

THE IMPORTANCE OF THE RESEARCH IN CONSTRUCTION HISTORY FOR THE SAFEGUARD AND VALORIZATION OF THE ARCHITECTURAL HERITAGE THE EXAMPLE OF THE BOURGEOIS HOUSES OF THE CITY OF PORTO

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Abstract: In recent times, the most developed countries have been responsible for the production of a surplus increasingly untenable, with serious consequences for the natural resources and for the environment. In the case of housing, this problem is aggravated, such is the dimension of its impact.

In a near future, the new paradigm centred in the intervention on the existing buildings, will impose, necessarily, a change in the design process. In this context, the research in Construction History reveals itself of the most importance, given its contribution for the knowledge of the techniques and the constructive systems of the past. This fact, actually, it is so much more relevant the greater is the patrimonial value of the object of study.

It is proposed to present the methodology that has guided the characterization and typification of the constructive system of the bourgeois houses of Porto, work that, initially, has aimed to give a contribution to the Construction History in Portugal, and that, subsequently, has served for the conception of a methodology of intervention in this important example of architectural heritage.

Starting from the surveys accomplished in the scope of academic works, the research on the constructive system of these buildings has been complemented and validated with the dispersed information taken from available old manuals and from scientific studies conducted on the subject, assuming, in this study, drawing as the main tool of interpretation and systematization of the accomplished work.

1. INTRODUCTION

We are in a transition phase, a paradigm shift, whose contours are still difficult to define, but that certainly will be marked by profound environmental concerns.

Expansionist practices that have marked the construction market and the current architecture, based on the consumption of natural resources and resulting in a strong negative environmental impact, will be progressively replaced by a greater focus on existing buildings, in particular on those with embedded cultural values.

In this context, acquire great relevance the studies on the materials and construction systems used in ancient buildings, in view of their preservation, herein considered as a first approach for a sustainable practice of architecture.

2. THE IMPORTANCE OF HISTORICAL RESEARCH FOR THE SAFEGUARD OF CURRENT HERITAGE

The importance of historical studies is one of the most repeated recommendations by the international documents related with heritage intervention and safeguarding projects, from buildings up to the urban scale of the city.

When it comes to ordinary buildings integrated into urban complexes, whose interventions, in general, are unable to obtain adequate financial resources, it is critical to develop studies that aim to systematize the information required to support the intervention in these buildings. Ideally, these studies should be widely publicized and made available to the technicians, for example, through the agencies of urban governance, as recommended by international documents.

In fact, the existence of historical studies, or its early realization, will guide and inform the intervention process, allowing to simplify certain types of inspections, thus making the task of recognition and mapping of the building main characteristics, less intrusive and time-consuming.

2.1. The contribution of the history of architectural construction

With regard, specifically, to the study of the historical building, the research initial objective is to understand the techniques and construction systems envisaged in the design and used in its construction. In a second phase, attention should be addressed on eventual further alterations of the structure and other elements, as well as on the occurrences that could have caused damage. In this sense, the knowledge of what happened in the past should help to understand the present and predict the future behaviour.

This is the framework that has encompassed the description and classification of the constructive system of the city of Porto bourgeois house, whose methodological approach is presented in the following.

3. CHARACTERIZATION OF THE CONSTRUCTIVE SYSTEM OF THE BOURGEOIS HOUSE OF PORTO

The characterization and classification of the constructive system of the bourgeois house in Porto has begun ten years ago and has undergone several stages of evolution, stemming from the evolution of studies. The first systematization was presented in 2004 [1]; in 2012, this former systematization has been subjected to a synthesis in the context of its integration in a rehabilitation manual for ordinary ancient buildings [2]; more recently, a new reformulation has been done, following a Ph.D. research aiming to develop an intervention methodology in the constructive system of ancient buildings [3].

The underlying studies were based on the knowledge gained through the realization of hundreds of academic works focused on the survey and interpretation of the constructive system of these buildings (Figure 1).

