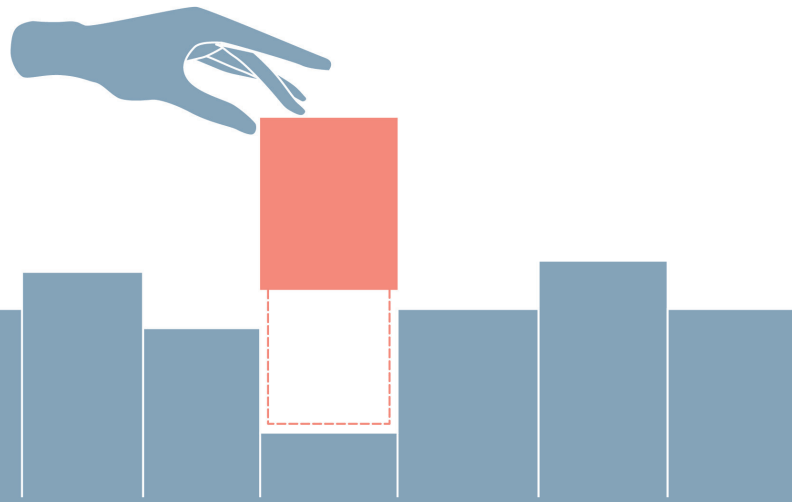


Unlocking Space

Infill Densification Strategies for Student and Youth
Housing Development



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**Politecnico
di Torino**

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ABSTRACT

The central focus of this thesis is the exploration of possibilities to increase the supply of student and youth accommodation in the city of Turin through infill densification strategies, characterized by development within vacant or underutilized spaces and properties in existing urban landscapes. In this way, housing for students and emerging adults serves as a catalyst for urban regeneration, offering essential services that benefit students and local residents while also addressing the issue of urban voids within existing built environment. Infill densification approach helps prevent urban sprawl, reconnect the fragmented urban fabric and produce more housing and services for the citizens through targeted localized interventions that together create a significant transformation in the overall urban environment.

This work investigates legal aspects of urban infill developments, their compliance with urban regulations and its financial feasibility in both global practices and specifically in the context of Turin. To achieve this, the state of the art is analysed and relevant case studies are presented in this thesis to extract applicable methodologies and design approaches. Subsequently, this research analyses potential obstacles to such developments in the context of Turin and offers regulatory adjustments and incentives for developments targeting student and youth housing infill developments. It also defines conditions of eligibility for accessing these opportunities.

The thesis concludes with a design proposal that demonstrates the potential for infill development in Turin. The project focuses on the redevelopment of the former industrial sites along Lungo Dora Firenze in the Aurora district, an area characterized by urban voids, underutilized density potential, and close proximity to university facilities. On this plot, various infill densification strategies will be implemented, and the methodology developed within the framework of the thesis will be tested.

Research question:

How to solve the lack of student and youth housing using infill densification strategies?

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00 | INTRODUCTION

Currently, many European countries that are welcoming students and young specialists from around the world are struggling with accommodating them within their cities.⁽¹⁾ Under supply of housing for both local and international youth demographics results in high prices for both rent and acquisition and inability of finding a living space within easy reach of universities and work places.⁽²⁾ It is significantly important to understand how it is possible to provide affordable housing opportunities to ensure decent living conditions for students and to have higher chances for young graduates to stay in the cities of their alma mater. Moreover, this housing needs to be located within easy reach to strategic urban zones of the city. Additionally, new housing developments undergo hard burden of long-time approvals^(2, p.24) and contribute to urban sprawl, often occupying the greenfields⁽³⁾.

The built-up city fabric seems to be dense and filled but is it actually the case? Global architectural researches and practices show that in many cities the built environment's potential remains underutilized. In many urban areas its structure is discontinued and interrupted, some properties are abandoned or not dense enough for the context they are present in. These urban voids, overseen and neglected, could be mapped, 'infilled' with a new function and used to bring lacking density into strategic city zones. Such infill densification strategy presents, as well, an opportunity to repurpose abandoned properties within city limits, contributing to a reduction in the carbon footprint associated with new developments.⁽⁴⁾

Consequently, from a sustainability perspective, student and youth accommodation in strategic urban areas emerges as a transformative force capable of revitalizing aging urban fabrics in need of rejuvenation while bridging the gaps within fragmented urban settings. By rejuvenat-

ing neglected urban spaces, this approach not only fosters a sense of community but also promotes a more environmentally conscious form of development that aligns with the principles of sustainable urban growth.

In addition to its socio-economic benefits, the implementation of student and youth accommodation through urban infill strategies has the potential to foster a vibrant and diverse urban environment, promoting a sense of inclusivity and community engagement. By creating spaces that cater to the needs of both students and local residents, these developments can act as hubs of innovation, creativity, and collaboration, further enhancing the overall fabric of the urban landscape.

Furthermore, the integration of sustainable design principles into the development of student accommodation can further amplify its positive impacts on the urban environment. By incorporating features such as energy-efficient systems, green spaces, and sustainable materials, these developments can contribute to the overall resilience and long-term sustainability of the urban ecosystem.⁽⁵⁾

The exploration of sustainable student and youth accommodation and its implementation through infill densification represents a significant opportunity to not only address the pressing housing needs of students and graduates but also to revitalize urban spaces, foster community engagement, and promote sustainable urban development. By harnessing the potential of student and youth accommodation in conjunction with sustainable design practices, we can pave the way for a more vibrant, inclusive, and environmentally conscious urban future.

01 | STATE OF THE ART

1.1 Student Housing

Student Housing Demand

Enrollment in university education has increased dramatically in recent decades as a result of significant expansion programs implemented by numerous nations. One may argue that in the 1980s, nations like the USA, Canada, Australia, and Japan spearheaded the first wave of higher education expansion.⁽⁶⁾ The so-called “massification” of higher education is being aided by the increasing number of universities and student enrollments worldwide, which many other nations followed throughout the ensuing decades.⁽⁷⁾ Among the numerous implications was the challenge of accommodating the expanding number of students, which is still a concern in many parts of the world.

A widespread decline in public funding for students has affected the European higher education system in recent years, placing the cost of living for university students on families. These developments, when combined with the general rise in housing costs and their impact on students’ financial resources, have the potential to exacerbate inequality by harming low-income students and families. As a matter of fact, there is a serious housing shortage in a number of European nations, and a dramatic increase in rentals and housing costs in the cities where HEIs are situated. Students and anyone looking for accommodation are therefore forced to compete for reasonably priced housing options.⁽⁸⁾ The need for student housing is particularly urgent in the university cities of Central-Northern Italy, especially in the large metropolitan areas. This is based on three key factors: the dynamics of the out-of-town student population, the private rental market, and the potential demand for beds. The gap is estimated to be just under 7,000 beds in Turin, Bologna, and Rome, and ap-

proximately 16,000 beds in Milan.⁽⁹⁾

According to the Vocational Education and Training Report (2023) done by IRES Piemonte, accommodation places for scholarship holders off-site in 2023 increased from 2 100 to around 2 500. However, in parallel, the number of out-of-state scholarship holders from just over 6 500 in 2018/19 raised to over 7 500 in 2021/22. As of today, just under one in three off-site scholarship holders have accommodation in a student dormitory. Another important trend is that the number of students having residency outside Piedmont is rapidly growing. To illustrate this statement, in 2009/10 students residing in Piedmont constituted approximately two thirds of all the students in Politecnico di Torino. Contrary, in 2018/19 the situation changed and students coming from abroad or from other regions outnumbered local students.⁽¹⁰⁾ The existence of big multinational investments demonstrates the viability of the student housing sector. In Turin, for example, more than 7 million euros were invested in the purchase of the area where the student residence of the Dutch company The Student Hotel will be built (over in the Aurora district), as well as approximately 63 million euros for the university residence project in Via Frejus, in the San Paolo district, following an investment by the company MeG Investment.⁽¹¹⁾

Negative effects on performance

A group of researchers at the University of Massachusetts Boston found statistically significant differences in the reported impacts of housing insecurity in a survey of 390 students. Forty-eight percent of students who reported experiencing housing insecurity were “somewhat to very” affected in their ability to attend class compared to 18% of their peers, and 81%

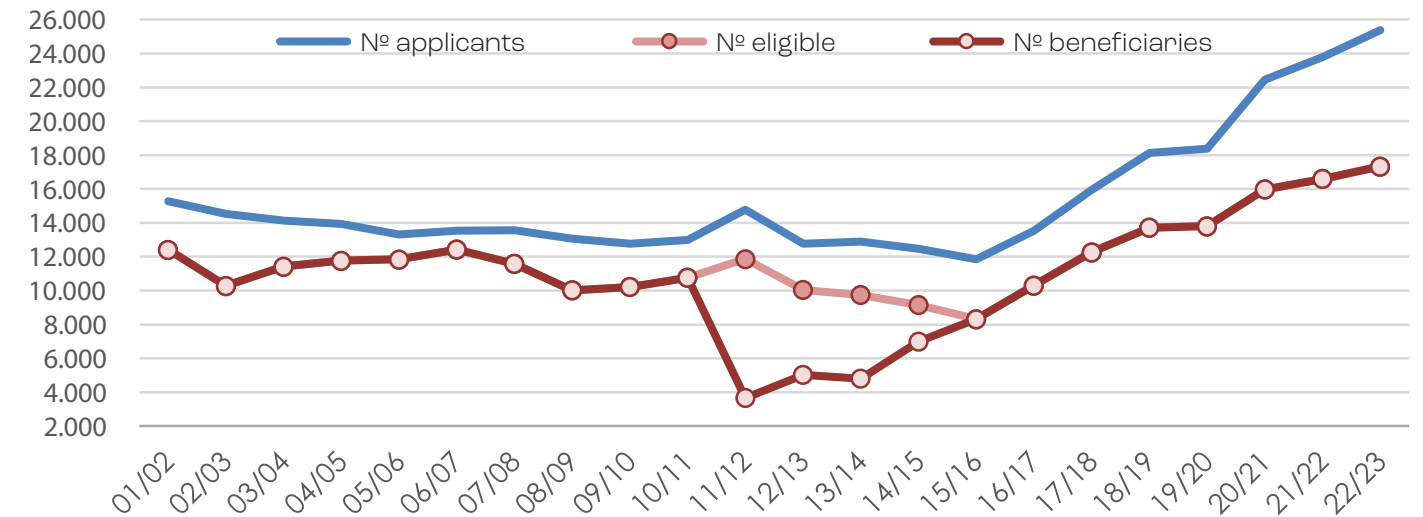


Fig. 1: applicants, eligible and beneficiaries of university scholarships in Piemonte , 2001/02-2022/23. - Source: IRES - Piemonte, 2023.

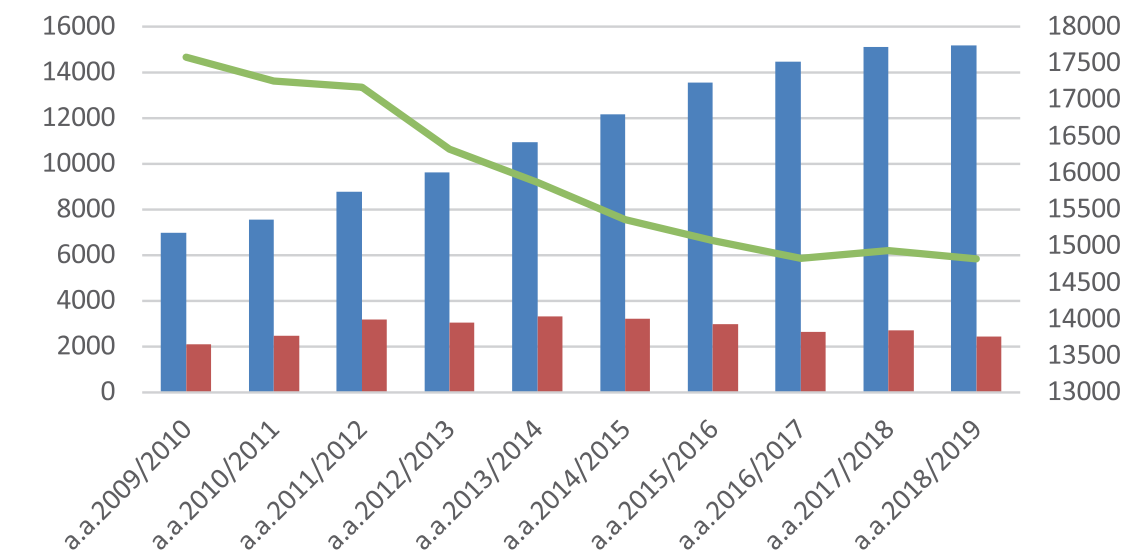


Fig. 2: Historical of students enrolled at Polytechnic of Turin by their region of origin. Absolute values. - Source: Erica Mangione doctoral thesis, 2022

were similarly affected in their ability to perform in class compared to 23%. Housing insecurity also increased the risk of students not completing their education. While similar percentages of students facing housing and food insecurity were impacted in their risk of failing classes, 43% and 44% respectively, housing insecurity significantly increased the reported risk of withdrawing or refraining from registering for classes, with 43% compared to 29%.⁽¹²⁾

Housing shortage as one of the “brain drain” reasons

The shortage of affordable housing affects the probability of young graduates to stay after graduation and become an investment for the local economy. Urban housing markets across the EU have seen prices rise sharply, particularly benefiting older generations who already own property, while disproportionately burdening young people and newcomers. As the report notes, “young people and newcomers to cities are especially affected” by housing unaffordability, which limits their ability to stay in economically dynamic metropolitan centers. This situation effectively “shut[s] out tenants, newcomers, and the young from good job opportunities,” pushing them to seek alternatives elsewhere. The cost burden is especially severe for renters, among whom the young are over-represented, with more than 30 percent spending over 40 percent of their income on housing. Consequently, many young graduates find it financially unsustainable to remain in their city of study and are forced to move in search of more affordable living conditions and better opportunities.^(2, p.14-18)

This appears to be especially significant in Italy, where approximately 20% of households rent their homes, transaction costs on the housing market are high, young people have limited credit access, and housing laws are poor, with few programs for youth social leased housing.⁽¹³⁾ Italy lacks a coherent national policy to help young graduates with housing. The transition period after graduation is a policy blind spot:

students lose access to university housing and benefits, but entry-level wages are often too low to afford market rents, especially in major cities like Milan, Rome, or Turin.

Student Housing in Italian Urban Context

Italy began to regulate building standards for new student housing units built with national money but funded also by private and public bodies after the mid-1990s. However, without precise standards about the design of individual and common spaces, student housing remained seen as a variation of a traditional residence. During these years the amount of students and teachers residing outside of the university cities increased and to respond to this demand EDISU began to purchase existing buildings within territory to turn them into student residences. As a result, there was a disconnection of city services, university offices and centers, and position of student residences. Students started demanding a higher quality accommodation, they also were struggling with a scarcity of available residences and with offered conditions. This pushed them towards a private rental market that offered a decent amount of single flats to rent. This phenomena affected the vulnerable groups of our society such as young couples and elderly, due to increasing rental prices.

The study of Carla Chiarantoni on student housing in Italy proposes three models of student housing in relation to urban context. Most purposed-built student accommodation was established in historical or central areas of the city, due to the historical importance of the city centre in the fabric and identity of the university, which is a model called “historical context”. Student housing that belongs to the model “central areas” is the type of housing that occupied and restored public historical buildings in town centres, taking advantage of public investments within national urban regeneration funds. In the same category also demi-suburban areas appear where universities and student housing



Fig. 3: Map of student residences by stage of realisation - Source: Erica Mangione doctoral thesis, 2022

serve as de facto scientific hubs, following the urban planning trends of the 1970s. These areas blend university facilities with city services, leading to the conversion of modern public buildings into student housing. However, these transformations often lack innovative spatial designs. Last model represents student housing in low-income, peripheral or deprived urban areas with the aim to revitalise these areas with University presence and community engagement or “peripheral areas” model. This can prove beneficial for the city, creating day time vibrancy, but that can be followed by progressive abandonment after dark. Overall, the main concern is that in most cases new-built student housing is decontextualized from the universities and/or city centers.⁽¹⁴⁾

Student Housing Providers in Turin

University residences in Turin can be divided into two main categories: the ones financed by local investors and managed by local institutions and the ones with non-local investors and managers.

Operators of student accommodation with local investors:

- Ente Regionale per il diritto allo Studio Universitario del Piemonte
- Fondazione Collegio Universitario di Torino Renato Einaudi
- Religious institutions
- Sharing Srl

Operators of student accommodation with non-local investors:

- Camplus Foundation
- CampusX
- The Student Hotel
- Stonehill Frejus Srl

To describe the many forms of student housing supply in Turin, generally, it can be divided into two macro categories: purpose-built student accommodation (PBSA) and the student housing in the rental sector, which include the peer shared apartments. First PBSAs in Turin

started to be developed in the mid-19th century by various religious institutions with their own management of services and fees, for instance, male and female sectors are still kept separate from each other. Another historical supplier in Turin is the Collegio Renato Einaudi that is a private foundation and a part of the national network of ‘Colleges of merit’. And lastly, there is an EDISU regional agency that is the only public operator present in Turin and financed by the region, active since the 1990s. Its student housing stock is represented by a dense network of residences across the city with more than 2000 beds available for low-income off-site students. There are also non-locally invested and managed student housing facilities, that are characterized by bigger capacity and various additional services provision such as co-working spaces, gyms, cafes, and restaurants. This type of student housing is also aimed at hosting tourists during the off-season. The drawback of these facilities is the price as it is still more expensive on average compared to the private rental market in the city. One of the most anticipated student housing projects in Turin is the Student Hotel near Ponta Mosca which opening was planned in 2023 but the construction works were postponed for the year 2026.⁽¹¹⁾

1.2 Urban voids

Turin’s urban voids

Talking about underutilized land in Turin, it would be important to mention the theoretical works of Ignasi di Sola-Moralis related to urban voids that he called by the French term *terrain vague*. Those are places within the city, abandoned or underused buildings and plots, that are usually unpaved and overgrown, without a specific function. Such urban voids usually provoke informal and marginal uses due to the lack of public control. It is sometimes difficult to define the physical limits of such places and to whom they belong. Urban voids interrupt the continuous urban fabric and create fragmented spaces within the city. But these vacant plots have

Vacant sites proposed for Co-City interventions



Fig. 4: Via Bologna 175 - Source: <http://www.comune.torino.it/>

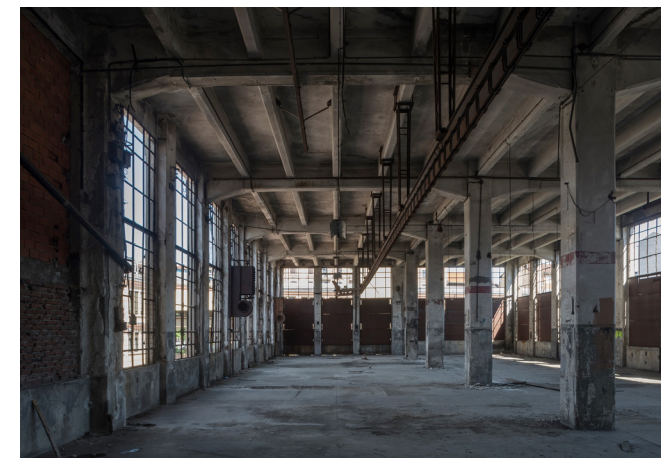


Fig. 6: Via Cumiana 15 - Source: <http://www.comune.torino.it/>



Fig. 5: Corso Umbria 54 - Source: <http://www.comune.torino.it/>



Fig. 7: Via Cavagnolo 9 - Source: <http://www.comune.torino.it/>

a great potential and bring a sense of freedom in modern lucrative developments as they are able to welcome new encounters and experiments.⁽¹⁵⁾

An interesting example of realizing the potential of unproductive areas in the city of Turin is the project Co-city that was carried out in the framework of the UIA – Urban Innovative Actions 1st call (topic: Urban Poverty) in 2017. This project was intended to regenerate disadvantaged neighbourhoods in Turin using collaboration with citizens and the city of Turin relying on the opportunities to utilize so called urban commons. Citizens of the neighbourhoods were playing roles of main actors while the local authority acted as facilitators. Main strategy of this initiative was the assignment of public functions to the abandoned structures and vacant land in order to fight the poverty and inequality. Together with the Houses of the Neighbourhoods, local network that spreads practices of social innovation, Co-city creates new jobs in the social economy sector as different enterprises emerge through the active participation of residents. Some of the project's proposals were related to urban regeneration interventions. For instance, the second floor of the building in Via Le Chuisse 66 that was in disuse got renovated and a Spazio Habitat was placed there – organization that helps vulnerable groups of citizens to find a job or get a psychological help. Another example is the Falklab workshop organized for young people to have a place to socialize and participate in dancing and music classes. It is also very much related to the concept of dealing with urban voids as it resides in a underused building inside a school complex Via degli Abeti, 13. Due to this projects, this school building renovated so the energy efficiency requirements were met in order to host these public educational events. This type of interventions in underused educational facilities are expected to be more common as the demographic rate in Turin is drastically decreasing.⁽¹⁶⁾

To continue my investigation on the urban voids in Turin, I analysed existing urban regeneration

projects and initiatives. One of them is the “Trentametro”, promoted by the Città metropolitana di Torino, that is created to revitalize abandoned industrial sites in Turin to boost the urban generation of the neglected areas and prevent urban sprawl. The project mapped thirty most suitable ex-industrial sites taking into consideration accessibility, surroundings, and services around. Also a geo-referenced web platform was created in order to promote all the rest of the available sites, so potential businesses can define a suitable area for them. Vacant plots mapped by Trentametro are located in the outskirts of the city.⁽¹⁷⁾

Another project that is worth to mention is the Nexto which is an association founded in 2015 and committed to making Turin the city of opportunities. Its Masterplan Project is intended to become a framework on which change and development in Turin can be built. As part of the project, there is a mapping of the places in the city that are available, immediately, to be considered within wide-ranging projects such as nZEB buildings, sustainable public spaces, public and private service hubs.⁽¹⁸⁾ Similarly, Torino Urban Lab made a public map of urban transformation so that the citizens, investors, operators and decision-makers could receive state-of the-art of disused areas in the city and metropolitan area. They provide information on the plots and buildings that are waiting for the interventions, undergoing transformation or already under construction work. Another Urban Lab project that is worth mentioning is the “Torino Atlas” which aims to tell the story of the metropolitan territory through the systematization of maps, cartographic representations, statistical data and infographics. It includes analysis on urban voids of undustrial nature that constitute a majot part of all empty urban fabric in Turin.⁽¹⁹⁾ Summing up, there is still a significant potential for redevelopment of Turin's terrain “vague”.

1.3 Density approaches

Year of construction

- Area decommissioned since 1989 and reused before 1997
- Area still disused as of 1997 and reused before 2001
- Area still disused as of 2001 and reused before 2005
- Area still disused as of 2005 and reused before 2012
- Area still disused as of 2012 and not yet reused before 2016

Area

- <18,000 sq. m.
- 18,000 - 60,000 sq. m.
- 60,000 - 140,500 sq. m.
- 140,500 - 300,000 sq. m.
- >300,000 sq. m.

Areas of intervention

- ZUT - ATS

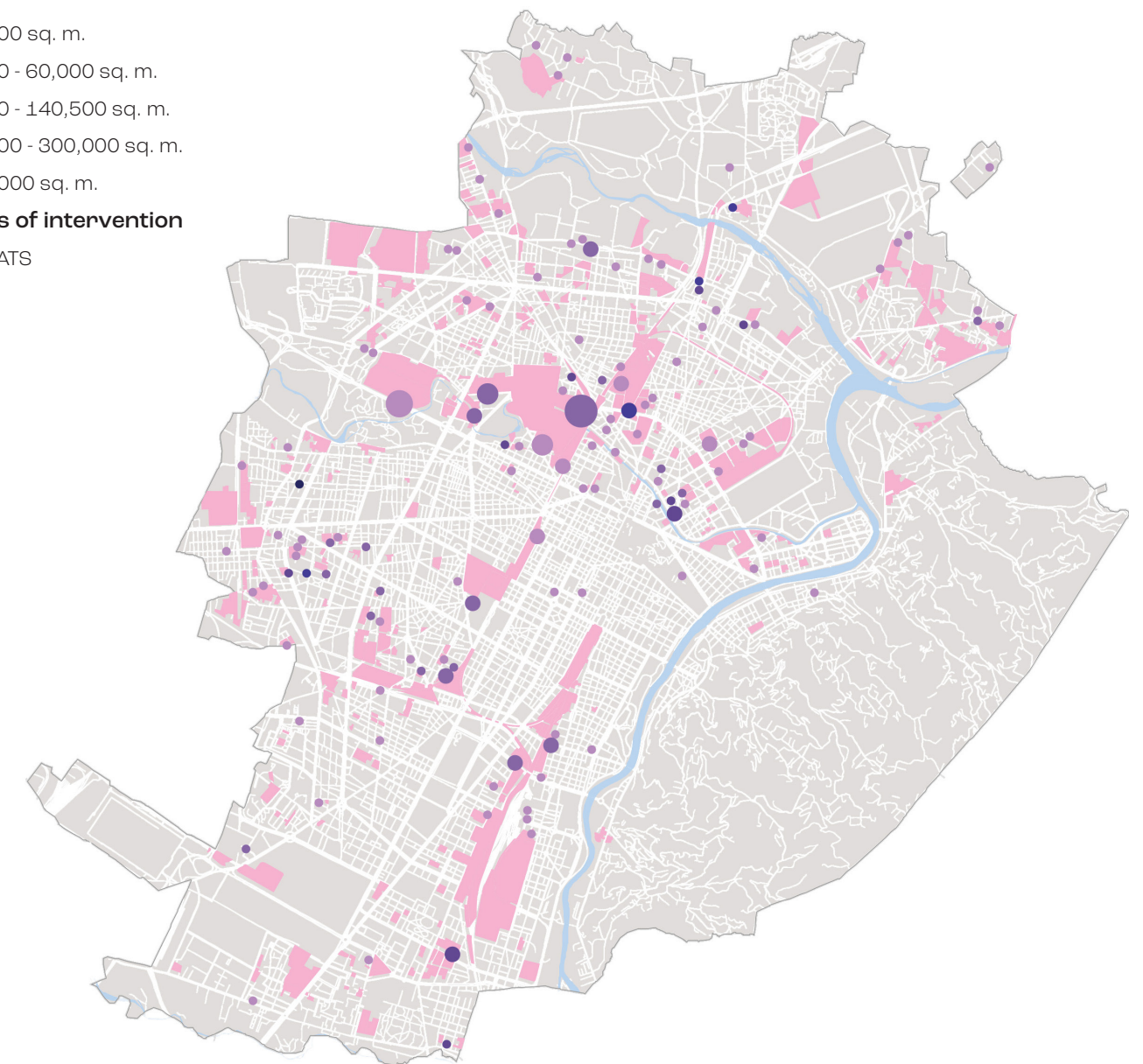


Fig. 8: Industrial areas in disuse - Source: Torino Atlas, Mappe del territorio metropolitano, Turin 2016

Densification

Densification is the pan-European approach in urban planning to address climate change issues. It is aimed to stop urban sprawl in order to preserve natural lands that is now actively used for new construction development. Urban sprawl is a significant contributor to carbon footprint increase. Doctoral candidate at the TU Delft Michael Mehaffy analysed various urban areas and concluded that urban sprawl is responsible for more than a third of global CO2 emissions.⁽²⁰⁾

Densification in the context of urban planning refers to the process of increasing the population density of a given area by constructing more buildings and housing units on a smaller land area. This can be achieved through various means such as:

- **Infill development:** Densification can be achieved through infill development, where vacant or underutilized land within existing urban areas is developed to increase density. Infill development can involve converting brownfields (previously developed land that is not currently in use) into residential or commercial properties, and redeveloping obsolete or abandoned buildings.
- **Vertical construction:** Building taller structures, such as high-rise apartment towers, is another method of densification. This allows for more housing units and population on a smaller land area.
- **Mixed-use projects:** Denser areas can support mixed-use projects, where residential, commercial, and recreational spaces are integrated, enhancing community engagement and reducing the need for lengthy commutes.

The goal of densification is to create more compact and sustainable cities by reducing the need for sprawl and promoting walkability, public transport, and green spaces.

Densification can be beneficial in several ways, including:

- **Reduced Urban Sprawl:** By building more densely, cities can reduce the need for

sprawling development and preserve green spaces and agricultural land.

- **Improved Public Transport:** Denser cities can support more efficient public transport systems, reducing the reliance on personal vehicles and decreasing traffic congestion.
- **Mixed-Use Development:** Denser areas can support mixed-use projects, where residential, commercial, and recreational spaces are integrated, enhancing community engagement and reducing the need for lengthy commutes.
- **Economic Benefits:** Densification can stimulate local economies by providing more housing options and increasing the availability of amenities and services.

However, densification must be carefully managed to avoid negative impacts such as:

- **Loss of Privacy:** High-rise construction can lead to loss of privacy due to increased overlooking and reduced ventilation.
- **Urban Heat Island Effect:** Extremely dense cities can exacerbate the urban heat island effect, which can negatively impact the urban microclimate.

