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Acervos de arquitetura e SIG-Histórico: decifrando os antigos sistemas de numeração predial

Architectural and Historical-GIS collections: deciphering the old building numbering systems

Colecciones arquitectónicas y SIG-Histórico: descifrando los antiguos sistemas de numeración de edificios

VILLELA, Ana Teresa Cirigliano[1]
BORTOLUCCI, Maria Angela Pereira De Castro E Silva[2]

[1] Universidade de São Paulo; Instituto de Arquitetura e Urbanismo; Programa de Pós-Graduação em Arquitetura e Urbanismo. São Carlos, São Paulo, Brasil.
anacirigliano@usp.br
ORCID: 0000-0001-6720-935X

[2] Universidade de São Paulo; Instituto de Arquitetura e Urbanismo; Programa de Pós-Graduação em Arquitetura e Urbanismo. São Carlos, São Paulo, Brasil.
anacirigliano@usp.br
mariacsb@sc.usp.br
ORCID: https://orcid.org/0000-0002-8237-1862

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Abstract

This article describes a research experience into the archival collections of private buildings at the Public and Historical Archive of Ribeirão Preto (APHRP), in which Geographic Information Systems (GIS) were used to cross-reference data from primary documents, such as cadastral plans, property tax books and architectural projects. In addition to the primary documents, historical buildings which have remained in the current landscape are also used as research sources. GIS is able to facilitate this dialogue between archives and landscape since it supports all information and documents regarding geographic space. In specific terms, it presents a system that recognizes old property numbering systems, supported by GIS, developed from identifying incompatibilities through consulting the private processes at APHRP, derived from changes in the way that properties are addressed. This article considers that this method applied to the spatial cross-section of the research, the Quadrilátero Central [The Central Quadrangle], enables the geolocation of architectural projects and may be replicated in other neighborhoods in the city of Ribeirão Preto and other municipalities.

Keywords: Geographic Information System, Private Buildings, Architectural Project.

Resumo

O artigo relata uma experiência de pesquisa no acervo de obras particulares do Arquivo Público e Histórico de Ribeirão Preto (APHRP), na qual são utilizados Sistemas de Informação Geográfica (SIG) para cruzar dados provenientes de documentos primários, como plantas cadastrais, livros de impostos prediais e projetos de arquitetura. Além dos documentos primários, são utilizadas como fontes da pesquisa edificações históricas remanescentes na paisagem atual. O SIG facilita esse diálogo entre arquivo e paisagem na medida em que apoia todas as informações e documentos sobre o espaço geográfico. Especificamente, apresenta uma sistemática de reconhecimento de antigos sistemas de numeração predial, apoiada em SIG, desenvolvida a partir da identificação de incompatibilidades no modo de consulta aos processos particulares do APHRP, derivadas das mudanças de endereçamento dos imóveis. O artigo pondera que este método aplicado ao recorte espacial da pesquisa, o Quadrilátero Central, viabiliza a geolocalização de projetos de arquitetura e pode ser replicado nos demais bairros da cidade de Ribeirão Preto e de outros municípios.

Palavras-Chave: Sistema de Informação Geográfica, Obras Particulares, Projeto de Arquitetura.

Resumen

El artículo relata una experiencia de investigación en la colección de obras privadas del Arquivo Público e Histórico de Ribeirão Preto (APHRP), en el que se utilizan Sistemas de Información Geográfica (SIG) para cruzar datos de documentos primarios, como planos catastrales, impuestos libros edificios y proyectos arquitectonicos. Además de los documentos primarios, los edificios históricos que quedan en el paisaje actual se utilizan como fuentes de investigación. El SIG facilita este diálogo entre archivo y paisaje, ya que apoya toda la información y documentos sobre el espacio geográfico. En concreto, presenta un sistema de reconocimiento de antiguos sistemas de numeración de tierras, apoyado en SIG, desarrollado a partir de la identificación de incompatibilidades en la forma de consultar los procesos particulares del APHRP, derivados de cambios en la dirección de las propiedades. El artículo considera que este método aplicado al corte espacial de la investigación, el Quadrilátero Central, permite la geolocalización de proyectos arquitectónicos y puede ser replicado en otros barrios de la ciudad de Ribeirão Preto y otros municipios.

Palabras clave: *Sistema de Información Geográfica, Obras Privadas, Projecto de Arquitectura.*

1. Introduction

Archival document collections are extremely valuable sources for revealing the production of architecture and the city, still somewhat underexplored by historiography. Architectural archive collections "are the testimonies of ideas and work practices that constitute important documents for the study of architecture, the city, the arts, techniques, professions and their relationships with society" (IAB, 2020)[1]. It is essential to highlight that architectural documents have "originated from activities related to the construction of buildings and other structures" and "are preserved as evidence or reference" (FERREIRA, 2021, p. 5). Thus, there are many challenges related to their safeguarding, organization, cataloging and preservation, presented concomitantly with the various historiographical possibilities enabled through their systematization, expansion and contextualization together with a series of other documents spread throughout national, state and municipal archives[2].

This article describes a research experience in the archives of private buildings from the Arquivo Público e Histórico de Ribeirão Preto (known in Brazil as APHRP[3]) developed within the scope of the thesis "Transformações da paisagem urbana: o Quadrilátero Central de Ribeirão Preto (1884-1949)" [Transformations of the urban landscape: the *Quadrilátero Central*[4] of Ribeirão Preto (1884-1949)], in progress at the Instituto de Arquitetura e Urbanismo at the Universidade de São Paulo. During the research, we interpolated this collection with primary documents found in other archives, including private collections, and with historic buildings that still remain in the current landscape, using Geographic Information Systems (GIS).

In specific terms, the article addresses a recurring problem in documentary research regarding the geolocation of architectural projects for private buildings, which renders it impossible to georeference data in GIS or even to understand the relationship between architectural production and urban space. This difficulty derives from the successive changes in the building numbering systems without having been adequately documented or, at least, the respective records being made accessible to the public.

Based on the spatial focus of the research, the Quadrilátero Central of Ribeirão Preto (Figure 1), we developed a method of making the old systems compatible with the one currently adopted in order to enable the spatialization of data and that, in the future, would be able to contribute to streamlining consultations for the processes of private buildings at APHRP.

Although we start from a local context, similar difficulties may be identified in other cities across the region. Thus, we trust that the proposed method may be reproduced and adapted to other archival collections not only for georeferencing purposes, but also to facilitate the procedures used to consult the content of such processes in municipal archives.

[1] This and all non-English citations hereafter have been translated by the authors.
[2] Archive is understood as the "receiving body, which either by transfer or collection receives the material naturally accumulated by public or private institutions" (FERREIRA, 2021, p. 6).
[3] All acronyms used throughout this article have remained as they appear in Portuguese.
[4] Official name of the area, meaning "Central Quadrangle".

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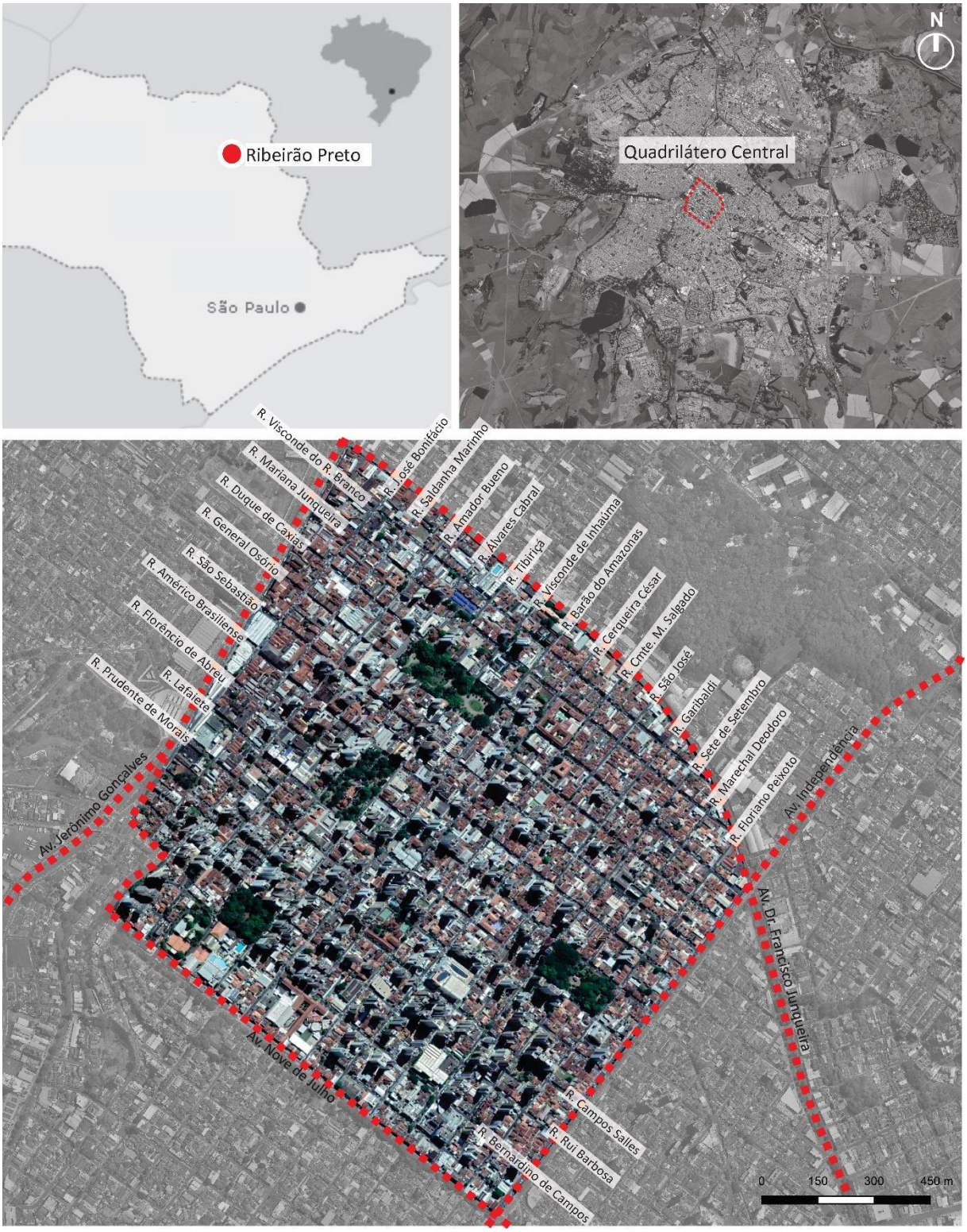
Figure 1: The locations of Ribeirão Preto and the Quadrilátero Central.



