Chapter 56

Inspection of pathological manifestations and map of damage on facades: case study in "Block C" of the polytechnic school of Pernambuco

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ABSTRACT
The Polytechnic School of Pernambuco, located at Rua Benfica, 455, in Bairro da Madalena, Recife - PE, has several blocks and completed 110 years this year (2022). It is possible to verify pathological manifestations throughout the university. Because of this, this research aims to perform an inspection to evaluate the current situation of the pathological manifestations found in the facades of "block C" and to elaborate a map of its damage. A literature review and case study were elaborated on the subject in question and related issues. The case study was done through the visual inspection methodology and has preliminary inspection, consisting of the collection of data related to structure and environment, an inspection of facades through surveys, with photographic records and preliminary diagnoses. Measurements were made to design the facades with software aid. Thus, the analysis was finalized, starting the elaboration of the data map, in addition to identifying the possible causes of the damage. That said, the identification of different pathological manifestations, on the façade of the studied block, will be presented. It is also expected that this project will contribute to the planning of a maintenance plan for "block C". With this, it is expected to contribute to the maintenance and restoration services of the studied construction.

Keywords: Mapa of damage, pathological manifestations, found, Manarrest.

1 INTRODUCTION

Carvalho, Ferreira e Silva (2008) [1] cite the success of innovation and that it depends on the organizational capacity to understand it as a constant process of growth and not simply luck. Innovations should also be associated with potential results-generating. If the innovations do not generate this or add value, they will certainly be withdrawn from the market and will no longer be innovations, in exchange for other novelties.

Since civil construction has its specificities with laws to be followed, there is a certain difficulty in the innovation management process. However, this sector is considered important for national development (PASCHOALIN et al., 2014) [2]. However, there is an evolution and, with this, constructive diversity, the quality of execution of the constructions ends up persisting without the correct supervision, resulting in various pathological manifestations (AMARAL et al., 2018) [3].

Over time, the problems resulting from the lack of preventive and periodic maintenance become more commonplace, which can threaten the feeling of security. That said, the importance of maintenance and treatment of pathological manifestations in buildings stands out (SILVA, 2021) [4].

According to Souza and Ripper (1998) [5], maintenance is established as joint actions that must exist to ensure the good performance of the structure, to increase the service life, aiming at a path that accompanies cost-benefit, following the norm and control of the work.

The Polytechnic School of Pernambuco, located at Rua Benfica, 455, in bairro da Madalena, Recife - PE, was founded on March 6, 1912, has several blocks and completes 110 years later this year (2022). It is possible to verify pathological manifestations throughout the university.

It is observed that a property is planned and built for its users to be served for many years. It is crucial to practice the constant maintenance of preventive construction so that there is no disbelief in the service life. This practice is not yet propagated by Brazil, that is, real estate does not receive the same attention as other assets when it concerns preventive maintenance (CASTRO, 2007) [6].

The lack of maintenance or execution errors ends up generating pathological manifestations, which according to Campante (2001) [7], appear precisely when the construction no longer performs well (the one that was expected for its useful life), failing to meet the needs of those who use it.

According to Tirello and Correa (2012) [8], the damage map is a graphic document that encompasses information about the construction, including its differences in materials and structures, and indicates pathologies through symbols and colors.

Given the above, the stand article inspects to evaluate the current situation of pathological manifestations found in the facades of the "block C" of the Polytechnic School of Pernambuco and elaborates a map of its damage.

With this, it is expected to contribute to the maintenance and restoration services of the construction studied.

1.1 GENERAL OBJECTIVES

To survey the pathological manifestations found in the "block C" of the Polytechnic School of Pernambuco and elaborate a map of damage aiming to contribute to the increase of the durability of the building, allowing the establishment of priorities for the actions necessary to fulfill the expected useful life and the preservation of the heritage.

1.2 SPECIFIC OBJECTIVES

- Carry out inspection visits of the facades;
- Evaluate the degree of deterioration of the studied building;
- Diagnose through visual inspection the pathological manifestations presented; and
- Draw up a damage map of facades.

2 METHODOLOGY

Scientific research can be characterized by several types, technical procedures, and specific techniques. In this case, a bibliographic review and case study was elaborated on the subject in question and related issues. With the help of this review, comments of the author were elaborated, which aims at the systematization of the content.

