



**Politecnico
di Torino**

Dipartimento
di Architettura e Design

Preliminary urban design proposal for “Parco archeologico” site in Milan

-A detail subject of Milan Navigli Canal Challenge

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ABSTRACT



Abstract

This thesis is based on the Milan Navigli Canal Challenge, we are tasked with conceptualizing the Milan of the future and envisioning a symbiotic relationship between the city and the Navigli canal. Projects focus on environmentally friendly design, mobility, and the relationships between water and urban spaces. By searching archives and literature, we were checking the government's principles, understanding the opinions and requirements of the people living in Milan around the Navigli, and conducting investigations about the site's current situation and the feasibility and civic acceptance of opening the canal. We chose “THE ART FESTIVAL” as the main theme for reopening the Navigli, connecting the 8 sites in the challenge to form a tour route, achieving sustainability, and preventing the possibility of the canal being filled again in the future. Through the specific design of “Parco Archaeological”, the Navigli is combined with art exhibitions. Through three parts segmented design (event square, leisure plaza, linear park), more activities are provided to the original residents and attract more foreign tourists. Redesigned sidewalks and added bike lanes enhanced the connection between sites for low-carbon travel. At the same time, we selected abandoned buildings on the site to upgrade, becoming a multi-functional center (Reception, Museum, Hotel). Connect the various functional zones of the entire site. This design takes an urban perspective from Milan and Parco Archaeological, with an artistic theme, providing information for the revival of Navigli, riverside transportation planning, and citizen participation in park design, contributing to the development of a more sustainable city.

Keywords: Milan Navigli Canal, Urban planning, Bicycle system, Building Renovation, sustainable design.

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01

INTRODUCTION

1.1 Background

1.2 The purposes of the thesis

1.3 The aims and scope

1.4 The methodology

1.1 Background

The Navigli are a system of canals linking Milan and its surroundings in the Lombardy region of Italy, with a history dating back to the Middle Ages.

The system consists of five canals: Naviglio Grande, Naviglio Pavese, Naviglio Martesana, Naviglio di Paderno, and Naviglio di Bereguardo. The first three were connected across Milan via the Fossa Interna, known as the inner ring. The urban area of Naviglio Martesana was covered with the entire ring of the lake in the early 1930s, sounding the death knell for the northern channel. Merchant ships continued to sail from the Naviglio Grande but decreased.

Progress continued, and in the 1960s the project of a river port to reach the Adriatic Sea via the Po River was definitively abandoned.¹

The word 'naviglio' is the Italian word for 'canal'. So "Navigli" is the plural of "Naviglio", the name of an artificial canal in Milan. They were built between 1179 (Naviglio Grande) and the 16th century (Naviglio Martesana) to connect Milan with the rivers Ticino and Ada. These routes were used for commercial aims and to transport the marble used in the construction of the mosque.²

In 2022, the Asociación Riaprire i Navigli ("Renovation of the Navigli Association") collaborated with Primitivo Studio, proposing a complete renovation of the current canal, to host the Milan Navigli Canal Challenge.³ Their goal is to create new opportunities for cities, and they believe that competitive entries will play an important role in influencing public opinion about the project.

The Navigli system does not only concern the city of Milan, but it is also a system that starts from the lakes located north of Lombardy and Switzerland and leads to the longest river in Italy: the Po. Reopen the internal section of the Milan Navigli

¹ Navigli

Source: <https://en.wikipedia.org/wiki/Navigli>

² Milan on Water: Navigli, the Planning Legacy of Leonardo da Vinci

Author: Global Site Plans - The Grid

Source: <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/milan-water-navigli-planning-legacy-leonardo-da-vinci/413891/>

³ MILAN NAVIGLI CANAL CHALLENGE

Source: <https://architecturecompetitions.com/naviglicanalchallenge/>

will re-establish the territorial fluvial connections that have been lost in the last century and reconnect the city of Milan with the sea and the mountains.

The reopened Navigli network does not concern only about mobility, it has the strong potential to become a linear ecological system that's able to create transversal ecological corridors along the whole Lombardy territory, increasing the environmental quality of the territories it crosses.

1.2 The purposes of the thesis

What we do in this paper is consider the Milan of the future and consider a symbolic connection between the city and the Navigli canal. We focus on environmental design, mobility, and the relationship between water and urban space. Our research is based on information provided by Milan's Navigli Canal Problem and the Navigli Canal Opening Project.

1.3 The aims and scope

· Reopening of the Navigli Canal Path:

Our first objective is to create a plan and strategy for reopening the entire 8km Navigli canal path. This includes defining architectural guidelines, identifying potential functions for the canal area, establishing key connections between new and existing spaces, and developing a branding strategy for the canal area.

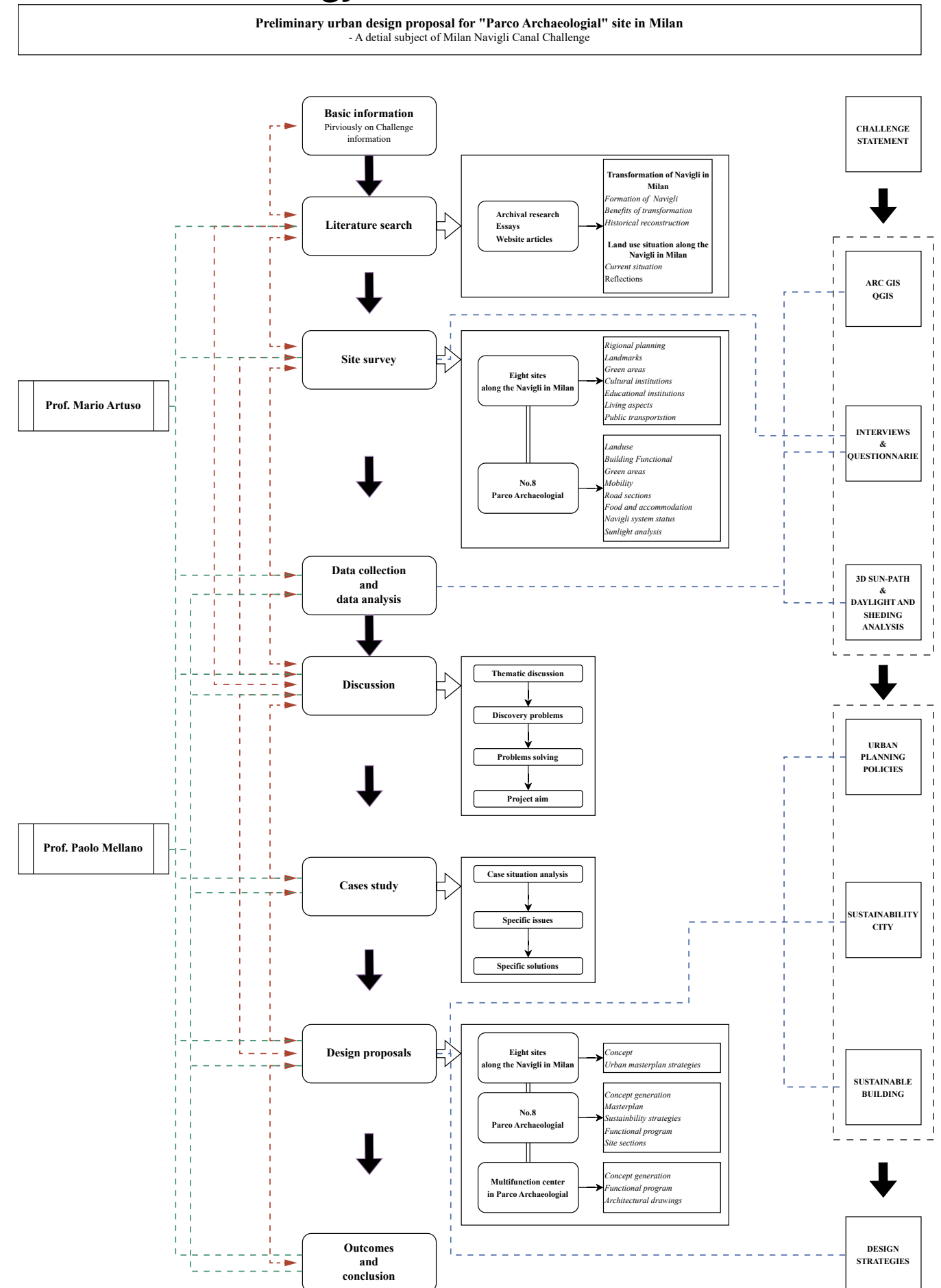
· Transformation of the Parco Archeologico:

We have selected the Parco archeologico, one of the smaller sections of the Navigli Canal Path, for transformation. The goal is to reprogram and introduce new functions that will enhance its connection to the reopened Navigli Canal. This transformation is expected to give the site a new identity and unlock its potential.

· Renovation of Abandoned Buildings:

We have identified two abandoned buildings within the site that are slated for renovation and upgrading. The objective is to align these buildings with the overall theme and purpose of the site, further contributing to the revitalization of the area.

1.4 The methodology





02

How to Revitalize Navigli in Milano: A Study Based on the Transformation of Navigli in Milano

2.1 Navigli and Milano: main overview

2.2 Navigli and the Urban System of Milano

2.3 The exploration of promoting the sustainable development of Navigli

2.4 Collective benefits of an urban transformation of Navigli (Boscacci et al., 2017)

2.5 Cerchia dei Navigli and the virtual historical reconstruction (Banfi F et al., 2021)

2.1 Navigli and Milano: main overview

2.1.1 Basic information

The Navigli di Milano are a system of irrigation and navigable canals, mainly serving the Milan city of the Lombardy region, which connected Lake Maggiore, Lake Como and downstream of River Ticino, also connected the Lombard region with Switzerland, northwestern Europe, the Canton of Graubünden and northeastern Europe, finally, flowing through the Po River to the Adriatic Sea.

Due to Navigli's regular water resource management, a large area has been irrigated and produced, which is related to the reclamation projects initiated by monks in the southern monasteries of the city as early as the 10th century. The construction of the entire system continued from the 12th century to the 19th century. Cerchia dei Navigli (also known as Naviglio Interno, Fossa Interna, or Cerchia Interna) represents the "hinge" of the Milan city, enabling the system to run.⁴

The Navigli that are part of the Navigli Milanese system are:

Naviglio Grande

Naviglio Pavese

Naviglio della Martesana

Naviglio di Paderno

Naviglio di Bereguardo

Navigliaccior

Circle of the Navigli (no longer existing)

Naviglio di San Marco (no longer existing)

Naviglio Vallone (no longer existing)

Artificial water bodies are:

Darsena di Porta Ticinese

Laghetto di San Marco (no longer existing)

Laghetto di Santo Stefano (no longer existing)

Roman fluvial port of Milan (no longer existing)

The most important navigation-obstruction gate along the Navigli Milanese are:

⁴ Reference The document can be available on:: [https://it.wikipedia.org/wiki/Navigli_\(Milano\)#CITEREFPifferi](https://it.wikipedia.org/wiki/Navigli_(Milano)#CITEREFPifferi)

Conca Fallata

Concrete

Conca dell'Koronata (disused)

Conca di Viarenna (disused)

Other artificial channels forming part of the hydrography of Milan are:

Ticinello Cable

Redefossi Cable

Canale Ticinello

Vettabbia

2.1.2 The formation of Navigli in Milano

• Predecessor (Before 12c)

The three major rivers that are part of the Milanese hydrography (Lambro, Seveso and Olona) flowed into their natural riverbeds, the Lambro and Olona farthest from the city, while the Seveso was closer, it being understood that they were at a certain distance from Mediolanum. Of the three, the Lambro is the only river that has not changed in centuries, although it flows into the old natural bed, Olona and Seveso were given by the ancient Romans.(AA,VV. 1954)⁵ The Mediolanum area had a lot of water because the village was located on the "water line". In the subsurface, a collision between geological layers with different permeability causes deep water to return to the surface.

The Seveso was the first river to be part of the hydrography of Milan to which the ancient Romans modified the route: its natural course originally brought it, coming from the northeast, to touch Mediolanum on its eastern side.

The ancient Romans built a water ring formed by two branches, the Grande Sevese and the Piccolo Sevese, which later became the moat of the Roman walls of Milan. In particular, the Grande Sevese constituted the northern, southern and eastern sides of the moat, while the Piccolo Sevese formed its western branch. The Grande Sevese and

⁵ AA,VV. (1954). nostro suolo prima dell'uomo, in Storia di Milano, I, Milano, Fondazione Treccani degli Alfieri. p. 11

the Piccolo Seveso still exist and are the oldest canals in Milan, since they date back to the Roman Republican Age (Codazz. 2011)⁶.

Arrived near the current Via Larga, due to a natural depression, the river Seveso once formed a large basin (ancient place names such as Via Poslaghetto and Via Pantano would be witnesses): here it would have been built, by the ancient Romans, the first river port of Milan, which was in communication, through the Vettabbia, with the Lambro, the Po and then the sea.

• The Circle of the Navigli (In the middle of 12c)

In 1152 a new artificial canal was built for military purposes between Abbiategrasso and Landriano diverting part of the waters of Ticino with the main aim of discouraging the incursions of Pavia.

Four years later, in 1156, Milan was equipped with new wooden walls, which were surrounded by a large moat flooded by the waters of Seveso and Merlata. From this moat, thanks to works of expansion carried out in the following centuries finished its military function, originated the Circle of the Navigli.

Built as a defensive moat of the medieval walls of Milan from 1156 (Pifferi, Tettamanzi e Magni, 1987) 12 and transformed into Naviglio in its south-east part between 1387 and 1496 thanks to the canalization and expansion works commissioned by the Visconti and Sforza, the Navigli Circle (also known as Naviglio Interno, Fossa Interna or Cerchia Interna) was the junction of the Navigli system in Milan.

The only part of the Navigli Circle that remained a simple, non-navigable loop was the section near the Sforzesco castle on the south-by-west side. Its job was to bring water to the castle.

The Navigli Circle, as a whole, was a ring of water that enclosed the medieval historic center of Milan, hence the name. As an immissary the Circle of Navigli had the pond

⁶ Codazz, Sergio. (2011. July 14). I canali di Milano (1^a parte). vecchiaMilano.wordpress.com.

of San Marco, which originated from the Naviglio di San Marco (or the last stretch of the Naviglio della Martesana, which changed its name to Naviglio di San Marco after the Conca dell'Incoronata), while as emissaries it had the Naviglio Vallone, which then merged into the Dock of Porta Ticinese, and a drainage channel that discharged any excess flow of the Circle of Navigli into Vettabbia.

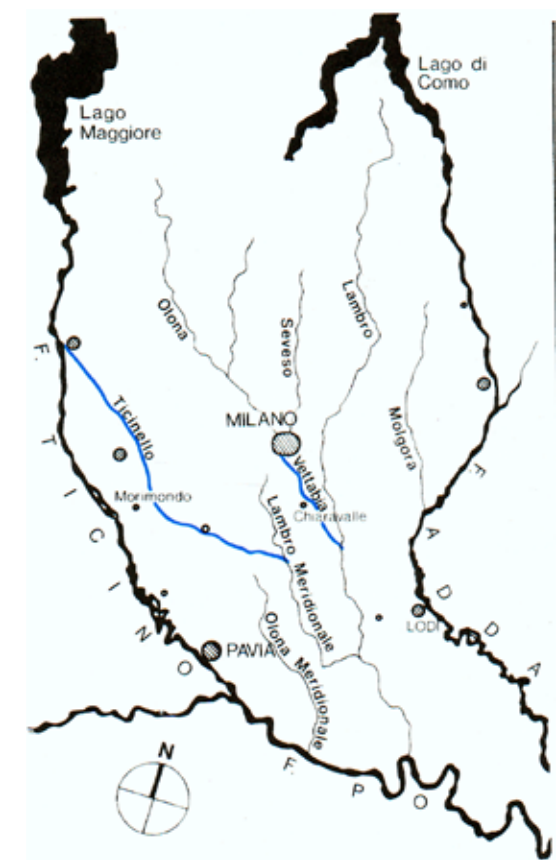


Figure 1. Map of Navigli in Milan and Pavia province during XII century. In blue artificial channels built for irrigational purpose
Source: Regione Lombardia, a cura del settore coordinamento per il territorio.(1989). Il sistema dei navigli Milanesi e pavesi.

• Naviglio Grande and Navigliaccio (13c-14c)

In 1272 part of the Ticinello Canal, the one between Abbiategrasso

in Landriano, was made navigable and became the Naviglio Grande. The Naviglio Grande was extended to the edge of Milan, where it arrived, not yet navigable, earlier in 1211: it ended its path near the Basilica of Sant'Eustorgio, then outside the medieval Porta Ticinese. The canal was not yet connected to the moat surrounding the city.⁷ This will happen after more than a century for the needs of the Veneranda Fabbrica del Duomo.

Even before becoming an important route of communication, the Naviglio Grande, with its one hundred and sixteen

⁷ It will become the inner pit with the expansion of the city and the construction of the Spanish walls.

irrigation mouths, dispensed water in the Milanese countryside, pouring its flow in a south-east direction and profoundly changing the hydrography of the area. New ditches and canals now crossed the plain, but this was not considered sufficient.

The pit that surrounded the walls became navigable, narrowing it, deepening it and transforming it, as already

mentioned, into the Circle of Navigli, and the Naviglio Grande extended to it, digging a landing place, the pond of Santo Stefano, where all the necessary building materials arrived. Previously (1359) the Navigliaccio had been built, open at public expense, to irrigate the park of the Pavia Castle of Galeazzo II and another aqueduct brought the waters of the Adda to the castle of Porta Giovia in Milan to bathe an equally grandiose garden.

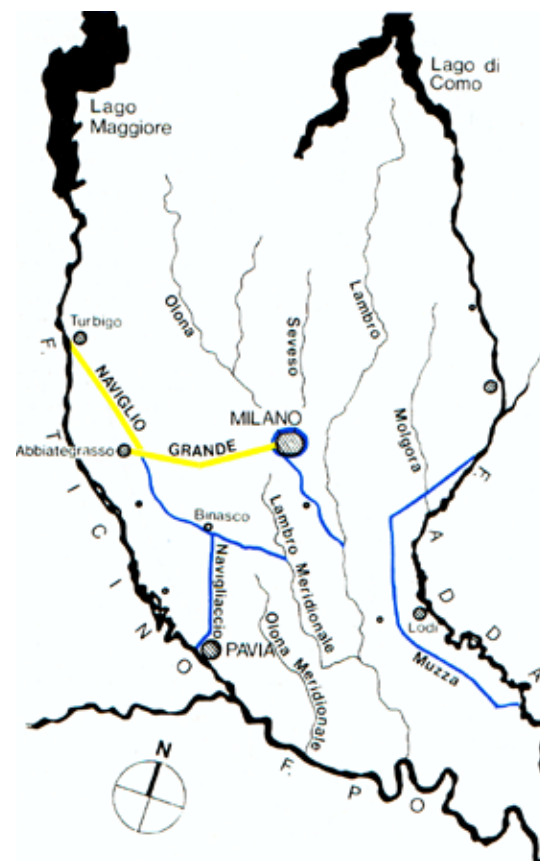


Figure 2. Map of Navigli in Milan and Pavia province during XIII century. In blue artificial channels built for irrigational purpose, in yellow the artificial channels built in this historical period.

Source: Regione Lombardia, a cura del settore coordinamento per il territorio.(1989). Il sistema dei navigli Milanesi e pavesi.

• Naviglio della Martesana, Naviglio di Bereguardo and Naviglio di Paderno(15c)

It was the successor of Filippo Maria Visconti, Duke Francesco Sforza, to build the Naviglio della Martesana, navigable canal that goes from Trezzo d'Adda to the Cassina de' Pomm and was made navigable in 1471; It was Duke Lodovico il Moro who brought it to the city connecting it to the Circle of Navigli in 1496 and thus realizing the junction of the waters of Adda and Ticino. In 1470, by the will of Francesco Sforza, the

Naviglio di Bereguardo had already been completed, which from the Naviglio Grande reached the plateau above Ticino, north of Pavia. In 1496 the Conca dell'Incoronata (also known as the Conca di San Marco) was built, (Pifferi, Tettamanzi e Magni, 1987) which was located along that stretch of the city of the Naviglio della Martesana that was then buried. However, Leonardo did not have time to elaborate plans to build a canal that, passing the rapids of the Adda, allowed the direct connection with the Lario. He completed them and handed them over in 1518 to King Francis I who in 1500, defeated the Moor, had taken over the duchy. They were too bold for the

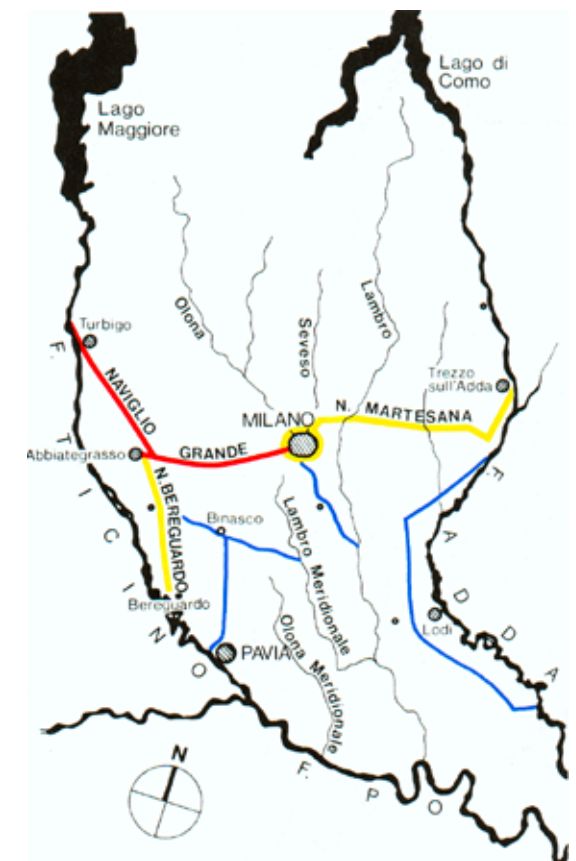


Figure 3. Map of Navigli in Milan and Pavia province year 1457. In blue artificial channels built for irrigational purpose, in yellow the artificial channels built in this historical period. In red preexisting channels

Source: Regione Lombardia, a cura del settore coordinamento per il territorio.(1989). Il sistema dei navigli Milanesi e pavesi.

time and it took almost two centuries to open the Naviglio di Paderno and more than two to connect Milan to Pavia thanks to the Naviglio Pavese.

• Darsena di Porta Ticinese (17c)

In 1603 the Dock of Milan was built, or an artificial water basin located near Porta Ticinese and used for mooring, storage of boats sailing the Navigli Milanese; It was built by the Spanish governor Pedro Enríquez de Acevedo, Count of Fuentes, as a port of the pre-existing lake of Sant'Eustorgio.

In 1953 the Darsena di Porta Ticinese was ranked thirteenth in the classification of national ports for reception of goods (Navigli24. 2017)⁸, then its function changed, with the transformation from a freight port to a tourist place. The Dock of Porta Ticinese has as its emissary the Naviglio Grande and as its emissary the Naviglio Pavese.

• Naviglio Pavese and Naviglio di Paderno (18c-19c)

The Naviglio Pavese was born from the need of Milan to be connected to the sea, which had already been realized in remote times through the Vettabbia and Lambro, and, from 1470, thanks to the Naviglio di Bereguardo. In 1706 the Austrian governor Girolamo di Colloredo decided to build wooden barriers along the banks of the Navigli, in order to protect citizens from the risk of falling into the water. (Pifferi, Tettamanzi e Magni.1987) It was then Napoleon himself who established its construction. The works started in June 1807, were interrupted from 1813 to 1817 due to the fall of Napoleon and were completed in mid-1819. Archduke Ranieri Giuseppe of Habsburg-Lorraine, viceroy of the new Austrian Lombard-Venetio Kingdom, was able to solemnly inaugurate the Naviglio Pavese on 16 August of the same year.

In the last decade of Austrian rule, the banks of the Inner Circle were made safer, creating granite parapets to replace the old wooden fences. (Pifferi, Tettamanzi e Magni.1987) It was always the Austrians who realized some works that, although far from Milan, were fundamental for navigability

⁸ Navigli24.it. (2017. October 13). Darsena, viaggio nel tempo alla riscoperta del porto di Milano. navigli24.it. The document can be available on: <https://web.archive.org/web/20171013224614/http://navigli24.it/darsena-di-Milano-foto-storiche/>.

between Lake Maggiore and Como: the works for the Naviglio di Paderno, which were begun in 1777, and the construction of the Redefossi Cable, (Pifferi, Tettamanzi e Magni.1987) which was built between 1783 and 1786.



Figure 4. Map of Navigli in Milan and Pavia province during XVIII century. In blue artificial channels built for irrigational purpose, in yellow the artificial channels built in this historical period. In red preexisting channels
Source: Regione Lombardia, a cura del settore coordinamento per il territorio. (1989). Il sistema dei navigli Milanese e pavesi.

• Nowadays (20c- Nowadays)

For many centuries, the Navigli Circle was grasped with a low water turnover, a phenomenon particularly problematic in terms of environmental pollution and public health. To solve the problem, in the second half of the nineteenth century some solutions were proposed, including the preliminary design of a propeller boat specially designed to clean the canals from waste. The definitive solution was finally identified in the coverage of the Navigli, an operation that also aimed to solve a series of problems related to terrestrial roads. (Pifferi, Tettamanzi e Magni.1987) The first canals to be buried were, between 1894 and 1895, the Naviglio Morto and the Naviglio di San Gerolamo, or the two branches of the Navigli Circle that departed from the Sforzesco Castle and caused serious hygiene problems due to stagnant water (both, as already mentioned, had no outlets, since the moat of the castle, their original destination, was buried in the seventeenth century). In 1857 it was the turn of the pond of

Santo Stefano, also buried for hygienic reasons due to stagnant water.

The Navigli Circle was completely buried between 1928 and 1930. (Pifferi, Tettamanzi e Magni.1987)

In the past the Naviglio della Martesana continued its urban path, now buried at the meeting with Via Melchiorre Gioia, towards the south-west passing Porta Nuova, passing first the Spanish walls, then the Gabelle bridge and finally meeting the Conca dell'Incoronata, after which it changed its name to Naviglio di San Marco. Shortly after, the latter gave rise to the small lake of San Marco, which entered the Circle of Navigli through the Conca di San Marco, while now it reaches the ramparts of Porta Nuova where it abruptly changes direction to the south-east changing its name to Cavo Redefossi. The Naviglio and the lake of San Marco, the Naviglio Vallone and the stretch of the Naviglio della Martesana from Porta Nuova to the Conca dell'Incoronata were completely buried at the same time as the similar closing works of the Cerchia dei Navigli, that is between 1929 and 1930; In this context, the last sections to be erased were the pond of San Marco and the Naviglio del Vallone, which by the end of 1929 had not been completely buried. (Pifferi, Tettamanzi e Magni.1987)

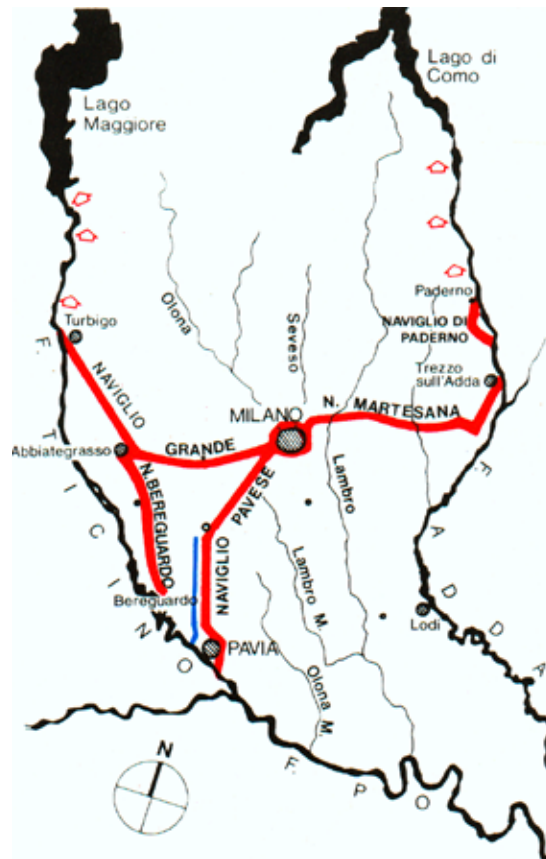


Figure 5. Map of Navigli in Milan and Pavia province at the end of XX century. In blue artificial channels built for irrigational purpose, in yellow the artificial channels built in this historical period. In red preexisting channels. Source: Regione Lombardia, a cura del settore coordinamento per il territorio.(1989). Il sistema dei navigli Milanesi e pavesi.

From 2008 to 2010, the Faculty of Architecture of the Politecnico di Milano conducted some studies on the possibility of restoring the Circle of Navigli and the connected canals. The project has set itself the objective of reopening the Circle of the Navigli and the connected canals, restoring the ancient connection between the Naviglio della Martesana, from Cassina de' Pomm, where this canal today sinks under Via Melchiorre Gioia, and the Naviglio Vallone, which would lead again into the Dock of Porta Ticinese.

2.2 Navigli and the Urban System of Milano

As mentioned above, the Navigli in Milano has gradually formed its current appearance with the changes of history. We cannot uniformly describe and analyze the functions of the entire Navigli. Therefore, based on the timeline, this part selects representative parts of the Navigli system for analysis.

2.2.1 The detail case of Navigli System - The Naviglio Grande



Figure 6. Naviglio Grande
Source: <https://www.riaprireinavigli.it/naviglio-grande-foto-storiche-g-26.html>

The Naviglio Grande was the first work of its kind to be built in Europe and historically, it is the most important of the Milanese canals, as well as one of the great engineering infrastructures that characterized the Lombard territory with roads, bridges and irrigation since the early Middle Ages, allowing the development of trade, transport and agriculture.

The supply of water from the naviglio effectively connected with the centuries-old reclamation and irrigation work of the monks of Chiaravalle, Morimondo and the other abbeys that had operated south of Milan. The simplification of transportation not only facilitated the small-scale trade that had previously taken place overland, but expanded its reach and enriched its catalog, spreading prosperity.

The city's need for timber, for example, allowed for deforestation and the creation of new areas for agriculture; the influx of raw materials encouraged the consolidation of previously sacrificed arts and crafts. This situation, fundamental to Milan's fortunes, lasted for centuries.

Summer irrigation lasted from the "Our Lady of March" (March 25) to the "Our Lady of September" (September 8), then began the iemal irrigation, with smaller water flows (one-fifth)].⁹ After its closure to commercial navigation, which occurred in 1979 (Navigli24. 2017. October 13), the Naviglio Grande was returned to its first function. Its one hundred and sixteen mouths (four on the left bank alone) still give water to vast expanses of grassland and crops in the Milanese and Pavese areas, although due to urbanization it is no longer the 580,000-plus metric perches, over 8,861,000 Milanese perches.¹⁰¹¹ The water from the naviglio feeds, from Abbiategrasso, the Ticinello canal and the Bereguardo naviglio and then the Darsena in Milan from which the Pavese naviglio originates and a second Ticinello cable that

⁹ During the winter period, the activity of the many mills located along the route took place.

¹⁰ One metric perch=15.2784 Milanese perches. The metric perch had been introduced by the Austrian government for cadastral reasons in 1815 and was worth a tenth of an acre.

¹¹ A detailed table of Milanese weights and measures, can be found at the history section of <http://www.bollatenet.net/>.

is its natural spillway, rejoining the Vettabbia.

Today it is still an open question whether the Naviglio Grande was conceived as an irrigation or navigable canal: the name navigium (= to navigate) and the winding initial route, artfully lengthened to soften its gradients, would suggest the latter hypothesis; the great reach to the outlet from the Ticino for the former. On the other hand, it is a foregone conclusion that, in the presence of a generous water intake, irrigation use automatically imposed itself regardless of original intentions. History, however, has not left us the slightest clue, even to hazard a guess, as to who the originator of such a work was.

• **Medieval Trade Route (12th-15th Century):**

The Naviglio Grande was constructed in the 12th century to connect Milan with Lake Maggiore and the Ticino River. During the medieval period, it served as a vital trade route, facilitating the transportation of goods between Milan and the surrounding areas. The canal enabled the movement of commodities such as grain, timber, marble, and other valuable resources, contributing to the economic growth and prosperity of Milan as a trading center.

What is certain, is the date of the construction of the defensive canal, 1152, and the architect, Guglielmo da Guintellino (Pifferi, Tettamanzi e Magni.1987), a Genoese military architect in the service of the Milanese, who between 1156 and 1158 also built the moat to defend the city and, with the spoil from the excavations, built fortified ramparts¹². Via Terraggio, parallel to the inner ditch, still exists in Milan today, which took its name from the embankment (terraggio, in fact) it had behind it and dates to that time. (Boselli. 1977)¹³

• **Renaissance Cultural Hub (15th-16th Century):**

During the Renaissance, the Naviglio Grande played a significant role in fostering cultural and artistic exchanges. The canal served as a channel for the transportation of

¹² The moat, with the entire city, was destroyed in 1162 by Barbarossa and rebuilt in 1167 by the Milanese and their allies in the Lombard League

¹³ Boselli, Pierino. (1977). *Toponimi Lombardi*. SugarCo.

artistic materials, including marble, pigments, and other supplies for Milan's renowned artists and architects. The Naviglio Grande also became a focal point for social gatherings, with lavish mansions and palaces lining its banks, where the city's elite would host cultural events and entertainments.

• **Industrialization and Waterpower (18th- early to mid 20th Century):**

With the advent of industrialization in the 18th and 19th centuries, the Naviglio Grande's function evolved. The canal's water flow was harnessed to power mills, factories, and workshops along its banks. The water wheels provided mechanical energy for various industries, including textile mills, paper mills, and ironworks. The availability of waterpower along the Naviglio Grande contributed to Milan's industrial growth during this period.

Several photographs of the Naviglio from the last decades of the 19th century and the early 20th century are devoted to fishermen, bathers, and outing boats, in a leisurely atmosphere of vaguely belle époque relaxation, as if the towpaths were doing a bit of a nod to the banks of the Seine. Falchetti¹⁴ like apaches, washerwomen instead of tailors, trani¹⁵ instead of bistros. For decades, Porta Cicca or Porta Cinesa¹⁶ remained the epitome of the popular and shabby Milan, with its colorful characters, loud-mouthed or heart-tightening ditties, illuminated chapels on every cantonment, artisans and artists in the alleys and courtyards.

After World War II, until after the mid-1950s, Darsena and Naviglio Grande were at the center of the Ambrosian Carnival. Since January, barges, roller coasters, bumper cars, merry-go-rounds and attractions of all kinds thronged between Porta Genova and Porta Ticinese: it was the packed and noisy "Fiera di Porta Genova," the arrival point of the traditional parades of floats that departed from the center,

¹⁴ falchetti, rambunctious belles (bauscia in Milanese)

¹⁵ the taverns, so called from the heavy red Trani wine that was mixed there, and tranat was the drunkard; they also served ready-made dishes, busecc, tripe, with beans or pork rinds, cassoeula, cabbage stew, or fried frogs

¹⁶ Milanese slang terms for Porta Ticinese

with el Meneghin and la Cecca, the Milanese masks, while infested and illuminated barges landed in the Darsena, laden with crowds and masks from the towns of Magentino and Abbiatense..

Mobility, understood in the modern sense of the term, was not a primary need of the subjects of the Duchy. Along the naviglio, small boats were the natural means of ferrying or moving on the short routes to fairs or markets or to serve the minute local trades, but in the seventeenth century the need for travel began to emerge, and from 1645 a regular service began, from Tornavento to the Darsena in Milan, picking up passengers from the various towns along the route.

It was a convenient, safe, and above all economical way to travel, despite the approximation of schedules. The boats that ran the service, which numbered two at the beginning of the eighteenth century, became twelve at the end of the century, and in 1796, by the Keeper of the Waters, an organic regulation was issued that reformed and standardized costs for passengers and luggage, the locations and characteristics of the landing places, convenient, in the center and low bank and armed. (Masetti. 1833)¹⁷

• **Decline, Neglect and the Last Splendour in Music (Mid to late 20th Century):**

In the 20th century, the role of the Naviglio Grande began to decline. The advent of railways and road transportation reduced the reliance on waterways for trade and transportation. Many industrial activities shifted away from the canals, leading to neglect and deterioration. The Naviglio Grande faced challenges such as pollution and neglect, resulting in a period of decline.

However, these are the last years of a great period of splendour that will not see a new dawn. The cost of transported goods has become very high, and then it seems now that everything has to be in a hurry, in a rush, even the haulage. The haulage on the way up is done with tractors, even a few larger and more capable barges are built, but it is

¹⁷ Masetti Agostino, a cura di. (1833). NOTIZIE STATISTICHE intorno ai fiumi, laghi e canali navigabili delle Provincie comprese nel governo di Milano. Regia Stamperia

of no use.

So on 31 March 1979, at 2 p.m., the last barge moored at the Darsena, it had a metal hull, was 38 metres long and five metres wide, bore serial number 6L-6043 and had left at 6 a.m. from Castelletto di Cuggiono. (Ogliari. 2009)¹⁸ She unloaded the last load of sand, 120 tonnes, the equivalent of over 20 lorries. From that day on, only water continued to flow on the Navigli, but only to irrigate the fields.

From the 1950s Milan became one of the European capitals of jazz and was an obligatory stop on the tours of all the great artists who performed in theatres¹⁹ (above all Nuovo, Lirico and Piccolo teatro). Brera was the district of the clubs where our highly esteemed bands played.

But in 1969 something extraordinary happened: Giorgio Vanni²⁰, a good drummer who had often played with the Americans, decided to open a jazz club on the Naviglio Grande, in an old farmhouse at the end of Via Lodovico il Moro, after Piazza Negrelli, where the number 19 tram ended its route. He called it the Capolinea and in no time at all it became a world reference for great jazz musicians, on a par with the Blue Note or the Caveau de la Huchette²¹.

• **Revitalization and Tourist Attraction (Late 20th Century - Nowadays):**

Starting in the late 20th century, efforts were made to revitalize the Naviglio Grande and its surrounding district. Restoration projects were undertaken to clean the canal and refurbish the canal banks, transforming the area into a popular tourist attraction. Today, the Naviglio Grande and the Navigli district are known for their vibrant ambiance, picturesque scenery, and lively nightlife. The canals are lined with charming cafes, bars, restaurants, art galleries, and boutiques, attracting visitors who come to enjoy the cultural

¹⁸ Ogliari, Francesco. (2009). Milano e i suoi Navigli, Selecta. Pavia.

¹⁹ Theatres and Music in Milan. The reference can be available on: <http://www.aboutMilan.com/it/teatri-e-musica-a-Milano.html>.

²⁰ Jazz mourns Vanni, soul of the Capolinea. The reference can be available on: <https://archivio.corriere.it/Archivio/interface/landing.html>.

²¹ Caveau de la Huchette. The reference can be available on: <http://www.caveaudelahuchette.fr/>.

and recreational offerings.

The Naviglio Grande has transitioned from a vital trade route and cultural hub to an industrial waterway and, ultimately, a vibrant tourist destination. Its historical significance, combined with the ongoing revitalization efforts, continues to make it an integral part of Milan's cultural fabric.

Only in recent years has a regional program for the enhancement of the Navigli Lombardi allowed the recovery (partly financed by the Lombardy Region itself) of numerous historical buildings in the municipalities crossed by the Naviglio Grande, as well as of the landings and banks of the same. The region, in 1993 after the appropriate consultations, had issued a document, the Navigli Master Plan (NavigliLive. 2009)²², within which it had chosen to maintain its interventions. Navigli s.c.a r.l.²³, a consortium that brings together the region, the municipalities of Milan and Pavia, the relative provinces and chambers of commerce, the Villoresi consortium²⁴ and forty-eight of the fifty-one coastal municipalities, took shape around what has now become "the Bible" for the recovery of ships.

This was a significant step forward in addressing the problems posed by the multiple territorial and administrative competences, often more fragmented than fragmented. Since 2003 the Naviglio Grande navigation service is active, whose routes are articulated on boats of a mainly tourist nature that are not integrated into the tariff system of local public transport. In 2010, s.c.ar.l. also seems to have started to recognise de jure the role of single coordinator of interventions.

In the meantime, he works assiduously on practical projects, such as the organization of tourist navigation, promotion, teaching and contacts with the various entities and local

²² NavigliLive. (2009. March 31). MASTER PLAN NAVIGLI - Le Competenze. naviglilive.it. The document can be available on: <https://web.archive.org/web/20090331141030/http://www.naviglilive.it/documento%20Master%20plan%20Navigli.html>.

²³ Navigli s.c.a r.l. The reference can be available on: https://www.halleyweb.com/c015016/include/mostra_foto_allegato.php?servizio_egov=sa&idtesto=219&node=6.

²⁴ Est Ticino Villoresi. The reference can be available on: <https://www.etvilloresi.it/>.

associations interested in the development of ships. On the banks of Naviglio Grande and Pavese, pedestrianised, every evening the Milanese nightlife turns on: restaurants (perhaps on an old boat moored and transformed), bars, pubs and taverns, nightclubs attract thousands of people. The district has two sides, the night and the day and is still full of artists' studios, craft shops, picturesque corners and chapels illuminated on the cantons. Every summer there are many opportunities for meetings, exhibitions, folk festivals for a more familiar audience.²⁵ From the towpath you can also embark (Navigli Lombardi S.C.A.R.L. 2010)²⁶ to enjoy the Naviglio from the water. Navigating, you may come across one of the many events that the coastal resorts regularly organize, because the awakening of the Naviglio Grande is not limited only to Milan.²⁷

26 April 2015, on the Great Naviglio, is inaugurated the new Dock that is returned navigable after 18 months of intense activities cost 20 million euros. The inauguration took place in the presence of the mayor Giuliano Pisapia, together with the CEO of Expo, Giuseppe Sala. (Vanni. 2015. April 26)²⁸ The renovation works involved the reconstruction of the embankments on Viale D'Annunzio and the construction of bollards to dock the boats. In addition, two cycle and pedestrian walks along the water have been realized, one between Via D'Annunzio and Viale Gorizia (35 meters long and with an elevator to take the disabled from the street floor to the elevated floor) and a shorter bridge over the Conca di Viarenna, already within the perimeter of Piazza XXIV Maggio,

²⁵ The reference can be available on: <https://www.vivereinavigli.it/>.

²⁶ Navigli Lombardi S.C.A.R.L. (2010. February 18). Sito Navigli lombardi. Internet Archive. Archiviato.The document can be available on:https://web.archive.org/web/20100218143406/http://www.naviglilombardi.it/pubblicazioni/focus/focus_dettaglio.asp?ID_M=106&ID=87.

²⁷ Consorzio dei Comuni dei Navigli - Turismo - Terre vicine. The reference can be available on: <https://www.consorzionavigli.it/?NDA3NDA0OA==>

²⁸ Vanni, Franco. (2015. April 26). Milano, Pisapia inaugura la Darsena restaurata: "Oggi è un giorno da ricordare"repubblica.it.

The document can be available on: https://Milano.repubblica.it/cronaca/2015/04/26/news/Milano_pisapia_inaugura_la_darsena_restaurata_e_festa_per_tutta_la_giornata-112877631/.

then, after eighty years, the Ticinello has returned to the open air.

2.2.2 The detail case of Darsena di Porta Ticinese



Figure 7. Darsena di Porta Ticinese
Source: https://it.wikipedia.org/wiki/Darsena_%28Milano%29

The Darsena di Porta Ticinese, also known as the Porta Ticinese Dock, is an artificial basin located in Milan, Italy. It has played various roles throughout different periods in the city's history. Here's an overview of its significance at different times:

The Darsena was desired and built in 1603, as a transformation of the small lake of Sant'Eustorgio (Erreerr earchitetto. 2017)²⁹ into a proper harbour, by the Spanish governor Pedro Enríquez de Acevedo, Count of Fuentes. It was built against the Spanish walls of Milan, built from 1548 to 1562 to replace the medieval walls of Milan, which had

²⁹ Erreerr earchitetto. (2017. December 20). La Darsena di Milano: com'era la vita intorno ai Navigli. Milanoalquadrato.com.

The document can be available on: <https://www.Milanoalquadrato.com/2015/03/27/la-darsena-di-Milano-comera-la-vita-intorno-ainavigli-2/>

become obsolete due to the invention of gunpowder, and then demolished in the early 20th century. The Darsena followed the perimeter of its south-western vertex, hence the characteristic elongated and curved shape of the water basin³⁰. The foundations of the Spanish walls were discovered in 2015 during renovation work on the Darsena, and incorporated into the new embankments (Navigli24.it. 2017)

• **Transport Port (17th-19th Century):**

The Darsena di Porta Ticinese dates served as a port for trade and transportation along the Naviglio Grande canal. It was an important hub for goods coming in and out of Milan, facilitating commerce with other regions. The Darsena played a crucial role in the city's economic development during the medieval era.

With the transformation of the small lake of Sant'Eustorgio into the Darsena, then into a proper port, the importance of the surrounding area grew consistently, becoming one of the landmarks of the Milanese. Many at the Darsena found employment in the port environment that had been created, in the businesses that gradually sprang up in the area, and in the fishing business, which was flourishing thanks to the constant supply of fish from the Milanese Navigli. (Erreerresearchitetto.2017)

For centuries chronicles, paintings, engravings, and later photography have recounted the comings and goings of barges in the Darsena, aided by the gradual increase in river traffic from the 18th and 19th centuries that made the Porta Ticinese Darsena increasingly important, both for Milan and for the ports that traded with it. (Erreerresearchitetto. 2017) For the earliest times, however, we do not have precise statistics on vessel movements and the quality and quantity of goods entering and leaving the Darsena.

• **Industrial Hub, Decline and Neglect (20th Century):**

During the industrialization period in the 19th and 20th centuries, the Darsena di Porta Ticinese played a significant role in Milan's industrial growth. It was a bustling area with

³⁰ The document can be available on: <http://www.Milanoneltempo.it/darsena.html>

warehouses, factories, and manufacturing facilities. The Darsena served as a transportation hub for raw materials and finished products, supporting industries such as textiles, metallurgy, and mechanics.

As the decades passed, river traffic in Milan's Navigli steadily decreased (Navigli24.it. 2017). The main cause was the progressive construction of the Italian road network, from which resulted the convenience, both economic and related to the delivery time of goods, of road and rail transport over river transport.

In the mid-20th century, as the importance of waterways for transportation diminished, the role of the Darsena declined. The canals faced neglect and pollution, leading to a period of deterioration. The Darsena di Porta Ticinese gradually lost its industrial significance and became a neglected area.

• **Archaeological Excavations and Reopening (21st Century - Nowadays):**

In September 2004, the municipality of Milan granted the Darsena area (the entire portion west of the Naviglio Grande) to a company that was to build an underground parking garage near it. At the beginning of the excavations, finds emerged that required the intervention of the superintendence and the halting of the work: these were the foundations of the Spanish walls of Milan and a wooden platform that was attributed to the flooring of the original Conca di Viarenna, the one built in 1438, later demolished during the construction of the Spanish walls and finally rebuilt between 1551 and 1558.

In May 2011, with construction sites closed, the northwestern part with the old outlet of the Olona and the harbor management area was laid out, then an embankment was raised to isolate this basin from the rest of the Darsena by cutting it off from bank to bank; a pipe poured the water from the eventual overflow. The embankment was traversed by a footpath that continued along the southern bank to the entrance to the Naviglio Grande. Blind otherwise, it was connected with the street level by an old service staircase.

On April 26, 2015, the Dock was reopened to the public after major renovation works that lasted eighteen months. The work involved the water basin and its banks, with the restoration of docking and mooring facilities. This renovation was carried out in preparation for Expo 2015, which was held in Milan from May 1 to October 31, 2015. At the same time, changes were made to the road system around the Dock: the road running along its southern bank was restricted to streetcars and pedestrians. (Il Post. 2015)³¹ The nearby Piazza XXIV Maggio was also involved in this street furniture makeover project, as pedestrian space was extended towards the new covered municipal market: the latter, in particular, is located near the place where the aforementioned slaughter beast and horse market used to be. (Codazz. 2010)³²

Starting in 2010s, efforts were made to revitalize the Darsena di Porta Ticinese and its surrounding district. A comprehensive renovation project took place, aiming to restore the historical significance and cultural value of the area. The basin was cleaned and refurbished, and the surrounding spaces were redesigned to create a vibrant public space.

Today, the Darsena di Porta Ticinese has been transformed into a popular recreational and cultural hub. It has become a symbol of Milan's urban revitalization. The area surrounding the Darsena is known for its trendy bars, restaurants, and shops, attracting locals and tourists alike. It is also a venue for cultural events and festivals, contributing to the vibrant social and cultural life of the city.

The modern Darsena has the Naviglio Grande as its tributary, the Naviglio Pavese as its emissary, and the Cavo Ticinello as its spillway. The latter runs its bed under the road surface of Piazza XXIV Maggio and then flows further east into the Vettabbia.

The Darsena di Porta Ticinese has transitioned from a

³¹ Il Post. (2015. April 26). Le foto della “nuova” darsena di Milano. ilpost.it. The document can be available on: <https://www.ilpost.it/2015/04/26/foto-darsena-Milano/>.

³² Codazz, Sergio. (2010. May 7). La Darsena. vecchiaMilano.wordpress.com. The document can be available on: <https://vecchiaMilano.wordpress.com/2010/05/07/la-darsena/>.

medieval port to an industrial hub and now serves as a vibrant urban space and gathering point in Milan. Its revitalization has breathed new life into the area, making it a significant landmark and attraction in the city.

2.3 The exploration of promoting the sustainable development of Navigli

Unofficial elections were held in 2011 and the Navigli Revitalization Project won almost 95% of the votes. The project revitalized the nearly 8-kilometer water system that connects the north and south of the city and borders Milan's Central Business District (CBD) to the east.

The reopening of Milan's canals is the restoration of the old route of the late 19th century and the creation of a system of canals and circular ways that pass through the center and produce a new city of the same quality from one side to the other.

Milan is an international city that is undergoing major changes not only economically and structurally, but also environmentally and aesthetically. For this reason, Navigli had to change. The opening of the canal will make Milan more attractive to the world, and revive and strengthen tourism, entertainment, and the cultural economy.

The government's project to open the canal includes a detailed and comprehensive construction plan that covers all aspects of the achievement of Navigli and the improvement of the area. Over the years, many studies, plans, projects, and studies have been carried out that show that the opening of Navigli is not only important for the citizens but also of strategic importance for the municipality.

The General Directorate of Public Works previously included the development of Navigli among its regional priorities. Research and studies have been underway since the 1980s, and some planning began at the beginning of the new century. (e.g. participation in the EU programme TERRA and the V.E.V. project).

The project 'Riscopriamo i Navigli' has been a great success thanks to the distribution of funds for the restoration of historical sites, art and construction and commercial activities to promote certain parts of the Naviglio Grande for tourism.

Through a collaboration between the region and the Politecnico di Milano (regional secretariat, Bocconi University, State University of Milan, and Pavia involved),

a master plan was drawn up for Navigli Lombardi, later to decide which interventions are the most effective. Navigli urgently needs to fix the system.³³

The Region has also committed itself to the protection of the most significant and at-risk areas through the imposition of environmental restrictions (e.g. landscape protection of the Naviglio Martesana in 2006)

The PTRAs Navigli Lombardi, project that comprises 51 municipalities, represented a further development of the Municipality's and the Region's interest in the issue. It was approved by the Region with D.C.R. no. 72 in 2010 and its implementation was monitored in 2014, in view of EXPO.

The overall objective, as stated on the municipality's website, is to 'enhance and preserve the Navigli as an element of Lombardy's historical, territorial and cultural identity.

This plan offers a unified view of the Navigli system that respects the uniqueness of each individual. At the heart of PTRAs is the relationship between Navigli and the surrounding area for sustainable development.

The strategies defined in the plan are as follows:

- a. Strengthening the use of historical/structural and natural/environmental heritage.
- b. Protect the complex from degradation, poor protection, and appropriate use of the surrounding areas.
- c. Coordinate interventions and planning tools to create opportunities for sustainable development and improve the quality of life.

The opening of Navigli will help fight climate change, reduce flood risks, and increase the quality of life of citizens and the beauty of the city.

