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Rome, 19-22 February 2020

# PROCEEDINGS

edited by  
G. Strappa, P. Carlotti, M. Ieva  
with the collaboration of  
F. D. De Rosa, A. Pusceddu



## URBAN SUBSTRATA & CITY REGENERATION

Morphological legacies and design tools

**ISUFitaly**  
International Seminar on Urban Form  
Italian Network



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## URBAN SUBSTRATA & CITY REGENERATION

Morphological legacies and design tools



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# Presentation

## **URBAN SUBSTRATA & CITY REGENERATION** **Morphological legacies and design tools**

The fifth Isufitaly Conference will focus on the notion of the substratum in its various aspects.

First, the typological one, as a set of rules inherited from the built landscape that allow reading and conscious transformation. We cannot reduce, of course, the complexity and richness of our ancient heritage to universal interpretational patterns that classify types and processes in a kind of taxonomy of the Ancient (that is true for any built environment). Instead, the identification of a few common criteria that allow us to interpret these phenomena through an architect's eyes, tracing the many outcomes back to the general rationales that produce them, can prove useful to morphological studies.

Then, the physical shape of the historical layer, which in many ancient cities has determined the structure of the current settlements. Substratum is, from this point of view, the part beneath the current built landscape that has no longer a function but still contribute to the form of new fabric. It is the prolific layer that gives rise to multiple organisms. We could then consider a 'substratum' as the composition of elements that once belonged to a built fabric or architectural organism. 'Substratum' despite having lost both their relationship of necessity that bound them together (their purpose and original organicity), and the continuity between the different phases of change and development, still transfer specific characters to the buildings originated by them.

Finally, the intangible aspect, the heritage of projects, experiences, and researches that constitute the working legacy on which current study can be based.

The notion of substratum could be, therefore, more than a specific issue, a way of seeing the built reality useful to the contemporary project.

The term not only includes the ideas of rooting and transmission; it also refers to the means, the tools we can use to reach the essence of the form, of its universal being. This universality, a quality that the actual building did not possess, constitutes a fertile abstraction: a reading as well as a project, how we give a new unity to the multiple and scattered forms of the remains we have inherited.

Furthermore, another theme, which is complementary to the substrata one, is that of urban regeneration. It is a topic extensively investigated by urban research which, in this context, could be reconsidered differently and innovatively.

In continuity with the previous Isufitaly meetings, the theme of the conference proposes a debate on the topics of the urban form transformation at different scales, in the light of our cultural heritage understood as a design tool.

The conference will take place at Palazzo Mattei di Giove, built on the ancient remains of the Teatrum Balbi, in one of the Rome areas where the relationship between the present city and the ancient substratum is more evident, even in its contradictions (the Porticus Octaviae, the Teatrum Marcelli, the archaeological area of Largo Argentina).

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A.3 Urban Morphology and Planning Tools

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Keywords: *urban morphology, tradition, typology, topography*

### Abstract

*The area of Fontainhas, on the edge of the center of the city of Porto, has been identified as a physical pretext to investigate the possibilities of reactivating portions of the degraded urban fabric starting from the introduction of new forms and programs.*

*Through the adoption of specific abacuses of generic basic elements as means for both the understanding of the city and the urban regeneration, the work we present is addressed through the division into three macro-areas of investigation, tradition, typology, topography, as distinct themes in continuous relationship with each other.*

*The study works around the concept of recurrence, identifying both single recurring elements and repetitive aggregation mechanisms within the urban form. These recurrences can be observed, read, analyzed, reworked and placed at the base of the proposal of new urban fabric, which appears therefore in direct continuity with the existing one.*

*Studying the interaction between form, typology and topography the project work on the aggregation of the single components starting from a series of abacuses of variation of the recurrent basic general elements, proposing a method extensible to different urban situations.*

### Framework conditions

Abandoned or underutilized public buildings and facilities, railway yards, disused ports and industrial areas, fragments of cities that no longer reflect collective practices, undetermined boundaries between the city and the countryside represent, even with different scales and characteristics, almost the only areas within which the contemporary project acts.

The scarcity of resources and the consolidation of an ever-greater awareness of the issues of environmental and social sustainability of transformations lead us to imagine careful processes, capable of proposing visions rooted in the specificity of the contexts in which we operate.

