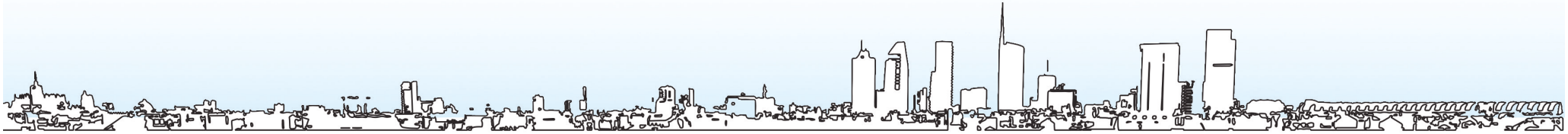
Sustainable student housing: Urban Village in Milan



A Diploma Thesis
presented to the University of Oulu

in fulfilment of the
thesis requirement for the degree of
Master of Architecture
Oulu, Finland, 2023

Authors Acknowledgement and Declaration

In this Mater thesis, It has been tried to prevent outsourcing especially in terms of images and visual communication, where there is no references pointed out, it is author's work.

Master Thesis (Diploma Work)

Sustainable student housing: Urban Village in Milan

University of Oulu, School of Architecture
Master of Science (Architecture)

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May 2023

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Abstract

This diploma thesis represents a sustainable housing design proposal for students co-living in Campus Polimi in Milan, based on integrating urban farming and landscape productivity. This urban village for students is located on an existing green plot on Polytechnic University's campus. This urban village accommodates 87 community-based living units for students.

The topic of the thesis appeared with the emergence of a shortage in housing for bachelor and master students who do not receive organized support since they are not recognized as a vulnerable group of people to housing demand. This issue is addressed with a multi-functional program to optimize the well-being of students. Sustainability is demonstrated via the social and ecological aspects of the design proposal. This prototype is a building consisting of multi-functional spaces providing communal activities like urban farming and co-working areas.

As a result of the research part based on both historical and climatic inspections, an adaptive design based on expanding modularity is produced. This modularity made mixing semi-public spaces with private spaces possible to create a flexible program that can adapt and change to future needs.

This thesis is divided into two parts. The first part briefly investigates the historical and climatic background of the design context through different analyzing methods in terms of historical and climatic visions. In the second part, the investigation's result is instilled into the design process of the building with architectural drawings and diagrams supporting the design proposal.

*Keywords: Student housing, Co-living,climatic proof, sustainability,Urban Farming,*sense of community

TABLE OF CONTENT

1-Introduction

"In every city in the world, housing is the first question architecture deals with."[1] Kwong Architects

As a crucial part of people's well-being, housing is a massive challenge of our time that affects the quality of living in urban areas. Housing is a critical part of urbanization, which requires comprehensive solutions. Housing for students is even more critical in metropolitans due to the high-demanding tendency of international students to admit for the availability and affordability. However, the quality of living in Metropolitans for students is neglected even though designated student housing complexes exist. This problem has started to grow in various aspects of urban student life, this widespread lack of proper housing for young students in a new context, here Milano as a metropolitan, causes a dominant effect on students' quality of life and performance in both living and studies. Therefore, one of the main issues in providing proper sustainable student housing is the lack of sustainable and green spaces in highly dense cities which is Milano, as an international context where various aspects of life and architecture meet, is already tackling the problem of climate change by greenifying its urban setting with an extensive urban reforestation program so-called "Forestami." This proposed sustainable housing aims not only to align its design criteria with urban revival through a green and sustainable built environment but also to create productive communities. This collective action produces food and culinary culture by providing common spaces for urban farming.

1-Kwong Von Glinow.

The chosen site is near the Polytechnic University of Milan campus, within a short time of walking and mobility, contributing to the student's well-being and the eco-friendly design of the built environment nearby. One of the challenges in finding an appropriate site for this project was the need for more vacant plots since the city's vacant spaces are filled already.
This design thesis seeks an approach of design that provides students with spaces for living, working, and studying together that not only benefits them in economic and societal aspects but also contributes to eco-friendly buildings with a sustainable solution like the self-sufficiency of food and energy consumption. From a sustainable design-solution point of view, the building is designed to circulate natural resources like water, energy, food, and waste.
Historic utopian cities inspire the project's social aspects; the ideal city has been a trendy topic in urban planning since the Italian Renaissance emerged. Today it is seen as a reference to planning and instilling the concept of a humane healthy community.
Urban and environmental analysis, literature reviews, and case studies of buildings and urban settings show that the projects that take their design criteria aligned with implementing previous Ideal cities and buildings with eco-friendly solutions result in sustainable projects that have significant improvements and offer innovative architectural language.

Urban and environmental analysis, literature reviews, and case studies of buildings and urban settings show that the projects that take their design criteria aligned with implementing previous Ideal cities and buildings with eco-friendly solutions result in sustainable projects that have significant improvements and offer innovative architectural language.

2-Context and the Issue

Context introduction,Milan metropolitan

The Metropolitan area Located in north of Italy of Milan consists of 3 234 658 inhabitants. (Città Metropolitana Di Milano, 2017.)
Based on govermental and economic policies, Land conversion to residential areas in the past 30 years has been siginificant, the reason behind this rapid transformation is to keep active the economic growth of the country.[2]

2-Elsevier BV, Sept. 2021

3- Fig.1 : Image source: Research Gate

A glance into sustainable housing

Sustainable housing is a broad term to describe, but based on the definitions in RIBA Sustainable Outcomes Guide, Housings designed as sustainable dwellings are supposed to meet their own needs for energy, food, water, and waste management, with minimal reliance on external resources. In general, it is aimed to lessen the carbon footprint and increase resilience and independence. Sustainable housing focuses on reducing dependence on traditional energy, water, and food systems by generating and conserving resources.

In terms of food production, sustainable housing often includes vegetable gardens, orchards, and providing residents with fresh products. This type of housing can offer numerous benefits, including increased food security, reduced environmental impact, and a stronger sense of community. [4]

4-(RIBASustainableOutcomesGuide2019)

Current and future Challenges of housing

Housing is an essential part of human life, making it possible to develop further well-being aspects like education, employment, and social services. According to UN-HABITAT, 30 percent of the world's population will need adequate housing by 2030. The demographics by UN-HABITAT show that 96,000 new housing units are needed based on daily demand by 2030. It is recommended that housing development in a sustainable way should be a centerpiece of policies in urban development and design by putting human rights and well-being at the forefront of sustainable urban development. [5]

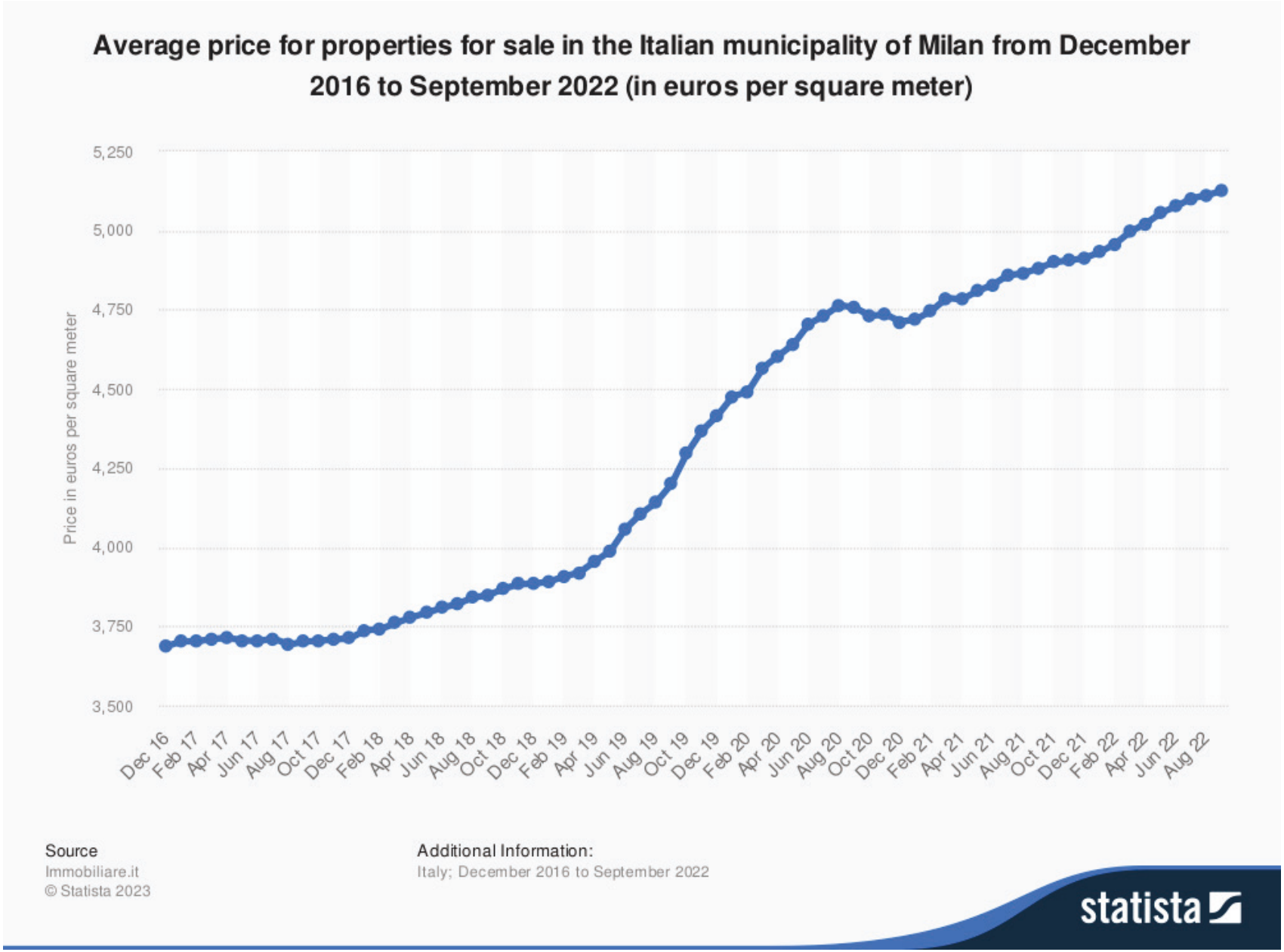
5-unhabitat. "Housing Challenges." .

Student housing Issues in Milan

In European metropolitan cities, there has been a high demand for housing, and even though there are initiatives and organizations for student housing, there is still a shortage of adequate housing units to ensure the well-being of students in a proper way.

Based on the statistics and analysis I found, the design site was chosen in Milan as the site of the proposal due to the lack of affordable housing after analyzing the urban environment and site visit, and I chose a location within the Polytechnic University of Milan properties. It is chosen as it is the property of the University and inside the campus, which makes it accessible for the target group of students with Bachelor's and master's degrees.

This demographic, on the next page, shows the demand for housing in the city of Milan According to the data extracted from Statista. It demonstrates that there has been drastic inflation in the housing industry between December 2016 to September 2022.



6-Fig-2- Average Price for Properties for Sale in Milan Italy.

Lack of adequate housing is a global problem in metropolitan cities, and Milan does not make an exemption. Due to rapid urbanization, gentrification, and rising housing costs, the city suffers from a shortage of affordable housing - including student housing. In this section, the housing industry is responding to these problematic pressures by exploring new ways to reduce environmental impact and promote sustainable development. Such homes can contribute to a positive impact on the demand for housing by ensuring to reduction their carbon footprint and providing renewable energy sources for their development. [7]

Housing and climate-friendly design solution in Milan

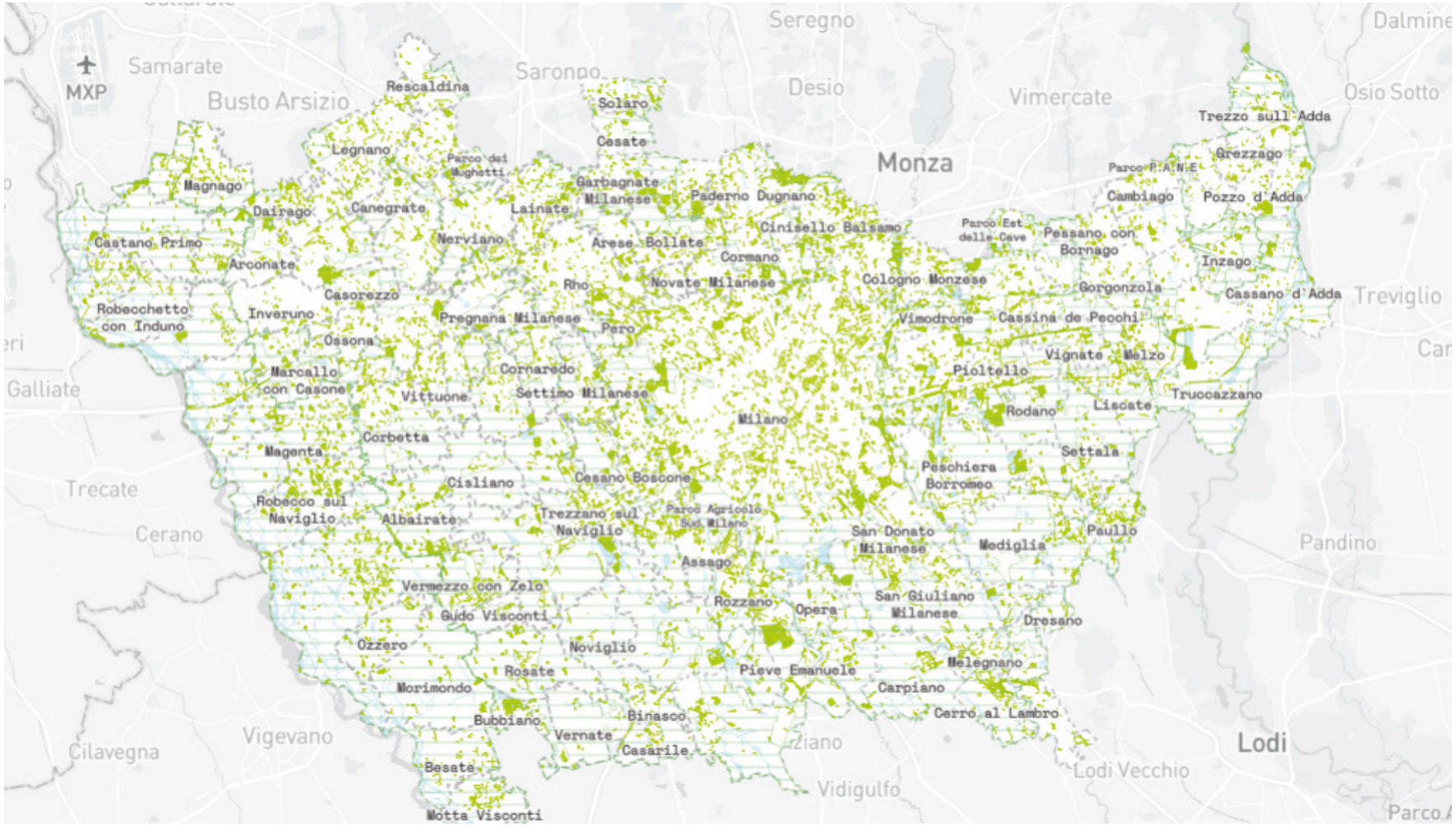
Addressing housing challenges requires a multi-disciplinary approach in terms of urban design and architecture.

In terms of a climate-concerned approach, The Metropolitan City of Milan has experienced an increase in the number of summer days with temperatures exceeding 29°, the number of consecutive days without rain, and the frequency of intense meteoric events due to high average temperatures in the area. This means that the area is experiencing more heatwaves and droughts than before.4 This requires a climate-friendly approach in terms of design.

From an Urban design point of view, Large cities are responsible for 75 percent of carbon dioxide that is produced. To tackle this problem, planting trees is the first step to greenifying the cities [8]. A comprehensive urban reforestation project, the so-called "Forestami," Aims to plant three million high-trunk trees by the year 2030 in order to raise well-being and contribute to be climate-neutral.[9]

8- "Cities and Climate Change." UNEP - UN Environment Programme

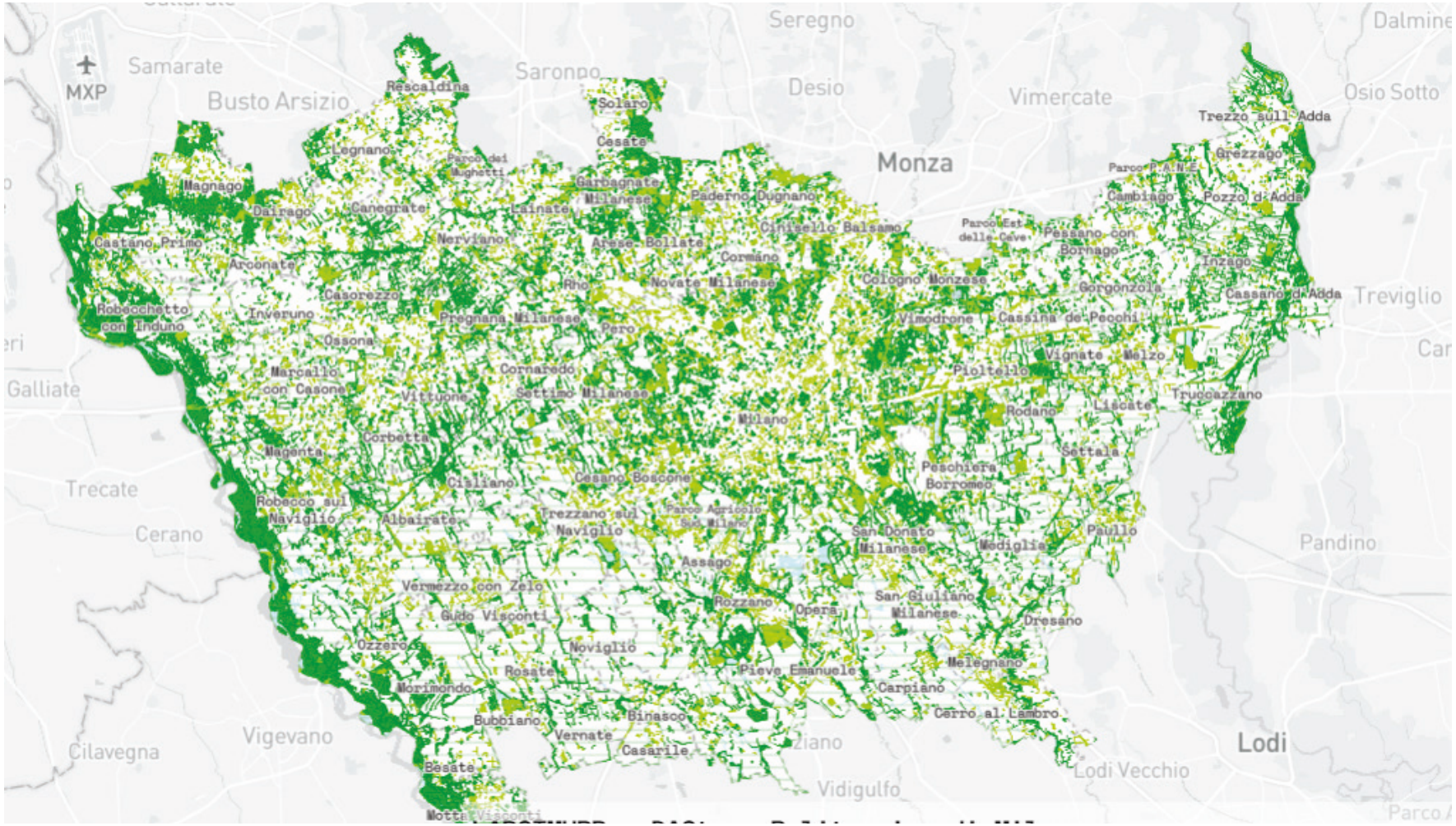
9-"Forestami." Forestami, 21 Apr. 2023



10- mapping of urbanised territory and existing greenery

The photo indicates the importance of green areas of the metropolitan that are critical in terms of urban heat island , and focuses on creating tree canopy cover in order to mitigate the tempreature.

