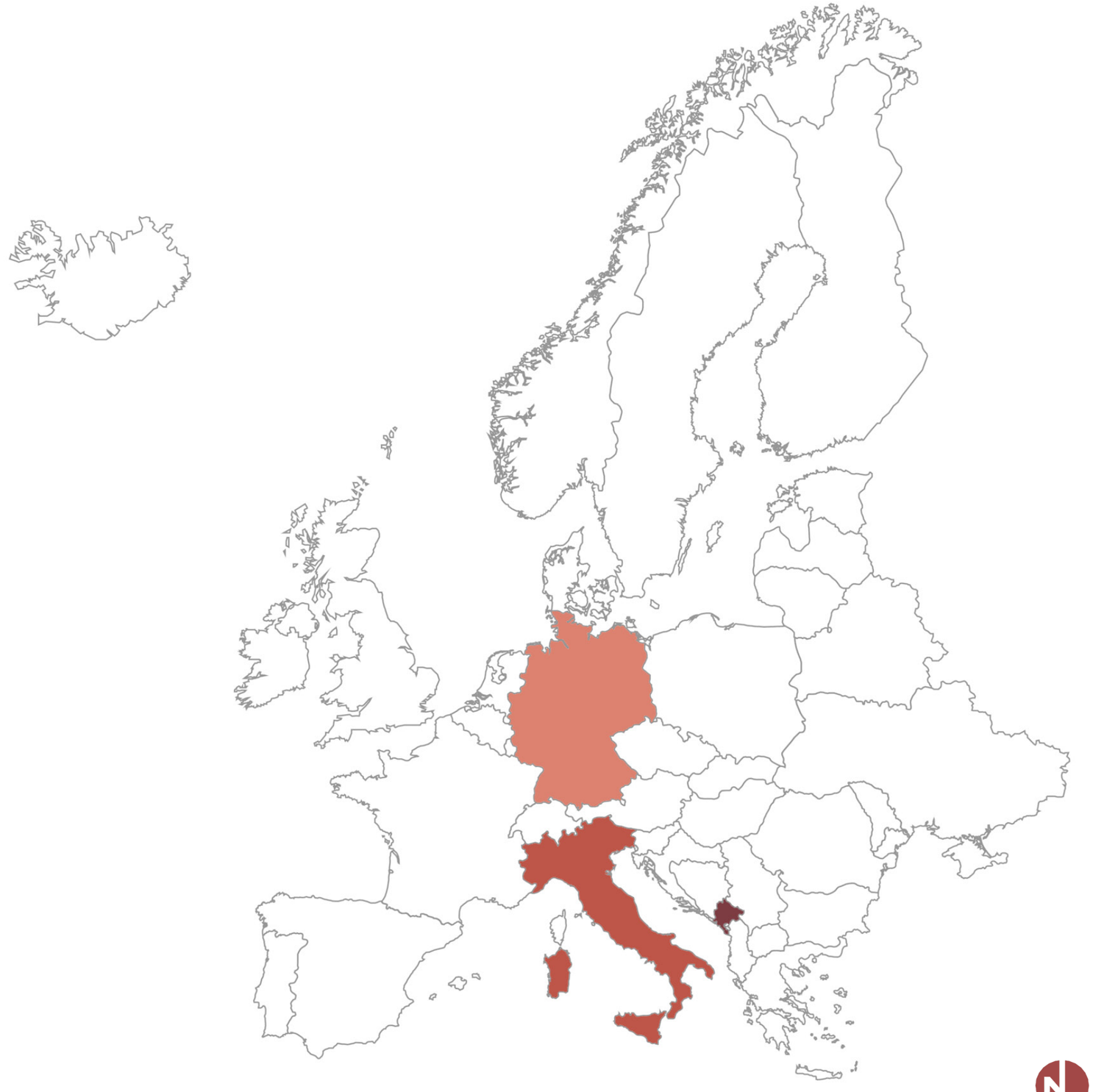


Fig.03. Map of countries of interest in Europe;

General overview
Location

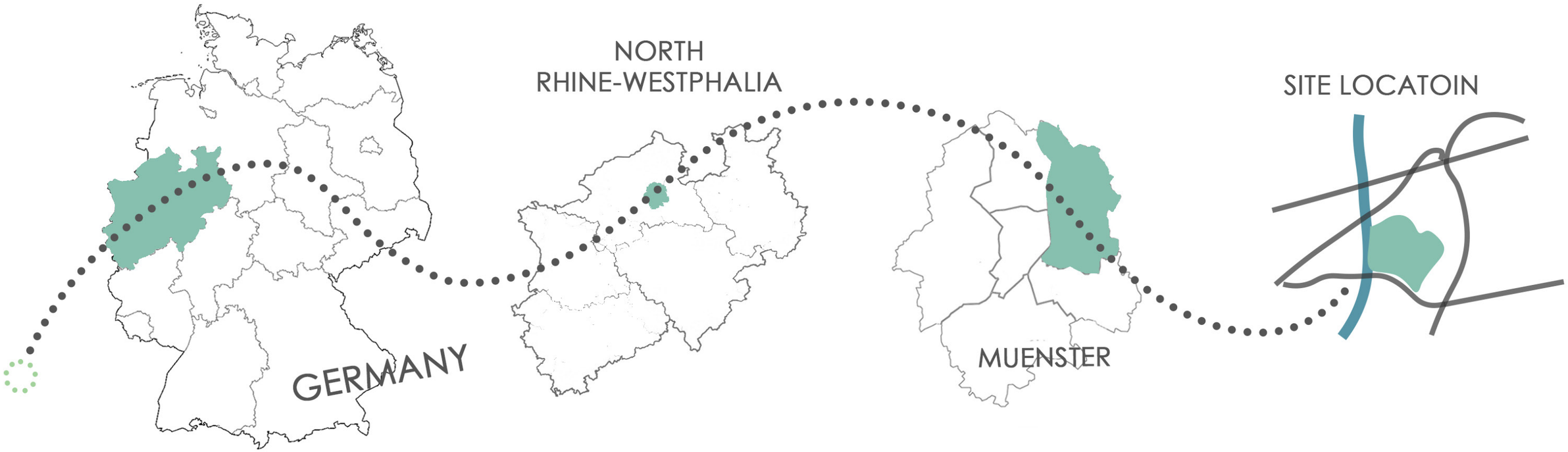


Fig.04. Collage of target location;

General overview
Sustainable Germany

Renewable energy in Germany is mainly based on wind and biomass, plus solar and hydro. Germany had the world's largest photovoltaic installed capacity until 2014, and as of 2021 it has over 58 GW. It is also the world's third country by installed total wind power capacity, 64 GW in 2021 (59 GW in 2018) and second for offshore wind, with over 7 GW. Germany has been called "**the world's first major renewable energy economy**".

Heavy winds on th North Sea and Baltic Coast incrase power production from North Germany wind farms. More than 21,607 wind turbines are located in the German federal area and the country has plans to build more. The key provider of biomass supply in Germany is supposed to be agriculture. Moreover, 40% of German wood production is also used as a biomass feedstock.

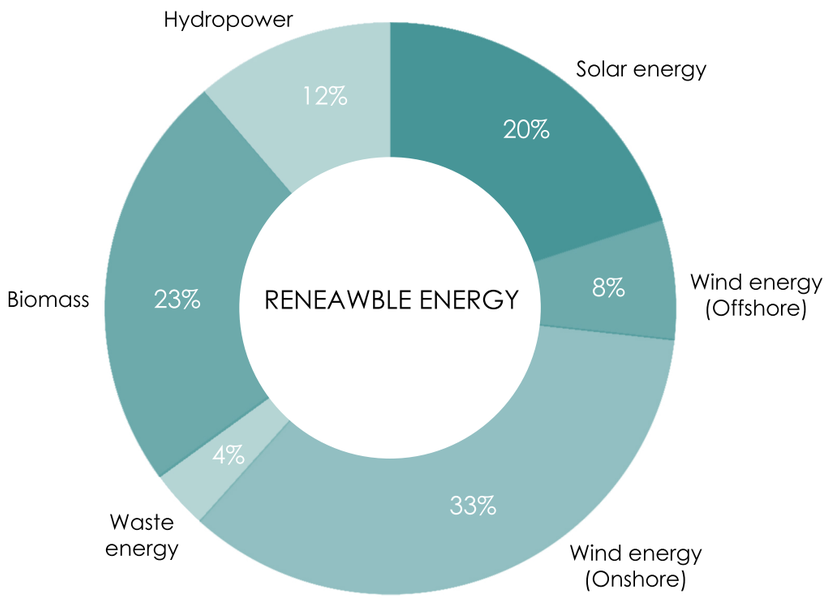


Fig.05. Pie chart showing renewable energy in Germany;

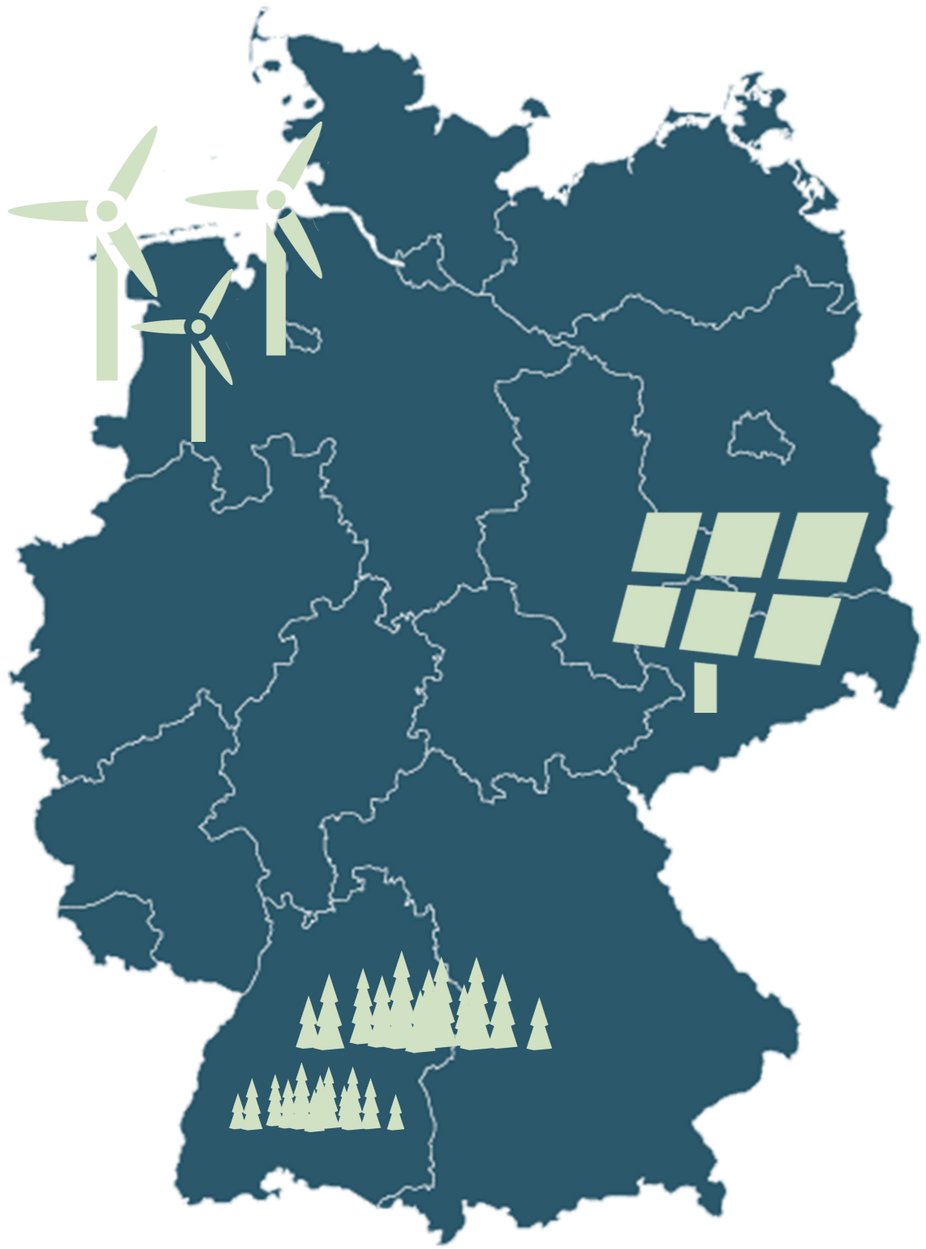


Fig.06. Map of renewable energy in Germany;

General overview
Germany

The city of Münster is located on 7 ° 37 ' 43.3 '' east of Greenwich, 51 ° 57 '46.6 '' north and lays on 61.3 meter above sea level.

The independent city of Münster in Westphalia is the seat of the administrative district of the same name, in the state of North Rhine-Westphalia.

Münster has had the official status of a large city since 1915 and, with its 310,039 (2016) inhabitants, is one of the tenth largest cities in North Rhine-Westphalia.

On a square kilometer of the total area of 303 km² there are 1034 inhabitants in Münster, which means that the city shows a medium to low density in a German comparison (for comparison: Bonn has the same number of inhabitants, but a double numbers, density of 2,307 inhabitants per square kilometer.

Münster is named after the monastary around which it grew, founded in the year 793. Münster is often called the 'Land of 100 moated castles'. The city and its surrounding area is home to 100 castles.

Country
Germany

Area
357.578 km²

Population 82.792.351 (2017)

Population density
233 inhabitants per km²

State
Nordrhein-Westfalen

Area
34.110 km²

Population
17.912.134 (2017)

Population density
525 inhabitants per km²

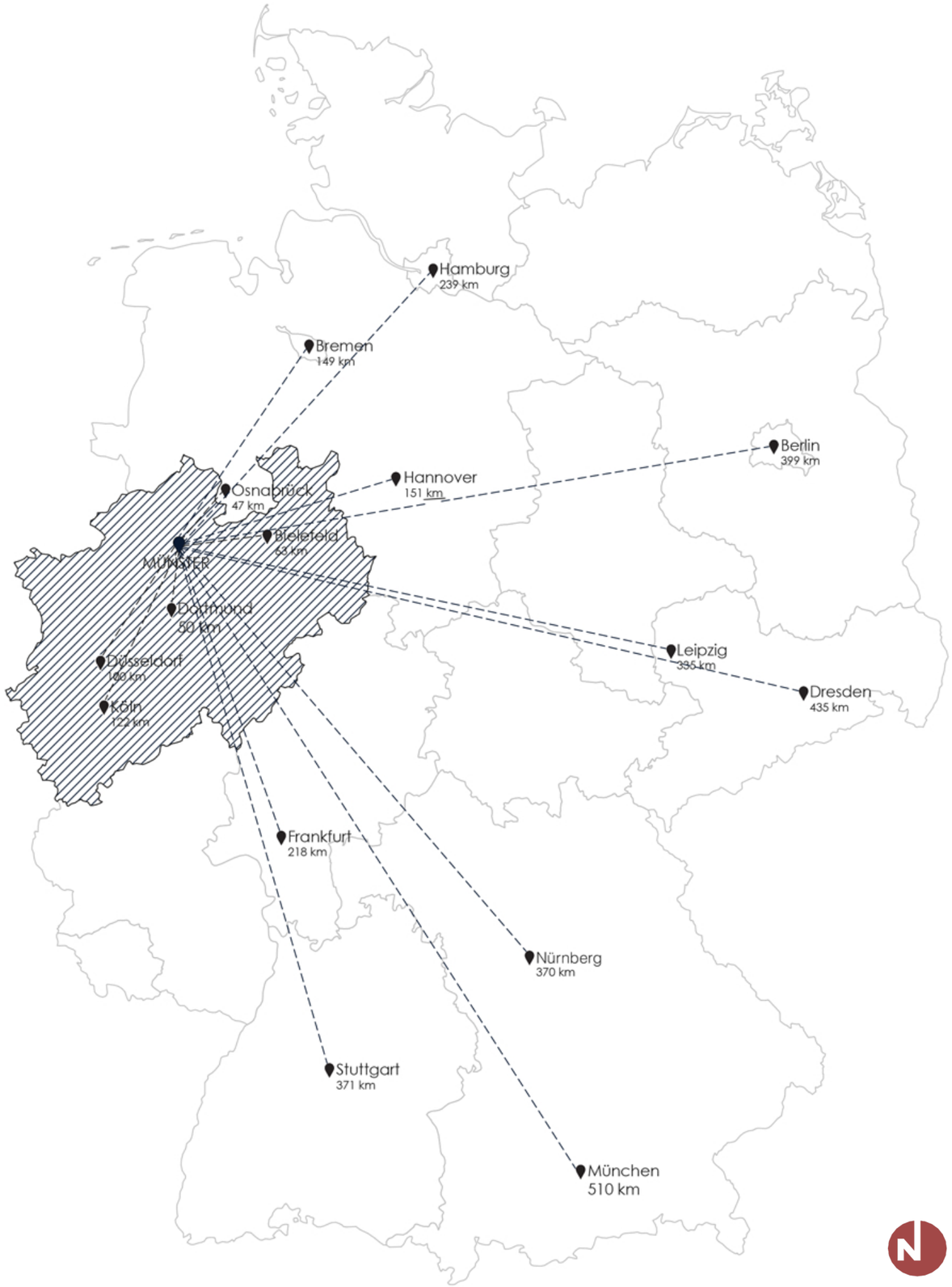


Fig.07. Map of Germany showing the main connections to Munster;

General overview
Munster

Münster can be easily divided into different parts of the city. There are five districts around the city center, which is also the center of Münster.

These are each divided into further, smaller quarters. The central and largest urban district of Münster Mitte comprises the core area of the city, which in turn is divided into the old town, inner city ring, middle south and middle north-east. Another important feature of the city is the promenade that surrounds the old town. The Mauritz district is located in the Mitte district.

Münster is home to 280,000 residents, including 55,000 students enrolled in six different universities and colleges.

Münster is known as the 'Bicycle Capital of Germany'. With 500,000 bicycles registered in Münster, there are almost two bikes per resident.