Source: Research material produced from aerial photographs on Google Earth, Image © 2021 Maxar Technologies.

2. "What do we look for in an archive?"

Initially, we did not formulate an objective answer to this question by Ariella Azoulay (2017), mainly because the list of documents that could help to understand the transformation process of the Quadrilátero Central is somewhat extensive. On the other hand, our interest in the production of urban buildings ultimately led us to the so-called Fundo Prefeitura Municipal, which represents "a major portion of the Archive's collection, reflecting all the areas of intervention by the public authorities in the face of the social demand for services'' (APHRP, 1996, not paginated). In addition to the cataloged documents, throughout the research, we "chanced upon" "lost" documents in the APHRP, such as urban cadastres, property tax books, uncatalogued photographs, loose request forms inside boxes, among many others. No matter how great our efforts have been to pre-define the types of documents that met the research objectives, it would have been a mistake to ignore the investigative possibilities that were presented through these documents, especially when considering the dialectic of preservation and cancellation present in the archives, as indicated by Azoulay (2017).

Among the documents consulted, the urban cadastral plans and the property tax books were fundamental in deciphering the old building numbering systems in force during the first decade of the twentieth century in Ribeirão Preto. Without them, it would have been difficult to accurately georeference[5] the architectural projects approved for plots of land in the Quadrilátero Central before adopting the current building numbering system, which only occurred in 1948 (RIBEIRÃO PRETO, 1948).

The city of Ribeirão Preto originated as a religious heritage, the result of land donations made by farmers in the mid-nineteenth century. The limits of the donated lands are inserted into the current Quadrilátero Central, which corresponds to the spatial scope of the research. It is, therefore, the oldest urban occupation nucleus. However, of the original nineteenth-century architecture, only the old Chamber House and Jail remains, the construction of which began in the late 1880s. In the first decade of the twentieth century, the wattle and daub houses were demolished and replaced by brick buildings, some of which still remain in the current landscape.

The roughness of the landscape (SANTOS, 2012) provides an indication of the intense transformation process that we studied from an unprecedented approach to the city, with a focus on architecture of a minor character. This production, as Gustavo Giovannoni already explained at the beginning of the twentieth century, contains testimonies of the current architecture from different periods, the value of which must be recognized both for its collective character and for its relationships locked in with the more grandiose monuments (KÜHL, 2013). In the Brazilian scenario, it was left to Ricardo Severo to emphasize, in conferences that took place in 1914 and 1915, that urban houses, intended for a wide variety of functions, would be responsible for conferring the architectural characteristic of the city (SEVERO, 1916).

In the local historiography, until the first decade of the twenty-first century, there predominated what Friedrich Nietzsche called monumental history, in which "greatness shall be everlasting" (NIETZSCHE, 2003, p. 19)[6]. In the history of architecture and urbanism, this tendency is manifested through the emphasis given to great works and great architects (CANIGGIA and MAFFEI, 1995). In Ribeirão Preto, there is a close relationship between the buildings studied, of a monumental character, and the coffee period, responsible for the development of the city between the end of the nineteenth century and the beginning of the 1930s. Academic research frequently mentions the institutional headquarters of

[5] The spatialization – or georeferencing – consists of the activity of associating data from a wide variety of sources with the coordinates of an absolute location, i.e., all the data is translated into points, polygons or lines supported by a system of known geographic coordinates.

[6] N.B. - For direct citations, the English version was used of NIETZSCHE F. *Untimely Meditations*. Cambridge Texts in the History of Philosophy. New York: Cambridge University Press, 1997, p.68.

power and the mansions where the coffee farmers lived, undoubtedly very important examples of local architecture. On the other hand, by placing an almost exclusive emphasis onto these particular buildings, another part of architectural production has been rendered invisible, that which was destined for exercising daily activities and occupied by anonymous characters, at least from the historiographical viewpoint. It is, therefore, a common architecture, little known, and one that rarely has its cultural value recognized. Among other reasons that we are unable to mention here, such factors have contributed to a systematic loss of this minor architecture, for which some documents, or fragments of documents, have nonetheless remained.

As with history, documents are also not "transparent lenses" of the past (KARNAL; TATSCH, 2009). Both may be understood as representations strongly marked by the tendency towards monumentalization. A reflection of this is the fact that large buildings are cataloged on spreadsheets prepared by the APHRP team and intended for researchers, while smaller buildings require complex and, possibly, ineffective consultations through protocols obtained from the Secretaria do Planejamento e Gestão Pública da Prefeitura Municipal de Ribeirão Preto (SPGP-PMRP).

One of the major challenges of this research has been to gather the available documentation on the minor architecture of the Quadrilátero Central and understand its role in transforming the landscape, whether through different styles, uses and templates, or through the relationships with public, grandiose buildings. The spatialization of historical data relating to each of the plots of land in the study area was therefore essential. In the research, the GIS enabled this process, but nonetheless did not dispense with lengthy searches through the archives (physical and digital) so that we could finally reach the stage of georeferencing the data.

We surveyed three categories of documents, which were graphic (plans and maps), photographic (aerial photographs, of public places and buildings) and bibliographical (property tax books, books of planning approval, almanacs, journals of national, state and municipal circulation, among others). These documents represent architecture and the city at different times and scales, and, despite the different languages involved, maintain their role as a common support. Given this condition, between the documentary survey and georeferencing, it was necessary to digitize all the documents, process the images and systematize all the material so that we could begin the stage of data spatialization.

The documentary research was conducted in the digital repositories of the Biblioteca Nacional (BN Digital) and the Arquivo Público do Estado de São Paulo (APESP), in the physical and digital collections of the Arquivo Público e Histórico de Ribeirão Preto (APHRP) and in the private collection of digitized photographs by Tony Miyasaka.

In the digital database of the Biblioteca Nacional, we found a small collection of photographs of well-known buildings and places, such as schools and squares, produced by Casa Beschizza to illustrate postcards that were in circulation in Brazil during the 1920s. The photos extolled the city as the "capital of coffee", but were of even greater value to research because, in the background, we are able to see another city, marked by simple buildings, and relatively unknown by historiography. This production would rarely be the focus of photographers, most of whom were commissioned, taking family portraits or registering public and religious buildings as well as those that belonged to the elite. A fresh look at the city emerged with the photographer Tony Miyasaka, who, from the 1950s onwards, in addition to his major works, recorded everyday aspects of the city, including through aerial photographs. While there is a considerable number of photos of his authorship at APHRP, it was in the private collection, held by the photographer's daughter, Elza Miyasaka, that we found precious records of a landscape in constant transformation.

Another possible approach to these everyday aspects of the city came from a series of almanacs available on the BN Digital, such as the *Almanak Laemmert*, which annually listed commercial and industrial establishments and professionals working in the city. Here, instead of the formal aspects,

seen in the photographs, we are given the uses and names of professionals, members of a class of free workers that had supplied the need for slave labor ever since the end of the nineteenth century.

Provincial and state almanacs reinforce the dynamism that marked the urban scene at the turn of the twentieth century. For spatialization purposes, such almanacs were extremely useful because they contain address data, unlike local almanacs, which only contain the names of professionals categorized by the activity they performed. The books with the taxes on professions were certainly able to help identify all of them, as well as the places where they worked. However, of the books that could have temporal correspondence with the other documents surveyed, only loose pages remained, and many were already lost.

To the photographs and almanacs, we added hundreds of photographs and thousands of architectural projects, in addition to urban cadastral plans and administrative books, available at the APHRP. Many of the APHRP photographs have already been digitized, and so we only scanned those that had not been cataloged. Only one of the cadastral plans however, had a digital file. The others were scanned or photographed for later georeferencing in a GIS environment. The public and private building projects were all scanned or photographed. Thus, we were able to create an image database, composed of reproductions of urban cadastral plans, architectural projects and photographs, which were later georeferenced together with a series of other data, from bibliographic sources, related to address, property, and uses, etc.

