ROUGH OROGRAPHY
The Urban Project Between History and Modernity

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SUMMARY
Understanding how urban space is constructed in contemporary times in relation to morphology, showing its principles and rules through strategies and projects carried out in recent decades is the objective of the research that focuses on what we consider the most interesting case among European cities: Lisbon. The Castle Hill, Santa Caterina Hill, Baixa, and the Tagus River estuary make up the topographical framework of the research. Starting from the construction of the first Arab settlements along the Castle Hill, passing through the convents and industries along the river banks, the eighteenth-century city built after a terrible earthquake and the modern era Chiado show the special sensitivity of Portuguese architects to geography in the construction of the city. It is hypothesized that topography is a fundamental component of urban design and construction.
Keywords: Urban Morphology, Lisbon, Topography, City and Design. Themes: Urban Space, Continuity, and Stratification.
Thematic block: 1. City and project
Themes: Urban Space, Continuity, and Stratification.

Introduction
The aim of this research is to examine the development of the contemporary city in relation to the morphology of its places, showcasing the principles and rules through strategies and projects implemented in recent decades that contribute to the creation of an inclusive city accessible to all. We seek to understand how urban space is constructed, how social spaces are organized, and how these spaces relate to buildings. Furthermore, we aim to demonstrate how public spaces are designed in the contemporary era, considering the contemporary as everything that has arrived until the present day. We study history to explore our own time, utilizing as a tool a section of the city that encapsulates projects from different epochs but layered in a single continuum. This study focuses on what is, from this perspective, the most interesting case among contemporary European cities: Lisbon. Lisbon is situated within a geographical framework composed of a series of hills and the estuary of the Tagus River, down which the narrow streets of the city descend. The city features an Arab-Medieval layout upon which the splendid 18th-century city has grown. This construction continues to adapt to the complex morphology of the area.

DOI: https://doi.org/ 10.5821/siiu.12725

Fig. 01 Lisbon seen from the Tagus river.

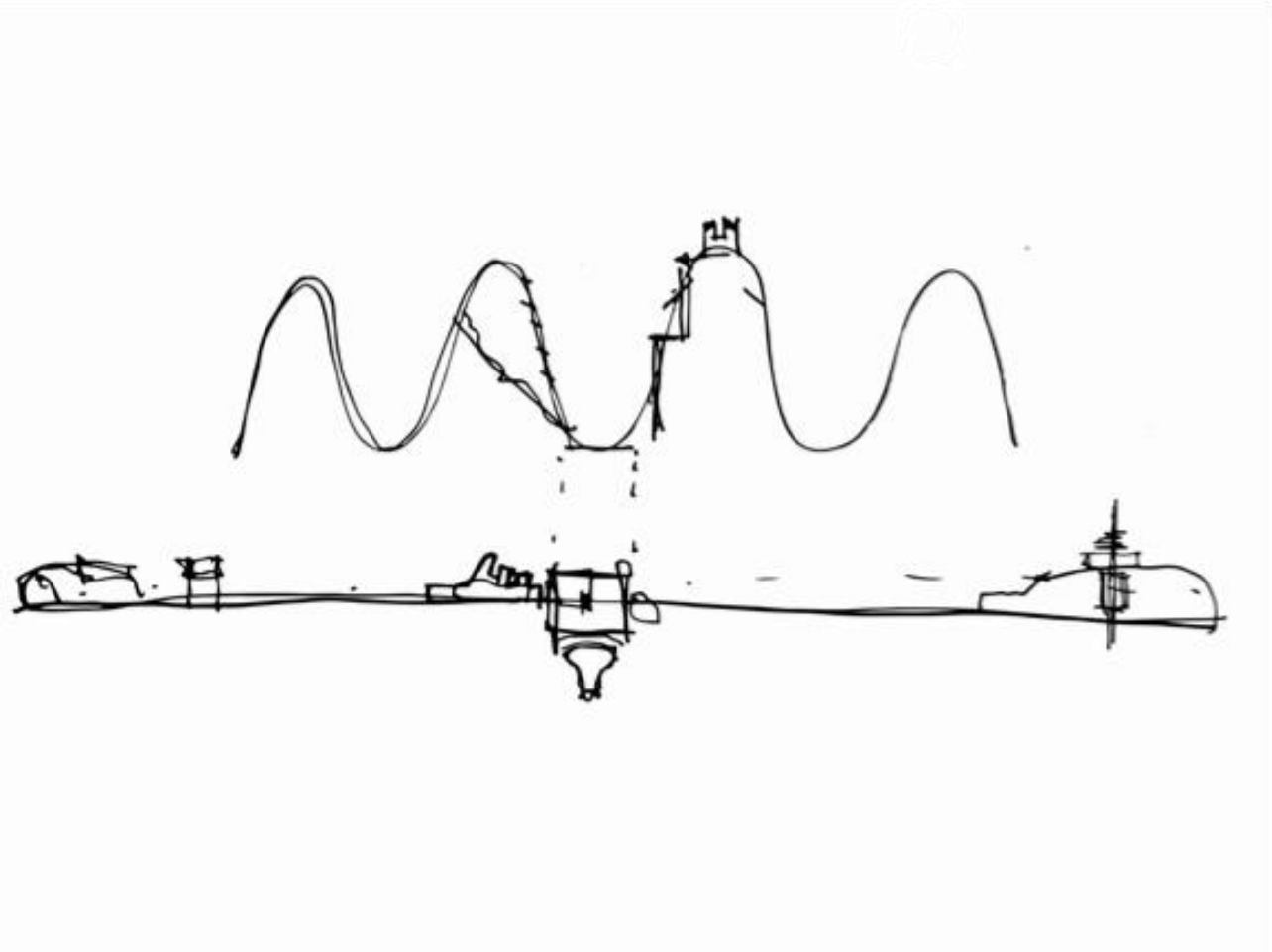

Fig. 02 Lisbon, the river and the hills.