10- Fig-3-ource: Forestami webpage.



11- mapping of urbanised territory and existing greenery
The photo shows the projected area covered by tree canopy.

11- Fig-4-ource: Forestami webpage.

The project is launched by the municipality of Milan in the region of Lombardy as a sustainable initiative to make Milano metropolitan greener and healthier to live by its two million population and three million trees will be provided.

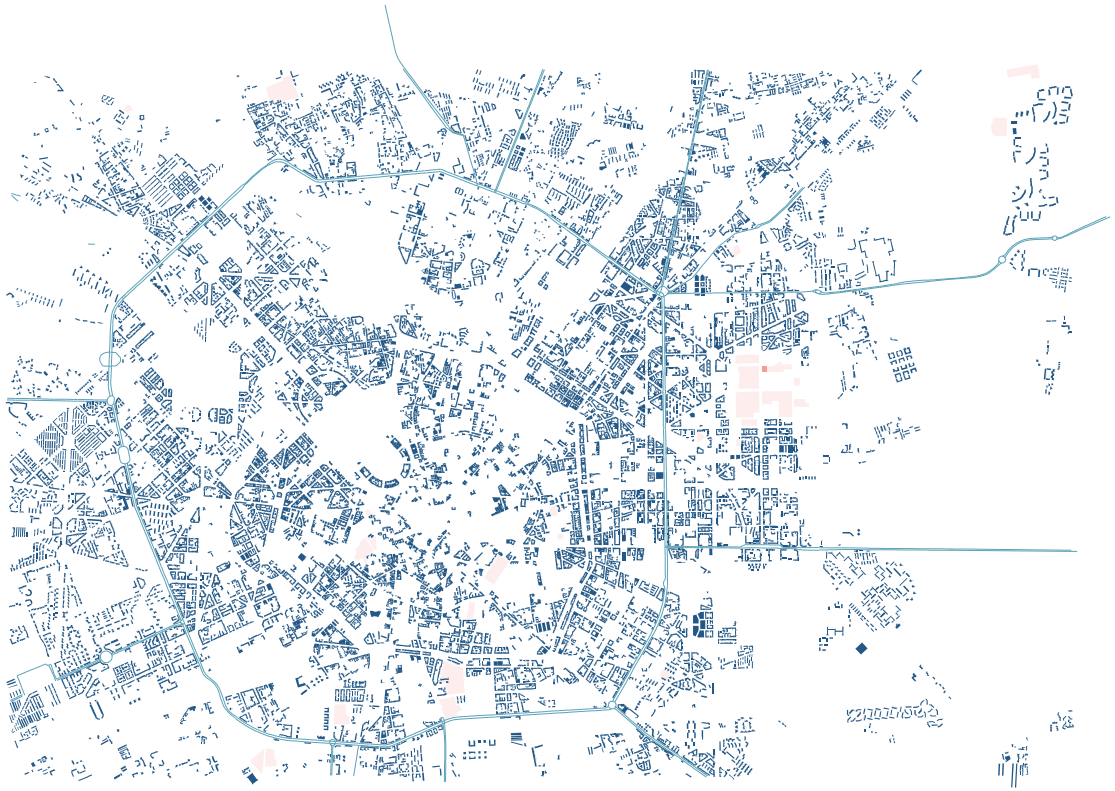
Project's president Stefano Boeri, says to the news agency called Euronews," "Planting trees is the most efficient, inclusive, democratic -- because it involves everybody -- and it's also a way slow down the consequences of climate change." [12]

12-"Forestami." Forestami, 21 Apr. 2023

3- Context analysis

Urban analysis, Metropolitan Scale

The site is situated in Città Studi, situated in the eastern side of Milan, beyond the second historic ring of the city and adjacent to the semi-industrial area and intercity railways. The metropolitan's cathedral Basilica is located at the very core of the city in Cathedral Square Piazza del Duomo and is considered a centerpiece of the city's architecture.



Metropolitan Plan

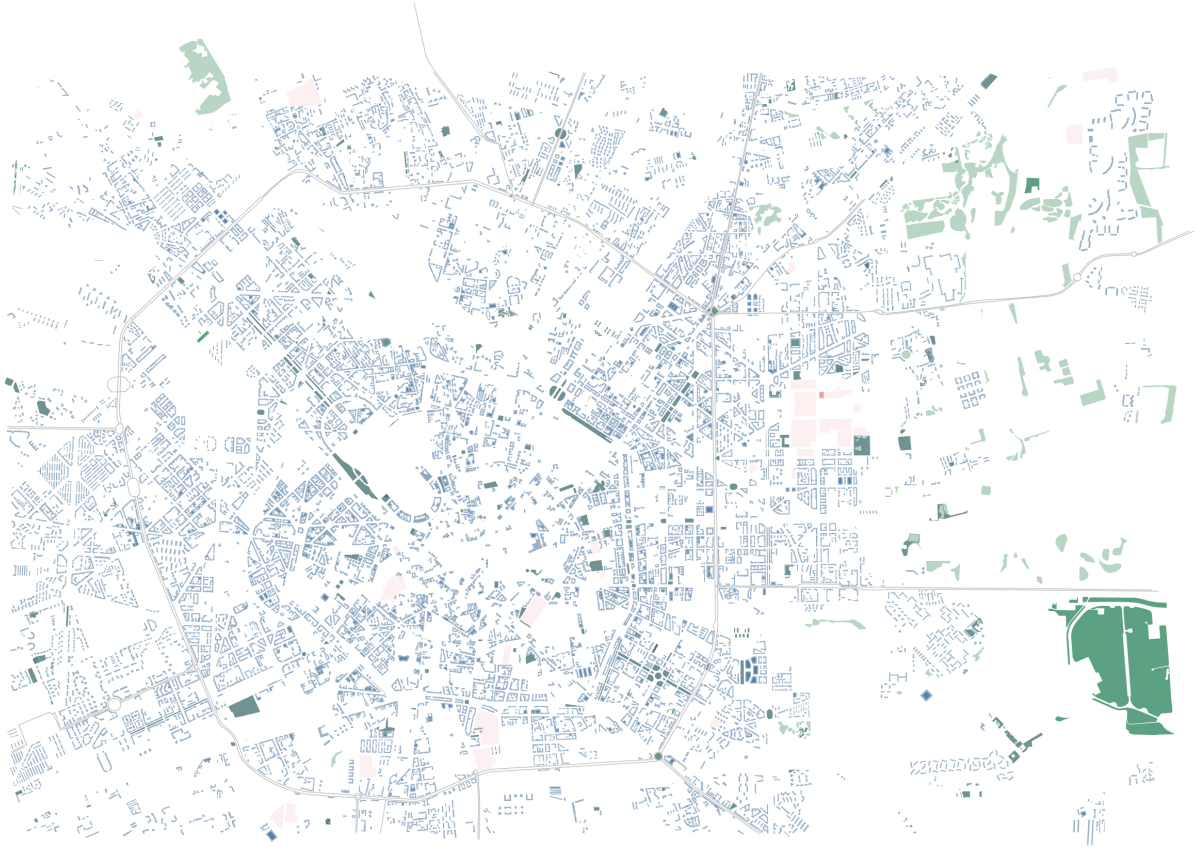
Accessibility in Urban Scale

Milan has nine administrative zones, including Duomu at its centerpiece and other districts surrounding it. As it is shown on the map, the site is located in District 3, accessible by Secondary roads as well as public transport routes, including the subway and Tramline.

Accessibility Plan

Public spaces in Urban Scale

The Site allocated for this thesis is adjacent approximately between 2 to 5 km from the green spaces in peripheral areas in the eastern part of Milan.

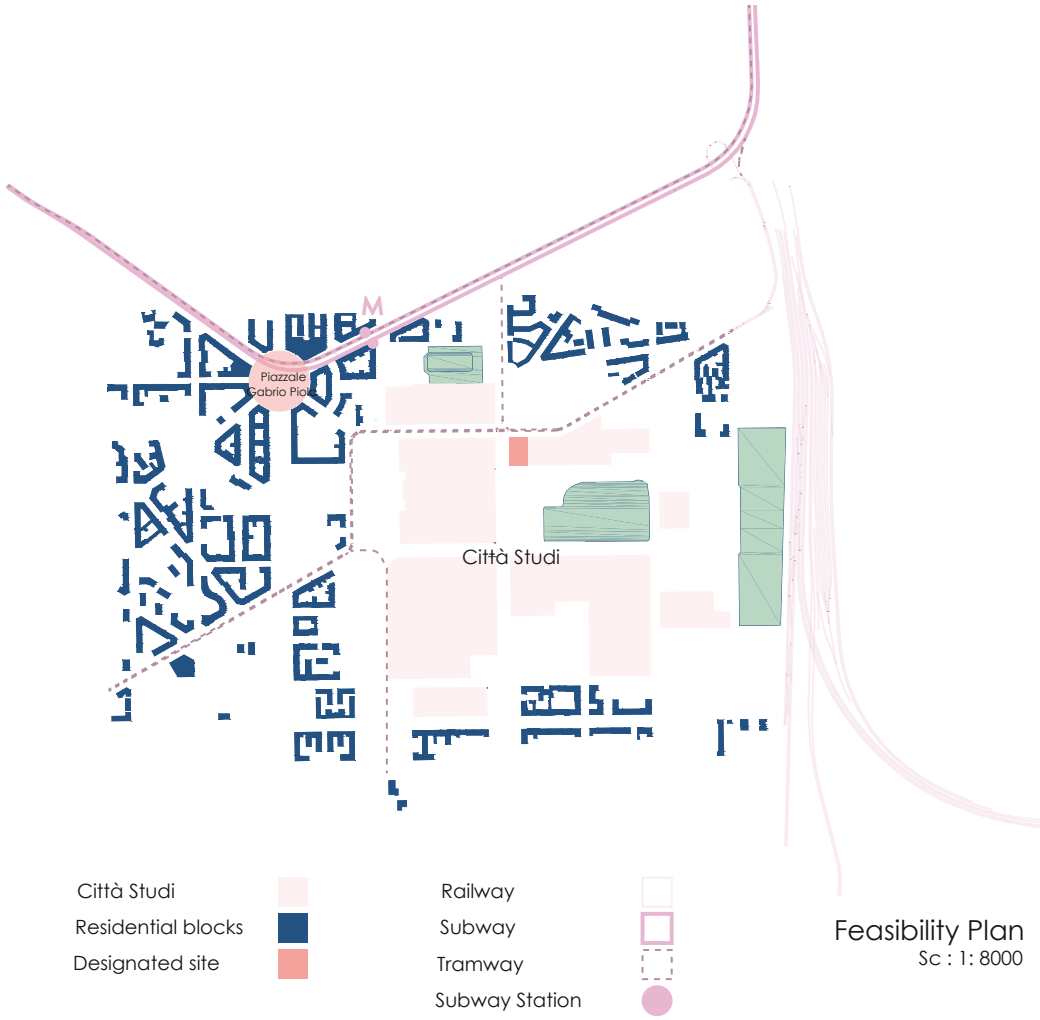


Greenery Plan

Neighborhood Scale

The chosen site is already near the Polytechnic University of Milan campus, across a short time of walking and mobility, which contributes both to the student's well-being also and eco-friendly design for the built environment nearby the university campus. One of the challenges in finding an appropriate site to choose for this project was the lack of vacant plots since the city's vacant spaces are filled already.

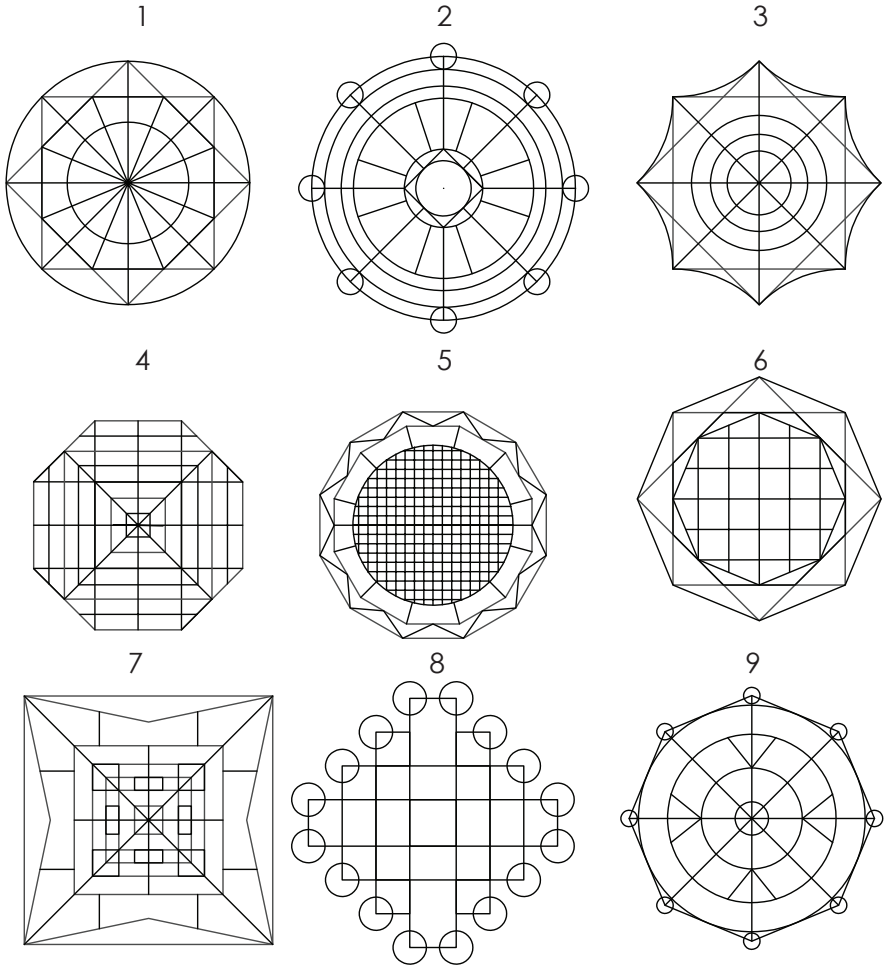
Case: The site area is approximately 2800 square meters and is located in the Città Studi campus of the Polytechnic University of Milan at the intersection of Via Edoardo Bassini and Via Giuseppe Ponzio streets, approximately 250 meters from the Architecture school and the university's library. Other faculties are within a maximum 10-minute walking radius of the site.



Feasibility Plan
Sc : 1: 8000

Historic background, Renaissance City

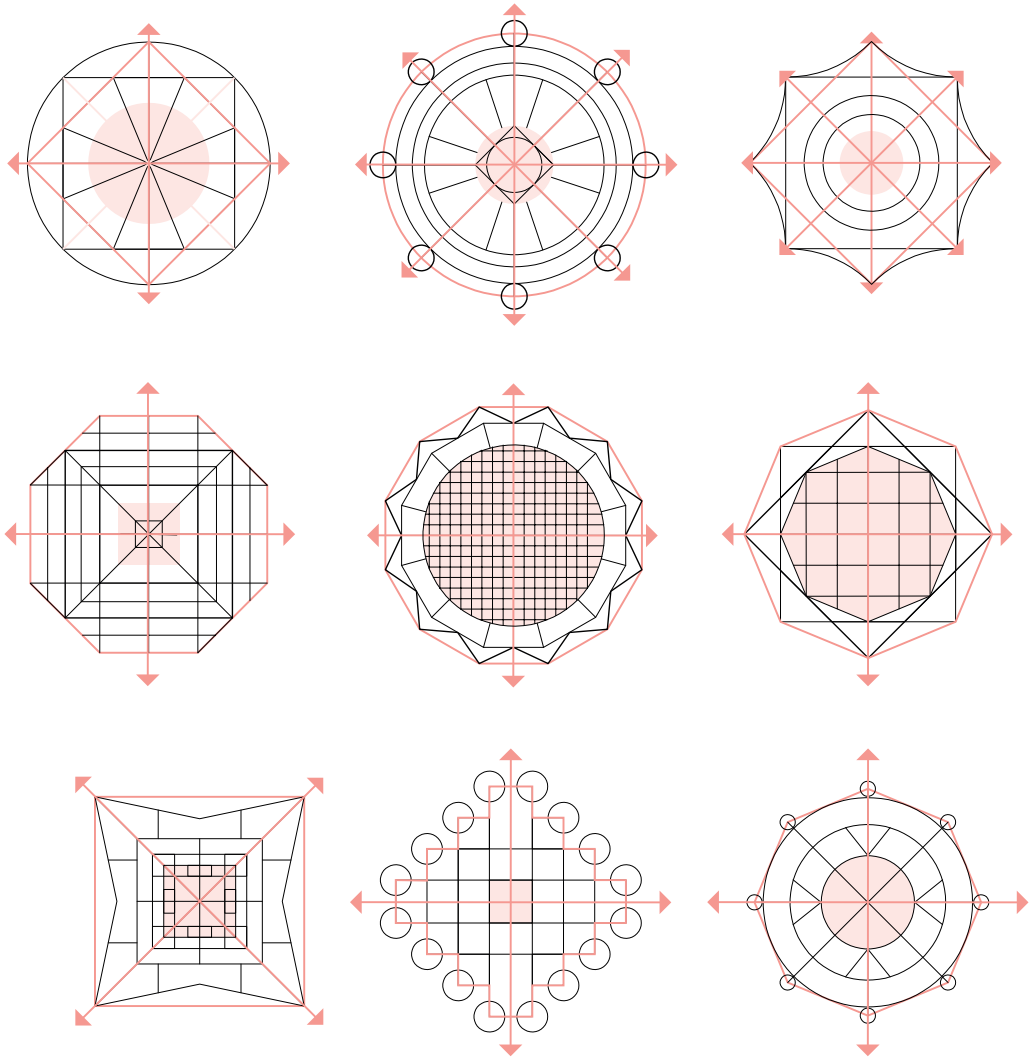
The ideal city has been a trendy topic in urban planning ever since the Italian Renaissance emerged. Today it is seen as a reference to planning and instilling the concept of a humane healthy community. It focuses on human values, urban capabilities, and repeated cultural and artistic revolutions. The idea of a renaissance city yet remained conceptual, and design was ignored through the actual realization of the planning and existing features of the city. [13]



14-Figure-5. Italian Utopian Renaissance city maps. 1. Filarete (1400-1469), 2. Fra Giocondo (1433-1515), 3. Girolamo Maggi (1523-1572), 4. Giorgio Vasari (1511-1574), 5. Antonio Lupicini (1530-1607), 6. Daniele Barbaro (1513-1570), 7. Pietro Cataneo (± 1510-1570), 8 and 9 Francesco di Giorgio Martini (1439-1502).

