Article

Gothic Drawing and Drawings in the Gothic Tradition in the Iberian Peninsula (13th–18th Centuries)

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Abstract: The inventory and cataloguing of the architectural drawings in the Gothic tradition made In the Iberian Peninsula has brought together exceptional sources that were previously scattered, usually little-known and valued, and, in many cases, unpublished. These materials can now be analyzed from multiple points of view, notably as tools for planning and surveying; as invaluable documents for the study of the enterprises they represent or helped to develop; as sources for the study of master builders; and as data sets for the analysis of the typological models, vaulting solutions, and rib-vault designs used in Gothic architecture—and in architecture of Gothic tradition—built in the Iberian Peninsula throughout the Middle Ages and Early Modern period.

Keywords: Gothic; architectural drawing

1. Introduction

Building on the aspirations of the first compilation of Iberian Late Gothic designs (Jiménez Martín 2011, p. 406), the research group "Thematic Network for Cooperative Research on Late Gothic Art (15th–16th centuries)" set out to create an inventory, as comprehensive as possible, of the architectural drawings in the Gothic tradition made in the Iberian Peninsula throughout the 15th and 16th centuries.[1] However, we soon discovered that we had to go beyond the strict limits we had set to extend the research in several directions. First, it was necessary to consider other types of design tools, such as "patterns" (*patrones*), "samples" (*modelos*), and "models" (*maquetas*). Second, projects made for sculpture and painting were included.[2] Finally, the chronological framework was extended to analyze the phenomenon of architectural drawing from its very origins. Thus, we moved the starting point back to the mid-13th century, while maintaining the end of the 16th century as the endpoint for our study, despite the artificiality of such a selection.

The fulfilment of our multiple aims required intense research work, encompassing extensive bibliographic as well as documentary and archival exploration. A first volume documenting this work has already been published, and contains an inventory, catalogue, and study of almost three hundred drawings and other design tools made for the conception, documentation, presentation and execution of Iberian Gothic projects between 1250 and 1600 (Figure 1) (Ibáñez Fernández 2019h).

This work revealed the existence of several objects—essentially drawings—which demonstrate the continuity of the Gothic tradition—from a formal, but especially technical and structural, point of view—throughout the 17th and 18th centuries, beyond the endpoint we had set. These designs have so far remained in "no man's land", receiving limited critical attention from the traditional, style-based discipline of Art History. Shaped by established taxonomies and periodization, the discipline lacks the tools needed for their study, and is even less able to explain their existence. Yet, the designs are evidently part of the phenomenon of Iberian Gothic that the research group had set out to investigate. Therefore, we decided to launch a second phase of the research project to complete their study.[3]
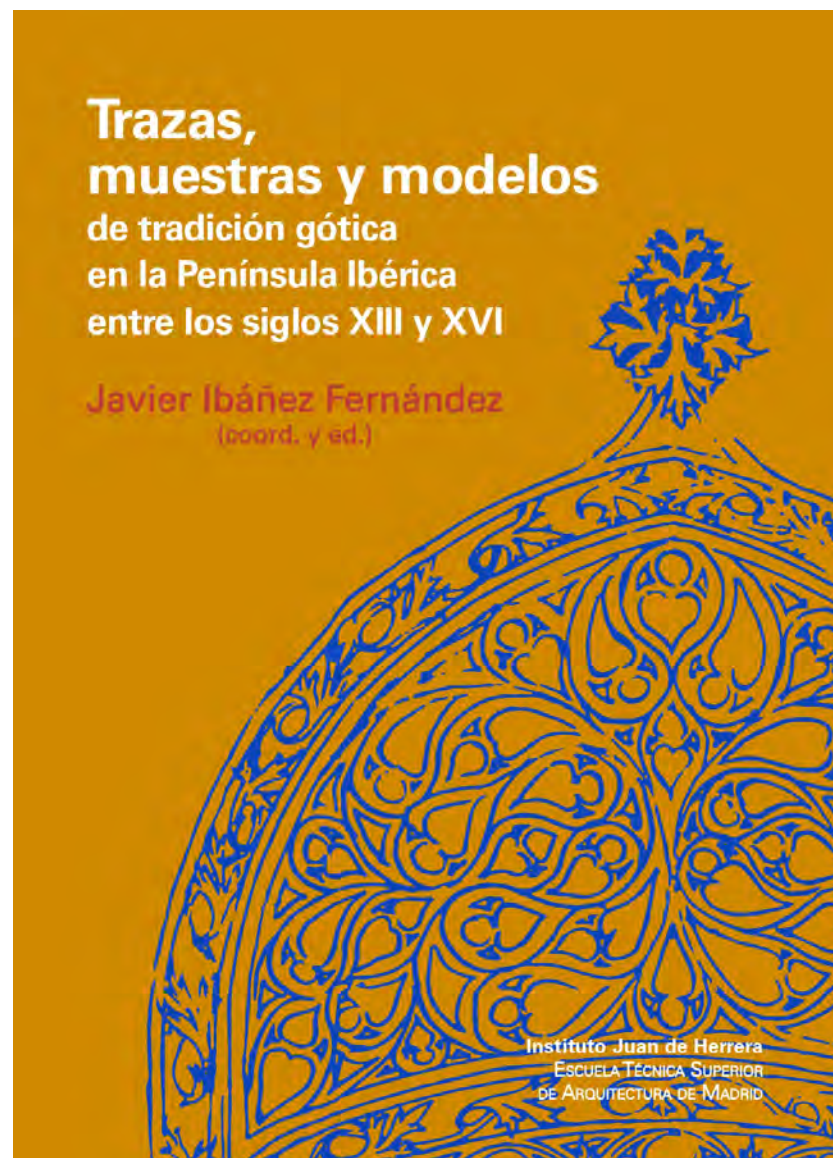
Figure 1. Book cover of Ibáñez Fernández (2019h).

As may be expected, this additional phase of work uncovered a few additional pre-1600 drawings. More importantly, it brought together a considerable number of drawings—largely of a practical nature—which manifest the desire to continue building in accordance with Gothic design rules and—above all—Gothic technical principles in the Early Modern period.

In some cases, a preference for the Gothic is explained by a desire for *concinnitas*. Notably, construction work on some Gothic buildings continued throughout the 17th and even 18th centuries. Moreover, in some specific cases, especially in the latter century, interventions on older buildings manifest a very early interest for architectural restoration. However, the majority of catalogued drawings are associated with what were likely "minor" projects, overseen by professionals whose skills were almost exclusively practical, based on stonecutting and developed within the building lodge, the environment where such craftsmen spent the majority of their careers. They contributed to the development of what is known as "modern stereotomy", which encompasses formal solutions and especially technical and structural formulae grounded in the Gothic tradition. This inheritance was passed down, generation after generation, until the beginning of the modern period, albeit in an increasingly ossified form.

The design tools studied in the first and second phases of the research project have been arranged according to strict chronological criteria and analyzed (either individually, or as a group if part of the same project or unit) following a standard set of fields modelled on the guidelines of the General International Standard Archival Description—ISAD(G), which have been applied—with minimal adjustments—to all objects, regardless of their nature.[4]

The field dedicated to "Related Units of Description" is particularly noteworthy. Beyond recording the existence of copies or complementary drawings, this heading encompasses and summarizes the written documentation that may accompany a given object. In most cases, such written documentation gives full meaning to the object and forms an indivisible unit with it. A case in point are the texts of contracts and agreements, appraisals, and lawsuits; however, there are also other documents, such as orders, counterdeeds, and delivery notes, which may initially seem less significant, but, once properly ordered and interpreted, allow the reconstruction of a drawing's production process. Conscious of the importance of this documentation, we decided to transcribe it in its entirety not only when hitherto unpublished, but also when published transcriptions proved incomplete or unreliable. In all instances, we aimed to offer as much information as possible on catalogued items.

2. Objects and Terms

Alongside the many objects studied in the project—mostly forms of graphic representation—one should consider the even more numerous references to this type of material found in medieval and Early Modern sources. These references are difficult to track and interpret, since the terminology used in pre-Modern documents obeys a *logos* that is no longer ours. It is difficult to match words and concepts exactly, especially when the "real objects" they indicate are lost. Yet, the words used long ago by those who held those objects in their hands or gaze are the only means through which we can study them today.

Many of the words used in the sources can be connected to either of two terms, *traza* and *muestra*. At first sight, this duality seems to reflect an awareness of the difference—and a desire to distinguish—between various forms of graphic representation on the basis of their more-or-less technical nature, original purpose, or eventual use. Thus, the term *traza* seems to have carried technical and practical connotations, and was therefore used to describe designs made by and for professionals, preferably to aid actual construction. In this respect, it is highly significant that it was applied, almost by default, to stereotomic drawings, and, especially, to full-scale tracings.

In turn, the word *muestra* seems to have been used to designate drawings which, regardless of their more-or-less technical nature, were made for an audience (educated or not) extraneous to the practice of any artistic craft. These drawings were intended to convey visually—or rather to *demonstrate*—a work's intended or current appearance, to be used in contracting or in other circumstances when it proved necessary to document or record a particular object (Ibáñez Fernández 2014, pp. 305–16).

Nevertheless, in spite of terminology, drawings of different types could in fact employ similar design strategies. Moreover, drawings could end up performing functions other than those that had inspired their execution. Indeed, our research led us to conclude that many *trazas* were used as *muestras*, and that *muestras* conceived as planning tools inevitably shaped the materialization of the related project. The difficulty of establishing the true nature of many drawings may explain why the two terms have been used interchangeably since early times, and have even been considered as synonyms. What is more, such problems of identification and interpretation may have motivated the gradual imposition, during the 16th century, of the word *traza* to designate any type of graphic representation. In practice, this development seems to have coincided with the growing popularity—for all kinds of drawings—of the New Renaissance system of representation, which was orthogonal, and therefore intrinsically technical, or, at least, "well arranged".

The professional profile of the draftsman became increasing important due to this development. In this period, it became possible to distinguish between drawings grounded

in the world of practical construction, made by artisans who could personally actualize their own projects, and drawings belonging to the context of *disegno*. These were made by artists whose training was fundamentally pictorial, who did not possess the technical and practical skills required by other crafts such as architecture, and were therefore obliged to delegate the implementation of their proposals to others. This differentiation is tangible in the treatises on architecture published in Castilian throughout the 16th century,[5] and in the lexicography.[6] It also underpinned the bitter confrontations between "technical" or "practical" architects and "inventive" or "speculative" architects—that is to say, between supporters of the pre-eminence of the material process of building, and supporters of the project. These debates continued over time, becoming particularly violent in the second half of the 17th century (Blasco Esquivias 1991, 2013).

Out of inertia, architectural historians tend to employ the term *traza* for almost any pre-Modern design. By now, it will be clear to the reader that the indiscriminate use of this term can be confusing and even misleading, especially since there are alternative terms, which are more or less precise but invariably less problematic than *traza*. Thus, "project" can be used to designate almost any proposal for artistic creation, whether or not it is of a technical–operational nature, regardless of the professional profile of its author or intended recipient and of its original purpose and eventual use. Instead, the word "survey" has a more specific character, and is particularly appropriate for graphic representations made with the intention of documenting or recording the state of a building under construction or already completed. When the lack of documentation makes it difficult, if not impossible, to discern whether a design is a "project" or a "survey", one can fall back on other terms, such as "design" or "drawing", which have broader semantic fields.

