





# VIRTUAL RECONSTRUCTION OF THE DISAPPEARED VALENCIA OIL MARKET (SPAIN)

## RECONSTRUCCIÓN VIRTUAL DE LA DESAPARECIDA LONJA DEL ACEITE DE VALENCIA (ESPAÑA)

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### Highlights:

- This paper proposes the virtual reconstruction of the Valencia Oil Market building, of which there are neither archaeological remains nor photographic images.
- An analysis methodology that allows us to obtain the dimensions of the building from the archival documentary information on the surrounding buildings is developed.
- The first graphic representation of the building is presented, as no proposal has been set out for the virtual reconstruction to date.

### Abstract:

This article proposes the virtual reconstruction of a disappeared building from medieval Valencia, known in historiography as *Lonja del Aceite*, *Llotja de l'Oli* or *Llotja Vella*, which was the predecessor of the current *Lonja de la Seda*, a building declared a World Heritage Site by UNESCO. It was a small building, probably built sometime between the 14<sup>th</sup> century and the first half of the 15<sup>th</sup> century; it survived until 1877, when it was demolished as part of the hygienist policies of the 19<sup>th</sup> century. The singularity of the reconstruction process lies in the absolute lack of physical remains that could constitute the starting point; there is no reliable graphic or photographic representation, beyond the schematic images contained in two perspective plans of the city of Valencia: Mancelli's (1608) and Tosca's (1704). As a result, there is still no reliable image of the building as it was at the time of its construction. The three-dimensional (3D) reconstruction has been based on the discovery of unpublished graphic and urban planning documentation; its analysis and validation has been complemented by an in-depth urban study based on historical cartographies. The objective is to determine, in the most objective possible way, its dimensions and location. On the other hand, concerning the formal and constructive definition, a comparative study has been resorted to with the Valencian and Italian architecture contemporary to the original building. The *Lonja del Aceite*, Oil Market, virtual reconstruction recovers the image of a practically unknown building in the history of Valencia, recovering that lost image with the aim of reintegrating it, in some way, into the collective consciousness.

**Keywords:** Valencian Gothic architecture; architectural restitution; cultural heritage; documentation; 3D reconstruction

### Resumen:

El presente artículo propone la reconstrucción virtual de un edificio desaparecido de la Valencia medieval, conocido en la historiografía como *Lonja del Aceite*, *Llotja de l'Oli* o *Llotja Vella*, antecedente de la actual *Lonja de la Seda*, edificio declarado Patrimonio de la Humanidad por la UNESCO. Se trataba de un edificio de reducidas dimensiones, edificado probablemente en algún momento entre el siglo XIV y la primera mitad del siglo XV; sobrevivió hasta el año 1877, cuando fue demolido en el marco de las políticas higienistas del siglo XIX. La singularidad del proceso de reconstrucción estriba en el hecho de la inexistencia total y absoluta de restos físicos que pudieran constituirse en el punto de partida; tampoco se cuenta con representación gráfica ni fotográfica fiable, más allá de las esquemáticas imágenes contenidas en dos planos perspectivos de la ciudad de Valencia: el de Mancelli (1608) y el de Tosca (1704). Como resultado de todo ello, a día de hoy se carece de una imagen fiable del edificio que lo represente tal y como fue en el momento de su construcción. Para la reconstrucción tridimensional (3D) se ha partido del descubrimiento de documentación gráfica y urbanística inédita; su análisis y validación se ha complementado con un profundo estudio urbanístico a partir de las cartografías históricas. El objetivo ha sido determinar, de la manera más objetiva posible, sus dimensiones y ubicación. Por otro lado, en lo relativo a la definición formal y constructiva se ha recurrido al estudio comparado con la arquitectura valenciana e italiana contemporánea al edificio original. La reconstrucción virtual de la *Lonja del Aceite* recupera la imagen de un edificio prácticamente desconocido de la historia de Valencia, recuperando esa imagen perdida con el objetivo de reintegrarla, de alguna manera, en la conciencia colectiva.

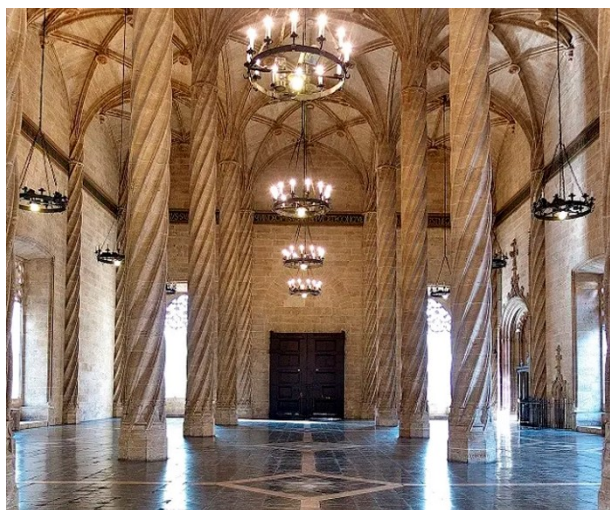
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**Palabras clave:** arquitectura gótica valenciana; restitución arquitectónica; patrimonio cultural; documentación; reconstrucción 3D

## 1. Introduction, background and objectives

The Oil Market was one of the first specialised commercial buildings in Christian Valencia and one of the early examples of civil Gothic architecture. Its construction is part of what has been called the Cycle of Markets of the Crown of Aragon (Lara Ortega, 2007), erected between the 14<sup>th</sup> and 16<sup>th</sup> centuries as buildings dedicated to mercantile activity, which reflected the bourgeois mentality of medieval Mediterranean cities (Llopis Verdú & Torres Barchino, 2008; Vila, 1984); in this paper, we will use the term Market to refer to the buildings known as *Lonja* in the territories of the old Crown of Aragón. This process is the result of the existence of a network of commercial relations that linked the Crown of Aragon with Italy and other Mediterranean cities, which led to the transfer of this architectural typology of proven effectiveness in terms of commercial activity to all the cities involved (Cataldi & Corona, 2002). This process led, in the case of Valencia, to the construction of the first commercial market, the predecessor of the current Silk Exchange Market (Fig. 1), and whose architectural characteristics we aim to recover virtually.



**Figure 1:** Valencia Silk Exchange Market, built between 1483 and 1498.

The largest markets of the Crown of Aragon have remained with little transformations, since they remained in use until practically the dawn of the past century. This has not been the case of the Oil Market, which has unfortunately not been an isolated case. In this sense, the demolition of buildings located in the centres of European cities was a common practice during the 19<sup>th</sup> century due to hygienist approaches, confiscations and housing needs motivated by exponential demographic growth (Ponce Herrero & Dávila Linares, 1998). These demolitions would affect not only the city's residential buildings, but also its defensive, religious and civil heritage; a practice that would also spread throughout the 20<sup>th</sup> century and that would lead to the destruction of numerous architectural and artistic examples of our historic cities.

Faced with this situation, virtual reconstruction offers us an accessible means to recover the original image of these disappeared buildings, which were part of the

history and landscape of urban environments, in order to disseminate their appearance and relevance (Aparicio Resco, 2021; Di Mascio, Chiuni, Fillwalk, & Pauwels, 2016; Pietroni & Ferdani, 2021).

In our case, we are faced with the virtual recovery of a heritage element of special historical and urban relevance, demolished at the end of the 19<sup>th</sup> century and of which no physical trace is preserved. In this process, we have used as a reference different recent research that has aimed at the recovery of architectural elements that have disappeared in the urban environment. In this regard, it is worth mentioning the virtual reconstruction works of the *Casa de Armas* in Valencia (Lillo Giner et al., 2021), the church of *San Agustín* in *La Laguna* (Soto-Martín et al., 2020), the temple of Mars Ultor in the Forum of Augustus in Rome (Ferdani et al., 2020), the Palacio del Almirante de Aragón in Valencia (Gómez Gil, 2020), the former Belo Horizonte School of Medicine (Mizrahy et al., 2024). Likewise, the work carried out in order to reproduce the appearance of the urban space in the past contributes to understanding the urban environment and the context in which these buildings were inscribed. For example, the memory of Perugia's *Fontivegge* district (Bianconi et al., 2023), the image of the most significant streets of the city of Granada in the 19<sup>th</sup> century (Fernández Ruiz & Gómez Robles, 2013), the appearance of the *Plaza Mayor de México* in the 16<sup>th</sup> century (Pastrana Salcedo & Janireth Bohórquez, 2017), or the evolution of urban space in Marina Franca (Leserri & Rossi, 2023).