Münster is a part of the metropolitan region (Euregio) with more than 1,000,000 inhabitants (Enschede, Hengelo, Gronau, Osnabrück)

Founded
793

Area
303,28 km²

Population 315.293

Population density
1.040 per km²

Elevation
61m

Municipal districts
7

Average age
39

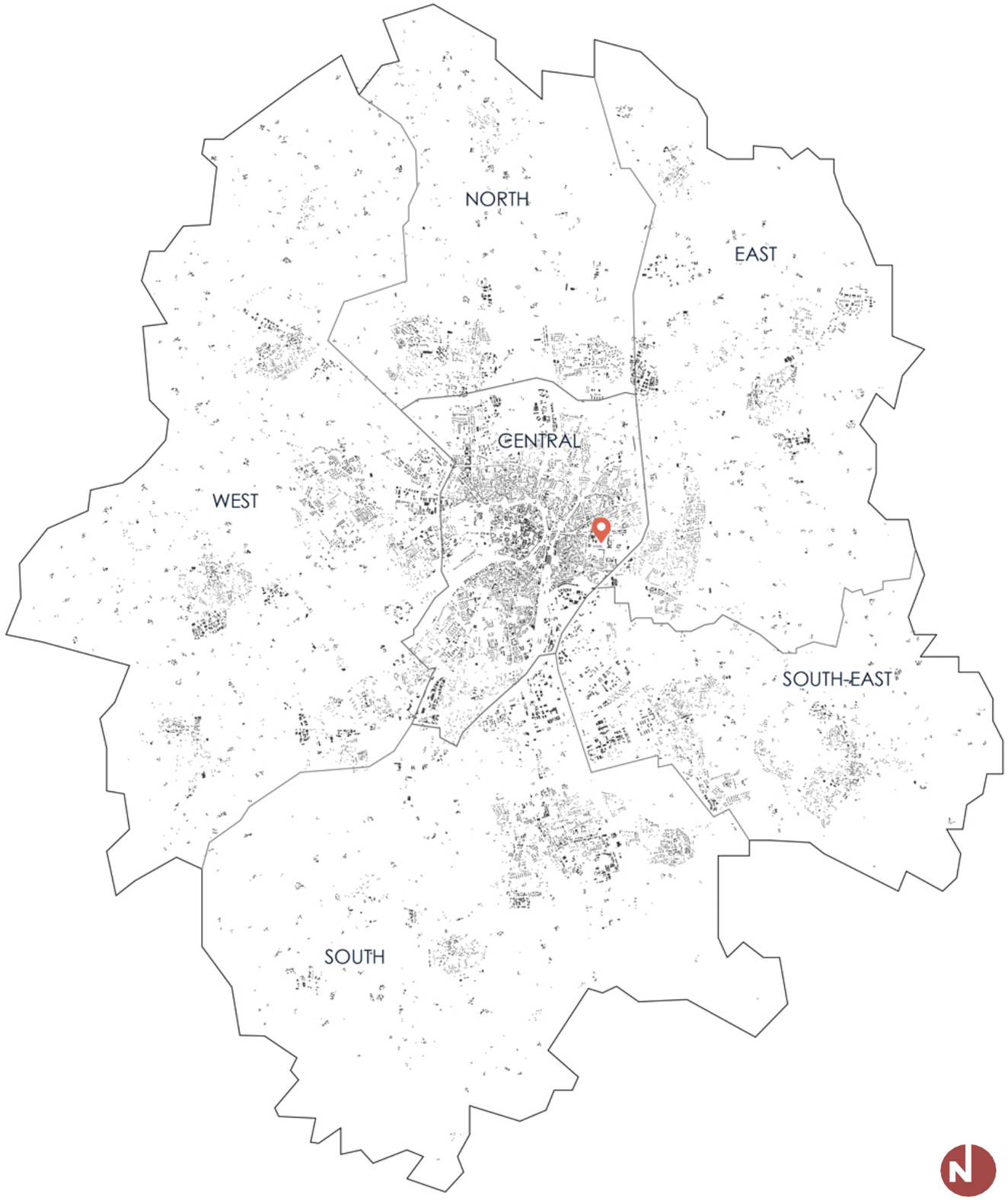


Fig.08. Map of Munster pointing out the project location;

General overview
Hard infrastructure

The old town of Münster is located in the heart of the city and all movement inside it is mainly done on foot or by the wheel. It is surrounded by the 4.4 km long promenade around the old town.

The main road is the Federal motorway A1. This route connects the city via exits Münster Nord and Münster Süd Münster. The city is located 122km away from Cologne and 280km away from Hamburg.

The public transport system of Münster is primarily in the shape of bus traffic. In addition to the ring of the promenade, Münster has another larger ring that can be accessed by car.

Bicycle

On foot

Automobile

Public transport

Use of different transport in the city of Münster

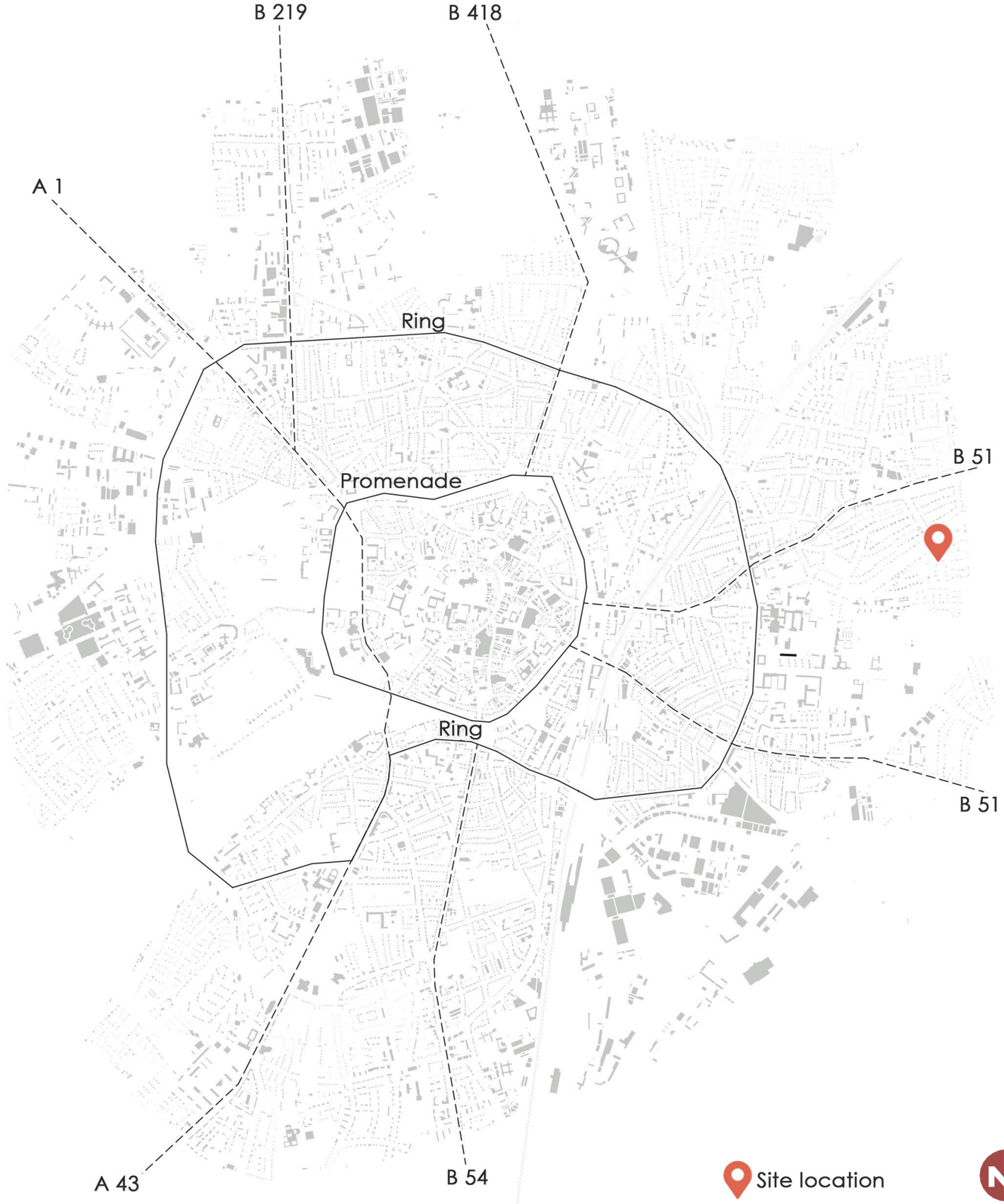


Fig.09. Map of hard infrastruture in Munster;

General overview
Blue and green infrastructure

Green infrastructure is the key for sustainable urban development. Parks, forests, green corridors and trees shape the city. They provide multiple benefits to society and they contribute to residents' well-being. The essence of the concept of green infrastructure is that this green is conside- red to be essential infrastructure that is any bit as impor- tant as 'hard' infrastructure or social infrastructure. Münster's parks, green spaces and recreation areas together add up to no less than 348 hectares – and a quarter of that is even made up of nature conservation areas.

The innermost core of "green" Münster is the "Promenade" – the only complete Promenade ring in the whole of Germany. Where once the city walls stood, today we have a green belt that wraps around the old town. The promenade with its double-rowed lime tree avenue is car-free and an important green corridor for all those living healthy lifestyle, travelling by foot or bicycle.

Münster, as the one of the most greenest city in Germany, has lots of parks, such as Aaseepark and Schlosspark, located behind the great baroque building that now forms part of Münster University. This vast area, with its ancient trees and welcoming café, is also home for Botanical Garden of Münster University, founded in 1803, with more than 8,000 species of plants.

Blue infrastructure refers to urban infrastructure relating to water, such as rivers, canals, ponds, wetlands, floodplains, water treatment facilities, etc. When we are speaking about Münster regarding on that elements, we must mention that the city lays on the Aa river. next to the said river, there are few canals and man-made Lake Aasee. Blue infrastructure is commonly associated with green infrastructure in urban environments and may be referred to as "blue-green infrastructure" when being viewed in combination.

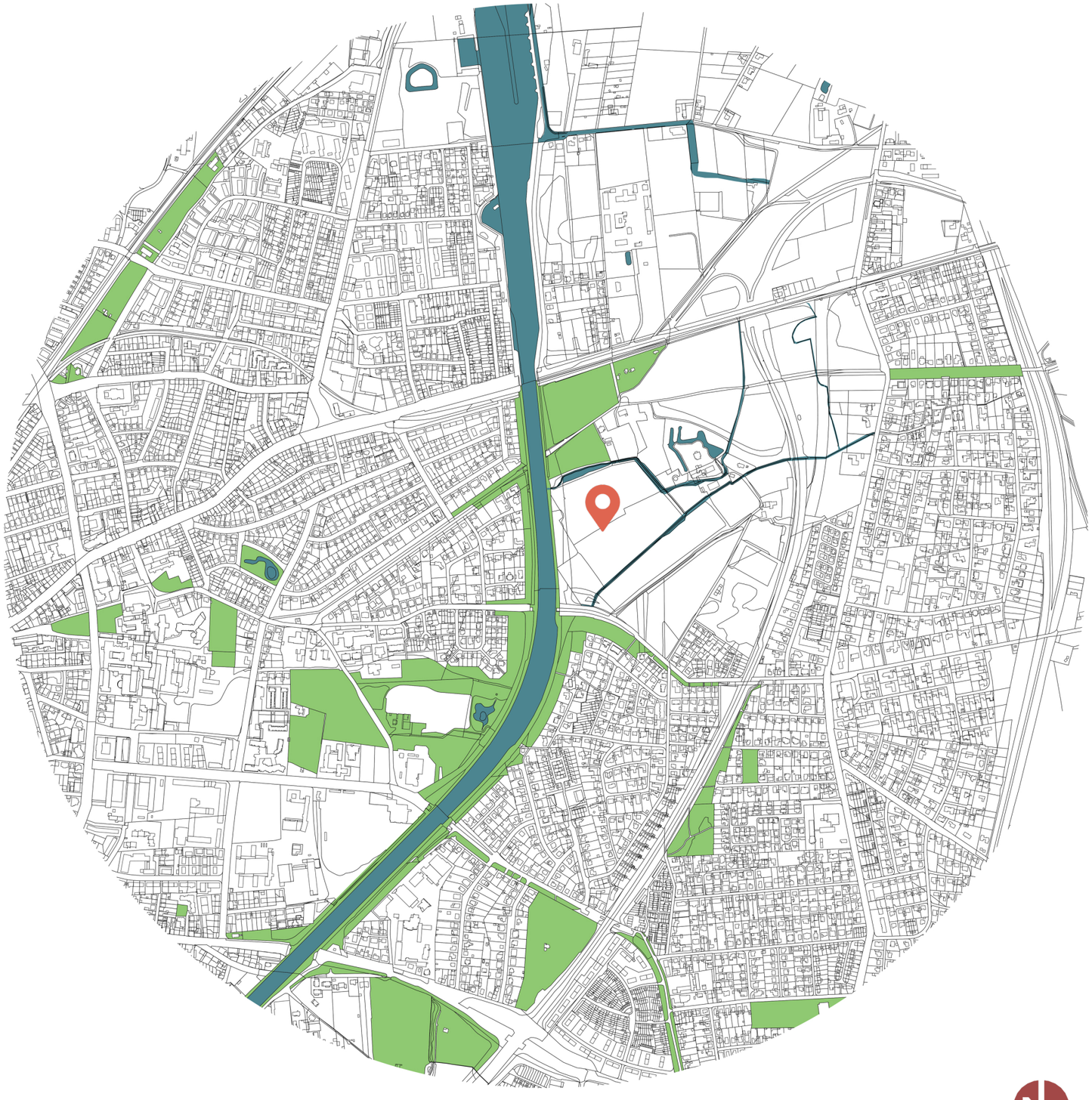


Fig.10. Map of blue and green infrastructure in Munster;

General overview
Noise and air pollution

Münster in general has very good air quality, if we take in consideration that its urban area is second biggest one in North Rheine Westphalia. Precisely because of such a large urban zone, there is a problem on and along the roads. Road transport is one of the biggest pollution in Münster, contributing poorer air quality, climate change, congestion and noise disturbance.

Air pollutants from transport include nitrogen oxides, particles, carbon monoxide and hydrocarbons. All of them have damaging impact on humans, animals and vegatation locally.

Noise from traffic roads affect 35% of city inhabitants in general. Sources of noise are mostly engine noise, tyre noise, car horns and stereos, door slapping and hard braking.

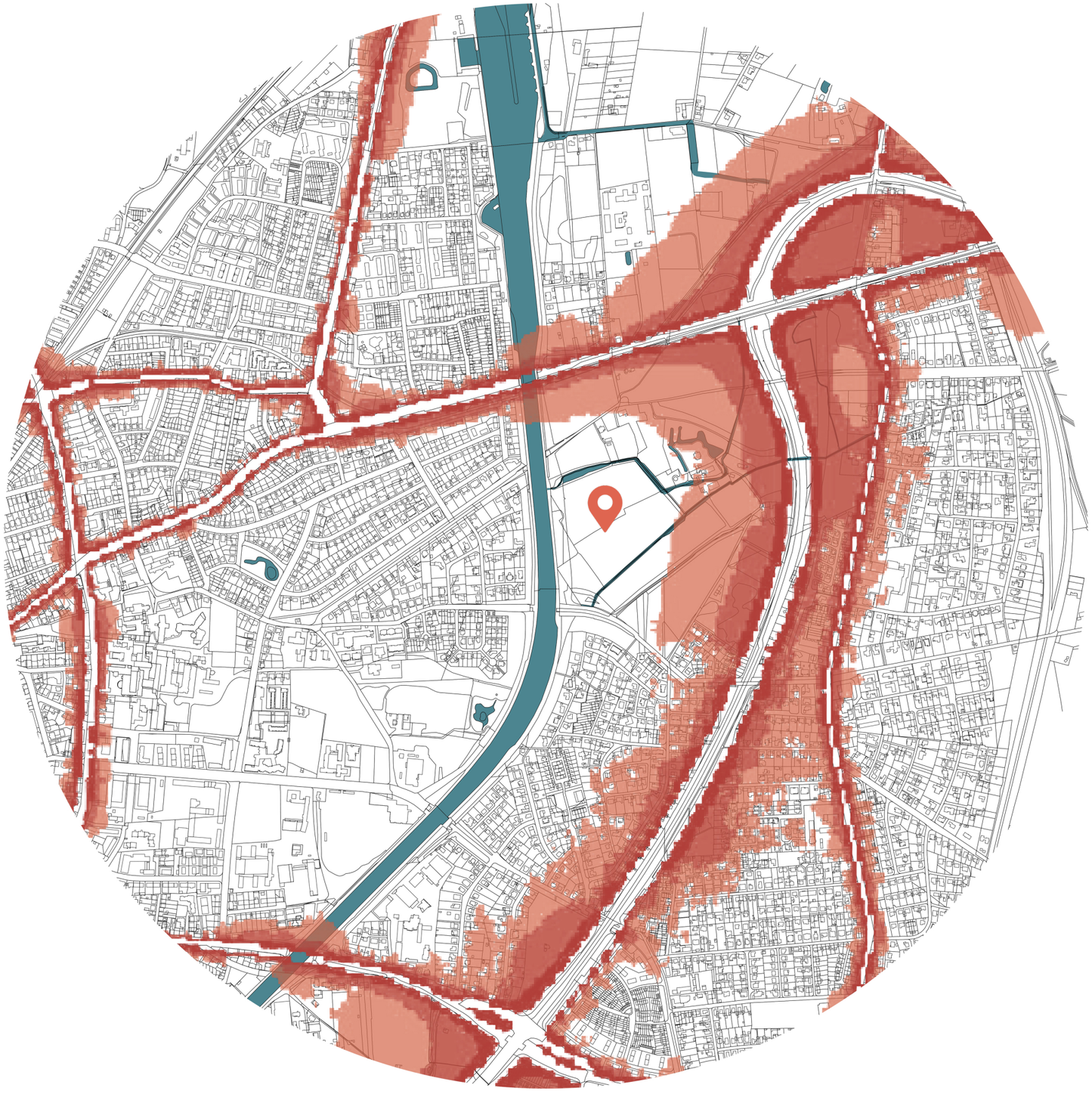


Fig.11. Map of noise and air pollution in Munster;

General overview
Climate analysis

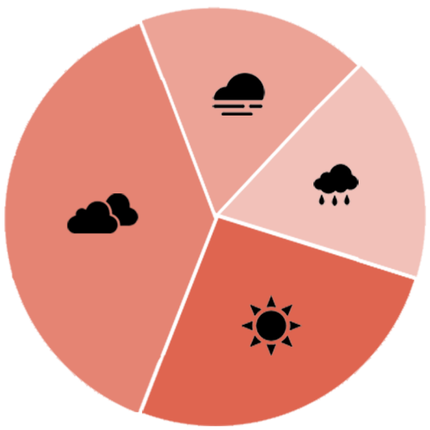
Münster lays at 51°58'N, 7°37'E, 66 m on 217m above sea level. This city in NRW region has a marine west coast climate, mild with no dry season, with warm summers. Heavy precipitation occurs during mild winters which are dominated by mid-latitude cyclones. Seasonality is moderate. According to the Holdridge life zones system of bioclimatic classification Münster is situated in or near the cool temperate moist forest biome.

The mean annual temperature is 9.5 degrees Celsius (49.2 degrees Fahrenheit). Average monthly temperatures vary by 16.5 °C (29.7°F). This indicates that the continentality type is oceanic, subtype truly oceanic. In the winter time records indicate temperatures by day reach 4.7°C (40.4°F) on average falling to -0.7°C (30.8°F) overnight. In spring time temperatures climb reaching 13.3°C (56°F) generally in the afternoon with overnight lows of 4.3°C (39.8°F). During summer average high temperatures are 22.3°C (72.2°F) and average low temperatures are 12.3°C (54.2°F). Come autumn/fall temperatures decrease achieving average highs of 13.7°C (56.6°F) during the day and lows of 6.3°C (43.4°F) generally shortly after sunrise

Total annual precipitation averages 719 mm (28.3 inches) which is equivalent to 719 Litres/m² (17.64 Gallons/ft²)

On average there are 1593 hours of sunshine per year. Visit the sunshine and daylight section to check monthly details including how high in the sky the sun reaches each month.

The most dominant wind in this city is the west and southwest winds, which are active throughout the year.



INSOLATION ANALYSIS
the ratio of sunny and non-sunny days

Fig.12. Pie chart showing variety of days in Munster;

the ratio of wind by the sides of the world
WIND ANALYSIS

Fig.13. Diagram showing variety of wind in Munster;

General overview
Social

Münster is a multi-faceted city. It is a city of science and learning, the City of Westphalian Peace, the capital city of bicycles and Germany's Climate Protection Capital. Westphalia's longstanding regional capital is a young city, not least thanks to its 50,000 students.

It is an outstanding place to live, work, learn and research. It is a place where urban culture, municipal diversity and first-class rural recreation intersect and have a mutually enhancing effect.

Münster is Germany's cycling capital, number two of the most sustainable - at the same time the most prosperous - cities in Germany, the one with the highest feel-good factor. Cyclists have access to an extremely well developed, 450 kilometre network of cycle paths designed for bicycle traffic, in addition to 255 kilometres of cycle paths located off the main roads on access routes. There are even special bicycle roads, on which the cyclists set the pace and take precedence over cars. The infrastructure is rounded off by a selection of bicycle parks, rental points and a dense dealer network.

The city attains best marks for its systematic development of city and region, the careful assimilation of historical heritage into city culture, and its effective promotion of environmental protection and environmental awareness. And it was repeatedly able to make a lasting impression because of its citizens, who actively participate in the city's development.

Fig.14. Collage of main social activities in regions of Munster;

General overview
History

I - ROOTS
initial Münster steps

Münster's roots can be traced back to the 6th century AD. The city officially came into existence in 793, when Frisian missionary Liudger founded the "Monasterium" cloister. Münster became a cathedral city as early as 805. The first panorama of the city dates from 1572 and shows the outlines of medieval Münster

Fig.15. Panorama of medieval Munster;

Fig.16. Old town Munster;

The core of the city begins to take on today's outlines in the late 16th and early 17th centuries. The picture shows a cartographic representation of the old town from 1636.