On other occasions, designs can be described according to their finish. Notably, simplified drawings usually made freehand on both fixed and mobile supports are called "sketches" or "croquis". Otherwise, drawings can be defined according to the view represented in them, or even according to the representation system used in their execution. Thus, we can describe them as "plans", "elevations", "sections", or else "multi-view projections".

3. Stereotomy

The identification, interpretation, and understanding of technical designs associated with the art of stone cutting—namely stereotomy—has progressed significantly in recent years thanks to the intensive research work carried out in the fields of Architectural and Construction History. The study of stereotomy is a specialized and distinct field in a state of continuous expansion and development. Providing an exhaustive inventory and catalogue of materials of this kind is, therefore, far from the intentions of the current project—and, above all, beyond our capabilities. We hope that this task will be tackled soon, hopefully by hands more competent than ours.

Nevertheless, an article dedicated to the study of Gothic drawings and the Gothic tradition in the Iberian Peninsula cannot fail to mention the existence of *monteas*, two-dimensional representations devoid of any perspective. *Monteas* visualize the defining features of elements to be carved in stone, enabling the production of drawings of their flat surfaces and eventually of templates or molds for carving. They were usually made at full scale (1:1) on fixed supports,[7] but they could also be executed on a reduced scale on portable supports. A case in point is the one made on paper by Francisco de Luna to appraise the work completed by Pedro de Albiz at the parish church of Priego (Cuenca). This drawing was eventually used as evidence in a lawsuit brought by the latter master against the church's steward in 1543 (Ibáñez Fernández and Domínguez Montero 2019b).

Successful solutions likely to prove useful for other projects could also be "collected" by reproducing them at a reduced scale in notebooks used by individual artists, workshops, or apprentices. These primers gathered learned and inherited formulas, personal inventions, and borrowed solutions that were copied and reformulated either partially or in their entirety, depending on the interest that they had generated.[8]

The vast majority of notebooks known to us include "stonemasonry patterns" devised for the carving of stonework elements following a stereotomic tradition rooted in the Late Medieval period. Among these are elements that seemingly do not fit any stylistic taxonomy or periodization, and even some that visibly belong to the New Renaissance architectural system. This should not be taken as evidence of the exhaustion of the Gothic tradition, which, in fact, would not become apparent for some time. Rather, professionals had little need to collect patterns that they had already mastered, and instead sought tools to reproduce the novelties exported from Italy.

In fact, there are very few explicitly Gothic designs in the *Manuscript 12686* of the Biblioteca Nacional de España, arguably the copy of a notebook compiled in the circle of Pedro de Albiz, Francisco de Luna, and Andrés de Vandelvira around 1544 (García Baño 2017); in the notebook of Hernán Ruiz *el Mozo*, dated around 1562;[9] in the *Libro de trazas de cortes de piedra* prepared around 1585 by Alonso de Vandelvira, of which only two 17th-century manuscript copies survive (Palacios Gonzalo 2015, pp. 34–37); or in the notes, sketches and designs attributed to the enigmatic Alonso de Guardia, dated after 1598 (Calvo López 2015, pp. 454–57). Indeed, such sources as a newly discovered notebook from the monastery of San Benito el Real in Valladolid, probably begun at the end of the 16th century (Figure 2),[10] or the treatise written by Ginés Martínez de Aranda around 1600 (Calvo López 2009a) do not contain any "stonemasonry pattern" for the making of elements in the Gothic style.
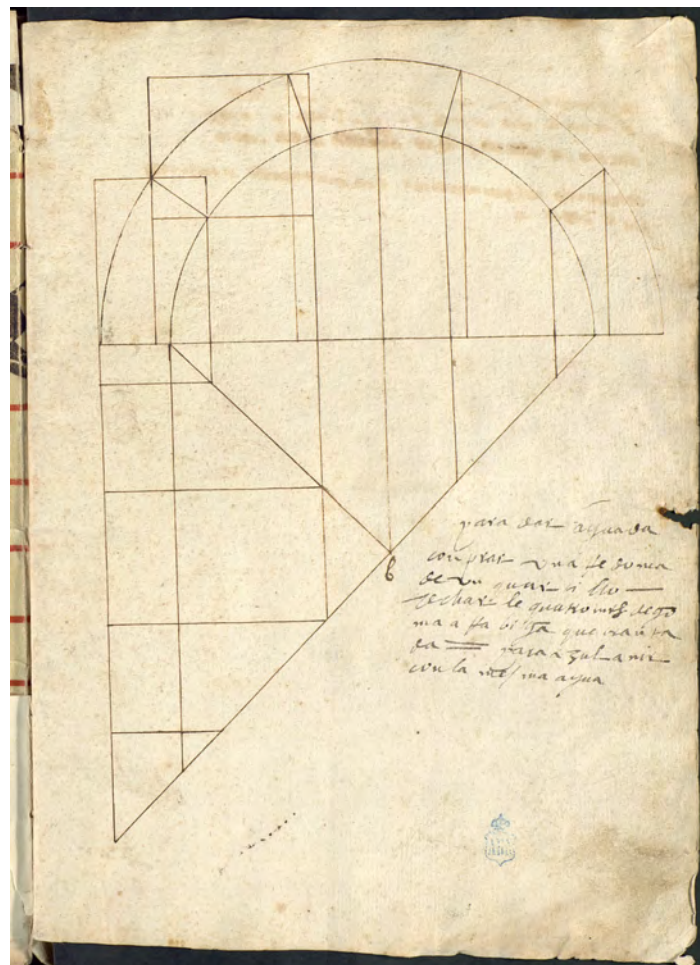

Figure 2. "Stonemasonry pattern" included in the notebook from the monastery of San Benito el Real in Valladolid [Archivo Histórico Nacional (A.H.N.), Clero, MPD, 109, f. 1 r]. © Archivo Histórico Nacional.

Nevertheless, these patterns continued to be handed down within building lodges, essentially because they remained in use throughout the 16th century and well into the 17th century. Even later, attempts to systematize this material were made in compilations such as the *Vertaderas traçes del art de picapedrer* compiled by the Mallorcan Joseph Gelabert in 1653 (Rabasa Díaz 2011) or the *Llibre de trassas de viaix y muntea* written by the Catalan Joseph Ribes as late as 1708 (Tellia 2020). Beyond revealing the continuing vitality of the Gothic tradition, these works aimed to stem the definitive loss of the stereotomic heritage of many generations.

4. Planning and Documentation

At this point, it should be acknowledged that the focus of the catalogue is on tools of graphic representation aimed at creating—and, to a lesser extent, documenting—architectural projects, although designs for sculpture, painting, and other media are also included. Representations were most frequently sections, with a few frontal perspectives, until the New Renaissance system and the attendant desire to recover the *species dispositions* discussed by Vitruvius popularized the use—and eventually the combination—of ground plans, elevations, sections, and even *scenographiae*.

In most cases, designs on portable supports survive in the archives of the civil or ecclesiastical institutions and leading noble families that commissioned their production, where they are isolated from their context or placed within artificial groupings of visual materials. In this respect, it is worth highlighting the important collection of drawings from this period in the cathedral archives of Coria (Cáceres), Segovia, Jaca (Huesca), Barbastro (Huesca), Lugo, Lérida, and Las Palmas; the series originating from the monastery of Guadalupe (Cáceres) and divided between the former Hieronymite monastery and the Archivo Histórico Nacional; the designs related to the patronage of the Medinaceli family; the drawings gathered by the Idiáquez family in relation to their foundations in San Sebastián (Guipúzcoa), part of the Archive of the Ducal House of Híjar and kept in the Archivo Histórico Provincial of Zaragoza since 1987; and those related to the artistic commissions of the Mendoza of the Infantado family, later absorbed in the Osuna family archive and now in the Archivo Histórico de la Nobleza in Toledo.

Other designs have survived because they were appended to documents of very different kinds. These documents are generally related to the contracting of works, to legal proceedings or lawsuits for breaches of contract, and to disagreements between the involved parties before, during, or, more frequently, after the completion of the works.

In fact, drawings—either originals or more-or-less accurate copies—could be attached to an agreement or contract for the execution of a project. Their presence usually influenced the content of the accompanying text. By referring to the visual, the text could avoid the description of details that could be conveyed more easily through a drawing. The visual and the textual element complemented each other in such a way that, once formally certified, they came to be considered as a single, indivisible unit, each acquiring the same legal value and importance as the other. Indeed, the parties involved in the execution of a given project usually required the joint and coordinated verification of the completed work in the light of both elements before expressing their acceptance of what had been done and declaring the contract fulfilled (Ibáñez Fernández 2014, p. 307).

Drawings of this kind could also be used as expert and testimonial evidence in lawsuits or trials, helping to convey to the relevant authorities the nature of a project, its state at a given time, and its uses. Alternatively, they could document and even preserve the memory of particular customs.

Finally, it should be noted that some drawings have survived by chance, thanks to the reuse of the supports on which they are drawn. Both parchment—an expensive material—and paper could be put to new uses, such as bookbinding, once what was represented on their surface had become useless. Indeed, the flexibility and strength of parchment made it particularly suitable for the manufacture of book covers, while pieces of paper could be reused as endpapers. Important designs have thus survived to the present day,

albeit in a trimmed or fragmentary form due to their new functions or medium. Notable examples include the project for the reconstruction of the *cimborrio* (lantern tower) and adjacent vaults at Burgos Cathedral, a drawing made on reused parchment which was then given an additional life as the cover of bound archival documents (Ibáñez Fernández and Alonso Ruiz 2019b); the drawings of dwellings executed on paper that became the endpapers of a copy of Claudius Ptolemy's *Geographicae enarrationis libri octo* in the Biblioteca General Histórica of the University of Salamanca (Castro Santamaría 2019c, 2019d) are another example.

5. Technique

Drawings could be made freehand directly on the support, or with a preliminary incised sketch, which was then inked. These tracings were usually made with a metal-point stylus and with the help of tools such as ruler and compass. Silver- or lead-point would mark paper and parchment not only with an incision, but also with a very fine greyish line. In the event of mistakes, indentations could be removed by a blunt instrument, while lines were erased with breadcrumbs and other means.

