

Sampling selection methodology: inventoried façades of Pelotas/RS

Metodologia de seleção para amostragem: fachadas inventariadas de Pelotas/RS

Metodología de selección para muestreo: fachadas inventariadas de Pelotas/RS

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Abstract

A sampling selection methodology using buildings facades of Pelotas/RS - a city located in the south of Rio Grande do Sul – are developed. Pelotas heritage is considered one of the most representative of eclectic architecture from Brazil. This sampling selection methodology alternative is based on framing, selection and buildings exclusion considering different solar orientations, typologies, damage degrees, among others. The properties list of Pelotas is presented in Cultural Heritage Inventory and *Zona de Preservação do Patrimônio Cultural* (ZPPC), following preservation level described in the City's III Master Plan. Some other constraints considering city morphology were also considering. Regarding the results, Pelotas mostly presents ground floor buildings, painted with mortar cover, and destined for services. Cracks, dirt and paint detachment were the main pathological manifestations found in Pelotas historical buildings. Although Pelotas presents many inventoried historic buildings protected by legal means, their cultural heritage condition recognition no guarantee the building's permanence over the time. Moreover, sampling methodology proposed in this study can

enhance and systematize surveys in field studies and does not disqualify the properties. This development denotes an innovation to be certainly applied in other historic cities.

Keywords: Historical heritage; Conservation; Facades; Sampling.

Resumo

O artigo busca criar uma metodologia para seleção de amostragem, estudando as fachadas de edificações de Pelotas/RS — cidade localizada ao Sul do Rio Grande do Sul. O Patrimônio da cidade, é considerado como um dos mais representativos do país. A pesquisa propõe um método por meio do enquadramento, seleção e exclusão de edificações de diferentes orientações solares, tipologias, graus de dano, etc. A relação dos imóveis presentes no Inventário do Patrimônio Cultural de Pelotas e a Zona de Preservação do Patrimônio Cultural (ZPPC) foram os critérios de triagem inicial, seguido do nível de preservação descrito no Plano Diretor da cidade. Outras condicionantes foram impostas a partir da leitura morfologia da cidade. Como resultados, destaca-se que a cidade possui em maior parte edificações térreas, revestidas de argamassa com pintura e de uso destinado a serviços. Além disso, as principais manifestações patológicas encontradas foram: fissuras, sujidade e descolamento de pintura. Pelotas adequou-se para o estudo em vista do grande número de edificações históricas, embora as edificações tombadas e inventariadas possuam proteção por meios legais, seu reconhecimento da condição de herança e patrimônio cultural, não possui garantia de permanência da edificação ao longo do tempo. Pode-se assegurar que a metodologia tem por finalidade potencializar e sistematizar levantamentos em estudos de campo e não busca desqualificar os imóveis. O desenvolvimento deste método denota uma inovação que pode, certamente, ser aplicada a outras cidades que possuam um grande número de imóveis históricos.

Palavras-chave: Patrimônio histórico; Conservação; Fachadas; Amostragem.

Resumen

El artículo busca crear una metodología para la selección de muestras, estudiando las fachadas de los edificios de Pelotas/RS, ciudad ubicada al sur de Rio Grande do Sul. El Patrimonio de la ciudad es considerado uno de los más representativos del país. La investigación propone un método a través del encuadre, selección y exclusión de edificaciones de diferentes orientaciones solares, tipologías, grados de daño, etc. La lista de bienes presentes en el Inventario de Patrimonio Cultural de Pelotas y la *Zona de Preservação do Patrimônio Cultural* (ZPPC) fueron los criterios de selección iniciales, seguidos por el nivel de

preservación descrito en el Plan Maestro de la ciudad. Otras limitaciones fueron impuestas por la lectura morfológica de la ciudad. Como resultado, es de destacar que la ciudad cuenta en su mayoría con edificios de una sola planta, cubiertos con argamasa pintada y destinados a servicios. Además, las principales manifestaciones patológicas encontradas fueron: grietas, suciedad y desprendimiento de pintura. Pelotas fue adaptado para el estudio en vista de la gran cantidad de edificios históricos, si bien los edificios catalogados e inventariados están protegidos por medios legales, su reconocimiento de la condición de patrimonio y patrimonio cultural no tiene garantía de la permanencia del edificio en el tiempo. Se puede asegurar que la metodología tiene como objetivo potenciar y sistematizar las encuestas en estudios de campo y no busca descalificar las propiedades. El desarrollo de este método denota una innovación que ciertamente se puede aplicar a otras ciudades que tienen una gran cantidad de propiedades históricas.

Palabras clave: Patrimonio histórico; Conservación; Fachadas; Muestreo.

1. Introduction

Brazilian Cultural Heritage are constituted in Brazilian Federal Constitution of 1988 as: "(...) goods of a material and immaterial nature, individually or as a set, which refer to identity, action, and memory of the different formator groups of Brazilian society (...)". In this context, Architecture is one of the most important material supports to preserve collective memory through its originality, projects, requalification, and restoration (Achiamé & Hautequestt Filho, 2017).

Cultural heritage preservation safeguard cultural assets through cultural artifacts, thought, feeling and human actions. However, important dilemmas between past and future are frequently faced because electing what must be preserved as heritage, is also considered what must be discarded. This difficult dilemma reflects the temporality awareness and human's relationships with her history. This agrees with cultural memories valorization, through actions committed for heritage safeguarding, with the reappropriation, restitution, and rehabilitation of the present by itself (Santos, Gonçalves & Bojanoski, 2012; Meira, 2008).

Historical buildings are the cultural identity of a population and fundamental for its legacy for the future generations. However, these historical buildings are naturally subject to the various degradation forms causing their deterioration after the passage of the time and resulting in pathological manifestations. In this context, historical building preservation is causally related to the pathological manifestations study, responsible for their deterioration,

and losses of their historical characteristics (Costa, Pinz & Torres, 2020).

Brazil is a pioneer country in relation to the specific legislation formulation for the cultural heritage preservation in Latin America. The safeguard concept was born in the Brazil to diverge from the unmeasured growth; however, the control over the rampant growth of urban areas and the preservation of heritage has not been a counterpoint to the development. According to the *Instituto do Patrimônio Histórico e Artístico Nacional* (IPHAN), 88 urban complexes are under to its protection (IPHAN, 2010; IPHAN, 2019). Among them, 13 are in the southern of Brazil: Lapa (PR), Paranaguá (PR), Jaguarão (RS), Pelotas (RS), Porto Alegre (RS) and Laguna (SC). Despite IPHAN action and some investments for qualification and some partnerships with other municipal and state institutions, less than 10% of the areas listed on national level present efficient standards capable of guide interventions in their historical complexes (IPHAN, 2010; IPHAN, 2019).