In this sense, and in line with the long tradition of studies on Urban Morphology and Building Typology (Moudon, 1997, Conzen, 2012), and aware of the potential that such researches have within the framework of urban reading and the subsequent project in a built context, we focus our interest in the elements of repetitiveness and recurrence in urban morphology, however irregular and disordered it may seem in its constitution and development, as precious instruments for the formulation of new urban fabric.

In particular the work we present 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, exploring how to operate through a simplification of complex elements in the identification of the general basis concepts for their reproduction, in a dimension of continuity.

In order to test our ideas and methods we identified a specific site, a place that has fertile morphological (or physical), social and cultural characteristics. Fontainhas, in the city of Porto, allow us to work on topics like tradition, typology and topography in an exciting cultural frame, in line with the Portuguese's studies tradition on Urban Form and about architectural answers to topographical and social matters. (Barbosa, 2010)

The development of an urban project based on the generation of new urban connections acting on the fragmentation of a portion of the city linking to the existing urban fabric constitutes the framework of our reasoning. The process from the matter to the intentions' wording crosses the theoretical topics, arising as the practical demonstration of the use of urban recurrences. Thus, a single small case become useful to show a methodology and to derive more generic observations on urban form generation, considering the crucial importance and usefulness of the employed instruments and of the built path to reach the aim, more than the final design solution.

### Fontainhas (or where we working on)

The area of Fontainhas 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, walking the area we observe how the picturesque sequence of spaces and views, that characterize continuously the urban fabric that borders the Douro, drastically cease and the waterfront promenade becomes only a vehicular street, suggesting the passers-by to turn around the area because "nothing interesting is going to happen there". Fontainhas has been defined as a zone between two bridges, an area which seems to be unwanted and unlucky.

The Infante bridge is the rejected bridge, because of the merely infrastructural reasons which led to its construction. The Maria Pia bridge, designed by 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 mainly 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 precarity 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 bond 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.

Like a large part of Porto, Fontainhas is the perfect reflection of the poetic City description made by Álvaro Siza Vieira, when he talks about the hard topography, defining it “demonic”, 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 enables the study to make an argument on the typological aspects of the city and the way Portuguese citizens congregate and live together. Moreover, the fact that the territory of Fontainhas is marked way by a big change of altitude, hard to be approached and to be solved, it can become through the project as an opportunity to transversally join the territory, connecting not only on the same level, but one level to another.

### **Working on Tradition**

Tradition 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 is considered in a strict relationship with the observation of recurrences, of continuative elements, in a dimension of transition and contemporary evolution.

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.

The aspects which regulate the city urban fabric, 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.

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 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 follows the same categories. 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.

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", which are displaced on "physical topics" (Romano, 1993). 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.

### Working on Typology

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 are 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 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 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 as a share extension of their living areas. These reasons are, probably, 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 this 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 (Teixeira, 1992).

At the same time, moreover, 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.

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 bordering 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.

That 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.

As mentioned above, 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 cannot be explained without considerate its social, cultural, historical background.

The new residential type, that we propose, 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. (Buarque, 1995)

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.

### **Working on Topography**

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 analyses 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 topographical devices (Berlanda, 2014). Through the observation and reading of the architectonic aspects, some elements are identified as the means for architecture to answer to the topography: 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.

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 the project, 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.

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 basic 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.

The point of contact between architecture and the ground is extremely crucial, as a matter of fact, the ground gives its own contribution 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, 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.

### **Conclusions. Working on transition**

As we see in the previous paragraphs, urban forms and building typologies, 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 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 level 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.