The first phase of the project will see two hydraulic systems, east and west, reconnected to the south of Milan, allowing new water to flow into the currently defunct Vettabbia system. Dock access reduces backwaters that cause summer algal blooms.

³³ The document can be available on: Navigli-lombardi-regional-territorial-area-plan: http://www.orobievive.net/30_letture/lettture_regione/navigli-lombardi-regional-territorial-area-plan.pdf.

From a traffic point of view, the opening will involve the rearrangement of parking areas in some of the affected areas (for example via F. Sforza, via Molino delle Armi), but other areas may also be repaired. around, thanks to the joint implementation of other urban innovations and sustainable mobility methods, such as Melchiorre Gioia. Water resources can be used in power projects, heat pump sources, microturbine installations, etc.

However, the opening of the five sections of Navigli is the first intervention that is part of a major urban transformation project. The project begins with the understanding of new environments, landscapes, and quality of life to achieve improvements in urban architecture and the environment.

In 2019, the city of Milan created a long-term program to promote development based on environmental and social sustainability, innovation, and digitization.³⁴

This project includes:

1. Plant 3 million trees by 2030
2. Add up economic gaps between the various communities of the city.
3. Investment in critical/strategic infrastructure and telecommunications services

The pandemic accelerated this change and gave Milan an opportunity to rethink its future.

³⁴ The document can be available on: Milano-for-Cleantech_Brochure: https://www.yesMilano.it/system/files/allegati/paragrafi/28366/Milano-for-Cleantech_Brochure.pdf.

2.4 Collective benefits of an urban transformation of Navigli (Boscacci et al., 2017)³⁵

The Navigli, are signs of prestige for the inhabitants of Milan; they are the city's oldest and most important canals, as well as some of Europe's oldest, navigable canals. They were built in 1177 and have long served the city by allowing to move products between Milan and the rest of Italy and Switzerland. Built in a period when water transport was an essential mode of urban transportation, the Navigli have been expanded through time and their connection role has grown since the project's inception. Due to the decline in freight traffic in the 19th and 20th centuries, Navigli were covered in 1929 to make room for the expansion of the public steam and electric rail systems. Only the Naviglio Grande, Naviglio Grande and Naviglio Pavese, located in the southern part of the city remain open (Mariotti, Riganti. 2021. P 2).³⁶

Today, Navigli are one of the remaining authentic linkages between Milanese and the water. The phrase Navigli has primarily to do with Milan's nightlife and the cafés, bars, and weekend antique fairs that line the river, where one may also rest or take a walk. Although it is not as profitable as it once was, and most of the river parts have been closed, the Navigli Canal area is still a popular gathering place for young people. Most of the remains of Milan's canal network can be found in the Navigli and Martesana canals in the north of the city. As vehicles and trains overtook ships as the quickest mode of transportation in the mid-twentieth century, most of the remainder moved underground. The canal is mostly still there, covered by modern roads and houses.

³⁵ Boscacci Flavio, Camagni Roberto, Caragliu Andrea, Maltese Ila, Mariotti Ilaria. 2017. Collective benefits of an urban transformation: Restoring the Navigli in Milan. Cities

³⁶ Mariotti Ilaria, Patrizia Riganti. 2021. Valuing urban regeneration projects: The case of the Navigli, Milan. City, Culture and Society

2.4.1 The Navigli regeneration project

According to the official planning documents of the Municipality of Milan clearly proposed the gradual reopening of the Navigli in 2012 (Boscacci et al. 2017; Boatti and Prusicki, 2018³⁷). The proposal promotes the activation of 8 km of waterways and connects the northern and southern parts of the city bordering the Milan CBD to the east. At the same time the Mayor of Milan conducted a public survey based on the canal project, the whole layout of which involves only 5 sections, 2 out of approximately 8 km. The first section (section A), from Martesana Naviglio (vertical street in the main axis from Cassina de Pomm to Via Carissimi, Via Melchiorre Gioia) will be developed first, as it involves hydraulic works (Figure 6).

To summarize, the Navigli canal system is significant to Milan on economic, cultural, and historical levels, and its restoration will help revitalize the city, increasing its livability as well as vitality.

A new survey was conducted in 2018 to determine residents' wishes over time, Phase 1 was conducted in the spring of 2018 and Phase 2 in the spring of 2019, and the results showed that support for the project decreased after local events.

After the regional conflict, the percentage of support decreased, reaching only 65% in 2019 and 84% in 2018.

The public consultation about Section A was organised in June 2018 and saw the participation of more than 400 citizens, organised into 12 round tables. The public meetings presented into details of the project and its costs to the citizens. The participants recognised the strengths of the project (urban quality improvement, increase of bike and walking paths, attractiveness towards new commercial and leisure activities, etc.), but also highlighted the following weaknesses: (i) limitations of the private and public practicability of the neighbourhood (parking lots reduction; traffic congestion due to the speed limit and pavement

³⁷ Boatti, A., & Prusicki, M. (2018). I nuovi Navigli Milanesi. Storia per il futuro. Maggioli Editore, Collana: Politecnica.

restriction, etc.); (ii) the rift in the neighbourhood, generated by the canal in the middle of the road Via Melchiorre Gioia, and the small number of bridges linking the two banks. (Mariotti, Riganti. 2021. P 2)

The objective of the urban transformation of this assessment is to restore part of Milan's ancient water system by connecting the Naviglio Martesana (from Cassina de'Pomm, in the north of the city) and the Darsena in the south, through the city (Figure 6).

The layout of the old Navigli, currently used almost exclusively on the main roads of the city, will be replaced by three parallel structures: an open canal, a slow cycle and pedestrian paths and a fast track for local public transport. The restored layout blueprint will cover a length of 8 km, and will cost about 351 million euros, according to independent estimates (Boscacci et al. 2017).

The new infrastructure is expected to improve the urban landscape within a 500 m radius distance from the canal bed. This urban transformation would provide several social and economic benefits, including:

- (1) Recreation possibilities (on and off-water activities);
- (2) Green infrastructure (creating natural forms that provide environmental benefits);
- (2) Ecosystem services (flood management);
- (4) Enhanced transport (freight movement of agriculture products and passengers);
- (5) place shaping (strengthening local identity);
- (6) increased tourist flows.

(Boscacci et al. 2017. P 13)

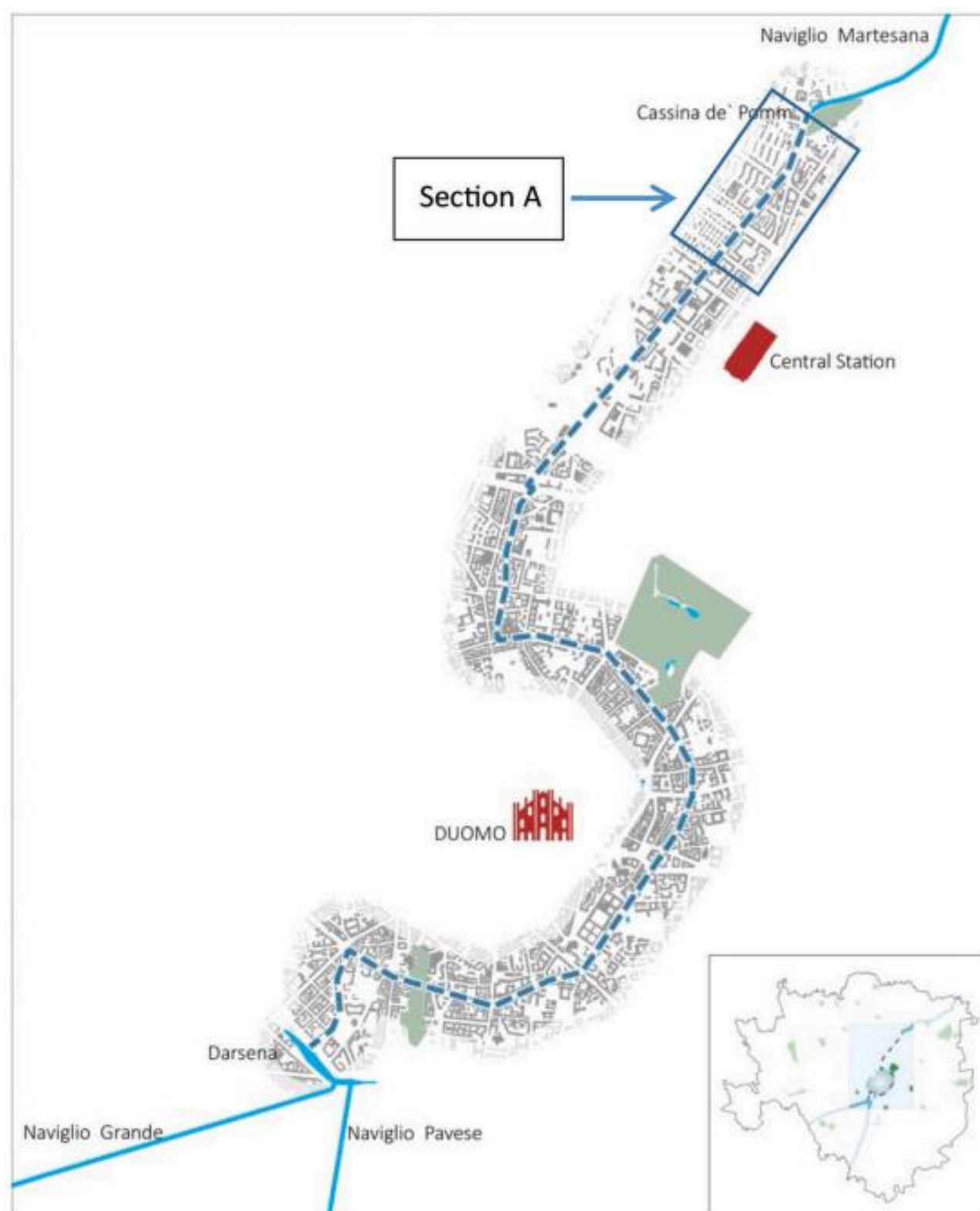


Figure 8. Project layout. Source: Mariotti, Riganti. 2021. P 3

2.4.2 Assessment methodologies

The study utilized two assessment methodologies: the hedonic price methodology (HPM) and the input-output model (I-O).

The HPM was used to estimate the value of intangible benefits, such as improved quality of life, by analyzing the market value of residential and commercial properties with a view of the Navigli. This approach allows for the quantification of the economic value associated with the urban transformation.

The improved quality of life for city dwellers and users due to a large urban transformation is by nature intangible and is typically appraised through the HPM. Because there is no real market for these benefits, a surrogate market is taken into consideration, analyzing the real estate market value of goods related to intangible benefits. (Boscacci et al. 2017)

On the other hand, the I-O model was employed to analyze the interdependence among economic sectors and the multiplier effects of infrastructure investment. This model helps to understand the economic impacts of the project and its potential to stimulate economic activity in various sectors. These two assessment methodologies were used together to provide a comprehensive evaluation of the economic benefits of the Navigli project in Milan.

2.4.3 Costs and benefits of the re-opening of the Navigli

According to the study, the present values of costs and benefits of the re-opening of the Navigli project in Milan are as follows:

Construction costs: The expected construction costs for the project are estimated to be 351 million euros.

Collective benefits: The study estimates that the collective benefits, as revealed by housing and commercial price increases linked to improved urban quality, amount to approximately 825 million euros.

Increased income: The project is also expected to generate increased income, with an estimated value of 168 million

euros.
These figures represent the present values of the costs and benefits, taking into account a discount rate of 3%.
(Boscacci et al. 2017)
Overall, the study suggests that the collective benefits of the Navigli project outweigh the construction costs, indicating that the project is profitable from a social perspective.

Present value of total costs	351.4 mil. €
Present value of collective benefits	757.1 mil. €
of which:	
Present value of the collective benefits due to public investment-driven income effects (40.8% of total costs)	143.3 mil. €
Present value of the collective benefits due to improved urban quality for the residential land market (160.7% of total costs)	564.7 mil. €
Present value of the collective benefits due to improved urban quality for the commercial land market (14% of total costs)	49.1 mil. €

Table 1. Present values of costs and benefits of the re-opening of the Navigli.
Source: Boscacci, Camagni, Caragliu, Maltese, & Mariotti, 2015

2.4.4 The potential challenges

The potential challenges in financing the Navigli project in Milan are mentioned in the paper. The study states that while the project is profitable from a social perspective, its financial profit is not guaranteed. The public sector would need to identify the necessary financial resources to subsidize the project.
The prospective results show that the benefits of the urban transformation are almost twice the construction costs, which confirms that the project is a positive result from a social point of view. In other words, the social benefit is greater than the social cost.
However, the project does not have to be financially viable. The public sector must identify the financial resources needed to support the project, through a single tax on a portion of the increase in property value. (Boscacci et

al.2017)
The implications for the public sector are that they would need to allocate the required financial resources to support the project. This could potentially be achieved through one-shot taxes on parts of the increases in property values.
The public sector would need to carefully consider the financial implications and determine the most appropriate funding mechanisms to ensure the successful implementation of the project.
Overall, the financing of the Navigli project poses a challenge for the public sector, and careful planning and resource allocation are necessary to secure the necessary funds for the project's realization.

2.5 Cerchia dei Navigli and The Virtual Historical Reconstruction (Banfi F et al., 2021)³⁸

This research paper focuses on the virtual historical reconstruction of the Cerchia dei Navigli in Milan using 3D survey, Historic Building Information Modelling (HBIM), and virtual visual storytelling. The authors emphasize the importance of preserving and disseminating historical and cultural values through digital reconstructions and interactive experiences. They propose the use of serious games and immersive environments to enhance education, training, and information sharing in heritage preservation. The article discusses the digitization process, including laser scanning and historical sources, to create interactive virtual reconstructions of historical sites in Milan. It also highlights the significance of the Cerchia dei Navigli in Milan's history. The authors describe the use of 3D surveying and extended reality technology to enhance the study and preservation

38 Banfi F, Bolognesi C.M, Bonini J.A, Mandelli A. 2021. The Virtual Historical Reconstruction Of The Cerchia Dei Navigli Of Milan: From Historical Archives, 3d Survey And Hbim To The Virtual Visual Storytelling. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences

of cultural heritage buildings. They explain the process of collecting primary and secondary data sources, creating 3D models, and mapping them with historical images.

The paper also discusses the method for historical reconstruction of the canals and water basins of the Cerchia dei Navigli, supported by historical archives, photos, 3D surveys, and HBIM.

The authors utilized different modeling techniques and XR development platforms to create interactive virtual experiences, incorporating advanced post-production techniques and VR headsets for a more immersive experience. Future developments will focus on enhancing interactivity and information sharing, with acknowledgments to the Municipality of Milan and the students involved in the content implementation process.(Figure 7.)

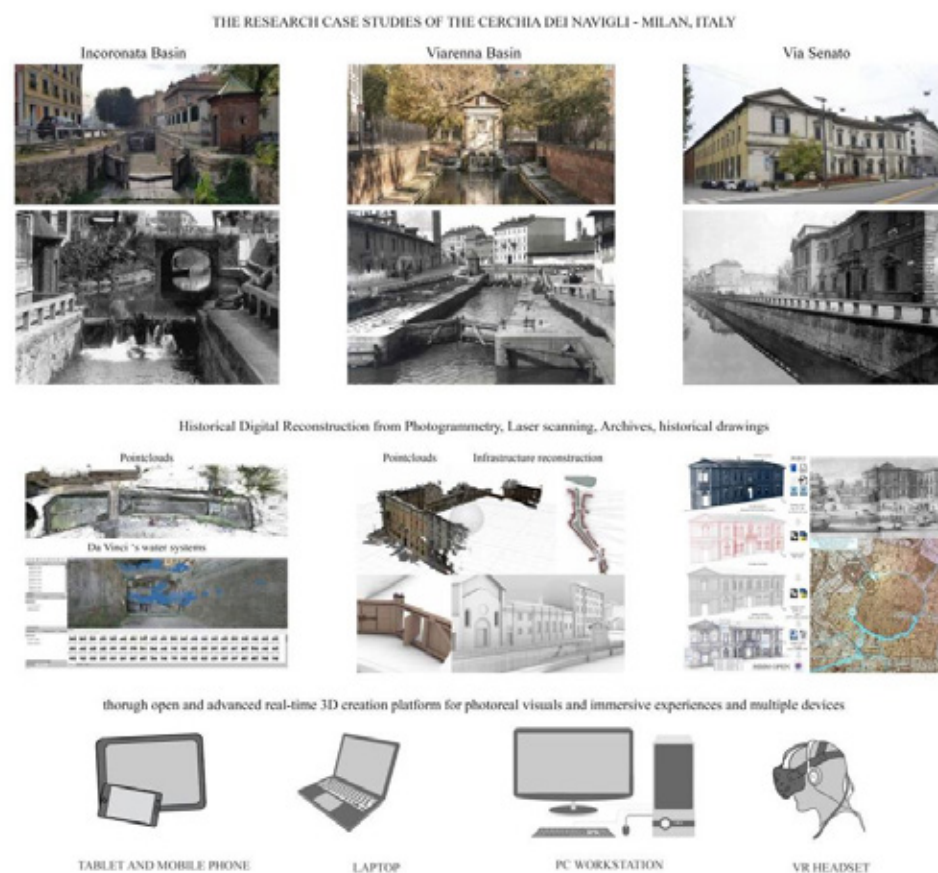


Figure 9. The research case studies in relation to the proposed digitization process and multiple devices and XR environment.

Source: Banfi F et al., 2021

2.5.1 Technologies used in the virtual reconstruction

In the virtual reconstruction of the Cerchia dei Navigli in Milan, several technologies were utilized. These include 3D surveying, Historic Building Information Modelling (HBIM), laser scanning, digital photogrammetry, and extended reality (XR) technology.

In the past five years, many restoration and reconstruction projects have used new technologies, such as 3D surveying and Building Information Modeling (BIM), to achieve the transition from the first digital age to the second digital age. The integration of 3D topography and BIM allows the identification of scientific methods that enable the digitization of topographical objects and extend their informative value throughout the life cycle of the building. In this context, BIM for traditional buildings (HBIM) structures, archaeological sites, and monuments improves the quality of the work of the relevant experts and provides information on the properties (physical and mechanical) of the property, wall panels, and front panels.

As a result, the transition from the first digital age characterized by vector CAD designs to a digital age influenced by intuitive digital models and new skills and knowledge in subjects beyond recovery.

Geometry, architectural presentation. In addition, architectural presentations focus on information technology (IT) development and high level of detail (LOD), level of information (LOI), and accuracy. The main tools driving this change are modeling applications, BIM platforms, and techniques to turn simple points into 3D studies.

Parametric object (Scan to BIM process). One of the main differences between 2D CAD vector renderings and digital models is the transfer of a model that can support the life cycle of the building in various configurations, plus many different details. In fact, one of the main advantages of HBIM is that it allows experts to track weather elements through a variety of 3D settings, from ground-truth models to more advanced models such as design and layout projects.(Banfi F

et al., 2021)

3D modeling, 3D topography, and digital photography have proven to be a good basis for the creation and simulation of virtual or historical environments. In this context, serious games, ie games that use the playful aspects of games to promote the purpose of knowledge and guidance, are 'critical games' aimed at learning while having fun.

Several serious games use technologies such as VR and AR to recreate situations that players can learn through experimentation (Hammady et al., 2021³⁹; Huhtamo, 2013⁴⁰; Helander, 2014⁴¹; Sylaiou et al., 2010⁴²).

In this case, unlike traditional video games, learning is done through virtual simulation where the paradigm of interaction is fundamental to meet the requirements:

- learning by doing active, experiential learning achieves qualitatively better results than passive learning;
- convey contents that, through classical training, would be much more difficult (and tedious) to learn;
- active involvement of the user who therefore becomes the protagonist of the training experience;
- the possibility of recreating a protected environment in which the user has the opportunity to discover and get involved without being afraid of making mistakes but can actually learn from their mistakes;
- development flexibility aimed at different types of users and devices;
- Freedom of implementation - the use of open XR platforms allows you to create scenes which in turn can be implemented both from a geometric point of view and from a content point of view. (Banfi F et al., 2021)

39 Hammady, R., Ma, M., Ziad, A. K., & Strathearn, C., 2021. A framework for constructing and evaluating the role of MR as a holographic virtual guide in museums. *Virtual Reality*, 1-24.

40 Huhtamo, E., 2013. On the origins of the virtual museum (pp. 134-148). Routledge

41 Helander, M. G. (Ed.), 2014. Handbook of human-computer interaction. Elsevier.

42 Sylaiou, S., Mania, K., Karoulis, A., & White, M., 2010. Exploring the relationship between presence and enjoyment in a virtual museum. *International journal of human-computer studies*.

2.5.2 Data collection

The authors collected data for the digital reconstruction of historical buildings through a combination of 3D surveying and the analysis of historical archives. They utilized 3D survey techniques such as laser scanning, photogrammetry, and topographical campaigns to gather geometrical information about the objects. Additionally, they extensively researched and consulted historical archives, monographs, and bibliographies to gather textual and image information about the buildings.

Research methods used in research case study: From primary and secondary data sources to digital models. 3D research of a work of art, building, or environment is certainly a good and useful way to learn about its shape, color, location, and relationship to the object. a powerful tool. It is not enough to get all the information about other properties or buildings. The survey gives us the geometrical information about a subject, but to have a complete overview of its history we need to search and study monographies and bibliographies consulting the historical archives. This research followed this principle by collecting as much as possible textual and image information about the three case of study here presented. Especially the historical photos, paintings and drawings helped the authors figure out the original design and the outline of the Cerchia dei Navigli in the past. This was not trivial research, in fact the layout of the city changed significantly over the years, and it wasn't easy to reconstruct the texts and the images found to a single historical period. The city of Milan passed through the bombings of the two world wars and through essential changes to the urban planning that led to the closing of most parts of the Cerchia dei Navigli. For these reasons, it was hard to identify landmarks in the images that help to reconstruct the places as they were in the past digitally.

The collection of the geometrical information considered using the latest technologies and methods in the survey field. Each case study planned a topographical campaign,

a photogrammetric acquisition, and some terrestrial laser scanner stations. The data elaboration took advantage of the multiple data sources to get the best from each instrument:

- the dense point clouds coming from the laser campaign were collected, registered and then imported in a NURBS 3D modelling software to reconstruct the primitive geometries of the buildings and environments;
- the photogrammetric approach both allowed to get high-resolution 3D textured models and orthophotos, which useful to map the NURBS models;
- the topographic measurements were useful for checking the elaborations' correctness and merging the models from laser and photogrammetry into a common reference system. (Banfi F et al., 2021)

2.5.3 The detail operation of data elaboration, model generation and Information mapping

Below is a brief description of the data analysis, file formats, and software used to model one of the case studies, the Senate building (Figure 7).

The laser acquisitions were performed using the Leica BLK 360, a lightweight and portable laser scanner with a resolution of 5 mm @ 10 m of distance and a precision of 4 mm @ 10 m. At the same time, some architectural points were measured with the total station Leica TS12. The images for the photogrammetric elaborations were acquired with a Nikon D90 coupled with an 18 mm lens. The laser data were elaborated with Leica Register 360. The georeferencing was possible thanks to the topographic measurements.

The scans were exported in .e57 format to be used in Mc Neel Rhinoceros 7 as a support for the NURBS modelling phase. On the other hand, the images were treated in Agisoft Metashape; here, it was possible to generate a high-resolution 3D model with the same reference system of the laser acquisition and the orthophotos exported in .jpg format, was used to map the 3D NURBS model in Rhinoceros 7. (Banfi F et al., 2021)

The model generations stage involved applying scan-to-BIM requirements such as generation grades 9 and 10, oriented to advanced 3D mapping techniques (Banfi, 2020)⁴³.

The second key step to achieving a material connotation of each digitised element is an automatic synchronisation mode between modelling software and XR development applications. This synchronised mapping technique has allowed obtaining several benefits during the model creation process between MC Neel Rhinoceros, Autodesk Revit and Twinmotion / Unreal Engine:

- use of a large number of orthophotos coming from photogrammetry;
- mapping the models with images corresponding to the detected elements without using default textures;

⁴³ Banfi, F. 2020. HBIM, 3D drawing and virtual reality for archaeological sites and ancient ruins. Virtual Archaeology Review,

- views and edits the scene in real-time in both software applications (Modelling application and XR development platform);
- reduces time-cost of XR development environments;
- prepares 3D objects for visual scripting, moving from simple static models to Interactive Virtual Objects (IVOs);
- provides support for all of the most popular VR headsets to take you from BIM to VR in seconds.(Banfi F et al., 2021)

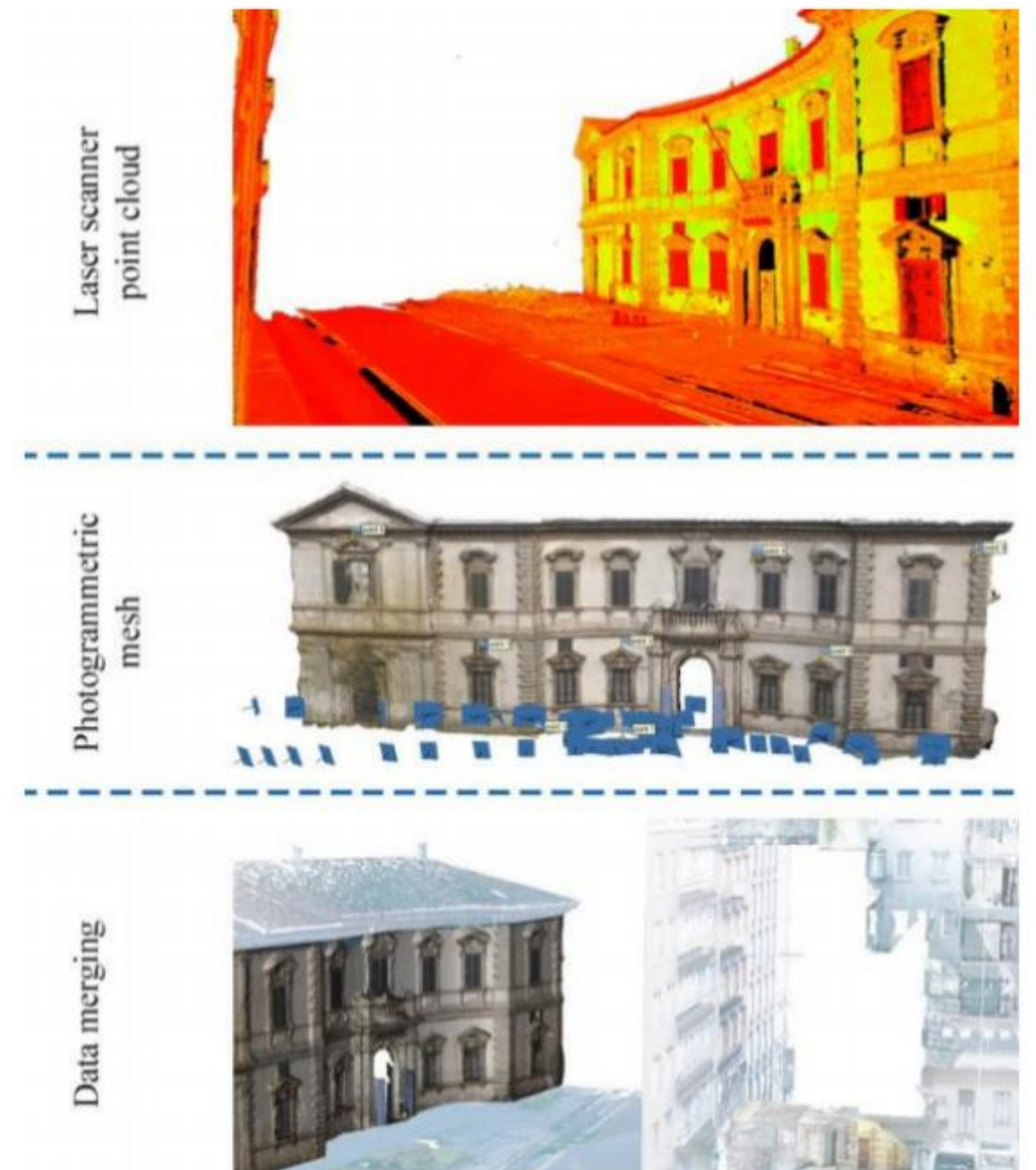


Figure 10. The primary data sources used for the model generation of the Senate Building.
Source: (Banfi F et al., 2021)



03

An analysis of the land use situation along the Navigli canal

3.1 The scope and methodology

3.2 The current situation of the Navigli Canal in the Milan metropolitan area and the surrounding land use along its route

3.3 Reflections - A redesign of the area around Cassina de Pomm with focus on place identity(Rolff, 2022)

3.1 The scope and methodology

Based on the conditions and information provided by the Navigli canal reopening project in Milan and The Milan Navigli Canal Challenge, this paper will be centred on the eight areas mentioned above: Cassina de Pomm, Via Melchiorre Gioia, Conca dell' Inconata, San Marco, Via Senato-Via Marina, Università degli Studi, Parco delle Basiliche, Parco Archeologico. Conca dell' Inconata, San Marco, Via Senato-Via Marina, Università degli Studi, Parco delle Basiliche, Parco Archeologico.

The motivation of this chapter is to provide background information about the Navigli Canal, in order to collect data on the current situation along the Navigli Canal and its surrounding areas, to analyze land use, infrastructure at eight selected nodes, summarize their advantages and disadvantages and the current status of their redevelopment potential, and finally draw some feasibility recommendations for each site regarding the reopening of the Navigli Canal.

The 'hidden potential' of local areas and neighbourhoods within cities has recently been the object of research demonstrating the ability of (apparently) 'interstitial' interventions to answer the needs of local communities in terms of urban regeneration (Rabbiosi, 2016)⁴⁴

a. Land Use Analysis:

- Analyze the current land use in each area. This can include residential, commercial, industrial, recreational, and public spaces.

b. Building Types and Distribution:

- Examine the types of buildings in each area (e.g., historic, modern, residential, commercial) and their distribution.
- Highlight any architectural or historical significance.

c. Traffic Conditions:

- Evaluate the traffic conditions in each area, including road infrastructure, congestion, and transportation options.
- Discuss any plans for improving transportation in these areas.

d. Public Facilities:

- Identify and describe public facilities such as schools, hospitals, parks, and cultural institutions in each area.

- Assess the adequacy of these facilities for the local population.

e. Greenery and Parks:

- Analyze the presence of green spaces and parks in each area.

Discuss the quality and accessibility of these green areas.

f. Strengths and Weaknesses:

- Summarize the strengths and weaknesses of each area based on your analysis.

- Highlight any challenges or opportunities for development.

g. Development Potential:

- Discuss the potential for development or revitalization in each area.

- Offer recommendations for enhancing these areas and promoting sustainable urban development.

3.2 The current situation of the Navigli Canal in the Milan metropolitan area and the surrounding land use along its route

3.2.1 Cassina de Pomm

Cassina de Pomm, located at the start of the Navigli in Milan, is an area with historical significance and attractions. Cassina de Pomm is the most northerly of the sites along the canal stretch to be opened, which makes it natural to inaugurate it first and then open the sites downstream. You follow the direction of the water and make a bet to the north when the most recent renovation along the canal was made to the south. This means that Cassina de Pomm is the place where, for the first time, the inhabitants of the city get a chance to imagine what the canal can be in the future and all the possibilities for a greener urban space and a more

⁴⁴ Rabbiosi C(2016) "Urban regeneration 'from the bottom up' ", City, 20:6, 832-844, DOI: 10.1080/13604813.2016.1242240

sustainable city that the reopening can bring.(Rolff O, 2022)⁴⁵

a. Navigli and Naviglio Martesana: Cassina de Pomm is situated at the beginning of the Navigli, a network of canals in Milan. It marks the final point where the Naviglio Martesana runs above ground before it goes underground beneath Via Melchiorre Gioia, which is one of the major roads in the city.

b. Original Basin: Along the now-submerged canal, there was originally a basin known as Cassina de Pomm. Although the canal is now submerged, this basin remains an important part of the Navigli's history and can potentially be relocated along the canal.

c. Cassina de Pomm Farmhouse: Cassina de Pomm is known for its ancient farmhouse, which is believed to be the oldest farmhouse in Milan. Its name dates back to the 15th century, highlighting its historical significance.

d. Giardino Cassina de Pomm: On the side of the Navigli, there is a public park called Giardino Cassina de Pomm. This park is a recreational area that offers green space and likely serves as a pleasant place for visitors to relax.

e. Sentry Box from World War II: The Giardino Cassina de Pomm also features a sentry box from World War II, which adds historical context and interest to the park.

f. Via Melchiorre Gioia: Via Melchiorre Gioia is one of Milan's main roads, and it is important for maintaining traffic flow in the northern direction, particularly toward the Greco neighborhood.

g. Residential Dominance: Cassina de Pomm is primarily a residential neighborhood, characterized by a concentration of residential buildings. This suggests that the area is primarily inhabited by residents, making it a community-focused neighborhood.

h. Commercial Areas: While the neighborhood is predominantly residential, it also has a significant commercial presence. The largest commercial area is located in the northernmost shopping center, indicating

⁴⁵ Rolff O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala: SLU, Dept. of Urban and Rural Development

that residents have access to shopping and retail services within the neighborhood. Additionally, there are scattered commercial buildings throughout the area, likely providing various goods and services to the community.

i. Educational Institution: The neighborhood is home to an educational institution, the "Istituto comprensivo Locatelli-Quasimodo" school, which is situated in the north-western part of Cassina de Pomm.

j. Religious Center: Cassina de Pomm also has a central religious institution, the "Chiesa Santa Maria Goretti" church. The church serves as a place of worship and community gathering for residents, contributing to the cultural and social fabric of the neighborhood.

It's clear that Cassina de Pomm has several strengths as a well-rounded neighborhood with essential facilities, but there are also identified shortcomings(e.g. poor quality of public space, limited pedestrian and cycling connections, lack of attractions) that a redesign could address to enhance the quality of life for residents and attract visitors. Here are some key points to consider for the redesign:

a. Connectivity: Improving pedestrian and bicycle connections is crucial for creating a more walkable and bike-friendly neighborhood. Connecting the existing Navigli with the soon-to-be-reopened Navigli can enhance accessibility and promote active transportation.

b. Public Spaces: Enhancing the quality of public spaces is essential for creating a more inviting and vibrant environment. This can include beautifying parks, plazas, and other communal areas, making them more attractive for residents and visitors alike.

c. Attractions and Points of Interest: Introducing attractions and points of interest can make the neighborhood more appealing. This could involve creating cultural or historical exhibits, art installations, or spaces for community events. Highlighting the neighborhood's historical significance, like its ancient farmhouse and Giardini Cassina de Pomm, can add to its unique character. Create events around the site to

create stories about it and eventually the whole canal(Rolff O, 2022)

d. Footpaths and Cycle Paths: Improving and safeguarding footpaths and cycle paths not only promotes sustainable transportation but also enhances the overall safety and convenience of getting around the neighborhood.

e. Community Engagement: Involving the local community in the redesign process is essential. Residents should have the opportunity to provide input and feedback to ensure that the changes align with their needs and preferences.

Cultural activities involving both artists, residents and other populations dealing with the area were proposed as a means to facilitate cultural expression and identity formation within the area. ‘Participation’ , ‘synergy’ , ‘bond-creating’ and ‘place-making’ emerged as key terms for many civic networks in the discussion on fostering urban regeneration ‘from the bottom up’ (Rabbiosi, 2016)⁴⁶

f. Preservation of Heritage: Preserve elements and spatialities that contribute to the identity of the site today(Rolff O, 2022). While redesigning, it's important to preserve the historical and cultural heritage of Cassina de Pomm, such as the farmhouse and church. These elements can serve as focal points in the revitalized neighborhood.

g. Sustainability: Consider incorporating sustainable design principles into the redesign, such as green spaces, energy-efficient infrastructure, and waste reduction measures, to make the neighborhood more environmentally friendly.

h. Economic Development: Encourage economic development by supporting local businesses and entrepreneurs. This can include creating spaces for small businesses and promoting local products and services.

i. Safety: Ensure that the redesigned area is safe for all residents and visitors, both during the day and at night. The lighting of the park will be further crucial to ensure that the park is safe, that the shrubs are kept low for good visibility and that evening activities are encouraged, such as events,

⁴⁶ Rabbiosi C(2016) “ Urban regeneration ‘from the bottom up’ ” , City, 20:6, 832-844, DOI: 10.1080/13604813.2016.1242240

and that the existing restaurant to the east of the park will be able to open up to the park as a result of the proposal(Rolff O, 2022)

j. Accessibility: Make sure that the redesigned neighborhood is accessible to people with disabilities, promoting inclusivity and equal access to amenities.

By addressing these aspects in the redesign process, Cassina de Pomm can transform into a more vibrant, attractive, and livable neighborhood that meets the diverse needs of its residents while also becoming an appealing destination for visitors.

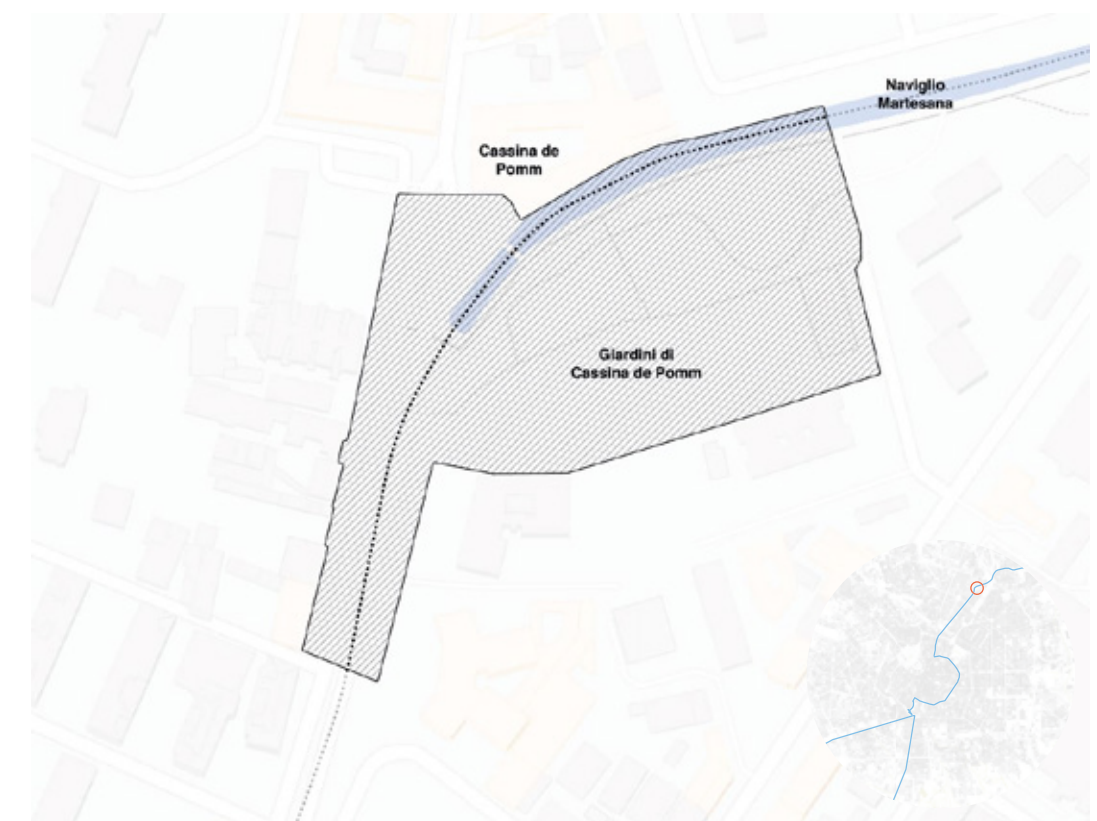


Figure 11. Cassina de Pomm

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.2 Via Melchiorre Gioia

The construction of a landscape project in parts of the city built over time more as road axes than as real neighborhoods of Milan (via Melchiorre Gioia). Via Melchiorre Gioia is a long artery that connects the extreme north-east of the city with the new Porta Nuova business center close to the historic center; with the burial of the Martesana canal in the 1960s it lost its identity without acquiring any new one.(Boatti, 2017)⁴⁷

Via Melchiorre Gioia plays a pivotal role in Milan's transportation network and urban development. Its historical significance, involvement in redevelopment projects, and the presence of green spaces and prominent landmarks make it a central feature of the city's evolving urban landscape.

a. Navigli Integration: Via Melchiorre Gioia serves as the point at which the Navigli canal system enters the dense urban environment of Milan. The canal runs through the central part of the street, reflecting the historical significance of waterways in Milan's development.

b. Historical Context: The street has historical significance as it was once bordered by the Naviglio della Martesana when Milan was enclosed within the Cerchia dei Bastioni, a historic defensive ring surrounding the city.

c. Major Traffic Artery: Via Melchiorre Gioia is one of Milan's primary roadways for vehicular traffic. It spans approximately 2.46 kilometers, extending from the Bastioni di Porta Nuova in the south to Giardino Cassina de' Pomm in the north.

d. Urban Renewal: The area is characterized by a mix of newly built buildings and skyscrapers, reflecting ongoing urban renewal and modernization efforts.

e. Green Space: A notable feature in the area is "the Library of the Trees," a large green space that provides residents and visitors with a natural retreat amidst the urban environment.

f. Role in Urban Redevelopment: Via Melchiorre Gioia has played a crucial role in the redevelopment of Milan's

⁴⁷ Boatti A.(2017). "La riapertura e la valorizzazione dei navigli come progetto di paesaggio e nuovo modello di vivibilità urbana per Milano", Ri-Vista. Research for landscape architecture, 15(1), pp. 104–121. DOI: 10.13128/RV-20712.

Business Center. Over the years, various projects, from the construction of the Municipal Technical Services tower in the 1960s to the present Garibaldi-Repubblica project, have transformed the area.

g. Transportation Hub: The street has become a critical transportation hub with its new underpass connection, referred to as "via del Nord," linking it with via Don Luigi Sturzo and the Milan Porta Garibaldi station. This enhances transportation connectivity in the vicinity.

h. Prominent Landmarks: The Lombardia Palace and the INPS Palace are notable landmarks that stand out along Via Melchiorre Gioia. Additionally, the Galfa tower is located in close proximity.

i. Intersection with Viale della Liberazione: Perpendicularly, Via Melchiorre Gioia intersects with Viale della Liberazione. This area is significant for urban development and includes structures like the Diamante tower within the Porta Nuova - Varesine project area.

j. Piazza della Repubblica: The street leads to Piazza della Repubblica, another significant public square in Milan.

The high level of modernisation has led to the prosperity of the area, but the other side of the double-edged sword is the lack of historical heritage. Not only that, but according to Il Giorno⁴⁸, Via Melchiorre Gioia, one of Milan's main roads for vehicular traffic, is also a constant source of confusion and traffic jams and even accidents, so we also need to consider the limited pedestrian and cyclist connectivity that results from the limited infrastructure that exists in the main.

In summary, what I can consider in the design for the reopening of Navigli is to:

a. Pedestrian and Cyclist Connectivity: To alleviate traffic congestion and promote sustainable transportation, prioritize the development of pedestrian-friendly walkways and dedicated cycling lanes along Via Melchiorre Gioia. These pathways should be well-connected and integrated into the overall urban fabric, encouraging residents and visitors to use alternative modes of transportation.

⁴⁸ Il Giorno, source: <https://www.ilgiorno.it/cerca?q=Via+Melchiorre+Gioia>

b. Historical Heritage Preservation: While modernization has its benefits, preserving the historical heritage of the area is equally important. Consider incorporating historical elements into the urban design, such as plaques, markers, public art installations or interactive exhibits that share the history of the Navigli and Via Melchiorre Gioia with residents and visitors, fostering a deeper appreciation for the area's heritage.

c. Linear Boulevard: Create a linear boulevard along Via Melchiorre Gioia that prioritizes pedestrian spaces, greenery, and public seating. This can help transform the street into a more inviting and aesthetically pleasing corridor, reducing confusion and traffic-related issues. In this sense, the most significant intervention is the one along via Melchiorre Gioia where the planting of three hundred trees alongside the reopened waterway constitutes an effective penetration of an ecological corridor from the peri-urban areas towards the city centre. Furthermore, the rediscovery of the canal as a multifunctional and green infrastructure stimulates the development of theme parks throughout the peri-urban south-west between Naviglio Grande and Naviglio Pavese, to the point of considering a Navigli Park as a subsystem of the Southern Agricultural Park. (Boatti, 2017)

d. Public Spaces: Design public spaces strategically throughout the area to serve as gathering points for the community. These spaces can host events, markets, and cultural activities, fostering a sense of belonging and vibrancy.

e. Connectivity to the Park and Naviglio: This connection can be a focal point of the redesign, providing a green pathway that links natural and urban elements.

f. Integration with Future Building Renovations: Collaborate closely with urban planners and developers working on building renovations around the Naviglio. Coordination will be key to ensure that the redesign aligns with future projects and contributes to a cohesive and integrated urban environment.

g. Traffic Management: Address traffic congestion and safety concerns along Via Melchiorre Gioia through improved traffic management strategies. This may include better signage, smart traffic control systems, and designated lanes for public transportation. Among the impacts on the road network are the reduction of the roadway useful for vehicular traffic in via Melchiorre Gioia (an artery penetrating radially into the city, which improperly carries traffic to the edges of the historic center) the creation of a one-lane road system one-way travel (counterclockwise) along the eastern sector of the Cerchia dei Navigli, the consolidation of a two-way cycling itinerary, mixed or reserved, on a single bank or on both depending on the sections and a continuity of the routes pedestrians.

By addressing these considerations, the redesign of the Navigli area can strike a balance between modernization and heritage preservation, while also improving traffic flow and enhancing the overall quality of life for residents and visitors. (Boatti, 2017)



Figure 12. Via Melchiorre Gioia

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.3 Conca dell' Inconronata

This area of Milan is well known as the home of the Conca dell'Inconronata, the canal's only remaining lock. This lock was originally constructed in 1496 and had contributions from none other than the renowned polymath Leonardo da Vinci himself. It stands as an exceptional example of the original "Conca Vinciana" system.

The Conca dell'Inconronata, or Conca delle Gabelle, is an ancient navigation basin in Milan that played a vital role in facilitating the transition between the Naviglio della Martesana and the Cerchia dei Navigli by compensating for the difference in water levels between the two.

Notably, the Conca dell'Inconronata is the only remaining portion of the Naviglio della Martesana within the confines of the Spanish walls of Milan. Unfortunately, a significant portion of this canal was buried between 1929 and 1930, coinciding with the closure of the Cerchia dei Navigli. This historical context further underscores the importance and uniqueness of the Conca dell'Inconronata as a surviving relic of Milan's waterway system.

The Conca dell'Inconronata is of particular importance in the history of Milan also because it is linked on the one hand to a possible intervention-design by Leonardo (never fully ascertained) but more pragmatically to the collection of navigation duties(Boatti, 2003)⁴⁹

The recovery of the Conca dell'Inconronata is one of the most emblematic interventions that the Navigli reopening project can offer to the city.(Boatti, 2017)

a. Location and Roads: The area encompasses a loop known as 'dei Bastioni,' which includes the last section of Via Melchiorre Gioia and the first section of Via San Marco, a major road in Milan. This central location makes it easily accessible.

b. Subway Station Moskova: The presence of the Moskova subway station nearby adds to the accessibility of the area

⁴⁹ Boatti A.(2003). "Milano ri-trova l'acqua e la sua storia. Gli elementi naturali e le risorse idriche come nuovi valori della qualità urbana nella metropoli" , Ri-Vista. Research for landscape architecture, pp. 63-85

for both residents and visitors.

c. Repurposed Old Buildings: Many of the older buildings in the area, originally used as warehouses, have been repurposed for various uses, contributing to the area's character and charm.

d. Tourist Destination: The area is now known as a bustling tourist destination in Milan, likely offering a variety of service facilities, restaurants, and shopping opportunities to cater to tourists and locals.

e. Ospedale Fatebenefratelli e Oftalmico: In the northeast corner of the area, you'll find the massive government hospital, Ospedale Fatebenefratelli e Oftalmico, providing important healthcare services.

f. Sports Center: To the southeast of the area, there is a sports center, providing opportunities for recreational activities and possibly hosting sports events.

g. Historical and Cultural Buildings: The area boasts several significant historical and cultural landmarks, including the Conca dell'Inconronata itself, Porta Nuova, Chiesa di Santa Maria Incolonata, Chiesa San Giovanni di Dio, and more. These buildings contribute to the historical and cultural appeal of the area, attracting tourists interested in Milan's heritage.

Overall, this area offers a dynamic mix of history, modernity, and various amenities, making it an attractive destination for tourists and a vibrant part of Milan. Its shortcomings lie in: lack of validation of the navigation lock, poor connection due to the difference of height, lack of public spaces.

Therefore, we can start to transform from these aspects:

a. Highlight the Historical Navigation Lock: Given the historical significance of the Conca dell'Inconronata and its association with Leonardo da Vinci, emphasizing this unique feature as a key point of interest is an excellent idea. This can be achieved through informative signage, guided tours, and interactive exhibits that educate visitors about its historical importance.

b. Reorganize Vertical Connections: To address the challenge

of poor connections due to differences in height, consider investing in modern infrastructure solutions such as elevators, escalators, or even a funicular railway system if feasible. This would improve accessibility and navigation within the area.

c. Improve Public Spaces: The lack of public spaces can be addressed by creating parks, plazas, or recreational areas within the region. These spaces can provide greenery, seating, and opportunities for relaxation, making the area more inviting for both residents and tourists.

d. Enhance Validation of the Navigation Lock: To further validate the navigation lock, consider hosting events, exhibitions, or cultural activities related to water navigation, historical canals, and the Conca dell'Incoronata itself. This could attract enthusiasts and promote awareness of the lock's significance.

e. Preserve Cultural Heritage: Continue efforts to preserve and maintain historical and cultural buildings in the area. This includes regular maintenance, restoration projects, and educational programs to promote awareness and appreciation of Milan's heritage.

By addressing these aspects, the region around Conca dell'Incoronata can evolve into an even more attractive and accessible destination for tourists and residents alike, while preserving its rich historical character.



Figure 13. Conca dell'Incoronata
Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.4 San Marco

San Marco is a neighborhood in Centro Storico, Milan. San Marco is situated nearby to the Brera quarter and the neighborhood Via Borgonuovo. San Marco is also situated close to the suburbs Porta Garibaldi and Porta Nuova.

a. Historical Significance: The area of San Marco was once known for the small lake which allowed for the arrival of goods into the city by boat. This lake was facing the historical Church of San Marco, built during the 13th century, and it represented the arrival into the historical city center. There was a wide and long basin called Laghetto di San Marco, which acted as a landing port for loading and unloading goods into this part of the city. Unfortunately, when the Navigli closed, this area then became a parking structure.

b. Cultural Attractions: This area is known for the presence of important aristocratic buildings and palaces, with a number of important attractions: in addition to the Church of San Marco⁵⁰, there is the Brera Art Gallery, the Academy of Belle Arti, and the Museo del Risorgimento. These institutions offer a wealth of art and historical collections for visitors to explore.

c. City Parks: The presence of notable city parks like the Indro Montanelli Gardens and Parco Sempione adds to the charm of the neighborhood, providing green spaces for relaxation and recreation.

d. Via San Marco Street Market: The Via San Marco street market, or "Mercato di Via San Marco," offers a vibrant shopping experience. With various sections selling different types of goods, such as farmers' produce, household items, clothing, and handicrafts, it adds a lively and diverse aspect to the neighborhood⁵¹.

Overall, Milan's San Marco area combines its rich history with cultural institutions, green spaces, and vibrant markets, making it a well-rounded destination for residents and

⁵⁰ Chiesa di S. Marco

Source: <https://www.lombardiabeniculturali.it/architetture/schede/LMD80-00038/>

⁵¹ Via San Marco street market

Source: <https://www.meetthecities.com/milan/milan-shopping-markets/via-san-marco-street-market/>

visitors alike. Despite this there are still some problems that need to be improved: limited possibilities for intervention due to the complex built environment; anonymous parking; lack of valuation of the building, etc.