1. Impervious Topography, the Morphology of a Capital

Studying the construction of urban space in contemporary times does not mean cataloging and sampling everything that has been built in the contemporary city, extracting it from its context.
On the contrary, the study of contemporary city construction is envisioned as a survey that starts with knowledge that maintains a fixed gaze on both the general and the particular, producing analyses that occur simultaneously at the scale of architectural detail and urban design.
The role of this research is not to define the city in the contemporary context, but rather to seek an answer to the question that resonates in urban discourse: How is urban space constructed in the contemporary European city?
To delve into the structure of this research, we need to define what is meant by public urban space in contemporary times.

1.2 What is public space?

Traditionally, public space is considered an open and free urban space, suitable for fulfilling collective needs of life and, in conjunction with private space, establishing a complementary relationship.
From a sociological perspective, public space is defined by the relationships among individuals who actualize these social interactions within urban space, thus playing a role in integration.
From an urban planning standpoint, public spaces enable the connection and territorial as well as functional continuity of the city. Therefore, public spaces serve as reference points with symbolic political and cultural value, where different users from diverse social groups carry out their vital functions.

1.2 What is the contemporary?

The definition of the contemporary is elusive, just as the contemporary time itself is elusive and untimely. Defining it is a challenging task. What truly interests us, in the study of the city, is understanding the role history assumes within the contemporary and how we, as contemporaries, experience it. Giorgio Agamben writes about contemporaries: "The contemporary is the one who, dividing and interpolating time, is capable of transforming it and putting it into relation with other times, of reading its history in an unprecedented way, of quoting it according to a necessity that does not arise in any way from their arbitrariness but from a demand to which they cannot but respond" (Agamben, What is the Contemporary 2008, p. 14). It is in this manner that we intend to approach the study of the contemporary city, considering the contemporary as the link between what the city has been in the past, the unexperienced, and what we are, our way of living. This allows for a non-chronological but simultaneous reading of history.

1.3 Why study Lisbon?

The study of Lisbon starts with field experience and analyzes the contemporary mutations of urban space. By dissecting parts of the city today and connecting contemporary construction to the past, we consider what the preexistences are today, not what they used to be. This allows us to attribute new meaning to collective themes. This relationship we are able to create highlights a unique value in the construction of Lisbon, namely its ability to layer collective themes within the construction of contemporary urban space, themes that have lost their original function in our urban way of life.
Lisbon can be seen as a litmus test, through which we can analyze the Western European city and extract the main themes to understand how urban space is constructed in relation to morphology.

1.4 Lisbon, born from the river amidst the orography

On the southern slope of Castelo Hill, along the banks of the Tagus River, in a strategically protected yet open position to the river estuary, the Phoenicians established the first commercial port in the history of the capital around 1200 BC. Known by the Greeks as Olisipo and founded under the sign of the myth of Ulysses, Lisbon emerged in an ideal geographical setting for the establishment of a city based on naval trade. While the Romans were conquering Hispania, which sided with Rome, Lisbon was integrated into the empire under the name of Felicitas Julia. For defensive and expansion purposes, large defensive walls were erected in the lower part, still visible today in the underground chambers of the Museu do Dinheiro. As the Roman Empire divided, the Arab domination arrived, and new walls were built in the highest and safest location of the city, yet still close to the coast, the Castelo Hill. The first castle structure was constructed, and the only remaining residential quarter with Arab origins, the Alfama, was established. When Lisbon was conquered under the leadership of Afonso I of Portugal, following the Christian tradition, Arab minorities settled in the Mouraria neighborhood. The Castelo Hill was inhabited on all its slopes. The city grew, and the lower part, now known as Baixa, became filled with dwellings following a medieval layout. The port expanded along the coast, becoming one of the most important in Europe, from where expeditions set sail to discover the New World. On November 1, 1755, a terrible earthquake struck Portugal. The Baixa was completely leveled to the ground, and the debris ignited in a fire that followed the seismic event. From this tragedy, the Marquis of Pombal ordered the complete destruction of the medieval city's remains and the construction of the Baixa Pombalina, following Enlightenment urban planning principles of order, rule, light, and hygiene. The older history of Lisbon reveals that the capital was founded on a strip of land extending from the river to the Castelo Hill, driven by both commercial and defensive reasons. The city grew and expanded along the slopes of the Castelo Hill, the closest place to seek refuge in case of attack. And finally, the construction of the Baixa, the only point where the tragedy of the earthquake opened up the opportunity for the creation of an Enlightenment-inspired urban fabric, channeling the winds and the light of the river.

Fig.03 Das ruinirte Lisabon. Unknown author. Source: (Wikipedia, 2019)

1.5 Geography of a Capital

Let's talk about a city dotted with a multitude of elevated points, from which it is always possible to glimpse the hidden side of things, in a journey marked by a continuous succession of new encounters. Lisbon is a city of great urban complexity and environmental and landscape sensitivity. Urban interventions generally have a significant functional, social, and visual impact. The city's orographic situation reflects its "exceptional sensitivity to geography and how it connects with architecture" (Gregotti, Rassegna 1994:5). The city is strongly influenced by the Tagus River, the hills, and the enclosed valleys, which have shaped the structure and morphology of the urban fabric, creating rich and complex visual relationships that characterize Lisbon's landscape and environments. The urban agglomeration has formed through a slow process of juxtaposition of small spontaneous or planned expansions, which are morphologically and typologically diverse and often integrate pre-existing elements from rural peripheral areas. The planned areas developed between the 19th century and the early 20th century in the central area of the city now consist of a highly interconnected and heterogeneous fabric, with spaces of great environmental diversity and subtle formal richness.

2. Walking to understand, drawing to comprehend, photographing to remember

Different methodological tools have been used for the cognitive analysis, aimed at studying the geographical development of the city. Through field research, where the city's life became a form of knowledge, by photographing, drawing, and mapping the contemporary projects, the principles and rules underlying the construction of the contemporary city will be revealed, with orography being a fundamental component.

Is walking through the city truly a form of knowledge? How does photography help reveal historical layering? How can schematic section drawings aid in understanding urban systems? How does mapping the city highlight hidden relationships among elements of analysis?

- Walking as a form of experiential knowledge, as a tool for analysis on a human scale: Living in the study area allowed us to discover the path that reaches Colina do Castelo from the hill of Santa Catarina, crossing the Baixa. This system represents a channel of pedestrian speed rich in stratifications.