Considering urban complexes under IPHAN protection, Pelotas heritage is considered one of the most representative of eclectic architecture from Brazil. Pelotas presents two important nuclei for its historical-cultural formation: one is localized in *Arroio Pelotas* - where its important *charqueadas*¹ are located - and another is localized in historic center - where the first urban allotments are located. Pelotas presented a glory period by *charque*² enrichment. During this period, several imponent buildings are constructed in Pelotas historic center considering large distance between them and the unpleasant odors during the *charque* production (Magalhães, 1993; Magalhães, 2011).

Cultural heritage preservation of Pelotas is extremely important for preservation of its construction history and cultural identity (Almeida & Bastos, 2006). The first official demonstration by *Serviço do Patrimônio Histórico e Artístico Nacional* (SPHAN) in relation to the cultural heritage preservation of Pelotas occurred only in 1955 with Republican Obelisk (SCHLEE, 2008). However, without an adequate preservation policy, Pelotas heritage has continued depending on the municipality community initiative and mobilization. Posteriorly, in the City's II Master Plan the first preservation concepts at municipal level was inserted (Almeida & Bastos, 2006; Ribeiro, 2013).

Although Pelotas historical buildings were backed by municipal law, criminal

¹ Charqueada is a rural property area where the charque is produced. The place is usually covered sheds where salted meat is exposed to the dehydration process. The saladeiril industry and the charque cycle (19th century) left their marks in the extreme south of Brazil, making Pelotas as a historical and cultural reference.

² Charque is a meat salted and dried in the sun aiming to keep it proper to consumption for longer time.

destruction has continued by the owners of the properties themselves, encouraged by the ignorance about the inventory and law definitions and by the real estate exploitation. In addition, local political and economic forces opposed to preservation have promoted the setback in the heritage safeguarding process (Schlee, 2008). Some institutions as *Conselho Municipal do Patrimônio Histórico e Cultural* (COMPHIC), *Comissão Eleitoral do Conselho Municipal de Cultura* (CONCULT) and *Universidade Federal de Pelotas* (UFPel) were fundamental for historical heritage protection of Pelotas. Moreover, an important revision in the Tax Code of the municipality was carried out in 2002 providing to the historical heritage in Cultural Heritage Inventory of Pelotas the possibility of urban tax exemption, named *Imposto Predial e Territorial Urbano* (IPTU) (Almeida & Bastos, 2006).

City's III Master Plan of Pelotas was established in 2008, delimiting *Áreas de Especial Interesse do Ambiente Cultural* (AEIAC). Another important preservation tool in Pelotas was the creation of 4 *Zonas de Preservação do Patrimônio Cultural* (ZPPC) (Rodrighiero & Oliveira, 2018). These zones were delimited following Pelotas formation process and urban development, and they were divided into: Site of 1st allotment, Site of 2nd allotment, Site of Port and Site of *Caieira* (Ribeiro, 2013). The map of AEIAC is also used in the definition and description of inventoried properties.

The inventoried properties are listed in Municipal Law Number 4.568/2000 together with the Decree Number 4.490/2003, specifying the property registration number, their address, and their protection zone. The inventoried properties are classified according to their preservation levels, describing in each property record, in accordance with those architectural characteristics (described on City's III Master Plan) converted into a numerical factor, which determines one of the 4 preservation levels. These levels are management and conservation instrument for historic buildings to establish different protection instances according to the remaining characteristics of each asset. The characteristics of the 4 preservation levels are described below.

- Level 1 properties extremely important for the city's memory rescue. Their architectural, artistic, and decorative characteristics internal and external are integral protected. The assets in this level may not, under any circumstances, be destroyed, mischaracterized or unused, and may be *tombado*.³

- Level 2 properties with external architectural characteristics preservation in right

³ *Tombamento* is an administrative act carried out by the Public Power with the objective of preserving, through the application of specific legislation, goods of historical, cultural, architectural, environmental value and affective value for the population, preventing them from being destroyed or mischaracterized.

condition, fully preserving public facades and volumetry. The assets in this level may undergo internal interventions.

- Level 3 properties of architectural ensemble importance. The assets in this level can undergo interventions, respecting their volumetry and their ambience in view of urban context.
- Level 4 properties not presenting exceptionality character, accompaniment, and architectural complementarity or, are to such a degree of mischaracterization. The assets in this level can be replaced without resulting in greater losses to the patrimony.

In general, cities, buildings and infrastructure have a life cycle similar to a living organism: they are designed, built and throughout their useful life age and degrade, requiring conservation, maintenance, repair and rehabilitation care to prevent their degradation (Rodrigues, 2008). Every building suffers from the constant action of the time, and its effects are aggravated by several factors, such as maintenance lack, misguided maintenance, or improper use. In addition to the impacts of the time, building interaction with the environment can also cause its degradation (Achiamé & Hautequestt Filho, 2017).

Throughout building's life, maintenance and rehabilitation concerns are constantly required, and facades are one of the components that requires the greater care. Facades are constantly exposed to the degradation mechanisms. Nevertheless, aesthetic connotations are extremely important considering its interaction with city's context and first visual construction impression. Facade coverings, in turn, are roles defined elements in a building. Among them, protection, finishing and seal complement (Chaves, 2009). An increase interesting for compatible materials with the conservation and restoration of historic buildings has been occurred aiming to avoid radical interventions, losses, and damage to valuable property structures (Kanan, 2008).

The current demand for monuments and historical buildings preservation has shown an investigative and scientific interest protentional viewer point. Several studies have improved historical mortars restoration techniques. In Brazil, the manual of conservation and intervention in mortars and lime-based coatings, developed by author Kanan (2008) together with IPHAN and the *Monumenta* Program, should be highlighted. The use of mortar cladding on building facades is an intensive practice in Brazil, dating to Brazil's colonization (Crescencio & Barros, 2005). In general, old mortars have more heterogeneous characteristics in their constitution than those currently produced, due to several aspects such as aging wear, presence of pathological manifestations and alteration of constituents (Kanan, 2008;

Rodrigues, 2013).