13-Overstreet, Kaley. "Exploring the History of the Ideal Renaissance

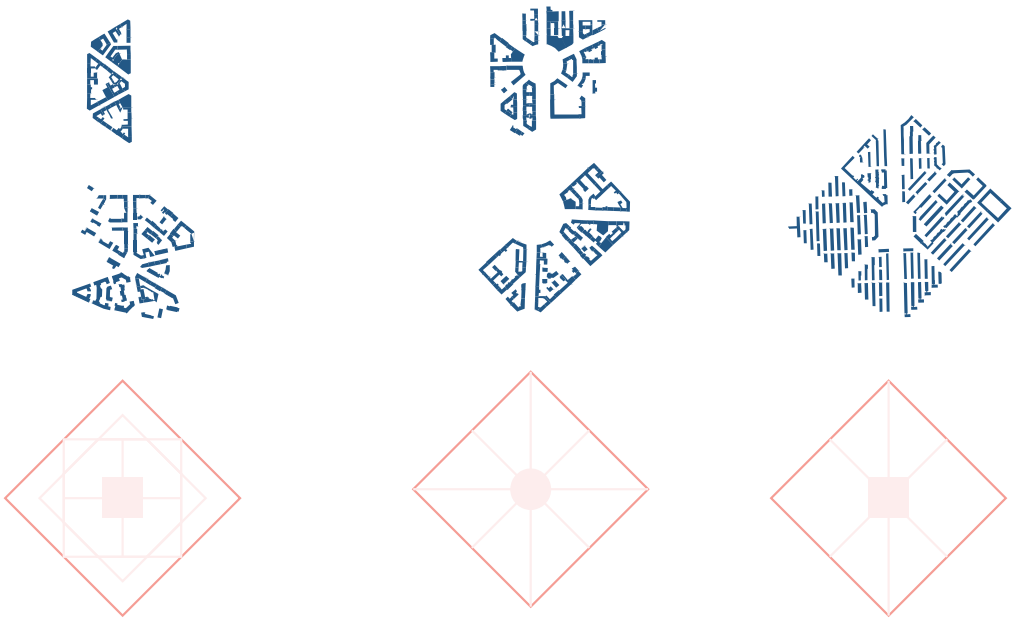
The idealistic Renaissance town is a symmetrical settlement. That plaza, as the most important space of the city, centers out in its heart to interact with the rest of the parts of the city. The symbolism of the planning was conceived as a new perspective of seeing the world with a system that concentrates on humanity and collective civilization called " Imanesimo." It is designed in a way to serve its residents in its best and optimal way. It considers social inclusion and mobility to make collective communities.



Directions, edge, nodes and cored of the Renaissance city maps, by author

Unlike the power-centered monarch building in the heart of the octagonal star shape city of the Renaissance called Sforzinda, the focal point in the proposed design is devoted to public space like a piazza to maximize the social contribution and interaction between people through activities take place in the plaza.

As centuries followed and these cities like Pienza and Sforzinda evolved into other cities with their idea, they were determining a clear perimeter with their surroundings, fortifying themselves with walls as well as marking a long central axe that breaks a variety of programmatic of the city to make in simplified.



Existing urban blocks in Milan, similar to the ideal Renaissance city maps.

Drawings by author

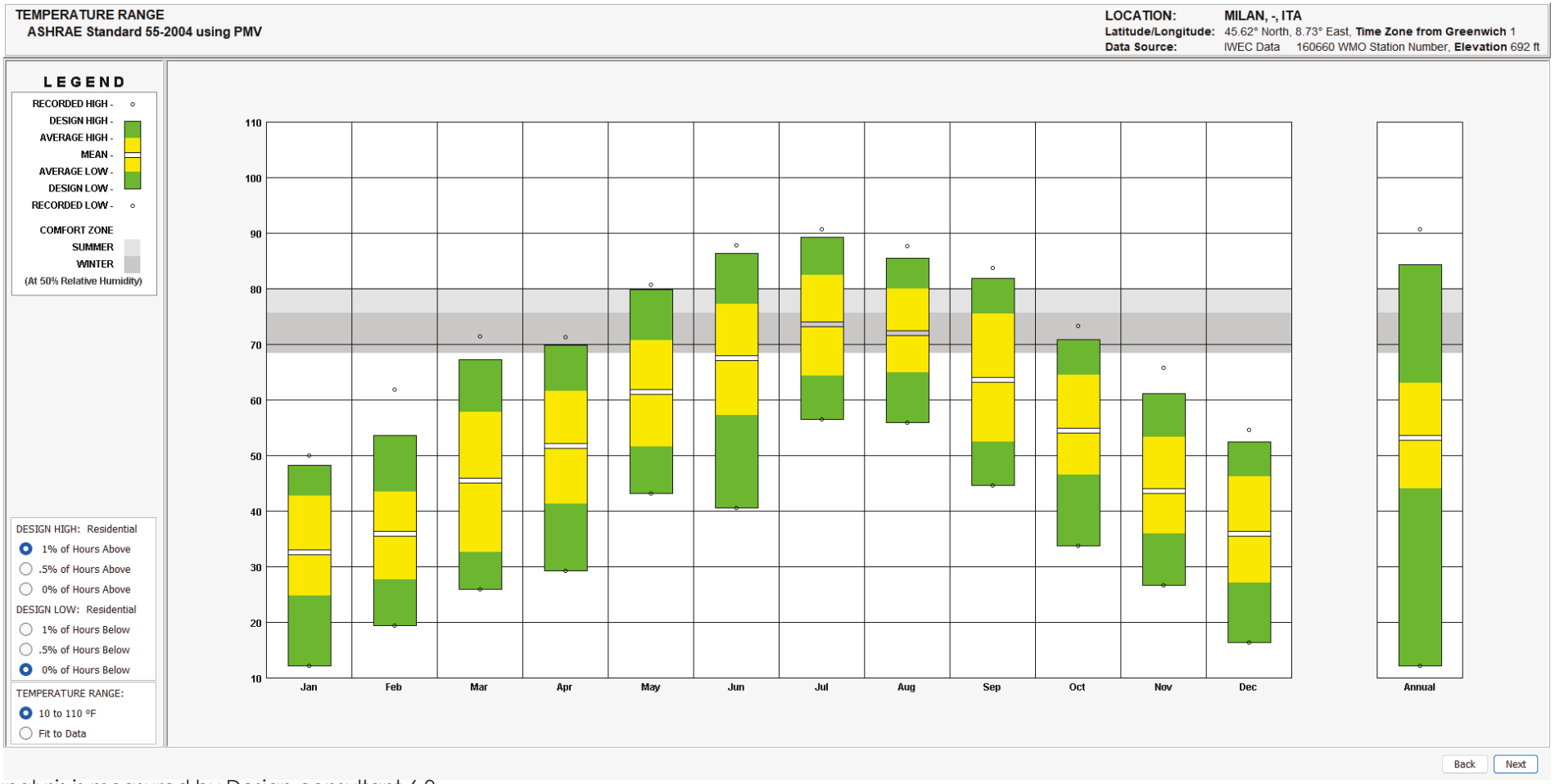
15-Overstreet, Kaley. “Exploring the History of the Ideal Renaissance

Climatic analysis of the context

Climatic analysis is the process of studying the climate of a specific location to determine how it affects the design of buildings and urban spaces. It involves analyzing local climate conditions such as temperature, humidity, wind speed and direction, solar radiation, and precipitation patterns. This analysis aims to help architects and urban designers understand how the climate affects people's comfort in buildings and outdoor spaces. It also helps them design buildings that are energy-efficient and sustainable.

The climatic analysis is a crucial aspect of architecture and urbanism that involves analyzing various parameters. There are several tools available for conducting climatic analysis. In this thesis, the climatic analysis was performed using an AI-powered tool called SPACEMAKER. Additionally, the climatic data for the city of Milan was extracted from a software program called "Climate Consultant 6.0."

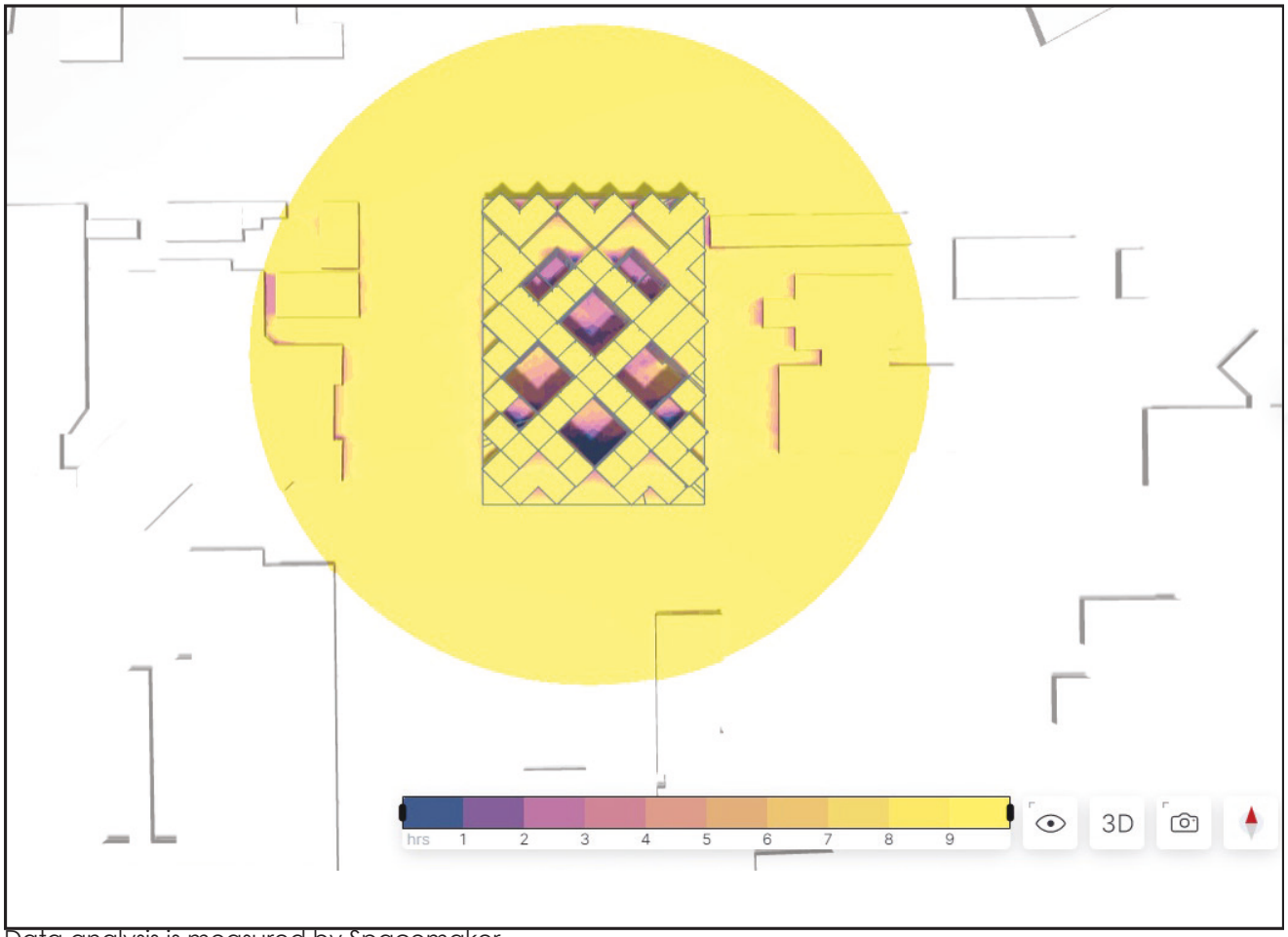
Temerature range of Milan

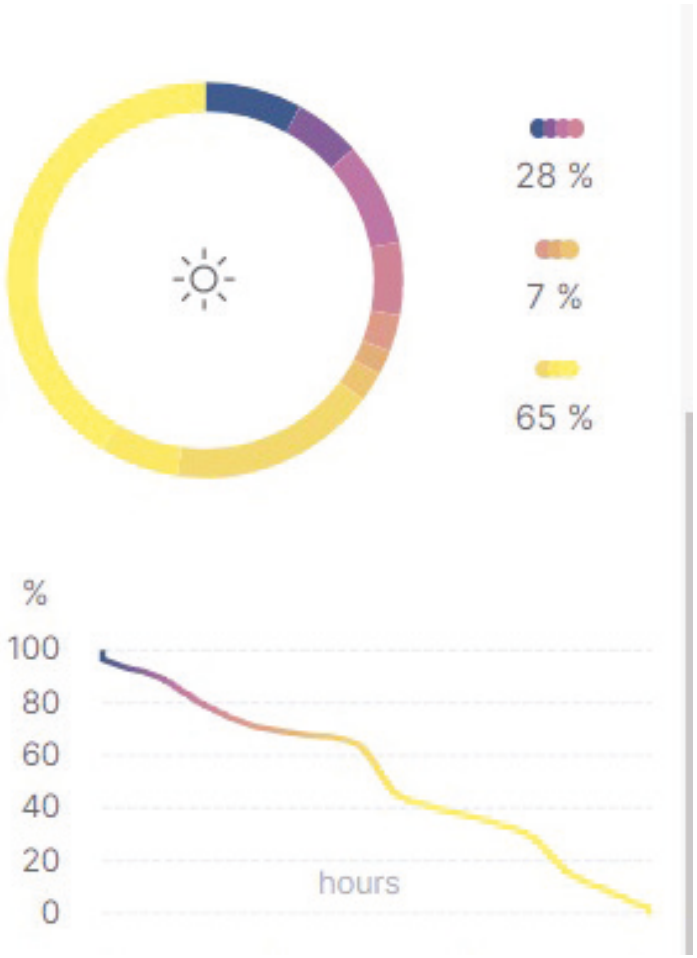


Data analysis is measured by Design consultant 6.0.

This graph shows that in Milan, on average, the annual temperature is relatively moderate, between 5 and 17 degrees Celsius. The highest degree in July is 28 Celsius degree.

Daylight Analysis of the site

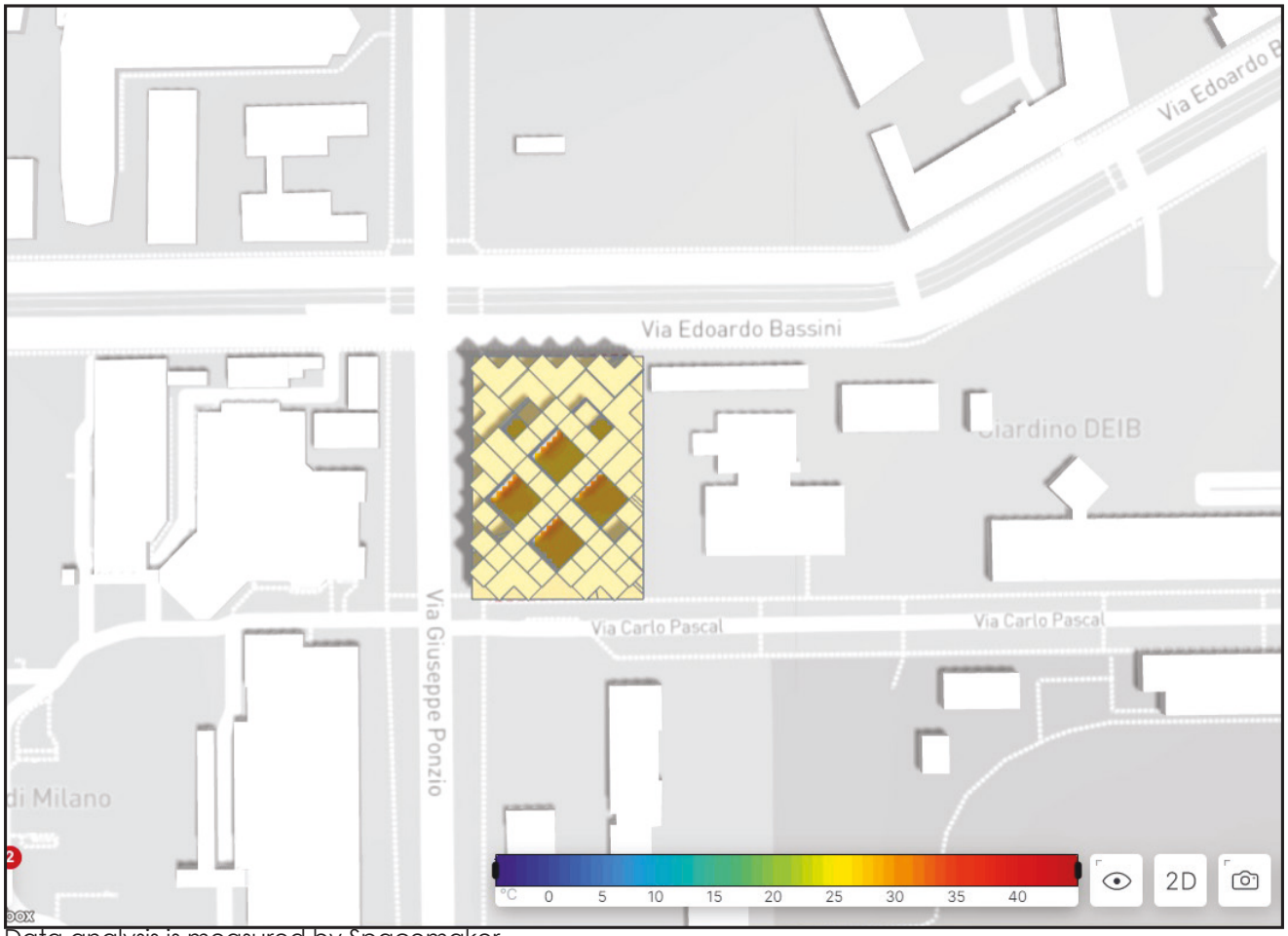


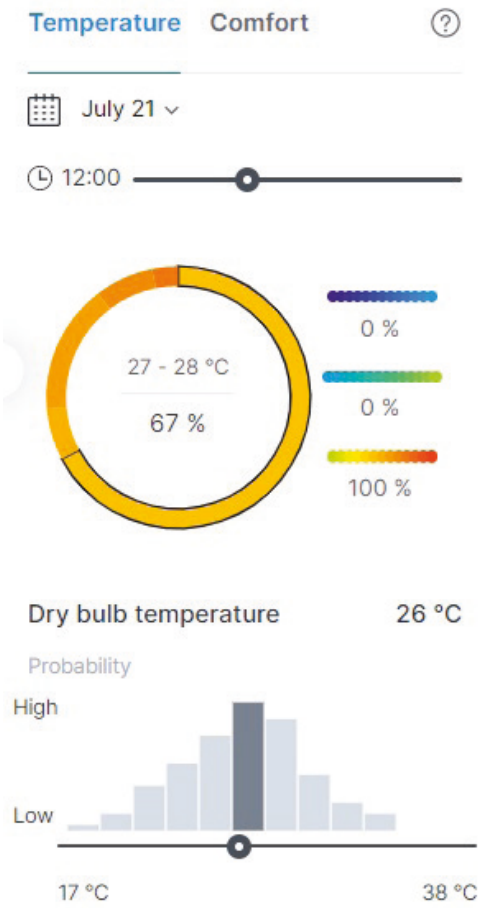


Data analysis is measured by Spacemaker.