Therefore, we can pay attention to the following aspects when carrying out the Navigli reopening project:

a. Create a Darsena (Wet Dock): Replacing the existing anonymous parking lot with a darsena, or wet dock, is an innovative idea. This transformation could harken back to the historical significance of the area as a point of arrival by boat. The darsena could serve as a focal point for cultural events, waterfront dining, and recreational activities, making the area more vibrant and attractive.

b. Integrate Church and Historical Elements: Integrating the existing Church of San Marco and other historical elements with the re-opened Navigli can further enrich the neighborhood's cultural heritage. This could involve creating pedestrian-friendly pathways that lead to historical landmarks, offering guided tours, and organizing events that showcase the historical significance of the area.

c. Provide Public Spaces and Functions: Developing public spaces and functions along the re-opened darsena adds to the livability and appeal of the neighborhood. This could include waterfront promenades, seating areas, art installations, and spaces for community events. Encouraging cafes, restaurants, and shops along the waterfront can also create a lively atmosphere.

d. Heritage Conservation: As part of these changes, it's crucial to ensure the conservation and restoration of historical buildings and palaces in the area. This will help preserve the neighborhood's architectural charm and cultural value.

e. Urban Planning: Collaborating with urban planners and architects to ensure that the interventions are seamlessly integrated into the existing built environment is essential. This will help maintain the character of the neighborhood while introducing contemporary elements.

These proposed changes not only address the identified

problems but also align with a broader trend of urban revitalization, transforming underutilized spaces into vibrant cultural and recreational hubs. By embracing the area's history and heritage, and by fostering a sense of community and public engagement, the San Marco neighborhood can become an even more appealing destination for both residents and visitors.

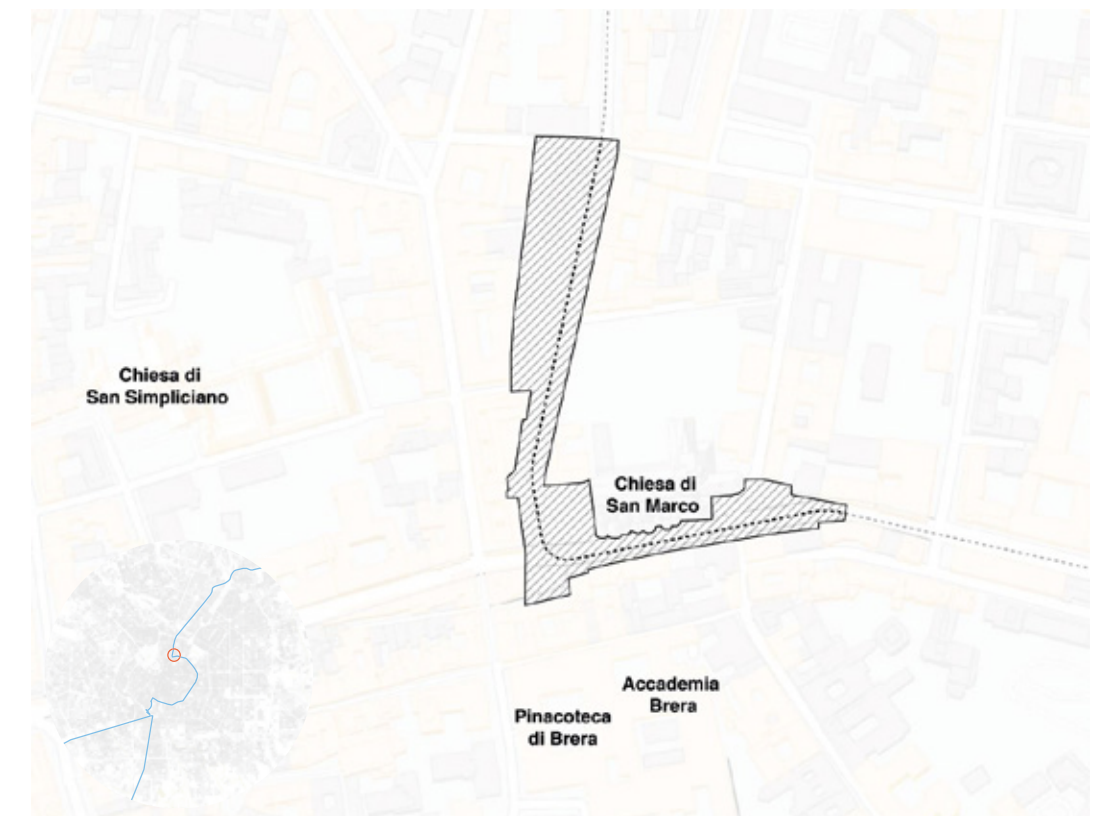


Figure 14. San Marco
Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.5 Via Senato-via Marina

Via Senato-via Marina refers to an area where two intersecting roads are located. Via Senato and Via Marina: a site balanced between nature and monumentality (Boatti, 2003).

a. Proximity to Historic Center: The location close to Milan's historic center places it at the heart of the city's historical and cultural heritage.

b. Bordering the "Quadrilatero della Moda": The neighborhood's adjacency to the famous "Quadrilatero della Moda," known for luxury fashion and shopping, adds to its prestige and allure. An important centre for high-end shopping and the beating heart of the events linked to Milan Fashion Week, it is home to numerous clothing shops of the most important fashion labels, ateliers, studios and showrooms that attract tourists from all over the world⁵².

c. Prestigious Buildings: The area has a history of hosting prestigious buildings associated with Milanese nobility, which contribute to its architectural grandeur.

d. Architectural Landmarks: Notable architectural landmarks include the Archiepiscopal Seminary, Palazzo Serbelloni (located near the ancient lock of Via Senato), and the 17th-century baroque Palazzo del Senato, all of which enhance the area's cultural richness.

e. Noble Gardens: The presence of beautiful noble gardens on the right side of the Naviglio, linked to the palaces in the vicinity, adds a touch of natural beauty and tranquility to the neighborhood.

f. Alzaia and Via Marina: The "alzaia" along the opposite side of the Naviglio and the well-designed Via Marina, created by the architect Piermarini in the late 18th century, connect the central part of the city with the Naviglio, Villa Reale's gardens, and the public gardens of Porta Venezia.

g. Environmental and Monumental Character: The area's overall environmental and monumental character is a testament to its historical and cultural significance. Its rich

⁵² Quadrilatero della Moda

Source: https://it.wikipedia.org/wiki/Quadrilatero_della_moda

history, impressive architecture, and landscaped areas create a unique and appealing urban environment.

The current problems that need to be solved in this area are: There is a lack of pedestrian and bicycle connections due to the strong existing infrastructure of the inner circle; anonymous parking; and a lack of connections between the park and pedestrians and bicycles.

Therefore, we need to consider the following factors when transforming:

a. Integrate Naviglio with the Park and Surroundings: To improve connectivity and create a more integrated urban environment, consider redesigning the area to seamlessly connect the Naviglio with nearby parks and green spaces. This could involve the creation of pedestrian-friendly promenades along the Naviglio's banks, allowing people to stroll or cycle from the waterway to the adjacent park areas.

b. Improving Pedestrian and Cycle Connections: Enhancing the quality and experience of pedestrian and cycle connections is essential. This could involve:

- Expanding and improving existing bike lanes and pedestrian paths, ensuring they are well-maintained and safe.

- Implementing traffic-calming measures, such as reduced speed limits, to make the streets more pedestrian and cyclist-friendly.

- Creating dedicated pedestrian bridges or crosswalks to connect different parts of the area, promoting ease of movement.

c. Providing Small Public Functions: Incorporating small public functions within parks and urban spaces can encourage community engagement and make the area more vibrant. Consider adding features like:

- Outdoor seating areas, picnic spots, or small cafes within parks to encourage people to relax and socialize.

- Art installations, cultural exhibitions, or performance spaces to promote cultural activities and events.

- Interactive play areas for children to make the

neighborhood more family-friendly.

By addressing these factors for transformation, the Via Senato-Via Marina area can become a more accessible, pedestrian-friendly, and culturally vibrant part of Milan. These changes can help bridge the existing gaps and create a well-rounded urban environment that caters to the needs and preferences of residents and visitors alike.

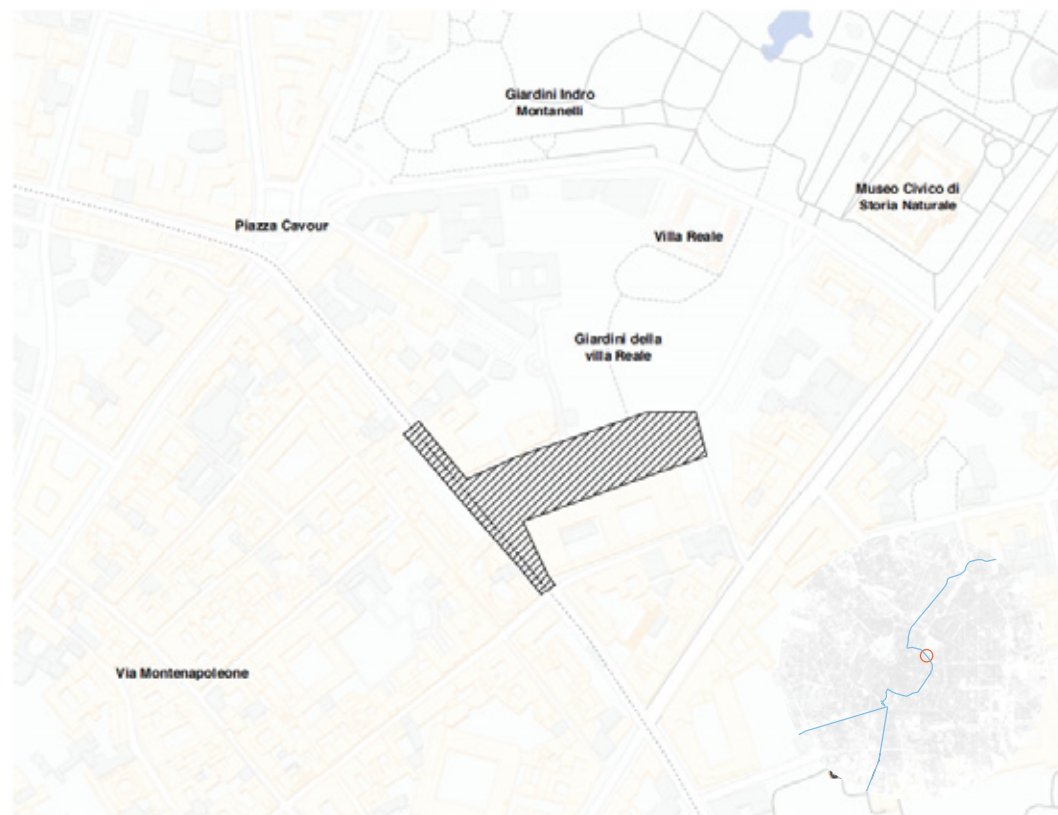


Figure 15. Via Senato-via Marina

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.6 Università degli Studi

Università degli Studi is an area focused on the Università Statale, one of the busiest and most dynamic areas in Milan. Università degli Studi, or simply University of Turin (UniTo), is an Italian state university, founded in Turin at the dawn of the 15th century⁵³.

a. Proximity to City Center: The area is conveniently located close to the Duomo and the city center, making it easily accessible for students and residents alike.

b. Cultural Institutions: In addition to Università Statale, the area is home to the Catholic Church Basilica di San Nazaro in Brolo and Cappella universitaria dell'Annunciazione, reflecting its educational and cultural significance.

c. City park: The Giardino della Guastalla, located across from the university on Via Francesco Sforza, offers a green oasis with walking paths and ponds, providing a tranquil escape in the heart of the city.

d. General Hospital: The General Hospital (Policlinico of Milan) is situated to the south of the park, serving as an important healthcare institution in the area. The Policlinico of Milan (Italian: Policlinico di Milano) also known as Ospedale Maggiore di Milano or Ca' Granda Ospedale Maggiore Policlinico, is the public district general hospital in Milan. It is one of the oldest hospitals in Italy, founded by Duke Francesco Sforza in 1456⁵⁴.

e. Commercial and Service Facilities: Corso di Porta Romana, intersecting Via Francesco Sforza, is lined with commercial and service facilities catering to the daily needs of residents and students, further enhancing the area's convenience.

f. Ongoing Developments: As one of the busiest and most vibrant areas of Milan, there are a number of projects and developments underway in Università degli Studi that will need to be navigated around when reopening the Navigli canal. These include the new underground Metro line 4 (M4)

⁵³ Università degli Studi di Torino

Source: https://it.wikipedia.org/wiki/Universit%C3%A0_degli_Studi_di_Torino

⁵⁴ Policlinico of Milan

Source: https://en.wikipedia.org/wiki/Policlinico_of_Milan

(Fior, Vitillo, Galuzzi, 2022)⁵⁵ which will allow for a reduction of vehicular traffic along Via Francesco Sforza, and in this area, the Naviglio flows along Via Francesco Sforza.

As this area continues to evolve and grow, it presents both opportunities and challenges in terms of urban development, transportation, and preserving its cultural and academic heritage. Effective urban planning and stakeholder collaboration will be key to managing these changes and maintaining the area's appeal. For the opening of the canal, the current problems that need to be solved at the site are: lack of pedestrian and bicycle connections due to the strong existing infrastructure of the inner circle; lack of architectural value of the university and park.

Redesigning the area requires considering the complex relationship between the urban context and the many important monuments and institutions to create a public space that enhances the potential of the area. Strategies worth considering include:

a. Integrate Naviglio with Parks, Universities, and Hospitals: Integrating the Naviglio canal with nearby parks, universities, and hospitals can enhance the area's overall connectivity and functionality. This integration can involve:

- Creating waterfront promenades or paths that allow pedestrians and cyclists to access the canal and adjacent green spaces easily.

- Considering the aesthetic and functional integration of the canal with the architectural elements of the university and nearby monuments.

b. Improved Pedestrian and Bicycle Connections: Enhancing pedestrian and bicycle connections is crucial for reducing vehicular traffic and promoting sustainable mobility. Strategies to achieve this include:

- Expanding and upgrading existing pedestrian and bike paths, making them safer and more attractive for users.

- Creating dedicated bike lanes and pedestrian walkways

⁵⁵ Fior M, Vitillo P, Galuzzi P.(2022). "New Milan metro-line M4. From infrastructural project to design scenario enabling urban resilience." Transportation Research Procedia. DOI: 10.1016/j.trpro.2021.12.040

along key routes like Via Francesco Sforza and Corso di Porta Romana.

In correspondence with the State University, from via Laghetto to corso di Porta Romana, the reopening of the canal will be positioned in such a way as to re-propose the historical alignment, using the space along one bank as a cycle/pedestrian path; in this section, approximately 410 m long, the width of the canal will be between 6 and 7 m, and the water line will be at a lower height from street level of approximately 2.60 m(Cipro, 2020)⁵⁶.

c. Providing Small Public Functions: Incorporating small public functions within parks and urban spaces can enhance the area's livability and appeal. These functions may include:

- Outdoor seating areas, kiosks, or cafes within parks to encourage social interaction and relaxation.

- Art installations, cultural exhibitions, or performance spaces that promote cultural activities and events.

- Interactive play areas and recreational facilities for all ages to make the neighborhood more family-friendly.

d. Architectural Enhancement: To address the perceived lack of architectural value of the university and park, consider architectural enhancements that can add character to the area:

- Collaborate with architects and designers to create visually appealing structures and landscaping features.

- Preserve and highlight historical architectural elements where relevant to maintain the area's cultural identity.

By implementing these strategies, the Università degli Studi area can be transformed into a more inviting, sustainable, and culturally rich urban environment. This approach not only addresses the identified problems but also fosters a sense of community, making it a desirable place for residents, students, and visitors alike.

⁵⁶ Cipro D.(2020).Il Partenariato Pubblico Privato nelle trasformazioni urbane. Il caso studio del progetto di riapertura dei Navigli milanesi. = The Public-Private Partnership in urban transformations. The case study of the Milan Canals reopening project.webthesis.biblio.polito.it

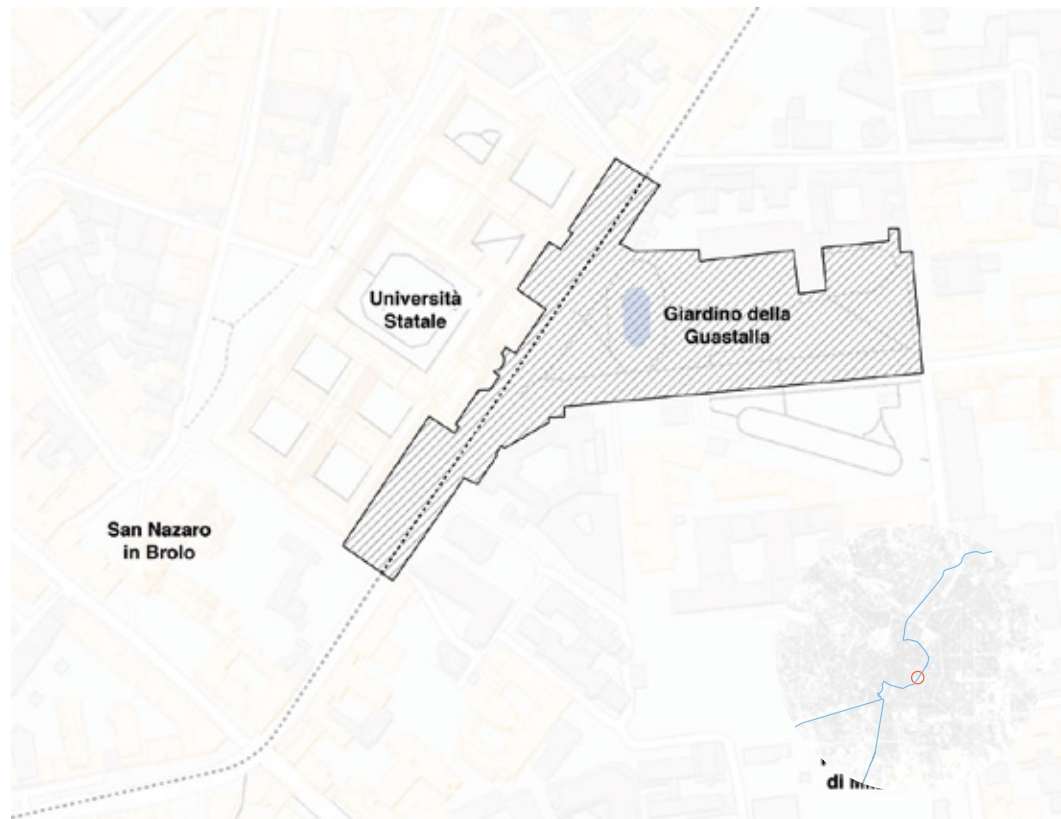


Figure 16. Università degli Studi

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.7 Parco delle Basiliche

Parco Papa Giovanni Paolo II, formerly "Parco delle Basiliche", is a park in the city of Milan. Its name comes from the presence of two large churches, the Basilica of San Lorenzo and the Basilica of Sant'Eustorgius, located on opposite corners of the square. Parco delle Basiliche or Parco Giovanni Paolo II is currently divided by an internal "ring road" which will be replaced by the reopened Navigli section. This section of Navigli will also be affected by the new underground metro line 4 that is under construction. The northern half of the park borders the Basilica of San Lorenzo, while the southern half is connected to the Basilica of Sant'Eustorgio.

a. Colonne di San Lorenzo: The Colonne di San Lorenzo, or Columns of San Lorenzo, is another notable historical site in the area. These ancient Roman columns are located near the Basilica of San Lorenzo and are a popular gathering spot for locals and tourists alike.

b. Museo Diocesano: The Museo Diocesano, or Diocesan Museum, is a cultural institution in the vicinity. Museo Diocesano often showcases religious art and artifacts, providing insight into the religious history of Milan and the region.

c. Navigli Section: The park is currently divided by an internal "ring road," but plans are in place to reopen a section of the Navigli canal, which will add to the park's charm and provide an attractive water feature.

d. Metro Line 4: The construction of the new underground metro line 4 will also impact this area, potentially improving transportation access and connectivity. The section of Navigli will also be affected by the new underground metro line 4 that is under construction.

e. Commercial Buildings: The park is surrounded by various commercial buildings, including restaurants, hotels, shops, and more. This makes it a vibrant area with plenty of options for dining and shopping.

f. Educational Institutions: The proximity of schools,

including a primary school, secondary school, and university, underscores the importance of this area as a hub for education and community life. It creates a dynamic environment where people of different age groups can interact and contribute to the park's vitality.

Overall, Parco delle Basiliche seems to be a multifaceted and culturally rich area that combines history, culture, and community life, making it a significant asset to Milan's historic center. The current problems that need to be solved are: lack of pedestrian and bicycle connections due to the strong existing infrastructure of the inner circle; fragmentation of spaces and attractions.

New projects should therefore focus on reconnecting the area with walking routes and public spaces, enhancing green areas and protecting historical heritage:

a. Pedestrian and Bicycle Connections:

- Elevated Walkways and Bridges: Construct elevated walkways or bridges over the existing inner circle or roadways to provide safe and convenient pedestrian and bicycle access between different parts of the park and the surrounding attractions.

- Dedicated Bike Lanes: Develop dedicated bike lanes within the park and along nearby roads to encourage cycling and improve mobility.

- Wayfinding Systems: Implement clear wayfinding systems to guide pedestrians and cyclists through the park and to nearby attractions.

- Safety Measures: Ensure the paths are well-lit and incorporate safety measures, such as speed limits for cyclists, to accommodate various users.

b. Enhancing Green Areas:

- Expand Green Spaces: Increase the green areas within the park by planting more trees, shrubs, and flowers. Create small gardens, relaxation spots, and picnic areas for visitors to enjoy.

- Green Roofs and Walls: Implement green roofs and walls on nearby buildings to enhance the green aesthetic and

improve air quality.

- Community Gardens: Establish community gardens within the park to involve local residents in its maintenance and cultivation.

c. Historical Heritage Integration:

- Adaptive Reuse: Explore opportunities for adaptive reuse of historical buildings, such as transforming them into cultural centers, museums, or cafés that complement the park experience.

- Heritage Trails: Develop heritage trails within the park, showcasing the historical significance of the area through informative signs, statues, and artworks.

A historical monumental complex of absolute value can be brought together in a unified project connecting Darsena, Parco delle Basiliche, Arena Romana, the Conca and Porta Ticinese (Boatti, 2003).

d. Metro Station Integration:

- Architectural Integration: Design the metro station to seamlessly integrate with the park's aesthetics and greenery, ensuring it complements the overall atmosphere.

- Transit Hub: Consider the metro station as a transit hub, providing easy access for visitors and residents and serving as a gateway to the park.

e. Reorganization of Public Spaces:

- Placemaking: Utilize placemaking principles to reorganize public spaces within the park. Create distinct gathering spots, seating areas, and performance spaces.

- Multi-Use Zones: Design flexible spaces that can host a variety of events and activities, from cultural festivals to community markets.

f. Community Involvement:

- Engage the Community: Involve local residents and stakeholders in the planning and decision-making processes to ensure that the revitalization efforts align with the community's needs and desires.

These projects and solutions can help transform Parco delle Basiliche into a more accessible, connected, and vibrant

space that celebrates its historical heritage while providing modern amenities and recreational opportunities for residents and visitors alike.

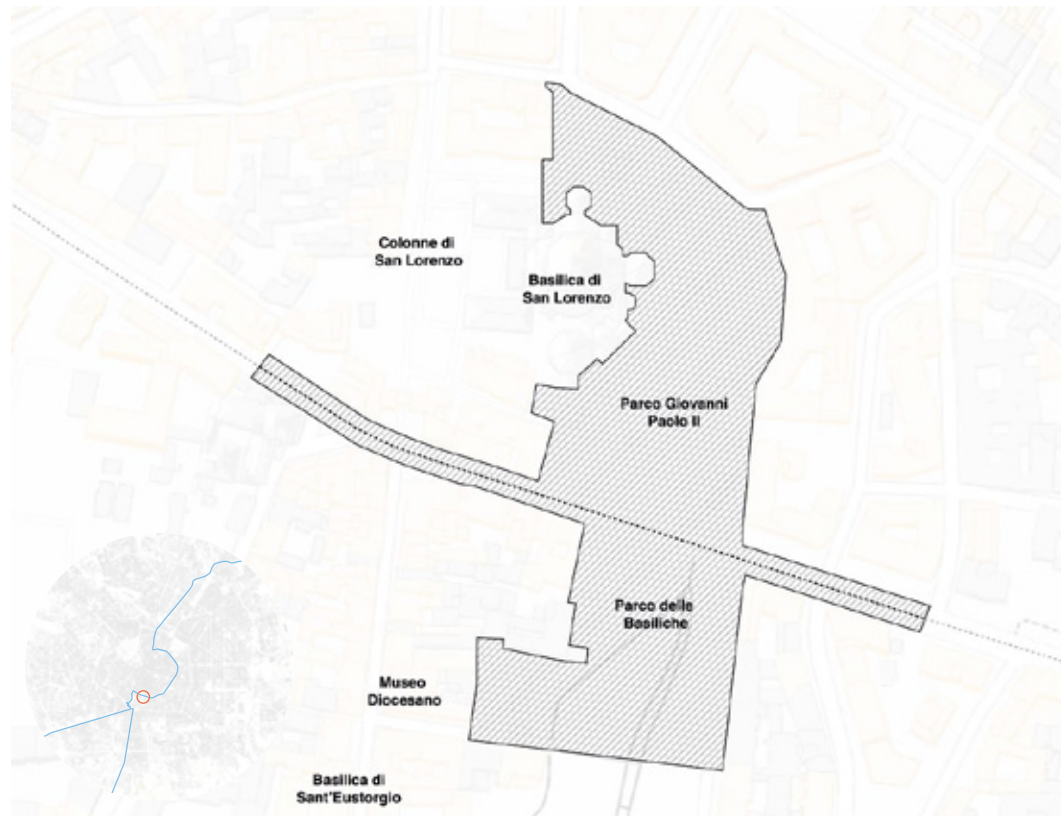


Figure 17. Parco delle Basiliche

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.2.8 Parco archeologico

Parco Archeologico is a green space in the city center, famous for its ancient Roman heritage and featuring the remains of an ancient circular theater. The Viarina Shiplock is located nearby and is one of the few ancient shiplocks that have been preserved. It is located at the traditional arrival point of Navigli on the Daseine River. This used to be the most important port in the city and one of the busiest ports in Italy. Recently, at the 2015 World Expo, Dasena underwent a comprehensive renovation and became one of the main attractions of contemporary Milan.

a. Water Network of Parco Archeologico area: The Darsena remains exposed on the surface, while the spur marked by the Conca Viarenna is hidden under the road.

b. Conca di Viarenna: The Conca Viarenna, also known as Via Arena or Conca del Vallone, is a navigation basin located on Via Conca del Naviglio in Milan. This basin was constructed by the Veneranda Fabbrica del Duomo between 1551 and 1558 to replace an earlier basin built in 1438, which was demolished during the construction of the Spanish walls of Milan⁵⁷. The Conca Viarenna was used to overcome a significant difference in height (approximately two meters) between the Cerchia dei Navigli and the Darsena of Porta Ticinese. It is historically significant as the first navigation lock built in Europe, showcasing Milan's innovative approach to managing waterways. The main elements are: (i) the filling tank, whose bottom is located at the same altitude as the main watercourse, (ii) two barriers called gates that allow you to manage the water level, (iii) the mandrake that allows passengers to get off boats and finally (iv) the tank also called spillway necessary for filling operations. The basin's interior is often covered in brick to avoid damage to the infrastructure by the boats that use it, while the doors were made of wood (Banfi, Bolognesi, Bonini, Mandelli, 2021)⁵⁸.

⁵⁷ Conca di Viarenna

Source: https://it.wikipedia.org/wiki/Conca_di_Viarenna#cite_ref-reloading_1-0

⁵⁸ Banfi F, Bolognesi CM, Bonini JA, Mandelli A. (2021) "The Virtual Historical Reconstruction of the Cerchia Dei Navigli of Milan: From Historical Archives, 3D Survey and Hbim To the Virtual Visual Storytelling", ISPRS - Int. Arch. Photogramm. Remote Sens.

c.Darsena:The Darsena is an artificial water basin located in Milan near Porta Ticinese. It served as a mooring and storage area for boats navigating the Milanese canals. The Darsena was a crucial hub for commercial river traffic in the city, emphasizing the historical importance of water transportation for trade and commerce in Milan⁵⁹. The fact that it remains exposed on the surface today makes it an interesting historical feature that connects the city to its waterborne past. Darsena has two tributaries of the Navigli Canal, Navigli Grande and Navigli Pavese, which are still open. There are many commercial buildings lined up along these two rivers, especially bars and restaurants. There are many tourists and residents in this area, especially It gets very lively at night, making it a hot spot.

d.Parco Archeologico:The Parco archeologico, originally the Roman amphitheatre of Milan, is an ancient amphitheatre located in the Roman city of Mediolanum, today's Milan. It measures 155 x 125 metres and is the third largest amphitheatre in Rome and Italy, after the Colosseum and the Capua's amphitheatre. It is located outside the Roman walls of Milan, near the Roman Gate of Ticino. It was built in the 1st century AD and was destroyed during the siege of Milan in 539 during the Gothic Wars⁶⁰. PAN (Parco Amphitheatrum Naturae)⁶¹ is a green archaeological project for the Roman amphitheatre, involving the enhancement of the theatre area (from 12,000 sqm to 22,300 sqm). It was conceived by the architect Attilio Stocchi with the aim of creating a large green archaeological park in the centre of Milan and is expected to be completed by 2022. But so far it remains unfinished. The Parco Archeologico and the PAN project represent a commitment to preserving and showcasing Milan's historical heritage. Once completed, this archaeological park will likely

Spat. Inf. Sci, XLVI-M-1-2021, pp. 39-46. DOI: 10.5194/isprs-archives-XLVI-M-1-2021-39-2021

59 Darsena (Milano)

Source: [https://it.wikipedia.org/wiki/Darsena_\(Milano\)](https://it.wikipedia.org/wiki/Darsena_(Milano))

60 Anfiteatro romano di Milano

Source: https://it.wikipedia.org/wiki/Anfiteatro_romano_di_Milano

61 PAN PARCO AMPHITHEATRUM NATURAE: PERCORSO GREEN NEL CENTRO DI MILANO

Source: <https://www.tribune.com/progettazione/2021/02/pan-parco-amphitheatrum-naturae-anfiteatro-milano/>

become a significant cultural and recreational asset for both residents and visitors, offering a unique blend of history and green space in the heart of the city.

e.Parco Rossi:Parco Rossi is in the middle of this area, with the Parco archeologico to the north and the Darsena to the south. It is also surrounded by residential buildings. I therefore consider it to have a unique environmental advantage. But the current state of Rossi Park is poor, showing dilapidated, unmaintained facilities and poor hygiene. In the absence of surveillance, many particularly uncivilised occasional visitors found undisturbed places to operate: dealing, drug and alcohol abuse, vandalism and public disorder. Particularly at night, children's play areas become playgrounds for uncivilised and ill-mannered teenagers or places where dogs are abused, manholes and utility cupboards become hiding places for drinks and drugs, street furniture is systematically vandalised, hedges and bushes are turned into toilets, and the accumulation of filth is the inevitable result of uncivilisation⁶².

f.Mobility:The mobility of the entire Parco archeologico site is advantageous, which is reflected in the fact that the main road Via Edmondo de Amicis in the north and the main road Viale Gabriele D'Annunzio in the south surround the site, and there are many railway and bus stations nearby.

Overall, the current situation, coupled with the prosperity of Darsena and the regeneration of Parco Archeologico, this area has great potential to become a new cultural, leisure and entertainment gathering place. The problem that needs to be solved in the redesign is: lack of valorization of the archaeological park and its public spaces; no connection between the park, the navigation lock, and the Darsena; low quality public spaces; safety hazard especially at night.

Therefore, here are design directions that could be considered to unlock its potential:

a. Urban Space Improvement:

62 Sporizia e degrado nei giardini di Conca del Naviglio: i residenti chiedono la chiusura notturna con una cancellata

Source: https://milano.repubblica.it/cronaca/2021/05/13/news/petizione_chiusura_cancelli_notte_giardini_conca_naviglio_milano_lombardia-300766679/

- Enhance the overall urban environment through thoughtful urban planning and design. This could include the redesign of streetscapes, sidewalks, and public squares to create attractive and welcoming spaces.

- Incorporate greenery, public art, and street furniture to improve aesthetics and comfort for pedestrians.

b. Improved Connectivity:

- Establish clear and inviting pedestrian and bicycle pathways that connect the Parco Archeologico, the navigation lock, and the Darsena. These pathways should be well-lit and safe for use both during the day and at night.

- Consider creating pedestrian-friendly zones with limited vehicular traffic to prioritize the safety and convenience of walkers and cyclists.

c. Attractions for the Archaeological Park:

- Develop attractions within the archaeological park itself, such as interactive exhibits, guided tours, and cultural events. These can help visitors better understand the historical significance of the site.

- Explore the possibility of adding new functions to the park, such as outdoor performance spaces, educational facilities, or cafes, to make it a more engaging destination.

d. Safety Measures:

- Intensify efforts to monitor and ensure the safety of the area, particularly during nighttime hours. This may involve increased police presence, security cameras, and community patrols.

- Implement well-designed lighting solutions to improve visibility and security throughout the area, making it more inviting for evening activities.

e. Cultural and Entertainment Programming:

- Promote cultural and entertainment events within the Parco Archeologico and the surrounding public spaces. Regularly scheduled activities, such as concerts, festivals, and exhibitions, can attract diverse audiences and activate the area.

f. Public Participation:

- Involve the local community and stakeholders in the redesign process. Collect input and ideas from residents, businesses, and cultural organizations to ensure that the revitalization efforts align with the needs and aspirations of the community.

g. Heritage Interpretation:

- Enhance heritage interpretation within the Parco Archeologico by providing informative signage, educational materials, and guided tours. This can help visitors appreciate the historical significance of the site.

The reopening of the Naviglio provides for the valorisation of what is an important historical testimony of the Conca di Viarenna, preserving the strong green connotation of the site; all this in the face of minor traffic problems and interference on the surface consisting mainly in the redefinition of parking spaces, to the advantage of greater usability of the area(Cipro, 2020).

By focusing on these design directions, the area has the potential to evolve into a dynamic and inclusive cultural, leisure, and entertainment destination that preserves its historical heritage while meeting the needs and desires of the local community and visitors alike.

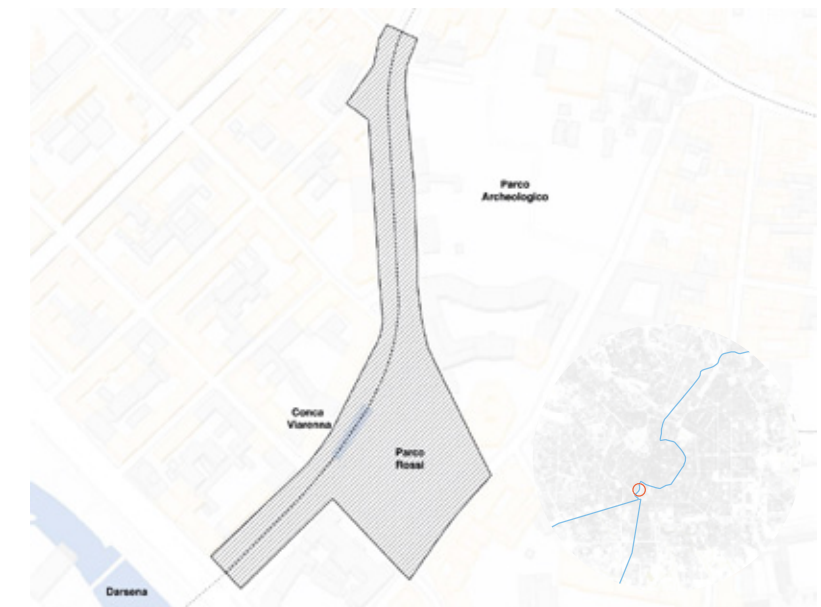


Figure 18. Parco archeologico

Source: MILAN NAVIGLI CANAL CHALLENGE <https://architecturecompetitions.com/naviglicanalchallenge/>

3.3 Reflections - A redesign of the area around Cassina de Pomm with focus on place identity(Rolff, 2022)

This section analyses an article by Olga Rolff, Uppsala:SLU, Dept. of Urban and Rural Development, entitled "En omgestaltning av området vid Cassina de Pomm med platsidentitet i fokus". As with one of the eight nodes studied above, this article is about the first site, Cassina de Pomm. This document is a summary of a thesis that explores the concept of place identity and its influence on the redesign of a specific area in Milan, focusing on the hidden canal system. The study uses research by design, site visits, and analysis of existing projects to understand the current identity of the area and propose a design that enhances its place identity. Next we will study the logic and methodology of its study of the site as well as summarise some of the important elements for the purpose of learning its thoughts on the analysis of a site, finding similarities and applying them to the study above.

3.3.1 Research logics

- a. The research logic of this paper involves investigating the concept of place identity and its influence on the redesign of the Cassina de Pomm area in Milan.
- b. The main method used in the research is research by design, which is a method for generating knowledge through design and solving wicked problems.
- c. The research includes a site visit to the Cassina de Pomm area to understand its existing identity and characteristics.
- d. Digital and physical models are used to study the site and explore design options.
- e. The research also involves analyzing previous design projects and case studies to understand how place identity has been addressed in practice.
- f. The aim of the research is to create a design proposal driven by the investigation of the existing place identity.
- g. The proposed design aims to enhance the place identity of the Cassina de Pomm area by focusing on activities, preserving existing elements, and opening up the park to the canal.
- h. The research emphasizes the importance of understanding one's own biases and environmental history when designing spaces.
- i. The paper discusses the importance of public opinion, time, maintenance, and material choices in shaping and preserving place identity.
- j. The research concludes with a discussion of the challenges and limitations of the design proposal⁶³

3.3.2 The methodology of this article's study of the site

The methodology of this article's study of the site involves several key methods, including research by design, site visits, and analysis of existing projects.

Firstly, the main method used in the research is research by design, which is a method for generating knowledge through

⁶³ Mentioned on Page 5, 11, 12--Rolff O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala:SLU, Dept. of Urban and Rural Development

design and solving wicked problems. This method involves an iterative design process where different design options are tested and refined to find a solution that addresses the challenges of the site and enhances its place identity. The research by design approach allows for the exploration of various design possibilities and the integration of research and design in a cyclical manner.

Secondly, the study includes a site visit to the Cassina de Pomm area to understand its existing identity and characteristics. The site visit provides an opportunity to observe and experience the physical environment, activities, and historical elements of the site, which contribute to its place identity. This on-site investigation allows for a deeper understanding of the site's context and informs the design proposal.

Additionally, the research involves analyzing previous design projects and case studies to understand how place identity has been addressed in practice. By examining these examples, the study gains insights into successful approaches and strategies for enhancing place identity. This analysis helps inform the design proposal and ensures that it aligns with best practices and lessons learned from previous projects.

Overall, the methodology of this study combines research by design, site visits, and analysis of existing projects to comprehensively understand the existing place identity of the Cassina de Pomm area and propose a design that enhances its identity. These methods allow for a holistic and informed approach to the redesign process⁶⁴.

3.3.3 The main points of the article

- The article explores the concept of place identity and its influence on the redesign of the Cassina de Pomm area in Milan.
- The study uses research by design, site visits, and analysis

⁶⁴ Mentioned on Page 5, 11--Rolff O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala:SLU, Dept. of Urban and Rural Development

of existing projects as methods.

- The hidden canal system in Milan and its historical significance are discussed, along with the interest in reviving the Naviglio canal.
- The study aims to understand the current identity of the Cassina de Pomm area and use it as a guide for the design proposal.
- Previous projects and case studies are examined to understand how place identity has been addressed in practice.
- The physical environment, activities, and historical elements of the site contribute to its identity.
- The importance of understanding one's own biases and environmental history when designing spaces is emphasized.
- The proposed design aims to enhance place identity by focusing on activities, preserving existing elements, and opening up the park to the canal.
- The design proposal includes features such as seating areas, a playground, outdoor gym, and improved pathways.
- The goal is to create a green and accessible space for residents and visitors.
- The proposal suggests using different colors and symbols to separate pedestrian and cycling paths, preserving historic elements, and holding festivals to build a sense of community.
- The importance of site visits in understanding place identity and the potential risks of relying too heavily on digital models are discussed.
- The importance of public opinion, time, maintenance, and material choices in shaping and preserving place identity is highlighted.

3.3.4 In redesigning the Cassina de Pomm area, the study utilises design research as a way of exploring the concept of local identity

The study uses research by design as the main method to explore the concept of place identity in the redesign of the

Cassina de Pomm area. Research by design is a method for generating knowledge through design and solving wicked problems. It involves an iterative design process where different design options are tested and refined to find a solution that addresses the challenges of the site and enhances its place identity.

By employing research by design, the study integrates research and design in a cyclical manner, allowing for the exploration of various design possibilities and the integration of knowledge gained through the design process. This approach enables the researchers to investigate the existing place identity of the Cassina de Pomm area and use it as a guide for the design proposal.

Through the research by design method, the study aims to answer questions such as what aspects and characteristics constitute the existing place identity of Cassina de Pomm and how place identity can guide the redesign of the area. The iterative nature of the research by design process allows for the testing and refinement of design ideas based on the understanding of the site's identity, resulting in a design proposal that is driven by the investigation of place identity. Overall, the study utilizes research by design as a methodological approach to explore and integrate the concept of place identity into the redesign of the Cassina de Pomm area, ensuring that the design proposal aligns with the existing identity of the site⁶⁵.

3.3.5 The historical significance and current interest in reviving the hidden canal system in Milan

The historical significance of the hidden canal system in Milan, including the Navigli canal, lies in its role in the city's development and the development of the northern regions of Italy on the Po Plain. The canals were initially built in the 10th century to drain agricultural land and enable cultivation. Over time, the canal system was expanded and improved,

⁶⁵ Mentioned on Page 5, 11--Rolff O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala:SLU, Dept. of Urban and Rural Development

allowing for regulated water levels and the use of the canals as transportation routes for goods and raw materials.

The canals played a crucial role in facilitating the transport of goods from the cities and lakes in northern Italy to the Adriatic Sea through a network of lakes, rivers, and constructed canals. However, with the advent of railways and automobiles in the 20th century, the canal system lost its purpose as a transportation system and was covered to make way for cars.

Currently, there is a growing interest in reviving the hidden canal system in Milan. This interest has led to an architecture competition that seeks to strengthen the place identity and design of several areas along the canal. The revival of the canals is seen as an opportunity to bring back Milan's "water city charm" and enhance its historical identity. The reopening of the canals is viewed as a way to preserve and celebrate the city's history and create a unique and vibrant urban environment.

Overall, the historical significance of the hidden canal system in Milan and the current interest in its revival stem from its role in the city's development, its potential to enhance place identity, and the desire to preserve and celebrate Milan's historical heritage⁶⁶.

3.3.6 The way in which the proposed design solution creates a sense of local identity for Cassina de Pomm whilst retaining existing elements

The proposed design proposal aims to create a sense of place identity for Cassina de Pomm while preserving its existing elements. The design follows the identity of the existing park, and some parts of the park will be retained in order to preserve the familiar elements that contribute to the identity of the current location.

Additionally, the design proposal includes the use of a blue glass pillar as a common symbol to create a unifying

⁶⁶ Mentioned on Page 6, 21, 22--Rolff O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala:SLU, Dept. of Urban and Rural Development

identity along the canal. These glass pillars would be placed by all bridges, casting a blue shadow on the bridge and conceptualizing a water surface, symbolizing the presence of the canal even if it is not fully open.

Furthermore, the proposal suggests the creation of a festival that would happen yearly while the canal is reopened. This festival would allow people to start creating a place identity for the canal even before all places are opened, fostering a sense of community and engagement.

By incorporating these elements, the design proposal aims to create a sense of place identity for Cassina de Pomm that respects and preserves its existing elements while enhancing its historical and cultural significance.

The last part of the products is the Cassina de Pomm design. The project was created from the reflections in the river that were appreciated during the visit to the site. The design will be based on the existing features of the floor. The decision not to completely change the park was made out of respect for the relationship between people and the park. This means that the floor parts are in good condition. To reinforce the identity of the river, there are two main routes for the entire canal. The first, like the first reference project, was created using the blue glass columns of all the bridges as a common symbol, with the aim of creating a unique identity. The glass column casts a blue shadow over the bridge, reflecting the natural water seen in front of the bridge below. The second approach for the entire river is to create an annual festival when the canal opens. Using the long-term project and festival information, one can begin to create a site marker for the river without opening all the sites.⁶⁷

Overall, the article provides a comprehensive analysis of the concept of place identity and presents a well-considered design proposal for the Cassina de Pomm area. It demonstrates a strong understanding of the historical significance, physical environment, and activities that

contribute to place identity. The inclusion of case studies, research methods, and the emphasis on public opinion add depth and credibility to the article.

⁶⁷ Mentioned on Page 6--Rolf O.(2022).Reflections - A redesign of the area around Cassina de Pomm with focus on place identity.Uppsala:SLU, Dept. of Urban and Rural Development



04

Urban analysis and design proposal

4.1 Urban analysis

4.2 Case study

4.3 Urban Masterplan strategy

As stated in chapter 1.3, the objectives of this thesis can be divided into three points, which in short are, as a first step, the development of a plan and strategy for the reopening of the entire 8 kilometres of the Navigli Canal Path in Milan, as a second step, the redevelopment of the site in a specific area (Parco Archeologico), and as a final step, the re-design of the derelict buildings on the site. Thus, our whole design proceeds sequentially from urban planning to site design to architectural design, i.e. it proceeds logically from the whole to the parts to the details. And this chapter starts with the first step. It starts with the collection of information about Milan and the canal route, analyses the problems and draws conclusions, and then develops a design proposal.

4.1 Urban analysis

4.1.1 The municipalities of Milan

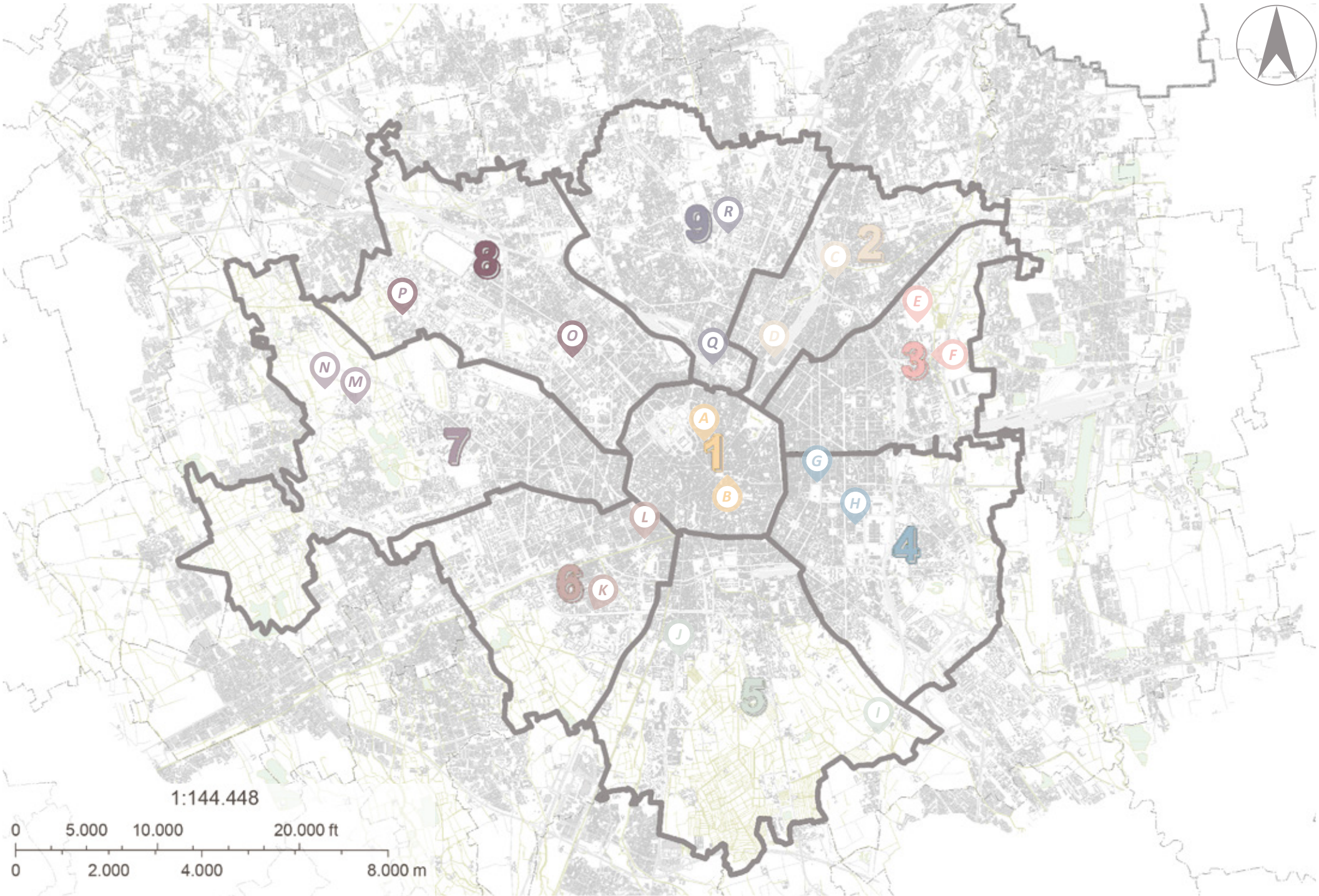
Milan is divided into nine municipalities (Italian: municipi or zone; known as zone di decentramento, "decentralization zones" from 1999 until 2016). They are numbered from 1 to 9. The organization was established in 1997, implemented in 1999 and reformed in 2016; prior to that the city was divided into 20 administrative zones⁶⁸.

Each municipality is a segment that starts in the centre and reaches the city limits, so central areas and peripheral areas are part of the same area. The Parco archeologico site belongs to the municipality 1 and is located at the bottom of its south-western edge, bordering the north-eastern edge of the municipality 6.

It's likely that both municipalities work together on matters related to this specific area to ensure effective administration and coordination between neighboring areas. This type of administrative structure is designed to address the unique needs and challenges of each part of the city while fostering collaboration between adjacent municipalities when necessary.

⁶⁸ Municipalities of Milan
Source: https://en.wikipedia.org/wiki/Municipalities_of_Milan

4.1.1 The municipalities of Milan



Map.1 The municipalities of Milan
Source: Prepared by the author

Informations	Municipalities								
	Municipality1	Municipality 2	Municipality3	Municipality4	Municipality5	Municipality6	Municipality7	Municipality8	Municipality9
Name	Centro storico	Stazione Centrale, Gorla, Turro, Greco, Crescenzago	Città Studi, Lambrate, Venezia	Vittoria, Forlanini	Vigentino, Chiaravalle, Gratosoglio	Barona, Lorenteggio	Baggio, De Angeli, San Siro	Fiera, Gallarate, Quarto Oggiaro	Stazione Garibaldi, Niguarda
Surface(km²)	9,67	1258	1423	2095	2987	1828	3134	2372	2112
Inhabitants	98531	162090	144110	161551	126089	151291	175465	188367	187773
Density(ab/km²)	10189	12884	10127	7711	4221	8276	5598	7941	8890

Table 2. Information statistics on the municipal districts of Milan
Source: Prepared by the author

4.1.2 The landmarks in Milan

Milan is a city rich in history and culture with numerous landmarks and attractions. Here are some of the most notable landmarks in Milan:

a. Milan Cathedral (Duomo di Milano): This iconic cathedral is one of the largest in the world and features stunning Gothic architecture. Visitors can climb to the rooftop for panoramic views of the city.

b. Galleria Vittorio Emanuele II: A magnificent shopping arcade, this historic structure is known for its impressive glass and iron roof, as well as its high-end shops, cafes, and restaurants.

c. Sforza Castle (Castello Sforzesco): This historic castle houses several museums, including art, history, and science museums. The castle itself is an impressive architectural landmark.

d. Leonardo da Vinci's "The Last Supper": Located in the Convent of Santa Maria delle Grazie, this famous mural is a masterpiece of Renaissance art.

e. Brera Art Gallery (Pinacoteca di Brera): An important art gallery with a vast collection of Italian and European art, including works by Caravaggio, Raphael, and Rembrandt.

f. La Scala Opera House (Teatro alla Scala): One of the most renowned opera houses in the world, it's a symbol of Milan's rich cultural heritage.

g. Basilica of Sant'Ambrogio: A stunning church known for its Romanesque architecture, it is one of the oldest churches in Milan.

h. Bosco Verticale: These residential towers are covered in greenery and are a modern architectural marvel, often

referred to as "Vertical Forest."

i. Navigli Canals: The historic canals are lined with cafes, shops, and restaurants, making them a popular spot for leisurely strolls and evening entertainment.

j. San Lorenzo Columns (Colonne di San Lorenzo): These ancient Roman columns are a historical site and popular meeting point in the city.

k. The Royal Palace of Milan (Palazzo Reale): A former royal palace turned museum, it hosts a variety of exhibitions and is known for its grand architecture.

l. Porta Nuova District: A modern development in Milan, featuring innovative architecture and skyscrapers like the Unicredit Tower.

