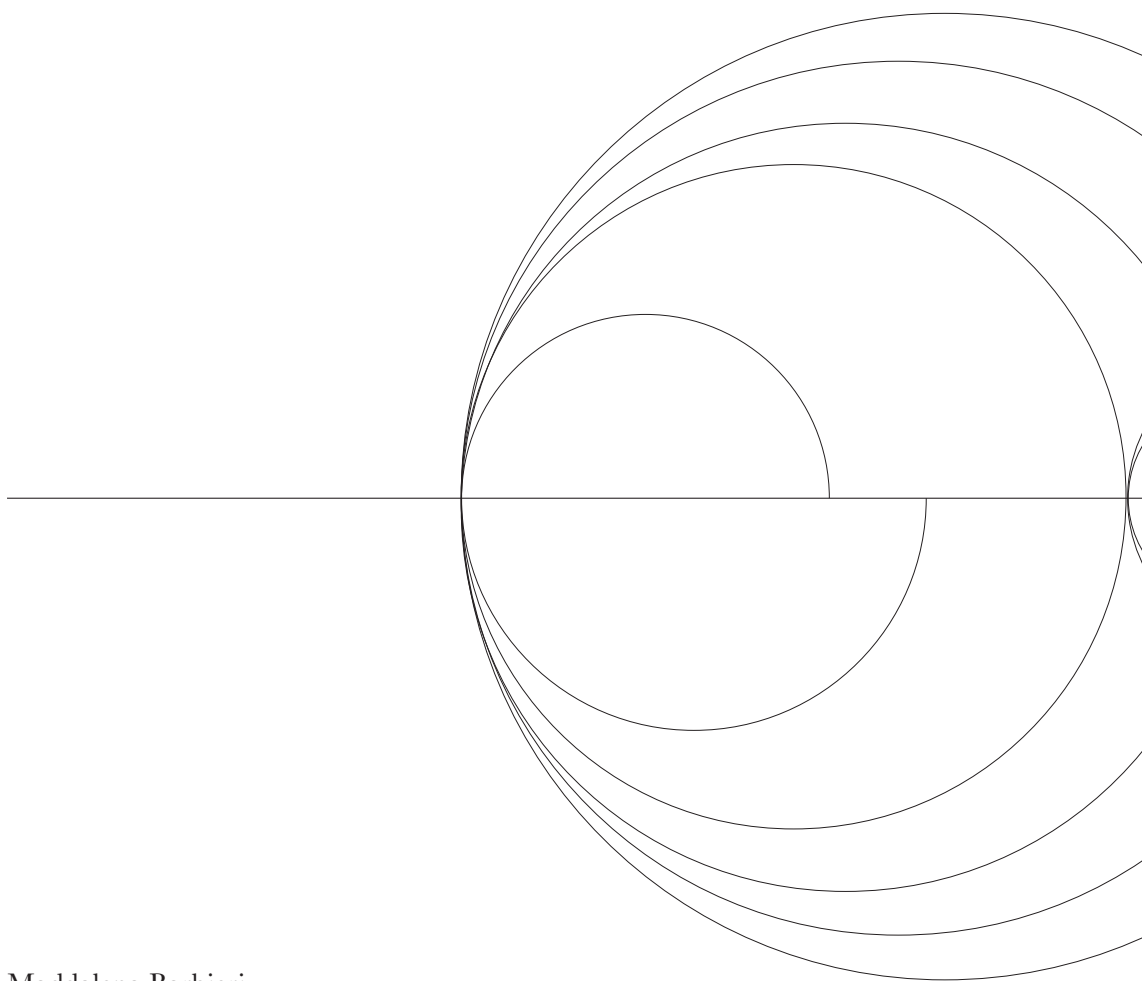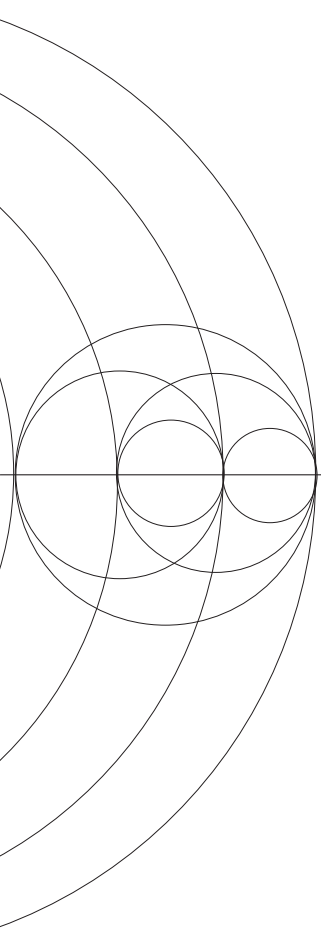# Urban recurrences as spaces generators

Maddalena Barbieri

Urban recurrences as spaces generators

Building Tradition between
Topography, Typology, Tectonics

A project for Fontainhas, Porto

Master Thesis
Architecture Construction City
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«Figli del Ponte nuovo, tra case crollate - sotto le rovine di questo o quel cadavere»

«Questa mia città di Porto ha un suolo indemoniato. Accidentato, granito che nei secoli si è opposto a piani frettolosi. Le file di case rotolano lungo i colli e aprono piazze, dove possibile: strette insenature e piani inclinati che nessun manuale suggerirebbe. [...].

I declivi impongono muri di pietra faticosamente adattata, piattaforme abbracciate al paesaggio seguendo l'essenza della sua logica, affacciate sul Douro, per produrre il vino che poi nutre la città, vino che paga i giardini incastonati negli isolati, nelle grandi quinte sul fiume, con alberi da incisione del Settecento, palme, camelie di molti colori, bosso, alberi da frutta, roseti dai colori scandalosamente vivaci contro le austere facciate. [...]

Figli del Ponte nuovo, tra case crollate - sotto le rovine di questo o quel cadavere. Ed ora ecco i viadotti sulla scarpata che appoggiano il loro passo poco delicatamente su muri e quinte, distruggono cose, senza essere liberi quanto serve ma nemmeno cauti [...].

Fluttuano fantasmi di quanto si dava come necessario e del desiderio di crescere - ma non così. Poco importa. Questa mia città di Porto ha un suolo indemoniato. E una nebbia fitta che nessun Sebastiano può penetrare.»

Oporto, in "Burgo", numero zero, giugno 1988, p. 20, in *Álvaro Siza*, Giovanni Leoni, Milano, Motta Architettura, 2009
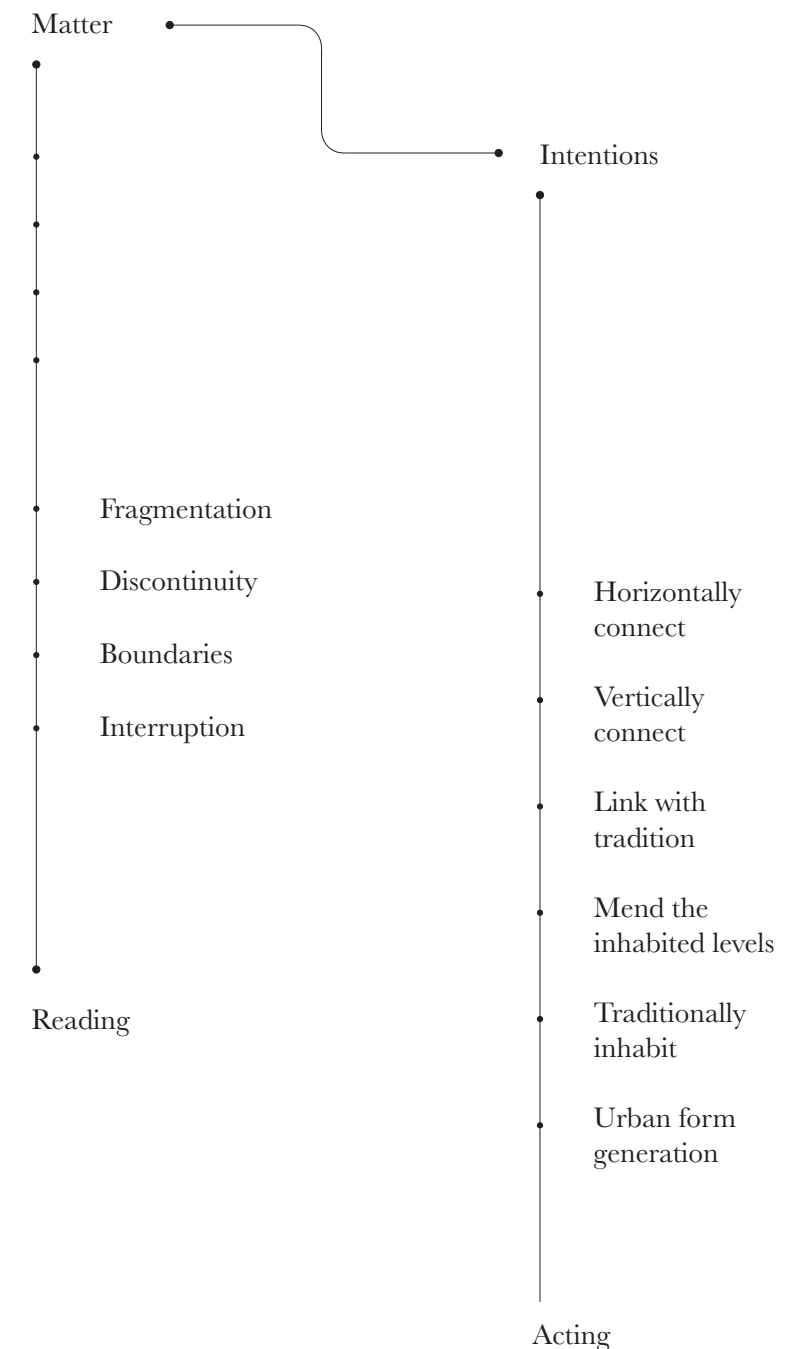
Introduction

My research work fits into the interest that I have been developing around the studies on Urban Morphology and Building Typology and around the richness that they can present within the framework of the urban reading and the subsequent project in a built context, in a dimension of renovation of the discipline. In particular, the starting point of the carried out work has been the original interest towards the elements of repetitiveness and recurrence in the urban morphology, as far as it might seem irregular and disordered in its constituting and developing. Moreover, my work aims to discuss the use of a recursive methodology in the process of transformation from the step of reading of the city to the one of acting on its forms, thus it has been questioning about the simplification of a complex element for the identification of the general basis concepts for their reproduction, in a dimension of continuity.

The specific case of the urban design is an area of the city of Porto and it arises as a pretext, a fixed circumstance inside of a wider argument, for the raising of the issue of recurrences in the urban elements, mainly concerning the topics of morphology, the typology, the topography.

The urban project based on the generation of new urban connections and on the acting on the fragmentation of the area linking to the existing urban fabric constitutes the framework of the reasoning on the role of recurrences as both starting and ending point.

The process from the matter to the intentions' wording crosses the theoretical topics, arising as the practical demonstration of the use of urban recurrences.

Matter

Intentions

Fragmentation

Discontinuity

Boundaries

Interruption

Horizontally connect

Vertically connect

Link with tradition

Mend the inhabited levels

Traditionally inhabit

Urban form generation

Reading

Acting

Methodology

The following project has been exploited as a single small case useful to show the methodology and to derive more generic observations on urban form generation. What was considered important during the carried out work was not really the result, but on the contrary the employed instruments and the built path to reach the aim.
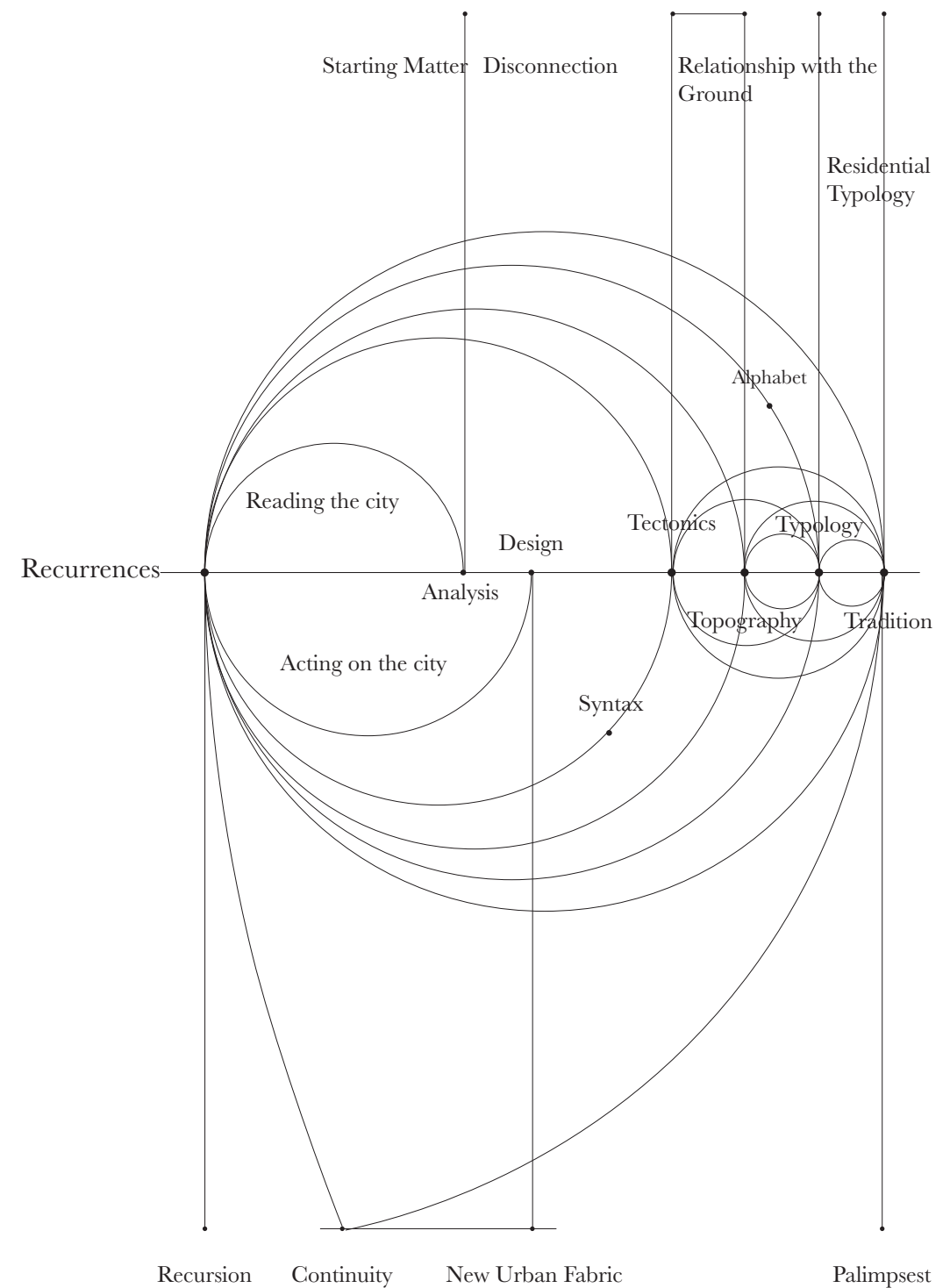
My work has started from a question, a matter (of discontinuity), but it might have started from any urban form problem of disconnection.

The process follows the traditional, typological, topographical and finally tectonic matters for the redaction of a complete observation and reading, involving the all-round structure of the topic.

At the same time of the reading, analysis, research, it begins the search for a solution to the matter, considering the process of discovery of various elements. The reading of a single aspect in the territory of the city of Porto induces the declaration of general statements in the territory, typology, topography, tectonic issues and in the way they relate with each other.

Furthermore, one of the important points of the followed method has been the role acquired by each of the subject in the point of intersection with the others and in the design process. Indeed, in this sense, each one of the considered elements plays a role in the parallel metaphor of language, syntax and grammar. As in language, the elements are connected together following precise rules in order to create a sensed talk, so in architecture and mainly urban design each aspect is connected to the others in order to solve a starting matter and generate new processes of urban changes.

Contents

1 Tradition

2 Typology

3 Topography

4 Tectonics

Photographic
Opening

Urban recurrences observation

This chapter stands as an introduction to the following carried out work, as a first exhibition of the physical experience on the site and in the city. The act of photographing has itself represented a moment of reading of the city. The action taken has been the observation of the recursive elements in terms of time and in terms of space, as a way to find the positive aspect of each identified problematic urban matter.

The area of Fontainhas seen from Vila Nova de Gaia. Made by the author
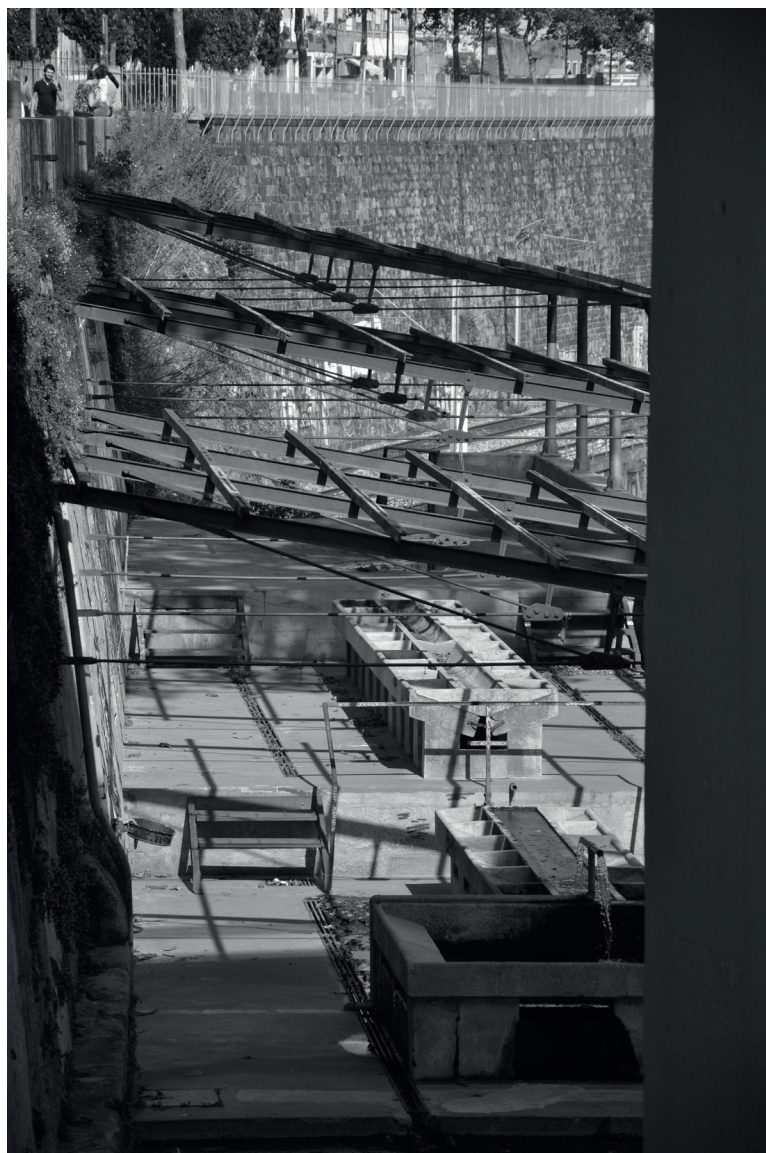
The old laundry basins. Made by the author
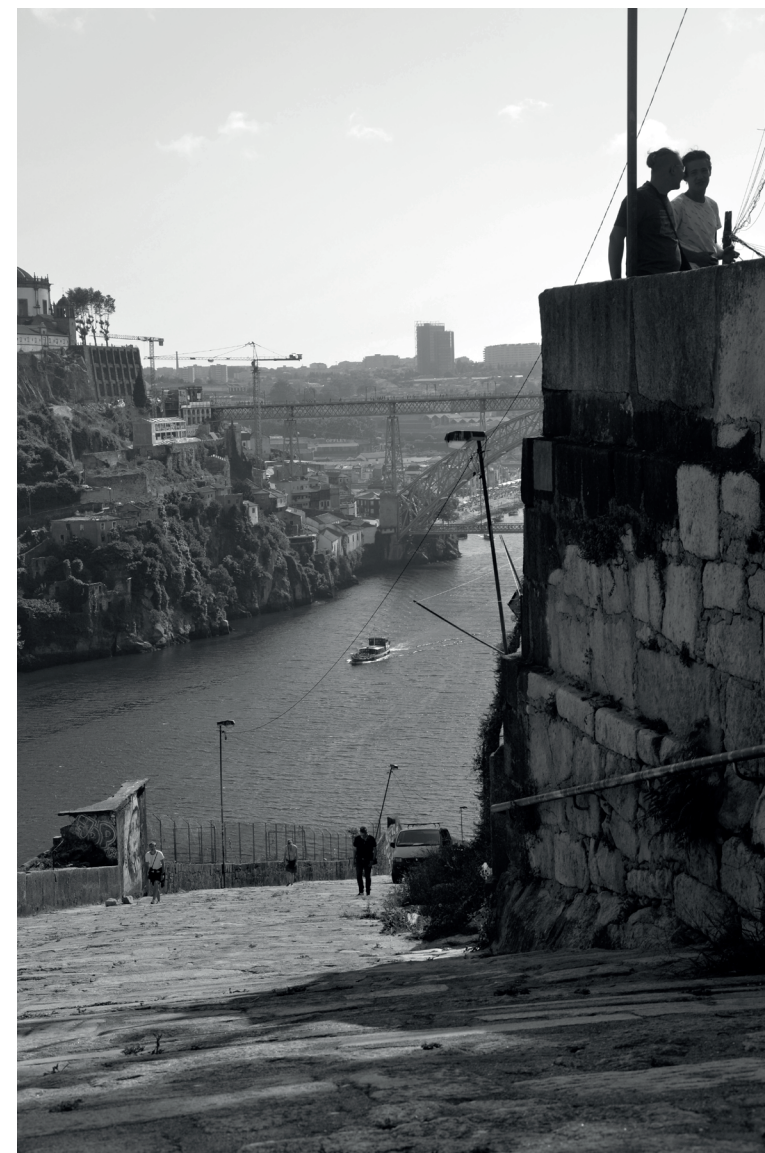
The way down to reach the river. Made by the author

The different levels of the connections. Made by the author

The corridor of *ilhas* typology. Made by the author

The street. Made by the author

The street. Made by the author

The street on the river. Made by the author

Decayed dwellings overlooking the river. Made by the author

The street. Made by the author

Buildings distributing on different levels. Made by the author

1 | Tradition

A *matter of continuity*

Tradition

A matter of continuity

*T*radition is set and intended as a reading and a subsequent acting following an approach that is based on the continuity with the past and with the existing urban elements; indeed, this has been based on the reading of the overlapping of basis information of the city useful for the creation of a starting and general point. Tradition has moreover been considered in a strict relationship with the observation of recurrences, of continuative elements, in a dimension of transition and contemporary evolution.

Tradition is considered as the point of historical continuity in terms of time and space, the point of depart with a view to renewal possibilities; therefore, it has been possible to identify some recurrent morphological and social aspects both in the history of the city and in the current form of the city.

The reading of the main morphological recurrences is then expressed in the generation of new urban morphological recursive elements, which become the key of constitution of the new residential urban fabric, in continuity with the existing one.

1.1

The fragmentation of the city of Porto

The considered area for the urban project is situated in the city of Porto, which was identified as a pretext for the generation of a wider argument about wider topics that will be later shown. The city was chosen for its fragmentation in the urban fabric and its continuous relationship and contamination with tradition, as well as for its broad presence of important topics and matters to be discussed on a general level.

The actual form of the city is the result of its history, of passed urban plans and dominations. The following paragraphs will be analysing the continuity aspects in the Portuguese population, in relation with their history. The Roman domination which started in the fourth Century marked the beginning of the city as a port city, thus defining its new name, which was also the reason of the name of the country itself. The country has been in the past object of various dominations, from Celtics, Romans, to Visigoths, Moorish Muslims, until reaching the independence in 1143, with the establishment of the new kingdom.

The kingdom period was a rich and important one, leading to the Age of Discoveries, which made the nation become a great commercial centre, thus leading to the growing of its ports. Since the period of the Spanish domination on the city, from 1580 to 1640, Porto has always and constantly shown a rebellion nature, opposing to the union under the Hasburg in 1640. Nevertheless, during this span of time, Porto knew a size growing economically and politically. After the Spanish domination, Porto was occupied by French Napoleonic troops in 1807 and remained under their control until 1814. As previously mentioned, Porto inhabitants may be recognised because of their rebellion character, especially during the nineteenth Century, which was scarred by many uprisings against the domination powers in order to defend the Constitutional Charter. Again, because of the establishment of the Salazar's dictatorship, Portuguese inhabitants found themselves to fight again against the power. This variation in the domination populations and political powers is found and discovered in the city historical maps and in the evolution urban and architectonic characters of the city.

The important variation in the domination of the country and of the city led to a mosaic urban morphology, rich of various different building typologies.

The addition of this aspect, noticeable through an apparent irregularity and disorder, with the topographical trend of the city, that is characterized by a relevant elevation gain above all in proximity of the river, is the key to understand the visible fragmentation that nowadays pervades the urban form. Moreover, in the last decades, a strong abandonment of the historical centre led to a loud buildings decay and demolition, which have contributed to the disorder and confusion in the inhabit modality.

Because of these elements, the urban connections are usually interrupted, thus creating fragmented and disconnected areas, that lay in a great contrast with the most developed and tourist regions. This fragmentation and disorder is the key element to give power to the thesis of recurrences in the city urban form.

Map of the city of Porto: Fontainhas territory

fragmentation

0   500   1000   1500   2000m

N
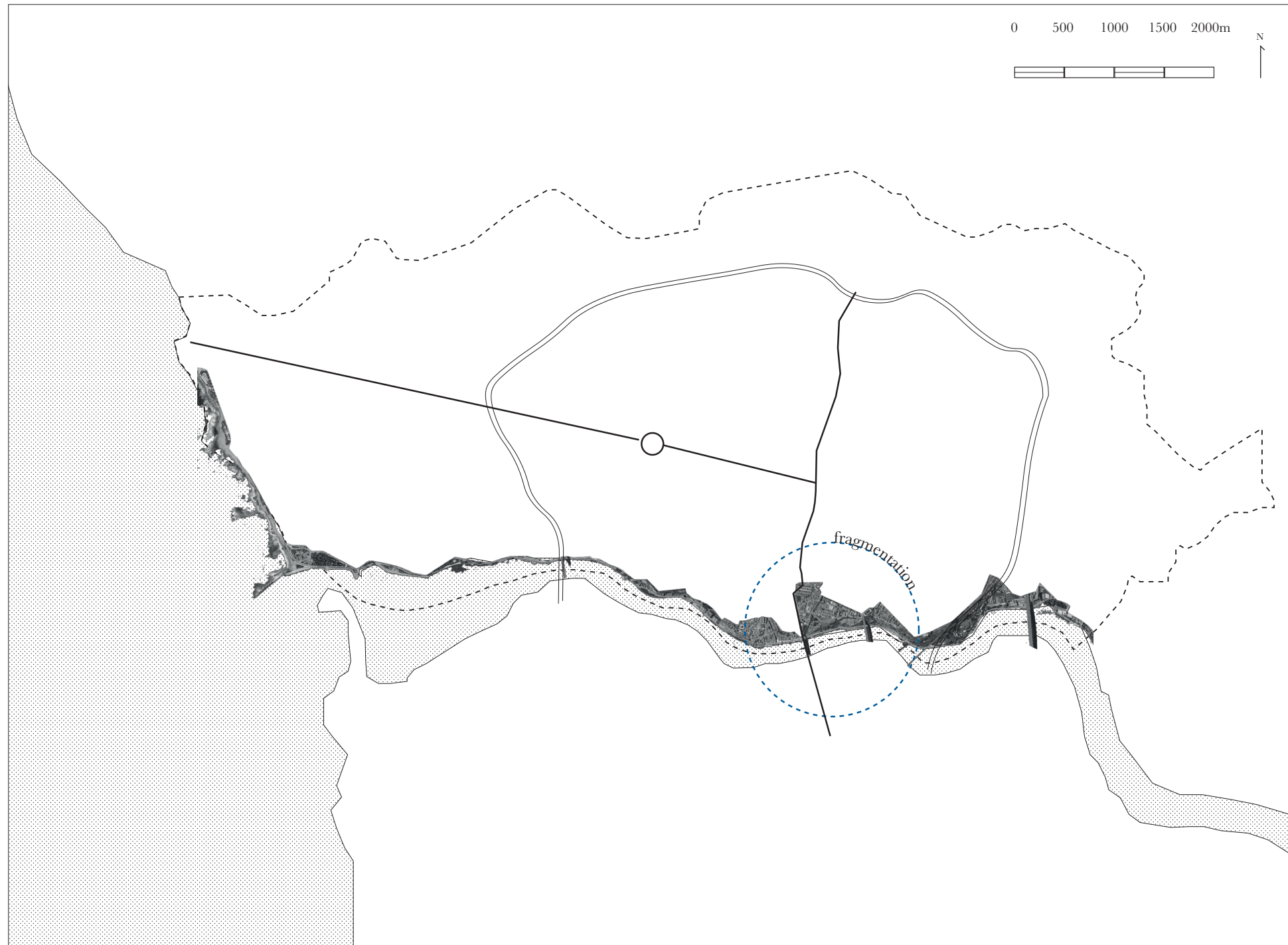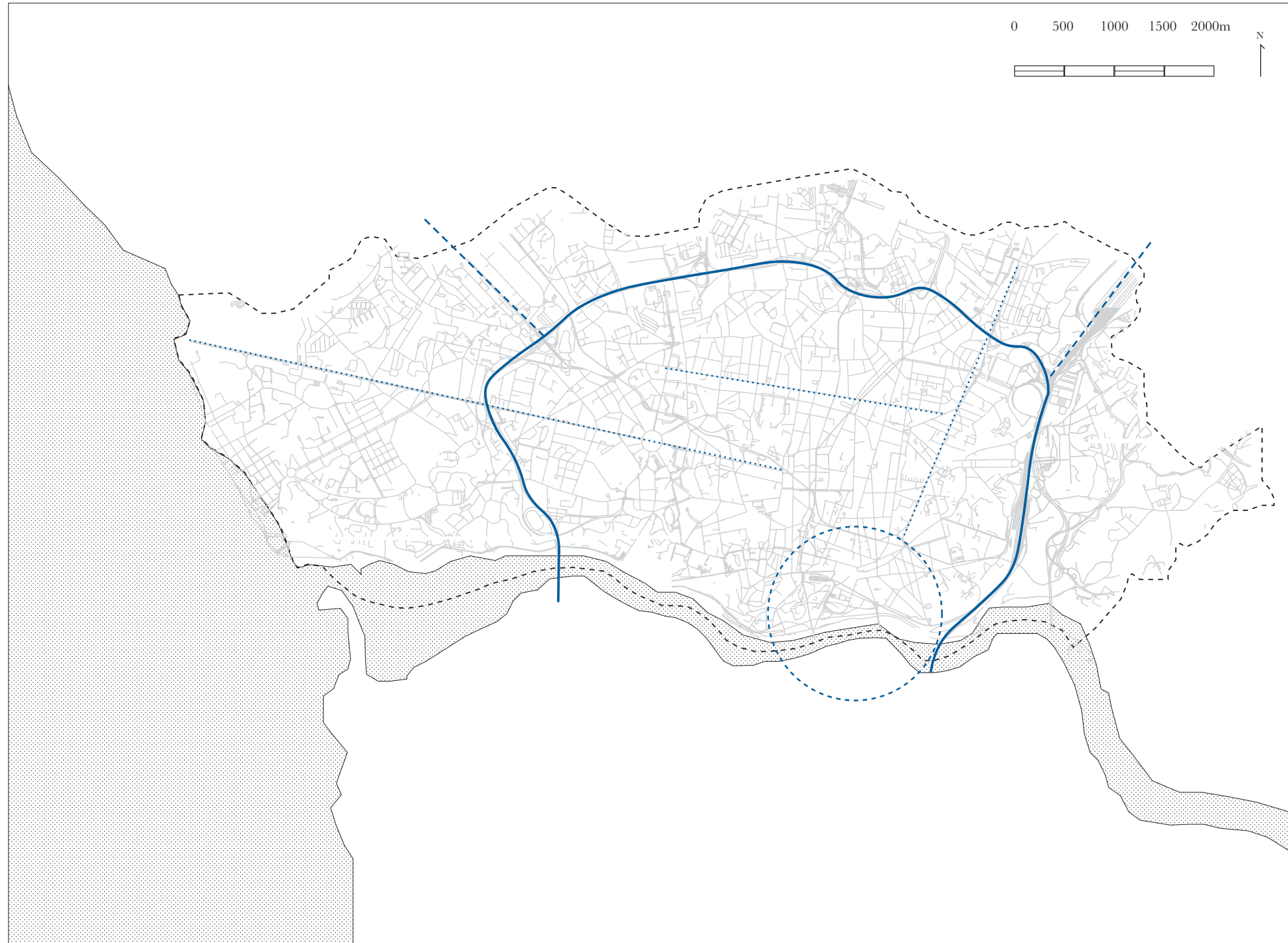
Map of the city of Porto: connections system
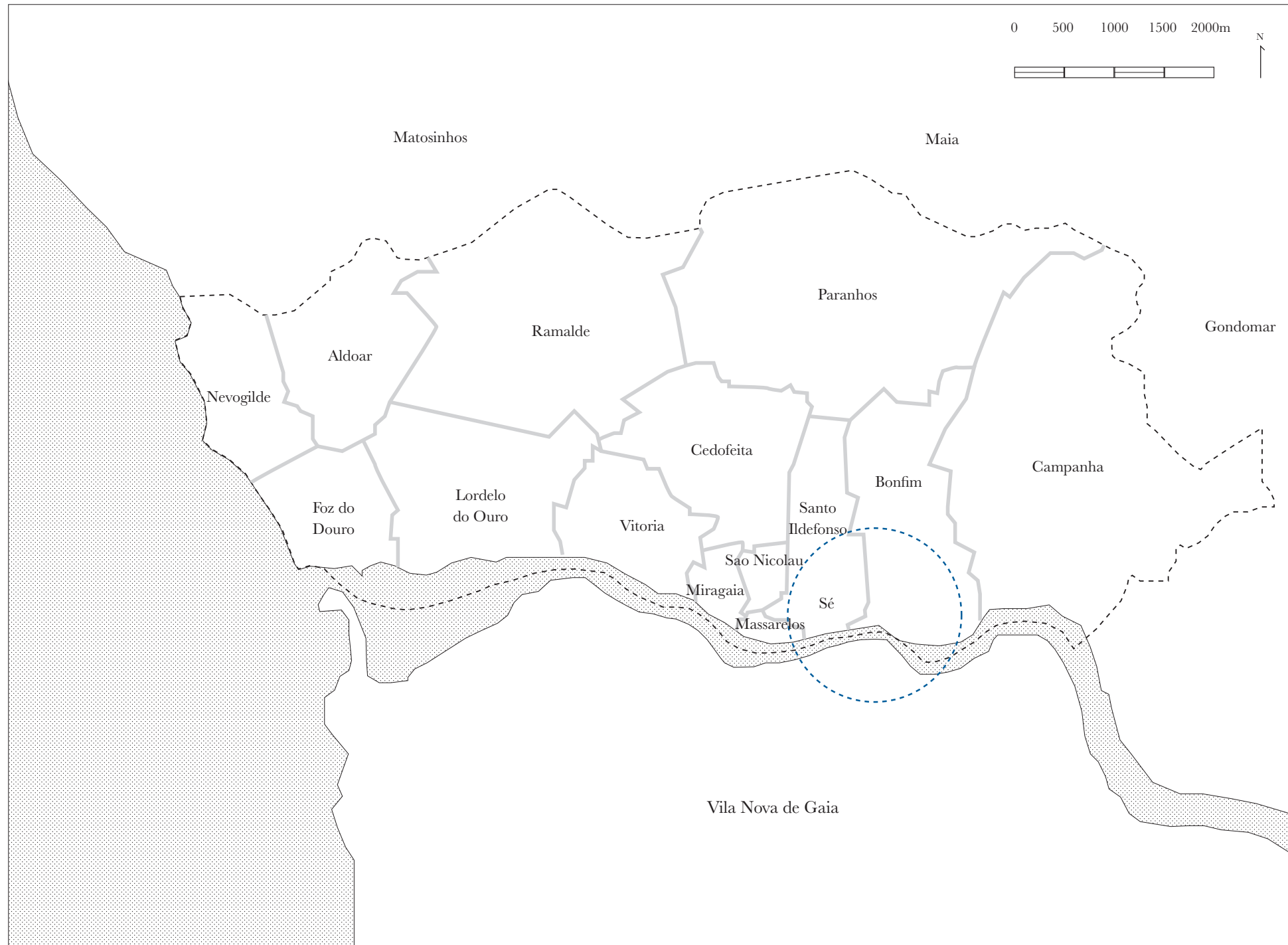
Map of the city of Porto: districts system
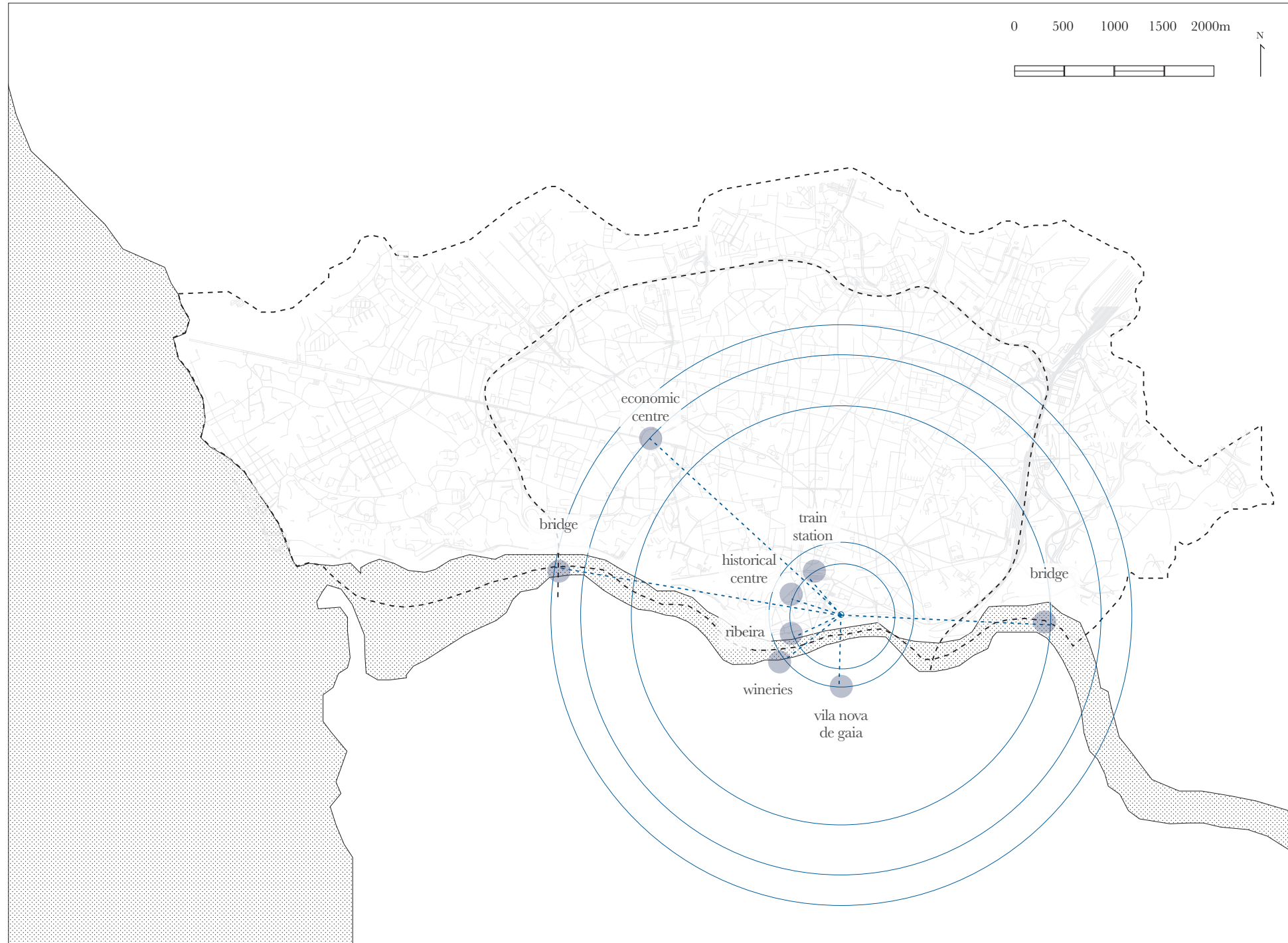
Map of the city of Porto: Fontainhas location and framework

economic
centre

bridge

train
station

historical
centre

bridge

ribeira

wineries

vila nova
de gaia

0   500   1000   1500   2000m

N

Map of the city of Porto: the evolution phases of the city

1.1.1

Porto as a developing city

The fragmentation of the city of Porto

During the second half of the XX Century, the city of Porto came across many questionable urban interventions. A relevant number of new streets and highways, crossing the urban areas, not only suburban, led to a visible and deep transformation inside the urban fabric.