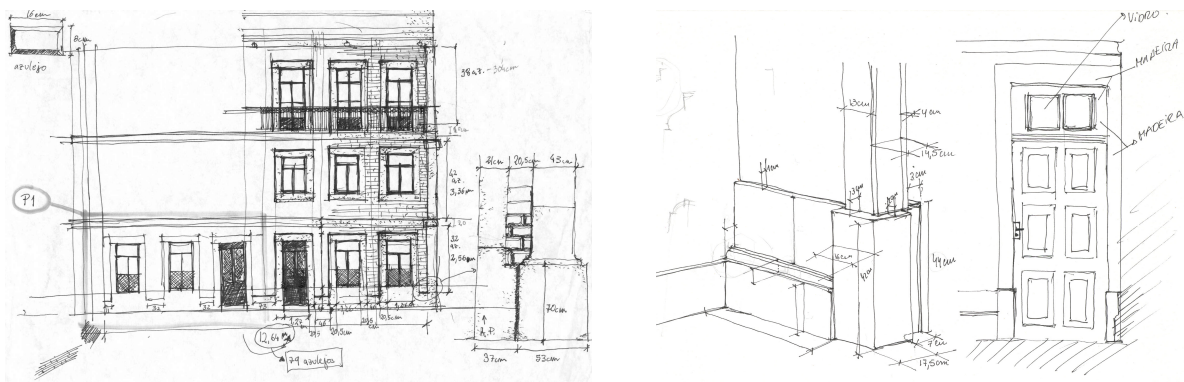


Figure 1. Examples of registration drawings made by students, from façade to interior.

Following this relevant data, which is increasing every year, it has been developed a research on primary and secondary sources of various kinds, which, altogether, have constituted an important support for the characterization and systematization process.

The primary sources, consisted, mainly, in the construction processes of buildings prior to 1900, belonging to the Municipal Historical Archive of Porto (AHMP); in the analysis of surveys related with the interventions of the Commissioner for Urban Renewal of Ribeira-Barredo Area (CRUARB), placed in the same archive; the manuals or treatises from the time of construction of the buildings and, finally, the main legislation that could affect directly the construction of these buildings.

Regarding the construction processes, it was decided to check only those corresponding to buildings that already have a photographic survey. From the analysis undertaken, it was found that, in general, the construction processes include very little information about the constructive system of the houses, both in drawings and written parts. The older the processes are, the more evident it becomes this fact.

Concerning the survey conducted by CRUARB, the lack of treatment and organization of the data, prevented the access to this material in due time.

The manuals with largest national divulgation during the eighteenth and nineteenth centuries [4, 5 and 6], as well as the main volumes of the "Professional Instruction Library" [7, 8, 9 and 10], published up to the early decades of the twentieth century, since they include the most common construction practices to the times in which they were produced, have made possible, by comparison, to validate the study undertaken.

The most influencing laws in the construction of buildings, notably the "Codes of Postures" established by the Porto City Council, from 1855 up to 1905, and the "Regulation for Healthiness of Urban Buildings", published in 1903, refers to some of the materials applied, namely in downpipes, gutters, water supply and sewerage components, etc.

With regard to secondary sources, deserve special mention the extensive studies on the houses of Porto, accomplished by ethnologist Ernesto Veiga de Oliveira, with illustrations by Fernando Galhano [11], given the fact that they represent the first systematization about this building system. These studies are complemented by more succinct approaches to specific materials or elements, such as crates and other iron elements [12], tiles [13], balusters [14] or plasters [15], among others. Studies on techniques of common use in the north of Portugal, such as the arts of plaster [16], also proved to be very useful, due to their influence in the construction of this type of buildings.

Recent academic studies on building materials and elements, such as tile [17] or masonry walls [18], have also contributed to enhance the characterization and for the establishment of deeper developments.

Still regarding academic studies, it should be pointed out the contribution of some recent works related with the urban context of Porto, where some aspects of the construction of domestic buildings were addressed [19, 20].

3.1. The importance of drawing

The drawing (sketch, rigorous or using CAD) has been the preferred tool of characterization of the constructive system of the bourgeois house in Porto, considering its interpretation, synthesis and representation.

As an example, it must be emphasized that the recent characterization performed in CAD support, has implied the reorganization and synthesis of all available information, which has been performed using the fundamental support of new sketches, in order to update the interpretive drawings previously elaborated for each of the elements (Figure 2).

The very conception of a constructive model to support a methodology of intervention in buildings was only possible thanks to the use of drawing as the main mode of systematic characterization.

The choice of drawing results clearly from the fact that this study has been undertaken in the area of architecture, but also because drawing constitutes a universal language, common to other disciplines, and in particular to those belonging to architecture and civil engineering domains.