The external coating system of the building functions as a layer of protection, subject to the degradation agents' action. This is one of the most building exposed areas (Carvalho, 2014). Historic and conventional buildings present natural degradation and, generally, develop some damage degree. Damage is considered any phenomenon occurring outside a predictable period affecting the building performance, whether physical, economic, or aesthetic (Azevedo & Guerra, 2009).

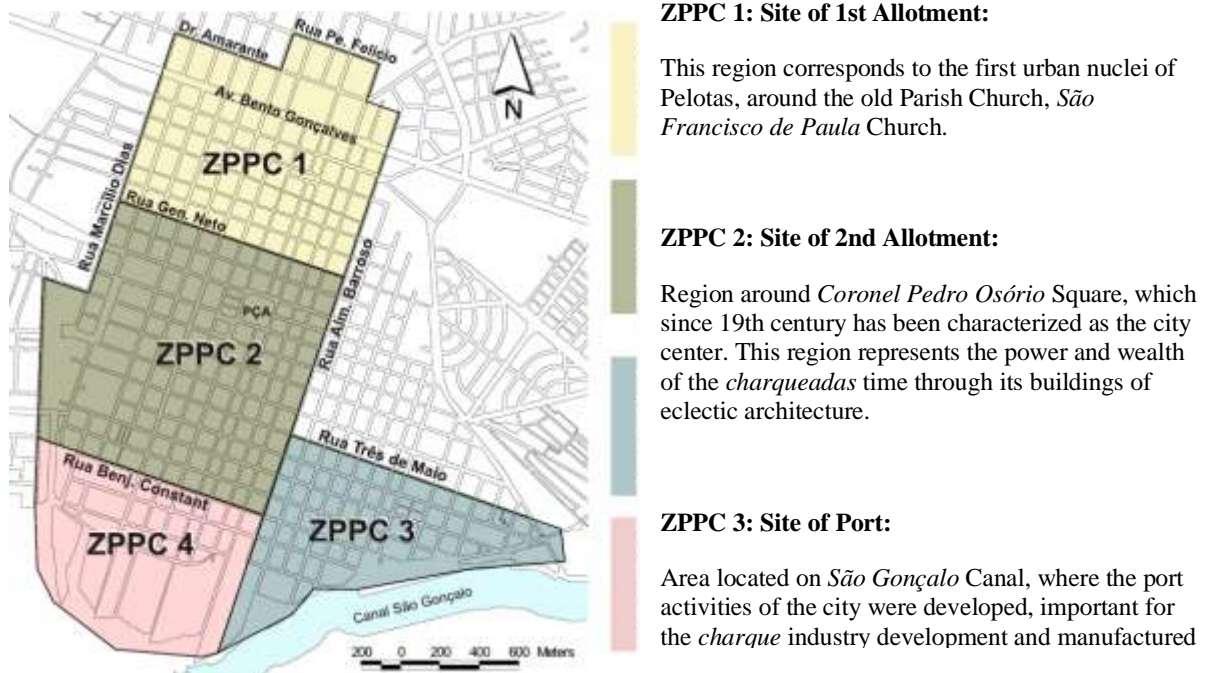
According to Cincotto (1988), regardless construction age, harmful phenomena to the building elements can be constantly observed. Some studies have indicated the facades coating as the highest incidence damage area, following by the paint injuries usually used to protect mortar coatings (Terra, 2001). Costa et. al. (2020) has also demonstrated the importance of using qualitative and quantitative indicators to elucidate pathological manifestation in historical facades coated with mortar.

Thus, considering all aspects pointed out about Pelotas evolution on the issues of preservation and the importance of safeguarding heritage, an investigation of pathological manifestations and degradation state of the historical facades is extremely necessary. In this context, this study proposes a sampling selection methodology for further assessment of degradation state of historical buildings facades in Pelotas.

2. Methodology

Initially, all ZPPC of Pelotas were checked considering their importance for cultural heritage preservation, and they are presented in Figure 1. Considering a universe of 2212 inventoried properties in the city, the identification of those inserted in the preservation area studied was the beginning for the first sampling screening. The ZPPC 1 was chosen considering its representativeness of the first Pelotas urban nuclei. Among the pre-selected properties, some conditions were also imposed to restrict the buildings selection. A survey of pathological manifestations on the facades was also carried out.

Figure 1: Location of Pelotas Cultural Heritage Preservation Areas.