The city of Porto is everywhere known as the city of bridges, because of its transversal connections between the centre of Porto and Vila Nova de Gaia, which preserves the reason getting the city to be known all around the world: the Porto famous wineries. The history of the bridges has been quite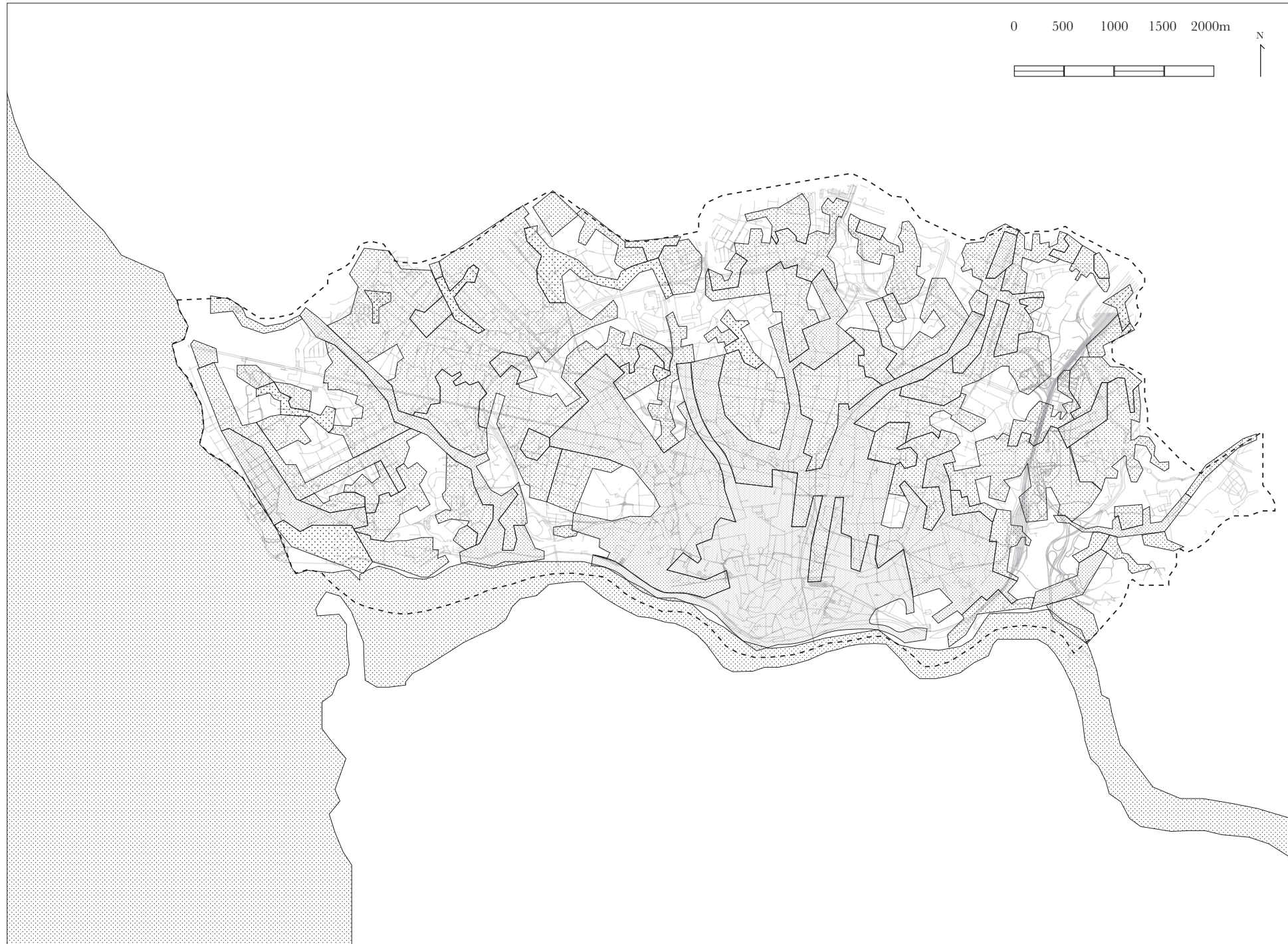 fought, starting from the construction of the most recent bridge: the Infante bridge, which is dedicated to vehicles, which means that is not really used in daily life by residents and by tourists neither. It is considered by inhabitants an unwanted construction, because it did not bring any real advantage to residents, instead it led to the demolition of many dwellings and to the relocation of a modest part of the population in total different areas. Residents did not want to move because they were extremely attached and linked to this alive neighbourhood, connected to the historical city centre, while the

new residential areas were built quite far from it. Moreover, the important presence of many poor residences built for the urban working classes contributed to the area decay in the second half of the XX Century.

In these last passed years, in the XXI Century, the city municipality is really rising up, suggesting many interventions for the restoration of the territory. The economy of the city is largely developing, the tourist features too. Important areas of the city are experiencing innovative master plans transforming them.

There is a common feeling in the streets and buildings of Porto, saying that something is changing, that the already existing strong passionate personality, the idea of Porto as the city of everyone, as a global city, needs to be showed to everybody visiting.

This concept and the spirit of transformation is revealed through the symbol created for the city by the Eduardo Aires White Studio in 2014, who drew "the new identity for the city of Porto".

The city municipality is stressing on this symbol, as a symbol of change, of uniformity and willingness to enter in an European world; starting from the idea that Portuguese people and tourists share about the city, the studio created a series of symbol, not only linked to the physical places but mainly with citizens lives.

The choice of the area of Fontainhas is still linked to this vibrant wind crossing the city, the one willing to remodel the city boundaries and life places, donating old historical areas a new life. The area has in the last years attracted the attention of many architects and urban planners, mainly acting in the city of Porto, and scholars, who proposed the topic to their university classes and design studio.

The greatest part of the ideas which include new architecture objects as a way to obstacle decay is based on the possibility to donate innovative public or semi-public spaces to residents, students and workers, thus designing cultural centres and public libraries, or students residences.

1.1.2

Fontainhas area as a fragmentation symbol

The fragmentation of the city of Porto

Particularly, the already noticed form of abandonment is visible walking and getting lost in the narrow streets of the area of Fontainhas. The area is situated in a landscape strategical position, because of its overhanging overlooking on the river Douro and on Vila Nova de Gaia and because of its important proximity to the historical city centre and to the charming walking on the riverside. Actually, the western part of the city arrives in this point and seems to be interrupted, suspended in a break with no apparent reasons.

In fact, we observe how the urban fabric that borders the Douro, which is, with its characteristic and picturesque architecture and interesting and touristic restaurants, a good reason to walk along the river, drastically cease to accompany the street, which becomes only a vehicles street for all the eastern part of the city, suggesting the passers-by to turn around because nothing interesting is going to happen then. Fontainhas has been defined as a zone between two bridges, an area which seems to be unwanted and unlucky.

0   50   100   150   200 250m   N

The fragmentation of the urban fabric of the area of Fontainhas

The Infante bridge is the unwanted bridge, because of the merely infrastructural reasons which led to its construction. The Maria Pia bridge, designed by the popular Gustave Eiffel, is the unused bridge, because it hosted a currently defunct railway. Fontainhas is marked by a strong and visible physical cutting caused by two railway lines, a difficult topography and a deep oblivion.

The improvement in the urban infrastructures and the construction of the Infante bridge, which is manly a fast connections for vehicles, not even for Porto inhabitants, led to the demolition of an important part of the urban fabric in this part of the city and a reduction in life quality of a great part of the residents of the small and quite poor houses on the escarpment.

The decadence of the buildings is also due to the initial low quality with whom they were built. This area is also characterized by the presence of a big number of the Portuguese residential building type of the *ilhas,* which was a residential working-class typology, marked and known because of its low quality construction and high degree of abandonment and decay, although presenting a strong attachment by its residents.

The impressive coupling of the residents to this kind of houses is a clear indication of their strong traditional sharing social character, strictly linked to the profound Portuguese state of mind. From the observation of the area, it is too evident how these spaces need a revitalization, the city but the inhabitants seems to have forgotten them, populating this area only on the day of São João, which helps the inhabitants to remember the existence of this place and its singular vibrant character.

Even if forgotten, the houses are still inhabited, Portuguese people infinitely love these extremely narrow streets, these decaying buildings and they probably would not want to restore them, because of their huge attachment to these walls, which preserve a rural character and an agrestic atmosphere.

Most of the inhabitants of this area are, in fact, of a rural origin, since they had moved to the city during the industrial revolution to start a new working life in the city, that was actually the reason of the *ilhas* construction

The area of Fontainhas is the perfect reflection of the poetic description of the city made by its "home-made" architect Àlvaro Siza y Vieira. Siza talks about the hard topography, defining it "demoniac", expressing how hard and exhausting it is to relate and get in touch with it.

The narrow and dense urban fabric grows on these slopes, following and indulging its gradient. Open and shared spaces are just derived spaces, created from the meeting of inclined streets, which play that role because people decide it, take over them.

The choice of the area was driven by the possibility to generate a new urban form for the reunification of the divided urban fabric and for the proximity to the historical centre, allowing in this way the reading of the city atmosphere and the reconnection to this urban vitality. These aspects might be summarized by a concept of formal contradiction, used to mean the contrast between a strong fragmentation and discontinuity in the built fabric, and at the same time a recognizing of some continuity aspects, that mark the presence of a certain recurrence and relationship in terms both of time and space.

The residential character of the area enabled the study to make an argument on the typological aspects of the city and the way Portuguese citizens congregate and live together. Moreover, as it will be later explained, a fundamental aspect of Portuguese population lives is its relationship with water and with the elevation gain continuously defining new morphological and aggregation rules.

The territory of Fontainhas is marked way by a big change of altitude, hard to be approached and to be solved, but it is in this project seen as an opportunity to transversally join the territory, connecting not only on the same level, but one level to another.

1.1.3

Boundaries as fragmentation points

The fragmentation of the city of Porto

T he area of Fontainhas is a particularly interesting area of the city of Porto.

The interest generated by its narrow streets and decayed buildings is not exactly the same of Ribeira or Praca da Liberdade, teeming with tourists.

Fontainhas is a local portion of the territory, a breathing old and characteristic Portuguese spirit area, it is not so cosy or welcoming in the first steps a non-Portuguese person moves here. Therefore, its streets need to be travelled two, three and even more times.

Then, it is possible to start to understand which reasons bring inhabitants not to move to other neighbourhoods, although the decaying flow that sticks the buildings and streets; Fontainhas keeps a rural character and a natural and landscape value while being right outside the city walls.

Fontainhas is situated right outside of the historical city centre, the one of the 14th century city wall; the physical boundaries of
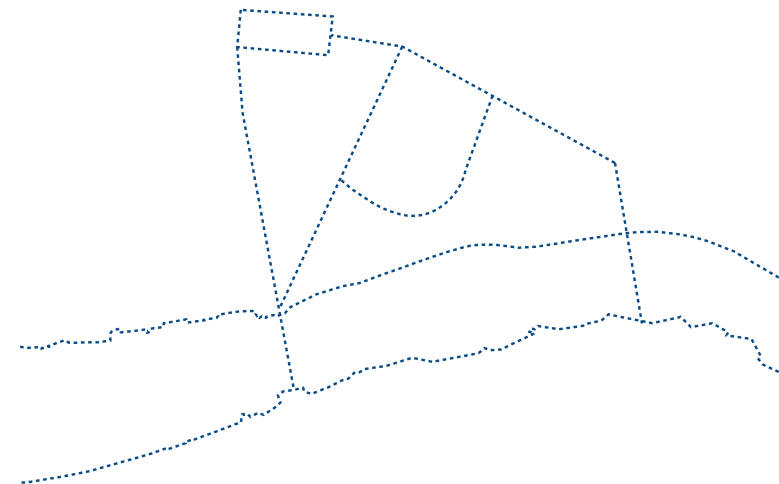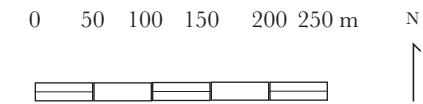
The boundaries of the area of Fontainhas increase the fragmentation

the considered territory are the historical city wall (so called muralha fernandinha), the river Douro, the sight on the opposite side of Vila Nova de Gaia, particularly on the Mosteiro da Serra do Pilar, the railway station and the current economical centre, the funicular connecting the two levels, the Luis I Bridge, the Infante Bridge.

All these elements contribute to the fragmentation and discontinuity of this area, but at the same time make this place manifest its great environmental, historical, connective value. As a matter of fact, a morphological boundary marks a separation, a point of discontinuity between the area and its surrounding, that affects the area itself, generating different points of form aggregation.

The main reasons of the problems are transformed in the main reasons of change through the intentions of the project.

The river Douro, the southern boundary, is the heart of the city, it is a natural physical obstacle but it is at the same time an opportunity for the view from both side to the other. It provides a nice and attractive atmosphere.

The railway station and the railways are the northern boundary, being both a populated and decayed area. It is known that the railways typically divide territories, but they also represent connections with farer points.

The Funicular dos Guindais, dating back to the nineteenth Century, is the western boundary together with the city wall. It is an element of topographical connection, physically joining two points of different altitude level, although at the same time, it strongly separates the territory, underlining the presence of the two separated levels.

The historical centre is the western boundary of the design area and the most alive portion of the city, a fact which might bring to the risk of carelessness and neglect toward the surrounding territories, as Fontainhas. Moreover, the old city wall is still present as a barrier that seems to exclude Fontainhas from the central area.

The two bridges represent the points of contact between the two coasts of Porto and Vila Nova de Gaia, they represent the eastern and western boundaries. It might be interesting to read the bridge element not only as an element of connection, but as a division one, too.

Indeed, in addition to "graphically" separating the view on both east and west sides, the Infante Bridge and the Luis I Bridge risk to generate some urban points hard to be managed, bringing important changes in the urban morphology of those areas. The grounding of a bridge on the earth might become a point of discontinuity for the portions of land on the two divided edges, and on the underneath part.

Vila Nova de Gaia, the opposite side of Porto, represents the reason to cross the bridges, it is the main attraction for many visitors. From Porto, Vila Nova de Gaia is an observed landscape, which means that the city should set itself as an observation point.

The interruption of the city in Fontainhas area is mainly generated by the just named boundaries, the ones may be used as a power aspect for the new project, changing from a point of disconnection to a connector element.

1.1.4

Connections against fragmentation

The fragmentation of the city of Porto

The evident fragmentation and disconnection/disconti-nuity calls for an intervention to mend the elements of the area in order to create new spatiality for residents, workers and for young people and tourists too.

The first connection to be created is the one from the western part of the city to the eastern one: it seems to already exist, but it needs a fortification and the establishment of new points, new hearts attracting people from the outside to walk along them and giving residents new ways to live the same place they actually do. The intention is the one to attract people to continue their path because of new and different interesting points to reach. As al-ready mentioned before, the difficult topography and the high al-titude spread is one of the reasons of this discontinuity in space, but it might become a point of strength, a different way to cross the landscape. New vertical connections and a path to be crossed with a naturalistic interest is the way to vertically and transversely mend this scenery.

The area already includes a wide both social and landscape po-

The intention of new connections

tential value in it, the design is the manner to discover it and give value to it in a maieutic way.

The interruption of the horizontal connections is also due to the disruption of the urban fabric because of the different infrastructural projects that have followed one another in this area. The dislocation of residents to the suburbs of the city led to a particular abandonment character and decay.

Re-constructing and re-creating a connectivity and continuity in the urban fabric, together with the new connections makes the territory walkable again, giving new ways to live and dwell it.

The aim is in fact to produce new spatiality which may bring life to new approaches to the social and shared life, a topic which is particularly dear to Portuguese inhabitants, thus in continuity with the existing tradition.

Streets, which are considered as narrow paths connecting different altitude points, buildings, as volumes directly facing the street and the Douro, squares, as derived spaces, from the accidental meeting of coincident streets or holes between buildings.

New streets, residential buildings and common open spaces, all based on the original existing recurrences of Porto, create new life and let Fontainhas return to the city of Porto, in the dimension of the continuity with tradition, contributing to the urban palimpsest generation.

The generation of new urban fabric and of new pedestrians connections are the causes of each other, in a continuous interrelationship. Indeed, the filling of urban voids through new urban forms flows into the generation of new streets and squares, thus creating a connective space, as lived and not only crossed. Inserting in a disordered and irregular urban form shows how it is actually governed by recurrent elements, that are the aspects to be analysed for the understanding of the area.
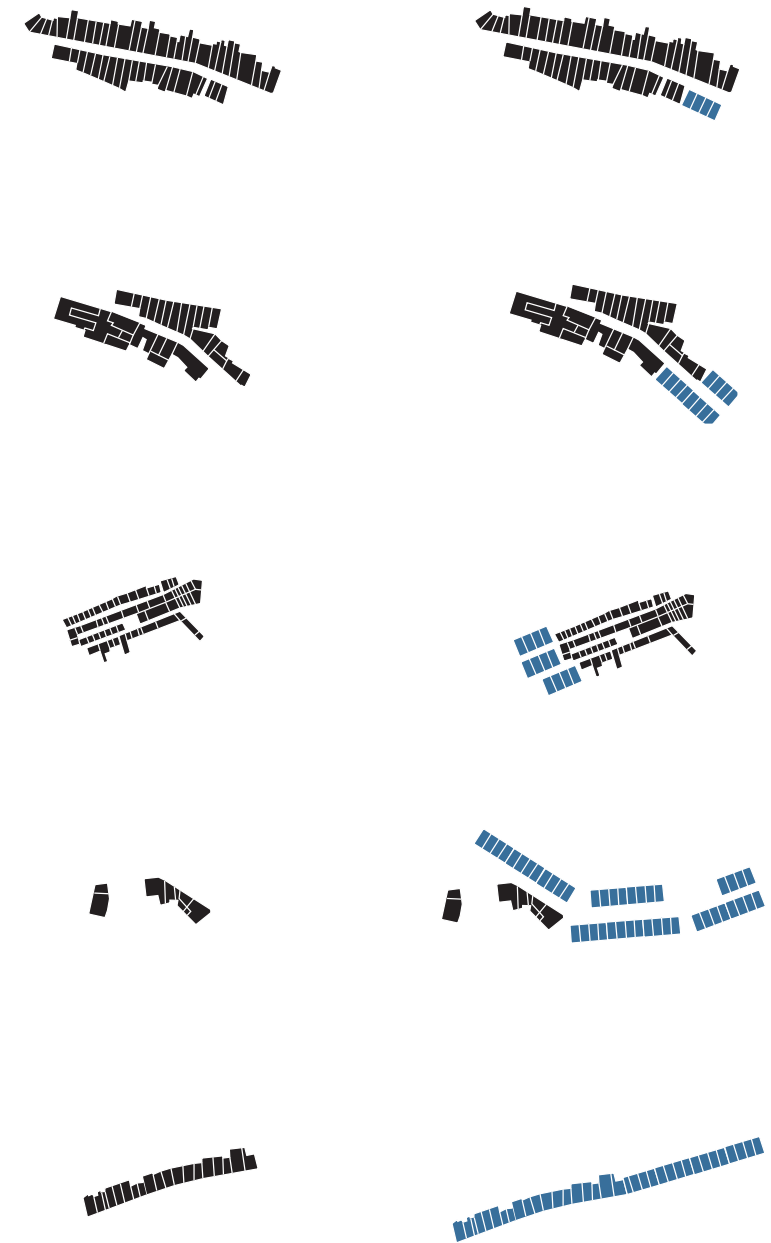


The intention of generation of new urban fabric

1.2

Recurrences in the morphology of the city

The study and analysis of urban morphology of cities is based on the research on specific characters regulating the shapes of the urban fabric.

These characters involve the identification of precise morphological recurrences that may be common to different cities and some more specific aspects of the studied city itself, caused by historical, social, cultural aspects.

The aspects which regulate the city urban fabric, the later called "morphological situations", are actually ways of shape creation and they can be read in a physical exploration of the city and graphically understood, in order to become the generative key for the creation of new parts of the city, thus laying in a strict contact with the existing one. In this case of fragmentation and disconnection, it emerges the needing of continuity with the existing urban fabric, thus with the existing recurrences.
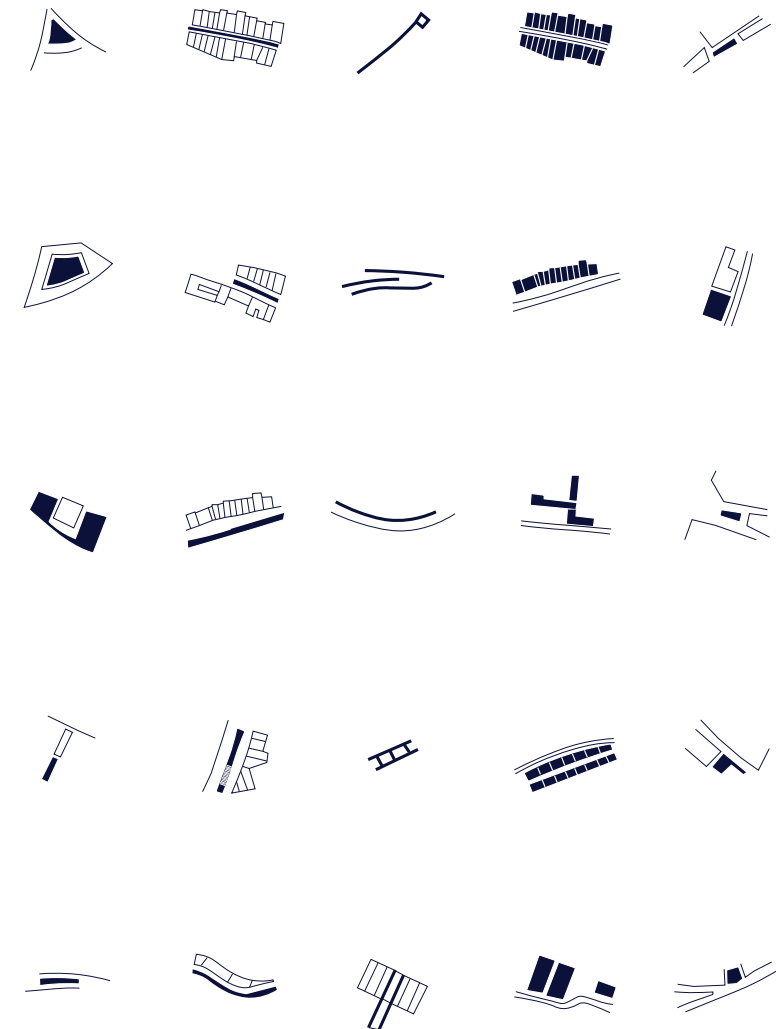
The observed and read recurrences in the morphological situations

1.2.1

Morphological situations

Recurrences in the morphology of the city

The reading of an urban territory may be approached following a morphological method, understanding the laws which rule the definition of the form, recognising the similar and recurrent aspects given by specific territorial characters. Indeed, through the observation and following reading and analysis, it has been possible to notice how a seemingly disordered and irregular urban fabric is actually characterized by specific elements which are at the basis of their aggregation and conformation.

In particular, inside of the carried out work, five categories were considered: green areas, streets, walls, squares, urban fabric.

The analysed situations are single case studies situated in different points of the examined area of the city, but they enclose more general rules of aggregation and composition of spaces, which has been considered as important for the establishment of a continuity in the urban form generation and regualtion tradition.

Moreover, the composition of each category of morphological situations is given by the intersection and relationship with the other aspects, which constantly influence each other, so it would not have been possible to consider only one if not in its liaison with the other urban forms. The actual morphology of the following situations pushes to understand their shape origin, thus the way they were built up together.

At a first sight or walk through Fontainhas territory and during a walk through many parts of the city of Porto, its urban morphology might look spontaneous, unplanned, undefined, which thus would also mean hard to be studied. Actually, each urban settlement follows precise intentional or unintentional rules, even if not coming from a planning project but from the needs of the territory or of human beings building them. As Marco Romano states, the urban morphology comes from the social topics (temi sociali), which are displaced on physical topics (temi fisici). [1]

As the society is regulated by rules, defining its structure and the natural territory is regulated by precise and geometric rules which can be studied, so it is for the morphology of the city. The same typological studies shows how the type is the first rule of the settlement, in fact some specific geometric and equilibrium laws are found in each type. The existence of general recurrent aspects does not preclude the existence of liberty in the urban project. The laws are set out as a common basis on the one it can be built the single morphological situation. In the following pages, there will be the reading of these morphological situations, that have first been observed and then chosen as generic example of a recurrent phenomenon.
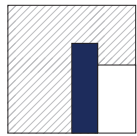
For each of them there is the introduction of a relationship between the real element seen through the picture and the schematic one which explains the rules of the morphology and which is the one for the reproduction of it.

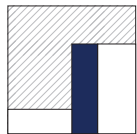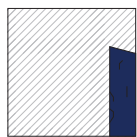[1] Romano, M., *L'estetica della città europea. Forme e immagini,* Torino, Einaudi, 1993
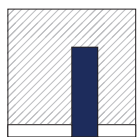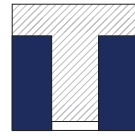
Walls
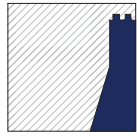
City
Walls

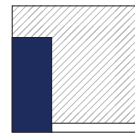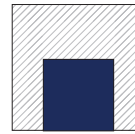

Terrace

Level
Change

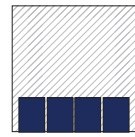Ruins

Plot

Urban
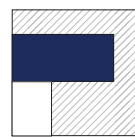Fabric

Double
Dense

Single
Dense

"Special"
Buildings

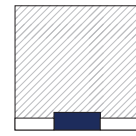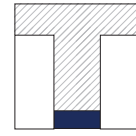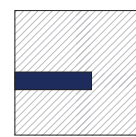

Ilhas

Terrace

Vegetation

Streets
Intersection

Inside
Block

Void
Areas
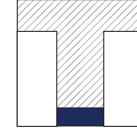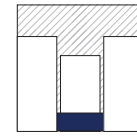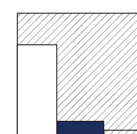

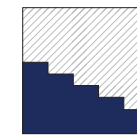Back
Building

Terrace

Streets

Dense
Fabric

Inside
Block

Riverside

Stairway

Trail

1.2.2

Public spaces as rules generators

Recurrences in the morphology of the city

In the same way as all the others previously seen morphological situations, public spaces, meant as squares for shared free activities, can be studied in their morphological recurrent elements and then create new forms in the new city. Particularly, public spaces show some specific aspects in the city of Porto in the area of Fontainhas, that make them be identified as different from the known square. They lay in a strict connection with buildings and streets, in a situation of equilibrium between each other. The generation of the former and of the later is consecutive, thus streets and buildings generate open spaces and public spaces create the form of buildings and streets.

Shared open spaces are present in the new project, that have been named social devices, which thus can be applicated to many places, able to create spaces around them, as buildings and street, following the original rules. After a more general reading of the five different morphological and territorial situations, a focus on the public spaces finds its space in this part of the carried out work. The way to approach to public open areas in the part of the city of Fontainhas is very distant from the European idea of "square".
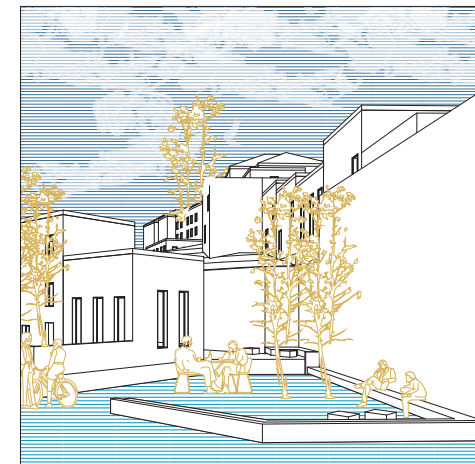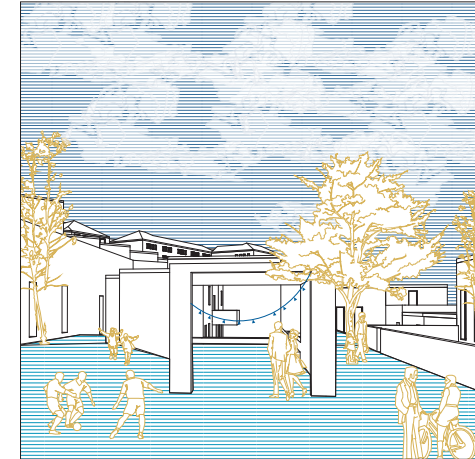
1.2.3

Social devices repetition

Recurrences in the morphology of the city

The design of the new residential area of Porto aims to become an alive space populated the whole day, not just a night dormitory, thus this is the reason of the insertion of both residential and daily working spaces.

The outside public spaces, as small squares, recreating the atmosphere that is possible to find in the surrounding area of the city, represent a way to generate sociality and live up the entire area. Free activities might take place in the spaces, but they are also thought as areas to be used for planned activities, workshops, out of office works, exhibitions, students or working activities.

They are characterized by a surrounding of crossing streets and buildings allowing it being both open/shared and enclosed/intimate. The reason why they are called devices is that they might be applied to different situations in order to link the urban fabric and create new connections, following and still being coherent to the vision of repetitive elements in the morphology of the city, actually a type that is recurrent in its internal possible variation. This variation presents itself as the richness element of an apparently very strict, severe and regulated approach.

Resting activities
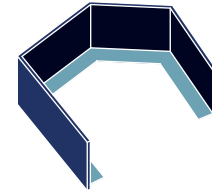
Exhibition activities
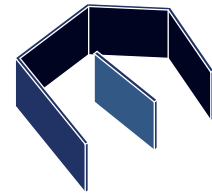
Stage activities
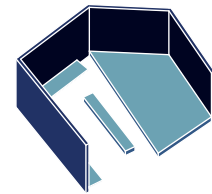
Water activities
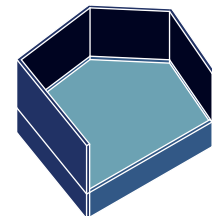
Social activities
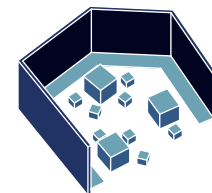
1.2.4

New morphological recurrences

Recurrences in the morphology of the city

The reading of the most recurrent morphological situations along the analysed area of Fontainhas is at the basis of the generation of new morphological rules able to regulate the new urban fabric.

Every part of every city, whether it is a foundation city or a medieval one, is generated by specific formal rules regulating its birth as much as its development.

In the moment of generation of a new part of a city, specifically inside a historic urban fabric, it was thought to be necessary to start from the existing rules, already governing the shapes which are possible to be observed in a preliminary reading.

The survey of the main existing morphological situations brought to the definition of new ones, regarding the physical disposition and way of creation of green areas, streets, walls, squares, urban fabric. The generation of the new recurrent aspects has been following the same categories that were identified in the first phase of reading. These elements arise at the basis of the new project, as an abacus of elements of variation of the same topic, as an alphabet of aspects from which to draw in the following step.
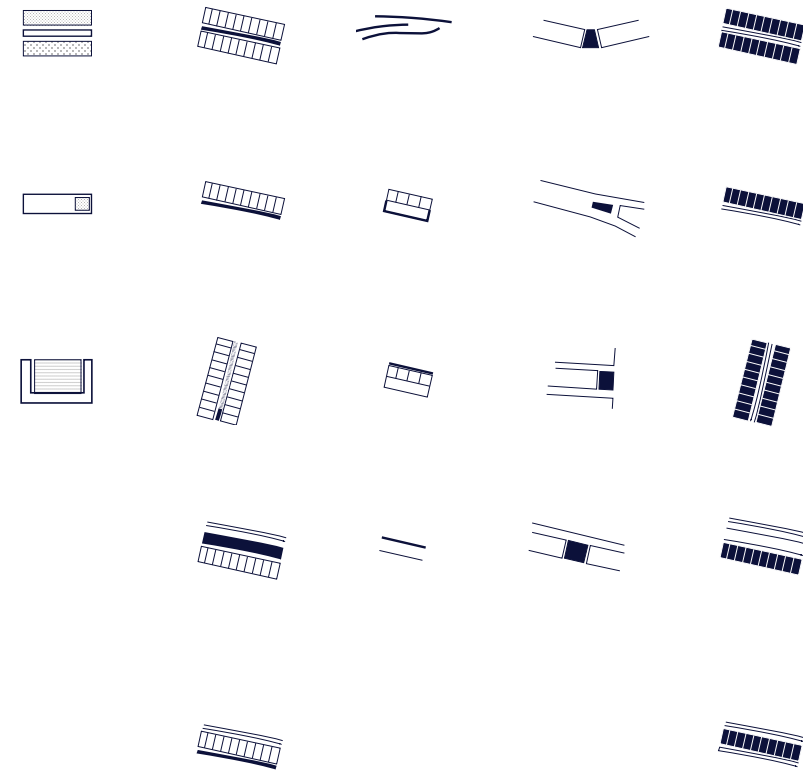
The abacus of the new recurrent morphological elements

1.3

Zooming out on tradition

The focus on tradition has been considered as the way to understand the research background and the historical starting point for the thesis study, with the intention to insert the considered argument in a wider topic in a dimension of continuity with tradition. The study of the morphology of a city may be carried out in various ways, according to the specific school of urban morphology that it is decided to follow; it has been in this case considered as study of transition inside of the urban tradition. Portugal quite recently showed out a own school of urban morphology, which was considered for the study of the city of Porto and mainly for the research on typologies. On a parallel level, the Italian and English schools of Urban Morphology were analysed, in order to create a general working background. The transition of the morphology of a city, the more studied aspect by Portuguese school, is the aspect which matters the most, because it is coherent with the change of the society itself and with its political, social, cultural needs. The study on morphology was divided in a section about the city evolution and another one about the study of urban form, focusing on the analogies and differences.