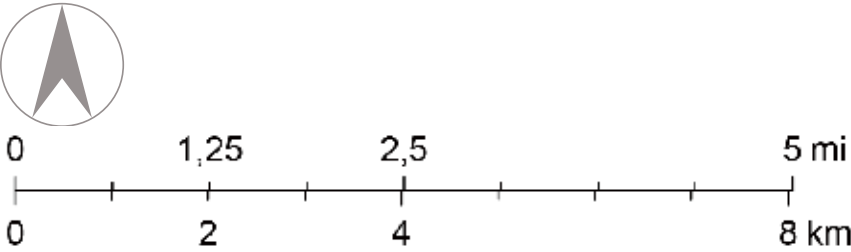
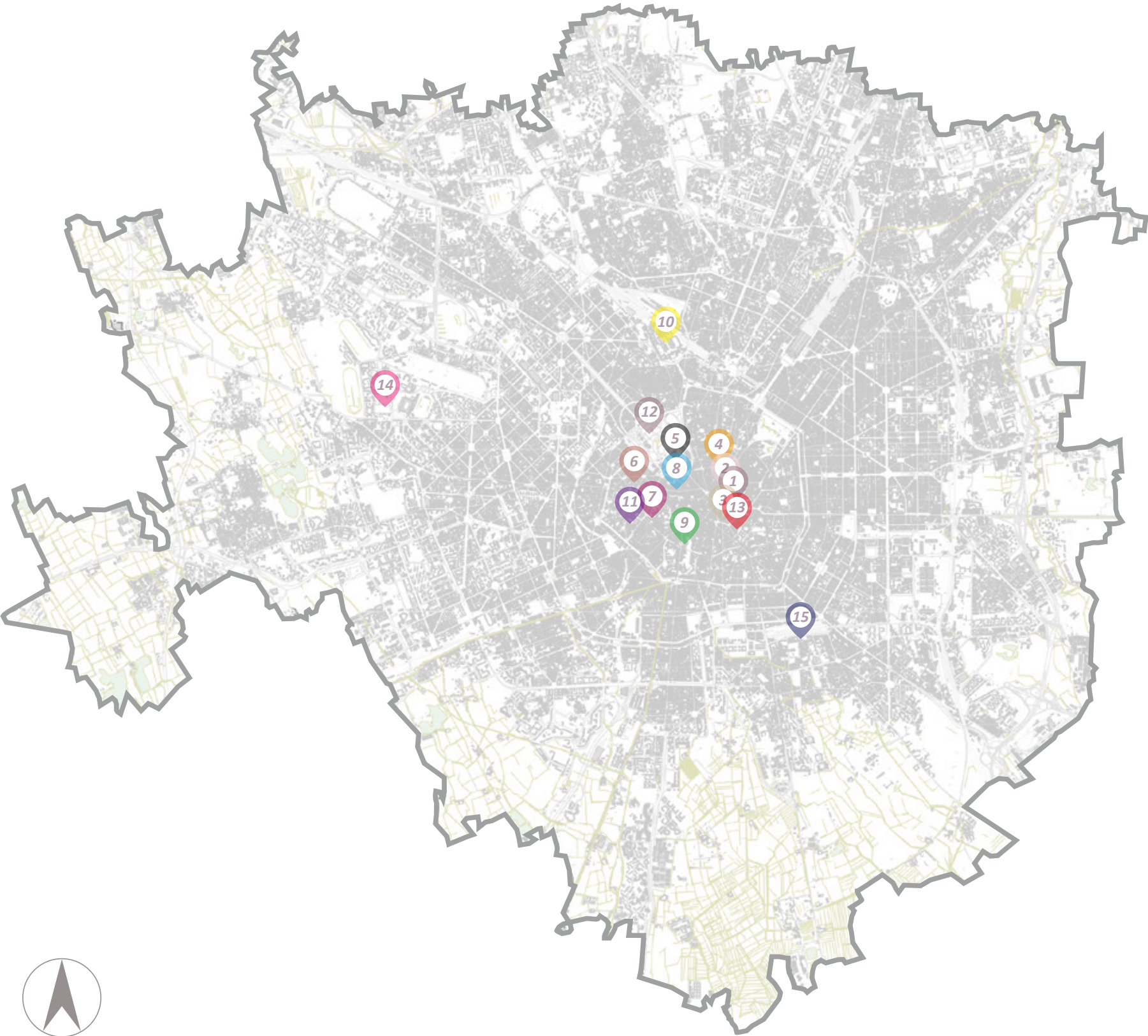
m. Monumental Cemetery (Cimitero Monumentale): An impressive cemetery known for its artistic and architectural value, featuring beautiful sculptures and monuments.

n. Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci: A science and technology museum that pays homage to the inventor Leonardo da Vinci.

o. Biblioteca Ambrosiana: A historic library and cultural institution founded by Cardinal Federico Borromeo in the early 17th century, it houses an extensive collection of manuscripts and artwork.

These are just a few of the many landmarks and attractions that you can explore in Milan, a city that beautifully combines its historical heritage with modern architecture and cultural treasures.

4.1.2 The landmarks in Milan



1.Duomo di Milano



2.Galleria Vittorio Emanuele II



3.Royal Palace of Milan



4.Teatro alla Scala



5.Sforzesco Castle



6.Santa Maria delle Grazie



7.Sant'Ambrogio



8.San Maurizio



9.Basilica di San Lorenzo



10.Monumental Cemetery



11.Museo Nazionale Scienza



12.Parco Sempione



13.Torre Velasca



14.San Siro Stadium



15.Fondazione Prada

Map.2 The landmarks in Milan
Source: Prepared by the author

4.1.3 The green areas in Milan

Milan offers several green areas and parks where residents and visitors can relax, enjoy nature, and escape the hustle and bustle of the city. Here are some of the notable green spaces and parks in Milan:

a. Parco Sempione: Located near the Sforza Castle, this expansive park is one of Milan's most famous green areas. It features beautiful gardens, walking paths, and a picturesque lake. The park is home to the Arena Civica, an open-air sports and concert venue.

b. Giardini Pubblici Indro Montanelli: These historic gardens are located near the Porta Venezia gate. They offer a serene escape with tree-lined paths, statues, and a natural history museum, Museo Civico di Storia Naturale.

c. Parco delle Basiliche: This park surrounds the Basilica of San Lorenzo and the Basilica of Sant'Eustorgio. It's a peaceful oasis in the heart of the city, with green lawns and beautiful trees.

d. Parco Lambro: A large park along the Lambro River, it's an excellent place for picnics, jogging, or cycling. The park offers a natural escape from the urban environment.

e. Orto Botanico di Brera: The botanical garden located in the Brera district is a place of serene beauty with a variety of plants, flowers, and trees.

f. Parco Nord: This massive park in the northern part of the city offers a vast expanse of greenery, walking trails, and recreational facilities.

g. Boscoincittà: A city forest located in the northern part of Milan, it provides a peaceful environment for nature lovers with walking trails and greenery.

h. Parco Forlanini: Located near Linate Airport, this park offers open spaces, playgrounds, and paths for jogging and cycling.

i. Monte Stella (Montagnetta): This artificial hill offers panoramic views of the city and is a favorite spot for hiking and picnicking.

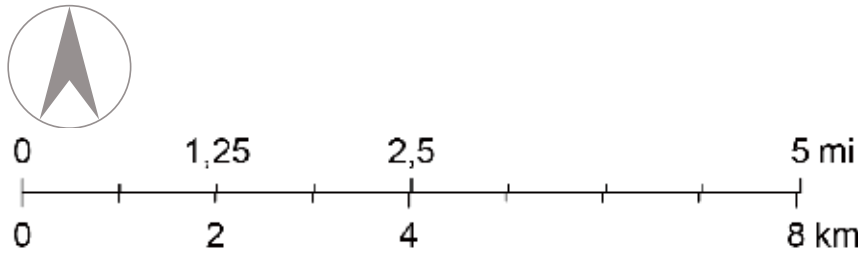
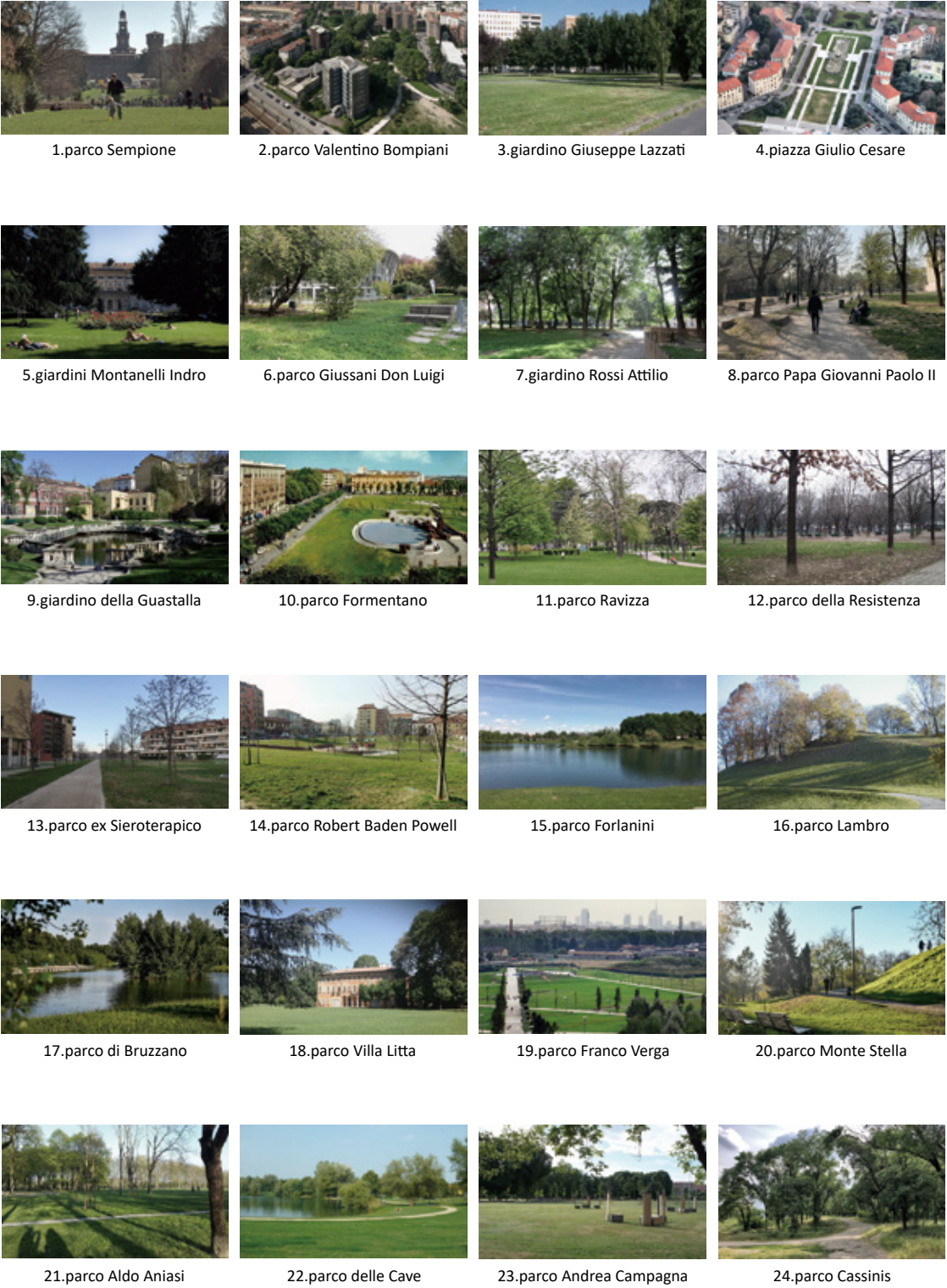
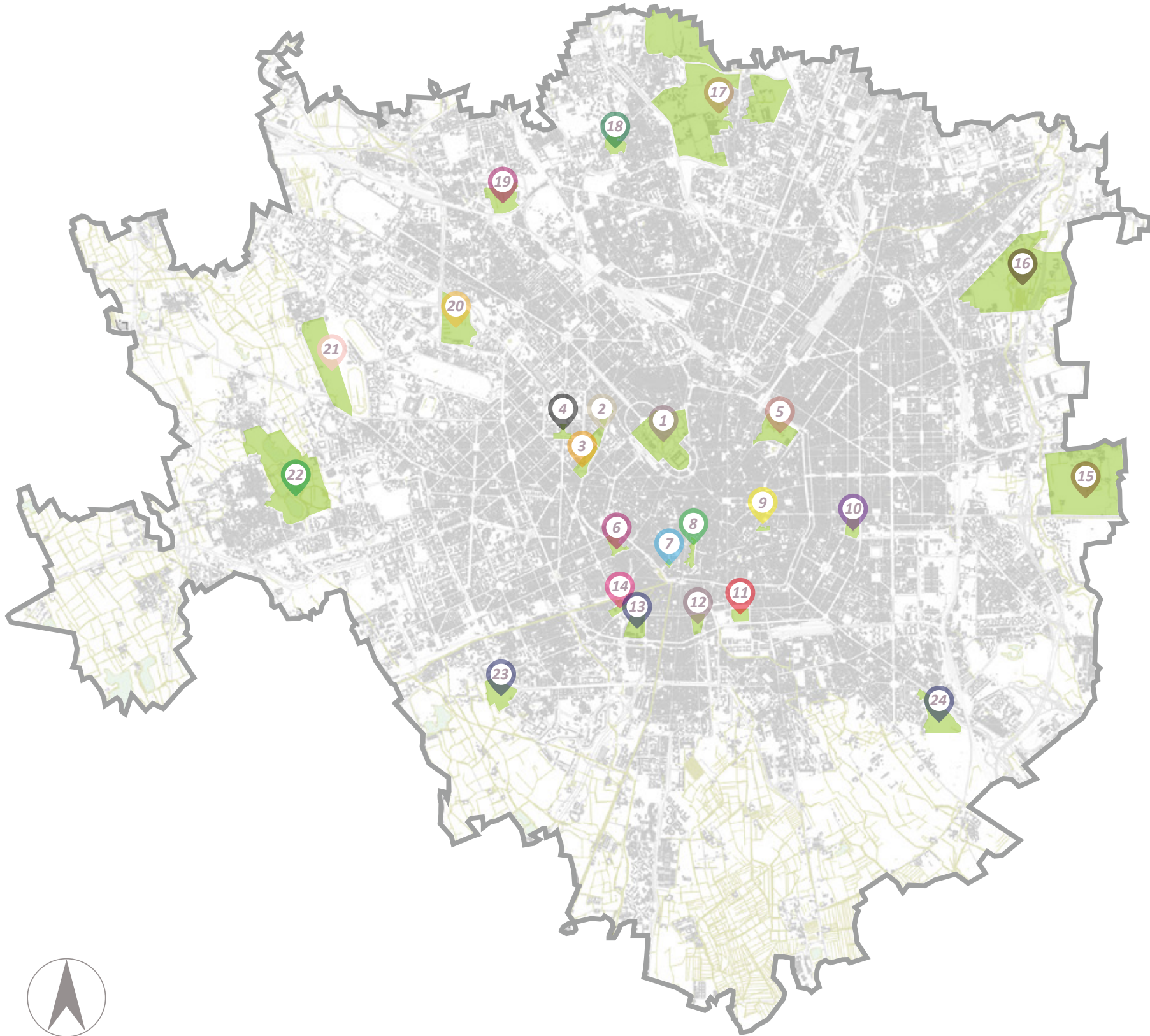
j. Parco Ravizza: A charming neighborhood park in the Navigli district, it features playgrounds, green spaces, and a pond.

k. Idroscalo: Located just outside Milan, this artificial lake and recreational area offer water sports, beach activities, and a large green space for relaxation.

l. Parco Porta Nuova: A modern park in the Porta Nuova district, it features contemporary landscape architecture, open spaces, and unique plantings.

These green areas provide opportunities for outdoor activities, relaxation, and enjoying nature within the bustling city of Milan.

4.1.3 The green areas in Milan



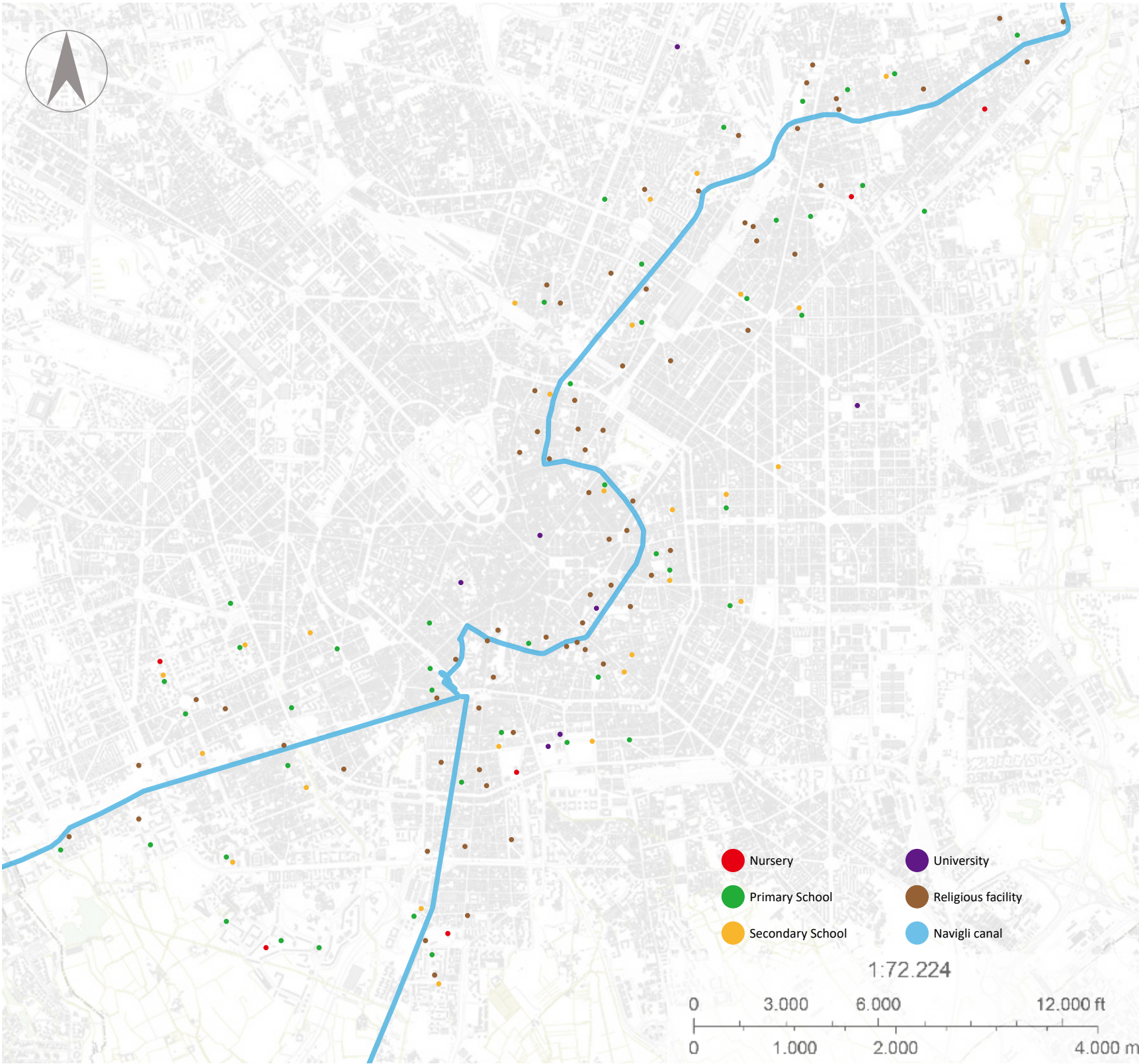
Map.3 The green areas in Milan
Source: Prepared by the author

4.1.4 Cultural and educational institutions along the Navigli

Along the Naveli Canal there are many cultural and public facilities, typically churches and schools. They reflect to a certain extent the type of population (age composition, numerical distribution) in which the community is distributed. Older churches might indicate a long-standing religious community, while modern schools might suggest a younger, growing population. The demographic characteristics, such as age and numerical distribution, are often linked to the development of educational and religious institutions in an area. The presence of churches and schools along the Naveli Canal suggests that these are vital community institutions.

Churches often have historical and cultural significance, and schools are essential for education. The location of these facilities along the canal might indicate a historical center or an area where the community congregates.

4.1.4 Cultural and educational institutions along the Navigli



Map.4 Cultural and educational institutions along the Navigli Source: Prepared by the author



4.1.5 Analysis of the living aspect of Milan

Distribution of municipal solid waste treatments in Italy in 2019-2020, by method

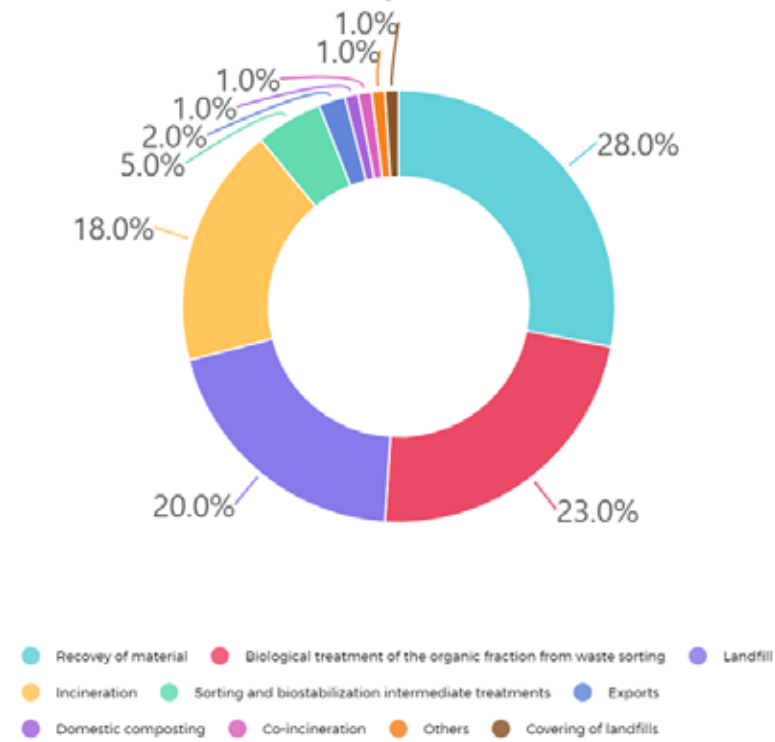


Chart.1 Distribution of municipal solid waste treatments in Italy in 2019-2020, by method
Source: Prepared by the author

Distribution of the total primary energy supply in Italy in 2021, by energy source

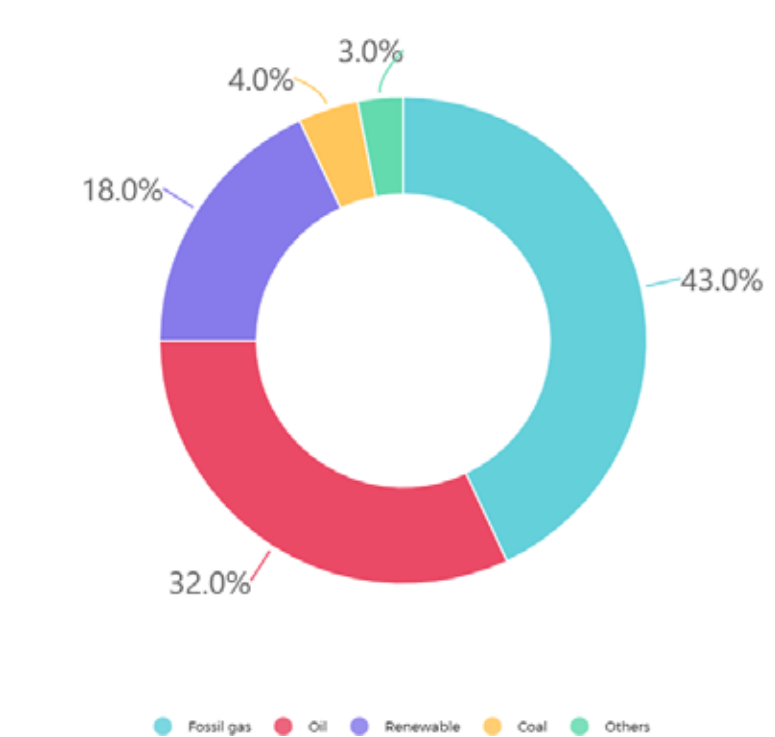


Chart.2 Distribution of the total primary energy supply in Italy in 2021, by energy source
Source: Prepared by the author

Monthly percentage of solar, wind, heating and cooling degree days in Milan

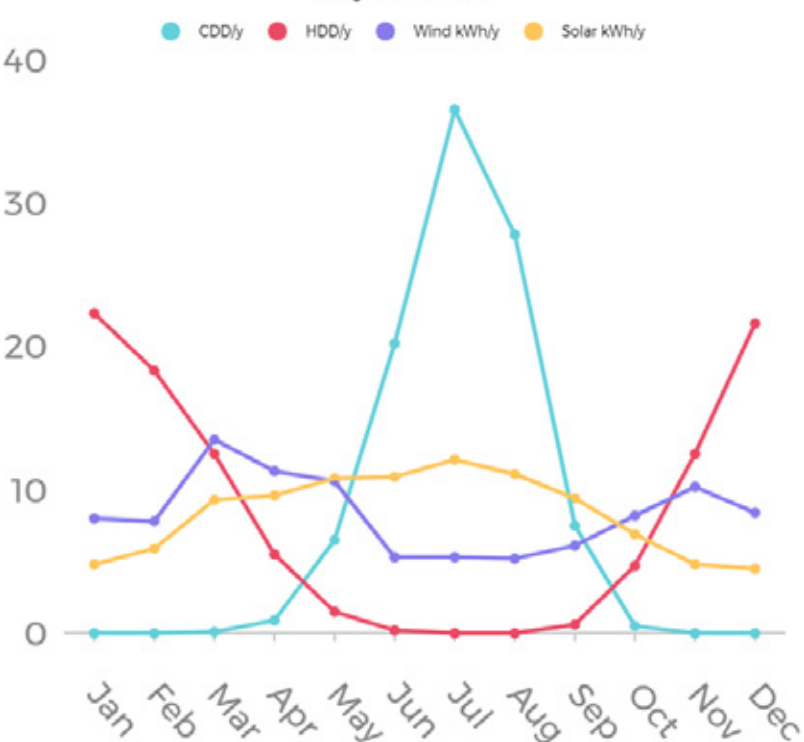


Chart.3 Monthly percentage of solar, wind, heating and cooling degree days in Milan
Source: Prepared by the author

Population Comparison (M)

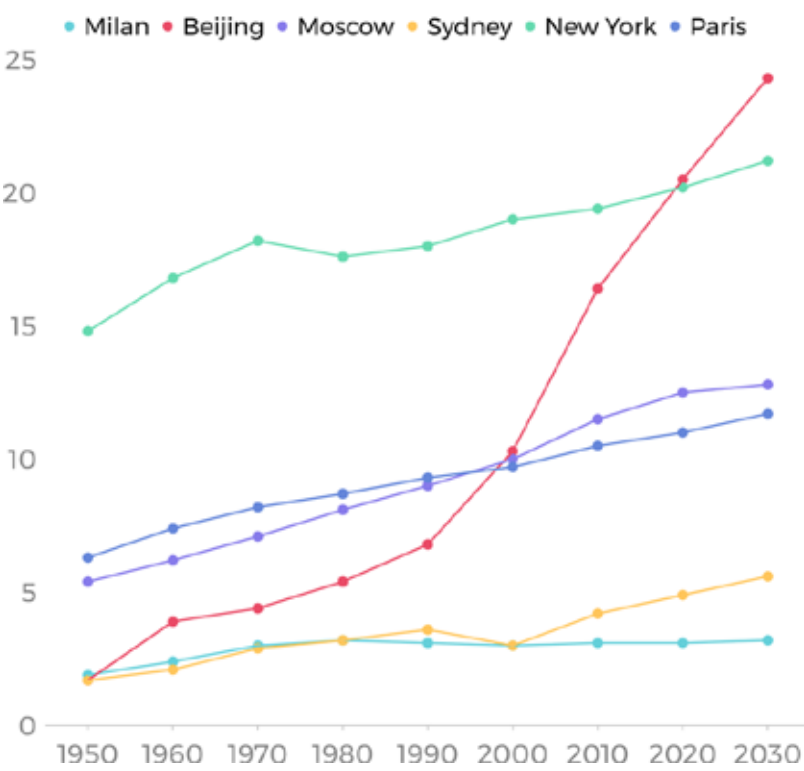


Chart.4 Population Comparison (M)
Source: Prepared by the author

4.1.5 Analysis of the living aspect of Milan

Milan's life quality score(0-100)

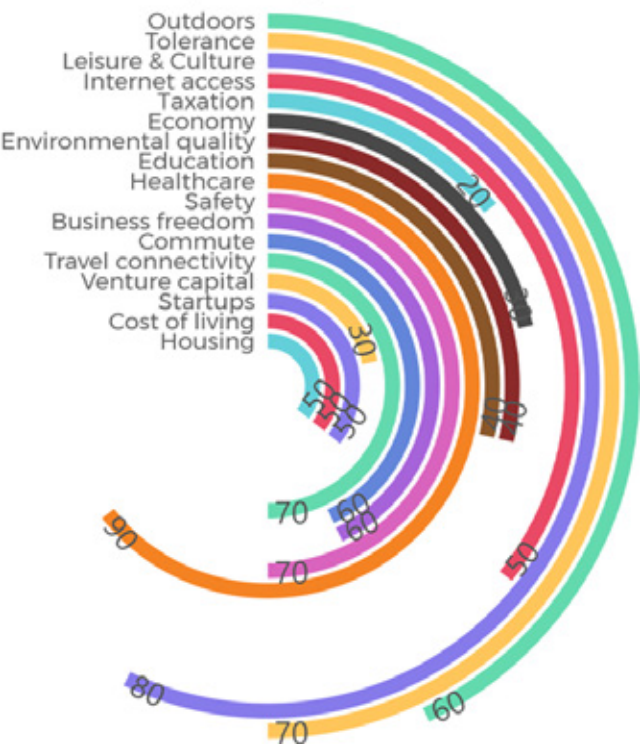


Chart.5 Milan's life quality score(0-100)
Source: Prepared by the author

Crime index comparison (0-100)

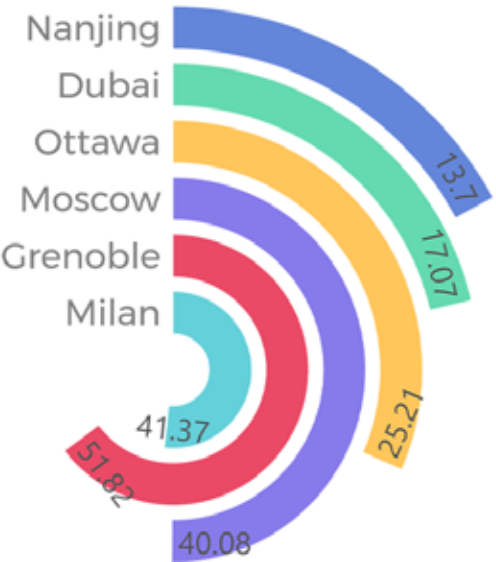


Chart.6 Crime index comparison (0-100)
Source: Prepared by the author

4.1.6 Public transit statistics in Milan

Milan is sixth in the world, again according to the Kantar City Mobility Index, for the availability of options and economic accessibility of the available transport modes. Unfortunately, this does not always translate into positive emotional attitudes: Milan barely exceeds the global average in the Commuter Happiness Index which records the movers' emotions in dealing with commuting every day.

In terms of Shared Mobility, it ranks eighth globally and third in Europe just behind the German leaders, but drops dramatically behind the French neighbors from Paris to Amsterdam to London, when assessing the integrated transport system from the environmental point of view, due to the high percentage of movers who choose to travel by car, alone (24.4%).

In any case, Mobility Futures shows that individuals are open to change, in the assessment of how to move in their city. The "lone motorists" are precisely those who seek alternatives and highlight a growing desire to move on foot, by bike, or by car as a passenger, instead of driving, to better exploit the time of travel.

Milan has adopted an Urban Sustainable Mobility Plan, PUMS, which aims to radically change the state of the city's mobility over the next 10 years. A series of sharing options are being promoted, including cars, bicycles, e-bikes, scooters, increase (and improvement) of the cycle path, and the construction of a Mobility as a Service System, MaaS, which includes the integration of the pricing of the public transport. The goal is to have a single transport "ticket" on the Mobility as a Service model that includes all transport models and services - including the sharing system.⁶⁹

⁶⁹ Innovative cities: Berlin leader of city mobility in the world, Milan in the top 10
Source: <https://www.digitaxi.it/eng/articolo.php?id=232>

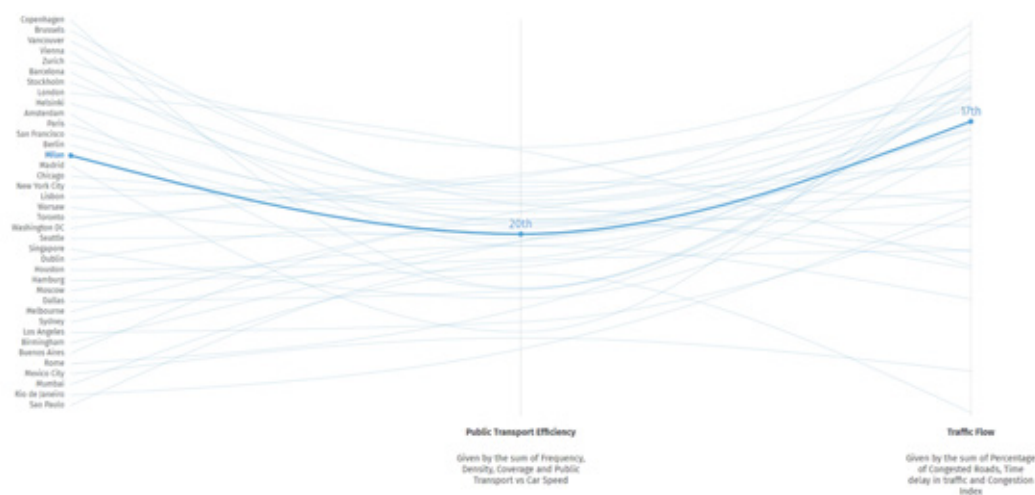


Chart.7 A visual comparison of key connectivity indicators across all cities
Source from: <https://urbanmobilityindex.here.com/city/milan/>

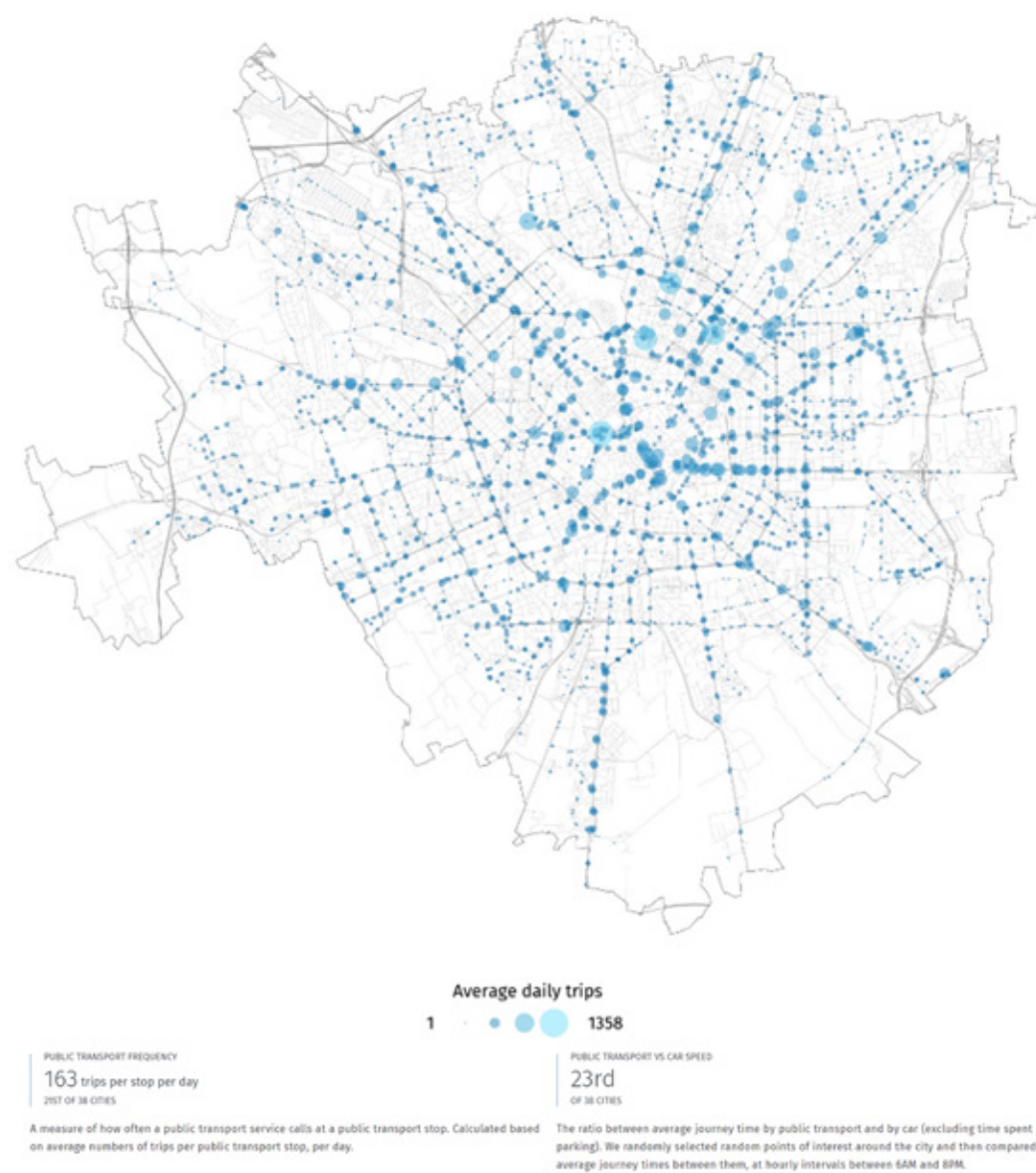


Chart.8 Public Transport Efficiency-Frequency
Source from: <https://urbanmobilityindex.here.com/city/milan/>

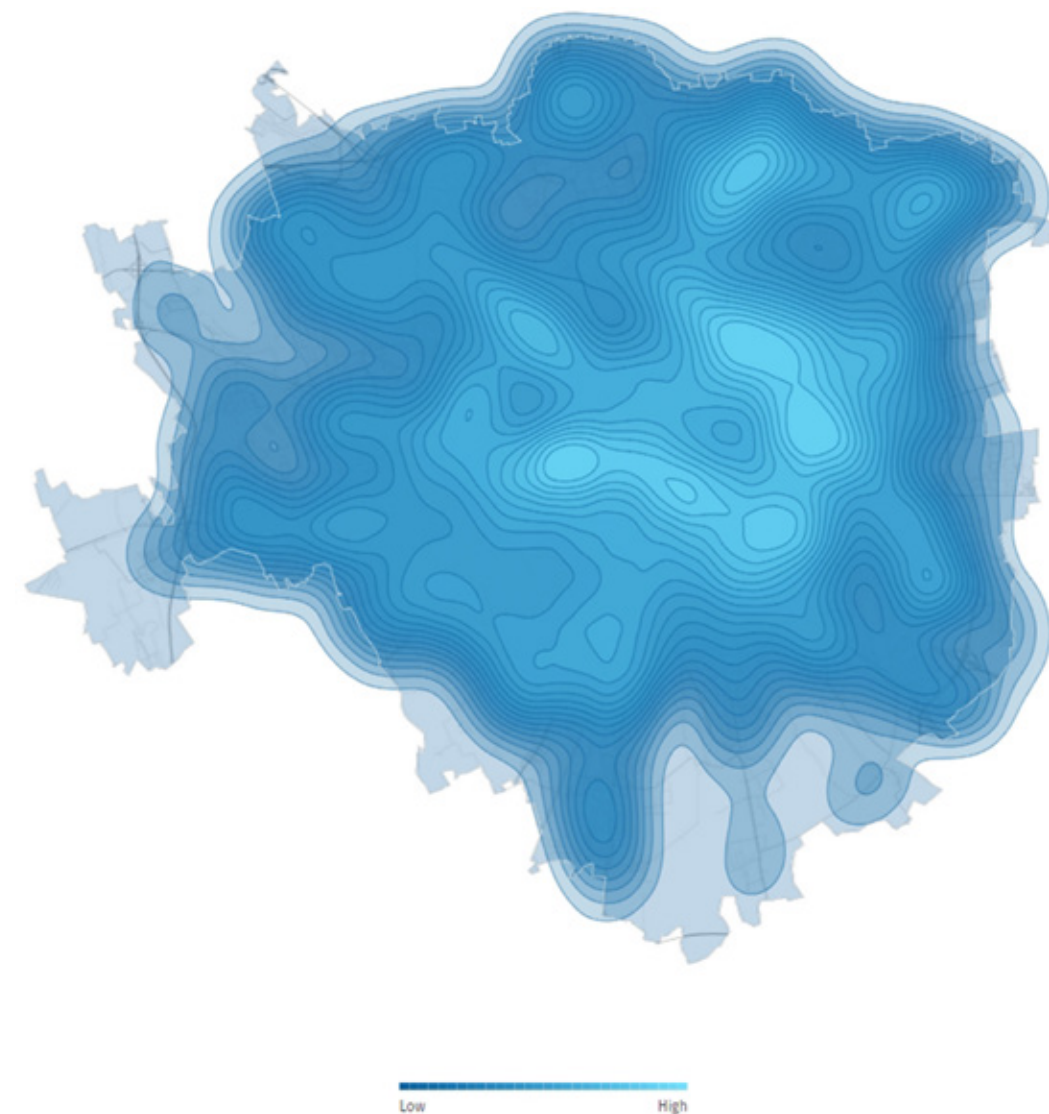


Chart.9 Public Transport Efficiency-Coverage
Source from: <https://urbanmobilityindex.here.com/city/milan/>

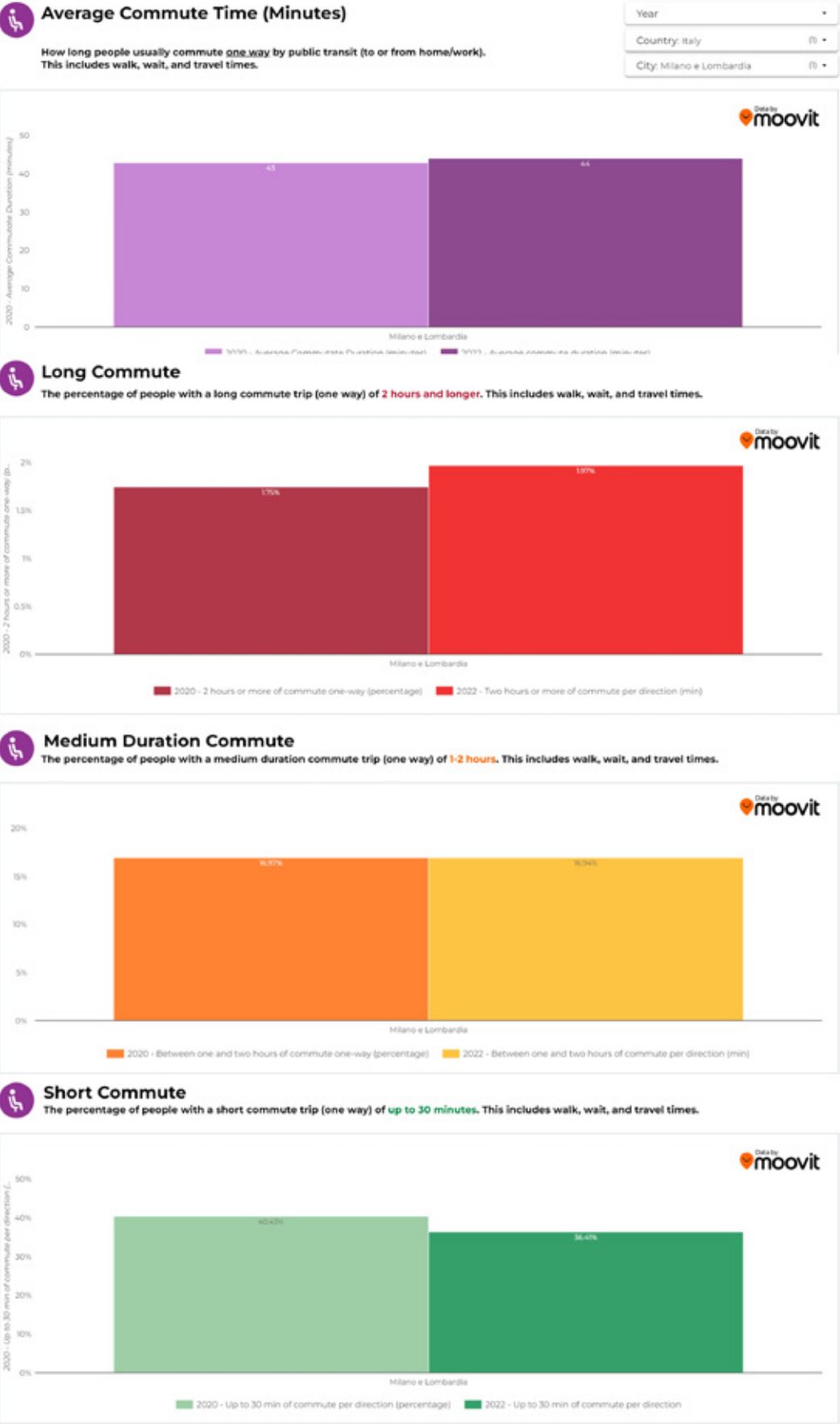


Chart.10 Milan commute time statistics

Source from: https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-countries



Chart.11 Milan commute waiting time statistics

Source from: https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-countries

4.2 Case study

The Navigli canal reopening project is an important urban regeneration project in Milan. The project is of great value from an environmental and landscape point of view, allowing the whole city to regain its ancient charm, restoring the great Milanese and Lombardy waterway system so that it can once again fulfil its proper transport function, especially in terms of tourism, from Lake Maggiore and Lake Como to the Po River and on to Venice and the Adriatic Sea. The reopening of the Navigli will attract tourists from all over the world, helping to strengthen the economy linked to tourism and adding value to Milan's architectural heritage.

The advantages that the reopening of Navigli could bring to Milan include:

- Improve the livability of the city's impersonal roads that have been built over time
- Reactivate and enhance historic sites and urban landscapes
- Protecting the urban environment, reducing the number of cars and improving the quality of life by starting a truly sustainable development process.

In the above description and analysis it is easy to see that the 8km long canal runs through the city of Milan and through the different municipal districts, so we can assume that its opening up can form a close link with the different attractions of the different districts and play a positive role in mutually promoting the economic, cultural and ecological development of the surrounding areas. The reopened Navigli network The reopened Navigli network does not concern only about mobility, it has the strong potential to become a linear ecological system that's able to create transversal ecological corridors along the whole Lombardy territory, increasing the environmental quality of the territories it crosses.

Based on these factors, two similar urban regeneration schemes were selected for analysis and study: Manhattan BIG U Protective Landscape Planning and Minhang Riverfront

Regeneration.

The primary goal of this chapter is to find and present renovation cases related to urban canals or waterfront areas. The two cases in this chapter are studied from the perspectives of a large urban scale and a small block scale, thus from a holistic to local perspective, Aiming to provide a comprehensive perspective through cases covering both large city scale and small neighborhood scale, highlighting the similarities and differences in approaches, outcomes, and challenges faced in these renovation cases. This analysis helps provide a well-rounded understanding of the subject matter.

4.2.1 2016 ASLA HONOR AWARD Analysis & Planning: Re-build by Design, The Big U by Starr Whitehouse Landscape Architects and Planners



Figure 19. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

Project data

Name: THE BIG U – REBUILD BY DESIGN

Code: HUD

Date: 21/03/2014

Program: Urbanism

Status: In Progress

Size in m²: 1000000

In 2012, Hurricane Sandy struck New York with unprecedented force, killing 43 people, flooding more than 9,000 buildings, leaving 2 million people homeless and causing \$19 billion in damage. The hurricane revolutionised the understanding of the dangers of climate change. The US Federal Emergency Management Agency's (FEMA) new Flood Hazard Zone (amended after Hurricane Sandy) includes 16 kilometres of Manhattan's coastline, and is home to 26.47 million square metres (285 million square feet) of floor space, 21,000 businesses, the New York Stock Exchange and the Financial District, a tourist attraction that draws 57.2 million visitors annually, and 200,000 residents (including 95,000 who are low-income, elderly or disabled) are located there. Through the Rebuild by Design Competition, the City and the federal government challenged the design community to develop innovative ways to protect the harbour, and its residents, from future flooding. In Manhattan, the BIG U proposal, designed by BIG Associates, won the competition over more than 100 competitors.

The BIG Team, led by BIG Architects, unveiled the design for this ten-mile long park in Manhattan, New York back in 2014. As part of the restoration of Manhattan, which was hit by Hurricane Sandy in 2012, the project provides protection for the low-lying and fragile terrain, and is actually a flood protection infrastructure 'disguised' as a park. As an "undetectable flood barrier", its role is not only to protect against flooding, but also to improve the public realm and enhance social and environmental benefits. The programme will be implemented in phases to allow for flexible scheduling according to the conditions of each area.

New York's Big U, also known as the Dry Line, is reminiscent of the High Line, designed by landscape architect James Corner, also in Manhattan, New York. Converted from an abandoned elevated railway, High Line Park opened to residents and visitors in 2009 as a linear sky garden, providing a green space in a crowded city, connecting different neighbourhoods, and earning significant economic

benefits, making it a model for renovation projects and urban revitalisation. In fact, Bjarke Ingels, founder of BIG Associates, admits that the scheme was inspired by the success of the High Line Park, "Instead of waiting for the infrastructure to be decommissioned, why not change it into a place that can serve as a park as well as provide different flexible functions for residents?"