Finally, the relevance given to drawing is further justified considering the fact that this characterization also aims to contribute to safeguarding and valorisation of the built

heritage.

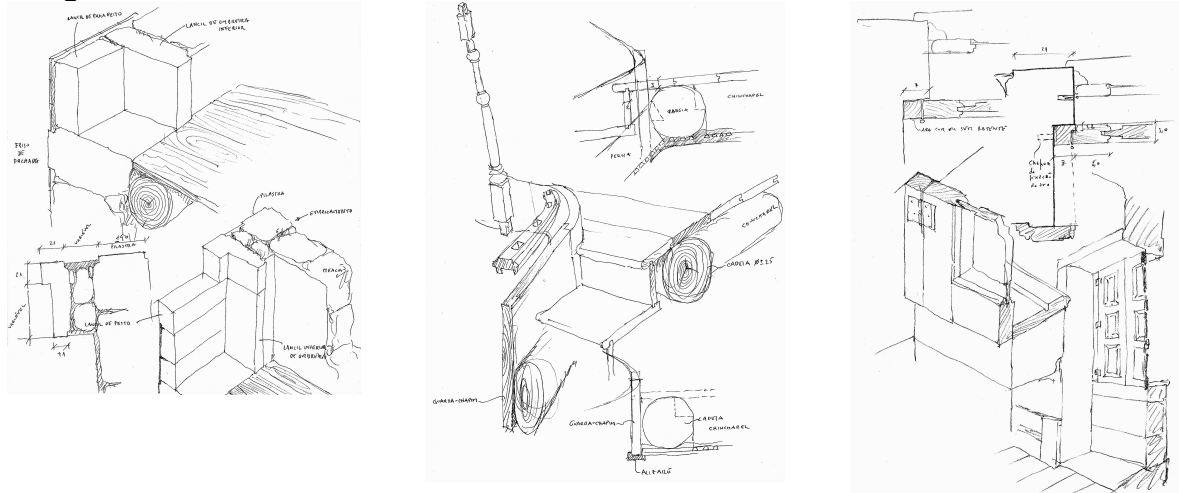


Figure 2. Example of interpretation drawings, from façade to interior, made by students.

3.2. Organization of the characterization

Since the first systematization [1], it has been established that information should be organized selecting the main components of the houses constructive system, taking in account the construction process of buildings. In accordance, it starts by addressing the foundations, followed by the execution of exterior masonry walls and floors, roofing, doorways and windows and, finally, the execution of coatings and finishes.

The development and deepening of knowledge about the building system led, in the last systematization [3], to a reformulation of the hierarchy of the elements, keeping the previous sequence, but focussing on their function and structural relevance. In accordance, the elements were structured as follows: foundations; buried walls; external walls; floors; roofing; interior walls; vertical accesses; outer frames; interior frames and building installations.

The characterization of each element seeks to follow a sequence that begins with the structural aspects, followed by the description of its coatings and finishes, and favouring, in principle, an approach from the general to the particular.

3.3. The characterization through the constructive elements

For each constructive element, all the required drawings are included, for a full characterization of the constructive model, namely in plan(s), elevation(s) and section(s). This representation encompasses different scales, moving from the general, integrated into the building, to the particular, concerning the main construction details. In addition, photos are also added in order to provide a clear characterization of the element in the house context (Figure 3).

In the following, the variants of the constructive model were also addressed, as many as it was possible to identify, both in their general representation, in drawing and photo, and in their

constructive peculiarities (Figure 4).