In addition to the archival sources, we also used what we refer to as material sources, i.e., the buildings that corresponded to the period studied. We recorded these examples through photographs produced in loco and identified them through visual analysis, searching for characteristic elements of styles and types common in the first half of the twentieth century. Initially, we were unaware of the dates of these examples and any documentation relating to former owners or authors of the project. We thus equipped ourselves with a kind of archeological gaze (PESAVENTO, 2004) when we confronted the two categories of sources – archival and material – seeking to recover, among other information, what no longer exists in the present, and to understand the meanings of what had withstood time. The relationships between such categories began to gain new contours when we associated the data obtained in the documents to the location coordinates with the support of GIS.

As indicated by Bol et al. (2009), visualizing spatial data adds something new even to well-known themes and objects. “In this vein, it should be noted that the GIS technology opens the way for mathematical modeling of spatial relations including network analysis, spatial regression, and other forms of spatial analysis” (BOL et. al., 2009, p. 3).

Geographic information systems have been used in research in the area of urban history, since they enable the visualization and analysis of data related to building processes in a spatialized manner and cross-referenced to different sources. It is possible to georeference maps, urban cadastral plans and other types of cartographic representation that provide information on aspects of the landscape as a whole. However, it is also possible to spatialize data at the building scale, such as those obtained through the processes of private buildings and inventories of public buildings. However, “spatializing data on the scale of the building is not an easy task, it implies the risk of imprecision, but it enables us to catch a glimpse of invisible aspects of the process, its dynamics, rhythms and logics" (BUENO, 2016a, p. 443). These difficulties are minimized when it comes to public buildings, as some are recognizable on maps and urban cadastral plans and others have been preserved until the present day.

Despite being very fruitful, the spatialization of data related to architecture comes up against practical issues, not always covered by the literature on the subject. We took advantage of the publication of the thematic edition *Arquivos e Acervos em Arquitetura e Urbanismo* in the periodical *Paranoá*, so as to discuss the difficulties of locating the architectural projects of the APHRP collection of private

buildings within the perimeter of the Quadrilátero Central. Although the approval processes for private buildings mostly contain ownership and address data, both have been modified over the years. Furthermore, successive changes in the building numbering systems make it particularly difficult – or even impossible – to spatialize data on the scale of the building. This is because the addresses contained on the covers of the processes and/or on the original drawing sheets do not correspond to current data, and there are no records with such equivalences.

To fill this gap, we developed a method for recognizing two building numbering systems, which were in force in the first half of the twentieth century. As sources, we used urban cadastral plans and property tax books from 1910 and 1918. The plans were georeferenced, and the buildings represented in them were vectorized in GIS. For each of the vectors generated, we assigned property and address data, which made it possible to locate hundreds of projects for private buildings.

3. The APHRP collection of private buildings

At the APHRP, processes are stored for both public and private buildings. For the public buildings there are several dossiers, containing the original drawing sheets of the project, invoices, descriptive memorials, newspaper reports, etc. Among the public buildings located in the Quadrilátero Central, there are six dossiers, including buildings that have already been lost, such as the Carlos Gomes Theater, which was demolished, and the Municipal Market, which was destroyed by fire. There are approximately 10,000 private property processes, covering a time span from 1910 to 1979. The records prior to 1910 are restricted to the period between 1902 and 1913 and are included in the administrative book entitled *Relação das plantas de construccção e reconstrucção aprovadas pela Câmara* [List of building and rebuilding plans approved by the Chamber]. There are therefore no records of projects prior to 1902.

Private buildings are stored in folders which are identified with the case number and approval date, and often there is also the address, name of the owner and/or responsible builder. The folders for the processes dated until the mid-1930s only contain the original drawing sheet(s), and from then on, there are requests for approval and descriptive memorials. Due to the fragile nature of the material, we only opened the folders that referred to plots of land inside the Quadrilátero Central. We conducted this triage based on the address data contained in the covers of the process files, although, on some covers, the data is only partially presented, containing, for example, just the name of the owner or just the name of the street, without any indication of the property number. In these cases, we checked the contents of the original drawing sheets and, in the case of plots of land located in the study area, we proceeded with the digitization, along with the others. We also used a camera to record the smaller sheets or those that were too fragile to be scanned. Others, already very damaged, were not even opened, and only the data presented on the covers were noted, without digitizing the graphic content.

After digitizing and processing the images, we began the data spatialization stage. This stage requires knowledge of the geographic coordinates of the buildings represented in the architectural projects, which is not always an easy task. By way of comparison, to assign geographic coordinates to a photograph, even when it is regarding cataloged material, with the respective descriptors, we look for elements in the image that enable us to pinpoint the exact location of the photographer when he captured that particular scene. In the case of assigning coordinates to architectural projects, there are two possible situations depending on whether or not the property exists in the current landscape. When at least the street on which the projected building is known and, in addition to having been built, has also been preserved, georeferencing is relatively simple. First, we looked for properties on the street in question with characteristics similar to those represented in the architectural drawings, especially on the facades. If found, more careful comparative analyses were conducted, seeking to identify, even in the smallest architectural elements, the correspondence between the built object and the represented object.

However, most of the collection of private buildings consulted within the scope of the research consisted of projects of buildings that have already either been demolished or significantly altered. Furthermore, not finding the built examples, it cannot therefore be affirmed, in advance, that the buildings had, in fact, been demolished. Some of them, although approved, were not built. Considering a series of factors and with the support of GIS, we developed a method to locate these projects, regardless of whether or not they had any material correspondences.

The first factor to be considered is related to any changes in the street names. In the case of the Quadrilátero Central, these were few and had already been considered in studies by memorialists (EMBOABA, 1955) and historians (ROSA; REGISTRO, 2007). The comparative analysis of the cartographic documents available at the APHRP map library enabled us to date these changes, which accompanied urban growth and the posthumous tributes paid to notorious characters in local history.

However, when tracing equivalences between the old building numbering systems and that currently in use, we found that we had insufficient sources to achieve the locations of the respective projects. In the APHRP collection, we found only two books with signs of changes in building numbers. The first book, undated and entitled *Reemplacamento* [Resigning], contained pages where all urban properties and their respective numbers should be listed. Interestingly, only the first pages had been filled in with the names of the owners and the property numbers of a single street (Rua Visconde do Rio Branco). The remaining pages had been left blank. The second book was entitled *Registro dos Números dos Prédios - Antigo e Moderno* [Registration of Building Numbers – Ancient and Modern], dated 1949. Once again, the registration and compatibility between the numbering systems were restricted to the same street mentioned in the previous book, leaving many uncertainties in relation to the other addresses. Although it contained data from just one single street, it was nonetheless possible to verify that, in the first book, renumbering had only occurred on the properties, without changing the numbering system itself. This only occurred in 1948, when Law No. 29 instituted the metric system. From this point on, the number of each building began to correspond, approximately, to the distance in meters, measured by the axis of the road, from its origin to the middle of the threshold. The references for defining the points of origin of the streets were maintained, and were the Retiro Stream (currently Avenida Doutor Francisco Junqueira) and the Preto Brook (currently Avenida Jerônimo Gonçalves). Based on these references, the properties on the right received even numbers and those on the left received odd numbers (RIBEIRÃO PRETO, 1948).

With the exception of the properties located on Rua Visconde do Rio Branco and on the corners, the others, for us, were of a veritable unknown quality regarding their geographic coordinates. After all, where, for example, would the building approved to be built at 23-25 Rua José Bonifácio, in 1923, be located? Ultimately, the question may seem irrelevant from a historiographical viewpoint, which in fact, we will demonstrate is not.

Let us then analyze the most recurrent situation regarding consultations made for the collection of private buildings at APHRP. Generally, they are initiated by people interested in making interventions on existing properties, such as architects and engineers, who see practical purposes in the projects, as well as students and researchers who want to study certain buildings due to their historical and/or artistic value. Regardless of the purpose, in order to consult the processes it is necessary to request the Information Sheet from the Planning and Public Management Secretariat, informing the current address of the property. If the building has been demolished and its number is unknown, it will be almost impossible to generate this document and, consequently, gain access to the project. If the Information Sheet is generated, it contains the case number, which is used for consultations at APHRP. Thus, an Information Sheet that contains “Process: 1949 000034” refers to the property approved under process number 34 in 1949. As the projects are filed according to the year of approval, the APHRP employee seeks out the boxes for that year and, inside the box, the folder with the process number.

However, the process data contained on the Information Sheets do not always correspond to the characteristics of the property of interest. This occurs because the sheets are issued based on current addresses, and any processes approved until 1948 did not comply with the metric system of building numbering. For example, if the object of the consultation was the process for the property located at 23-25 Rua José Bonifácio, it would not be found through this system, since this same property is currently registered under number 244. There are very few processes with updated documentation. As we consulted all the processes from 1910 to 1949, and filtered those located in the Quadrilátero Central, we used GIS to locate these "lost" processes. This was the case of the property on Rua José Bonifácio, in which we found strong similarities between the property and the design, both in the facade and in its implementation.