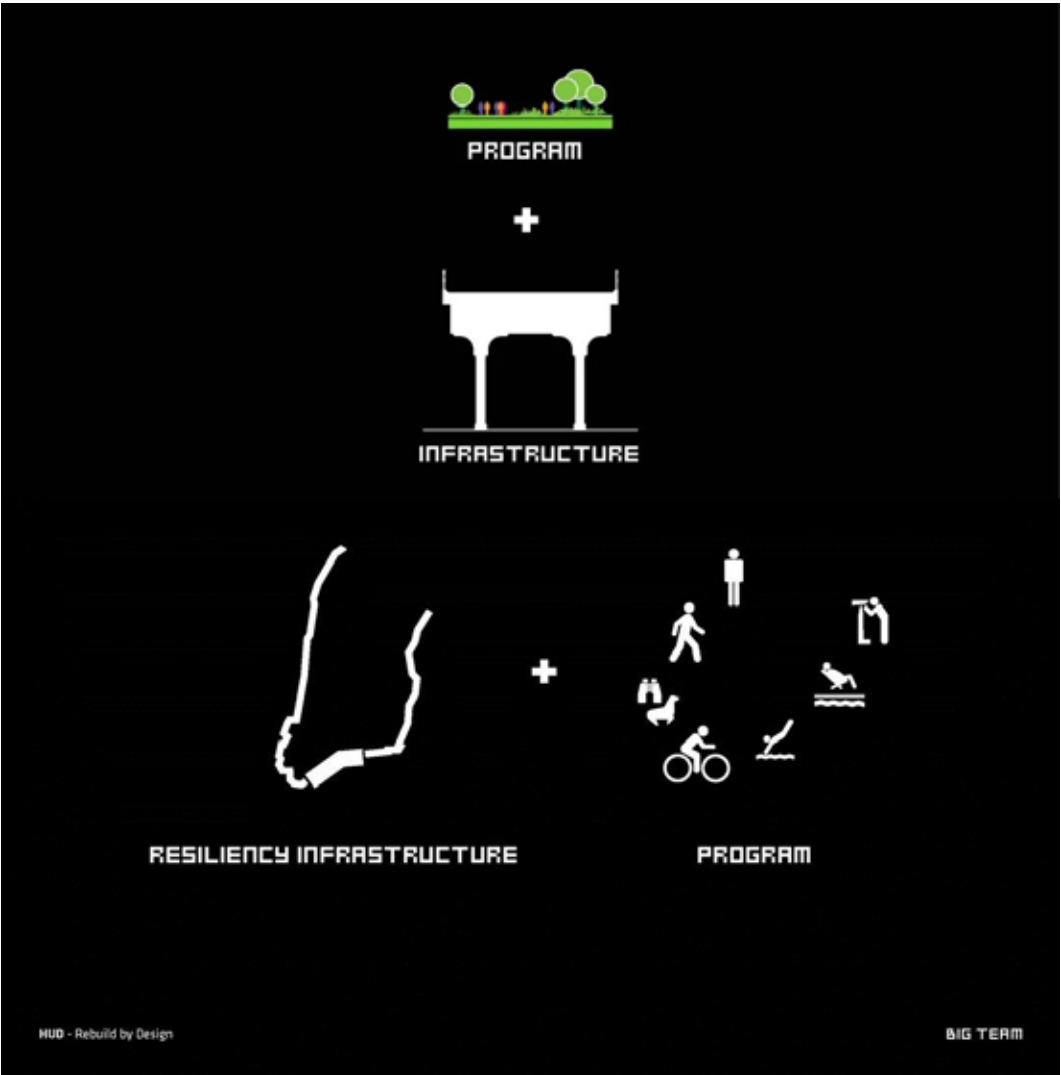


Figure 20. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

Built around Lower Manhattan, BIG U is a series of protective landscapes stretching from West 54th Street to East 40th Street, bringing needed cultural, recreational, and socio-economic benefits to the local area while protecting city neighbourhoods from the threat of heavy rainfall and sea level rise. The BIG U scheme consists of continuous zoning that protects a series of discrete flood zones, which together form a shield that protects the ability of New York to prosper and grow even in the face of climate change. The protective interventions, design choices, and amenities in each zoning district are tailored to meet the needs of the coastal communities they protect. Zoning takes into account additional project implementation and financing to protect the functional operation of the overall system. For the Redevelopment Design Competition, the BIG U proposal focuses on three zoning districts that were most devastated by Hurricane Sandy: C1 extends from 23rd Street through East River Park to Montgomery Street; C2 encompasses the area between the Brooklyn and Manhattan Bridges; and C3 extends southward from the Brooklyn Bridge to Battery Park.

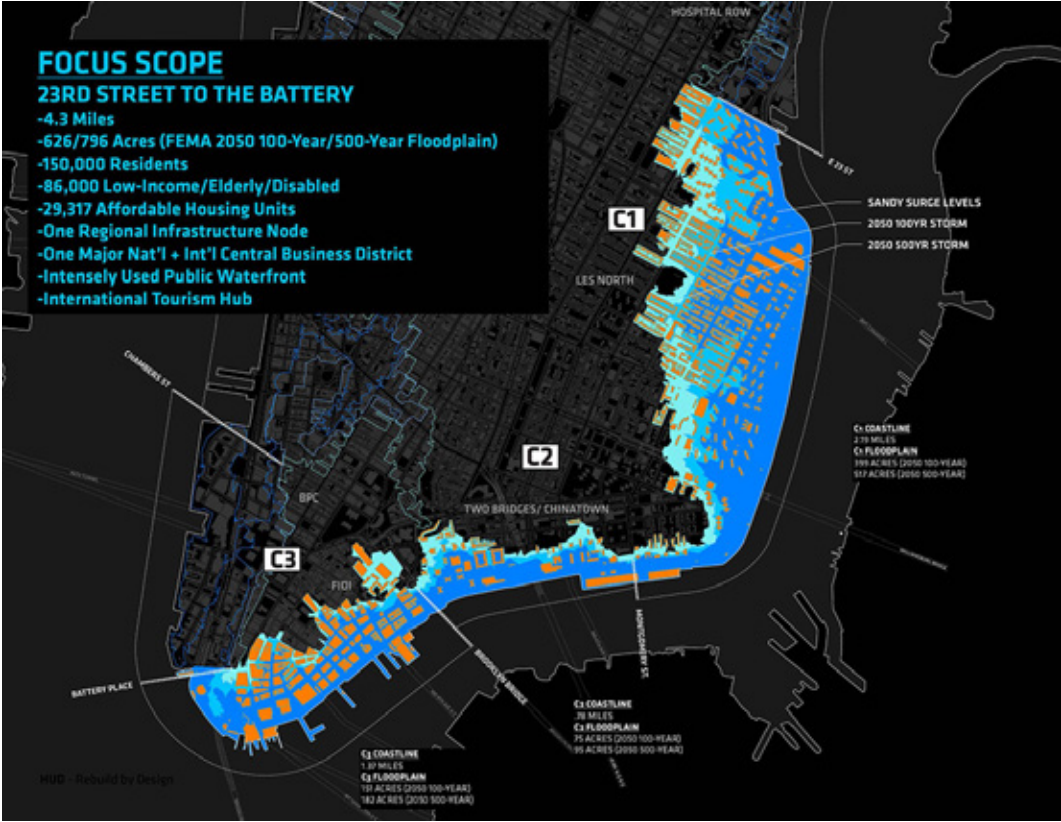


Figure 21. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

At C1, a 4.5-metre (15-foot) continuous, meandering berm depicts the East River Park topography and protects the Roosevelt Expressway (FDR Drive) and upland neighbourhoods. New pedestrian bridge circulation routes, bike lanes, and frequent pedestrian bridges enhance local connections to the riverfront and remove highway barriers. Extendable end road walls maintain traffic flow and protect the 14th Street Consolidated Edison substation. The park plan tailors amenities to the park's immediate neighbours while its scenic beauty and varied landscapes draw visitors to the site. On the higher ground, the landscape architects applied ecological wetlands and rain gardens to enhance the local urban experience and constructed green corridors to guide the park entrances.

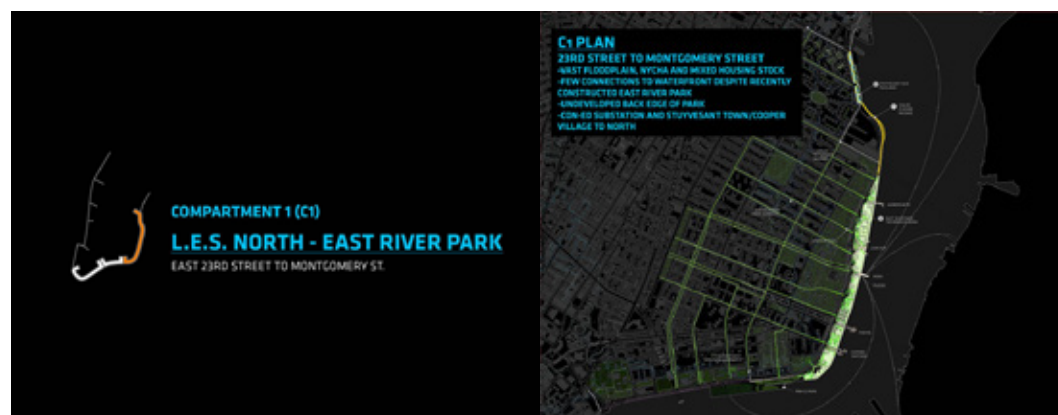


Figure 22. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

C2 incorporates a continuous, sinuous 1.2 metre (4 foot) bench that spans the Manhattan and Brooklyn Bridges, providing protection from lower rainfall and using extensible barriers to combat waves and storm surges. This low-profile bench maintains the water feature and opens up new spaces for recreation, markets, and social services. In the long-term conceptualisation of this area, landscape architects will allow the berm system to pass through existing featureless public housing parks, transforming them into flood-control landscapes that manage floodwaters and combine recreation, agriculture, social services, and economic opportunities.



Figure 23. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

C3 is an area of profound economic and cultural significance to the city and the nation. New berm landscaping and comprehensive cultural amenities in Battery Park rejuvenate one of the nation's most iconic open spaces while protecting its prominent financial centre. Beneath the FDR Drive, extendable barriers with low walls and berms create a multi-layered stormwater defence system that shelters the surrounding community and protects critical infrastructure. The landscape architects used community connections to form a diverse coalition of properties, including commercial entities, non-profits, public parks, and the Coastal Patrol, to advance the project further.

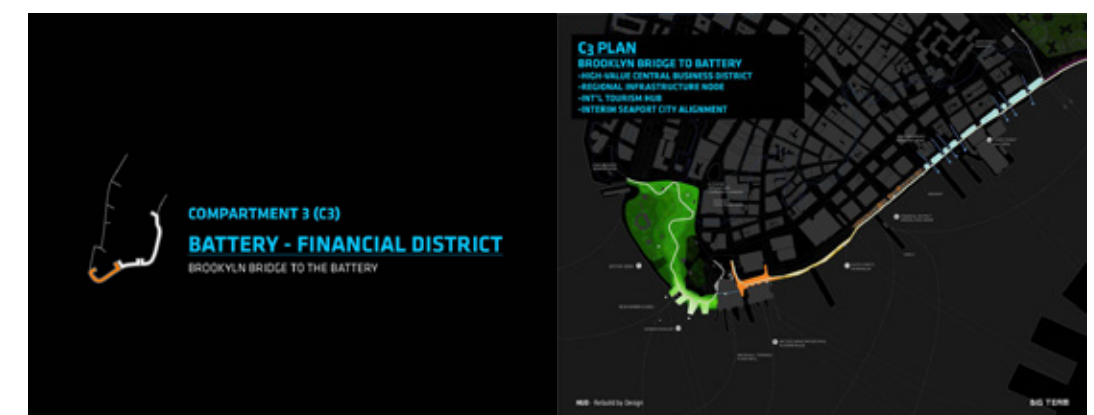


Figure 24. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

Each of the districts was planned and designed in close collaboration with community groups, with three districts encompassing three urban neighbourhoods, two waterfront districts, a ferry terminal, several social housing blocks, an expressway, multiple underground infrastructure networks, and miles of waterfront corridors. To balance these overlapping interests, the design team visited more than 100 organisations over a 16-week period, including city, state, and federal agencies, elected officials, and planning commissions, and more than 150 residents of the project area participated in a design workshop guided by the landscape architects to draw their own visions. The move to include protective measures in the open spaces of the social housing meant that the design team had to face up to a longstanding debate between residents, developers and the government. Through timely and frequent communication with community members and government officials, open and honest discussions with stakeholders about financial constraints and project choices, and by listening to the voices of the residents in the design and functionality of the project, the team was able to deliver a solution that was embraced and supported by all social groups.

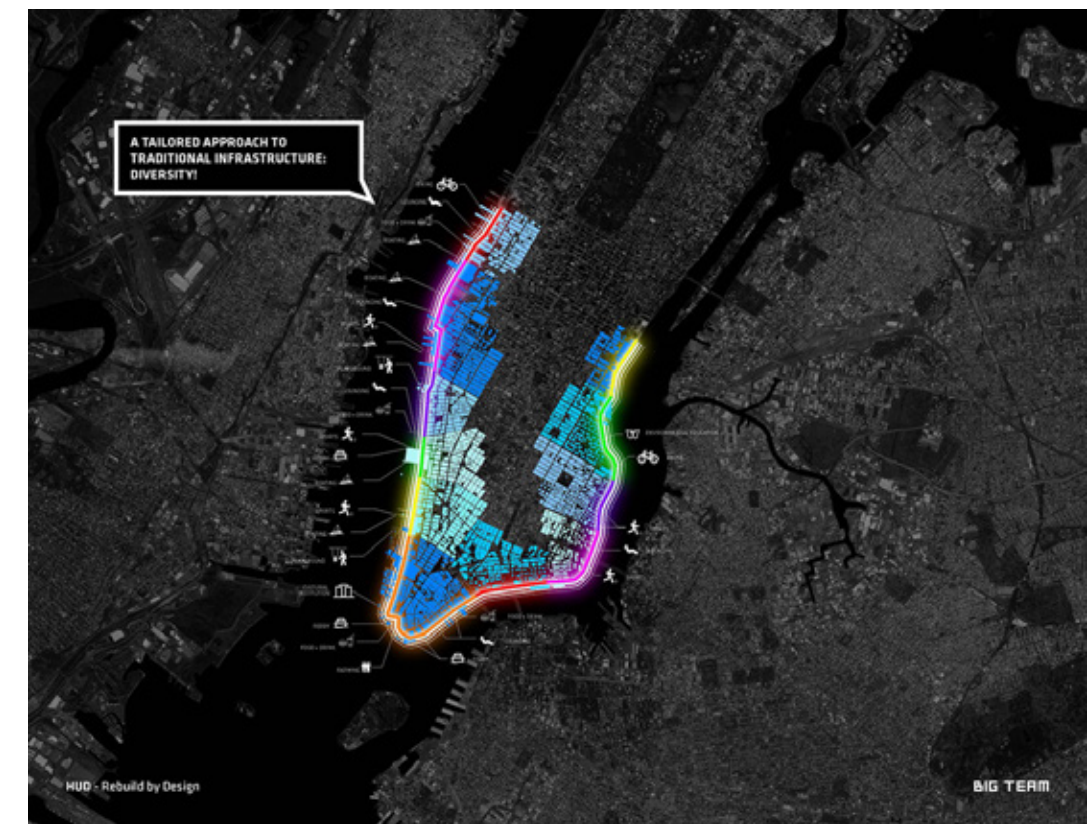


Figure 25. THE BIG U Source: BIG—Bjarke Ingels Group <https://big.dk/>

The Big U is recognised as a transformative blueprint for resilience that effectively maintains communities and economies and achieves responsive attention and interaction to community livelihoods, filling fragile, high-density, low-lying areas with incredible vitality. Not only does it resist flooding, it improves the public realm and enhances social and environmental benefits. Flood dams, no longer a wall between the city and the water, but different but connected pearls in a string set up for each community. This programme can also be implemented in phases, with flexible scheduling to suit each area. The Big U is a flood control system that links all the forces of society (the city, the housing authority, the community) in a veritable bond, while at the same time improving the urban environment and even increasing employment opportunities.

4.2.2 Minhang Riverfront Regeneration, Shanghai, China
by SPARK



Figure 26. Minhang Riverfront Regeneration
Source: <https://www.architechcn.com/news-view-2826.htm>



Figure 27. Minhang Riverfront Regeneration
Source: <https://www.architechcn.com/news-view-2826.htm>

Project data

Name: Reconstruction of Waterfront Landscape Public Space
on the East Bank of Hengjing Harbour, Minhang, Shanghai

Completion Date: 2021

Total area: 23,787 square metres

Project Design: SPARK

Minhang Riverside is a remarkable story of urban regeneration. Prior to the renewal, the area's overgrown riverbanks were in decay, facing paths leading to dilapidated industrial warehouses, as well as industrial and abandoned utilities, showing the area's years of neglect. Today it is a dynamic mix of commercial, technical, and administrative activities connected by the SPARK urban park, a spatial framework that has been updated in the current development. SPARK's proposal creates a 750 m-long entertainment environment that meets government and community requirements. The need for a place that promotes better pedestrian relations and promotes a sustainable living environment. SPARK's design concept uses single-celled diatoms as a sustainable project. Diatoms are beautiful types of algae, which purify water. Diatom shapes can be analyzed in two or three ways that keep riverbanks alive and tell the story of the river and the environment.

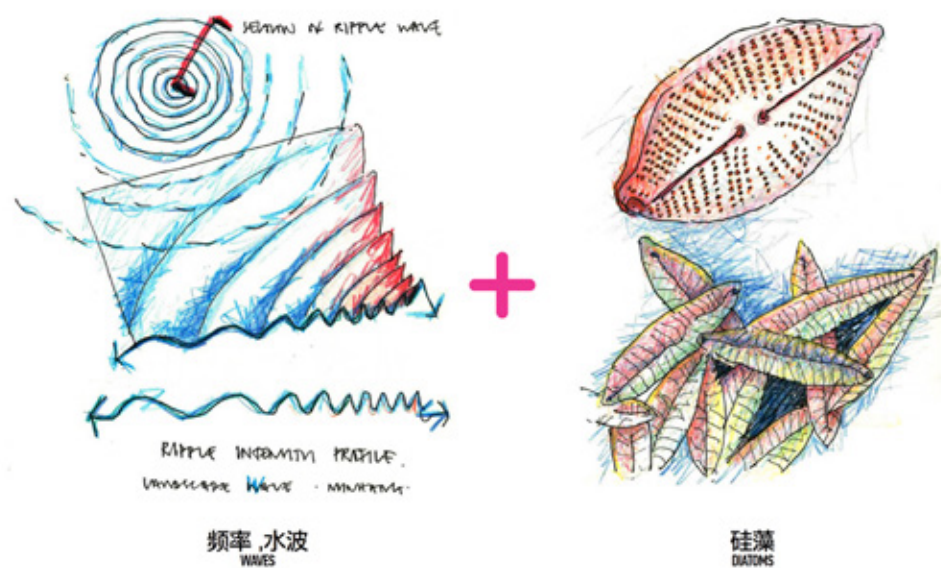


Figure 28. Landscape concept
Source: <https://www.architechcn.com/news-view-2826.htm>

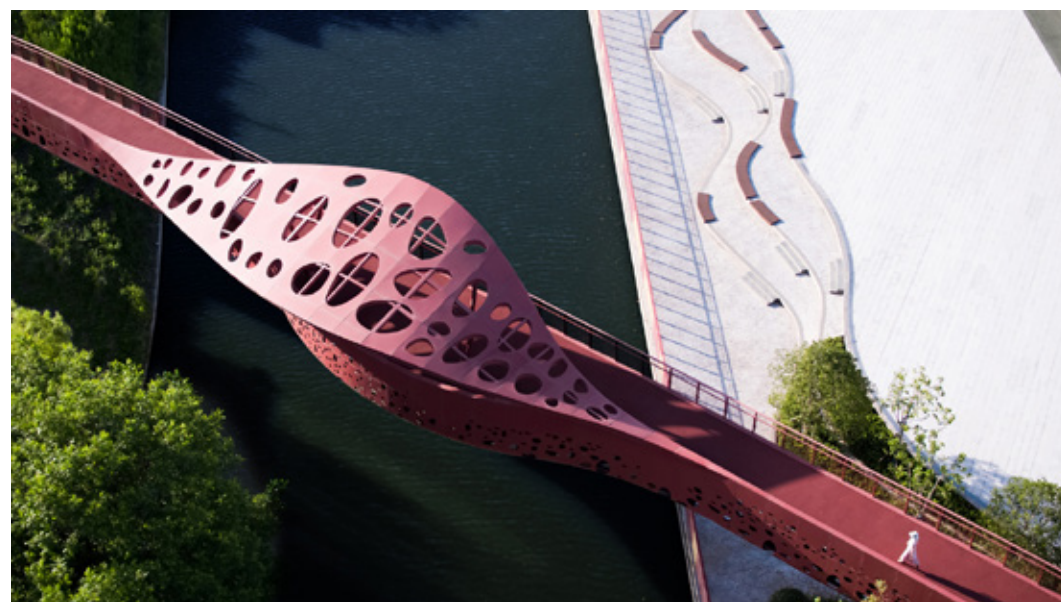


Figure 29. Diatom Bridge
Source: <https://www.architechcn.com/news-view-2826.htm>

The design of the riverfront includes a continuous green ribbon trail, a running track and bike path, and three pedestrian bridges that connect residential, educational, and commercial amenities in the community. The landscape was designed to enhance the creation of the waterfront experience by layering four distinct zones with accessibility to the river for the first time. These linear zones adopt an abstracted riparian form with innovative activity areas of lawns, cafes, sports parks and event plazas distributed along the riverbank.



Figure 30. Pedestrian bridge
Source: <https://www.architechcn.com/news-view-2826.htm>



Figure 31. Green ribbons of walking
Source: <https://www.architechcn.com/news-view-2826.htm>

SPARK also created a series of bespoke wayfinding signage and urban furniture to give storytelling and accessibility to the transformed environment. Stephen Pimbley, Partner at SPARK, says: "The Minhang Waterfront Regeneration Project is an excellent demonstration of how urban open space can be a key element of public regeneration and social sustainability. The project has fostered a sense of civic responsibility for the local area and set a local standard for the quality of life for future residents".



Figure 32. Riverside open space area
Source: <https://www.architechcn.com/news-view-2826.htm>



Figure 33. Bespoke wayfinding and furniture
Source: <https://www.architechcn.com/news-view-2826.htm>

"We are thrilled with the potential goals of this project and our imagination to bring new life to the riverbank and provide a safe, desirable environment that attracts locals, students, tourists and business people to explore this once forgotten riverbank and celebrate its rebirth," said SPARK's co-owner, Lin Wenhui.



Figure 34. Comparison of before and after regeneration
Source: <https://www.architechcn.com/news-view-2826.htm>

4.3 Urban Masterplan strategy

4.3.1 Thinking Maps - Step1 - Urban Perspective

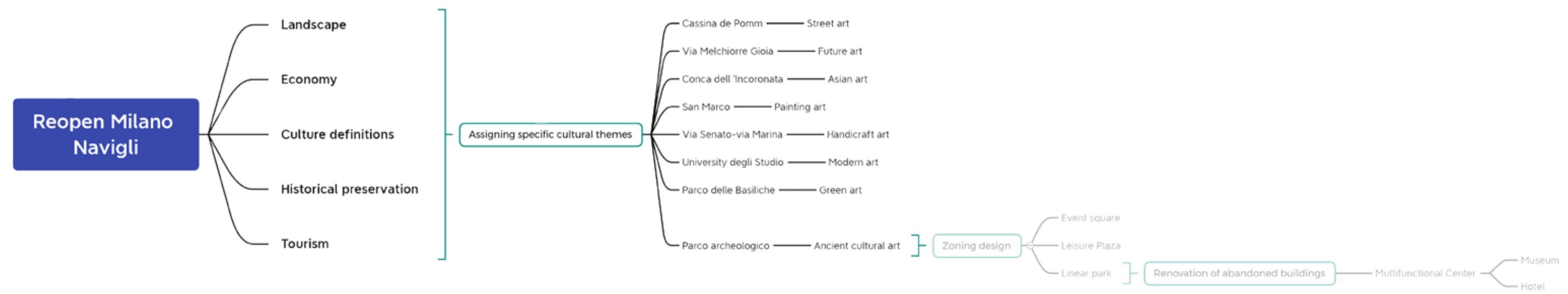
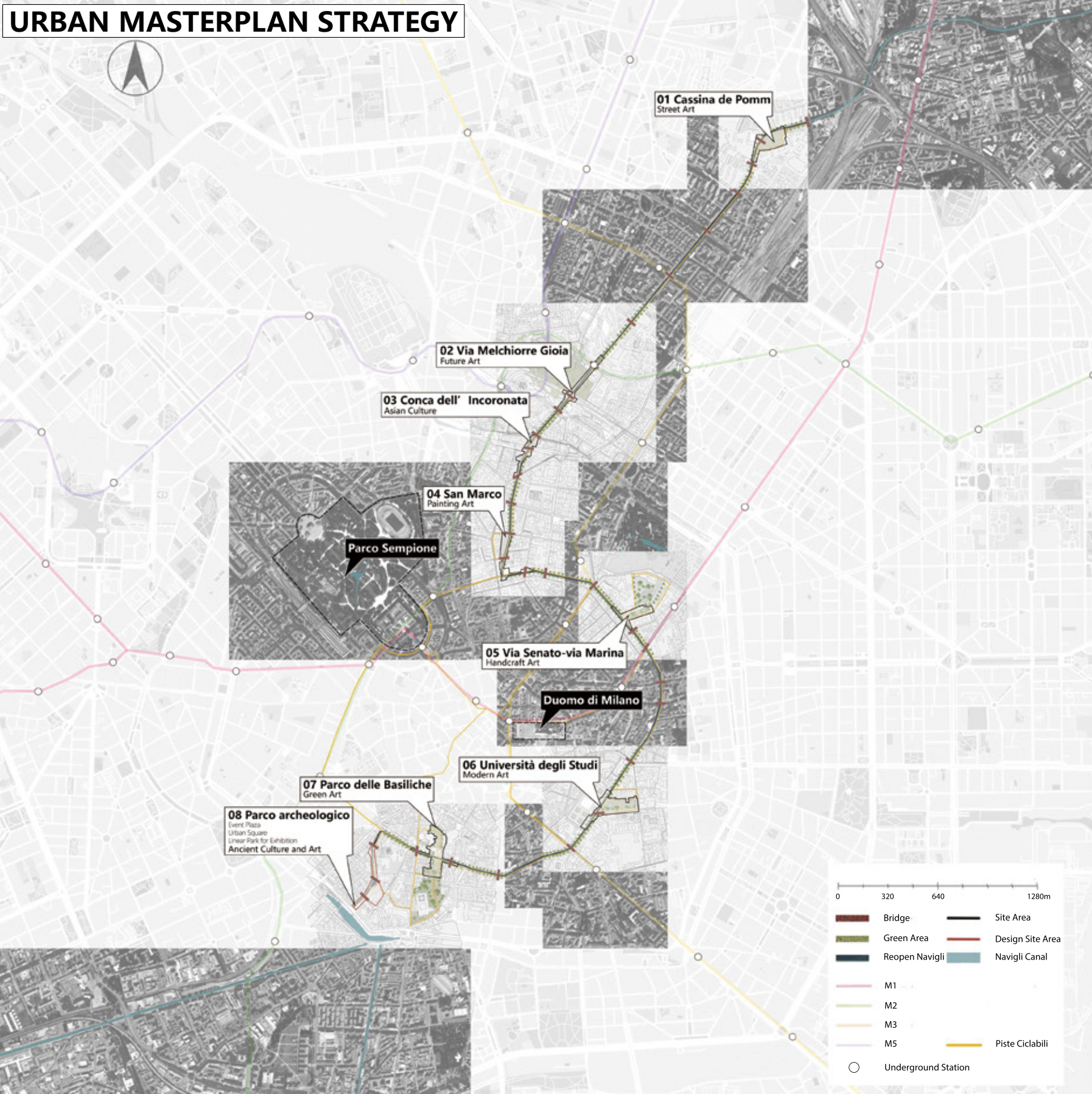


Chart.12 Thinking Maps - Step1 - Urban Perspective

Source: Prepared by the author

4.3.2 Urban masterplan



Map.5 Urban Masterplan strategy

Source: Prepared by the author



05

Parco Archaeologico - Site Analysis and Design Proposals

5.1 General information about the site

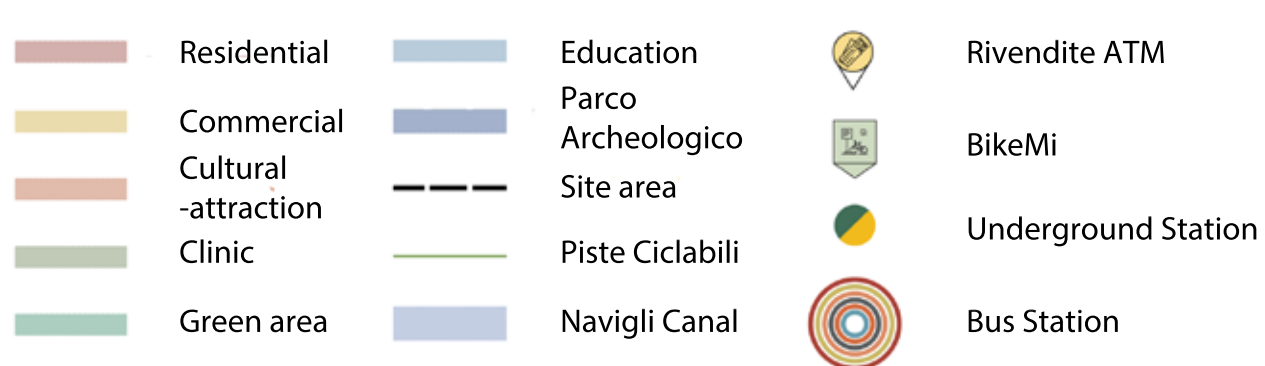
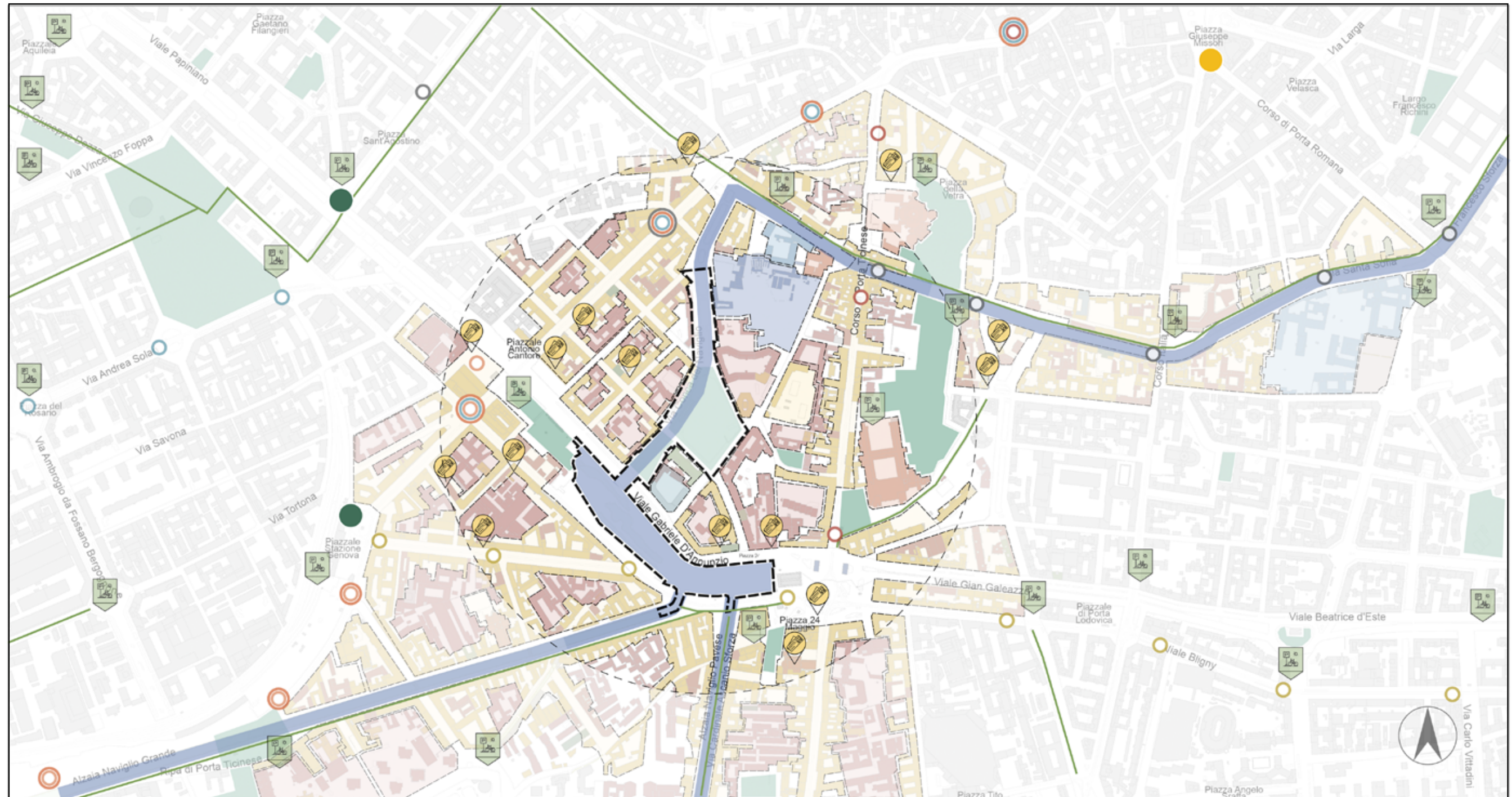
5.2 Analysis of key nodes on the site

5.3 Problems to solve and tasks

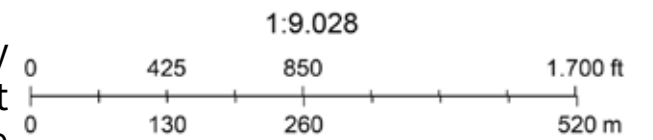
5.4 Case studies-Superkilen, Denmark/BIG

5.5 Design proposal for Parco Archaeologico

5.1 General information about the site



In section 3.2.8 above, we have already gained a basic understanding of the current state of the Parco archeologico site. As the focus of our study, the Parco archeologico site will be specifically analysed in this chapter. After this analysis, we will make a proposal for a targeted redesign.



Direzione Urbanistica - Area Pianificazione Urbanistica Generale
Comune di Milano

Map.6 General information about the site

Source: Prepared by the author

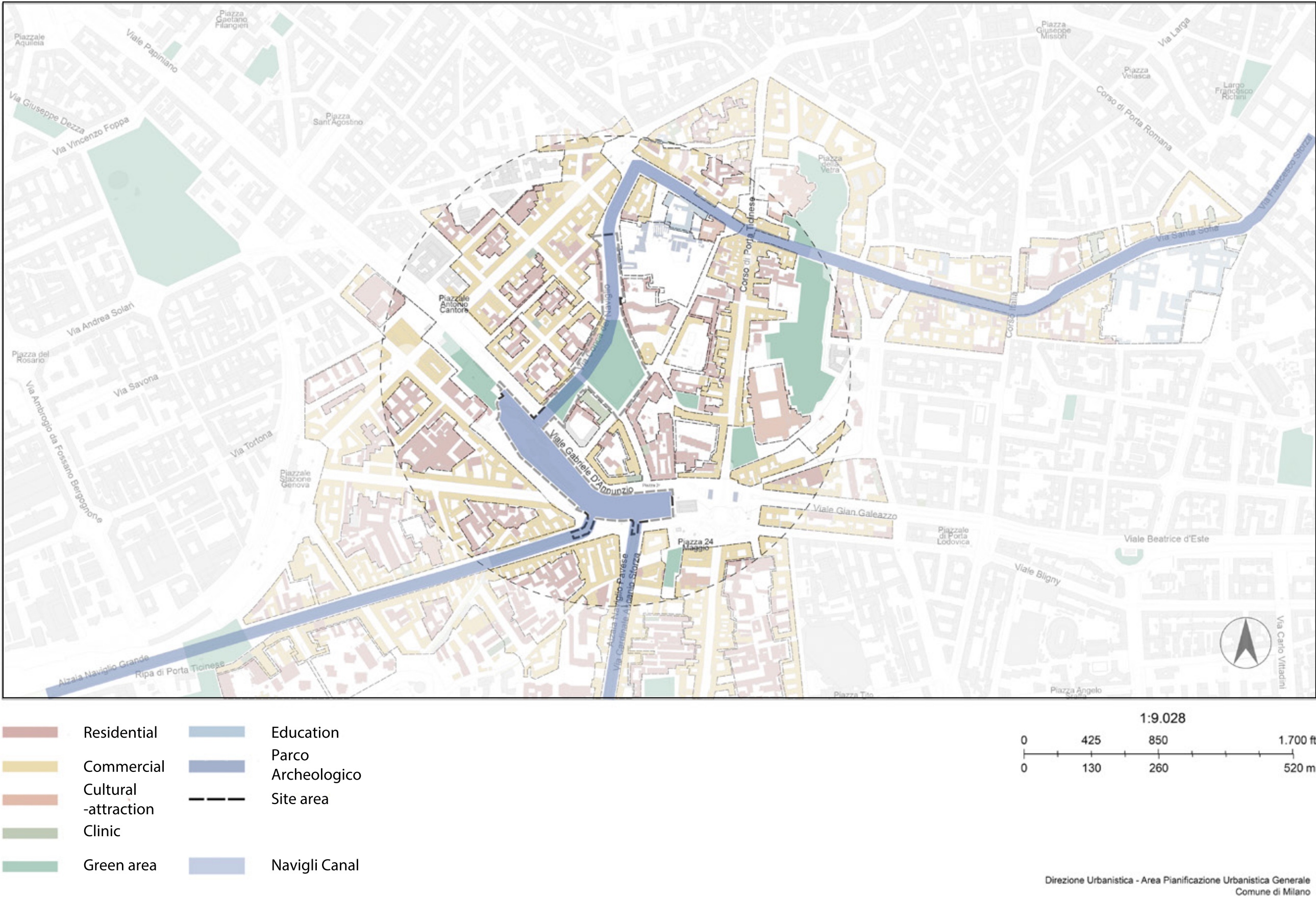
5.1.1 Landuse around Parco archeologico



 Residential	 Education
 Commercial	 Parco Archeologico
 Cultural -attraction	 Site area
 Clinic	 Abandoned
 Green area	 Navigli Canal

Most of the buildings around the site are residential buildings, and most of the buildings on both sides of the main road are mixed function buildings. (the ground and first floors are for commercial functions, and the first or more floors are for residential functions) It can be seen from the figure that both the north and south sides of the site are commercial buildings and the traffic flow is dense, while there are obvious functional and service faults in the middle of the site connecting the north and south sides, and some of the buildings are abandoned, and the ancient buildings in the site are not well used (under construction).

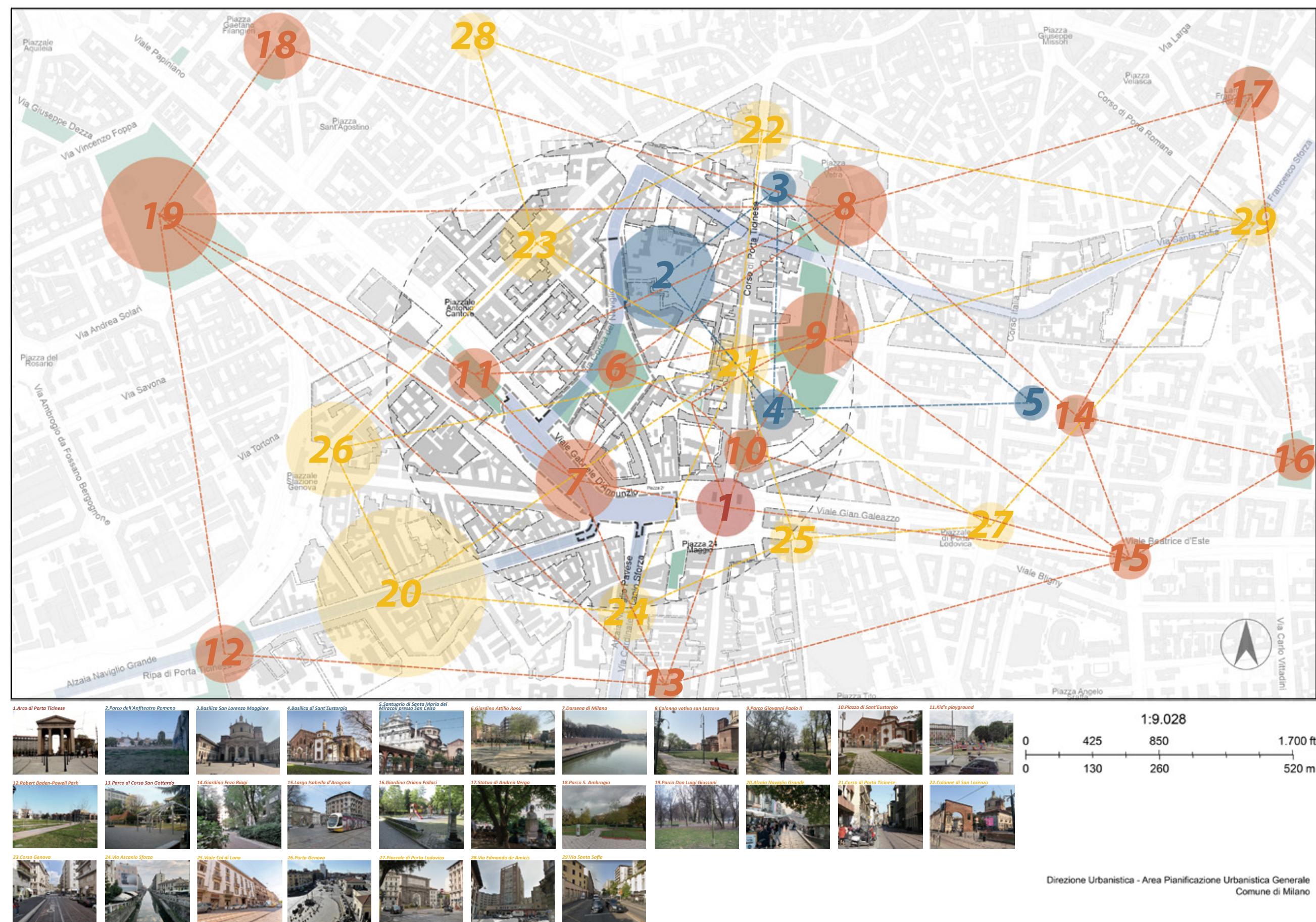
5.1.2 Building functional division



Map.8 Building functional division

Source: Prepared by the author

5.1.3 Functional connection



Map.9 Functional connection

Source: Prepared by the author

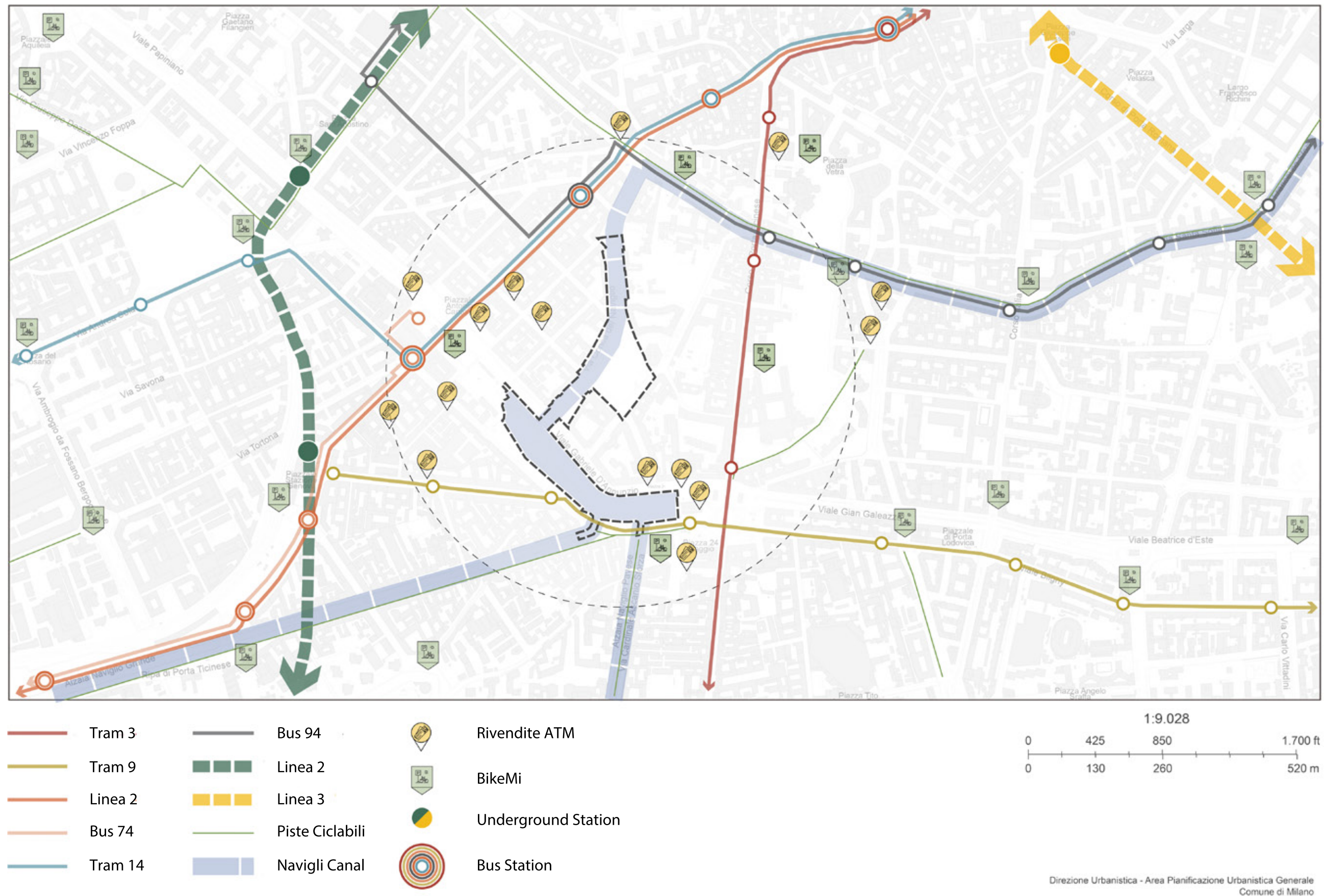
5.1.4 Green area



Map.10 Green area

Source: Prepared by the author

5.1.5 Mobility



5.1.6 Food and accommodation



5.1.7 Road sections
viale gabriele dannunzio



via conca del naviglio



Map.13 Road sections

Source: Prepared by the author

5.1.8 Water system status

Unlike many cities in Europe, Milan was not built on a river, making it a unique city for a city that has become one of the largest in Europe. Located on a steep plain below the Alps, the city benefits from a high water table, which can provide most of the city's water supply, just a few meters underground.

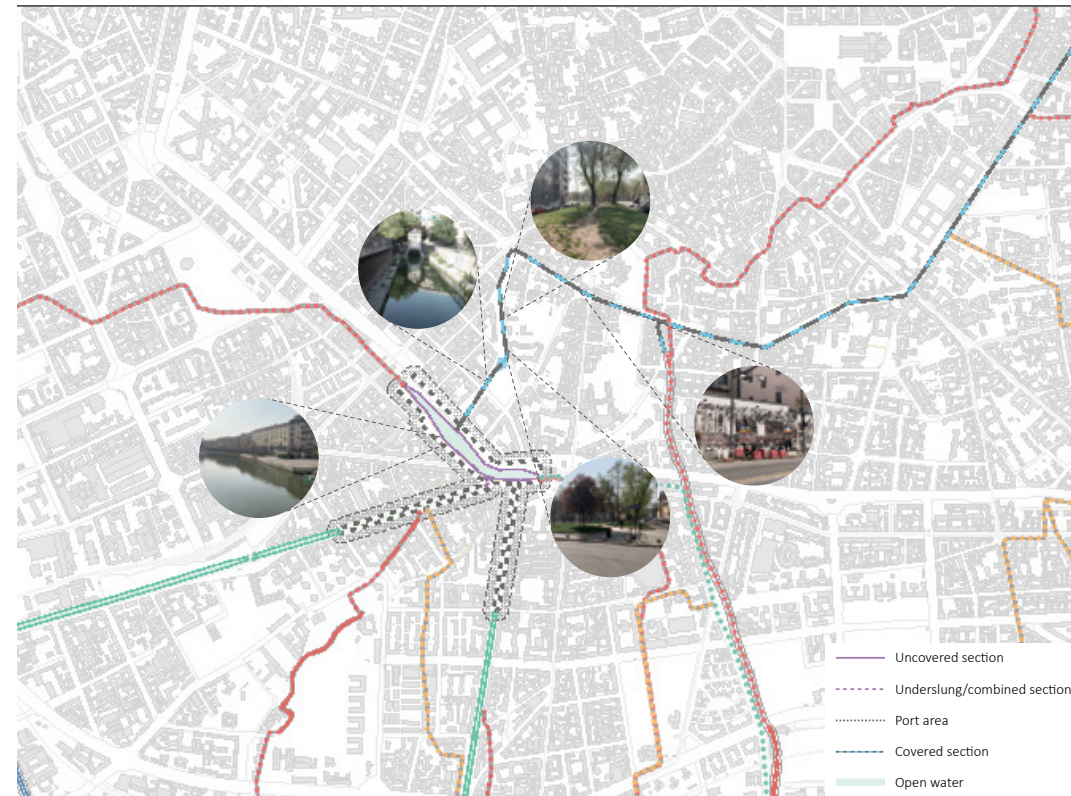


During the latter half of the Twentieth Century, pressures on inner city land and a loss in function of the extensive urban canal network led to the systematic dismantlement of the Milan's inner city water network, its locks and canals, many being drained and covered to provide inner city highways to accommodate the increased use of private transport in the city. This included the iconic Cerchia di Navigli, or Circle of Canals, dating back to the 12th Century, which now forms the route of the inner city ring-road.⁷⁰



Figure.35 Transformation of Milan city water network
Source from: <https://jackrichardson.co.uk/portfolio-item/milan-and-water-architecture-and-design/>

⁷⁰ Transformation of Milan city water network
Source: <https://jackrichardson.co.uk/portfolio-item/milan-and-water-architecture-and-design/>

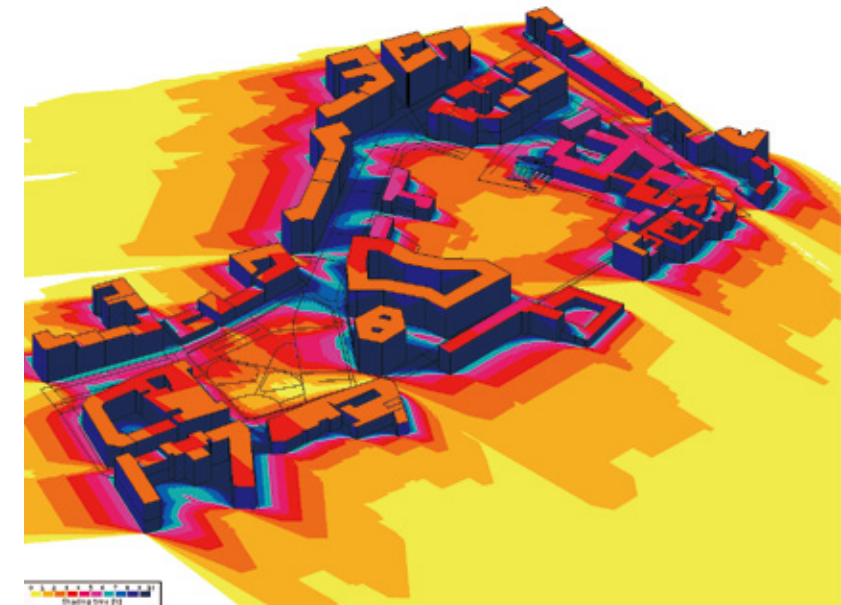


Map.14 Water network of Parco archeologico area

Source: Prepared by the author

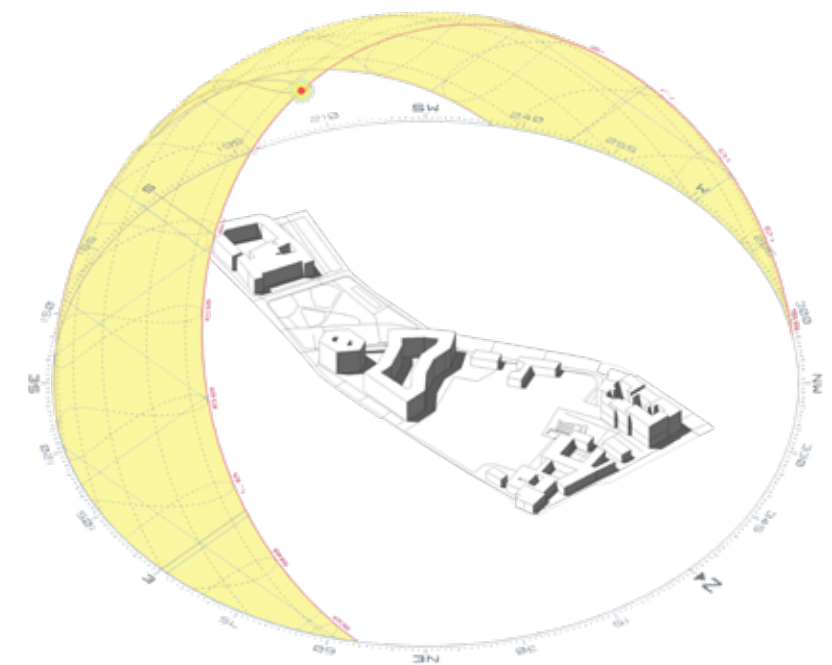
It is clear that the waters of the Parco Archeologico area reflect this feature. The Darsena remains exposed on the surface, while the spur marked by the Conca Viarenna is hidden under the road.