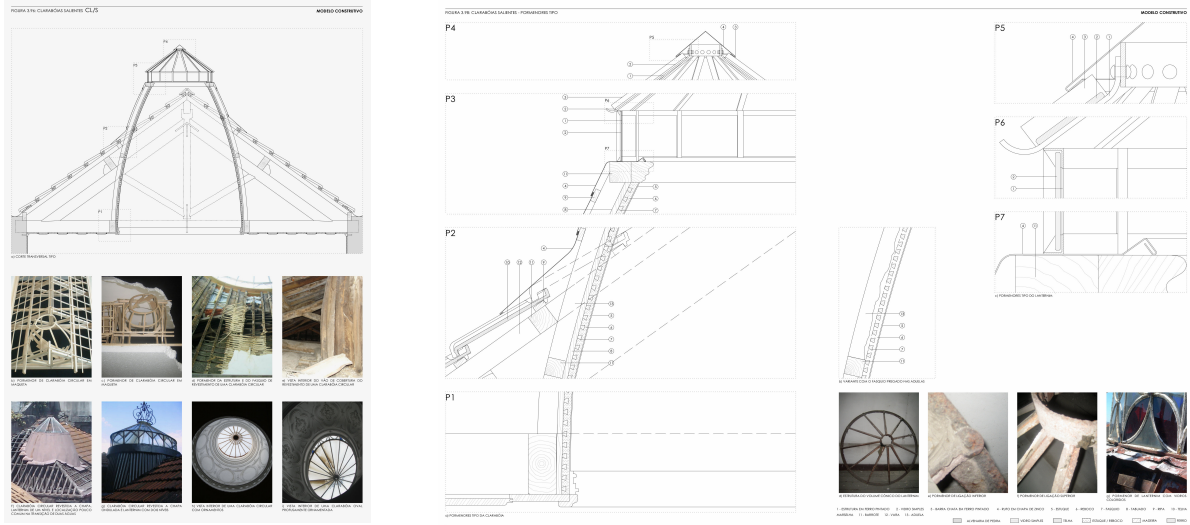


Figure 3. Skylight model. Section type drawing, details and photos.

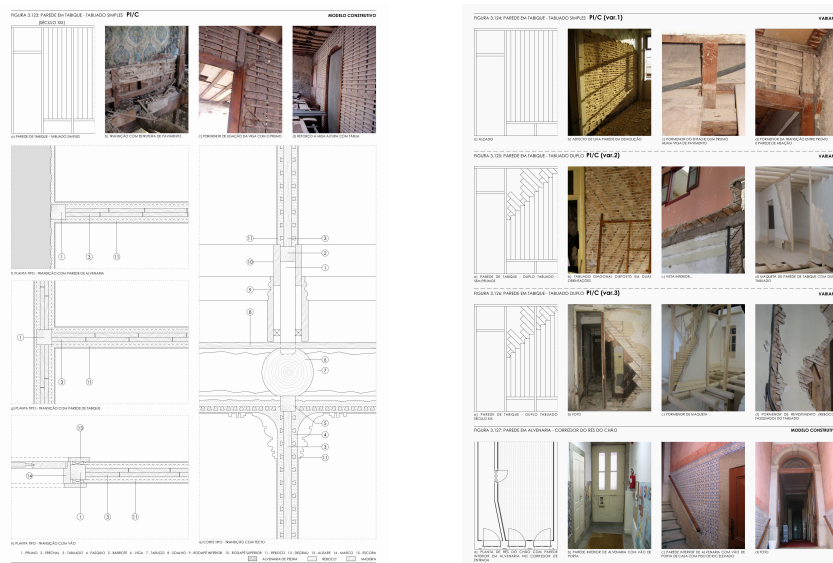


Figure 4. Interior walls: model and variants. General drawings, details and photos.

4. DEFINITION OF A CONSTRUCTIVE MODEL

The recognized high degree of systematization of the applied techniques and constructive solutions, followed by a strict application of materials, facts that were certainly influenced by the systematization of the reconstruction forced, at the second half of the eighteenth century, by the Marquis of Pombal, has determined the design of a constructive model, consisting on an easily identified building and fully represented by the appropriate plans, elevations and sections (Figure 5).