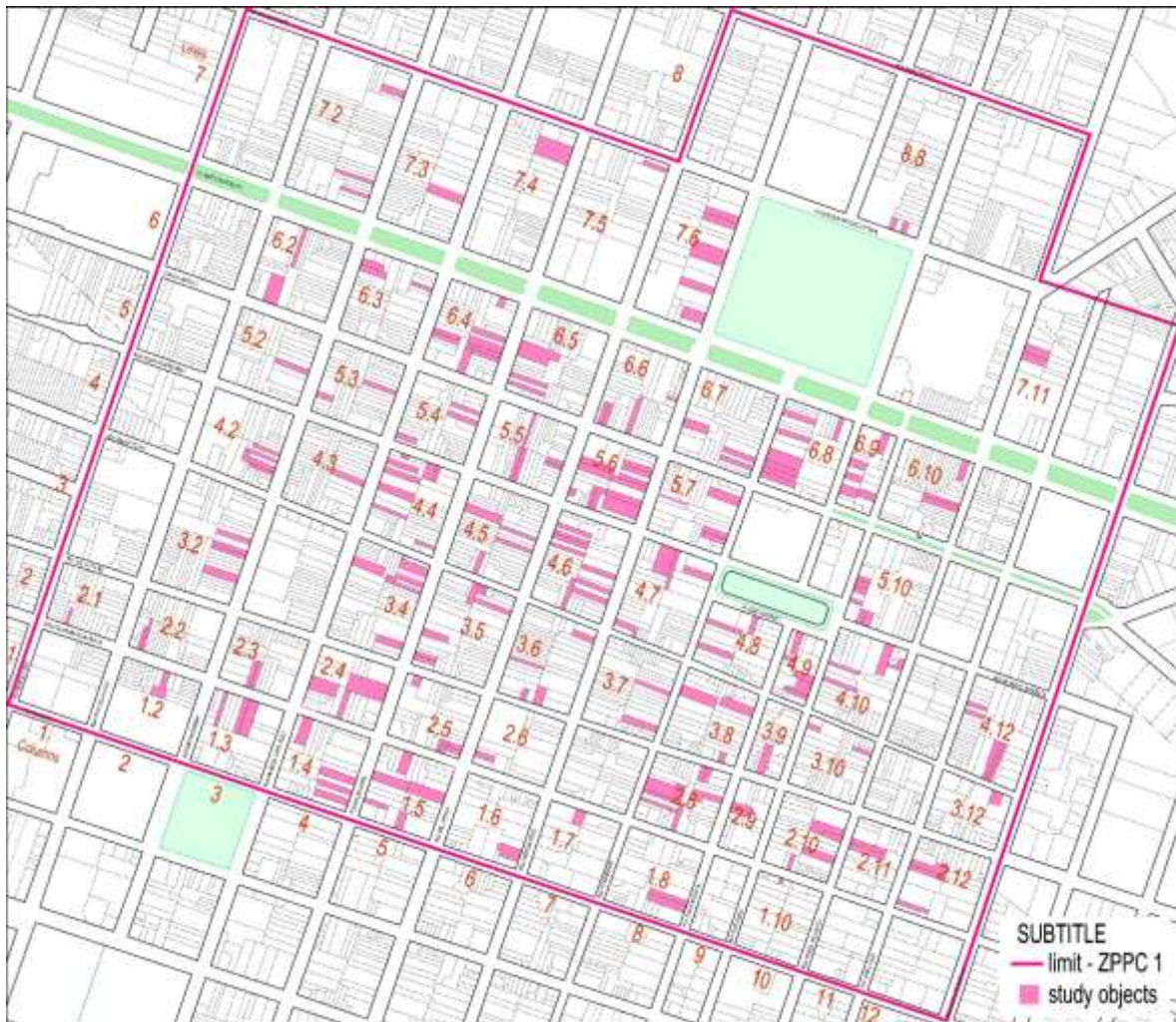


Source: Inventory Properties User Manual, 2008.

Preservation levels stipulated by City's III Master Plan were used as a selection criterion, opting for properties with preservation Level 2 because their external characteristics manutention are maintained, undergone some internal interventions. These buildings may present pathological manifestations resulted of internal modifications carried out by the owners. After this screening sampling, 394 properties were reached. A visual and photographic survey of them was carried out to select the study objects, establishing some criteria for other screening, carrying out a preliminary survey of the facades.

To systematize the field survey, a numerical classification was established to organize the study area. As shown in Figure 2, the blocks of ZPPC 1 were divided into 7 lines and 12 columns for a total of 84 blocks, of which 73 have Level 2 listed properties.

Figure 2: Map ZPPC 1 - Field survey.



Source: *Secretaria de Cultura de Pelotas* (SECULT) adapted by the authors.

Field surveys were carried out during the morning shifts (09:00 - 12:00) and the afternoon shift (14:00 - 18:00). The aiming of this stage was recognizing the samples and cataloguing them by photos. The photos were taken in a perpendicular plane of the facade (90°). In view of the difficulty of making photos without distortions, since the city center has several streets with small dimensions and with the presence of cars and vegetation, some photos were made with misrepresented in the angulation according to Figure 3.

Figure 3: Facade of Block 1.8 - Street XV Novembro, 664.



Source: Authors.

The Table 1 for the properties survey for the block's systematization was elaborated. In addition to a preliminary visual and photographic survey, some questions were established: number of floors, type of facade cladding, property current use, solar orientation, and architectural type. Elaboration criteria for the items presented in Table 1 was the property's characteristics definition of Pelotas. Thus, the most expressive local architecture buildings characteristics were established.

Table 1: Field survey table Line 1 - Q1.4.

Line 1	n°	Visual	Use	Number of floors	Coating	Observations	Solar orientation	Architectural type
BLOCK 1.4								
Street Mar. Deodoro	757							
	753							
	751							
	1312							

Source: Authors.

In the visual survey, part of the methodology proposed by Lichtenstein (1986) was used, which presupposes the survey of subsidies through site survey as the initial stage of the pathological manifestations study. Aiming to understand the building failures, the subsidies

survey should be carried out through site and history building survey and damage appearance. Visual and photographic analysis of pathological manifestations were investigated (Lichtenstein, 1986). In the initial visual building inspection, the main objective was mapping and survey the pathological manifestations. Concomitantly with the visual inspection phase, a photographic record of the building was performed using a digital photographic camera coupled to a fixed tripod with standardized height. The tripod was fixed at a height of 0.90 m and positioned at 6.50 m from the analyzed views. Aiming to enable the photographs expansion for better analysis, a high-resolution camera was used to obtain a good images view. In the second stage, for each facade, the 2D design was performed using AUTOCAD software with each respective graphic pathological manifestation identification.

Regarding existence of certain pathological manifestation, in the visual column on analysis form, the presence of pathological manifestation was marked - not the degree of severity or its extent, but only the existence of mold, detachment of plaster and painting, cracks, dirt, perch and vegetation.

In the use column on analysis form, the properties were classified in residential, commercial, service, institutional, religious, mixed, and unused. As the number of floors was marked on ground floor, two floors and three floors and whether the property was located on the corner. In the facade types column on analysis form, refer the coating used in the building under analysis, classified as mortar + paint, *cimento penteado*⁴ and *cimento penteado* + painting. Finally, the observation column is indicated some information as: recent painting of facade, application of textured mass, base of the facade with marble coating, partial painting of the *cimento penteado*, and among others.

