Intervention limits in floor wood structure restoration of a historical building

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ABSTRACT: In 1995, a routine inspection carried out by the Restoration Department of Federal University of Rio de Janeiro disclosed instability of wood floors in a room located in a Brazilian 19th century building. This paper presents a concise report of this structural degradation. It focuses mostly on the project of structural restoration of areas that brought about the practice works to be implemented in a historical building listed by the Brazilian Historical Artistic Heritage Institute. Not limiting this study to a description of the strengthening work stages, this research analyses the actions adopted to restore the damage caused by termites in wood beams, trying to evaluate the adequacy in this specific work of the guidance of international charters of architectural heritage. The main goal of this paper is to analyse the criteria that oriented the feasible restoration and the limits of this intervention.

1 INTRODUCTION

The conservation criteria, available in charters, agreements and international declarations, are applied to the restoration program of historical buildings. One of the most controversial matters by the conservation architects and heritage consultants’ standpoint is the insertion of materials and constructive techniques in historical heritage.

The debate involving the replacement and/or insertion of degraded materials interplayed with the heritage authenticity aspects and its values will herein be presented.

In order to exemplify the technical issues, the case study of a wood floor restoration will be undertaken. The practice work has been performed in the city of Rio de Janeiro, in a historical building, widely recognized for its artistic and cultural values.

This paper describes the structural restoration of those wood floorings. However, its main target is to demonstrate that the project here displayed has respected the intervention limits of restoration charters. In order to prove it, this study will show the rehabilitation phases followed by the suitability between restoration theories and practice.

2 THE ISSUE OF REPLACEMENT AND/OR INSERTION OF THE BUILDING NEW ELEMENTS

By intervening in an ancient building, one must bear in mind its primary aim, in order to guarantee a proper preservation: to value properly its original constructive elements. As a consequence, when dealing with the restoration of the whole building or parts of it, materials should only be replaced and/or added if there is a technical requirement. The use viability of the architectural monument would be guaranteed, as well as its preservation, preventing any imitation or counterfeit.

The restoration project must start by the identification of the elements to be preserved and those suitable for adaptation and/or removal. In order for this to be accomplished, a precise and meticulous register of the building history is needed. Besides, the physical status and its current conditions regarding constructive materials require special care when it comes to pinpointing its frailties.

It must be underlined the need of a detailed survey of new materials and technologies insertion, adding distinct physical proprieties to the building, when compared to the existing ones. One must also analyse the utilisation of traditional materials and construction techniques in a historical heritage.

One of the resolutions of the Athens Conference in 1931 was the use of modern techniques and materials in consolidation work of historical buildings. However, the strengthening “should whenever possible be concealed inasmuch as the aspect and character of the restored monument may be preserved” (In: http://www.icomos.org).

The Venice Charter, dating from 1964 goes in the article 12: “Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so
that restoration does not falsify the artistic or historic evidence”. In addition to that, in the article 10: “Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience” (In: http://www.icomos.org).

The Italian Charter of Restoration of 1972 approaches a prevailing architectonic restoration standard: “the replacement and possible integration of ornaments [...] ought to differ from the existing elements, implying the material and surfaces to stand out, making them distinguishable from the originals”. It also mentions the interventions must be implemented for fear no doubt is left and by the most discrete manner (In: http://www.icomos.org).

The General Conference of UNESCO at Nairobi in 1976 recommends researches and systematic surveys on the use of modern techniques in conservation works, as well as studies about craftsmanship techniques, important to the building safeguard.

3 THE MATTER OF AUTHENTICITY IN INTERVENTION

The legitimacy of the restorative intervention in historical buildings was debated since the very beginning of restoration theories. Authors like Boito stated as a fundamental concept the distinction of the new parts from the existing ones, as well as emphasizing the prudence of limiting intervention actions to the minimum required. All material to be added or replaced should have a different feature, in the type of material to be used, or should bear a plaque, indicating the successive architectural alterations. The new parts to be inserted should exhibit simple lines, being perfectly balanced with the ancient building.

Later on, the Venice Charter has established that the new elements ought to differ from the existing parts, and the same criterion was sustained by the Italian Charter of Restoration.

This differentiation theory was strengthened in later congresses, aiming at the visibility of the interventions to be carried out, refusing the idea of utilisation material and techniques similar to the existing ones, preventing historical fraud.