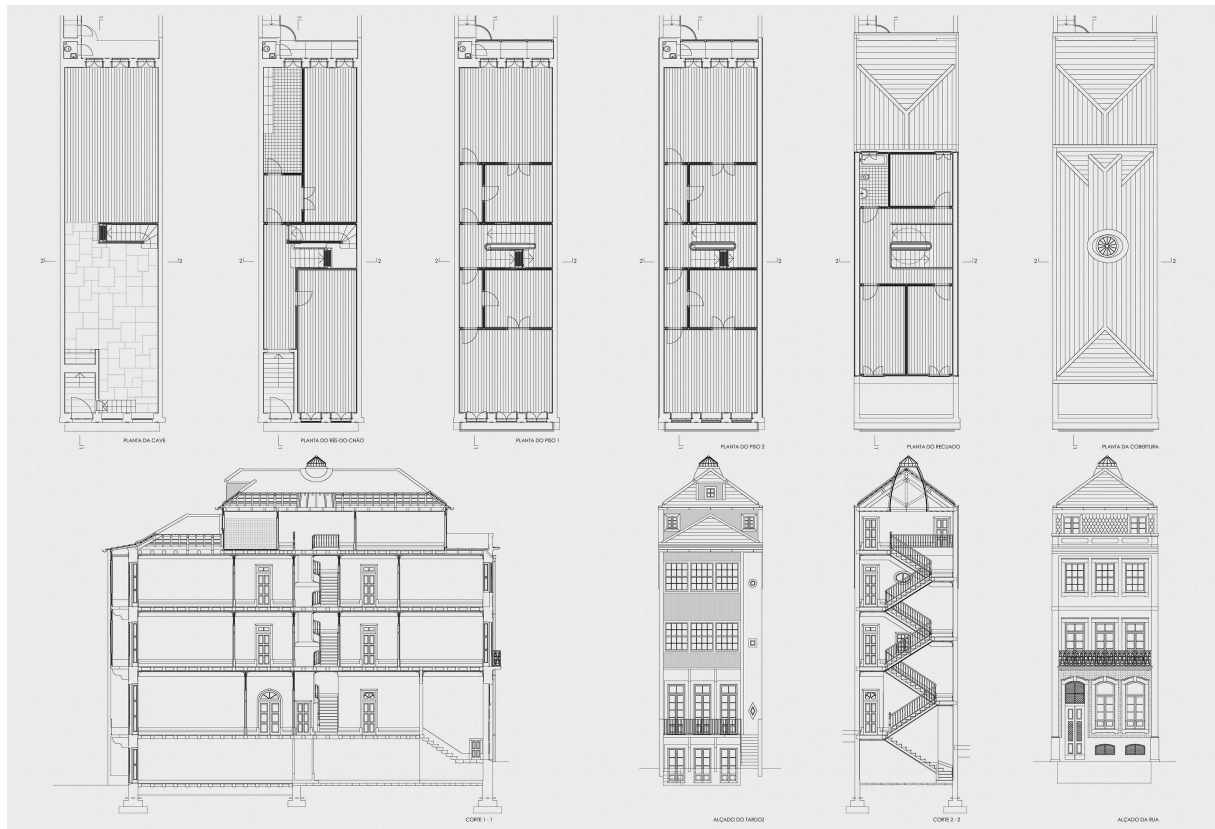


Figure 5. Plans, sections and facades of the constructive model.

This model has been established taken the most frequent constructive solutions for each of its elements, from foundations to the outer frames. The result is necessarily a nineteenth century building, due to the fact that, along this century, the city of Porto has suffered a strong development and expansion.

The design of this constructive model has had, as its main goal, the implementation of a methodology of intervention in these buildings, which aims to streamline the corresponding actions of intervention, always subjected to various constraints, such as, for instance, the lack of economic means to conduct the appropriated surveys and inspections.

5. CONCLUSIONS

The historical studies in architecture, and namely on the traditional (pre-industrial) constructive systems of ordinary (domestic) buildings, tends to acquire increasing importance at this paradigm shift stage we are in. This results, on the one hand, from the disbelief that some less careful options have earned, and secondly, from the need to reuse existing assets, for obvious reasons of environmental sustainability. In the case of the studies that have been carried out over the constructive system of the bourgeois house in Porto, there exists a belief that they represent a relevant contribution to the history of architecture and construction in Portugal, as well as to the safeguard of this architectural heritage.

In fact, one gets the expectation that through this contribution and the intervention methodology developed in its sequence, it becomes possible to qualify the interventions into this built heritage, while ensuring the protection of their cultural values.

5.1. Suggestions for future developments

Throughout the research that has been carried out, several issues arose that could provide clues to future developments. In this regard, it should be noted:

- Analysis of the buildings surveys undertaken under the action of CRUARB;
- Study of the buildings processes integrating the conservatories and the archives of "Waters of Porto";
- Study of the documentation relating to professional organizations (architects, civil engineers, etc.), as well as professional training schools of Porto;
- Exhaustive study of the various representations of this built heritage in graphic (drawing, printmaking, painting, photography, etc.) and written supports.

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