II - END OF THE 17th CENTURY
plan of the fortified town center from 1657

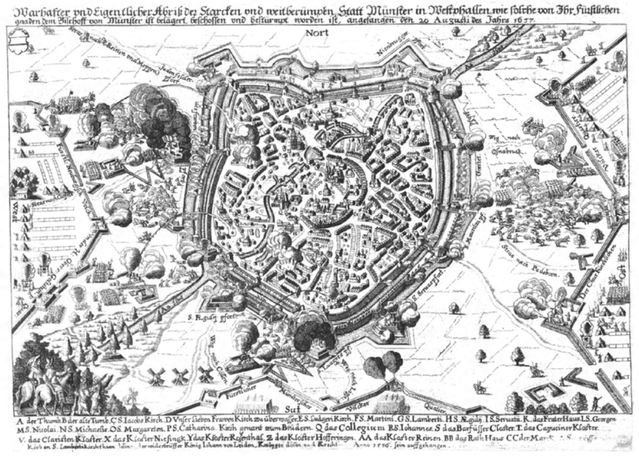


Fig.17. Old town Munster in 17th century;

III - 19th CENTURY EVOLUTION
the greatest progress of the city

During this century, the city has made great progress. The defense of the city is improving, which is also expanding beyond the walls. Comparing maps from the beginning and the end of the 19th century, we can value this time interval as one of the most important in the history of the city.

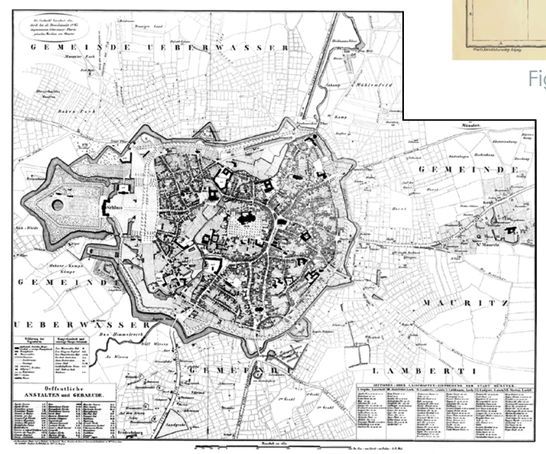


Fig.18. Start of 19th century;

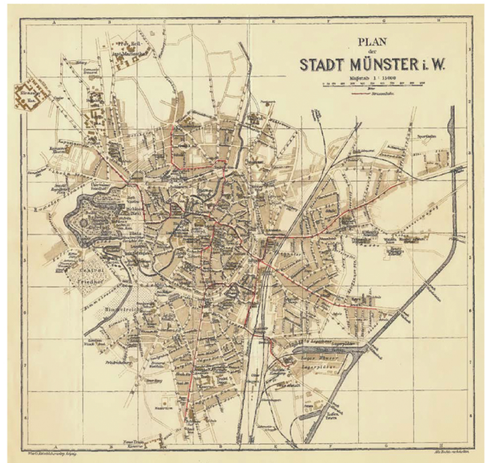


Fig.19. Development of the city;

IV - ENTERING OF THE 20th CENTURY
period of the development after World War I

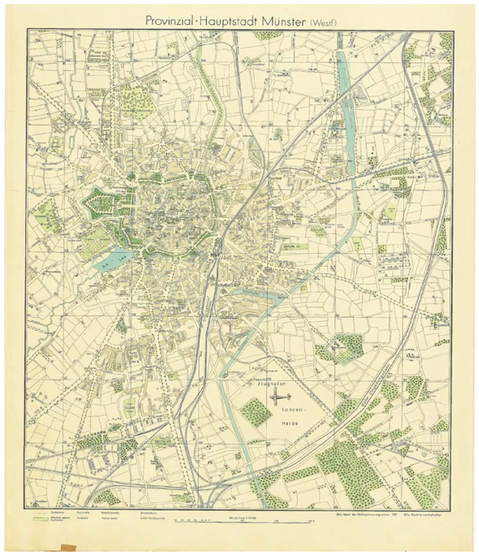


Fig.20. Munster in 20th century;

V - MIDDLE OF THE LAST CENTURY
period of the development after World War II

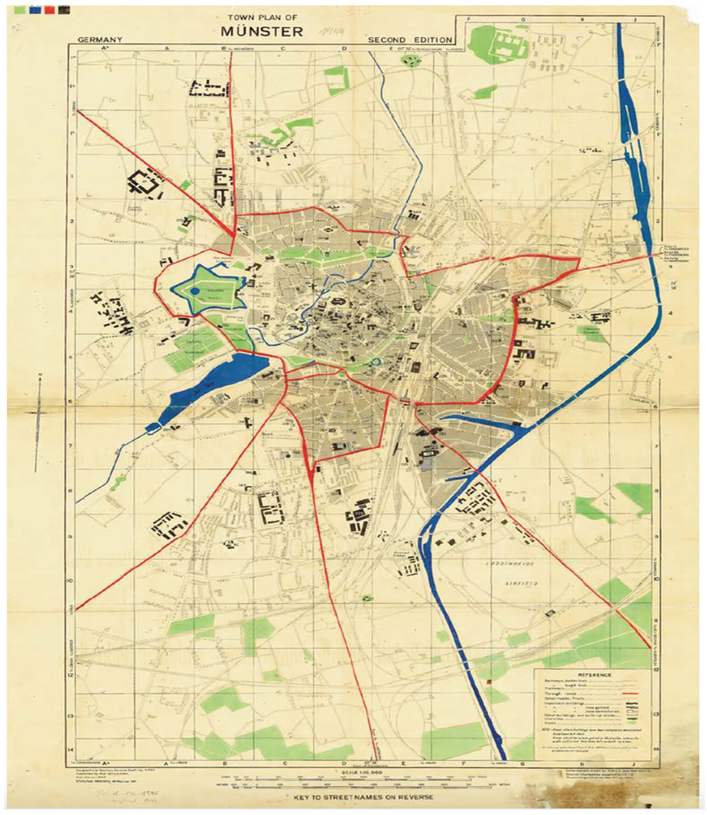


Fig.21. Next phase of Munster;

VI - END OF THE 20th CENTURY
obtaining contours of today

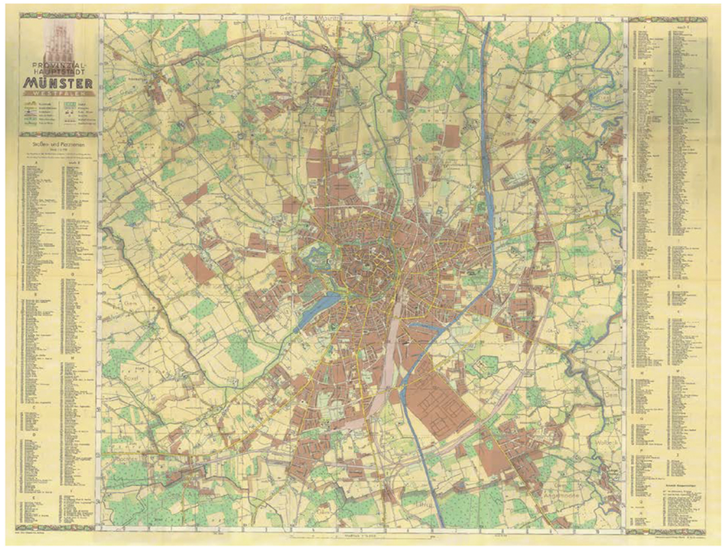


Fig.22. Final map of history at the end of 20th century;

General overview
Physicality of the site

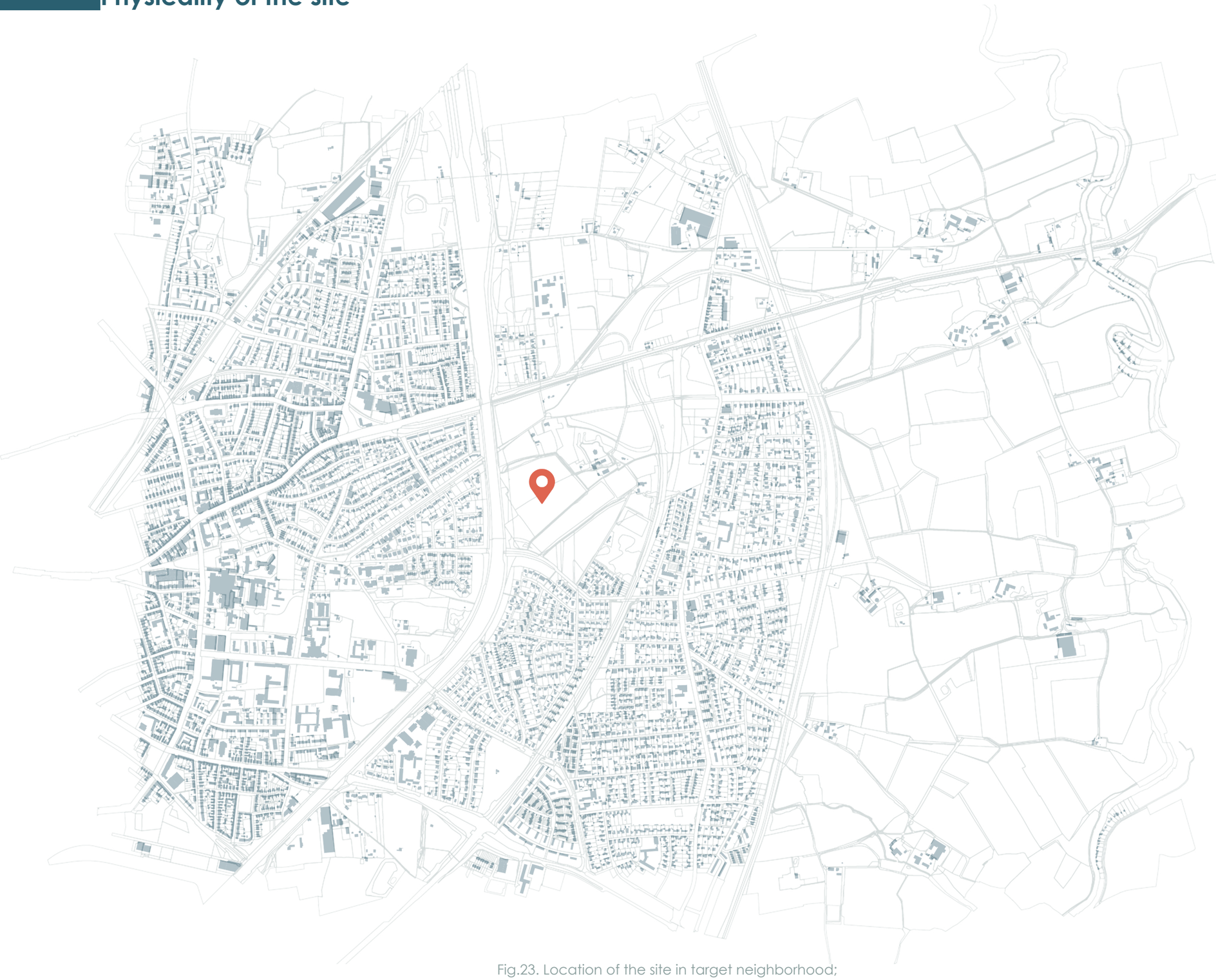


Fig.23. Location of the site in target neighborhood;

Fig.24. Bird eye view of the location;

The chosen location for this project is in the residential neighborhood in the northwest part of Munster. All the main services are existent and can be found in close proximity.

The main attribute of this location was the canal passing through which is found on the west edge of the site. This location is also full of small lakes and one of them is located and acts as a north border for the community. On the south part, there is already an existing residence with the road as the main access to the site. The east part of the chosen location is the least developed as of right now.

Fig.25. Site view from the south-west;

Fig.26. Meeting of canal and site;

Fig.27. Site view from the south-east;

Fig.28. Zoomed-in view of the site and closest surroundings;

Case study
A Thousand Yards

The design is a assembly of modular building-blocks, that contain five main functions of the pavilion. Each block connects at the corners to its neighbors and offers a continuous space inside and one linked “urban gardening” area on the roof.

The pavilion was designed as a network of small scale units. It was a core feature to avoid a large, iconic structure that covers a majority of the land. Rather, they wanted to create a village-like typology that can be explored by the visitors. The small scale typology creates a space with the notion that something special is able to happen at each corner. A village creates diversity, it creates unexpected connections, and the curiosity to discover the unforeseen.

Like a checker-board, the building blocks and yards alternating with one another to create a symbioses between architecture and the yards. All yards are filled with various functions, from ping-pong tables or children playgrounds for the active guests to themed gardens with benches for the tired visitors.

Fig.29. Diagram showing concept of the project;

Fig.30. Realistic views of the project;

Case study
The Grid

The structure is based on a 3×3 m grid which offers:

- Structural simplicity
- Flexibility in the arrangement of spaces
- A playful arrangement of rectangles on the facade

The Grid becomes the formal identity of the building and renders it recognizable in its urban environment.

The playful façade offers a variety of choices in creating various qualities of space: closed spaces, balconies, niches. It allows the use of a variety of materials: ceramic tiles, aluminum lattices and glass panes. The flexibility in materials creates diversity and the possibility to adjust to the products that are offered in the market and agree with the budget.

The general placement of the building favours cross ventilation on the west-east axis taking advantage of the W and SW winds that pleasantly blow during the summer months. An atrium along the west-east axis provides a three-storey void for the growing of tall trees.

With the use of aluminum lattices, the facade becomes a screen that filters the sun and creates pleasant micro-climate in each apartment. Plants in various sizes colonize parts of the building: voids, niches, screens, creating in this way a natural layer that protects the envelope of the building and enhance the building's micro-climate, the quality of life and its identity.

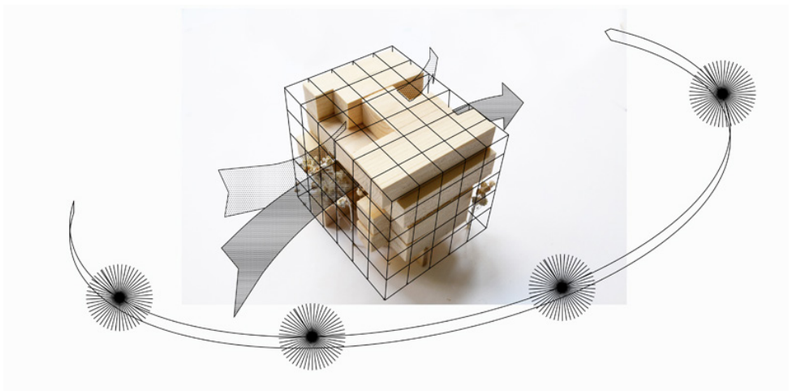


Fig.31. Grid and natural elements in works;

Fig.32. Realistic views of the project;

Case study
Tangier Bay Housing

This modular social housing project for Tangier, Morocco, utilizes **prefabrication** and passive design principles to create a **sustainable neighborhood** with enviable views of the Atlantic. Stephane Malka of Malka Architecture envisioned the four modules as adjustable green-roofed habitats that create a constantly evolving urban structure.

Fig.33. Realistic views of the project;

The buildings, made up of four **modular prefab units**, are equipped with loggias and terraces which have several functions-they provide beautiful views of the ocean, facilitate natural ventilation and allow natural lighting to reach the most remote corners of the interior spaces.

During summer, a **shading system** controls solar intake and ensures the buildings' optimal bioclimatic performance.

An abundance of **vegetation** gives the neighborhood a more pastoral feel and blends the new structures into the surroundings.

The strict **rectangular geometry** of the modules is softened through the extensive use of perforated screens which also reference the traditional decorative elements of the local culture.

Despite their size, the structures seem to be in line with the human scale and, together with the surrounding greenery, creates a **harmonious environment**.

Fig.34. Realistic views of singled out elements;

Master plan
Concept

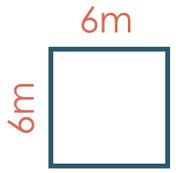
Starting with a single cubical of dimensions 6 meters by 6 meters which we found as optimal for all comfortable living arragments with maximum reach of the sun within.

Next step was the design of building with base module of unchanged cubicle in middle with function of main connection with surrondings dependend on wants and needs of residents.

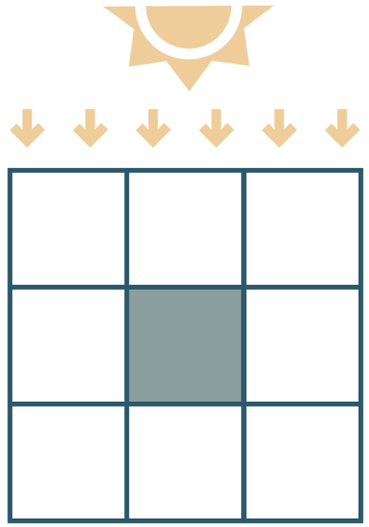
Coming to master plan the whole concept is based on a grid of dimensions 6 meters by 6 meters as single cubical. Going from this point as the first station of design it extended and intertwined between all the other elements proposed until we came to the final design. All cubicals have their own function of living, working, commercial or green.