This daylight analysis diagram shows that 65% of the areas of the whole building are getting more than 9 hours of daylight on the Summer solstice, which is June 22. However, there is 28 % of the whole areas, including the facade and ground surface, are not exposed to more than 4 hours of sunlight at this time.

Microclimate Analysis of the site:Temperature

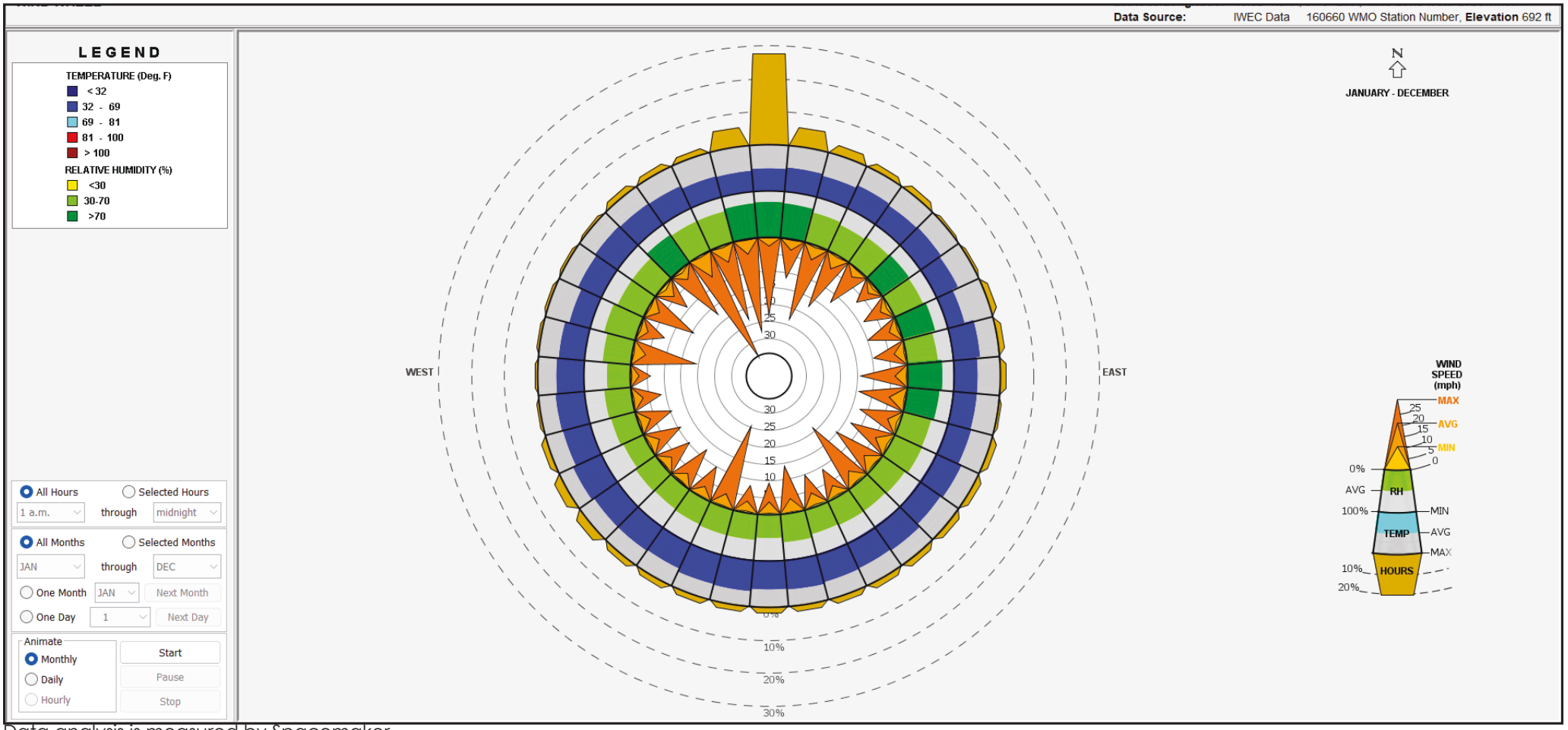




Data analysis is measured by Spacemaker.

This microclimate analysis in terms of average temperature depicts that the Majority of the time (67%), the Dry bulb temperature is between 27 to 28 centigrades in the Courtyards located in the center of the complex to provide comfortable temperature for living.

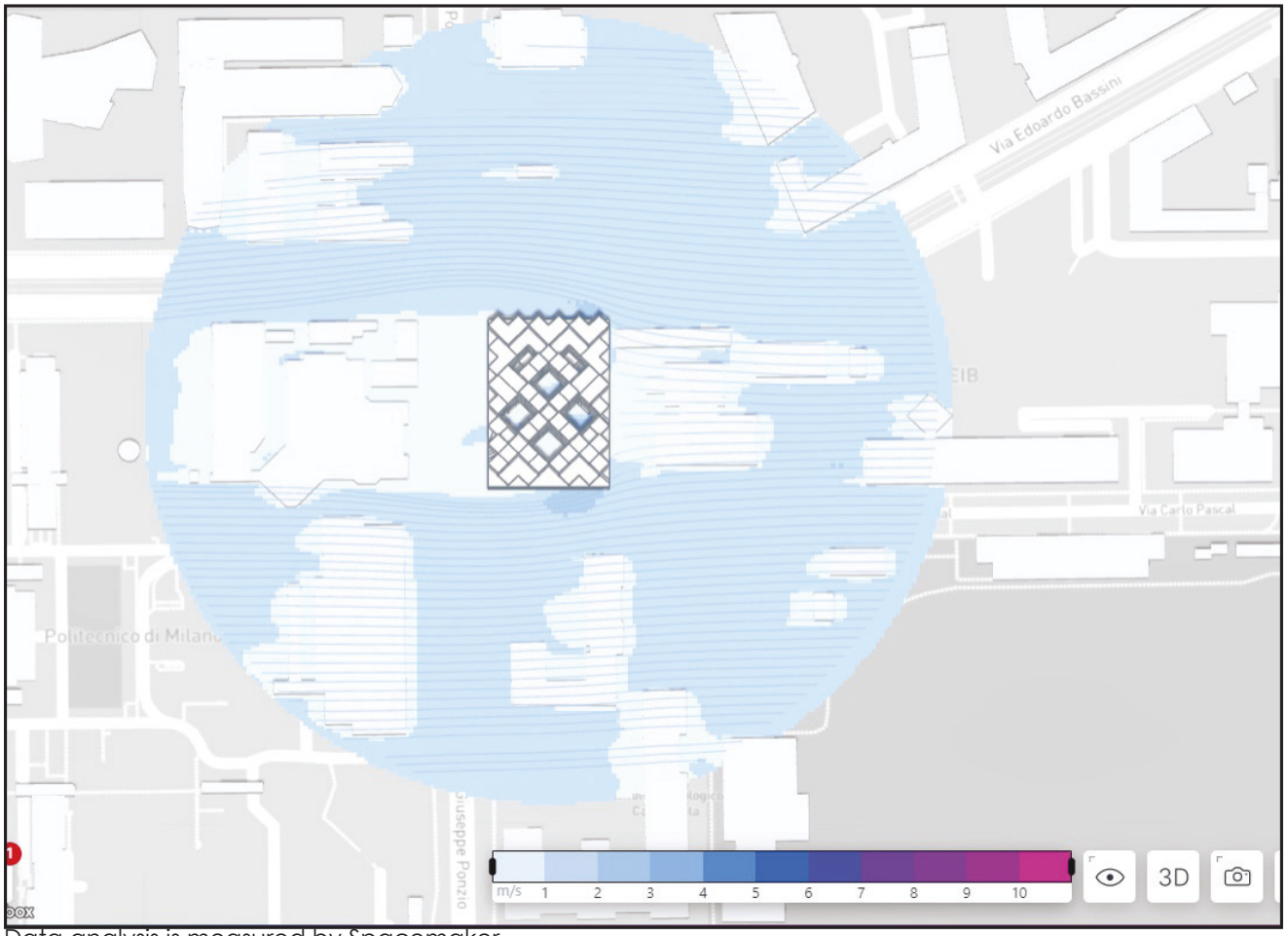
Windwheel analysis of Milan

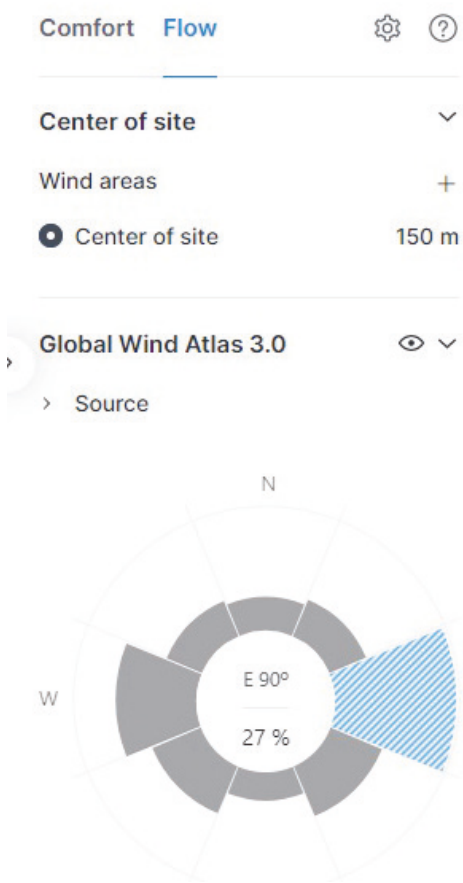


Data analysis is measured by Spacemaker.

This wind wheel indicates that the dominant wind is in the northern direction of the city, whereas the fastest flow of the wind is directed from the North-West side of the metropolitan.

Wind Analysis

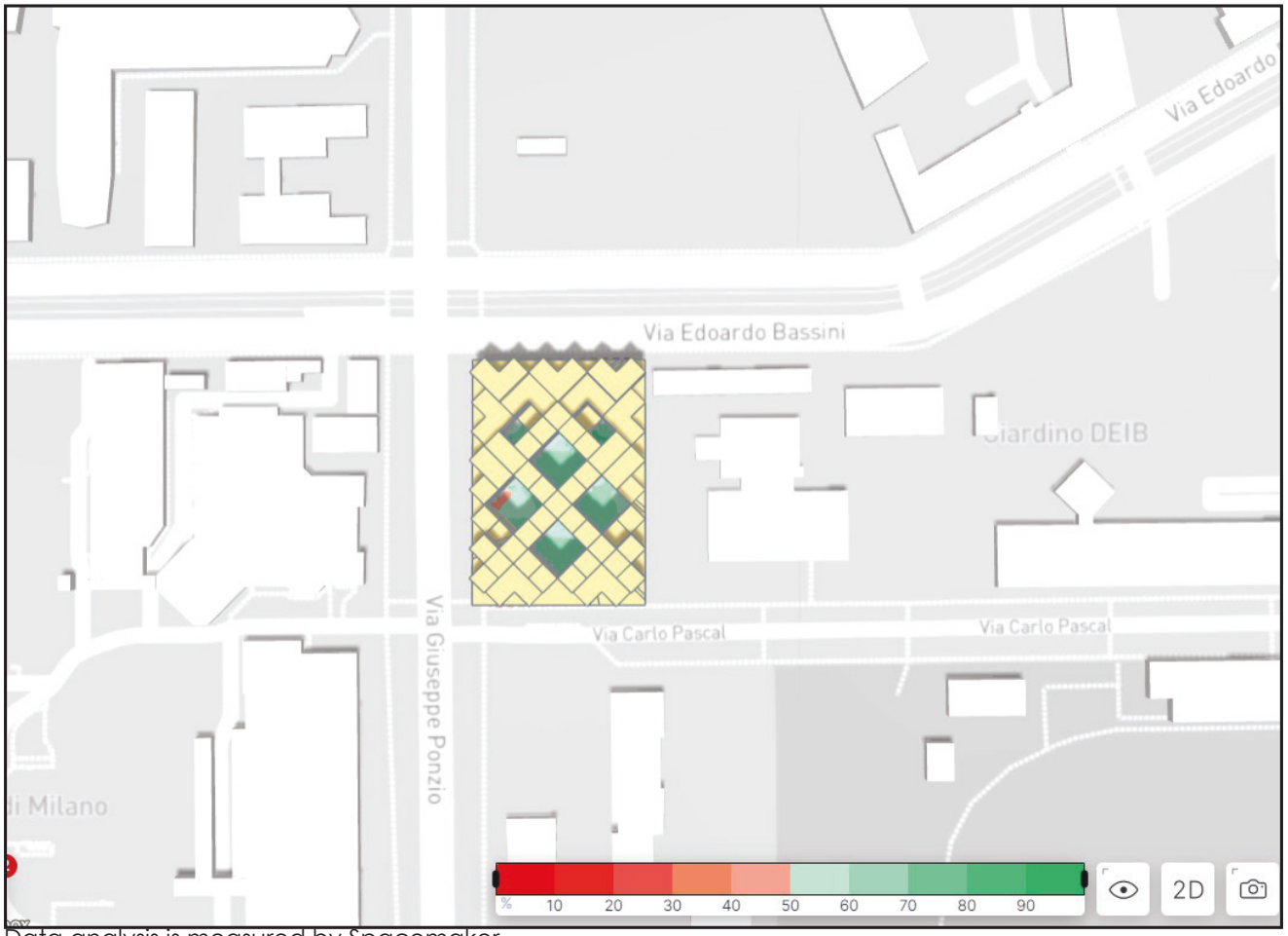


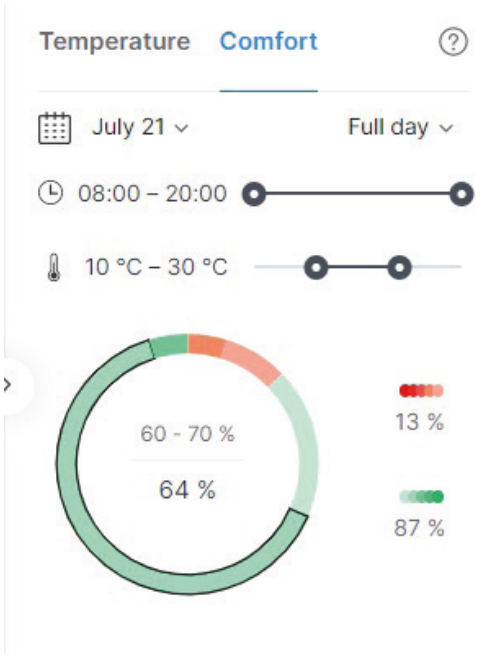


Data analysis is measured by Spacemaker.

This wind flow analysis indicates that due to the piloti that raised the building, wind flows uninterrupted from East to West as the dominant flow of air.

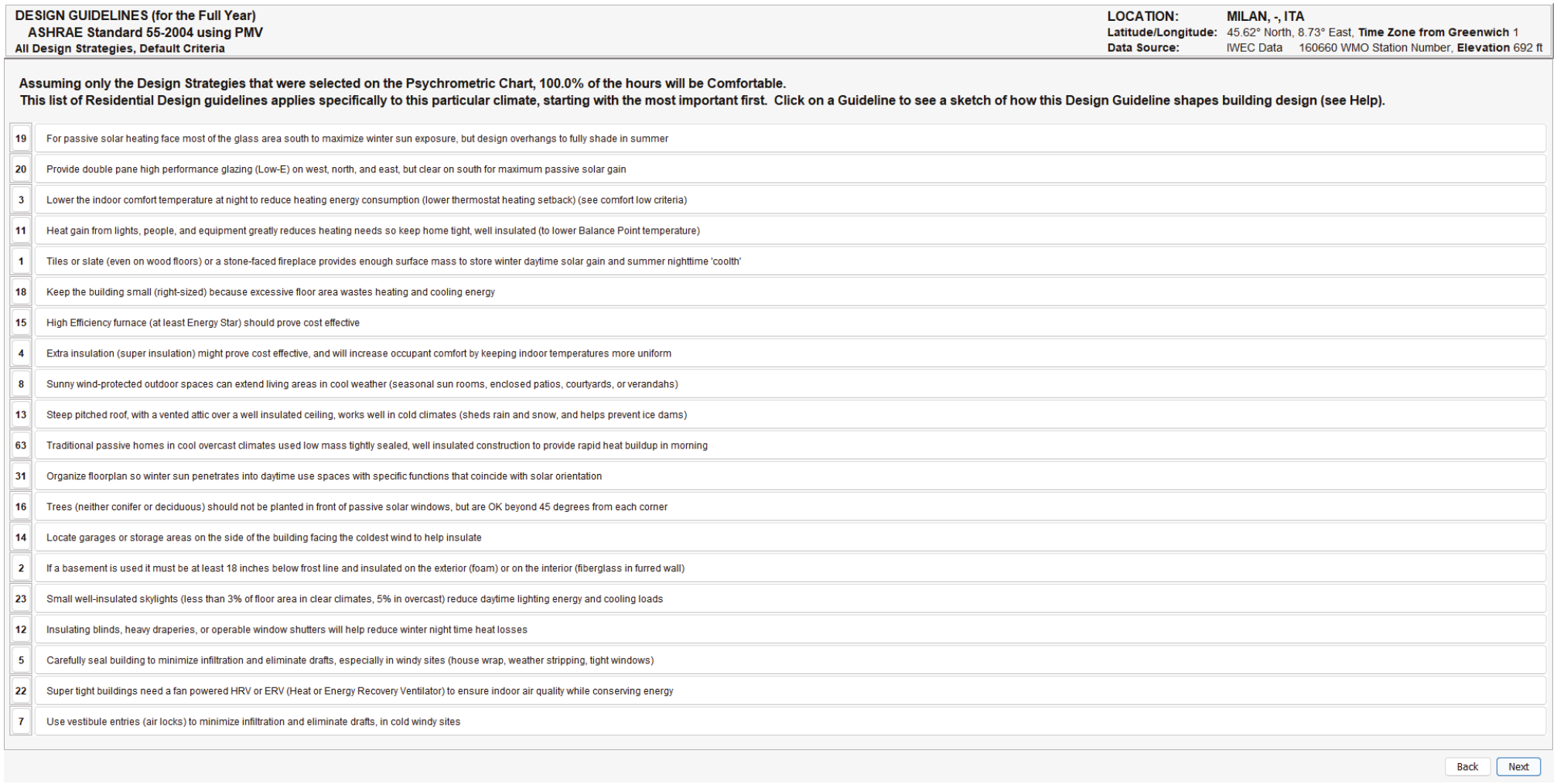
Microclimate Analysis,Comfort





Data analysis is measured by Spacemaker.