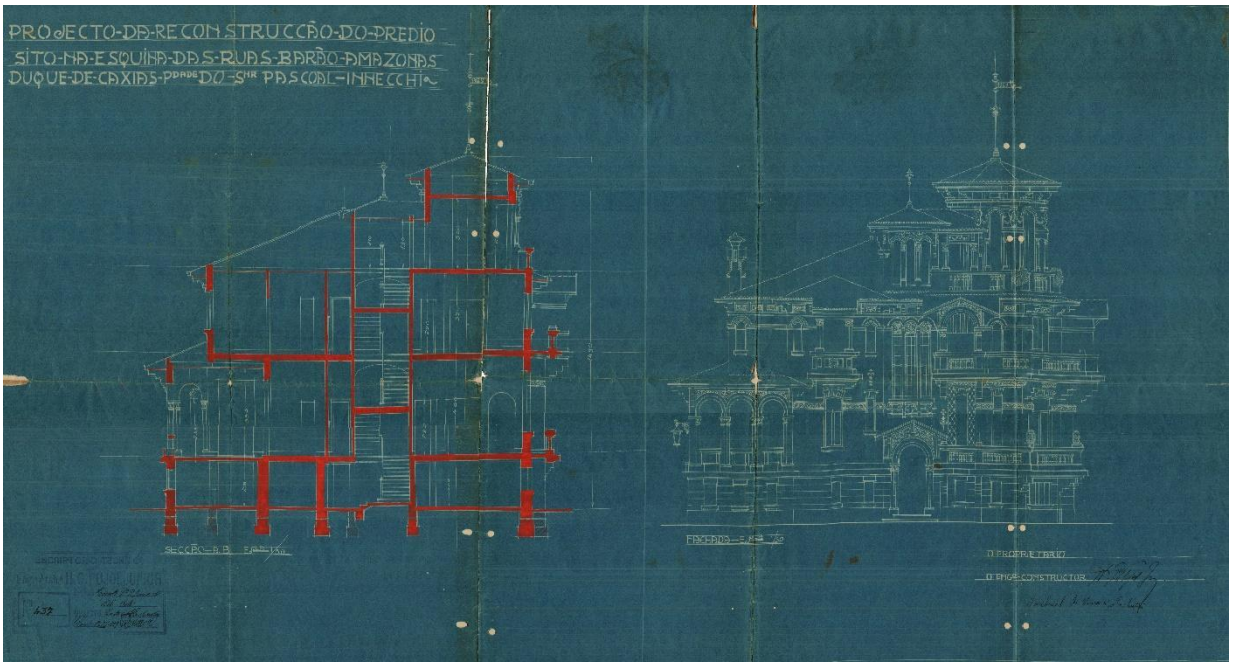
Figure 2: The building on Rua José Bonifácio and the detail of the façade (Process N.95 from 1922)

Source: Research material, 2020; APHRP.

As may be observed in the comparison between the building as it stands today and the design of the façade, dating from 1922, an extra floor has been added, as well minor as changes in the ornaments and compositional elements of the façade. This peculiarity reinforces the dynamic character of the transformation of architecture and landscape, which even began on the drawing board of civil construction professionals. It also highlights the necessary systematization of collections in architecture and urbanism based on factors that facilitate their universal access, whether for practical or research purposes.

Among so many aspects, access to collections is essential so that historical narratives may be expanded, also recognizing the value of minor architecture. Therefore, we bring in a second example, related to the Palacete Innechi, a well-known building to the local population and frequently mentioned in academic research. The project, by the architect-engineer Hypolito Gustavo Pujol Junior, dates from 1929 (Figure 3). The building was demolished in the 1970s, but there are cataloged photographs and original drawing sheets of the project that are easily accessible to researchers.

Figure 3: Original drawing sheets of the project for the Palacete Innechi (Process N. 200 from 1929).

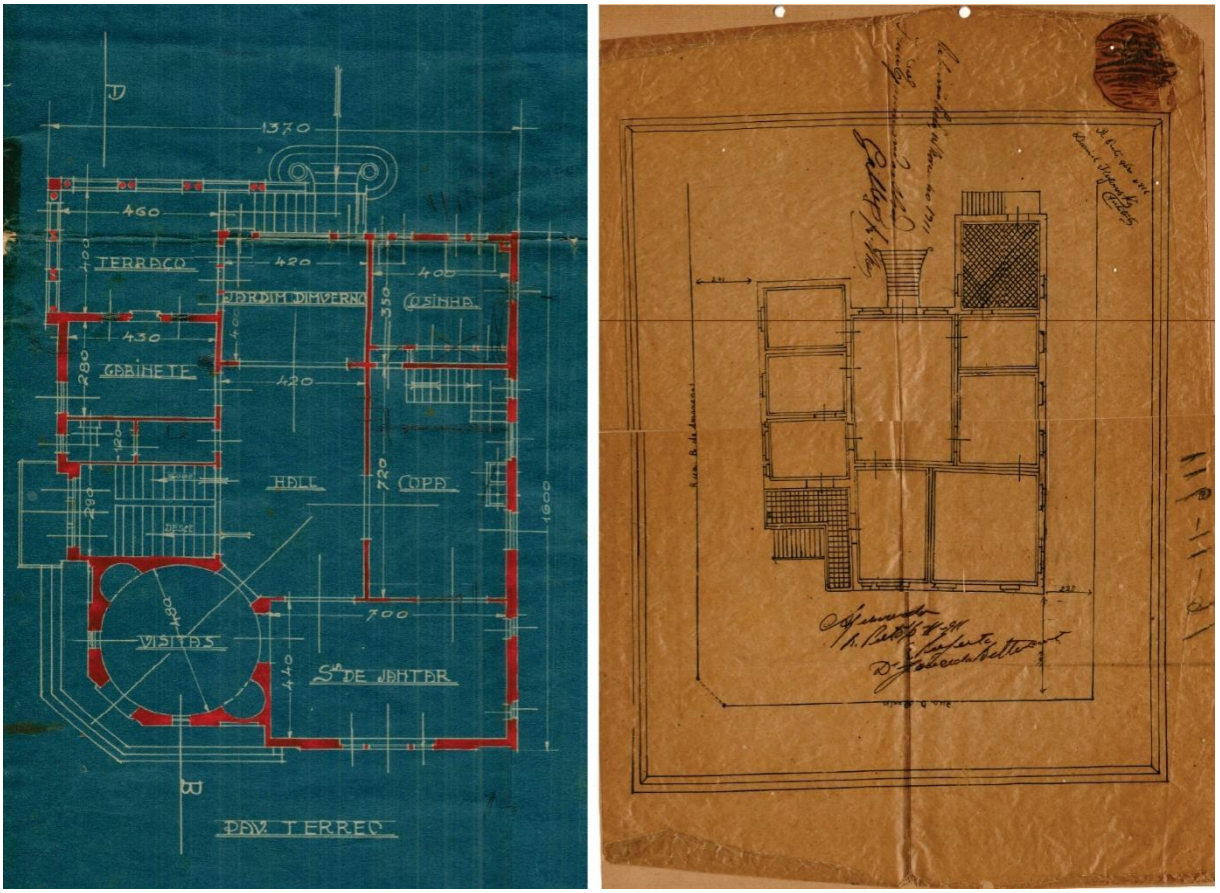


Source: APHRP.

During our research, we found the building project of the residence that preceded this mansion, signed by the architect Daniel Kujawski and the builders Gallo & Filho, dating from 1911. This was a completely unknown building in the local historiography, with no known photographic record, but which revealed some interesting aspects of the mansion. The designs signed by Pujol Júnior are entitled *Projecto da Reconstrucção do Prédio sito na esquina das Ruas Barão Amazonas (e) Duque de Caxias de propriedade do Sr. Pascoal Innechi* [Project for the Reconstruction of the Building located on the corner of Barão Amazonas St. and Duque de Caxias St. owned by Mr. Pascoal Innechi]. In other words, although the existence of another building on the same land was a known fact, its formal and spatial characteristics were unknown. The 1911 project contains only one floor plan, with no indication of the spaces. Even so, as presented in Figure 4, it may be observed that part of the pre-existing structure was used on the ground floor of the mansion. A document such as this only comes to light when systematic, case-by-case, process-by-process consultations are undertaken. From this point on, it is possible to verify how many layers overlap in the urban landscape over time and which of them have been recognized by history.

At APHRP, we consulted 9,116 processes, relating to the period from 1910 to 1949. There are thousands of others dating from 1950 to 1979, but which were outside the scope of the research. Among the APHRP processes, there are only 458 cataloged, relating to the most commonly researched buildings and sites. Among them, we cite the *Cervejaria Paulista* [the Paulista Brewery] to which fourteen of these processes are associated and the *Companhia Antártica Paulista* [the Paulista Antarctica Company], which contains twenty processes dating from 1911 to 1949. The others, which refer to architectural production of a minor character, come up against not only the difficulties of consulting due to changes in the building numbering systems, but also due to the silencing of documents relating to these buildings because they lack exceptional characteristics.