To achieve successful densification, urban planners and architects must balance these factors through careful design and planning, incorporating elements such as walkability, public transport, and green spaces to create more sustainable and livable cities.⁽²¹⁾

Urban Infill

One term in urban planning related to the strategy of densification is the urban infill, which “is defined as new development that is sited on vacant or undeveloped land within an existing community, and that is enclosed by other types of development. The term “urban infill” itself implies that existing land is mostly built-out and what is being built is in effect “filling in” the gaps...” — National League of Cities Sustainable Cities Institute. The strategy of infill based on stitching and completing in the weave of existing urban fabrics is one of the most suitable techniques for soft densification. This may involve recon-

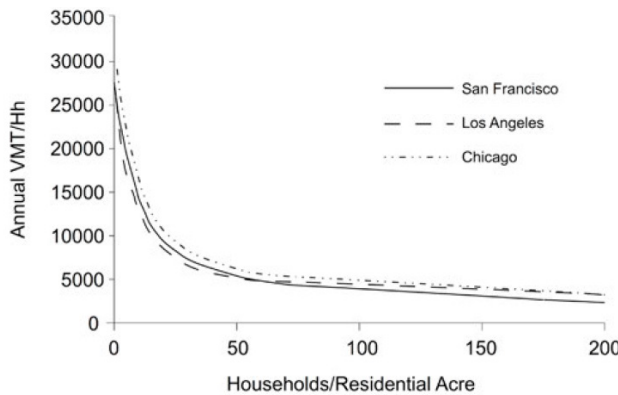


Fig. 9: - Driving versus residential density in the US studies. - Source: 2015 Michael West Mehaffy, TU Delft

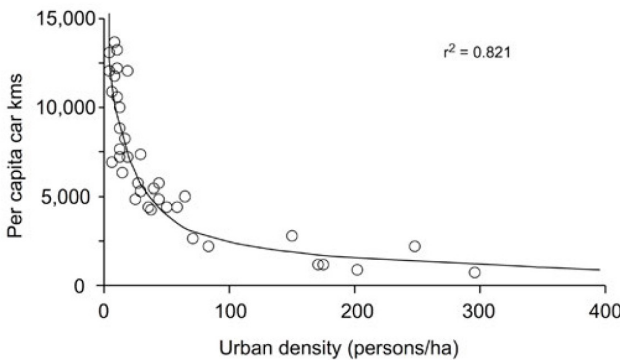


Fig. 10: - Urban density (persons/HA) in the US studies. - Source: 2015 Michael West Mehaffy, TU Delft

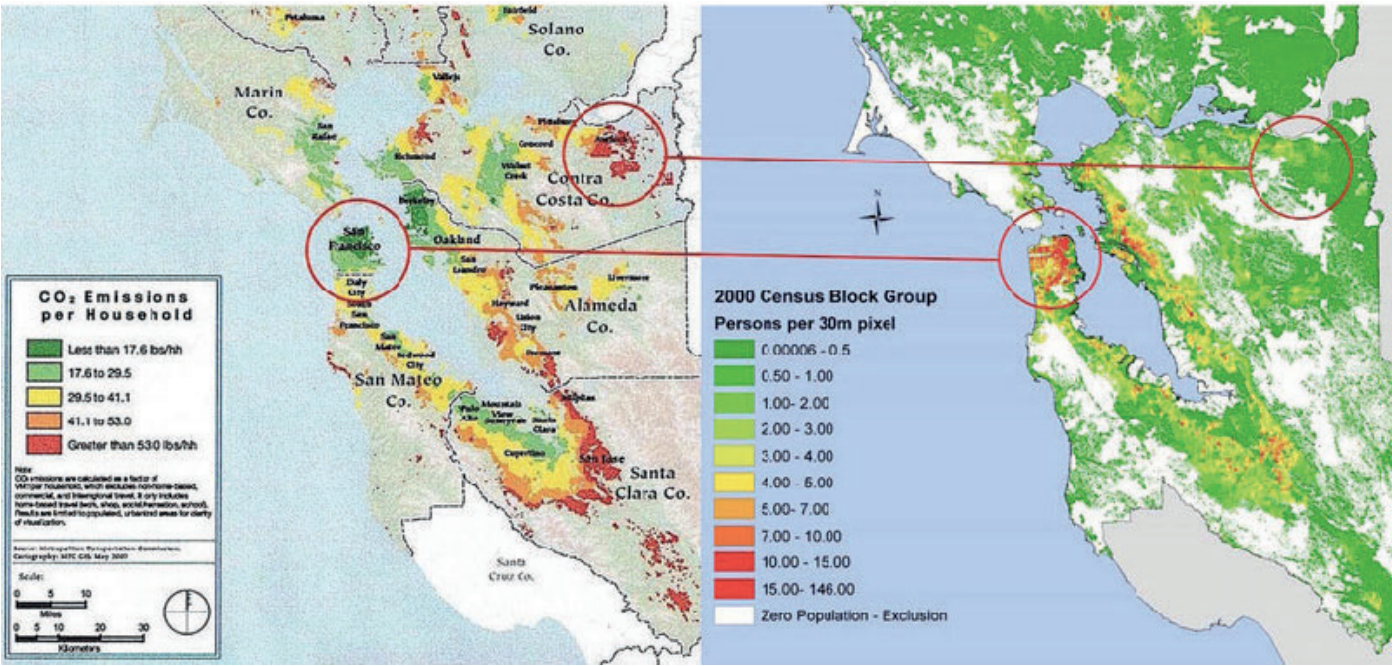


Fig. 11: The striking inverse relationship between density and emissions from transportation is readily visible in this comparison. On the left, a map of the emissions per household from transportation, with green showing lower emissions and red showing higher emissions. On the right, residential density, with dark green showing lower density and red showing higher density. - Source: 2015 Michael West Mehaffy, TU Delft

nection of the residual spaces, restoration or redevelopment of existing volumes, and implementation of minor interventions. Infill solutions can be used when, for example, the city center is in need for densification or some voids within the city that were formed due to natural or anthropic reasons need to be filled and also when the existing neighbourhoods are not capable to meet new residential and functional needs.⁽²²⁾

In a book called “Urban Intensities: Contemporary Housing Types and Territories” written by Peter Rowe, who is a professor at the Harvard University Graduate School of Design, there are two main types of urban infill architecture suggested. First one is the “**infill de novo**” which is supposed to infill predetermined street layout or infrastructure plan with a new development completely or partially across the site. Second one is the infill housing in the form of **singular or puntal interventions** that are related more to the redevelopment of existing buildings, that can belong sometimes to different time periods, than to “infill de novo”. Such singular intervention refers to a single building or building that can be understood as the specific points in the urban landscape complex that can be adapted to existing built environment or contradict with it. With time, puntal interventions on existing urban fabric can be multiplied and transform away the present built condition or, in the opposite, reinforce it. Such redevelopment solutions can be a response to different site conditions: one house replacing another; “one house beside others, with the implication of shared or different contextual features; a house literally within the framework of another; a house that gives the appearance, rather than the thorough reality of other houses; and even a house under other housing, again with an element of disputation about the expression involved. A good example of the latter requirement is the Maison de Verre house in the Saint-Germain-des-Prés district of Paris. This house was designed by Pierre Chareau at 1928 as a renovation of existing building. Due to the presence of a tenant on a second floor that did not want to move out, ar-

chitect decided to put second floor on stilts and remove the part of the building below, replacing it with a new glass house. According to Peter Rowe, infill housing as a puntal intervention is more preferable in modern context of need for space and density.⁽²³⁾ In a research done by Department of Architecture of the University of Bologna, there are some other, more specific types of urban infill developments are introduced: “**expanding and constructing a new building volume, adding a volume adjacent to an existing structure, inserting between blind facades, elevating structures and, ultimately, demolishing and reclaiming vacant areas**”.⁽²⁴⁾

Talking about advantages of urban infill, the identity of the urban fabric can be strengthened, increasing the diversity and attractiveness of a neighbourhood. Adding dwellings in the right place can improve the existing mix of functions and strengthen or repair the existing identity of a city block or neighbourhood. But adding building mass to a city normally occurs at the expense of open (green) space. If improving the overall quality of the inner city is the goal, then smart densification must go hand in hand with the qualitative upgrading and quantitative expansion of urban green. Also infill developments are usually within easy reach to various amenities and public transportation nodes that in a long-term perspective will reduce people's need to use private cars. The fact that each function has a unique pattern of energy use is another benefit of incorporating homes and associated activities within the city. Heat and cold can be transferred between buildings by strategically placing functions, which can drastically lower the energy consumption of the current building stock. Although it necessitates new partnerships and organizational improvements, this clever energy exchange method has the potential to significantly lessen the city's environmental impact. Furthermore, a useful tool for cooling the inner city and improving comfort during what seem to be increasingly hot summers and heat waves is the intelligent placement of building volumes in relation to prevailing breezes, ur-

DENSIFICATION + GREENIFICATION = SUSTAINABLE CITY

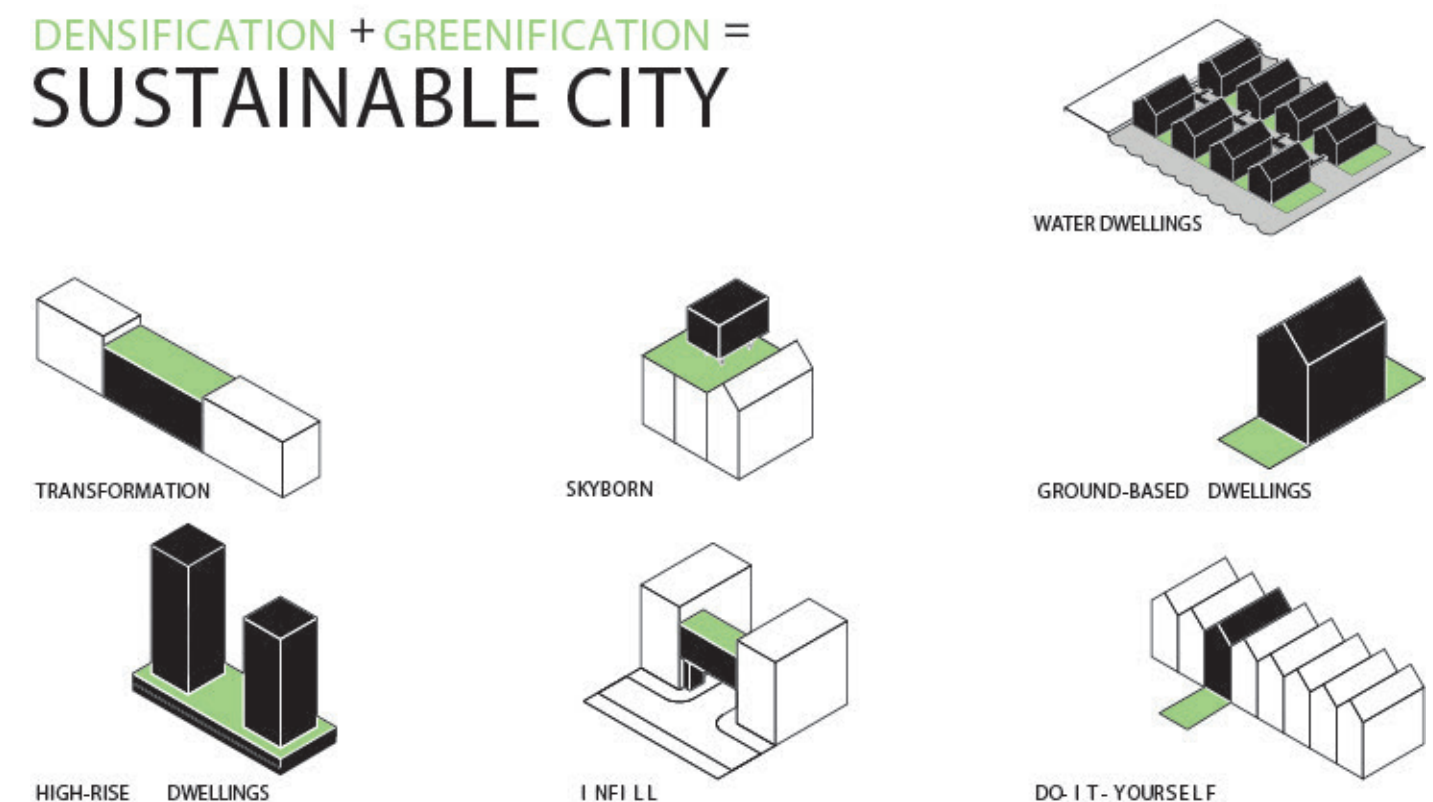


Fig. 12: Densification and greenification strategies proposed for the city of Rotterdam - Source: Tillie et al., 2019

ban green spaces, and water bodies. In addition, it is concluded that it takes less energy to build and maintain infrastructure for urban infill relative to suburban development. Generally, infill strategies aim to prevent urban sprawl and advocate for more compact and, thus, sustainable cities.⁽²⁵⁾

02| CASE STUDIES

Backyard Homes

Location: Los-Angeles
Type: Proposal
Year: 2010
Authors: Dana Cuff et al.
Program: Urban development+residential

Relevance
“Backyards Homes” UCLA research paper is relevant to this thesis topic as it explores the possibilities of densification in order to mitigate the current sprawl. Even though it addresses densification of single family residential zones in LA, its policy recommendations and financing schemes can be applicable for the city of Turin.

Description
The research paper “Backyard Homes” by Dana Cuff, published in 2010, explores the concept of small, self-sufficient homes built in backyards as a potential solution to the growing need for affordable and sustainable housing options, particularly in urban areas where land is scarce and expensive.
Accessory dwelling units (ADUs), also known as backyard homes, are defined as small, self-contained dwellings built in the backyards of existing homes. These homes are designed to be energy-efficient, environmentally friendly, and cost-effective, providing additional living space while reducing the need for new construction and promoting community cohesion.
One of the key benefits of backyard homes is their affordability. By offering a more affordable alternative to traditional housing options, backyard homes can be accessible to a wider range of people, helping to address the issue of housing affordability in urban areas. Additionally, “these homes are designed with sustainability in mind, incorporating energy-efficient features and environmentally friendly materials”, which can significantly reduce the carbon footprint of

urban living.
Another important aspect of backyard homes is their potential to foster a sense of community. By providing additional living space for family members or renters, these homes can bring people together and strengthen social connections within neighbourhoods. Furthermore, by allowing for more housing units on existing properties, backyard homes can help increase urban density without requiring new construction, making efficient use of limited land resources.
Despite the numerous benefits of backyard homes, research at cityLAB-UCLA discovered that significant hurdles to secondary units remain, leading to the following policy recommendations:
1. Reduce parking requirements, particularly in transit zones.
2. Remove building and planning code barriers to backyard homes, particularly the passage-way law, alley setbacks, and setbacks between structures on a given site.
3. Expedite the planning approvals for secondary units when an existing house is retained on site.
Because secondary units also fall victim to the complexities of the design and construction process, cityLAB, in collaboration with Kevin Daly Architects (KDA), is generating a prototype infill housing unit. This new model is environmentally innovative, with a simpler delivery system that resembles purchasing a car. As opposed to the development recipe of the dingbat, the backyard house formalizes the informal development practices on lots across Los Angeles. Not all backyards will accommodate a backyard home, but if just 10 percent of L.A.’s single-family parcels built such units, the city would increase its housing stock by 50,000 dwellings. This would go a long way toward addressing the housing-jobs crisis.⁽²⁶⁾

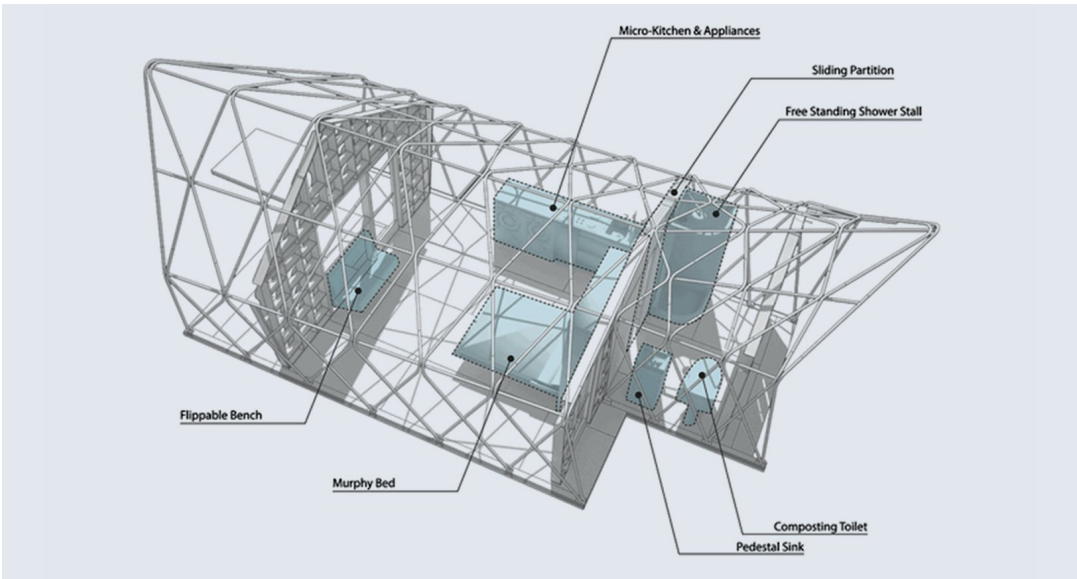


Fig. 13: Prototype of cityLAB’s Backyard Homes study - Source: <https://www.citylab.ucla.edu>



Fig. 14: Backyrads Homes development scenarios - Source: Dana Cuff et al., 2010

OPPORTUNITY STARTS AT HOME: Addressing Housing Insecurity for Underserved L.A. Community College Students.

Location: Los-Angeles

Type: Proposal

Year: 2019

Authors: Dana Cuff et al.

Program: Urban development+Student housing

Relevance

This report is relevant for my research because it discusses the potential of using underutilized plots of land that are in possession of the Los Angeles Community College District (LACCD) to develop affordable housing for students.

Description

The research focuses on the issue of housing insecurity among students in Los Angeles Community College District (LACOD) and its impact on academic performance. The report provides statistics on the percentage of students surveyed who were experiencing some form of housing insecurity and had experienced homelessness in the past year. It also discusses the traumatic effects of housing insecurity on students and the need for supports and services to address these issues. The research is based on a comprehensive review of literature, including academic articles, books, and reports from organizations and government agencies. The study also presents case studies of innovative programs that address housing insecurity for underserved students, such as the partnership between Tacoma Housing Authority (THA) and Tacoma Community College (TCC) that connects students experiencing homelessness or risk of homelessness with Housing Choice Vouchers. As a specific design strategy proposal, cityLAB-UCLA explores the potential for siting affordable housing on underutilized land at three LACOD schools: Pierce College, Los Angeles Valley College, and Los Angeles Harbor College. Three site strategies for affordable housing development are presented: courtyard housing, town center, and live-learn hub. For

instance, The LA Valley College proposal suggests building a “town center” with commercial on the ground level and housing above, creating a gateway between the campus and its surroundings. The site is located at the intersection of Fulton and Burbank, where a corner parking lot sits at a primary point of entry. Appropriate sites for affordable housing at LAVC are those with ample surface parking and connected to mass transit and nearby commercial areas. The design illustrates that parking can be accommodated, with the 75 spaces needed for future residents one level underground, while a second level of underground parking would replenish the parking displaced by the new building. The schematic design for LAVC is a 114,000 square foot rectangular structure with 200 residential units, ground-level supportive services for educational or community use, and a mixture of commercial spaces. The apartments are divided between studio, 1-bedroom, and 2-bedroom units, with new green, open space provided. The site offers an opportunity to create a new relationship between the school and surrounding community—a new “town center,” where housing, school, transit, commerce, and accessibility all merge into one.

The report concludes that housing insecurity has a significant impact on academic performance and that initiatives are needed to address this issue on campuses. It also highlights the potential for on-campus housing to generate revenue and support local businesses. The report emphasizes the importance of addressing the housing crisis in the region, which is driving the homelessness crisis, and how affordable housing on LACCD campuses can contribute to solving this issue.⁽²⁷⁾



Fig. 15: LA Valley College's "Town centre" project site - Source: Dana Cuff et al., 2019

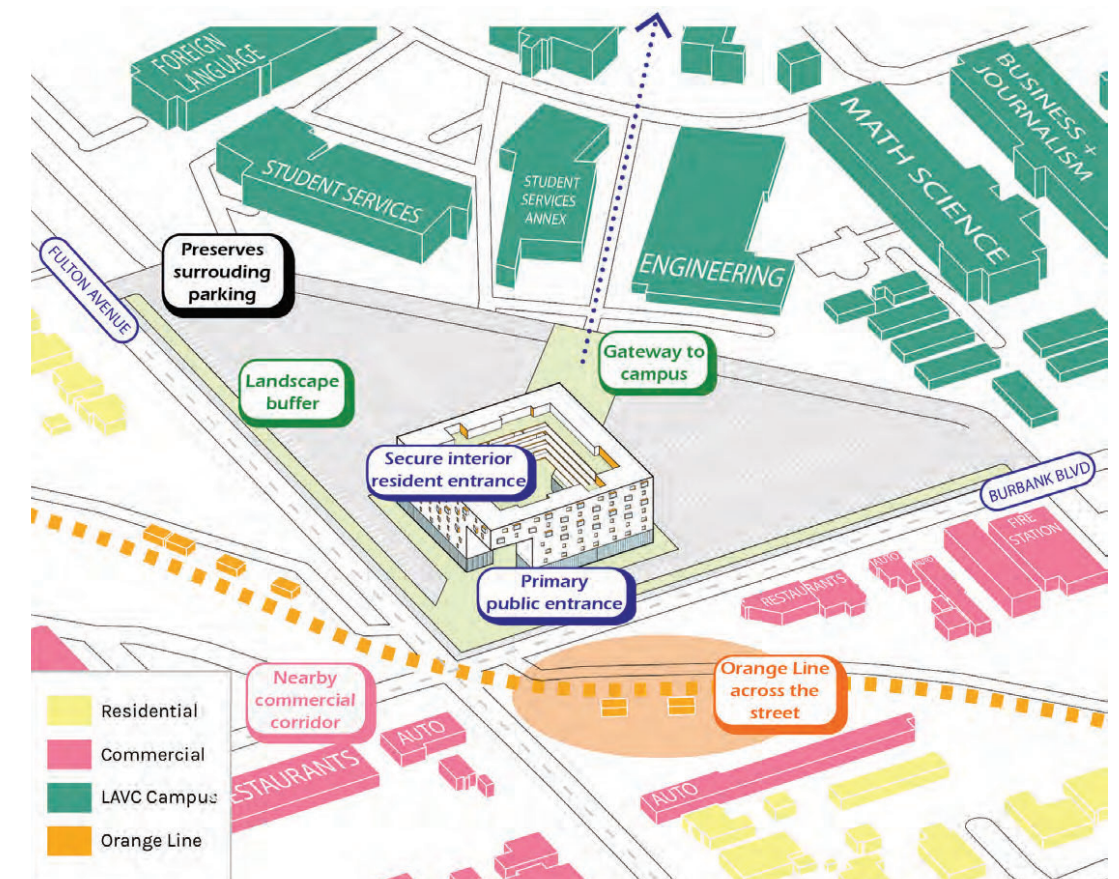


Fig. 16: LA Valley College's "Town centre" proposal - Source: Dana Cuff et al., 2019

Kühne & Co floating infills

Location: Rotterdam
Type: Built projects
Year: 2023
Authors: Kühne & Co
Program: Office + residential

Relevance

Architectural works of Kühne & Co are of a big value for infill densification topic as the office suggest peculiar utilisation of non-obvious “vacant” plots such as parking lots or service passages. Actual implementation of such projects is brought to reality due to the architect’s ability to negotiate with municipality and developers, justifying feasibility both from social and financial points of view.

Description

In this period of crisis, small-scale is not a magic word, but it is a way to cope with economic setbacks. The Rotterdam architectural firm Kühne & Co focuses on smaller construction projects, often for private clients. It is typical that these often concern infill locations and the majority of the floor space is above ground floor level. Kühne & Co therefore purchases air rights from the municipality of Rotterdam.

One of Kühne’s first tests of urban fabric “knitting skills” was located in Boomgaardsstraat, in the central district of Cool. Here he creates a street with one building, in what was previously nothing more than a messy space, with a view mainly of parked cars and rear facades. Initially Joost Kühne was looking for a plot to build an office for his architectural firm. After he had already investigated quite a few locations, he came across a small piece of free space in Boomgaardsstraat. Back then he still assumed the classical way of building: you look at whether a plot is large enough. And if not: whether you can buy space from the neighbours. It didn’t work so Joost Kühne came up with an idea to raise building on columns above existing parking lot. However, no one at the OBR (Rotterdam Development Company, ed.) responded enthusiastically to that plan. Then the architect

decided to contribute private money. On the top floor he then included 1 apartment with a roof garden for himself in the building as at the time, it was easier to get financing for a home than for commercial space. Moreover, Joost Kühne had already obtained the money for the living space from the private fund, so that the financing of the plan was already one quarter complete. It clearly reflects the ratio of the floor area: a quarter is residential; three quarters is office space. Basically, architect had to pay the OBR for the air rights. Just like with a normal building, you pay in proportion to the floor area, but the price is a lot lower. That is a matter of pushing and pulling during negotiations, because there is no standard for this. It is difficult to determine the savings from building in the air. On the street Kühne & Co only had to deal with the municipality as a negotiating partner. In the case of the parking lot, they also had to deal with NSI, the owner of the adjacent office, who had a long lease on the parking space. NSI imposed the condition that the parking lot must be redesigned. Due to the more efficient layout, the installation of the columns has not been at the expense of parking capacity.

One of the following projects of the office is the infill building in Mauritsstraat, Rotterdam, spanning in-between existing structures. The project involves reforming the access to the Boomgaardhof street as this new building hovers above the entrance to an underground parking garage that was creating a gap in a consistent street front. Floating infill forms an important passage in the center of Rotterdam having only 27 m² in its footprint. The construction is carried out by extending the existing building on the north side with a rounded volume, which contains the smallest possible stair and a constructive wall at a sufficient distance from the old foundation. ⁽²⁸⁾

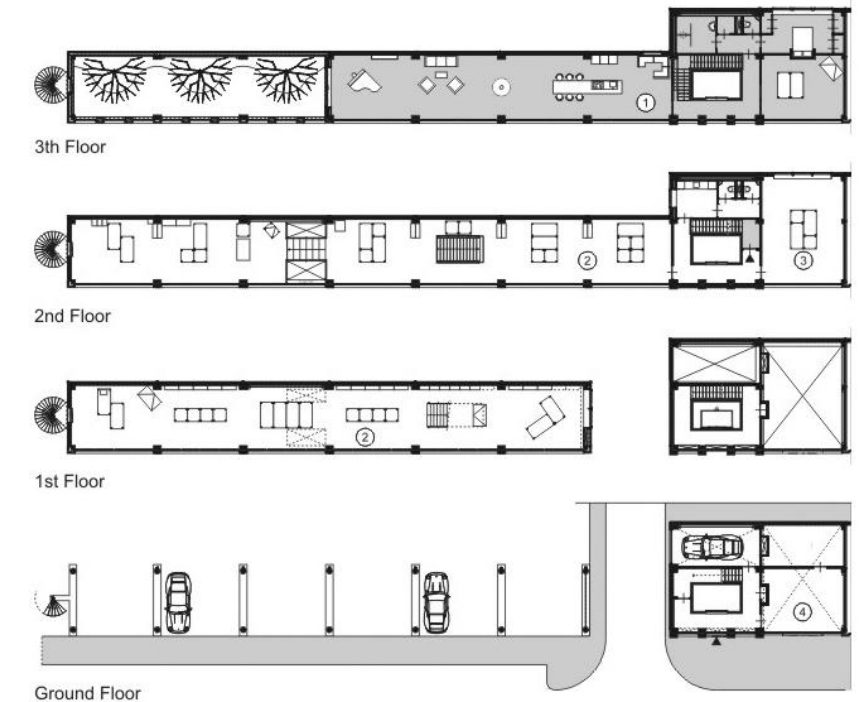


Fig. 17 and 18: Office and architect’s dwelling on Boomgaardsstraat, street view and plans - Source: <https://www.miesarch.com>

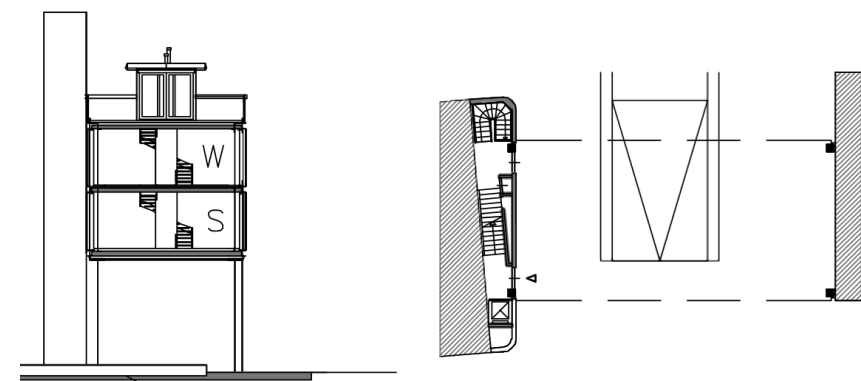
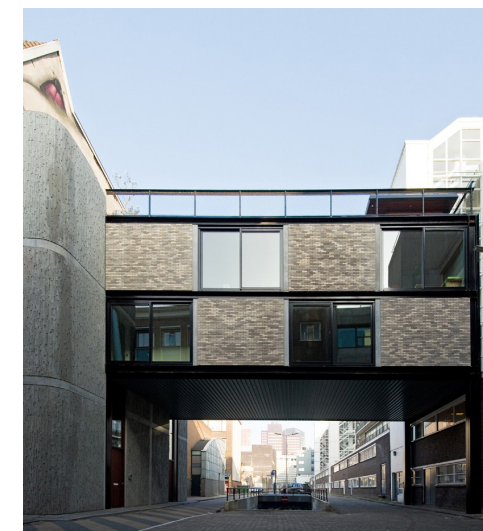


Fig. 19 and 20: House + office “floating building” in Boomgaardhof, street view, section and ground floor plan - Source: <https://rotterdamwoont.nl>

Infill in architecture of Stephane Malka

Location: France
Type: Proposals and built projects
Year: 2011-2016
Authors: Stephane Malka
Program: Residential

Relevance

This case study was chosen due to its peculiar responses to housing crisis and urban sprawl challenges through using “urban commons” for creation of new forms of inhabitation. Stephane Malka designs modular prefabricated structures that lean on existing buildings or crawl above them, intensifying strategic areas of French cities.

