https://doi.org/10.4322/CINPAR.2022.012



XVIII CONGRESSO INTERNACIONAL SOBRE PATOLOGIA E REABILITAÇÃO DAS CONSTRUÇÕES
XVIII CONGRESO INTERNACIONAL SOBRE PATOLOGÍA Y REHABILITACIÓN DE LAS CONSTRUCCIONES
XVIII INTERNACIONAL CONFERENCE ON BUILDING PATHOLOGY AND CONSTRUCTIONS REPAIR
17 TO 19TH NOVEMBER 2022

Damage to historic facades: a case study in the historic center of Viçosa do Ceará

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Abstract: Among the elements that make up a building, the facade represents the architectural identity exposing traces of the constructive patterns of an era and are the main means to obtain information about the constructive characteristics and evaluate the state of conservation of historic constructions. Thus, this research, through the inspection of 48 facades in 25 buildings in the historic center of Viçosa do Ceará, identified the mechanisms of existing damage, considering the constructive characteristics of the elements that make up these facades, thus contributing to the knowledge of the behavior of historic facades and consequently to the preservation and memory of the historic heritage Brazilian. The most frequent damage to the buildings inspected is due to climatic factors of the city, associated with the distribution of elements of the facades. These factors influence the deterioration of the building causing cracks in the masonry, mortar detachment, paint peeling and surface condensation. Despite being degraded to the urban context in which they are inserted, the inspected facades present a regular state of conservation, when considering the time of existence and exposure to climatic agents and can last for centuries if periodic maintenance is made. Thus, it is essential to continuously monitor the presence of damage to the historic heritage built.

Keywords: Historic facades; Masonry walls; Conservation state

1. Introduction

The facades of a building are the elements that limit the internal spaces and the external space. However, the importance of facades goes beyond sealing and contact, they play an important role in the configuration of landscapes or urban spaces, both by the registration of their former inhabitants and by the testimony of an era of society (TELES, 2010). With this, the facades acquire cultural value.

However, when the historic buildings are observed in a state of degradation and losing the representativeness of the period to which they were built, the facades of these buildings are the most affected. Various damage can occur on building facades due to different causes such as weather, overload, humidity, thermal variations, movement, and soil accommodation. Such factors, connected to materials, inadequacy execution and maintenance, imply the progressive emergence of anomalies (BAUER; CASTRO; SILVA, 2015).

According to Lopes (2008), the walls of historic masonry buildings have low resistance to traction, reduced ductility, and high stiffness properties, ensuring that this type of constructive solution has low power dissipation capacity and causes a lot of damage. In addition, Bauer, Castro, and Silva (2015), states that high thermal stresses and mechanical tensile stresses can cause adhesion failures between the various layers of the facade walls and in a scenario of propagation of this eventual failure may generate a process of progressive degradation that will compromise the overall performance of the facade.

Some facades may present detachment and/or progressive collapse of the masonry walls after the development of the damage in the plane, followed by the complete collapse of the structures, that is, the mechanism of the damage occurs from the plane to the outside. Shear stress can promote the appearance

of cracks that depending on the level and location can significantly reduce their tipping stability (FELICE, 2011). However, damage mechanisms can occur outside the plane of the facade without first significantly damaging the walls in the plane (RESTREPO-VELEZ; MAGENES; GRIFFITH, 2013).

The mechanism of collapse out of the plane is often reported involving the entire facade but can also be limited to the top of the facade. Occasionally, in poorly connected buildings, the entire facade behaves like a rigid body, which departs from the corners and rotates along a horizontal hinge at the base (CASOLO; UVA, 2012).

According to Casolo and Uva (2012) the patterns of recurrent damage and failure mechanisms in historic buildings can be identified and studied from the information of the facades. According to the shape, proportion, arrangement of the openings and size of the facades, it is possible to analyze different types of damage mechanisms. But, the process of degradation is unique in each building, even if the materials are similar, because each historic building is constituted with unique characteristics, result of a certain epoch, reflecting traditions, techniques, and ancient materials, requiring the study of each situation in a particular way (GUIMARÃES, 2009).

