

The Importance of Design in Porto's Ancient Buildings Interventions. Characterization of the Pathological Context through a Constructive Model.

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ABSTRACT

This article stems from an ongoing research that aims primarily at designing a methodology for intervention in old buildings (in particular, in the bourgeois houses of Porto), targeted for the rehabilitation of traditional construction systems and based on "best practice" procedures in heritage conservation.

A brief essay describing the usefulness of drawing in defining a constructive model that characterizes the existing buildings is presented, in particular in the context of its most frequent pathologies, emphasizing its importance in conceiving a methodology for intervention.

The ongoing research that the authors has been developed on traditional construction in northern Portugal has contributed to the definition of this model, namely through studies on the ordinary housing in the city of Porto, also called bourgeois houses, and the recent research into the collection of CRUARB, the municipal office responsible between 1974 and 2002 for the urban heritage conservation of the Historical Centre.

The investigation in progress has been confirmed the belief that the drawing is essential for the establishment of a methodology for intervention in old buildings, supporting the entire process, from the survey analysis of the existing built environment, through the stages of conception and construction, to the maintenance of buildings during their lifetime. The universal language of drawing also adds to the ability of bringing together the interests of the various disciplines involved in the actions of heritage conservation.

KEYWORDS

Heritage, Architectural conservation, Inspection and diagnosis.

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1 INTRODUCTION

The city of Porto has an historical centre classified as World Heritage by UNESCO in 1996, covering an area of about 50 hectares and a population of about 13.000 inhabitants spread over 1.796 buildings. Although subject to heritage conservation actions since 1974, when CRUARB (Commissariat for the Urban Renewal of the Ribeira and Barredo Areas) was founded, very little was accomplished. Currently, it is evident that the vast majority of buildings requires urgent intervention works, ranging from simple maintenance to extensive works of rehabilitation. According to the last Management Plan for the Historic Centre [Loza *et al.* 2008] the state of conservation of buildings was as follows: 25% Good, 36% Average, 32% Poor and 4% Ruin, being the remaining 4% was undergoing works.

Also, the various incentives created by central government were not able to stop this dereliction process, partly driven by the freezing of rents the law from 1950, only abolished in 2005. It is crucial to overturn this situation, calling for the cooperation of the whole society, from politicians, through the universities and interested companies, to the citizens.

The solution for the urban rehabilitation problem, when happening naturally in an integrated manner, and particularly the rehabilitation of its historic built environment, necessarily entails the establishment of rules of engagement, the rationalisation of procedures and the definition of objectives and strategies, appropriate to the existing context, without disregarding the uniqueness of each building. Therefore, it is equally important to define general and specific rules, delineating procedures for action, with the ability to understand and accept the uniqueness and specificity of each intervention, when concerning the pre-existence and the intervention program.

"Best practice" in heritage conservation is understood to be the set of procedures that inform the actions of intervention, resulting from a consensus based on the practical and intellectual experience of civilizations, of which the international documents (charters, conventions and recommendations) are its maximum expression.

In fact, "best practice" recommends that in the process of intervention in an old building special attention should be paid to the initial survey and characterization of the existence, as the deepening of this knowledge is crucial to the development of the project and the success of the intervention. The attention given to this stage is also important so that the intervention meets two important criteria, namely to ensure compatibility of materials (traditional and new) and the conservation of the authenticity of the intervened object.

Unfortunately, it appears that the characterization of the existence stage involves a lot of resources, including surveys (topographic, photographic and geometric), various inspections, registration and fault diagnostics, historical research, archaeological survey, etc., thus being often overlooked or taken lightly.

Accordingly, it is of utmost importance to look for ways of streamlining the tasks necessary to perform the steps of characterization of buildings in intervention action. The rationalisation of constructive solutions through idealized models, the characterization of changes or phenomena associated with major pathologies, will be undoubtedly important contributions, whose success is dependent on the degree of experience of the professionals involved. We should nonetheless highlight that each case is unique, and that this information does not replace more rigorous inspections or examinations whenever appropriate.

2 THE CONSTRUCTIVE MODEL

The constructive system of the bourgeois houses of Porto, as of the old buildings in general, is the result of an empirical know-how, by using a very narrow set of readily available materials, without being subject to any prior conception of the project (in Porto, the street elevation is only required in planning applications from 1889). These buildings are characterized by a diversity of technical solutions, languages and forms of functional organization, which constitute an heritage deemed of systematization, as indeed has happened to the housing typologies in the study by [Fernandes 1999].