This microclimate analysis proves 64% of the time; there is a high probability of comfort between 10 to 30 centigrades in the open spaces of the complex on the day of July 21.



DESIGN GUIDELINES (for the Full Year)
ASHRAE Standard 55-2004 using PMV
All Design Strategies, Default Criteria

LOCATION: **MILAN, -, ITA**
Latitude/Longitude: 45.62° North, 8.73° East, **Time Zone from Greenwich** 1
Data Source: IWEC Data 160660 WMO Station Number, **Elevation** 692 ft

Assuming only the Design Strategies that were selected on the Psychrometric Chart, 100.0% of the hours will be Comfortable.
This list of Residential Design guidelines applies specifically to this particular climate, starting with the most important first. Click on a Guideline to see a sketch of how this Design Guideline shapes building design (see Help).

19	For passive solar heating face most of the glass area south to maximize winter sun exposure, but design overhangs to fully shade in summer
20	Provide double pane high performance glazing (Low-E) on west, north, and east, but clear on south for maximum passive solar gain
3	Lower the indoor comfort temperature at night to reduce heating energy consumption (lower thermostat heating setback) (see comfort low criteria)
11	Heat gain from lights, people, and equipment greatly reduces heating needs so keep home tight, well insulated (to lower Balance Point temperature)
1	Tiles or slate (even on wood floors) or a stone-faced fireplace provides enough surface mass to store winter daytime solar gain and summer nighttime 'coolth'
18	Keep the building small (right-sized) because excessive floor area wastes heating and cooling energy
15	High Efficiency furnace (at least Energy Star) should prove cost effective
4	Extra insulation (super insulation) might prove cost effective, and will increase occupant comfort by keeping indoor temperatures more uniform
8	Sunny wind-protected outdoor spaces can extend living areas in cool weather (seasonal sun rooms, enclosed patios, courtyards, or verandahs)
13	Steep pitched roof, with a vented attic over a well insulated ceiling, works well in cold climates (sheds rain and snow, and helps prevent ice dams)
63	Traditional passive homes in cool overcast climates used low mass tightly sealed, well insulated construction to provide rapid heat buildup in morning
31	Organize floorplan so winter sun penetrates into daytime use spaces with specific functions that coincide with solar orientation
16	Trees (neither conifer or deciduous) should not be planted in front of passive solar windows, but are OK beyond 45 degrees from each corner
14	Locate garages or storage areas on the side of the building facing the coldest wind to help insulate
2	If a basement is used it must be at least 18 inches below frost line and insulated on the exterior (foam) or on the interior (fiberglass in furred wall)
23	Small well-insulated skylights (less than 3% of floor area in clear climates, 5% in overcast) reduce daytime lighting energy and cooling loads
12	Insulating blinds, heavy draperies, or operable window shutters will help reduce winter night time heat losses
5	Carefully seal building to minimize infiltration and eliminate drafts, especially in windy sites (house wrap, weather stripping, tight windows)
22	Super tight buildings need a fan powered HRV or ERV (Heat or Energy Recovery Ventilator) to ensure indoor air quality while conserving energy
7	Use vestibule entries (air locks) to minimize infiltration and eliminate drafts, in cold windy sites

Back Next

According to ASHRAE's design guidelines, a set of standardized criteria for user comfort is focused on consideration in the design proposal.
The guidelines that are focused on the design process are as follows below:

-Facingmostoftheopeningtowardthesuntomaximizewintersunexposureresultinginpassivesolargain.
- Providing sunny wind-protected outdoor spaces like patios, courtyards, and verandahs.

4-Solutions and Ideas

Solutions for sustaiability of the building

The broad spectrum of sustainable solutions only covers some aspects of this proposal. However, some solutions based on sustainable development are considered, which are briefly below, extracted from RIBA Sustainable Outcomes Guide Booket [16] ,and Housing 2030 by UN-HABITAT. [17]

1-Housing Landuse: Land policies significantly impact the ability of housing systems to provide affordable and adequate homes. The land is at the core of adequate housing and is essential for affordable housing. [18]

In terms of implementing these policies, two main aspects have been considered in the process of design, which are:

I- Layout: The building is organized in a fluid and open-plan approach that allows different units to have accessibility and natural sunlight.

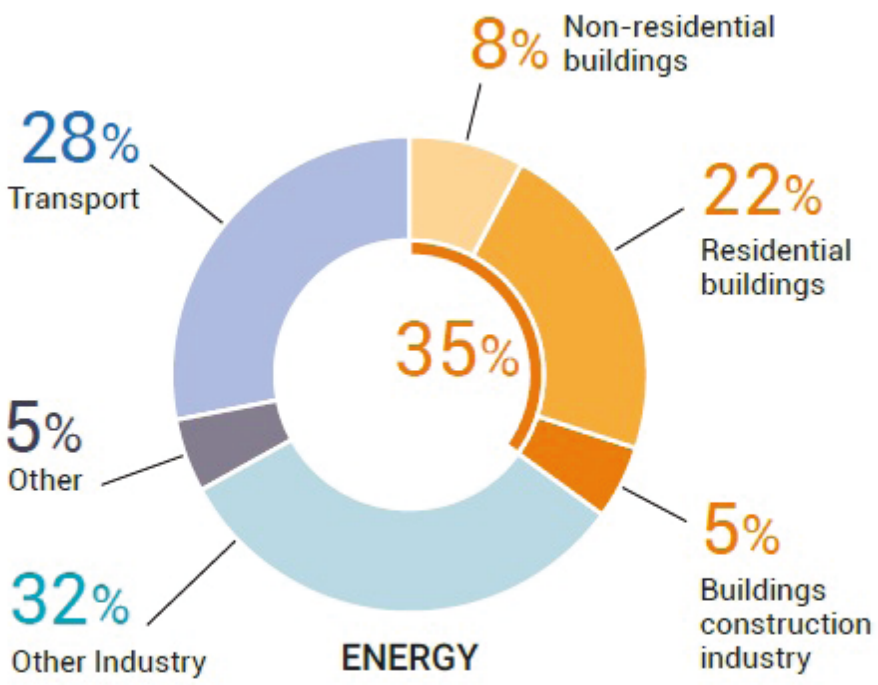
II-Orientation: Based on the environmental analysis presented before, the optimal form-finding of the building is oriented to receive natural light.

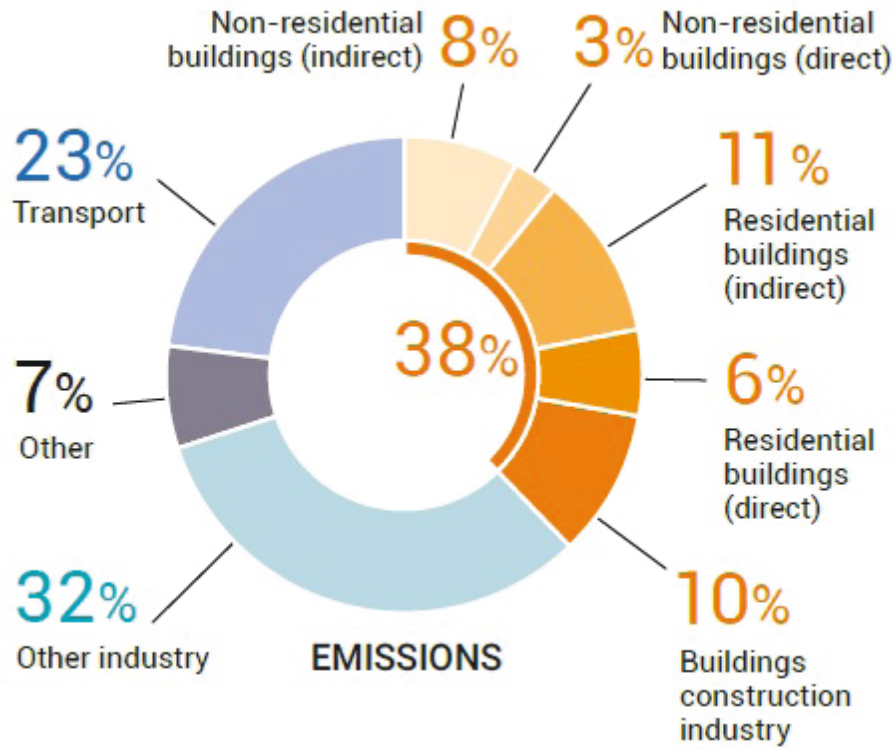
16- (Sustainable-outcomes-guide)

17- "Housing2030: Effective Policies for Affordable Housing in the UNECE Region.

18- "The-role-of-land-in-achieving-adequate-and-affordable-housing.

2- Climate-neutral housing: According to UNECE, buildings consume over 70% of electricity and 35% of primary energy in economically developed countries. They are also responsible for 38% of CO2 emissions from combustion.[19] Therefore, policies and solutions to achieve climate-neutral housing through housing construction exist.





19-"Updated Framework Guidelines for Energy Efficiency Standards in Buildings."

20-Flg6-"Updated Framework Guidelines for Energy Efficiency Standards in Buildings."

Based on the information regarding the contribution of the building industry to Co2 emissions, there are policies that can be implemented in order to minimize this effect and mitigate the carbonization of the housing. These ideas are inspired by the information abovementioned.

There are several solutions to create climate-neutral housing; some are focused on in this thesis to implement in policies and design processes.

I- Material sustainability: Using Timber structure as a biomaterial is a solution to mitigate emissions for construction. Biomaterials offer an alternative construction product that is typically biodegradable at the end of life, helping to regenerate natural systems. Biomaterial building products can contribute to occupants' comfort with healthier indoor conditions regarding air quality, temperature control, and humidity regulation. [21]

21- UNECE, Framework Guidelines for Energy Efficiency Standards in Buildings

II- Renewable Energy: Fossil fuels such as coal, oil, and gas are the most significant contributors to global climate change. According to UN climate action, they account for over 75% of global greenhouse gas emissions and nearly 90% of all carbon dioxide emissions.[22]

Renewable energy is vital for sustainable development because it is cleaner than fossil fuels. It is essential for a safer, cleaner, and sustainable world. The United Nations has set a goal to increase the share of renewable energy in the global energy mix by 2030. Societies worldwide are transforming how they produce and use energy, moving away from fossil fuels towards cleaner, renewable forms of energy. [23]

II-Recycling water and food: Recycling food and water is a crucial aspect of sustainability. Composting is one method of reducing food waste and greenhouse gas emissions that contribute to climate change. Food loss and waste are responsible for an estimated 8-10% of global greenhouse gas emissions, while the use of land and water resources puts increasing pressure on biodiversity.[24]

22-United Nations. "Renewable Energy – Powering a Safer Future

23-United Nations. "Renewable Energy – Powering a Safer Future

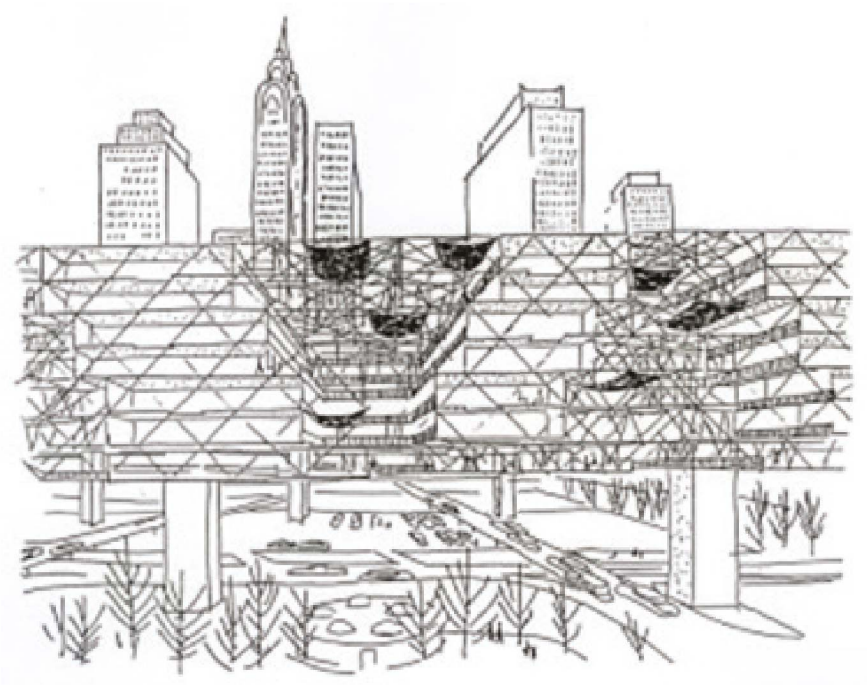
24-United Nations Environment Programme. "How Composting Can Reduce Our Impact on the Planet."

5-Reference Projects

Sustainability through adaptive and flexible housing:

As Yona Friedman says: Buildings must "touch the ground with a minimum surface area; be collapsible and movable; be transformable at will by the inhabitant."

In this project, the flexibility of the design helps the residents to have freedom of choice in a multilayered design or housing complex in an urban space. It can be fitted over less-used areas and in-fill. The aim of the project is to expand the city within its boundaries and without demolishing the existing buildings.[25]

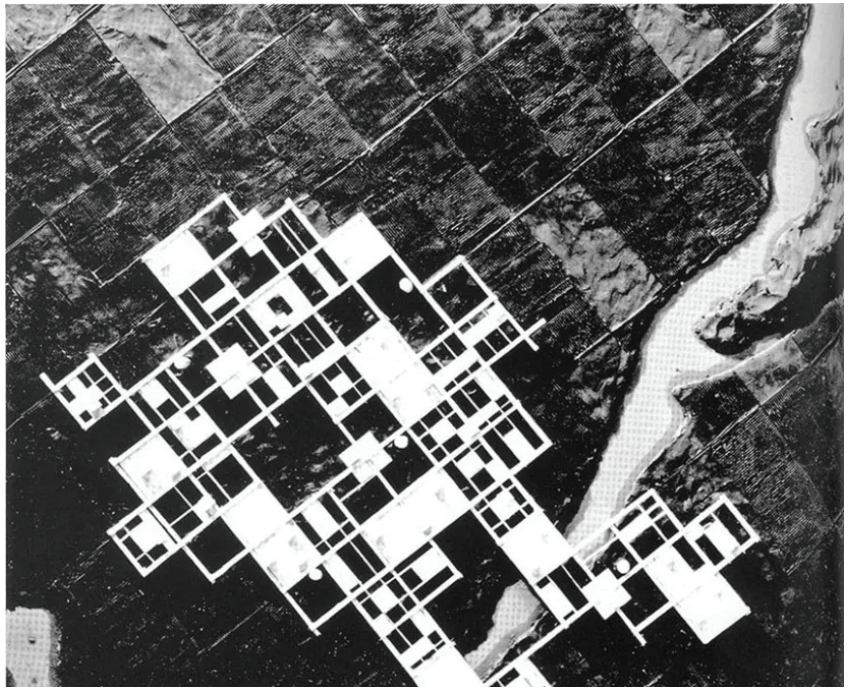


26-Fig7-Ville Spatiale, a theater of daily life over the city of New York, Yona Friedman, 1964

Sustainability and Community run architecture:

Sustainability through community-run architecture is an approach that gathers people around an activity through architectural design.

Kisho Kurokawa's Agricultural city is one of those different types of cities, such as agricultural, industrial, or consuming cities that have to form a compact community. The living units multiply spontaneously without any hierarchy, gradually bringing the village into being a traditional rural settlement.[27]



Agricultural city by, Kisho Kurokawa, 1960, Aichi, Japan.

28-Fig8- -Investigations in collective form

Sustainability via social inclusion and affordability, European responsible housing

La Borda Housing in Barcelona is different from a typical housing development because it promotes a communal living model. By prioritizing common space over private dwelling space and fostering community life through shared common facilities and spaces, La Borda aims to optimize its space and resources while encouraging interaction between residents.[29]

La Borda is also focused on sustainability in both the low environmental impact of the construction project and the sustainable usage of the building. The construction methods and materials used have been chosen to minimize the environmental footprint of the project without raising costs. The building's residents are encouraged to use it responsibly and sustainably to minimize the consumption of natural resources.