In a scenario with the aim of the study is to express the damage of the building numerically or graphically (quantitative evaluation) and, facilitate the analysis of them, it is necessary, initially, to evaluate the building with a qualitative character (GASPAR; BRITO, 2005). In this sense, knowing the factors that led these buildings to degrade and ruin is of extreme value, analyzing the mechanisms that are part of this process, can promote means of prevention and subsidize decision-making and interventions. Without knowledge of the causes of ruin, there are no conditions to be determined intervention criteria.

Thus, this part of the research aims through the observation of the facades of the historic center of Viçosa do Ceará to identify the mechanisms of existing damage, considering the constructive characteristics of the elements that make up these facades, thus contributing to the knowledge of the behavior of historic facades and consequently to the preservation and memory of the Brazilian historic heritage.

2. The historic center of Viçosa do Ceará

Viçosa do Ceará is an ancient catholic indigenous village and forms an important urban stretch for the history of the colonial occupation of Ceará The Historic and Architectural Complex of the city is constantly mentioned as guardian of vestiges that go back to the colonial past, highlighting the original layout of the Village of Nossa Senhora da Assunção made in the Jesuit missions under the activities of the priests of the Society of Jesus (VIANA, 2015; CASTRO, 2001).

Between the 1990s and 2000s, in addition to the historic center of Viçosa do Ceará, the state of Ceará had more cities inserted in the " List of historic heritage assets" by IPHAN, through its urban complexes officially organized and recognized as national heritage: the "Architectural and Urban Complex of the City of Icó" (1997), the "Architectural and Urban Complex of the City of Sobral" (1999) and the "Architectural and Urban Complex of the City of Aracati" (2000). The historic architectural collection of Viçosa do Ceará comprises 72 mansions in principal zone and approximately 57 properties in secondary zone, totaling 129 historic buildings and is protected at the Federal level by Decree-Law Nº. 25 of 1937.

Due to the lack of documentary information, it was not possible to accurately identify the year of construction of the buildings studied. However, according to information from the Study for Federal Preservation of the Architectural and Urban Complex of the City of Viçosa of Ceará (IPHAN, 2002), presented in Figure 1, it is known that the buildings evaluated in this research were built in the 17th, 18th, 19th and 20th centuries. The area bounded by the polygonal yellow color represents the strict protection area and the polygonal of red color delimits the protective environment. It is noted that initially in the 17th and 18th centuries, the buildings were concentrated very close to the Church Nossa Senhora da Assunção and focused on it. After the 19th century there was an increase in buildings, but always growing radially the Church.

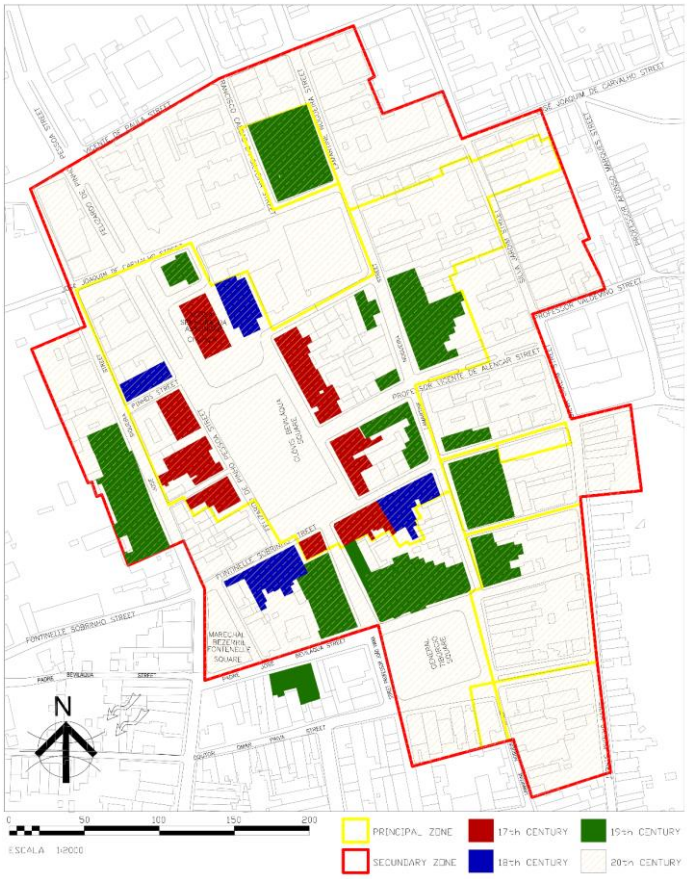

Figure 1 – Viçosa of Ceará for century.