Finally, the works dedicated to the graphic reconstruction of buildings outside their context have served as a reference, as they are another example to know the methodologies applied to architectural restitution. In this field, we can highlight the work to recover the Roman theatre of *Urbs Salvia* (Bassoli et al., 2022), the baker's house in *Torreparedones* (Cáceres et al., 2022) the castle of *San Salvador de Todea* (Valle Abad et al., 2022), the monastery of *San Jerónimo de Buenavista* in Seville (Guerrero et al., 2023), the interior heritage of the Cathedral of Girona (Pàmies et al., 2023), or that of the *Alcázar de Sevilla* (Vargas Lorenzo, 2019).

This overview has allowed us to take a multidisciplinary approach to the research, whose objective is the recovery of a particularly unknown civil and commercial heritage element of which there are no detailed descriptions in the academic bibliography, photographs or specific testimonies. Therefore, the 3D reconstruction serves to understand the characteristics of its architecture, its configuration with respect to the current urban void space, as well as its importance in the construction of the city's landscape as a social and meeting space. In the same way, the purpose of this paper is to contrast and expose the methodology followed so that it can be used for the reconstruction of other buildings that have disappeared and present similar circumstances.

## 2. Methodology

The Oil Market is one of the least studied historical buildings in Valencia. Demolished in 1877, we start this study off the total and absolute non-existence of physical remains that could constitute the starting point, since it has not been possible to locate any archaeological study

that could give us a dimensional reference on which to develop our reconstructive hypothesis. This lack of information constitutes a singularity that differentiates this work from most of those previously mentioned, which has implied the need to develop a methodology in which the analysis of documentary information and the historical study of the building has played a fundamental role in establishing criteria that are as objective as possible to differentiate between frequently contradictory sources.

## 2.1. Bibliographic documentation

With regard to the study and analysis of the historical bibliographic documentation of the building, the references to it contained in the works of Esclapes (1738), Boix (1849), Díaz (1861), Cruilles (1876), Escolano (1880), Llorente (1887), Teixidor (1895) and Orellana (1923) have been consulted. However, despite the fact that most of these authors came to know it physically, descriptions of the building itself are scarce and incomplete, focusing attention on historical rather than architectural aspects. On the other hand, at the contemporary level, there is a lack of a specific monograph on the market, and its analysis is generally limited to tangential references in studies on the Silk Exchange Market. In this area, it is of interest for this research the works of Lara (2007) regarding the analysis of the market buildings in the Crown of Aragon, Serra (2023) in the study of the relationship between the city's market buildings and the market square in Valencia, or authors such as Sebastián (1984) and Bru (1995), who address the relationship between Valencia's commercial constructions and its socio-cultural environment. With regard to the graphic reconstruction of the building, special mention should be made of the contribution of Ramírez (1999), who develops the only hypothesis of graphic reconstruction that we have been able to find (Fig. 2) and which, as we will see, differs from our approach.

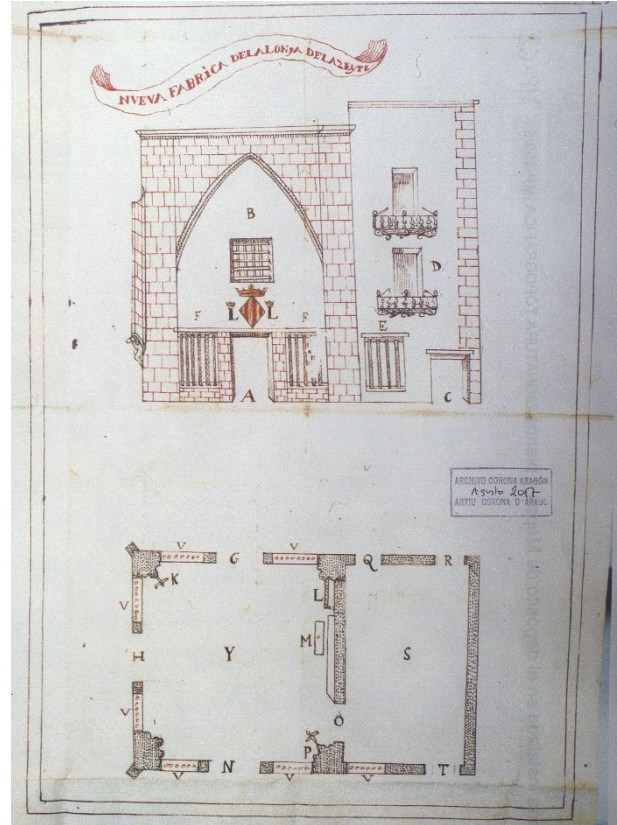


**Figure 2:** Graphic reconstruction of the Oil Market (Ramírez Blanco, 1999). The proposal of a perimeter porticoed structure can be appreciated as well as a central courtyard.

Finally, it should be noted that the present hypothesis of reconstruction of the Oil Market has resorted to the comparative study of the building with other Valencian medieval constructions, with the aim of extrapolating formal references that allow to cover the existing information gaps. In this regard, the analysis of the bibliography on Valencian Gothic architecture has been a fundamental source in the development of the reconstructive hypotheses proposed (Navarro Fajardo, 2006; Zaragoza Catalán, 2000).

## 2.2. Primary Documentary Sources

The lack of bibliographic sources implies that graphic documentary information has been the fundamental basis of our reconstructive hypothesis. In this regard, the discovery of three unpublished blueprints has been the starting point for the graphic reconstruction developed.



**Figure 3:** Floorplan and elevation of the Oil Market (1696).

The first is an unpublished drawing contained in a document preserved in the Archive of the Crown of Aragon dated in 1696, which includes the first known representation, floorplan and elevation, of the Oil Market, a brief description and a list of functions that took place within the building and the adjoining estates. Despite its imprecision, this plan allows us to know the image of the building at the end of the 17<sup>th</sup> century (Fig. 3).

The second document is a street plan, dated 1860, also unpublished and belonging to the Rieta Archive. It is the only floorplan that reflects with some precision the measures and the state of the urban environment of the building before its demolition, although it is necessary to highlight its lack of graphic accuracy (Fig. 4).

The second unpublished document is the main basis of our graphic reconstruction process. This is a file belonging to the Rieta Archive, preserved in the Historical Archive of the Valencia City Council (hereinafter, Rieta). It is undated and consists of a floorplan, an elevation and two cross-sections without any written text or description.

Despite the lack of a precise chronological reference, its characteristics allow us to identify the process of demolition of the building in 1877 and constitute a data collection of the state of constructive ruin that justified it (Fig. 5).

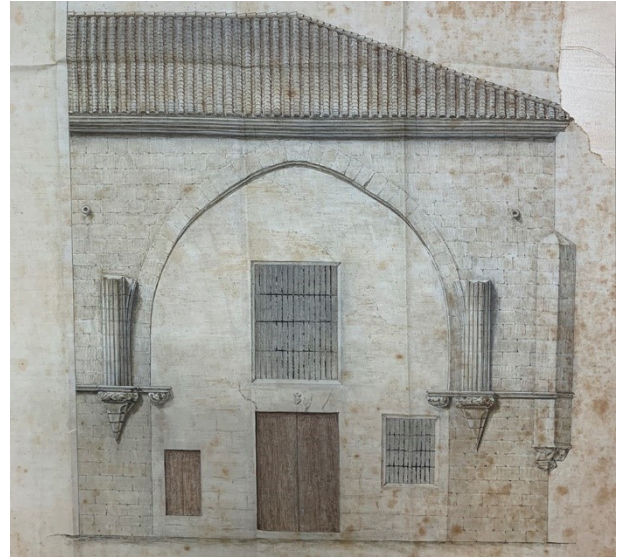


**Figure 4:** Street plan showing the urban environment of the Oil Market. AHMV. Fondo Rieta. ER. 9-14.

The analysis of these three documents has been complemented by the comparative analysis of the historical cartographies of the city in order to reconstruct the process of urban transformation and that of the building itself. In this regard, we highlight the plans of Mancelli (1608), Tosca (1704), Ferrer (1831), Montero (1853), the Army Corps of Engineers (1869), the Army General Staff Corps (1883), Calvo, Ferreres and Arnau (1884) and Ferrer (1892-1893), which we will discuss in greater detail later (Llopis Alonso & Perdigón Fernández, 2016).

A detailed analysis of the urban archives of the Historical Archive of the Valencia City Council has also been used, related both to the market and to the buildings located in its immediate surroundings. Of particular note are those documents that refer to the facts relating to the demolition of the building, as well as the files on the renovation and rebuilding of the adjoining buildings, which provide graphic and dimensional documentation that bring us closer to the object of study (Fig. 6).