Description

French architect Stephane Malka published a book called “Le Petit Paris” in which he shares 14 projects aimed at rethinking the city, healing its architecture through working on urban commons. Malka suggests to extend what exists without destroying it, and to reclaim abandoned areas of the city to transform them. He states that the process of architectural production is no longer adapted to real needs as it is costly in terms of time, and therefore, money, and it increases the gulf between architecture and the needs of citizens. Moreover, it is difficult to speak of “environmentally friendly” architecture when the act of building in itself damages the environment. To solve these issues, the city must be reconsidered with a view to transformation - via the superimposition, addition, and extension of existing structure rather than built up from scratch. Malka's methodology based on colonisation of abandoned public spaces by a non-specialised labor force that creates structures using prefabricated or recycled elements. This project parasites the city quite literally: it leans into it, generating an urban vitality that is reactive and affordable, creating new potentials for collective use.

One of the architect's proposals “Ame-Lot” is of a special interest for this thesis work it is an ex-

tension of existing building made in order to create student housing. Its urban form is a rough extension of blind walls and existing housing. The skin is formed of an existing module: wooden pallets. Maintained by horizontal hinges, the pallets fold upward, creating privacy or large openings. The modular aspect of the various pallets creates varied shapes that constantly change with use. By reappropriating materials, existing structures can be recycled without additional and costly transformation.⁽²⁹⁾

Another innovative solution is the project “3BOX”, located on the edge of the river Seine in Paris. Referring to the “La Loi Alur” law established in France, architect claims that now the vertical extensions of buildings are possible and the land acquisition is not needed as the right to built is obtained in exchange for a common parts of the existing building's renovation. Thus, he suggests to suspend and raise modular building units in-between existing buildings at the corner plot. These units are easy to be constructed and dismantled, topped with green roofs. the construction is 40% below the real estate market price. each unit is made of a steel structure and gypsum board with the thermal insulation carried out from the outside. Among similar projects, I would also mention plug-in city 75: with the idea of optimizing their properties, the co-owners of a building located in the 16th arrondissement of Paris commissioned stéphane malka architecture to enlarge their apartments and bring more natural light in. Malka is expanding it horizontally by grafting a series of extensions, bow windows, balconies and loggias of variable sizes with views of the city, which seem to sprout out from the edifice. The idea behind the project is to inhabit the façades, increasing user space by growing outward rather than upward.⁽³⁰⁾



Fig. 21: “Ame-Lot” - Source: <https://studiomalka.com>

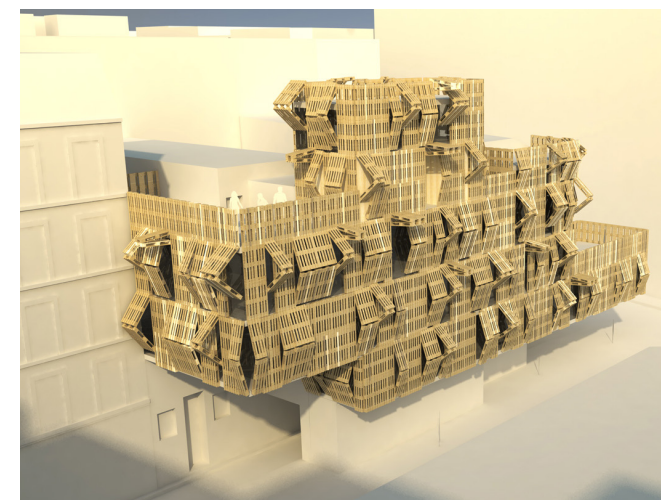


Fig. 23: “Ame-Lot” - Source: <https://studiomalka.com>



Fig. 22: “plug-in city 75” - Source: <https://studio-malka.com>



Fig. 24: “3BOX” - Source: <https://studiomalka.com>

Over Byen Arkitekter extension student housing

Location: Copenhagen
Type: Built project
Year: 2023
Authors: Over Byen Arkitekter
Program: Student housing

Relevance

This building in Copenhagen is one of the rare examples of an existing building being used as a host for additional stories of student housing. It is helpful for thesis research as it gives some ideas on possible structural solutions and also justifies such investments in case of a European market.

Description

Renovating a building can mean many things. Sometimes it is something as relatively simple as restoring the existing building stock to its original condition. More and more often, however, there is a need to optimize or further develop the buildings so that they can better meet society's changing needs in the meantime. One project where that philosophy is particularly clear is Lygten 37, formerly an old commercial building with three floors plus a basement, in the heart of Copenhagen's Northwest quarter, opposite Nørrebro's City Center. The building was originally occupied by KONE Elevator and has since housed KEA before its latest transformation. However, when KEA vacated the property, it was decided that a change was needed. In order to meet the growing need for better shopping opportunities in the area, the lower floor of the building has been converted into retail space. The two floors above have been turned into offices, which with their location close to Nørrebro station house attractive workplaces.

At the same time, there is a great demand for youth housing in the entire capital city area, but especially in Nørrebro, which over recent years has developed into a focal point for Copenhagen's youth culture. Therefore, it was not

enough to simply renovate the existing building mass and convert parts of it into retail business – there was a need to add to it. It was therefore decided that, on top of the existing building stock, three floors with a total of 75 student housing should be built. It set enormously high demands on the professional quality to ensure compliance with formal requirements such as fire safety and structural integrity. For an easier construction process, new 3-storey student housing will be built from prefabricated modules, which are produced in Lithuania.⁽³¹⁾ There is no particular information on the project's financial feasibility, however, after conducting information on youth housing subsidies in Denmark, it is possible to assume that this type of investment is among the safest ones. Unlike other countries such as the UK or Ireland, Denmark's student housing sector provides an additional layer of security: it offers a flexible use class, which incorporates residential use. This means you can always attract professionals who are happy to live in a micro apartment. Moreover, the Danish student sector received substantial government financial backing during the corona pandemic so this market has supply deficiencies and economic support and is also attracting an international audience. The Act on subsidized private youth housing was adopted as part of the government's housing package in December 2002 and it is still in effect with some minor changes in 2022. The Minister for Economic Affairs and Trade can give commitments for grants to developers for the establishment of subsidized private youth housing by: new construction or conversion of existing properties which are not used for housing.⁽³²⁾



Fig. 25: Lygten 37 youth housing street view - Source: <https://www.cwobel-ejendom.dk/>



Fig. 26: Lygten 37 assembly process - Source: <https://dmdmodular.com>

Ruggero Menegatti Architetto reuse student housing

Location: Venice
Type: Built project
Year: 2014
Authors: Ruggero Menegatti Architetto

Relevance

Residenza Universitaria dei Crociferi exemplifies a successful adaptive reuse project for student housing that was made possible due to the governmental support through reserved funds for co-financing of such projects. Those reuse projects are of a special value for the cities not only because they bring new residential facilities but also trigger urban regeneration as illustrated by this case study.

Description

In Italy, a strong push towards the expansion and renewal of the supply of more affordable accommodation was promoted by Law No 338 of 14 November 2000 “Provisions on housing and residences for university students”, which launched an implementation programme of interventions with strong strategic connotations. The recent National Recovery and Resilience Plan (PNRR), by reserving a substantial portion of funds for the co-financing of realisations, has further enhanced the objectives of the law through the recently published implementing decrees. Law 338/2000, which has been implemented to date with five calls for applications, was issued with the aim of increasing the supply of accommodation facilities, especially in favour of capable and deserving students without economic means, and the prime objective of enhancing the value of the existing building stock through incentives. The law, in essence, acknowledges the cultural guidelines of the new student residency, which sees in these infrastructures an opportunity to trigger processes of urban requalification, social regeneration and economic development, as demonstrated by the most recent panorama of realisations characterised by the attempt to overcome traditional settlement, typological and functional

standards.⁽³³⁾

The University Residence of the Crucifers was built in Venice by the IUAV University Foundation in two phases, participating in two calls for proposals of the law 338/00: the first concluded in 2013 and the second in 2016 for a total of 255 new housing places for students and researchers. Its construction was possible with the collaboration of numerous national and local bodies and institutions: first and foremost the Municipality of Venice which granted the complex a free forty-year surface right, the MIUR and the Region of Veneto (through the Institution for the Right to Study-ESU of Venice) who co-financed the recovery intervention, the Venice Foundation which subsidized the design and technical costs inherent to the contract, not least the IUAV University of Venice which, through a group of teachers and its engineering company ISP srl, developed the recovery project.

In Residenza Universitaria dei Crociferi collective service areas, some of which are also accessible by city residents, consist of a cafeteria, restaurant, game room, library, auditorium, meeting room, study room, gymnasium and laundry room, and are mostly located on the ground floor. The former convent also consists of three former cloisters, which have been designated as outdoor social spaces for all users (internal and external). The mixed use of the common spaces on the ground floor by students and Venetians ensures a continuous exchange that has effectively regenerated an area of the city on the edge of tourist routes, inhabited mainly by the elderly and poor in meeting places. The inclusion of students has effectively redeveloped the neighborhood: the residence represents an established meeting place for residents and also fosters the growth of the supply of commercial and directional activities in the area.⁽³⁴⁾



Fig. 27: Residence cloister view - Source: <https://rmastudio.it>

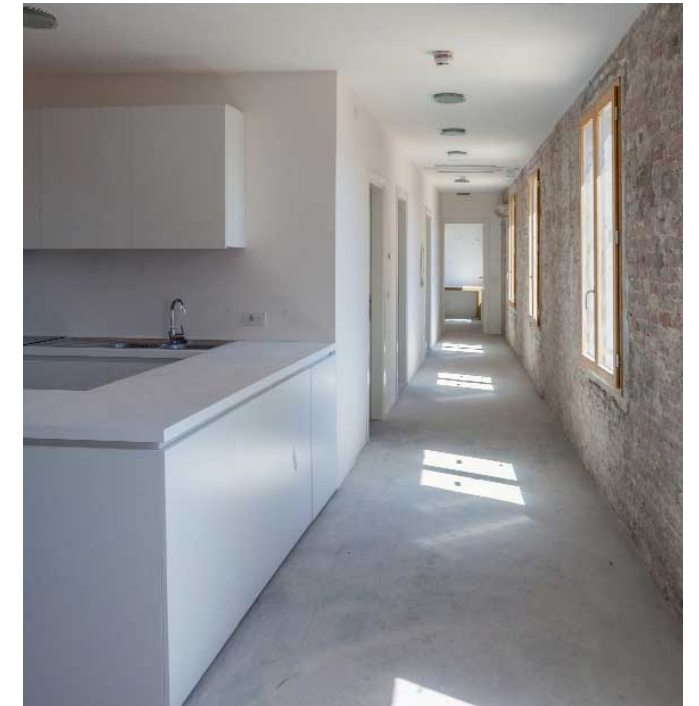


Fig. 28: Interior view - Source: <https://rmastudio.it>



Fig. 29: Public event in the cloister - Source: <https://www.veneziatoday.it>

CO-CITY

Location: Turin
Type: Competition, Prototype
Year: 2023
Authors: The Open Workshop & Spiegel Aihara Workshop (Joint Venture)

Relevance

This case study was chosen due to its possibility to fill the gaps between existing buildings and contribute to soft densification of the neighbourhoods. Another relevant aspect is that this project proposes flexible living space arrangement, one of which is co-living that has a correlation with student housing layouts.

Description

The CO-CITY project is included among the 18 winners of the first UIA - Urban innovative Action call in 2016, which resulted in a 4.1 million euro grant from the European Commission. CO-CITY takes as its starting point the juridical framework provided by the Regulation on collaboration between citizens and the City for the care, shared management and regeneration of urban commons approved in 2016, and adopts the Pacts of collaboration between citizens' organisations and the City administration as a tool to foster and cultivate mutual trust between local communities and local institutions. The project addresses the challenge of regenerating various urban neighbourhoods and fighting social exclusion. In order to do so, it aims at transforming abandoned buildings, vacant land, and underused public spaces into urban commons: spaces co-managed by the community and the City administration. The commons are entrusted to the care and management of the citizens through forms of active participation. The aim is to promote social mixing, community cohesion, social enterprise development and job creation so as to contribute to breaking the cycle of poverty and exclusion.

The CO-CITY project has been carried out by the City of Turin in partnership with the University of Turin (Computer Science Dept. and Law

Dept.), the Italian National Association of Municipalities (ANCI) and the Cascina Roccafranca Foundation as the leader of the Neighbourhood Houses Network. The first step of the project was the public call launched in May 2017, which aimed at collecting proposals from citizens' organisations for pacts of collaboration, therefore communicating with target beneficiaries and adopting a participative approach. This public call laid down the conditions for the submission of proposals allowed in the co-design phase, which was meant to define and finalize the contents and activities of the pacts of collaboration. Such a legal device was forged in order to facilitate the resolution of local communities' controversies and to admit proposals from city inhabitants without requiring a particular level of expertise, meaning accepting informal groups even if they were not assembled in formal organizations.

The pacts also had different features, especially in the types of the actors involved and the partnerships created. BeeOzanam,⁹ a community hub located in a former industrial site in the Borgo Vittoria neighbourhood, is founded on a wide and diverse partnership of structured social cooperatives and associations already active in the area. Their project has a multi-purpose aim, forming a bridge between the production of welfare services for the community, cultural innovation, and environmental sustainability. Additionally, a community garden has been created on the rooftop. Another proposal was to regenerate a building in Via Cumiana 15, an abandoned section of the former Lancia industrial establishment. The renewed area is able to host a variety of civic activities: vertical agriculture, educational activities, street sports and creative/multi-media activities.⁽³⁵⁾



Fig. 30: Via Cumiana 15 before renovation - Source: <https://www.facebook.com/viacumiana15>



Fig. 31: Via Cumiana 15 after renovation - Source: <https://cumiana15.com/>



Fig. 32: BeeOzanam courtyard view - Source: <https://cooperativecity.org>

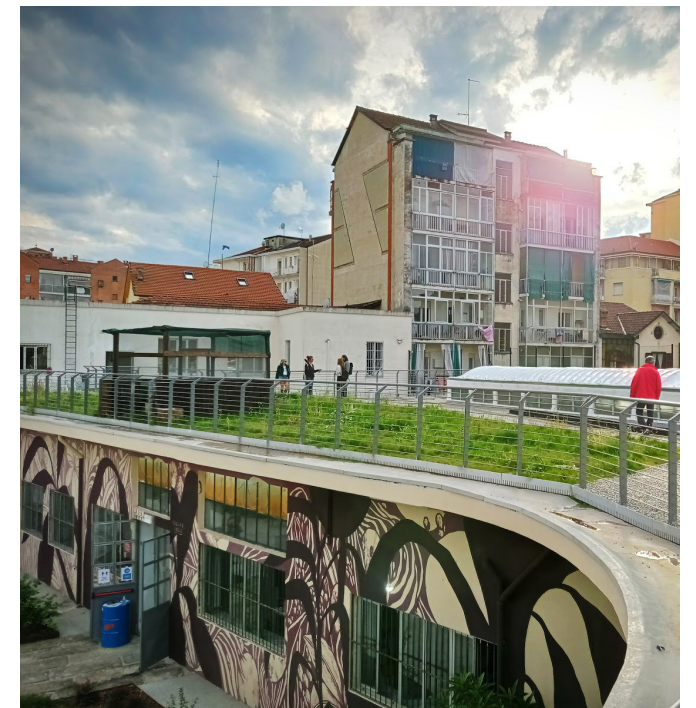
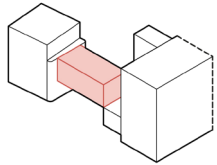
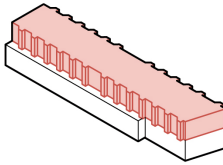
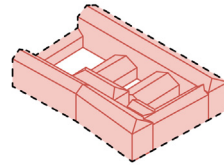


Fig. 33: BeeOzanam roof garden - Source: <https://cooperativecity.org>

LESSONS LEARNED

Infill type		Infill de nuovo		Infill through extension		Infill through adaptive reuse
Case study	Dana Cuff for UCLA densification proposals	Kühne & Co floating infill	Studio Malka extensions projects	Over Byen Arkitekter extension student housing	Ruggero Menegatti Architetto reuse student housing	CO-CITY
Stakeholders	private (housing agencies)/ non-profit housing developer; homeowners; municipality	studio; OBR (Rotterdam Development Company); NSI (leasing parking lot); municipality	studio, development company Toits du Monde + private owners + municipality/ studio + private owners + municipality	studio; private developer C.W. Obel Ejendomme; municipality (presumably); students and youth	studio; IUAV University Foundation; municipality; students	residents or associations; City of Turin; public educational facilities
How achieved	cityLAB-UCLA provides following policy recommendations for ADU : <ul style="list-style-type: none">• reduce parking requirements, particularly in transit zones.• remove building and planning code barriers to backyard homes, particularly the passageway law, alley setbacks, and setbacks between structures on a given site.• expedite the planning approvals for secondary units when an existing house is retained on site.	The street was already registered as such in the land registry , so architect had to arrange an easement for it. In fact, that is permission from municipality to hang the building above a piece of land. In the case of the parking lot, he also had to deal with NSI, the owner of the adjacent office, who had a long lease on the parking space. NSI imposed the condition that parking lot must be redesigned . So due to the more efficient layout, the installation of the columns has not been at the expense of parking capacity.	These types of the interventions are possible due to the ALUR law introduced in Paris in March 2014. It led to: removal the soil occupancy coefficients (COS) on parcels where the density rules prevented the realisation of the totality of the areas established by the local town planning plan (PLU); grant exemptions from PLU rules for projects intended for housing meeting an objective of diversity; 2/3 of willing tenants is enough for interventions to be made.	Main stakeholder is the private developer who owns property in need of renovation so obtaining permissions in this case is less challenging. Developer decided not to just add retail and office functions to the building but to also add 3 floors with 75 student housing on top. Challenge was to ensure compliance with formal requirements of fire safety and structural integrity through a lot of preparatory work and open dialogue between all parties .	Residenza Universitaria dei Crociferi was built in Venice by the IUAV University Foundation in two phases, participating in two calls for proposals of the law 338/00 . Main successful features of this project are: collective service areas; cloisters, designated as outdoor social spaces for all users; mixed use of the common spaces on the ground floor by the students and Venetians; consistency with energy efficiency goals through the use of renewable sources.	CO-CITY takes as its starting point the juridical framework provided by the Regulation on collaboration between citizens and the City for the care, shared management and regeneration of urban commons approved in 2016, and adopts the Pacts of collaboration between citizens' organisations and the City administration as a tool to foster mutual trust between local communities and local institutions. it aims at transforming abandoned buildings, vacant land, and underused public spaces into urban commons .
Financial feasibility	As a result of cityLAB proposal, in 2016 three bills were signed into law with new regulations that made ADUs legal in all California cities . If owners has the cash and/or existing loan proceeds in hand to pay for his entire ADU budget, he can now utilize those funds to pay for his ADU and utilize the CalHFA ADU grant to cover eligible redevelopment costs . CCDA will place those funds into a managed escrow account along with the grant proceeds for safe disbursement to approved 3rd party vendors throughout your ADU project.	Architect had to pay the OBR for the air rights. Just like with a normal building, you pay in proportion to the floor area, but the price is a lot lower . That is a matter of pushing and pulling during negotiations, because there is no standard for this . It is difficult to determine the savings from building in the air. Architect contributed private money and included 1 apartment himself in the building as it was easier to get financing for a home. Also architect had to buy the 168 m2 parking space that was already released.	In case of private developers, they fund improvements of existing properties and with this obtain the rights to build their extensions. This process saves developers a huge amount of money which, in turn, enables it to sell the apartments space for a much more reasonable price. For the private building co-owners, French government has some subsidies for boosting renovations , such as zero-interest eco-loan (eco-PTZ) and a sustainable development taxcredit.	Danish government offers covering 34 percent of an investment on youth housing , and for this private developers can apply in an annual application round. To ensure affordable rent, a reasonable rent level is set . Denmark's student housing sector offers a flexible use class , which incorporates residential use. This means you can always attract professionals who are happy to live in a micro apartment.	In Italy, a strong push towards the expansion and renewal of the supply of more affordable accommodation was promoted by Law No 338 of 14 November 2000 " Provisions on housing and residences for university students ", which launched an implementation programme of interventions with strong strategic connotations. National Recovery and Resilience Plan (PNRR) reserves a substantial portion of funds for the co-financing of realisations.	The CO-CITY project is included among the 18 winners of the first UIA - Urban innovative Action call in 2016, which resulted in a 4.1 million euro grant from the European Commission . Initiative stimulates urban authorities to experiment with innovative solutions, even if there is the risk of a failure. The City made investments in terms of public works regarding building refurbishment, spatial renovation and equipment provision, wherever it could be a key enabling factor for the innovative services.

03 | REGULATIONS AND FEASIBILITY

In order to apply previously analysed densification methods in the case of the city of Turin, it is important to understand the potential obstacles from the Italian building regulations. This chapter is going to discuss how we can modernize administrative functions causing a drastic leap in productivity for the territorial system understood as an economic, social and cultural organism that integrates public and private actors.

Regulatory adjustments proposal:

- **Air rights transfer**

This is a concept of property owners being able to sold their undeveloped square meters potential to other neighbouring buildings, usually adjacent to them. The development of the property under air rights transfer has to be made in compliance with zoning regulations. This concept is wide spread in New-York city where following key mechanisms provides this procedure:

- Zoning Lot Merger: adjacent property owners can combine their lots into a single zoning lot, enabling the transfer of unused development rights from one property to another within the merged lot.

- Transferable Development Rights (TDR): TDRs permit the transfer of development rights from one property to a non-adjacent property, typically within the same zoning district or a designated area. This mechanism is often employed to preserve historic landmarks or open spaces by transferring their unused development rights to other locations.

So while in NY developers can purchase additional development rights to increase height and density as long as they comply with zoning laws and public approval processes, in Italy and, consequently in Turin, development

rights are not transferable between properties. Adjustments to density or height occur only through municipal approvals tied to specific public interest projects. This is unfavourable because air rights transfers enable densification in strategic areas, reducing urban sprawl. Market incentives encourage developers to prioritize urban voids and central locations, supporting sustainable land use.⁽³⁶⁾

- **Relocated floor area**

Referring again to the NY experience, it is important to include its strategy on conversion of underutilised commercial spaces into residential properties through the Section 15 of the Zoning Resolution. Such conversions are possible within NY regulatory framework but, however, relatively limited. NY-based company Envelope, focused on zoning analysis and evolved from collaboration between SHoP Architects, and the Director of MIT's Civic Data Design Lab, made their own proposal to change the Section 15 of the Zoning Resolution. The key strategy useful for this research is that relocated floor area to accommodate for light and air/yards/courts should be as-of-right without concern for height limits and/or sky exposure planes. Otherwise, developers are losing square meters available for sale in situations where conversion without subtractions is not feasible. Proposed regulatory exemption would allow private developers to contribute to the public realm in the form of sustainable development while still achieving their development goals.⁽³⁷⁾

- **Change of use procedure revision**

In Turin change of use process is approached individually and can be seen as a risk factor for developers wanting to convert, for instance, commercial/industrial buildings or underutilised plots into residential facilities.

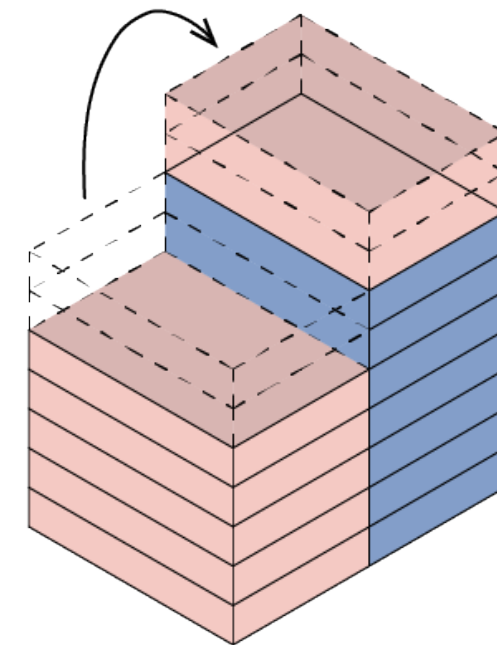


Fig. 34: Air rights transfer scheme - Source: self-elaboration 2025 Lina Milovidova

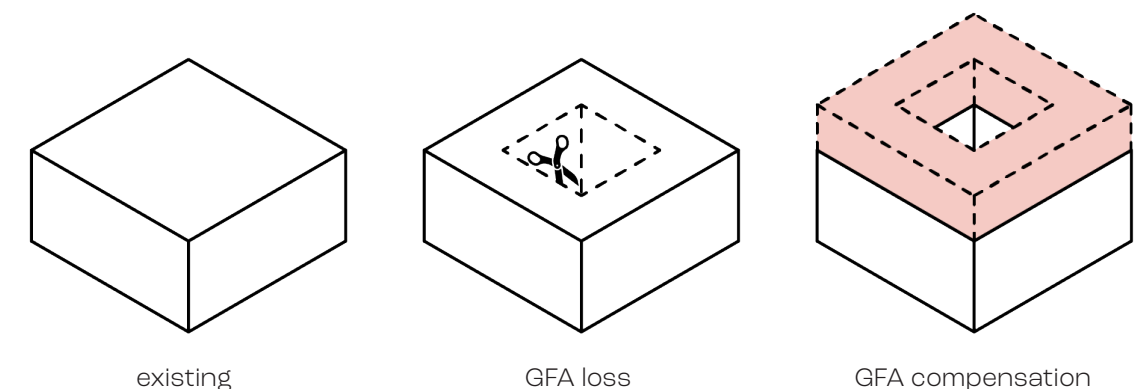


Fig. 35: Relocated floor area scheme - Source: self-elaboration 2025 Lina Milovidova

Another case where this can become a problem is when there is an aim of extending commercial property to accommodate some residential units on top of it. In this case, zoning would need to be changed into mixed-use. Through the study of the legal documents, such as “Regolamento comunale in materia di disciplina del contributo di costruzione” and “Norme di semplificazione in materia urbanistica ed edilizia”, it is evident that at the moment there are no specific fees required to change the use of a building. What has to be taken into consideration is the recalculation of urbanisation changes as the difference between the charges for former use and new residential use. A 50% reduction is applied to the difference, lowering the total payable amount. If the change results in lower urbanization charges (a net negative difference), the municipality does not provide a refund for the previous charges.⁽³⁸⁾ For instance, if you are converting a commercial property into residential apartments, and the calculated urbanization charges are:

- For the new use (residential): €50,000
- For the old use (commercial): €30,000

The difference is €20,000. After applying the 0.5 reduction coefficient, the urbanization change you owe is €10,000.

However, the process of approval in current legislation is blurry as there are no certain criterias for assessment of projects requiring change of use. Addressing the Dutch spatial planning experience, Turin and Italy in general could adopt **standardized guidelines for impact assessment**. Good spatial substantiation (goede ruimtelijke onderbouwing) is a critical requirement in Dutch spatial planning when deviating from the existing zoning plan (bestemmingsplan).⁽³⁹⁾ It involves providing a well-justified argument that demonstrates the proposed change aligns with principles of good spatial planning (goede ruimtelijke ordening). This substantiation must comprehensively address the impact of the proposed development or use and show why it is acceptable from a planning perspective. Based on Dutch experience, the guidelines could include the following:

- Compliance with Good Spatial Planning Principles (urban coherence, efficient use of space, sustainability and environmental impact, compatibility with surrounding uses.
- Assessment of Impacts: parking and traffic, noise pollution, privacy and light, natural values and biodiversity, cultural and historical context, social and economic impact.
- Compliance with higher-order planning documents (like local planning strategies)

It could also be suggested to provide **pre-approved residential overlay zones** within commercial or industrial areas identified as underutilized or declining. Residential use would be automatically allowed as a secondary function without need for full variance procedure. In this way, pre-approved flexibility within non-residential zones (and not currently mixed-use) could be expanded for targeted residential conversions. Additionally, define performance standards (e.g., noise reduction, green building certification) that automatically qualify projects for approval. Another proposal could be the **implementation of a tiered system** that will provide simplified approval procedures for small-scale interventions. For small-scale interventions, the goal of a tiered system would be to avoid requiring a full zoning variance (variante al PRG) when the intervention has a minimal impact and aligns with broader planning goals. Instead, small-scale projects could be handled through simplified administrative processes. As small interventions typically don't challenge the overarching goals of the PRG, by defining them as administrative matters, the integrity of the zoning framework is preserved without unnecessary amendments. At the moment, in Italian spatial regulations documents there are no established thresholds for considering the scale of the development. Thus, it is possible to refer to the experience of the UK, where minor development is one where the number of dwellings to be constructed is between 1 and 9 inclusive.⁽⁴⁰⁾ This kind of development will

have minimal impact on the urban fabric or infrastructure. In the framework of this thesis, it could even be recommended to increase this threshold up to 20 units if certain criterias are met (to be discussed in the next chapter).