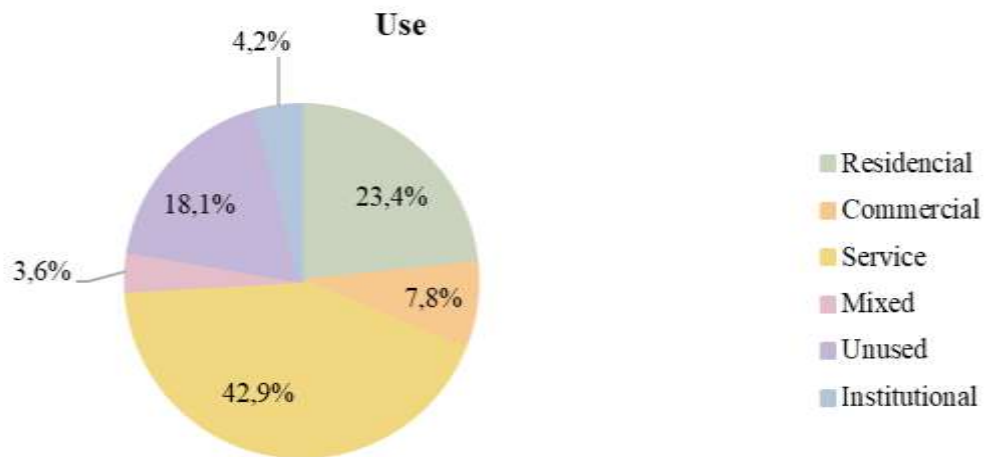
3. Results and discussion

In this stage, the characteristics collected in the total sample (359 properties) will be presented to evaluate which buildings are suitable for the application of the methods to evaluate the building degradation state. In the survey, the absence of physical barriers in front of the facades, such as the absence of walls, railings, and sidings, was imposed. The real use estate was classified as residential, commercial, service, mixed, unused, and institutional.

⁴ External coating - a name especially common in the south of Rio Grande do Sul - is one of the many forms of imitation of stone found by civil construction, over the centuries (Neutzling, 2019). This coating is formed by a binder, in general lime and/or cement, adding sand of various particle sizes and various minerals such as mica, dolomite, calcite, among others (Fratini, 2006).

According to the Figure 4, 42.9% of properties are used for services, 23.4% are used for residential use and 18.1%, are unused. The use for services found was as following: law firm, barbershop, nursing home, among others.

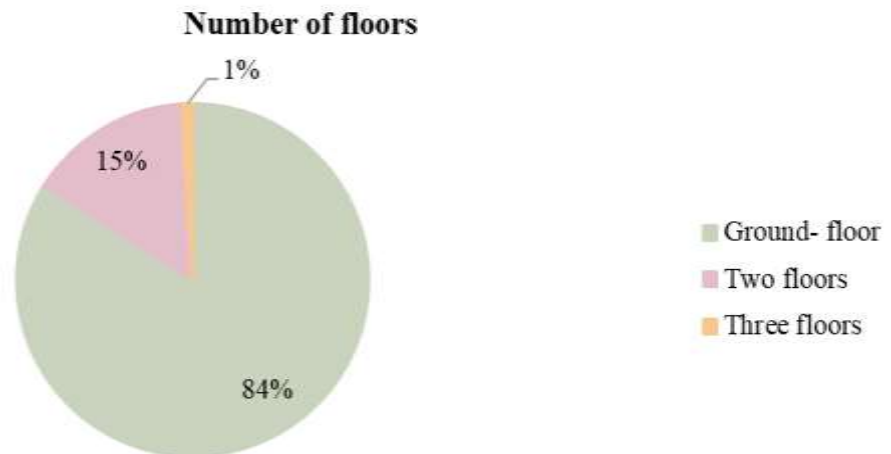
Figure 4: Graph of the use of the properties under study.



Source: Authors.

The number of floors was marked as ground floor, two floors and three floors. If the property was located on the corner was also considered. According to Figure 5, a number of 84% of the 359 properties are ground floor properties, and only 1% is three floor properties. Ground floor properties were selected considering the difficulty of taking photos without distortions since the city center presents several streets with small dimensions. A pre-selection of 303 copies was reached.

Figure 1: Graph of the number of floors of the properties under study.



Source: Authors.

In addition to the number of floors, buildings with large dimensions of facades was eliminated. According to the Figure 6, a photographic montage to obtain all the facades would be necessary. At this stage, a pre-selection of 279 properties was reached.

Figure 6: 2 Facade of Block 2.10 Street Félix da Cunha, 821.



Source: Authors.

Buildings with physical barriers, as trees, poles, and bus stops in front of the facades, as can be seen in Figure 7, were excluded. A pre-selection of 203 properties was reached.

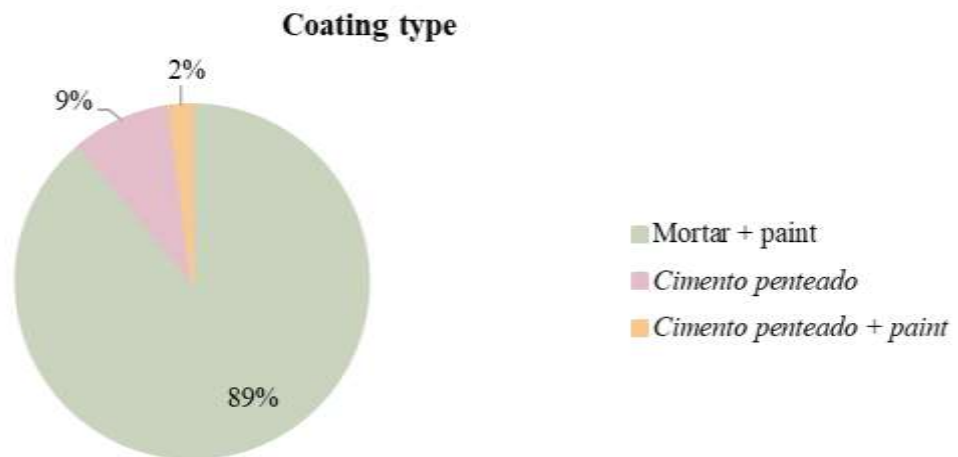
Figure 7: 3Facade of Block 2.9 Street Voluntários da Pátria, 746 and Facade of Block 3.2 Street Santos Dumont, 335.



Source: Authors.

The survey referring to the coating types in the facades indicated mortar + paint as the most used coating in the study area, as can be seen in Figure 8. This result agrees with that obtained by Terra (2001) which determined mortar + paint as the most coating used in Pelotas. As delimitation, 168 buildings with the same constructive characteristics were selected, excluding facades with other coating types. Only facades with mortar coating was considered.