For this research, 25 buildings were selected that best represented the damage present in the historic building studied, totaling 48 facades inspected. It was also considered the representativeness of some buildings, such as the Matriz Church, the Theater, the Municipal Council built between the 17th and 20th centuries.



Figure 2 – Some buildings of the historic center of Viçosa do Ceará.

3. Facade inspections

The inspections are intended to identify visible anomalies in the facade cladding system, such as detachment regions, fissures, efflorescence and stains. And in this way determine whether there are immediate risks and urgent measures to be taken. (ANTUNES, 2010). In addition, Mesquita et al. (2016) state that inspection is the first step in assessing the state of a building and identifying damage and deficiencies that compromise its structural safety and habitability, knowing that the deterioration of historic buildings is most often caused by the natural wear and tear of materials, or the action caused by physical factors, biological, biological and human.

The challenges encountered in assessing damage and facade materials involve many different areas of knowledge. Information on the history of the building, the chronology of the materials, constructive techniques of each era and the pathology of these constructions are necessary (TELES, 2010). However,

data from different sources also needs to be collected. In some cases, Kanan (2008) states that the historic survey should be made, being essential the prior collection of documents in notaries and public archives.

First, a research was carried out to identify the architectural projects of the buildings and information such as the date of execution of the construction. The research was carried out in the collection of public and municipal archives of Viçosa do Ceará and in the Library of the 4th Regional Superintendence of the National Institute of Historic and Artistic Heritage (IPHAN), but no documentation was found on all buildings. The survey was then carried out on the site of the architectural details of the facades, as well as the materials and possible construction methods used in the execution of the facades.

The survey in loco requires adding knowledge of photography, which although replaced by the automatism of current cameras, it is important to have a notion of exposure time and framing to ensure that the photos of the survey are useful (TAVARES et al., 2005).

Facades are typically vertical. Inspecting them requires some vertical transport. Excluding single-story buildings, it is necessary to plan this form of access. For this research, equipment was needed to assist in the identification, mapping and classification of pathological manifestations of the historic building of Viçosa do Ceará. Among the equipment used are the manual and digital tape, digital camera and unmanned aerial vehicle (UAV) – MAVIC MINI 2 DJI, Figure 3.



Figure 1 - Unmanned Aerial Vehicle (UAV) - MAVIC MINI 2 DJI.

The objective of this stage is to identify, through tactile-visual identification, the damages present in the building of Viçosa do Ceará and record them and m inspection forms referring to each facade studied.

4. Main occurrences of damage

The buildings, since their construction, suffer deterioration of the materials, which are caused by various factors. In the case of old buildings, the action of degradation agents is considered the most harmful by the longer life of the building elements. Another factor that influences the deterioration process are the differentiated constructive characteristics of old buildings compared to modern buildings (DENDIA, 2008).

There are numerous pathological problems that affect the components of old buildings. Likely, there are many causes that can generate the appearance of these problems. According to Appleton (2003) one of the main causes of the pathological problems of ancient buildings is the inevitable aging of materials. This aging can be caused by the alteration of the fundamental properties of the materials due to climatic factors or even by wear due to use.

This research sought to identify the existing damages in a simplified and general way. The areas of incidence of damage on each facade were not calculated because it would require a much more time-consuming and detailed study.

To calculate the percentages of damage to the inspected facades the existing damage was quantified by the presence or absence of them, not being considered the area of occupation of the damage on the facade. In general, the most frequent damage observed in the buildings were surface condensation (dirt) (16.80%), biodeterioration (1.60%), paint peeling (20.80%), rising damp (12.00%), infiltrations (14.40%), mortar detachment (13.60%), cracks (16.00%) and vegetation (4.80%). The percentages of the occurrences of damage to the facades inspected are shown in Figure 4.