Finally, it should be noted that, despite the fact that photographic testimonies of Valencia from 1877 are preserved, we only know of a historical photograph of the square in which the building was located. It is a photograph that we have interpreted as documenting the state of the site left by the demolition of the market and that at least tangentially allows us to glimpse on the right of the image of the interior wall attached to the adjoining buildings. This dates the photograph between 1877, the date of the demolition of the market, and 1892, since on that date they appear demolished in Ferrer's plan. We will delve deeper into this photograph later.



(a)

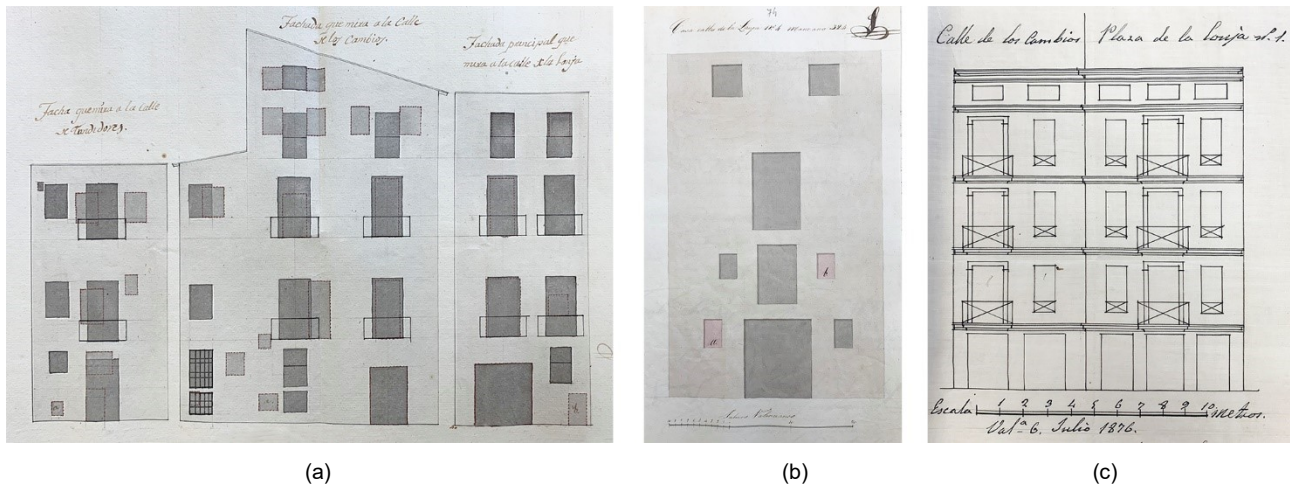


(b)



(c)

**Figure 5:** Oil Market historic surveying: a) Elevation; b) Cross-section; c) Floorplan showing the tracing of the ribs (c. 1877).



**Figure 6:** Rebuilding project files in the surroundings of the Oil Market: a) Lonja, Cambios and Tundidores Street (1807); b) Lonja and Cambios Street corner (1835); c) Lonja Square (1876).

### 3. Historical analysis of the architectural evolution of the Oil Market

As a fundamental step in carrying out this reconstruction, it has been necessary to determine as precisely as possible the historical process of the building. We lack absolute chronological certainties about the date of construction of the Oil Market, as well as the vicissitudes over time, which is reflected in the chronological inconsistencies of the bibliography analysed.

#### 3.1. The first market of Valencia: 1314-1498

It seems possible to determine with sufficient precision that in 1314 there was already a commercial market in Valencia (Salvador & Monserrat, 1876; Serra Desfilis, 2023), although it is not possible to determine the existence of the market until 1344 through a specific documentary reference (Teixidor, 1895). It seems that by then it had already been built and was necessary to expand it, since on January 29<sup>th</sup> of that year, the Council proposed that part of a courtyard or plot owned by the city should be used for its extension. This market should have been immersed in the narrow urban space inherited from the Muslim city, so it must have been small in size and framed by various buildings that, in one way or another, were articulated around it (Teixidor, 1895). A century later, in 1440, the Council raised the need to demolish buildings around the market, to create a square and rebuild it. The process lasted until 1444, when the houses surrounding the market were demolished and, in the words of Teixidor, *"fabricose entonces la Lonja con la amplitud que en el día tiene i pusieron como adorno en las esquinas que miran al medio día i mercado dos figurones o estatuas de piedra, una de muger i otra de hombre, que llamaron engonari"*. This same hypothesis, that of the construction of the definitive building on this date, is defended by Llorente (1887).

From our point of view, it is likely that the final building, demolished in 1877, was built in its final form at this date. Although the historical evidence is not fully conclusive, an analysis of the architectural form reflected in the Rieta Archive seems to indicate a date closer to the first half of the 15<sup>th</sup> century than to the possibility that the building

had been erected a century earlier. As we will see, the building would have been made up of a single square *campata* of approximately 12 m on each side and around 10 m high, with no rooms on it, which clearly distances it from the precedents of Castellón (Lara Ortega, 2007) and resembles some Italian market buildings, probably due to the influence of both visiting Italian merchants and those based in the city (Cruselles Gómez, 2006; Igual Luis, 2021). On the other hand, the very structure of the vault that made up the Oil Market, a vault with five keystones formed by transept arches, tiercerons and liernes, was common in Valencian architecture of the 15<sup>th</sup> century (Navarro Fajardo, 2006; Zaragoza Catalán, 2000), while the previous Valencian markets were generally built through warehouses separated by arcades that supported flat wooden roofs. These constructive considerations have been incorporated into the reconstruction graphic proposal.

#### 3.2. The second market: Oil, honey, wax, rice... and many others, 1498-1696

The first graphic evidence of the building can be found in two axonometric plans of the city, those of Mancelli (1608) and Tosca (1704). The first, despite its low degree of definition, shows us a unitary block in which the Oil Market is attached to other buildings, covering the entire block with a single and questionable-hipped roof. But the most interesting part is that Mancelli's drawing differentiates between the small windows of the houses in the northern half of the building and a large arch in the south (Fig. 7a), which coincides with our hypothesis.

On the other hand, Tosca, though more detailed, is harder to read, as the building is rotated and its west façade is foreshortened, almost in side view. Despite this, there is a clear difference in the case of the roofs between those of the houses and that of the market. And, although with some difficulty, the existence of small windows seems to be glimpsed in the façade of the market facing the square, unlike Mancelli's large unitary arch (Fig. 7b).

<sup>1</sup> The market was then built with the spaciousness that it has nowadays, and they put as an ornament in the corners that look

at noon and the market square two figurines or statues of stone, one of a woman and one of a man, which they called *engonari*.

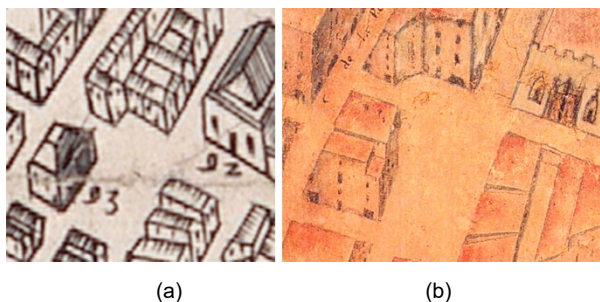


Figure 7: Zoom in the representation of the Oil Market: a) Mancelli's plan; b) Tosca's plan.

This could be due to the proposal to modify the building presented to the city council eight years before Tosca drew his plan, in 1696 and mentioned above<sup>2</sup>. It is a set of documents in which Joseph Peris offers to carry out renovation works in the market due to its limited capacity. The objective was to adapt its use to the commercial needs of the time, taking charge of the costs of reform and the acquisition of the adjoining properties to expand the available space in exchange for the concession of the position of *Alcayde* for him and his family for the term of "tres vidas"<sup>3</sup>, that is, 50 years. The text contains the first precise description of the building and its condition on that date:

*"La qual Alondiga es una fábrica antigua, totalmente desproporcionada para dicho empleo porque está abierta por tres partes, como si fuera una Plazuela el suelo sin pavimento alguno, sin tener Almacenes para serrar y guardar las mercaderías"*<sup>4</sup>

And Peris describes the proposal in the following terms:

*"Ha ideado [...] que dexando en su propio ser la fábrica de la lonja vieja la serrara con puertas y enrejados de ierro, enlosara el suelo de todo su sitio, y comprara las casas adjuntas a ella y en todo su distrito formara nueva lonja según la planta que presenta para el arroz y el cáñamo, y de los altos de dichas casas havra habitación para su alcayde quedando este perpetuamente en la obligación de mantener y conservar todo la sobredicha fábrica"*<sup>5</sup>

The plan that accompanies the proposal, together with its key, shows that the resulting market would be functionally articulated with the adjoining buildings, of which the ground floor would be dedicated to extending the surface available in the market for use as a warehouse for goods such as "oil, honey, wax, rice, silk, hemp, sugar, pitch, resin, tar, almond and many others...". The elevation shows that the three arches would be closed with masonry –instead of the iron grille

proposed in the text– to guarantee the safety of the goods, leaving open the central door and two side windows in each of them (Fig. 3).