- Photography as a tool to change perspectives and show what escapes the hurried eyes when experiencing the city. Through step-by-step photographs, we aim to tell the story of this journey that starts from Largo do Camoes and reaches the castle through morphologically distinct but interconnected city spaces.

- Drawing sections as a three-dimensional reading of the territory. The section helps us understand how this hidden part of the city was designed and built by architects in an imaginary collaboration spanning 3000 years. It reveals the continuity of spaces, level differences, and various means of ascent employed.

The metropolitan scale allows us to highlight the relationships between orography, buildings, spaces, and mobility elements, while the local scale analysis emphasizes the materials used and the relationships between successive constructions over time.

By combining different analytical methodologies, conceptual maps of the city have been created, defining urban systems composed of a stratification of individual elements belonging to different categories.

The city of Lisbon did not originate from a detached project imposed from above but rather from changing human needs over time, such as the use of Praça do Comercio, or from emotions like the terror caused by an earthquake, which led to the necessity of inventing new technologies to build houses capable of withstanding seismic events or sudden fires, or from political power imposing a city design based on order.

3. Research Results

The research results stem from the survey of city elements, including urban spaces and public buildings, and their structuring together with major urban systems: the ecological system of urban greenery, various forms of mobility, and the riverside front system. All of this remains closely connected to orography, which here is understood as the place where the relationship between individual elements and systems is made possible, assuming the characteristics of an orographic space.

The orographic space is the terrain on which the city of Lisbon rests, characterized by rugged reliefs that have dictated and continue to dictate the city's main constraints. The orographic space is also defined by its contact with the river, where the city faces and was built.

The orography is easily recognizable, and its main features are the mythical seven hills: Colina de Santana, Colina de São Roque, Colina de São Jorge (Castelo), the two Colinas das Chagas, Colina de Santa Catarina, Colina de São Vicente, the Vale da Alcantara, and the extensive relief of Monsanto.

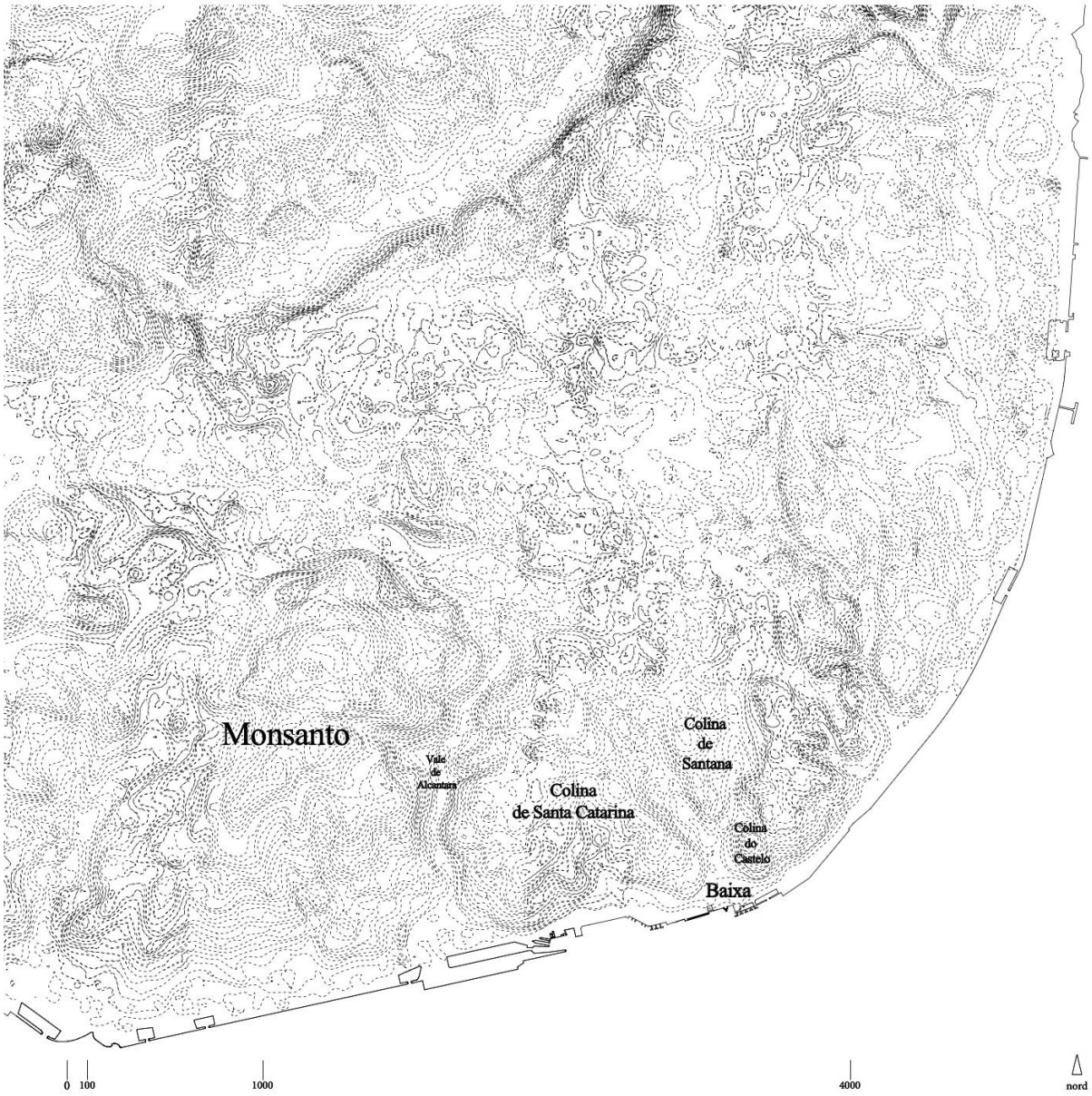

Fig.04 Rough orography of Lisbon. Source: (Bartolo, Filippucci, 2019)

Indeed, we can observe how the urban fabric of Lisbon has been structured on this rugged orography. The main areas subject to the construction of public buildings follow the contours and depressions of the orographic space, as seen in the striking cases of Baixa Pombalina and the Castelo, as well as along the riverfront, culminating at the two extremes of the city area in Belém to the west and Parque das Nações to the east.