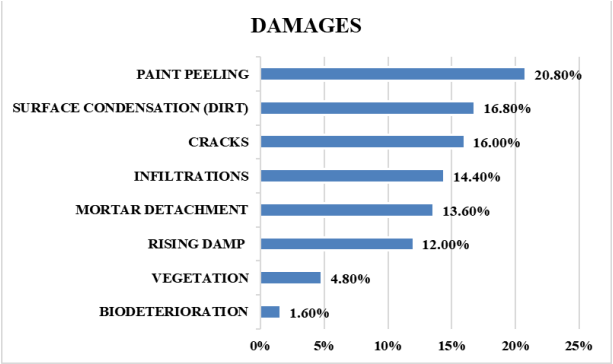

Figure 4 - Facade damage

The evaluation of the conservation status of the facades studied presents a considerable number of buildings in regular state (52.00%), followed by buildings in poor condition (24.00%), buildings in good condition (16.00%), and a small number in ruins (8.00%). It was considered as a "high" state of conservation the facade that keeps all finishing materials preserved; “regular" the facade that keeps most of the finishing materials preserved; “low" the facade that keeps preserved only a small part of the finishing materials and "ruins" the construction that presents part of its structure in collapse.

To better exemplify the existing damage the facade was divided into four regions. This division was adapted from the studies developed by Gaspar and Brito (2005) and allows measuring the damage of facades by region. Figure 5 illustrates the division regions of the facade.

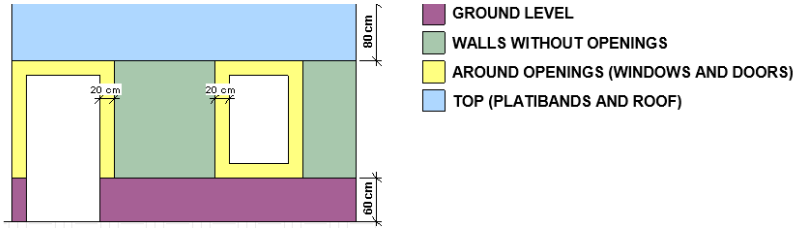

Figure 5 - Facade regions

For the distribution of damage by region, a particular damage was accounted for more than once when it appeared in more than one region. The percentages of damage by region were balanced, since all regions presented considerable presence of damage. The soil region corresponded to 31.15% of the incidences of damage. Followed by the regions of the top (28.69%), arounds openings (21.31%) and region walls without openings (18.85%).

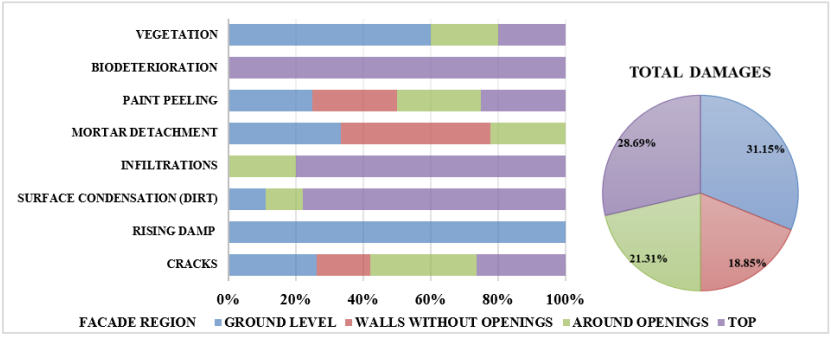

Figure 6 - Distribution of damage by facade region.

Following, the facades were classified into four orientations: north, south, east and west. Totaling 48 facades in 25 buildings inspected. Different types of damage were observed in each orientation of the facades. However, the west facades presented higher incidence of damage (33.60%), followed by the south facades (30.40%), north (19.20%) and east (16.80%).

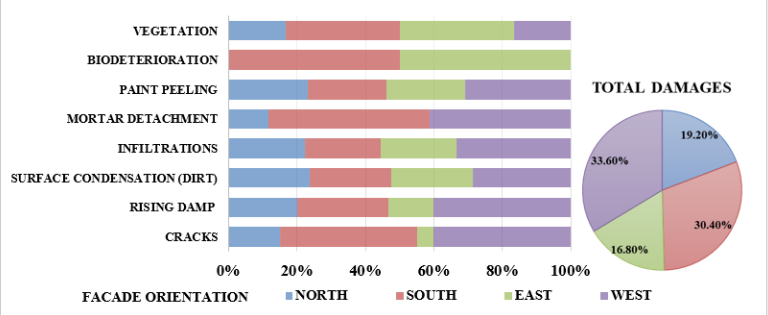

Figure 7 - Distribution of damage by facade orientation.