In this sense, the traditional historiography of the building agrees that in 1734 "...se cerró y se pusieron puertas a sus tres lados, con que se evitaron muchas ofensas de Dios, que por estar abiertas se cometían de noche"<sup>6</sup> (Teixidor, 1895). All of this is confirmed in the drawings that make up the Rieta file that show a similar appearance, with the exception of the ground floor of the annex building that was detached from the market and rebuilt later, as reflected in the urban files analysed.

### 3.3. Decline and demolition: 1696-1877

This building would arrive with few variations until the second half of the 19<sup>th</sup> century, increasingly lacking a clear function. Until 1875 it can be said that we have a lack of documentation on the evolution of the building. In that year, a proposal from the residents was presented to the municipal council, in which they proposed its demolition and the use of the site to build a flower and fruit market<sup>7</sup>. From this moment on, in the documentation of the Historical Archive of the City of Valencia, various files are preserved that reflect the controversy provoked in the city between the supporters of the demolition and those of its conservation, in a debate in which signatures were collected on both sides and in which an appeal delayed the process<sup>8</sup>. Finally, in 1877 the demolition was definitively approved, without the aforementioned flower market being built<sup>9</sup>.

## 4. Construction of the hypothesis

The graphic reconstruction process described below is based on the comparative analysis of the documentary and historical sources described above. All this has allowed us to determine three fundamental aspects: the dimensions of the building, its formal structure and its relationship with the immediate built environment.

### 4.1. Dimensions and location of the Oil Market

The starting point for the reconstruction has been the file of the Rieta archive preserved in the Archive of the City Council of Valencia, as it is the only reliable representation of the building at the time of its demolition. The analysis of this document has made it possible to determine the morphology of this Gothic building with a trapezoidal floor plan (almost square), attached to another building on one of its sides; this structure coincides, in essence, with the image contained in the document of 1696 preserved in the Archive of the Crown of Aragon<sup>10</sup>. However, both documents lack a graphic scale that would help to determine their dimensions and express the positioning of the market in the urban

<sup>2</sup> Archivo de la Corona de Aragón (ACA). Consejo de Aragón. Legajos, 0850, nº063.

<sup>3</sup> Three lifespans.

<sup>4</sup> The market is an old building, totally disproportionate for this use because it is open on three sides, as if it were a small square, the floor without any pavement, without having warehouses to saw and store the goods.

<sup>5</sup> He has devised [...] that leaving the building of the old market in its own being, he will close it with doors and iron grilles, pave the floor of its entire site, and buy the houses attached to it and in all its surroundings will make a new market according to the presented plan for rice and hemp, and of the tops of said houses

there would be rooms for its *alcayde*, who would be perpetually obliged to maintain and conserve the whole of the above-mentioned building.

<sup>6</sup> ... it was closed and doors were placed on its three sides, with which many offenses to God were avoided, which, because they were open, were committed at night.

<sup>7</sup> AHMV, Policía Urbana, 1875. Caja 118 (149). Exp. 311.

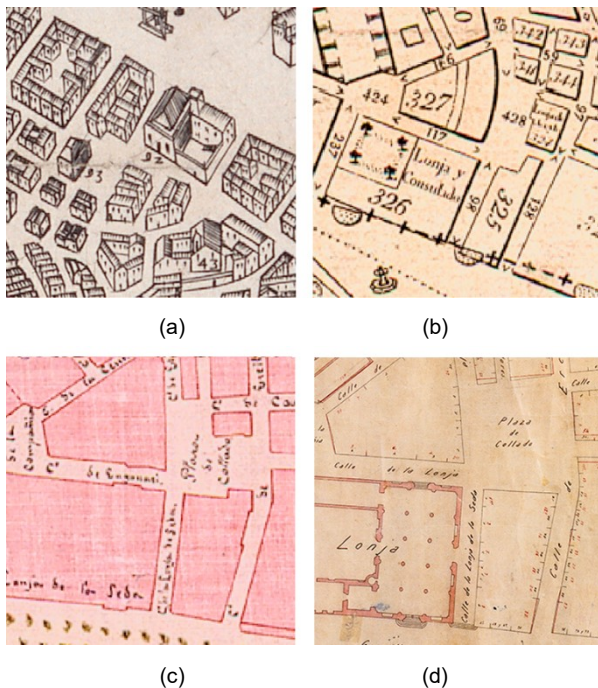
<sup>8</sup> AHMV, Policía urbana, 1876. Caja 121. Exp. 323 bis; Caja 124. Exp. 533.

<sup>9</sup> AHMV, Policía urbana, 1877. Caja 122. Exp. 21 bis.

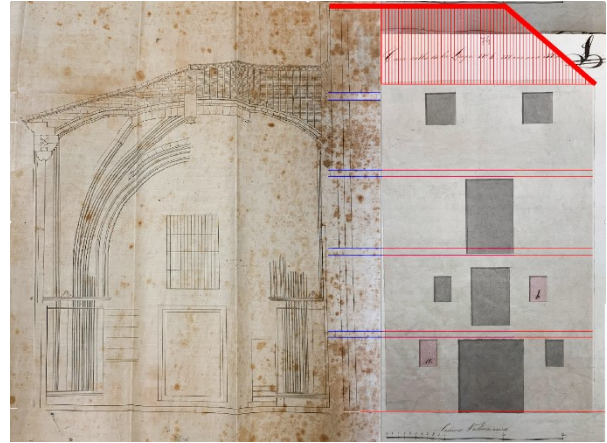
<sup>10</sup> ACA, Consejo de Aragón. Legajos, 0850, nº063.

context, which has implied the need to start from the urban environment to shed light on these aspects, determining the dimensions of the original building from the current urban structure.

In this sense, the analysis of historical cartographies allows us to affirm that between 1608, the date of Mancelli's plan, the first representation of the urban fabric of the city, and 1877, the date of the building's demolition, there were only two significant modifications: the progressive realignment of the surrounding streets, and the modifications of the block of the Oil Market itself<sup>11</sup>. Thus, in the plans of Mancelli (1608) and Tosca (1704) and in the document of the Crown of Aragon, the attached buildings maintain the same width as the market. On the contrary, in 1831, these buildings invaded the road space on the side of the square, maintaining an irregular structure that can still be seen in the alignment plan of 1860<sup>12</sup> and that will not disappear until the demolition of the block (Fig. 8).



**Figure 8:** Evolution of the urban space around the Oil Market: a) Mancelli (1608); b) Ferrer (1831); c) Army General Staff Corps (1883); d) Ferrer (1892-1893).



**Figure 9:** Comparison between the Rieta cross-section and the elevation of the annex building, used to size the Oil Market.

Given that the urbanistic files corresponding to the attached buildings have been located, knowing their configuration and dimensions has been one of the fundamental steps to locate and size the market. From the analysis of the three previously mentioned files, we know the measurements of the front walls<sup>13</sup>, forming a trapezoidal plan in coherence with that of the market itself. In addition, one of these files presents an elevation of the building in which the composition of the façade openings is included, allowing us to intuit the position of the building's interior slabs<sup>14</sup>. By comparing this elevation with the cross-section of the market drawn by Rieta, in which the slabs of the adjoining building appear, it has been possible to determine with sufficient precision the height of the façade of the market by superimposing and scaling the plans (Fig. 9), and from it the approximate dimensions of the floor plan.

Based on these measurements, the positioning of the block in the urban fabric of the city has been determined. To this end, the alignment plan of 1860<sup>15</sup> (Fig. 5) and the alignment plan of Ferrer of 1982-83 (Fig. 8d) have been used, as they are the closest chronologically to the demolition of the building and, consequently, to Rieta's plans. If the first one represents the location of the market in its environment, the second one presents the surroundings of the square once the entire block in which it was located was demolished. The comparative analysis of these plans has allowed us to determine the realignment of some of the streets in this urban area between 1860 and 1892, which has been complemented by another dossier that corroborates the dimensions of another of the façades that overlook the square, currently transformed and rebuilt (Fig. 6a), and that coincide to perfection with its current dimension.