Figure 4: Detail from the ground plan of the Palacete Innechi (Process N. 200 from 1929) and an original drawing sheet for the project of the pre-existing residence on the plot of land (Process N. 101 from 1911)



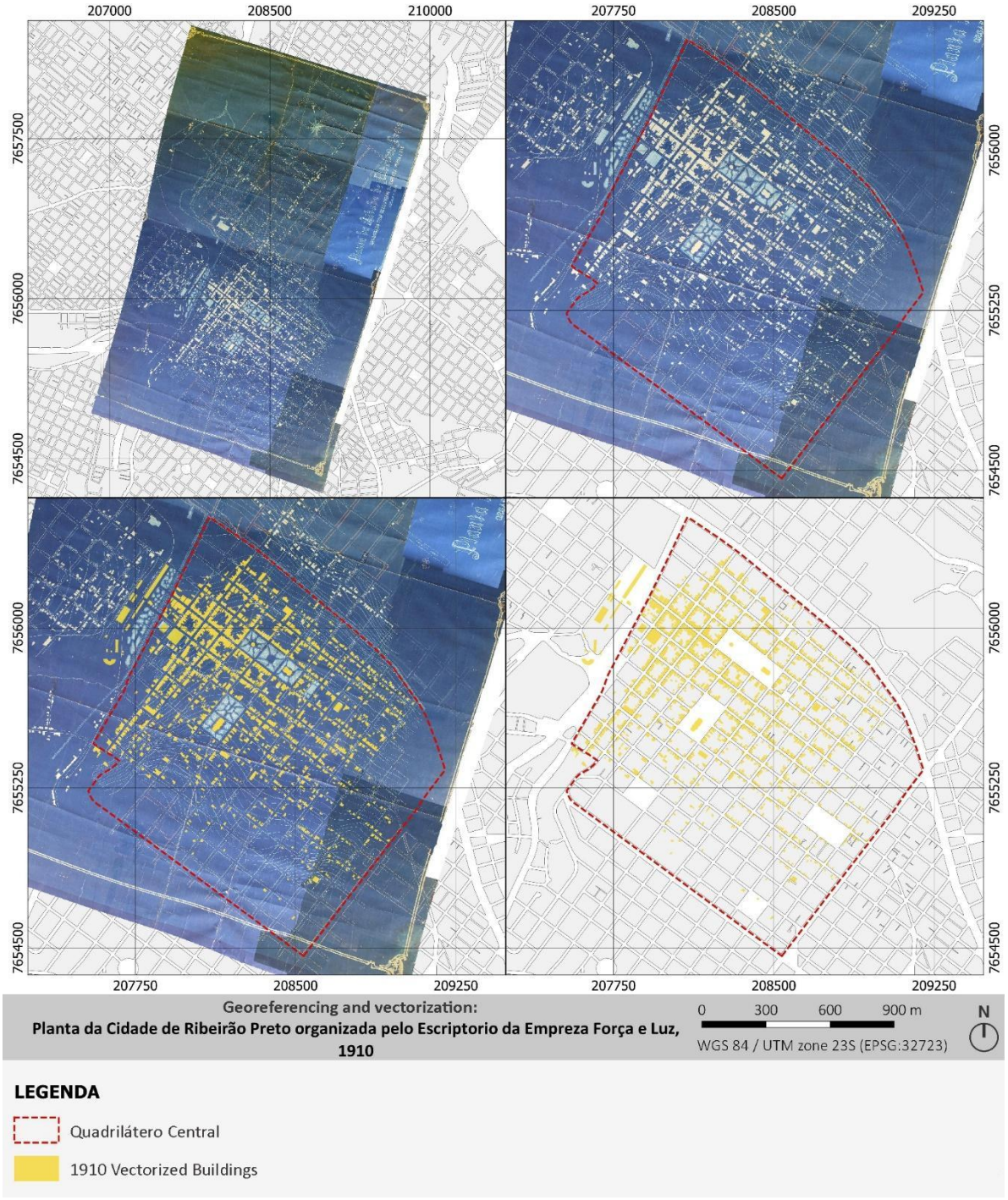
Source: APHRP.

Systematizing a thriving collection such as that at APHRP is a lengthy task that demands resources for the acquisition of equipment, but, above all, time. Unfortunately, we received no funding or support to conduct the research, hence we resorted to low-cost equipment and free software, which, in our view, generated excellent results. We used a handheld scanner and a professional camera to digitize APHRP documents and QGIS software for georeferencing data and documents.

3.1 Cadastral plans

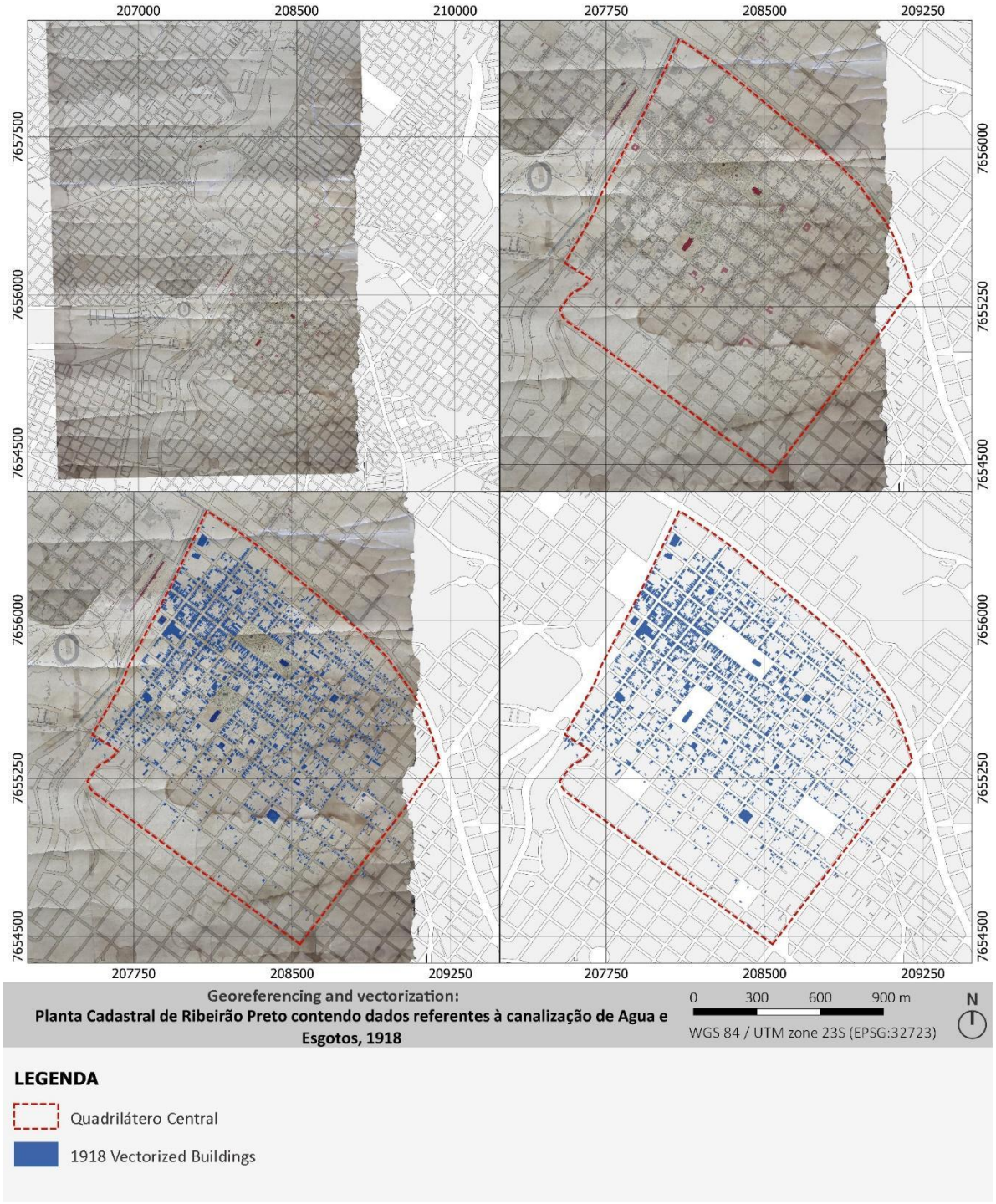
For the spatialization of the architectural projects, we as a cartographic base, used the *Planta da Cidade de Ribeirão Preto organizada pelo Escriptorio da Empreza Força e Luz* [Plan of the City of Ribeirão Preto organized by the Offices of the Força e Luz Company], from 1910 (Figure 5), and the *Planta Cadastral de Ribeirão Preto contendo dados referentes à canalização de Água e Exgottos* [Cadastral Plan of Ribeirão Preto, containing data regarding the canalization of Water and Sewage], from 1918 (Figure 6). Both were georeferenced and vectorized in GIS.

Figure 5: Georeferencing and vectorization processes for the Planta da Cidade de Ribeirão Preto organizada pelo Escriptorio da Empreza Força e Luz (1910)



Source: Research material produced from the APHRP cadastral plan.

Figure 6: Georeferencing and vectorization processes for the Planta Cadastral de Ribeirão Preto contendo dados referentes à canalização de Água e Exgottos (1918)



Source: Research material produced from the APHRP cadastral plan.

The georeferencing and vectoring processes of the cadastral plans of 1910 and 1918 was relatively simple. We used the cartographic base of 2016, provided by the Prefeitura de Ribeirão Preto (PMRP). As there were very few changes in the urban fabric of the Quadrilátero Central, it was possible to associate a series of points present in the cadastral plans and in the orthophotographs through the

Georeferencing tool of QGIS. We then used the *Polygon* tool to vectorize the buildings represented in each of the plans, using yellow vectors for buildings from 1910 and blue vectors for 1918.