5.1.9 Sunlight analysis



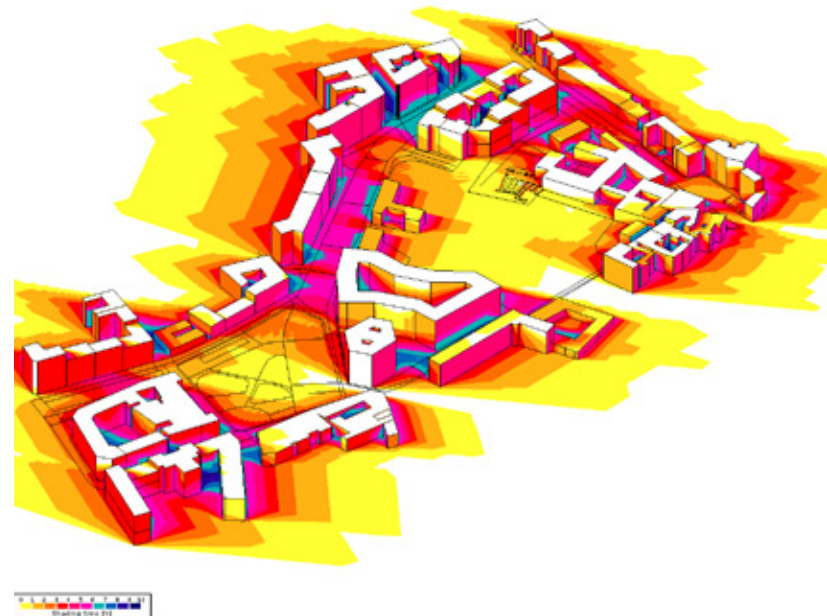
Map.15 Summer solstice shadow(12:00 AM)

Source: Prepared by the author

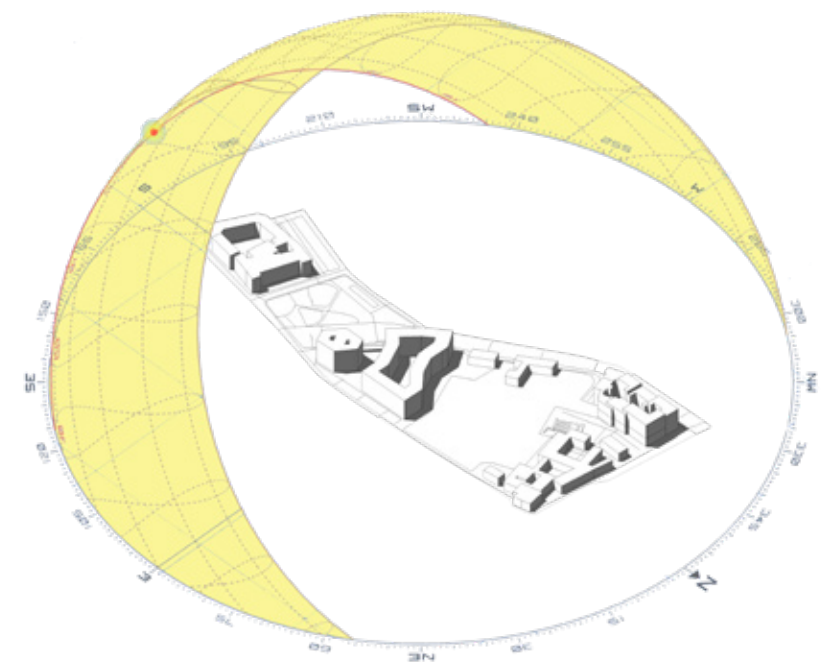


Map.16 Summer Solstice Sun Path(12:00 AM)

Source: Prepared by the author



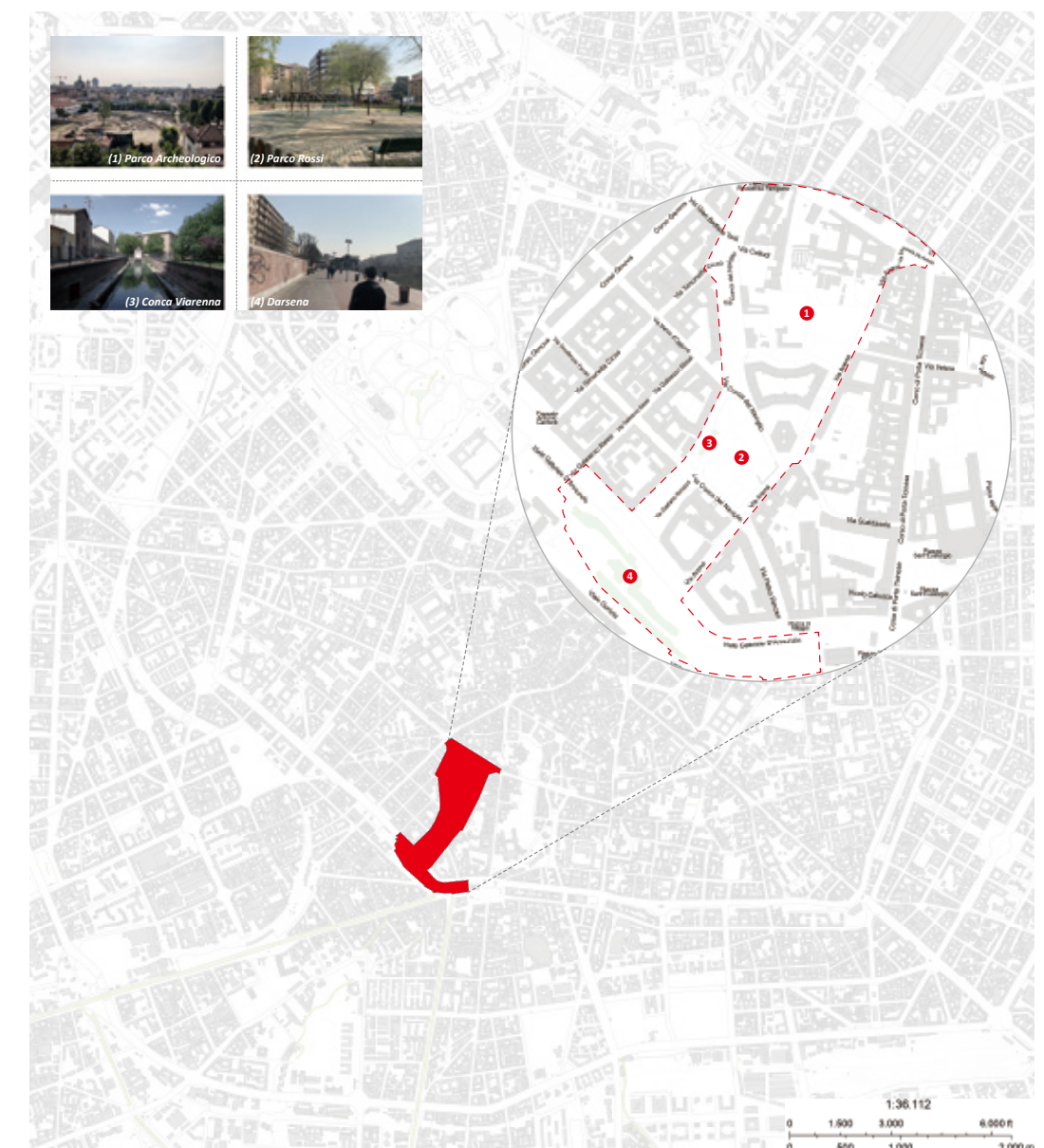
Map.17 Winter solstice shadow(12:00 AM)
Source: Prepared by the author



Map.18 Winter Solstice Sun Path(12:00 AM)
Source: Prepared by the author

5.2 Analysis of key nodes on the site

The Parco Archeologico site consists of four important areas, from south to north: Parco Archeologico, Parco Rossi, Conca Viarenna and Darsena. They occupy the majority of the site and have a certain historical value that deserves to be preserved by means of renovation. They are worth preserving through renovation. They are therefore of great importance for the design of the site. In this section we will analyse each of them.



Map.19 Key nodes on the site
Source: Prepared by the author

5.2.1 Reconstruction of the Parco archeologico

In section 3.2.8 of the previous article, we have already mentioned that the Parco archeologico is about to be transformed into the Parco Amphitheatrum Naturael (PAN), which is still in the construction phase. The project includes the creation of a walk in the greenery from the amphitheater to San Lorenzo, with a visit to the hypogea of Sant'Aquilino, where it is possible to admire the stones of the amphitheater. possible to admire the stones of the amphitheater taken to build the late ancient mausoleum, recently restored. To continue through the park of the Basilicas up to Sant'Aquilino, it is necessary to take a walk in the greenery from the amphitheater to Sant'Aquilino. To continue through the park of the Basilicas up to Sant'Eustorgio in a single 10 hectare park. To redesign the structure there will also be 1,700 square meters of hedges, which will help to recreate the layout of the arena inside the hollow, while a double row of cypress trees will trace the external, raised ellipse, which will become a walkway to admire the archaeological complex. Originally the arena was similar in size to the archaeological complex. Originally the arena was similar in size and appearance to the Colosseum. While the renovation imagined by architect Attilio Stocchi recreates the imperial amphitheatre with archeological archeology, it is not clear whether it was a new one imperial amphitheater with arboreal elements of ancient topiary (boxwood, myrtle, privet and cypresses)⁷¹: a large elliptical garden to outline the surface of the ground and the shape of the archaeological complex. surface of the ground and the shape of the plan of the lost amphitheater outline and completion of the archaeological remains. The project involves the expansion, which has already taken place, of the imperial amphitheater and the completion of the archaeological remains.

The project involves the expansion, which has already taken place, of the park from the current 12,500 square metres to

⁷¹ Milan will get its Colosseum back. Work on the Amphitheatrum Naturae gets underway, source: <https://www.finestresullarte.info/en/news/milan-will-get-its-colosseum-back-work-on-the-amphitheatrum-naturae-gets-underway>

a future 22,300. The architect's objective is to make the ring around the podium, the steps and the walls of the 425 meter long perimeter ring recognizable.⁷²

From the above we can assume that PAN will be the focus of the entire venue to attract and gather popularity. Therefore our design proposal will be built around the PAN.

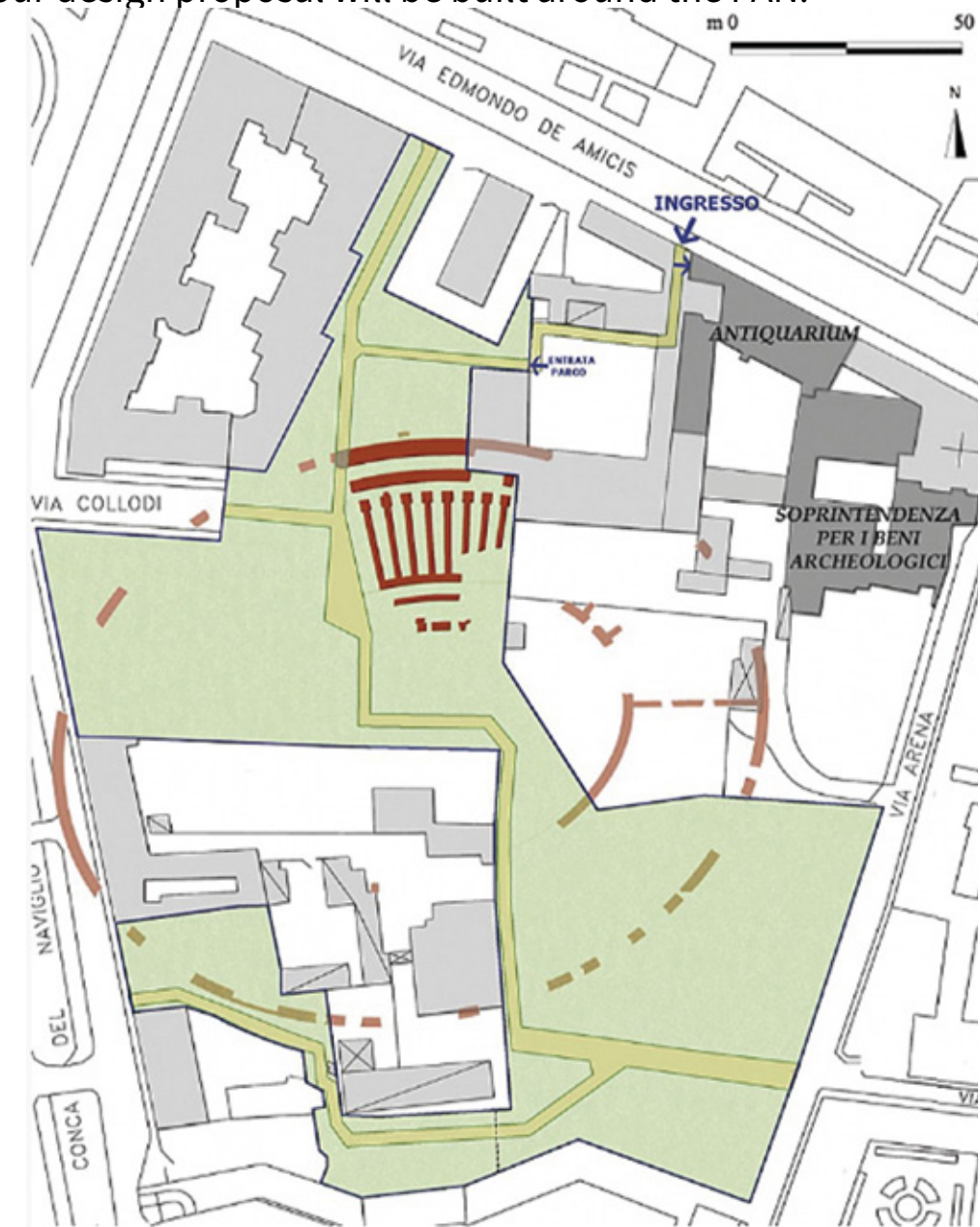
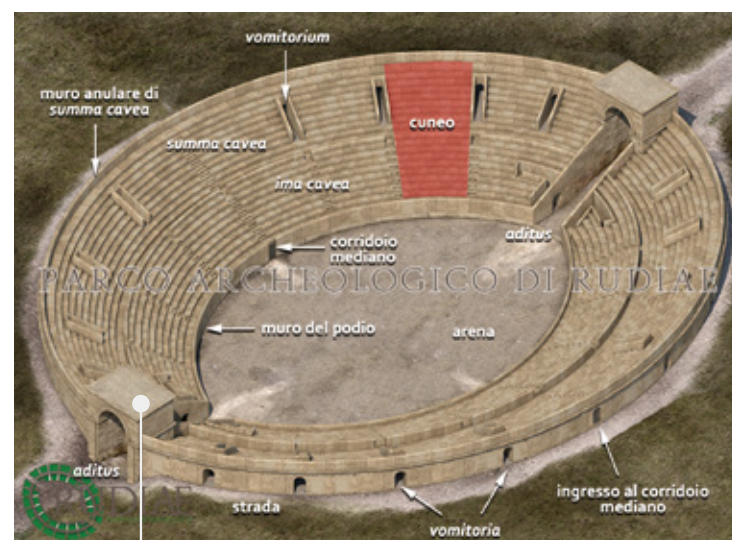


Figure.36 Plan of the Roman Amphitheatre Park showing ancient structures

Source: http://milanoarcheologia.beniculturali.it/?page_id=3933#

⁷² Storia e natura-Ecco come sarà il Colosseo green di Milano

Source: <https://www.linkiesta.it/2021/02/anfiteatro-green-milano-pan/>



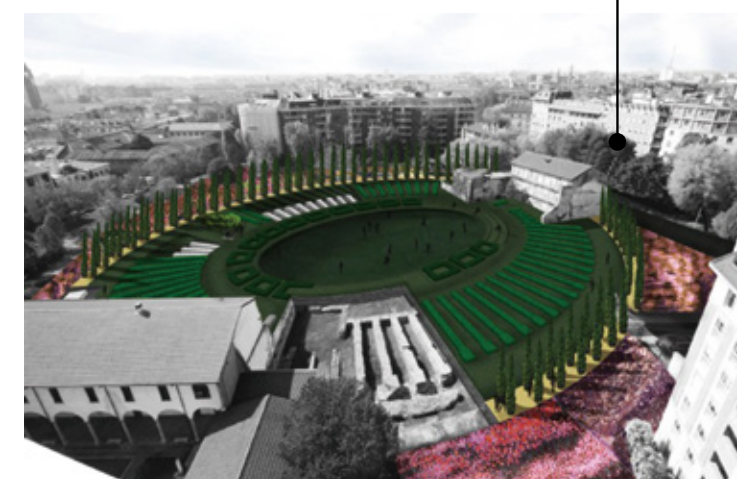
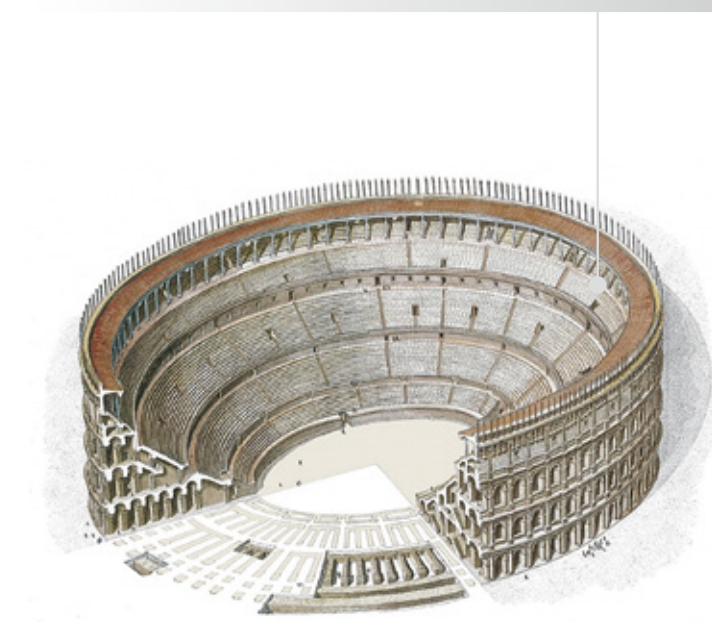
Historical



Current

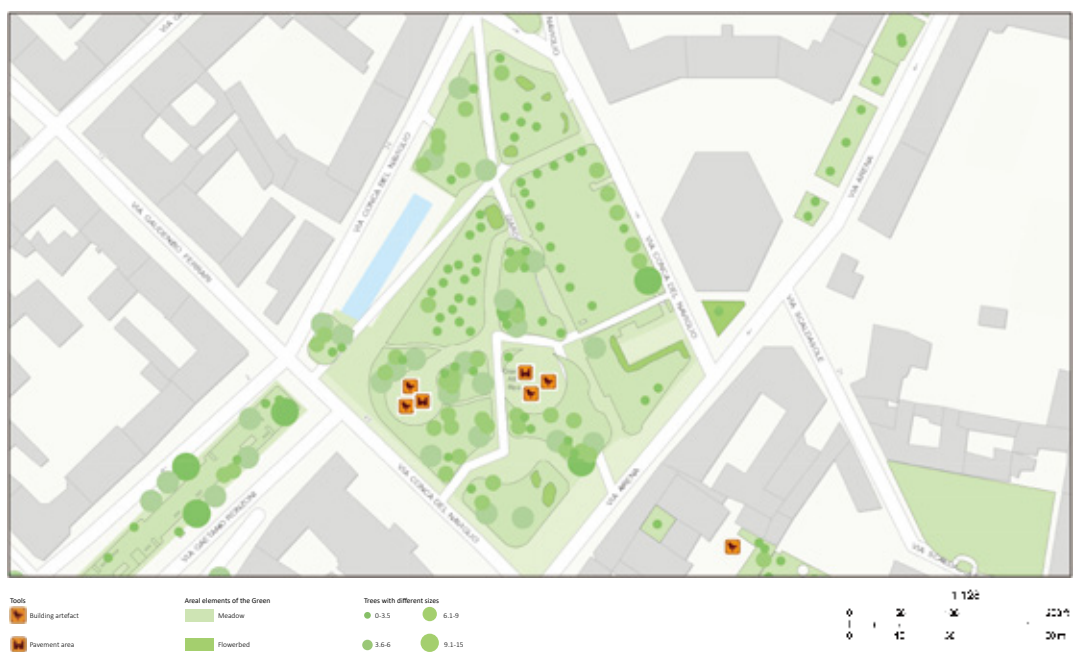


Final



5.2.2 Current problems faced by Parco Rossi

Parco Rossi is in the middle of this area, with the Parco archeologico to the north and the Darsena to the south, which serves as a bridge between them. We therefore consider it to have a unique environmental advantage. Parco Rossi faces problems of degradation, security and public order, as described in section 3.2.8 above.



Map.21 Parco Rossi's current floorplan
Source: Prepared by the author



Figure.37 Parco Rossi Status site photos
Source: Prepared by the author

In the absence of surveillance, many particularly uncivilised occasional visitors found undisturbed places to operate: dealing, drug and alcohol abuse, vandalism and public disorder. Particularly at night, children's play areas become playgrounds for uncivilised and ill-mannered teenagers or places where dogs are abused, manholes and utility cupboards become hiding places for drinks and drugs, street furniture is systematically vandalised, hedges and bushes

are turned into toilets, and the accumulation of filth is the inevitable result of uncivilisation.



Figure.36 Degradation of Parco Rossi

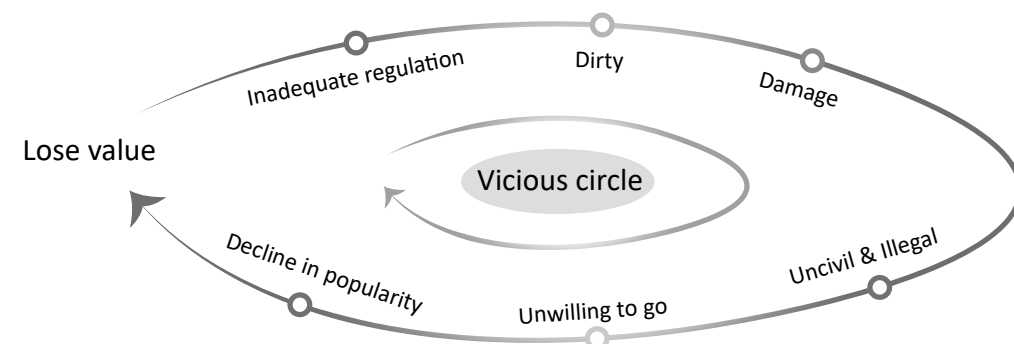
Source: <https://www.milanotoday.it/zone/centro/conca-naviglio-degrado.html>



Figure.38 Milano Conca del Naviglio, movida selvaggia: la rivolta dei residenti, 1.100 firme per recintare i giardinetti
Source: https://milano.corriere.it/notizie/cronaca/21_giugno_04/milano-conca-naviglio-movida-selvaggia-rivolta-residenti-1100-firme-recintare-giardinetti-768eed72-c501-11eb-86af-ac042f3197d2.shtml

vandalism and disturbance of the public peace. Especially in the evenings, children's play areas become playgrounds for uncivil and ill-mannered teenagers or abusive dog areas, manholes and utility cabinets are hiding places for drinks and drugs, street furniture is systematically vandalised, hedges and bushes are turned into latrines, and the accumulation of filth is a logical consequence of the uncivilised people's continued existence. This is why citizens are calling for the following measures to be implemented regularly in order to increase the safety, decorum and usability of the park itself:

active day and night surveillance by the police and also by means of cameras, increased lighting to eliminate dark areas, restoration of the numerous litter bins, and the use of the park as a place of public safety.⁷³



Map.22 Vicious circle
Source: Prepared by the author

Overall, we believe that a Parco Rossi update is imminent, so we'll start with the entry point of improved security.

⁷³ Salviamo i giardini Attilio Rossi (conca del naviglio) dal degrado!
Source: <https://www.change.org/p/giuseppe-sala-salviamo-i-giardini-attilio-rossi-conca-del-naviglio-dal-degrado>

5.2.3 Via Conca del Naviglio - Conca Viaredda



Figure.39 Historical and current photos of Conca del Naviglio
Source: https://it.wikipedia.org/wiki/Conca_del_Naviglio

Whoever walks along Via Conca del Naviglio and does not know its history, perceives the appearance of an unimportant street. Were it not for a section, in which what was once the Conca di Viaredda resurfaces; suffice it to say that through this lock passed almost all the marble that today makes up Milan Cathedral.⁷⁴



Figure.40 Comparison between the 1860 map and today's map
Source: Maps extract by Giovanni Brenna and Google map

The Conca del Naviglio has an important historical value but today only a small part of it is not covered by the ground, so we want to preserve it and revitalise it by opening up the canal.

⁷⁴ Via Conca del Naviglio - Conca Viaredda
Source: http://www.milanoneltipo.it/conca_del_naviglio_via.html

5.2.4 Darsena' s potential

With regard to Darsena, we are more concerned with its two tributaries of the Navigli Canal, Navigli Grande and Navigli Pavese, which are still open. As we mentioned above, there are a large number of shops lined up around the perimeter along the two tributaries, notably the restaurants and bars. This creates a bustling scene (as can be seen in section 5.1.6 above). We have visited the area and found that this is true, both during the day and in the evening, with a large number of tourists along the two tributaries. We therefore believe that the Darsena area has great potential to help us revitalise the reopening of the Parco archeologico site. Just as the river has been reopened and the water is flowing in, the attraction of the new Parco archeologico will bring people in and revitalise the new site. But what we need to take into account in the design is security, both in terms of public order management and policing, especially at night, because we don't want to repeat the demise of Parco Rossi.

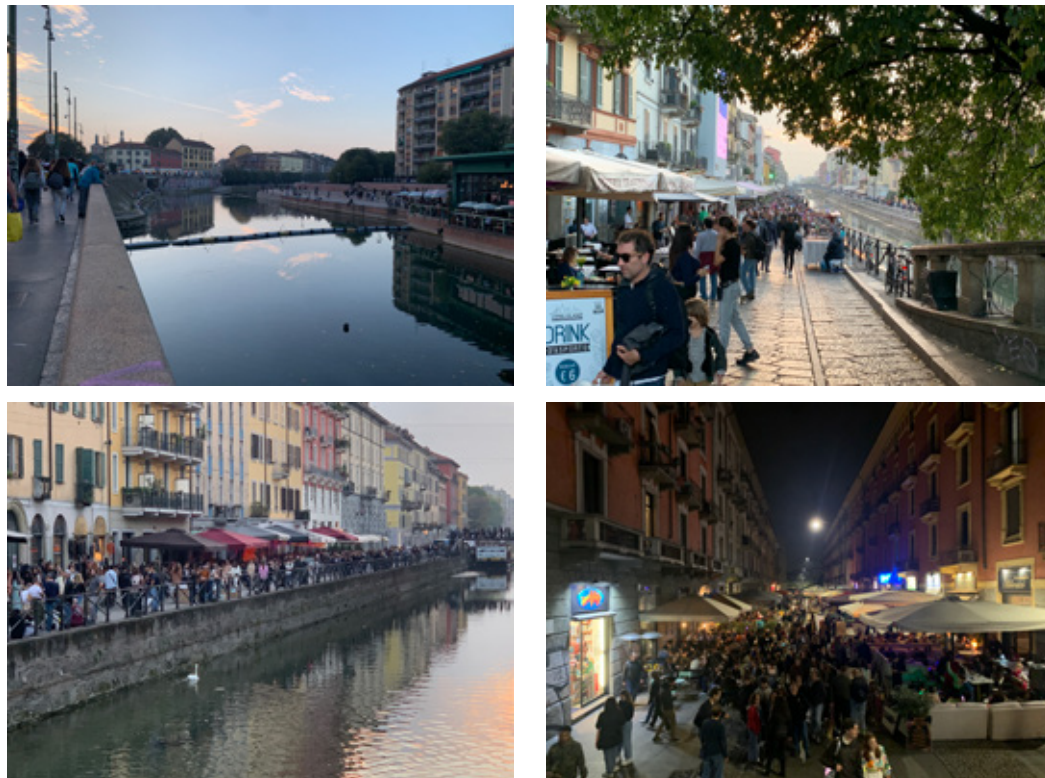


Figure.41 Darsena's site photos
Source: Prepared by the author

5.3 Problems to solve and tasks

In the previous section we analysed the nodes of interest of the Parco archeologico site one by one and derived the problems they need to solve. Now we need to connect and integrate the various points. Briefly, firstly we need to consider the decaying Parco Rossi, which includes its redevelopment in order to stimulate the valorisation it deserves. Then, next to the Conca Viarenna, we believe that it can be preserved and utilised in such a way as to reopen the canal, in order to perpetuate its historical value. Finally, the construction of the PAN will give a new attraction and value to the public space, we need to establish connections with the above areas and with Darsena and to create new functions to enhance the connection and attraction of the spaces. In this way the spaces can be connected into a linear public space with a certain attraction.

5.4 Case studies-Superkilen, Denmark/BIG

Looking at the whole Parco archeologico site, we can see that, because of the Navigli Canal, it presents a linear shape and has different functional zones at different nodes along the route. Based on these characteristics, we have selected a case to learn about their linear planning and functional zoning, Superkilen by BIG.



Figure.42 Superkilen

Source: <http://www.archina.com/index.php?g=works&m=index&a=show&id=1504>

Project data

Name: Superkilen, Denmark

Completion Date: Spring 2012

Total area: 30.000 m² / 322917 sq.ft / 750 m long public space

Project Design: BIG

Superkilen, a super Linear park in Copenhagen, the capital of Denmark, is a narrow public space of about 800 metres in length, covering an area of 30,000 square metres. It is the most ethnically populated area in Denmark and was once the area with the most prominent social problems. Instead of generating clutter, the exaggerated lines and colours of Superkilen integrate the environment and order of the neighbourhood, reflecting a penetrating sense of vitality and perfectly suiting the character of Copenhagen, a Nordic metropolis that has been called "the best-designed city".

In order to create better and more transparent infrastructure throughout the community, existing cycle paths will be re-organised to create new connections to surrounding communities, with a focus on connecting to Mimersgade, where residents have expressed a desire for bus access. This transformation involves the whole of the outer Norrebro area and is part of a wider infrastructure plan. Alternatives to bus access include signalling, extended middle lanes or speed bumps.

Superkilen is divided into three colour-coded areas, each with a distinctive atmosphere and functional conditions: the large and expansive red square, which serves as an extension of the adjacent stadium and offers a range of recreational and cultural activities; the black square, which serves as the heart of the Superkilen, where locals can meet or play chess next to the Moroccan fountain; and the linear

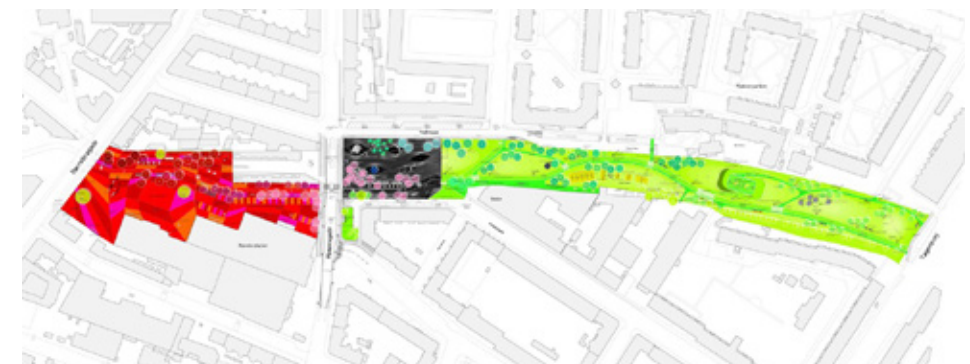


Figure.43 The three areas of Superkilen

Source: <http://www.archina.com/index.php?g=works&m=index&a=show&id=1504>

extension of the green space, which serves as a natural The linear green extension serves as a natural meeting place for large sports events and provides a vantage point overlooking the surroundings. These three areas form the backdrop for a surrealist collection of global urban diversity, containing over 100 objects from 60 cultures that reflect the true nature of the local community. The objects were selected through an intensive curatorial process working closely with local residents.

The area with the red ground is a place for sports and recreation in the neighbourhood park. The designers used red quadrilaterals of different purities and sizes spliced into the ground to appear free and spontaneous, serving as a visual guide and reducing the visual dullness of the



Figure.44 Market/culture/sport – the red square

Source: <http://www.archina.com/index.php?g=works&m=index&a=show&id=1504>

pavement. As an extension of the City of Copenhagen's Nørrebro Recreation Centre, a series of recreational facilities in the area allow residents to interact while exercising and playing. The colourful patchwork flooring mirrors the tone and materials of the Nørrebro Recreation Centre and its new

main entrance. Ethnic landscaping and sports facilities also make the red area a popular place for fitness and exercise for the neighbourhood, with more people coming from other parts of Copenhagen on weekends.

Mimers Plads is the centrepiece of the Superkilen masterplan. It is where locals meet around the Moroccan fountain, Turkish benches and under the Japanese cherry trees as an extension of the area's courtyard. On weekdays, fixed tables, benches and barbecue facilities act as an urban living room for backgammon and chess players, among others. By partially solving the problem of the height difference with Midgaardsgade and enabling the bicycle ramp, the bicycle traffic is shifted to the eastern side of the square between the Hotherplads and the cross-bike path connection. Towards the north is a small hill facing south with a view of the square and its activities.



Figure.45 Urban living room – the black square

Source: <http://www.archina.com/index.php?g=works&m=index&a=show&id=1504>

The area of green grass is another place for residents to exercise and play, and it provides land for large-scale sports activities. The designers took advantage of the undulating



terrain to provide this area with facilities and soft hills where residents can picnic, sunbathe, play street basketball and more. The Olympic spirit of sport is one of mutual understanding, friendship, solidarity and fair play. Obviously, street sports, which are free of racial and national differences, are the most direct way for the Super Linear Park to promote multiracial interaction among its inhabitants.

On top of the three zones, they presented hundreds of artefacts from 60 cities

Figure.46 Sport/play – the green park

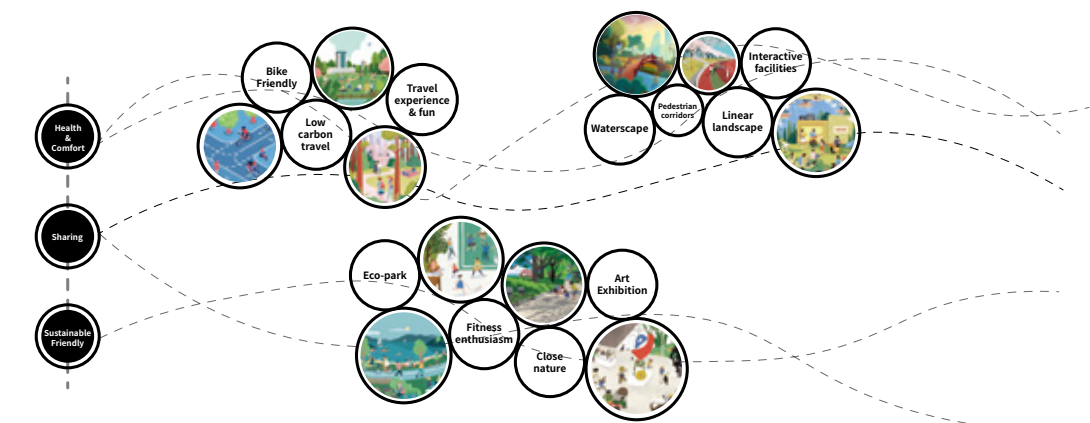
Source: <http://www.archina.com/index.php?g=works&m=index&a=show&id=1504>

around the world. In the process of designing the park, the firm fully involved the local residents, avoiding preconceived ideas and achieving maximum publicity, BIG recognised that this project was not just an urban design, but also a showcase for the best of global cities. In addition to the public furniture in the park, the designers emphasised species diversity in the choice of plants: cherry blossom and larch from Japan, palm from China, cedar from Lebanon, etc. The project is also a public space with public access. At the same time, it is a super park of cultural diversity that is seamlessly connected to the public transport system, the bicycle transport system and the pedestrian system.

5.5 Design proposal for Parco Archaeologico

5.5.1 Concept for new designs

On the basis of the series of analyses presented above, we have been able to generate a new design idea for the Parco archeologico site, namely a new linear Navigli Park. Firstly the reopening of the Navigli Canal is the basis of the concept, which allows the site to be presented as a linear landscape structure. The second point is the opening of the PAN and the redesign of Parco Rossi, which provides the site with a variety of spaces for activities. In order to connect them, we wanted to create new sustainable features, including fitness and recreational facilities, as well as natural landscape footpaths and cycle paths, in order to provide convenience and safety while satisfying the visitor's comfortable travelling experience. Last but not least, in conjunction with the urban design in chapter 4, we decided to create a linear exhibition space for ancient culture, creating a unique theme for the site while also taking advantage of the continuity of the canal. In summary, our concept is to create a multi-functional, pedestrian friendly, environmentally friendly linear theme park.

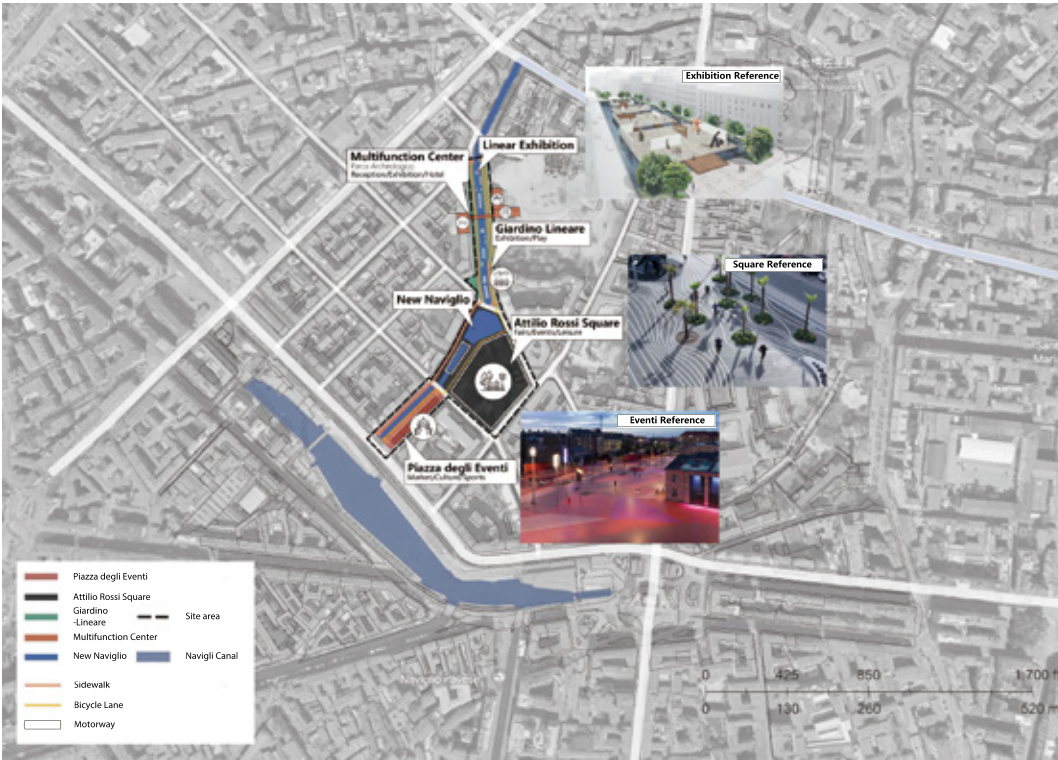
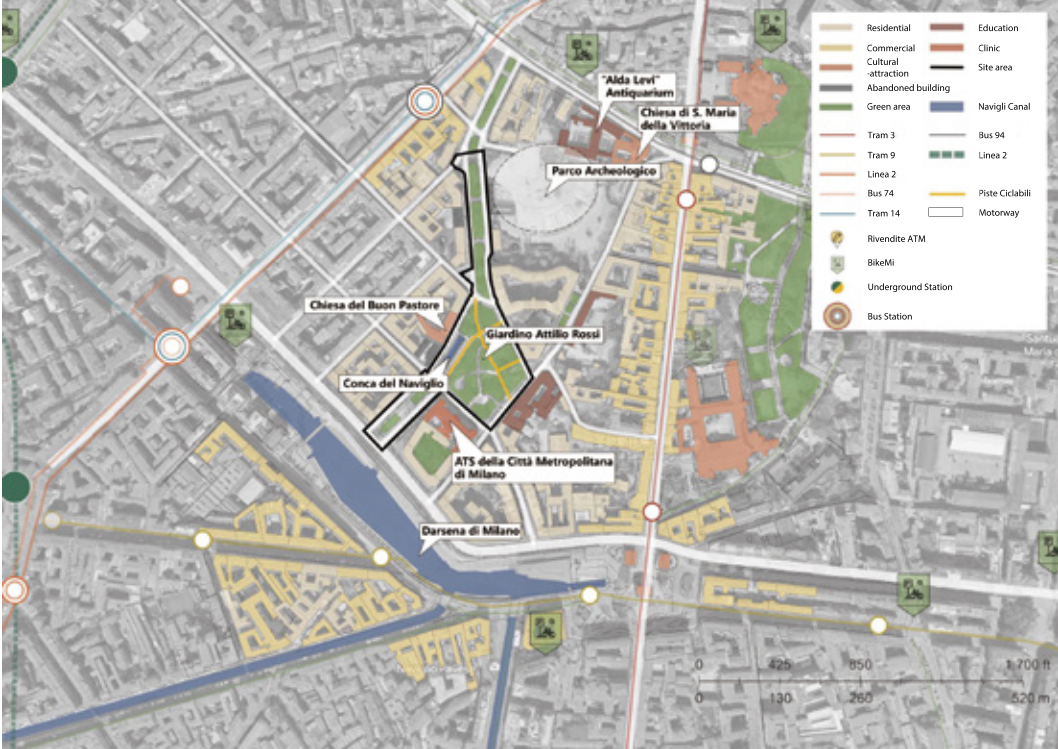


Map.23 New Linear Navigli Guidelines
Source: Prepared by the author

5.5.2 The corresponding strategy

The new strategy divides the original site into four different functional areas, which are named Piazza degli Eventi, Attilio Rossi Square, New Naviglio, Giardino Lineare from south to north.

Piazza degli Eventi serves as the entrance to the site, offering a marketplace, fitness equipment, etc. Attilio Rossi Square retains the original recreational function of Parco Rossi while adding an exhibition and event area, while New Naviglio is the preservation and reopening of the Conca del Naviglio. New Naviglio is the preservation and reopening of the Conca del Naviglio and the expansion of its area to create a waterfront terrace space. Giardino Lineare is the addition of a linear exhibition space based on the opening of the canal. In addition, two abandoned buildings have been selected for renovation to create a multifunctional centre for linear exhibition and PAN, which combines reception, museum and hotel functions. More details of the design are shown in the masterplan.

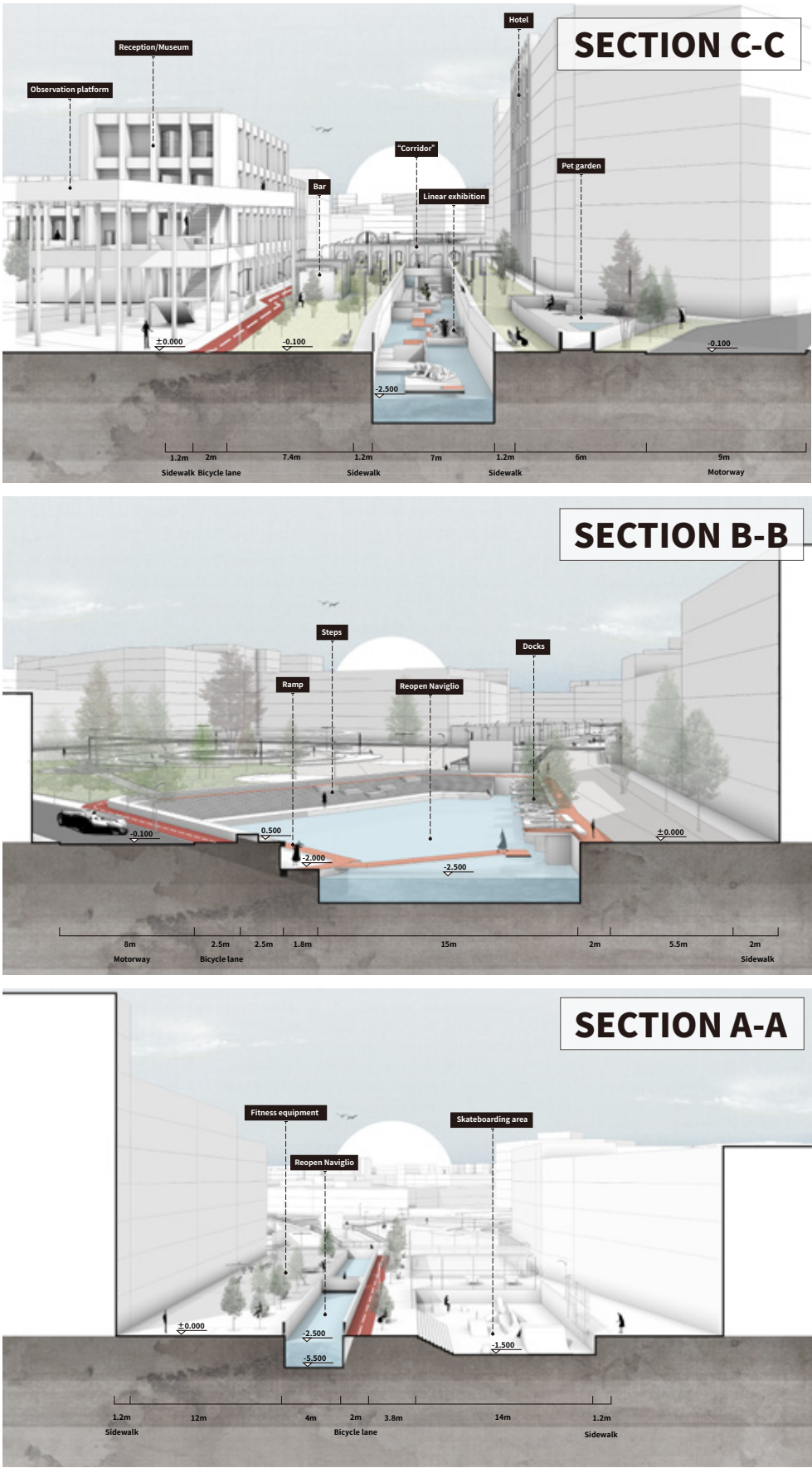
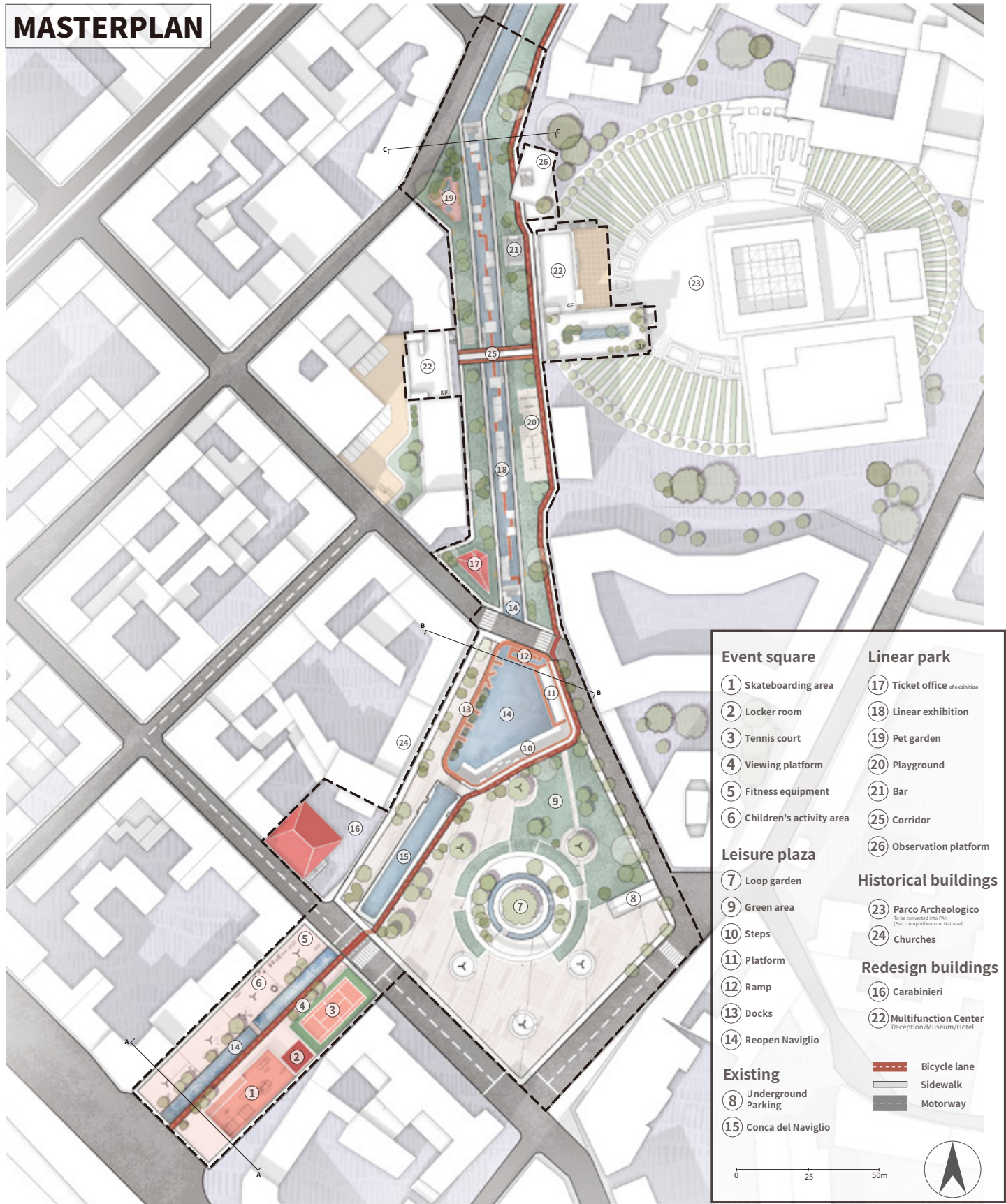


Map.24 Original site vs. New strategies
(top: existing surroundings & mobility; bottom: new functional zoning)
Source: Prepared by the author