The case study, through Tavares methodology (2011) [9], has preliminary inspection, consisting of the collection of data related to structure and environment, an inspection of facades through surveys, with photographic records and preliminary diagnoses. Thus, the analysis could be completed, starting the elaboration of the data map, in addition to identifying the possible causes of the damage.

For the elaboration of the damage map, a design was carried out using the AUTOCAD software, since there were no plants on these facades, being necessary measurement using tape and sketch making, using the models of hatches and colors of Rocha (2017) [10] and Barreto (2020) [11].

3 FINDINGS

The building is located in the city of Recife, that is, in a medium with high relative humidity, which favors the appearance of certain pathological manifestations. Having said that, it is expected to identify several pathological manifestations on the façade of the studied block.

3.1 BLOCK C

Inspections in block C took place on 28 September and 30 November 2022. The photographic records, on the first day, were made with a "clear" sky and no rain. Already on the second day, it had rained the day before and the records were made with cloudy skies.

3.1.1 Front façade

The front façade of block C (Figure 1) is the main access to the block, so it has a movement of students.

Figure 1 - Front façade

Source: Author

According to Ribeiro (2018) [12], efflorescence is a pathological manifestation formed by the saline deposit in the coating, after exposure to water, whether from infiltration or weather, it is worth mentioning that in some cases these salts can cause a deep degradation. In addition to the lack of maintenance, since it is an area at the top of the building, the difficult access can be the cause of this (Figure 2).

Figure 2 - Efflorescence at the top of the front façade

Source: Author

The façade presents dirt at specific points, mainly near the water outlet of the air conditioning drains (Figure 3). This pathological manifestation happens due to the accumulation of water that flows, constantly, leaving dirt particles in the route.

Figure 3 - Dirt on the front façade

Source: Author

And some points, presented detachment of painting at the bottom of the structure (Figure 4), but also near some windows on the upper floors (Figure 5). The presence of moisture is the possible cause of detachment in the lower region of the façade, but in the vicinity of windows, the wrong choice of material may have caused this pathological manifestation.

Figure 4 - Detachment of the painting at the base of the façade

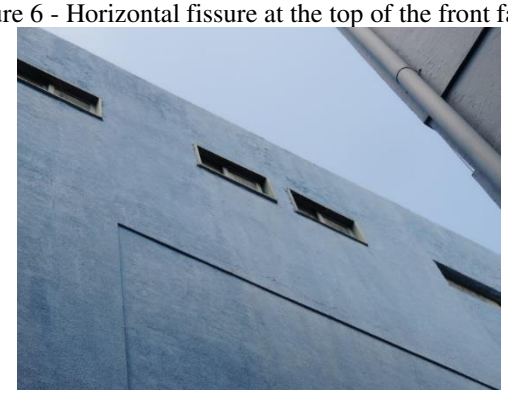
Source: Author

Figure 5 - Detachment of the painting near the windows

Source: Author

As you can see in Figure 6, a horizontal fissure is noted in the upper region of the façade. This fissure can be observed throughout the length of the façade, it is highlighted that the sun before reaching part of Block C, reaches Block J that is ahead, that is, this fissure can be due to the distinct thermal dilation between the part that receives the sun directly and the part that is in the shadow of Block J.

Figure 6 - Horizontal fissure at the top of the front façade



Source: Author

In addition, vegetation was found on top of the marquee (Figure 7) in which the plaque with the name of the block is found, this is due to the difficulty of visualizing the area and the lack of regular maintenance.

Figure 7 - Vegetation in the marquee

Source: Author

Elaborated on the front façade of block C, the damage map (Figure 8) represents the current situation of the façade seen according to the inspections carried out, it should be noted that the block presented underwent the last maintenance on 29/11/2019, with painting, according to engineer Otávio Wilson who was one of the responsible for monitoring. Through this map, it is possible to perceive the dirt points, the regions most affected by the detachment of the painting, the cracks found, as well as the few areas with mold and vegetation.