The high solar radiation in the afternoon, causes in the west facades a high thermal charge that mainly causes the peeling of paint and cracks. It is known that the appearance of damage is due to the presence of other damages, this was the highest incidence of damage in this orientation and may be a consequence of the cracks, because they are how humidity accesses the inside of the masonry and cause infiltration and mortar detachment, for example. The south orientation is characterized by constant humidity, a consequence of almost zero solar radiation and, therefore, presented considerable amount of damage. It was observed in higher occurrence mortar detachment and biodeterioration, justified by constant humidity, because the presence of water provides the development of microorganisms that occupy the surfaces of the walls in a generalized way, in addition, humidity causes deterioration and expansion of the components causing micro stresses that cause the total degradation of mortars.

The facades with orientation to the north, presented paint peeling, presence of vegetation and infiltrations mainly in the upper part of the walls, but with a lower incidence to be compared with the west and south facades. The east oriented facades presented the lowest incidence of damage, a fact that can be justified by good solar radiation during the morning. The damage manifested with the highest percentage was the dirt developed especially in the covers of the towers and walls near the roof, justified by the wind direction that carries particles that are present in the atmosphere.

4.1 Surface condensation (Dirt)

When analyzing the aspects related to the architectural characteristics and constructive techniques used in the buildings, it can be observed that most of the facades with platibands are visibly damaged (Figure 8). Vieira (2005) states that the absence of protruding horizontal elements favors direct contact with rainwater, together with the absence of water detachment plans, such as eaves, contributes to greater accumulation of particles and the appearance of surface condensation in this facade element.



Figure 8 - Facades with platibands of the historic center of Viçosa do Ceará.

The presence of surface condensation is probably due to the accumulation of particles of atmospheric contamination, dust and black smoke carried by the wind, aided by the high index of relative humidity, characteristic of the city. According to Teles (2010) the formation of surface condensation is a consequence of a "dry" accumulation, when humidity is deposited on surfaces bringing particles suspended in the air, this amount of water derived from air humidity is very small to running, but enough to penetrate the most superficial pores. The mechanisms of the support of these dark particles are the surface tension associated with the gravitational phenomenon and the characteristics of the coating (texture, porosity) on the elements of the facades (VIEIRA, 2005; DENDIA, 2008).

The geometry and dimensions of the edge made on the surfaces of the facades determine the greater or lesser degree of the adhering of contamination particles. In inspections of horizontal and vertical edge near openings

and details in the planes of the facades, it is observed that these elements form a platform for deposition of particles of atmospheric contamination, due to their dimensional and geometric characteristics.



Figure 9 - Elements of facades of the Historic Center of Viçosa do Ceará.

4.2 Biodeterioration

This type of damage is formed by a group of biotic organisms that develop on the paintings, concrete, and masonry, produces an aesthetic, physical (disaggregation) and chemical (organic and inorganic acids) deterioration that manifest in colored spots, leaving the mortar surface subject to erosion and leaching, becoming weakened and deteriorated. The essential factors for its existence are light, temperature and wind. The percentage of masonry humidity determines the growth pattern (DENDIA, 2008). Breitbach (2009) states that organic-based substrates, such as paints and varnishes, are easily colonized because some of the components of the paint and varnish formulation provide nutrients for bacteria and fungi, making them susceptible to biodeterioration.



Figure 10 - Presence of biodeterioration in facades of the Historic Center of Viçosa do Ceará.

Repaints processes are often used in an attempt to solve the problem of biodeterioration. In fact, they can restore the watertightness and aesthetics lost by the paraments, but only mask the effects of biodeterioration. As a result, there is a widely accepted notion that paints do not have great durability, and that only frequent repaints are able to maintain good appearance.

In the inspections in the historic center of Viçosa do Ceará, it was observed that the facades in the south direction were pointed out as the most affected by biodeterioration, due to the weak solar radiation in the plane of the facade. Figure 10 presents examples of this damage in the historic facades studied.