5.5.3 Thinking Maps - Step2 - Parco Archeologico site



5.5.4 Masterplan & Sections



5.5.5 Functional scenarios



Children' s activity area & Skateboarding area



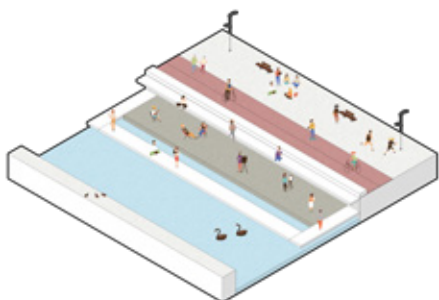
Docks



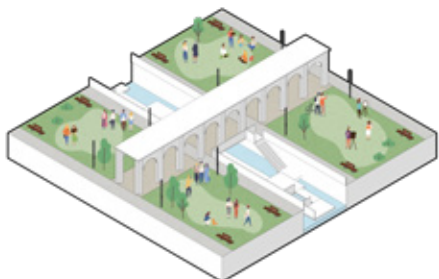
Playground



Fitness equipment & Tennis court



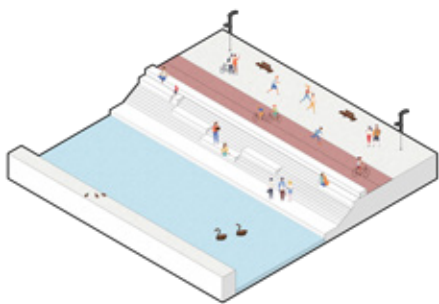
Platform



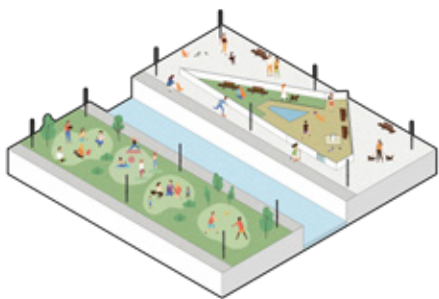
Corridor



Loop garden

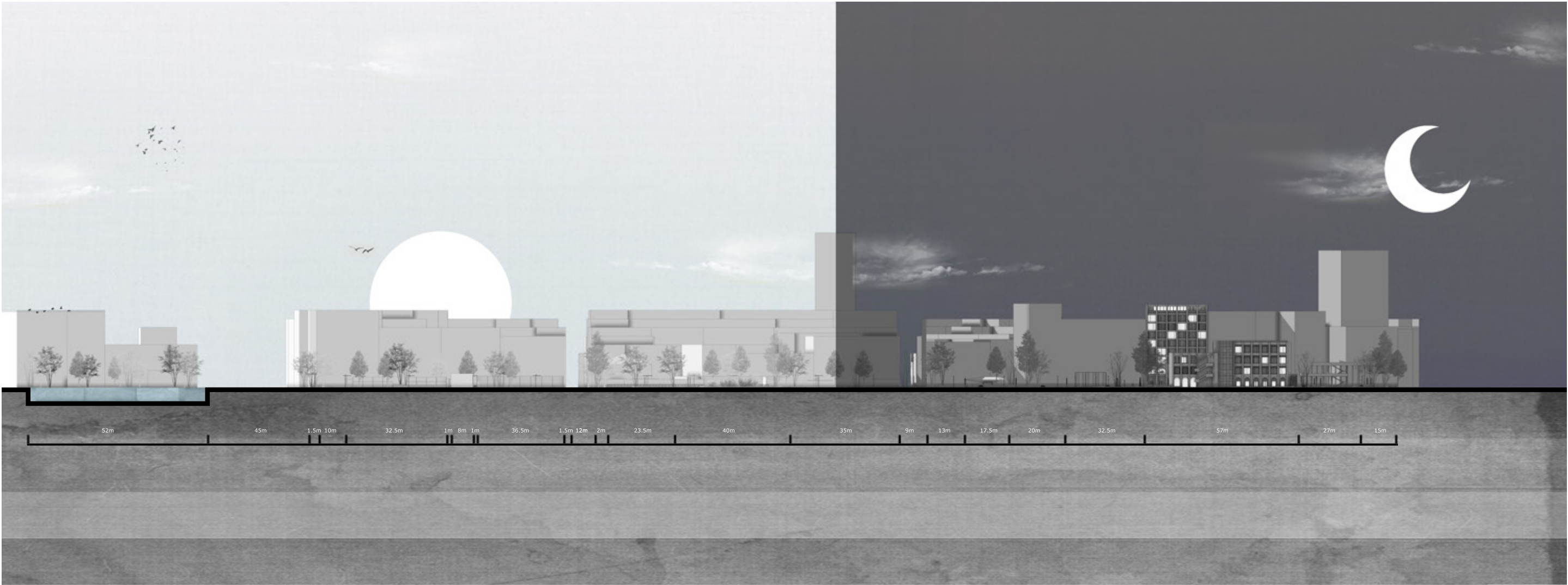


Steps



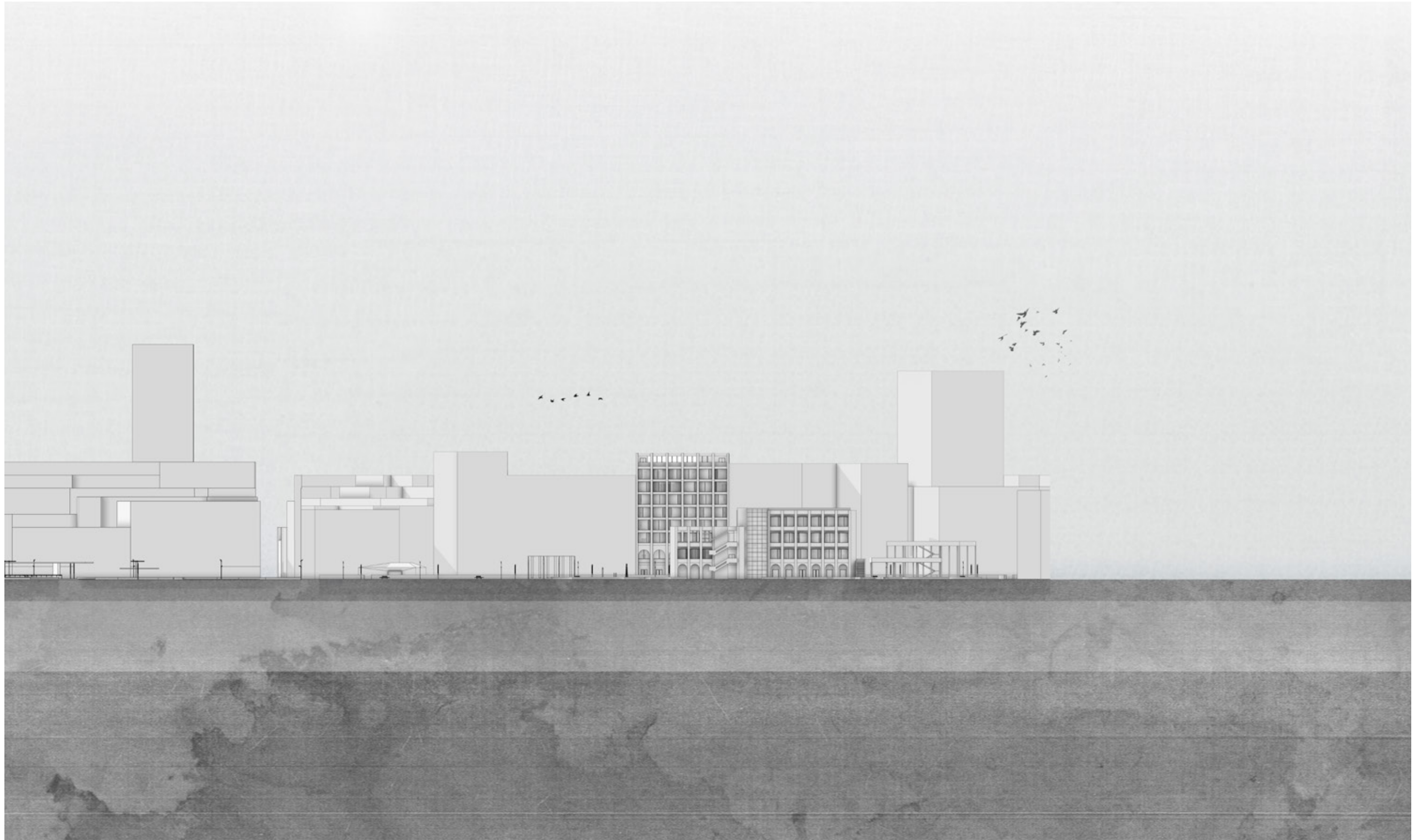
Pet garden

5.5.6 Site elevations



Map.27 Site elevations

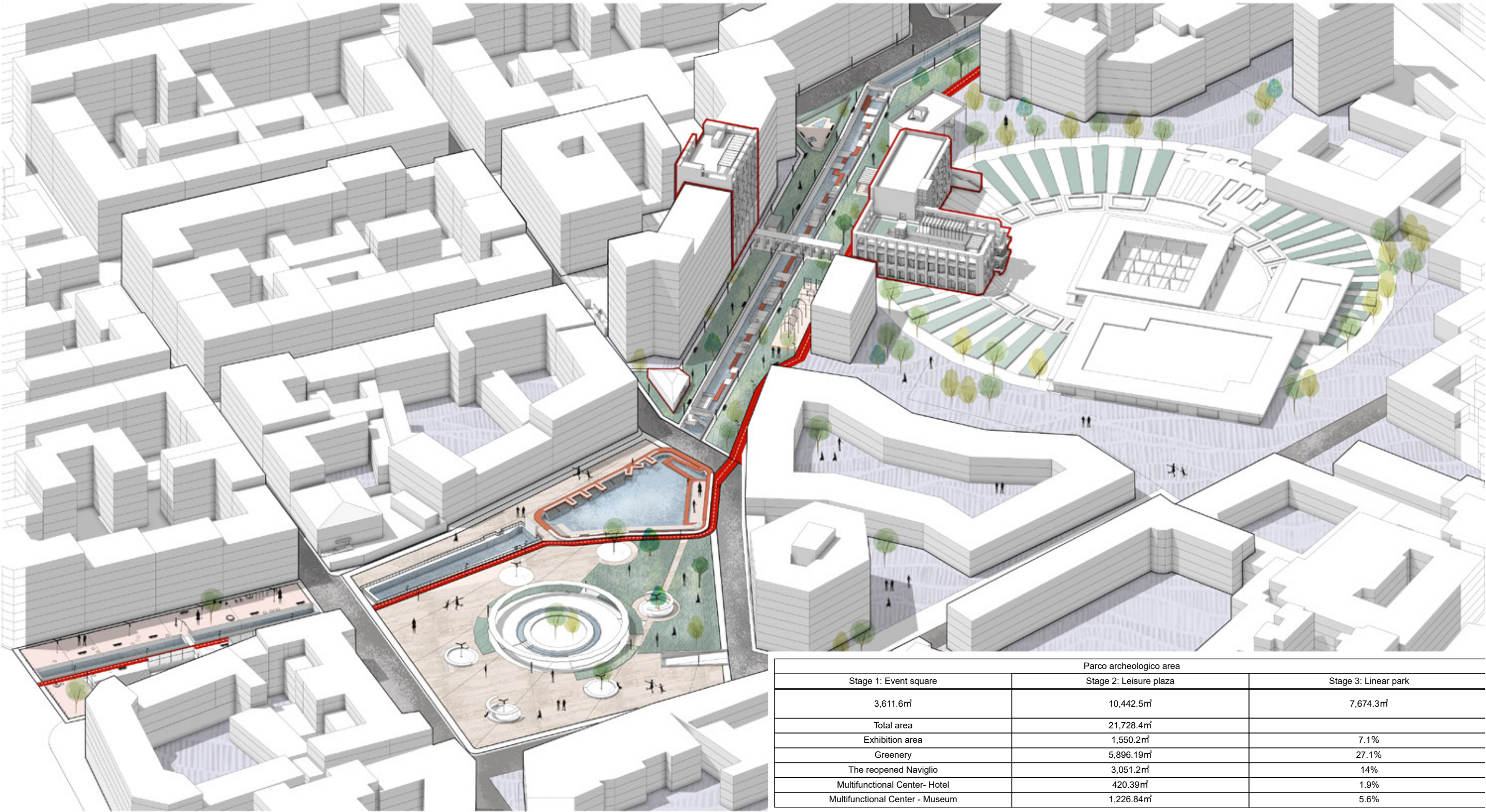
Source: Prepared by the author



Map.28 Site elevations

Source: Prepared by the author

5.5.7 Site axonometry



Map.29 Site axonometry Source: Prepared by the author

Table 3. Site area statistics Source: Prepared by the author

The background image is a grayscale photograph of a multi-story building with a curved facade and many windows. A large, leafless tree stands in the foreground, partially obscuring the building. A commemorative plaque is visible on the building's facade, featuring the text '5494 GIARDINO ATTILIO PITTORE 1909 - 1994' and a small circular logo.

06

Proposal for renovation of abandoned buildings

6.1 General information about the buildings

6.2 Aims of renovating the buildings

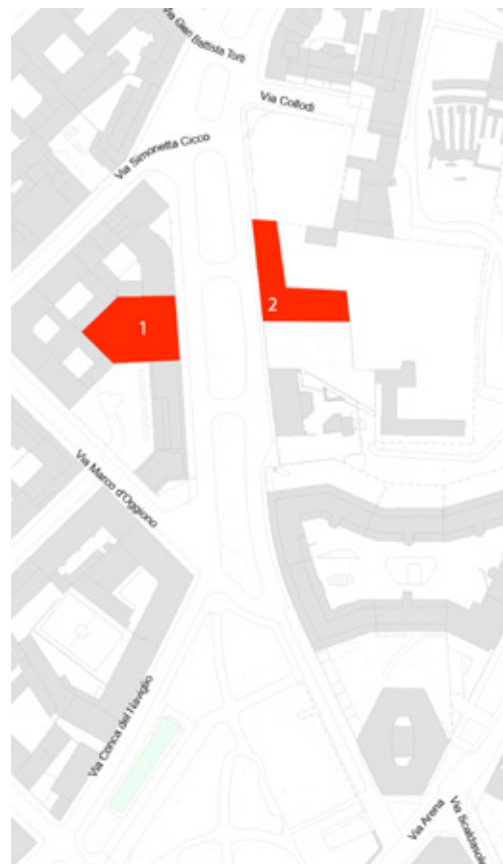
6.3 Case study-Friedrichstadt housing block, Kreuzberg, Berlin

6.4 Concepts for new designs

6.5 Plans & Facades & Sections

6.6 Axonometric

6.1 General information about the buildings



Map.30 Two buildings to be renovated (1.via Conca del Naviglio 20;2.via Conca del Naviglio 17&21)

Source: Prepared by the author

The two buildings we intend to renovate are located on via Conca del Naviglio (a street built on one of the important crossings of the Milanese canal system that connects the inner and outer ring canals), specifically they are located on both sides of the linear exhibition area we have designed as shown in Map.26 and we will temporarily distinguish between them with numbers 1 and 2 for the sake of explanation. Building 1 (via Conca del Naviglio 20) is located on the west side of the linear exhibition area and is currently a hotel. It is a building built in 1968 based on a design by the architect



Figure.47 via Conca del Naviglio 20

Source: (left)<https://blog.urbanfile.org/>;(right)prepared by the author



Ivo Chierichi (Hotel Corso Genova then Mercure, Idea and finally It is a building built in 1968 based on a design by the architect Ivo Chierichi (Hotel Corso Genova then Mercure, Idea and finally Hotel Allegro Italia Espresso Darsena).



Figure.48 via Conca del Naviglio 17&21

Source: Prepared by the author

Building 2 (via Conca del Naviglio 17&21) is located on the east side of the linear exhibition area and directly opposite building 1. In addition it borders the PAN to the east. We didn't find much information about this building, but our research on the ground has confirmed that it is a closed and abandoned building in a state of disrepair. We assume that it was once a residential building, with shops on the ground floor (the signboards have not been removed and it appears to have been a ceramics shop).

In light of the above, we believe that these two buildings have the potential to be transformed into a building that meets our design theme and have therefore selected them for renovation.

6.2 Aims of renovating the buildings

The reason we decided to renovate these two buildings was to make them fit the theme of our site design, increase the functionality of the site and maximise their value. In the case of building 1 we aim to retain its function as a hotel, rearranging the interior spaces and functions to make it more suitable for different types of tourists, while in the case of building 2, which borders on the PAN, we aim to transform it into a museum and reception serving the Parco archeologico, and we would like to reorganise the interior spaces while retaining part of the original brick façade and adding a new facade. We want to redefine the interior space while preserving part of the original brick façade and adding a new floor. The two buildings will be connected to form a whole, i.e. a multifunctional centre serving the Parco archeologico, the linear exhibition and even the entire site.

6.3 Case study-Friedrichstadt housing block, Kreuzberg, Berlin

For the renovation of these two buildings, our task focuses on the redevelopment of the interior spaces and the renewal of the façades, as we want to make them more attractive than ever by maximising their functional rationality and making them beautiful and sustainable. Therefore, we searched for a large number of case studies before designing, and finally chose a similar and suitable case for us to study, which is Friedrichstadt housing block, Kreuzberg, Berlin by Aldo Rossi.



Figure.49 Friedrichstadt housing block
Source: <https://www.miesarch.com/work/1508>

Project data

Name: Friedrichstadt housing block

Location: Berlin, Germany

Subject Date: 1987

Architect/Designer: Rossi, Aldo (1931-1997)

The Friedrichstadt Housing Block, designed by Aldo Rossi in collaboration with Gianni Braghieri. This building is a significant part of the architectural landscape in Berlin, particularly in the southern Friedrichstadt area.

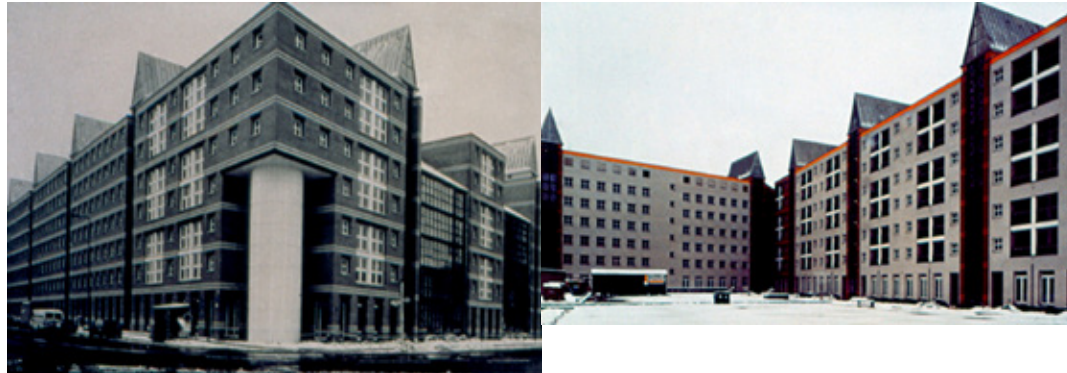


Figure.50 Friedrichstadt housing block
Source: <https://www.miesarch.com/work/1508>

a.Location and Context:

The Friedrichstadt Housing Block is located in Block 10 in southern Friedrichstadt, bounded by Friedrichstrasse, Kochstrasse, Wilhelmstrasse, and Puttkamerstrasse.

The block was incomplete in the 1970s, with only a few buildings constructed in the interior.

b.Architectural Goals:

Aldo Rossi aimed to restore the historical structure of the block. Preservation of the continuity of the street front was a crucial goal. Architectural diversity was sought while maintaining residential construction.

c. Design Features:

- The design includes a distinctive white cylinder volume with copper roofs.
- Different apartments and spaces contribute to the architectural diversity, creating unique facades for each segment.
- A strong green vertical element accentuates the differences between various segments.
- The red clinker facade is structured with stripes of yellow

clinker and green window lintels.

- Staircases are visible from the exterior, covered with green metal panels.
- Square white windows divided by rungs into smaller squares characterize the design.
- Extensive facade glazing on Wilhelmstrasse serves for soundproofing.
- An oversized column dominates the building corner, acting as a space sculpture.

d. Courtyard Features:

The courtyard of the block includes various areas for use, play, and tenant gardens.

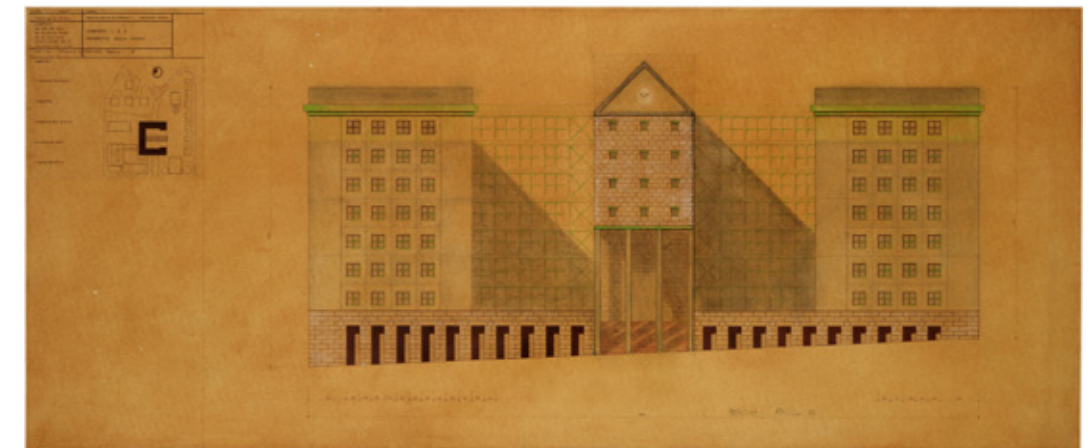


Figure.51 Friedrichstadt housing block
Source: <https://www.miesarch.com/work/1508>

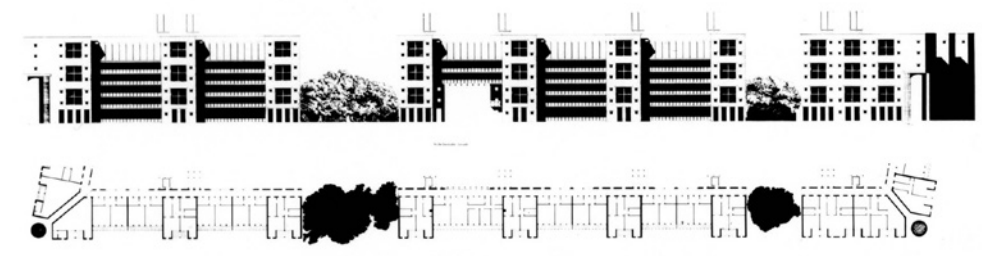


Figure.52 Friedrichstadt housing block
Source: <https://www.miesarch.com/work/1508>

Overall, the Friedrichstadt Housing Block blends historical restoration with modern architectural elements, creating a visually interesting and diverse residential complex in Berlin. Aldo Rossi implemented a geometrically rigorous design, resulting in an extremely appealing building.

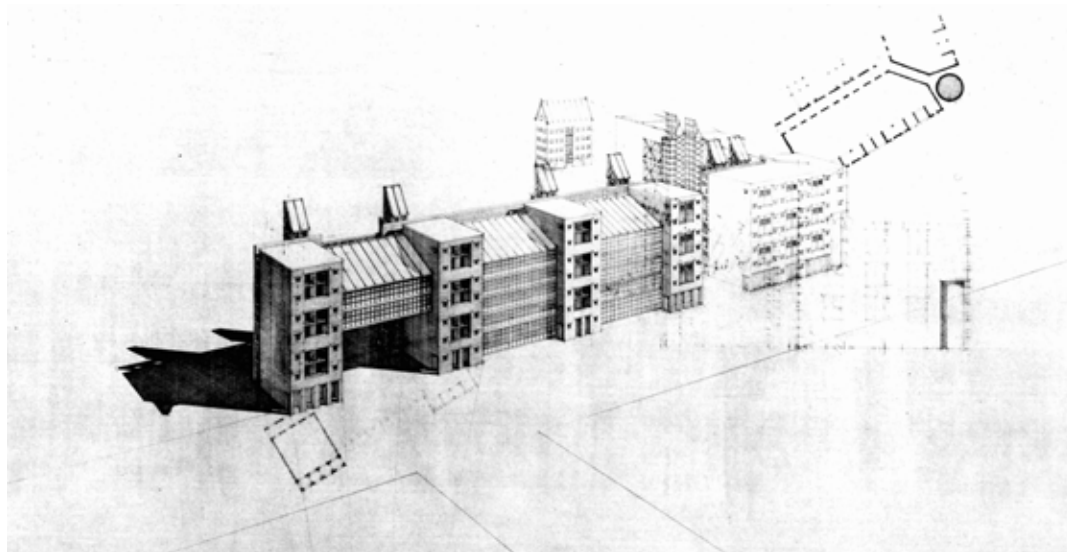


Figure.53 Friedrichstadt housing block
Source: <https://www.miesarch.com/work/1508>

6.4 Concepts for new designs

We decided to connect the two buildings as a whole through functionality, thus forming a multifunctional center serving the PAN, linear exhibitions, and other functions throughout the site. Its three main functions are hotel, reception, and museum.

First of all, we retain the original function of Building 1, which is a hotel, but give it more functions such as restaurants, convenience stores, gyms, collaborative offices, etc. At the same time, the hotel's room types have also been increased. This design is to meet different travel types and needs.

Immediately afterward, we transformed Building 2 into an archaeological site museum. On the ground floor, we designed the reception and ticket office to promote the order of the PAN and the preservation of the site. We designed the museum to give visitors an in-depth understanding of Parco Archeologico. In addition, the building also has offices, libraries, and other functions attached to it.

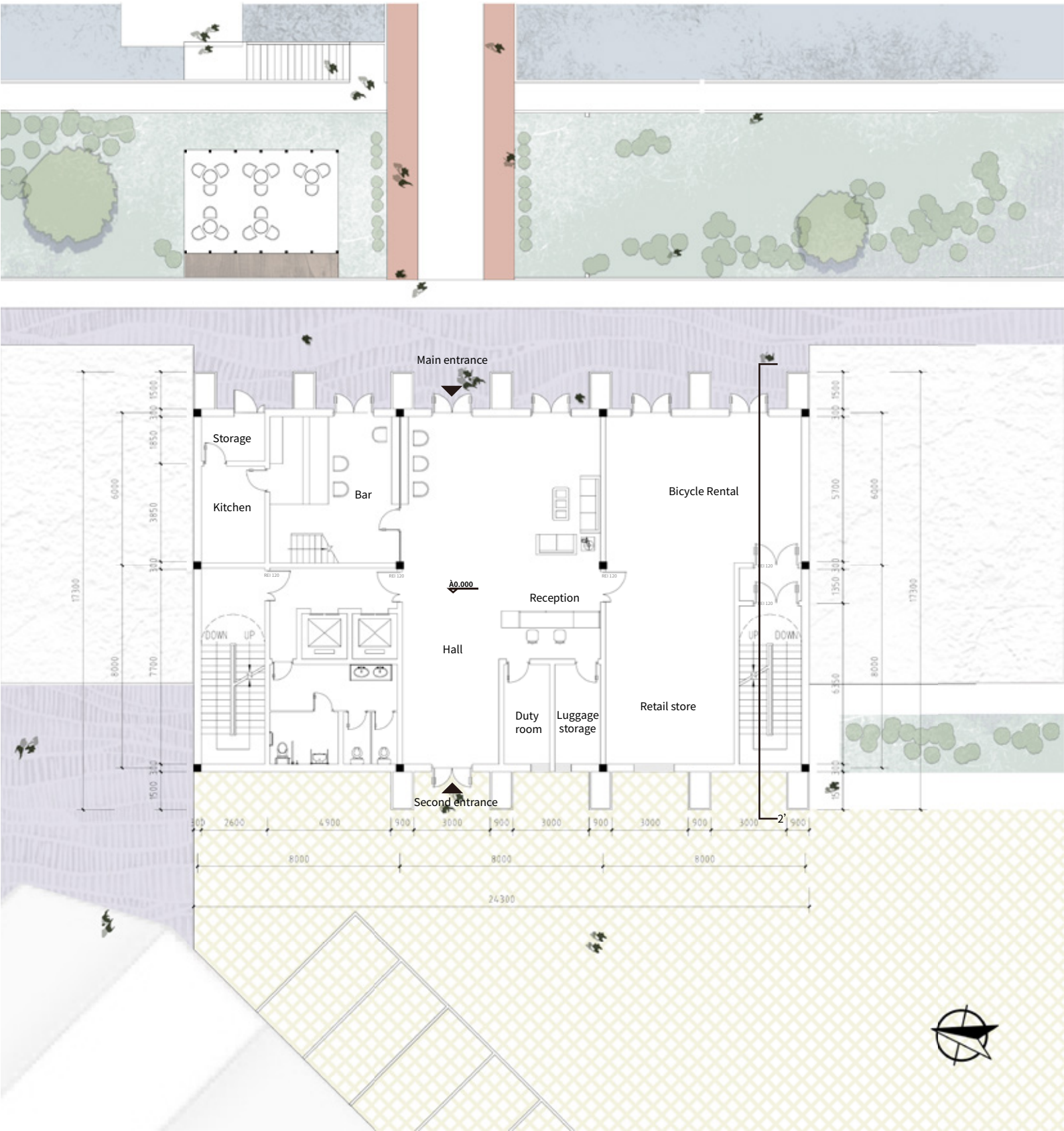
The facades of both buildings were updated to achieve a relatively unified effect.

6.4.1 Thinking Maps - Step3 - Architectural perspective



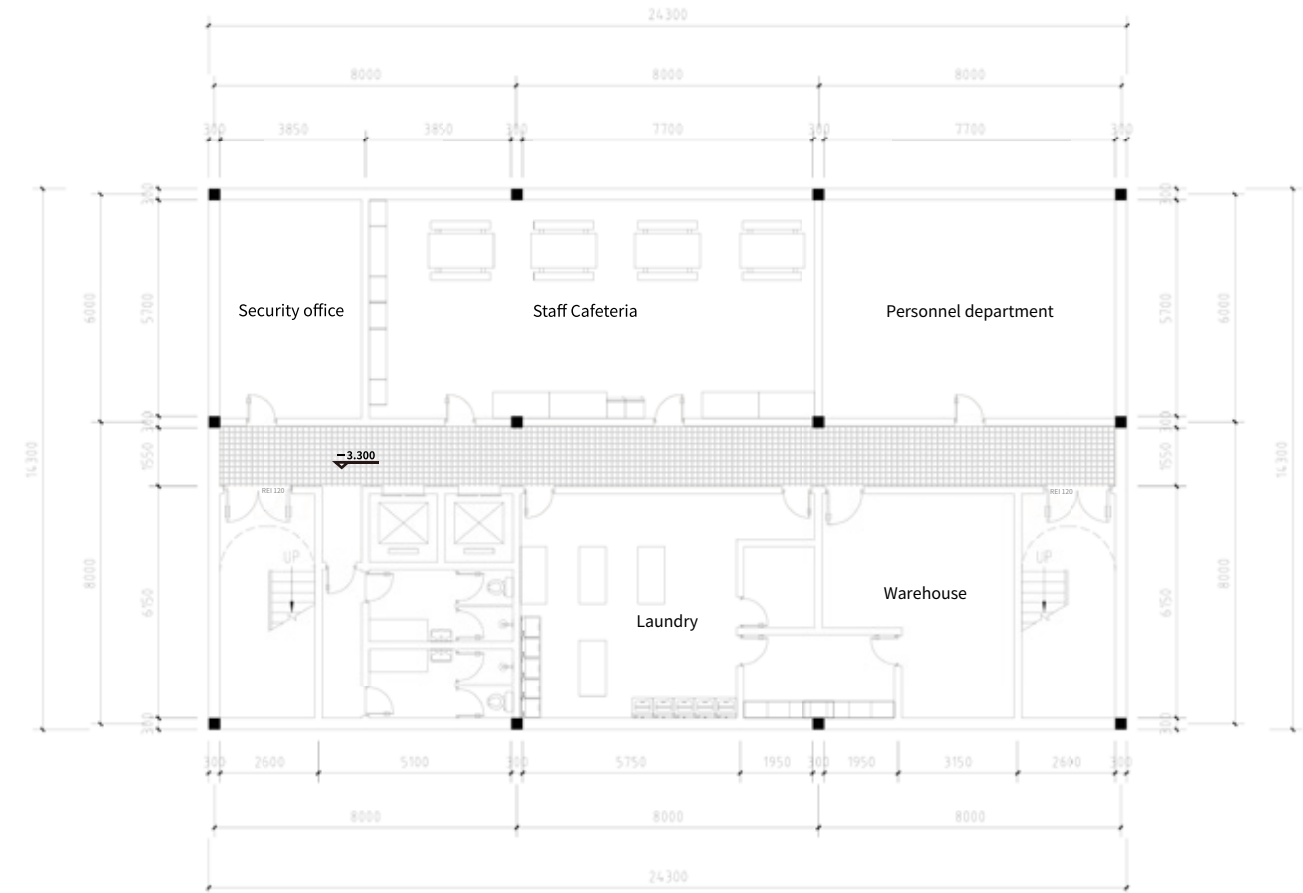
6.5 Plans & Facades & Sections

6.5.1 Hotel

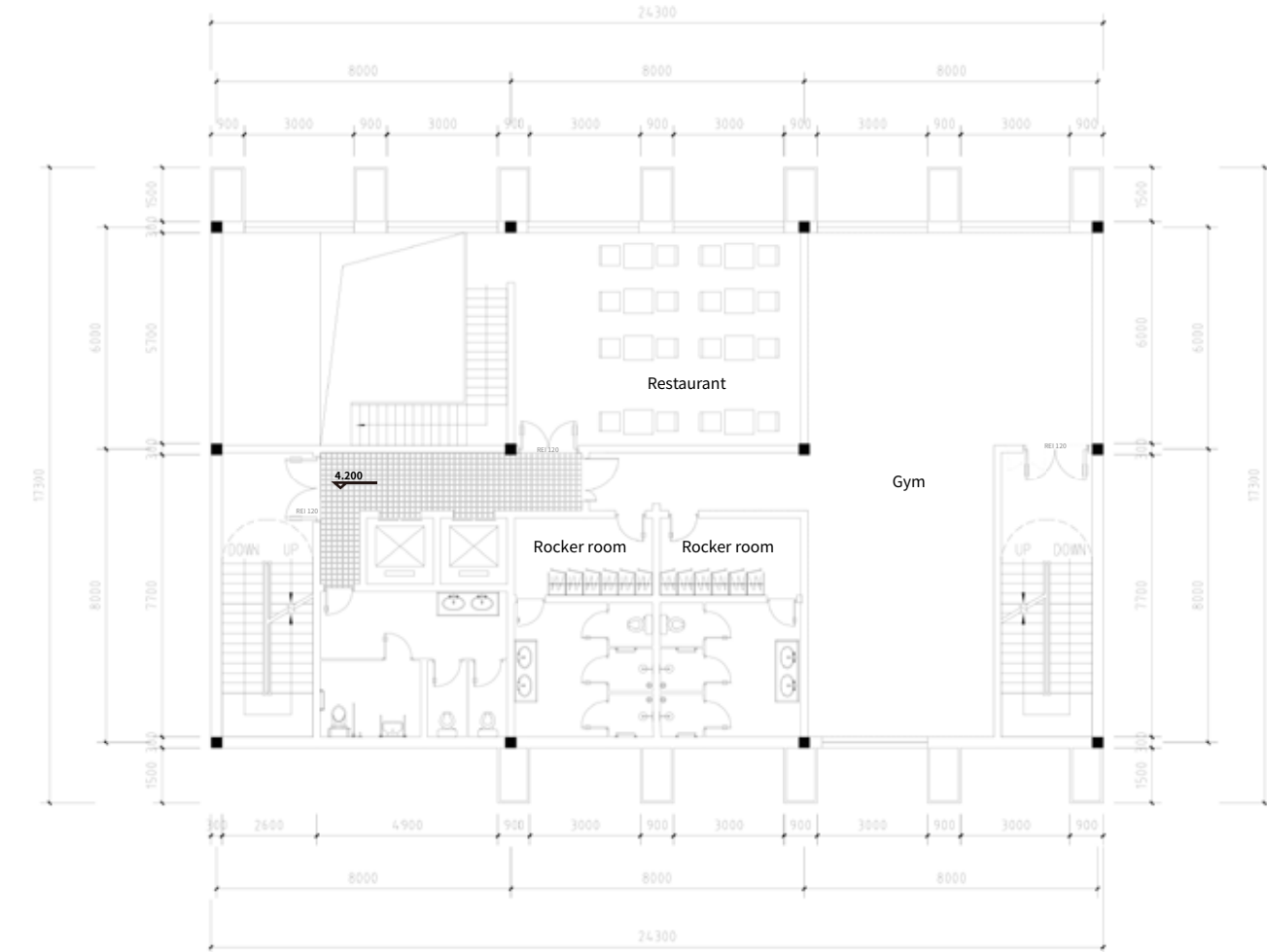


Ground floor - Reception 1:200

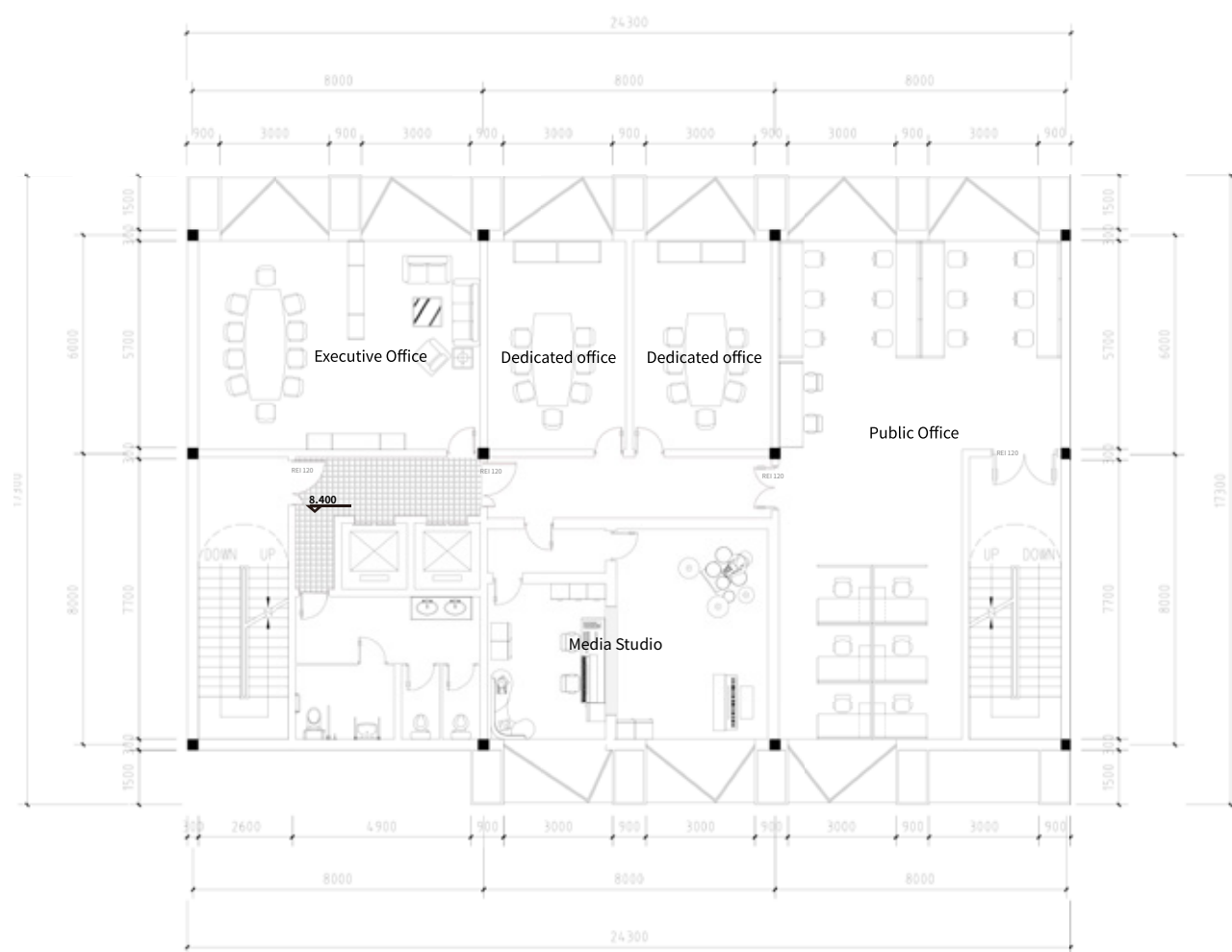
Map.31 Hotel ground floor plan-Reception 1:200 Source: Prepared by the author



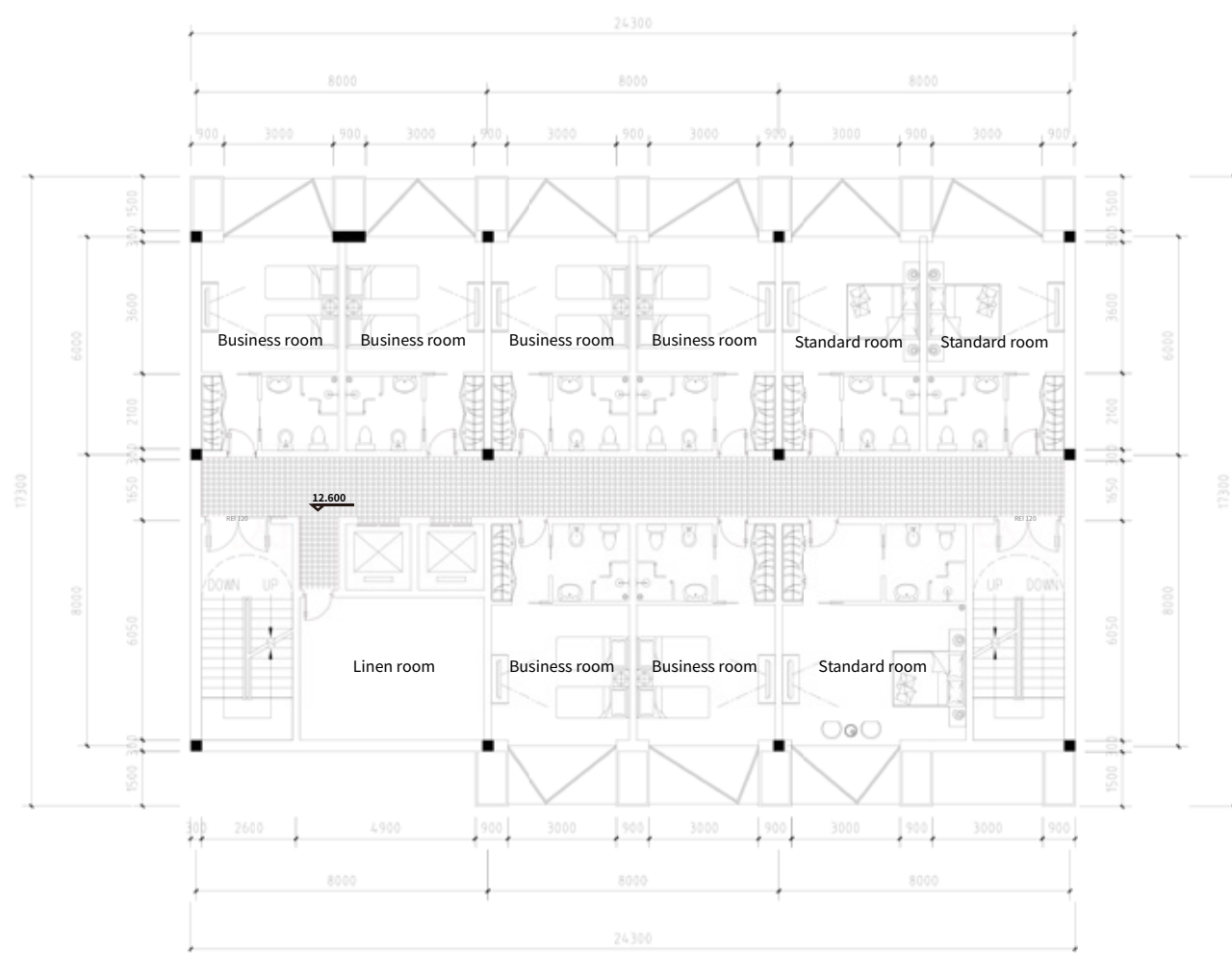
Map.32 Hotel basement floor plan-Staff area 1:200 Source: Prepared by the author



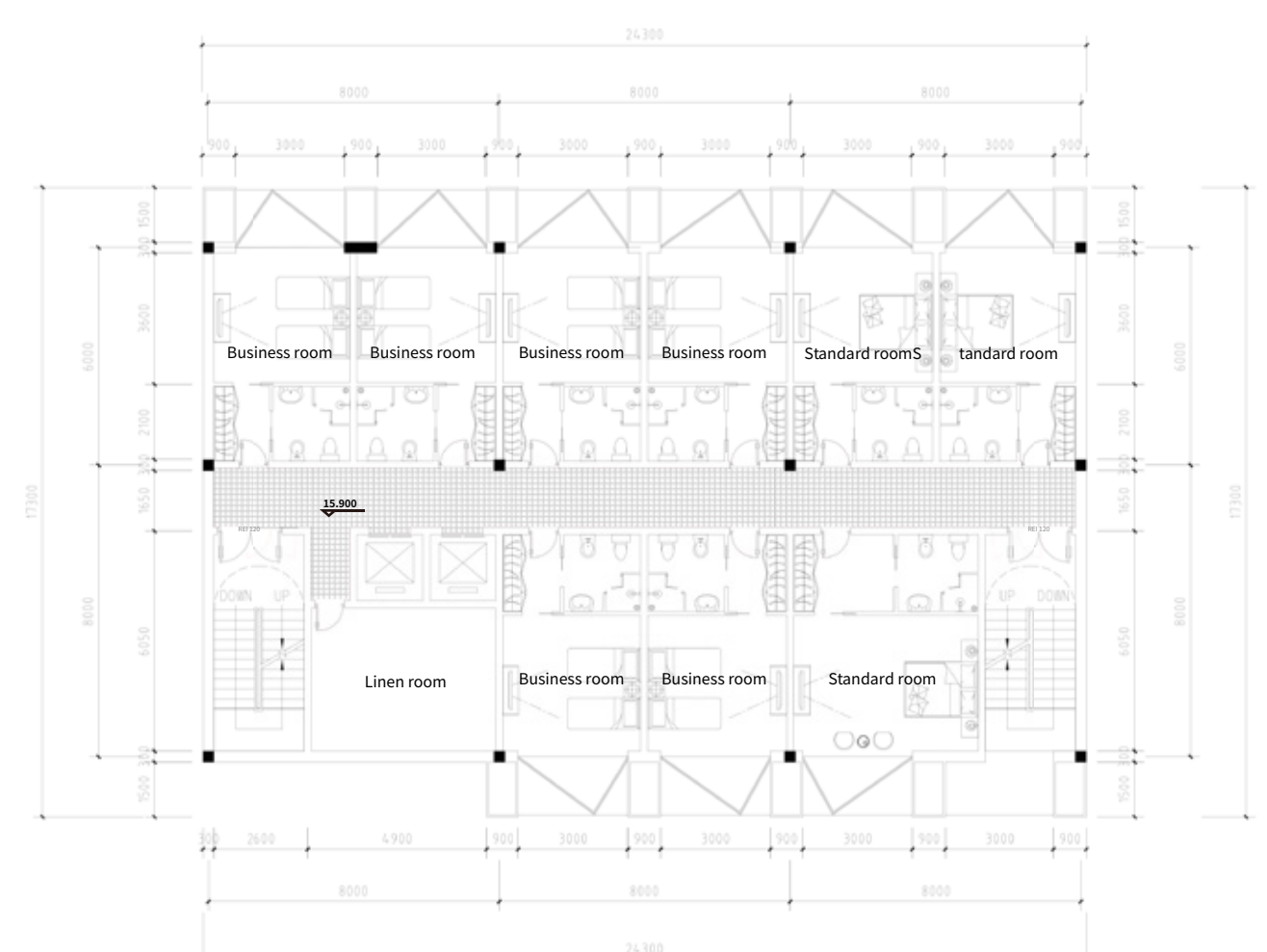
Map.33 Hotel 1F plan-Dining & Fitness 1:200 Source: Prepared by the author



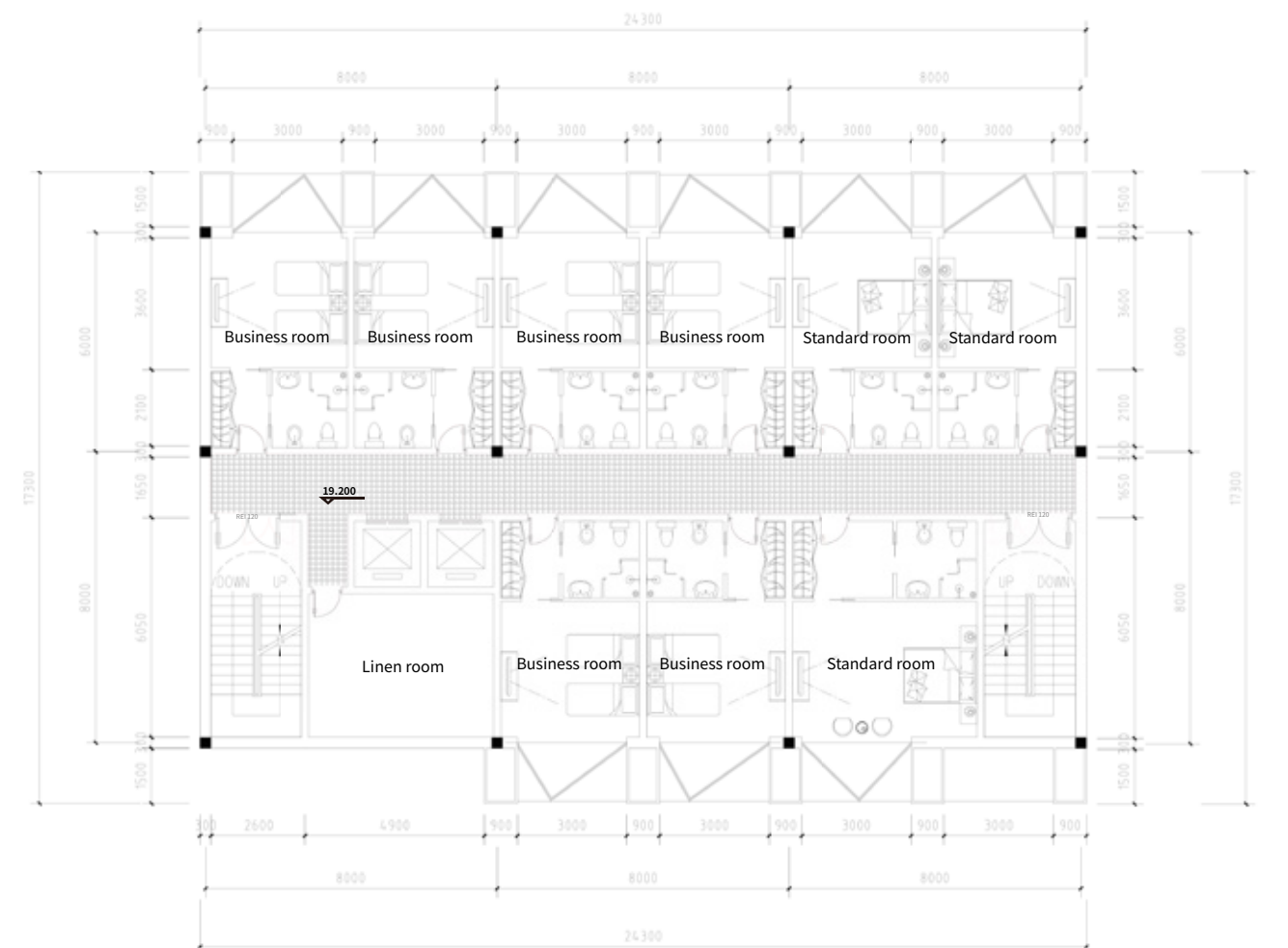
Map.34 Hotel 2F plan-Co-working 1:200 Source: Prepared by the author