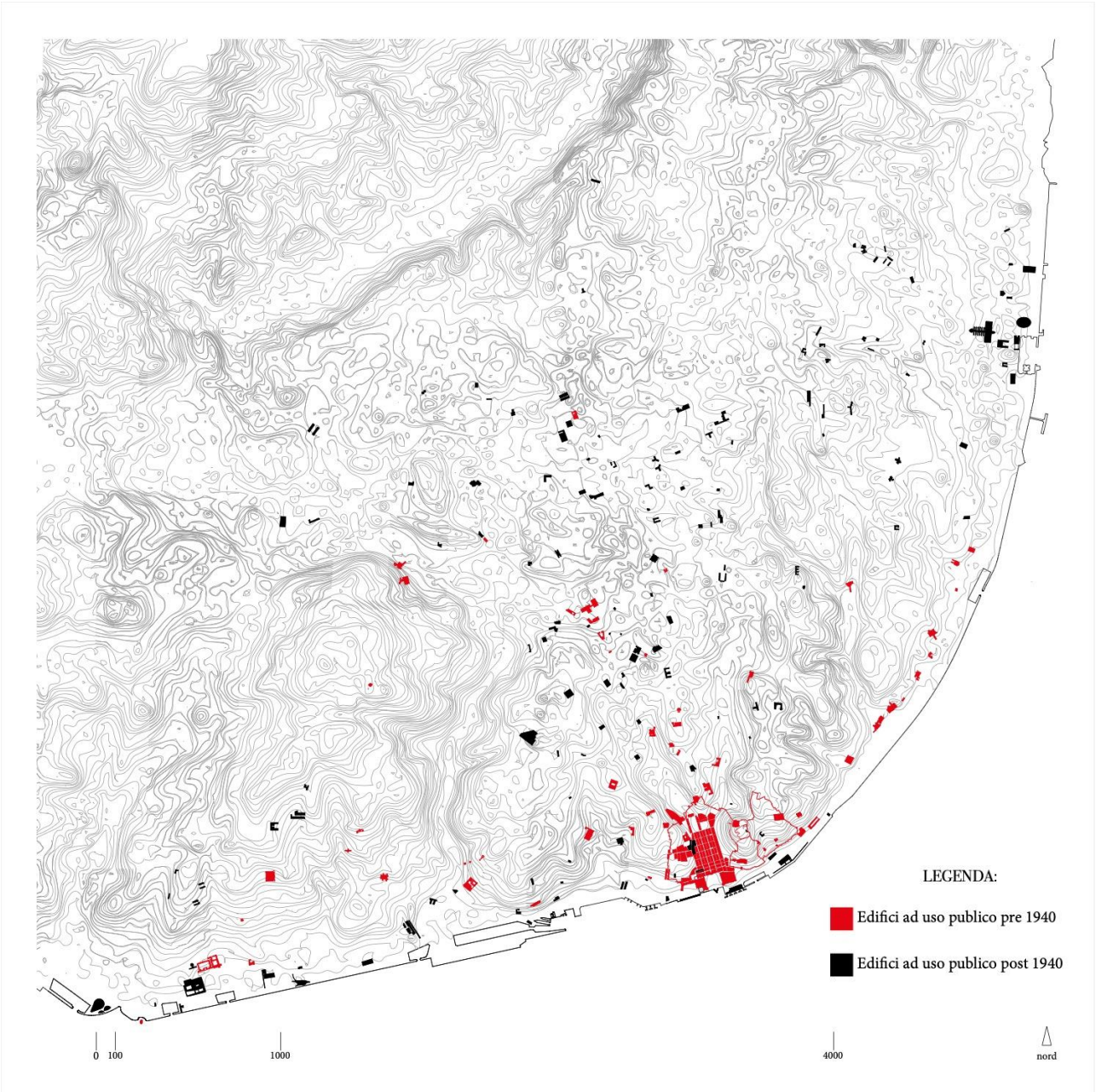

Fig.05 Public buildings between history and orography. Source: (Bartolo, Filippucci, 2019)

Regarding the structuring of the urban fabric on the orographic space, the open public spaces follow the directions of the reliefs. The avenues meander through the depressions on the sides of Colina de Santana, while the urban parks occupy the most valuable parts of the territory, often positioned on the hilltops. In some cases, they even offer the added value of being viewpoints (miradouros). The organization of public spaces on the orographic space refers to an evolutionary process of the city, which specifically demonstrates both the structuring of public parks on the reliefs and the geographical development of urban space, identifying the areas of main interest in the city.