However, other techniques, such as sanguine or graphite, may have been used for preliminary drawings in this period. Reddish traces of sanguine seem visible in both the underlying grid and the drawing of what may be the first project for the infirmary cloister of the monastery of Guadalupe, a design which has been related to Vasco de la Zarza and dated between 1518 and 1519 (Figure 3) (Ibáñez Fernández and Villaseñor Sebastián 2019). It is possible that graphite started to be employed for similar purposes in the second half of the 16th century. While no relevant drawings have been studied through chemical analysis, it seems that graphite was already in use in this period for rendering poché, as in the proposals presented by Pedro de Tapia for the Cathedral of Coria in 1573 (Jiménez Martín 2019l, 2019m).
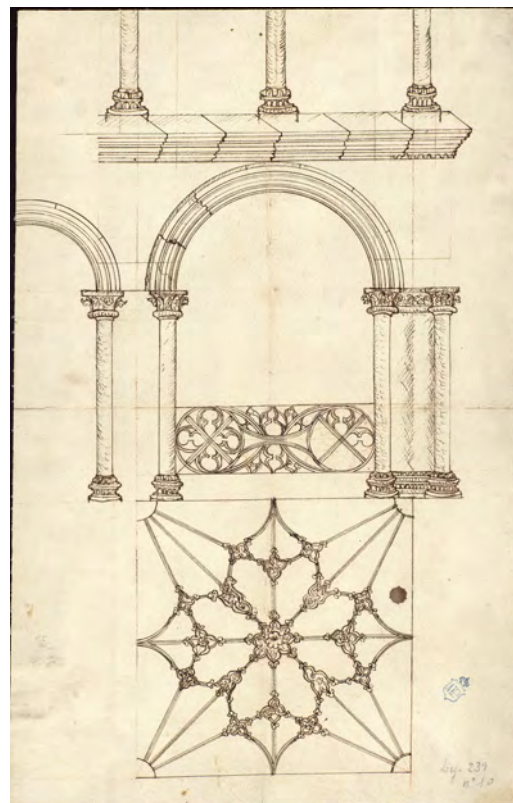

Figure 3. First project for the infirmary cloister of the monastery of Guadalupe (Cáceres) [A.H.N., Clero, MPD, 18]. © Archivo Histórico Nacional.

Be it as it may, once the preliminary drawing had been completed, the design was finished with sepia or oak gall ink, using a wide range of tools such as rulers, ruling pens, or compasses with all their accessories, while ornamental elements and details were usually added freehand. Once the ink had dried and the traces of the preliminary drawing had been removed as far as possible, the result could be enriched with the inclusion of color, washes, shadows, or textures such as hatching.

6. The Views

Research for the catalogue has brought to light a range of interesting formats used to visualize the vertical development of buildings—notably, the frontal perspectives used to represent two-dimensional projects such as doorways (as in the drawing for the portal of the Chapel of Saints Cosmas and Damian in the parish church of Santiago in Zaragoza (Figure 4) (Ibáñez Fernández 2019b)), altarpieces, and even works of a sculptural nature.

Figure 4. Project for the portal of the chapel of Saints Cosmas and Damian in the parish church of Santiago in Zaragoza [Archivo Histórico de Protocolos Notariales de Zaragoza (A.H.P.N.Z.), Fondo de muestras y trazas]. © Archivo Histórico de Protocolos Notariales de Zaragoza.

Likewise, the catalogue also includes elevations of varying precision, such as the drawing of a pinnacle in the Archivo Capitular of Lérida, dated around 1400 (Cabezas Gelabert 2019c). There are also truly exceptional visualizations such as the well-known

presentation drawing of the first proposal for the chancel of San Juan de los Reyes in Toledo, attributed to Juan Guas and Egas Cueman (who shared the role of Master of Works at the Franciscan convent) and dated between 1478 and 1490. In this perspective section, the relative position of transept and apse was distorted to capture all the main elevations as concatenated planes without overlaps (Ibáñez Fernández and Alonso Ruiz 2019a; 2021, pp. 117–39).

However, the overwhelming majority of surviving designs consists of horizontal sections, parallel to the earth and close to the ground. Such views are documented from the beginning of the period surveyed in the research project, as evidenced by the graffiti found in Alcañiz (Teruel) (Ibáñez Fernández and Martín Marco 2019a) and Cuenca (Jiménez Martín 2019a). This suggests that under normal circumstances plans were the go-to— and very likely, the only—form of visualization for the conception, documentation, and surveying of projects, and that other types of graphic representation were not usually necessary (Jiménez Martín 2011, p. 399). This may explain why many of these drawings attempt to visualize, at the same time as the ground plan, the elevation of the structure as a whole or of some specific elements by incorporating auxiliary views (*abatimientos*) or "transparencies".

We define *abatimientos* as the representation on a plan of the elevations of elements such as doors or windows. Such mixed views have a long history, and became firmly established in some regions, notably Aragon, where they survived until very late in the 17th century as a sort of "representational atavism". An example is the project drawn up in 1665 by Juan de Lasala Marzal for the vaulting of the nave of the parish church of Castiello de Jaca (Huesca) (Figure 5).[11] The drawing features a plan of the three star vaults (each with five keystones) to be erected over the nave, but also an auxiliary view of the oculi designed to illuminate the interior of the building.
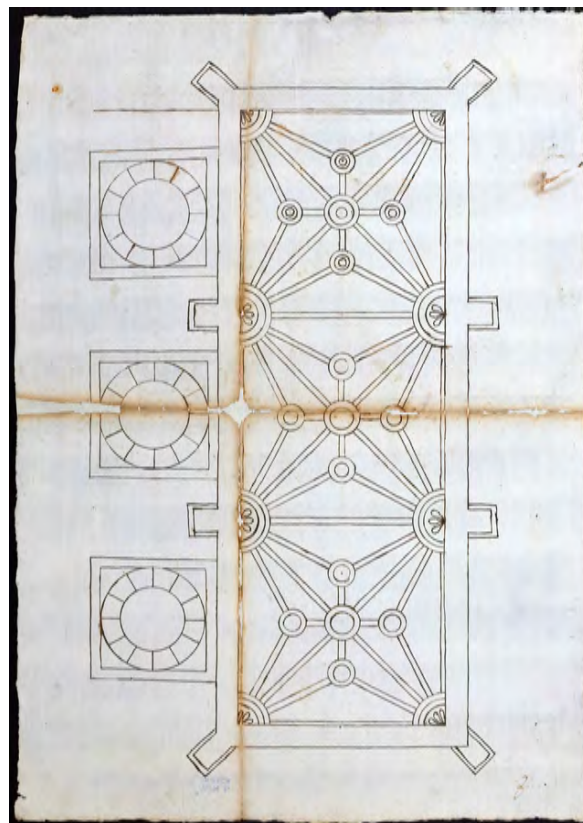

Figure 5. Project for the vaulting of the parish church of Castiello de Jaca (Huesca) [Archivo Histórico Provincial de Huesca (A.H.P.HU.), ES/AHPHU-MPGD/1/1]. © Archivo Histórico Provincial de Huesca.

A literally unique variation of this type is the first proposal for the chapel of the Dukes of Infantado in the Church of San Martín de Mendoza (Álava), dated around 1550–1575: a plan with two "folding tabs" or "flaps" pasted onto it to insert the elevations of the chapel's portals exactly where they would be located (Figure 6a,b) (Ibáñez Fernández and Domínguez Montero 2019c).

"Transparencies" can be defined as the representation, on the horizontal section of a wall, of additional sections located above or below the given level. Various views were thus superimposed, offering a fairly accurate idea of the location of spaces and the distribution of loads in a building. The resulting drawings could nevertheless be difficult to read and interpret, for example when two different openings were located one above the other (Jiménez Martín 2011, p. 399). Moreover, the growing practice of filling the thickness of walls with hatching or wash hindered the use of "transparencies", leading to their disappearance around the mid-16th century, to judge from the corpus inventoried by the project.

The convenience of describing different heights with multiple horizontal sections became evident by this time. Multiple sections can visualize the disposition of levels located one above the other, as in the drawing of the Hospital de Nuestra Señora del Rosario in Briviesca (Burgos), attributed to Pedro de Rasines and dated between 1560 and 1561. Each of the hospital's two floors was drawn on a different sheet of paper, and the two sheets were joined together (Alonso Ruiz 2019e). In other cases, multiple views represent a building's footprint separately from elements and even building components to be erected over a certain height, as in the projects for the parish churches of Siétamo (Figure 7a,b)[12] and Ibieca (Huesca) (Ibáñez Fernández 2019f), one dated to 1572 and the other to roughly twenty years later, around 1593. Each project is represented by two drawings, one of the church plan and the other of the rib vault designed to cover it. The Siétamo drawings are on the recto and verso of a single sheet of semi-transparent parchment. Front and back are perfectly aligned, enabling the plan and the vaults to be seen and "read" at the same time. In contrast, the horizontal sections of Ibieca were drawn on two sheets of laid paper. These are completely opaque, although they can be superimposed.

Attempts to combine different types of representation are documented from an early date. A case in point is the juxtaposition of plan and elevation in the project for the western portal of Barcelona Cathedral made by master Carlín in 1408 (Cabezas Gelabert 2019d). As far as we can tell from the lithographic copy made by José Eusebio Monfort at the end of the 19th century, Carlín correlated a frontal perspective of the splayed portal with a horizontal section featuring the plan of some of the portal's microarchitectural elements.