Tradition

City Expansion

Residential Typology

Monarchic

Democratic

Monarchic

Method

Importance of Re-draw

Morphological Periods

Portuguese Study

Cartography

Age of Discoveries

The single case for general assumptions

V. Oliveira P. Pinho

Study of Urban Form Comparison

Transition

Portuguese Society

Ilhas Type   Teixeira   Conzen
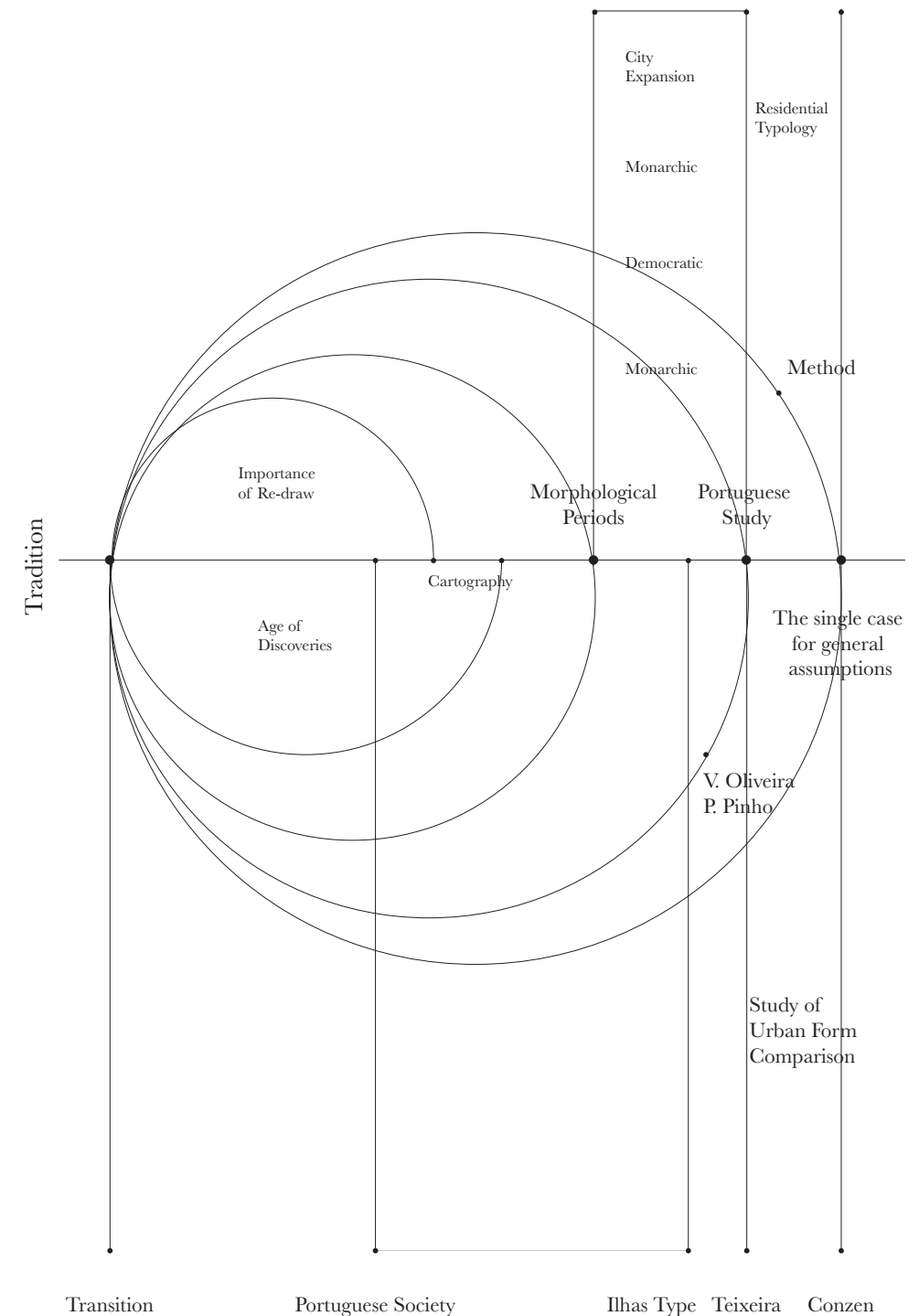
1.3.1

Morphological periods

The XII Century marks the beginning of the history of the city of Porto as a real city, which was called "foral" and covered only 3,5 hectares.

The city at that time was surrounded by a Romanesque city wall of the VI Century with four gates and it comprehended a cathedral, a residential building for the clergy, a small market and a number of small houses. Rua d. Hugo, a small and irregular street, with irregular plots of a 3-70 metres frontage, was one of the most important ones.

Therefore, the city at that time was characterized by irregular buildings, with a really variable width and an inconstant height from one to four storeys.

It was meaningful in the XIV Century the construction of the new city wall, with sixteen gates, enlarging the original area of twelve times. This new area included also the Ribeira, that then became the new port of the city.

Rua da Flores identifies the characteristic form of buildings of that time: it connected two existing squares, Largo de s. Domingos and Praca de s. Bento da Ave Maria, and it was 350 metres long. Buildings, which are still keeping their original form, usually nine metres width and between two and six storeys high, were less variable and irregular then rua d. Hugo.

In the XIX Century, there was a northern and western expansion of the city, mainly following two axes, Avenida da Boavista and Rua da Constitucao.

Avenida da Boavista was 11 metres width and 500 metres long, until reaching a 13 higher length in 1978.

Rua da Constituição was built in three different moments.

This century met the strong industrialization which brought a great part of rural workers to move to the city for a new job.

In 1890, a third of the population were people of rural origin emigrated to work in the industrialized city. [1]

This increase of the working class in the city caused the demand for low-cost housing, because the existing buildings were not enough to host all the new inhabitants; private builders first, philanthropic societies and industrialists later met the demand for new housing.

Around 1850 in Porto industrialists and middle classes builders met the demand of the working class through the construction of the ilhas, which consisted of rows of pretty small houses mainly with one and sometimes two floors, built in the yards, following the same plot, of old bourgeois housing.

Whole families lived in these small houses, in unhealthy conditions, usually without water supply and with common toilets.

They were hide from the street and the access was through narrow corridors crossing the middle-class houses built on the street.

This typology had no relation with oldest Portuguese rural or urban typologies, but they were just the direct answer to the economic needs both of the builders and the users.

The ilhas were located in parts of the city occupied by the middle class during the beginning of that century, which at the moment of construction of ilhas were already in a state of decay. The

[1] Teixeira, M. C. (1992). As estratégias de habitação em Portugal, 1880-1940. Análise Social, 65-89.

65,5% of the total construction volume between 1864 and 1900 was covered by ilhas.

The activity of promoting and building ilhas as an investment field was managed by small artisans and traders, who could only afford the erection of this kind of housing: this became the object of speculative activities of the lower portion of the middle classes of Porto.

The morphology of ilhas itself helps understanding their background and their development field: the land plots belonged to the middle classes, whose resources were limited, who decided to invest, build and own the ilhas.

The reasons of the shape and the inner organization of ilhas presents a totally economic nature. [2]

With regard to the evolution of ilhas during the years, it is possible to notice that in 1899 in Porto there were 1048 ilhas, inhabited by 50000 residents living in 11129 houses. The form of ilhas remained mostly unchanged during the century.

The XX Century was marked by the construction of a heavy road infrastructure partially overlapping the original urban fabric of the city and radically changing the mobility policies and the organization of the urban fabric. [3]

The ilhas continued to be built during the first years of this century, preserving their particular arrangement and continuing to satisfy the economic needing of the lower classes.

At the beginning of this century, both industries and philanthropists started to build social housing for working classes, offering better conditions than the ones of the ilhas, but not all the workers could afford these new residences and they were often occupied by families with a higher income.

In 1909, the number of ilhas had increased to 1200, with 12000 dwellings and in 1929 they still increased to 1301 ilhas with 14676 houses, despite the new regulations which imposed higher standards of living conditions. [4]

In fact, although the ilhas were expected to cease construction, there were still no other options for working class housing.

From a morphological point of view, according to the analysis of the scholar N. Marzot, three different periods can be found in the development of the city of Porto.

The Monarchic period (1813-1865) is the Enlightenment period and it is marked by the starting stages of urban expansion, outside the medieval wall. In this period, the Almada street was opened and five gateways roads to some other cities were consolidated.

The industrialization caused the construction of a new typology for the working class: the ilhas. The Late-Monarchic and Dictatorial period (1892-1960) saw the development along three streets, defining new directions, supporting new façades and defining the surrounding urban fabric.

There was the attempt to eradicate the ilhas from the city, with the construction of new social housing. The Democratic period (1978-2003) met the construction of important new infrastructures cutting the existing urban fabric.[5]

The main parts of the current city are the historical centre, the

[2] Teixeira, M. C., A*s estratégias de habitação em Portugal, 1880-1940*, in "Análise Social", 1992, p. 65-89.

[3] Oliveira, V. (2016). Urban morphology: an introduction to the study of the physical form of cities. Porto: Springer.

[4] Teixeira, M. C. (1992). As estratégias de habitação em Portugal, 1880-1940. Análise Social, 65-89.

[5] Barbosa, M., Oliveira, V., Pinho, P., , *The study of urban form in Portugal: a comparative analysis of the cities of Lisbon and Oporto*, in "Urban Morphology", June 2010, p. 55-66

Baixa, the Boavista area and the western part.

The historical centre is the area contained in the demolished XIV Century city wall, with irregular streets and plots, very dense urban tissue and narrow buildings.

The Baixa is the northern part of the historical city centre, built between the XVIII and the beginning of the XX Century, with regular streets and blocks usually covering a 6 metres width on the street.

The Boavista area is still nowadays the financial and economic centre of the city, organized around the large green roundabout called Rotonda; very different streets branch out from it, characterized by a diverse pattern of plots and building [6] and leading to even more various kind of urban rules and patterns.

As previously analysed and expressed, the city of Porto is in a continuous state of development and growth, trying to fix the problems of the city centre and the reasons of territory abandonment; this means that its urban morphology, too, is going to change and evolve, following the new needing of the city.

[6] Oliveira, V., *Urban morphology: an introduction to the study of the physical form of cities*, Porto, Springer, 2016

1.3.2

The study of urban form in Portugal

The study of Urban Morphology is developed and investigated in a different way and following a characteristic process in each specific country of research and in each school of thought, on account of divergent external influences given by the distinct form they get in touch with.

The main scholar of this field in the Portuguese environment was Teixeira, but still, these researches remain undeveloped if compared with the ones of other countries, as Italy, thanks to the scholar Saverio Muratori and his disciples, as Great Britain, with the Conzenian School.

Indeed, the first explorations on urban form in Portugal date back to the second half of the XX Century.

All the Portuguese scholars of Urban Morphology mainly base their researches on cartography, starting from its importance during the Age of Discovery. Many of the carried out surveys, like Silveira (1951), Ribeiro (1962), start from some cartographic basis of the Age of Discovery and from the comparison between Portuguese settlements' and colonies' patterns.

Oliveira in 1973 came up with the first thesis on urban geography, focusing on Porto's urban development and spatial variety.

In 1996, Teixeira carries out a substantial work, full of references and images of cartography, made from a digital database he created with cartographic records and digital images.

Teixeira also develops a study on ilhas, the typology built in the XIX Century for the working classes, explaining the influence that the socio-economic factors had on its construction and stating that that type, even if unhealthy, was adapted to its inhabitants at that time. The research made by Teixeira began the basis for all the following studies on ilhas. In the same year, Barrata described three different historical residential types in Porto, contributing to the delineation of Porto urban form: mercantile, enlightened, liberal.

In 2006, Oliveira and Pinho made a morphogenetic analysis of Porto and Lisbon, defining the different periods of their expansion; also here it is visible the importance of the use of cartographic redrawing in the analysis of a city over a long period of time.

According to V. Oliveira and P. Pinho, it is not fair to talk about a Portuguese School of Urban Morphology, because of its few scholars and its too recent researches; it is anyway possible to identify different approaches which take inspiration from other schools: a spatial analytical one, a configuration, a process typological, a historic geographical. The main issue in the development and internationalisation of the Portuguese school is the language since many researches, not only the oldest but also many contemporaries, are not translated in English (only 30%). [1]

At the opening of a research on Portuguese Urban Morphology studies, a large bibliography can be found, but it cointains a limitation, since the greatest part is still not accessible for not Portu-

guese language speakers.

The Portuguese school is increasingly growing, mainly in the last years, showing and manifesting a detachment behaviour towards the other schools of Urban Morphology.

The work of Ferreira, Texeira, Valla and Fernandes is based on the study on historical maps, that contitute an important and consistent material, because of the importance of Portugal during the Age of Discoveries, which brought to the drrawing of many city maps.

These atlas were redraw through a software by the Urban Morphology scholars, above all Teixeira, in order to detect the elements of urban constitution of each period; in each map, the previous elements were not removed, but the new urban forms were added to the previous ones. A digital model was created thanks to the overlapping of all the maps, making them congruent and useful for the study on the urban morphology of the city.

List of the Cartographic Sources which based the research work of Portuguese Urban Morphologists.

Planta Redonda by George Black (1813),
Plano da Cidade do Porto by J. Francisco de Paiva (1824),
Oporto by W.B. Clarke (1833),
Planta Topografica da Cidade do Porto by J.C. Lima (1839),
Planta da Cidade do Porto by Federico Perry Vidal (1865),
Planta Topografica da Cidade do Porto by Telles Ferreira (1892),
Planta topografica da Cidade do Porto of the STCMP (1903),
Planta topografica da Cidade do Porto of the STCMP (1932),
Planta topografica da Cidade do Porto of the STCMP (1937),
Carta Militar de Portugal of the IGE (1948),
Planta topografica da Cidade do Porto of the STCMP (1960),
Levamento Aerofotogrametrico of the DGPU (1978),
Cartografia Digital of the STCMP (1992),
Carta Militar de Portugal of the IGE (1997),
Planta da Situação Existente of the STCMP (2003).

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[1] Barbosa, M., Oliveira, V., Pinho, P., , *The study of urban form in Portugal: a comparative analysis of the cities of Lisbon and Oporto*, in "Urban Morphology", June 2010, p. 55-66

1.3.3

The specific case for general assumptions

During the phase of definition of the methodology to use for the redaction of this work, the research made by the English scholar M.R.G. Conzen was carried out, for a better understanding of the procedure he has been following. M.R.G. Conzen (Berlin, 21 January 1907 – Newcastle upon Tyne, 4 February 2000) was an Anglo-German geographer, who is nowadays considered, together with the Italian Saverio Muratori, as one of the greatest scholar of Urban Morphology around the world and whose works are used as basis for new urban analysis[1]. From the Italian point of view, Conzen's theories are not considered as the main ones, because of the important presence, in the Italian studies of Urban Form, of Saverio Muratori and Gianfranco Caniggia.

Many of Conzen's works were completed by J.W.R Whitehand, who constituted, in 1974, the Urban Morphology Research

Group at the University of Birmingham, which became, after 25 years of advanced studies, an important research centre inside the urban form landscape.

Conzen's most significant work for understanding his method is "Alnwick, Northumberland: A Study in Town Plan Analysis", published in 1969, which is a detailed morphological study of the English market town of Alnwick. This research captures the attention of the reader with its title, referring to an apparently not important small town. Conzen on his own declares that a so much small settlement can not include all the aspects of the urban form, but its modest dimension and its simple structure indicate it as adapt in order to show some morphological phenomena and base principles of a general interest [2].

Some other important researches led by Conzen are contained in "Thinking about urban form. Papers on urban morphology, 1932-1998", edited by his son Michael P. Conzen. In this book too, it comes out the intention of the English geographer to use an example to explain some general character of the morphology of a city. Moreover, this book explores many ways to detect the elements of historic townscape following a compared approach.

Before concentrating on Conzen's findings, it is necessary to take in consideration the precursors of this geographical urban morphology study. Shlüter is the main one, with his essays of 1899, the first about the city ground floors, the latter about the main aspects of the geography of settlements. The work influencing the most the work of Conzen is the result of a research of the University of Halle, where Shlüter was the supervisor, the analysis of the city of Danzig; the map of Danzig was published in 1918

[1] Moudon, A. V. , *Urban Morphology as an emerging interdisciplinary field*, in "Urban Morphology", 1997, p. 3-10

[2] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland*, Milano, 2012

by Geisler and it contained a differentiation through colours of buildings, depending on their activity and on their height. The influence of this work on the methodology taken by Conzen is visible from the importance he attributes to the graphic visualization and representation[3].

The importance of drawing for Conzen is underlined by I. Samuels in his article for "Urban Morphology", stating that it was extremely important for the geographer the drawing on his own the plan in order to understand the settlement. About this topic, the author shows the difference between him and the Italian S. Muratori, whose work was helped by the drawings of his students[4].

Going more specifically inside the topics faced by him, the concept of the unity descends from the notion of Anlage used by Kretzschmar at the beginning of the XX Century, but also from the concept of Staftteil by Shlüter. The concept of relative chronology by Keyser too, might be a source for Conzen's work. Having German precursors and English successors, Conzen becomes a bridge between English and German research. Still, some substantial terms as "burgage cycle", "metrology" and "urban fringe belt" may find their forerunners in the precedent surveys respectively of Bernoulli, Strahm and Louis. The idea of the city made of the inner structure of the blocks was already described before by Roncayolo, with the "Unité de plan".[5]

Moreover, there are no exact proofs of the presence of Italian study of morphology in Conzen's studies, but works as the plan for the city of Bologna and a copy of "La città di Padova" were presents inside of Conzen's library, who had also read Aymonino, Rossi and others.[6]

Methodology is certainly the main aspect in Conzen's studies, his way to approach the study of the urban form. His work shows how each form is the result of a process, of the organic association of parts together; it is necessary to decompose the reality, but at the same time to keep its substantial unity and indivisibility. Conzen studies the history of the city and of its form always with the objective of understanding its actual form[7]. The geographer observes the city as an entity in a never static continuous mutation, without fixed boundaries.

The followed approach is based on obtaining general character values, starting from the investigation of a specific case, establishing some founding concepts which can be applied to recurrent phenomena in the urban morphology. The starting point is almost always a city, chosen because of certain characterizing element, of the one Conzen shows its main generating elements with the aim of postulating general laws.[8]

Although the aim is the one to explain the actual form of the city, Conzen never starts his analysis from the current form of the site, following a backward process; the geographer studies the morphology of the settlement following, in a chronological way,

[3] Whitehand J. , *British urban morphology: the Conzenian tradition*, in "Urban Morphology, July 2001, p. 103-109

[4] Samuels I., *Conzen's last bolt : reflections on « Thinking about urban form"*, in "Urban Morphology", 2005, p.136-144

[5] Gauthiez B., *The history of urban Morphology*, in "Urban Morphology", February 2004, p. 71-89

[6] Samuels I., *Conzen's last bolt : reflections on « Thinking about urban form"*, in "Urban Morphology", 2005, p.136-144

[7] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland*, Milano, 2012, p. 13-14

[8] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland*, Milano, 2012, p. 28-29

the growing of the system, showing in an extremely clear way the process of development giving the current system as a product. The result is a process of changes and transformations, not just a layer overlapping. [9]

Availing himself of this method, Conzen clearly expresses the task of the morphological analysis and its perspectives in the study of settlements, that is the reasoning on its transition and its constitution.

Conzen arises himself in juxtaposition with previous scholar of the city regarding the meaning of urban system, defining it as the set of streets and their organization in a street system, units and the aggregation in blocks, buildings and their constructed perimeter. Indeed, previous studies considered a settlement only the relation between full and empty, ignoring the plot structure. Conzen considers the street as an open space, delimited by street margins and used by vehicles; blocks are the parts of the urban fabric which are not occupied by streets; each block is made of units. The composition of the different defined elements, streets, blocks, units, aggregated in various ways, generates the urban fabric. Each combination is, as Conzen explains talking about the British town of Alnwick, unique, thanks to the elements of the place; this is the reason why analysing an urban settlement means to study its physical conditions, the main arguments of it social and economic development[10].

The greatest part of his ideas is developed around the concept of

unit, which is like a detailed and micro-scale urban fabric. The study of the single units and how they relation between them gives us information about the form.

Conzen considers the city as an organism divided into morphological regions, which were sectors presenting the same morphological characteristics and a certain unity. The morphological region became the main object of many of the maps created by Conzen[11].

Being the most critical point of his examination, Conzen underlines how the transformation is the main feature of a morphology, despite the city itself and its tissue oppose to them. In fact, the urban fabric is a conservative morphological element, as it is the street. These fatiguing changes of the urban form can be read, and they tell information about the development, the culture and the history of the city.

Conzen considers the city as a palimpsest, where each single period leaves its material footprints in the form of the city. Each period creates it own phase, which contains its own types and its own characteristics, that can be analysed.

The study of urban form is a recognised research sector worldwide; this gratitude is expressed mainly by the existence of the ISUF, that is the International Seminar on Urban Form, an organism inaugurated in 1994, bringing together urban morphologists around the world, so unifying different ways to approach the urban form analysis depending on the school membership.

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[9] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland,* Milano, 2012, p. 175

[10] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland,* Milano, 2012, p. 29-30

[11] Whitehand J. , *British urban morphology: the Conzenian tradition*, in "Urban Morphology", July 2001, p. 103-109

The English school of morphology, following Conzen's ideas, is mainly geographical.[12]

Although, we can consider the Conzenian School as deriving from German ideas, being Conzen a Berlin student and having had German teachers. As Larkham states in one of his articles, the British school of Urban Morphology is not strictly kinked to Conzen researches, but there is also an English indigenous geographical tradition, less interested in the study of the process, but caring more about the classification and description of different settlements; this vision may be exemplified by the vision of Smailes.[13] Conzen on his own defines Smailes' study as the observation of a series of *recurrent elements*.[14]

From an Italian point of view, the British school of Morphology is not very well known, because of the imposing presence of scholars as Muratori and Caniggia. According to what is written in the introduction of the Italian edition of the book about Alnwick by Conzen, the two schools share both some similarities and some differences. Both the Italian and the English school share the vision of the great importance of the continuity of the urban landscape and its transformation mechanisms, they both have a morphogenetic approach to the built environment, they put their interest in anonymous buildings, as important part of each city, they care about a cartographic analysis and a historical data collection.

While Caniggia stresses on single buildings and their constitution,

Conzen focuses most on the urban fabric, looking at single buildings only in relation with the city; the other important difference can be noticed in the nature of the city itself, seen by Caniggia as a biological organism in evolution and seen by Conzen as consequence of a social fortuity. [15]

The comprehension of Conzen's production is important for the architectural research because of the methodology he uses, that might be extended to more fields; adopting a specific case of a city as a starting point, then analysing it with the aim of providing general laws able to be employed in many cases.

This kind of interpretation of the city offers a deeper reading and understanding of the territory, considered as a conflictual process to approach with the research.

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[12] Whitehand J. , *British urban morphology: the Conzenian tradition*, in "Urban Morphology", July 2001, p. 103-109

[13] Larkham Peter J., *The study of urban form in Great Britain*, in "Urban Morphology, May 2006, p. 117-141

[14] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland*, Milano, 2012, p. 28

[15] Conzen M. , *L'analisi della forma urbana. Alnwick, Northumberland*, Milano, 2012, p. 19

2 | Typology

A *generative alphabet*

Typology

A generative alphabet

From the morphological reading of the area, the major typological characters of buildings arise.

The typological analysis was mainly concentrated on the "ilhas" residential social type, because of its particular interest both cultural and morphological aspects. The adopted behaviour has been the detection of the recursive aspects of the city, since the typology itself is an evident element of recursion.

Through the analysis of some case studies, the main morphological features of the type were identified, proving to be worthwhile in the creation of a new typological abacus from which to draw for the generation of the new passages of urban fabric.

The very basic type, resuming the most interesting morphological aspects and formal rules of ilhas, embodies its same social asset of shared spaces for inhabitants, thus providing the basis for a theoretical discourse on social characters in the Portuguese typological tradition.

2.1

Typological reading

T he existing surrounding urban fabric is, together with its contextual elements, the central starting point for the followed approach to the city, through the detection of the recursive elements, meaning the types, in the area. The kind of repetition is the same as the one already found in the morphological situations reading, since it is characterized by a replication in a dimension of variation.

The main aspects related to the type and its repetition in the built urban fabric are always strictly linked to the social and cultural main features of the inhabitants and the historical period of their construction. More specifically, the area of Fontainhas is marked by a mainly dense slight urban fabric, scarred by the *ilhas* phenomenon, meaning that the area was greatly occupied and inhabited by the working classes just moved from the countryside to the city centre for working reasons. The diagram on the side shows a differentiation in parts of the urban fabric of the surrounding of the design area, based on the typological form, to the ones it can be applicated once more the principle of recursion and recurrence.

Ilhas	Town Houses			Blocks	Special

The abacus of the recurrent typologies of the area surrounding Fontainhas

2.1.1

Reading the type of the ilhas of Porto

Typological reading

As previously analysed, the main characteristics of *ilhas* descend from some important and relevant socio-economic aspects of that time.

The concept of type is the direct reference of the question about the kind of object of an architecture. [1]

As previously quoted, the architecture of Porto of the period including the end of the XIX and the beginning of the XX Century is dominated by the *ilhas*.

The *ilhas* are the answer to the biggest topic of the urban residential issue.

The European phenomenon of the Industrial Revolution modestly occurred in the main cities of Portugal, too, where the industry did not play a fundamental role in the cities' economy. This weak

industrialization induces a strong migratory flow from the rural to the urban parts of the country, creating a significant increase in the urban population, especially the lower classes.

The Portuguese industry is not enough developed to absorb the whole mass of new workers, the labour offer is higher than the demand and this brings to very poor salaries and conditions for the working class.

The presence of so many new inhabitants brings about the taking of old, disused and decadent buildings, the sub-lease of overcrowded residences and a very high population density.

This series of events is the preamble of the possibility, for the middle classes, to create a new business through the construction and the sale of new residential buildings for the lowest class. Through the realization of precarious housing, the *ilhas*, the new urban bourgeoisie owners of building plots generate a new form of revenue. The major characteristics of this new typology are the direct consequence of its economic and social conditions.

The bad quality of the used materials comes from the low possibility of investment of the promoters, who did not need a huge capital in order to have a maximum income; also, small artisans and traders invest their tiny savings on the *ilhas*. [2]

The typology of Porto finds its equivalent in Lisbon with the patios, which is an evolution of residential buildings of rural origin constructed in proximity to the industrial zones; differently from Porto, salaries and the industrial development of the city are extremely higher, producing a more organised housing market for the working classes.

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[1] Moneo, R., *On typology.* on "Oppositions", 1978

[2] Gomes, S., *O problema (e algunas solucões) das casas portuguesas. Modelli di organizzazione dello spazio dell'abitare sociale in Portogallo*, tesi di dottorato, Politecnico di Torino, 2018

Patios are opened spaces situated inside the existing blocks or in small interstices between buildings, surrounded by houses all opened on the common central space.

Both patios and *ilhas* are the result of the usage of existent spaces, which brings to the important variation of the basic typology, showing itself with its rules, but still changing a lot according to the surrounding conditions. [3]

The *ilhas* type also finds two additional similar typologies from the morphological point of view with the English "back-to-back houses" and with the Flemish "beguinages".

The "back-to-back houses" were built during the industrial revolution because of the rapid increase in the town population moved by working reasons to relocate to the city, where industries were. They were usually very small, characterized by only one room for two or maximum three floors; they shared at least two walls, bringing bad quality of ventilation and life in general.

The *ilhas* are single or double rows of very small houses build behind the existing middle-class residences, occupying their yards and so covering its same depth of a 5,5 metres module.

Each little house covers a maximum of 16 square metres, with often only one storey; they were frequently divided in three different spaces through wood walls without doors which generally did not even reach the ceiling of the house. With regards to the structure and its materials, which soon started to degrade, the inner partitions and the roof were wooden made, while the external construction was made of stone. [4]

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[3] Gomes, S., *O problema (e algunas solucões) das casas portuguesas. Modelli di organizzazione dello spazio dell'abitare sociale in Portogallo*, tesi di dottorato, Politecnico di Torino, 2018

[4] Gomes, S., *O problema (e algunas solucões) das casas portuguesas. Modelli di organizzazione dello spazio dell'abitare sociale in Portogallo*, tesi di dottorato, Politecnico di Torino, 2018
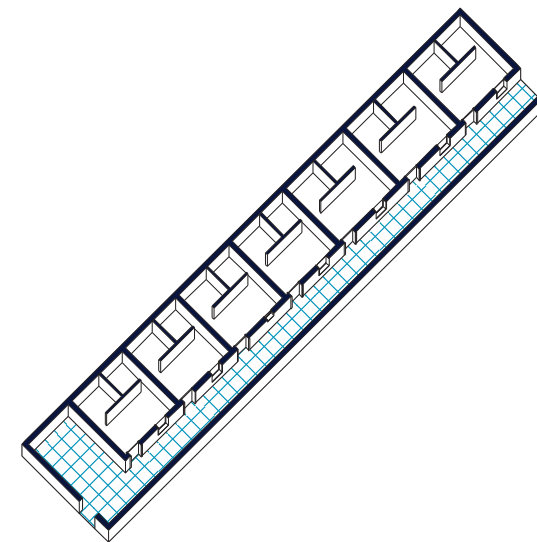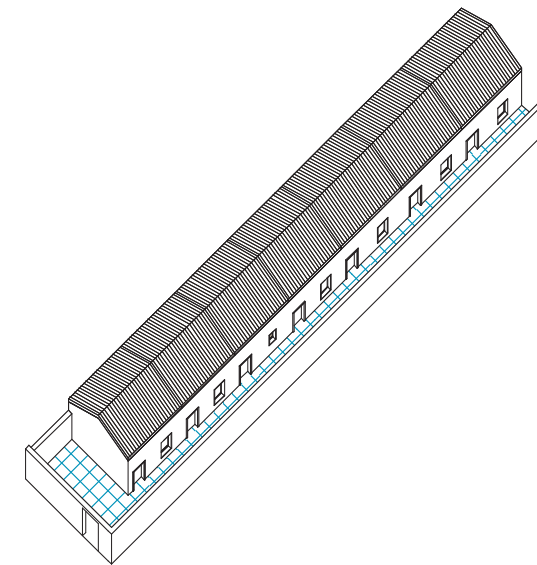
Axonometry of the generic type of ilhas

The characterising aspect of ilhas is the inner corridor, which works as a multifunctional space.

It is the way to walk from the urban streets to the single accesses of the houses, a ramification of the urban connections, a way to take them inside the blocks.

These corridors create a way to let the mobility enter inside the urban fabric, living it in its fragmented nature. In addition to being a connective space, the corridor is an open air courtyard, a common space daily used by inhabitants.

The ilhas organization gets out the strong communal spirit of Portuguese enlarged families, which could share spaces as extension of their living areas.

These reasons are the ones which make ilhas still inhabited nowadays, being the only typology allowing a shared life in a certain private way. An interesting aspect of the ilhas typology is its variability; the first reason is that they were built in interstitial spaces, without constant dimensions, so ilhas had to deal with a certain depth and length of the plot, a certain orientation of the bordering buildings, a given flow of the street and a street frontage.

Moreover, Porto is a city which grows and develops on a quite rough and difficult terrain, meaning that the difference in level is never constant, so each ilhas had to cover a unique drop. In addition, the construction of one type depended on the economic possibilities of each promoter and from the needs his clients are supposed to have. Each ilhas is unique in its organization, but we can distinguish, from the careful redraw carried out by the Faculty of Architecture of the University of Porto during the event of Porto Academy 2016, some typological aspects that contribute to a more specific classification. [5]

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[5] Tattara, M., *Dogma*, Porto Academy, July 2016

A1
2 rows - on the street
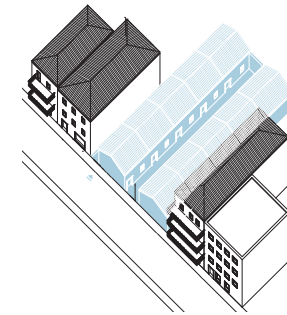
A2
1 row - on the street
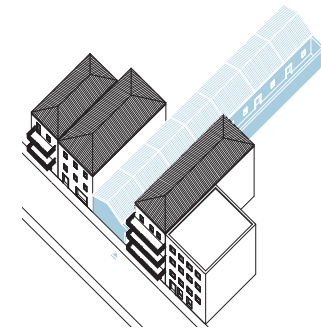
B1
2 rows - behind
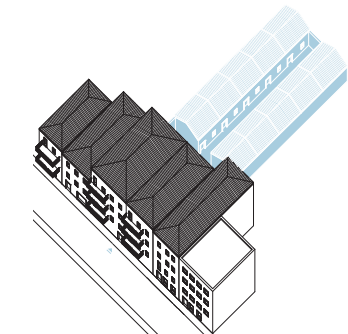
B2
1 row - behind
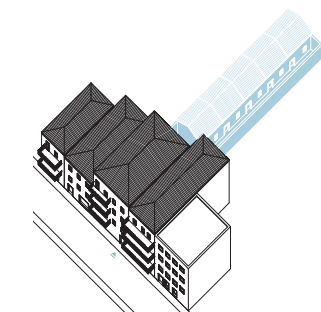
2.1.2

The type understood through case studies

Typological reading

An important and useful for the design part of this work is composed by the reading of fourteen case studies, situate in the area of Fontainhas and in the surrounding part of the city. The choice of the case studies, between the large number of *ilhas* met and drawn during the trip, is based on the carried out work of the The redrawing of *ilhas* and the action of photographing them contributed to the understanding of the morphology and the relationship between spaces.

The visited *ilhas* are still inhabited, except two, which have been demolished.

For each one, a diagram of the paths and of the inside and outside spaces and of the private and shared spaces was made and it is through these diagrams that it is possible to get the relationship between shared spaces and outside spaces, that in most cases coincide.

The drawings of the following case studies were rebuilt basing on the work carried out during the Porto Academy 2016, an event hosted by the University of Porto; it was made complete through the addition of the photographic survey of the considered *ilhas*.
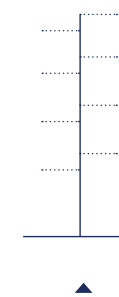
| Paths | Inside/Out | Private/shared |

Pictures showing the entrances of the studies *ilhas*. Made by the author

Pictures showing the entrances of the studies *ilhas*. Made by the author

n 1 Campo 24 de Agosto 185A

The ilhas is situated in Campo 24 de Agosto 185 A, hidden and separated from the street through a closed gate, a very narrow passage in between two nowadays decayed buildings.
The building does not seems to be currently inhabited.