In his book Theory of Restoration written in 1963, Brandi (2004) mentions the judgement of counterfeit. The author refers to the essential attributes the subject should possess, but is not able to earn: the falseness is in the judgement and not in the purpose. One of two identical objects may be considered a fake, according to its intention.

Pursuant to him, the distinction between copy, imitation and counterfeit is not in the specific diversity of the production methods, but otherwise. Hereupon, he points out two situations in which an intervention could be considered a counterfeit:

1. Production of a purpose with the specific intention of deceiving either the period, the material coherence or the author, or
2. Diffusion of an object, not necessarily intended to deceive as if it were an authentic work, from that period; by non-authentic authors and producers different from the genuine one, and made out of distinct materials. In other words, it has been created with no counterfeit intention, but meant to be divulged as the original.

According to Brandi, to get the counterfeit judgement, it is necessary to prove the swindle.

This issue has been developing, oftentimes being debated in international congresses and seminars. In Japan, November 1994, the Nara Conference, based upon the Venice Charter, has discussed the authenticity issue linked to the intrinsic heritage value and the cultural identity of the region in which it is placed.

Following the international stream, Brazil has hosted the V Regional Meeting of ICOMOS in 1995. A regional document on authenticity of the southern cone countries was the result of this assembly. Brasilia Charter established that authenticity of values is manifest, supported and preserved in the truthfulness of the heritage that we receive and transmit. Intervention must rescue building or site character, underlining its authenticity without transforming its essence and balance, avoiding extraordinary actions and enhancing its values. The Charter avows the quality of the treatments as fundamental and all new elements introduced must be both reversible and harmonious with the whole.

The issue of authenticity is rooted in the values attributed to the heritage. The judgement of value was broadly discussed in “The modern cult of monuments” by Riegl in 1903. This matter was the main point of Nara Conference, in 1994, related to scientific studies on cultural heritage, conservation and restoration planning and procedures for the World Heritage Convention.

The Nara Document claims that the authenticity emerges as the chief criterion when it comes to values attribution. “The understanding of authenticity plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning”. (http://www.international.icomos.org).

The interventions carried out in the University Palace of UFRJ – Federal University of Rio de Janeiro will be herein analyzed based on these concepts, more specifically the floor restoration of three rooms located in this building.
4 THE EDIFICATION SUBJECT OF INTERVENTION

The University Palace (Fig. 1), heritage building located in the University Campus of Praia Vermelha houses some faculties of Federal University of Rio de Janeiro. It is a neoclassical style building, situated in the city of Rio de Janeiro, listed in Brazilian Historic and Artistic Heritage Institute. The building exhibits restored rooms, ceilings and walls smartly decorated, frequently used for concerts, congresses, academic, technical and administrative activities and solemnities. The rectory appointed these areas to the academic community and to Rio de Janeiro inhabitants’ use.

4.1 Restoration of wood floors

The loose fixation between the beam and the clapboard of the floor in Education Faculty of Federal University of Rio de Janeiro lead to a prospective action in order to find out its cause. The primary visual survey pointed to some clapboards disconnected, next to the walls. These supporting walls were wet. By analyzing the roof conservation status over these areas, it was possible to detect clogging of the rainwater down pipe, leading to an overflow above the gutters, causing frequent infiltrations in the internal face of the wall and also percolating its core, reaching the supporting clapboards wood beams. This humidity has created ideal conditions for the termite and fungus infestation in the floor. Around 60% of the wood beams were infected by termites. The micro-organisms and urban plagues, as we know, burgeon at humid zones, promoting the rottenness of part of this beams, reducing partially or drastically its original section (Fig. 2).

The Restoration Department was designated to work on a strengthening project of three wood floor rooms: (1) Science and Culture Forum coordinator cabinet, (2) Coordination of Post-Graduation Program of Faculty of Education Coordination. (3) Golden room (Fig. 3). Under the supervision of the head architect, a multidisciplinary team was gathered, composed by urban plagues biologists experts, structural engineers, and a proficient firm specialized in wood structural restoration. The practice work evolved, therefore, in three lines. In the first one, biologists determined the termites infecting species, in order to guarantee the efficiency of the plagues control program. In the second one, structural engineers calculate the remaining section of each wood beam, to make the structural assessment. Finally, the practice restoration work was carried out according to the engineers strengthening project.