• Maximum height relaxation

In some areas of the PRG altezza massima is limited to 8-12 meters only that does not provide conditions for sustainable urban developments in some cases as it prevents creation of adequate density. In order, to improve height restriction regulations, we can refer to the experience of Paris urban planners. On June 5, 2023, the Municipality of Paris adopted a new town planning regulation (plan local d'urbanisme – PLU) to reform city building rules in light of climate change impacts and in order to increase the social housing offering. Ambitious in terms of housing, the new PLU bioclimatic aims for 40% public housing, including 30% social housing by 2035.⁽⁴¹⁾ One of the key focuses of the PLU is the

encouragement of the transformation of existing building fabric through elevation instead of the consuming more soil. According to this plan, authorities now banned all the building developments that exceed 37 meters in height but at the same time allowed to extend the existing buildings up to those 37 meters as-of-right for streets whose width is greater than 12 metres. “From the moment we ban almost all construction on the ground, we have to build housing, and our path is the transformation of the building”⁽⁴²⁾, explains Emile Meunier, who thinks that these elevations will be done sparingly and accompanied by ecological constraints, since according to environmentalists, elevations could be conditioned by the improvement of the environmental qualities of the building. The consultations carried out by the environmentalist group would show that above 30 m, it would be more complicated to make bioclimatic architecture. At this height, explains the elected official, “you consume much more

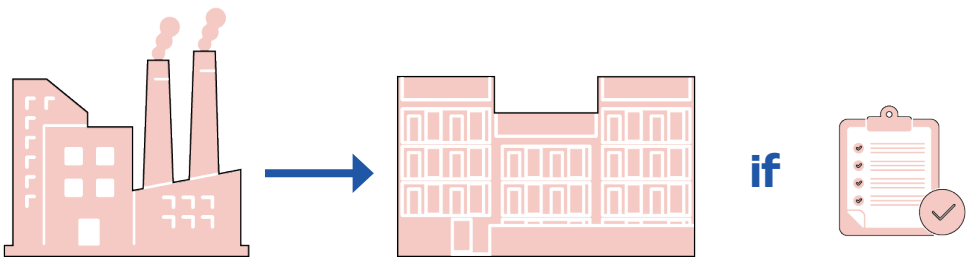


Fig. 36: Change of use procedure revision scheme - Source: self-elaboration 2025 Lina Milovidova

Fig. 37: Maximum height relaxation scheme - Source: self-elaboration 2025 Lina Milovidova

energy both in the design of the building and in its life as a building. The higher a building is, the more people and fluids are moved and the surface in contact with the air is also larger.”⁽⁴²⁾ The executive has therefore decided that the new PLU would above all be a “PLU of transformation”, as Emmanuel Grégoire sums it up.

It is also possible to refer to MVRDV proposal “Pari(s) plus petit” for President Sarkozy’s 2009 urban planning consultation for the great challenge of the Greater Paris area. The proposal includes adding two floors to all Haussmannian-era buildings situated in the city center. This approach aims to increase the density while preserving the architectural integrity of historical structures.⁽⁴³⁾

To define similar approach to the context of Turin, it is possible to suggest as-of-right vertical elevation of existing buildings up to a certain threshold based on the average height of the buildings in the targeted district. For instance, we have the information on the average building height in the district of Crocetta which is 20 meters.⁽⁴⁴⁾ Referring to this statement, we can suggest that all the existing developments in Crocetta should be able to be extended vertically up to 21 meters (corresponding to 7 meters residential housing) in case it complies with other building regulations.

Another suggestion, inspired by the MVRDV proposal, could be encouraging the elevation of existing structures if in this case it improves consistency of the urban skyline. Similar provision can be found in French Duflot ordinance where deviations from PLU rules may include exceptions to the envelope rules along the street, within the height of the existing adjoining construction.⁽⁴⁵⁾

- **Minimum lot size relaxation for small plots**

In some zones of PRG there is a limitation for the coverage ratio that defines the maximum proportion of a parcel’s surface area that can be occupied by buildings. This regulation helps control density, maintain open space, and ensure proper urban development. In some residential areas in Turin the coverage ratio is even limited to only 1/3 that might prevent the development of small size plots suitable for infill constructions.⁽⁴⁵⁾

If there is a lot of 100 sqm under 50 percent coverage ruling, there would be only 50 sqm left for the construction itself which might be insufficient even for small residential infill developments. It could be suggested to make lot coverage exemptions for construction on small lots in order to better maintain urban voids within the city and develop better provision of affordable housing. Exemptions should only be applied if certain criterias are met (to be discussed in the following chapter).

- **Streamlined Permitting Process**

In 2012, Rotterdam’s municipality initiated a program called Klein&Fijn (translating to Small& Beautiful), tasking Studio Hartzema with the charting of all the empty residual plots in the city centre that could host new developments. The research unveiled hundreds of sites that could accommodate small-scale projects. Consequently, the municipality of Rotterdam developed a special permitting process for this kind of designs, and, for instance, architectuur maken’s house project is a result of this policy. In a map, 442 both empty and already built-up lots were identified (a total of 1.9 million m² of additional housing). For each lot, the typological solutions vary from gap filling, transformation, vertical extension to demolition-new construction. From this large bulk of small projects, Hartzema and the municipality identified 34 contenders (85,000 m² of additional space) to potentially put on the market. Four Rotterdam architectural firms were then invited to draw up plans for eight building lots.⁽⁴⁶⁾



Fig. 38: Vacant lots mapping scheme - Source: <https://studiohartzema.com/en/projects/kleinfijn/>

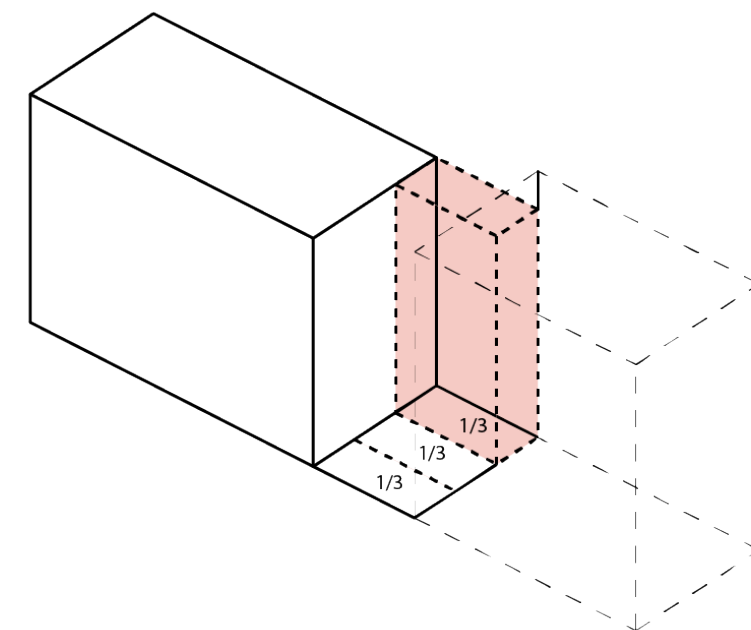


Fig. 39: Minimum lot size scheme - Source: self-elaboration 2025 Lina Milovidova

The strategy provides a clear framework that firmly guides urban planning decisions (building line and height). At the plot level, there is room for spontaneous, bottom-up initiatives. Klein&Fijn focuses on the city center for the time being. Left over spaces, gaps in street façades; projects in which, in addition to densification, the integration also offers urban structure reinforcement. In addition, the study shows that other densification strategies such as vertical extensions and reuse contain enormous capacity.

Consequently, the municipality of Rotterdam has opened a Klein&Fijn desk. This is where architects and developers can come up with smaller urban plans, so they don't have to go the same long way as larger plans. Afterward, they officially launched a website called Plug Rotterdam, under the auspice of AIR (Architecture International Rotterdam), where the use proposals for any specific site and the ongoing process could be judged.⁽⁴⁷⁾

There is already an existing initiative on the topic of underutilized properties organized by the municipality of Turin which focuses exclusively on municipal-owned properties.⁽⁴⁸⁾ Their primary function is to manage and optimize publicly owned real estate by either selling or renting properties that are currently underused or vacant.

Taking Klein&Fijn project as a reference, municipality in Turin could create a centralized municipal office, referred to as the "Turin Infill Development Desk" (Sportello Sviluppo di Infill a Torino), in order to improve existing initiative. The proposed desk's responsibilities would be:

- Serving as the primary contact point for architects, developers, and citizens proposing infill projects.
- Providing guidance on municipal regulations, zoning laws, and urban planning goals.
- Offering support to streamline the permitting process, especially for smaller-scale projects.
- Launching a website similar to Plug Rotterdam to maintain transparency.

• Fostering developments "in the air"

Another experience useful for dealing with regulations related challenges in Turin can be derived from Kühne & Co architects based in Rotterdam. As discussed previously, they purchase "air rights" from the municipality of Rotterdam in order to build their projects in a cheaper and more efficient way. Practically, it means that you can buy a part of private/public infrastructure such as roads or parking and build an elevated structure above it. In the case of Kühne & Co it was parking for one project and street with underground parking entrance for another.²⁸

But it is not something unknown for Turin as we can see from referring to Palazzo Lancia or Cittadella Politecnica buildings. In a similar way, it could also be implemented for smaller infill-type projects. But as Joost Kühne admits, even in Rotterdam which is a city acting as a sort of a living architectural laboratory, no one expects you to build structures on locations like that. It leads to complex negotiation processes with developers and municipality. Although, once there is a successful case study of such a building showcasing an innovative solution, it becomes much easier to implement similar projects in the future. Therefore, to encourage this strategy's adoption, Turin could launch a pilot project competition to invite architects and developers to propose innovative elevated structures

Also, in the case of such elevated developments in Rotterdam, like with a normal building, you pay in proportion to the floor area, but the price is a lot lower. As Joost Kühne highlights, it is a matter of pushing and pulling during negotiations, because there is no standard for this. Thus, for the case of Turin it could be suggested to provide a standardized guidelines for this kind of buildings, comprising fee reductions for purchasing or leasing above ground spaces. Additionally, certain underutilized infrastructure areas (over parking, roads, railway tracks) could be designated for air rights projects. It

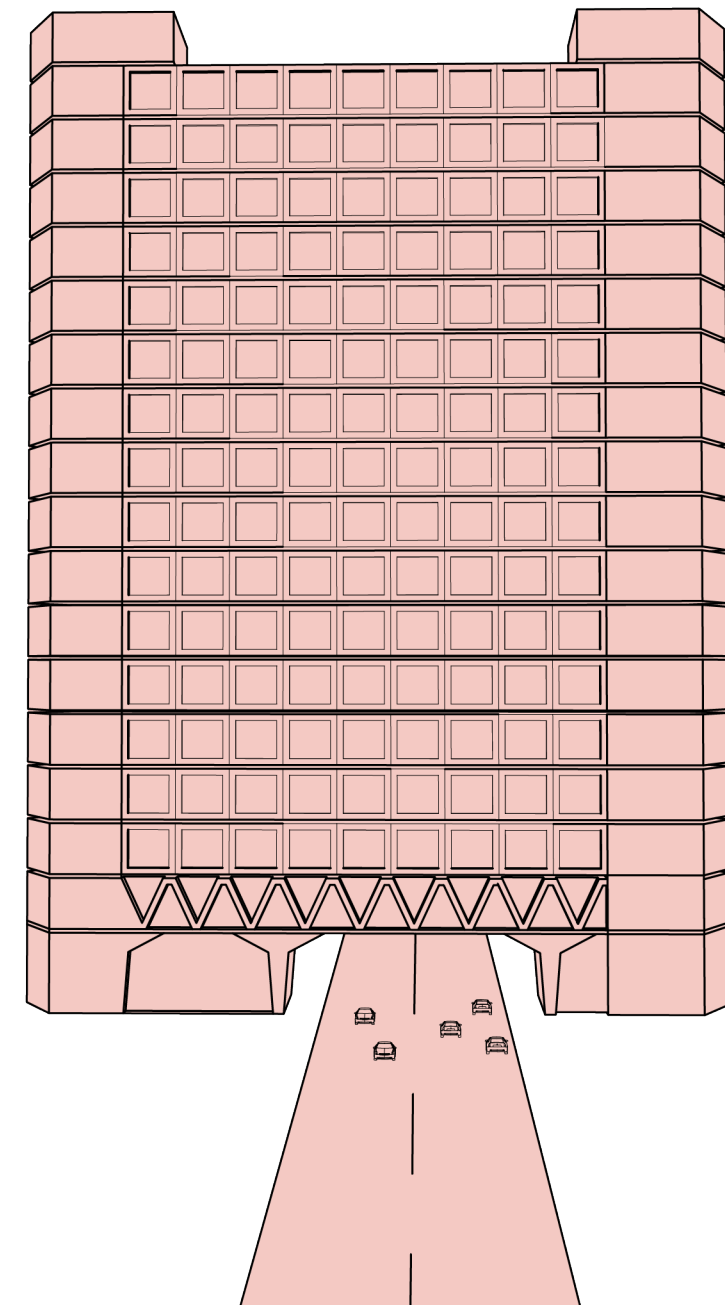


Fig. 40: Palazzo Lancia scheme - Source: self-elaboration 2025 Lina Milovidova

could be implemented through Piano Regolatore Generale as “Air Rights Development Zone”.

- **Relaxation of parking requirements**

The Tognoli Law (Law No. 122 of March 24, 1989) establishes that in new residential buildings, including their associated areas, at least 1 square meter of parking space must be provided for every 10 cubic meters of constructed volume.⁽⁴⁹⁾

According to the New York based urbanist Cindy McLaughlin, off-site parking has serious drawbacks for the urban quality.⁽⁵⁰⁾ Off-street parking requirements are financial burdens on developers, making affordable housing more expensive to build, and therefore harder to achieve. Transit-rich, walkable communities don't need off-street parking. Moreover, off-street parking requirements could make smaller developments infeasible. And generally, it could endanger the viability of a any development.

There is already a following exemption provided in Regolamento Edilizio di citta' di Torino:

- Small volume increases (≤ 120 cubic meters): no mandatory parking spaces are required.
- Larger volume increases (> 120 cubic meters): parking spaces must be provided in proportion to the total volume increase.
- If several small expansions occur over time and together exceed 120 cubic meters, parking spaces must be allocated based on the total cumulative increase.⁽⁵¹⁾

However, this exemption does not take into account target group of a new residential development. If it is planned to accommodate students and fresh graduates, it would be logical to assume that the parking needs of such a group would be different than that of families and older adults who are more likely to own a private vehicle. Therefore, it could

be suggested to exclude from the parking requirements calculation all the living units intended for young tenants and instead to provide bike parking space as a compensation. Additionally, developer dollars saved can be submitted via taxes to fund clean transit options and other public services to support an influx of new residents.

- **Density bonus**

A zoning tool known as density bonuses allows developers to construct more housing units, taller structures, or more floor area than is typically permitted in return for a specific public benefit, like the inclusion of affordable apartments in the development. In place of constructing the affordable units on-site, developers may choose to make contributions to a housing fund through the creation of an affordable housing density bonus program. Density bonuses offer rewards for growth that contributes to the realization of a shared community goal. In regions where there is a demand for more housing that is affordable for households with low and moderate incomes, developers can be encouraged to build more affordable housing alternatives through the use of density bonus programs.

They can also be utilized to provide amenities like parks, open space, or transit and non-motorized transportation features, or they can be used to attract development to certain neighbourhoods or zones, like housing in urban centers or transit-oriented development in station areas. Development that benefits the public without direct public money is the end outcome. In order to offset the increased expenses or variations in profit margins between market-rate and below-market-rate units, the developer will be compensated with additional money from the construction of affordable housing or other public benefits.⁽⁵²⁾

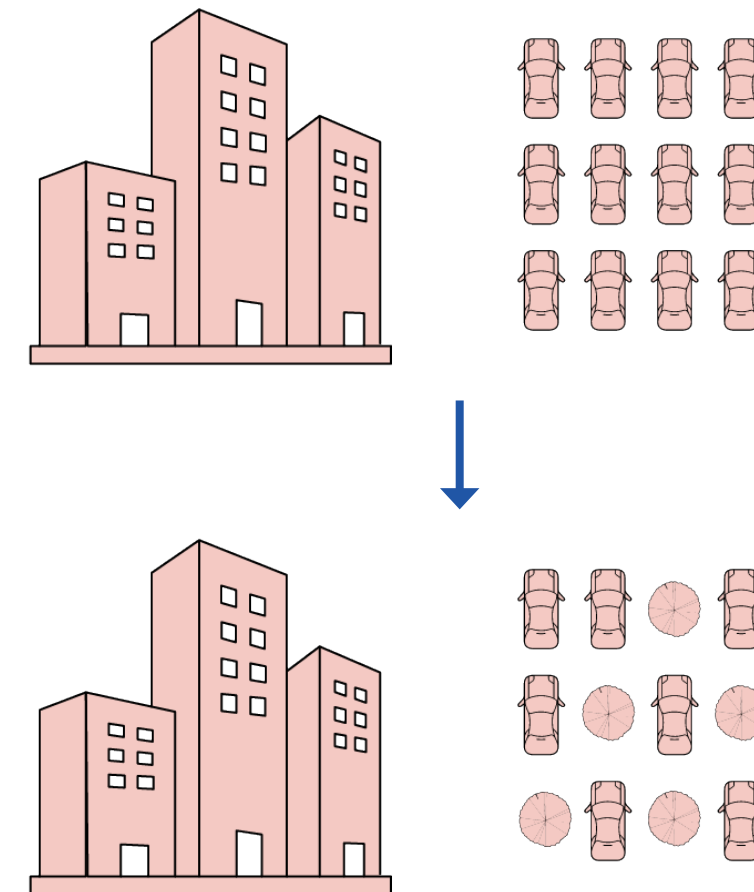


Fig. 41: Relaxation of parking requirements scheme - Source: self-elaboration 2025 Lina Milovidova

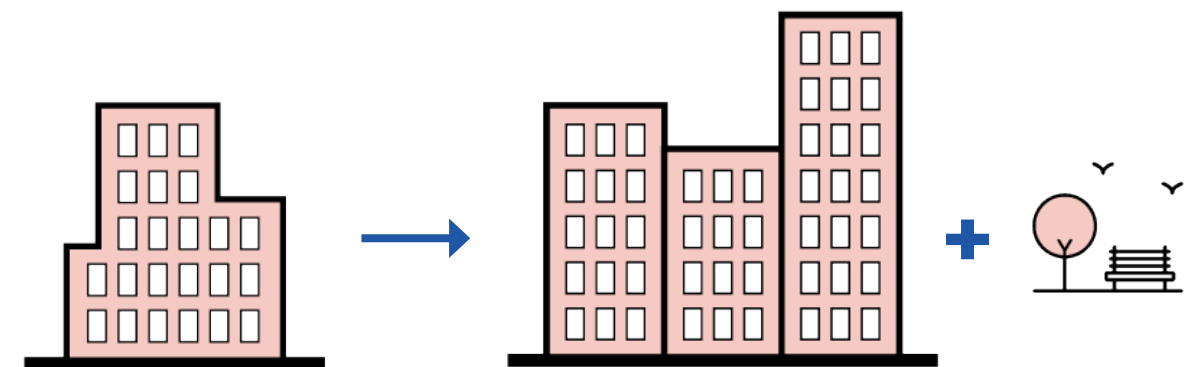


Fig. 42: Density bonus scheme - Source: self-elaboration 2025 Lina Milovidova

Conditions in order to qualify for regulatory adjustments:

- **A 30% minimum affordable requirement**

Referring to the Dutch experience, municipalities often set specific programming standards for new construction projects to ensure a mix of housing types. For example, Amsterdam has implemented a “40-40-20” rule, which stipulates that new developments should consist of: 40% Social Housing, 40% Mid-segment Rentals, 20% Free Sector Housing. These stringent requirements aim to increase the number of affordable homes but have also been identified as potential obstacles to the feasibility of some projects.⁽⁵³⁾

Some urbanists find it more feasible to provide more modest demands, for instance, Cindy McLaughlin in her article “NYC’s Commercial Break — Critiquing the State’s Commercial to Residential Conversion Proposals” suggests to limit requirements to 25 % affordable and 75% market-driven housing. She also suggests a possibility to increase affordable requirements (up to 50%), including supportive housing for homeless people in exchange for increasing benefits.⁽³⁷⁾

Similar to this proposal, the BaanTower project in Rotterdam, designed by Powerhouse Company, includes 427 rental apartments, with 30% allocated to the affordable housing segment.⁽⁵⁴⁾

Based on the provided information, it could be suggested for Turin to make a 30% minimum affordable requirement in order to qualify for regulatory adjustments and bonuses.

- **Funding improvements of existing properties**

Theoretical base for this condition is deriving from Paris experience and, in particular, from the works of Stephane Malka. French

government provides subsidies for renovation projects, such as zero-interest eco-loan (eco-PTZ) and a sustainable development taxcredit. It is also allowed to grant exemptions from PLU (Plan Local d’Urbanisme) if the development includes diverse social groups which directly corresponds to the typology of student and youth housing in this thesis work.⁽³⁰⁾

Practically, it can be proposed that eligibility for regulatory adjustments and bonuses would be granted for adaptive reuse or vertical extension developments that incorporate retrofitting of existing structures. The refurbishment must improve the building’s energy class by at least one level. Additionally, in case of extensions of private-owned properties, approvals of 2/3ds of all tenants number have to be enough to receive a building permit.

- **Funding clean transit options and other public services**

Learning from the planning laws of Melbourne, Australia, Turin could adopt some transparent standardized mechanisms, such as an InfrastructureContributionsPlan(ICP), to ensure proportional contributions from developers towards infrastructure development based on project scale and impact.⁽⁵⁵⁾ It would allow developers to obtain building permits in a more flexible but community-beneficial way. For instance, in Melbourne planning laws allow to specify open space contributions when developers subdivide land, to compensate for reduced private open space in subsequent residential densification. In the case of Turin, it could be suggested that if providing enough of parking space is not possible because of physical obstacles or reduced viability, developers could compensate by contributing to bike lanes infrastructure, bike parking or public transportation development. Financial support of the city’s infrastructure could also be provided in exchange for any kind of other bonuses and adjustments suggested in this thesis dissertation.

Off-site pedestrian and bicycle improvements, above and beyond those required by the development standards. These may include but are not limited to:

- Enhanced pedestrian and bicycle-oriented streetscapes
- Protected bicycle lanes and pedestrian pathways, improved bicycle and pedestrian crossings/signals, bicycle racks/shelters
- New pedestrian and bicycle connections to transit facilities, neighbourhoods, trails, commercial areas, etc
- Removal of existing pedestrian and bicycle barriers (e.g. cul-de-sacs)
- Upgrading traffic signals to enhance pedestrian and bicycle safety

- **Installation of green roofs**

In 2008, The City of Portland Oregon adopted an Ecoroof Incentive program to address the city’s stormwater management problems and the incentive program was active through 2012.⁽⁵⁶⁾ The program provided an incentive for the installation of green roofs and other innovative roofing methods to better manage stormwater runoff. Green roofs have the potential to help mitigate both the urban heat island effect, increase the energy efficiency of buildings, and manage stormwater.

Through the program, the city offered property owners and developers an ecoroof construction incentive of \$5 per square foot in the form of a subsidy. Also, The Portland Central City Plan District offers an Ecoroof Floor Area Ratio (FAR) Density Bonus to larger scale development projects. If a building includes an ecoroof that meets specific requirements, the FAR bonus will allow a larger development footprint or additional floor area than would otherwise be allowed by zoning codes.

This case could be implemented in the context of Turin where heavy rains put a pressure on

existing water management infrastructure. It could also help to mitigate the urban heat island effect. Thus, it is recommended to allow developers contribute to the urban sustainability through ecoroofs installation in exchange for special bonuses and adjustments granted by municipality.

- **Usage of the recyclable or bio-based materials**

In order to qualify for density or height bonuses, new developments should incorporate the use of recyclable or bio-based materials. This proposal could take a cue from Carbon Neutral Cities Alliance (CNCA) policies developed under the framework of the project “Dramatically Reducing Embodied Carbon in Europe’s Built Environment”.⁽⁵⁷⁾ They suggest that all main building materials, projects shall require suppliers to provide company specific Environmental Product Declarations (EPD). Product embodied carbon performance data, including EPDs, shall be recorded and submitted as part of the project documentation.

Turin could adopt this strategy and could also develop guidelines for construction projects in a way where circularity, material efficiency and maintainability are maximized. The city should ensure that all construction materials that have a minimum service life defined and that can be subject to maintenance, have a maintenance and repair strategy defined, as well as a disassembly or reuse strategy.

- **Integration of solar, wind or geothermal energy systems**

Providing density/height bonuses in exchange for installing solar energy systems encourages the growth of green energy while mitigating

energy sprawl. Municipalities can apply this type of incentive to solar power by granting bonuses to developers if a certain portion of the new development gets its power from solar or renewable energy. Municipalities can create a tiered system where the more solar or renewable energy installed (measured by energy output or percentage of energy needed on-site), the higher the granted bonus. These ordinances require municipalities to determine the proper incentive and the corresponding property requirements.

For instance, the American city McCall provides density bonuses in the Planned Unit Development (PUD) chapter of their code.⁽⁵⁸⁾ The PUD chapter provides the City zoning flexibility outside of the standard zoning regulations. McCall uses this flexibility to provide density bonuses for a number of public policy interests, primarily, renewable energy. The City provides a 10% bonus to density, if 50% of the total energy needs of the development are provided by “solar, wind, geothermal, or an alternative renewable energy source.” This of-right bonus provides early notification of the bonus and helps encourage renewable energy. Similar strategy could be applied for the city of Turin.

- **Holds sustainable certification for green building design**

In Ashland, Oregon, priority plan checks are given to all applicants pursuing LEED certification in order to address American policy approaches, aiming to finish reviewing green construction plans in three days. In addition to additional specific services, Albuquerque’s Green Path initiative claims a 50% reduction in plan review time (from eight weeks to four). They direct participants to a special Green Path counter that offers a reduced wait time, a quicker plan approval, and guarantees that participating buildings will be featured prominently. Plans must obtain specific certifications in order to be eligible for priority plan evaluations in some jurisdictions. This is the case in Fairfax,

Virginia, where residential residences must be constructed to achieve at least LEED residences Silver, NGBS Silver, Earthcraft Select status, or Green Globes (three to five green globes), while commercial buildings must be designed to achieve at least LEED Silver. In Charlotte County, Florida, any residential or commercial facility that satisfies the requirements of the NAHB Green facility Program, the Florida Green Building Commission, LEED, or the Green Building Initiative may be eligible for consideration in the green building program. Possible parking and floor-area-ratio (FAR) reductions, fast track permitting, and county marketing incentives like press releases, green building signage, and recognition awards are some of the incentives.⁽⁵⁹⁾

Turin’s municipality in a similar way could promote green building design among developers by granting expedited plan reviews and other bonuses based on Italian sustainable certification. For instance, the Leadership in Energy and Environmental Design (LEED) certification, originally from the United States, has been adapted for the Italian context as LEED Italia. Launched in 2009 by GBC Italia, it assesses buildings based on sustainability criteria tailored to Italy’s specific environmental and regulatory conditions.⁽⁶⁰⁾ Another certification possession eligible for special adjustments could be CasaClima, developed in the South Tyrol region. It promotes energy-efficient building practices to reduce energy consumption during colder seasons. Established in 2002, it has certified approximately 9,000 buildings in Italy as of 2019.⁽⁶¹⁾

- **Preservation of open space**

Open space, as a form of population-serving infrastructure, can deliver a large range of social, environmental and economic benefits to communities by improving community health and well-being, protecting urban biodiversity and enhancing the city’s climate change resilience. Population growth and development

are reducing private open space, gardens and tree canopy cover. Referring to Australian experience, their planning laws allow local councils to specify open space contributions when developers subdivide land, to compensate for reduced private open space in subsequent residential densification.⁽⁶²⁾ For Turin, it could be a way not to mitigate negative outcomes of construction but to encourage developers not to diminish open space at all by opting for vertical extension, adaptive reuse and elevated infill structures. It could be done through introducing development bonuses to certain projects that target preserving open space.