Another experiment of this kind is the project for the infirmary cloister of the monastery of Guadalupe, which, as discussed above, is attributed to Vasco de la Zarza and dated between 1518 and 1519. There seems to be a perfect correspondence between the perspective elevation of the cloister bay represented in this drawing and the vault projection shown below it. Thus, the design constitutes a precocious example of double orthographic projection, predating by several years the diffusion of Sebastiano Serlio's enormously successful treatises. These works—and especially *Regole* and *Terzo libro*, first published in 1537 and 1540, respectively, and then republished as a single volume in Spanish in 1552, 1563, and 1573—would eventually guarantee the success of the "plan-and-elevation" system. The format is used with complete confidence in other designs, such as that of the tower or fortress of the Dukes of Infantado in Mendoza, whose date is difficult to pinpoint exactly but must be in the second half of the 16th century, if not later (Ibáñez Fernández and Domínguez Montero 2019d). By this point, the impact of Palladio's *Quattro libri*, published in Venice in 1570, led to the inversion of the usual formula in favor of an "elevation-and-plan" sequence, as seen in the project for the construction of the chapel of Diego Monreal, bishop of Huesca, in the parish church of San Pablo in Zaragoza, designed by Juan de Villabona in 1601 (Figure 8).[13]
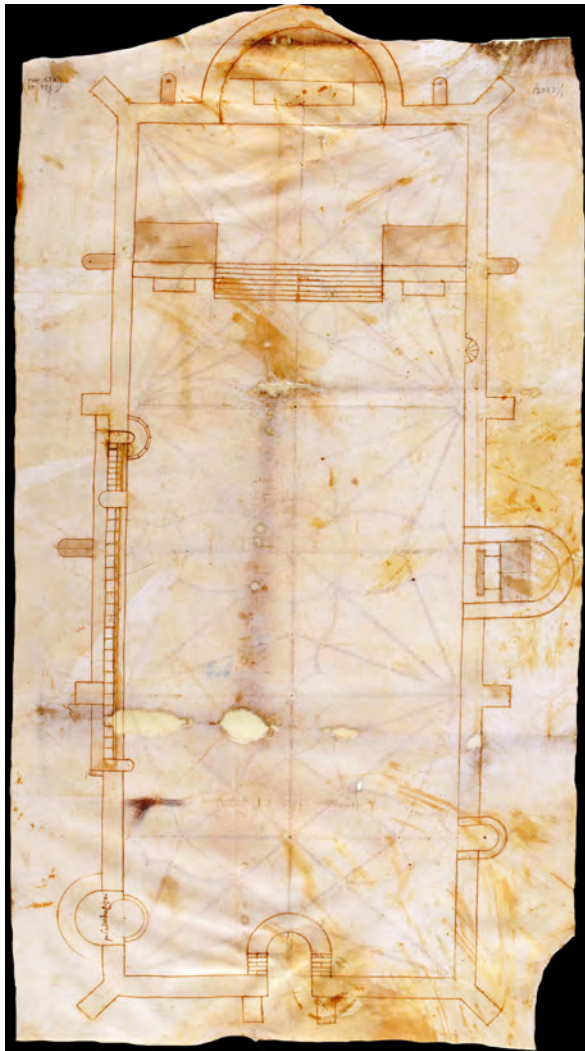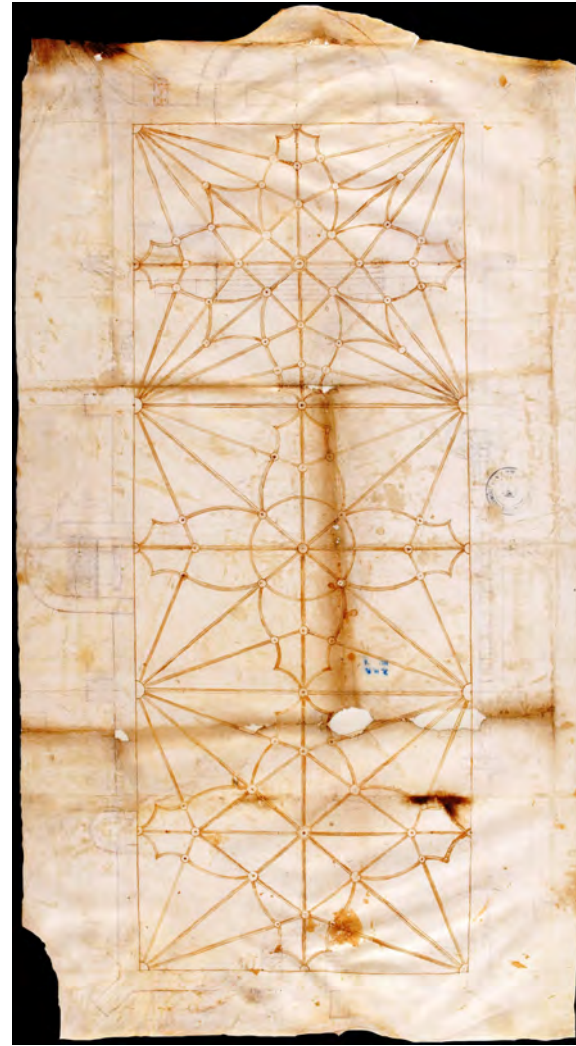
Figure 6. (**a**,**b**) Project for the chapel of the Dukes of Infantado in the church of San Martín de Mendoza (Álava), with the "folding tabs" opened and closed [Archivo Histórico de la Nobleza (A.H.NO.), OSUNA, CP. 11, D. 22]. © Archivo Histórico de la Nobleza.

(**a**)

(**b**)

Figure 7. (**a**,**b**) Project of the parish church of Siétamo (Huesca) [A.H.P.HU., ES/AHPHU-012032/1]. © Archivo Histórico Provincial de Huesca.

Figure 8. Project for the chapel of Diego Monreal, bishop of Huesca, in the parish church of San Pablo in Zaragoza (A.H.P.N.Z., Fondo de muestras y trazas). © Archivo Histórico de Protocolos Notariales de Zaragoza.

On other occasions, a plan and its corresponding elevations could be represented on the recto and verso of the same sheet or even on different sheets, as in the project for bishop Juan Moriz de Salazar's chapel in Barbastro cathedral, attributed to Pedro de Ruesta and dated 1608 (Figure 9a–c).[14]
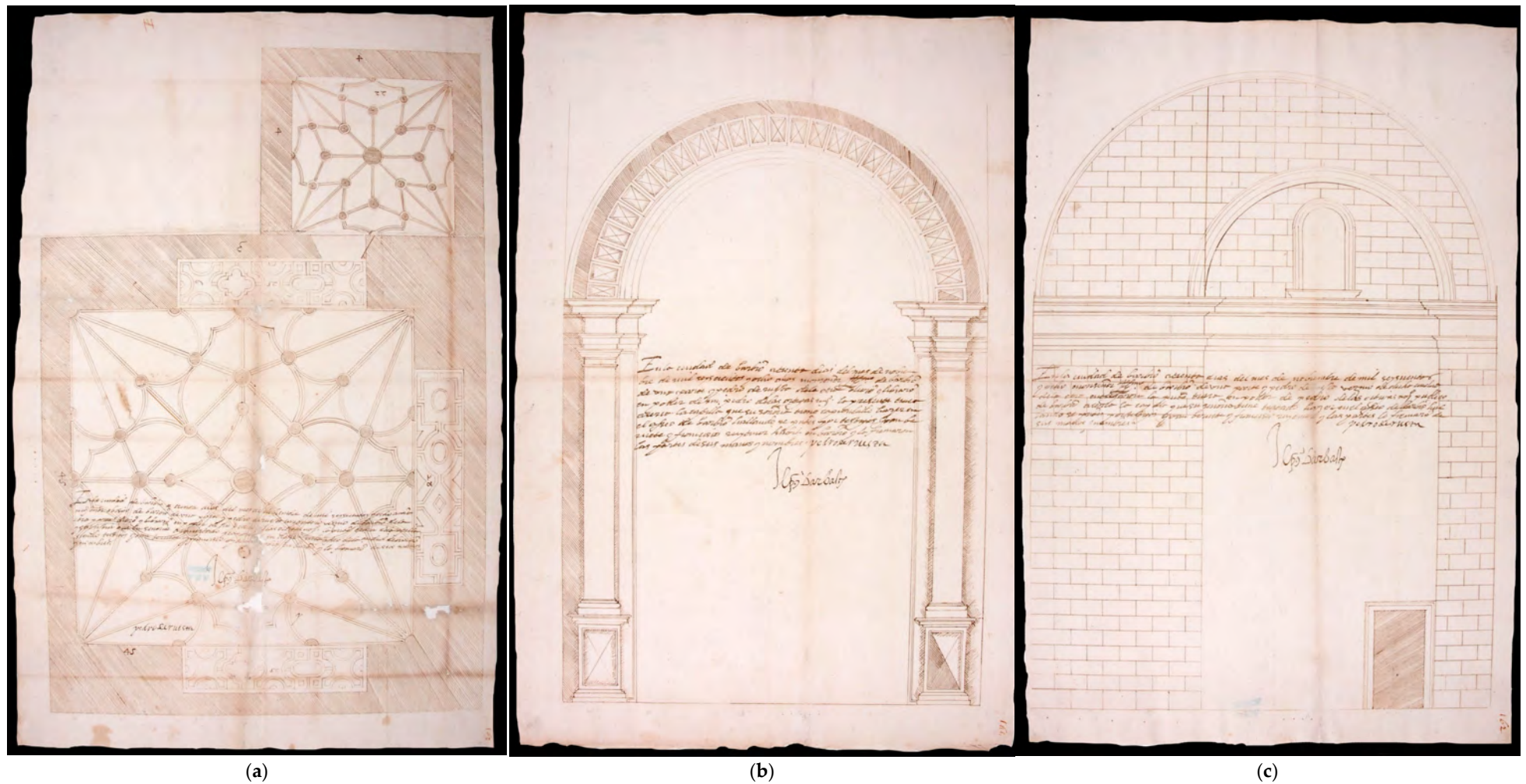
(a)

(b)

(c)

Figure 9. (a–c) Project for the chapel of Juan Moriz de Salazar, bishop of Barbastro (Huesca), in Barbastro cathedral [A.H.P.HU., ES/AHPHU-011837/5, 6, y 7]. © Archivo Histórico Provincial de Huesca.

Lastly, floor plans could also be combined with other types of graphic representation, such as sections, with the two views perfectly juxtaposed, usually vertically. This can be seen in the project for the Cuarto de San Julián at the monastery of San Benito el Real in Valladolid, drawn by Rodrigo Gil de Hontañón between 1566 and 1569 (Figure 10) (Alonso Ruiz 2019g).
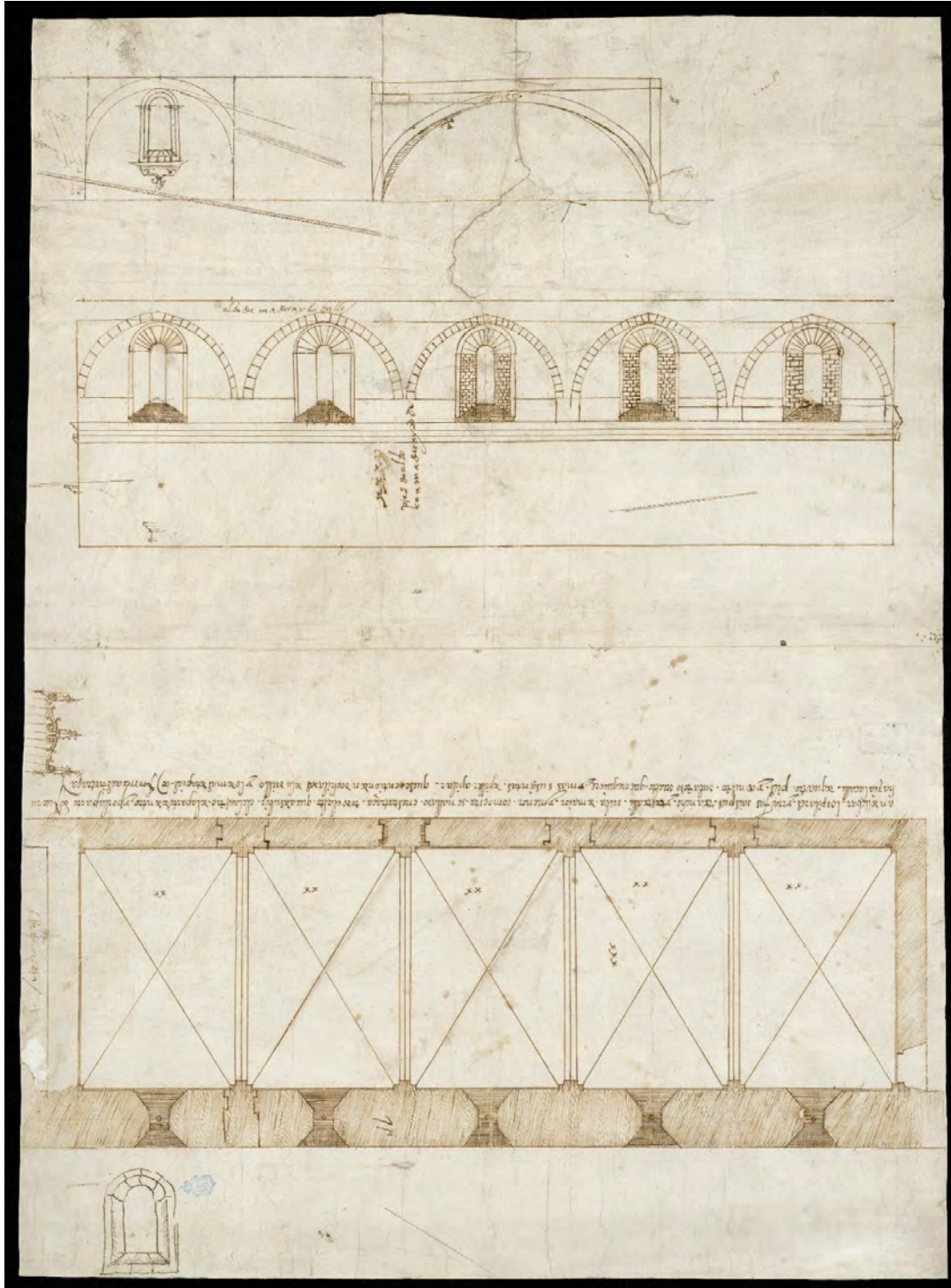

Figure 10. Project for the Cuarto de San Julián at the monastery of San Benito el Real in Valladolid (A.H.N., Clero, MPD, 129). © Archivo Histórico Nacional.