4.3 Paint peeling

The processes of degradation, natural and early, to which are subject ed the painted surfaces of the facades cause the appearance of several anomalies. Depending on the conditions of design, application, drying conditions, environmental and exposure conditions, different anomalies arise, and an irreversible degradation process begins that will lead to loss of visual quality of painted surfaces, and impairment of the protective function of these (CHAI et al., 2011). In the case of paints peeling may occur at the interface of the film with the application substrate, in the paint film itself, or in a combination of both, and may cause surface humidity, during or after painting (DENDIA, 2008).

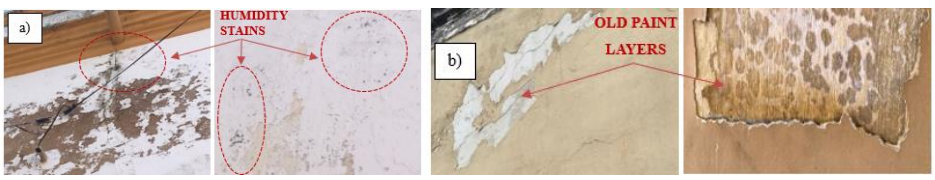

Figure 11 - Paint Peeling on facades of the Historic Center of Viçosa of Ceará. a) powder peeling; b) layered peeling.

During the inspections were identified, peelings of the paint that manifested themselves by various causes, in the form of powder and layers (Figure 11). In situations where the occurrence of peeling scans was observed in the form of powder was also observed in the presence of humidity, as shown in Figure 11 a. The paint peeling in the form of powder occurred mainly in platibands, justifying the origin of these powder paint peeling to a possible lack of maintenance of the gutters, causing the infiltration of rainwater in these walls, another fact that justifies the origin of these powder paint peeling, due to the presence of humidity is the presence of stains on the substrate.

When analyzing the paint peeling found in the facades, in the form of layers, Figure 11 b, it was observed that most of the paint was applied to the previous painting, generating a powdery surface causing the paint film to lose its adhesion on the surface. According to Fagundes Neto (2007), the paintings applied on powdery surfaces such as whitewash, mortar and substrates containing loose parts, have a high chance of peeling. In addition, Oliveira Júnior (2020) states that paint peelings can be caused by inadequate surface preparation, if the substrate presents loose grains a disaggregation process is started and if painted, the paint will also detach.

4.4 Infiltrations

Humidity from infiltration strains comes from rainwater which, together with air humidity, speed, and wind direction, penetrates elements of facades through the external environment (DENDIA, 2008). Infiltration in the roof occurs due to the poor functional performance of this element and due to the poor function of the rain drainage (gutters and fall pipes), causing damage to the building components. Thus, it is important to continuously maintain the building, through the cleaning of gutters, which usually accumulate leaves; and maintenance of the roof, avoiding broken tiles that allow the infiltration of water (APPLETON, 2003).

The presence of platibands evidences the existence of gutters, which without proper maintenance contribute to the constant presence of water on the surfaces of the facades, generating infiltrations, Figure 12. The under sizing of gutters can also be pointed out as the reason for the presence of humidity in the platibands.

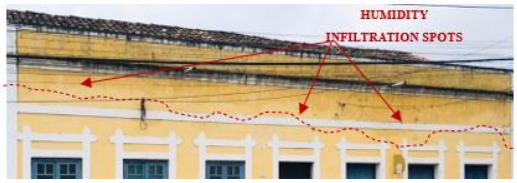

Figure 12 - Humidity infiltration spots on facades of the historic center of Viçosa do Ceará.

4.5 Rising damp

According to Freitas, Torres and Guimarães (2008) rising damp is one of the main causes of degradation of buildings and the mechanisms that condition the transport of humidity in building elements are complex. The ascending humidity is originated by the absorption of soil water that, by capillarity, migrates to the construction, due to the surface tension of the water and the chemical forces of accession between the liquid and solid parts. The micropores of interconnected materials look like tubes and water travels from the ground to the building. The influence of the materials that make up the facade directly affects the way water is absorbed by capillarity, the greater the thickness of the wall, the greater the height that humidity will reach, because it will need greater surface to evaporate (OLIVEIRA et al., 2021).