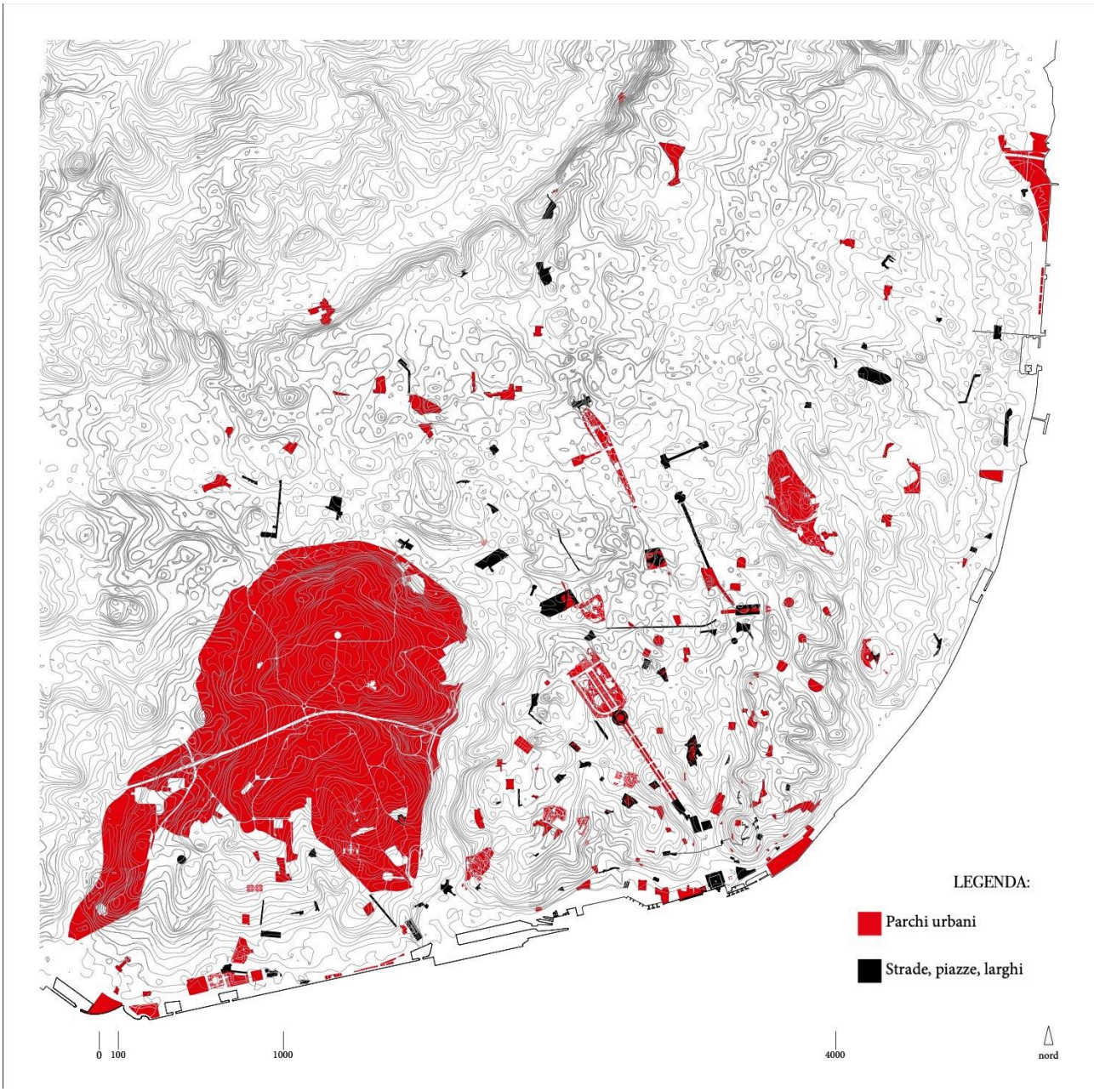

Fig.06 Best places for urban parks, streets and squares. Source: (Bartolo, Filippucci, 2019)

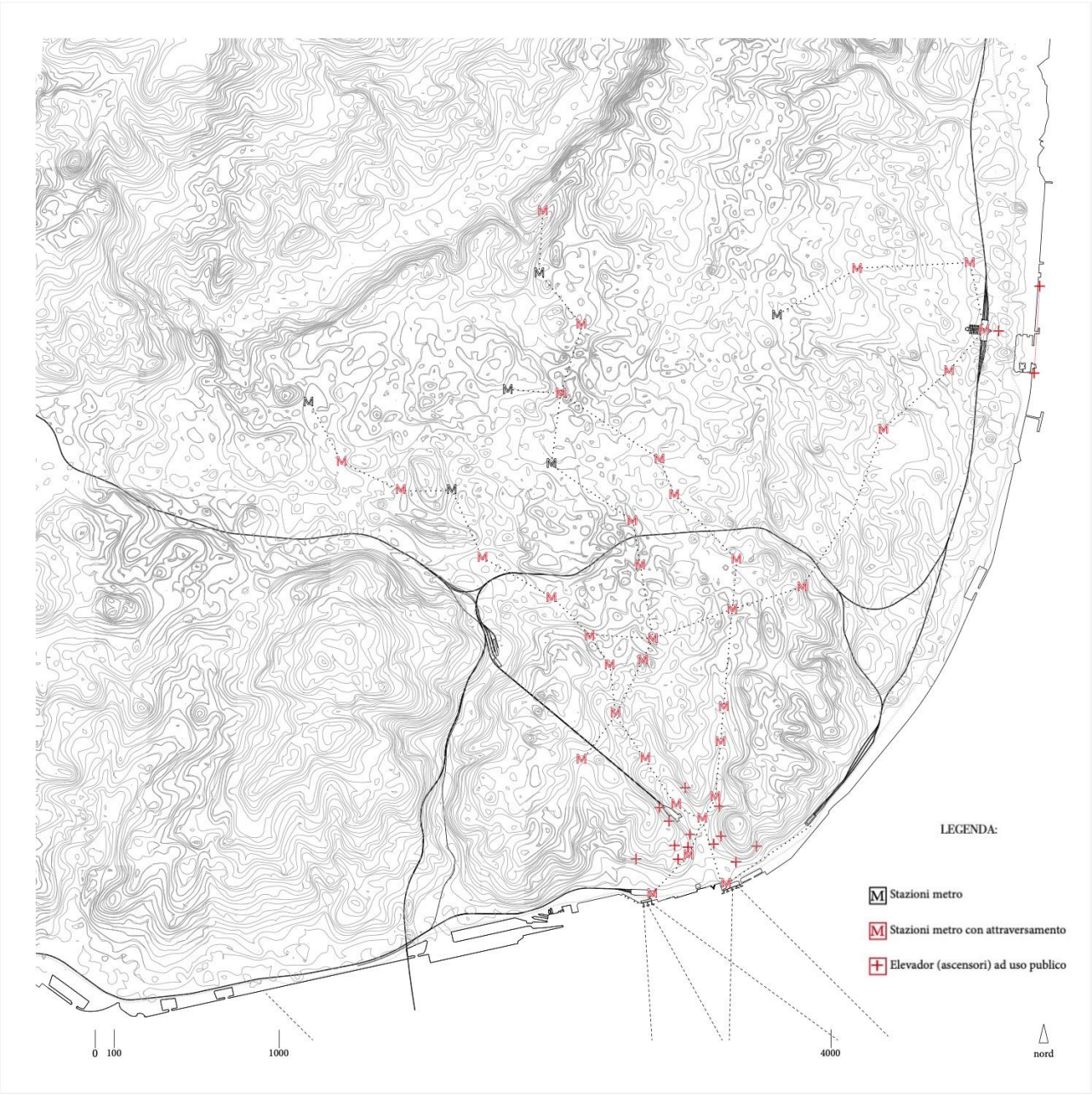

Fig.07 Mobility not as an obstacle but as an opportunity.