- **Reuses an existing abandoned structure**

As previously analysed in the Case studies chapter, in Italy there are already several initiatives and opportunities for developments aiming to reuse existing structures instead of sprawling onto limited open space such as Co-City project in Turin. Moreover, Turin’s updated General Town Plan (PRG) emphasizes urban regeneration by focusing on revitalizing suburbs, repurposing derelict and unused buildings, and addressing housing and social emergencies.⁽⁶³⁾ The plan aligns with environmental protection measures, including reducing land consumption and reusing existing buildings, thereby promoting sustainable urban development. Thus, one of the eligibility criteria for density/height bonuses or streamlined permitting process could be reuse of vacant buildings.

- **Engagement in a PPCP with municipal institutions**

Municipality of Turin could also provide support to projects fostering collaborative management through public-private-community partnerships (PPCPs). This approach involves active collaboration among public authorities, private entities, and community organizations to

manage urban spaces. This inclusive approach ensures that redevelopment efforts align with the community’s needs and aspirations. For instance, by adopting a collaborative governance framework, Co-City Turin redefines traditional public-private partnerships to include community actors, thereby enhancing the sustainability and responsiveness of urban management practices.⁽¹⁶⁾ This model leverages the strengths of each sector to effectively address urban challenges and that is the reason why it is beneficial to encourage developers to take part in PPCP more often in exchange for better viability of their investments.

- **Provides or improves community facilities**

Base for this criteria can be derived from development policies of El Camino community in California, where a special Community Benefit Programme was introduced.⁽⁶⁴⁾ A developer taking part in the Community Benefit Program will be required to enter into a binding agreement with the City that specifies the community benefit that will be provided in exchange for the higher intensity requested. The City will negotiate the terms of the Agreement including the period during which the intensity will be available to the developer and community benefits that will be provided by the developer.

For instance, special permits or adjustments could be granted to developers upgrading and improving existing open spaces and facilities, expanding their functions and increasing vegetation; increasing access to publicly owned land that currently has restricted access. Also, it could be possible for developers to fund a new public space, plazas or neighbourhood-serving parks off-site. Additionally, eligibility criteria could include contributions to and/or space provided for any community facilities. It would be important for the municipality to maintain and update a prioritized list of priority community benefit projects or improvements in anticipation of future development applications.

- **Serves as a demonstration project for future urban policies**

It could be proposed that the City of Turin establish a program aimed at showcasing the successful implementation of its urban development objectives. Developers would be eligible to apply for bonuses or incentives if their projects serve as demonstration models that align with and advance the municipality's planning goals. Such approach is already evident in the Phoenix, US, where Demonstration Project Program provides funding assistance for historic rehabilitation projects which best demonstrate city historic preservation goals and objectives.⁽⁶⁵⁾ The program purpose is to encourage those historic rehabilitation projects which retain historic building materials and features, reverse inappropriate alterations, reconstruct missing historic details, and return a building to its historic appearance.

In a context of Turin it could be suggested to not narrow down this kind of demonstration projects just to historic rehabilitation but keep it open for any urban policies promoted by the municipality.

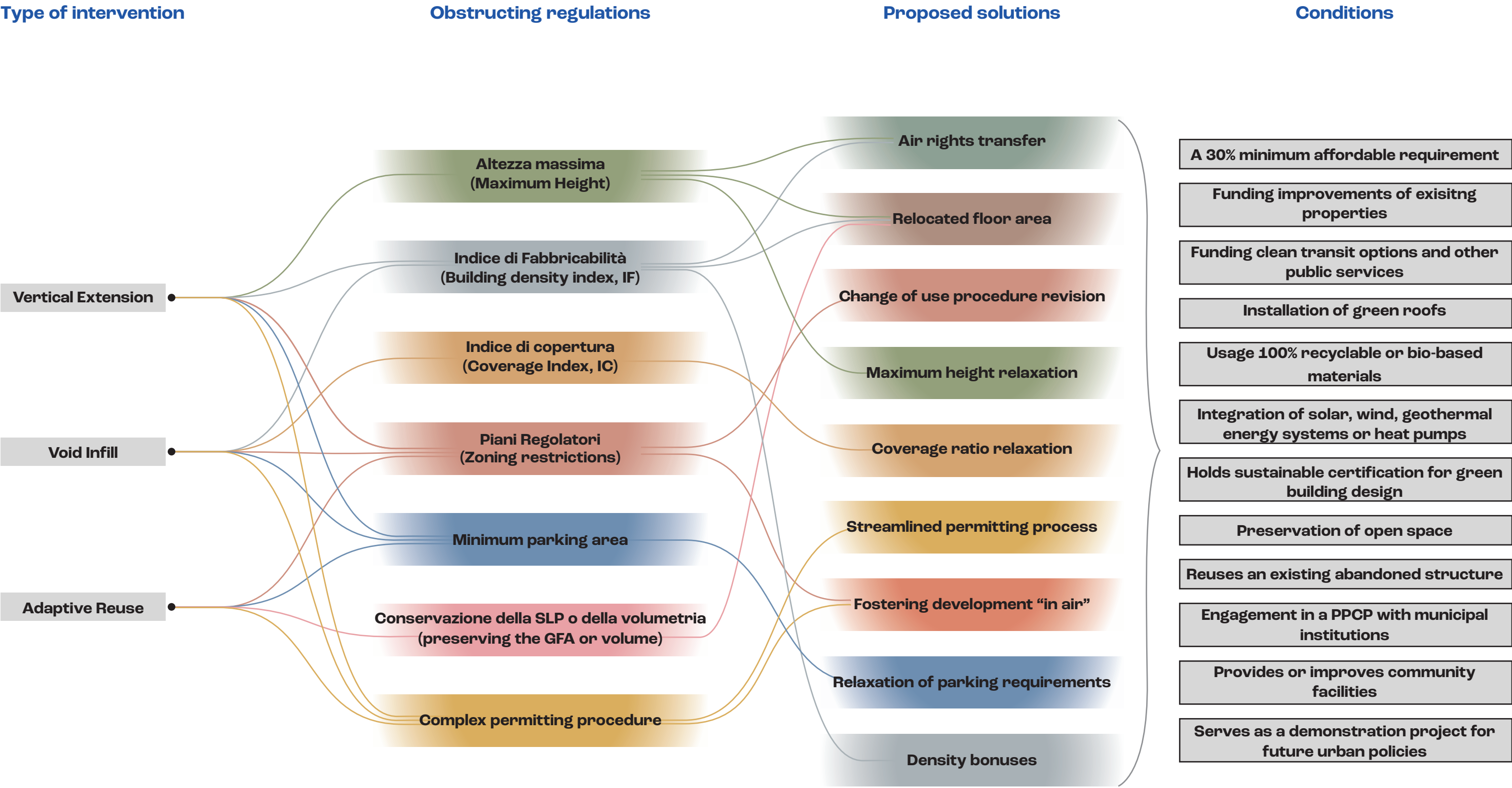


Fig. 43: Chart on infill densification implementation - Source: self-elaboration 2025 Lina Milovidova

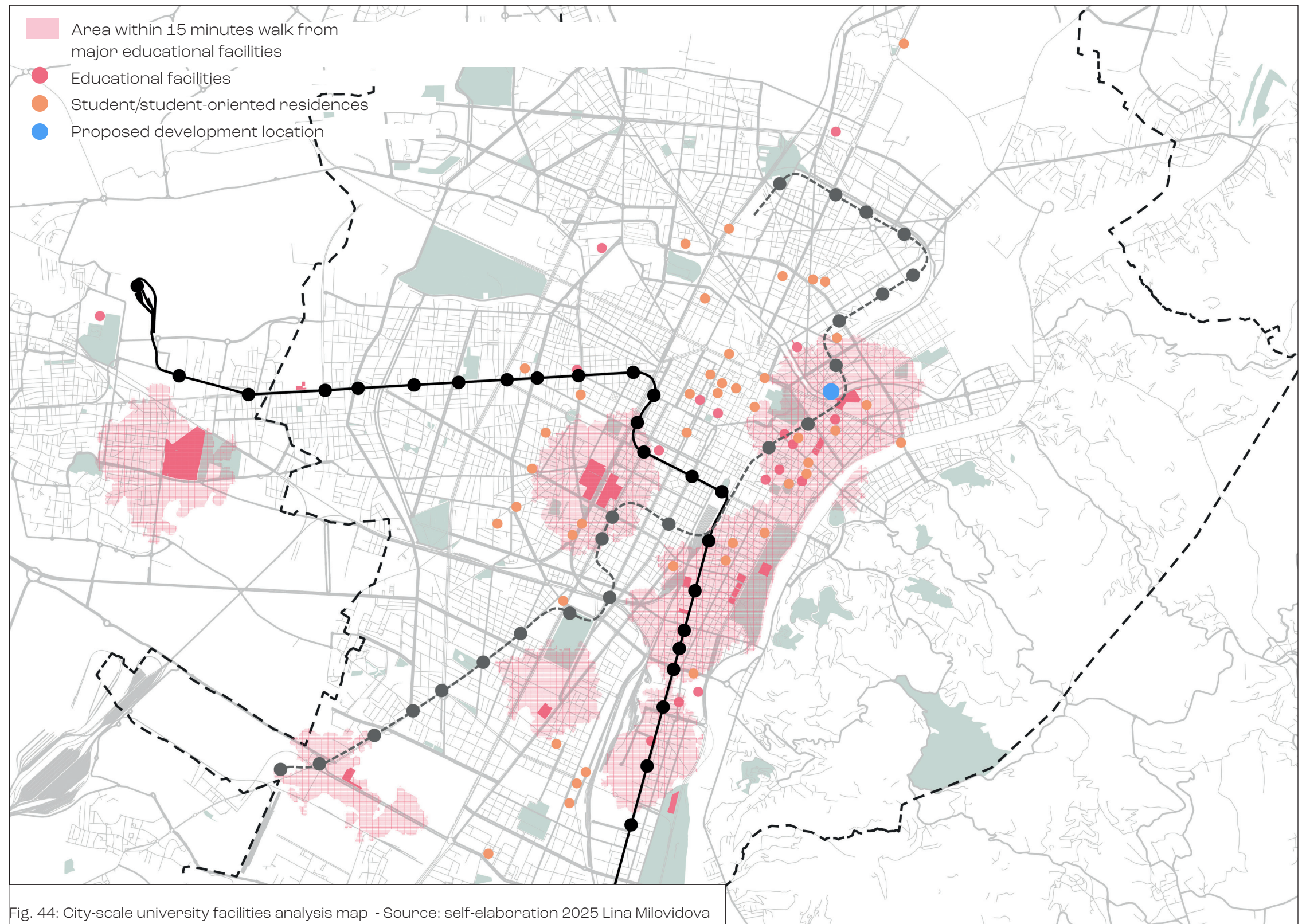
04| URBAN ANALYSIS

Identification of potentially successful areas for student and youth -oriented residences

According to “Pedestrian mobility and University campus accessibility...” research students who take more time (more than 30 minutes) to get to the campus are the most dissatisfied, while a significant percentage (60.7%) of those who take less than 15 minutes to get to campus are satisfied.⁽⁶⁶⁾ Taking this data into consideration, we would apply “15 minutes walking distance to the university” criteria for defining the suitable areas for potential student and youth housing location. On the map represented on the right those areas can be seen together with the existing and planned student residential facilities. The radius was applied only for big to medium sized campuses as smaller ones especially in the outskirts would not attract the decent number of tenants.

As we can see from the mapping results, the areas, where student housing is potentially the most feasible, lay in the Aurora, Centro, Crocetta, San Salvario and Lingotto districts. Taking into account the new planned metro line we could also add the area around Mirafiori Polito Campus to this list.

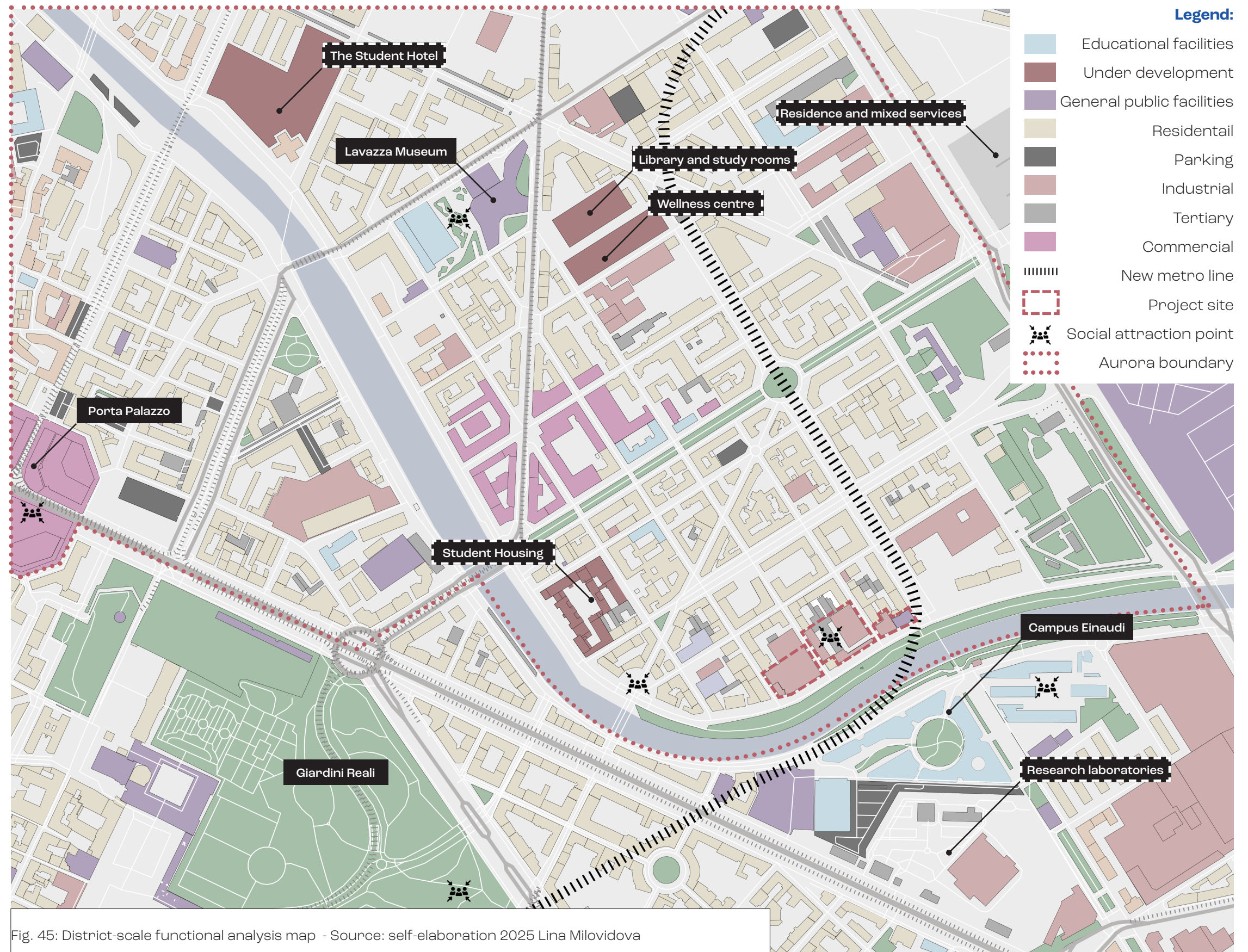
The site chosen for this thesis project development is located in the Aurora district, with easy reach from Luigi Einaudi Campus.



Aurora district as urban regeneration area

The Aurora district in Turin is a historically significant area that once thrived as a hub for industrial activity and working-class settlements. During the 19th and early 20th centuries, Aurora was home to numerous factories and warehouses, especially along the Dora River, shaping its urban and social landscape into one driven by labour and immigration. However, the deindustrialization period in the late 20th century led to widespread economic decline and physical degradation. In recent years, the area has become a focus of urban regeneration, transforming from post-industrial decay to a dynamic space for cultural innovation, sustainability, and inclusive development. A flagship example is the Nuvola Lavazza complex, which has revitalized a large brownfield site into a contemporary headquarters housing museum and green spaces. Similarly, the Open Incet innovation hub repurposed a former industrial site into a collaborative space for digital innovation and social entrepreneurship.

Recent and future developments in Aurora district mostly target students and younger generation, thanks to the presence of the Einaudi Campus. In the year 2024 the Relife Torino student residences were opened in the place of ex-Lavazza factory in Corso Novara. Another student housing which is a part the Student Hotel chain is going to open in 2026. During the same year Aurora district is also expecting to host another new redevelopment, which is ex Maria Adelaide Hospital being turned partly into student housing by Fondazione Camplus (500 sqm is going to be devoted for medical services). According to the mayor of Turin, this project is a successful implementation of public-private partnership in the city: "A project is starting that meets the needs of one of the strategic development directions of our city – a university city – and that makes it increasingly attractive to young people from all over the world, with particular attention to the inclusion of students with disabilities," commented Stefano Lo Russo,



Mayor of Turin. “But that’s not all: thanks to this agreement, a property that had been abandoned for some time will once again be made available for use by the entire city community, while preserving its original vocation as a local medical facility. This is truly a wonderful example of the benefits of public-private cooperation.” As a result, the cost of the rooms will vary depending on their intended use: approximately 50% of the rooms will be offered at prices 15% below market rate; 30% of the rooms will be allocated to Edisu; 18 rooms, as previously mentioned, will be available for students with severe disabilities; the remaining rooms will be offered with a 20% rent reduction.⁽⁶⁷⁾ Additionally, ex Gallettificio Militare located in via Modena is going to be transformed into repository to relocate a library collection with a study area available to art students from the nearby Campus Einaudi.⁽⁶⁸⁾

Aurora’s evolving ecosystem makes it an ideal candidate for youth- and student-focused architectural interventions. Its central location, within walking distance to both Politecnico di Torino and University of Turin campuses, paired with still-affordable rental prices and availability of underutilized spaces, makes it a strategic node for new developments. Furthermore, the multicultural vibrancy of the district offers an authentic, engaging environment for young residents, fostering social cohesion and intercultural exchange. Current municipal and private efforts increasingly target youth as a core demographic, with dedicated funding streams for co-living, affordable rentals, and adaptive reuse projects for housing. Therefore, positioning a student and youth housing initiative within Aurora not only addresses real urban needs but also contributes meaningfully to the area’s inclusive regeneration trajectory.



Fig. 46: The Student Hotel, render - Source: <https://www.one-works.com/our-works/torino-student-hotel/>



Fig. 47: Student housing RELIFE vista dall’alto. (@Lombardini22) Source: <https://www.ingenio-web.it/articoli/studentato-relife-a-torino-quando-l-architettura-crea-comunita-e-riqualifica-il-territorio/>

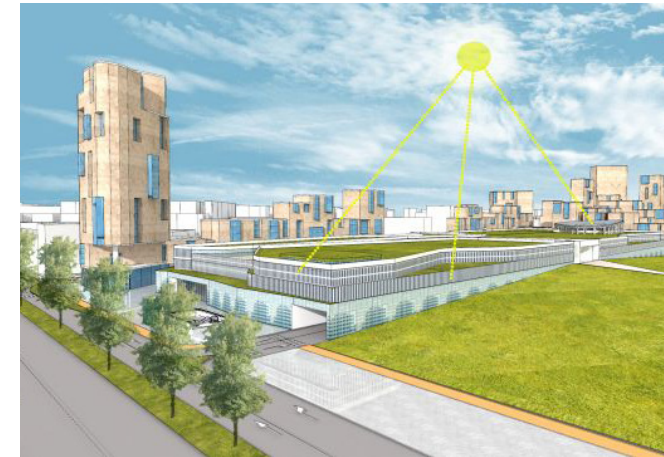


Fig. 48: Area Regaldi - old urban planning commission design proposa, 2015, Source: <https://www.torinoclick.it/territorio/area-regaldi-primo-tassel-lo-per-la-trasformazione-della-zona-nord-di-torino/>

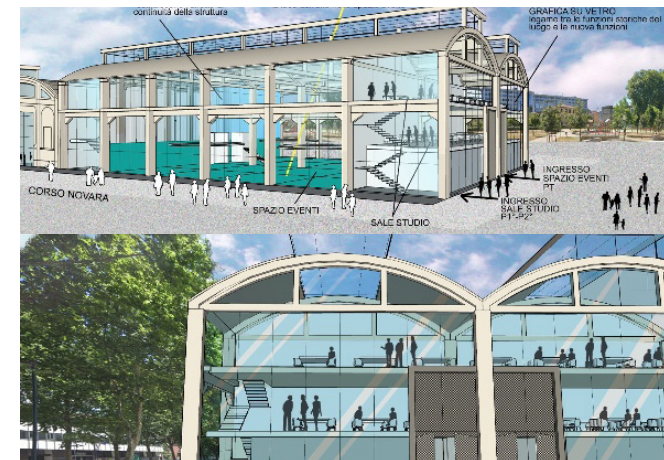


Fig. 49: Ex Fonderie Nebiolo - Fondazione della Confederazione Islamica Italiana
Ex Fonderie Nebiolo, via libera alla riqualificazione
<https://www.torinotoday.it/attualita/ex-nebiolo-approvazione-giunta-comunale-progetto-riqualificazione.html> Source: <https://www.torinotoday.it/attualita/ex-nebiolo-approvazione-giunta-comunale-progetto-riqualificazione.html>



Fig. 50: Camplus student residence, render - Source: <https://www.torinotoday.it/attualita/progetto-studentato-ex-maria-adelaide.html>



Fig. 51: Italgas renovation project render, 2025. Source: <https://www.torinoclick.it/territorio/presentato-il-nuovo-polo-dellinnovazione-di-italgas-sorgera-in-corso-regina-margherita-storica-se-de-del-gruppo/>

Social analysis of targeted area

To gain first-hand insights into citizens' experiences with the development area, this study conducted 60 interviews in a survey format with the citizens of Turin. It could give some directions for developing the public space area in addition to the private residential developments. This survey was shared on Facebook within the groups dedicated to Vanchiglia and Aurora districts life. Vanchiglia was included as the chosen project site is located right across the river from it so the insights of Vanchiglia residents were considered to be equally important. While the number of participants may not be statistically representative in comparison with the entire population, it offers valuable individual perspectives that can be used as guidance for the design of the future of the neglected Aurora/Vanchiglia areas. The survey was divided into two parts where the first part is focused on demographic and punctual data such as the age and the occupation of the participants, then the second part is focused on the desirable activities to be designed in the area and on individual insights on the current state of the urban environment there.

Q. 1 What is your age group?

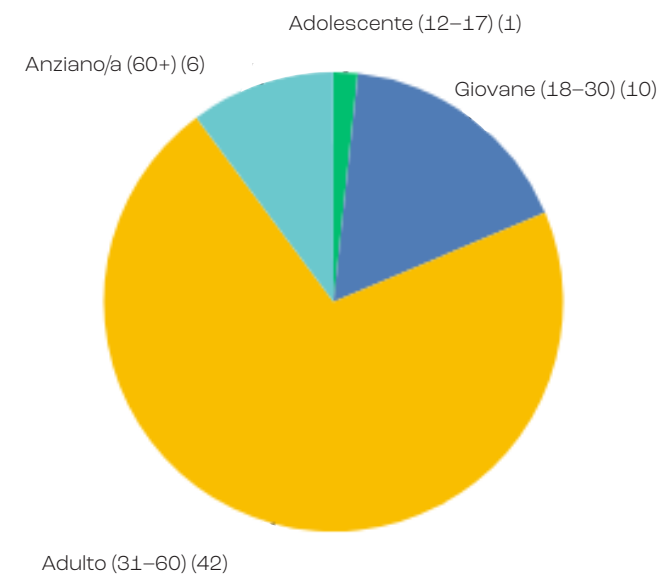


Fig. 52: Age group chart - Source: self-elaboration 2025 Lina Milovidova

Q. 2 What is your occupation?

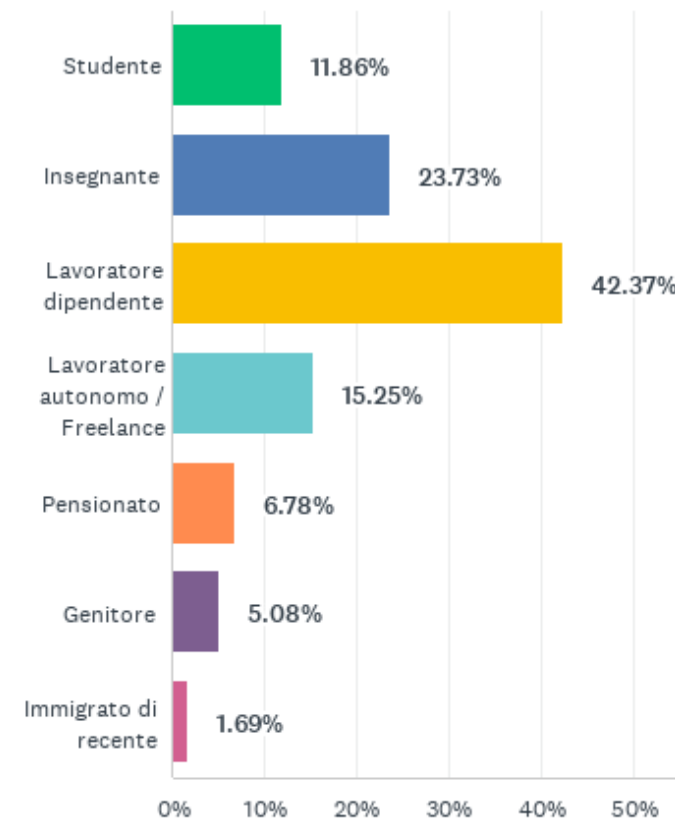


Fig. 53: Occupation chart - Source: self-elaboration 2025 Lina Milovidova

Q. 3 Where do you live or spend most of your time?

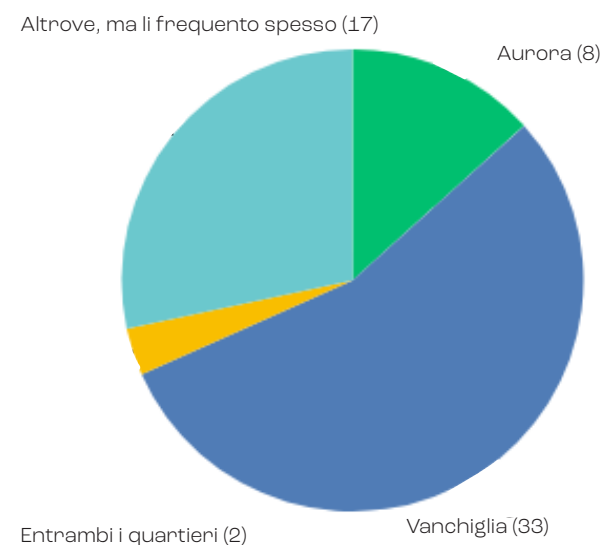


Fig. 54: Relation to analysed areas chart - Source: self-elaboration 2025 Lina Milovidova

Q. 4 What would you like to find in the Aurora and Vanchiglia neighborhoods?

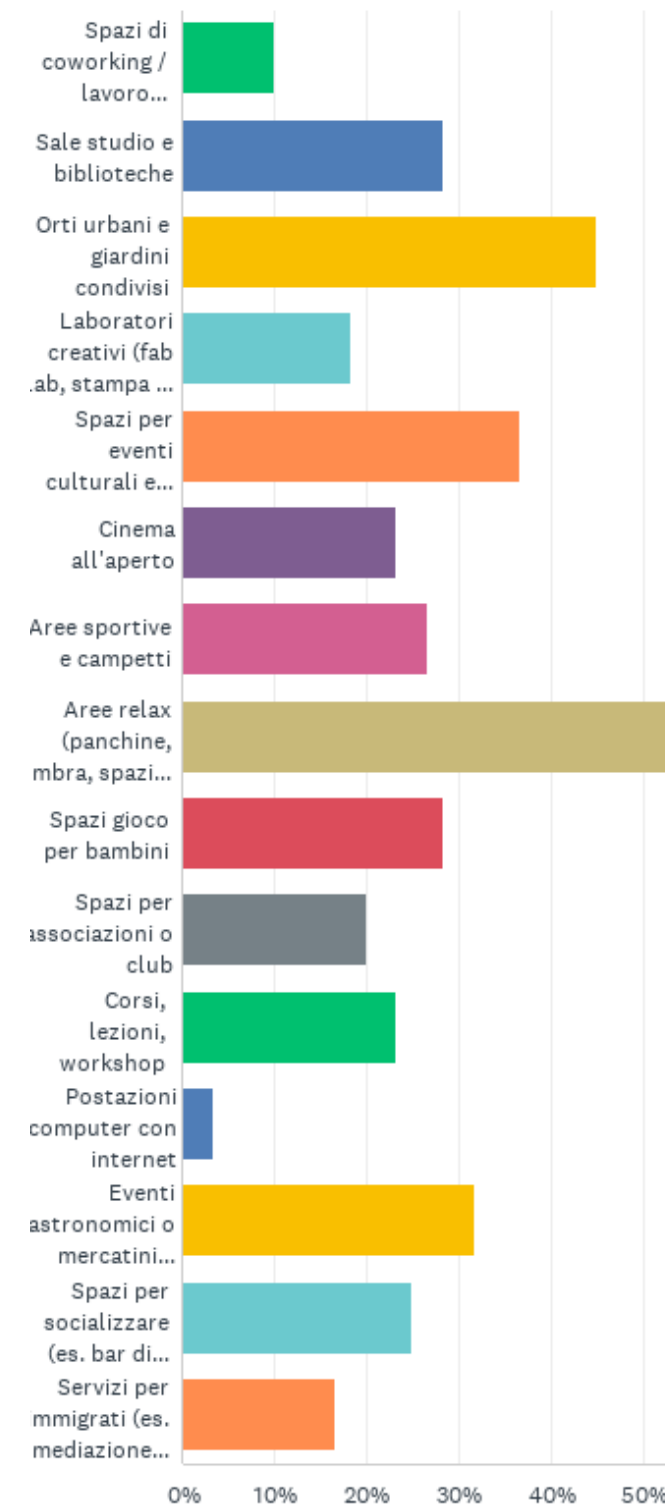


Fig. 55: Preferred public functions chart - Source: self-elaboration 2025 Lina Milovidova

Q. 5 Se potessi cambiare una cosa subito nei quartieri, quale sarebbe?

This was an open question to receive interesting insights on citizens' desires regarding area redevelopment. In the thesis content only several responses are going to be presented capturing the general sentiment:

- 'Cleanliness and degradation first and foremost, and more green areas'
- 'Closure of the night clubs'
- 'Adding cycling paths'
- 'Tram in Vanchiglia and outdoor seating areas, plus basketball courts'
- 'Events in public places for teenagers and young people, study centres that are transformed into recreational areas'
- 'Add venues for night-life'
- 'More space for sports'
- 'Pedestrianisation necessary'
- 'I would remove some of the outdoor seating area and build an underground car park because, even though I am a resident, I can never find a parking space.'
- 'introduce mandatory closing at midnight for premises located in apartment buildings'
- 'less cars more greenery'
- 'Eliminate outdoor seating areas and night-life bars'

Other responses are dedicated to the problems of security and cleanliness of the area: 'lighting', 'dirt', 'improving safety', 'wash away graffiti and penalise those who do it', etc. The rest of the responses is divided mainly into two groups: the first one is proposing to add the parking facilities and the other one is, on the opposite, prioritise pedestrians. The solution for some of the contradictories could be the implementation of the underground parkings and placing the noisy venues away from the residential housing. Overall, it is evident that most of the respondents prioritise green relaxing spaces, gardens and spaces for the cultural events.