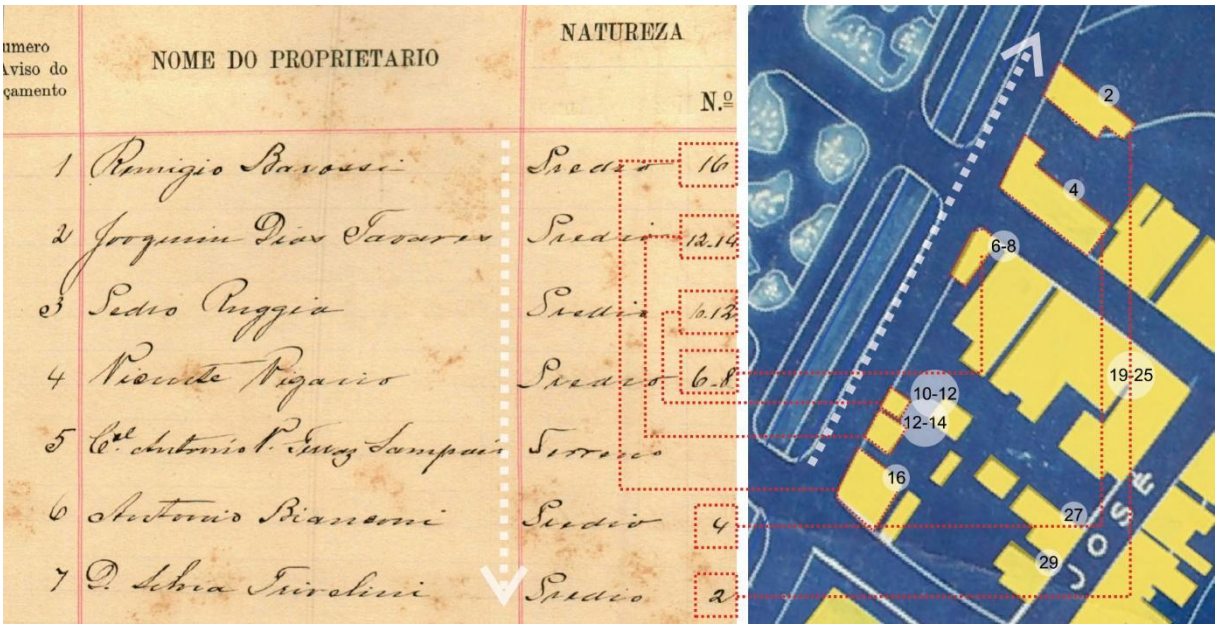
Once the vectorization had been completed, we began to assign data to each of the vectors. As a source, we used the contemporaneous property tax books with each of the plans, i.e., referring to the years 1910 and 1918. However, the correspondence between the vectors, as represented in the original plans, and the property numbers, such as those listed in the tax books, demanded unconventional strategies, as explained below.

3.2 Property tax books

In the property tax books, municipal tax collectors recorded the private properties, street by street, noting down the owner's name, the number(s) of the property, the rental values and the amount of tax levied. In general, the collectors' route started at the beginning of the street, i.e., at the watercourses, so that the records presented the building numbers in an increasing sequence. Eventually, these routes were reversed, but the hierarchy of the streets visited was maintained: first, all streets running parallel to the Retiro Stream, from Rua Visconde do Rio Branco to Rua Bernardino de Campos, and then all streets running parallel to the Preto Brook, from Avenida Jerônimo Gonçalves to Rua Marechal Deodoro (see map in Figure 1).

In GIS, we adopted the same route as the tax collectors, assigning data to each of the vectors, as exemplified in Figure 7.

Figure 7: Property tax book and a section of the 1910 plan referring to Av. Jerônimo Gonçalves



Source: Research material produced using the tax book and the cadastral plan for 1910, available at APHRP.

In the 1918 plan, the buildings and plots of land were represented individually, which helped when attributing data based on the tax book of the respective year. Some particularities were also noticed in the notes of this book, exemplified in Figure 8. The figure contains the reproduction of excerpts from the pages with the list of properties located on Rua General Osório. Lines 289 and 417 show the properties owned by Joaquim Serra and Maria dos Santos, respectively, the first corresponding to building number 40-42 and the second to 21-23. It may also be noted that, in addition to the numbers for Rua General Osório, there are numbers for Rua José Bonifácio, indicated by the abbreviations J.B, at the front. In the case of Joaquim Serra's property, we read "44 J.B." and, in the following, "46.44

J.B.”.

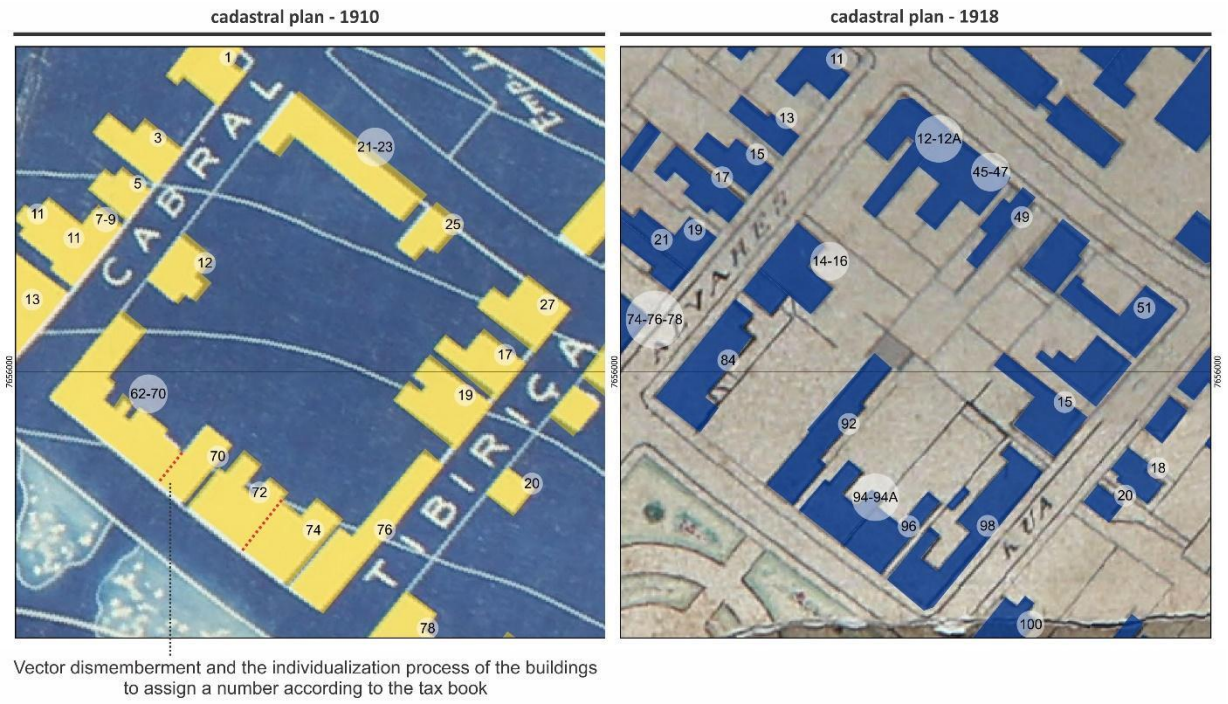
Figure 8: Property tax book and a section from the cadastral plan of 1918

Source: Research material produced using the property tax book and the cadastral plan of 1918, available at APHRP.

In the cadastral plan of 1910, in addition to the plots of land not being represented, the buildings have no contours, i.e., it is not possible to specify the limits between them, in the case of implantations with no lateral distancing. In stretches with a lower occupational density, this was not an impediment, as in the case in Figure 7, which shows a stretch of Avenida Jerônimo Gonçalves where the buildings are detached from one another. However, there are stretches of blocks with large patches representing rows of attached buildings. At first, it seemed impossible to identify the buildings contained therein, especially since most of them had been demolished. However, if we did not, it would be difficult to recognize the numbering system in force in that year, as well as locate the projects approved up to 1918. We therefore sought to identify the buildings that made up these "patches", using the division of lots and the 1918 vectors as references. (Figure 9).

We then associated the data from the tax book for the year 1910 to the vectors of the buildings, referring to the owner's name, street name and property number. Evidently, here we assume the risk of inaccuracies inherent to the spatialization of data on the scale of the building, as previously alerted by Bueno (2018). Even so, the results obtained enabled us, if it was not necessary, at least, to have a very close notion of the real location of many of the projects approved between 1910 and 1918. Furthermore, considering that a new urban register would only be undertaken in 1939, with the data assigned to the vectors, we were also able to estimate the location of the projects for new buildings, approved from 1918 onwards for the plots of land that had stood empty until then.