The terrain on which the city is built sometimes presents a challenge that needs to be overcome. Therefore, urban mobility often relies on mechanized transportation systems such as elevators (elevador), escalators, and traditional trams, which enable movement within the city. This continuity facilitated by mechanized lifts is a system that adapts technologically in contemporary times but pursues an objective that has been identified in the past, demonstrating a sort of underlying historical continuity in the city's vision. In addition to the aforementioned public systems, certain buildings and metro stations are equipped with lift systems, ensuring urban connectivity. Mobility systems go beyond mechanized lifts. The metro, despite not being significantly affected by the orographic space in its route due to being underground, strategically incorporates its usefulness in the stations, providing urban transit. On the other hand, the railway follows the main depressions like the Valle d'Alcantara, and in the central and hilly part of the city, it is underground until the Rossio station.

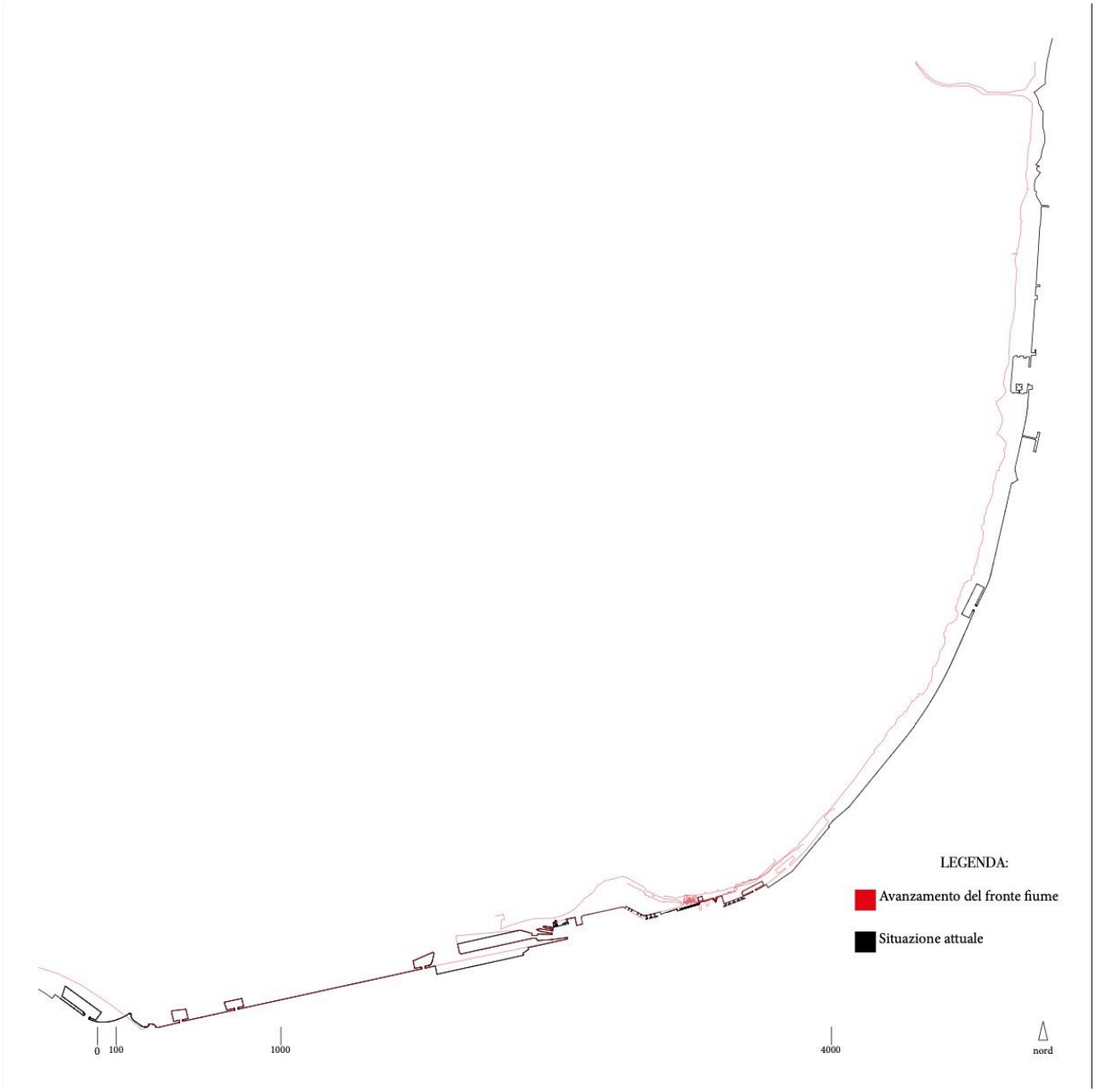

Fig.08 The advancement of the river front line.

The railway runs along the riverbank, leaving only the stretch between Cais do Sodré station and Santa Apolonia station open. Once again, the orography plays a fundamental role, as this layout of the railway along the river's edge is due to practical reasons. In what was Lisbon's prime industrial zone, rail transportation of goods was facilitated by the predominantly flat terrain. This has contributed to the development of the riverfront, which, prior to the post-earthquake reconstruction of 1755, consisted mainly of beaches and natural coves, with few exceptions. Since Pombal's intervention and onwards, this development has continued unabated, resulting in the fully shaped riverfront we see today.