Figure 8 - Front façade damage map

Source: Author

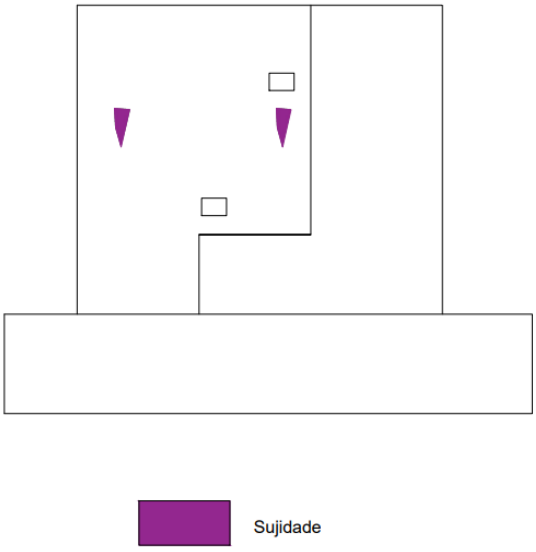
3.1.2 Right side façade

It was identified that the two side facades present few pathological manifestations since Block C has recently undergone maintenance, as previously mentioned, reputed with painting, the right (Figure 9) is dirty due to the humidity resulting from the air-conditioning drains that allow water to flow, as observed in the damage map (Figure 10).

Figure 9 - Right side façade

Source: Author

Figure 10 - Damage map of the right side façade



Source: Author

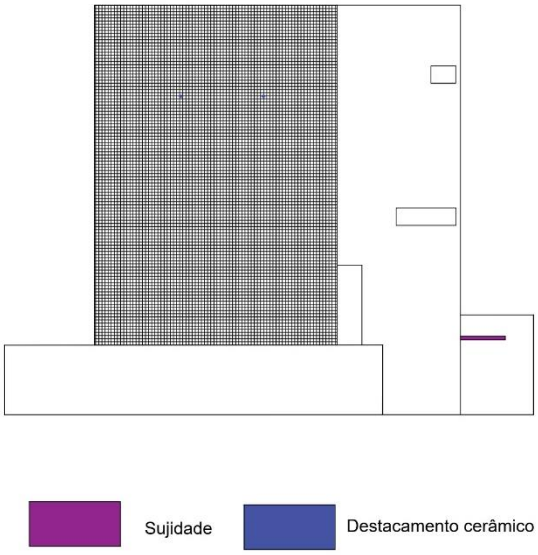
3.1.2 Left side façade

The left side façade (Figure 11) has a stretch of ceramic cladding, where it was possible to observe two points of ceramic detachment, due to the openings through which the air-conditioning drains come out and a lot of dirt on the side of the marquee as can be observed on the damage map of this façade (Figure 12).

Figure 11 - Left side façade

Source: Author

Figure 12 - Damage map of the left side façade



Source: Author

R, the difficulty in designing some pathological manifestations at the top of the structure is not drawn, since it was not possible to obtain the exact measurements of the localization points.

3.1.3 Posterior façade

The back façade of Block C (Figure 13) has only one access to the block, which is not used by the students. It draws attention to points of the detachment of paint in places that previously existed brackets

and attachment points of the protection grid in the windows of the first floor, which indicates a lack of maintenance of the façade after these changes.

Figure 13 - Posterior façade

Source: Author

There is a recurrence of dirt (Figure 14) in the area just below the air conditioning condensers, which should happen due to the high amount of drains draining water through the façade.

Figure 14 - Dirt on the back façade

Source: Author

Due to the location of the posterior façade, without other buildings that make it difficult to access birds and light, it is possible to observe some points with vegetation (Figure 15) that take advantage of the humidity due to the condensers of air conditioning.

Figure 15 - Vegetation on the posterior façade

Source: Author

It is possible to observe the map of damage to the posterior façade (Figure 16), which presents punctual pathological manifestations without greater difficulties to correct.

Figure 16 - Map of damage to the posterior façade

Source: Author

All damage maps were made, after inspections, from the photographic records.

4 CONCLUSION

The "Hollow BlC" of the Polytechnic School of Pernambuco is in good condition and receiving the necessary maintenance, such as painting. The pathological manifestations with the highest occurrence are dirt, due to air conditioning installations with water being poured directly through the façade, and detachment of the paint due to moisture also caused by air conditioning drains. Nevertheless, it is noteworthy that these pathological manifestations only affect aesthetics, so maintenance has less costly and simpler solutions.

It is expected that the damage maps presented in this article contribute to better conservation of the building since they indicate the points of pathological manifestations found during the inspections of the facades.

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