Despite the fact that the 1860 alignment plan represents the square in its entirety and places the market in it, it is necessary to take some of its data with caution. The superimposition of the plan with other more precise contemporary cartographies, and even with the 1892 planimetry, shows important graphic imbalances. On the contrary, this plan provides us with a series of

<sup>11</sup> AHMV. PU, 1835. Caja 51 (59). Exp. 74; AHMV. PU, 1876. Caja 120 (151). Exp. 43.

<sup>12</sup> AHMV. Fondo Emilio Rieta. ER. 9-14.

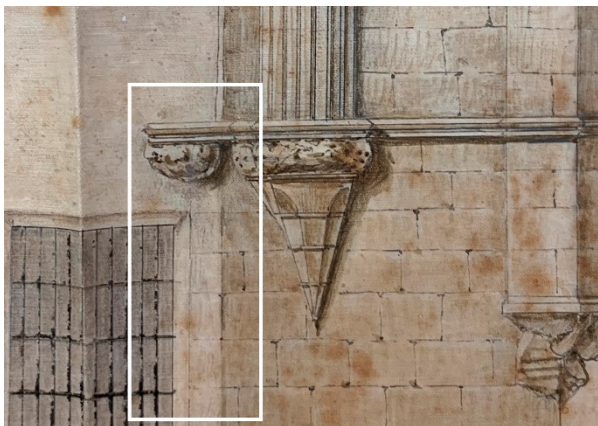
<sup>13</sup> AHMV. PU, 1807. Caja 23 (26). Exp. 120; AHMV. PU, 1835. Caja 51 (59). Exp. 74; AHMV. PU, 1876. Caja 120 (151). Exp. 43.

<sup>14</sup> AHMV. PU, 1835. Caja 51 (59). Exp. 74.

<sup>15</sup> AHMV. Fondo Emilio Rieta. ER. 9-14.







**Figure 13:** Location of the capital and the attached column, which correspond vertically to the outer rib of the arch.

#### 4.2.2. The roof of the Oil Market

The second topic that we propose to address, as an example of the analysis strategy followed for the definition of the hypothesis, is the analysis of the roof of the market. If we take a closer look at the elevation of Rieta facing the square, we can see the existence of two cantilevered drains integrated into the façade wall, coexisting with a sloping three-pitched roof adjusted to the cornice (Fig. 5). These drains seem to refer to a flat roof that diverts the water to the haunches of the vaults, taking advantage of the slope of the vaults to collect and divert the water to the outside of the façade. This is how they appear, for example, on the roofs of Seville Cathedral, where the drainage wells of the roof acquire a depth that would allow a similar solution in the Oil Market (Fig. 14). The resulting image of the building (Fig. 15) would be, in this case, more similar to that of other contemporary Gothic buildings erected in the city of Valencia, such as the Romanesque façade of the Cathedral itself, the cloistered space of the convent of *El Carmen*, or the chapel of the cemetery of *San Juan del Hospital*, to the detriment of the sloping roofs and their corresponding eaves.



**Figure 14:** Roof of the Seville Cathedral.

It is likely that this type of constructive solution was the one originally used for the market and that a modification would have been necessary to replace the original constructive solution with a more conventional three-sided hipped roof. This fact would be consistent with the documentary evidence of intervention on the roofs in 1467, just 23 years after the date of construction<sup>16</sup>. At this time, the roofs were in danger of ruin, so repairs had to be made to them and, subsequently, in 1470 they had to be repaired again<sup>17</sup>.



**Figure 15:** Hypothetical proposal for an original roof, later replaced by a hipped roof with which it reached the 19<sup>th</sup> century.

In the 3D model developed, we have chosen to keep the hipped roof for two reasons: the first is the fact that this hypothesis we propose, although plausible, is not fully confirmed; the second is the fact that the hipped roof would be the one that would characterise the building for most of its useful life, as well as being the one that would be in operation in the 19<sup>th</sup> century, in which the reconstruction developed for the surroundings of the square in the 3D model would be dated.

#### 4.2.3. The arch springs on the façade

There is a unique aspect of the building reflected in Rieta's survey that raises doubts in the reconstruction process: the arch springs on corbels that appear on the west elevation of the building. These are ribs that seem to constitute the start of a new roof that, due to their formal characteristics, differ significantly from the interior arches. Initially, it could be thought that the loggia was originally intended to be extended according to a second *campata*, in the generative manner of a large number of Italian and Valencian lodges, generated from a repeated module according to a linear scheme (Lara Ortega, 2007). This interpretation would fit in with the documentary references that repeatedly speak of the limited capacity of the building and the need for its expansion, which ended up leading to the decision to erect the Silk Exchange Market. However, the vaulted

<sup>16</sup> AHMV, MC, A-38, f. 119r, 5-V-1467.

<sup>17</sup> AHMV, MC, A-38, f. 112r, 27-III-1470; CCC, O-37, f. 140; LCR, qq-5, f. 69v.

structure of the interior, in which the ribs stand out on a bundle of attached shafts that extend them to the ground, differs radically from the springs of the façade, which rest on two capitals attached directly to the walls, as if a portico were to be erected at the entrance to the loggia. A coherent interpretation of these elements has not been found, so it has been decided to reflect them in the proposed reconstruction, refusing to make any further interpretation.

#### 4.3. The architectural references

The last analysis on which the hypothesis is based refers to the architectural comparison of the graphic information of Rieta's plans with contemporary Gothic architecture. Once the market's construction date was set in 1444, we selected some contemporary buildings of the city of Valencia for their comparative analysis as formal, structural, and compositional references.

The first case is the Funerary Chapel (Fig. 16) of the complex of the Church of *San Juan del Hospital* (Valencia), dated between the end of the 13<sup>th</sup> century and the beginning of the 14<sup>th</sup> century (López González & García Valdecabres, 2019). Originally, the chapel was formed by a cubic prism of 18 Valencian palms on each side, approximately 4.10 m, so its size is significantly smaller than that of the Oil Market, resulting in a smaller precedent that is the closest example in the city of Valencia to the concept of spatiality that would later be developed on a larger scale in the Oil Market (Ferrando Francés et al., 1978).



Figure 16: Funerary Chapel of *San Juan del Hospital*.

Likewise, and despite not being conceived in the same way, we find the cloisters of the convents of *El Carmen* and *La Trinidad*, both in the same city of Valencia. The cloister of the Convent of *El Carmen* was built between the 14<sup>th</sup> and 15<sup>th</sup> centuries (Zaragoza Catalán, 2012), and was completed about twenty years before the construction of the Oil Market. The pilasters are practically devoid of decoration and the columns on which the arches rest are simpler than those of the Oil Market. Similar is the case of the cloister of the Convent of *La Trinidad*, founded in 1445 and located in front of the historical city on the left bank of the Turia River (Zaragoza Catalán, 2000). This group of buildings has served as a formal reference to reconstruct both the general concept of the market building and those parts that are scarcely or defectively defined in Rieta's plans. In addition to this comparative analysis aimed at determining the formal characteristics of the building, a study of the characteristics of contemporary medieval

buildings has been added in order to determine the characteristics of the interior covering, a five-key vault that is not common in Valencian architecture.

In this sense, it is commonly accepted that the first case of this type of vault was built in the transept of the Cathedral of Amiens around the year 1270, being the transept of the Cathedral of Toledo (c. 1300) the first built in Spain. The first Valencian example can be found in the chapel of the Immaculate Conception in the church of the Royal Monastery of *Santa María del Puig*, which can be dated to the first half of the 14<sup>th</sup> century; from the same period is the chapel of the Cathedral of *Segorbe*, which is now hidden by a later vault. In the 15<sup>th</sup> century, many examples of this type of vault were developed, including those of the apses of the Monastery of *Corpus Christi* in *Llutxent* and the Church of *San Bartolomé* in *Jávea*, becoming in the following centuries a very common solution in the religious buildings of Valencia.