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

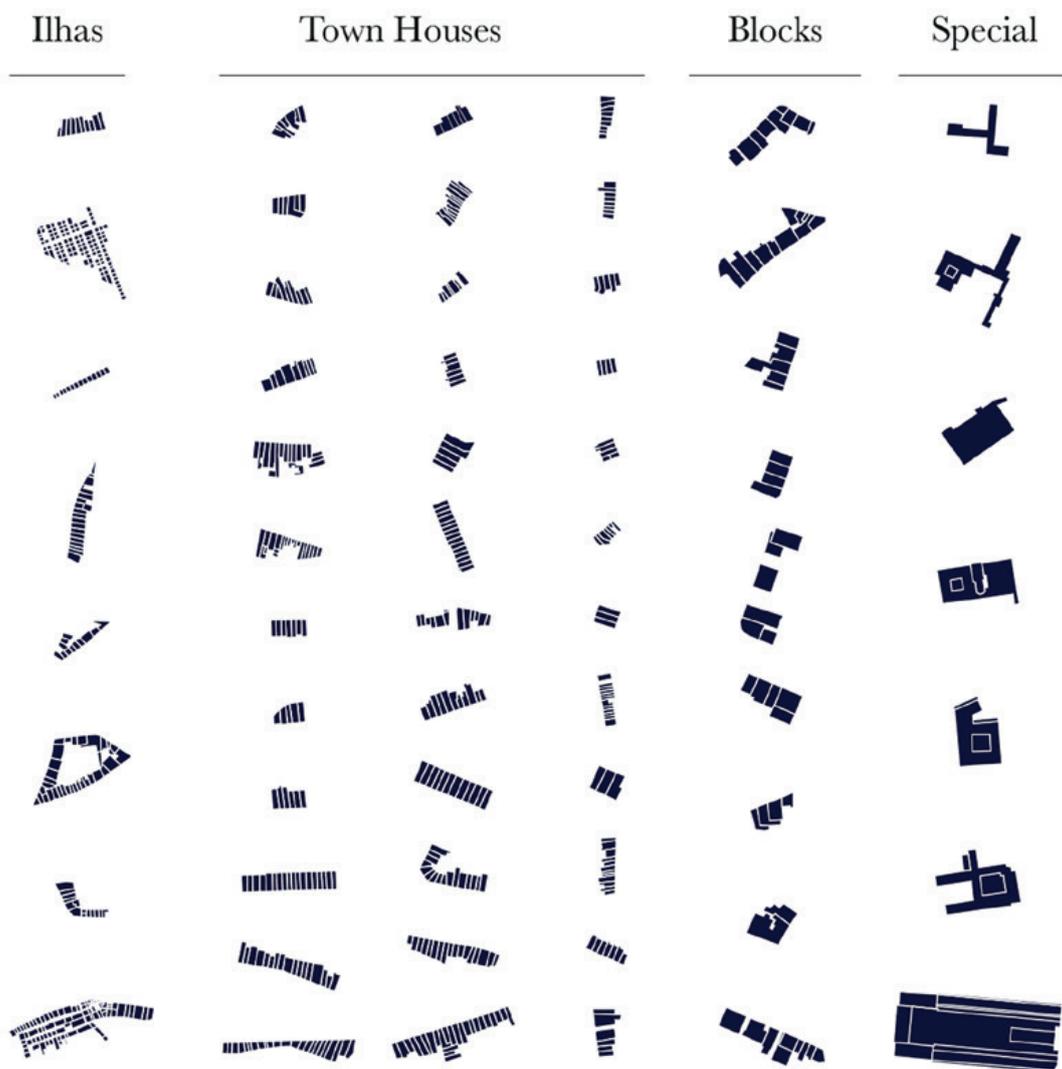
architecture projects.

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.