29-European responsible housing

30-Fig9- The South Facade © Fundació Mies van der Rohe

31-Fig-10-The patio © Fundació Mies van der Rohe

32-Fig-11-The multipurpose room seen from patio © Fundació

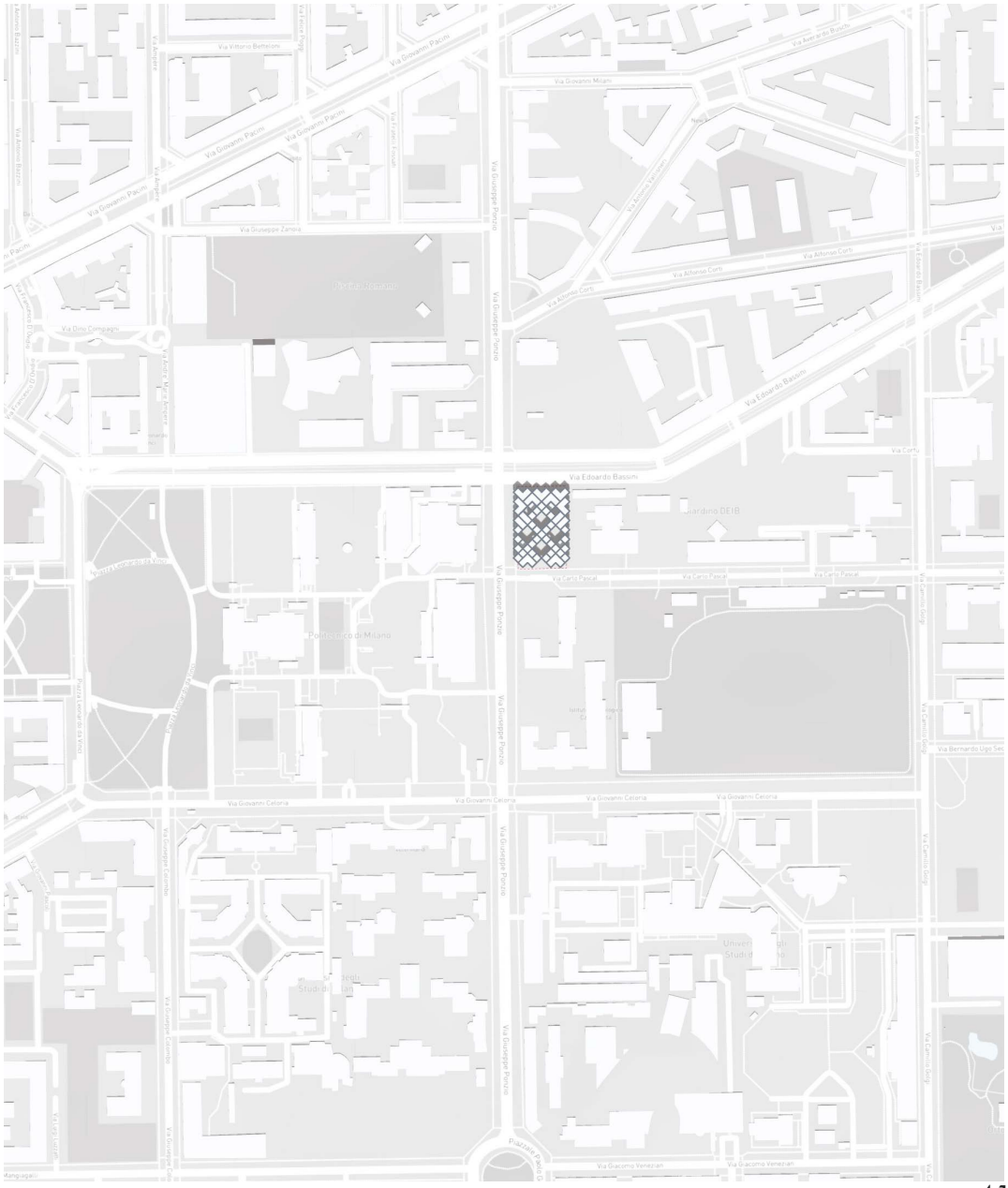
33-Fig-12-The multipurpose room © Fundació Mies van der Rohe-

6-Design Process and outcome

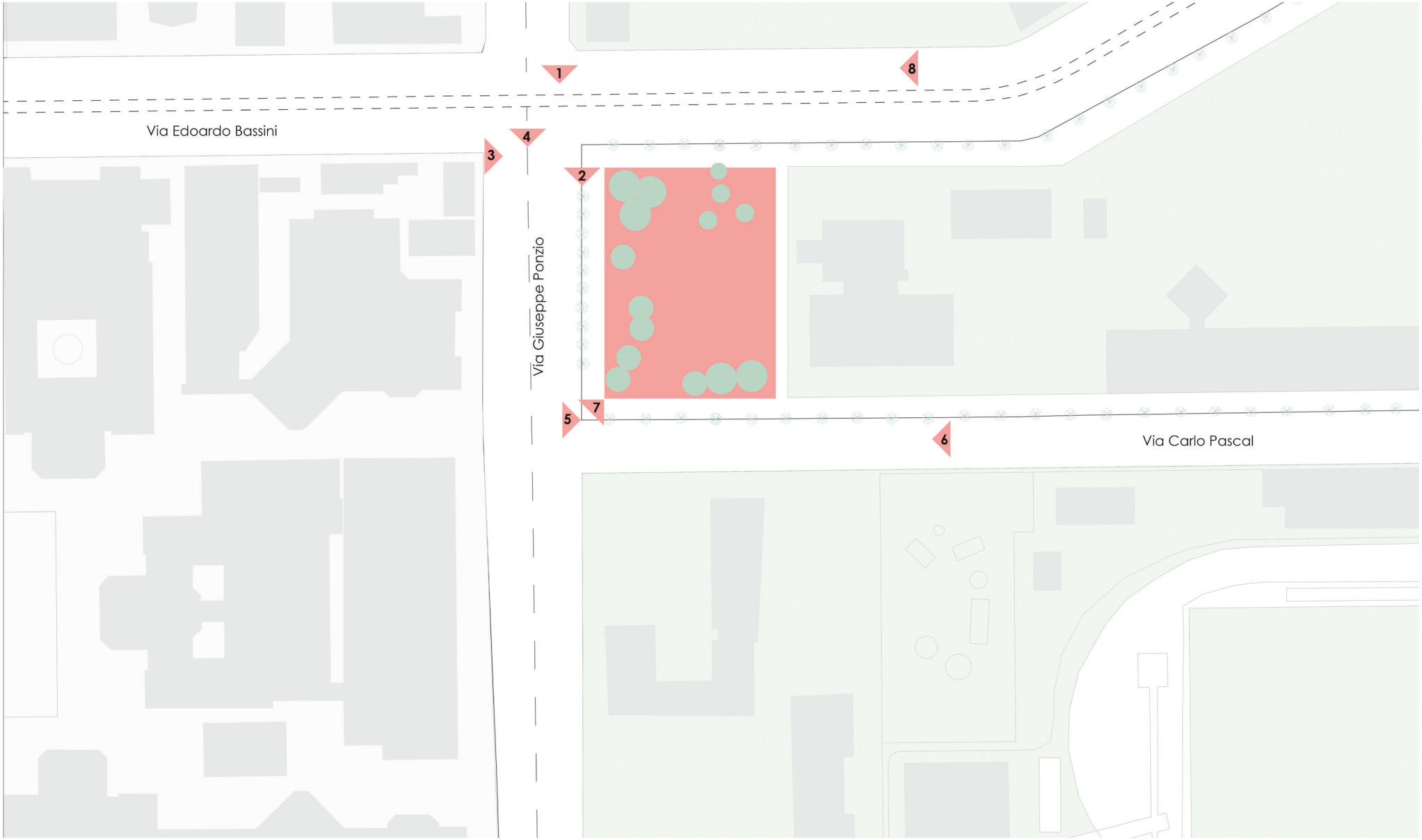
Contextual information of the site

The designated site is surrounded by a considerable amount of green spaces around the campus and in the design proposal. It is focused on the importance of greenery and providing an Urban canopy on the site.

The site area is approximately 2800 m2 that is raised on the pilotis in five floors to maximize land use and create in a total of 87 units for student housing.



Site observation



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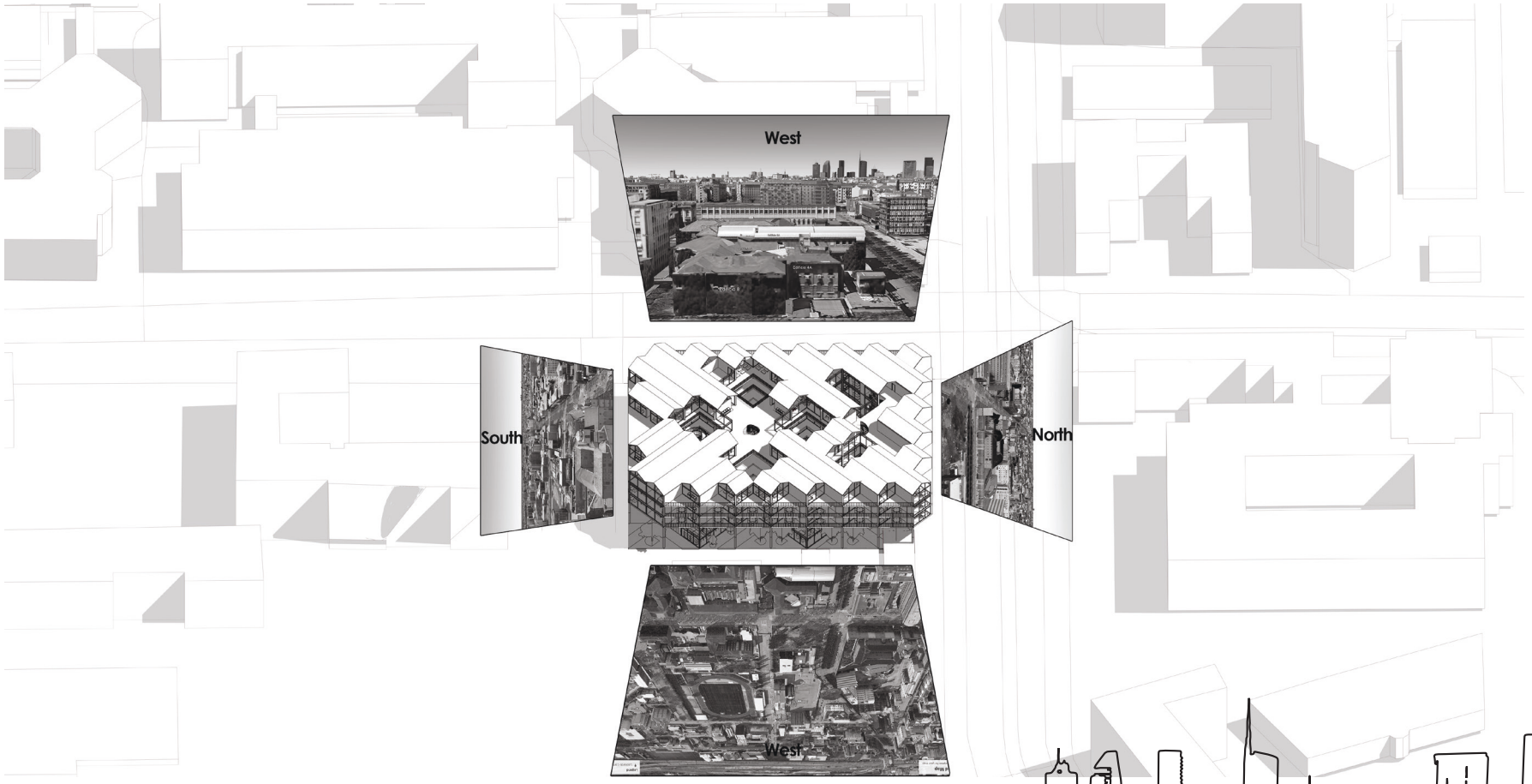
Views of the site

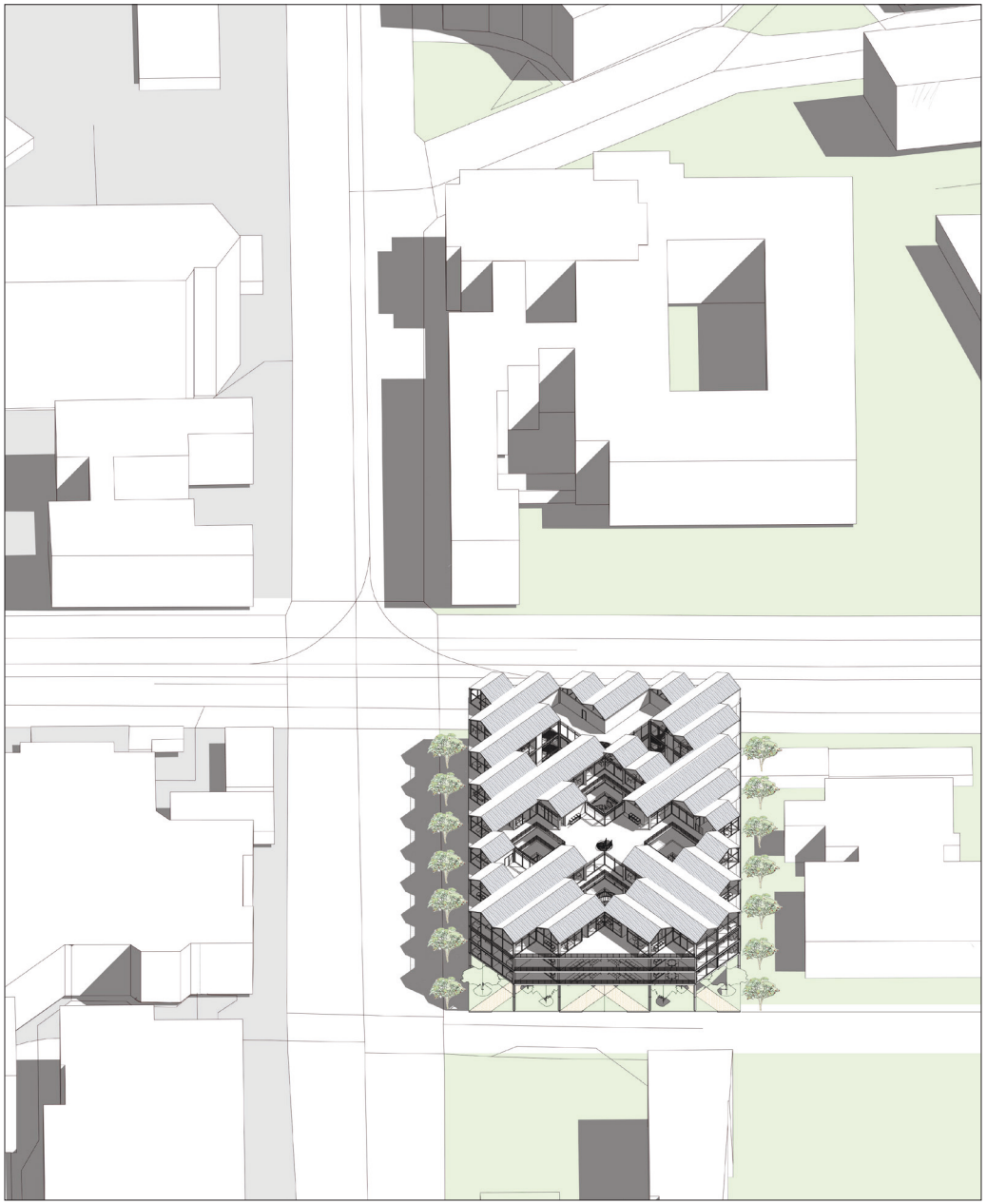
Inspired by the case studies, The student urban village is inspired by the communal model of living, which prioritizes common shared space over private dwelling.

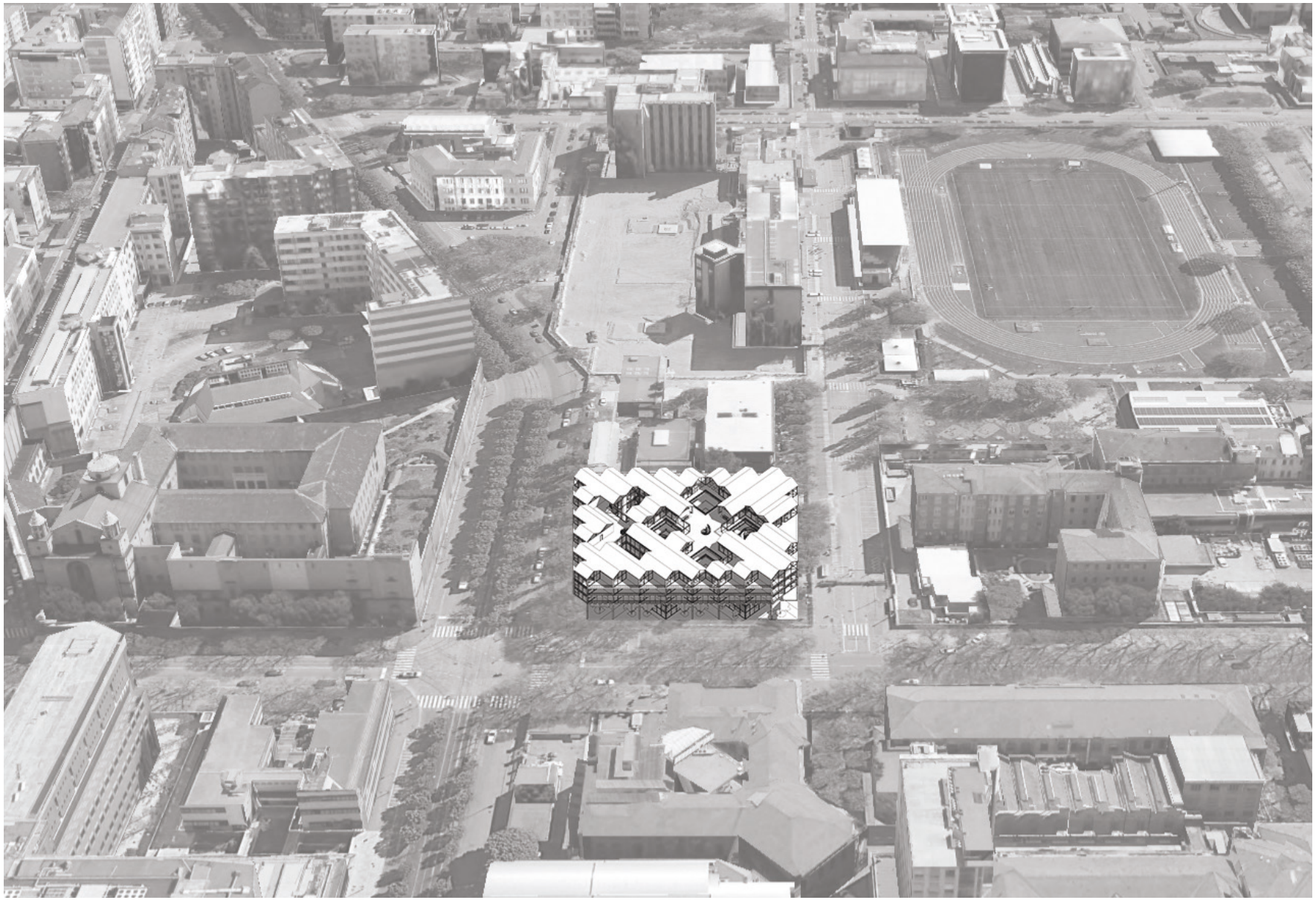


Design process

Inspired by the case studies, The student urban village is inspired by the communal model of living, which prioritizes common shared space over private dwellings.

This urban village also focuses on sustainability in low-impact materials and functional utilization of the building. The building's residents are encouraged to use it responsibly and sustainably to minimize the consumption of natural resources.



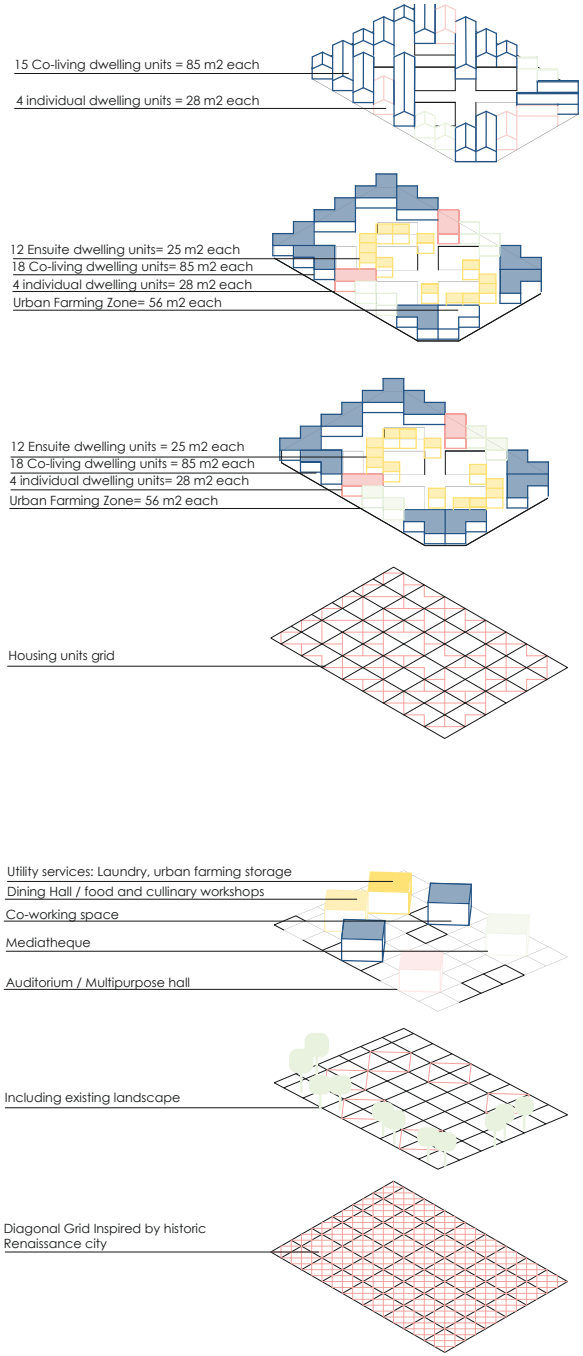


Aerial rendering of the building

Programmatic scheme

Public spaces on the ground floor based on communal activities bring people together and create interaction between people. There is a specified space on the ground floor devoted to the production and cultivating of plants and urban farming, which not only helps the students grow their food but also provides a context for social interaction and inclusion of students.