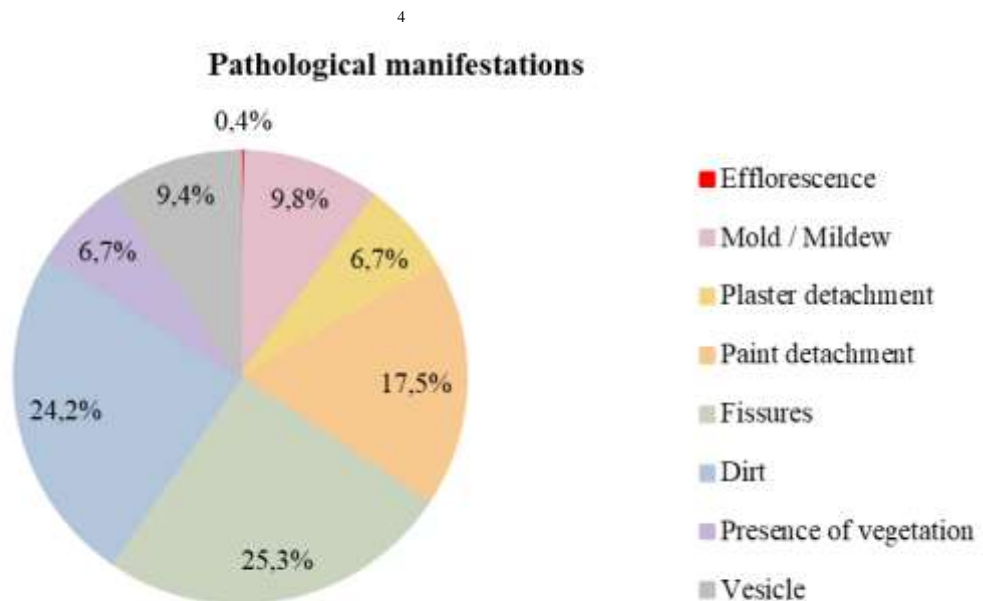
Figure 8: Graph of the type of coating of the properties under study.



Source: Authors.

Buildings without pathological manifestations were excluded. In addition, ruined buildings without internal integrity conformation were also removed. A pre-selection of 157 buildings with desirable characteristics was reached. Among them, 25.3% of pathological manifestations are fissures, 24.2% are dirt, 17.5% are paint detachment, among other, as presented in Figure 9.

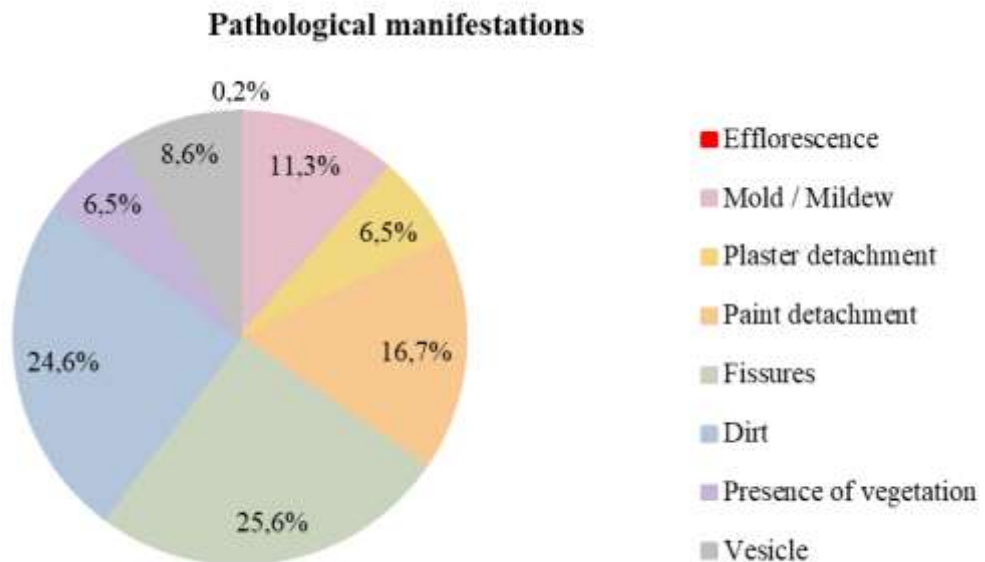
Figure 9: Graph of the type of pathological manifestation of the selected properties (157 properties).



Source: Authors.

Although some buildings were excluded because of surveying and standardizing difficulties, pathological manifestations of 394 properties are presented in Figure 10. Among them, 25.6% are fissures, 24.6% are dirt, and 16.7% are paint detachment, validating the result obtained in the 157 properties, as presented in Figure 9.

Figure 10: Graph of the type of pathological manifestation of real estate (394 properties).



Source: Authors.

In Table 2 are presented the relationship between solar orientation and number of facades. Buildings with different solar incidences were elected to prove or not the interference of solar position in the pathological manifestation's appearance. Solar facades orientation criteria were established considering environmental conditions as the main responsible for facades degradation, as described by Veira (2005). Among them are temperature variation, relative humidity, rainfall and winds and solar radiation incidence, as well as microorganisms' action. Mazer et al. (2016) has verified the appearance of pathological manifestations on the facades in different amounts and in different directions. Their relationship with the temperature variation and wind direction has been identified according to the geographic direction. The geographic direction presenting highest solar incidence has presented the highest number of pathological manifestations, with emphasis on cracks and detachments, indicating a possible relationship between geographic direction and the damage types. The greater infiltrations facade presence in the geographical direction with higher wind speed and wind incidence has indicated a probable relationship between them and infiltrations incidence.

Buildings with facades of northeast, southwest, southeast, and northwest solar incidence were studied. Corner buildings were excluded considering the presence of two facades in different solar incidences. A pre-selection of 144 copies was reached.

Table 2: Relationship between solar orientation and number of facades of study objects.

Solar Orientation	Number of properties
Northeast	24
Southwest	28
Southeast	55
Northwest	37
Northeast and Southeast	6
Northeast and Northwest	1
Southwest and Southeast	2
Southwest and Northwest	4

Source: Authors.

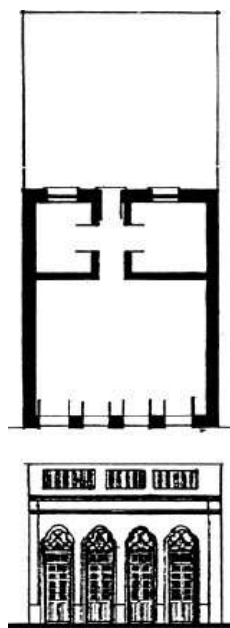
Under facades solar orientation correlation aspect and pathological manifestations detection, according to Rodrigues (2016), the buildings photographs can be better made in the morning or in the afternoon, reducing the interferences related to the direct projection of the sun's rays on the facades. Direct illumination of the sun generates a greater reflectance in the photographic image, making difficult to visualize certain pathological manifestations. The author points out the fissures as an easier visualization in facades when there is no direct sun's ray's projection. On the other hand, moisture pathological manifestations with microorganism's presence present easiest visualization in photographic images at 12:00 hours, considering the sun perpendicular to the Earth, more uniform lighting without direct sun incidence on the facades.