Project area along Lungo Dora Firenze

The three plots that were chosen as a potential project site are located along Dora river and formed by via Parma, via Modena and via Mantova streets. According to geoportale di Torino these sites belong to industrial activities, although not anymore present in today's settings. The scenic location next to the river, proximity of the university campuses and presence of the public facilities around makes this area a great opportunity for infill densification project targeting students and young population. Currently, these plots can be labelled as underutilised with a high potential for all the three infill types: infill de novo, vertical extension and adaptive reuse. The characteristics of the area that make it especially suitable for this kind of development are the relatively low density and height and blind façades facing the river.

Moreover, all three plots belong to the “area for transformation into services” as stated in the PRG. In the PRG regulatory data sheets these plots are mentioned under the name of “area 9.g - Lungo Dora Firenze” and its type of service envisioned is the “areas for collective residences”. It aligns with this thesis proposal and with broader urban regeneration goals in the Aurora district.

Before the project design, it is necessary to verify the current PRG requirements, although, taking into consideration the fact that it is currently getting revisioned and the latest available document is dated December 2024. First of all, two buildings of the central block (the one along via Modena and another along via Mantova) are “edifici caratterizzanti il tessuto storico” so all their visible parts (facades, roofs, chimneys, etc.) facing public or visually connected spaces are protected. Second of all, regarding redevelopment procedure, areas to be transformed for public services are subject to direct acquisition by the administration.⁽⁶⁹⁾ Alternatively, part of the area may be developed for private use, while the remaining

portion must be transferred free of charge to the city, similarly to the case of Maria Adelaide hospital redevelopment mentioned previously in this chapter.

The buildability index for these transformation areas (in case of private uses) is as follows: On already developed lots, the index of 0.7/3 sqm GFA/sqm ST is increased by one-third of the existing GFA, up to a total maximum of 0.50 sqm GFA/sqm ST, and may also be increased for GFA generated by developments related to urban, river, and hillside parks (see Arts. 21 and 22) up to the same total maximum. In the case of transformation extended across multiple areas, the total buildable GFA is the sum of the GFA allowed for each individual area. Areas owned by the municipality or by institutions responsible for implementing the services do not have building capacity and are excluded from the calculation of areas to be transferred for service standards.

Stakeholders involved:

-  Students
-  Graduates
-  High and medium income individuals
-  Developers
-  Municipality
-  Private property owners
-  Business owners
-  University
-  EDISU

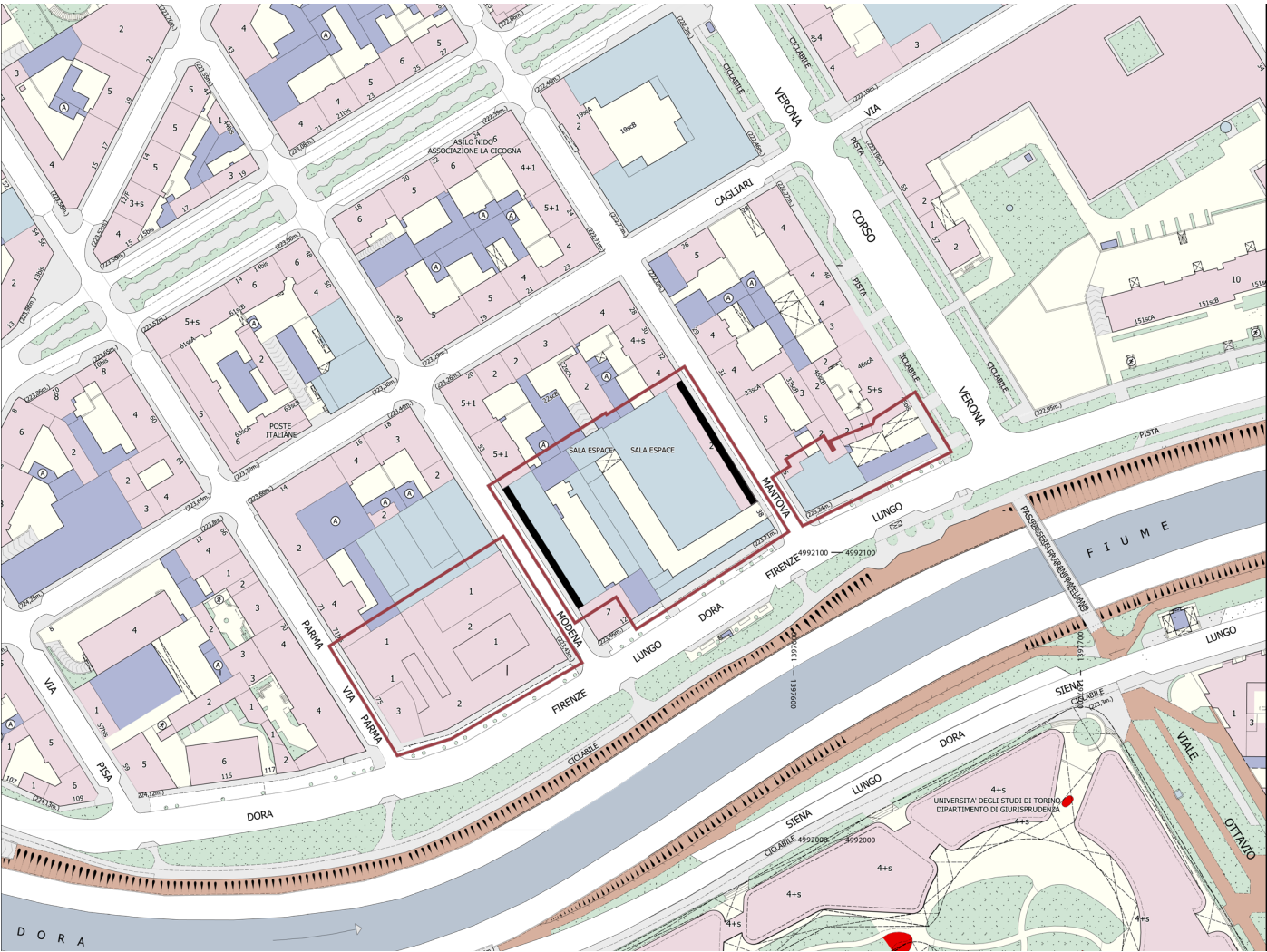


Fig. 56: Project site's analysis map - Source: self-elaboration 2025 Lina Milovidova



Fig. 57: Project site's analysis map - Source: self-elaboration 2025 Lina Milovidova

Plot 1 existing facilities:

Available facilities:

- 1 - Furniture shop
- 2 - Associazione Culturale Qubi
- 3 - Television studio
- 4 - Wheelchairs shop
- 5 - Agenzia di Comunicazione

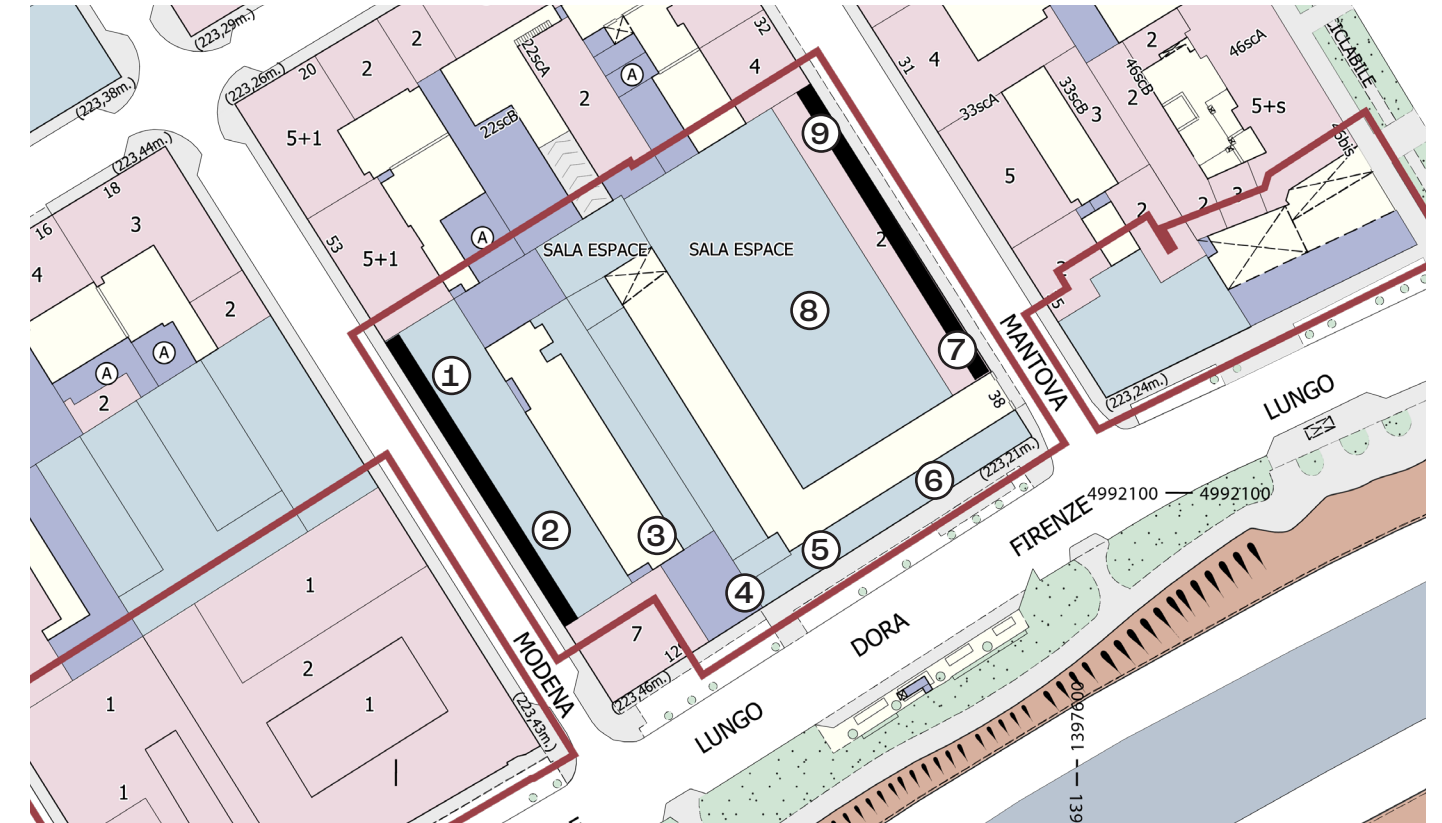


Fig. 58: Project site's analysis map - Source: self-elaboration 2025 Lina Milovidova

Plot 2 existing facilities:

Available facilities:

- 1 - Azimut club
- 2 - Auto store
- 3 - Car dealer
- 4 - Cosmetic industry office
- 5 - Event venue
- 6 - Caffeteria
- 7 - Yoga studio
- 8 - Istituto Europeo di Shiatsu
- 9 - Terrarium shop

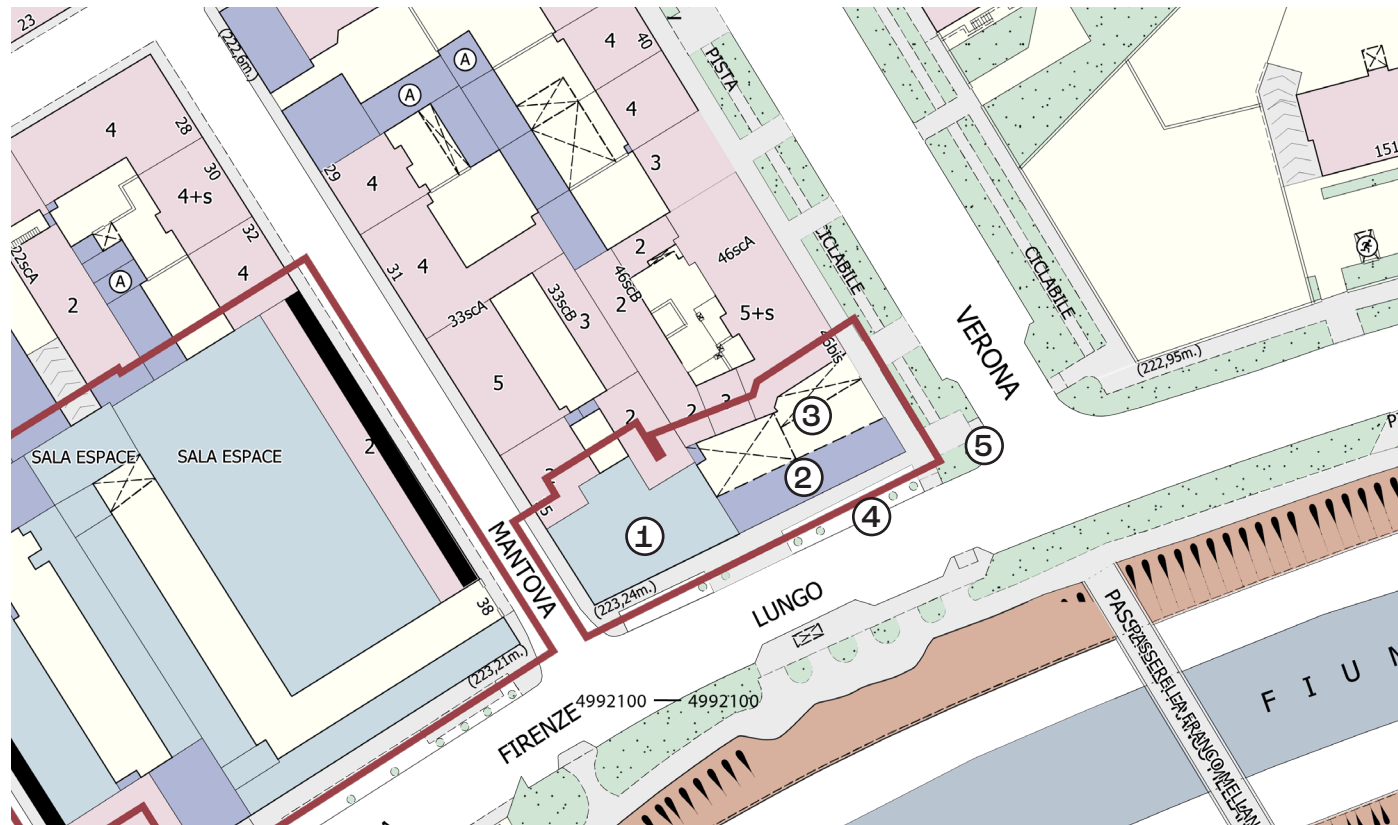


Fig. 59: Project site's analysis map - Source: self-elaboration 2025 Lina Milovidova

Plot 3 existing facilities:

Available facilities:

- 1 - Warehouse
- 2 - Portico without superstructure
- 3 - Backyard with a shed

Historical background

All the three plots belong to industrial landuse and the buildings in the central plot are protected as industrial heritage. The real landmark of the area is a historic building in Via Mantova 38 once used by Ambrosio Film—a pioneering silent film company founded in the early 1900s. The original structure, designed by Pietro Fenoglio in 1911, was purpose-built as a film studio and remains a significant piece of early industrial architecture.⁽⁷⁰⁾

Arturo Ambrosio and Roberto Omegna began experimenting with film in 1904. By 1906, they had established Arturo Ambrosio & C., which soon evolved into Società Anonima Ambrosio. Their early studio was on Via Santa Teresa, and not long after, they purchased a cinema on Via Catania 30. As the company grew, it became clear that a more advanced facility was needed. In 1911, just steps from their original studio, they built a new complex along the Dora River, between Via Mantova and Via Modena.

Fenoglio's design reflects a deep understanding of the technical requirements of filmmaking at the time. The main studio featured a steel framework supporting a dual-pitched glass roof topped with a skylight. Elevated above ground level on a reinforced concrete base, the studio had an identical-sized space underneath used for workshops and storage, linked by a freight lift. The adjacent office building, facing Via Mantova, still retains its original facade. Behind it, across a courtyard, were additional workshops and a garage. A third building connected these wings and opened toward the riverbank, which offered a scenic backdrop for outdoor filming.

Inside, offices for key figures like Ambrosio, Omegna, and Rodolfi were located on the ground floor, along with workspaces for sculptors and set painters. The upper floor held rooms for camera crews and photographers, and a small darkroom. The rest of the complex included various workshops on the lower levels,

and costume and dressing areas above, all linked to the main studio via a wide staircase.

Between 1914 and 1915, the company acquired more land near the original site, aiming to expand with additional filming areas and riverside views. The plan included building another outdoor studio, but the worsening economic situation in Europe disrupted these ambitions. By 1916, production had halted entirely, and the studio never regained its footing. The intended studio space ended up being used as farmland during wartime shortages.

In 1924, Ambrosio's company declared bankruptcy. Five years later, the property was sold to Società Edifici Civili e Industriali for 900,000 lire. Over time, the complex passed through several owners and was repurposed for different functions. Today, the buildings have taken on new lives: they house design studios, cultural spaces, and creative offices. In 2001, the basement and connecting rooms were taken over by the Compagnia Sperimentale Drammatica, led by Beppe Bengamasco and Ulla Alasjärvi. Thanks to funding from regional and municipal authorities as well as foundations like Compagnia di San Paolo and Fondazione C.R.T., the space was renovated and became Espace—a flexible venue suitable for a wide range of cultural activities. As of 2025, the building now houses Q35, an events venue that relocated from Via Quittengo 35 in the Barriera di Milano neighbourhood. Both the Espace Theatre and the Compagnia Sperimentale Drammatica are no longer active.

Historical photos

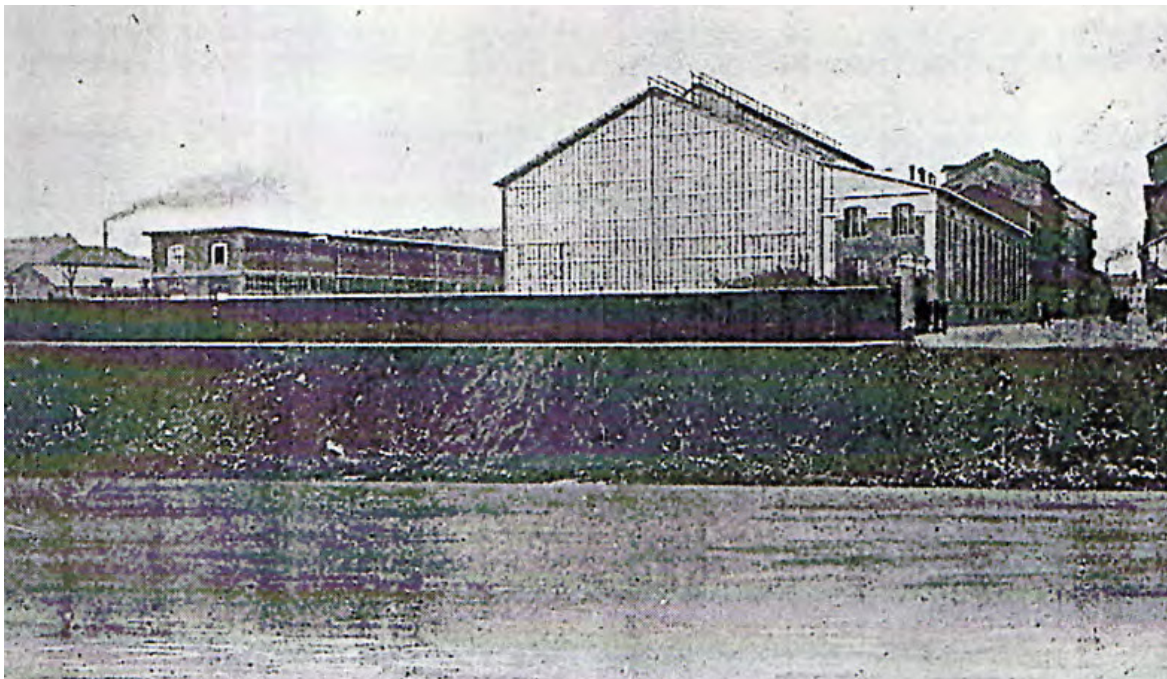


Fig. 60: Ambrosio cinematographical complex in Via Mantove, historical photo - Source: 'Immagine note di storia del cinema inverno' 2001 n. 50.



Fig. 61: Ambrosio cinematographical complex in Via Mantove, photo from 2001 - Source: 'Immagine note di storia del cinema inverno' 2001 n. 50.



Fig. 62: Ambrosio cinematographical complex in Via Mantove, adjacent building, photo from 2001 - Source: 'Immagine note di storia del cinema inverno' 2001 n. 50.

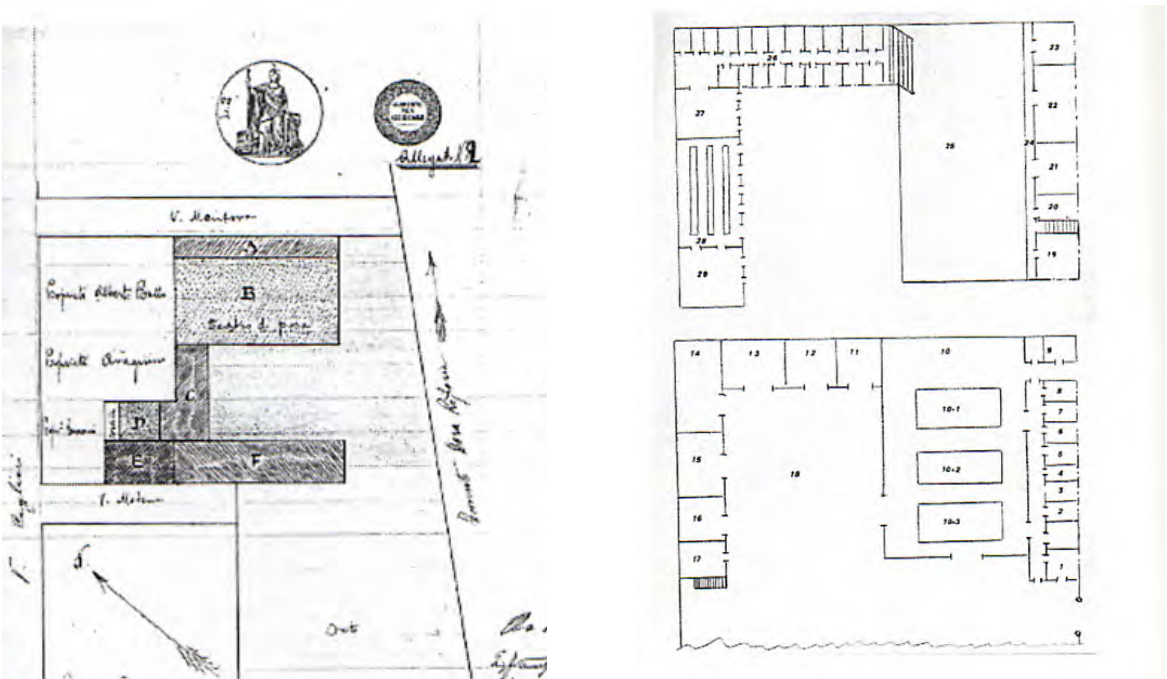


Fig. 63: Planimetria of the complex, on the right - sketch by Annigo Frusta - Source: 'Immagine note di storia del cinema inverno' 2001 n. 50.

Current state photos



Fig. 64: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 65: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 68: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 69: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 66: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 67: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 70: Photo of the project's site current state -
Source: Lina Milovidova 2025



Fig. 71: Photo of the project's site current state -
Source: Lina Milovidova 2025

Current state photos



Fig. 72: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 73: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 76: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 77: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 74: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 75: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 78: Photo of the project's site current state - Source: Lina Milovidova 2025



Fig. 79: Photo of the project's site current state - Source: Lina Milovidova 2025

Well-preserved buildings: All the three plots include existing structures that are in good condition and represent a valuable built asset.

Historical significance: ex Stabilimento Cinematografico Ambrosio of the Plot 2 brings a cultural value to the area.

Underdeveloped area: in some parts of the plots 2 and 3 the full potential of building volumes in terms of height and GFA is unrealized.

Compliance with the PRG zoning: the City of Turin provisions these areas to be developed for the collective residences which is aligning with this student and youth-oriented housing concept.

Strategic location: Campus Luigi Einaudi is just a five-minute walk away, and the city centre can be reached within 20 minutes on foot.

Blind facades: all the residential buildings from the surrounding plots have blind rear façades.

S

Undefined structural state: the lack of the information on the state of the load-bearing structures intended for extension.

Limited ground-level permeability: Plot 1 is fully built up at ground level, which may result in issues related to natural lighting and ventilation within the existing structures.

Narrow badly-maintained courtyards: the courtyards of the plots 2 and 3 are not accessible for the citizens and hold no public value.

Lack of green spaces: there is no vegetation on all the three plots which is contributing to urban heat island effect.

Private tertiary buildings in the courtyards: Plot 2 has two ex-storage blocks in its centre that are currently used by private entities.

W

New metro line: the part of the second metro line in Turin is planned to go through Conso Verona which will improve the accessibility of the design area.

Private-Public-Partnership: as this is the area for service-dedicated transformations, municipality requires to dedicate part of it to public services which opens a path for collaboration between private entities, communities and the city.

Vertical extension: 2-floors building in the second plot can be potentially increased for placing the residential units.

Adaptive reuse: existing built assets are in a good condition and offer strong potential for conversion into residential use, reducing construction costs and preserving architectural character

Demolishing and creating courtyards: if demolishing the central secondary buildings in the plot 1, new courtyard space could be created.

O

Resistance from the residents: as the project development is taking place in already dense urban environment, some tenants of the surrounding properties could potentially resist the construction works due to possible noise and waste issues.

Regulatory or policy changes: shifts in zoning regulations that are going on right now may affect the regulatory compliance of the development and increase bureaucratic hurdles.

Market perception: some investors may be cautious about collective residence development and requirements to support public services, potentially affecting the amount of revenue.

Construction and structural risks: unforeseen issues during renovation (e.g., structural weaknesses, outdated systems) can cause delays and cost overruns.