In many cases, the presence of some humidity is part of the life of a historic building. The waterproofing of foundations was not common practice in construction methods until the beginning of the 20th century, although foundations with stones, less permeable elements, were common at the time (TELES, 2010; TAVARES et al., 2005). In addition, Araújo (2004) and Guimarães (2009) explain that the walls in massive bricks of historic buildings were usually built on stone masonry foundations approximately half a meter high to prevent the walls from being easily degraded by water, the authors also claim that for a successful restoration, as well as the survival of a building with this type of material depend on how the water of this building is discarded.



Figure 13 - Presence of rising damp in facades of the historic center of Viçosa do Ceará.

Rising damp is usually revealed by the appearance of patches with horizontal development at ground level (GUIMARÃES, 2009). For Barreto (2019) this damage is one of the most severe forms of humidity manifestation in buildings due to the long period in which it remains on the walls, causing the crystallization of salts in the walls. Teles (2010), adds that only the water is carried by capillarity inside a wall and evaporates by the mortar, it does not cause greater damage, but, if there are soluble salts in this water, they will be transported to the point where it evaporates and with this concentration of salts occurs expansive effects within the pores of the mortar, causing its degradation. Figure 13 shows the presence of rising damp in facades of the historic center of Viçosa do Ceará.

Humidity occurs in an erosive manner and its subsequent drying tends to cause the formation of perforations, surface, or deep cracks in the facades, leading to the formation of other damage (SHIRAKAWA et al., 2011).

4.6 Mortar detachment

The most common degradation in the mortars of the facade is the detachment of the mortar, which usually occurs by the action of humidity, composition of the mortar and by vibratory phenomena. The separation between substrate (solid bricks) and mortar mortar can occur by simple expansions or by the total detachment of the mortar layer (DENDIA, 2008; TELES, 2010).

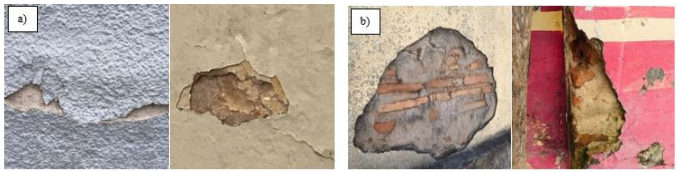

Figure 14 - Mortar Detachment on facades of the historic center of Viçosa do Ceará: a) expansion of mortar; b) total detachment of the mortar.

Figure 14 a show the expansion of the mortar that occurs when the mortar loses its adhesion capacity to the substrate, happening its detachment out of the plane of the facade forming a geometric variation in the mortar (BAUER; SOUZA; MOTA, 2021). The total detachment of the mortar, Figure 14 b, is the definitive separation between mortar and masonry, causing discontinuities on the surface through the fall of the mortar's sections due to the effect of gravity and material deformations.

In the inspections it was observed that some decorative elements of the facades presented part of their deteriorated coatings. Bauer, Souza e Mota (2021) state that the deterioration of mortars in decorative facade elements is a particular case of detachments, as it may be a consequence of an accidental loss of material by mechanical action or impact.



Figure 15 - Detachment of the decorative facade element mortar.

The detachments represent the end of the mortar's useful life, which have the function of protecting the substrate. In addition, there is a deterioration of the visual quality of the facade, causing the devaluation of the building.

4.7 Cracks

The movements of the materials and components of the buildings are inevitable and usually generate stresses higher than the resistance of the materials breaking the continuity of the system and causing problems of cracks (CONSOLI, 2006). According to Trevisan (2003) among the possible causes of cracks in old buildings are the expansion of mortar by delayed hydration of lime, the presence of expansive clay minerals in the aggregate and expansion due to crystallization of soluble salts. These causes can generate horizontal fissures that are observed across the entire surface with varied openings that tend to generate the degradation of the elements of historic facades.

In the parallel encounter between details and plane of facades, the formation of cracks was also observed, indicating horizontal and vertical des locations or the deficiency of anchorage between these elements. These decorative elements of facades have different composition of masonry walls, usually, they are more fluid mortars, clays, or smaller bricks that, when receiving thermal loads or vibrations, can move in different ways from the plane of masonry. These cracks have a straight configuration along horizontal and vertical edge. The presence of these fissures was common near ground level, a place that presents thicker horizontal edge skirting the entire facade.



Figure 16 - Presence of fissures and details of historic facades.