ECO COMMUNITY

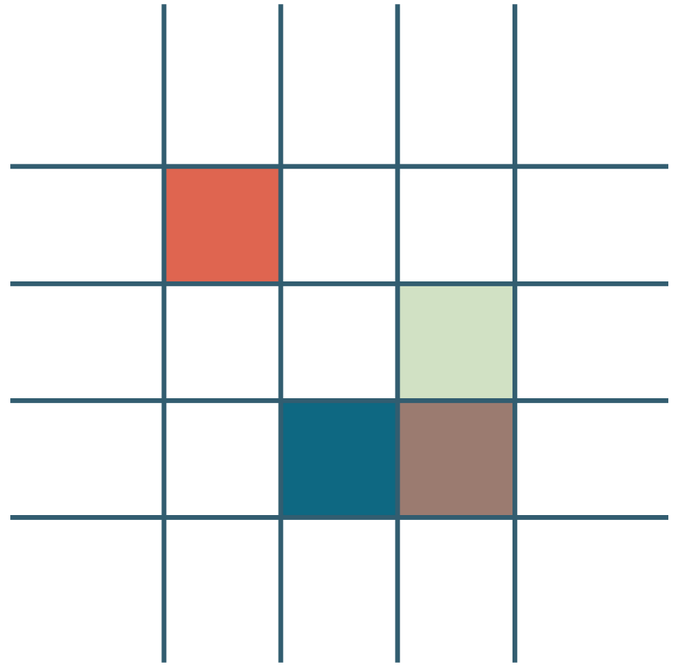
Fig.35. Logo of the project;



SINGLE CUBICLE
(optimal size for maximum light coverage)

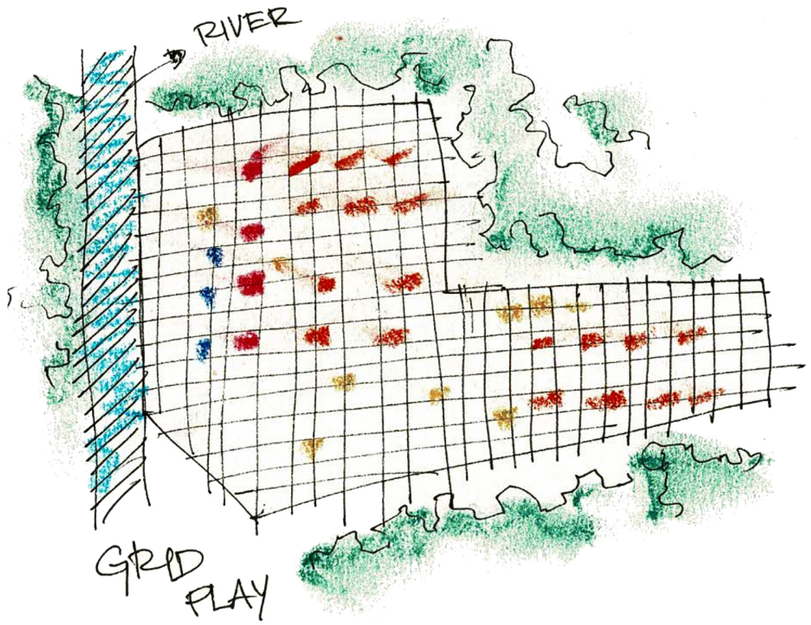


BASE MODULE BUILDING
(middle cubical as main connection)

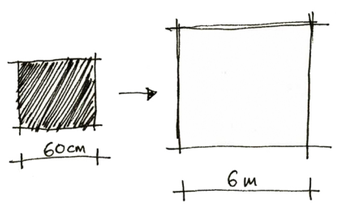


MASTER PLAN GRID
(cubical as single function)

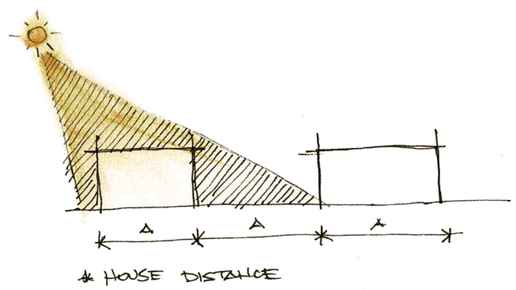
Fig.36. Concept diagram;



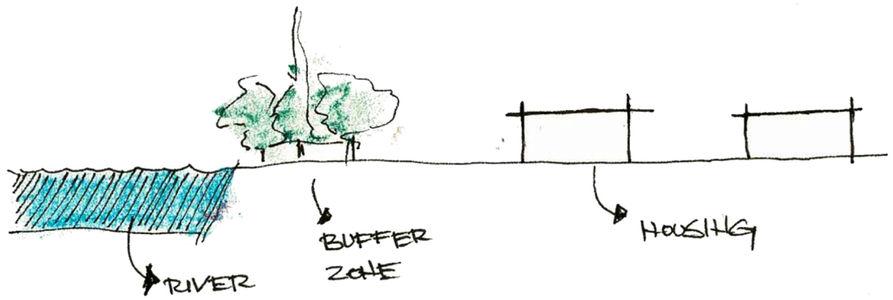
site concept



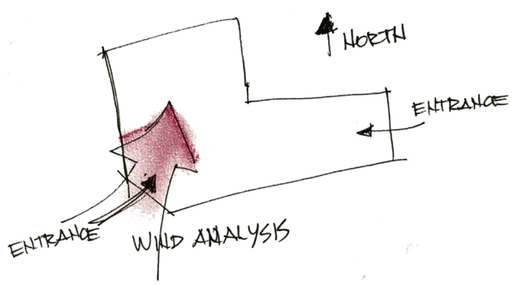
modul size



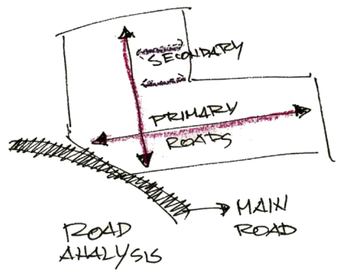
sun study



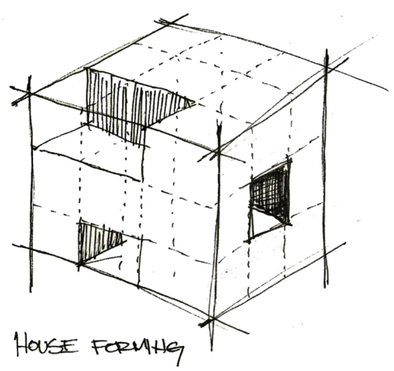
river position study



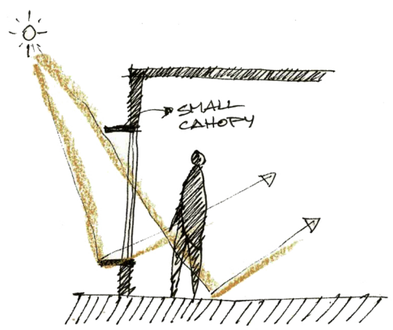
wind analysis



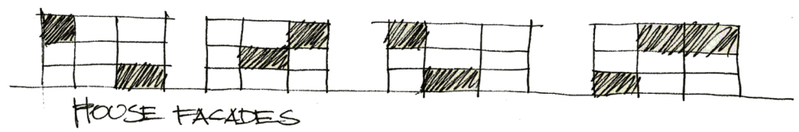
road analysis



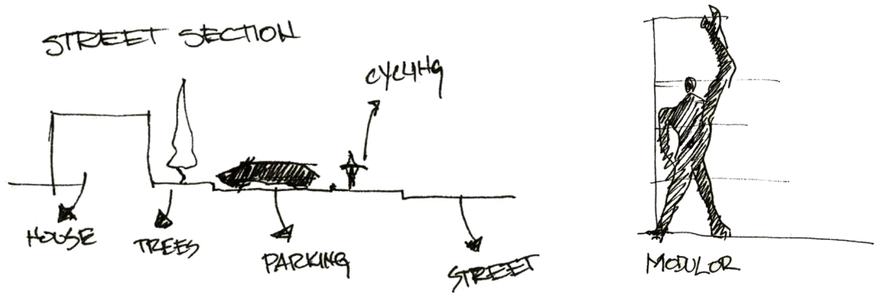
model



house section



facade forming



front yard

Fig.37. Concept sketches;

Master plan
SWOT analysis

We see SWOT analysis as a useful tool in development of projects. It helps us see a big picture of existing situation and all possible scenariosthat could be developed in future.

As the diagram shows it shows all strengths, weaknesses, opportunities and threats of subject in question. The primary objective was to help us develop a full awareness of all the factors involved in process of making a project.

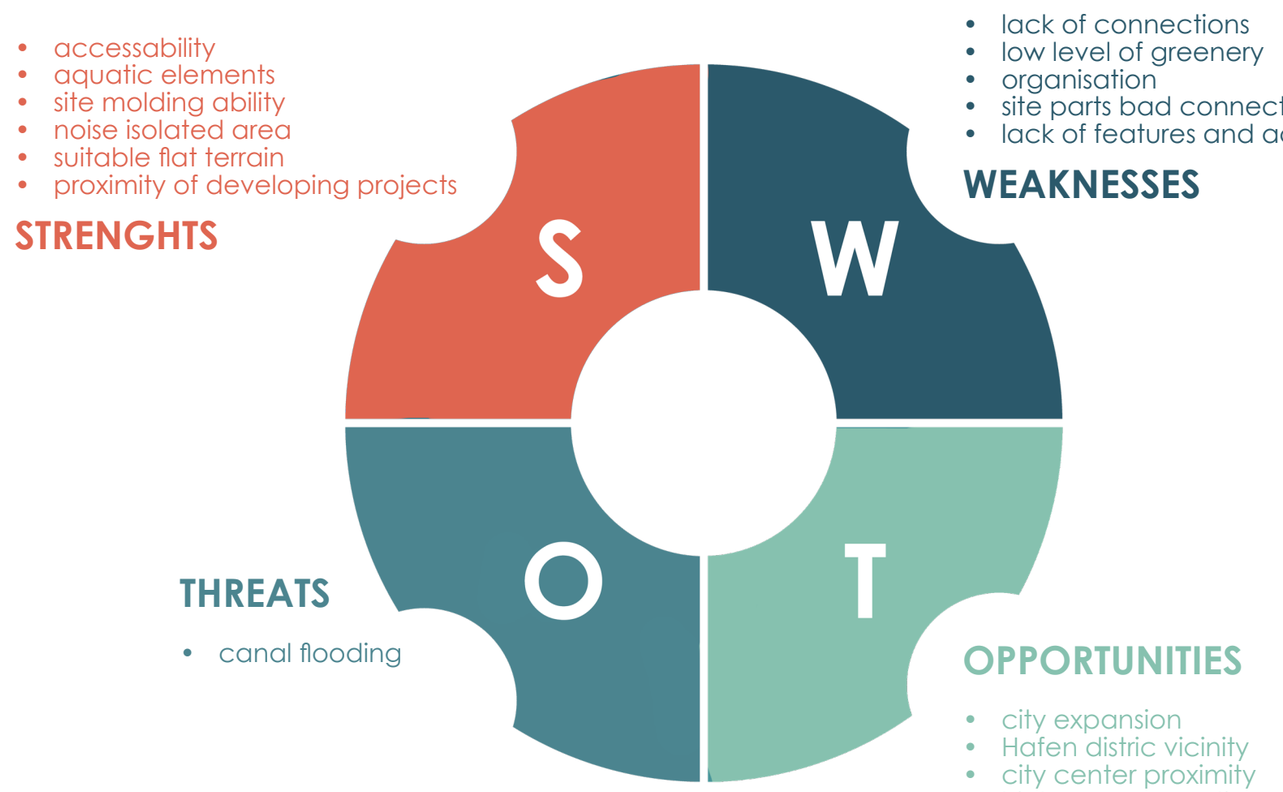
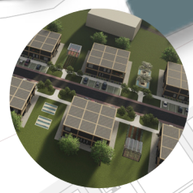


Fig.38. Diagram of SWOT analysis;

Master plan
Strategy

Housing area

Secondary access



Private access

Housing area

Social sircle

Green house

Green courtyards between housing units

Rain garden

Between public and private Co-habit

Social sircle

Recreational activities

Urban farming as buffer between coummunity and neighborhood

Public access

Fig.39. Diagram of strategy;

Master plan

Master plan

Fig.40. Master plan;

Master plan
Ground level

Fig.41. Master plan with ground level plan;

Master plan
Placement

Position

All residential units were placed on the master plan according to the existing climate in the region which is mostly dictated by the wind. The strongest winds in this area are coming from the southwest as shown on the diagram. The Red line is pointing out the most vulnerable and affected side of the unit while we tried to preserve the rest overlooking the green.

Fig.42. Diagram showing the logic of units placement accoring to wind;

Master plan
Exploded

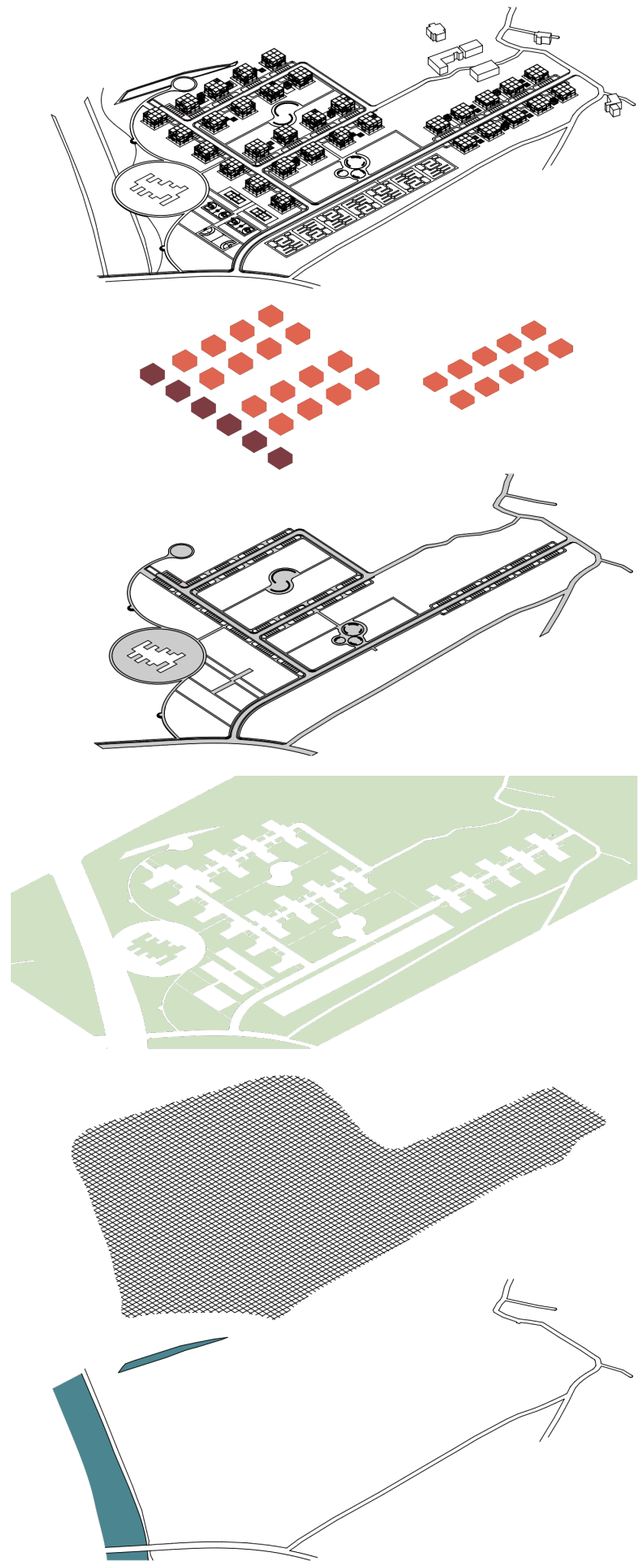


Fig.43. Exploded master plan showing all main elements;

Exploded diagrams are showing the process of desing and road to the final master plan. Starting off with grid as base on which each cubical got its own function. Trying to perserve as much green as possible the connection between came with organic lines bringing all spaces together.

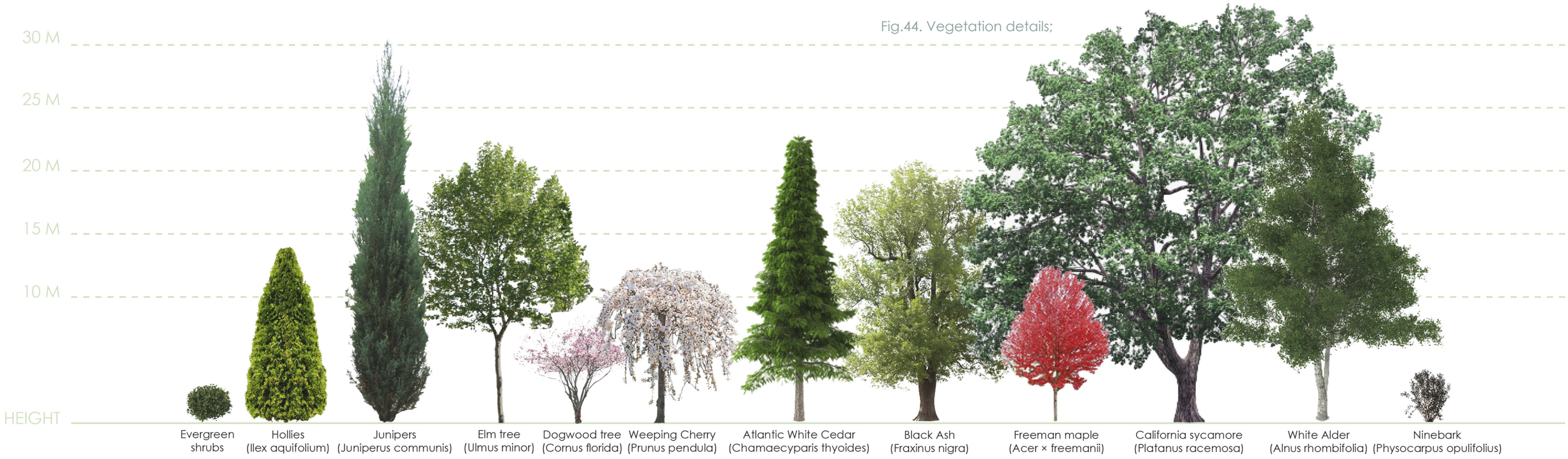
Master plan
Proposed vegetation

Along river flood waters do rise up and spill out of their banks, trees can help slow down some of that water and help capture sediment. When the sediment falls out of the water, it's actually building the structure of the banks, adding sediment and new layers of soil, as opposed to it being washed away. It can contribute to higher peak flows for flooding. Those areas become less resilient; they recover less quickly from disturbance events like floods.

Trees define the landscape, creating the bones of open green space. The whole appearance of space may be diminished with wrong vegetation. There are many different types to choose from depending on shade, privacy, or something ornamental.

Trees define the landscape, creating the bones of open green space. The whole appearance of space may be diminished with wrong vegetation. There are many different types to choose from depending on shade, privacy, or something ornamental.

Fig.44. Vegetation details;



Master plan
Section

Site is located just alongsite river and this can bring many advantages and disatvantages to our project. Starting from advantages there is no need for water from the outside sources, all water inside can be collected and reused for residents needs in housing elements and for the need of urban farming located within the community. On the other side fooding is the main issue and it has been dealt with water resirvour which is directing all extra water within. There is cascade construction planned on the river front that bring us function space for lesaure with three height levels depending on season that bring extra water to riverbed.

GOALS

- Perseved native spicies;
- Landscape with drought-tolerant plants and raise them organically to reduce water and keep pesticides and herbicides out of the environment;
- Perseve open green space;
- Green space enrichment;
- Water managment inside the site;

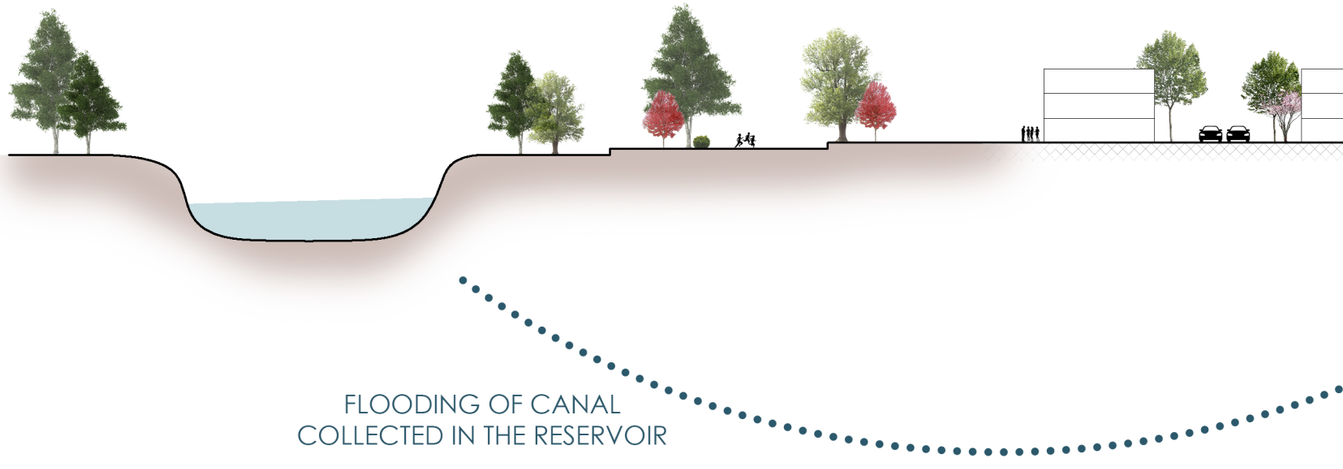


Fig.45. Master plan section with planned intervetions;