• Shared space surface	218 m^2
• Number of storeys	2
• Number of units	15
• Number of rows	1
• Current state	inhabited
• Relationship with the street and entrance type	entrance through middle class building
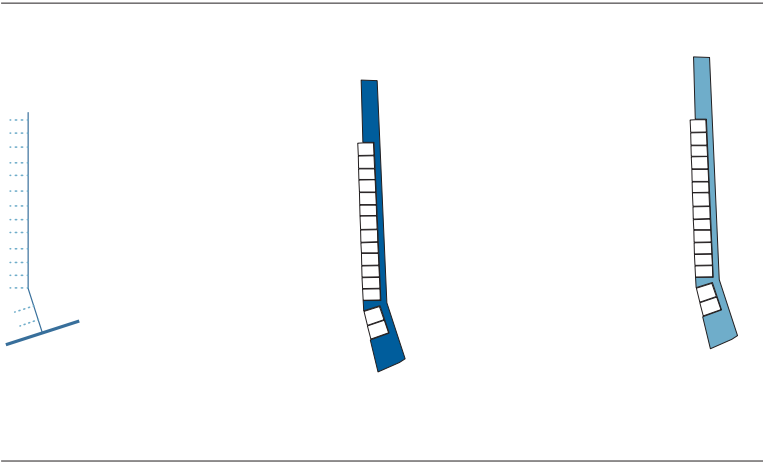
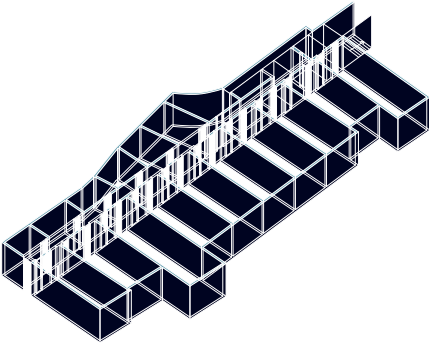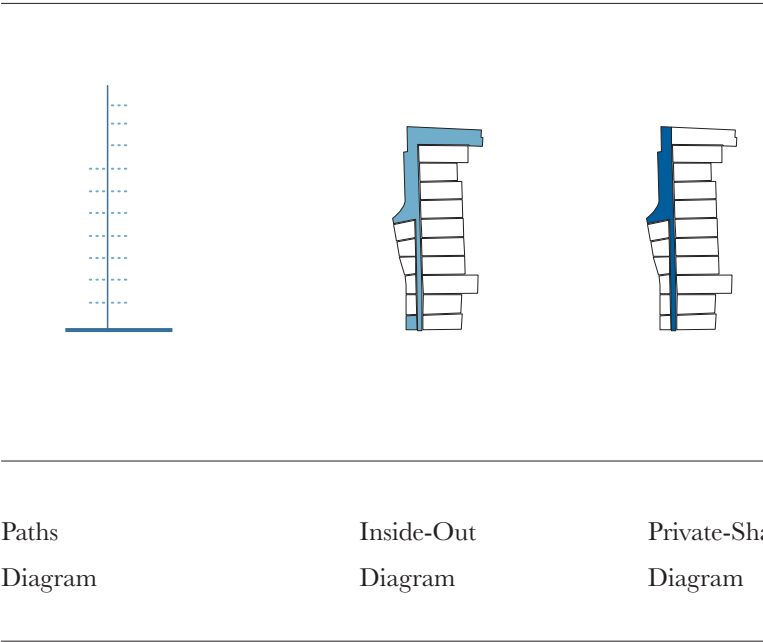| Paths Diagram	Inside-Out Diagram	Private-Shared Diagram
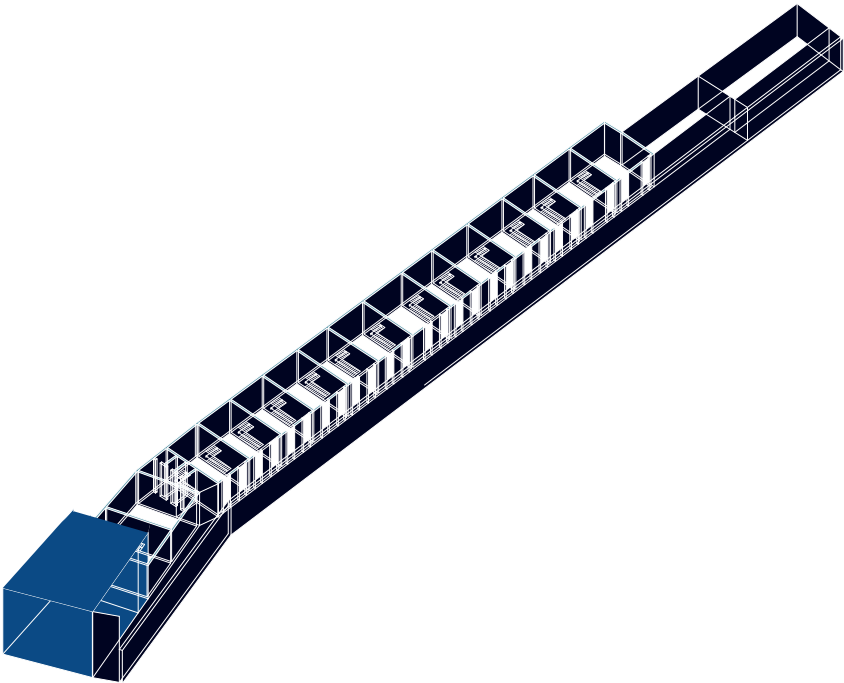
n2 Campo 24 de Agosto 178

The ilhas is situated in Campo 24 de Agosto 178, it is not visible from the street, because it is compeletely hidden behind two residential/commercial buildings, through which it is possible to reach the long corridor of the residential building.

● Shared space surface	80 m²
● Number of storeys	1
● Number of units	4
● Number of rows	1
● Current state	inhabited
● Relationship with the street and entrance type	entrance from the street

Paths	In-Out	Private-Shared
Diagram	Diagram	Diagram
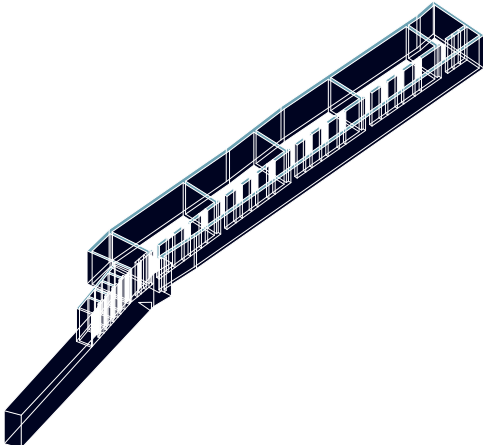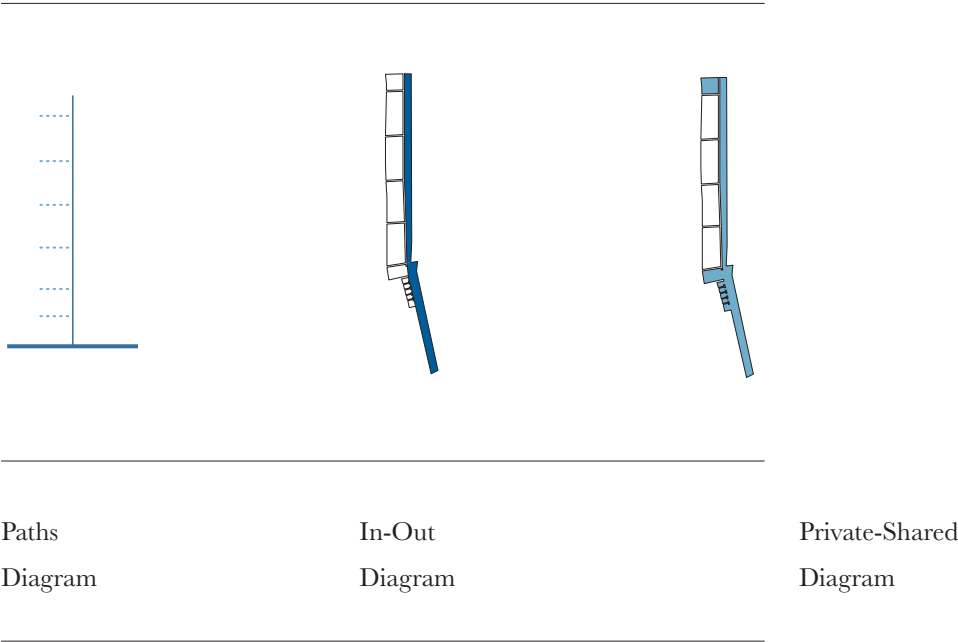
n3 Avenida de Fernao de Magalhaes 21

The ilhas is situated in Avenida de Fernao de Magalhaes 21; differently from many other case studies, the facade facing the street is quite wide, comprehending both the blue entrance gate and the blind wall all covered with coloured azulejos.

Paths	Inside-Out	Private-Shared
Diagram	Diagram	Diagram

- Shared space surface — 378 m^2
- Number of storeys — 2
- Number of units — 32
- Number of rows — 2
- Current state — inhabited
- Relationship with the street and entrance type — entrance from the street
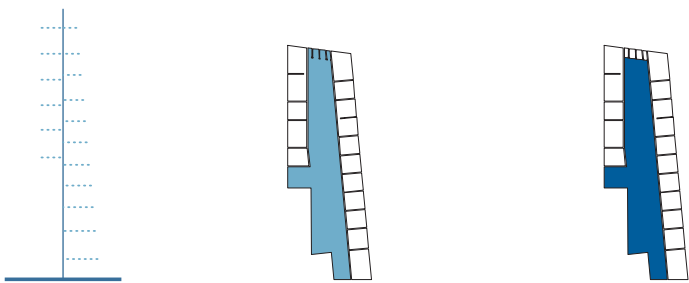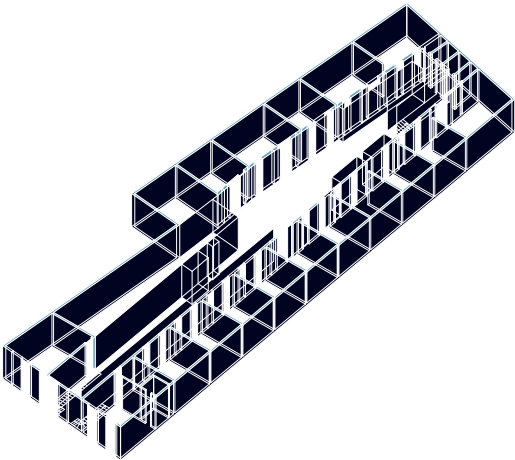
n4 Avenida de Fernao de Magalhaes 175

The ilhas was situated in Avenida de Fernao de Magalhaes 175, it is not possible to view it nowadays because of its demolishment and replacement.

● Shared space surface	134 m²
● Number of storeys	2
● Number of units	9
● Number of rows	1
● Current state	demolished
● Relationship with the street and entrance type	entrance from the street
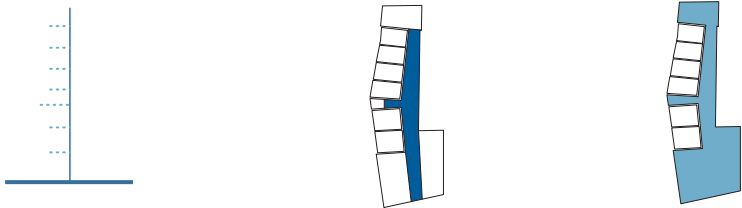
Paths
Diagram

Inside-Out
Diagram

Private-Shared
Diagram
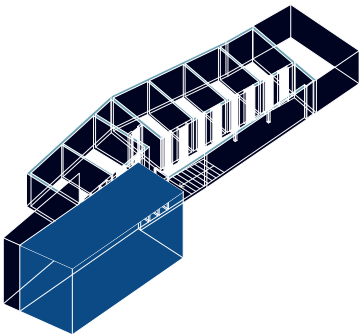
n5 Travessa Fernao de Magalhaes 141

The ilhas situated in Travessa Fernao de Magalhaes presents itself as different from the others because of the overlooking of both the units facades on the coincident streets. This case study is detached from the others because of its composition.

| Paths | Inside-Out | Private-Shared |
| Diagram | Diagram | Diagram |

• Shared space surface	348 m²	
• Number of storeys	1	
• Number of units	10	
• Number of rows	2	
• Current state	inhabited	
• Relationship with the street and entrance type	entrance through middle class building	
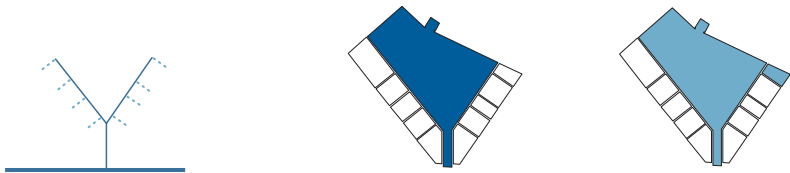
n6 Travessa Campo 4 de Agosto 126

The ilhas is situated in Travessa Campo 4 de Agosto 126; it has already been renovated, it is inhabited and it lays in a good state, characterized by a lush vegetation creating a parallel row to the one of the residential units.

Paths
Diagram

Inside-Out
Diagram

Private-Shared
Diagram

• Shared space surface	80 m^2
• Number of storeys	1
• Number of units	10
• Number of rows	1
• Current state	inhabited
• Relationship with the street and entrance type	entrance through middle class building

n 7 Rua de Sao Victor 182

The ilhas is situated in Rua de Sao Victor 182; the street is strongly characterized by the ilhas type, creating a sequence of narrow gates hiding long corridors. Since they develop all parallel, they follow straight lines.
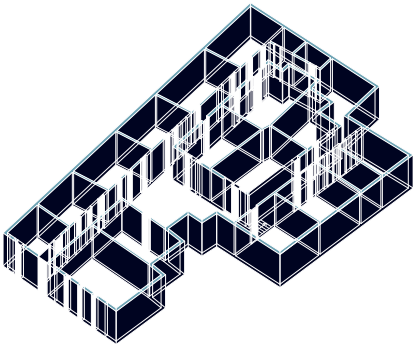
- Shared space surface   89 m^2
- Number of storeys   1
- Number of units   20
- Number of rows   2
- Current state   inhabited
- Relationship with the street and entrance type   entrance from the street
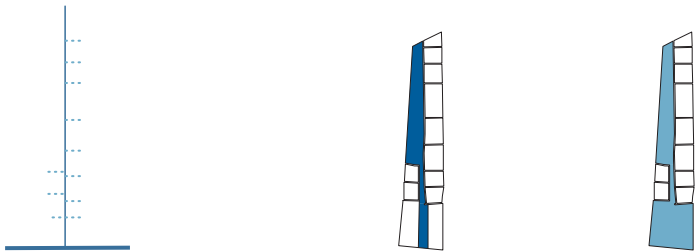

| Paths Diagram | Inside-Out Diagram | Private-Shared Diagram |
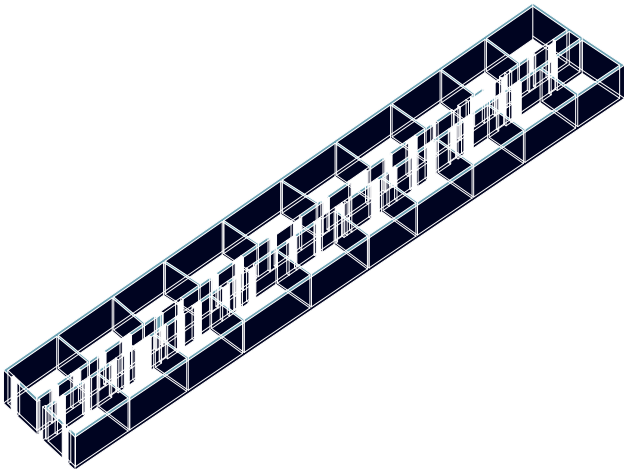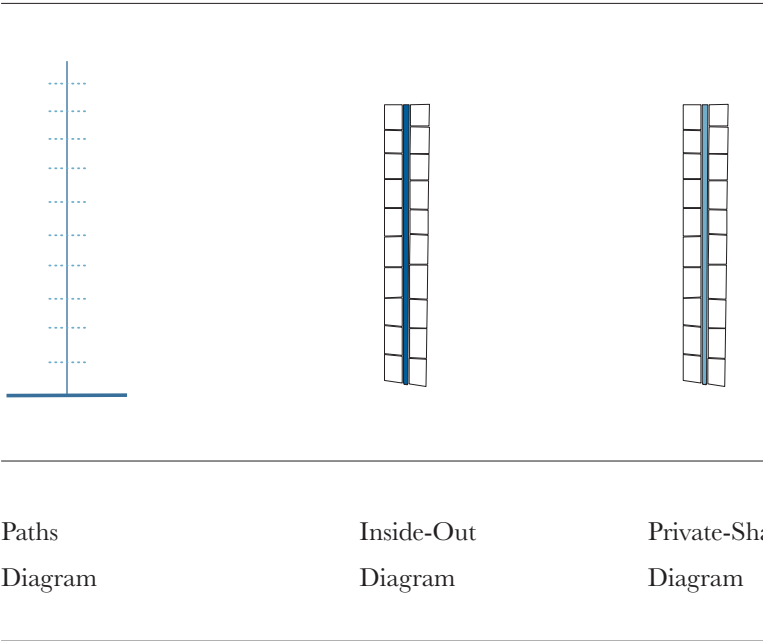
n8 Rua de Sao Victor 90

The ilhas is situated in Rua de Sao Victor 90, it lays behind a middle class building. It is developed on two parallel rows entering inside the block with the single units.

• Shared space surface	66 m²
• Number of storeys	1
• Number of units	15
• Number of rows	2
• Current state	inhabited
• Relationship with the street and entrance type	entrance from the street
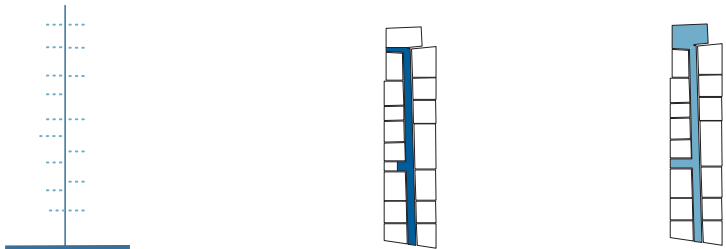
Paths
Diagram

Inside-Out
Diagram

Private-Shared
Diagram

n9 Rua de Sao Victor 68

The ilhas is situated in Rua de Sao Victor 68, it has recently been renovated by a Portuguese architecture firm, the entrance and two blind walls overlook the street. It occupies more than one single plot, growing on two directions.

Paths Diagram	Inside-Out Diagram
Private-Shared Diagram	

- Shared space surface — 130 m^2

- Number of storeys — 1

- Number of units — 14

- Number of rows — 3

- Current state — inhabited

- Relationship with the street and entrance type — entrance from the street
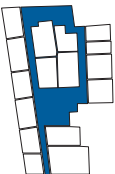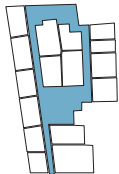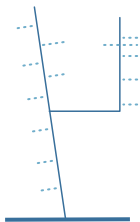
n10 Rua de Sao Victor
49

The ilhas is situated in Rua de Sao Victor 49, it goes inside the block occupying two plots. On the street side, the building is shown as the gate entrance and two low hipped roof buildings.

- Shared space surface   160 m^2
- Number of storeys   1
- Number of units   7
- Number of rows   1
- Current state   inhabited
- Relationship with the   entrance from
  street and entrance type   the street

| Paths | Inside-Out | Private-Shared |
| Diagram | Diagram | Diagram |
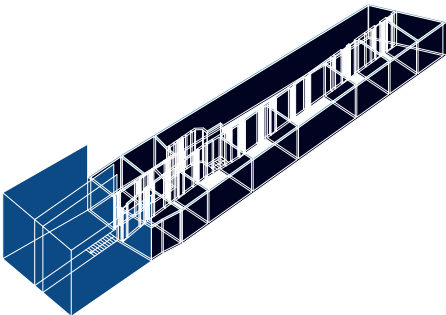
n 11 $\underset{83}{R}$ua de Sao Victor

The ilhas is situated in Rua de Sao Victor 83; the building is not inhabited because of the state of decay in which it lays. Its lenght almost croosed the whole block, reaching the opposite street.

● Shared space surface	143 m²	
● Number of storeys	1	
● Number of units	19	
● Number of rows	2	
● Current state	demolished	
● Relationship with the street and entrance type	entrance from the street	

Paths	Inside-Out	Private-Shared
Diagram	Diagram	Diagram
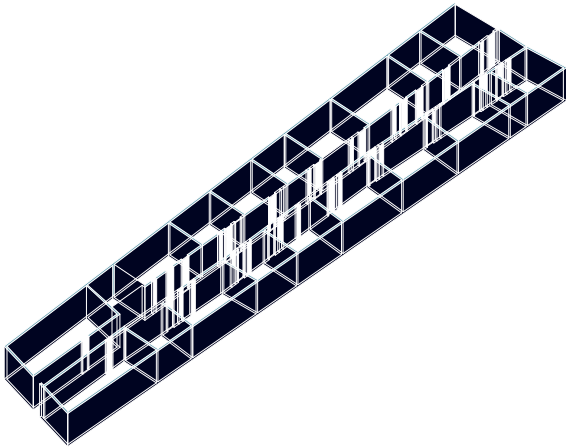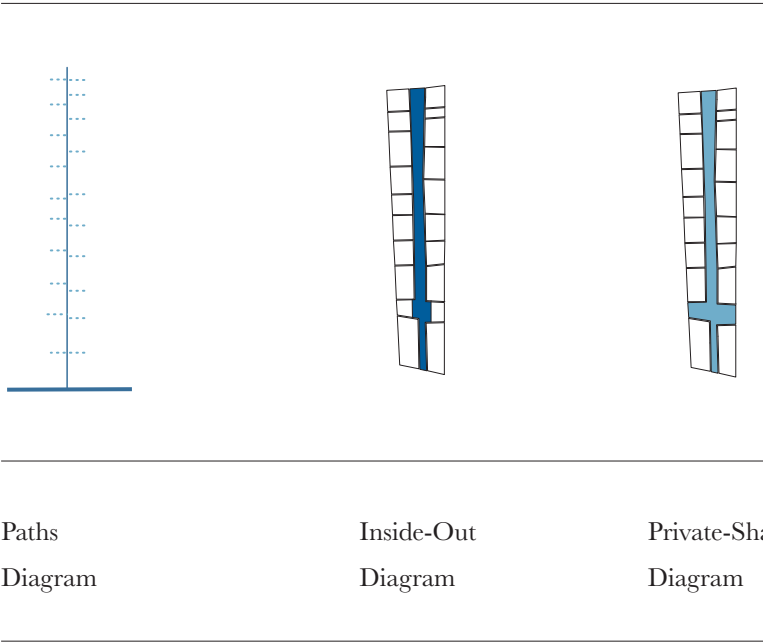
n 12 Rua de Sao Victor 109

The ilhas is situated in Rua de Sao Victor 109. The building is developed following a longitudinal direction, distributing along the central corridor and manifesting a symmetric structure.

Paths Diagram

Inside-Out Diagram

Private-Shared Diagram

|	
• Shared space surface	180 m²
• Number of storeys	1
• Number of units	30
• Number of rows	2
• Current state	inhabited
• Relationship with the street and entrance type	entrance from the street
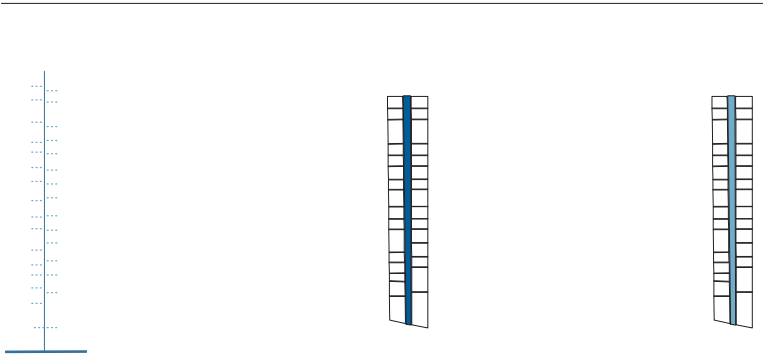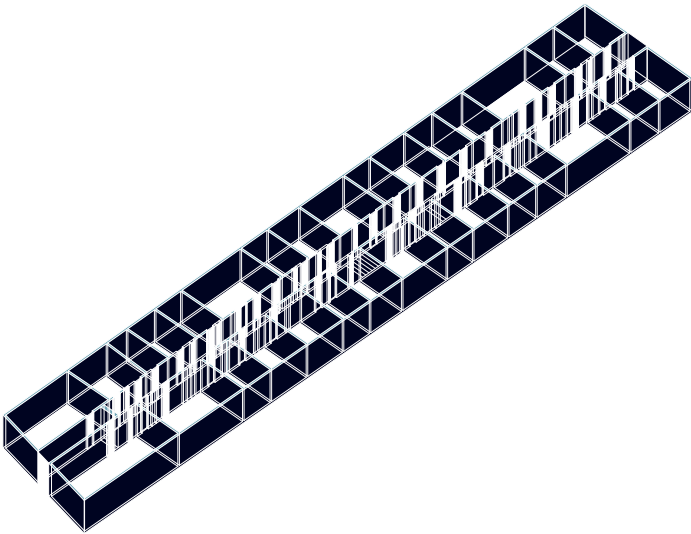
n 13 Rua Passeio das Fontainhas 31

The ilhas is situated in Rua Passeio das Fontainhas 31, it is one of the case where the elevation gain plays a fundamental role, generating a difference in the storeys elevation. This change also gives an overlooking on the river.
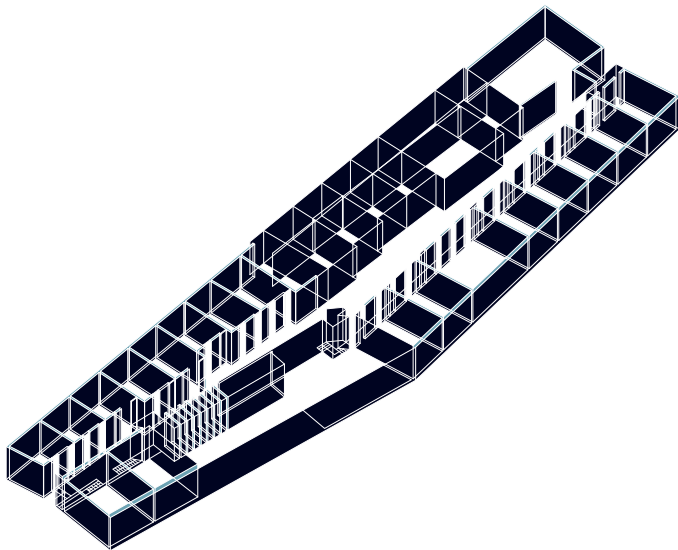
• Shared space surface	370 m²
• Number of storeys	2
• Number of units	45
• Number of rows	1
• Current state	inhabited
• Relationship with the street and entrance type	entrance from the street
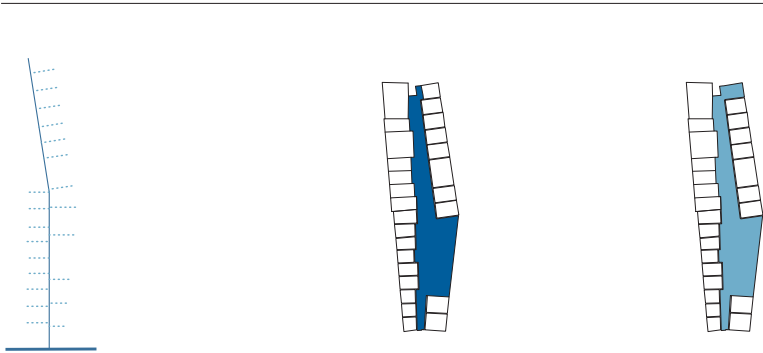
| Paths	Inside-Out	Private-Shared
Diagram	Diagram	Diagram

n 14 Rua da Corticeira
25

The ilhas is situated in Rua da Corticeira 25, it is also called Bair-ro Tapada, that means that it is considered as a real independent block, as a separate neighbourhood. As the previous case study, it develops on a topographical elevation.

| Paths | Inside-Out | Private-Shared |
| Diagram | Diagram | Diagram |

- Shared space surface — 158 m^2
- Number of storeys — 1
- Number of units — 18
- Number of rows — 1
- Current state — inhabited
- Relationship with the street and entrance type — entrance from the street
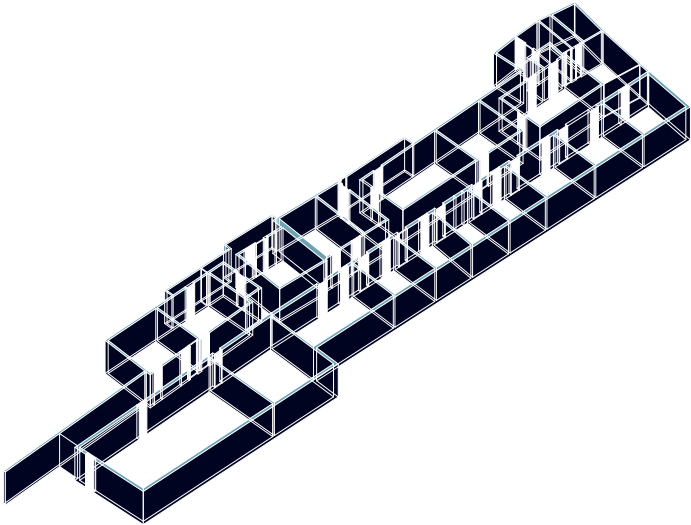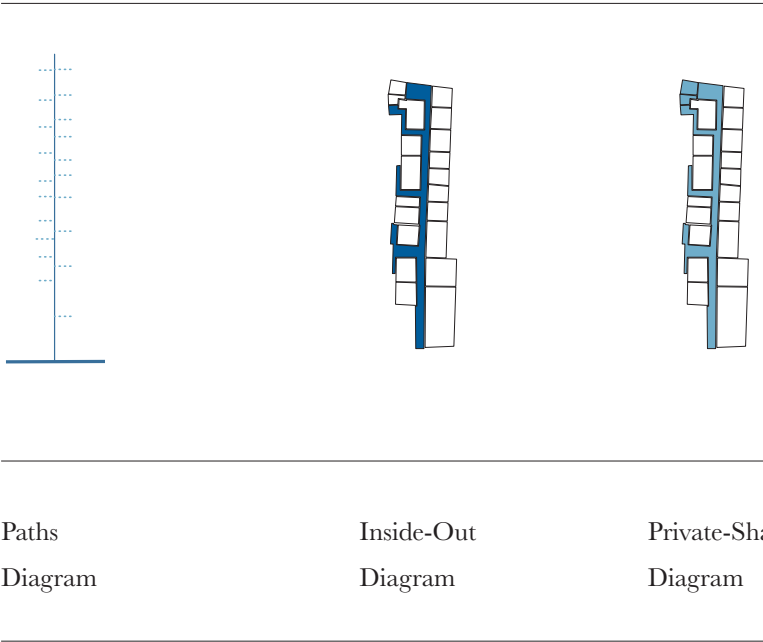
2.1.3

Typological analogies

Typological reading

In the morphological reading of a building typology, it is possible to identify the social and cultural reasons leading the form to be generated in that specific way, through the identification of specific recurrent elements in the spaces aggregation. Similar aspects and needing in the society may lead to similar morphological features in the building type shape, thus a further repetition also in a different context. Indeed, it is possible to read in the same way as *ilha*s other residential buildings with a particular social character. Similar residential typologies have been detected in particular in the Flemish context, with the *beguinages*, in the Portuguese in Lisbon with the *patios,* in the English and Irish. The Flemish "*beguinages*" were building complexes built in the Middle Ages by donors promoters in order to host the Béguines, who were women who dedicated their lives to God but without retiring from the society, indeed with the intention to live in a strict contact with it; they gave birth to a kind of shared living ensemble enclosed by walls or ditches and composed of houses, churches, green areas, generating a real small urban settlement,

with a precise morphology.[1]

As the *ilhas* of Porto, the *beguinages* were surrounded by a wall aiming to separate and isolate it from the city and from the society, which means the existence of a coexistence between a spirit of separation and intimacy and one of direct relation with the society. This kind of buildings were built by external promoters, as the middle classes in the case of *ilhas* and rich donors in the case of the *beguinages*. An additional common aspect was the co-presence of residential and dormitory areas and working areas as laboratories. Still in the Portuguese framework, the *ilhas* finds its equivalent in Lisbon with the patios, which is an evolution of residential buildings of rural origin constructed in proximity to the industrial zones; differently from Porto, salaries and the industrial development of the city are extremely higher, producing a more organised housing market for the working classes.

Patios are opened spaces situated inside the existing blocks or in small interstices between buildings, surrounded by houses all opened on the common central space. Both *patios* and *ilhas* are the result of the usage of existent spaces, which brings to the important variation of the basic typology, showing itself with its rules, but still changing a lot according to the surrounding conditions. [2]

In England and Ireland, too, similar building constructions are possible to be found; these buildings mainly hosted lonely women or widows or poor working classes and were morphologically built in a similar way as *ilhas* were, with a long corridor skirting the more private units.

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[1] UNESCO, *Flemish Béguinages*, in "UNESCO World Heritage Centre", 2019 https://whc.unesco.org/en/list/855/

[2] Gomes, S., *O problema (e algunas soluções) das casas portuguesas. Modelli di organizzazione dello spazio dell'abitare sociale in Portogallo*, tesi di dottorato, Politecnico di Torino, 2018

2.2

Dynamics in typological approach

What turns out interesting and efficient in the typological approach, after the reading of the existing typologies composing the urban fabric, is a dynamic process for making it change in a new type, a concept that stresses again on the element of variation in the repetition.

With dynamics we mean that, after a classification of the existing types, the work moves on the variation of the form, meeting the new requirements of the developing design.

Having to insert in the new topography and to create the new connections in the area of Fontainhas, the type changes above all in its orientation. The corridor, which here becomes a real liveable and agreeable courtyard, is rotated and placed along the same street.

This allows the courtyard having a more open and direct contact with the street, not being hidden in the inside of the block, but in the continuity of the sharing atmosphere of the residential type.

The dynamic process of evolution of the basic elements of the type. The object orientation is inverted, increasing the relationship between the courtyard and the street.

2.2.1

A new social type

Dynamics in typological approach

Morphological characters and spaces disposition in the residential typology lay in a strict contact with the social reasons and the construction work flow of the type itself, as it has been possible to analyse through the reading of the traditional *ilhas* type, whose morphological nature can not be explained without the explication of its social, cultural, historical background.

The new residential type is a consequence of the just expressed process of variation and dynamic action on the traditional typology of the *ilhas*. It still preserves a character of intimacy, in the private living or working unit, but it presents a strong sharing character in the rest of the building, which therefore means in the fourth shared unit and in the outside courtyard. This coexistence of private/intimate and social/sharing has already been found in the basic typology and in the analogical ones that have been found in the other contexts.

The new type is composed by three private units, used as small apartments for Portuguese residents or as rooms for airbnb tourists or for university students or as working offices, which have a direct access on the outside courtyard. The forth unit is dedicated to shared spaces for shared activities, as it is the whole outside courtyard. Thus, the fourth unit is thought as a room for more public activities, which can be joined also by external people, such as study room for students residences, areas for travel planning for tourists and finally shared laundry or hall for residents. This follows the idea of a mixture of functions, in a combination of living and working.

The working units act as co-working spaces and they play the role of making the area alive also during the day, in order not to risk to create a dormitory neighbourhood. Working and studying activities might moreover get in touch and generate some mixed use buildings, open to the public in certain occasions.

The social nature of *ilhas*, which are still lived as they were at their origin, so with a prevalence of use of the outdoor shared spaces and of the street, is still permanent in the new type. The contact between the courtyard and the street is very tangible, allowing a kind of life which shows a local and a neighbourhood style, that does not want to hide from the street, but always show and invite, in this case differentiating from the traditional typology of the Portuguese *ilhas*.

The variation of the traditional type allows an increase in the contact with the street, through the rotation of the units and courtyard from perpendicular to parallel with respect to the street; the nature of the correlation type-street is modified, from more intimate to public, which is the index of the changing process from totally residential to the semi-public of the new typology.

The corridor is not a corridor anymore, as it becomes a real and effective courtyard for outside activities, but still covering the role of distribution from the entrance on the street to all the units.