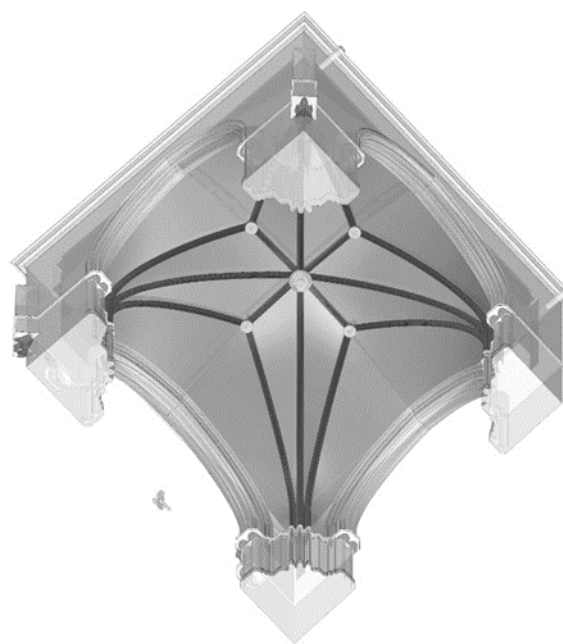


Figure 17: Lower view of the five keystones vault of the reconstruction of the Oil Market.

This type of vault appears in various treatises from the 16<sup>th</sup> to the 17<sup>th</sup> centuries, such as those by Vandelvira or Alonso de Castro, which do not explain its layout, or those by the Valencian father Tomás Vicente Tosca or Joseph Gelabert, who do provide instructions for it (Fig. 17). Especially interesting is the description provided by Gelabert in his treatise (VV.AA, 2011), detailing each step for the execution of the star vaults with tiercerons, or five keystones chapels, on a square space that, in his opinion, is the one of the greatest difficulty. Given its similarity to the vault depicted by Rieta for the Oil Market, Gelabert's layout (Fig. 18) has allowed a correct geometric interpretation of it that has allowed us to reinterpret the drawing and cover its geometric and constructive gaps.

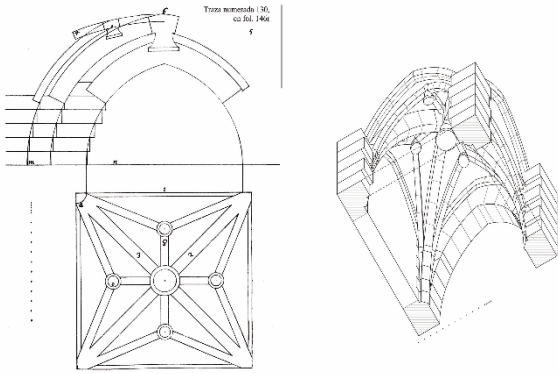


Figure 18: Layout of the five keystone vault in the treatise of Joseph Gelabert.

## 5. Virtual reconstruction process

The virtual reconstruction process has been developed in a transversal way according to the needs and objectives of the different phases of the project. For this reason, the tools used have been interspersed to solve the problems that have arisen as the reconstructive proposal advanced, and as a means to draw the different hypotheses. In this sense, it has been essential to resort to the elaboration of freehand sketches to work, interpret and visualise the aspects before and during the use of digital media (Fig. 19).



Figure 19: Sketch drawn during the work process.

### 5.1. Survey of the surroundings

The first phase consisted of surveying the surroundings in which the market was located, that is, the *Doctor Collado* Square and its perimeter buildings, which have been drawn in 2D using the AutoCAD 2023 program based on on-site data collection. Likewise, the survey of the floor plan has been contrasted with the existing cartography in the cadastre, which has been downloaded in DXF format to import it into the same program later, and which has been especially useful in knowing the internal morphology of the buildings that make up the blocks adjacent to the square. This general floor plan has served as a support to draw the reconstructive hypothesis and the location of the market, since it has allowed us to understand the evolution of the building blocks as a previous step to define the position of the building according to the sources found during the research. Subsequently, the elevations of the buildings that make up the square have also been drawn in AutoCAD and will serve as support for the 3D modelling (Fig. 20).

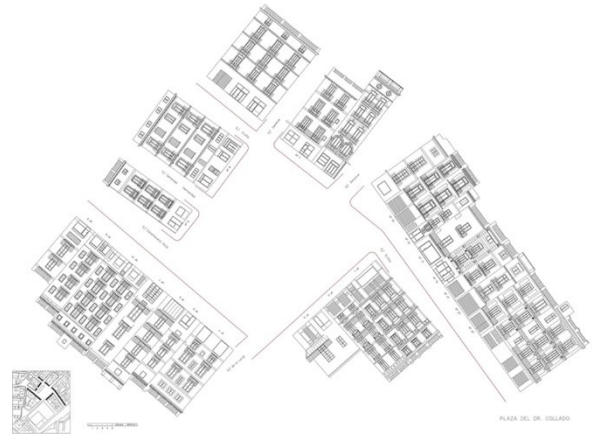


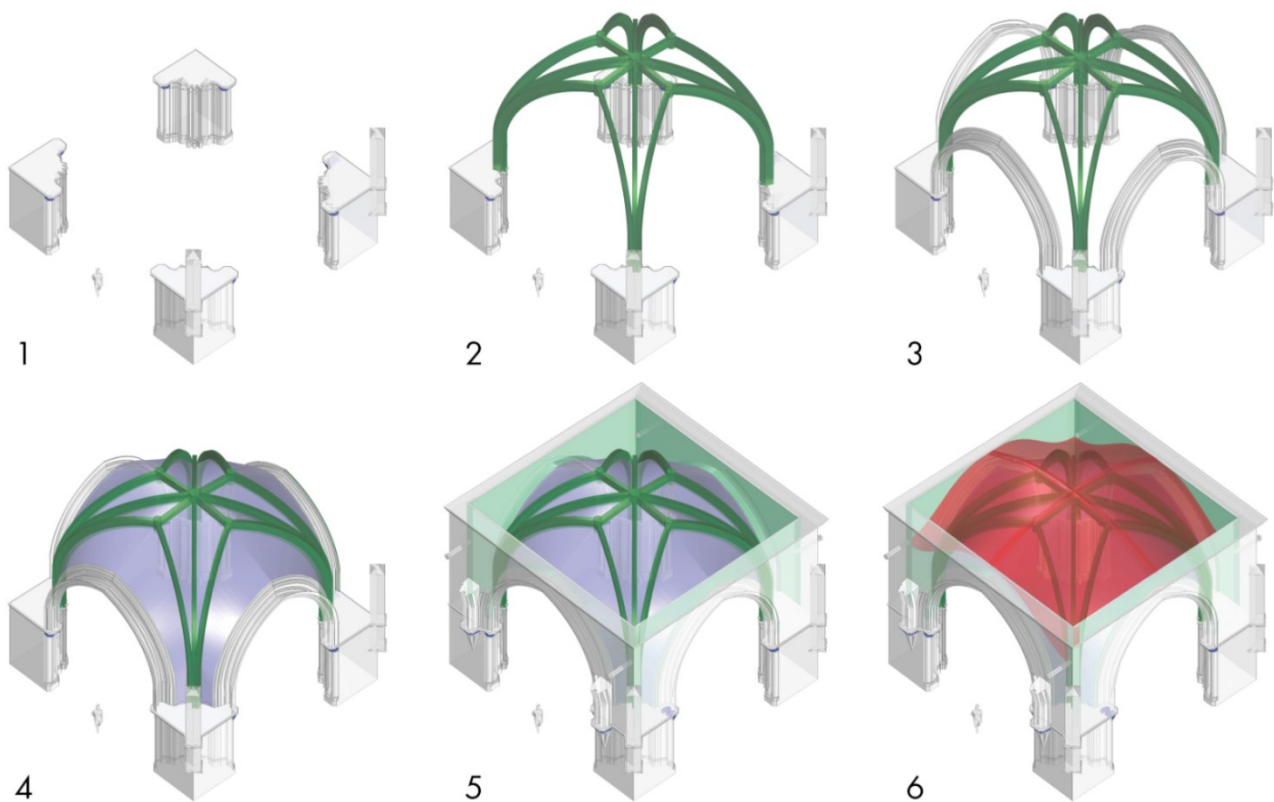
Figure 20: Survey of the *Doctor Collado* Square.

### 5.2. 3D Modelling

All this graphic information has been imported into the Rhinoceros v7 software, where the 3D modelling of the set has been carried out, the process of which is summarised below (Fig. 21). First of all, the supports have been modelled using straight extrusions and all their horizontal protrusions and indentations have been defined, joining them through transition surfaces. Secondly, the four arches of the façades and their cornices have been modelled by extrusion, as well as the ribs of the vault, whose bays have been reconstructed using intermediate surfaces. Thirdly, the five keys of the vault have been modelled with different revolutions and the roof by means of a single complex parabolic surface.