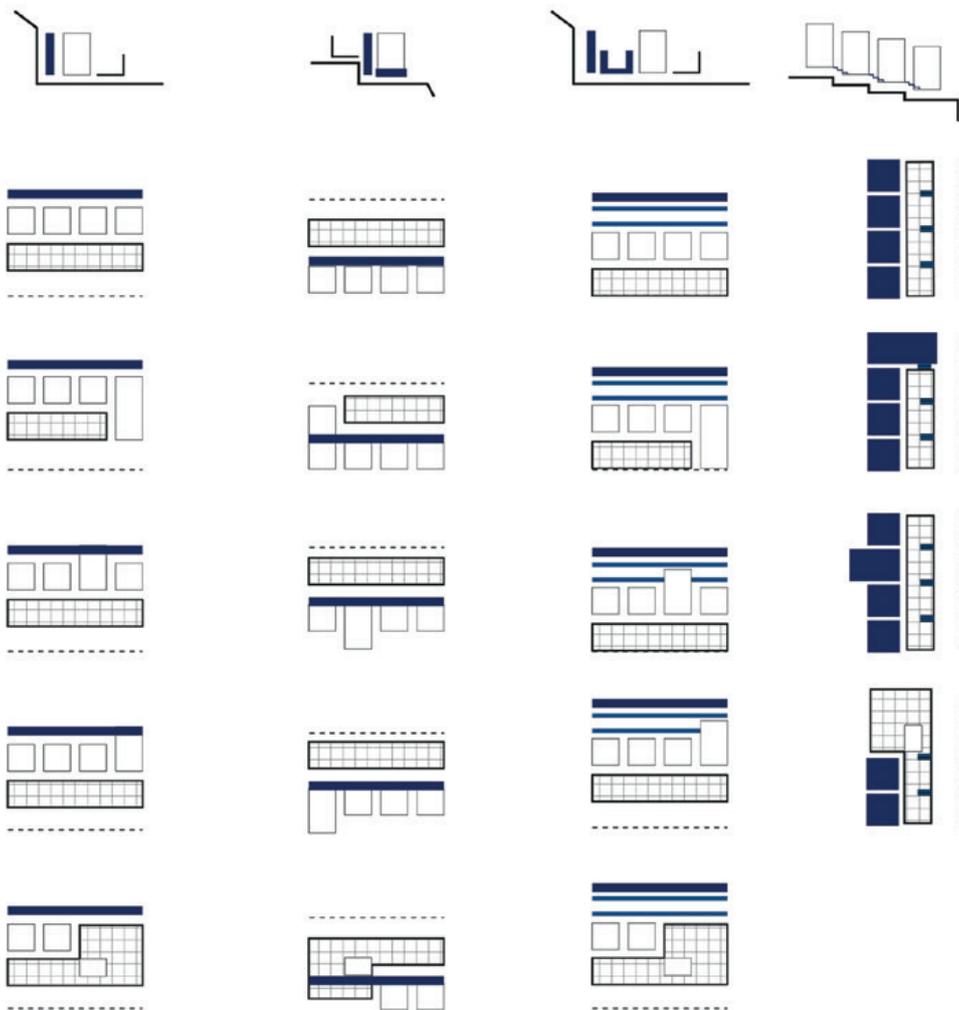
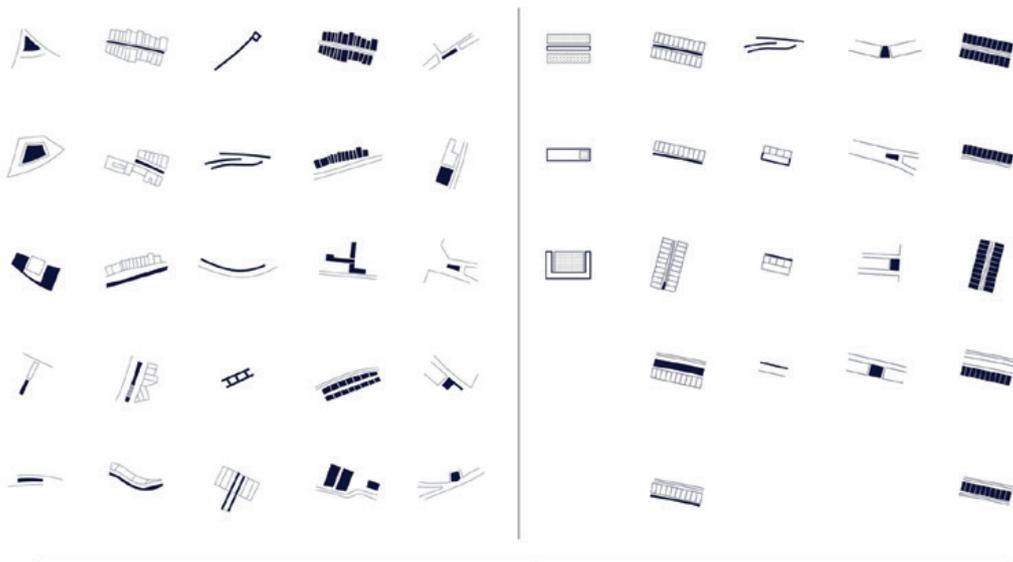
The process of abstraction of the morphological and physical but also typological and topographical situations, when it has to do with urban designs, allows the generalization and thus the creation of generic rules, applicable to different areas and scenarios.

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.



**Figure 1.** The abacus of the recurrent typologies of the area surrounding Fontainhas.



**Figure 2.** The abacus of the recurrent morphological situations;  
**Figure 3.** The abacus of the new recurrent morphological elements;  
**Figure 4.** The abacus of interaction between Typology and Topography.

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