7. Color and Poche

The earliest use of color is found in a series of projects for the construction of altarpieces, such as that of Nuestra Señora de Pompién (Huesca) (Figure 11) (Ibáñez Fernández 2019a), made in Aragon between the 1560s and the early years of the 16th century. Here, yellow denotes those areas of the frame to which gold leaf would be applied, most likely with the aim of offering to the patron an image as close as possible to that of the finished work.
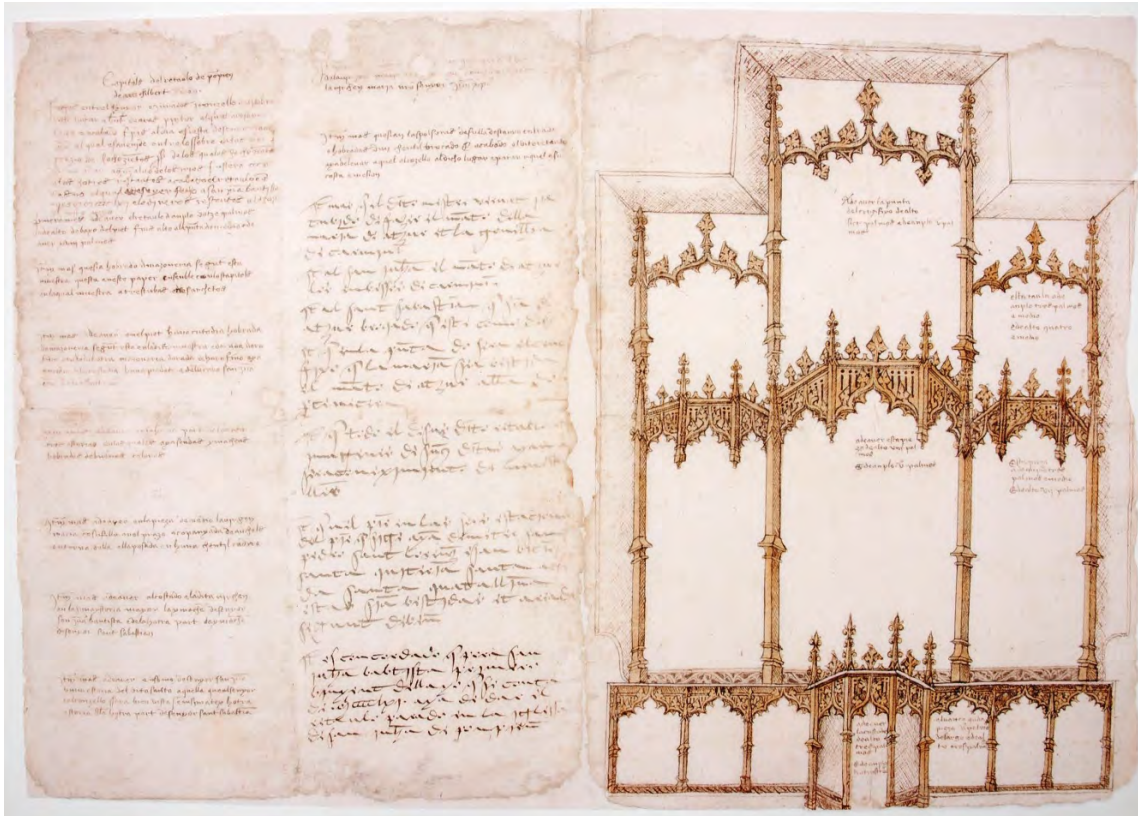

Figure 11. Project for an altarpiece dedicated to Our Lady in the parish church of Pompién (Huesca) [A.H.P.HU., ES/AHPHU-011837/9]. © Archivo Histórico Provincial de Huesca.

Color was soon introduced in architectural drawing, at first for visual effect, as in the vault design for three bays of the church of Santiago de Calatayud (Zaragoza), dated to 1525 (Ibáñez Fernández 2019c), and then, in an almost seamless evolution, to facilitate reading and interpretation. For example, poché could be rendered with hatching, with textures aimed at simulating material qualities, or with opaque color washes. It was used to distinguish solid walls from openings, but could also become part of a complex visual code developed to facilitate the understanding of a given project. An example is the horizontal section of the east end of the church of the Hieronymite monastery of Santa María de la Estrella (La Rioja), made in 1554, in which a new proposal is superimposed to an existing project, "correcting" it. The new design is distinguished from the old by its poché filling: a pink gouache for the latter, and a dense crosshatching in dark ink for the former (Figure 12) (Ibáñez Fernández and Alonso Ruiz 2019c). Similarly, some designs for interventions on pre-existing buildings employ different colors or patterns to distinguish what had already been built from what would be constructed ex novo.
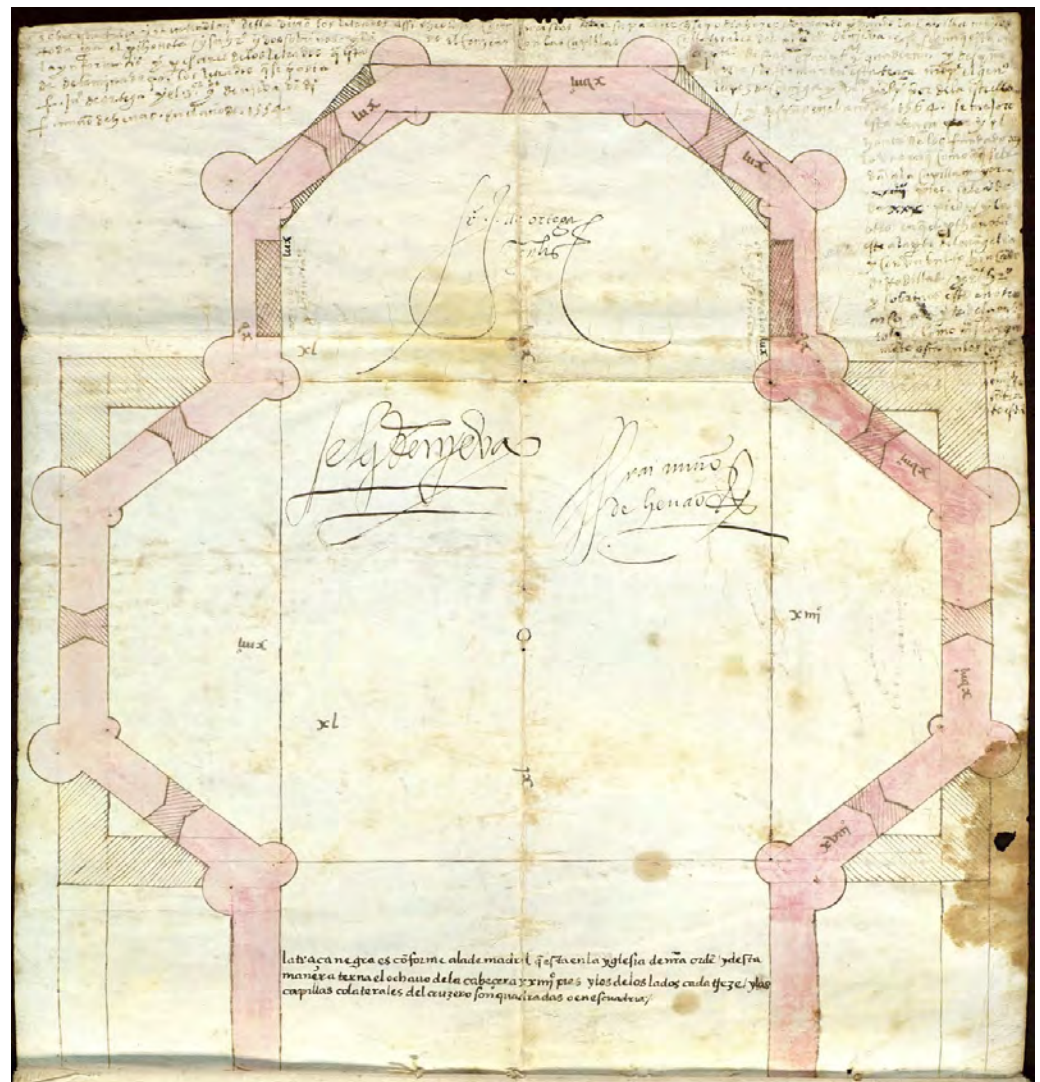
Figure 12. Corrected proposal for the east end of the church of the Hieronymite monastery of Santa María de la Estrella (La Rioja) [A.H.N., Sección Clero Secular-Regular, Carp. 1.062, 18]. © Archivo Histórico Nacional.

8. Shadows

Shading appears at an early date, initially in the guise of very fine lines or cross-hatching in projects for two-dimensional structures, notably in the drawings for the tomb of Alonso de Velasco and the sculptural decoration of the Chapel of Santa Ana in the monastery of Guadalupe, signed by Egas Cueman and dated around 1467 (Jiménez Martín 2019d). The rendering of both drawings is closely related to the work of Roger van der Weyden (Campbell and Pérez Preciado 2015, p. 164). They are plastic and almost sculptural, largely thanks to the carefully executed recreation of core and cast shadows.

Shadows were soon used in architectural projects too. This can be seen in the initial proposal for the chevet of the church of San Juan de los Reyes in Toledo, mentioned above and attributed to Juan Guas and, perhaps not by chance, to Egas Cueman (Ibáñez Fernández and Alonso Ruiz 2021, p. 122). In this drawing, light and volume are compellingly rendered through the use of wash. Experimentation with this technique continued throughout the 15th century with increasingly accomplished results.