Finally, the set of elements that form the details of the market have been modelled, such as the springs of the arches and their outer corbels. To this end, special attention has been paid to the stereotomic traces proposed in Rieta, especially those that seem to define with greater fidelity and accuracy. In this sense, it should be noted that some of these details were not defined in this way, but were sketched due to their formal complexity and the absence of orthogonality. For this reason, these elements have required a reinterpretation through the taking of references in order to be able to model them with verisimilitude. We are referring, for example, to the morphology of the capitals with vegetal motifs, which we have been able to model with reasonable accuracy by finding similar patterns in drawings made by [Violet-le-Duc \(1866\)](#). Specifically, we are referring to the motifs characterised by the branches and leaves of the thistle, which are typically Gothic.

The next step was rendering the final images, which was done using the V-Ray 6.0 engine for Rhinoceros. The materials used are self-made and, specifically, the material applied to the reconstruction of the market has been obtained by taking photographs of the ashlar walls of the Silk Exchange Market, due to their temporal, material and geographical coincidence. For the rest of the buildings, a solid white material has been used in order to serve as a contextual reference –as a backdrop– and to avoid masking the building under study by means of noise. Finally, the post-production of these images was carried out with Adobe Photoshop 2022, where the renders were adjusted, and all the elements that provided the image with a sense of scale were introduced.



**Figure 21:** Modelling process in Rhinoceros: 1) Supports; 2) Ribs, keystones; 3) Façade arches; 4) Bays; 5) Walls, details; 6) Roof.

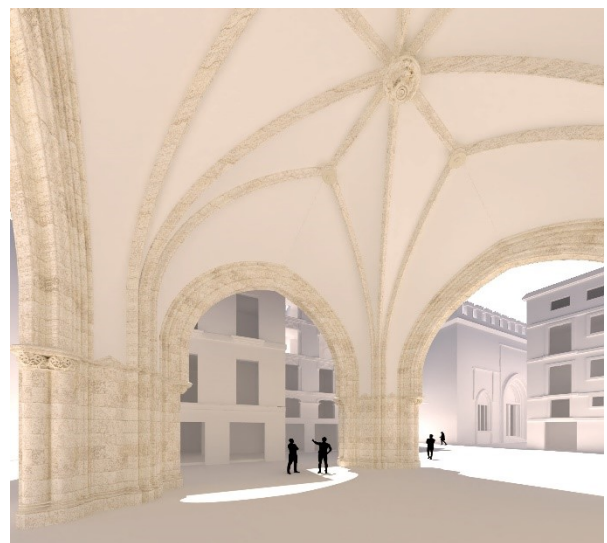
### 5.3. Generation of 3D images of the Oil Market in its environment

The last part of the reconstruction consisted of the elaboration of criteria for the definition of the environment in the proposed graphic reconstruction. Given the long history of the building, it has been necessary to define the moment of historical evolution that had to be graphically reconstructed.

Given the lack of data prior to the 19<sup>th</sup> century, it has been decided to propose the reconstruction of the urban space surrounding the market in 1877, at the time of its demolition, since this is the historical phase of which we have the most information and most reliable. In order to define it, the current survey of the environment has been compared with the information available in the city archives regarding demolitions and replacements, and a synthesis of all this has been proposed.

The result is that a significant part of the currently existing buildings have been validated as buildings that, most likely, were already built in 1877, and that have not undergone major modifications since then. Secondly, it has been possible to reconstruct the façades of the buildings annexed to the Oil Market, since the files that defined them have been found. And finally, the file for the rebuilding of the building that was located just in front of the façade of the market, facing *Engonari* Street and on the corner of *Lonja* Street, which appeared as a volume that invaded the street in front of the south façade of the Oil Market, has not been located. Therefore, for its formal definition, it has been extrapolated from other contemporary buildings.

In this environment, which faithfully corresponds to the year 1877, when the building was demolished, it has been decided to insert the Oil Market, devoid of the closing walls that characterised it since the beginning of the 18<sup>th</sup> century. This has been because this is the only way to represent the spatiality of the building and its relationship with the surroundings. The result of this process is the 3D reconstruction presented below, in which the market opens up to the surrounding space in a way analogous to the one it was conceived at the time of its construction (Fig. 22).



**Figure 22:** Reencounter of the *Lonjas*. Interior view of the Oil Market with the Silk Exchange Market in the background.

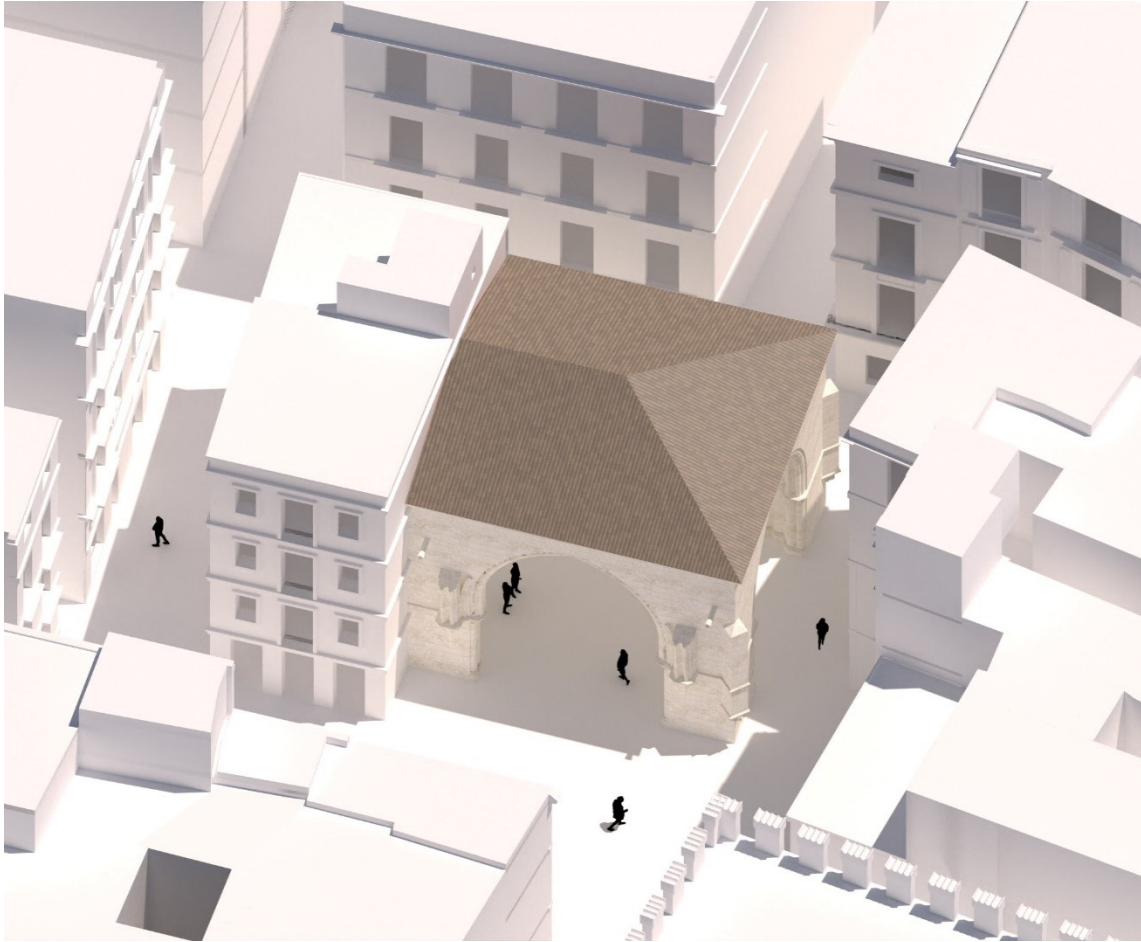


Figure 23: Oil Market within its urban environment in 1877.

## 6. Discussion

The present research proposes a global methodology for the graphic reconstruction of disappeared architecture in historical centres, starting from a total absence of archaeological remains and articulating both the documentary and historical information as well as the comparative analysis of other contemporary architectures of the time. In the case at hand, the main problem arises from the numerous documentary contradictions and the lack of certainty regarding the dimensions of the building, as only graphic documentation lacking scale has been preserved. For this reason, the rigorous analysis of the urban space resulting from the demolition has played a fundamental and unique role in ascertaining the dimensional traces of the disappeared building within the preserved constructions and comparing the results obtained with the formal and constructive logic of the architecture of its time.