Indeed, a careful analysis shows that, despite the uniqueness of each building, it is possible to identify many intransience and a high degree of systematization and standardization of constructive methods. This is very notorious for the period of the nineteenth century, which also corresponds to the most consistent season of this historical legacy, and is linked to the great expansion of the city, which began in the late eighteenth century, and certainly was also influenced by the reconstruction of Baixa Pombalina destroyed by the earthquake of 1755.

2.1 The Importance of Implementation and Dissemination of Research about Old Buildings

The study on the constructive system of bourgeois houses of Porto has started with the academic research that led to a first systematization [Teixeira 2004] and is being further addressed through consulting the information available in the collection of CRUARB. However, at this stage of the research and against our best expectations, there appears to be few documents relating to surveys (geometric, photographic, records of anomalies, diagnoses, etc.). The explanation for this, not yet evaluated, may relate to various reasons: loss of documentation, lack of capability or simply the option of not proceeding (due to the advanced state of disrepair of the buildings).

The lack of published studies on the materials and construction techniques used on the old buildings in Portugal, developed within academia or resulting from the municipal offices practice, probably indicates that the scenario of Porto is not unique in the country, as the same happens with the other cities, with the exception of the Baixa Pombalina. This status contradicts the recommendations of international documents since the Venice Charter (1964).

Despite these setbacks, it is based on the existing systematization that we currently undertake the development of a constructive model designed to be part of a methodology for intervention in old buildings in general and, in particular, in the bourgeois houses of Porto.

2.2 The definition of the Constructive Model

The constructive model is composed of one or more building (s) representing the main features of the constructive system of the houses. Its idealization results from the classification methods and techniques of the various elements that compose the building, based on the observation frequency of their occurrence. The result is a building which iconography identifies with the existing ones, representing their common characteristics.

In the case of Porto, the number of occurrences that characterize the still existing houses exceeds its materialization in a single consistent building, and it is therefore necessary to increase their number. In this case, it is essential to find a logic for the other buildings still to create, being its classification by eras one hypothesis.

When analyzing the systematization of the types of housing developed by [Fernandes 1999], which classifies the old buildings into three main types, corresponding to the merchants (seventeenth century), enlightenment (eighteenth century) and liberal periods (nineteenth century), the adaptability to the occurrences recorded was noted, so these types were adopted for the definition of the buildings that will compose the constructive model.

2.2.1 The Merchant House, XVI / XVII century

The merchant's house is located inside the overcrowded wall, in compact blocks, fully occupying the small plots. It usually has only one facade facing the street, and has several floors, four to six, many of them in sway.

Only the ground-floor walls are in granite masonry (stone abundant in northern Portugal), the remainder being on wood as well as the floors and roofs. These walls of wood or 'of frontage', are composed of a square grid structure, filled with mortared small stones or filled brick. The floors or 'sobrados' are made of wooden logs simply peeled, coated with pine planking on the floors and ceilings, if any. The structure of the roofs, usually hip type, also consists of wooden logs like the previous ones, being its coating initially with straw, which was progressively replaced by ceramic tiles.

Corresponding to a time when the housing space had not yet been specialized, these houses are predominantly multifunctional and the ground-floor is designed for retail or workshops and the other floors would often house the for property owners and employees.

2.2.2 The Enlightenment House, XVIII century

The Enlightenment house began to develop in depth, usually featuring two facades both facing streets or one facing the inner courtyard, depending on the type of plot.

The construction of the Enlightenment house becomes more robust, because the front walls are being replaced by granite masonry. Several houses belonging to wealthy property owners, have remarkable facades with monumental works, trying to imitate the exuberance of the Baroque style. The structure of the houses still uses wood logs, as well as the roofs, which remain hip type. Inside, the highlights are the ceilings in wood, in the shape of a "skirt-shirt" or more elaborate, in the form of panels. At the end of this century, the first coating in stucco develop and on the outside, the first frames with glass panels.

In regards to its internal spaces, the house retains the same multifunctional organization although there was however a specialization and hierarchy of the housing spaces due to society changes.

2.2.3 The Liberal House, XIX century

The major innovation that the liberal house (Fig. 1) introduces, in terms of functional organization relates to changing the type of usage, from multifunctional to single use as it is designed exclusively for residential purposes. Consequently, the ground-floor where the social spaces are located, moves away from the street, whereas the kitchen and services move to the basement, whilst the bedrooms are kept on the upper floors. The setback top floor, which is much used, and the attic of the roof are intended primarily as storage rooms and to support spaces or dormitories for employees.

The plots slightly increase in width (6.5 m average) and significantly in depth, as a consequence of the spatial evolution of housing, where the introduction of a central skylight allows for the existence of interior compartments. Health concerns determine an increase of the ceiling height and the introduction of toilets that are located on the facades of masonry.