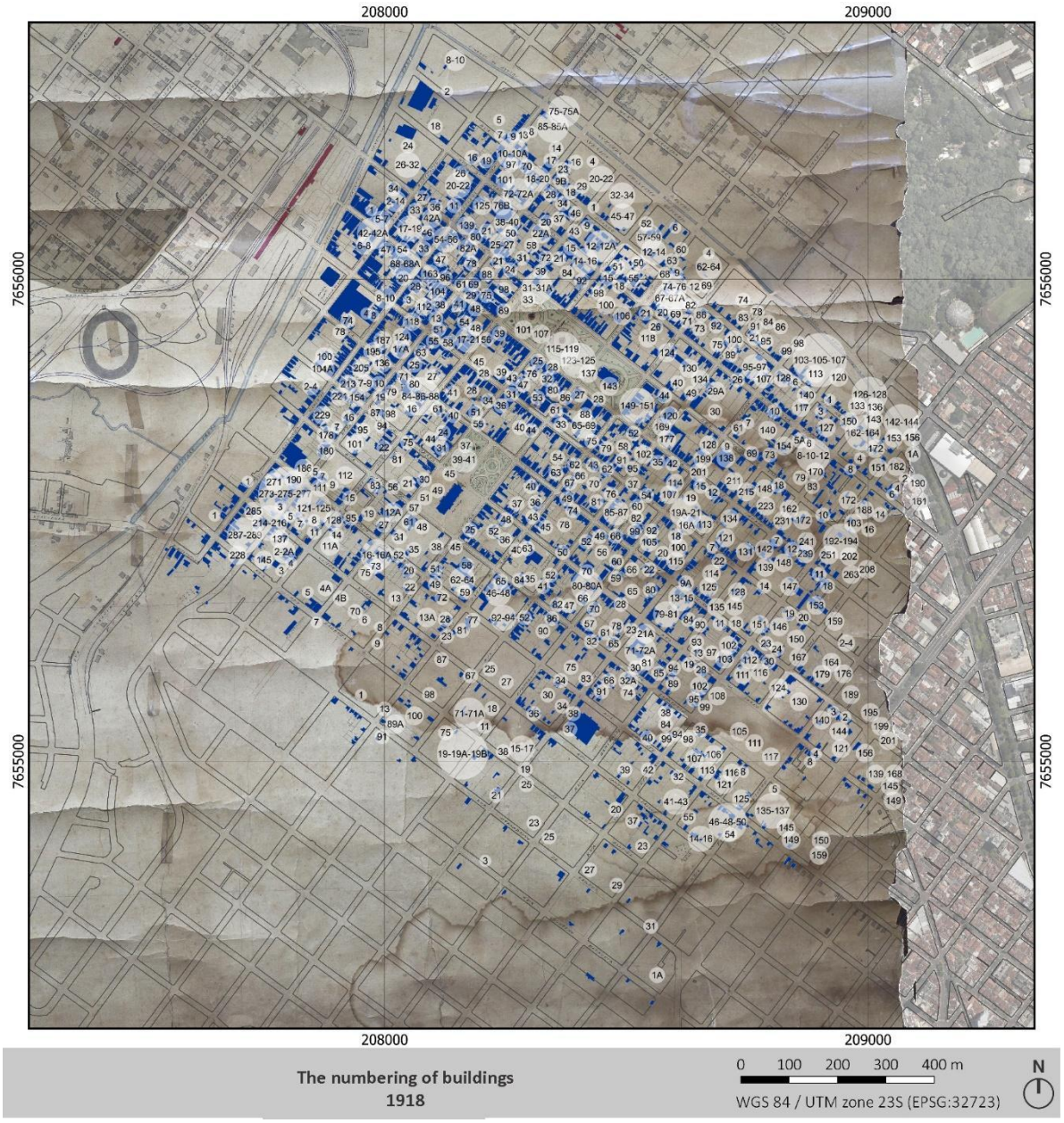
Figure 9: Vectors on the cadastral plans from 1910 and 1918



Source: Research material produced using the cadastral plans available at APHRP.

Figure 10 presents the result of the process for recognizing the building numbering system for the entire Quadrilátero Central in force in 1918. The data registered in GIS makes it possible to locate architectural projects both by the old building number and by the owner's name. It also enables the consultation of preserved building projects through geographic coordinates, which may facilitate conducting historical research linked to completing restoration and conservation projects.

Figure 10: Building numbering on the cadastral plan of 1918.



Source: Research material produced using the tax book and the cadastral pan of 1918, available at APHRP.

4. The spatialization of private buildings

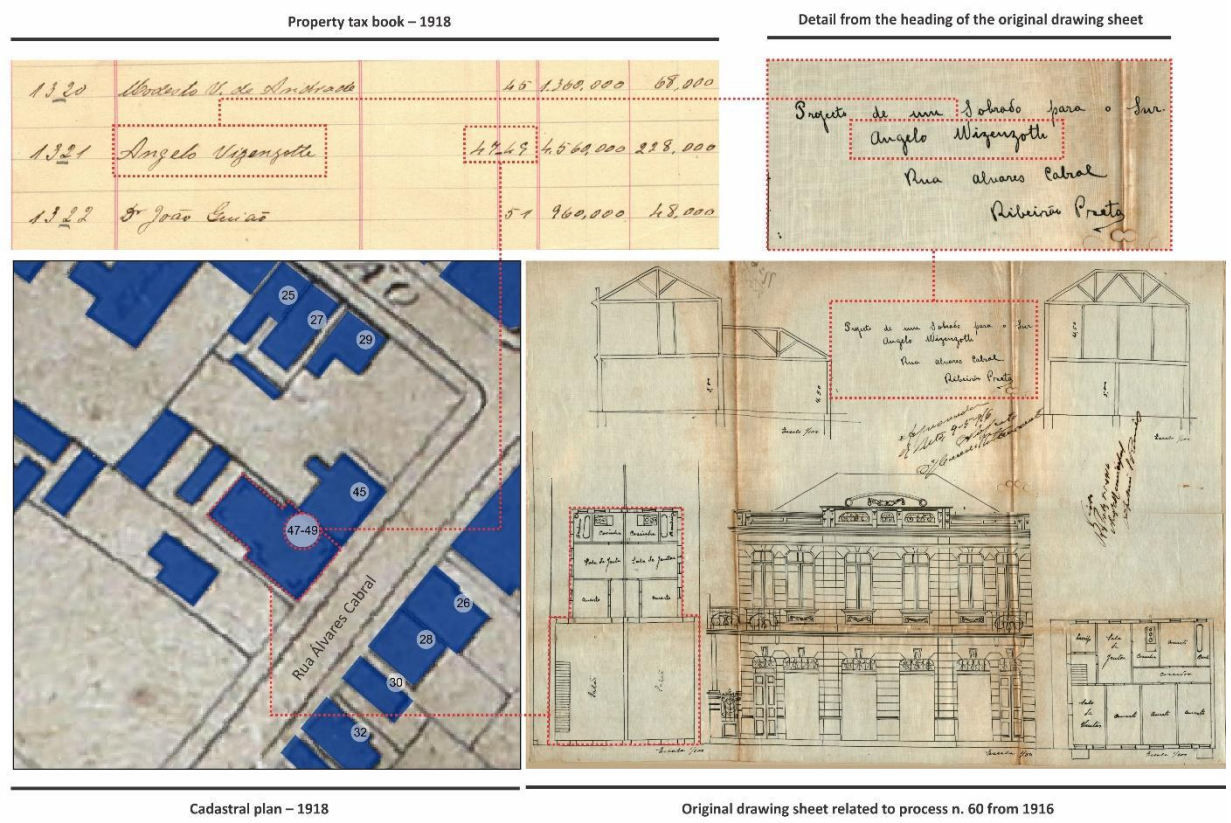
Once the cadastral plans had been georeferenced and vectorized and the data had been assigned from the property tax books, we began the spatialization of the architectural projects from the APHRP collection of private buildings. We spatialized data including projects that had not been scanned due to the fragile state of the material based on existing data contained on the covers of the processes, which certainly implied the existence of a number of gaps. However, this avoided further compromising the preservation status of these documents.

We created a specific layer in QGIS to insert data related to architectural projects. Among the data, we cited the year of the project, the names of the professionals (designers, builders, engineers, architects and/or contractors) and the owner, use, nature of the project, APHRP process number and current address. We also opened a field so as to directly link the georeferenced data in GIS to the images of the digitized original drawing sheets. Thus, it is possible to have direct access to graphic content and project data based on geographic coordinates.

Next, we exemplify the application of the geolocation method of projects based on two exemplary cases, the first referring to a demolished property and the second to a partially preserved building.

Figure 11 presents the mixed-use townhouse designed in 1916 for Mr. Angelo Wizenzotte, located at Rua Álvares Cabral. On the cover of the process and on the original drawing sheet, the property number is not informed.