In the following part of the work, the three variation in the use of the *ilhas* for co-working space, co-studying and co-housing, will be deeper analysed.
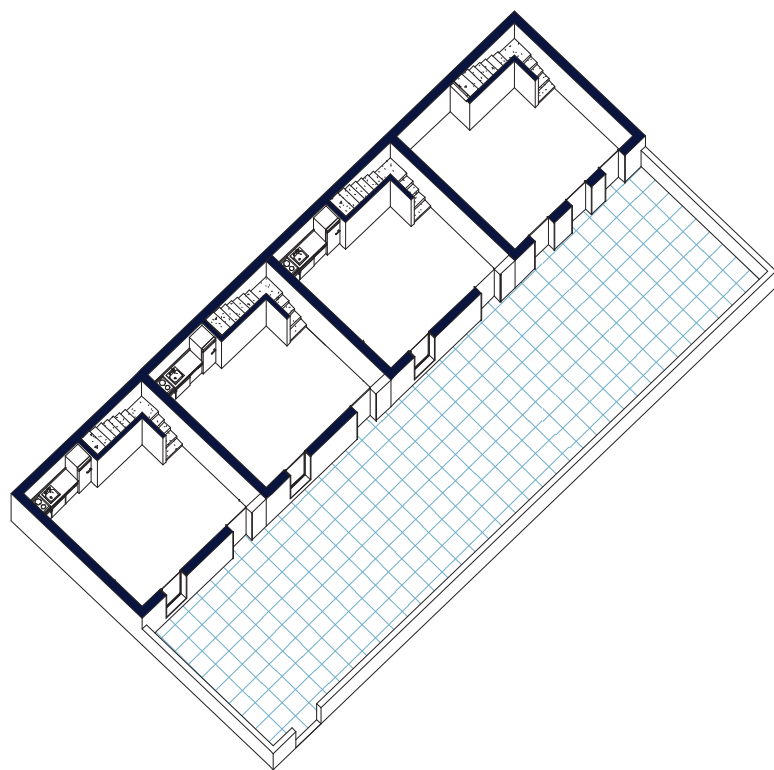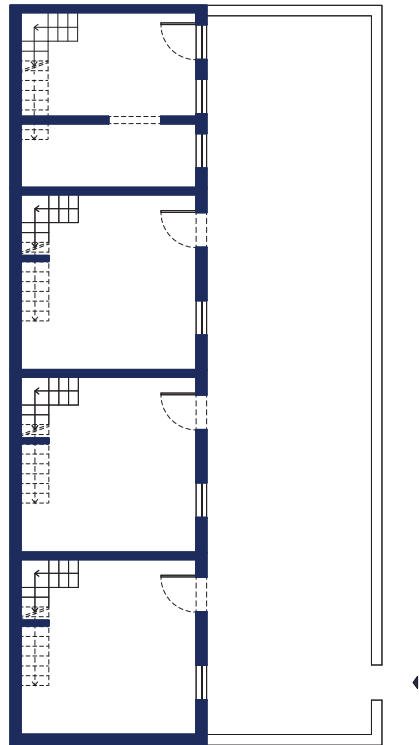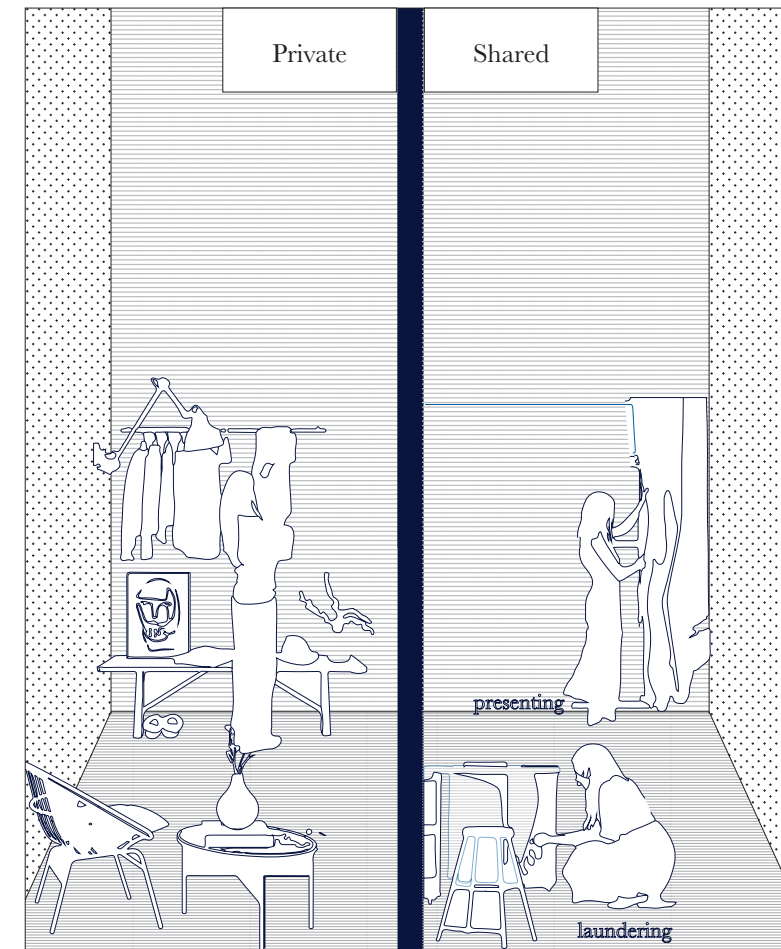
Ground floor
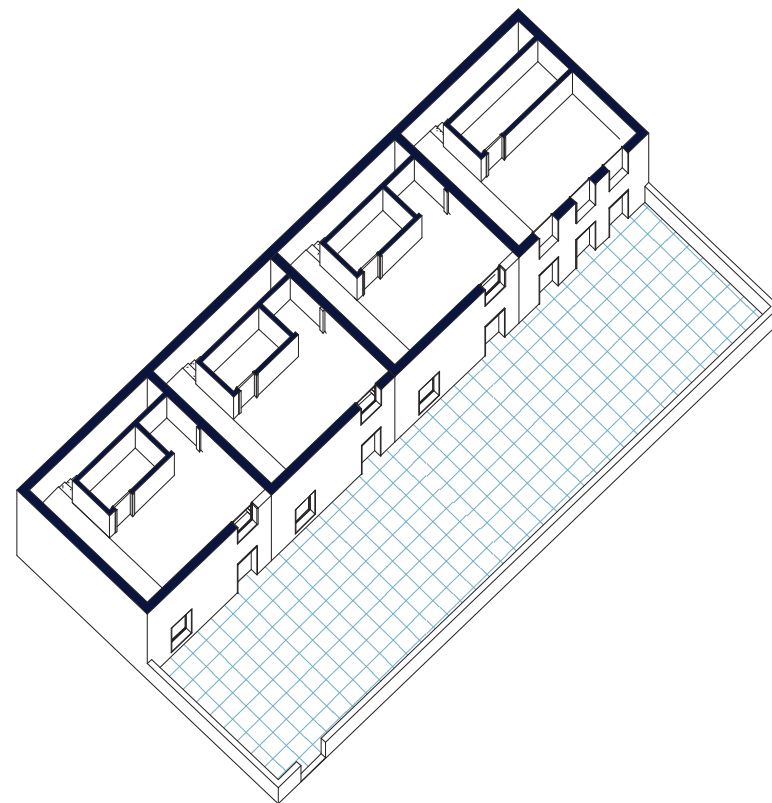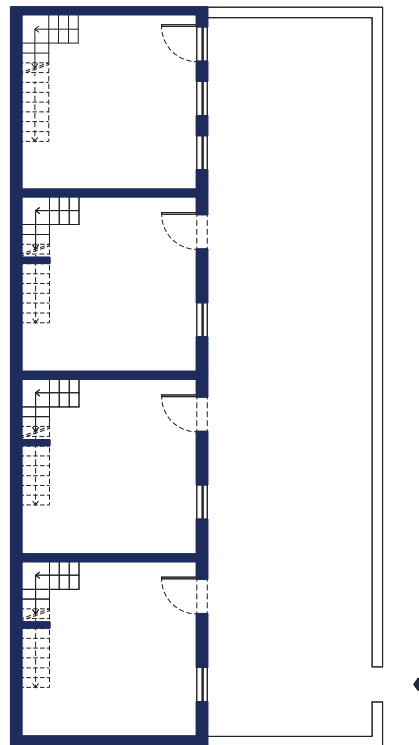
First floor

A | Co Housing

Type

0 1 2 3 4 5

Residents can live their intimate dimension in their private unit and share the dailylife in the shared one, that is in fact dedicated to common activities
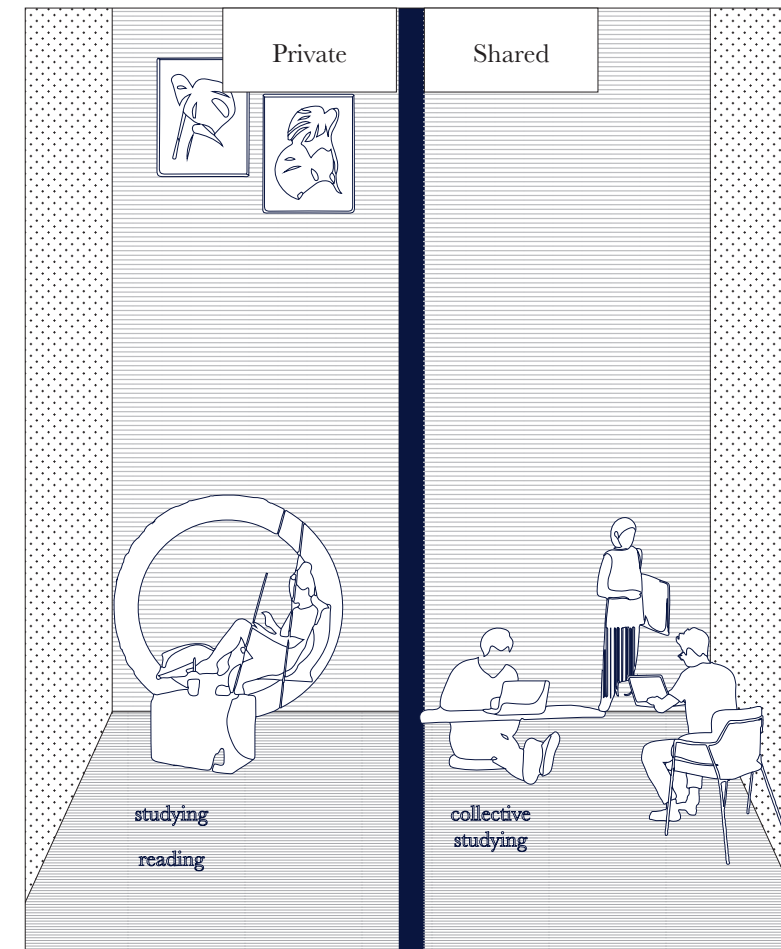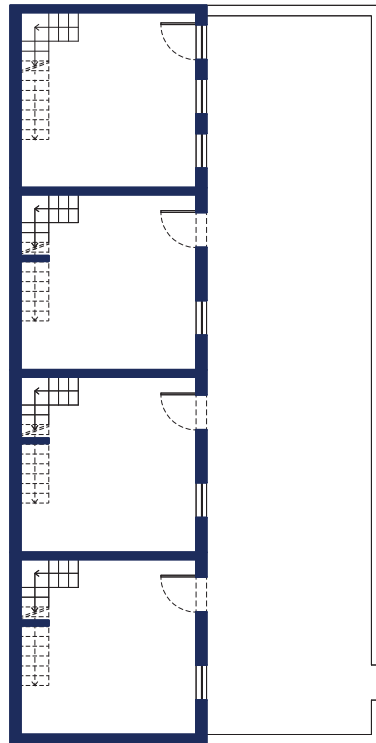

Private   Shared

presenting

laundering

B | Co Studying

Type

0 1 2 3 4 5

Students can live their intimate dimension in their private unit and share the dailylife in the shared one, that is in fact dedicated to common activities


Private   Shared

studying

reading

collective studying

C | Co Working

Type

0 1 2 3 4 5

Workers can live their intimate dimension in their private unit and share the dailylife in the shared one, that is in fact dedicated to common activities

Private   Shared

working

collective working

collaborating
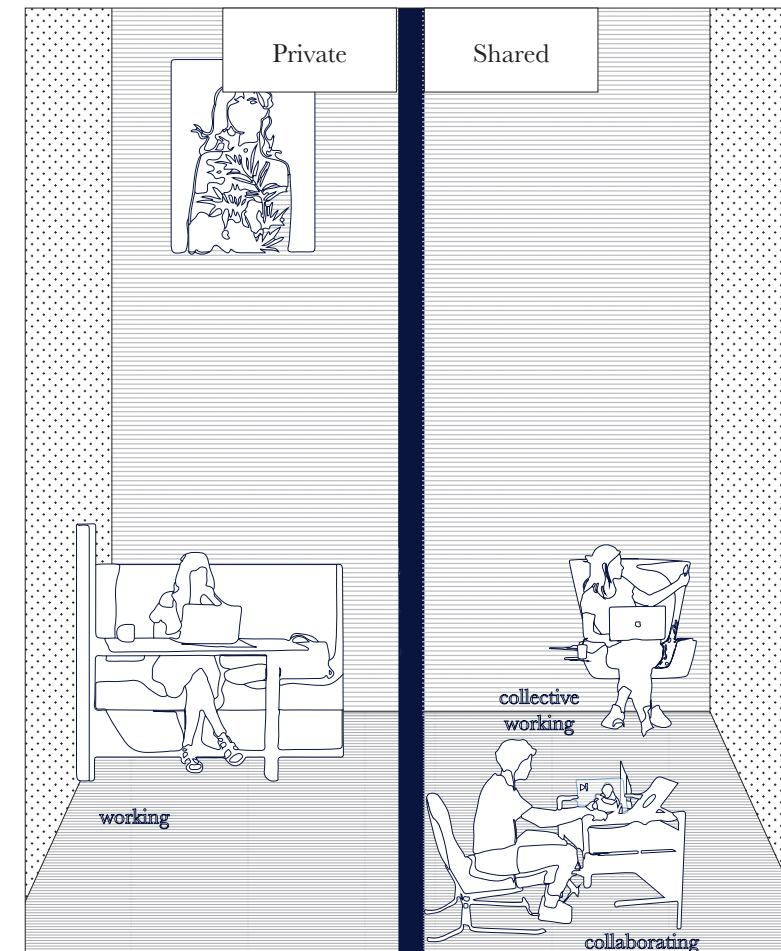
2.2.2

A new typological alphabet

Dynamics in typological approach

In order to generate the new urban fabric, an abacus of residential types was created, working as an alphabet from which to draw. The basis type is regulated by the same principal laws generating the studied typology of the *ilhas*, preserving the small private units and the bording shared corridor, originally thought as just a connective space, joining the units, but consequently acquired the function of external courtyard. The creation of the morphological rules of the basis type then flows into the dynamics of the type composition approach. The scheme is shaping up to be the starting point for the aggregation of forms, based on the already seen morphological urban recurrences.

The type changes in its relationship with the street, in its inside-outside spaces disposition and in its interaction with the ground, generating various ways to live the spaces and to pass from one to another place. Inside of this process it has been found again the repetition of the recurrent basic general elements, that are varied according to the relationship with the ground, that are thus expressed through the section, that arises as a different kind of approach to the type study.
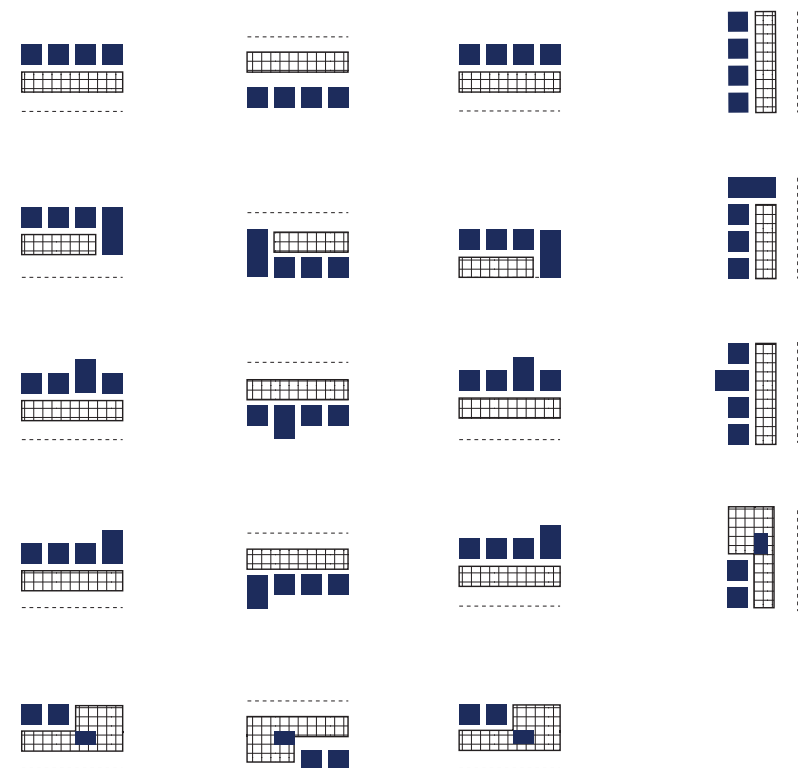
2.2.3

The typology for the regeneration project

Dynamics in typological approach

The original *ilhas* are still inhabited by really loyal residents, meaning that the answer, differently from how the municipality already tried to find solutions in the past, should be the regeneration of these very decayed buildings, in order to allow residents to still live there but enjoying better conditions, instead of relocate the dwellers outside of the area and not regenerate the ruins.

In the following pages, an example of *ilhas* which is present in the design area and was analysed in the case studies research is drawn and a solution of regeneration is proposed, through the addition of the topographical devices to ease the structural maintenance.

This process, as parallel to the main urban design work, shows how a design methodology, if based on general rules and methods, may be applied to different situations presenting the same beginning matter; through this concept we come across again the idea of recursion as the simplification of the complex object for the implementation of its basilar and intrinsic idea.

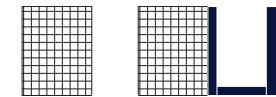The first operation on the existing *ilhas* is the insertion of the re-
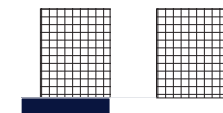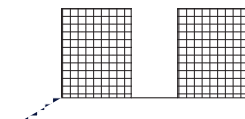
The existing type
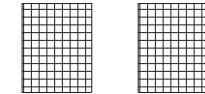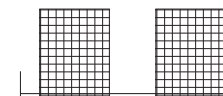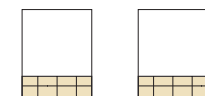
+ Retaining wall
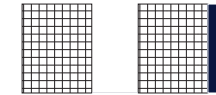
+ Ditch

+ Platform

+ Stairway

External spaces

Facade regeneration

taining walls, for the reinforcement of the present structure, which is in fact one of the element that is going to be later better explained, as a mean to answer to the topographical gain. In the cases in which a retaining wall is already there, the method to be followed should be the insertion of a reinforcement grid in order to improve its structural answer.

Where the building follows a terrace kind of grounding on the soil, a concrete and stone platform may be inserted, as well as new stairs and a ditch. All these elements work exactly in the same way they do in the new types, meaning as additional elements for the insertion and contact between the architectural object and the soil. In addition to contributing to a structural reinforcement, the inserted elements generate new ways to live the spaces, as new terraces, external areas, enlarging the actual existing space, which really corresponds to the minimum for the habitability of the dwellings. In fact, the existing problem in the built *ilhas* is the presence of too small spaces, which are actually derived and adapted spaces, not designed and thought for the real activities dwellers use them for.

In addition to the design of spaces, through the improvement and enlargement of them, the facade becomes the further element to be treated.

In fact, the existing stone part is preserved in the lowest part of the walls, becoming as a basement and following the same formal rule of the devices, transmitting the idea of structural element, while the upper part of the façades is plastered in white, conveying a spirit of news.

The windows and doors' frames are made more contemporary and coloured, inviting people to enter.

This process binds to the already followed one in many old buildings of the city, which have been included in a project of regeneration for the creation of new contemporary tourists residences, in a continuity procedure for the maintenance of tradition.
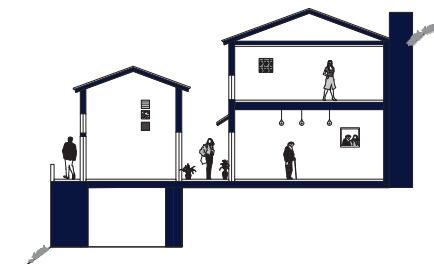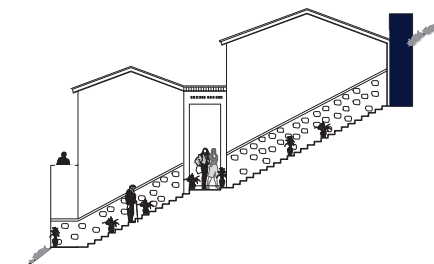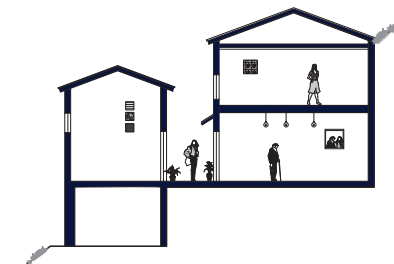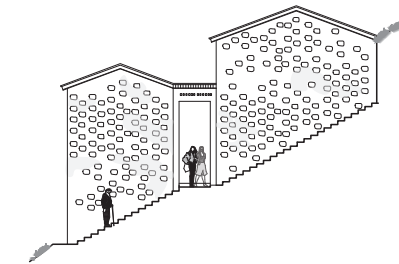
2.3

Zooming out on building typology

The way in which the type was considered, as a simplified figure regulated by geometrical, meant as morphological, laws, which are a recursive aspect in the urban fabric of a city, is better explained in the following texts. Indeed, the used methodology is collocated inside of a wider argument focused on the continuity aspects of tradition of the typological study, using the understanding of the precedent typological research methodology as a basis background. The analysis of existing case studies flows into a theoretical production of rules regulating the form, which, since they are general, they can be applied to several situations, as the point of depart of a later variation. The residential type is moreover considered in the Portuguese panorama, which saw it over studied, especially in a social and participative dimension, which saw the population as the main character of the story to be written. The general concept of type and how it was conceived in the years and the consideration of the type in relation to the site contributed to the construction of the design process.
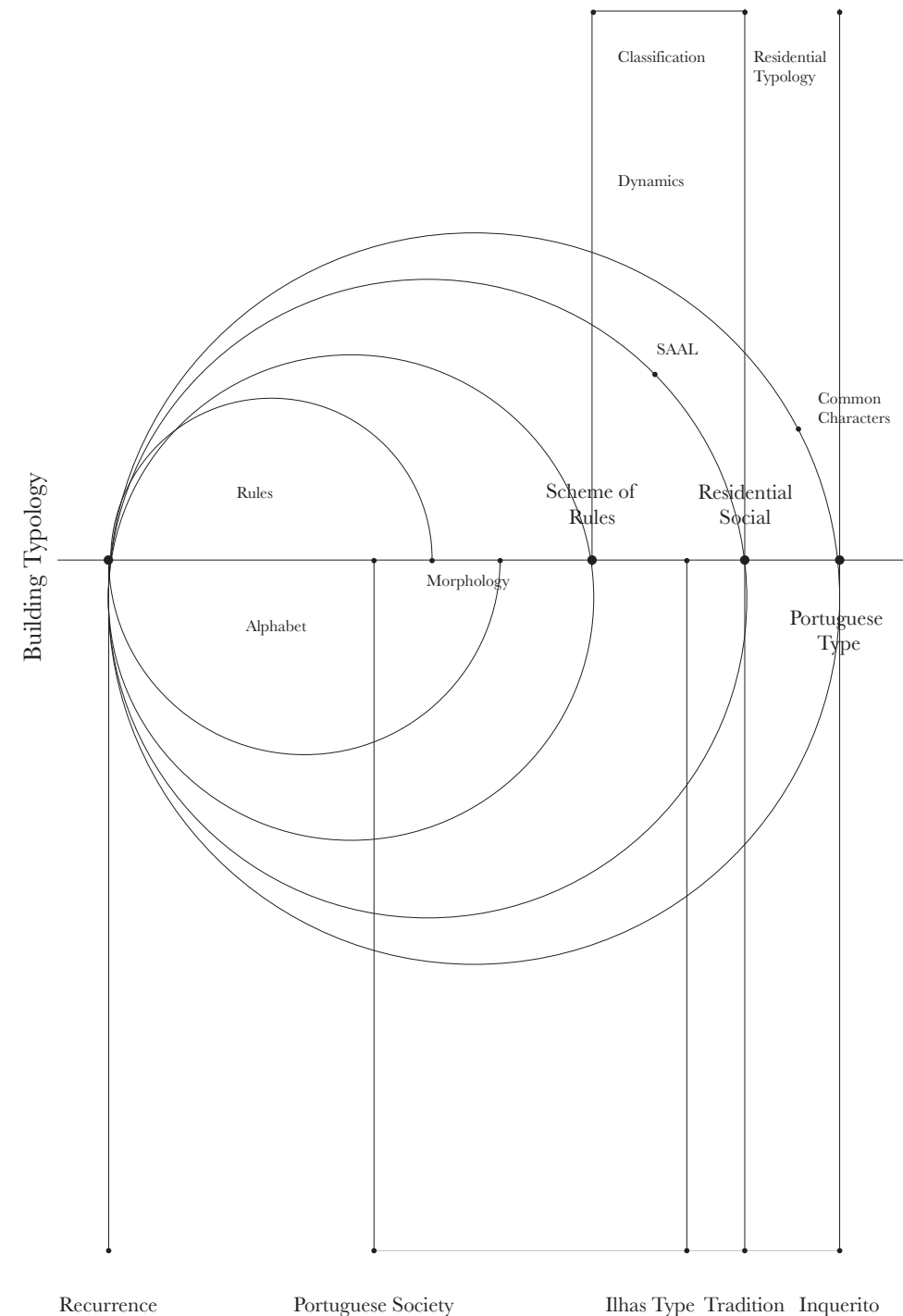
2.3.1

The type as a scheme of rules

"The notion of type underlies all logical inferences that help one to classify the phenomena, to put them in groups based on their similarities, as well as to make distinctions between them. This act of classification enables multiplicity to turn into unity, which at the same time generates reasoning and knowledge".[1]

As analysed by Rafael Moneo on "Oppositions", different theories about the use of the type in architecture were developed.

Quatremère de Quincy in the XVIII Century, influenced by the period of the Enlightenment and the edition of the first encyclopedias written with the aim of classifying rational information[2], created the first formulation of the idea of type, as an element which explained the reasons of architecture and related with needs and nature.

As time and architecture has progressed, according to modernists, the type was just a restriction, meaning immobility and hindering the complete freedom that the author can express in his work.

On the other hand, since it grew and developed in the world of industrialization and mass production, the modern movement develops the type as a prototype, as a unit which should be reproduced exactly as it is in a factory production process methodology; encased inside of this idea, the logic which was considered as only abstract becomes real in architecture, it is realized.[3]

The analysis of the types of a city and the ways they relate between each other is a method to understand the city itself, and not only its physical form. According to Saverio Muratori, who developed the typo-morphological approach in Italy in the 60s, the city was a formal structure understandable through its continuous historical development and the type was the element that was used in order to understand the structure of the city and its transitional patterns of growth.

Understanding a type also means to understand the rules on which the design process of that time is based, thus it involves also its social, political and economic background, because the logic of the form is strictly connected with reason and use.

Inside of this same logic of thought, in the following chapter, I will focus on the study of the *ilhas*, even through the understanding of their history and setting of birth, before concentrating on the analysis of the form.

The type is described also in its differentiation from the model; while the former expresses the features in their character of permanence in connection with the past, the latter is a mechanical reproduction of an object.

The common understanding of type refers to an object or artefact that belongs to a class or group that brings together others with similar attributes.

[1,2] Güney, Y. D. (2007). *Type and typology in architectural discourse*, in "Baü Fbe Dergisi", 2007, p. 3-18

[3] Moneo, R., *On typology* on "Oppositions", 1978

The fact of belonging to a type leads to the possibility of being classified, of recognizing some formal general recurrent aspects.

The formal structure of the type might take different meaning, as being like a total reduction of the form to a more simple abstract geometry, with the risk of obtaining a mere question of mathematics, connecting more with reality, concerning also social activity and building construction, or like a belonging to a period in history.

Each architecture can be described through its formal features, which can be geometrically, graphically studied and, after the overlapping of many archetypes, can be summarized with some main characters.

These distinctive characters of a type may be described in a very synthetic and graphical way showing its formal structure.

The design process can use the type acting on it, destroying it, transforming it and finally respecting it; in fact, types are not just a way to describe the existing architecture of a city, indeed they can be the way to produce new architecture.

Differently from what the common thought could lead to, the type is the way for the author to express his freedom, it is the instrument used to invent something unprecedented; the fact of having strict rules to follow and some substantial elements in the formal structure implies the idea of transformation.

The type means an awareness of authentic facts, which include an acknowledgment of the option of change.

The richness of the type lays in its possibility to be transformed and changed, contaminated and altered.

The operations which can be applied on a type are infinite and they are not fixed, even if they can be classified too.

The architect might choose to extrapolate the typology, change its use, play on its formal laws starting from a reading of the new background hosting it.

Different existing types in a city are exactly like the letters in the alphabet, which acquire a different significance according to the different composition in a sentence and according to the changes in society, namely to the topic of the talk.

Like in the alphabet, the type allows the creation of a code from a various catalogue, a combination of different joined elements.

A reference of this metaphor may be the etymology of the word "type".

The primitive source of the word laid in the Greek verb "typto", meaning "to beat, to hit, to mark"; the second acquired sense is the one of the Greek word "typos", standing for relief, engraving, and seal.

With the development of printing in Europe, the meaning of the word embraces the characters of the alphabet imprinted on a block used for impression.

The term "typology" came after the one of "type", intended as the relative study and categorization of organizational and structural features into types. This activity is a very precise logical-mathematical and scientific discipline, which meets social and cultural sciences.

Classification is the practical action allowing this kind of reasoning, a necessary activity for human thinking helpful to understand and clarify the similarities and differences between several and distinct phenomena.[4]

The notion of type also met certain critics, above all when it dangerously went close to the concept of stereotype, to the perception of a rigid type repeated and reproduced in an irrespective way towards the background, without showing particular attributes.

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[4] Güney, Y. D. (2007). *Type and typology in architectural discourse*, in "Baü Fbe Dergisi", 2007, p. 3-18

Type is the idea embodied by an element, it has got a symbolic significance, it can be made schematic, classified, it can be the basis for infinite different new designs.

Model is one specific object, which can be reproduced exactly as it is; it is described by some specific unique elements. Using the type as a starting point for the design process means to analyse its different applications in order to extrapolate its fundamental laws, which generate and rule its shape. These laws are brought into play and updated to the new context, to the new social and economic background, taking the form of a new type, still based on the historic one. The laws are the permanent aspect, but they do not avoid the transformation, they actually make it possible.

The type acquires a rich meaning once it is carefully investigated in this transformation through years and one it is viewed in the connection with the whole, which is the city with its morphology. In fact, the study of types and its cataloguing might be considered as one branch of the research on urban morphology of a urban settlement. The dynamic factor in the types classification is the one allowing the variation inside a settlement. Studying urban fabrics, it is possible to study the strict rules constituting them, given by various parameters, which practically generate the shapes, the patterns, the sequence of topics.

The apparently informal and spontaneous settlements are open systems, not perfect network, they are of course different from the "foundation towns", which look very rational, made of geometric schemes, but this does not mean that they are informal.

The seeming disorder of the spontaneous settlement consists in fact of connections, semantic relations between opposite points, the spaces are articulated by the so called by the scholar Marco Romano in his books "temi collettivi" (en: collective topics).[5]

These characters of informal settlements suggest the presence of rules generating relationships between spaces.

Each culture is characterized by specific design themes producing a different output in the creation of patterns.

The African fractals for example demonstrate how even behind unconscious accidental patterns lie intentional mathematical components. A set of well defined practices allow the sequence of the modules, by providing strict laws, like recursion, scaling, self similarity, infinity, fractal dimension. [6]

The analysed principles in the field of African settlements is actually applicable to every analysed settlement, which hides behind its apparent informal shapes, very regular mathematical formulas discovered in space and logics, meeting the local human invention, permitting singularity features in each single place where they are applied. The reading of a settlements includes, indeed, the analysis of the topics and of the relationships generating rules which lie behind the shapes and the patterns we can see. The settlement pattern is not, of course, static nor fixed and stable, on the contrary it is characterized by a dynamics in time and a continuous organic and complex evolution; this means that also the rules which generate it are constantly evolving as the society and its features are. Indeed, as the Italian scholar Marco Romano states in his books, it would be possible to build the city as an unlimited carpet, in the idea of a possible infinite ideal expansion, as an harmonic sequence of figures.[7]

Studying the governmental laws of the existing form, the architect

[5] Romano, M., *L'estetica della città europea - Forme e immagini*, Torino, Einaudi, 1993

[6] Eglah, R., *African Fractals - modern computing and indigenous design*, Rutgers University Press, 1999

[7] Romano, M., *L'estetica della città europea - Forme e immagini*. Torino, Einaudi, 1993

may create the new generative laws of the urban form.

This concept is increasingly consolidating in the idea of the contemporary city, generated by scientific data and connexions between them, working as codes in continuous mutation.

In this contemporary idea of the city, the generative codes create the basic background scenario, made dynamic by improvisation and people performances, in the already dealt system rules-freedom.

In every field, the presence of rules does not avoid the presence of a deep freedom, instead it makes it possible, otherwise, it could not be called freedom.

2.3.2

Residential social type

According to Marco Romano in "L'estetica della città europea", "the settlement materiality is the mirror of the associative intention": the physical space is in direct contact with the collectivity and its features. Romano bases the explication of this notion on the relationship between "civitas" and "urbs". Civitas as the community of citizens living the city, with their ambition to reach their right social position.

Urbs as the stones building the city, with their raw materiality. The collectivity builds types in which they can recognize, expressing their will to persist through the place they build and then live.

Still following Romano's way of thinking the European city, the relationship between urbs and civitas is the global expression of the domestic/individual encounter between family and house; so, the family is the unit/cell of the civitas and the house in the unit/cell of the urbs and the same features of the global liaison may be found in the domestic one.

The just realized reasoning brings me to call the building type as a "social type", justified by the relation between the material built object, with its unique morphology and formal characters, and the society building and dwelling it influencing its form.

Considered this way, the Portuguese residential type perfectly embodies this spirit of representing the social features of inhabitants through the morphological features of their place of life. Explor-

ing Siza's thought, it is visible how the main aim of the Portuguese architect is to put himself at the service of man and city, bringing as referential unit of measurement the human dimension: to Siza, the aim is to improve spaces, to improve life quality of people living them.

The specific example of the intervention by Siza on Sao Victor in Porto, which is exactly situated in the bordering area of Fontainhas area, is crucial for its involvement of the community, who is both the destination and the point of departure. Siza acting on Malagueira project in Evora is the additional confirmation of the city custom designed for the community, increased by the social aspect which the new housing project required. The phenomenon which encloses the strong social and collective aspect of Portuguese housing is represented by the promotion dated 1974-76 by the Local Ambulatory Support Service (SAAL - Serviço Ambulatório de Apoio Local) of the social activism of a group of architects to engage with the struggling working classes of Porto and Lisbon, offering revolutionary solutions to their poverty, with the support of the new temporary socialist government.

Precisely Siza writes, between his several thoughts on architecture, that it was unavoidable to have discussions about the project with inhabitants or future inhabitants in the context of his country after 1974, where struggle for housing was extremely strong and hard. [1]

Thanks to this way of thinking, Siza stands back from the Modern Movement, embracing the collective dimension of architecture and its sharing character. Thus, accepting this way of "making" architecture, the architect quits the desire to create a sculptural work, giving priority to the tradition and to the maintenance of the ordinary. The fact of the strict link of Siza's architectures to the traditional architecture of the region is actually related to the direct relationship he set up with the local population and their particular nature. [2]

The active engagement of the population in these housing projects entails a symbolic way to think of houses, coming near the democratic metamorphosis of the city and the architectural morphological transformation. The intervention was not limited to the construction of new housing solutions for the working classes, but focused on the survey of living conditions, supervising land use. The practical and tangible result of this situation are not the only outcomes, since it above all brought to the discovery of a new method to design architecture which was then extended to Europe, changing the role of the architect to a social and political level and trigging a series of new questions about his task which are still at the centre of the design theory debate.

Inside SAAL realizations we explicitly read the reflection of the family in the house on a domestic level and of the "civitas" in the "urbs" on a global level.

[1] Frampton, K., *Alvaro siza complete works*, Phaidon, 1999

[2] Leoni, G., *Alvaro Siza*, Milano, Motta Architettura, 2009

2.3.3

Portuguese tradition of type

The study and research on the residential Portuguese building typology met its most important step with the experimental research "Inquérito à Arquitectura Regional Portuguesa", which built a great relevant work of analysis of the architectural rural residential heritage, also involving a social and cultural reading of the historical growing backgrounds, with the aim of constituting a series of written volumes that could be useful for the design practice in Portuguese sites.

Starting from the theories of Keil do Amaral, the purpose of the collective work carried out by the main Portuguese architects of that time was to investigate the relationship between the social background of life and the inhabitant, focusing on the existing relationship between a way to get in touch with and answer to life situations, in an above all social field, and the realization of this epistemological idea in architecture.

The book and the involved research relates to the attachment of the Portuguese architecture to the tradition aspect in a productive manner and to the Portuguese historical architectural culture, emphasizing the importance of the popular architecture as a starting point for new constructions.

The goal comprehends the finding, the discovery of an authenticity in the Portuguese architecture panorama.

The work is organized through a division of the complete research

in six different geographical areas, assigned to different working teams, who had to adapt to some general defined rules, which was followed by the reunion of the complete final work in order to publish and disclose to be used as an instrument for designing. The final conclusion of the work expresses how each region is characterized by a traditional style and particular rural typology, changing depending on the different context and site features, thus it turned out quite impossible the definition of a common architectural style for the whole Portuguese country, which was instead the beginning topic to be demonstrated through this work. Furthermore, the Inquerito is a research about tradition, expressed through drawings and pictures of the popular residential typologies, to be used as a lesson for architects in the various fields of construction, morphology, tectonic, residential typology kind of construction, relation with the site, economics.

It shows how these residential buildings and their rules are well linked and connected to the place they are built in.

In the relation with my study, it is important to underline how precise it is the reading Portuguese architect carry on about the residential building and its local and popular aspect, which makes it so much characteristic and interesting to be studied.

The work of the "Inquérito" is a further confirmation of the social character that has already been analysed in the previous part, which is in a particular modality embodied by Portuguese architecture of every period (then materialized with the Escola do Porto of Tavora, Siza, Souto de Moura).

Moreover, it should be underlined how it comes out the specific characteristic of the Portuguese attitude of both the research field and the practical designing field based on a localized exercise strictly related to the site and on a social involvement of architects in the defence of architecture and of the city as a life place and as a citizens right.

This particular and charming spirit is actually still living in the

conception of architecture by the greatest part of Portuguese architects and inhabitants, who consider architecture and above all urban design as a social practice, placing dwellers at the heart of the topic, meant as the fireplace which stands as the stage where inhabitants life take place.

From the conclusions of this work, it emerges the importance and the relevance of the consideration of the traditional type as a starting point to be classified in a taxonomic manner, in order to evolve it in a dynamic process developing new architecture. [1]

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[1] Gomes, S., *O problema (e algunas solucões) das casas portuguesas. Modelli di organizzazione dello spazio dell'abitare sociale in Portogallo*, tesi di dottorato, Politecnico di Torino, 2018

3 | Topography

A variation rule generator

Topography

A variation rule generator

The area of Fontainhas is the manifestation of a difficult topography, characterized by the hard slopes, which are actually largely diffuse in the whole city. The carried out work analysed the theoretical relationship between architecture and ground. the way in which the architectural object interacts with the ground tells about the theoretical and conceptual meaning of that architecture. The topographical reading of the territory found the action of particular topographical devices as intermediaries between the artefact and nature as the site accommodating it.

In the design, the architectural objects get in touch with the ground through the intermediary action of four topographical devices: retaining walls, platforms, stairways, ditches.