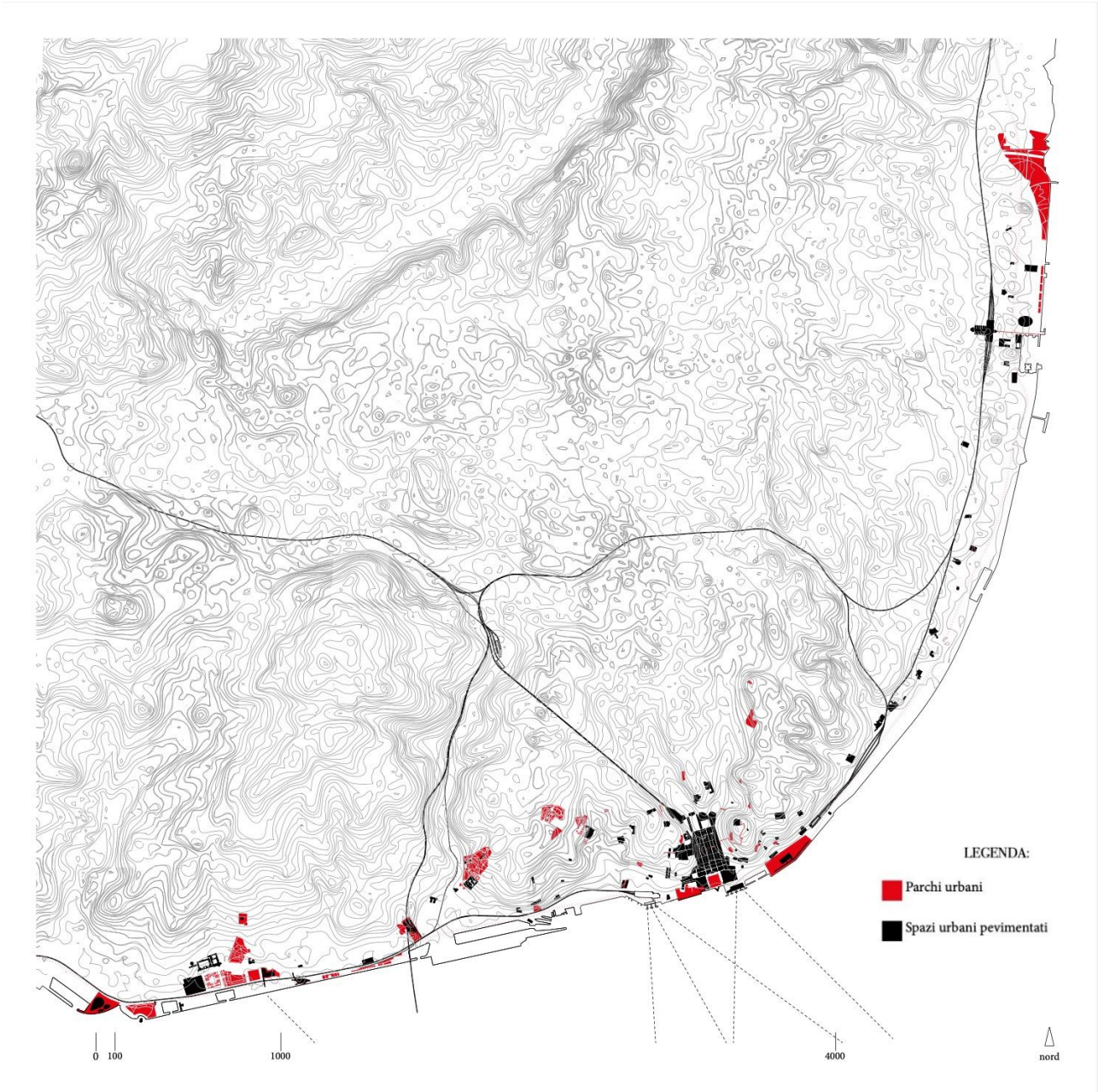

Fig.09 The construction of the river front line.

The current shape of the riverfront is thus the result of a historical stratification that saw it play a central role in the industrialization of Lisbon. Now that much of the production has shifted to peripheral areas, the role of this boundary area has been reinterpreted, becoming a space for the community. Accessibility is ensured through an early pioneering intervention in this reclamation process: the cycle path. This creates a path of spatial continuity through the old industrial areas, providing an opportunity to assign new meaning to those spaces and buildings.

4. A section of the city

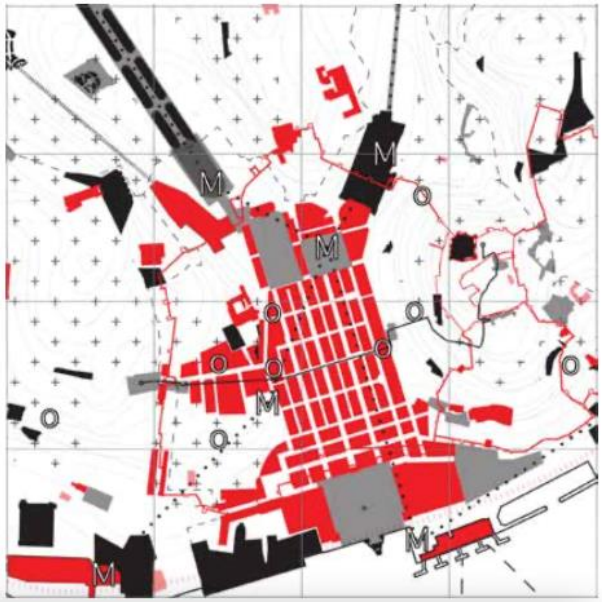

Fig.10 Systems of complexity.

By delving into a smaller scale and focusing on the Chiado, Baixa, Castelo system, we can observe how it forms a linear space or, more precisely, a development along an imaginary continuous line. This space starts at the statue of Fernando Pessoa on Rua Garrett, near Largo de Camoes, and descends into the Baixa-Chiado metro station. It then exits at the intersection of Rua do Crucifixo and Rua da Vitoria, continuing straight ahead, leaving behind the arch of the metro station designed by Alvaro Siza, and heading towards the neon sign of the Santa Maria Maior Elevator. It horizontally crosses the entire Baixa and ascends once again through the elevator located in the old building, arriving at Largo do Caldas. From there, it continues to ascend using the second elevator, this time built into the modern building of Mercado do Chão do Loureiro, spanning seven floors.

Fig.11 Speed channels 1-2.

Following the walls for a few more meters along uphill streets, it reaches the Castle and its trees. Of course, the same route applies in reverse. This imaginary line, as can be inferred from the description, is not on a flat surface but rather rests on two hills at its ends and slopes down to the valley in the center.

Fig.12-13 Speed channels 3-4.

Indeed, this sequence of ups and downs continues, shaping a unique space in the city, a partially underground boulevard. It is precisely for this reason that there is a need for a sectional reading of this urban phenomenon.