T

05| PROPOSAL

Current situation

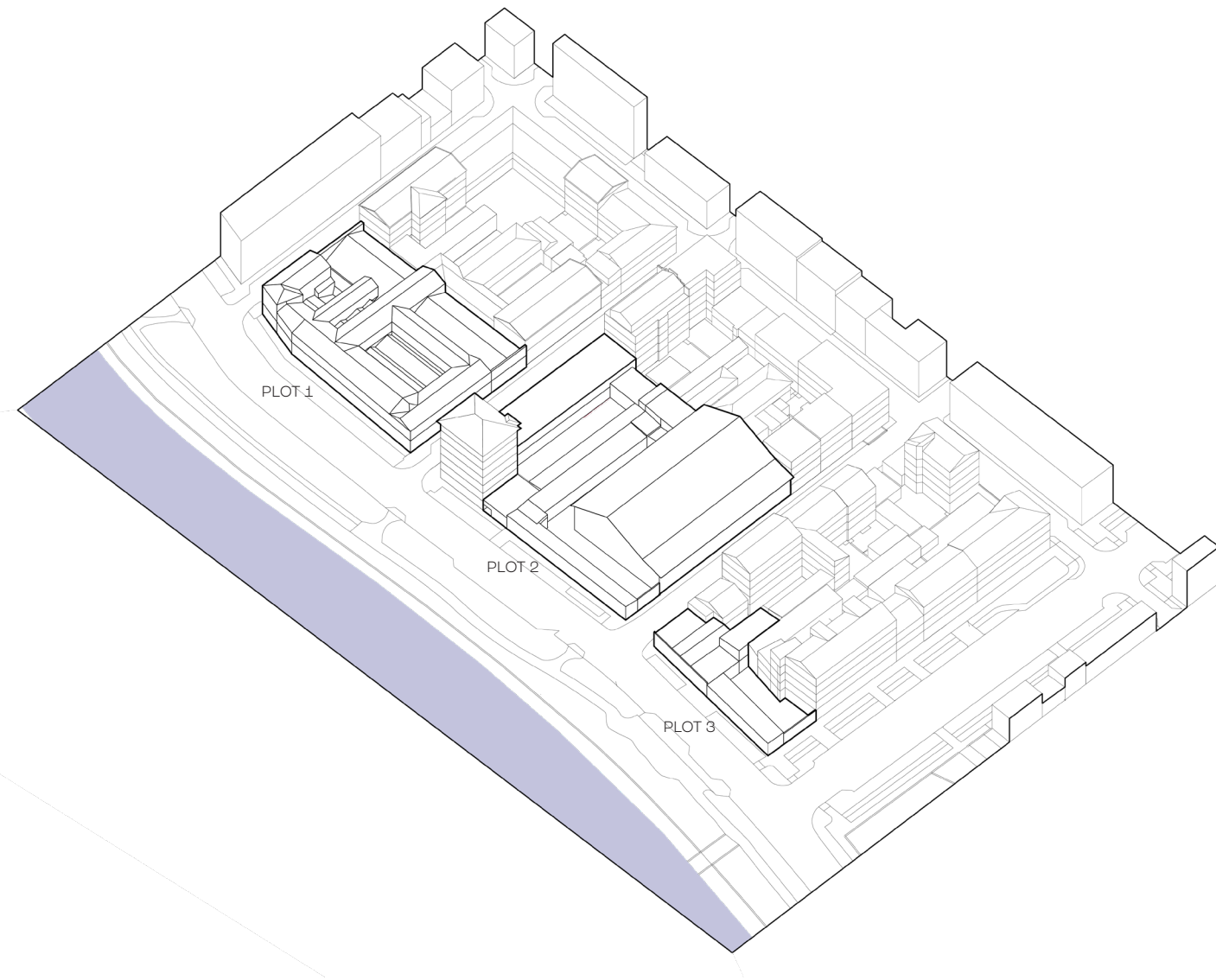


Fig. 80: Current state diagram - Source: self-elaboration Lina Milovidova 2025

This proposal suggests redeveloping Lungo Dora Firenze ex-industrial site into residential and public mixed-use development by the means of infill densification. This project works with additions, extensions and modifications of the existing urban fabric infilling it with new functions and meanings.

Demolition scheme

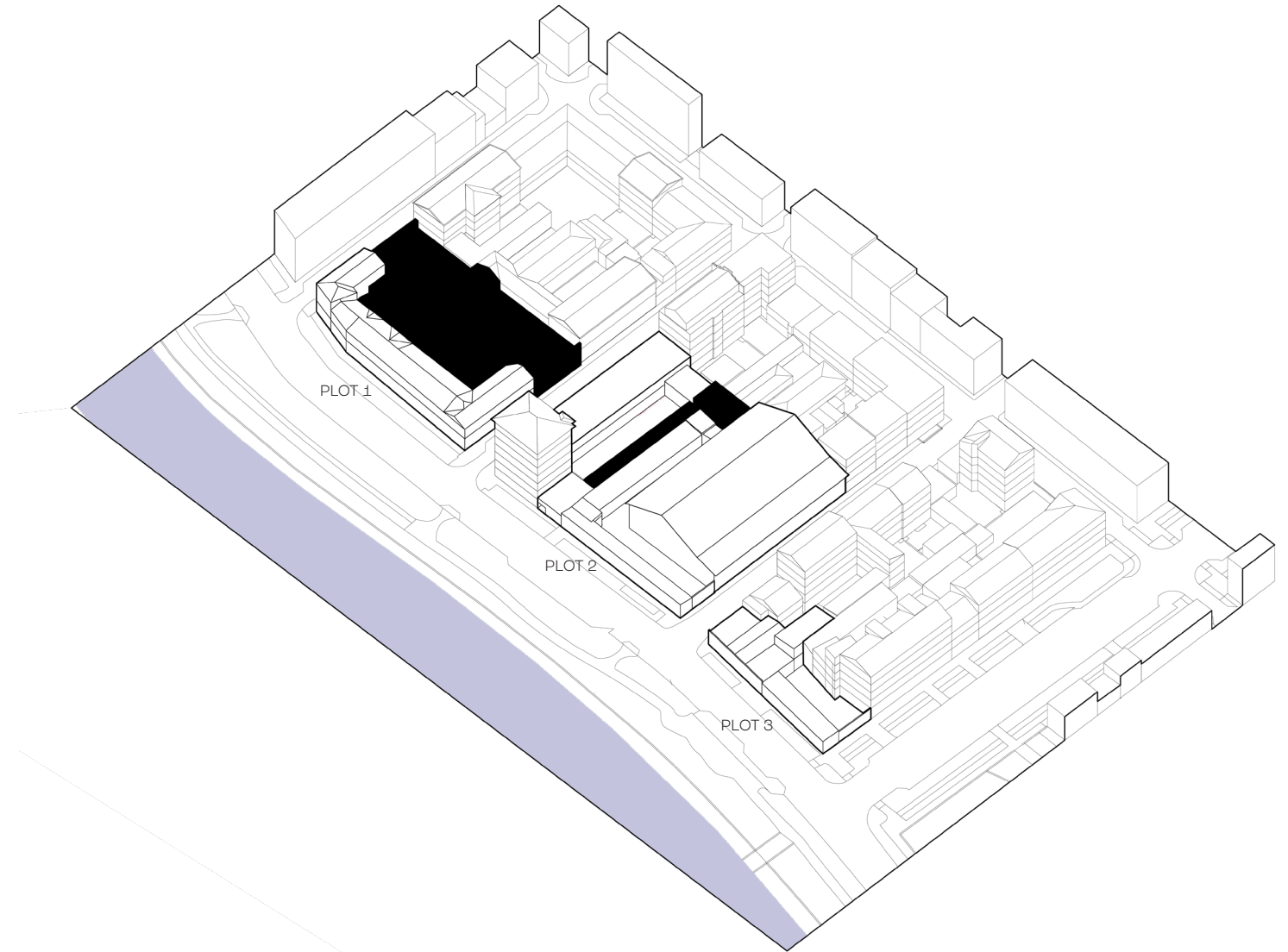


Fig. 81: Current state diagram - Source: self-elaboration Lina Milovidova 2025

Plot 1 has a fully built-up territory which is an obstacle to its conversion into residential/mixed-use facilities because of the problems with daylight and ventilation. Also, taking into account heat island effect and its negative impact on the city neighbourhoods, this projects suggests to eliminate the low-rise warehouse structures in the middle of the plot in order to gain space for green courtyards and student facilities. On the plot 2 eliminating the secondary structures allows to organise a garden and common space.

Additions and modifications

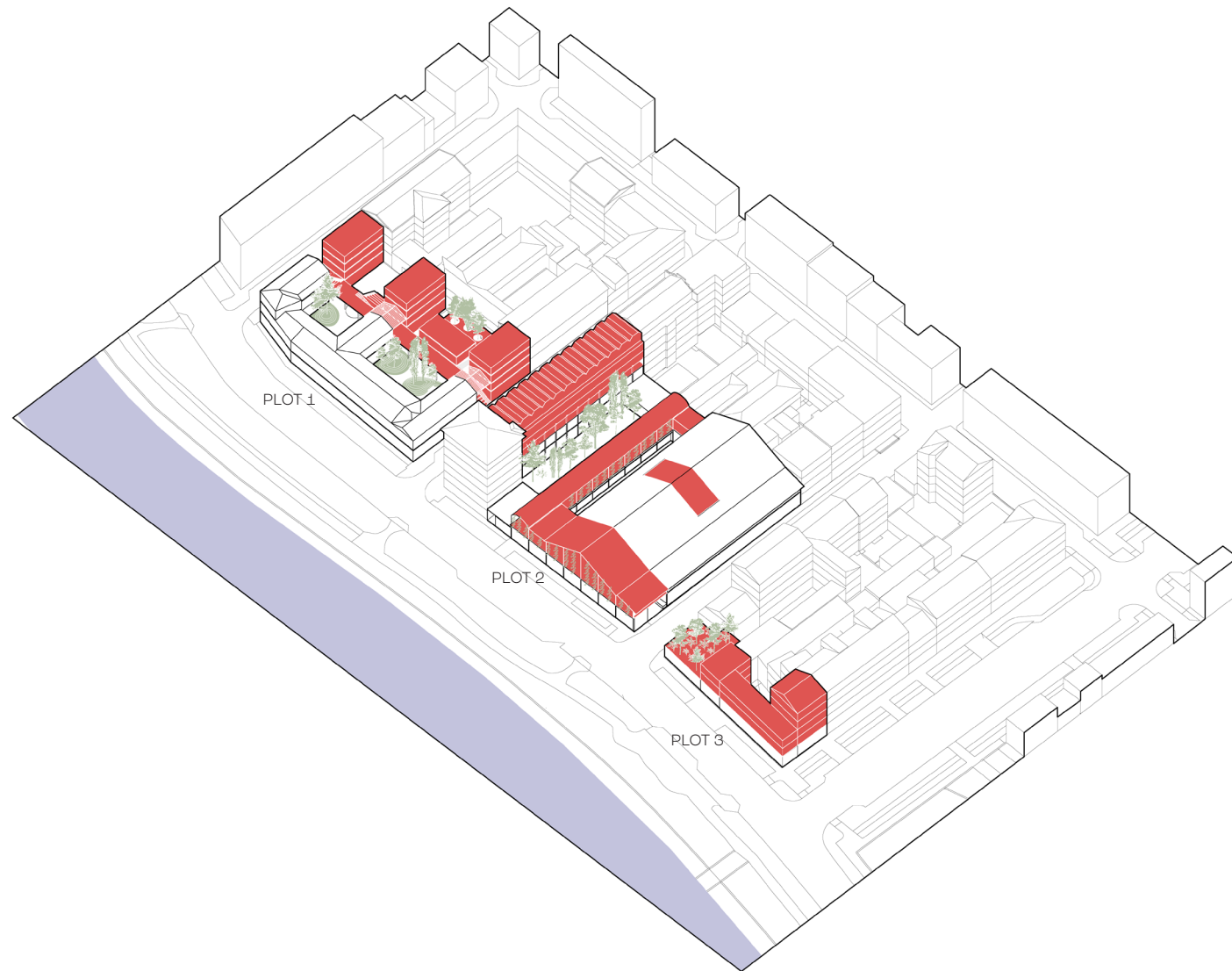


Fig. 82: Additions and modifications diagram - Source: self-elaboration Lina Milovidova 2025

The emphasis of the proposal is on vertical expansion rather than land occupation, preserving ground-level space for the creation of green areas.

Functional scheme

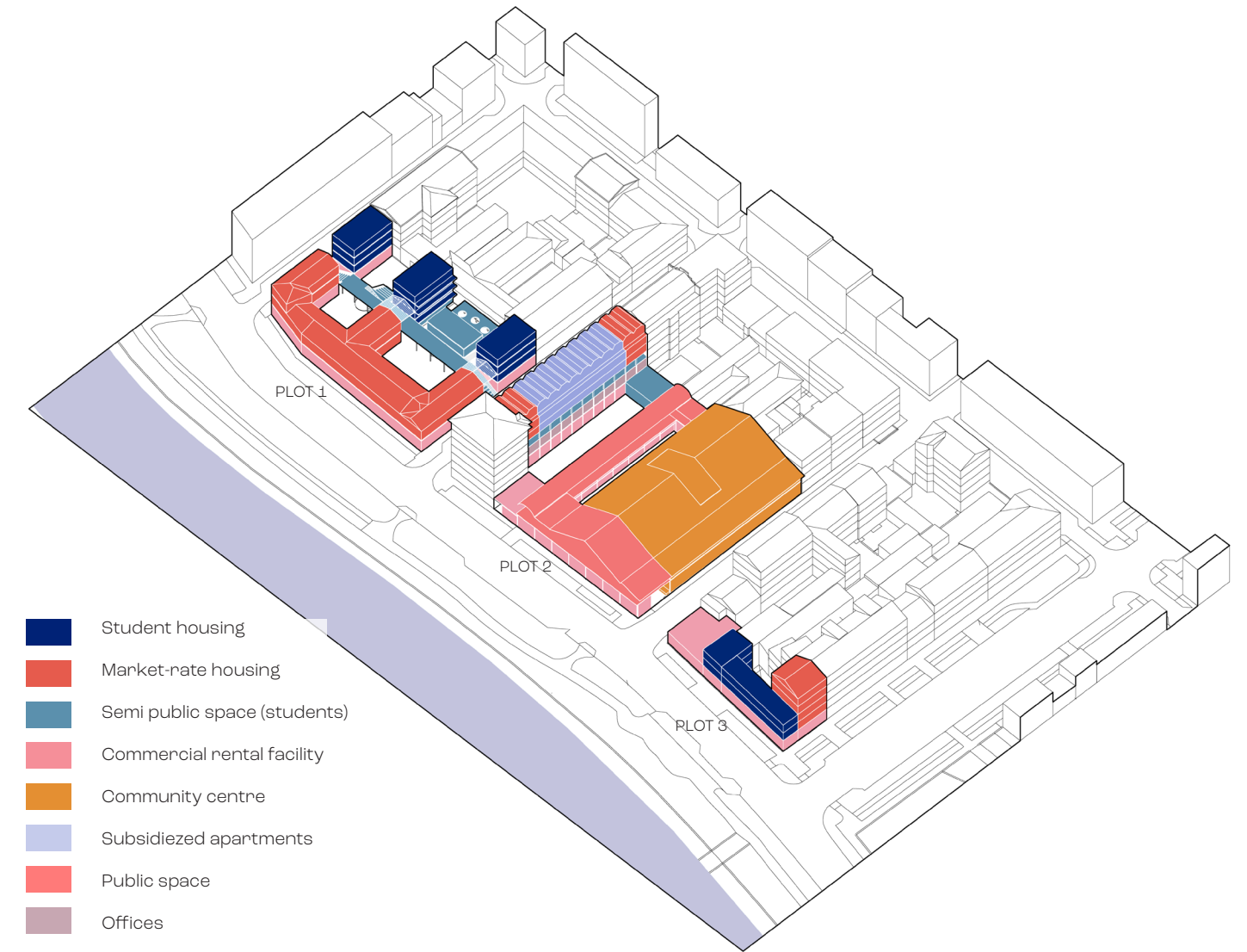


Fig. 83: Functional diagram - Source: self-elaboration Lina Milovidova 2025

As a result, the project becomes a mixed-use development comprising market-rate housing, student residences, and subsidized units dedicated for younger generation. Additionally, this project suggests redeveloping former Ambrosio film studio into community centre with an elevated public space around it which is forming a street front along Lungo Dora Firenze.

SLP limits and proposed modifications:

On already built plots 0.50 sqm GFA/sqm ST is the absolute maximum SLP coefficient according to the PRG from December 2024. It is possible to add 1/3 of the existing SLP by right but only in case it is under the 0.5 cap. After calculating current SLP for the existing plots of the design proposal, it is clear that even the already built area exceeds this limitation, therefore making any additions to low-rise structures impossible. However, this thesis suggests that it is more viable to prioritize technical and environmental compliance over arbitrary volumetric limits. This approach encourages quality architecture and sustainable densification.

Subsequently, it could be suggested to eliminate the cap of 0,50 mq SLP/mq ST and allow to add one-third of the existing SLP with no limitation if it meets ventilation and daylight requirements.

As a result:

Suggested Modification to Art. 20: Simplified SLP Calculation for Built Lots

On already developed lots, eliminate both:

- the base index of 0.7/3 mq SLP/mq ST,
- the maximum cap of 0.50 mq SLP/mq ST.

Allow additional SLP equal to one-third (1/3) of the existing SLP, provided that

- all ventilation and daylight standards are respected in accordance with building code;
- the project does not compromise public infrastructure, street access, or service provisions;
- urban design quality and energy/environmental performance are maintained or improved.

And, as discussed in previous chapters, it can be added that in order to be eligible for such a modification, developments must meet at least one condition listed on the page 59. In the case of this design proposal, following conditions are met:

- affordable housing requirement,
- provides or improves community facilities,
- engages in a PPCP with municipal institutions (development of the student housing).

SLP schemes

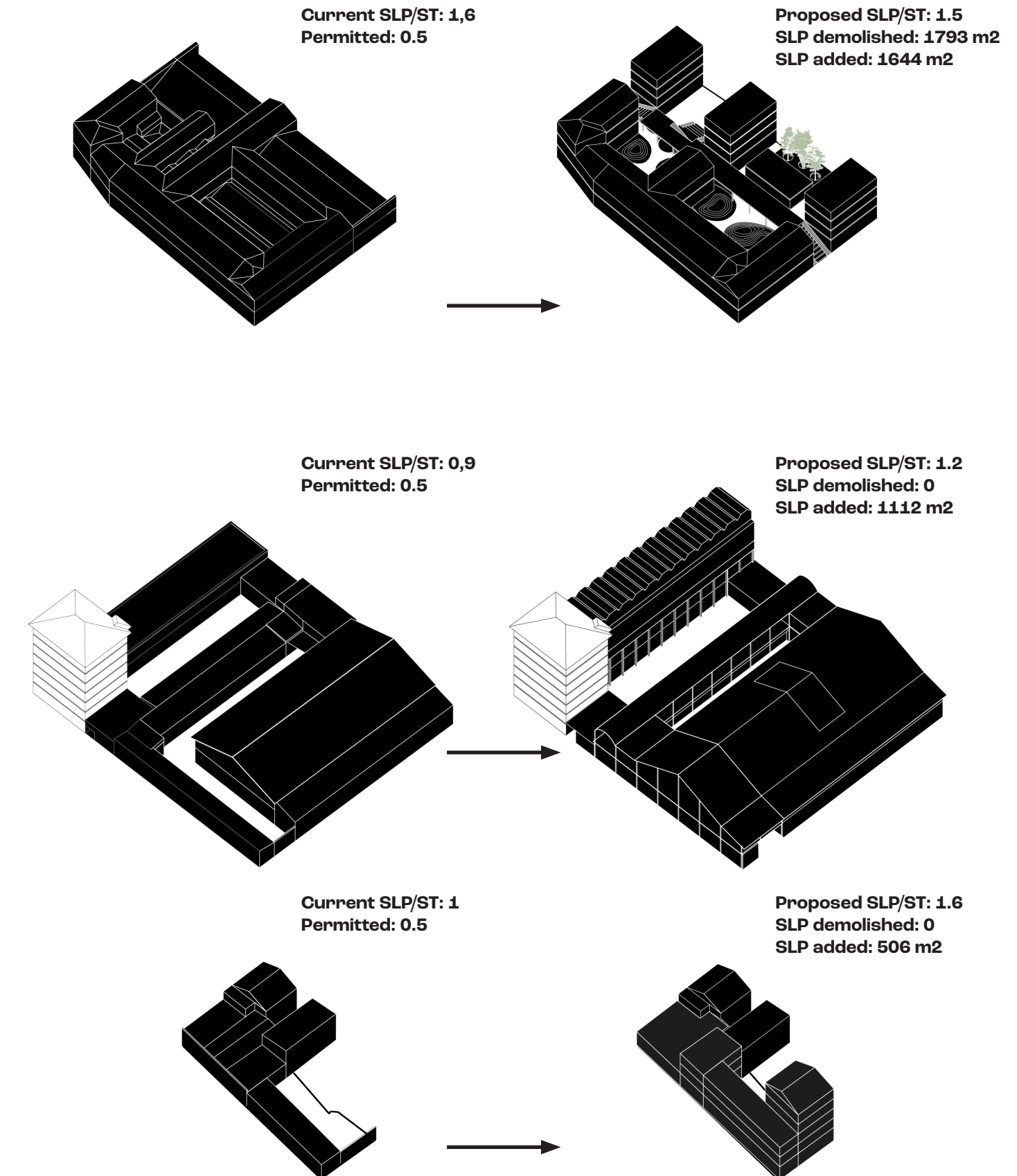
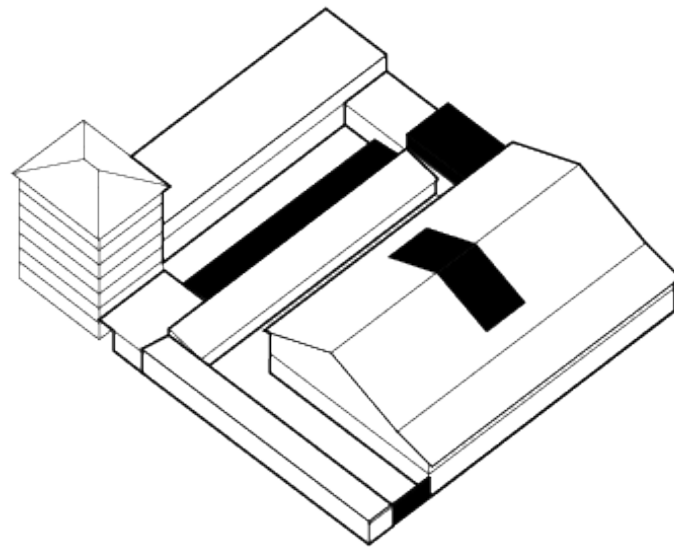


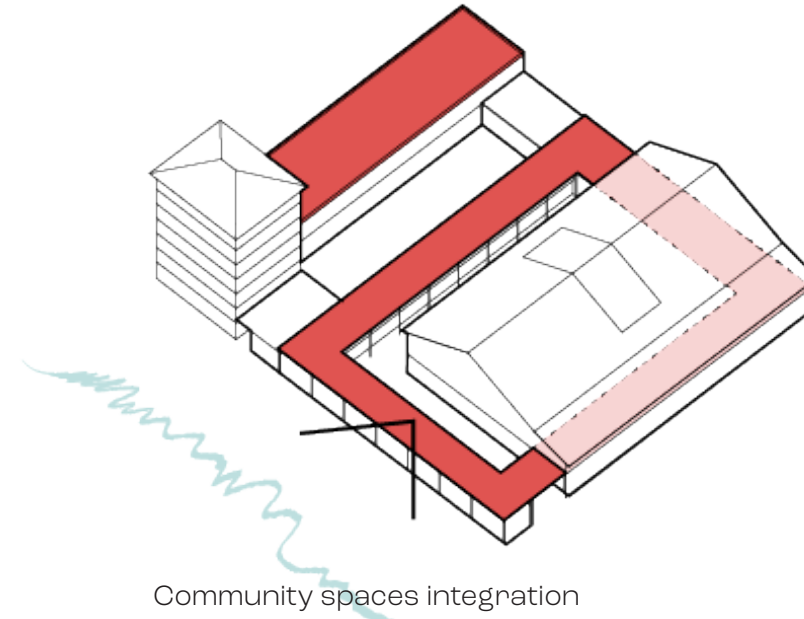
Fig. 84: SLP diagrams - Source: Lina Milovidova 2025

CONCEPT SCHEMES

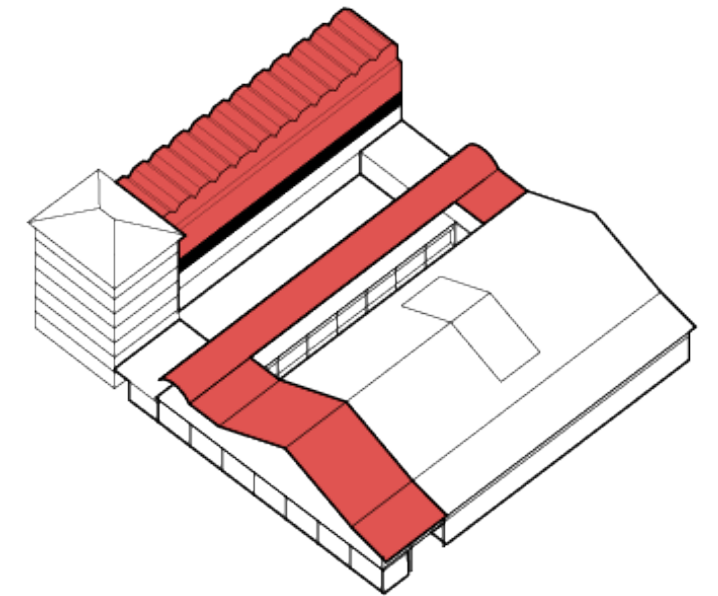
This thesis further explores a possible design solution for the Plot 1 proposal, focusing primarily on the vertical extension of the Via Modena building



Demolition

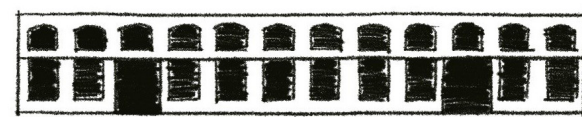


Community spaces integration



Building extension and front-forming canopy

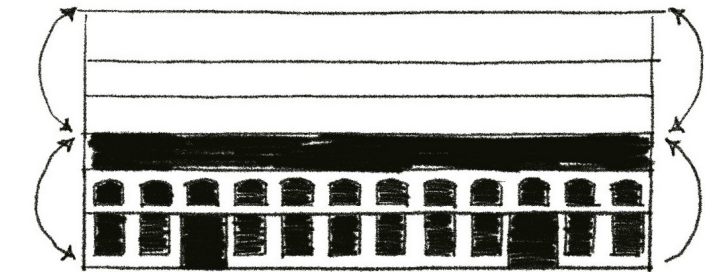
Fig. 85: Conceptual massing diagrams - Source: Lina Milovidova 2025