During the use of the building, cracks can originate from retraction of masonry and mortars, overlapping layers of different materials, excessive deformations, or fatigue to hydrothermal cycles (MATTANA; PEREIRA; COSTA, 2013). Teles (2010) describes that the presence of some cracks in the materials of historic facades is associated with variations in humidity, materials with different dilation and temperature changes. When these variations are distributed throughout the mortar, they tend to form mapped fissures. During the inspections, the presence of this type of cracks was verified, which resemble the roads connected in a map.



Figure 17 - Map cracking on facades of the historic center of Viçosa do Ceará.

In the region between the openings of doors and windows, the presence of cracks was observed, Figure 18. The region of the openings is very conducive to the appearance of cracks due to the concentrations of stresses in the contour of these elements and due to the absence or undersizing of the upper structures such as lintel and arches.



Figure 18 - Presence of cracks in the openings of historic facades.

Cracks by tension concentration were observed in lateral platibands and in meeting points of the wall with the apparent roof. Figure 19 shows this type of damage to the inspected facades. This type of fissure can be caused by the stress caused by the weight of the wooden structures and tiles that make up the roofs.

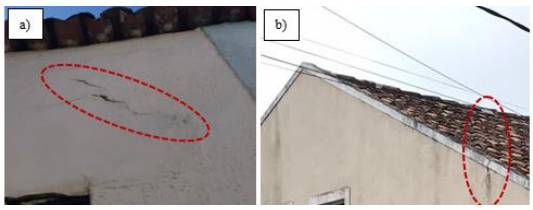

Figure 19 - a) Presence of cracks near the roof; b) Presence of cracks in the platibands

According to Tavares et al., (2005) the existence of cracks in these robust elements becomes more worrying when there is the possibility of water penetration into the facade plane, decreasing the load capacity of the wall, which will be more vulnerable to tipping movements. Thus, the presence of cracks in this region is a warning sign for the maintenance of large platibands.

4.8 Vegetation

The presence of vegetation was frequently observed during inspections, Figure 20. The growth of vegetation contributes to the potentialization of attack on the built heritage. Vegetation is one of the natural phenomena that can accelerate the degradation of masonry into massive bricks. Seeds deposited by wind or animals can germinate on the walls causing degradation as it happens in the soil. The action of the roots may break through the bricks or cause humidity retention that will damage the structure to (ARAÚJO, 2004).



Figure 20 - Presence of vegetation.

5. Conclusions

This research aimed to identify the mechanisms of damage existing in historic facades considering the constructive characteristics of the elements that make up the facades and thus contributes to the knowledge and conservation of this group of buildings. The historic center of Viçosa do Ceará was the object of study, where information was collected through tactile-visual identification of story facades.

Based on the inspections carried out it was observed that most of the buildings in the historic center of Viçosa do Ceará belong to eclectic architecture with a huge presence of horizontal and vertical edge, detail frames, platibands and pediments valued with the presence of baluster. The presence of these elements on the facade influences the deteriorating image of the building, as it forms a platform for deposition of particles of atmospheric contamination, due to its dimensional and geometric characteristics.

In general, the most frequent damage observed in the buildings were paint peeling (20.80%), surface condensation (dirt) (16.80%), fissures (16.00%), infiltrations (14.40%), mortar detachment (13.60%), rising damp (12.00%), vegetation (4.80%) and biodeterioration (1.60%).

The climatic factor of the city is associated with the presence of damage to the facades because the existence of humidity, with low solar radiation in much of the year is a propitious factor for the development of damage. The main occurrences recorded as a function of humidity were surface condensation (dirt), ascending humidity and vegetation.

Cracks by tension concentration were observed in lateral platibands and in meeting points of the wall with the apparent roof due to the stress caused by the weight of the roof structures. In the region between the openings of doors and windows, the presence of cracks was also observed due to the concentrations of stresses due to the absence or undersizing of the upper structures.

Although degraded to the urban context in which they are inserted, the inspected facades present a regular state of conservation (52.00%), when considering the time of existence and exposure to climatic agents and can last for centuries if the proper periodic maintenance is made. Thus, it is essential that continuous monitoring of the presence of damage to the built historic heritage be made. Thus, the information collected in the inspection forms that gave rise to Appendix B can serve as photographic, technical and historic material for periodic studies on the occurrence of damage in the Historic Center of Viçosa do Ceará.

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