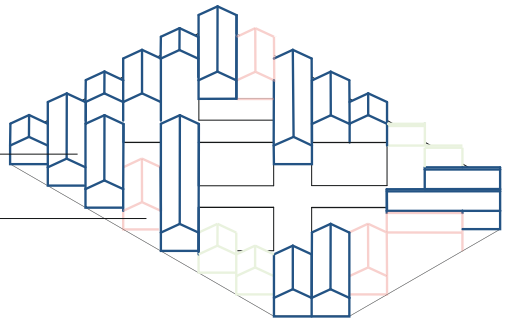
There are also communal areas for co-working, studying, and gathering within the same complex. These semi-public buildings bring people to work together and encourage them to interact.



Programmatic diagram

15 Co-living dwelling units = 85 m2 each

4 individual dwelling units = 28 m2 each



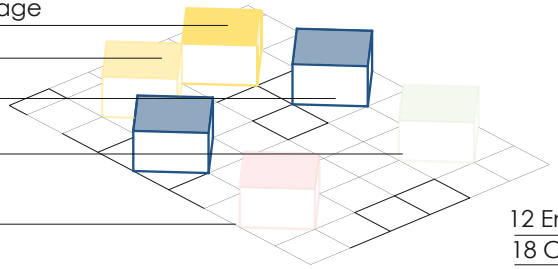
Utility services: Laundry, urban farming storage

Dining Hall / food and cullinary workshops

Co-working space

Mediatheque

Auditorium / Multipurpose hall

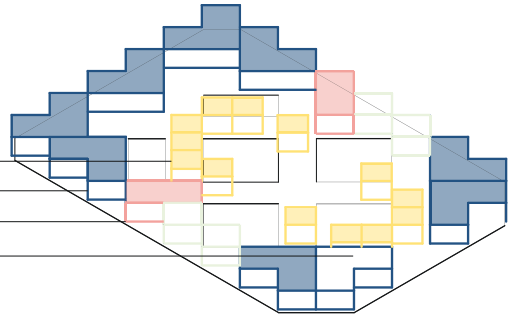


12 Ensuite dwelling units= 25 m2 each

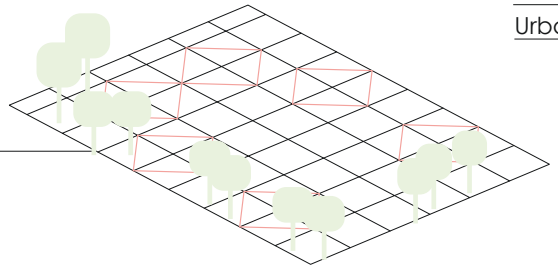
18 Co-living dwelling units= 85 m2 each

4 individual dwelling units= 28 m2 each

Urban Farming Zone= 56 m2 each



Including existing landscape



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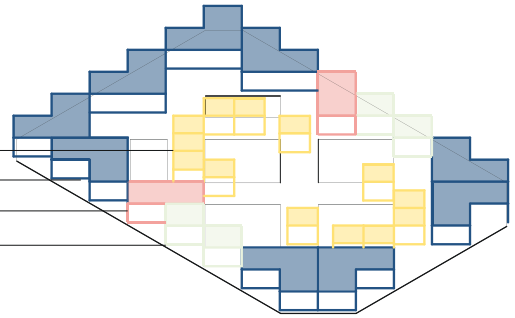
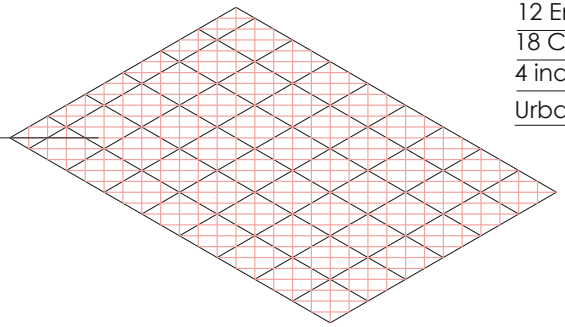
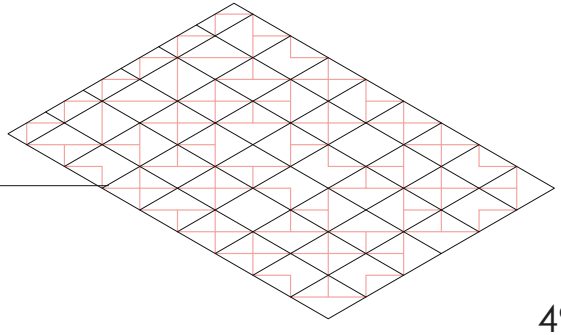


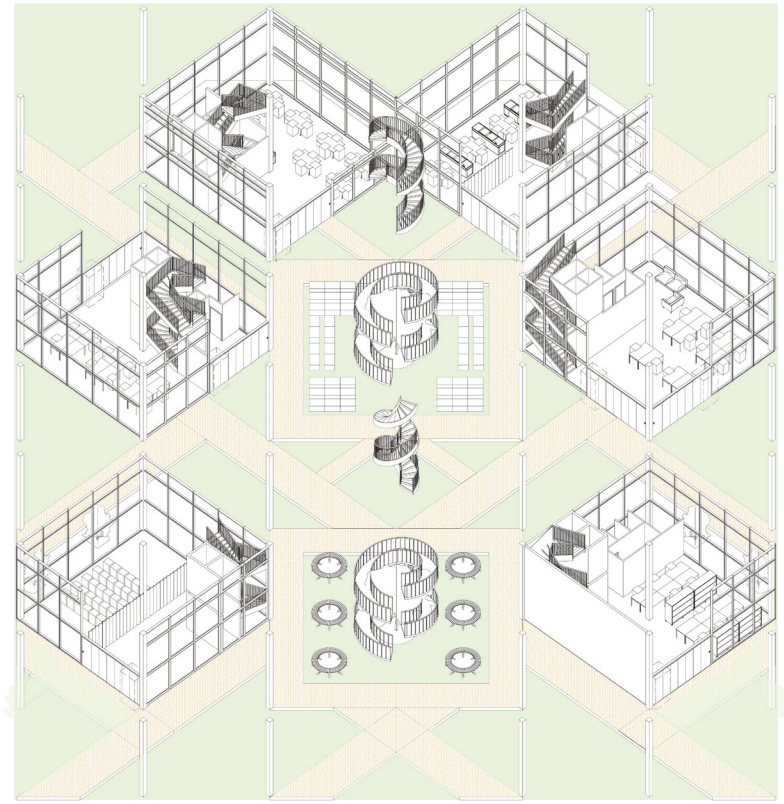
Diagonal Grid Inspired by historic Renaissance city