Constructively, the systematization of the elements and construction processes is noted. The exterior walls are entirely in brick, with the exception of the facades of recessed floors, supported on the logs. The facades acquire a more austere design, starting to use the tile as a preferential coating choice. In the structure of the floors, as well as on the roof, the application of wooden log coexists with the squared beams. The finish of the floor continues to use pine planks and the ceilings are already coated with stucco work more or less elaborate depending on the economic capabilities of the owners. The hip type roof remains and the gable type emerges, all with more slope, allowed for by the use of the Marseille tile. The skylights, raised or low-flying, square or circular, are new elements to emerge in the rooftops worthy of highlighting.

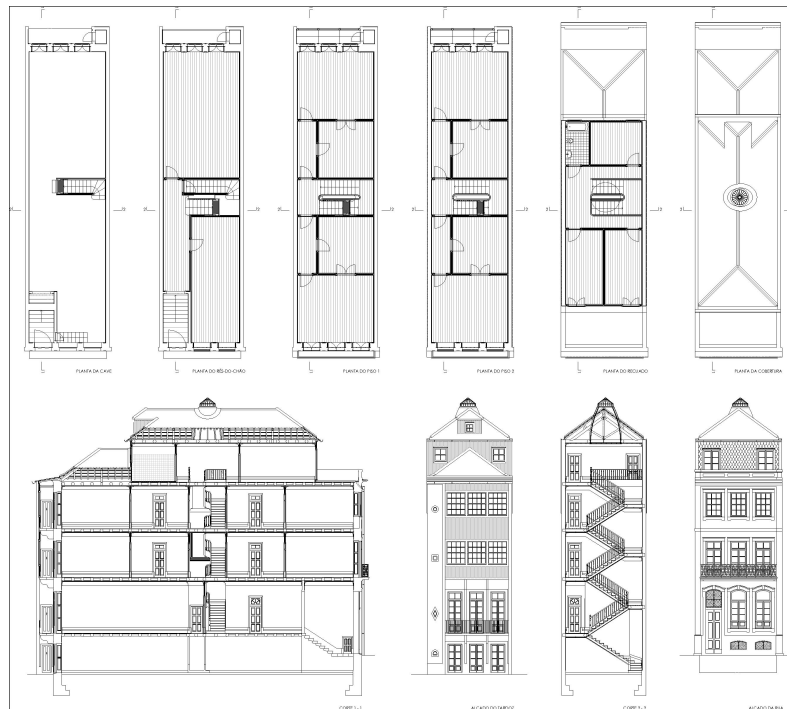


Figure 1. Plans, sections and elevations of the buildings that constitute the constructive model, namely a liberal house, corresponding to the nineteenth century.

The constructive model is represented in the drawings of plans, sections, elevations and typical-details, in scales never less than 1:50, representing the general, and up to 1:1, for detail.

The model representing the constructive system of the houses in detail, as well as other information characterizing the buildings, for example: the most frequent anomalies or commonly introduced changes [Teixeira & Póvoas 2009] should be a supporting tool for the preliminary design assessment and diagnosis, but also for the design and construction, helping to streamline the complexity of interventions. In this sequence, by analogy, it is possible for the technicians to regulate inspection of the existing, making it more assertive, thus reducing the time spent in the preliminary diagnosis. Moreover, this procedure will prevent or minimize the inconvenience that these operations are having on users, where it is necessary to keep the buildings open.

3 FROM THE CONSTRUCTIVE MODEL TO THE CHARACTERIZATION OF THE PATHOLOGICAL CONTEXT

The characterization of the anomalies most important and most frequent, to apply to the constructive model refers mainly to the phenomena noticeable by simple observation, which does not require more complex testing, involving varying degrees of intrusiveness. This systematization stems from the authors personal experience, from consulting existing documentation in the offices of the local authority responsible for the historic centre urban conservation, the old CRUARB, currently under the Society for Urban Renewal (SRU), Porto Vivo, and the establishment of similarities with other published studies such as [Cóias 2006]: [Feiffer 1995], [Cabrita 1993], [Appleton 2003], [Aguar *et al.* 2005], etc.

Research done to the collection of CRUARB has revealed the existence of too brief or insufficient information regarding the characterization of buildings worked on, particularly with regard to surveys (geometric and photographic) and records of inspection and diagnosis of abnormalities. If at the start of this government agency activity this lack of records can be justified by the unstable post-revolutionary period of April 25, nevertheless the responsibility for the heritage conservation of the historic centre that is granted later should have imposed more rigorous performances. As for the

existing documentation in the current SRU relating to the buildings recently intervened upon, there are only short surveys, virtually brief descriptions based on simple observations, unrelated to the geometric survey, as well as a generalized absence of more detailed inspections.