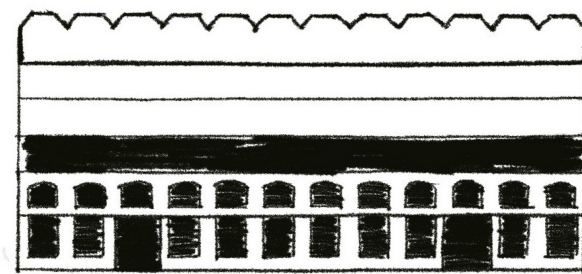
Existing facade facing via Modena



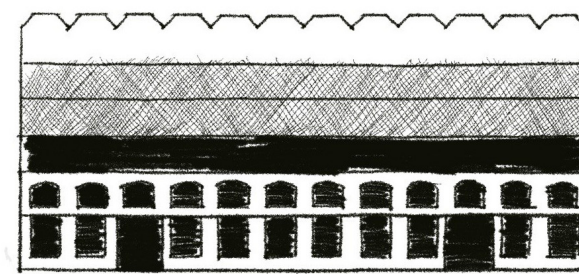
Gap between old and new structures



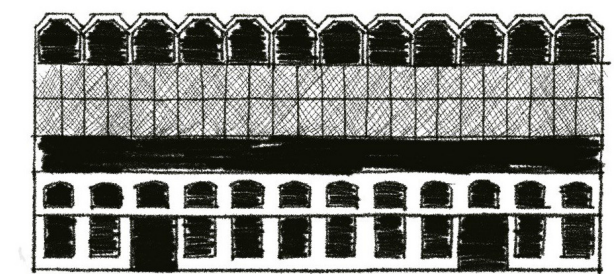
Additional volume



Creation of the prominent frontage



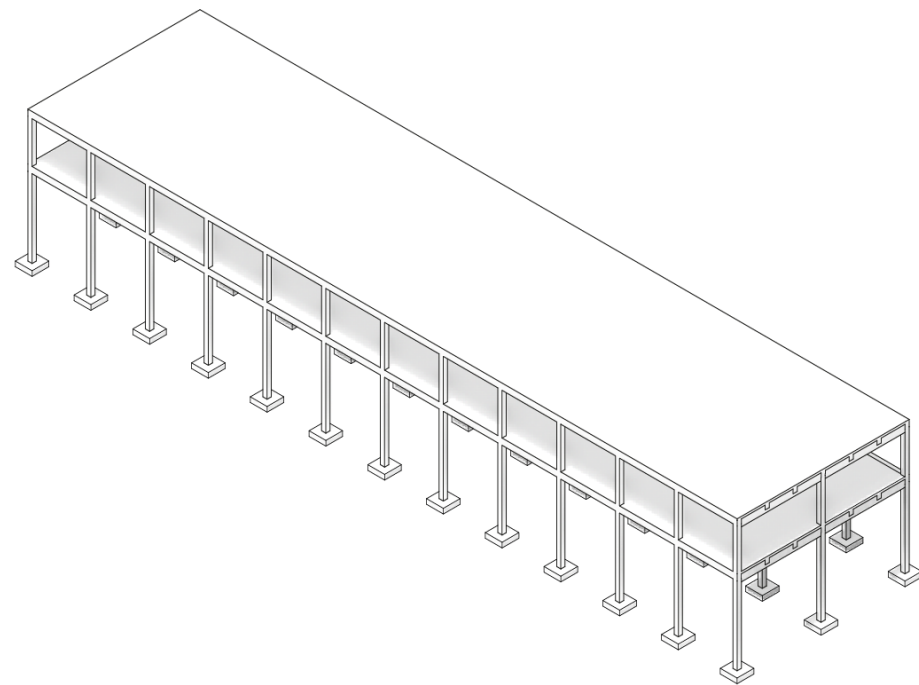
Wired mesh shading system



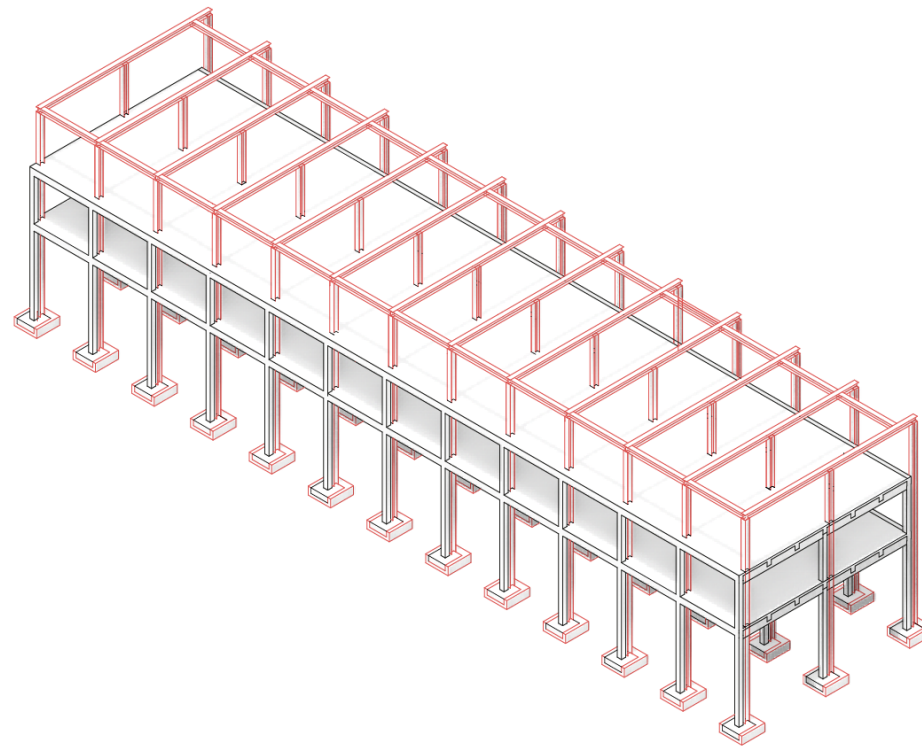
Final output

Fig. 86: Conceptual facade diagrams - Source: Lina Milovidova 2025

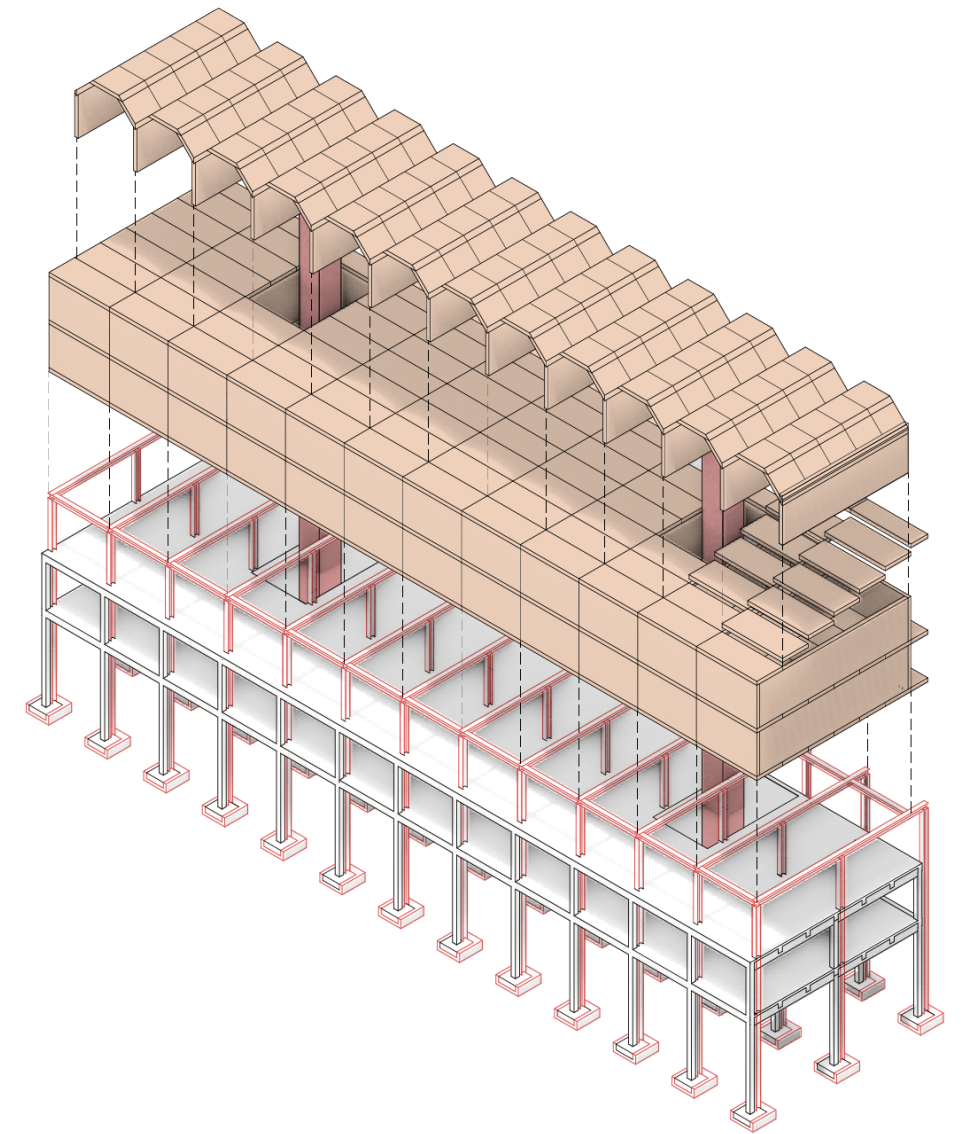
STRUCTURE SCHEMES



Existing concrete structure cast-in-place



Steel frames inserted next to existing structure,
foundation strengthening



CLT load-bearing walls, CLT slabs and roof panels

Fig. 87: Structure diagram - Source: Lina Milovidova 2025

PUBLIC SPACES AXONOMETRY

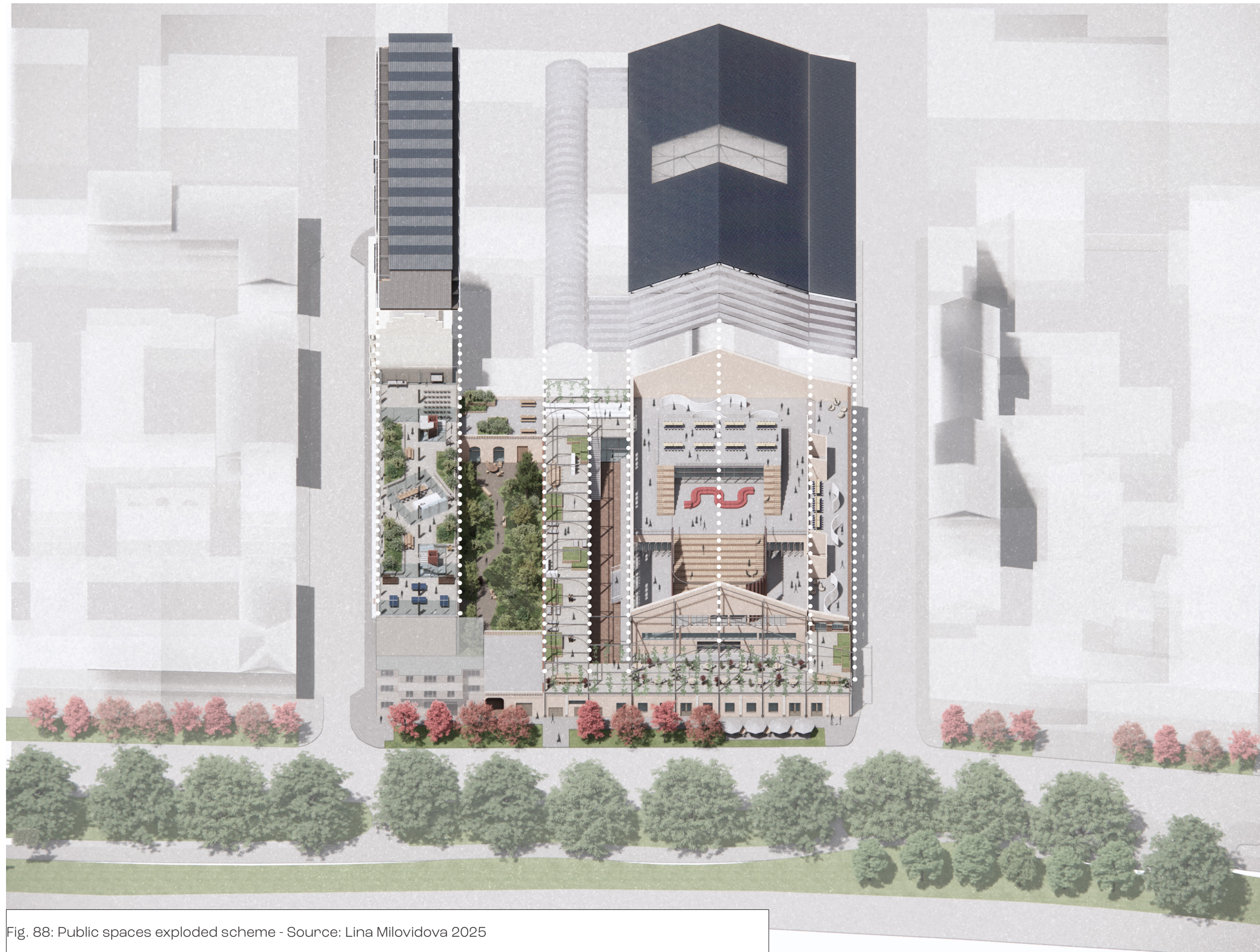


Fig. 88: Public spaces exploded scheme - Source: Lina Milovidova 2025

SECTION SCHEME



Fig. 89: Section scheme - Source: Lina Milovidova 2025

GROUND FLOOR PLAN PLOT SCALE

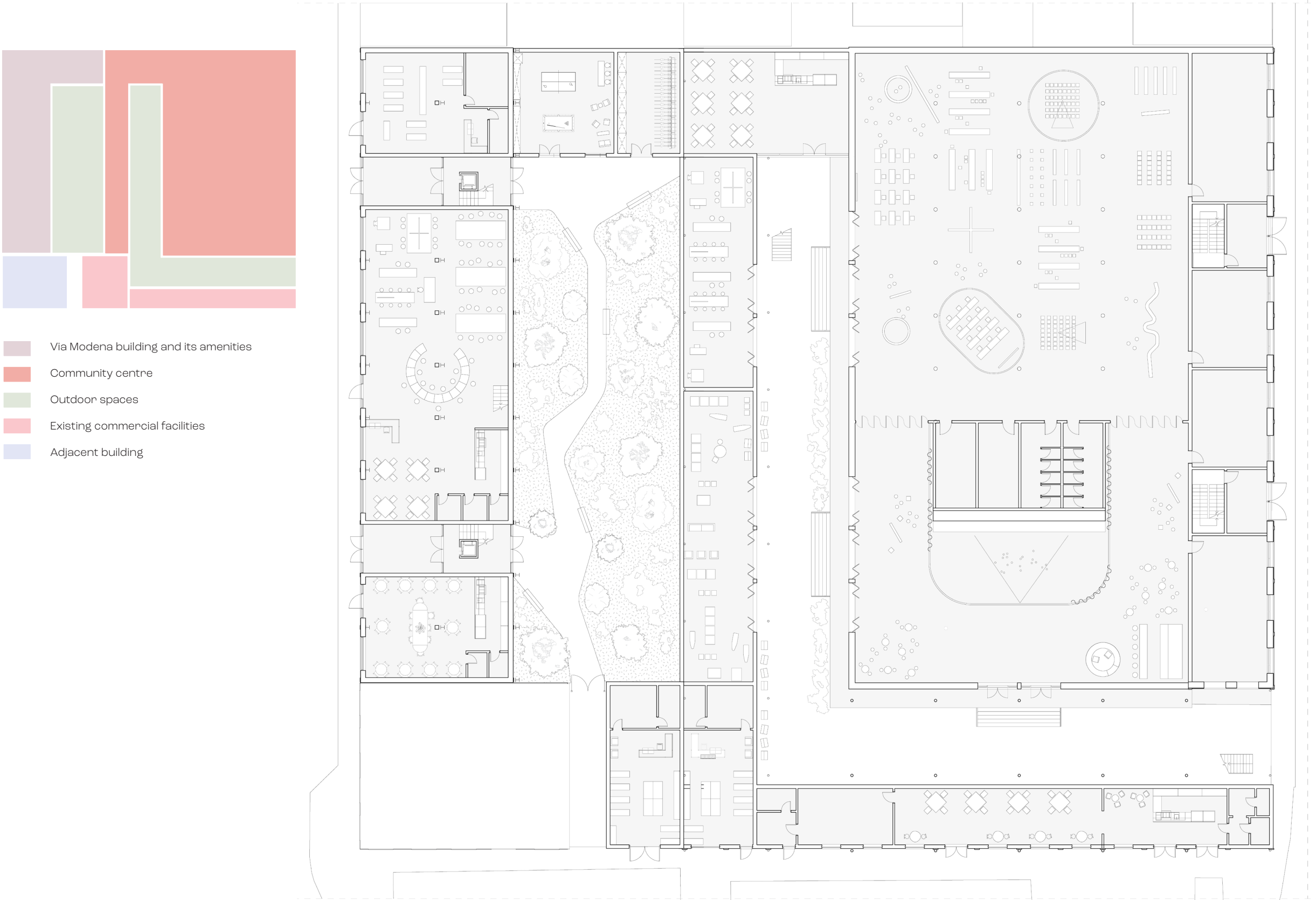


Fig. 90: Ground floor plan plot scale - Source: Lina Milovidova 2025

5 10 15 20 m

GROUND FLOOR PLAN BUILDING SCALE

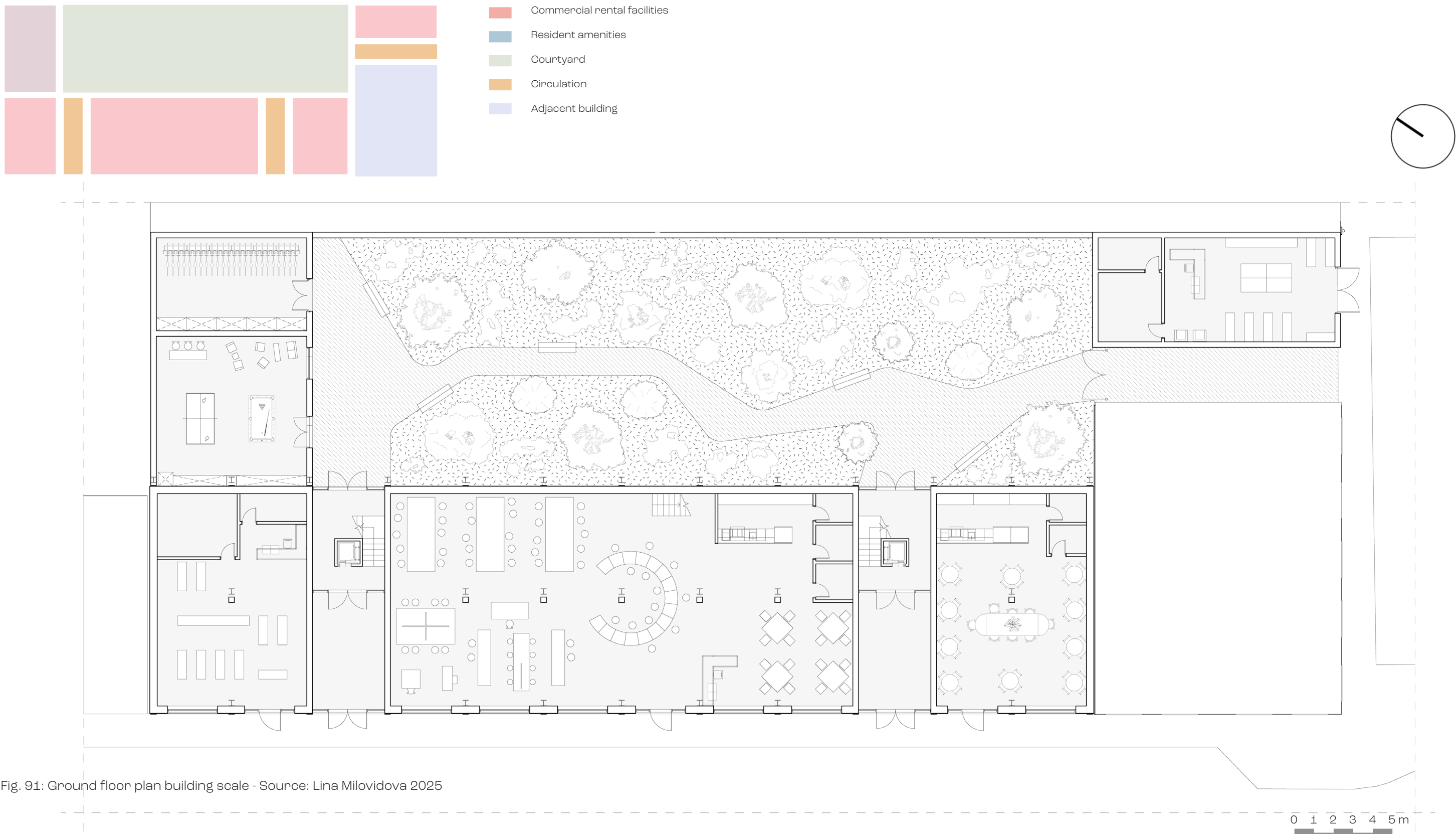


Fig. 91: Ground floor plan building scale - Source: Lina Milovidova 2025

THIRD FLOOR PLAN



Total number of designed apartments in the building: 24.

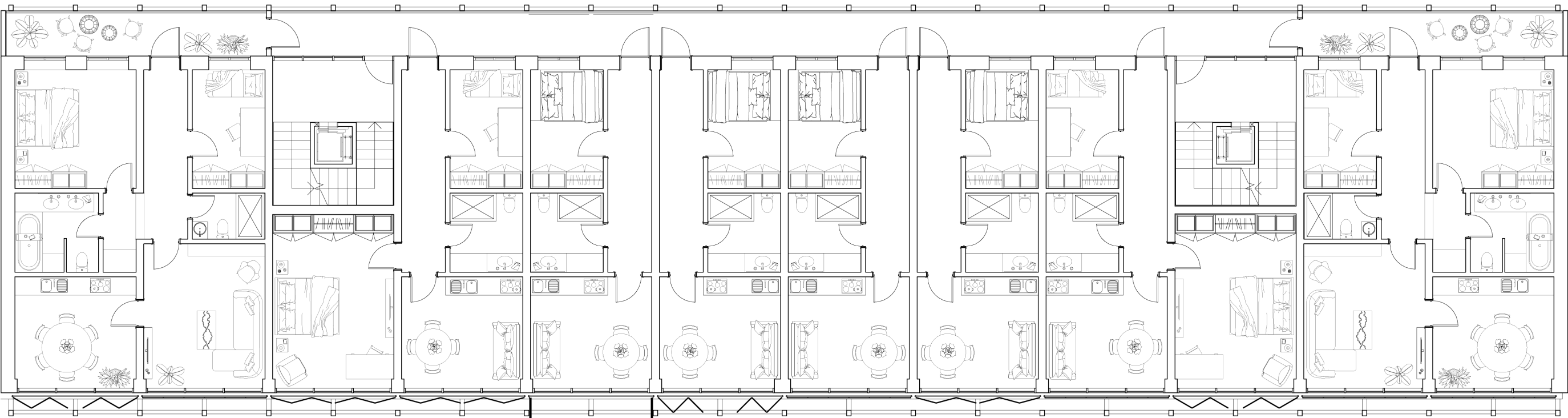


Fig. 92: Third floor plan - Source: Lina Milovidova 2025



VIEWS



Fig. 93: View from Via Modena - Source: Lina Milovidova 2025



Fig. 94: View from Via Modena - Source: Lina Milovidova 2025

VIEWS



Fig. 95: View from the plot 1 courtyard - Source: Lina Milovidova 2025



Fig. 96: View from the plot 1's elevated courtyard - Source: Lina Milovidova 2025

VIEWS

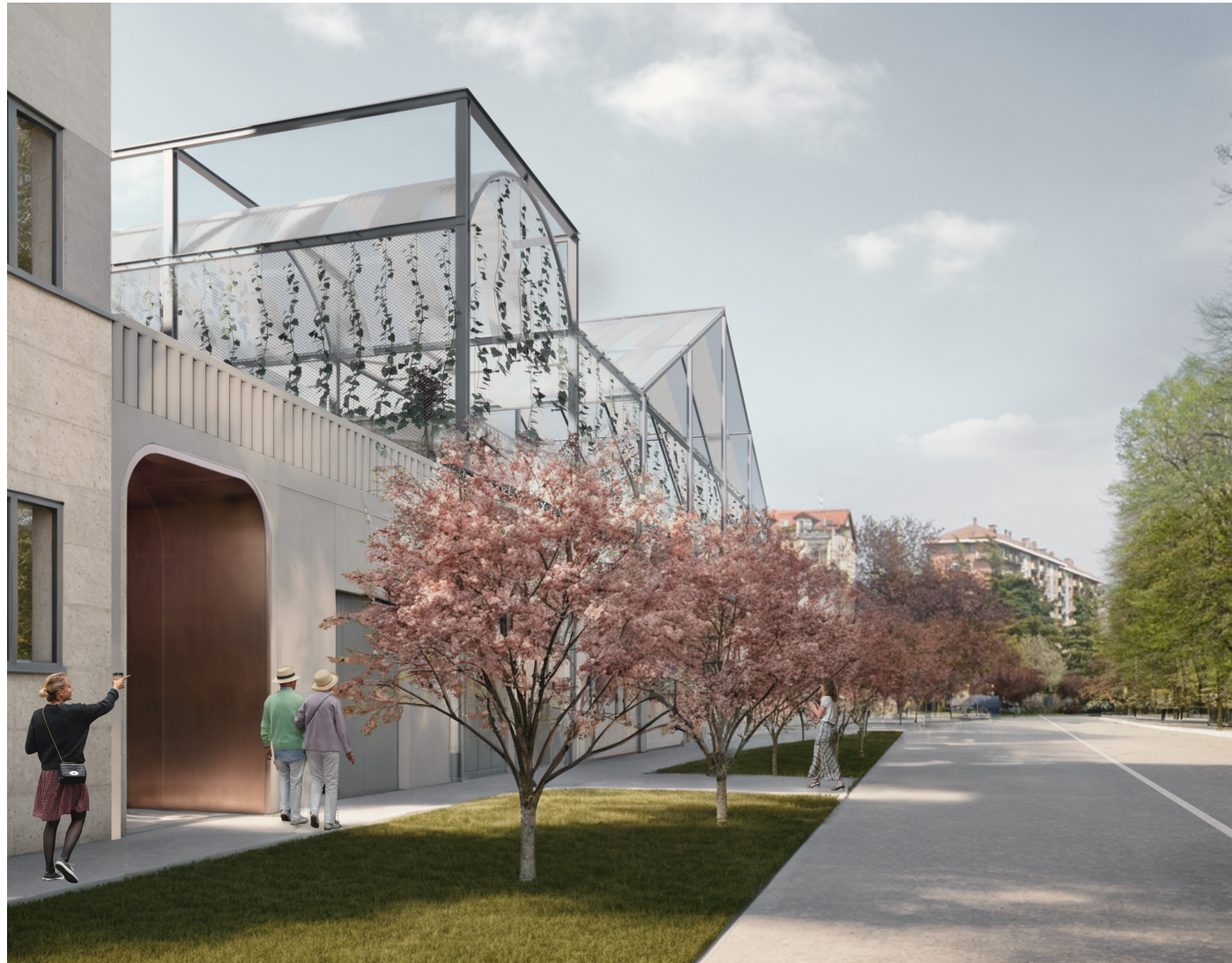


Fig. 97: View from Lungo Dora Firenze - Source: Lina Milovidova 2025

The canopy is made of UV-resistant polycarbonate sheets, providing weather protection while helping to regulate the microclimate beneath it.



Fig. 98: View from the community centre elevated walkway - Source: Lina Milovidova 2025

06| CONCLUSION

This thesis set out to explore the potential of infill densification strategies to address the shortage of student and youth housing in the city of Turin. Through an extensive analysis of densification methods, regulatory frameworks, financing mechanisms, and best practices across Europe and beyond, the research confirms that urban infill is a powerful, underused instrument for sustainable, inclusive, and efficient city-making.

Turin, like many European cities, suffers from a growing mismatch between housing demand and supply for its student and young professional populations. This mismatch leads to rising rental prices, increased competition, and social inequality. However, a closer look at the city's fabric reveals overlooked spatial opportunities - abandoned buildings, underutilized lots, and fragmented plots that could be reactivated through targeted interventions. Infill densification enables new housing to be introduced precisely where it is most needed, within the existing urban framework, minimizing environmental impact and maximizing access to infrastructure and services.

Case studies from Los Angeles, Rotterdam, Paris, Copenhagen, and Venice further demonstrate the potential of diverse infill strategies including vertical extensions, adaptive reuse and new structures filling the urban voids and realising density potential. These examples highlight that innovation in design must be supported by innovation in policy. Regulatory adjustments, such as density bonuses, simplifying change-of-use procedures, and incentivizing infill development, are vital for unlocking this potential in Turin.

The design proposal in the Aurora district puts these principles into practice, transforming an

underutilized industrial site into a mixed-use, mixed-tenure hub of student life and community engagement. It demonstrates that infill is not just a technical response to a spatial problem, but a holistic strategy for urban regeneration, climate resilience, and social inclusion.

An essential of the proposed project lies in the integration of free-market apartments within student and youth housing developments. Rather than relying solely on subsidies or student-oriented programs, the inclusion of market-rate housing units introduces a mixed-income model that improves financial feasibility. This hybrid approach makes projects more attractive to investors, enables cross-subsidization, and contributes to socioeconomic diversity within the development. By designing buildings that are flexible, inclusive, and economically balanced, student housing can become a financially viable asset rather than a burden.

Ultimately, this research calls for a paradigm shift in how cities approach housing: away from expansion and towards intelligent reuse; away from isolated development and towards integrated, community-oriented interventions. Infill densification, when combined with financial realism and policy innovation, offers a clear pathway toward a more equitable, vibrant, and sustainable urban future.

07| APPENDICES

Gestore / Nazionalità investitore	Altri Enti Privati religiosi / Ita, Local	EDISU Pubblico (Regione) / Ita, Local+State	Einaudi Privato - Fondazione / Ita, Local+State	Sharing Privato / Ita, Local	TOT
Prima apertura	1843	1992	1935	2015	-
N. sedi attive	26	15	4	1	46
N. posti letto attivi	1.255	2.173	663	536	4627
N. sedi in progetto*	0	1	2	0	3
N. posti letto in progetto*	0	80	190	0	270
Prezzo medio stanza singola a carico dello studente	398 €	227 €	636,36 €	460 €	-
	-	(2.500 per 11 mesi)	(7.000 per 11 mesi, riduzioni per reddito fino a 184€/mese min)		-

*esclusi progetti 338, PNRR, Universiadi 2025

Fig. 96: University housing funded by local investors - Source: Mangione, E., 2022

Gestore / Nazionalità investitore	Campus** Privato - Fondazione / Ita	CampusX Privato / Ita	The Student Hotel Privato / Ita	Stonehill Frejus Srl Privato / Lu	Altri privati / Non Ita	TOT
Prima apertura	2016	2021	2023	In costruzione	Da definire	-
N. sedi attive	11	2	0	0	0	13
N. posti letto attivi	1270 ~	480	0	0	0	1750
N. sedi in progetto*	1	0	1	1	2	5
N. posti letto in progetto*	400	0	525	582	682	2189
Prezzo medio stanza singola a carico dello studente	600 €	620 €	599 €	-	-	-
	(stima)	(stima)	(stima)	-	-	-

*esclusi progetti 338, PNRR, Universiadi 2025

** In addition to the PBSA, Campus manages numerous structures consisting of apartments of various sizes for a total of another 573 beds.

Fig. 99: University housing funded by Inon-ocal investors - Source: Mangione, E., 2022

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Fig. 10: - Urban density (persons/HA) in the US studies. - Source: 2015 Michael West Mehaffy, TU Delft

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