Residence
Typology

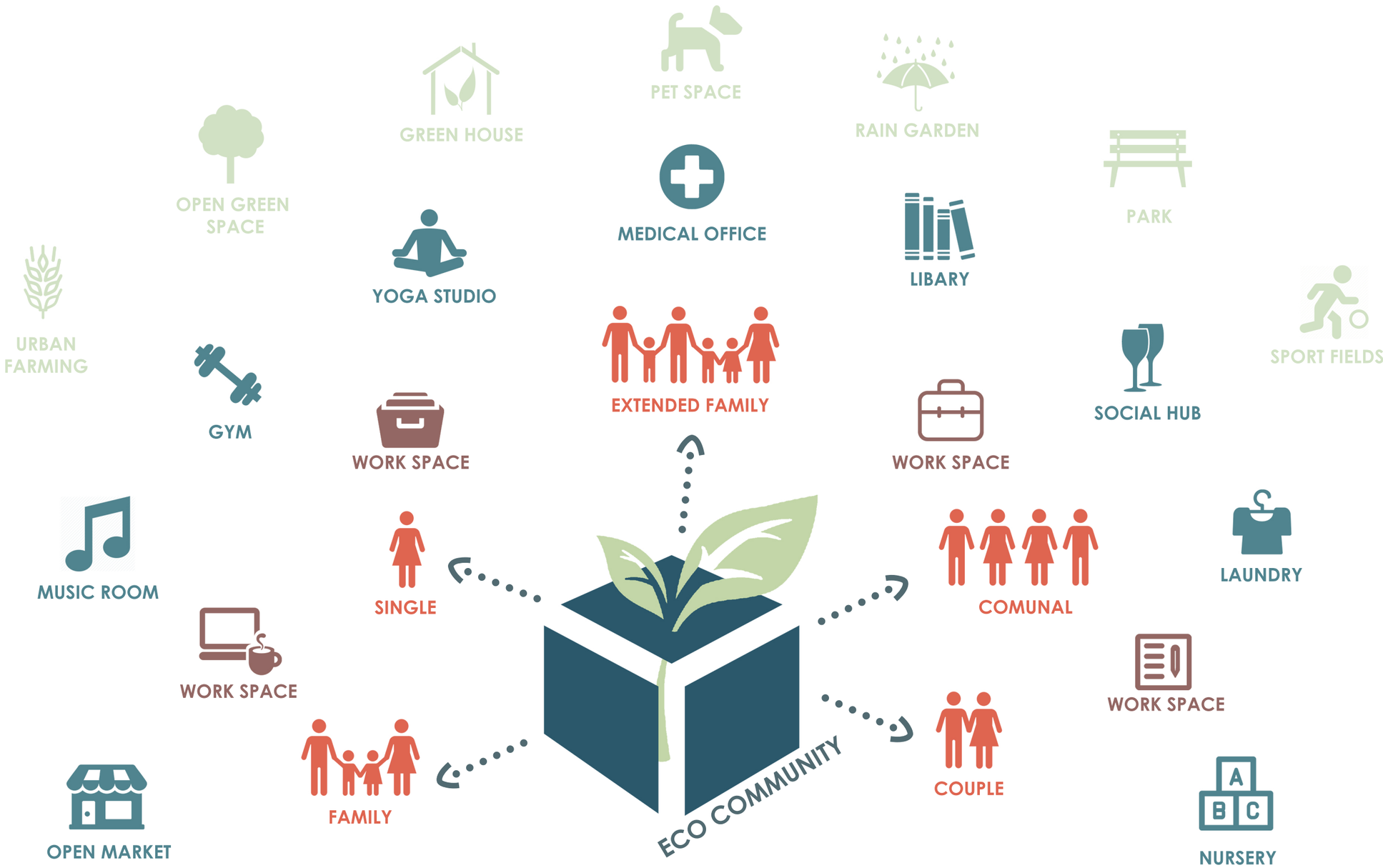


Fig.46. Diagram showing types of housing;

Residence
Base module

BASE MODULE is fixed construction for all future untis in the community cosistent of:

- CORE
- MOVEMENT (CONNECTION)
- SHELL

Core is the main support made out of rammed earth concrete. Inside of it is the mani connection for the whole building, all the movment happening. It is surronded by shell made out of wood suporting all proposed units of housing.

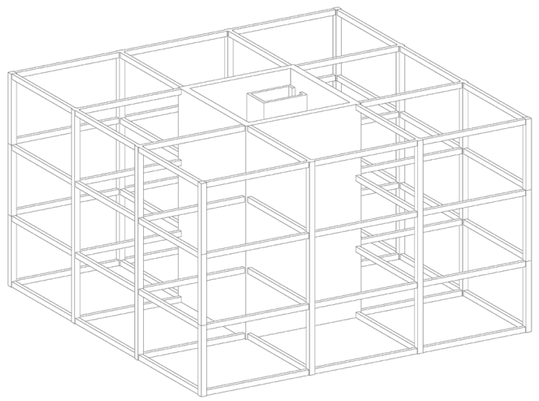


Fig.47. 3D view of base module plan;

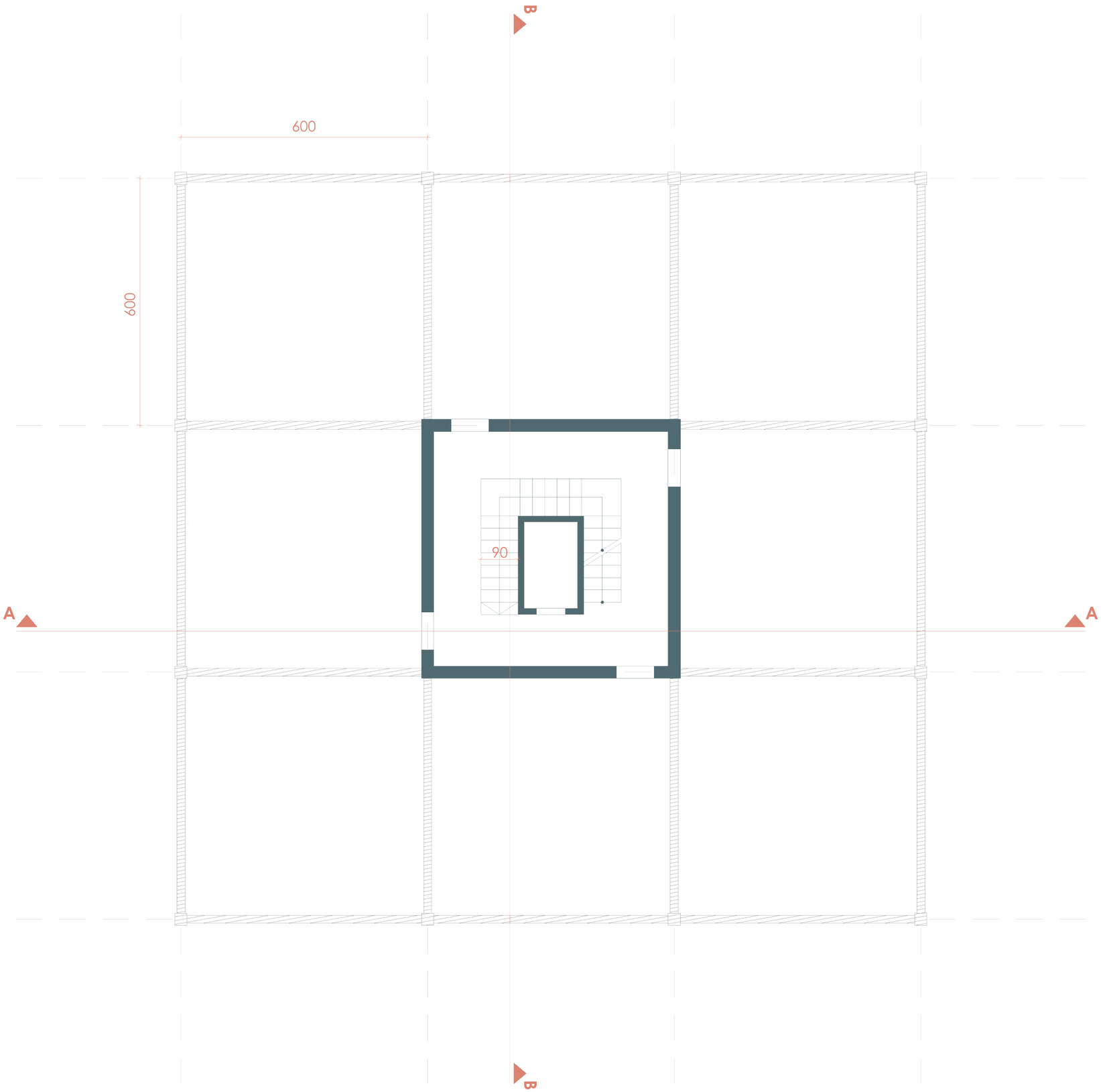
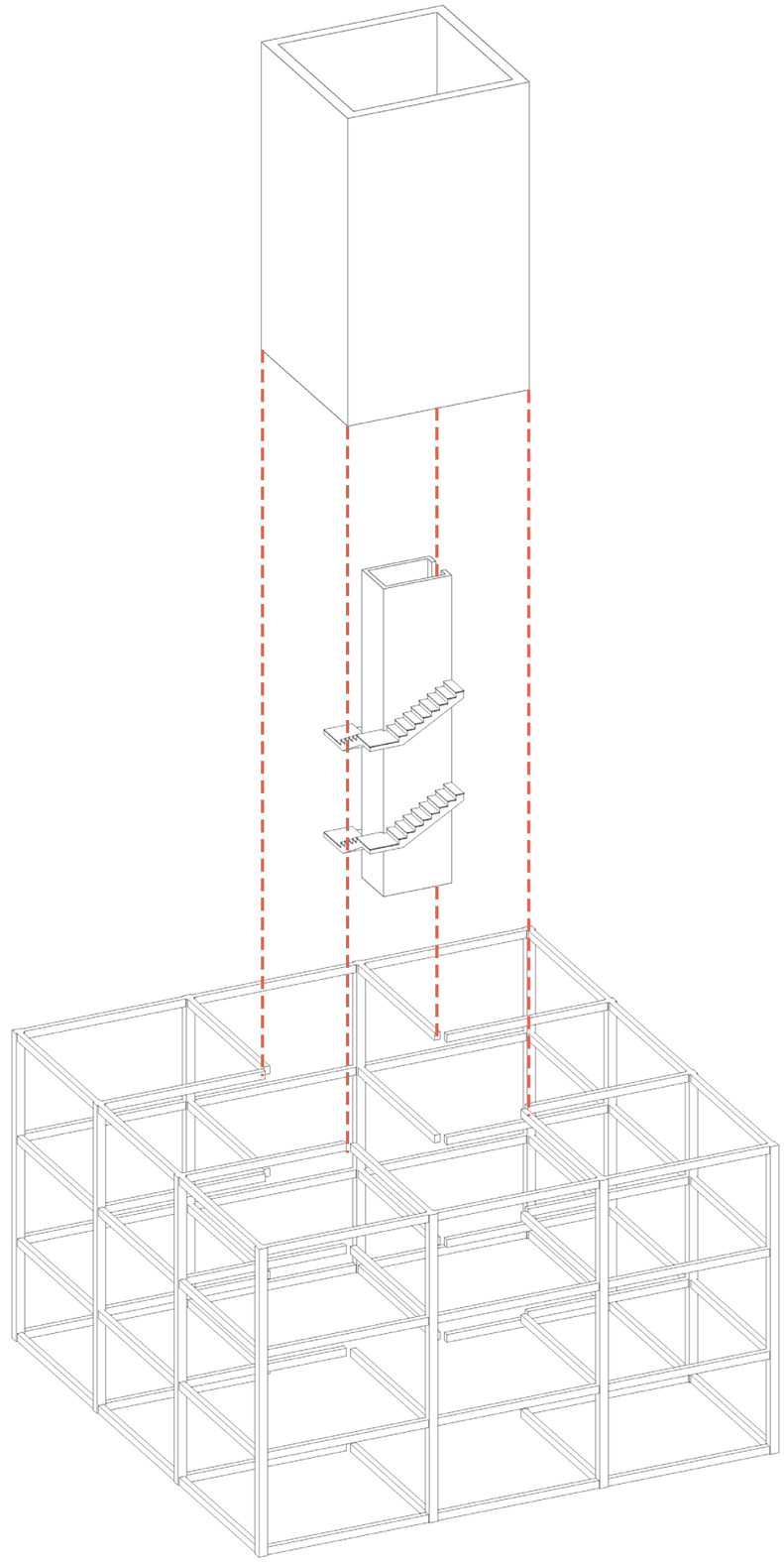


Fig.48. Base module plan;



CORE

MOVEMENT

SHELL

Fig.49. Base module plan exploded;

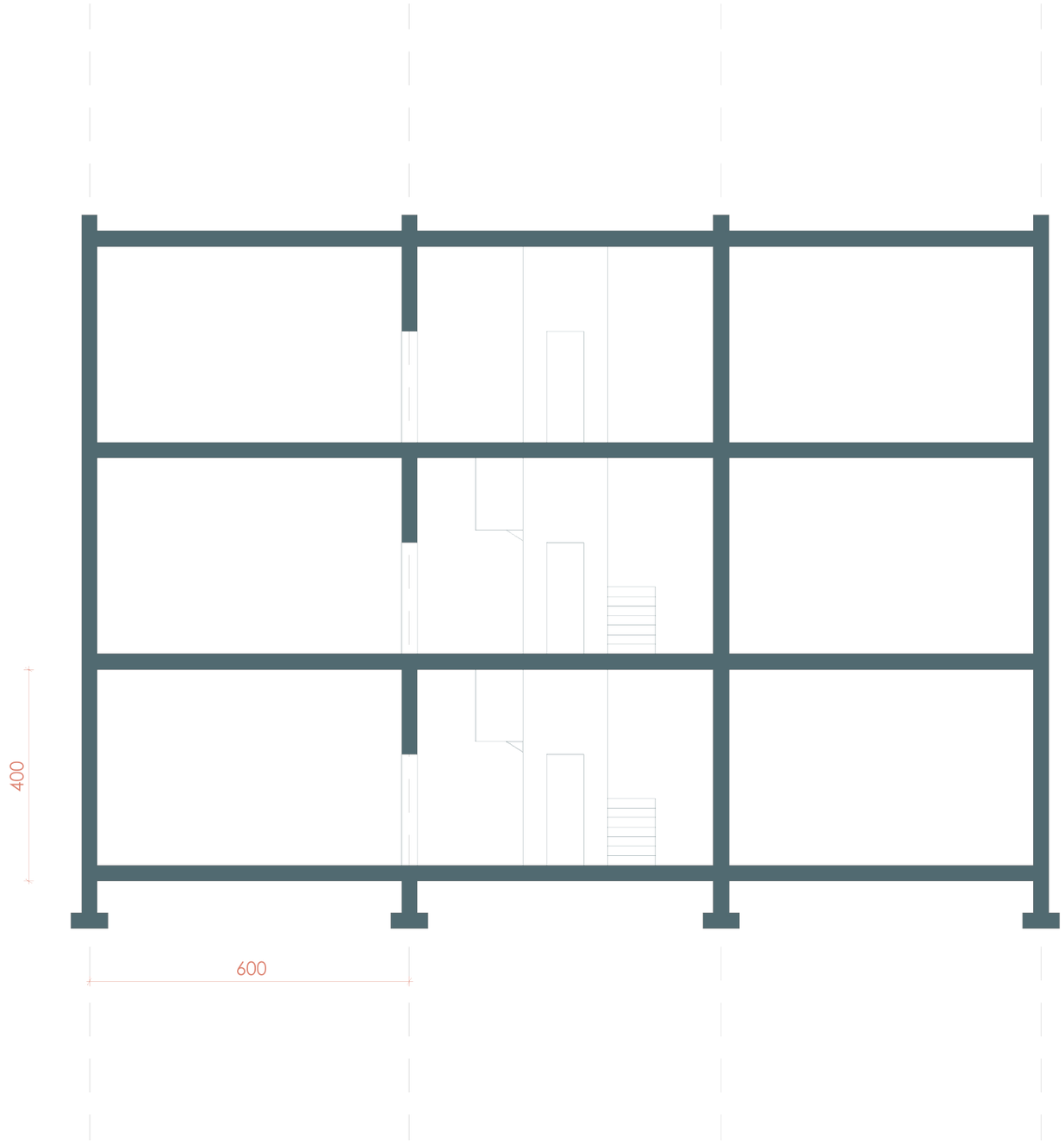


Fig.50. Base module section A-A;

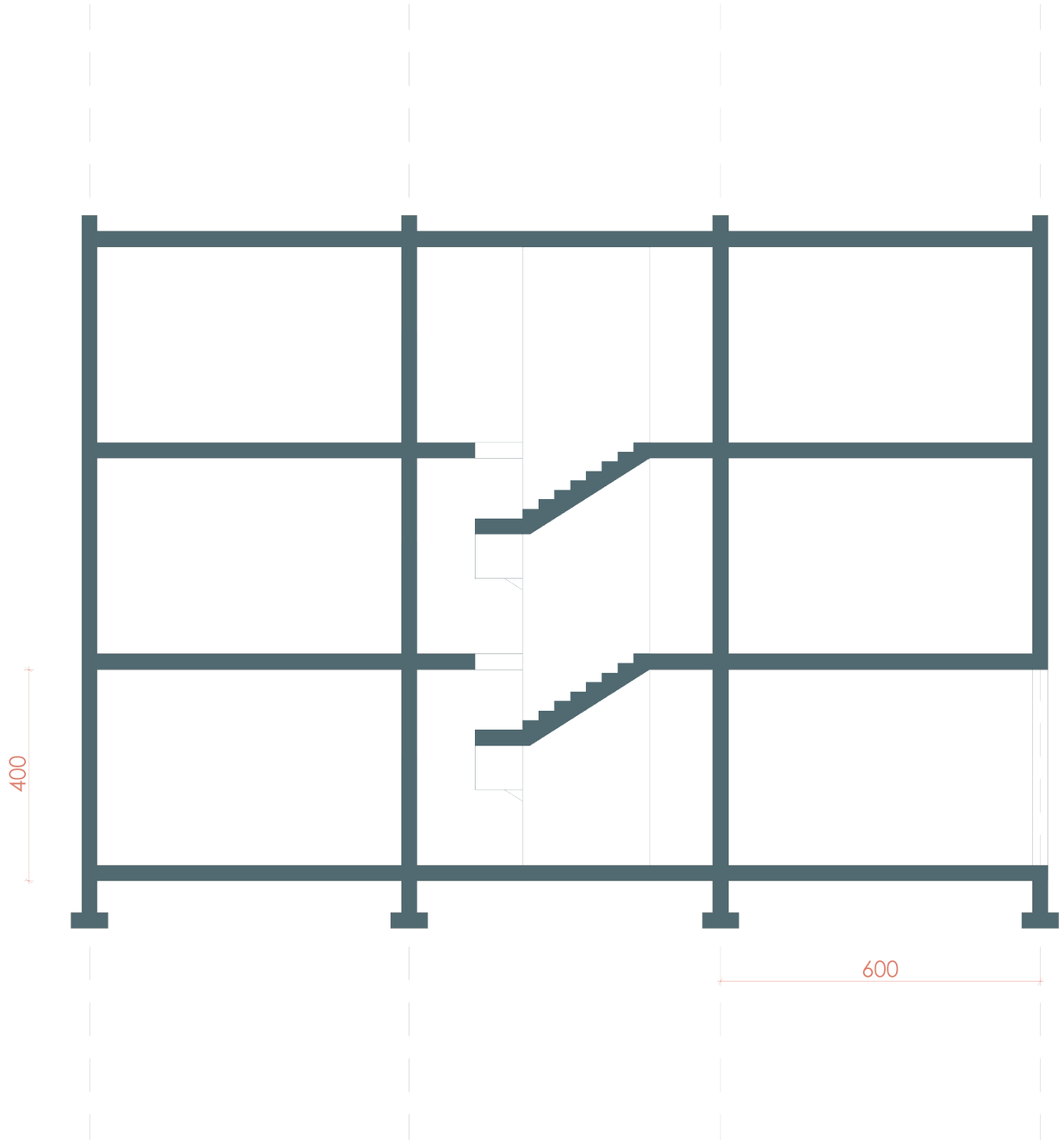


Fig.51. Base module section B-B;

Residence
Materials

Knotted Timber
(SHELL)

Rammed Earth Concrete
(CORE)

Polished Concrete
(STAIRCASE)

Painted Brick
(PANELS)