3.1 The Form of Representation

The organization of the pathological context through the graphic elements is done from the general to the particular, following the scales normally used in the projects: plans, sections and elevations to scale 1:50; internal spaces or relevant areas to the scales 1:25 or 1:20; unique elements such as exterior and interior joinery, to scale 1:10 and typical details to scales 1:5, 1:2 and 1:1.

The 1:50 scale encompasses drawings of plans, sections and elevations, representing an overview of the building and the integration of different parts in the development. This scale can cover a lot of information about the various anomalies, indicating for example its exact location, some quantitative and qualitative data or reference to other drawings where there is a detailed approach (Fig. 2).



Figure 2. Elevations, of street and courtyard, to scale 1:50, of a bourgeois house in Porto. Model, corresponding to the Liberal period, indicating the most frequent anomalies.

1:20 or 1:25 scales consist mainly of drawings of plans, sections and elevations, representing partial areas of the building or specific elements which are considered worthy of mention. Examples: excerpts from the walls, the main interior spaces, unique elements such as skylights or dormers, etc.. The ability of these scales to contain more detailed information allows for the inclusion in the drawing of more data about the anomalies and the elements in the analysis (Fig. 3).



Figure 3. Plans, of floor and ceiling, and elevations of a main interior space of a bourgeois house in Porto, to scale 1:20, indicating the most frequent anomalies.

The 1:10 scale, which may still consist of plans, sections and elevations, often represents the elements whose specificity is worthy of emphasis, such as interior and exterior joinery (Fig. 4), skylights, windowpanes, dormers, etc. Finally, the scales 1:5, 1:2 and 1:1, typically consist of drawings of sections, used to represent the typical details, of transition or closing situations, examples of which include: gutters (of parapet or division wall), eaves, transitions existing on roofs, transitions between floors and between exterior or interior walls, etc.

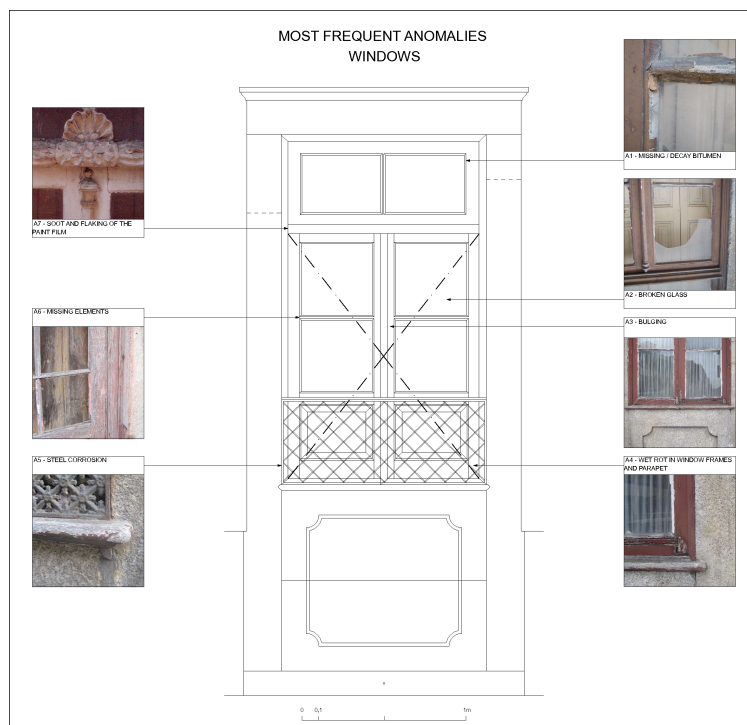


Figure 4. Elevation of a window to scale 1:10, indicating the most frequent anomalies.

Since the various scales which constitute the most frequent characterization of the pathologies of bourgeois houses of Porto are interdependent and complementing each other, it is essential to ensure the good connection between the drawings in order to enable their easy reading and coherence.

The graphic elements described will be accompanied by inspection and diagnosis summary reports with other complementary data, such as: causes and consequences of deficiencies, repair solutions and prevention methods, considered essential to a better definition of the pathological context of the buildings.

We hope that this proposed constructive model with an indication of the pathological context of bourgeois houses in Porto will form a valuable contribution to the development of a methodology for intervention in these and other ancient buildings, helping to streamline the complex process that characterizes this type of actions, thus fulfilling the objectives of increasing its number and quality, of preserving the authenticity of an heritage property, as well as of a sustainable activity.

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