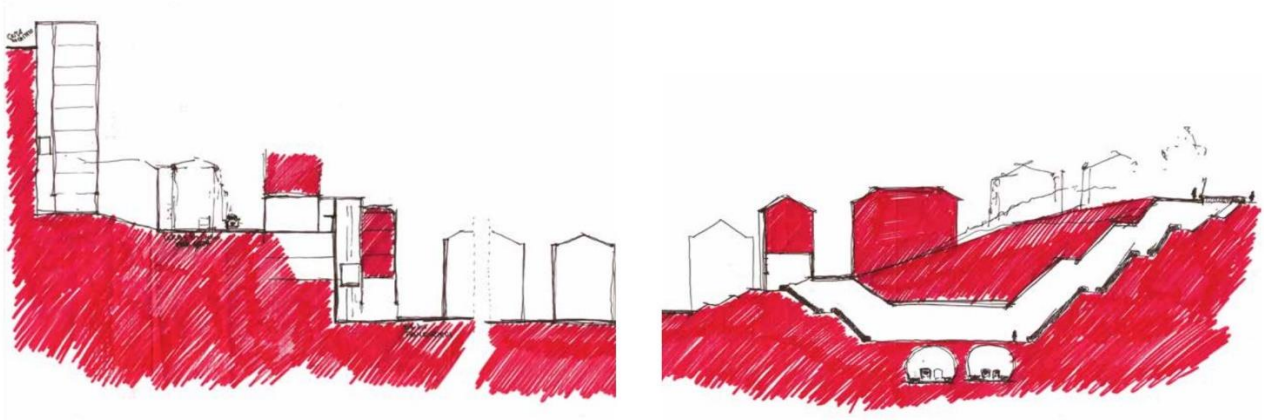

Fig.14 A section of the city: Baixa-Chiado-Castelo.

This imaginary section creates a system of connections among disparate elements, which, when observed individually within their respective areas, form a continuous pattern in terms of elevation.

The first segment described is the one that connects Largo de Camões to Baixa. This section, which can also be traversed on the surface through the city streets, is seamlessly connected by the entrances of the Baixa-Chiado metro station. In addition to its broader role in city-wide mobility, the metro system provides an underground boulevard with mechanized uphill transport (escalators), making movement more convenient. Therefore, the metro station itself functions as an urban space for pedestrian mobility, much like the other examples of mechanized ascents found on this side of the Santa Catarina hill: the historic Santa Justa Elevator, the elevators of Armazéns do Chiado, the Baixa-Chiado parking lot elevator, the escalators of Rossio station, and the electric tram of Calçada da Glória.

On the other side of Baixa, in Rua dos Franqueiros, one ascends the hill of Castelo through the Santa Maria Maior Elevator. This elevator is integrated within one of the buildings in the unified block that separates Baixa from Alfama. This building houses residences, exhibition spaces, and the offices of the Santa Maria Maior Parish.

5. What can we learn?

What can we learn from the contemporary construction of urban space in Lisbon? In what ways can topography be considered a resource in the design and construction of the city? How can modern mechanical elements integrate into buildings from past eras? How can regional-scale mobility be functional to local-scale mobility? How can the Chiado-Baixa-Castelo system enhance the city's experience? What tools allow us to read the territory? How can form and function be harmonized in complex topographic contexts?

6. Conclusions

In conclusion, in line with the research objectives, we aim to elucidate the principles that govern the construction of collective urban space in Lisbon in relation to its topography.
We have observed that the city's construction is not the result of a heuristic process, following a defined path. Rather, through the study, experience, and interpretation of Lisbon's contemporary urban space, we sought to generate an external and entirely interpretive perspective on the city. The aim was to propose a proactive model for constructing collective urban space that can adapt to the topographic context.
The principles of construction highlight a system of values and strategies that seamlessly connect the city's topography to the recomposition of its parts through the construction of spaces and buildings.
The first principle of this construction is based on intensifying the network of spatial connections, as demonstrated in the analyzed case.
The construction we have examined thus far is characterized by the need to recompose the existing elements in a way that diversity and flexibility become the driving forces of the city's development.
By acting on strategic nodes, such as those within the Chiado-Baixa-Castelo system mentioned earlier, at the limits of the topography, urban fractures, and voids, we can enhance them in a dense and multifunctional form, proposing new uses and expanding possibilities for traversing the city.
The second principle is based on the reconstruction of the framework of collective spaces.
Rebuilding a continuous framework, filling in the missing parts within the topographic discontinuities, reintegrates the entire city into the system of urban relationships. This principle translates into the establishment of a new order of centralities and axes of social interaction, alternating spaces for leisure with spaces for commerce. Consolidating the city into interconnected areas and nodes of functional density implies variety, exploiting the opportunities offered by different locations, and differentiating and articulating the forms of volumes and voids.
The theoretical principles listed above derive from the strategies implemented by the Lisbon administration, capable of reimagining a compact, dense, porous city closely tied to challenging topography.
The first strategy is evident in the role assigned to urban parks, particularly in how green public spaces are positioned in Lisbon's territory concerning topography. They are often located in the most valuable areas, on hillsides and in the most ventilated parts, such as miradouros or the castle area. Thus, this strategy, with a local impact, is conceived and implemented on a regional scale, identifying the elevated points as prime locations for social activities.
The second strategy aims to overcome elevation differences through mechanized ascents or urban space amenities. By utilizing building cavities and interstitial spaces within the fabric, these elements are seamlessly integrated into the established city, employing contemporary technological means to provide new urban connections. In this case as well, local interventions are pursued through neighborhood-scale studies. Besides positioning urban parks in elevated areas, efforts are made to ensure easy and effortless access to these spaces for people.
From these strategies, it is evident that the coherence between intervention scales, whereby a general idea is implemented in specific actions, becomes a strength in Lisbon's construction. Local intervention tools are aligned with the pursuit of a global plan, while the global design guides local planning. The planned design of the city is not a constraint on

the construction of spaces and buildings, including private ones, but rather the initial step in the dialogue between architecture and urban planning, with the aim of creating a more egalitarian city. This coherence

represents a synergy between intervention scales and actors in the construction process, where topography serves as the common ground on which the complex construction system of Lisbon is built.

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