This is demonstrated by the exquisite drawing presented by Juan de Aguirre for the parish church of Nuestra Señora de la Asunción in Zumárraga (Guipúzcoa), dated 1577 (Figure 13) (Ibáñez Fernández and Tarifa Castilla 2019). In the section, the shadows, minutely applied using washes of the same ink as employed in the rest of the drawing, play

an important role in conveying the exceptional and complex architectural typology devised for the church. Its unusual plan features two perfectly differentiated units. First, a single nave with intercommunicating side chapels, located between the buttresses and equipped with tribunes, to be vaulted at the same level as the nave to create a sensation of unitary space closely comparable to that of a hall church; second, a triconch chevet, composed of a transept with trapezoidal arms and a polygonal apse, an arrangement reminiscent of the experiments with centralized trefoiled transepts developed in late-medieval Castile. In this project, shadows are also used to emphasize the profiles of the ribs and even to describe the structure of the vault webs. This design strategy seems aimed at conveying to the potential client that the entire building would not only be vaulted in stone, but specifically as a "grid-cross vault", that is, with a binary or double system of ribs and webs, which extends to the coffered designs proposed for the chancel.
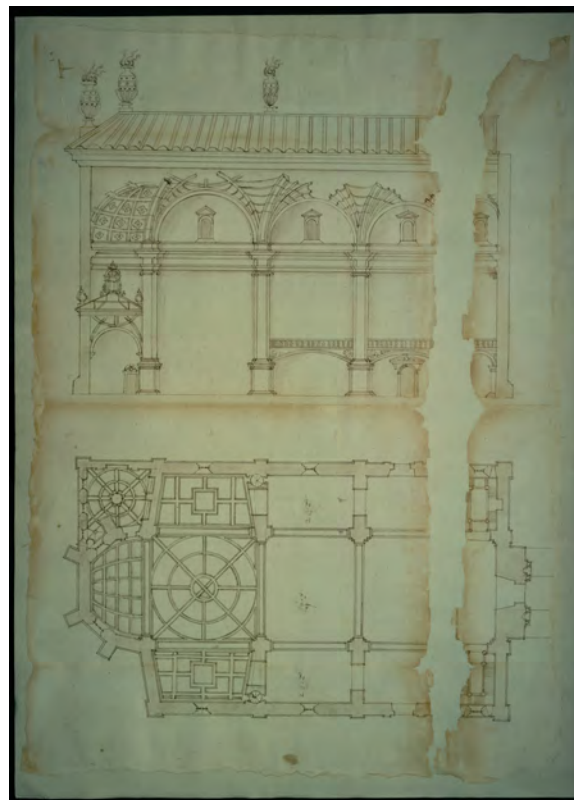

Figure 13. Project for the parish church of Nuestra Señora de la Asunción in Zumárraga (Guipúzcoa) [Archivo Diocesano de Pamplona (A.D.P.), Procesos, Secr. Ibarrola, c/70 – n° 27]. © Archivo Diocesano de Pamplona.

Lastly, a mention should be made of graphic notations that are not, strictly speaking, shadows, such as the "fans" or "crow's feet" that appear, for example, in some floor plans related to the Gil de Hontañón family. Adding detail at the level of the impost, these marks are intended to describe the profile of the tas-de-charge and vault (Jiménez Martín 2011, p. 402).[15]

9. Dimensions and Graphic Scales

From an early date, designs are frequently accompanied by annotations with the dimensions of their elements. This can be seen in the plan for the bell tower of San Félix de Gerona, drawn up by Pere Sacoma in 1368 (Cabezas Gelabert 2019a), on which a record was made of the length of the church wall adjoining the structure to be erected.

The systematic inclusion of dimensions is seen for the first time in the scaled-down copy, made by Juan de Hoces around 1480 (Jiménez Martín 2019e), of the general design

for the Cathedral of Seville attributed to Master Isambart. Here the numerals are in Roman characters. The project made some years later, in 1502, by Bartolomé de Pelayos for the second construction phase of the Cathedral of Coria (Jiménez Martín 2019g) features both Roman and Arabic numerals. Early examples of the exclusive use of Arabic numerals are the designs gathered in the *Livro das fortalezas* by Duarte de Armas, dated between 1509 and 1510 (Nunes da Silva 2019), and the drawings for the Royal Chapel of the Cathedral of Seville, made in 1537 (Jiménez Martín 2019h). This form of numbering gradually became the norm during the 16th century (Jiménez Martín 2011, p. 401).

Closely related to numerical annotations is the linear scale or *pitipié* (Jiménez Martín 2011, pp. 402–4; 2016, pp. 62–65). This graphic tool establishes a relationship between the small-scale unit used in a drawing and the larger one which governs actual building. A scale is already included in the project for the reconstruction of the parish church of Aranzueque (Guadalajara), dated between 1495 and 1530 (Ibáñez Fernández and Domínguez Montero 2019a), and, of course, in the drawings made by Juan de Torollo for the infirmary of the monastery of Guadalupe, dated around 1520 (Villaseñor Sebastián 2019a, 2019b). In the former, the linear scale takes the form of four small crosses drawn near the south corner of the west side of the building; in the latter, the *pitipiés* are represented by points or roundels, as in the "trunk of leagues" (*tronco de leguas*) used in contemporary nautical cartography (Jiménez Martín 2011, p. 403; 2016, p. 63). They are located in the margins of drawings and bear no apparent relation to them, as was frequent in portolans and navigation charts.

Pitipiés can be drawn so unobtrusively that they are difficult to recognize and identify. This is the case, for example, with the one used in Juan de Álava's project for the church of the convent of San Esteban in Salamanca, dated before 1524 (Castro Santamaría 2019a). In other cases, they have a captivating or even unexpectedly ornamented appearance. In this regard, one should mention the *pitipiés* "disguised" as *rejas* (decorative metal screens) used by Rodrigo Gil de Hontañón in some of his projects,[16] or the one crowned by a compass used by Martín de Manaria/Mañaria/Mañaría in the vaulting proposal for the central nave and transept crossing of Jaca Cathedral, whose execution has been dated between 1597 and 1598 (Álvaro Zamora 2019).

10. The Multiple Possibilities of the Inventory; Focused and Transversal Readings

The process of creating the inventory and cataloguing the drawings has brought together exceptional sources that were previously scattered, usually little-known and valued, and, in many cases, unpublished. These materials can now be analyzed from multiple points of view, notably as tools for planning and surveying; as invaluable documents for the study of the enterprises they represent or helped to develop; as sources for the study of master builders; and as data sets for the analysis of the typological models, vaulting solutions, and rib-vault designs used in Gothic architecture—and in architecture of Gothic tradition—built in the Iberian Peninsula throughout the Middle Ages and Early Modern period.

11. The Works and Their Authors

The designs gathered in the catalogue allow us to gain a deeper knowledge of the architectural projects they helped to plan or record. Their value, which is unquestionable even when the buildings represented in them have survived to the present day, albeit in a transformed state, is even greater when the structures have disappeared. In this regard, it is worth mentioning the sketch of the ground plan of the old collegiate church of Santa María del Pilar in Zaragoza (Ibáñez Fernández 2019d), which, despite its schematic nature, is an essential tool—especially given the scarcity of other visual and even archaeological sources—to understand the building, its cloister, and the original disposition of the Pilar chapel—which would eventually disappear as the church was renovated—from the last quarter of the 17th century onwards, according to a plan very similar to that of the New Cathedral of Salamanca.

As it happens, a complete survey of the Castilian cathedral was received in Zaragoza when it was time to tackle the vaulting system of Santa María del Pilar. The survey consists of a ground plan, a double orthogonal projection of the transept, and a section of the *cimborrio* above the crossing (Figure 14a,b).[17] The drawings, made by Andrés García de Quiñones between 1733 and 1746, were clearly documentary in nature. Yet, they must also have had a certain "exemplary"—or, in other words, "propositional"—value, since they were likely sent to the Aragonese capital to publicize the designs used in Salamanca and encourage their adoption. In the end, this did not happen, as the elevation of the church in Zaragoza was completed with two *quincunxes* joined by means of a transept eventually covered by a cupula. Nevertheless, the drawings from Salamanca are still preserved in the Archivo Capitular (Chapter Archive) of El Pilar. Their value is incalculable, since they represent, alongside other lost structures, the last great Gothic *cimborrio* erected in the Iberian Peninsula: a lantern designed on the model of Burgos cathedral by Fray Pedro Martínez de Cardeña and built by Joaquín de Churriguera between 1714 and 1721. Damaged by the Lisbon earthquake of 1755, the *cimborrio* was dismantled two years later and replaced by the cupola that can still be seen today.
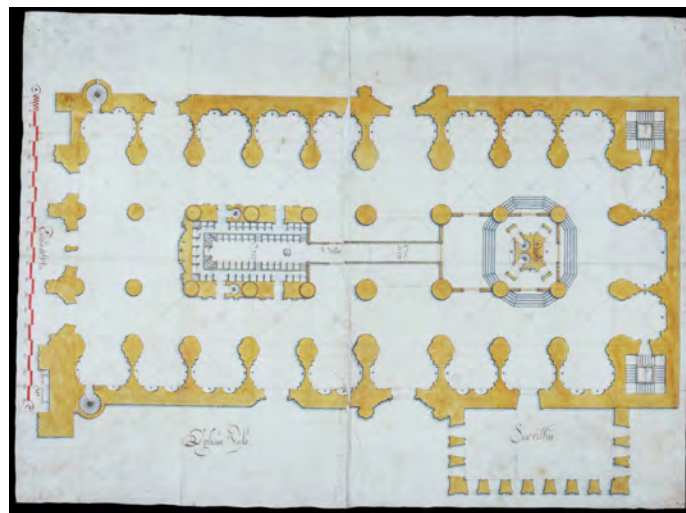
(**a**)
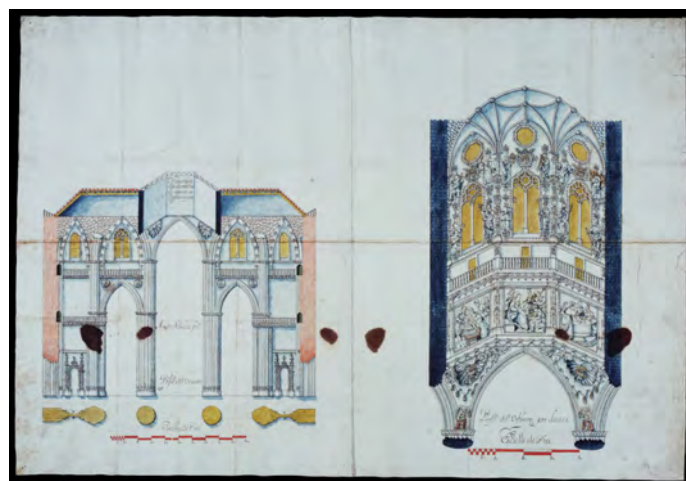
(**b**)

Figure 14. (**a**,**b**) Ground plan, double orthogonal projection of the transept, and section of the *cimborrio* of the new cathedral of Salamanca [Archivo Capitular del Pilar de Zaragoza (A.C.P.Z.), 6.4.1.30_1, y 6.4.1.30_2]. © Archivo Capitular del Pilar de Zaragoza.

As to the authors of the designs, the inventory includes a range of professionals beyond the great names of Iberian architecture in the medieval and Early Modern periods. These craftsmen are, if not quite anonymous, at least very-little-studied to date. Their professional profiles are varied. There are many stonemasons whose practical and technical skills were likely developed in the building lodge. However, there are also many masters skilled in the handling of brick and plaster, men whose works were conceived for materials other than stone but remained formally or stylistically Gothic.

12. Typological Models

The oldest examples gathered in the catalogue have a strong speculative character, used as a starting point for discussion rather than as a real proposal to be directly executed. This applies to the graffiti found in Alcañiz and Cuenca, but also to the project devised by Antoni Guarch for the transept and chancel of Tortosa Cathedral (Tarragona) dated between 1379 and 1382 (Cabezas Gelabert 2019b), which was never executed despite combining two planimetric models that had already been tested successfully elsewhere—one at Valencia Cathedral, and the other at Barcelona and Gerona.