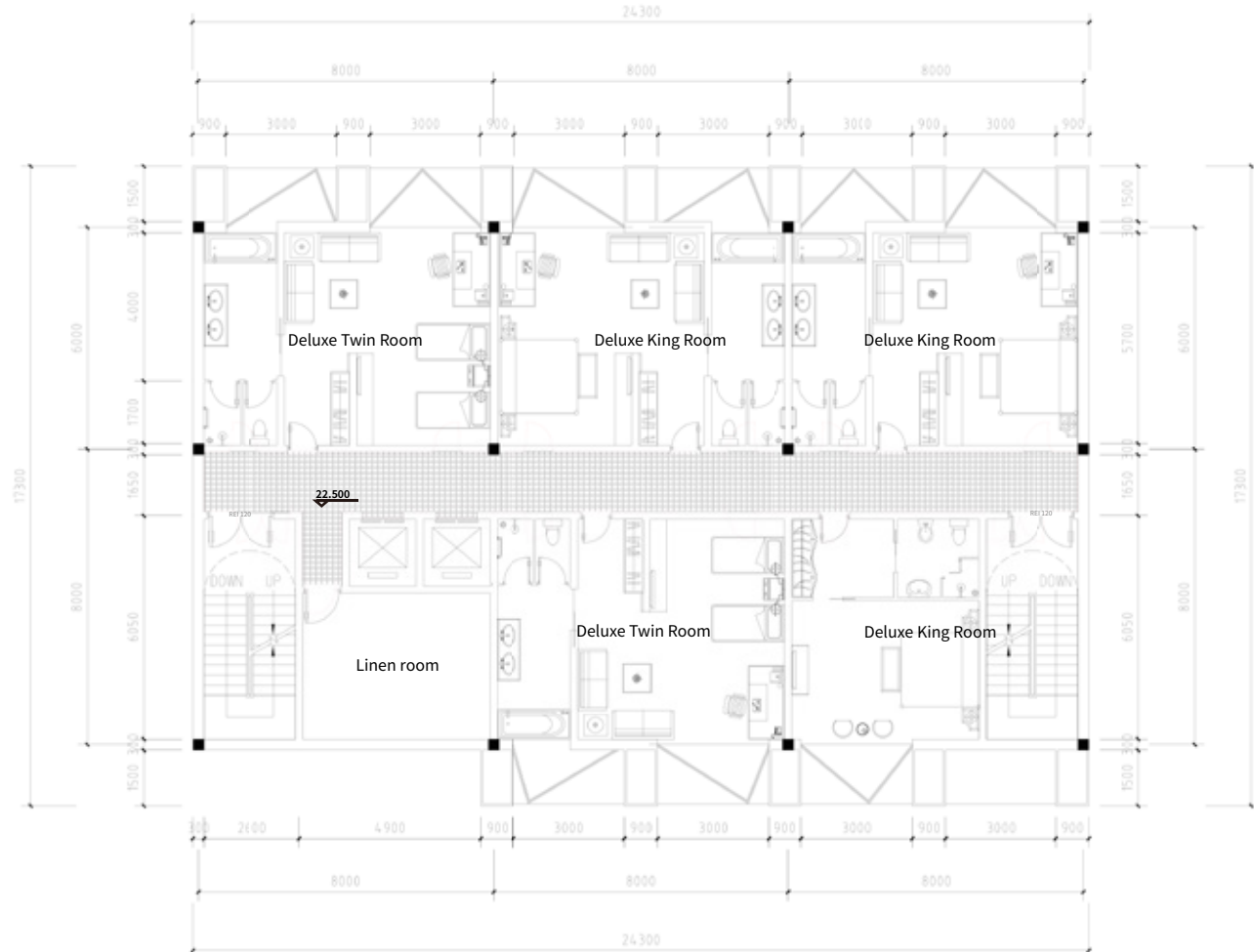
Map.35 Hotel 3F plan-Hotel standard rooms 1:200 Source: Prepared by the author



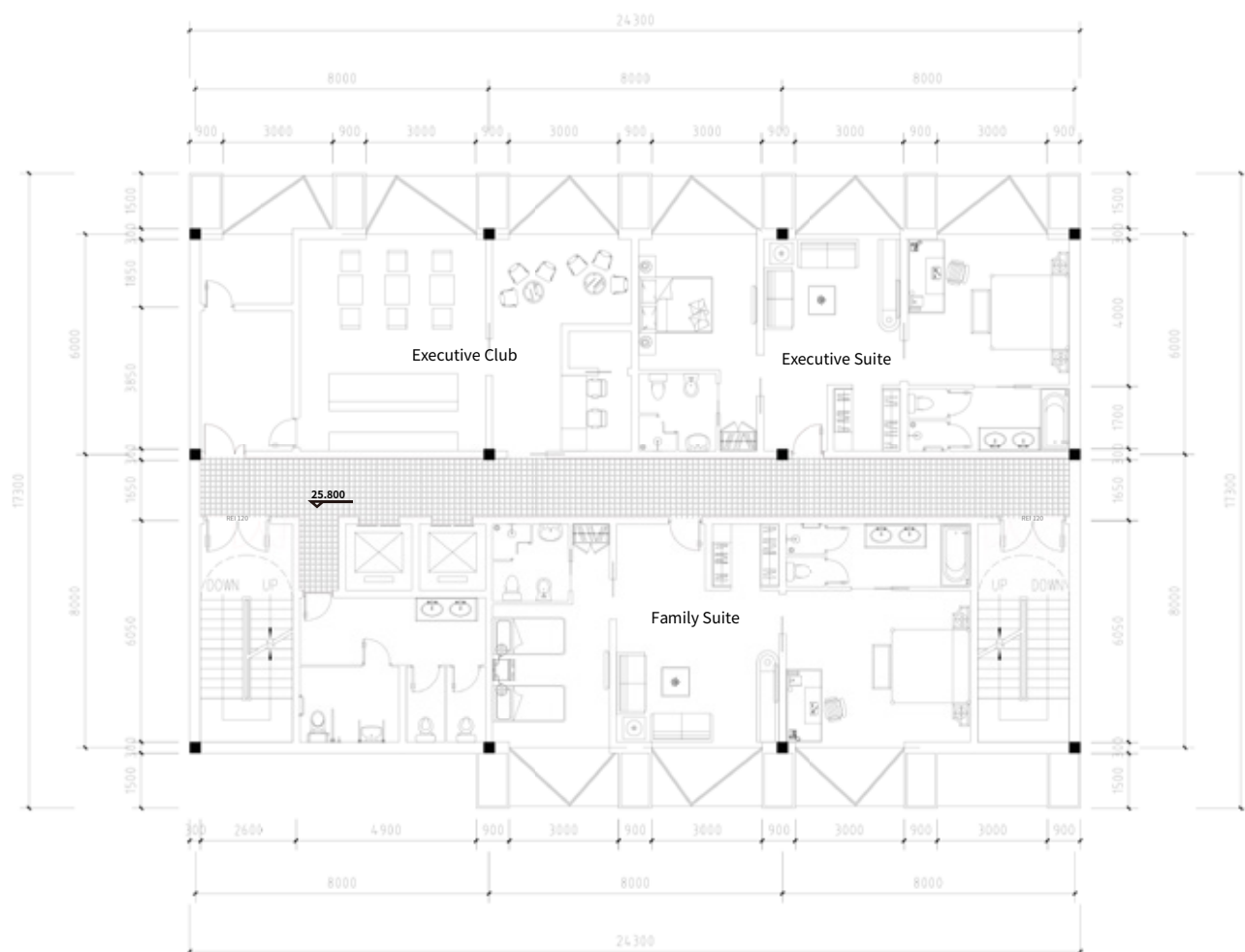
Map.36 Hotel 4F plan-Hotel standard rooms 1:200 Source: Prepared by the author



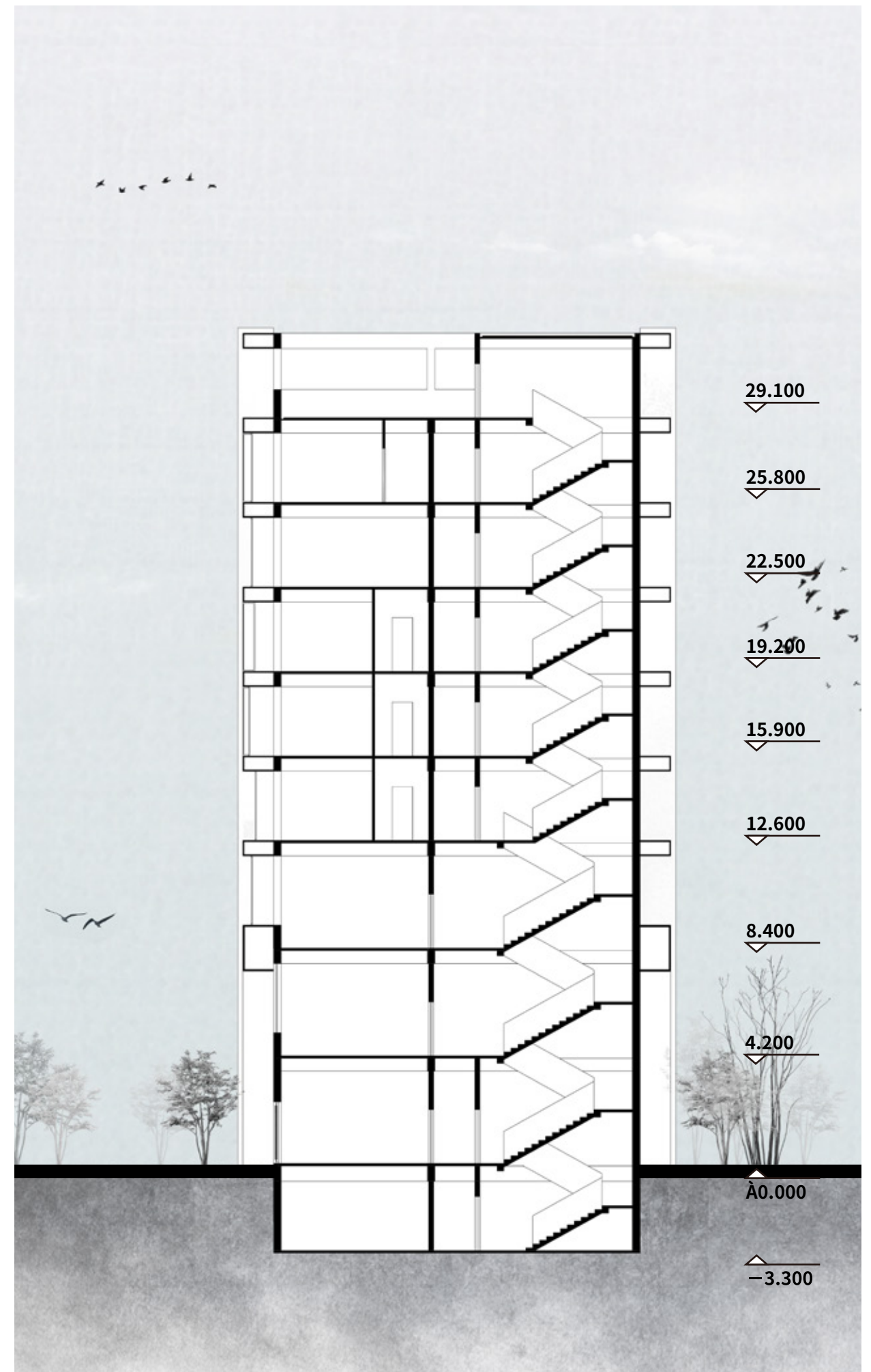
Map.37 Hotel 5F plan-Hotel standard rooms 1:200 Source: Prepared by the author



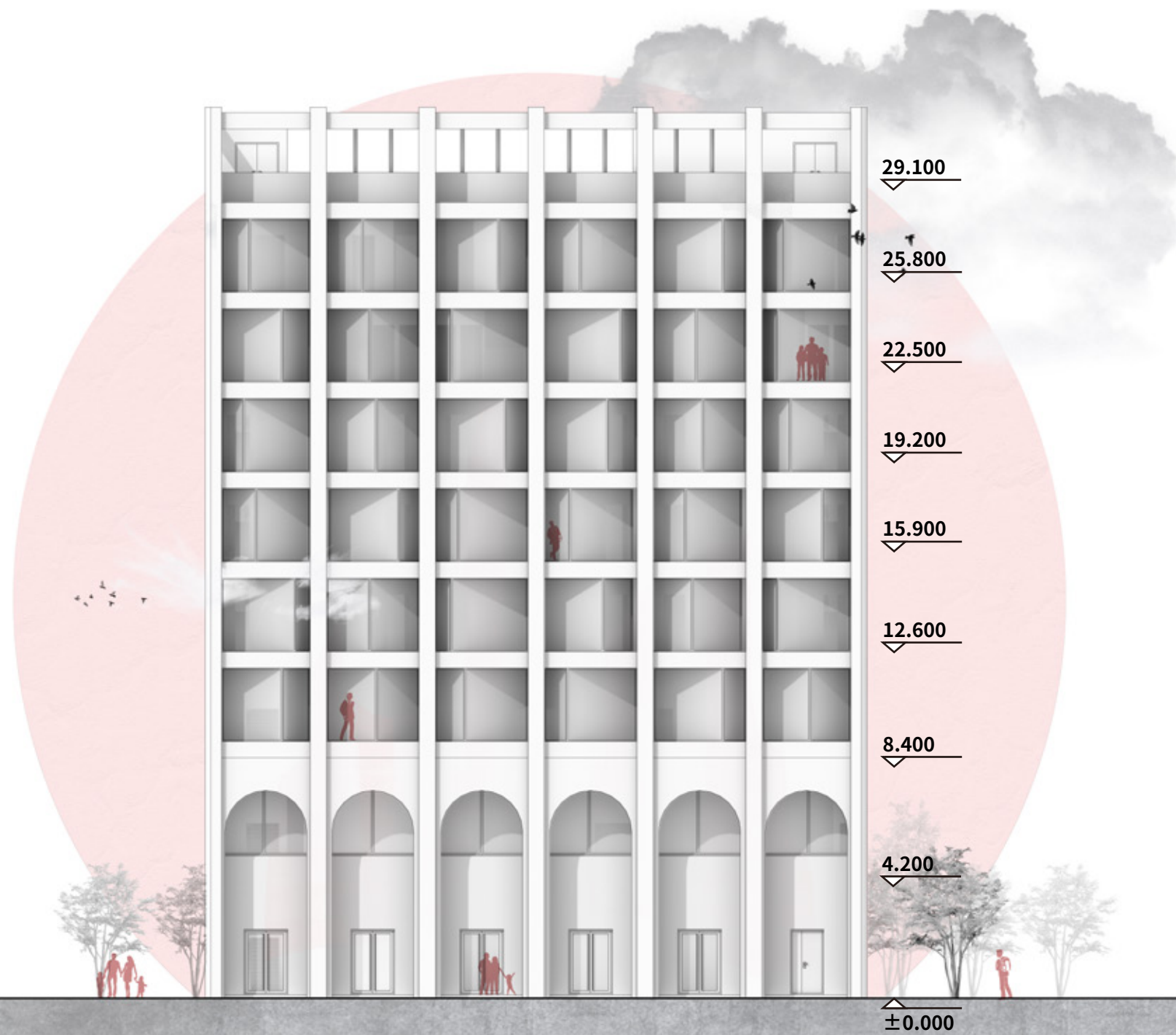
Map.38 Hotel 6F plan-Hotel suites 1:200 Source: Prepared by the author



Map.39 Hotel 7F plan-Hotel executive rooms 1:200 Source: Prepared by the author

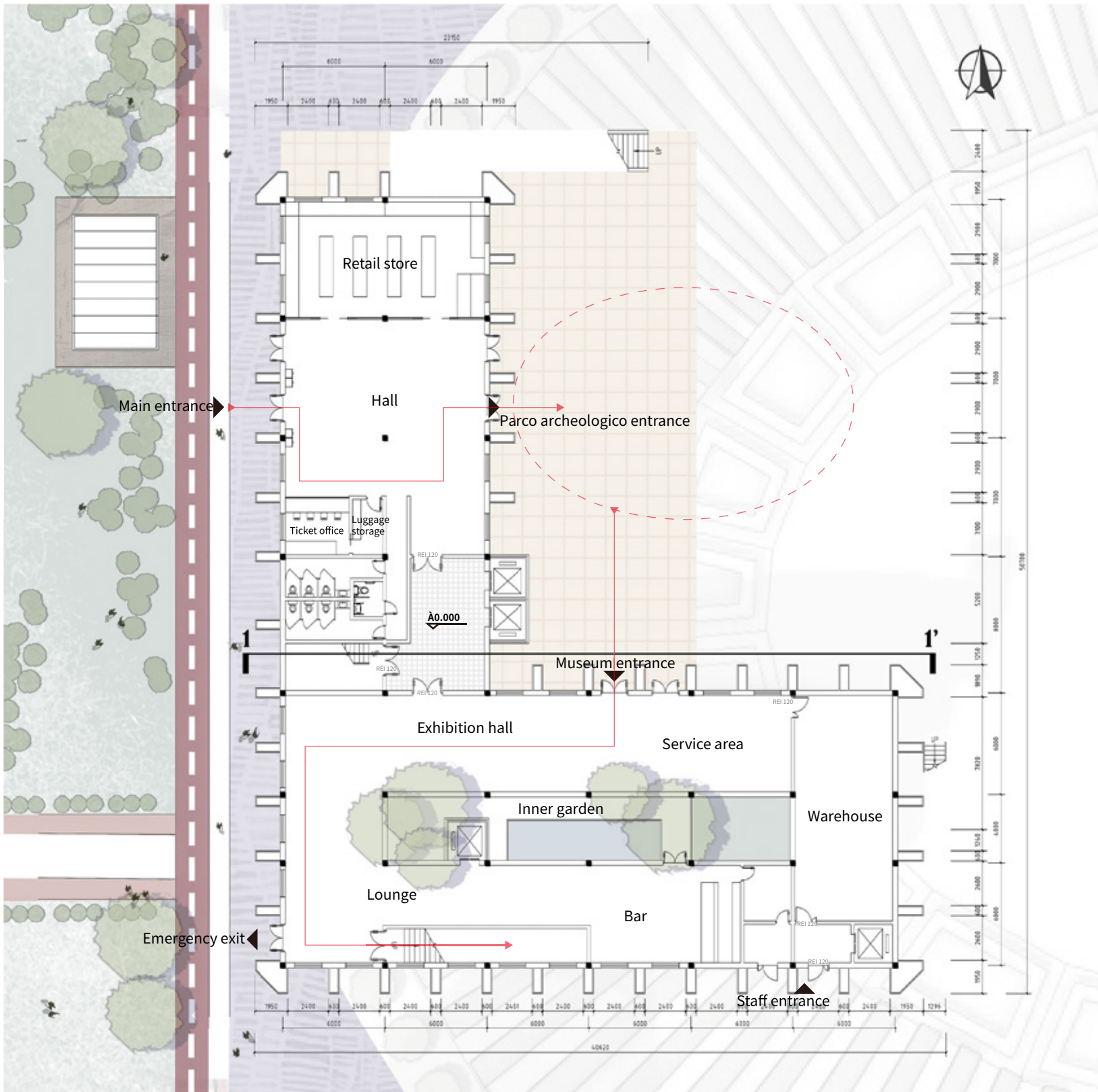


Map.40 Hotel section 2-2' 1:200 Source: Prepared by the author



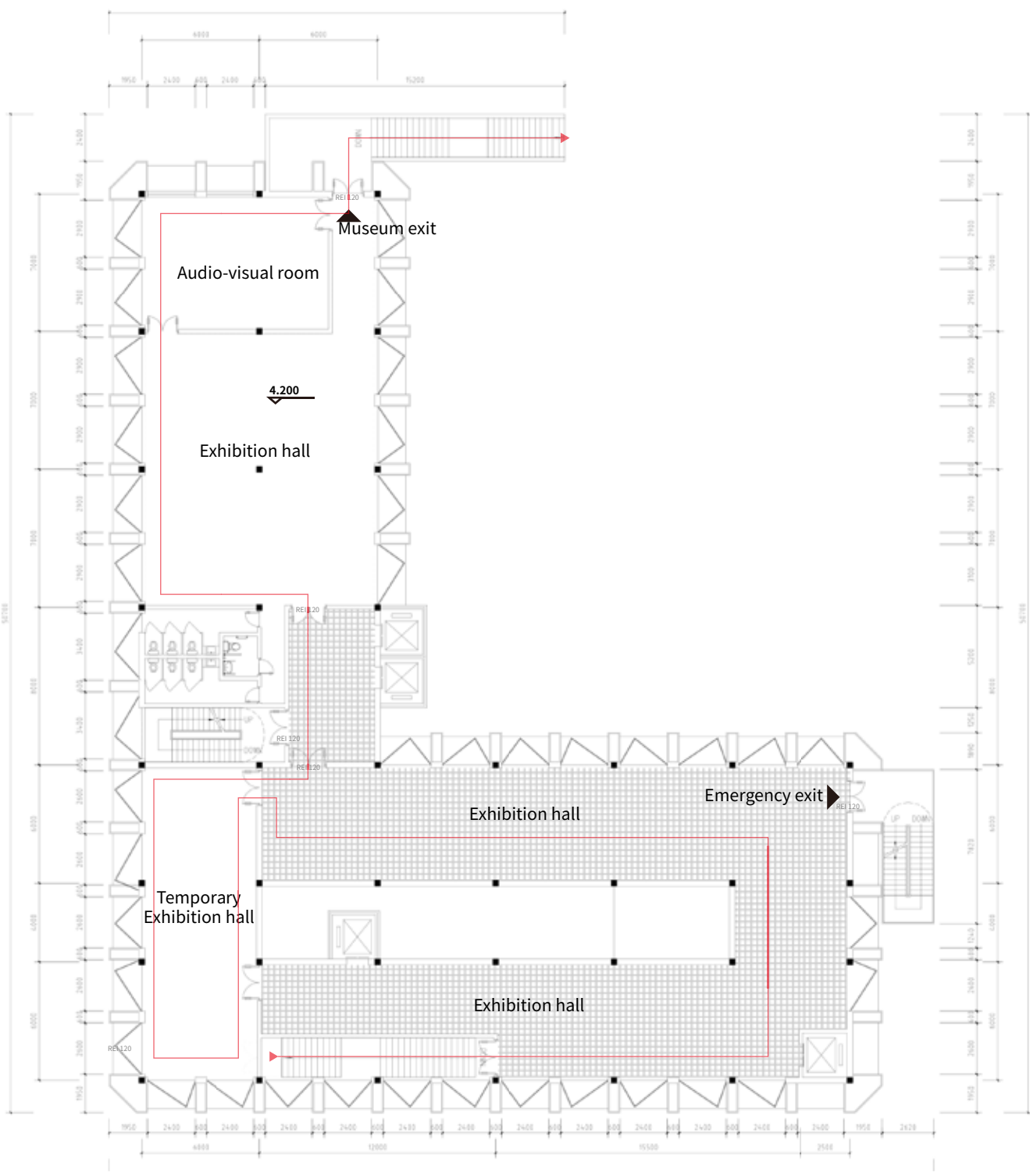
Map.41 Hotel East facade 1:200 Source: Prepared by the author

6.5.2 Museum



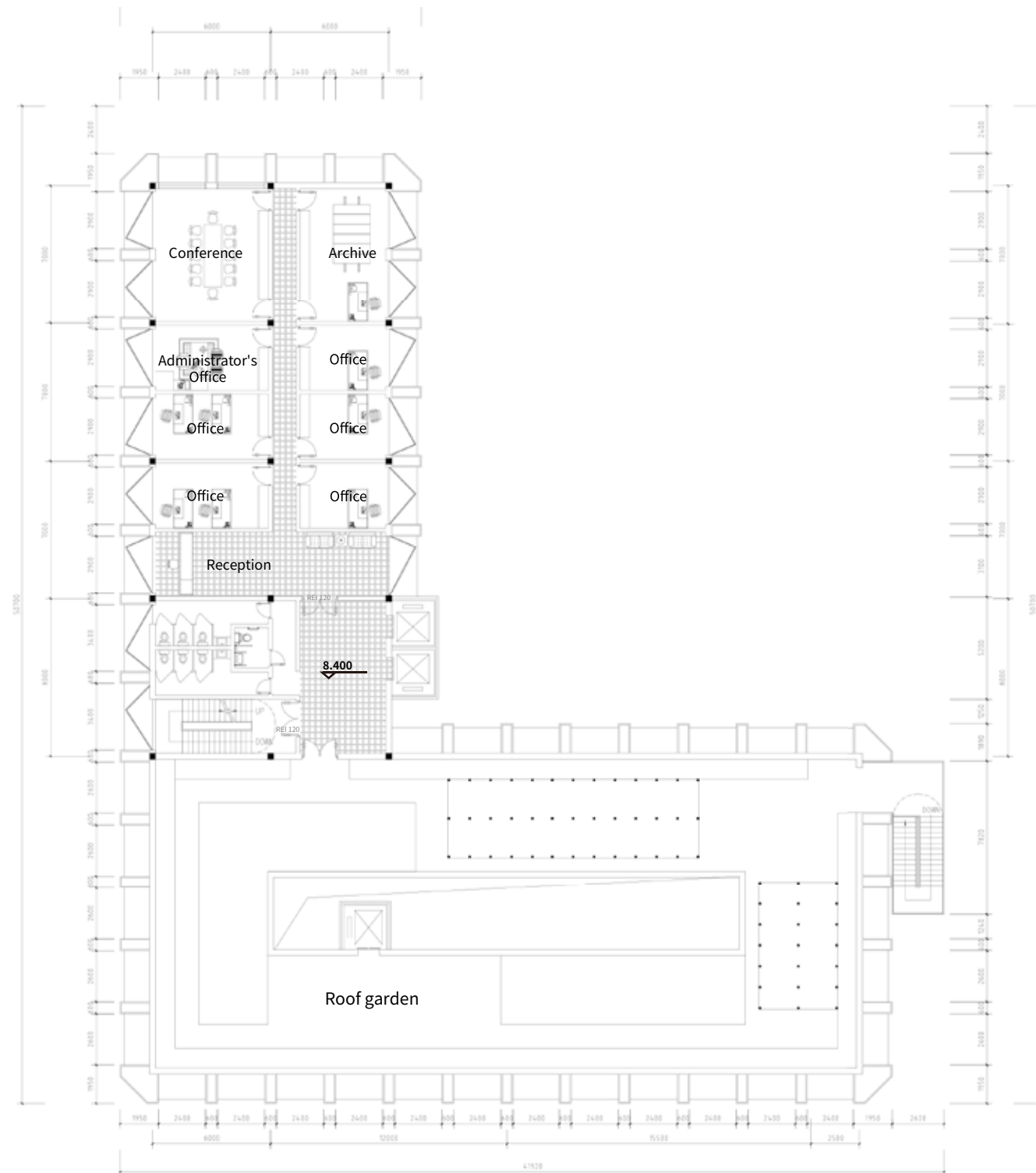
Ground floor - Reception & Exhibition 1:300 → Museum tour route

Map.42 Museum Ground floor plan - Reception & Exhibition 1:300 Source: Prepared by the author



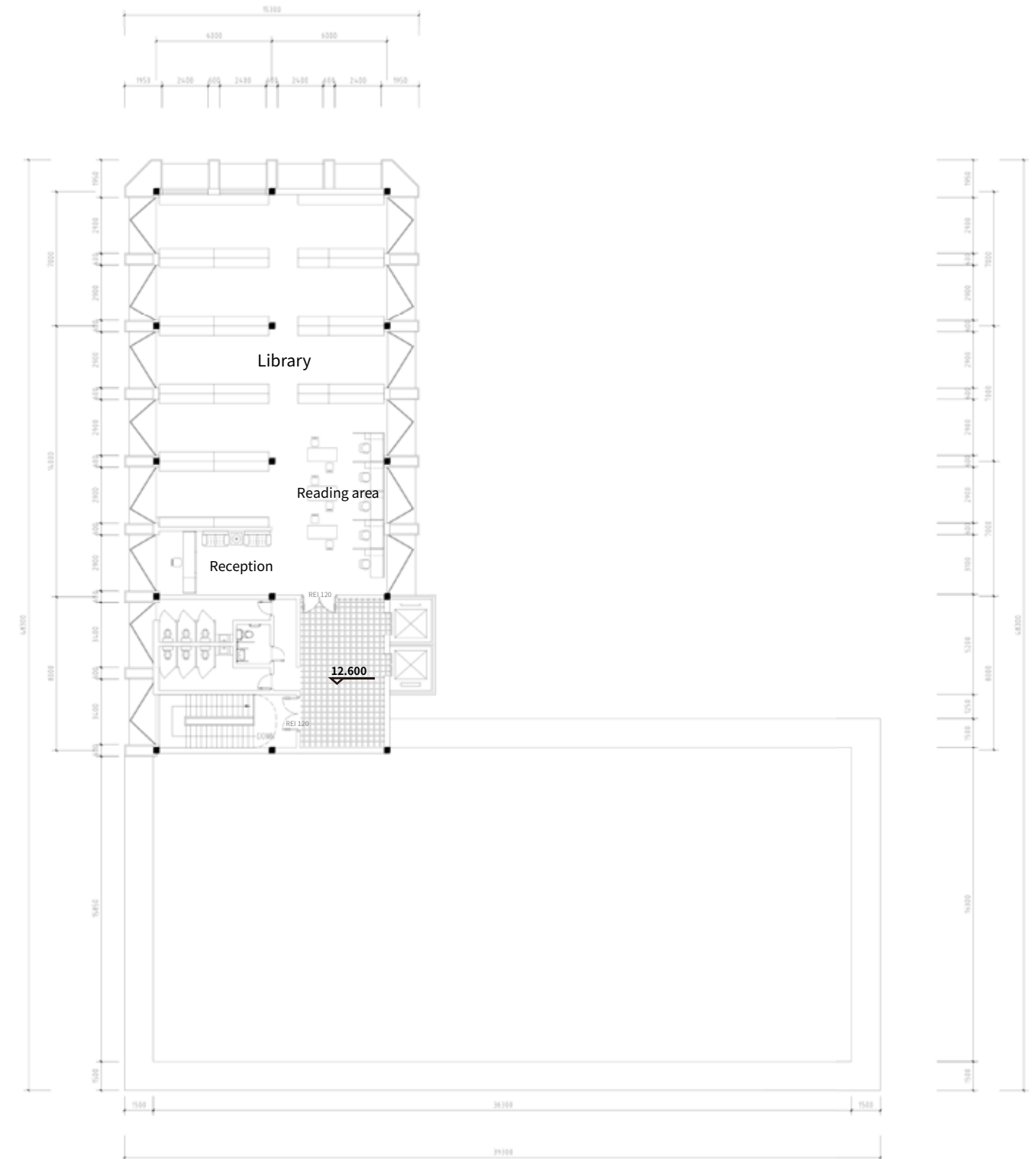
1F - Exhibition 1:300 → Museum tour route

Map.43 Museum 1F plan - Exhibition 1:300 Source: Prepared by the author



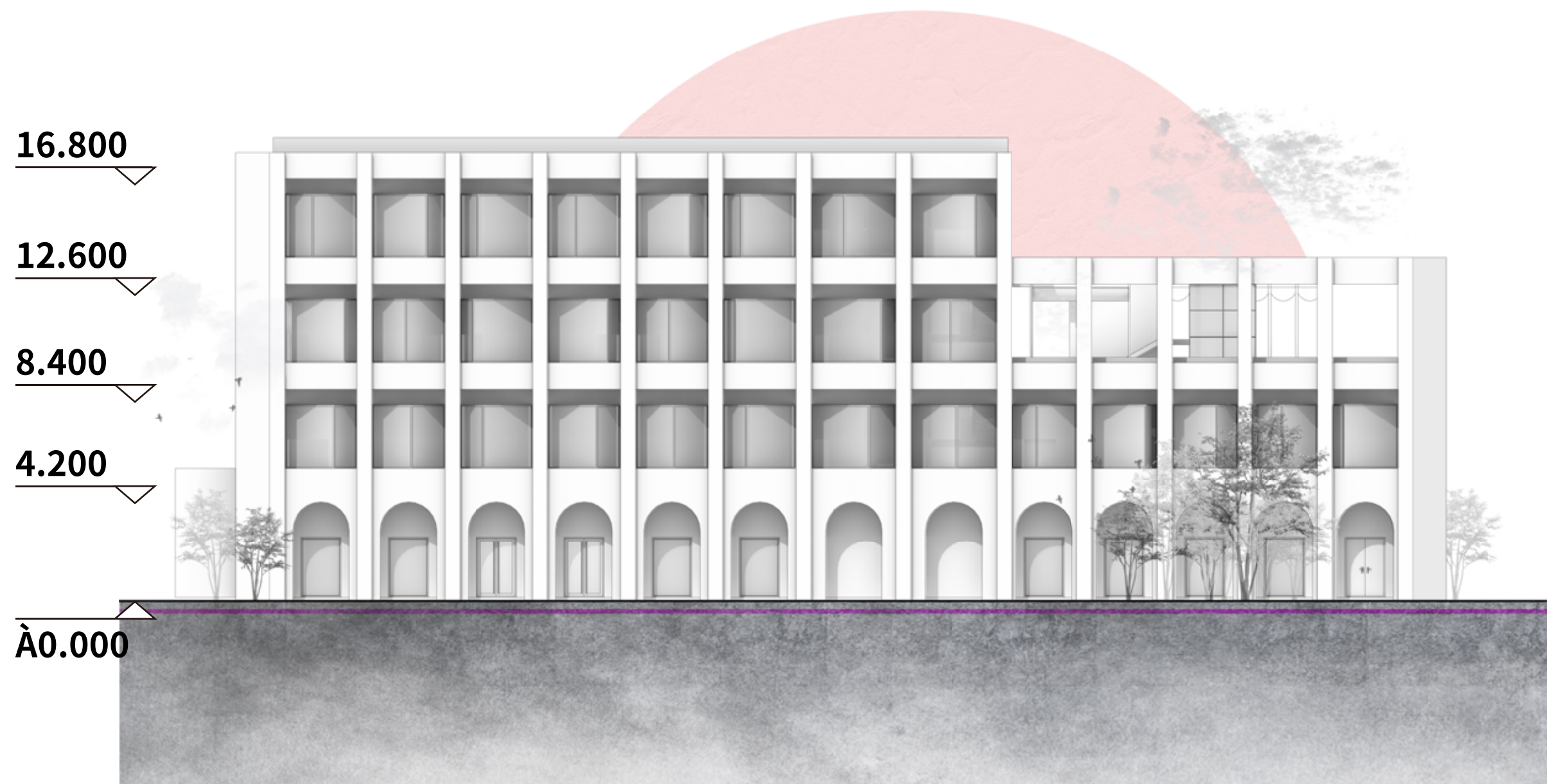
2F - Offices 1:300

Map.44 Museum 2F plan - Offices 1:300 Source: Prepared by the author

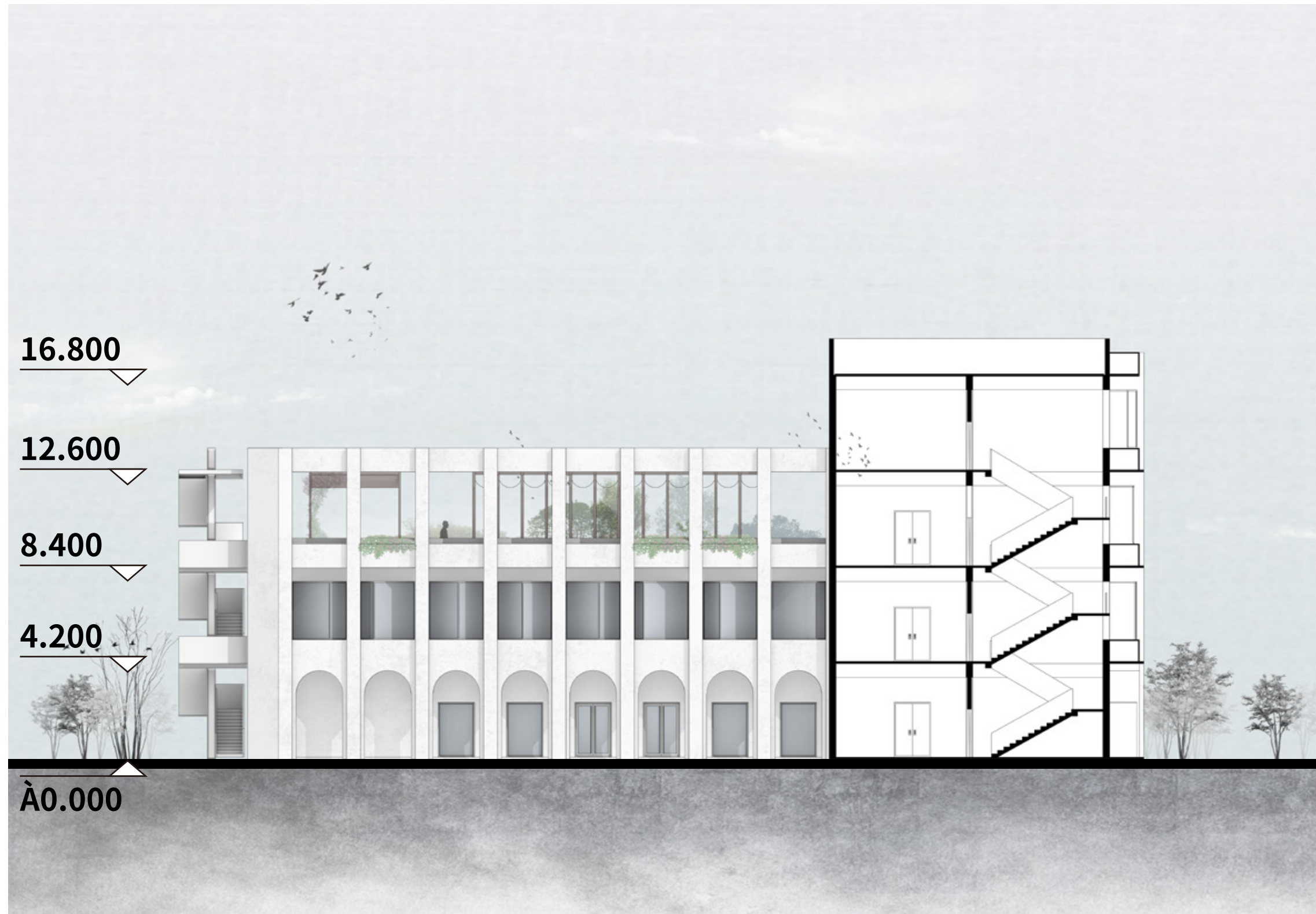


3F - Library 1:300

Map.45 Museum 3F plan - Library 1:300 Source: Prepared by the author



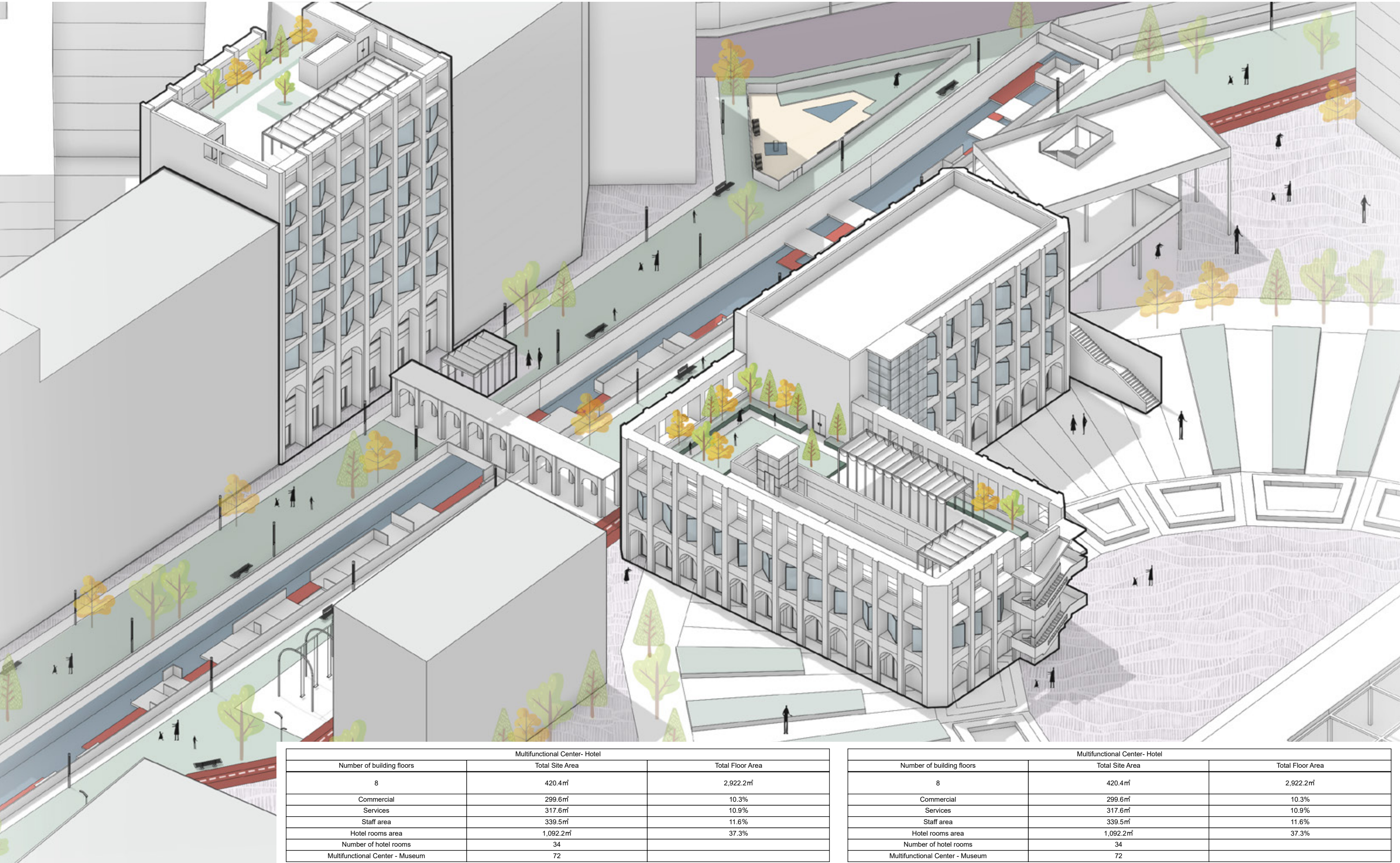
Museum west facade 1:200



Museum section 1-1' 1:200

Map.47 Museum Section1-1' 1:200 Source: Prepared by the author

6.6 Axonometric



Multifunctional Center- Hotel		
Number of building floors	Total Site Area	Total Floor Area
8	420.4m ²	2,922.2m ²
Commercial	299.6m ²	10.3%
Services	317.6m ²	10.9%
Staff area	339.5m ²	11.6%
Hotel rooms area	1,092.2m ²	37.3%
Number of hotel rooms	34	
Multifunctional Center - Museum	72	

Multifunctional Center- Hotel		
Number of building floors	Total Site Area	Total Floor Area
8	420.4m ²	2,922.2m ²
Commercial	299.6m ²	10.3%
Services	317.6m ²	10.9%
Staff area	339.5m ²	11.6%
Hotel rooms area	1,092.2m ²	37.3%
Number of hotel rooms	34	
Multifunctional Center - Museum	72	

Map.48 Axonometric Source: Prepared by the author

Table 4. Hotel area statistics Source: Prepared by the author

Table 5. Museum area statistics

Source: Prepared by the author



07

CONCLUSION

- 7.1 Research results - The reasons and significance of improving the Landscape of the Navigli
- 7.2 The design proposal in the Navigli system
- 7.3 Integration and interconnection of proposals with the Navigli system
- 7.4 Summary

7.1 Research results - The reasons and significance of improving the Landscape of the Navigli

Landscape of the Navigli

The project aims to define the Milan of the future and imagine a symbolic link between the city and the Navigli canal. The improvement of the Navigli area is important for the city of Milan. This not only enhances the beauty and cultural value of the city but also contributes to the overall well-being of residents and tourists. Here are some key points:

Historical and Cultural Heritage: The Navigli Canal has a rich historical and cultural significance, dating back to the 12th century. Improving its landscape can help preserve and showcase this heritage, attracting tourists and residents alike.

Tourism and Economic Development: A visually appealing Navigli Canal can become a major attraction for tourists, contributing to the economic development of the region. Tourism-related activities, such as cafes, restaurants, and shops along the canal, can flourish with an improved landscape.

Quality of Life for Residents: A well-maintained and aesthetically pleasing canal contributes to the overall quality of life for residents. Access to beautiful outdoor spaces can enhance the well-being of individuals and create a sense of community.

Recreational Opportunities: An improved landscape can provide opportunities for recreational activities such as walking, jogging, cycling, and boating. Creating green spaces and pedestrian-friendly paths can encourage a healthier and more active lifestyle among residents.

Environmental Benefits: Enhancing the landscape can also include environmental considerations, such as planting more trees, creating green spaces, and improving water quality. This contributes to the overall ecological health of the area and promotes sustainability.

Community Gathering Spaces: A well-designed canal landscape can serve as a hub for community events,

festivals, and gatherings. This fosters a sense of community and provides residents with communal spaces for social interaction and engagement.

Increased Property Values: The improvement of the Navigli Canal's landscape can positively impact property values in the surrounding areas. Well-maintained and attractive public spaces often lead to increased real estate demand and values.

Preservation of Urban Identity: The Navigli Canal is an integral part of Milan's urban identity. Preserving and enhancing its landscape contributes to maintaining the unique character and identity of the city, fostering a sense of pride among its residents.

Cultural Events and Festivals: An improved canal area can host cultural events and festivals, attracting artists, performers, and cultural enthusiasts. This not only adds vibrancy to the city but also promotes cultural exchange and awareness.

Infrastructure and Connectivity: Landscape improvements can go hand in hand with infrastructure enhancements, such as improved pathways, bridges, and lighting. This contributes to better connectivity and accessibility for pedestrians and cyclists.

In summary, improving the landscape of the Navigli Canal in Milan is a multi-faceted initiative that can have positive effects on tourism, the economy, community well-being, and environmental sustainability. It's an investment in the city's past, present, and future.

7.2 The design proposal in the Navigli system

To achieve the goal of the chosen challenge project, reopen the Navigli canal and connect it with the Milan city, our design has chosen the theme of art, combining the reopen Navigli canal with art exhibitions. To achieve sustainable goals through narrative design from the perspectives of the city, site, and architecture.

7.2.1 The design proposal for the urban perspective

The newly reopen Navigli canal system showcases an overall solution that includes addressing challenges and issues faced by humanities, historical protection, and the environment. The eight sites in the project each have different artistic themes which is in line with the cultural and historical landscape around the site.

These eight attractions correspond to eight different art themes, namely the street art of Cassina de Pomm, the future art of Via Melchiorre Gioia, the Asian art of Conca dell 'Incoronata, the painting art of San Marco, the handicraft art of Via Senato via Marina, the modern art of University degli Studio, the green art of Parco delle Basiliche, and the Ancient culture art of Parco archeologico.

These artistic themes are determined by taking into account the historical background of each block, their current surrounding environment, and the main types of facilities. Therefore, their corresponding artistic themes can also reflect their unique cultural characteristics to a certain extent. For example, the Conca dell 'Incoronata scenic area is surrounded by a Chinatown in Milan. Therefore, the development of the Asian Cultural and Art Festival can become a platform for cultural exchange between different regions, promoting cultural and economic development while also contributing to Milan's cultural diversity and inclusiveness. Another example is that we have decided to set the artistic theme of Parco archeologico as Ancient Culture Art, which is clearly due to the excavation of the Roman amphitheater and the construction of PAN. This allows for integrating historical background and current situation with the theme, to map the

local cultural characteristics to the greatest extent possible. Therefore, when extracting the artistic theme of one of these 8 individual scenic spots for analysis, We can believe that naming art themes and organizing art festival exhibitions can greatly promote the cultural and economic development of the local area and its surrounding areas.

When we look at it from a broader perspective, the eight art themes have formed a linear and continuous whole through the reopening of the Navigli Canal. Each point can influence and promote each other, thereby making cultural diversity more vibrant and driving the economic development of the entire region. The combination of Navigli canals and art exhibitions not only compensates for Milan's lack of an art week as an international metropolis with rich cultural heritage. It also attracts more people to participate and provides tourists with the opportunity to experience Milan's history and culture.

7.2.2 The design proposal for the Parco Archeologico site

From the perspective of the site, zoning design can better connect Darsena area and the site. Through a three-stage transition, the pedestrian flow is gradually introduced into the reopened Navigli canal area, providing more activity spaces for residents living in the surrounding areas. The redesigned road system can also better connect with the surrounding area and integrate into the road system from the urban perspective. The riverside walkway further increases the connectivity with the Navigli canal. The layered riverside walkway allows tourists to experience the reopened Navigli canal from different perspectives and helps with the overall management of the canal system.

The Event square, as the first stage, provides activity and sports venues as its main function. It includes a Skateboarding area, tennis court, outdoor fitness equipment, and children's activity area to meet the different sports needs of residents of different age groups in the surrounding area. The canal equipped with observation platforms has also been reopened and connected by bridges.

The second stage is Leisure Plaza, which is the renovation and integration of the former Praco Rossi and Conca di Viarenna. The reopening of the canal is the focus here. Conca di Viarenna has undergone renovation and we have developed a new Naviglio along its route, along with a series of waterfront platforms for visitors to enjoy. Praco Rossi is no longer a degraded venue, but a loop garden where people can relax.

The third stage is the Linear park, a linear area. Here, the reopening of the Navigli Canal is still our primary objective. But the Linear exhibition on the river enables the opening up of the river to be more than just a single function of the river. At the same time, the cycle paths and footpaths are successfully connected to the previous two stages to ensure the continuity of the site. In addition to this, a ticket office is provided to keep the exhibitions in order, and a bar, playground, pet garden, observation platform, and other

features are added to enrich the functionality of the site and to satisfy the needs of the visitors. Finally, the two buildings we selected were transformed into a multifunctional center to serve both the site and the newly built PAN.

7.2.3 The design proposal for the buildings renovation

The architectural perspective is the central system in the site design, as well as the embodiment of the combination of the Navigli canal and artistic themes in the site area, creating an area for tourists to wear, eat, live, and travel. Creating economic conditions for the area and facilitate site maintenance. Achieving sustainable design goals.

This multifunctional center is divided into two parts, the hotel and the museum.

The hotel building is located on the west side of the river and is based on the renovation of the old building that served the function of a hotel. The new hotel is more than just a place to stay. The hotel has a bike hire shop and retail outlet on the ground floor for visitors to park their bikes, a bar on the ground floor, and a restaurant on the upper floor for both guests and non-guests. The two upper floors also offer a gym and a shared office area. In addition, the range of rooms has been increased to cater to the different needs of the different types of guests. A viewing area on the top floor allows travelers to enjoy the views of the entire site.

The museum building is located on the east side of the river and directly opposite the hotel. The main functions provided by this building are the reception and ticket office for PAN on the ground floor. The ground and ground floors are used as a museum for the Roman theatre. In addition, the upper two floors are equipped with offices and a library for the use of the building's employees. Thus, the museum building is mainly intended for visitors to the PAN.

The two buildings are connected by a corridor, with signage to guide the visitor, thus forming an integrated multifunctional center.

7.3 Integration and interconnection of proposals with the Navigli system

These are the main elements of our design proposals, which were created with the reopening and revitalization of the Navigli Canal in Milan as the primary goal. When we integrate these three perspectives, we can see that they are in fact interconnected and in a progressive relationship. Our logic was first to define the future direction of the reopened Navigli Canal from a holistic point of view, i.e. the eight points of the artistic theme. We then chose one of these points, the Parco Archeologico, to plan in detail in order to make it fit best with the theme of Ancient cultural art. The final step in our design was the renovation of two abandoned buildings within the Parco Archeologico site to maximize their fit with the specific theme of the site.

Thus, they are progressive and interlocking design proposals. In the end, when taken together as a whole, it is a design proposal for the reopening of the Navigli Canal in Milan, from the whole to the parts to the details.

7.4 Summary

Overall, in the design of reopening Navigli canals, zoning design has several advantages: firstly, from an urban perspective, the selection of zoning design can consider various factors and elements, including functional requirements, environmental characteristics, and social impacts, ultimately achieving the goal of adapting to local conditions. Through comprehensive consideration, design choices can balance various needs and interests, ensuring the overall coherence and coordination of the design scheme.

Secondly, from a site perspective, zoning design can optimize and utilize available spatial resources. By conducting research on the surrounding areas of the site, we can consider the functional requirements of different areas and establish connections by identifying the same attributes in each area. For example, in the Parco Archaeological area designed in this project, a three-segment zoning design was carried out to understand the needs of local residents through on-site research and visits, and the functions of the original site were optimized. The redesigned road system links the three zones together.

Last but not least, From the architectural perspective, the design of the multi-functional center can cope with special periods, such as the COVID-19 epidemic in the previous years. When isolation is needed, the overall building functional zoning can provide different services to meet the basic living needs of residents or tourists to achieve sustainable purposes.



08

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