3.1

Topographical reading

Portugal is a quite small country, lying on the west side on the Atlantic Ocean.
 Its geographical position is the direct correlation and cause of its extremely pending ground, the particular aspect which affects not only the natural and wilder part of the territory, but the cities too, allowing them the manifestation of a special and unique character.

Indeed, as already mentioned before, the division of the research in four different and distinct parts does not forbid a continuous interrelationship in between them.

As the one of all the Portuguese cities, Porto's territory is a very steep one, manifesting a level change of about thirty metres only in correspondence to the coast of the river Douro, then growing again until reaching about 150 altitude metres. This topographical trend greatly influences the street-flow, the building typologies characters and the morphology of the city, as we already analysed in the territorial field, through the generation of dense and steep urban fabric, narrow and derived streets and stairways to bridge

the elevation gain, small and unconnected public spaces, generated between different levels of the ground. The recursion is given by the continuity in the pending of the ground, because even if the sloping does not develop in a constant way, the architecture finds common ways to answer, that may be identified in different parts of the city as constant and recurrent elements.

The key of the reading of Porto's topography is the Douro river, which winds its path through profound depressions surrounded by precipitous escarpments either part.

In the northern part of the city territory, the topography grows creating high hills and thus the possibility to always overview the landscape, from them.

The presence of the hills always allows, from almost each point of the city, a top view on the below areas, thus enabling a wideband perspective.

The green areas are present in the city in the form of parks or private and public garden, while in the eastern part of the metropolitan city, moving towards the eastern side, a wilder vegetation, following the river, is shown. The vegetation, in the area of Fontainhas becomes the way to show the decay and abandonment of buildings, under whose demolished and fallen roof it is possible to view weeds and brushwoods as a symptom of forgiveness of the place by inhabitants.

These aspects provide to the city a bucolic and countryside character, a particular romantic feeling which links mainly the most degraded parts of the city, as Fontainhas, the ones which need a renovation through an approach in continuity with tradition. The considered area presents itself as one of the deepest of the city, because of the lean out on the river, so that the existing buildings and the paths lay on different levels; this aspect is preserved in the new project, too, becoming itself a way to vertically connect the topography, in the strict existing relation between buildings and streets.

Topographical reading - maximum elevation gains system
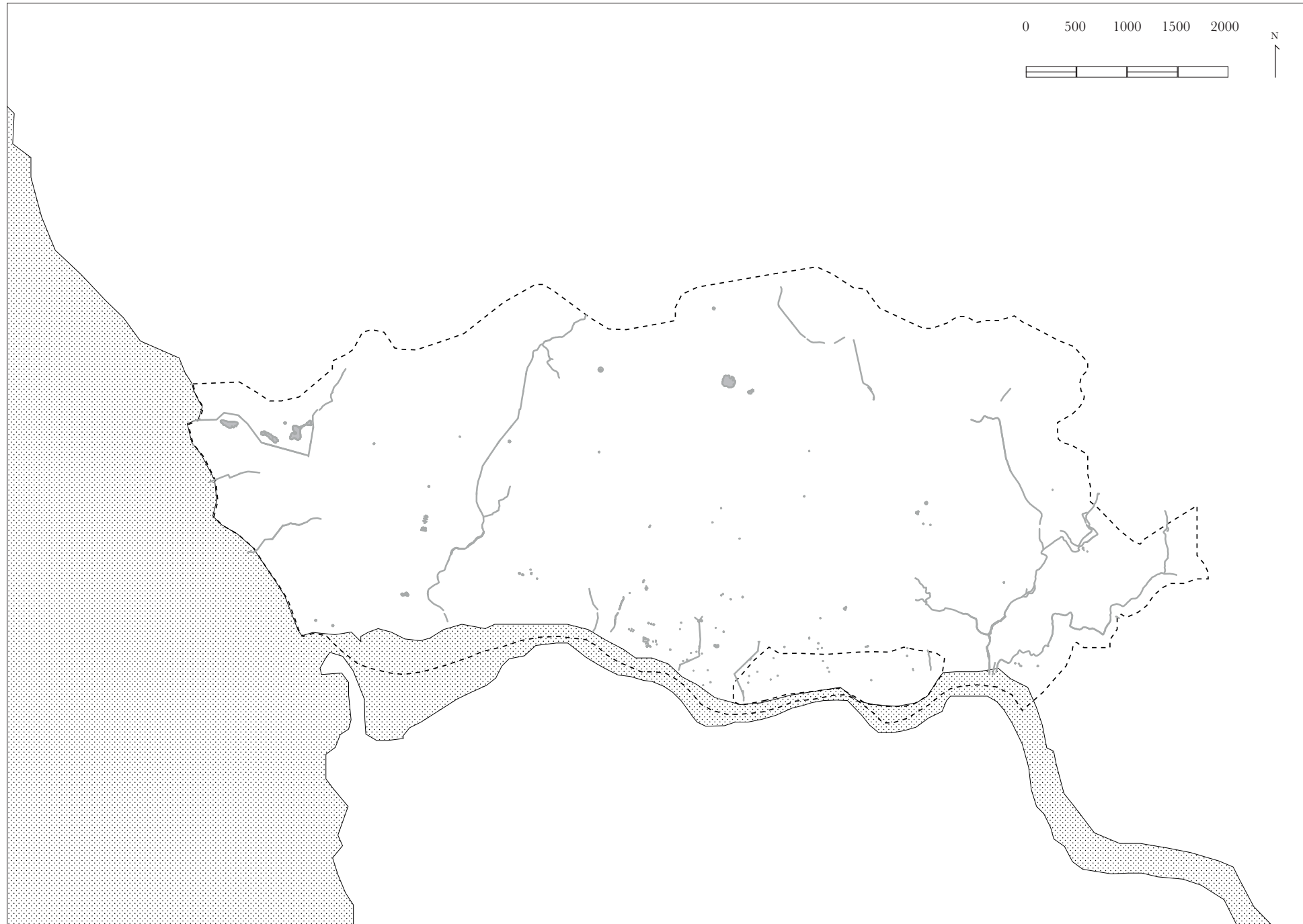
Topographical reading - water system
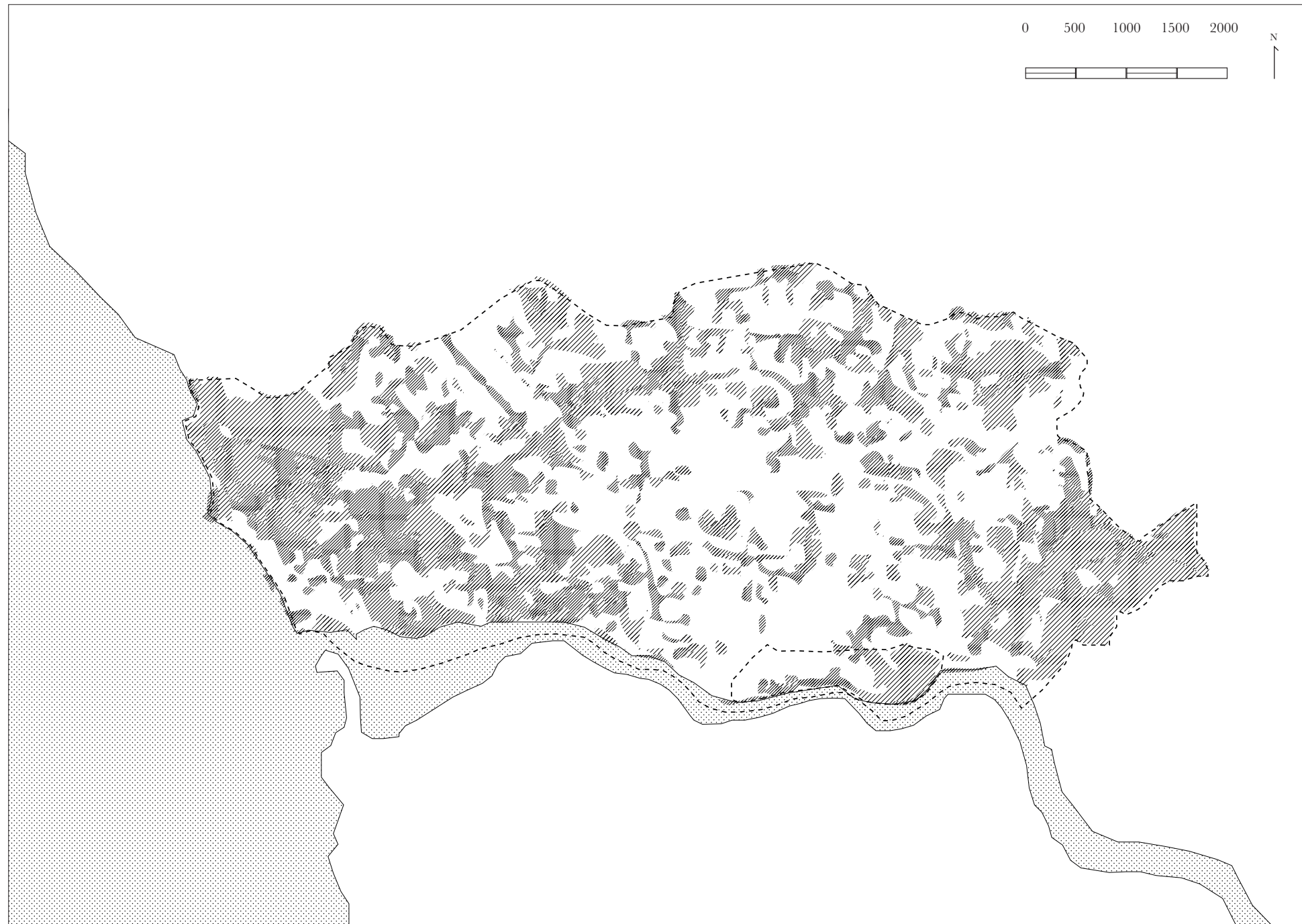
Topographical reading - vegetation system

3.1.1

# Porto answers to topography

Topographical reading

Portuguese landscape seen from a large scale view is governed by differences in altitude and hard slopes, providing a special and unique character to its cities, leading people exploring them to climb pending streets and walking up steep stairs. The altitude difference in Porto in all its glory is in correspondence of the Douro river. The consequence of this pending area of the city is a quite rural character both of buildings and streets, which become almost trails even hard to be walked. Buildings were constructed along the contour lines facing the river with the main façade and creating an atmosphere of overlooking facing landscape.

Through the observation and reading of the architectonic aspects, some elements have been identified as the means for architecture to answer to the topograohy: walls, platforms, stairs, ditches are characteristic elements of this panorama, coming from a, it could be said, structural and needing reason. Although the reason is structural, it is evident how these elements answering to topography unleash a series of social and activity situations.
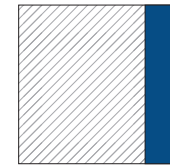
Wall
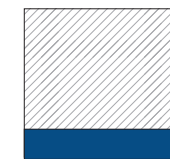
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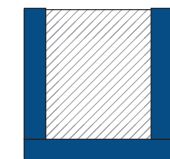
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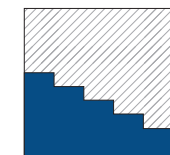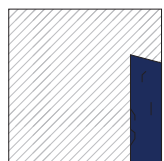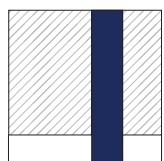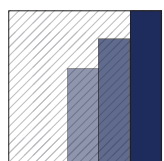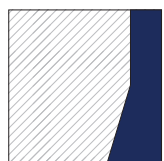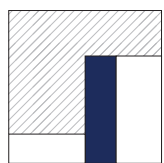
Stairway

Wall
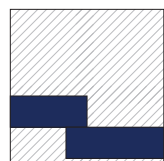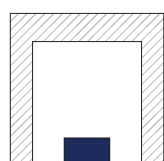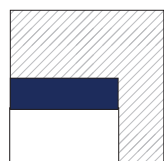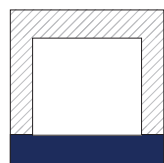
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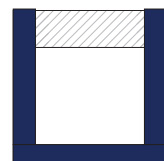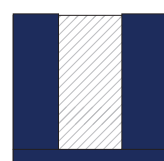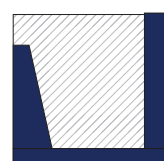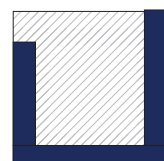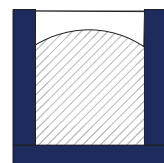
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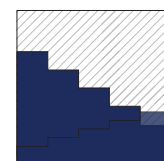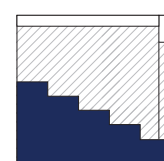
Stairway

3.2

Topographical fences as strength points

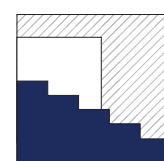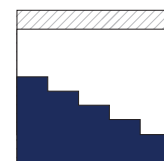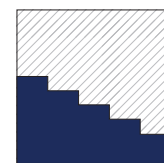Topography and landscape might be considered as two ways really linked for the expression of common meanings: they are both related to the aspects of the site. Topographical aspects describe a landscape, giving a scientific overview. The site to which Portuguese architects seem to be very attached to is expressed by its topography, by the way the ground, the rivers, lakes and so on change and get in touch the ones with the others.

As morphology, so topography should be studied from a possibility in transition perspective, through the highlighting of the changing and evolution aspects. The interesting and stimulating feature of topography is its changing in time. In this work, topographical features and difficulties become the starting points and strength features for the design, in the same way it has already been done with the traditional and typological field.
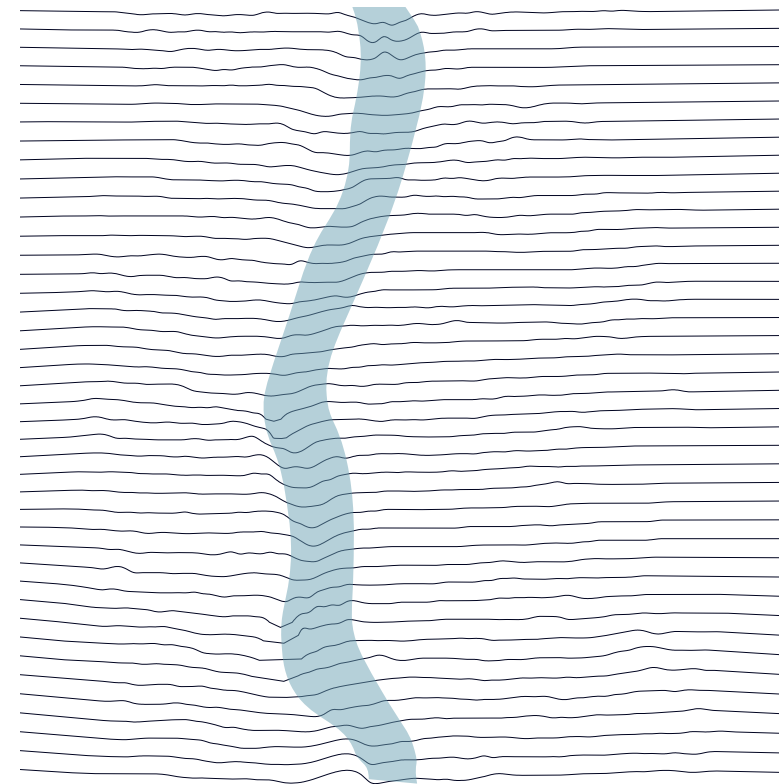
3.2.1

# Topographical devices to bridge the elevation

Topographical fences as strength points

Wall

The point of interaction between the architecture object and the ground manifests an important and meanwhile critical point in the design process. In fact, the way the architecture meets the soil reveals a concept, a theoretical idea of the way the artefact gets in touch with nature, that can be identified as a recurrence in the landscape of a certain city, manifesting a repetition in the approach to the insertion in the elevation gain. The design at this point inserts an object which arises as an intermediary, allowing the type to enter the ground in a light and reasoned way. The elements we just studied and surveyed as recurrent in the landscape of Porto are schematic and made simple objects, until becoming four basis devices.
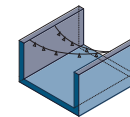
The typology clings to them, fixing themselves to the ground. Walls, platforms, ditches, stairways are both structural and social elements, so providing new liveable spaces.
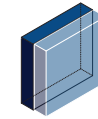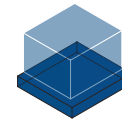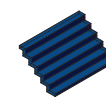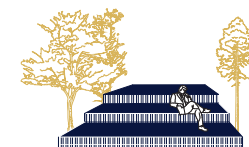

Platform

Ditch

Stairway
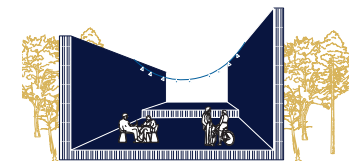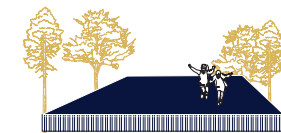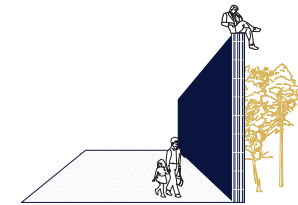
3.2.2

Topography for typological variation

Topographical fences as strength points

Reached this point of the work, we come across again with the typological abacus, expressing the variation of the building types, with the adding of a further element in the modification process.

The point of contact between architecture and the ground is extremely crucial, as a matter of fact, the ground gives its own contributes to the variation, because of the different kind of intersection with the type. Indeed, the degree of inclination of the soil influences also the position of streets, thus the orientation of entrances and the aggregation of the single units and their relationship with the courtyard and the street.

The presence of the just explained topographical devices is the mean allowing architecture interacting with the ground and change, getting in touch with the topography in different various modalities, first modifying in section and meanwhile and consequently in plan disposition.

The type still based on the same constant generic rules change, as it has already been seen in the analysis of the *ilhas* of Porto case
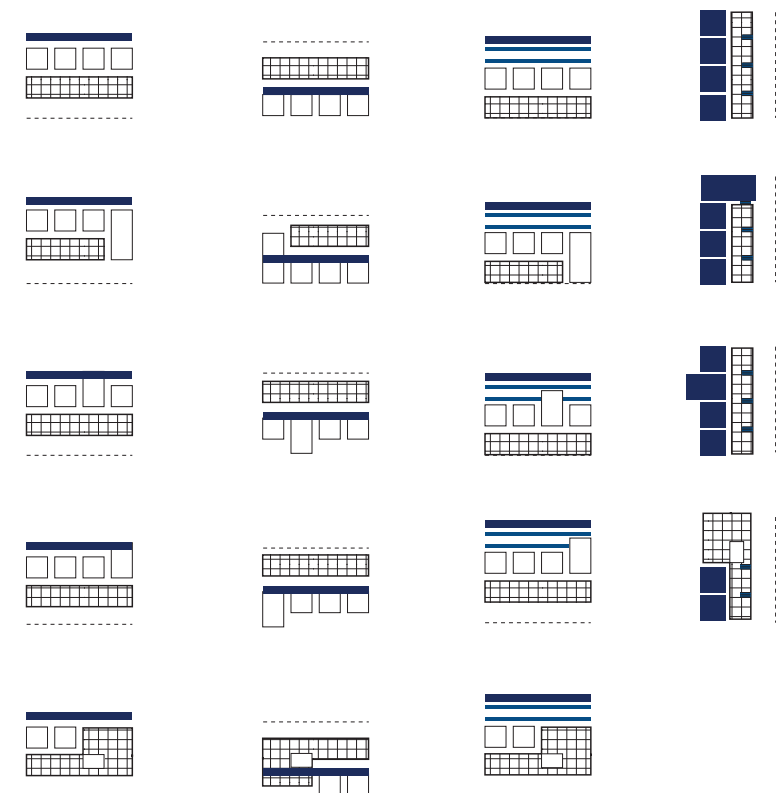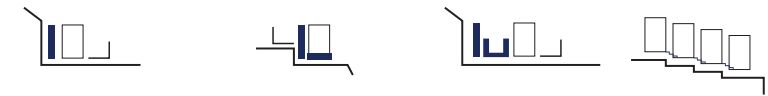
studies, according to the surrounding buildings it has to get in touch with, according to the different elevation gain it has to fill, according to the streets orientation and the needing for the accesses orientation, the necessity of space dimension and the kind of activity it has to host.

Thus, the elevation gain of the specific site hosting the new type is a variable which leads the type to adapt, to change in order to position itself on the ground or inside of the ground. The topographical matter and the architecture object enter inside of a shared experience, writing together the way to create the interrelationship.

Retaining walls, basements/platforms, ditches and stairways are set out as means, intermediaries to reach a typological change in the point of contact with the soil. They moreover become further objects of sociality, adding shared outside spaces or paths to the residential areas.

The beginning alphabet is changed through the introduction of the topographical devices as variation and dynamic devices.

In addition to the morphological division of types, it is added the syntactic division and variation, meant as the way used to enter the soil, to ground on the earth.

In fact, this variation is above all seen in the section of each type, which come out quite weird as approach in the study of building typologies.

In fact, building typologies in the study of urban morphology are mainly studied in plan, analysing their morphology of the ground floor, which allows to detect the access, the relationship with the street and with the context.

Since the key of the work is the reading of the relationship with ground, the section expresses the kind of insertion and the disposition of the rooms and the entrances on the soil.

The type changes according to its relationship with the ground, manifesting the same basic rules but varying in the aggregation of the single aspects and in the relationship between the units, the courtyard and the street.
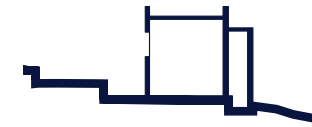
3.2.3

Dwelling the elevation gain

Topographical fences as strength points

The kind of approach to be adopted towards the ground in the moment of "colonization" by human beings needs to be respectful, allowing the new urban form insert and adapt inside of the natural framework.

At the same time, the action of the architect can avail of the soil and its malleability in order to create new activity of relation for the human who is going to inhabit and live those interesting spaces.

The imaginary drawn section on the page beside this one shows a big number of imaginary and conceptual manners to use level changes in section.

Actually, architecture on its own is the modelled material lived by us, but the ground, considered as an alive and dynamic, always changing matter, may become a modelled subject in the same way as architectural objects.

Relating to a steep ground might grow into the chance for the architect to generate new ways to let people live the soil. Letting architecture not only lean to the land, but interact with it and write together a new form, is the way to get a four-handed work
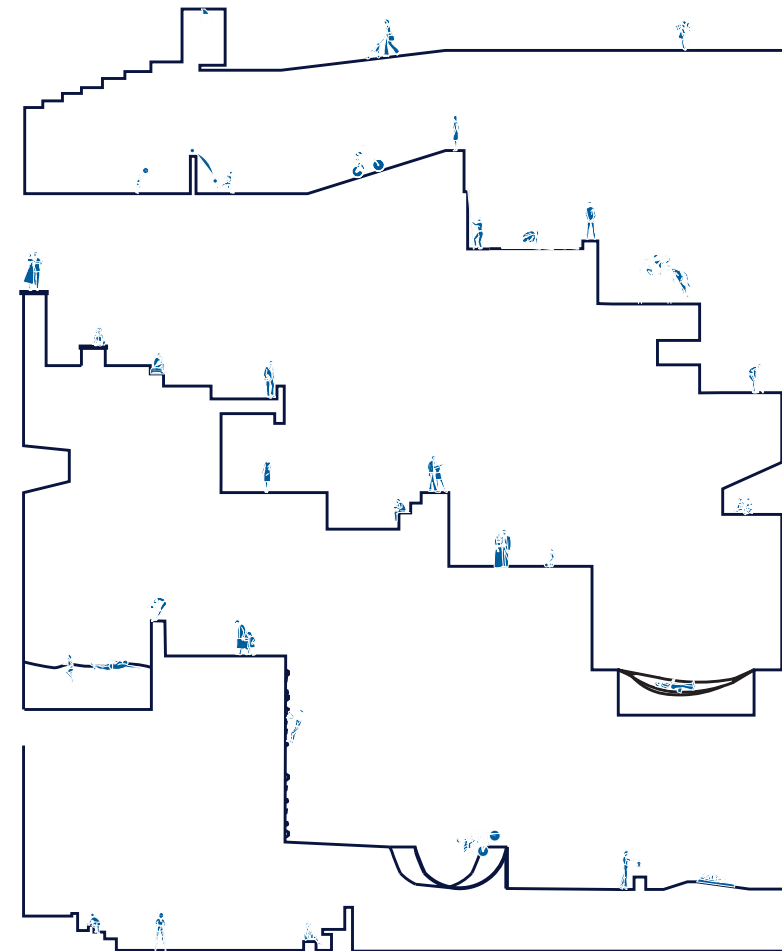
as outcome, in order to be both be the protagonists and not unresponsive inert.

The most pendent area of the design territory is marked by a fifty metres elevation gain, on the coast of the river, which contributes to the fragmentation of the strip of land, making almost impossible a connection between the two extreme levels, living two different lives.

The design includes three different level of flattening of the ground, in order to produce some longitudinal pedestrians paths, enough wide to be lived in many ways and not only crossed; they are not paved, but they remain covered with vegetation.

The traversal connections are developed as concrete stairways, linking up the separate longitudinal designed trails, the ones are wild paths, covered by grass and natural stones, sometimes becoming urban gardens to be cultivated by inhabitants.

The longitudinal paths allow a continuous opening to the Douro direction and a close attachment to the vertical soil, creating a panoramic and overlooking bucolic passage, and meanwhile an occasion to live the nature and its wild vegetation.

These paths become a further opportunity for the use of the topographical devices that were just before explained as a mean of introduction in the elevation gain, thus through the compression of the ground thanks to retaining walls and platforms and through the insertion of stairways for the connection of the different levels. The generated elements become social elements, therefore they are the means to create new spatiality to be lived in a different way.
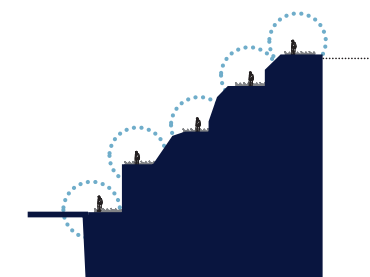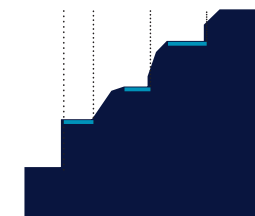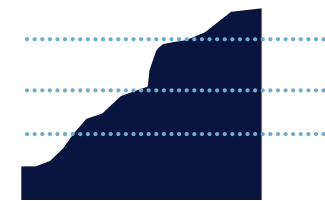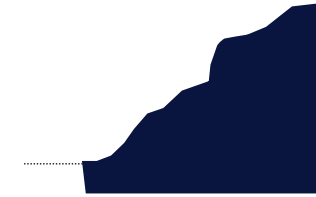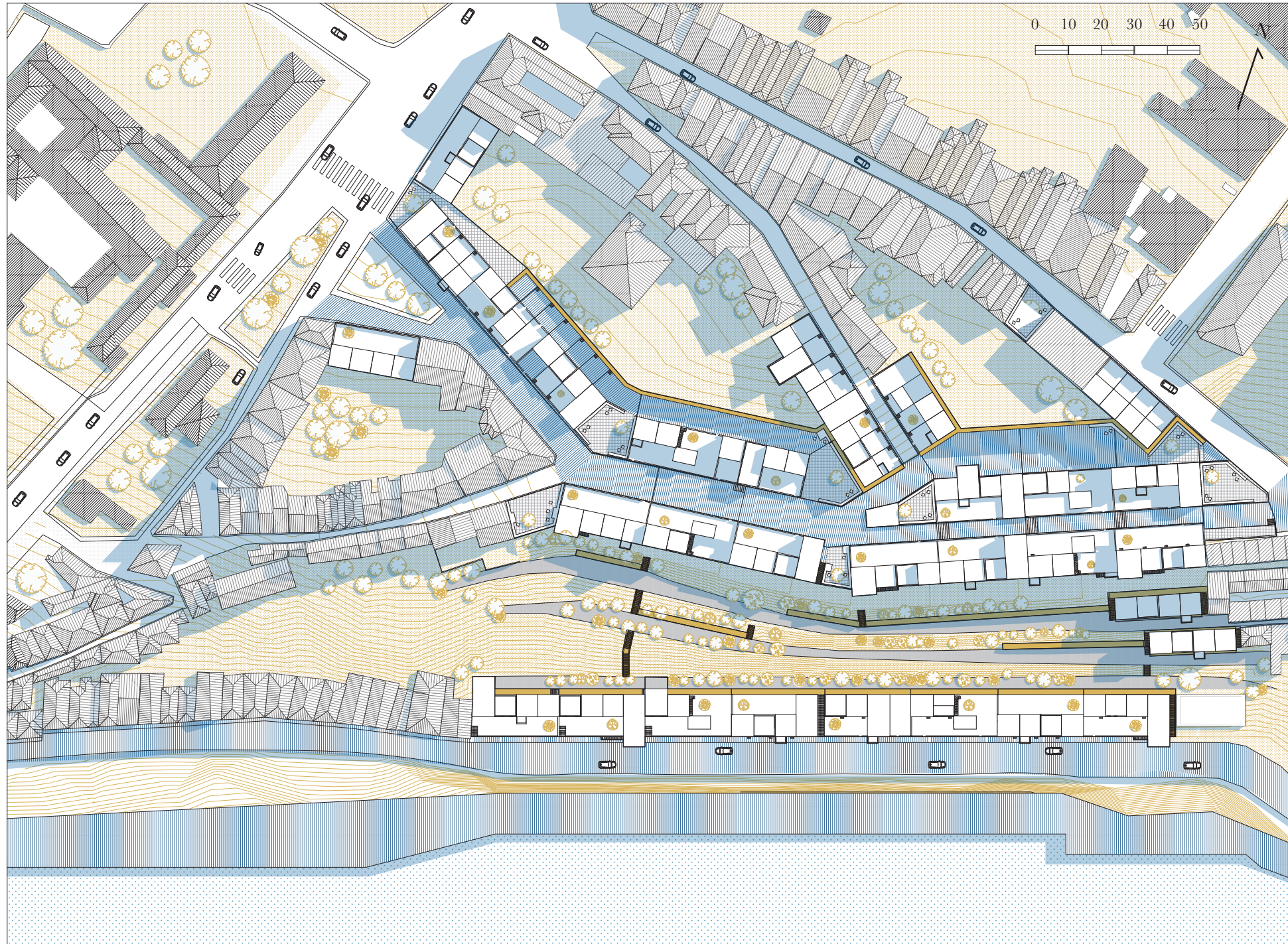
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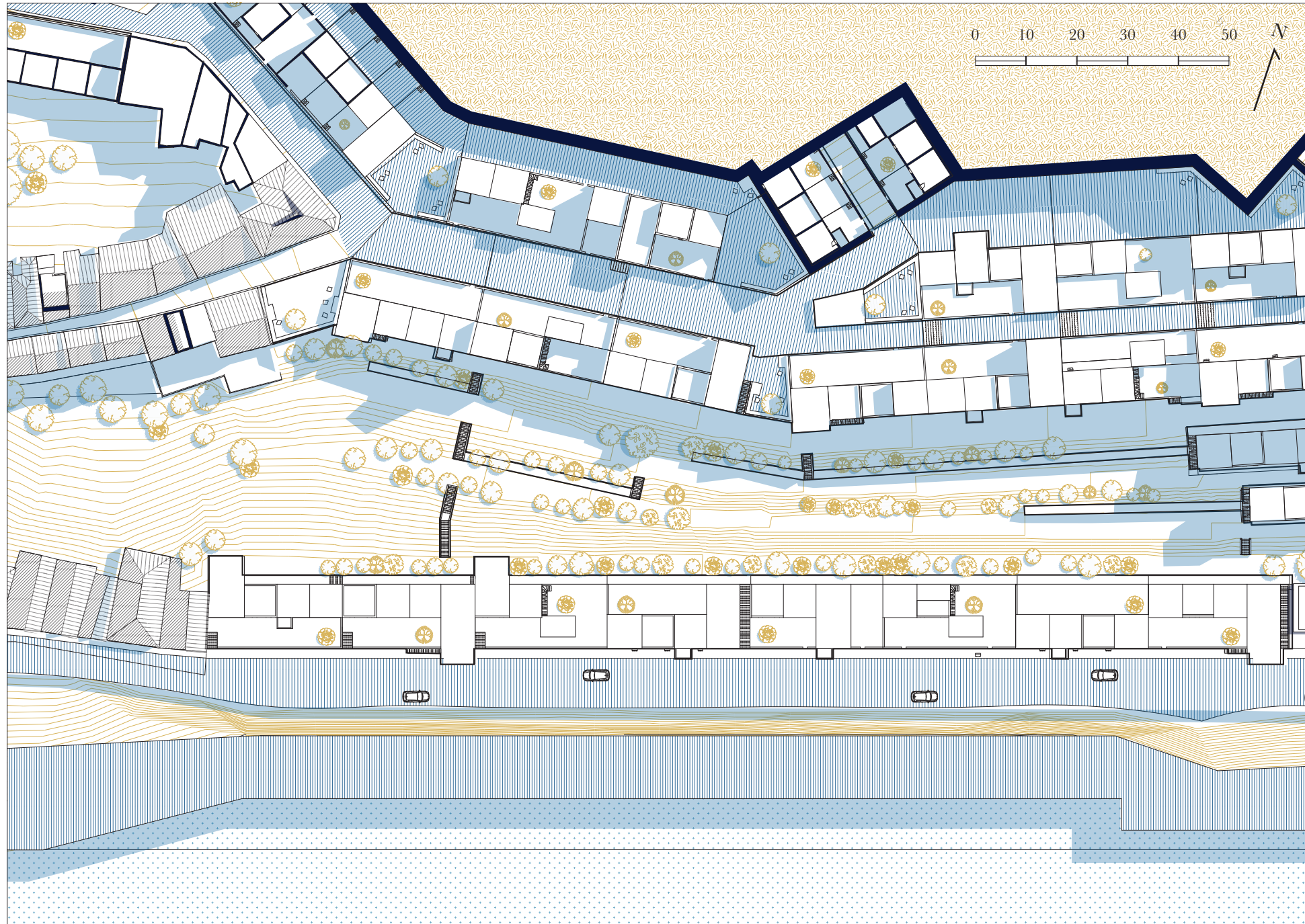
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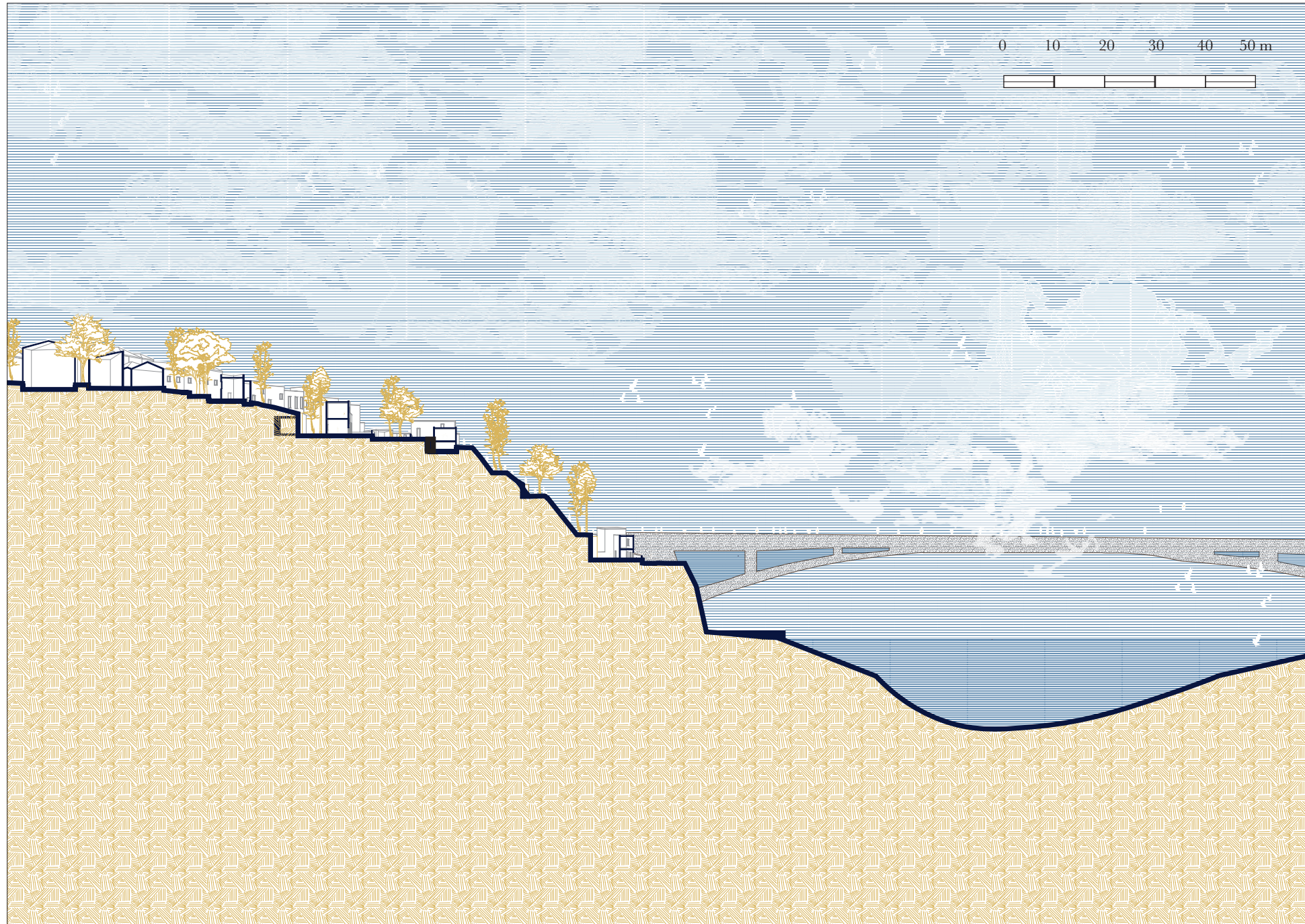
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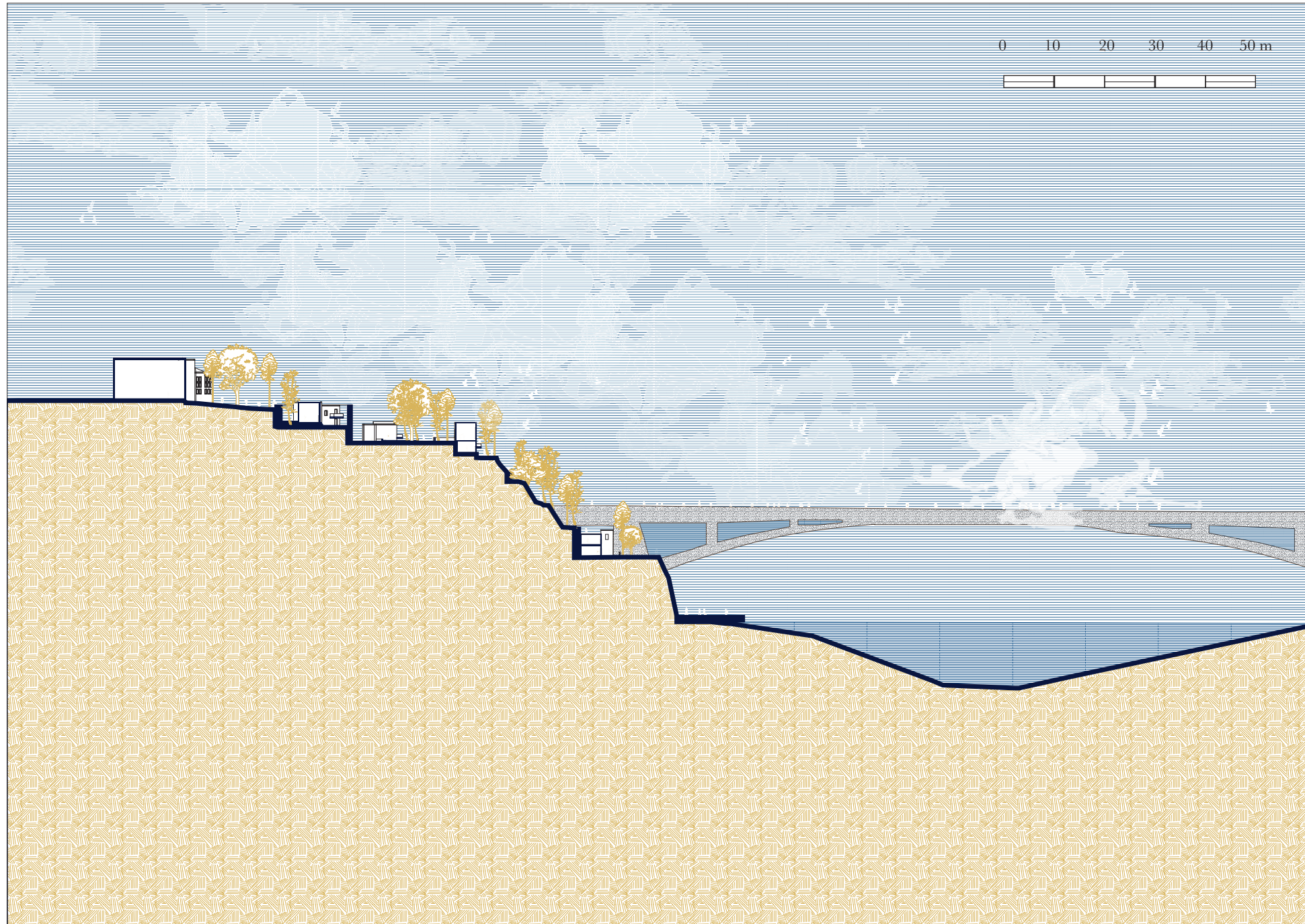
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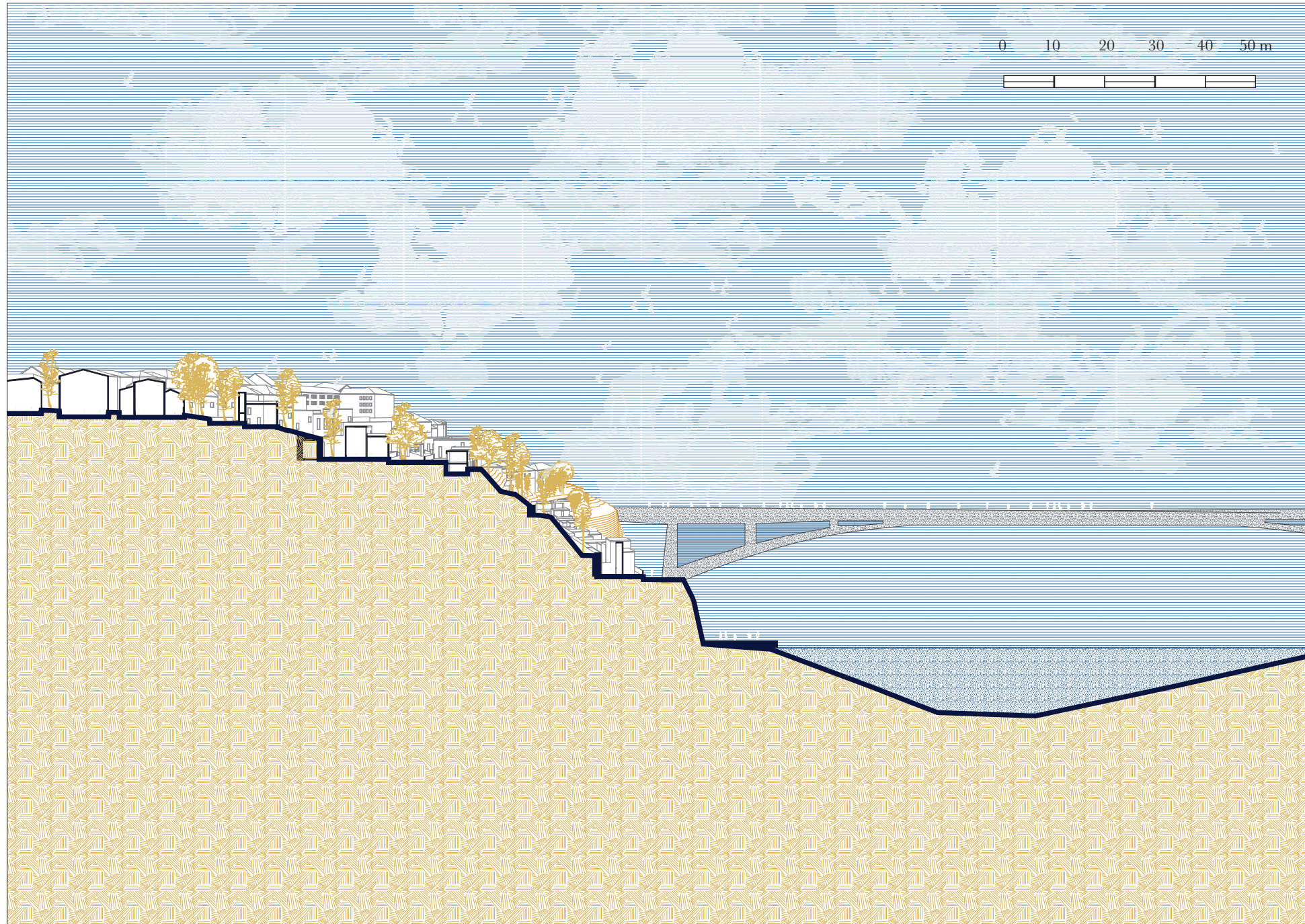
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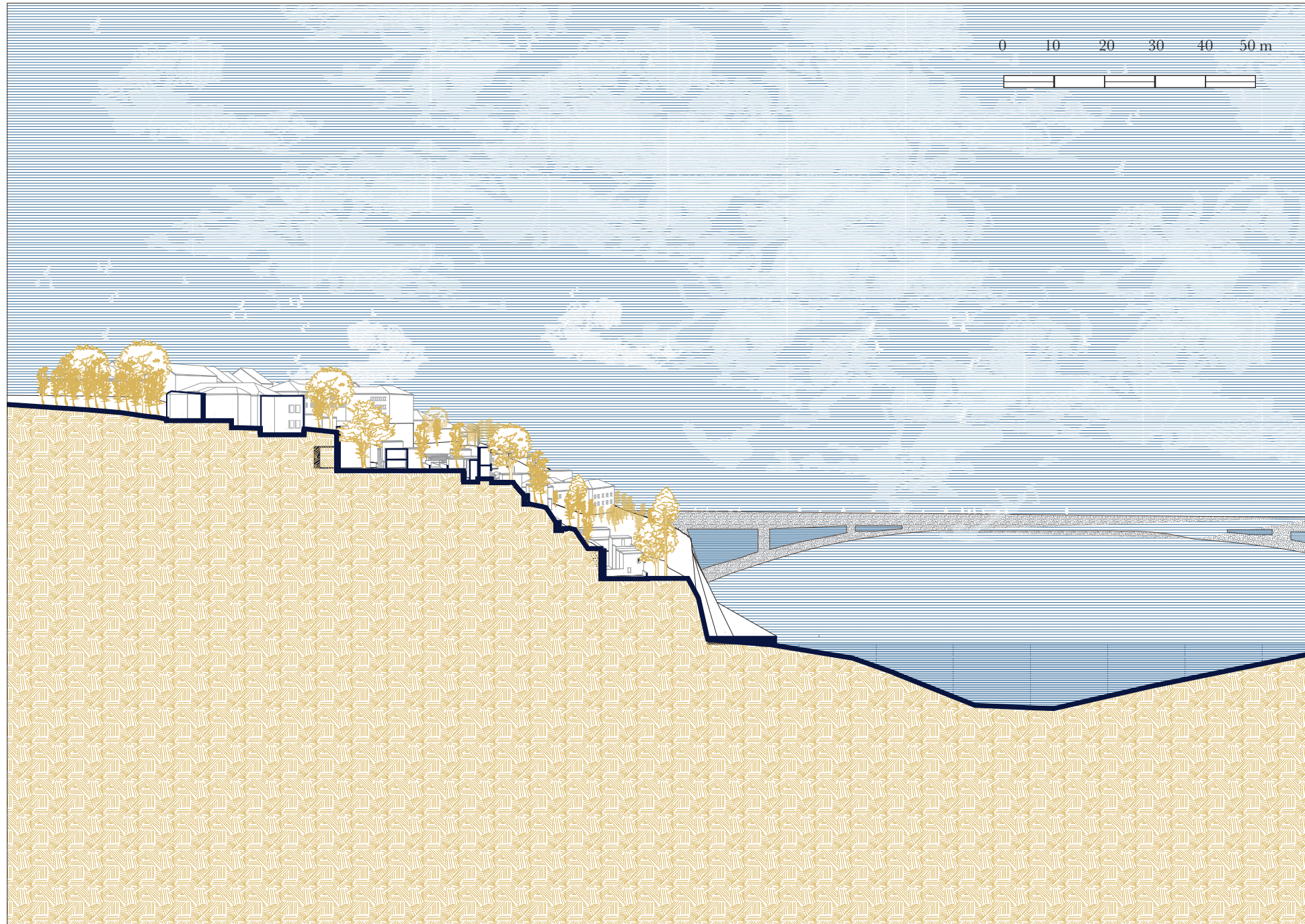
Section DD' 1:1000