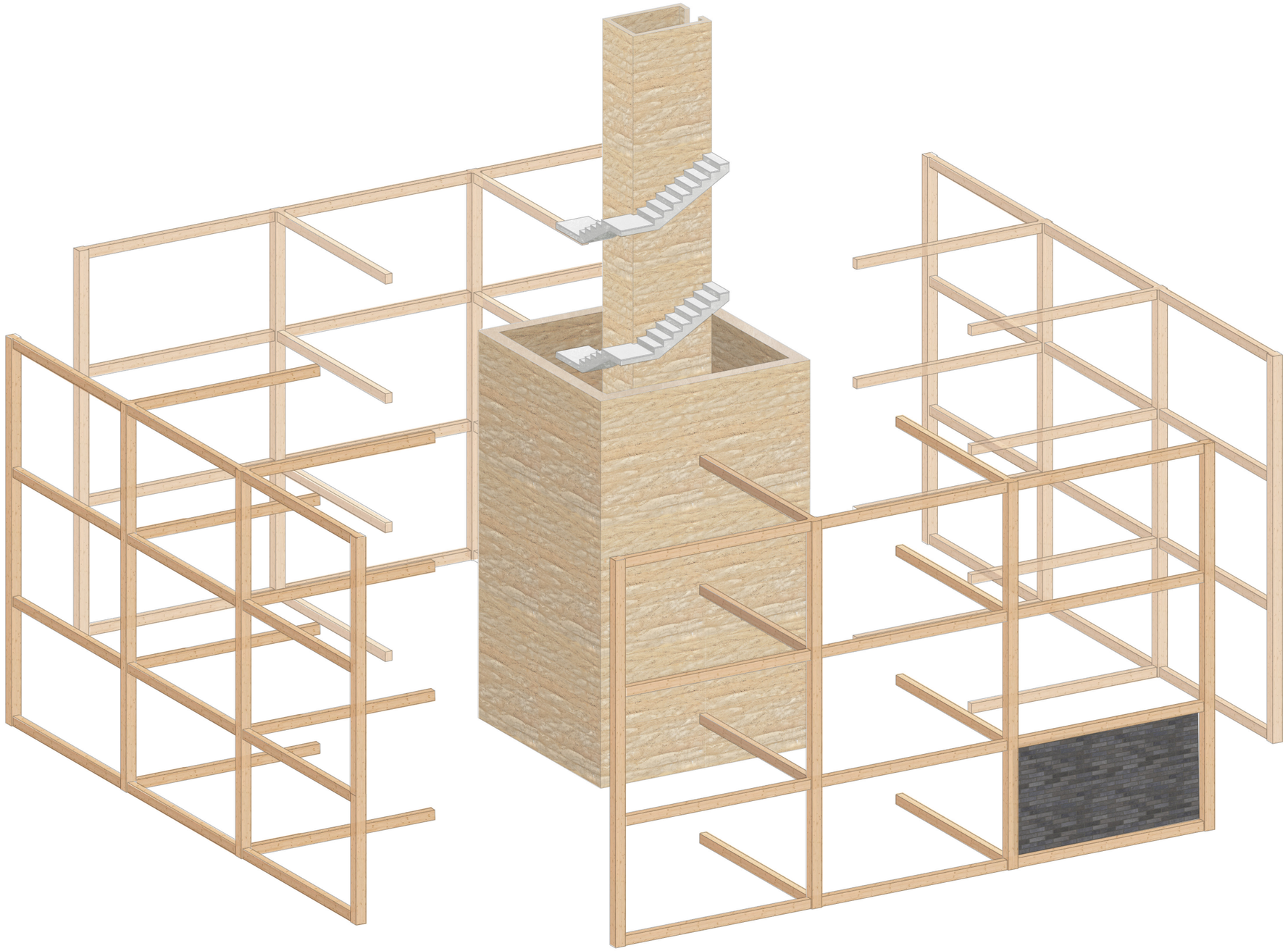
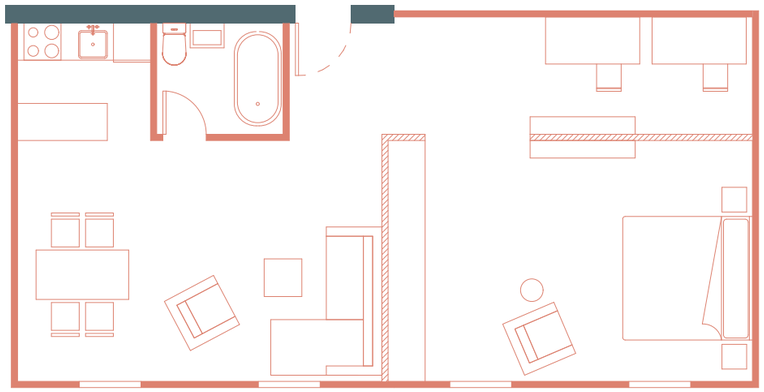


Fig.52. Base module exploded view of elements and materials;

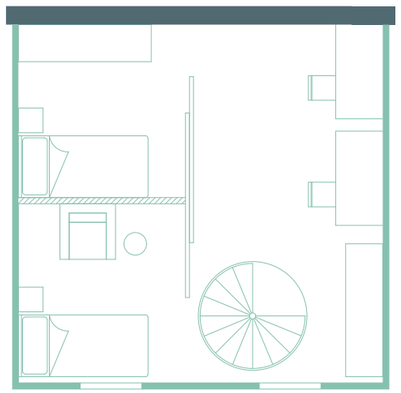
CATALOG OF PROPOSED HOUSING LIVING UNITS

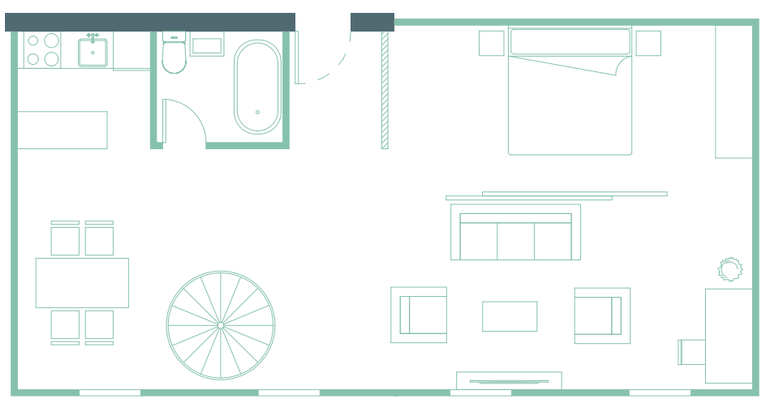
TYPE01
SINGLE LIVING / 36m²



TYPE02
COUPLE LIVING / 72m²

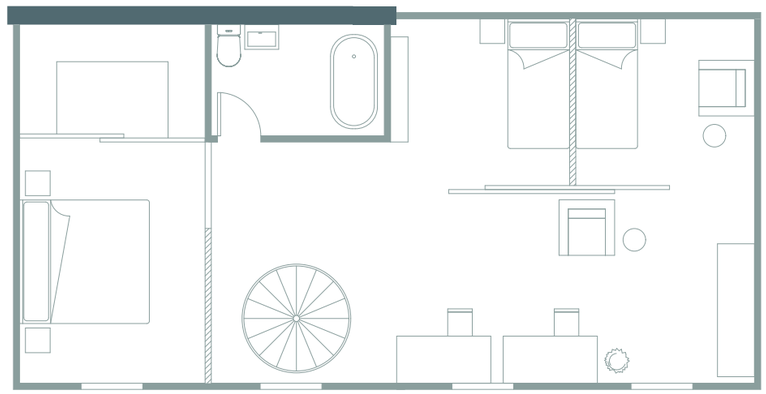
TYPE03
FAMILY LIVING / 108m²

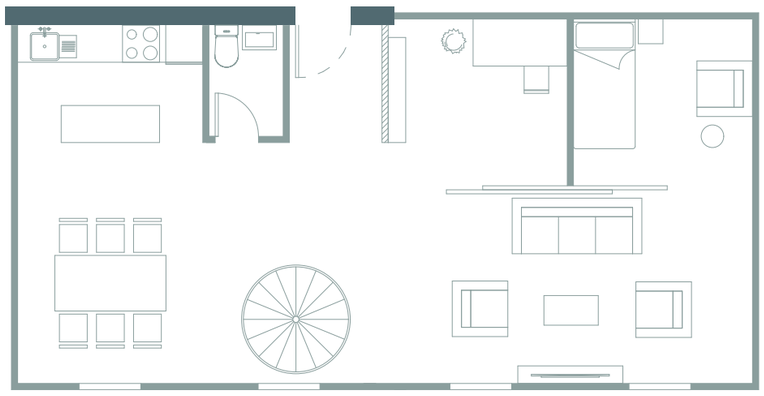




TYPE04

EXTENDED FAMILY LIVING / 108m^2





TYPE05

COMMUNAL LIVING / 144m^2

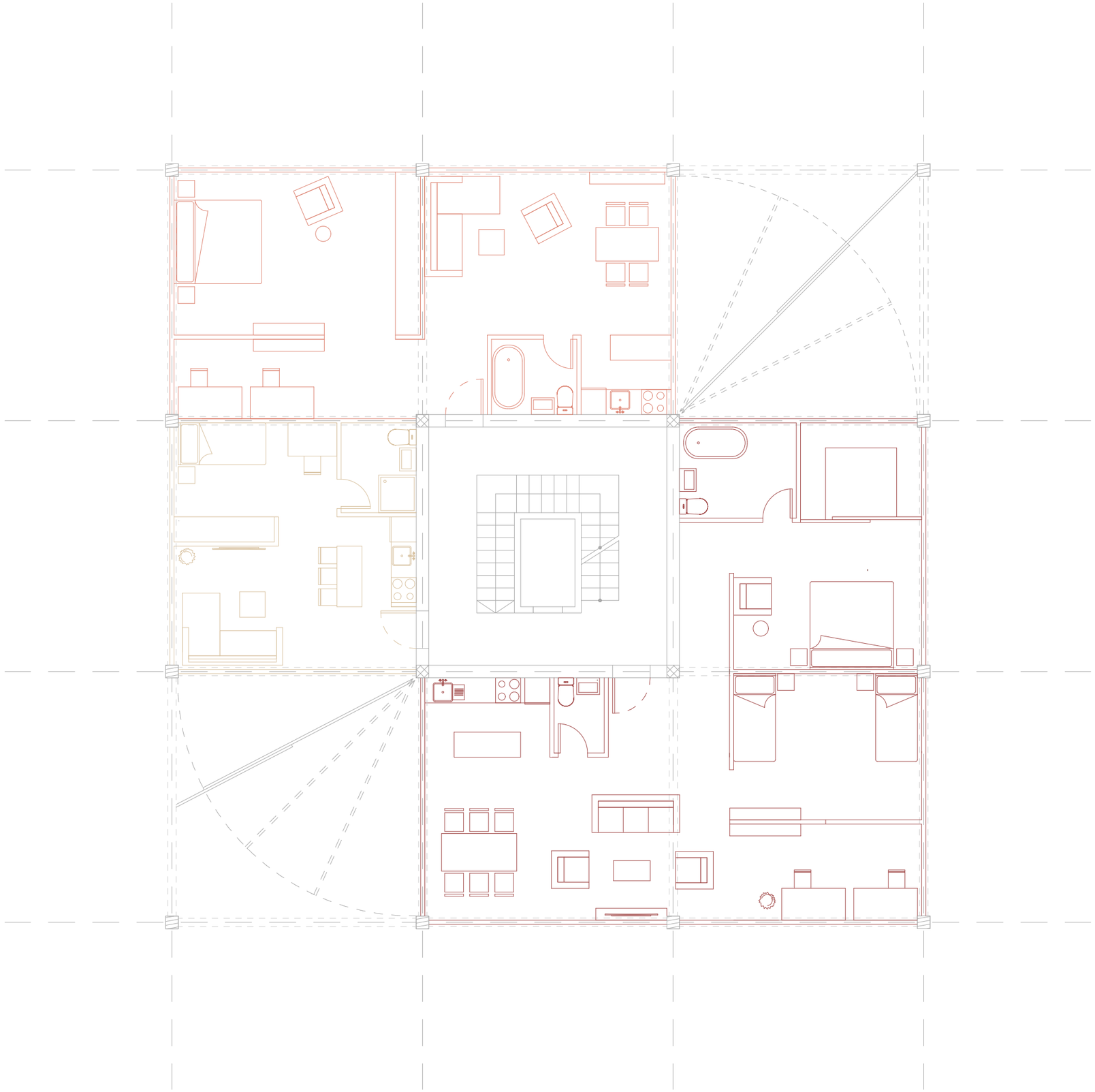


Fig.53. Typical floor plan #1;

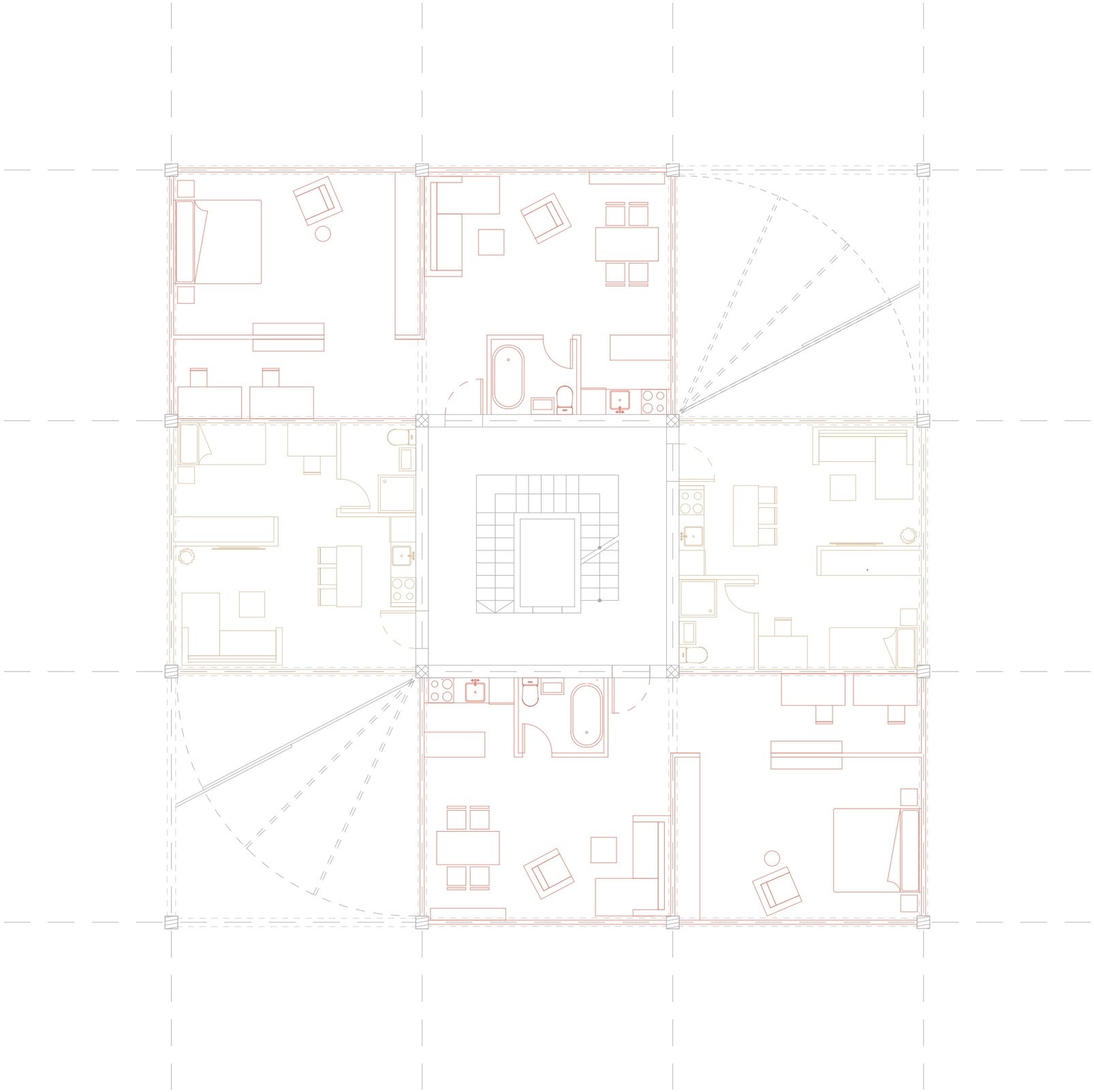


Fig.54. Typical floor plan #2;

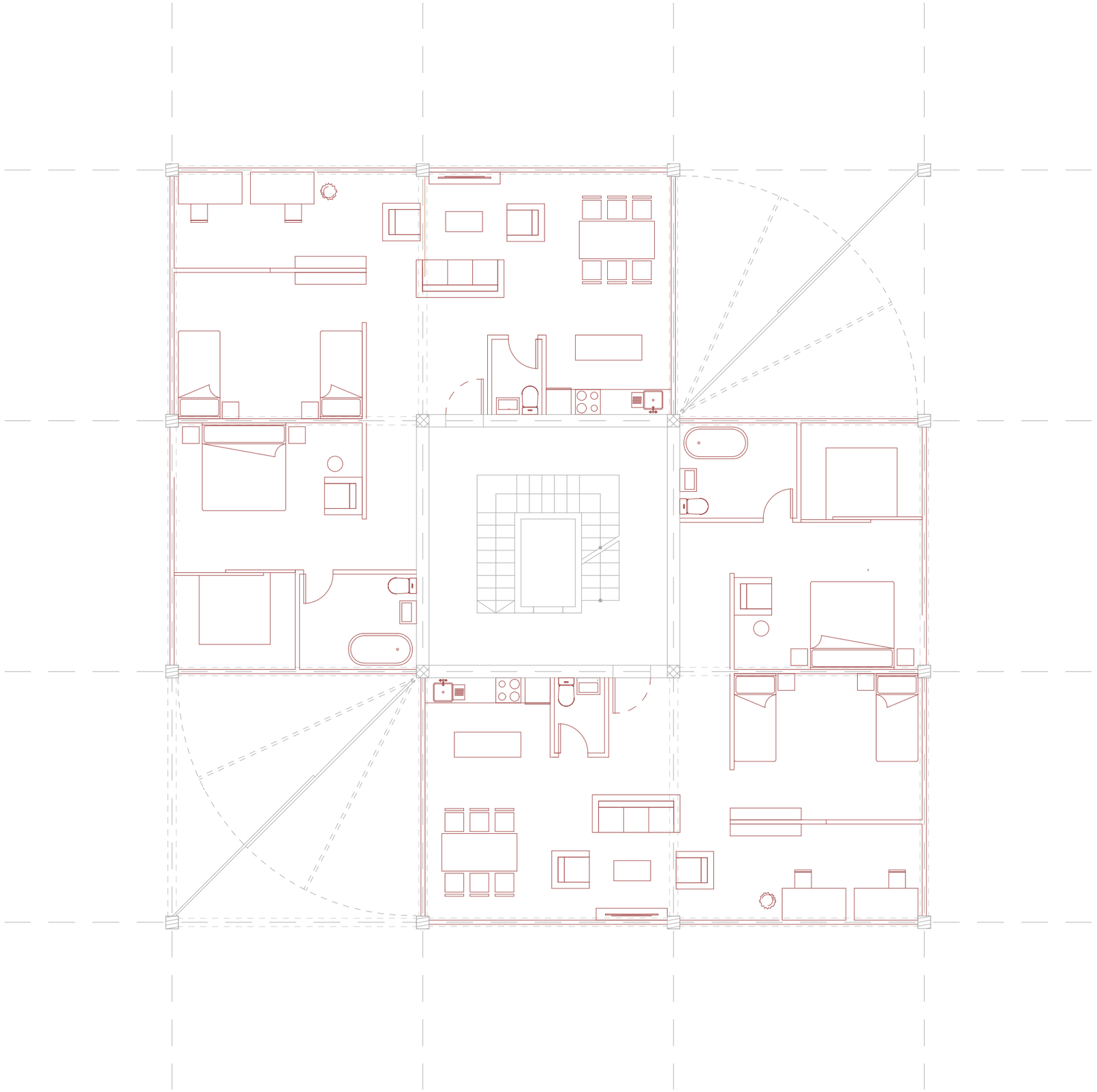


Fig.55. Typical floor plan #3;