The methodology presented here makes it possible to apply it in other case studies, where the absence of architectural remains can be complemented by the search and location of archival sources. For this reason, one of the main difficulties of the research has been to connect all the information found in such a way as to produce a complete fit of the various pieces, providing an integral and coherent meaning to all the documents available. This methodology can be linked to several other works, such as those by Gómez Gil (2020), Lillo et

al. (2021) or Bonet (2023), where graphic and written sources constitute the reconstructive support (Gutiérrez-Pérez, 2023), differing from others whose pillar is made up of the existence and subsequent study of archaeological remains (Valle Abad et al., 2022). We understand that, unlike the previously mentioned examples, the singularity of this work with respect to the previous ones lies, precisely, in the intimate relationship of the process of building modelling with respect to the dimensioning, interpretation and modelling of its urban environment (Figs. 23 & 24).



Figure 24: View of the Oil Market from Ercilla Street.



Figure 25: View of the Oil Market from the Silk Exchange Market.

Secondly, the graphic indefiniteness and the dimensional inconsistencies between sources imply that the volumetric and formal definition of the building itself has had to be developed from a process of historical study that served as the basis for a comparative analysis work with other architectures to cover the numerous geometric gaps that have occurred in the modelling process. Thus, once the process of fitting the primitive sources has been overcome, a search has been carried out for contemporary buildings that could serve as parallels and support for the hypothesis and subsequent modelling, as is the case in other research (Ferdani et al., 2020). In this sense, we are faced with a complex 3D modelling due to the absence of orthogonality of the building and the elements of the urban environment, as well as the existence of stereotomically complex ribs, surfaces and volumes that have hindered this phase of the reconstruction, which brings us, for example, closer to the work of Vargas Lorenzo (2019) in relation to the modelling of domes and vaults. In this respect, the stereotomic analysis of the construction and the study of the characteristic geometry of the layout of the ribs of Valencian Gothic architecture in general, and of the five-keyed vaults in particular, as defined in the treatises on stereotomy, has served to shape the building as a whole.

Finally, with regard to the final formalisation of the 3D models, the visualisation of the images of the reconstruction has been carried out with an abstract vocation, dematerialising the environment —whose reconstruction is not the central object of the research— and modelling the elementary architectures of the buildings that surround the market (Fig. 25). In the case of the latter, it has been chosen to texture the market, in order to represent its materiality and give it prominence so that it stands out from the context (Fig. 26). This type of graphic design can be found in other graphic reconstructions such as those of Moya-Olmedo (2023) or Bassoli et al. (2022), whose representations are far from other works where the interest of the authors lies precisely in showing materiality, through a fully realistic visualisation, as is the example of Bonet (2023) or Valle, Fernández and Rodríguez (2022).



Figure 26: Oil Market from *Los Derechos* Street.

## 7. Conclusions

The virtual reconstruction of the Oil Market recovers the image of a practically unknown building in the history of Valencia that, paradoxically, had a capital importance in the life and commerce of the city. Obscured by the splendour of its successor, the Silk Exchange Market, and given the almost absolute absence of historical images and descriptions, it has remained in oblivion, lacking an image that would allow its existence in the public consciousness. This virtual reconstruction recovers that lost image with the aim of reintegrating it into the collective consciousness of the Valencian citizens.

Given the non-existence of archaeological remains, this recovery has been possible thanks to the archival work undertaken, which has concluded with the discovery of various plans and graphic testimonies on which to base a proposal that obviates the discretion and arbitrariness of the few previous descriptions or reconstructions. Without them, this reconstruction would have been impossible, but their existence, by itself, has not been

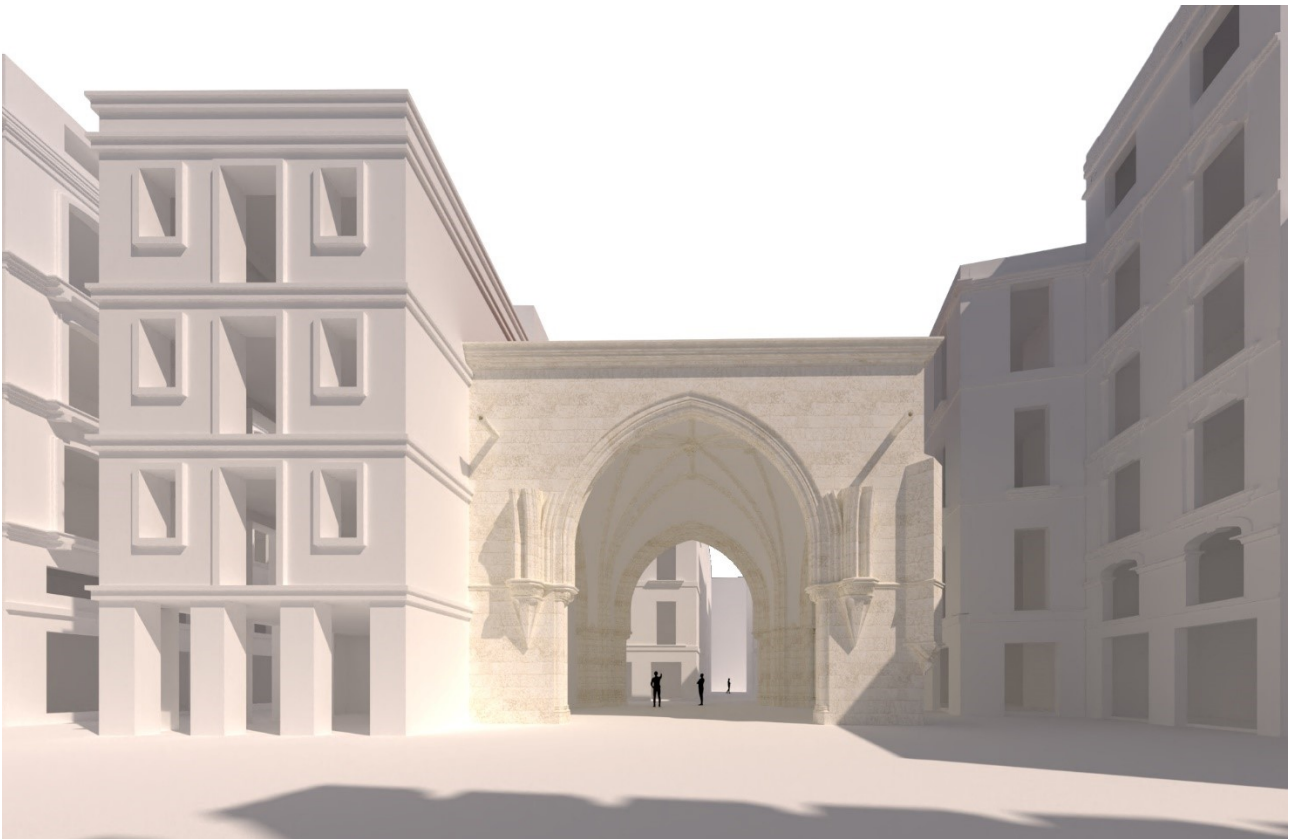
enough. It has been necessary to systematically delve into the scarce bibliographic and documentary information preserved, since a deep understanding of the building, its evolution and its history is essential to make sense of these images and support the graphic decisions that have made it possible to choose between sometimes conflicting possibilities.

Although it is not possible to determine all the phases of the building, we have been able to understand its history and evolution over time, from its primitive conception to its demolition. It has been decided to reconstruct the image of the primitive market, eliminating those later layers that masked the original according to the needs of each moment, to understand the importance of the building for the society at the time. Unfortunately, the loss of function and the modifications made to the building resulted in a lack of appreciation by society, since it was not even photographed before its demolition. An example of the still non-existent social and protective mentality of heritage, which in Valencia at that time had not yet seen the light of day, added to the deterioration of the building. Perhaps the closing of its arches, which made it little more than a ruined box, did not allow the society to intuit the value contained in a Gothic vault that, if it had been in plain sight, could have come to be esteemed for what it deserved.

That is why our reconstruction, in addition to recovering an unknown architectural structure, aims to enhance its value. For this reason, the reconstruction of the Oil Market (Fig. 27) shows how it could have been built if, instead of demolishing it after a bitter dispute in society between detractors and supporters of its conservation, the latter had been chosen and rehabilitated; an arcaded space open to the square, as it was in the first centuries of its existence, closed only by bars, but preserving that visual permeability that linked its interior space to both the square and the adjoining Silk Exchange Market.

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**Figure 27:** Oil Market within its urban environment in 1877.

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