3.2.4

The relationship with water

Topographical fences as strenght points

The Douro river is the third biggest river of the Iberian peninsula, crossing both Spain and Portugal and marking their geographical boundary for more then 100 km. The river is the heart of the city, which literally overlooks the water as a continuous observation terrace, but at the same time it is the observation point, to look at both the riversides from a unique point of view.

The river, as it was already quoted in the first chapter, represents both a virtuous element for the area and a problematic one, placing itself as the practical reason of the important and relevant elevation gain.

The western part of the city has already been handled by the Italian architecture firm Proap, which developed a project concerning the coast and its relationship with the city generating a long path sliding along the river with the aim of connecting the eastern and western part of the city and at the same time the highest to the lowest area, letting the river entering the city. Actually, the design was only carried out in the western part of Porto, which now

lives the chance to walk on the Douro, building a closer relationship with water, while the eastern part, including Fontainhas, has been considered in the phase of the design, but it has later been skipped and forgotten, in the realization stage.

Continuing the developing of the paths and connections topic driving the project choices, it was drafted a stone and wood walkway just slightly elevated from the river level, in order to establish a direct contact with the water, which is nowadays totally non-existent in this part of the coast.

The walkway includes both a cycle route and a pedestrians one and it can become as a shore allowing people bathing and sailing.

The upper connection is the extension of the popular and super visited by tourists street on the Douro river, the one full of restaurants and shops.

This part of the street, bordered by mainly residential buildings, stands as different than the existing western one, showing a more private and intimate character, away from the noise of Ribeira, but becoming a place of interest for its agreeable pathway.

Thanks to the direct access of the types on the street and to the vertical stairways connections, the street is a further shared space, a bit more public than the internal one, but which can still be occupied by shared activities, workshops, work and study occupations.

In this way, the water passes from being just an observation object, overlooked from above, to being really lived and inhabited and to being the a further cause of aliveness of the territory; its starts to be part of the city, instead of remaining a lonely and isolated component.

As in the Roman and Baroques villas and buildings, the water, in addition to being a scenographic element, is a way to live and cross the spaces, the key to see them in a new different way, it is itself a path, for going and for staying, therefore it is lived through the happening of various activities.

3.3

Zooming out on topography

Topography has been greatly studied in many different field, not only the construction or technological one. Topography is in fact in a direct connection with the territory and it is frequently considered only in the design sites showing and manifesting particular or difficult topographical features. Nevertheless, the topographic features of a site should always be studied and analysed for a better understanding of it.

The study of topography also means to understand how the buildings of the surrounding territory get in touch with the ground, an aspect which also belongs to the traditional construction of the place.

Portugal has always shown a particular interest in the relationship between architecture and ground, of course because of its tough soils and important elevation gains; this reciprocal interaction is going to be later analysed both from a general and from a site specific point of view.
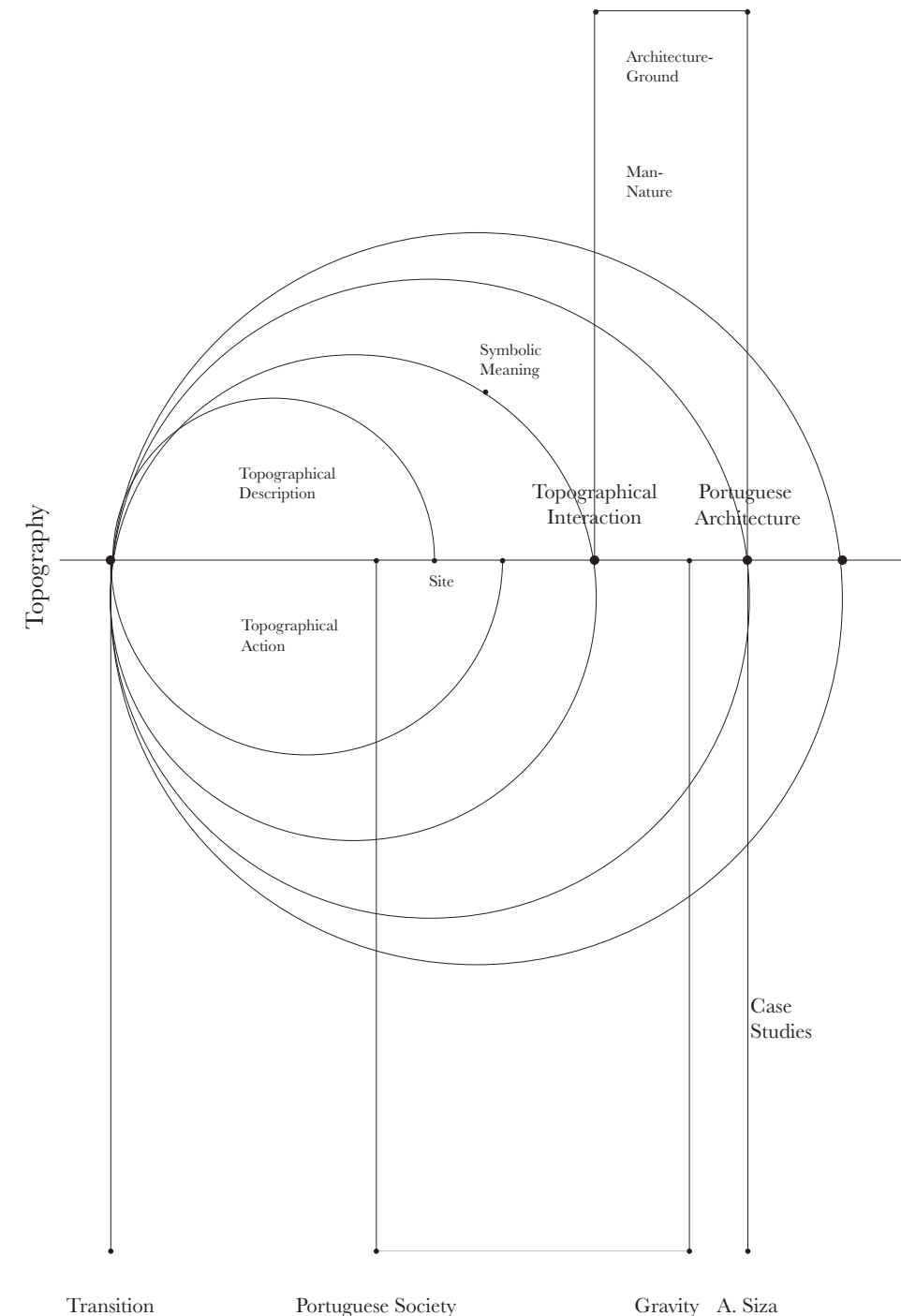
3.3.1

Topographical interactions

Exploring the word "topography", it is unavoidable to find a broad spectrum of meanings. The word comes from the two Greek words "topos-", meaning "place" and "-graphia", which means "writing". If we intend the term in the most literal way, the topography means to write a place, in the sense of describing its natural features.

Many definitions of topography actually describe it as "the physical appearance of the natural features of an area of land".

Making an action of combining the two different visions of the same term, it turns out apparent how the topography is both the object, meaning the land, the territory to describe, and the description itself of the said object, namely the territory.

The topography actually contains within it the action of writing, which is, we can say, operated by man.

The territory is created by the action of the human being "on" and "with" the nature, in a process of alive reciprocal sharing between each other.

Man should not impose his action on nature, but integrate and fit in nature, create with it, in the complicate and mysterious dimension of a four-handed work.

Analysing the topography, the relation that is established between architecture and ground is consequently studied, so is the relationship man-nature.

The ground is not just a two dimensional surface ready to accom-

modate the building however it presents, on the contrary it is the basic material for the design, to be considered exactly on the same level of architecture, constituting the designing process.

The point of encounter architecture-ground can acquire infinite meanings and it is treated in a different way by each architect and in each different design period and school; the way of approaching to the ground, to insert in it or just float on it clearly appears from the reading of the drawings of an architectural object, above all sections.

The operation of approaching to the ground requires a deep comprehension of the site, that has always been meant differently by each architect, operation expressed through sketches, observation, scientific study. The ground and the site can be understood through the reading of maps and its comparison with the reality, through the physical repetitive walking on the soil in different ways and directions. The various approach towards the ground flows into a variable equilibrium of prevailing of the artefact on the nature or vice versa.

The point of touch of the artefact with the ground generates a consequent modification of the site, which is anyway in a continuous transition, both for the man and nature itself action.

Understanding the topography of a place, of the site of the project means not just to comprehend and describe its geometrical and physical features, but to penetrate in its materiality, geology, geography, but history and culture too, through the understanding of the tradition in the approach of a population towards the soil.

The topography of a place is a complete and all-round description of its peculiarities, meaning the built and the inbuilt terrain too, its geographical informations, the main characteristics of the site.

As stated by Tomà Berlanda in his book titled "Architectural Topographies", the way to intend the ground from an architectonic point of view includes also and mainly a conceptual theoretical

meaning, as well as the more immediate physical and material one. [1]

The symbolic meaning is visible in all the architectures intersecting with the ground in a direct way, through which the author leaks his conception of link between archetype and ground, therefore the more elevated one between man and nature.

The architect may respect the terrain flow, modify it, let it come inside the project, elevate the building, excavate and dig it, being attracted by the ground or afraid of it. The whole of these actions towards the ground might be classified and used as a starting abacus for the design process.

In the process of design taking into account the site and its topography, the key always lies in the consideration of the ground as a matter to deal with, not just as a plate line in the background.

[1] Berlanda, T., *Architectural Topographies*, New York, Routledge, 2014

3.3.2

Portuguese down to earth architecture

Reading the architectures of the Portuguese school architects Fernando Tavora, Alvaro Siza, Eduardo Souto de Moura, it is visible how they give priority to the site and its description, as Siza states: "I begin design when I visit a site". The basic reason leading to their careful attention towards the ground is based on the features of the Portuguese soil, which is characterized by steep slopes, height differences and complicated cliffs. Before approaching to the design, they approach to the soil, to the ground and its nature, meticulously describing it. The first aspect of Porto that is recalled by Siza y Vieira in 1988 in "Burgo" in the poetic description he draws up of his beloved city is its "demoniac soil"; Siza paints the image, which gradually figures in the reader's mind of the urban morphology and of its landscape, focusing on man artefact dominated by the presence of nature, houses unravelling on the hills, interrupting to give rise to open and in the balance spaces. The architecture and its features is strongly influenced by nature, the slopes entail heavy retaining walls, which fit in the landscape adapting to it; man artefact follows the logic of the existing natural altitude, but at the same time transforms it incorporating and giving it more force. The only description of the city would be sufficient in order to explain the

thought of the Portuguese architect about the relationship architecture-ground, in a holistic vision of recurrence and complementarity of the two opposite aspects.

As Giovanni Leoni states in his book about Álvaro Siza, the contact that the architect establishes with the site is a tough triumph, building a complex system of fluctuating relations between the in-process design and the place which is going to host it, going from a domination sensation to a fear sensation to a respectful approach. The combination of the just mentioned opposite approaches is the formula expressing the basis idea of the Portuguese school projects.[1]

As already mentioned in the previous paragraph, the practical and material approach of the architect regarding to the ground reflects the wider theoretical idea. The ground itself stands as the bearing material of the architectonic project, constituting not only the physical point of insertion of the building in the soil, but the specificity of the place with its history and landscape physicality.[2] The homage to Álvaro Siza written by his Portuguese "precursor" Fernando Távora (Porto, 1992) expresses the concept of "builder of works of gravity […], powerful and Portuguese", defining him a master, a person who builds something serious, coherent, significant. Távora actually wants to focus on gravity in its physical and scientific meaning, the force "which gives us weight and ensures that we stand vertically). In his vision as well, we detect the complementarity of the intellectual and the physical spheres, for which it is unavoidable to involve the further when we refer to the one and vice versa. [3]
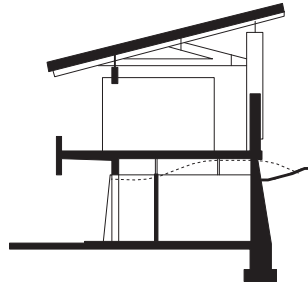
In this conception of the figure of Siza, the idea of gravity necessarily pushes our mind to connect it with our attachment to the ground and its corporeality, tangibility and so to the heavy, though landing, grounding of the architecture, the building materials inside the earth, in a controversial relation of reciprocal domination, equilibrium and submission. Siza's works express how deep was his attempt to position his project in an equilibrate status compared to the ground strength. This equilibrate status is shown through the progressive entrance of the artefact in the natural material, which is modelled by the new object, it is changed by it, it would not be real if it would remain unchanged. The Portuguese architects Fernando Tavora, Alvaro Siza y Vieira and Eduardo Souto de Moura have always put themselves in a study position in the relationship with the site of their designs.

The four case studied that we consider here are Casa em Serra da Arrabida, by Eduardo Souto de Moura, the Boa Nova Tea House and the Tolo House by Siza, the Pavilhao de Tenis of Tavora.

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[1] Leoni, G., *Alvaro Siza*, Milano, Motta Architettura, 2009

[2] Franceschin, M., *Dialoghi possibili scritti sull'opera di Alvaro Siza. Premessa di Vittorio Gregotti*. Napoli, Clean Edizioni, 2016
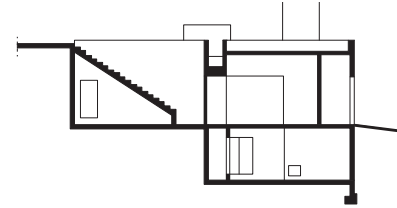
[3] Frampton, K., *Alvaro siza complete works*, Phaidon, 1999

1

3
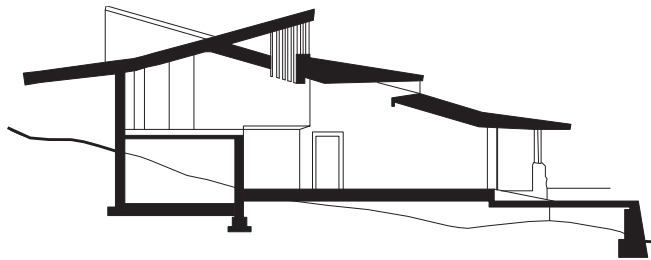
2

4

Sections of the Pavilhao de Tenis (1), the Boa Nova Tea House (2), Casa
em Serra da Arrabida (2), , the Tolo House (4)
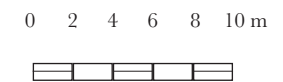
4 | Tectonics

The syntactic rule

Tectonics

The syntactic rule

Tectonic concept in architecture stands as the physical construction of the formal idea of design.

For this reason, it is kind of a epilogue of this work, showing the real construction of the project on the site, the realization of the architectural object.

At the same time, tectonic, which is a so vast concept, brings out many questions to be demanded. this is the aim of this last chapter, conclude the design topic and demand for a wider interrogation about urban regeneration projects. The task of tectonic area in this work is to accomplish the relationship between typology and topography manifesting as a medium between the two.

4.1

Tectonics in the architecture of the city

In the reading of a city and its urban aspects, analysing the tectonic characters may be meant as the understanding of the practical laws which lay at the basis of its construction, in the vision of continuity of tradition. Construction in this sense does not only mean the structural and technological laws, but the theoretical concepts too, thus the principles founding the city morphology itself.

Following the talk under way, this would mean the reading of the materials, the processes making architecture taking place in topography, connecting the theoretical and the physical points of the same concept.

The already seen topographical devices are the means to realize the architectural concept in the site.

The urban design should include a tectonic reading and acting, intended as the understanding of how objects are made and constructed.

Tectonics Intermediary

City

Understanding

Theoretical Aspects — Physical Realization

Concept ualization — Constr uction

General Project — On-site Project

Archite cture — Topo graphy
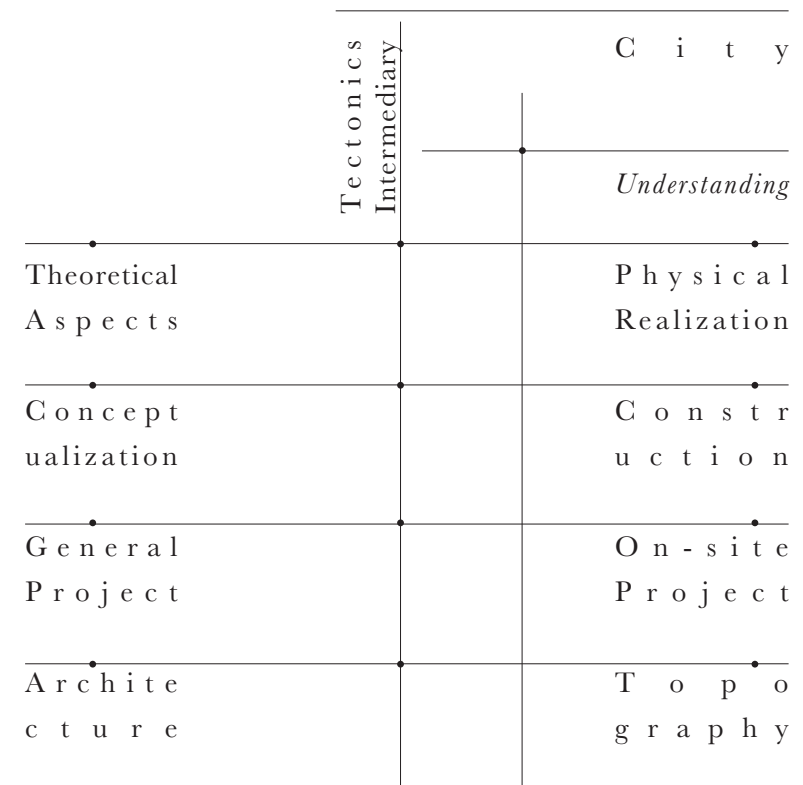
4.1.1

Tectonics as intermediate instrument

Tectonics in the architecture of the city

The panorama drawn up in the previous three chapters showed how in the urban project framework the residential typologies generate urban form following some defined morphological recurrences, given by the analysed urban situations.

The rules are influenced by the topography, which becomes the field of action of the designed architecture.

In this point of contact between architecture and topography, the introduction of four defined so called topographical devices is the solution key to regulate the grounding on the soil.

Since tectonics is seen as the concrete and physical realization of the concept, it can be stated that the topographical devices are actually the tectonic means to make architecture happen, thus to let the typology interact with topography, which constitutes the real aspect manifested by the site.

The previous analysis and research showed how the type can be

enclosed in a set of laws regulating it, abstract and logical/mathematical rules that can be extracted from the single cases in order to generate a new model.

The model containing the rules is then the possible key to generate infinite new types adhering to the original structure.

As in the native analysis, the single cases, even if accorded to the same rules, are declined in various ways because of the factors acting on them, as the context, the overlooking on the street, the internal paths, the number of units needed, the orientation, the difference in altitude, as so the ruling model that we assume for the generation of new types is therefore declined in various ways. The topographical variation is one of the main factors which act on this dynamical modification of the type, promoting transition. The same type on its own, in fact, assumes different morphological sense and physical configuration according to the exact place where it is situated, attributing more and more importance to the site.

The topographical characteristics are in fact probably the most important and biggest variant of the site, which as a matter of fact greatly influence the conformation of the building, also depending on how, as we analysed before, it goes to insert itself in the land and ground on the welcoming soil.

It could be stated that the difference in topography entails a forced typological variation, because of the needing to relate to a certain level of the street, a certain height difference, so this brings to a levels change, to an accesses change and finally to a real morphological change. This variation is not left to chance, but it is strongly regulated with the basic recurrent elements.

Tectonics, in this studied relationship architecture-ground is therefore the medium allowing this connection, standing as the realization of the type on and in and with the site, in a dimension of collaboration and cooperation, in the creation of a four handed work.

4.1.2

Tectonical construction

*Tectonic in the architecture of the city*

The topographical devices are technological and structural elements helping the type inserting himself in the ground and establishing a relationship with it. As the Portuguese architecture has always wanted to fit into a traditional process, following a continuity methodology, preserving many formal and structural elements, so is this project going to do.

The stone basement, which is a structural element, that means it is a massive object transmitting the sensation of a deep attachment to ground and nature, characterizes the topographical devices and the basis structure; but, still, the very clean white shape covering the stone component. All the topographical devices are stone units, all the residential typologies are white concrete units and this change helps the variation, too.

The retaining wall follows the idea of the reinforcement grid for a better soil restraint.

The following sections show how these large instruments touch the ground on one side and touch the building on the other, as real intermediaries.