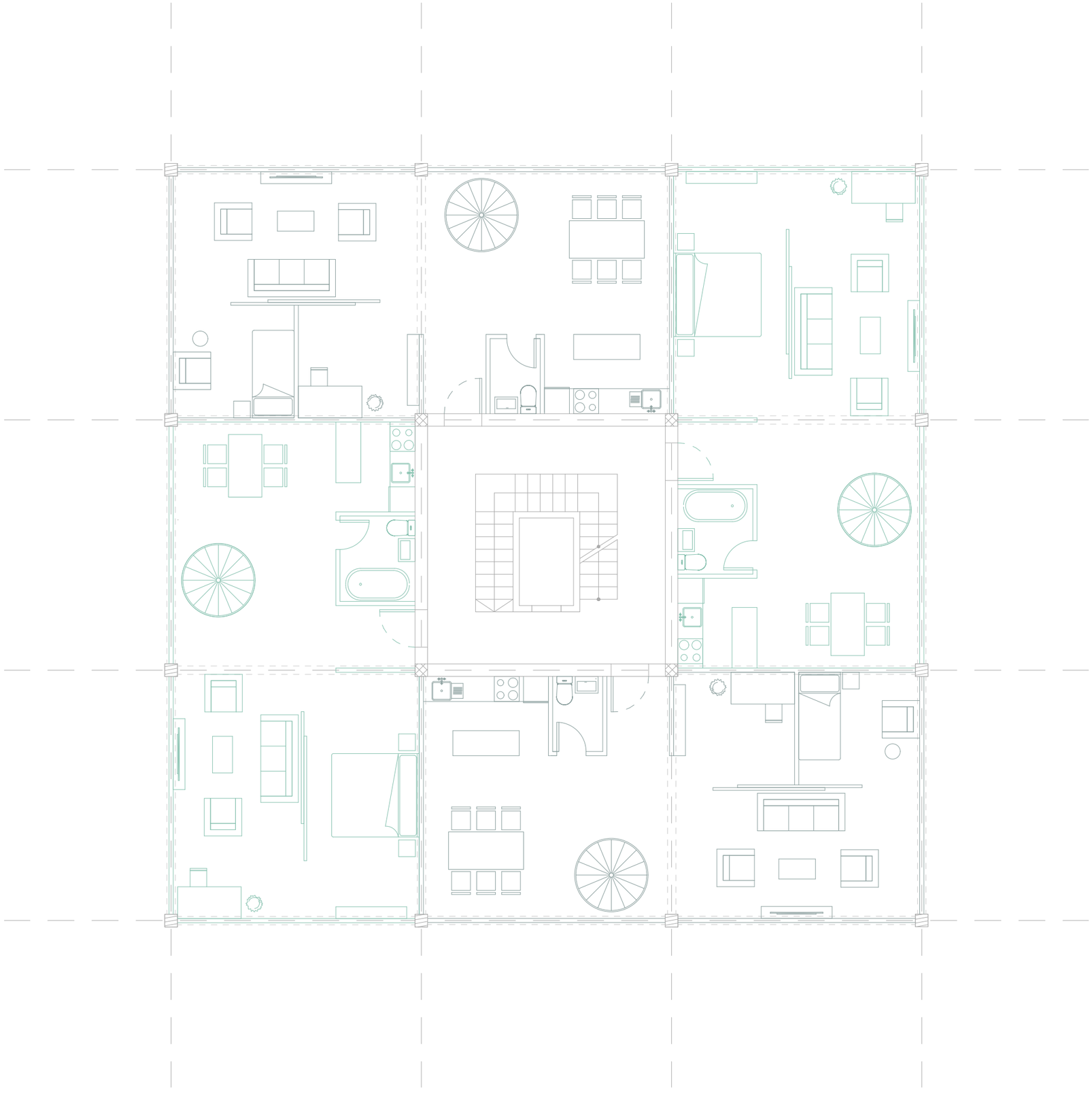


Fig.56. Typical floor plan #4;

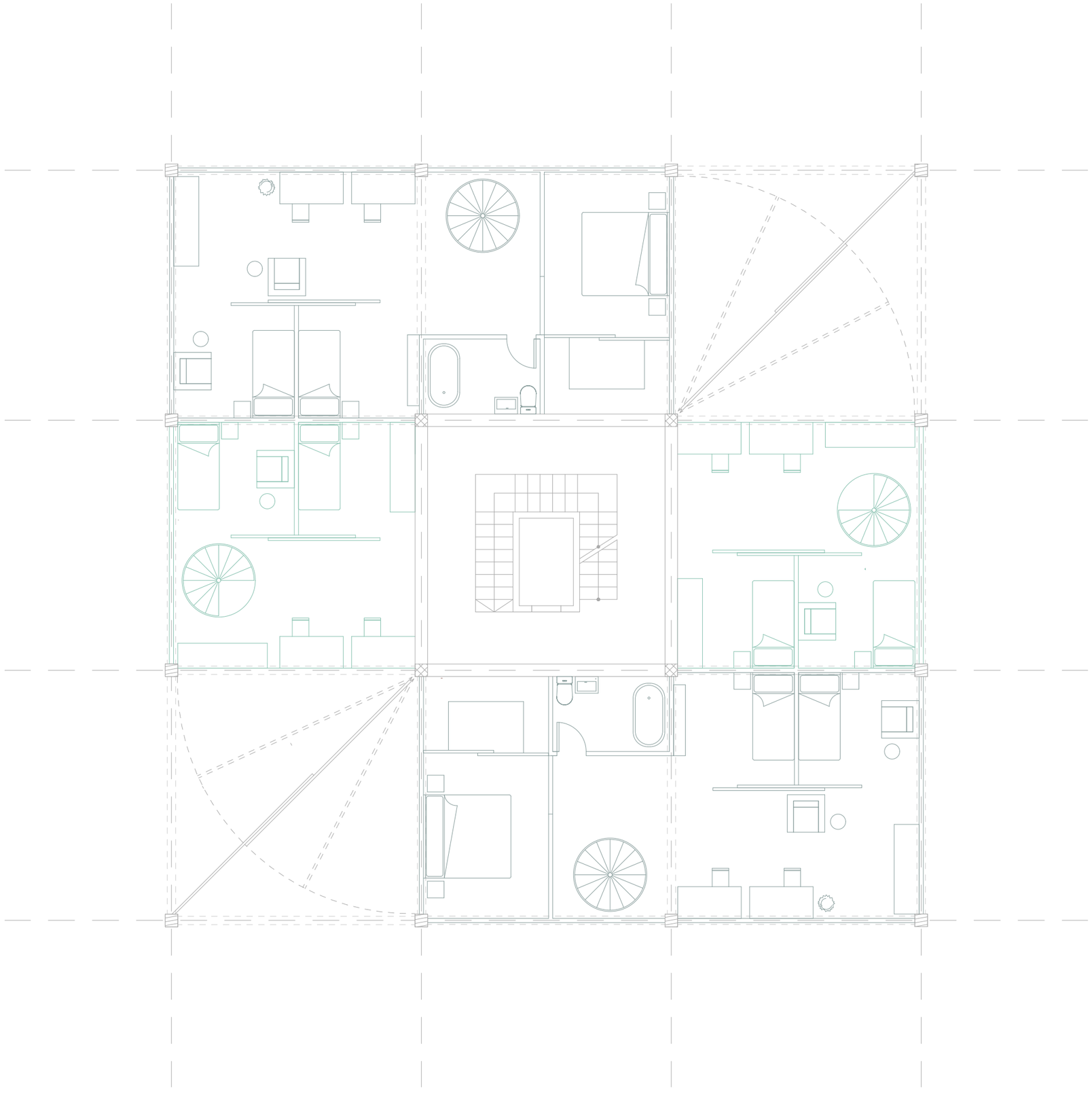


Fig.57. Typical floor plan #4 upper;

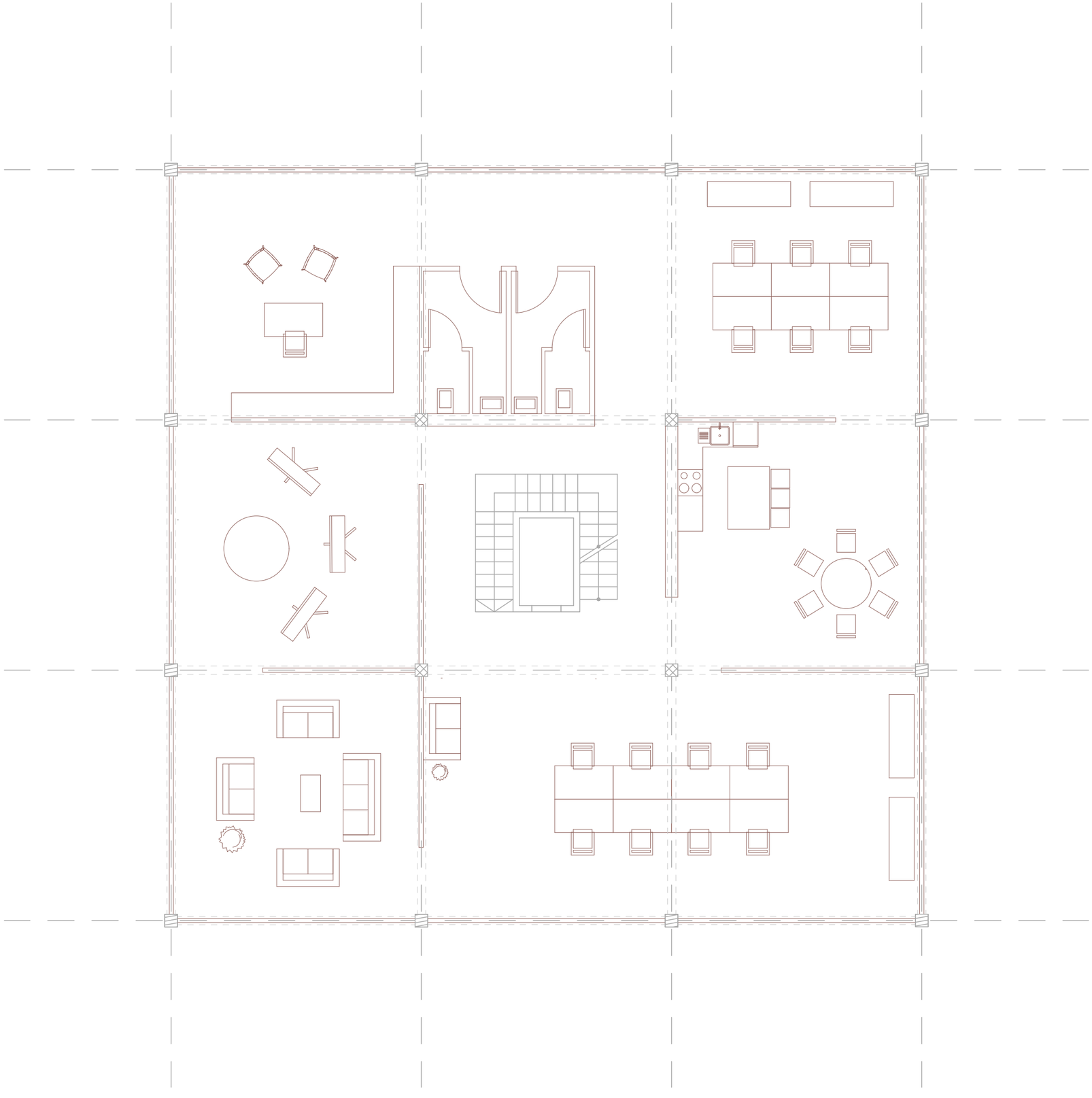


Fig.58. Typical floor plan #1;

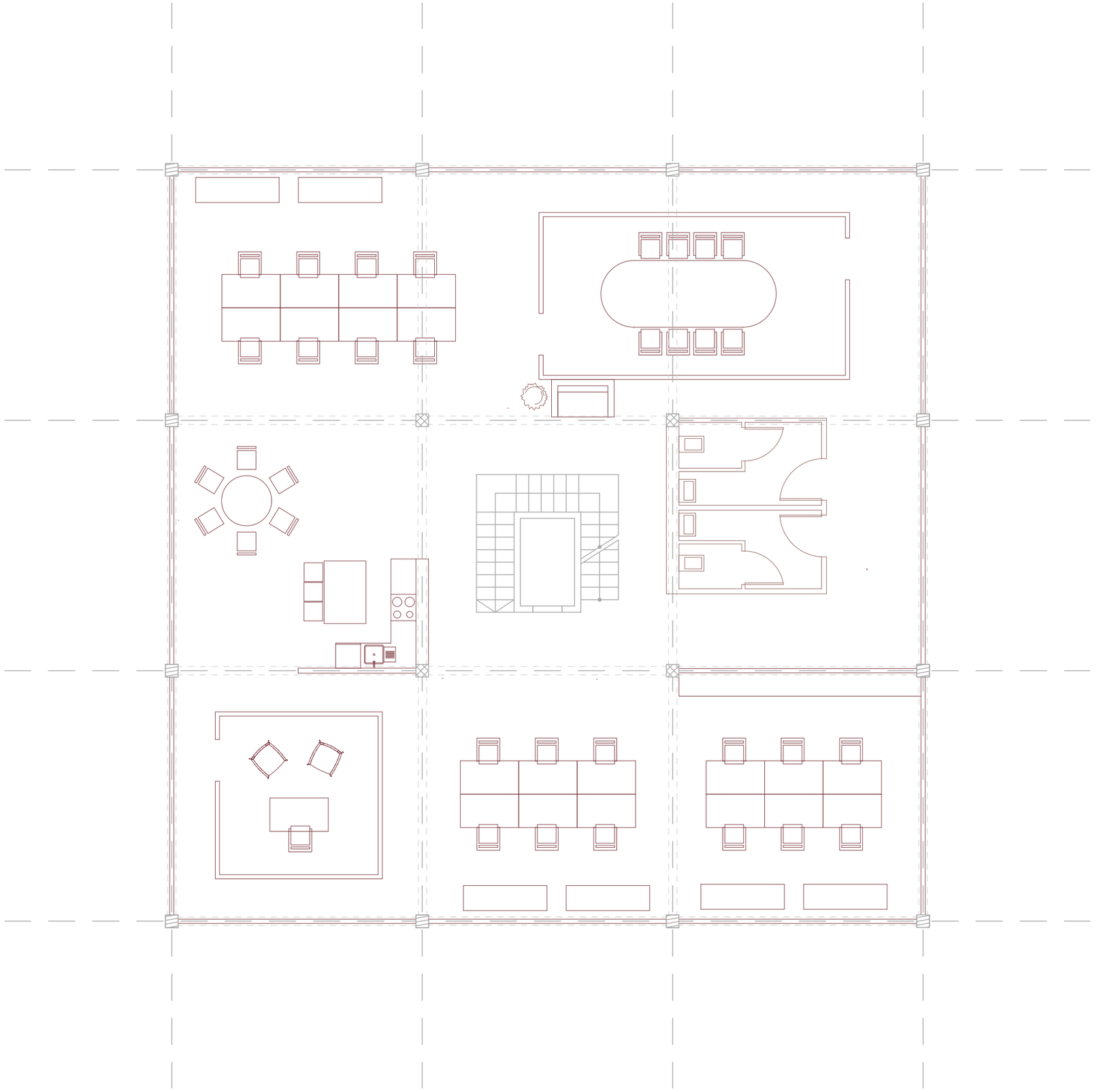


Fig.59. Typical floor plan #2;

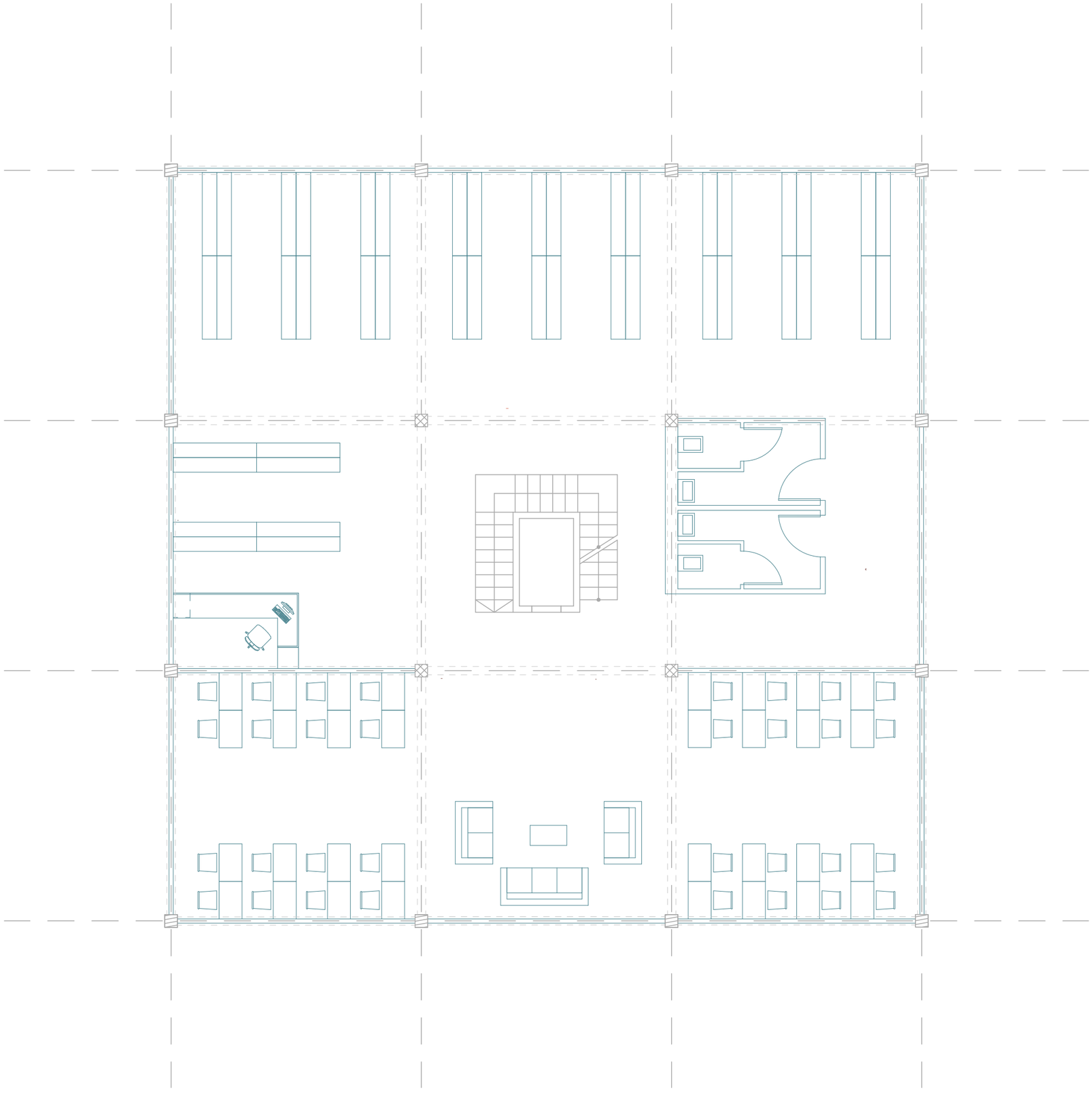


Fig.60. Libary floor plan;