Finally, considering several field observations, some results should be remarked as recent painting of the facade, application of textured mass, base of the facade with stone cladding, partial painting of *cimento penteado*. Considering these observations, it was possible to perceive the owners performing conservation interventions in buildings as periodic paintings. Nevertheless, inappropriate conducts with the historical heritage as the application of stone coverings on facades, were pointed out.

The concept of type was also considered as a selection criterion. Da Costa, Gonsales & Cotrim (2019) consider type in architecture as a variety of meanings and uses, falling into the relationship between building/program or building/use. Aragão (2006) emphasizes type as different meanings, depending on the author and the period. First theoretical formulation of

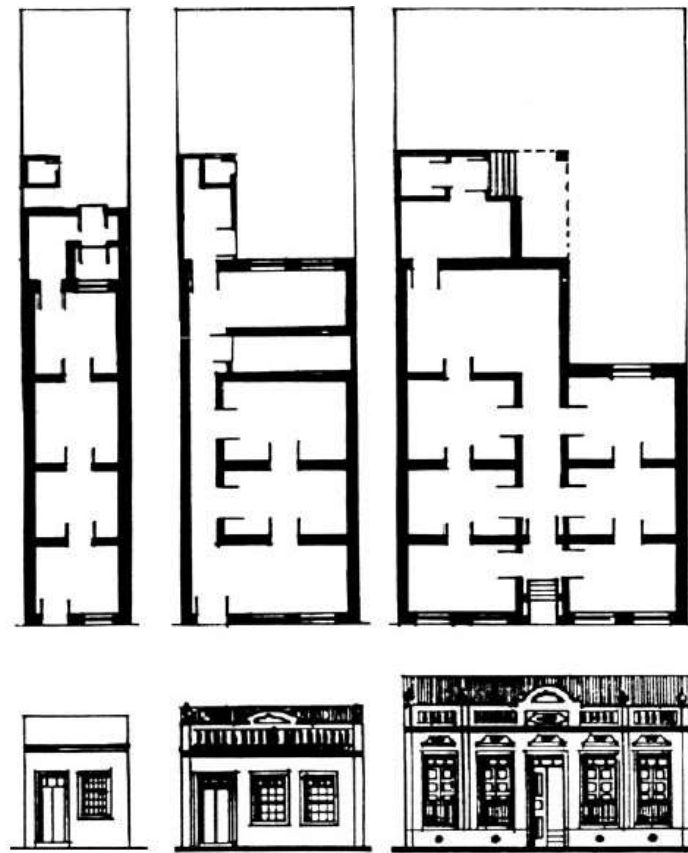
type was proposed by Quatremère de Quincy, in Paris, at the end of the 18th century. His definition was used in the 20th century by historians and architects such as Aldo Rossi, Aymonino and Panerai. In addition to the concept validity, in this study, type was treated according to the *Programa de Revitalização Integrada de Jaguarão (PRIJ)* (Oliveira & Seibt, 2005). Type is conditioned by tested lot, by plant program distribution necessity (reflected in the facade and in the volume), by building function, by construction time posture codes, by climate, by topography, among others. Thus, all buildings with type of commercial, as presented in Figure 11, whose facade composition is determined by the rhythm of several doors, were removed. Thus, the study reached 140 buildings facades with type of house of door and window, side corridor and central corridor, according to Figure 12.

Figure 11: Type: commercial.



Source: Authors adapted from Oliveira & Seibt, 2005.

Figure 12: Type: door and window house, side hall house and central hall house.



Source: Authors adapted from Oliveira & Seibt, (2005).

Three facades with type of door and window facades, side corridor and central corridor are presented in Figure 13. All of them are exemplary of Pelotas architecture.

Figure 13: Pelotense architecture: side corridor house, door and window house and central corridor house.



Source: Authors.

Nowadays, the urban growth, the constant technology evolution, the real estate market and, the new types and materials implementation on the architecture, have leading to a

stylistic and formal discrepancy in relation to historical architectural goods. These factors associated with the absence and inefficiency of preservationist policies have resulted in the deterioration and mischaracterization of architectural heritage buildings. The architectural mischaracterization results in losses of the original characteristics because of the successive inadequate interventions (Rodrighiero, 2019). *Programa de Revitalização Integrada de Jaguarão* establishes de-characterization degrees to measure interventions in the original buildings design. Its classification is following as entirety, grade I, grade II, grade III and grade IV (Oliveira & Seibt, 2005).

Following PRIJ classifications, the buildings considered in this study were those classified as entirety or grade I. These buildings can present mild mischaracterization with only architectural composition attack, which can be removed or replaced. Taking photographs into account during the preliminary survey, the buildings were classified and 91 were selected for the final survey stage evaluation of the facades. In the final survey, new photographs and a visual facades analysis was performed to enable a better photographs enlargement. The camera was Nikon D3100 model, 14.2 megapixels resolution (3072 x 4608 pixels).

In view of the difficulties faced in the preliminary survey with the presence of cars and pedestrians, the field surveys were carried out in the morning shift (06:00 - 09:00). Times and days with less people circulation were selected, making photographs without physical barriers possible. As described in the previous step, the photographs were taken perpendicular to the facade plane. Between preliminary survey stage and the final survey of the facades, some buildings underwent conservation interventions, such as paintings and renovation, as shown in Figure 14, were excluded.