The wood beams were properly inspected. For this purpose, the clapboards of the rooms to be restored were removed after being mapped. The most vulnerable zones, located in the extremities and under the roof gutter called for extra care. The tongue and groove connections of the clapboards to the wood beams were previously done by means of long forged iron nails. They were then replaced by steel screws. This system allowed the access to the beams, as long as from that time on the wood beams assessment was to be made...
The removal of the nails frequently destroys partially or completely the clapboards mortises, whilst the use of screws allows their removal without damage, making possible the application of baits and products to promote the termite and other wood degradation vectors.

The Figure 4 shows the ongoing floor restoration in the Science and Culture Forum coordinator cabinet, University Palace.

When defining the material to be adopted in this practice restoration work, the wood seemed to be the best choice. Studies pointed out which Brazilian species bore elasticity modulus fine enough to encompass the room wide extension. Special cares were taken so to guarantee the proper level of the new beams dryness. Stoves were used to assure its efficiency, when replacing and strengthening the pre-existing ones.

The Figure 5 shows a scheme of the replaced strengthening beams in the Science and Culture Forum coordinator cabinet. This proceeding has been likewise carried out in the other two restored chambers.

Regarding the project of floors structural strengthening, the Restoration Department had aimed in the first place at human's life safeguard. Therefore, each pre-existing structural wood beam has been assessed, to pinpoint those to be strengthened or replaced. Another special care was required from the biologists responsible for the termite control. The product used in the disinfection process should not be toxic, to avoid harming the docents, students, employees and other haunters of the building, since the restoration practice has been mostly achieved during academic year.

5 FLOOR RESTORATION SURVEY: INTERVENTION LIMITS

When opting for wood to be used in beams and clapboards replacing and strengthening, this was a natural choice, as the material embodies the concept of the original project. However, the species were picked out according to their elasticity moduli, not necessarily taking into account the existing species found in the room. However, wood benefitting was achieved by modern extraction and sawing techniques. This proceeding abides restoration documents, like the Venice Charter and the Italian Charter of Restoration. This case study has respected the former: the replacement and strengthening of the wood beams has been integrated to the whole. However, concerning the intervention period, the difference between the inserted material and those pre-existing ones can only be distinguished by the wood benefitting modern system.

When it comes to the replacement of the iron forged nails by steel screws fixing the wood floors next to the walls, the distinction between the pre-existing technique and the modern one is fully catered.
The necessary strengthening in some of the timbers was accomplished by the “sandwich” technique, putting two new pieces parallel to the pre-existing ones.

The remaining doubt refers to the highly perishable feature of the wood, mainly when utilized in humid tropical weather (Rio de Janeiro relative humidity is above 70% all year round). If this high humidity level foments the termite infestation why had not the timbers been replaced by a more long lasting material, like steel?

The option for metallic beams could pinpoint the exact intervention period, and the advices of the heritage charters would be abided. A future survey could allow the identification of steel utilization as dating from our times. An extra benefit would consist of the prolongation of the inserted beam durability, when compared to the pre-existing one. By the way, one of the main goals in restorative interventions is to hinder new interventions on a short span. The replacement of wood beams by metallic ones could be threat a future, for the utilization of modern materials and techniques would make a “patchwork” out of the heritage building. Losing the constructive original features dated from its erection period would mean losing its authenticity as well.

Concerning its physical aspect, a primary mapping of the pre-existing wood pieces had been performed, before the removal of the floor wood clapboards, allowing its fixation to the previous position. The new inserted wood pieces followed the original pattern, the usual proceeding in these cases.

6 CONCLUSION

The current theories tell the insertions from the whole, and were applied to this restoration work. The material had not been changed, likewise preserving the authenticity of the building. Moreover, the durability of the restoration practice carried out may disagree with future conservation decisions.

The key point about the restoration proceedings definition and the materials to be utilized depends upon the limits of the intervention; in other words, up to what extent it is possible to intervene in a heritage?

This intervention ought to be limited by the preservation of a historical building, its values, authenticity and identity of the local cultural heritage where the monument belongs. One must dedicate special care to the values to be preserved and what would be the essence of restoration practice.

Regarding our heritage actions, this is a concept and paradigm changing era. The target should not only be the material safeguarding, but mainly the historical building image and authenticity, as a cultural identity offspring.

REFERENCES

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