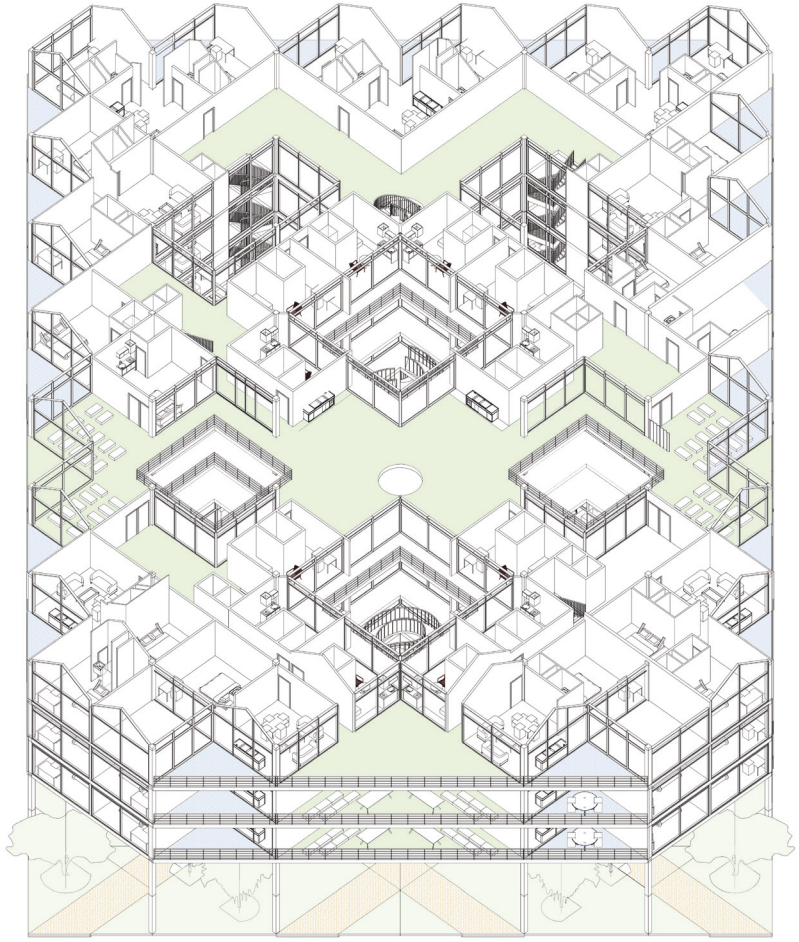
Housing units grid



Schemes for sustainability



Green landscape for urban farming on the main floor

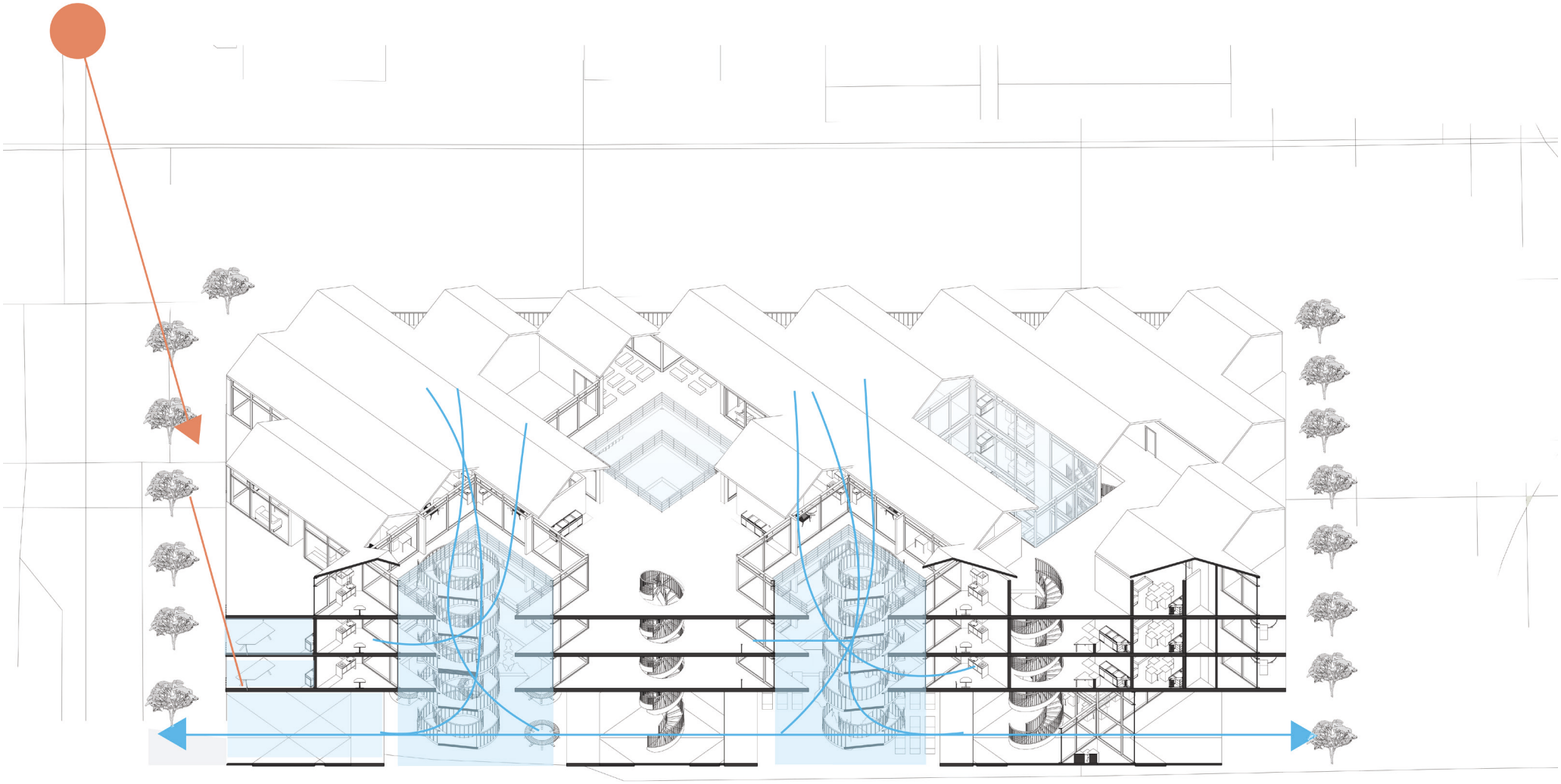


Plating terraces with aquaponic farming

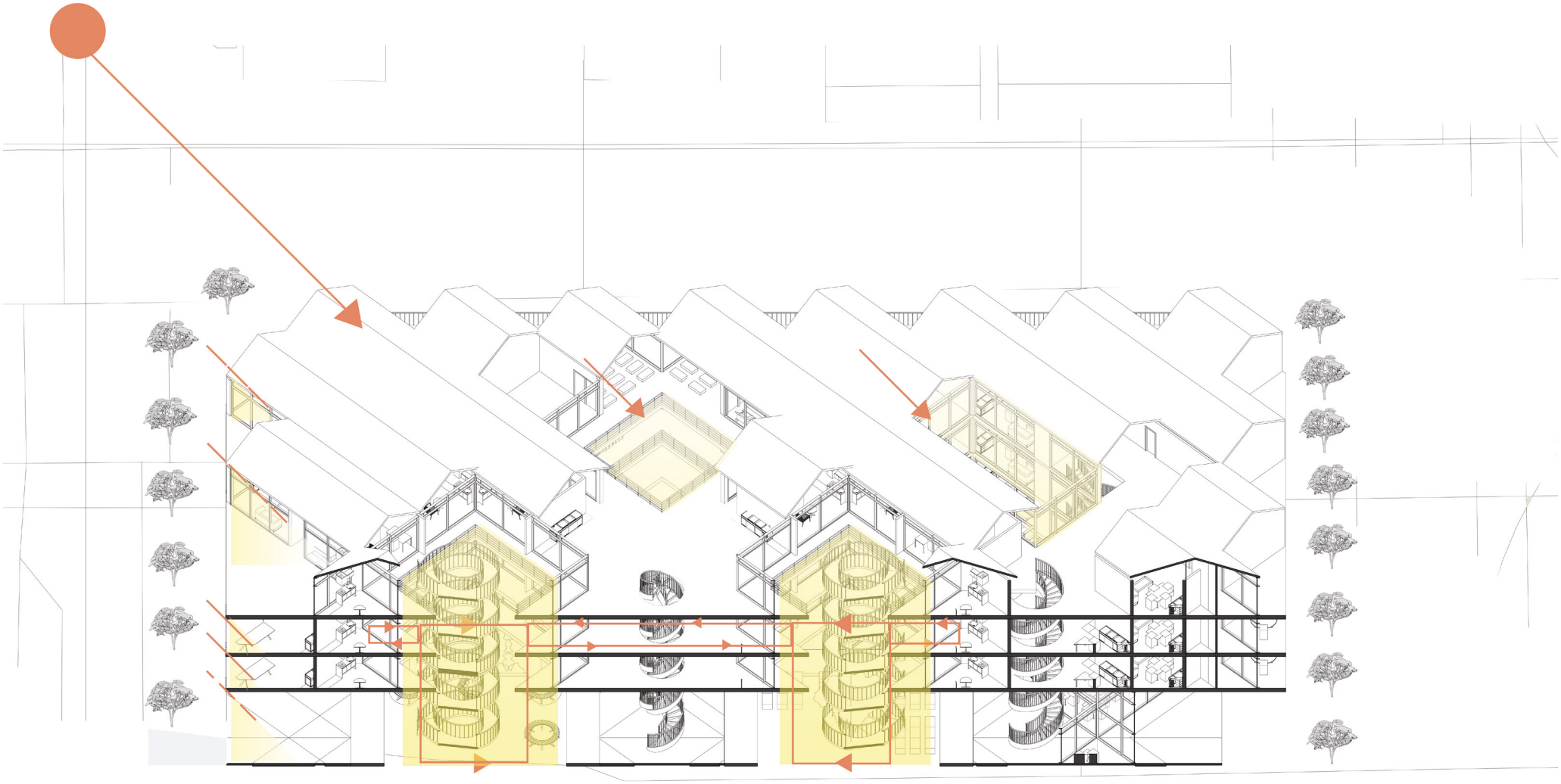
Green landscape

urban farming on the top floors

Speculative Section, showing urban farming in the proposal

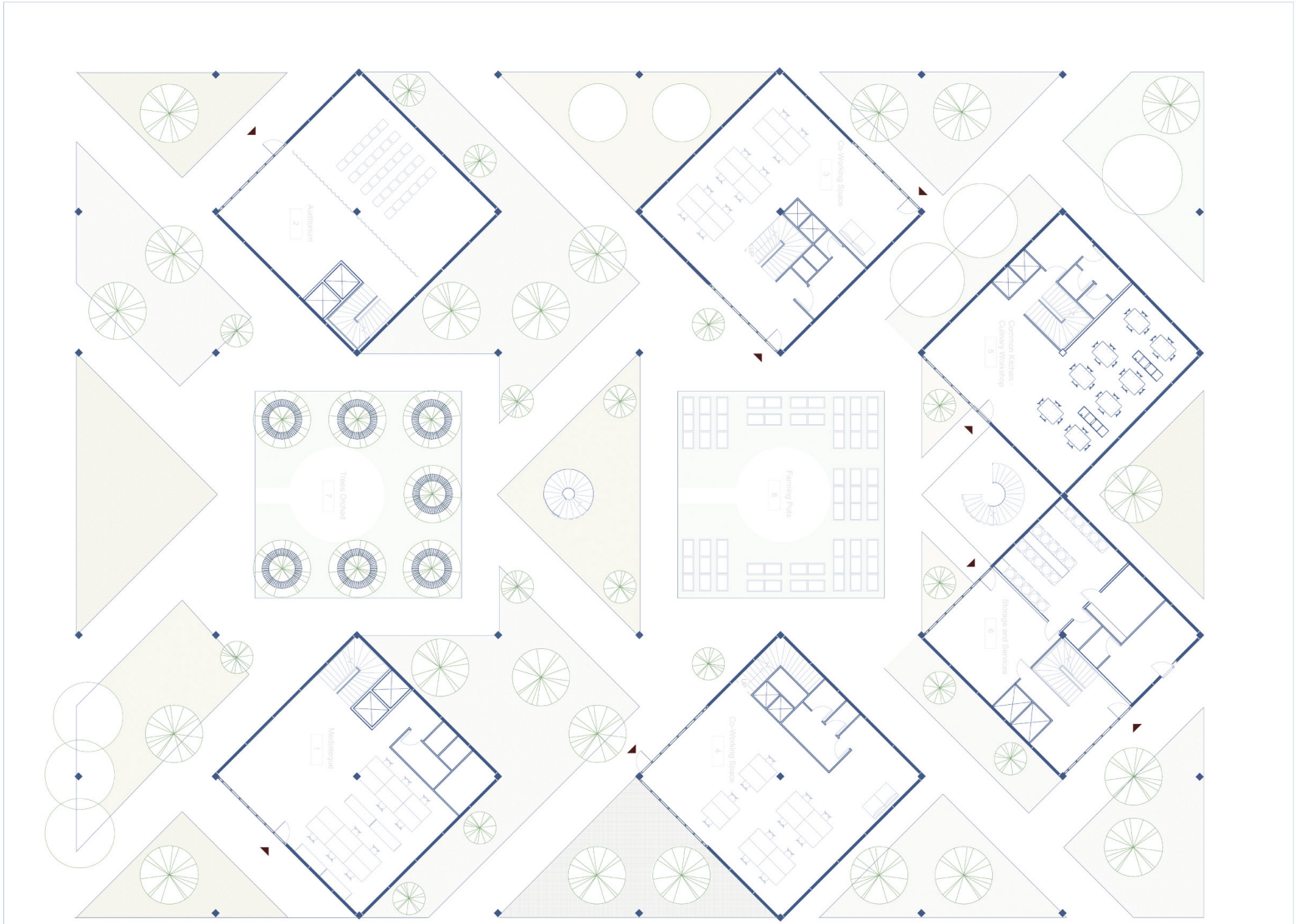


Passive design section, natural ventilation



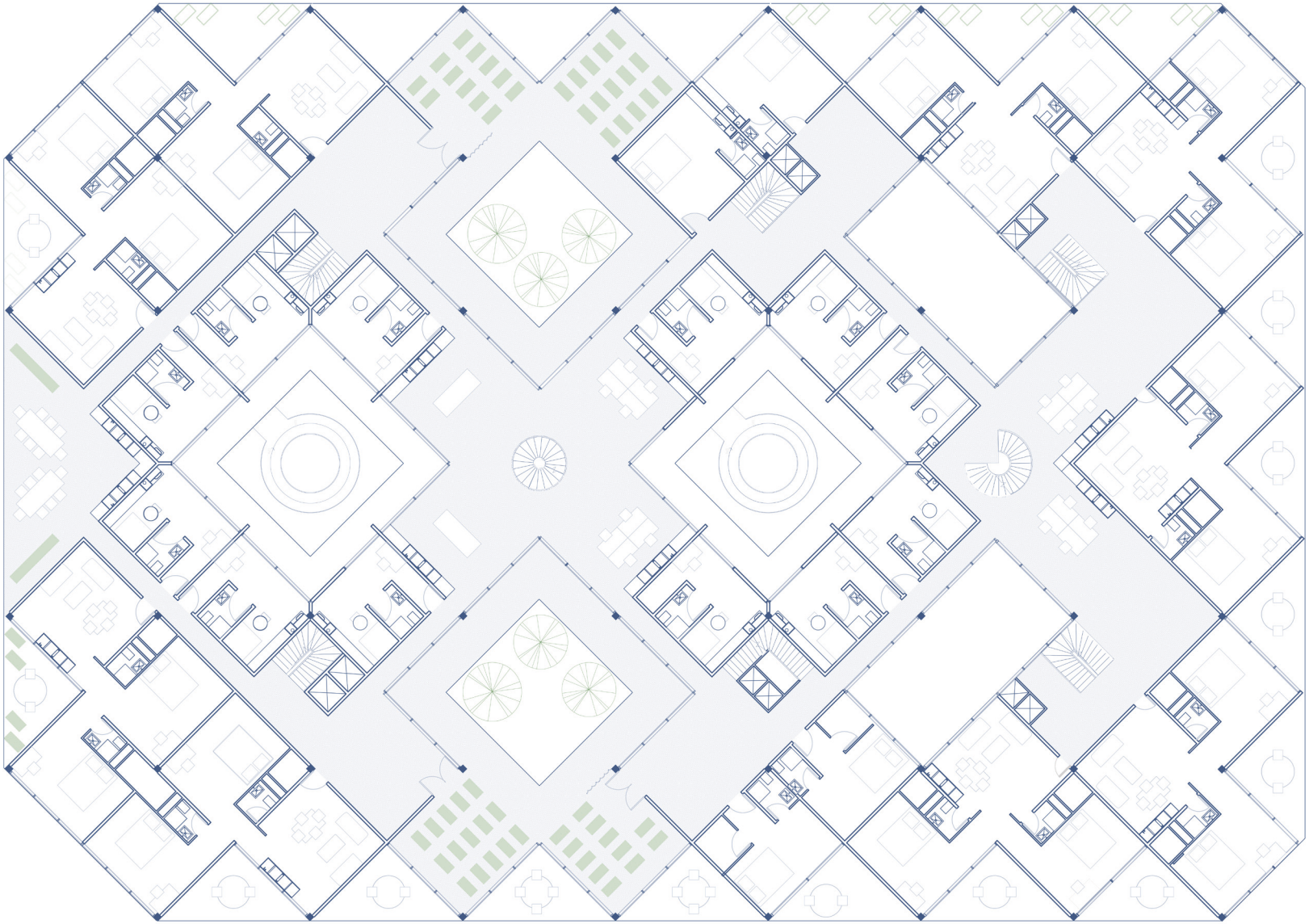
Passive design section, natural ventilation

Architectural documents

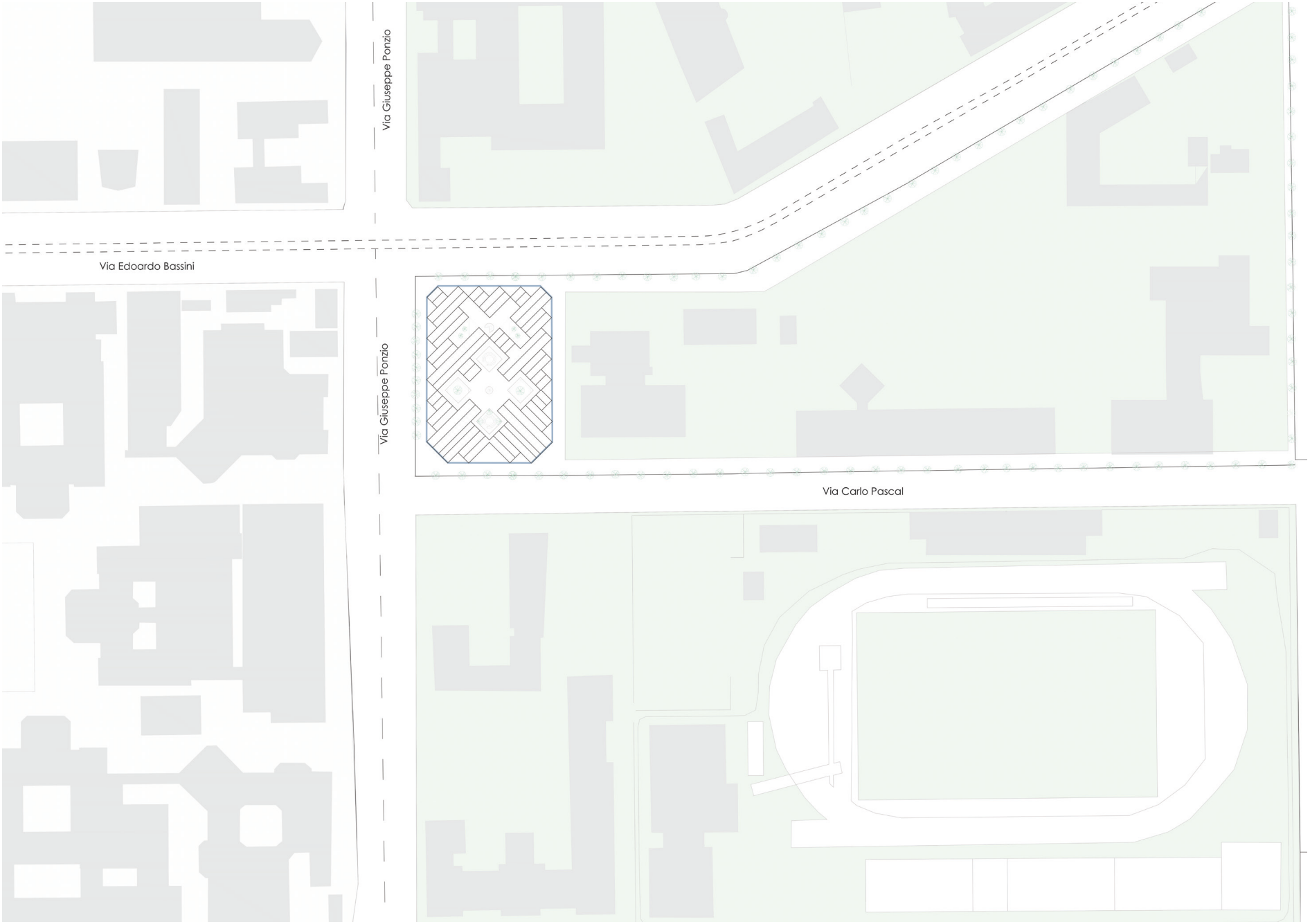


`First Floor Plan

Scale: 1:500

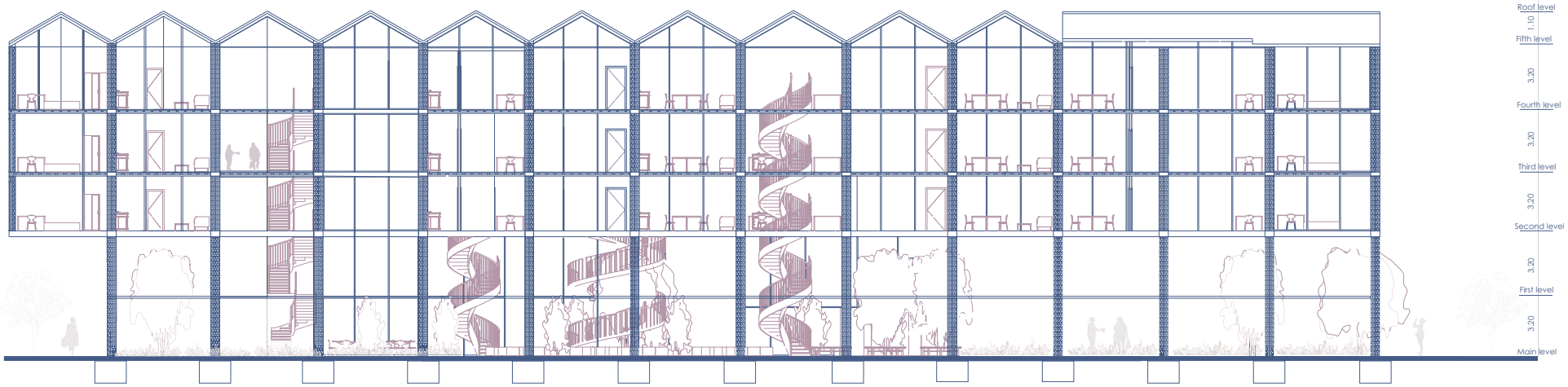


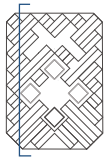
Third, fourth, fifth typical plan



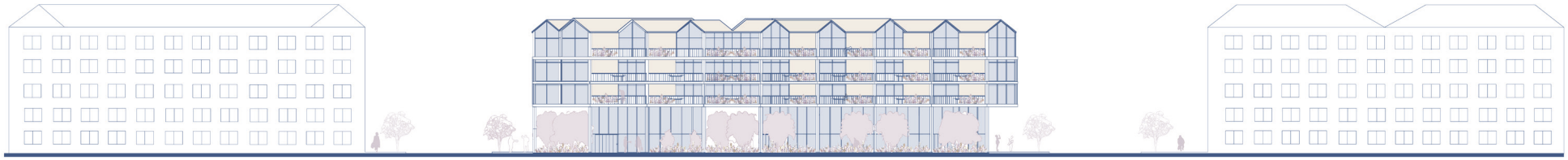
Site Plan

Scale: 1:1500





Section A-A



East Facade

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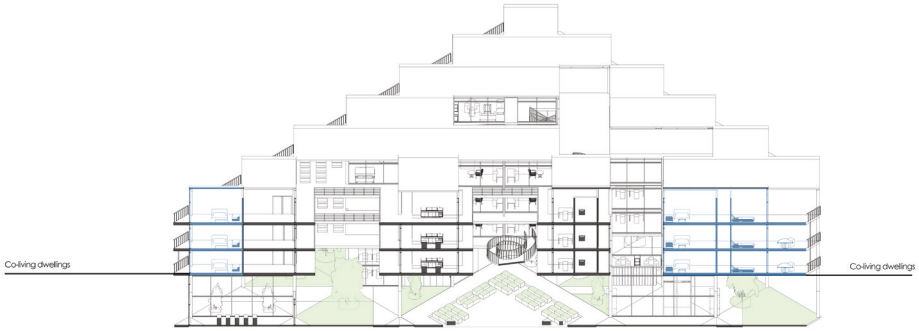

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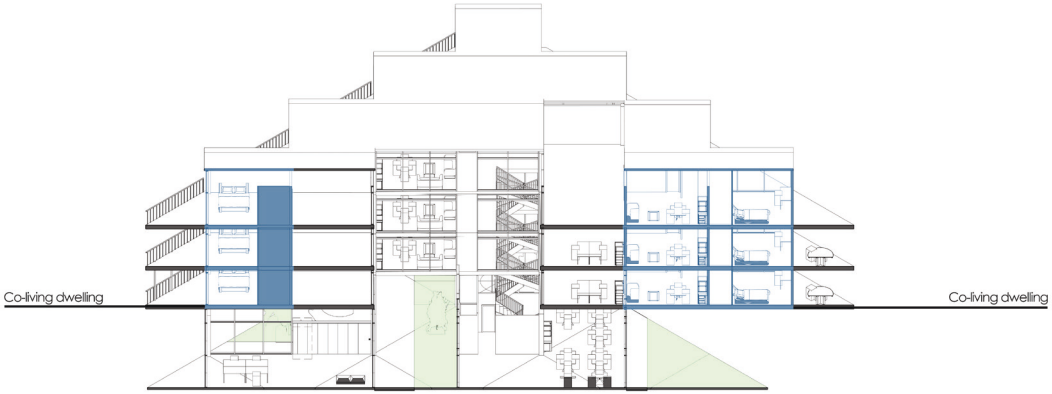
Section Perspectives



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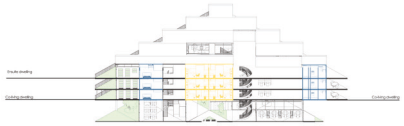

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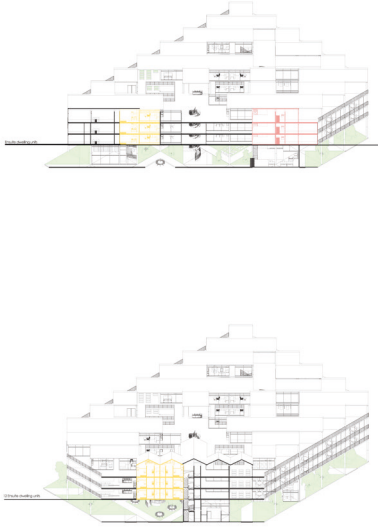

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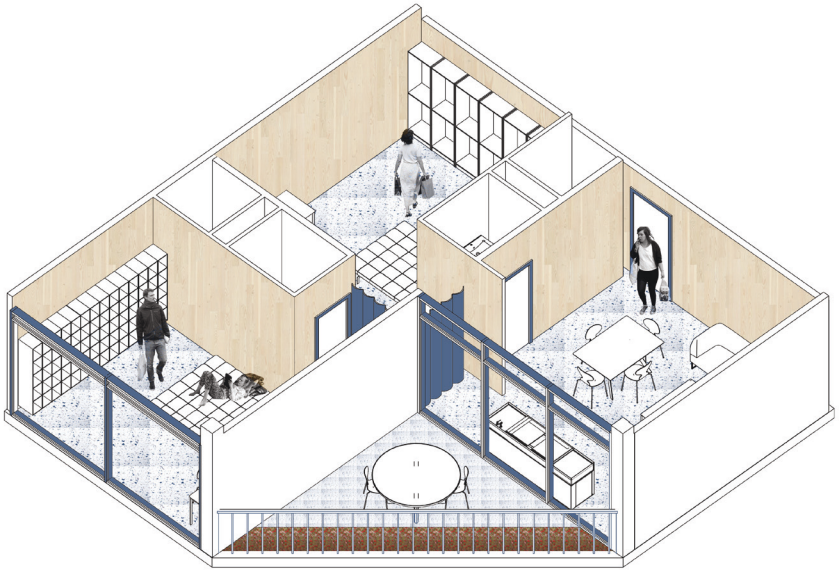
Unit's Schematic dwelling



Co-living dwelling unit, 85 m2

Ensuite -living dwelling unit, 25 m2

Perspectives

7-Closing words

in this thesis it is tried to consider different aspects of sustainability in student housing design, it is while sustainability is a broad term in architecture and urban design, making its implementation and assesment diffiicult. However with numeruos tools for practicing this concept in design process and its assesment is becoming widespread and useful.

There are several tools available for assessing sustainability in architecture and urban design such as Building Research Establishment Environmental Assessment Method (BREEAM) for Communities, Comprehensive Assessment System for Built Environment Efficiency (CASBEE) for Urban Development, Green Building Index (GBI) for Township, Leadership in Energy and Environmental Design (LEED).[34]This assesment methods can be the continuation of this work and other architecture and urbanism related projects.

At the end, I would like to appreciate the support and insight my supervisor Prof. Helka-Liisa Hentilä provided for me during the past months.

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