Figure 11: The process for localizing the property of Angelo Wizenzotte



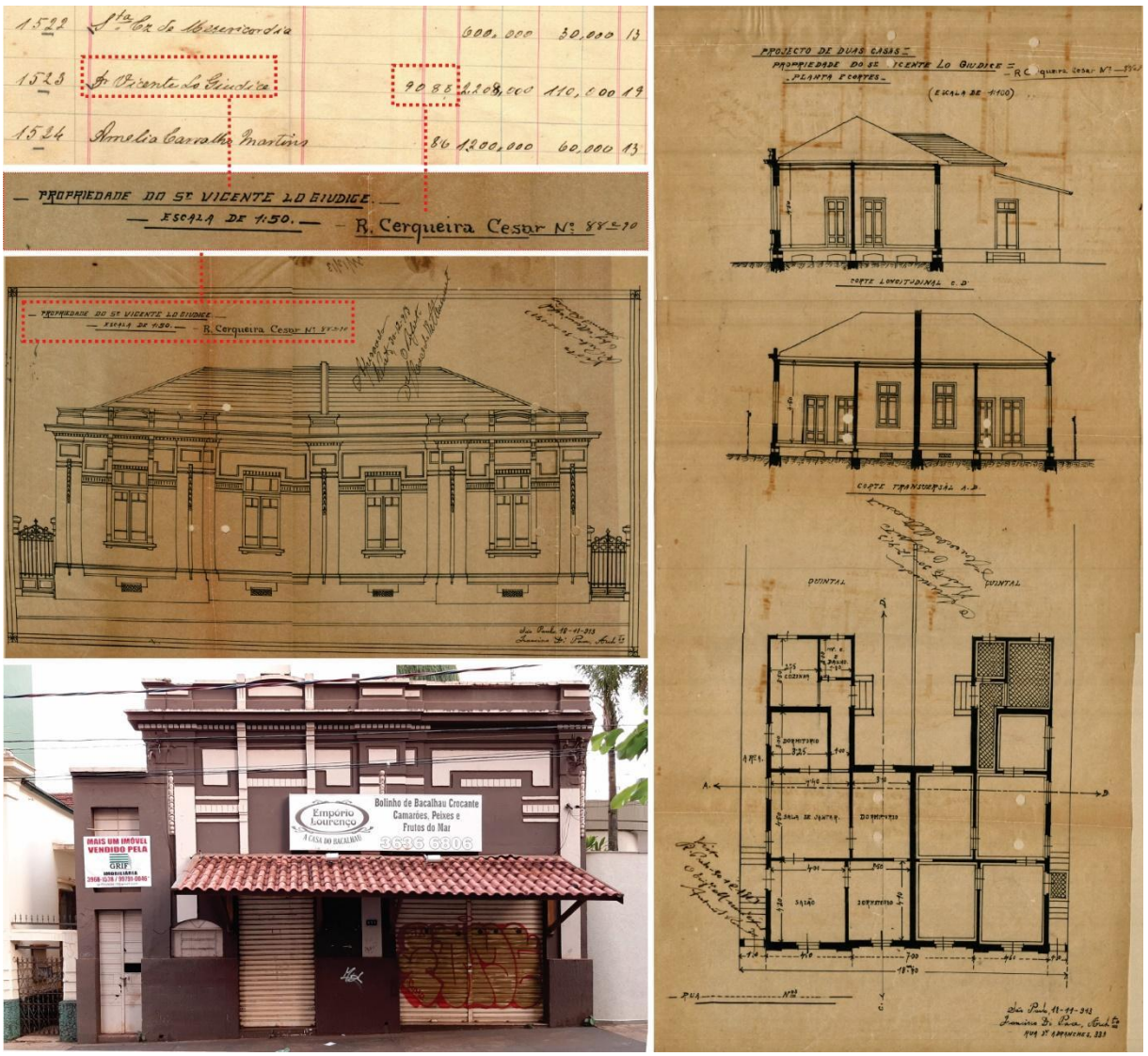
Source: Research material produced using the documentation book from APHRP.

However, the name of Wizenzotte appears in the list of properties on Rua Álvares Cabral in the property tax book of 1918, inscribed under numbers 47 and 49. In addition to this information, we confirm the location of the project by comparing the geometric features and the building's location. In the section outlined in red in Figure 9, we see that the symmetrical format of the building was precisely reproduced in the cadastral plan of 1918. Furthermore, we draw attention here to the implantation of the townhouse, without a frontal setback, but with a lateral setback, along which an access corridor to the back of the plot has been established. In the Wizenzotte project, a two-story building was envisaged, with the ground floor for commercial use and the upper for residential use. In the cadastral plan of 1918, the engineer Raphael Schettini, responsible for the design, used a specific symbology to represent the two-story properties: as we see in the image, on the corners of the house an "L" has

been drawn. Most likely, this record contained a caption. However, as there were considerable losses along the edges of the sheet, this information was not available to us. Thus, when cross-referencing different sources, we were able to better understand such symbologies and their relationships with the building characteristics of the Quadrilátero Central.

In Figure 12, the reproduced architectural project corresponds to a building whose facade remained partially preserved. The remaining portion is registered under number 875, although, at the time the project was approved, it corresponded to a semi-detached building, registered under the numbers 88 and 90. This data is found both on the original drawing sheet and in the tax book. With specific reference to the original drawing sheets, there are also the names of the designer, Francisco di Pace, and the builder, the Italian Vicente Lo Giudice, who was also the owner of the property.

Figure 12: The process of localizing the property of Vicente Lo Giudice



Source: Research material produced using the documentation book from APHRP; Research material, 2021 (Photo).

This last example reinforces the possible interlocutions between architectural collections and the material landscape, bringing archival documents closer to the built heritage. This is perhaps a necessary way of bringing research in the history of architecture closer to urban history, since both are

directly related to building production and the production of the city.

5. Conclusion

The APHRP collection of private constructions includes buildings designed in different styles, among which we mention eclecticism, art deco, neo-colonial and modern, in addition to striking architectural typologies across the landscape of the first half of the twentieth century. More than the stylistic and formal characteristics represented individually on the original drawing sheets for the projects, there is an intrinsic relationship between building production and the production of the city, the understanding of which requires the spatialization of data. For this, methods with specific procedures are needed to enable the spatial location of primary documents.

We used a system of launching property taxes associated with cartographic representations to decipher the property numbers in force in 1910 and 1918. From this recognition, we were able to obtain at least two parameters to associate geographic coordinates with the projects of private buildings: the name of the owner and the building number. Thus, we were even able to locate the processes that did not contain any indication of the property number by consulting the name of the owner and vice versa. The localization of projects approved after 1918 did not have the same degree of precision, although it served as a reference, enabling us to estimate the location of projects approved between 1918 and 1939, when a new urban cadastre began, this time, with individualized original drawing sheets of urban blocks and that would only be completed in 1942. A very valuable material, which remained in use, at least, until the 1960s, in which information related to building activity was updated.

From the method and georeferenced data, we were able to glimpse historical aspects of urban transformations, which are reflected in the current landscape. For example, by superimposing plans from 1910 and 1918 onto the most recent aerial photos, we are able to see which properties have been preserved, which have been demolished and which have been renovated. Or even, by georeferencing the data of each of the buildings, we quantify and locate properties that belonged to owners who, since the beginning of the twentieth century, invested in the formation of a rentier real estate market, as verified by Bueno (2016b) in the city of São Paulo. Such approaches expand even further when we compare the data presented herein with others collected during the research, such as photographs and trade and industry data present both in almanacs and in professional tax books.

The main purpose of the method we have developed based on GIS was the location of projects that integrate the temporal and spatial cross-section of a doctoral research, but it may certainly also contribute to a review of the current search system used by APHRP, given the many incompatibilities arising from changes in the addressing of properties. This signifies that the research may return a georeferenced database to APHRP, through which direct consultations may be undertaken for the processes of private buildings, without needing to request information sheets from other bodies, especially since they are ineffective in the case of projects approved before 1948. Ease of access to these processes could, therefore, contribute to providing visibility to this collection, especially to smaller buildings, many of which have withstood time on the urban landscape, although for how long, we cannot be sure. Moreover, looking beyond the attributions of preservation, management and access not only to the processes of private buildings, but to the entire APHRP collection, the research opens up possibilities for the dissemination of documents through online platforms, such as the so-called SIG-Web and Web Mapping, thus reinforcing the “popular and cultural dimension” (FERREIRA, 2021) of public archives.

Thus, we leave our contribution, emphasizing that this is a research study in progress and in the process of improvement, but with ample possibilities of methodological reproduction.

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ANA TERESA CIRIGLIANO VILLELA

Substitute Professor of Architecture and Urbanism at the Federal University of Santa Maria - Cachoeira do Sul campus, in the area of Fundamentals of Architecture and Urbanism. Member of Icomos-Brasil, and of the Heritage, Cities and Territories Research Group. (IAU-USP) and the Research Group Representations of Place (FAU-UFAL). PhD student in Theory and History of Architecture and Urbanism at the Institute of Architecture and Urbanism of the University of São Paulo (IAU-USP) since 2019. Professor of the Architecture and Urbanism at the Centro Universitário Barão de Mauá, in Ribeirão Preto. She holds a master's degree in Architecture, Technology and City from the Faculty of Civil Engineering, Architecture and Urbanism of the State University of Campinas (FEC / Unicamp, 2015) and a degree in Architecture and Urbanism (Uniube, 2010).

Co-authorship contribution: Conception; Data curation; Analysis; Data collect; Methodology; Software; Supervision; Validation; Visualization; Writing – original draft; Writing - proofreading and editing.

MARIA ANGELA PEREIRA DE CASTRO E SILVA BORTOLUCCI

Senior Professor at the Institute of Architecture and Urbanism at the University of São Paulo - IAU/USP. She participates in the Graduate Program in Architecture and Urbanism-IAU / USP as a professor and advisor for master's and doctoral degrees. Leader of the Heritage, Cities and Territories Research Group. Ad hoc referee for FAPESP, CAPES and several scientific journals. Founding Associate Member of CICOP/Brazil (since 2008). Full member of CONDEPHASC - São Carlos, SP (2005-2007; 2018-2020). Member of the Board of Trustees of Fundação Pró-Memória de São Carlos (2015-2017). Member of the Pró-Casa do Pinhal Association - São Carlos, SP (2005-2018). Member of the Souza Campos Institute - São Carlos, SP (since 2006). PhD from the Faculty of Architecture and Urbanism of the University of São Paulo - FAU/USP (1991). Master's degree from the São Carlos School of Engineering of the University of São Paulo - EESC/USP (1983). Graduation in architecture and urbanism from the Federal University of Pernambuco - UFPE (1976).

Co-author contribution: Analysis; Supervision; Validation; Visualization; Writing - proofreading and editing.

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