A new and striking model appeared shortly afterwards: the innovative design proposed by master Isambart for the Cathedral of Seville in 1433, which features an inscribed Latin cross and a straight headwall. This model would be employed again in typologically comparable buildings on both sides of the Atlantic—in Salamanca (Castro Santamaría 2019b), Jaén, Valladolid, and Mexico (Jiménez Martín 2019k)—throughout the 16th century, with echoes resonating in even later projects, such as the above-mentioned reconstruction of El Pilar in Zaragoza in the 1680s.

In addition, the catalogue features examples of other formulas, such as the one—rooted in the Middle Ages—with three naves, transept, and chancel with ambulatory; the hall church; and the "false hall". The former was used by Juan Gil de Hontañón and close collaborators for the design of the Cathedral of Segovia in 1524 (Alonso Ruiz 2019a), while the hall plan was used, among others, in the construction of Barbastro Cathedral, as seen in the project for the enlargement of the church's west end drawn up between 1618 and 1622 (Figure 15).[18] The "false hall", which characteristically includes a transept, emerged from the configuration developed at Zaragoza Cathedral due to an eventful construction history. The design was codified as an architectural subtype in the project for the collegiate church of Daroca (Zaragoza), dated to 1586 (Ibáñez Fernández and Martín Marco 2019b), and achieved an extraordinary fortune throughout the 17th and 18th centuries thanks to its adaptability to Classical and the Baroque formal principles (Ibáñez Fernández and Andrés Casabón 2016).
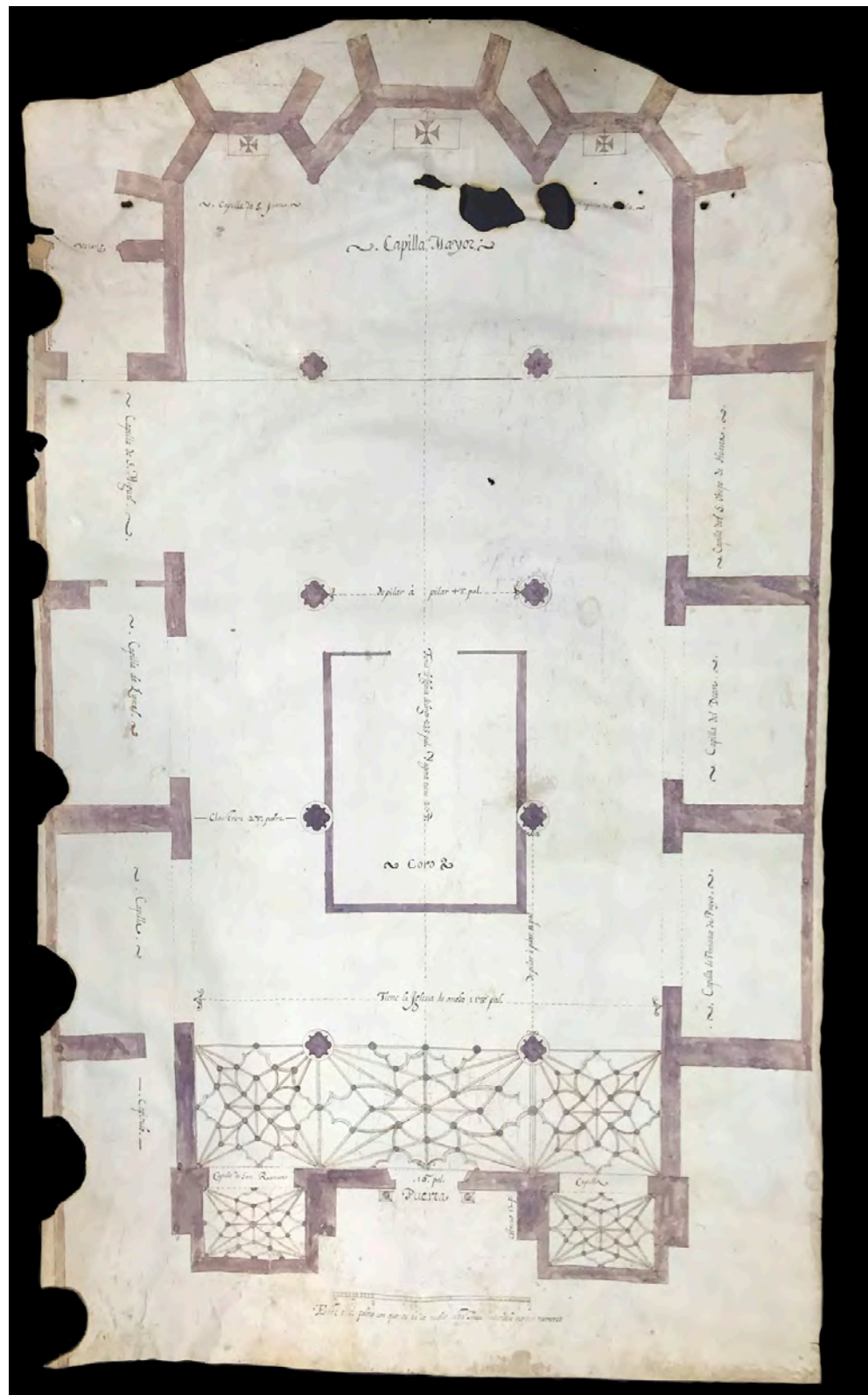
Figure 15. Project for the enlargement of the west end of Barbastro cathedral (Huesca) [Archivo Diocesano de Barbastro (A.D.B.)]. © Archivo Diocesano de Barbastro.

13. Vaulting Solutions and Cross-Ribbed Designs

Vaults could be designed to be built in stone, with bricks (generally laid flat, as in a 'tile' vault), or even with reed with a wooden armature; that is to say, as timbrel vaults. However, surviving designs rarely clarify the material to be used in construction.

Only a few examples manifest the intention to use stone. This can be visualized in an elementary way through the representation of isodome ashlars, as in the project for the reconstruction of the church of San Lourenzo de Agrón in Ames (La Coruña), dated 1521 (Taín Guzmán 2019). A more complex and refined form of representation is seen in the above-mentioned drawing made by Juan de Aguirre for the church of Zumárraga, where masonry breaks are marked on the rib profiles. This project makes it clear that the architect intended to vault the entire building with stone, applying a system of ribs even for the coffered vaults envisaged for the apse.

In terms of typology, some of the vault drawings suggest tile or timbrel vaults. This is the case with drawings of a summary and even schematic nature in which vaults are delineated by means of single lines, as in the project for the vaulting of the Chapel of Nuestra Señora del Remedio in the monastery of San Lamberto in Zaragoza, dated 1556 (Figure 16) (Ibáñez Fernández 2019e). Paradoxically, the same impression is conveyed by other drawings where greater attention is paid to decorative details, notably those for the vaulting of a chapel in the church of the Hospital de San Lázaro in Valladolid, dated 1558 (Figure 17a,b) (Alonso Ruiz 2019c, 2019d). The economy of means seen in the first type of drawings is completely justified. Since there was no need to build ribs in stone, molded brick, or structural plaster, the master builder needed no information other than the general outline of the design to be reproduced—using a line of bricks as a base underneath the plaster, or entirely in plaster—on the shell or intrados of the vaults. In the second type of drawings, plaster seems required for the final materialization of some elements, especially those of a sculptural nature. Yet, as noted above, caution is necessary, especially when no additional information survives. The way in which vaults are designed does not always indicate unequivocally the techniques and materials to be used in their construction.

As to the design of rib vaults, a type with tiercerons and five keystones appeared as early as the 15th century alongside the basic simple quadripartite vault. For example, it features in the vaulting of the *cimborrio* in the project for the construction of Seville cathedral and in the design for the Chapel of Santa Ana at Guadalupe (Jiménez Martín 2019d). The design remained popular throughout the 16th and even 17th centuries and generated new complex designs enriched with both additional straight ribs and liernes, and with curved ribs or *combados*. These vaults were extraordinarily successful in territories such as Aragon or the Ribera region of Navarre, where a long tradition of brick and plaster construction allowed vaults to be made without excessive technical or structural risks.