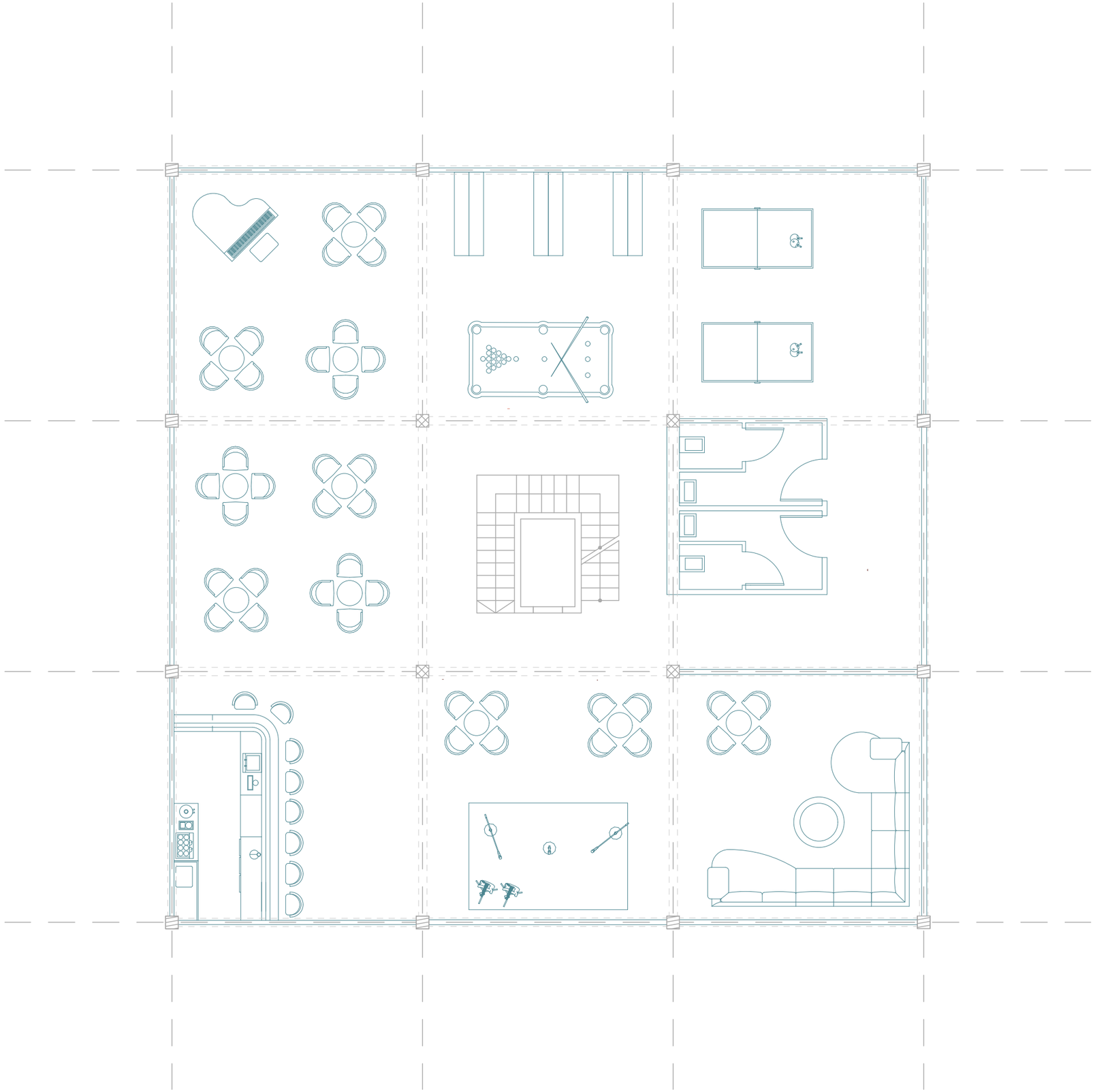


Fig.61. Social pub floor plan;

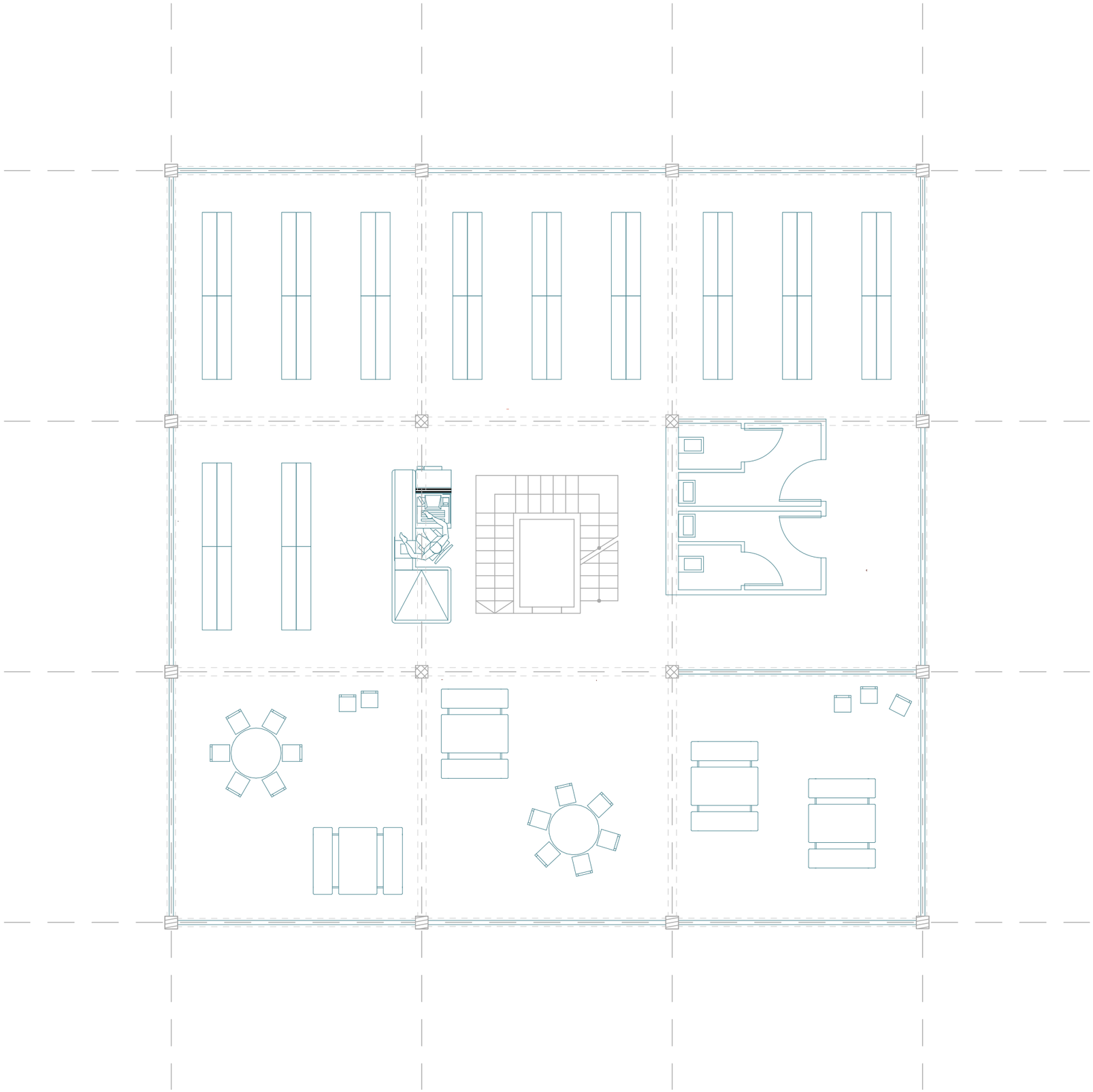
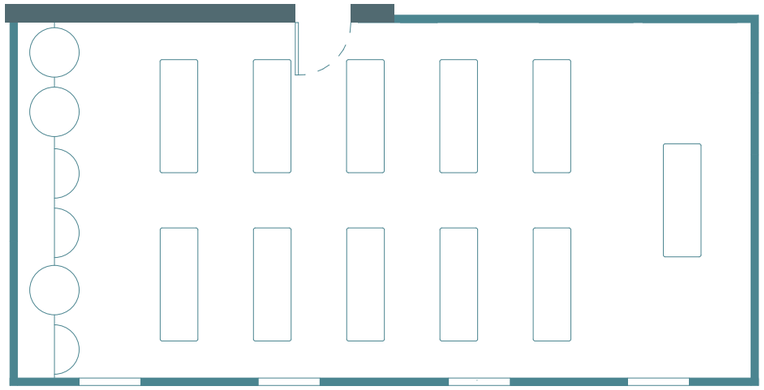
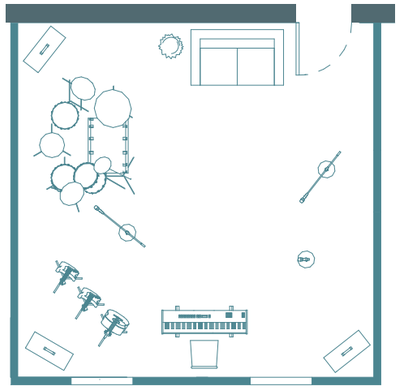


Fig.62. Open market floor plan;

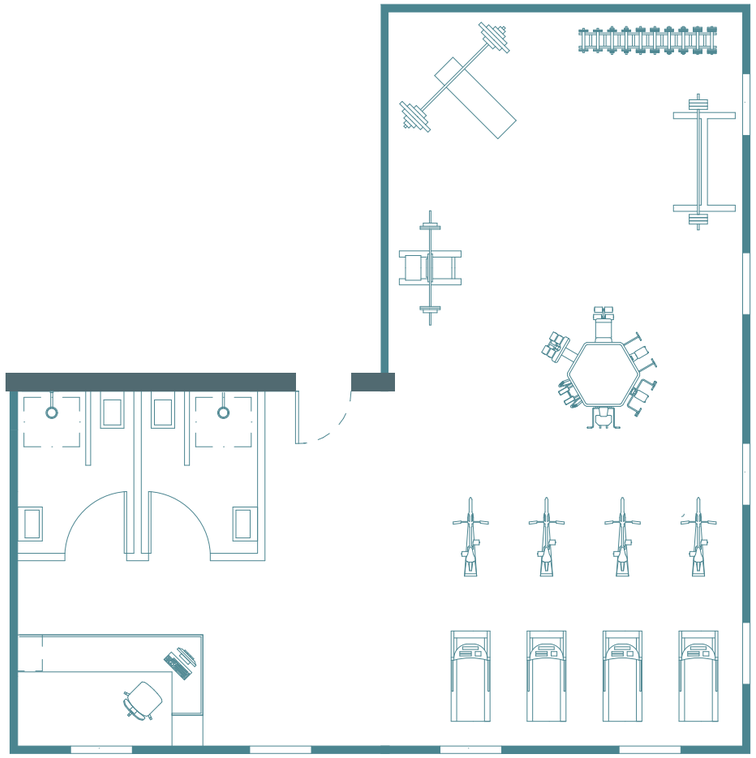
CATALOG OF PROPOSED COMMERCIAL UNITS



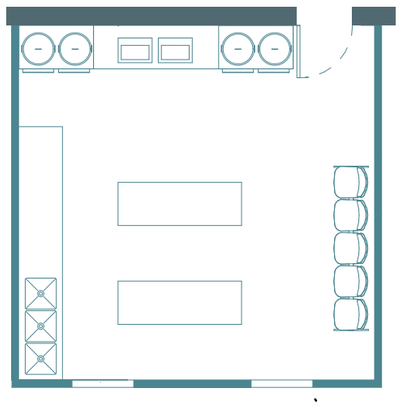
TYPE01
YOGA STUDIO / 72m²



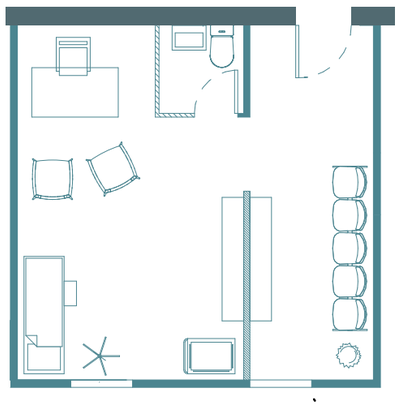
TYPE02
MUSIC ROOM / 36m²



TYPE03
GYM / 108m²



TYPE04
LAUNDRY ROOM / 36m^2



TYPE05
MEDICAL OFFICE / 36m^2

TYPE06
NURSERY / 108m^2

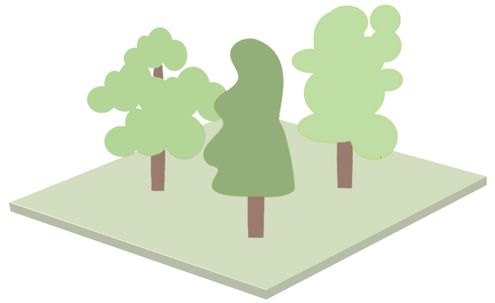
Residence
GREEN

Green space is a big part of this project, the goals was to perserve as much as possible. Along with saving the existing we introduced new types of green space with different functions that will both enrich the project and give more quality to life of residents.

There is five types of proposed green space:

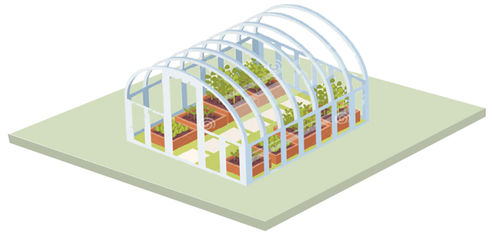
- OPEN GREEN SPACE
- FUNCTIONAL GREEN SPACE
- GREEN HOUSE
- RAIN GARDEN
- URBAN FARMING

Proposed green space can be found in all parts of the site depending of the type we are talking about. Urban farming is located on the south edge of project acting as a buffer between our community and neighbourhood. Green house and rain gardens are planned along with proposed housing meant for living as green pockets located between for close use.

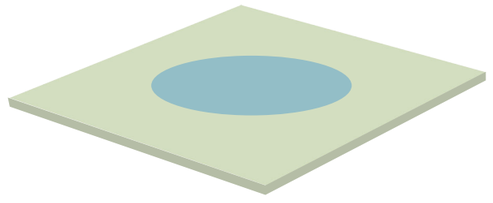


OPEN GREEN SPACE

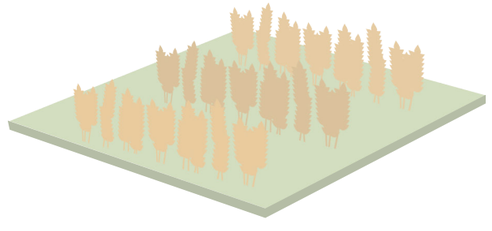
FUNCTIONAL GREEN SPACE



GREEN HOUSE



RAIN GARDEN



URBAN FARMING

Fig.63. Diagrams showing proposed types of green space;

Residence
Green house

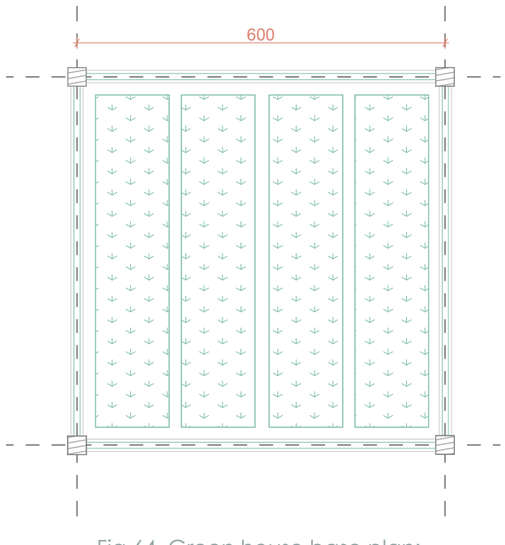
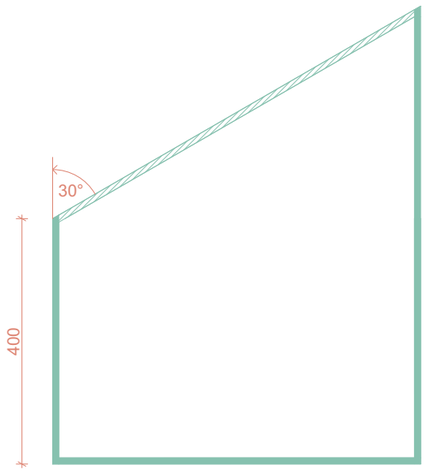


Fig.64. Green house base plan;

One of the main part of planned greeen space in this community is the green house.

It is planned as a single cubical 6mx6m which could be placed as a stand alone or as an add on to the existing residential housing, dependent on needs of residends.



TYPE01
OPTIMAL HEAT
(direct south sunlight)

TYPE02
INTESE HEAT
(full sunlight)

TYPE03
MODERATED HEAT
(bright noon sunlight)

Fig.65. Sections of green house module showing proposed roof types;

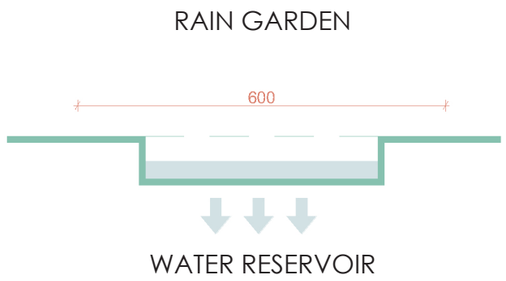


Fig.66. Diagram showing water path of rain garden;

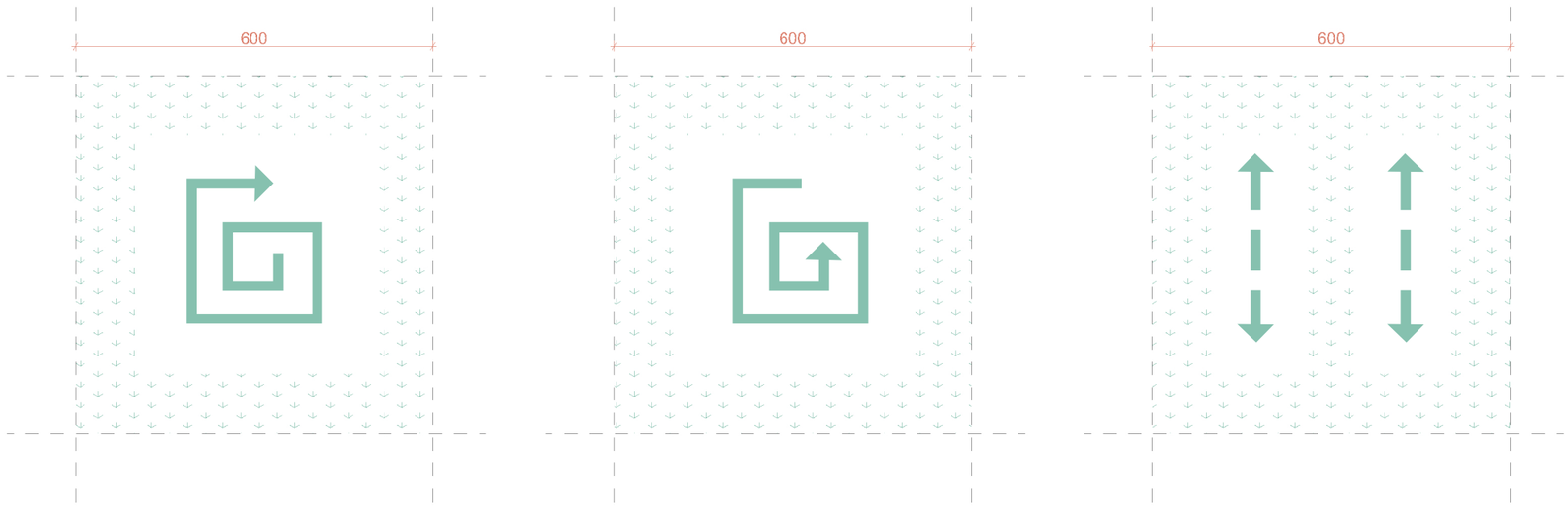


Fig.67. Rain garden base plans showing proposed types;

Visualisation

Fig.68. View of master plan;

Fig.69. View of main street in co-habit area;

Fig.70. View of residence unit;

Fig.71. View of residence area with green pocket containg green houses;

Fig.72. View of residence area with green pocket containg rain garden

Fig.73. View of residence with social aspect;

Fig.74. View of open space with social aspect

Fig.75. View of green aspect showing urban farming and functional green space;

Fig.76. View of housing units with green pockets between;

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