The topographical elements efficiency is given by the presence of a reinforcement grid
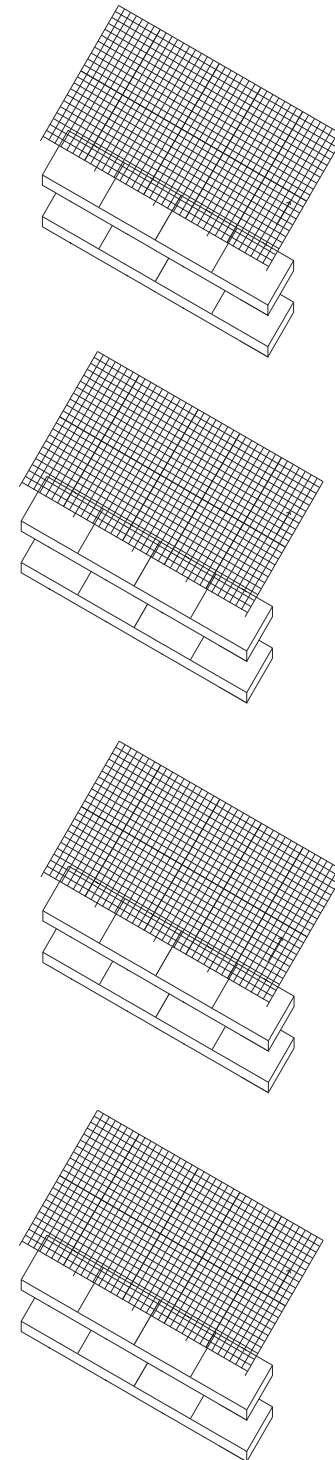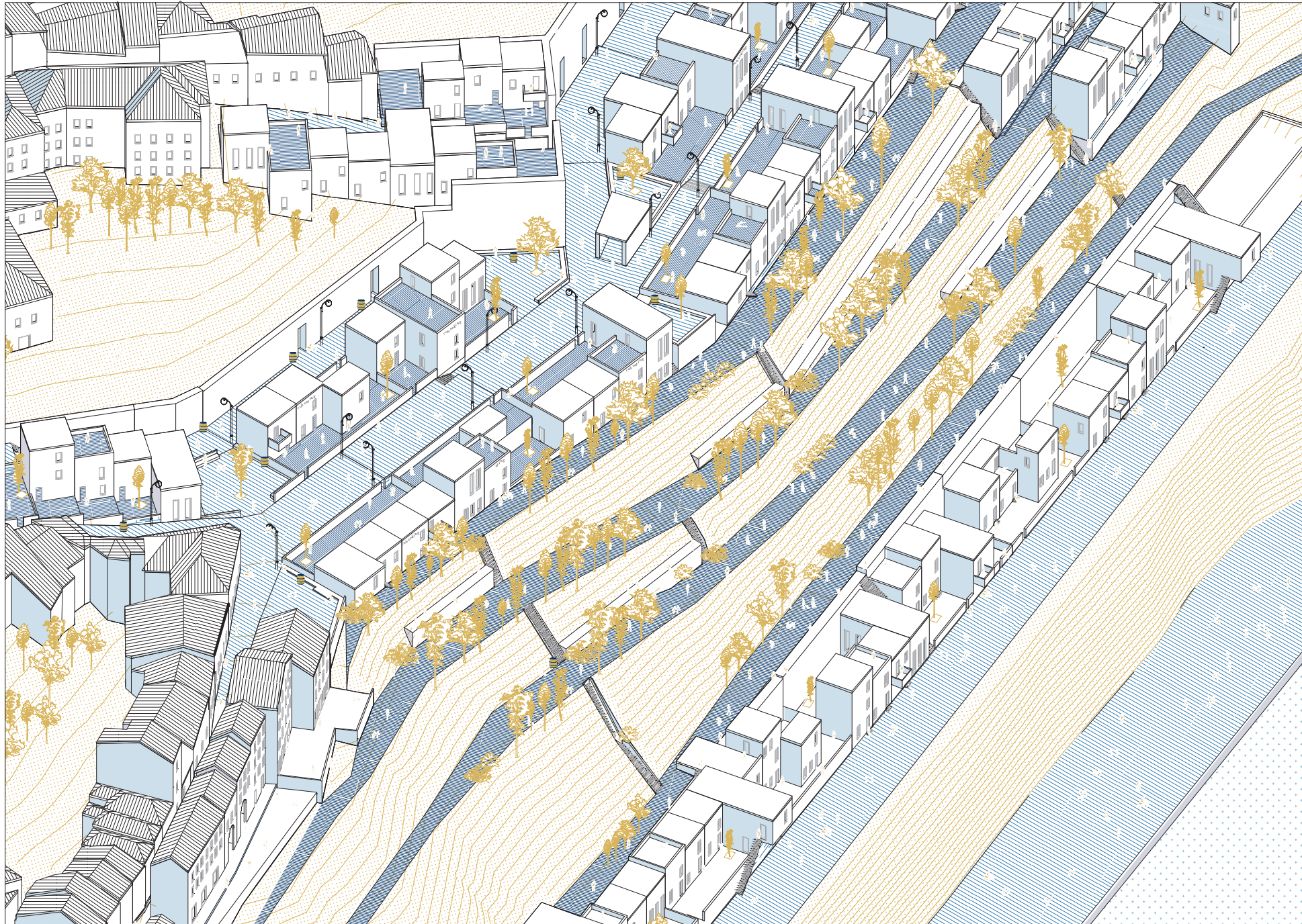
General axonometry
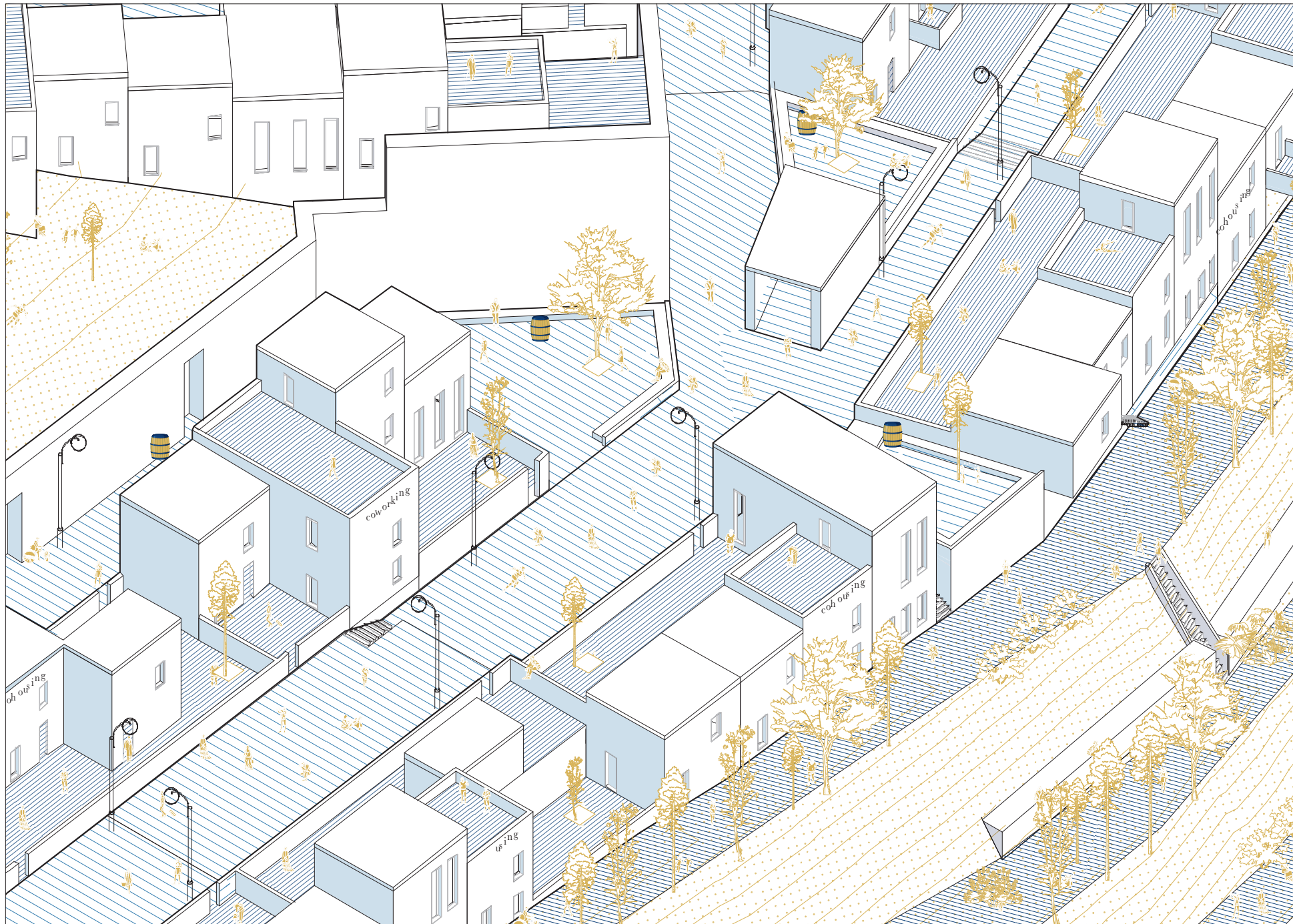
Axonometry - zoom

View
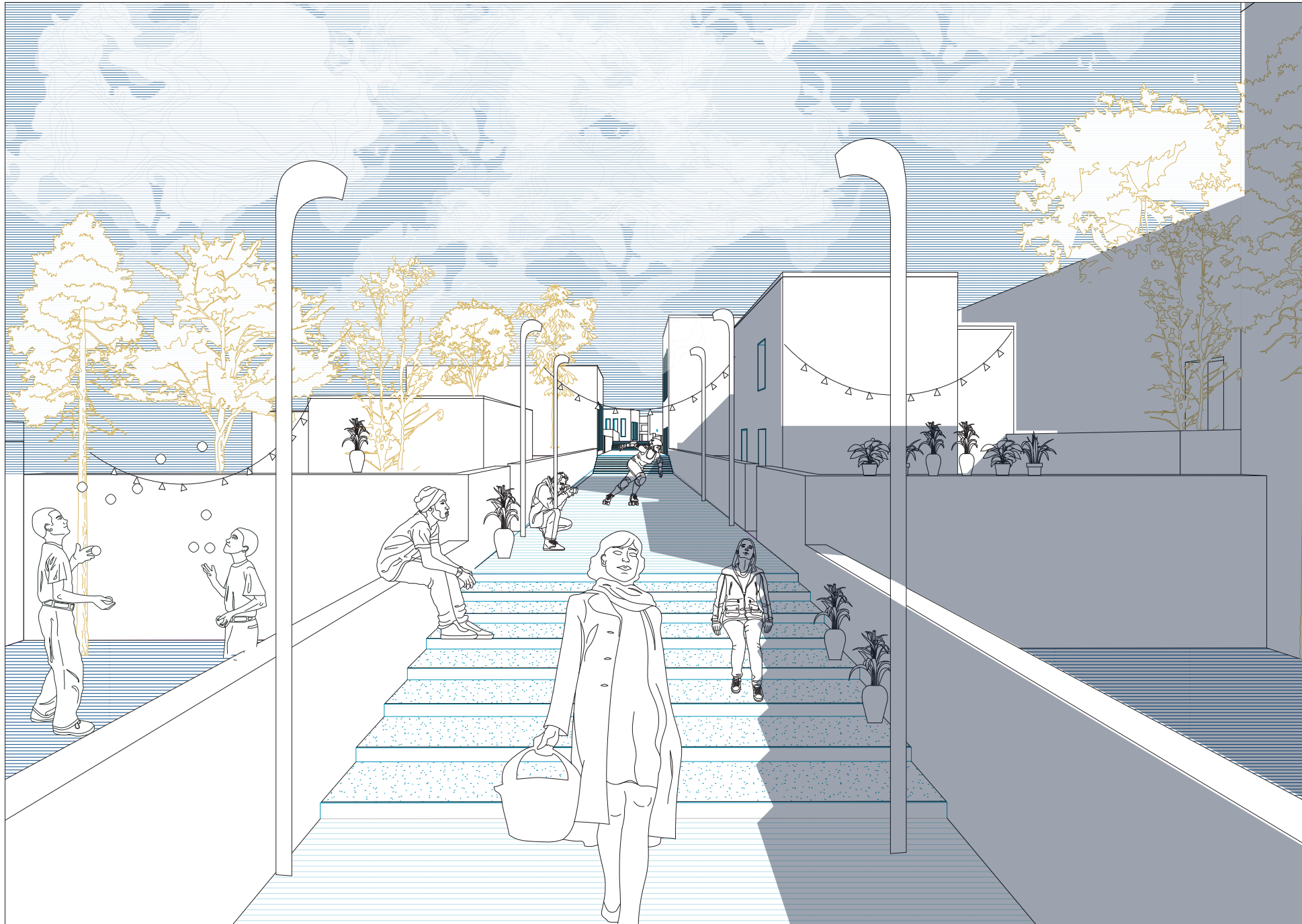
View

View
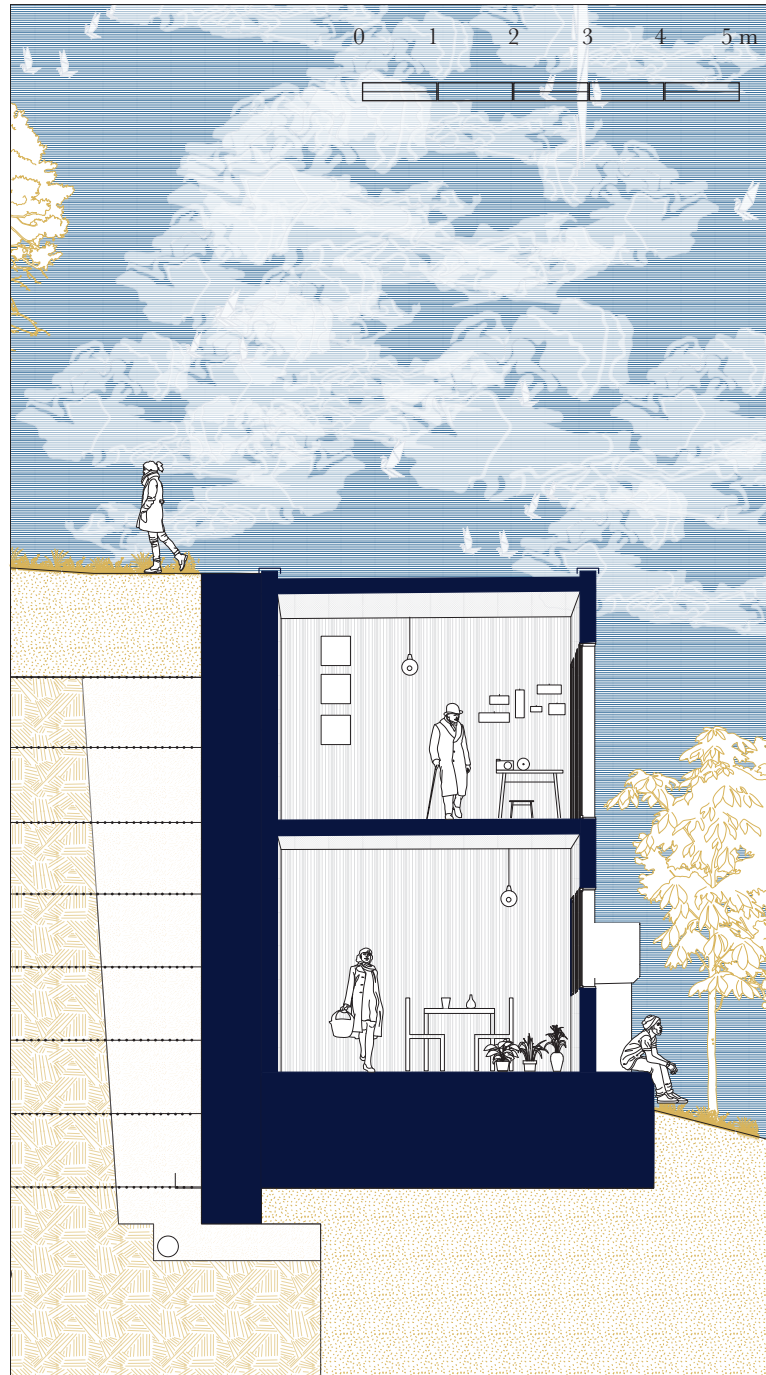
Section of the insertion point of the typology in the ground 1:100
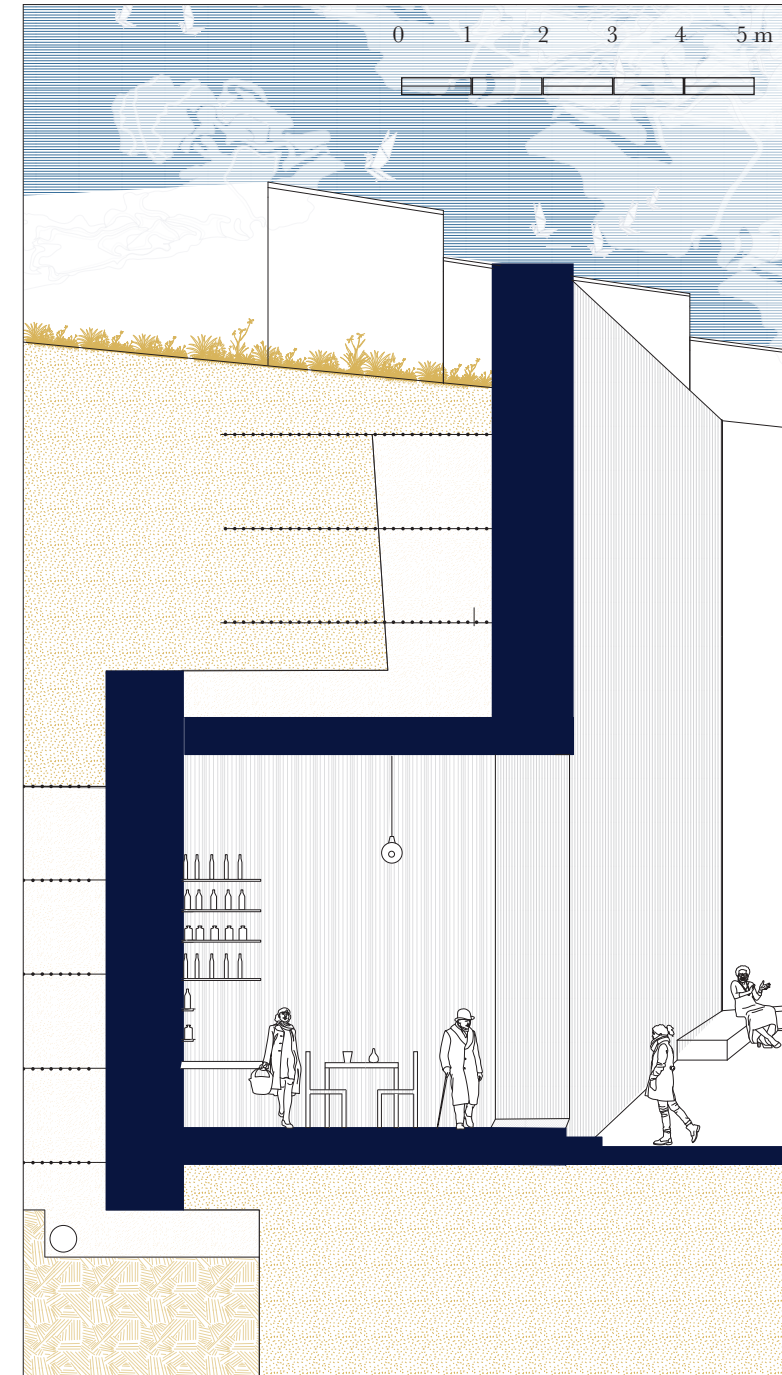
Section of the insertion point of the ditch under the ground 1:100
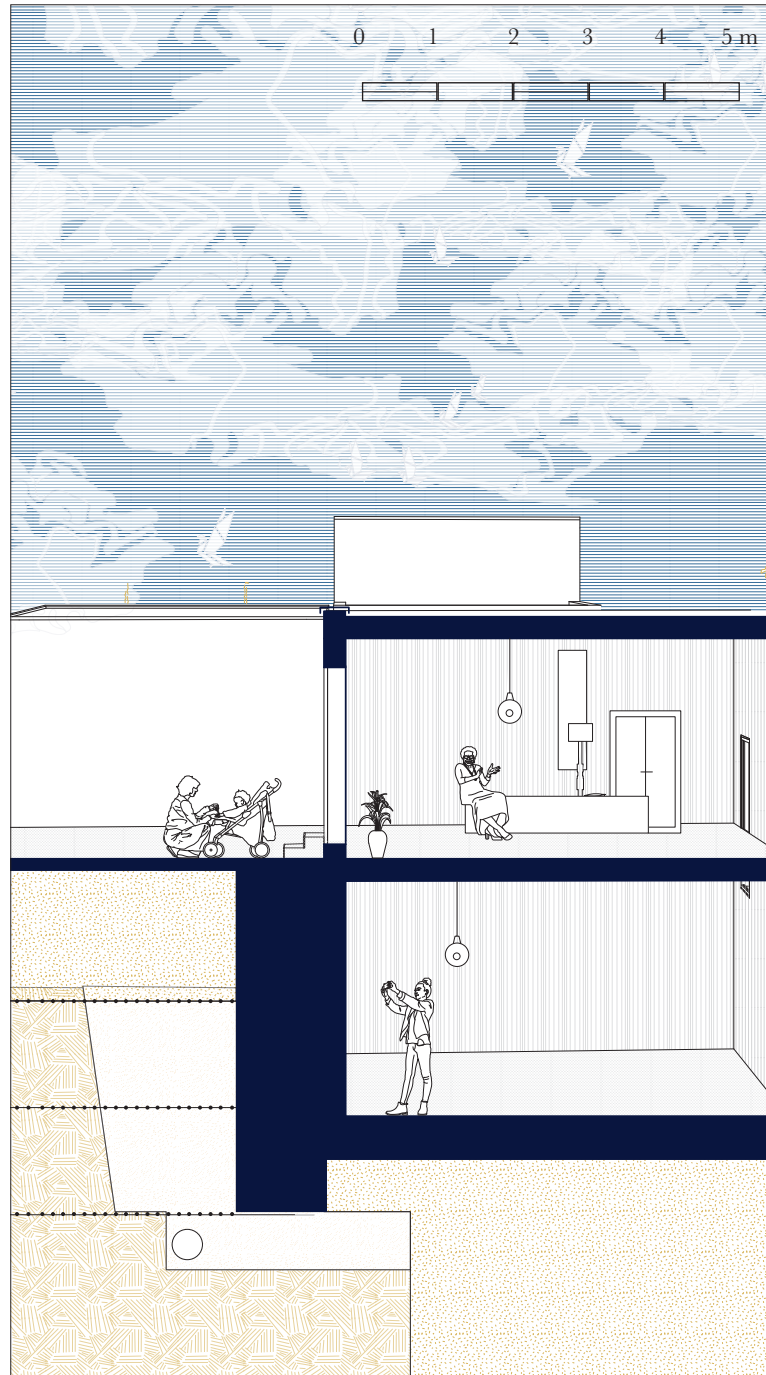
Section of the insertion point of the typology in the ground 1:100
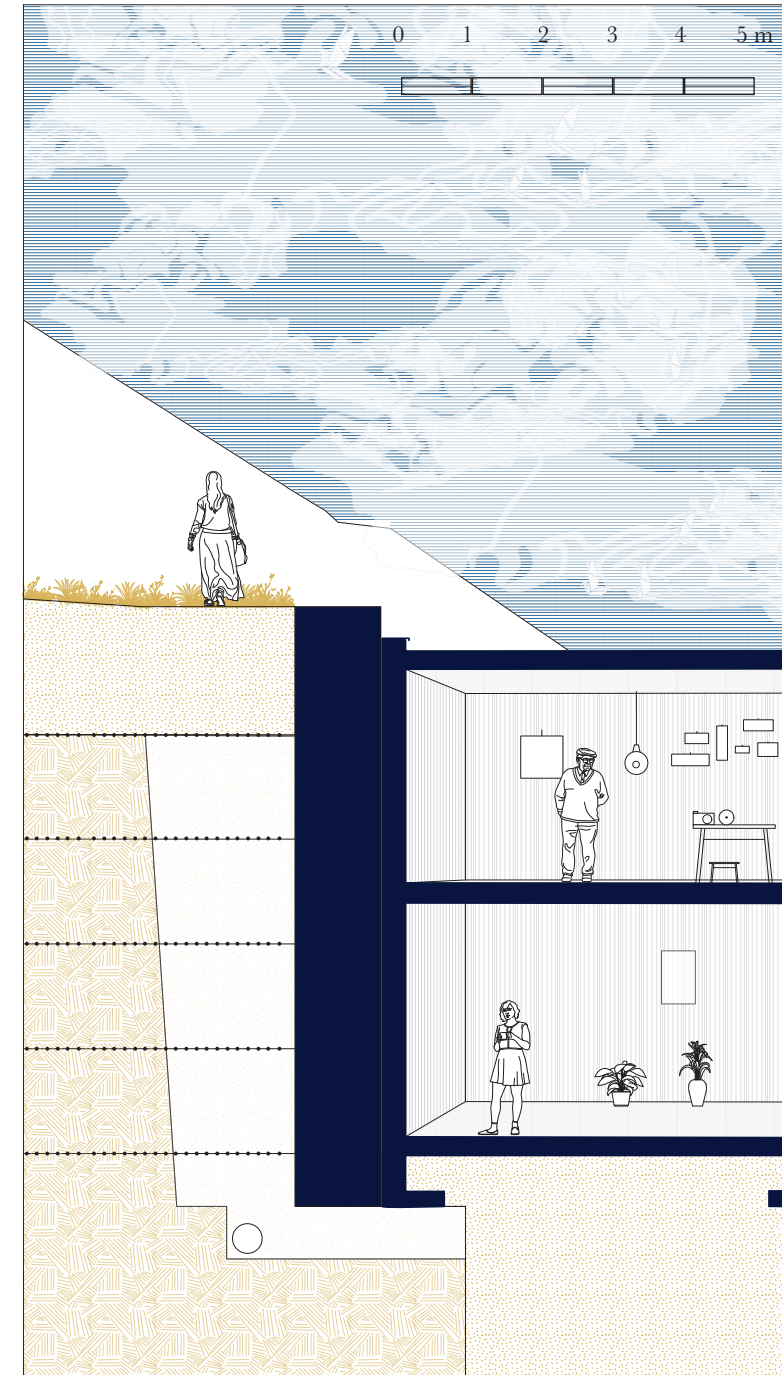
Section of the insertion point of the typology in the ground 1:100

4.2

Tectonics as extension of the pilot scheme

Tectonics might be meant as the process of transformation of the theoretical idea, a concept of design converted into the real and physical space to be actually lived.
In this paragraph, tectonics is going to be considered above all as the extension of the small and restricted design to a larger scale consideration, reaching the application of the same principles to a larger territory of the city.

The beginning design becomes thus a strategy, a model which might be used as a methodological process for other spaces, which express similar matters and needing, that may be read and considered as the completion of the urban fabric.

In this case the considered area is the one surrounding the territory of Fontainhas. In fact, four additional areas were identified as the action zones for the strategy to be applied, because of their deficiencies, which are most of times given by a demolition or a strong decay of some buildings.

4.2.1

A strategy to be used in larger scale

Tectonics as extension of the pilot scheme

The urban project takes on a different meaning from a more localized project of a building, thus affecting more and more the society and its involved features. Tectonics is going to be here explained as the realization of the primordial conceptual idea of creation. Indeed, on a urban level of consideration, the just expressed concept means the extension of the single and theoretical project to a real action area, as the application of the general in the specific; the general rules stay, the singular ones vary and change. This relationship between general and specific gets in touch with the concept of recursion, because of the general aspect of the recursive element that is considered both in the analysis phase and in the action one; in fact, the extension of the elemental ruling characters of the type of process is the one that can be replicated assuming different natures.

Even more than the project of an architectural object, the city design induces the consideration of tectonics, because of its continuous transition of forms, but in a dimension of continuity and recurrence with the past and in addition because of the real needing
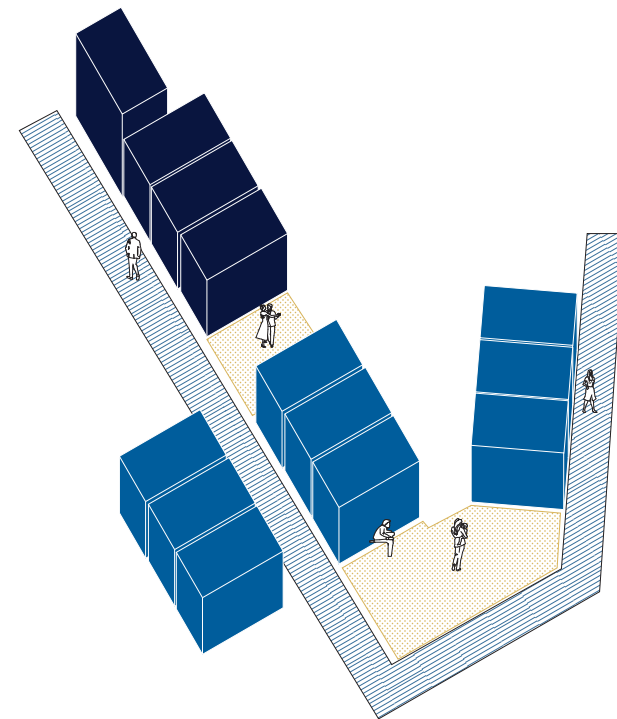

Diagram showing the possible completion on different fragmented blocks through the use of the recurrent types and morphological situations

of a simplification for the implementation of a single approach and typo-morphological scheme to different urban situations. The urban project defines a work in progress, a construction in the making, a process in continuity with the city itself. Through the reading of the city and of the territory and the interpretation of the main components of the site, understanding the relationships between spatial objects and social ones, it is possible to create new transformation scenarios, acting on the process of the morphological and the social factors. The just shown project strategy makes use of certain particular recurrent elements, taken from the city itself, already lived by citizens and visitors, already working well with a certain way to live and inhabit them, which constitute the soul of the site, thus the new design needs to arise in continuity with them. The same approach may be followed in all the urban areas which present the same nature of matter of the considered one, which means fragmentation and discontinuity in the urban fabric and disconnections; this city, in fact, is characterized by many abandoned and thus decayed areas in the central historical part, due to the city centre abandonment and relocation of many citizens to the suburbs of the city.

Porto's urban fabric is often marked by inbuilt areas or demolished parts which became urban voids, decayed territories.

Thus, after the detection of the areas needing a similar kind of approach in the construction of new urban form to beat fragmentation and to build up new connections, the addition of the designed new social type is the first action which brings back life in the area. The construction of the new urban form involves then the generation of new street connections, giving birth to the block, which is often hidden in the deterioration.

Moreover, social devices are inserted following the morphological previously quoted rules, at the end of a row of buildings or at a streets corner, allowing a further revitalization of the considered territory.

Decayed area
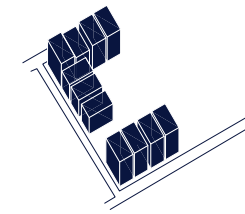
Types addition
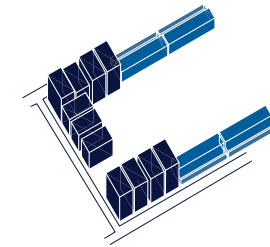
Streets generation
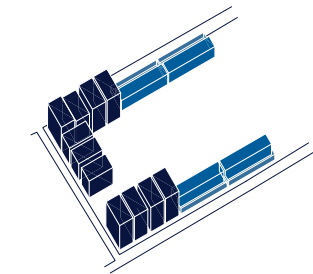
Social devices
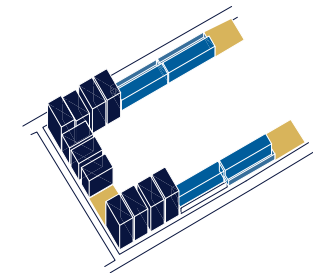
Urban form completion
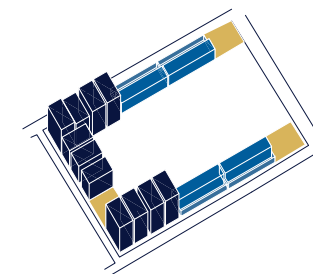
4.2.2

Transformation strategy for the city

Tectonics as extension of the pilot scheme

The urban project takes on a different meaning from a more localized project of a building, affecting more and more the society and its elements.

The urban project defines a work in progress, a construction in the making, involving a not univocal process nevertheless a unique result. Of course, this character of the urban projects finds its origins in the own aspect of urban form, which lays in a continuous and always changing transition and evolution. The urban project needs in fact to adapt to the changes of the inhabitants and to the evolving society, still linking to the tradition and to the permanent aspects, inserting in an existing dimension preserving its basing and fundamental characters, but in a view of innovation and transition, like a continuous subsequent overlapping.

Actually, this kind of transition keeps a conservative flow, manifesting the continuity elements of the tradition of the city, from a morphological, social, cultural, typological point of view, that means that the city preserves its fundamental aspects, transitionally transforming them.

Through the reading of the city and of the territory and the interpretation of the main components of the site, understanding the relationships between spatial objects and social ones, it is possible to create new transformation scenarios, acting on the process of the morphological and the social factors.

The just shown project strategy makes use of certain particular recurrent elements, taken from the city itself, already lived by citizens and visitors, already working well with a certain way to live and inhabit them.

Moreover, the urban design, which is different from the urbanistic planning, is considered as the definition of specific basic morphological/social rules as a starting point for the single architecture projects.

The relationship between morphological and social is actually extremely strict, since the physicality of a place actually comes from its social features and from the exigencies of the population inhabiting it.

Thus, the rules lying at the basis of urban morphology ensure a syntactic order to the urban fabric. Indeed, they are the demonstration of the intentionality in the generation of new urban form, which is not constituted casually.

The process of abstraction of the morphological and physical but also typological and topographical situations, when it has to do with urban designs, allows the generalization and thus the creation of generic rules, applicable to different areas and scenarios.

The direct consequence of the existence of this social-morphological connection is the continuous mutation of urban forms because of the continuous mutations of the society.

The group of people inhabiting a city changes, thus there is not an irreversible urban form, but a transitional one.

This aspect strengthens the possibility to build different scenario when working on a urban design, or to build a single scenario that may evolve and develop in different ways.

4.3

Zooming out on tectonics

In the same way as tradition, typology, topography, likewise tectonics issue is a really wide matter, that might be faced in multiple modalities. Actually, tectonics gets to comprehend a more, it could be said philosophical and abstract meaning, if intended as the transposition of the theoretical concepts in the real and built architecture, thus the relationship between the idea and the practical matter. This is moreover presented as the reason why the extension of the design on the area and on the city has been considered as a tectonic matter, thus it is presented as the transposition of the starting abstract idea to the wider practical matter. This is the reason why tectonics might be considered as the soul of the building, as its intrinsic meaning, the one which at first pushes the architect to create it, the basis concept, and which later stands as the mean of realization. In the following paragraph, a study on the role of tectonics in the design process and in the composition syntax has been carried out, still considering the language metaphor as a method to better understand the different roles in architecture.
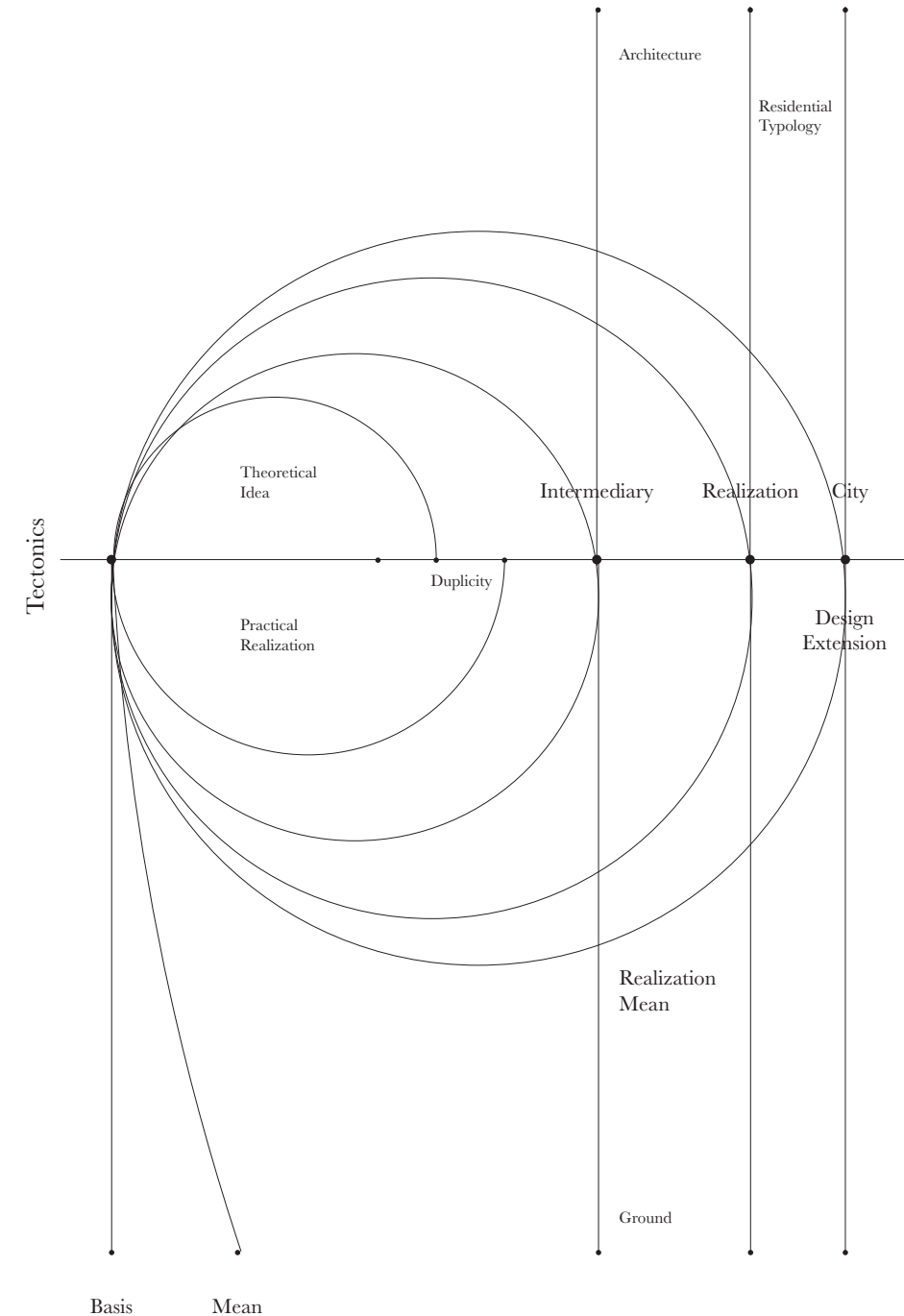
4.3.1

Tectonics in the composition

syntax

Tectonics in the architectonic field is meant as "the science or art of construction, both in relation to use and artistic design." [1]
Tectonics is mainly related to the activity of making the architectural shape a constructed form, physically built; moreover, it is the way to realize the designed art and to materially, bodily translate into presence the beginning theoretical idea.

This is why it is not only connected with the practical act of building, but it is in a direct relation with the theoretical and meta-physical "poetic of construction".

The physical qualities of the building, in fact, send back to its theoretical presence, to its meaning and existence.[2]

The entrench of the building is marked by the tectonic subjects, which are the manifestation of the existence of the construction on the ground in a certain moment, in the relation with the exact site and place of realization.

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[1] Def. *"Tectonics"*, in Merriam-Webster's Dictionary, 2019, https://www.merriam-webster.com

[2] Maulden, R., *Tectonics in Architecture from the physical to the meta-physical.* Massachusetts Institute of Technology, 1983

Thus, tectonics stands in the middle of architecture as the idea owned by the architect and its realization in the particular site, with its special topographical features and social and cultural aspects.

Tectonics lies at the hearth of the already researched relationship that exists between architecture and topography, becoming the modality of realization, of a static insertion, or better of the dynamic grounding, of the constructive building (with its existence idea inside) on the physical soil.

In fact, the moment of meeting between the just mentioned factors coincides with the materialization of the object, the idea which becomes real in the moment of encounter with the terrain.

Tectonics reflects the revelation of the building itself; the physical, constructive and material relation between the single parts of the whole is the mirror of the theoretical and epistemological liaison between them.

So is the relation between buildings and between the new designed construction and the context which accommodates it.

The way, meaning the constructive structural technological manner, a place is built reflects its social cultural spirit. In this case again, this topic is linked to the one of tradition, therefore a population culture is marked by a traditional path that underlines its funding characters, that can be read as continuity elements, the same ones that are taken up for the new intervention in that city.

As stated in the research by C. J. Shwartz at the Kansas State University, architecture is the art combining the design of spaces for people and "the tangible realities of gravity, material properties, and assembly sequences".[3]

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[3] Shwartz, C., *Introducing Architectural Tectonics*, New York, Routledge, 2016

Reading an architecture, we can discern both its conceptual meaning, related to people, to the site and its constructive method, also related to people, culture, tradition, site. So, while telling an architecture, as the one of this work, the main aspects to transmit is exactly the conceptual and theoretical one, followed by the practical and construction one.

Once more, tectonic is strictly related with the making in the sense of sensibility and of the poetic of the raw construction.

Referring to the grammar and syntax language already used before, mainly in the section dedicated to typology, primarily useful as a metaphor in order to better express the meaning, also tectonics may be inserted in the same way of speaking.

In this sense, in this epistemological world where building typologies are represented by the varying letters of the alphabet, which can be combined and aggregated in order to create sentences able to tell something, tectonic is the relation between phrases and their meaning.

Thus, sentences are given by the addition of letters, well ordered in a complex system, and words.

They are regulated by the syntax, which provides precise rules to follow and to satisfy, through a right and correct morphological disposition of the words, related to the sense to be transmitted.

Following some defined generative rules, the tectonic provides a sense of the construction allowing the establishment of architecture (letters and words) in the sentence thanks to the syntactic and grammar rules (morphological aspects, which actually govern every form of construction both from the point of view of creating and from the one of analysing).

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