The extraordinary longevity of the vault with five keystones, as well as its potential as a starting point for new designs, is perfectly visualized in the project by Claudio Casales for the construction of the parish church of Palo (Huesca), dated to 1630 (Figure 18).[19] Casales's proposal features the repetition of a design with five keystones in the three bays of the nave, while two additional sets of ribs have been added in freehand to the westernmost bay: on the interior (nearer the center of the vault) a series of liernes, and on the exterior an unfinished ring of curved ribs or *combados*.
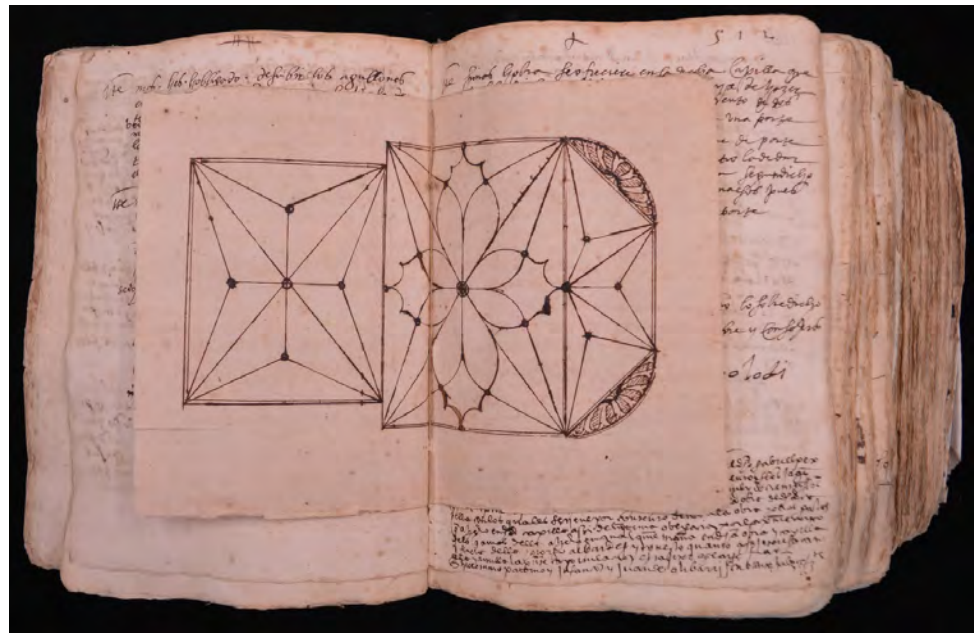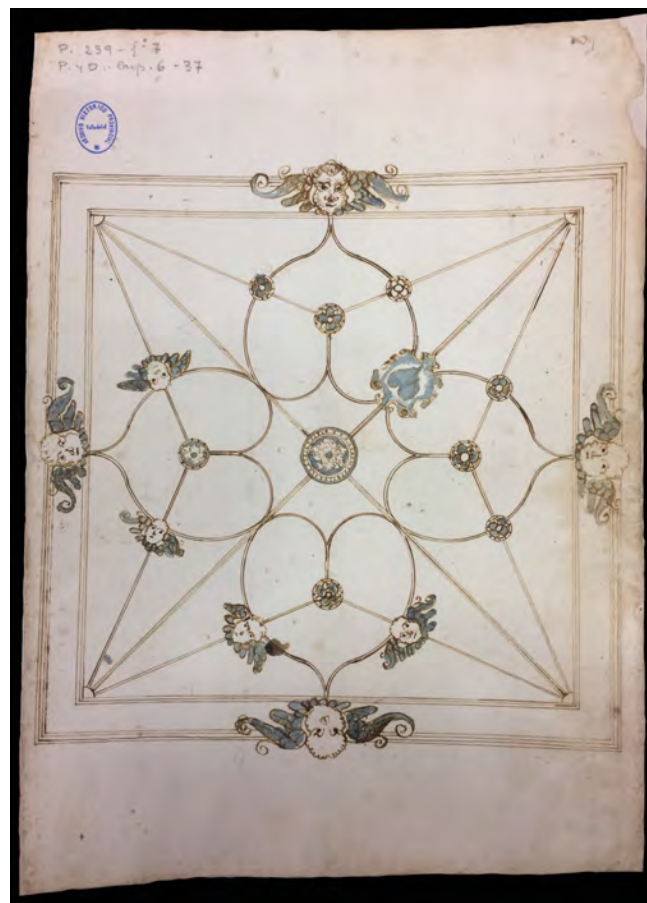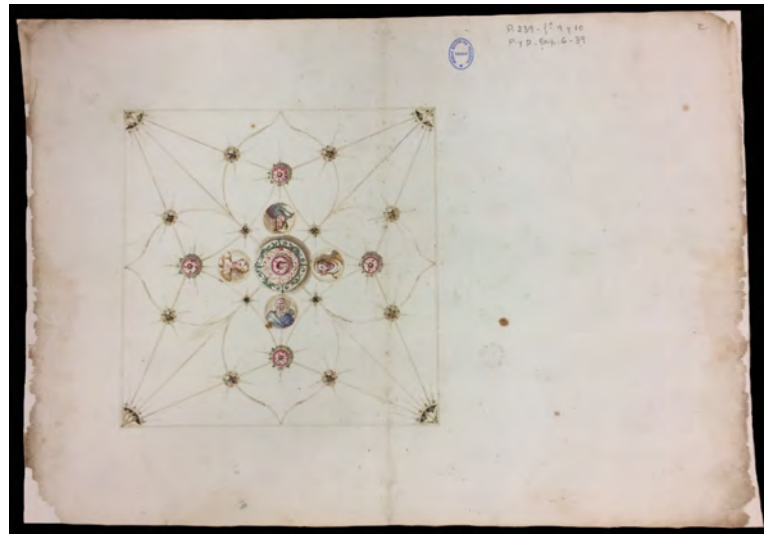
Figure 16. Project for the vaulting of the chapel of Nuestra Señora del Remedio at the monastery of San Lamberto in Zaragoza [A.H.P.N.Z., Lorenzo Villanueva, 1556, ff. 510 v-513 r]. © Archivo Histórico de Protocolos Notariales de Zaragoza.

(a)

Figure 17. *Cont.*

(**b**)

Figure 17. (a,b) Projects for the vaulting of a chapel in the church of the Hospital de San Lázaro in Valladolid [Archivo Histórico Provincial de Valladolid (A.H.P.VA.), Planos y Dibujos, Carp. 6-37, y 6-39]. © Archivo Histórico Provincial de Valladolid.
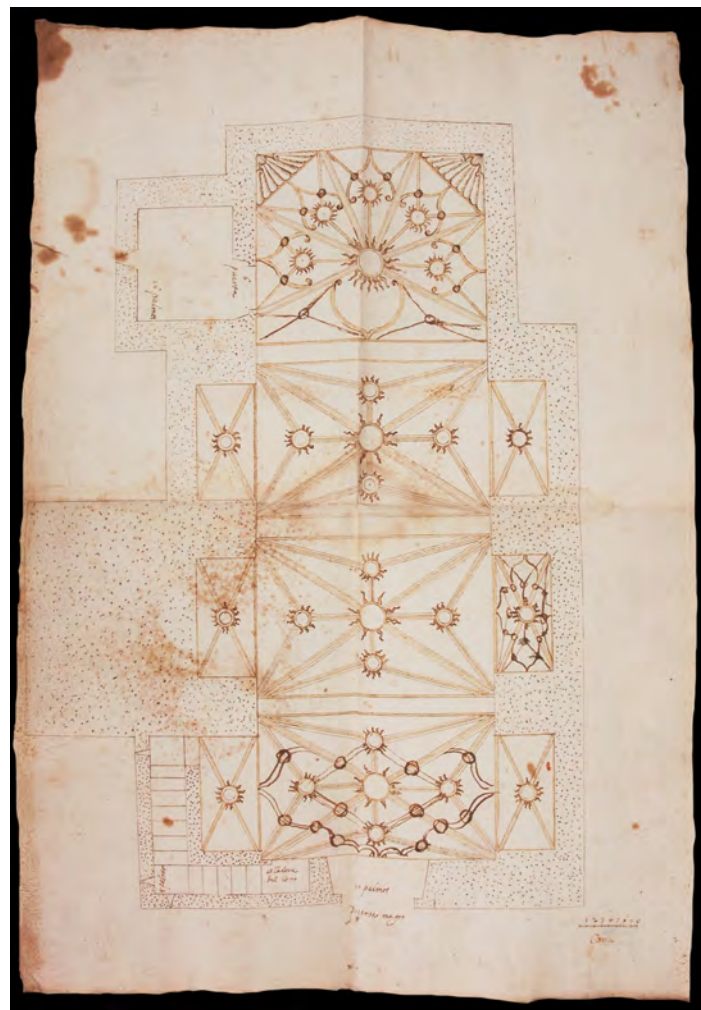

Figure 18. Project for the parish church of Palo (Huesca) [A.H.P.HU., ES/AHPHU-MPGD/1/6]. © Archivo Histórico Provincial de Huesca.

These formulas came to coexist with coffered vault decorations of an antiquarian nature. Indeed—and this should be emphasized—when the latter had to be built in stone, their construction was attempted through techniques derived from rib vaulting; for example, by erecting them as composite, binary, or duple structures, comprising ribs and webs, that is to say, as "grid-cross" vaults, or as unitary solutions of the ribbed vault type based on the carving and assembly of *piezas enterizas* ("one-piece elements") (Ibáñez Fernández 2016, pp. 57–64). While the forms had changed, the techniques remained those of late medieval origin that had once given shape to the best peninsular Gothic architecture. These techniques would ensure the survival of that rich building tradition until the dawn of modernity.

Data Availability Statement: Details about the data can be found in Ibáñez Fernández (2019h).

Conflicts of Interest: The author declares no conflict of interest.

Notes

1. This was accomplished through the R&D Research Project "Architectural designs in the Iberian Peninsula between the 15th and 16th centuries. Inventory and catalogue" (HAR2014-54281-P), financed by the Ministry of Economy and Competitiveness of the Kingdom of Spain.

2. In fact, the only designs left out of the catalogue are those connected to engineering works such as bridges, since they arguably require a distinct analysis.

3. This second phase received additional funding as the D&R Project "Drawings of Gothic architecture and Gothic tradition in the Iberian Peninsula in the 17th and 18th centuries. Inventory and catalogue." (HAR2017-85523-P), again financed by the Ministry of Economy and Competitiveness of the Kingdom of Spain.

4. The fields that make up each record are: Title; Date; Author; Location; Inventory Number; Description, Scope and Content; Support; State of conservation; Technique; Dimensions; Inscriptions; Scale; Remarks; Analysis; Related Units of Description; and Bibliography.

5. In this sense, it is highly significant that Diego de Sagredo, in his *Medidas del romano*, published in Toledo in 1526, distinguished with absolute precision between "diseñar/dibujar" and "trazar", and that in the first Castilian translation of Vitruvius, published as late as 1582, the term "graphidos" used in the Latin original and translated into Italian as "disegno", was rendered through two different words, "dibujo" and "traza" (Cabezas Gelabert 1992, pp. 225–26; Ibáñez Fernández 2014, p. 317).

6. The differentiation is perceptible in the *Tesoro de la lengua castellana o española,* published by Sebastián de Covarrubias y Orozco in 1611, in which the term "diseño" does not appear; the verb "dibujar" is listed a neologism with Italian roots; the word "dibujo" is defined as the "delineacion de pintura escura sin colores"; the word "muestra" is described as "el diseño que haze el bordador, u otro official, para dar a entender lo que ha de ser la obra"; and the verb "trazar", which is explained as the delineation of a work, "la qual se demuestra por planta y montea" (Cobarruuias Orozco 1611, ff. 317 r-v, 558 r, and 50 v; Ibáñez Fernández 2014, pp. 317–18).

7. The *monteas* traced on the roofs of the Cathedral of Seville are studied in the first volume of the catalogue (Jiménez Martín 2019b, 2019c, 2019f, 2019i) while the second volume will feature those on the vault of the sacristy of Tuy Cathedral (Pontevedra) and that on the choir loft of the monastic church of Santa María de Montederramo (Orense).

8. A splendid overview of these notebooks, which perfectly contextualizes them within the larger field of the early modern literature on stonemasonry, is (Calvo López 2009b). On the drawings within the notebooks see (Rabasa Díaz 2015; Calvo López and Rabasa Díaz 2016).

9. This work includes a drawing of a *montea* for a lierne vault with five keystones, (Jiménez Martín 2019j).

10. Archivo Histórico Nacional [A.H.N.], Clero, MPD, 109; (Ibáñez Fernández 2019g, pp. 23–27).

11. Archivo Histórico Provincial de Huesca [A.H.P.HU.], MPGD/1/1. On the project and its context, (Ibáñez Fernández 2004).

12. A.H.P.HU., EN/AHPHU-012032/1.

13. Archivo Histórico de Protocolos Notariales de Zaragoza [A.H.P.N.Z.], Fondo de muestras y trazas. This drawing is analyzed in (Ibáñez Fernández 2005, pp. 58–59). Juan de Villabona's biography is studied in (Ibáñez Fernández 2011).

14. A.H.P.HU. ES/AHPHU-011837/5, 6, and 7.

15. This can be seen, for example, in the crossing of the second plan proposal for Segovia Cathedral, dated 1524 (Alonso Ruiz 2019b).

[16] This is the case, for example, of the project for the construction of the porch of the church of the monastery of San Benito el Real in Valladolid, dated between 1566 and 1569 (Alonso Ruiz 2019f).

[17] Archivo Capitular del Pilar de Zaragoza [A.C.P.Z.], 6.4.1.30_1, and 6.4.1.30_2; (Ibáñez Fernández 2010, pp. 245–46; Rupérez Almajano and Fernández 2010; Ibáñez Fernández and Alonso Ruiz 2021, pp. 245–48).

[18] Archivo Diocesano de Barbastro [A.D.B.], no inventory number.

[19] A.H.P.HU., ES/AHPHU-MPGD/1/6.

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