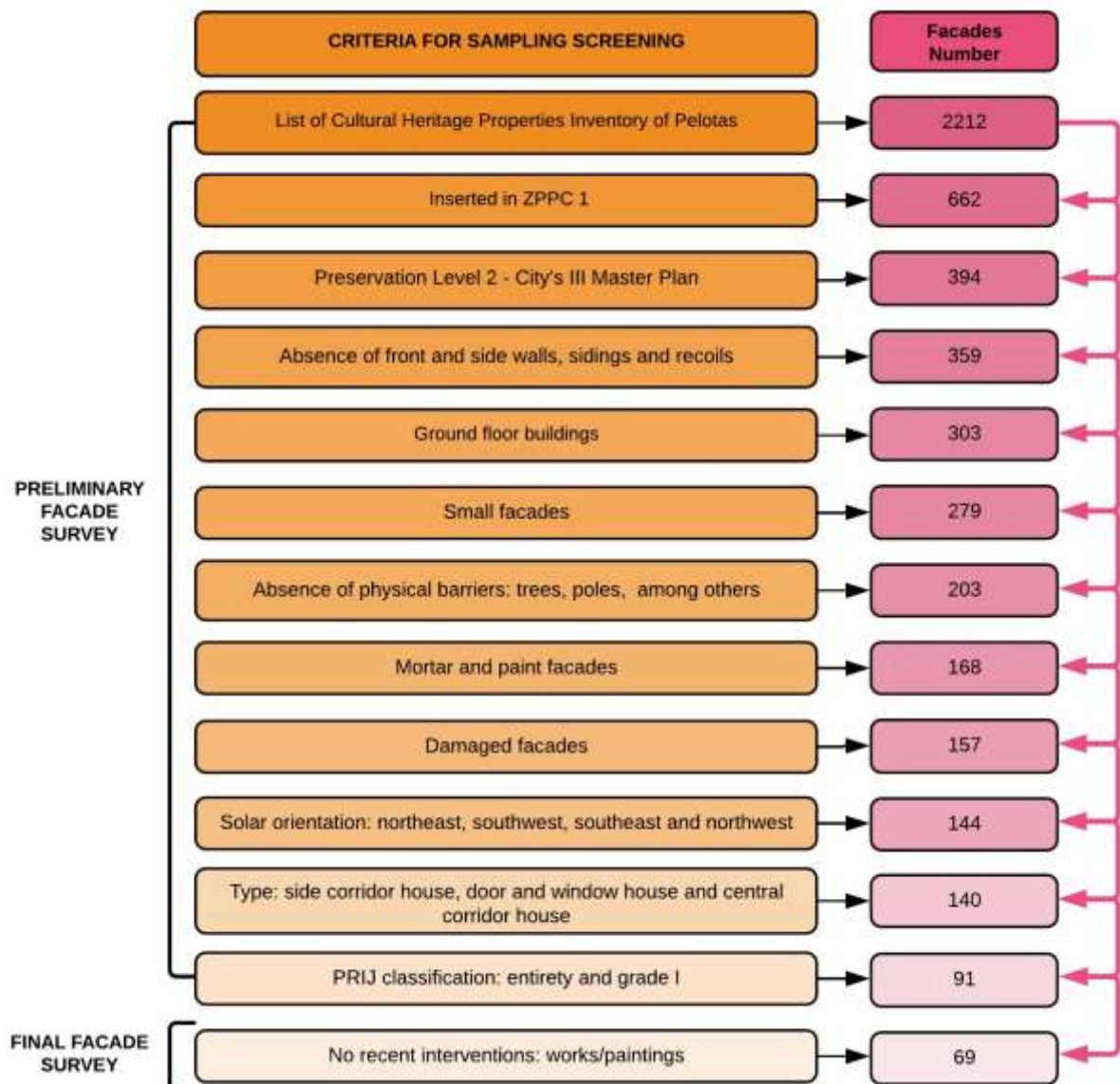
Figure 14: Preliminary survey of the facade - Block 1.3 Street Voluntários da Pátria, 1405
versus final survey of the facade - Block 1.3 Street Voluntários da Pátria, 1405.



Source: Authors.

After the analysis of 91 properties, some properties under conservation and requalification facades interventions during the period of the study were excluded. Thus, 69 buildings with the following characteristics were evaluated: ground floor; no interference in front of the facade; mortar coating with paint: northeast, southwest, southeast and northwest solar positions; located in the middle of the court; type: door and window, side aisle and central aisle and PRIJ classification: entirety and grade I. In Figure 15 are illustrated the sampling definition screening, addressed the cuts made between the ZPPC selection steps, preliminary survey of the facades and final survey of the facades.

Figure 15: Flowchart of the sampling definition.



Source: Authors.

It is important to highlight that all selected properties in ZPPC are located in the central area of the city, in the first urban nucleus, and in smaller streets. According to Oliveira (2012), the streets in ZPPC 1 present an average of between 10 and 15 m of width. In addition, there is a balance between the number of longitudinal and perpendicular streets, and the place was historically generated by the first chapel, serving as the generation historic center point. The buildings located in the historic center belong to the eclectic architecture style. In Pelotas it is possible to find one of the largest national collections about eclectic architecture, containing listed and inventoried buildings. Eclecticism can be considered as an art movement, artistic and/or architectural, which makes the use of decorative and compositional elements from other periods. Eclecticism can be considered as a scientific

and/or philosophical method, aiming to reconcile different ideologies. Under architectural viewer point, this style brought several elements of different eras selecting them according to their aesthetic quality in search, mainly, of perfection. In this respect, Vieira (2005) has demonstrated some data about the influence of architectural details on the state of conservation of facades due to the dirt particles deposition on the facades paraments. The results of the authors correlate the pathologies analysis with the ornamentation and urban morphology.

4. Conclusions

Regarding historic buildings, the conservation of materiality becomes paramount, and deepening and systematizing knowledge in the heritage and pathological manifestations area is extremely necessary task for heritage conservation and preservation. Pelotas was adapted for the study in view of the large number of historic buildings. Although listed and inventoried buildings are legal means protected, their recognition of heritage condition and cultural heritage do not present any guarantee of the building's permanence over the time.

Sampling selection methodology proposed in the present study was extremely efficient for pathological manifestation evaluation. Several historic buildings facades were representativeness sampling, optimizing, and justifying the means for including and excluding facades. The methodology aiming to enhance and systematize surveys in field studies does not seek to disqualify the properties. The development of this method denotes an innovation useful to be applied in other cities with many historic properties. Although the study was proposed in Pelotas, the criteria created can be adaptable for other locations. This takes a research to transcend the academic area and immerse itself in the practical field. The sampling selection methodology made possible to assess the state of degradation of the facades of inventoried buildings in Pelotas, since it restricted and grouped buildings while maintaining damage rates compatible with the initial sample.

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