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The palace of Charles V in the Alhambra: graphic analysis of the 'large plan' (circa 1532)

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Abstract

Around 1526, Emperor Charles V decided to build a new Renaissance palace in addition to the Nasrid palaces in the Alhambra of Granada, a monumental site currently included in the United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage List. In that period, a large floor plan, which is preserved today at the Library of the Royal Palace of Madrid, was drawn to represent the building and its surroundings. Although this anonymous drawing has attracted considerable historiographic interest, a study of the graphical aspects analysed here, namely, paper assemblage, drawing technique, representation system, metrology, graphical scale, dimensioning, and labelling, is lacking. To accomplish this analysis, the original document was carefully examined and digitalised with high definition. This process allowed a comprehensive graphic analysis, utilising other drawings from the same period as a comparative reference and studying for the first time the major characteristics of one of the most relevant architectural drawings of the 16th century.

Keywords Drawing, Architecture, Renaissance, The 16th century, World Heritage

1 Introduction

The library of the Royal Palace in Madrid has preserved a singular, undated plan by an anonymous author¹ (Fig. 1) that originated in the 16th century and that represents the Alhambra in Granada. The document is known as the 'large plan' due to its large size, 1307 × 669 mm. The plan depicts the implementation in the medieval citadel of the new Renaissance palace that Emperor Charles V funded after his stay in the Alhambra in 1526 during his honeymoon with Isabella of Portugal. The drawing was probably completed before 1532, since the execution of the palace works began on that date (Marías 2018, 137), and the definitive location of the new palace was not depicted, as it was ultimately built slightly eastwards (Fig. 2).

The layout shows the palace with a square floor, a circular courtyard and arcaded squares southwards and westwards. Some parts constructed from the medieval period

were also represented and labelled: the fortified enclosure of the Alcazaba, several towers, walls, and relevant Nasrid palaces. In addition to the new palace, westwards, a blank indicated the place occupied by the mosque, used then as a Christian church. Another area not depicted was the eastern part of the citadel or medina, where other Nasrid palaces and edifices were located.

The 'large plan' is the earliest known graphic representation of the Alhambra citadel. Numerous details of the monumental site at that particular time were illustrated, facilitating the comprehension of its subsequent transformations. It was discovered in 1912 and was partially reproduced by Lampérez (1922, 493) in a reduced size, which probably impeded analysis of its details in the major restorations that were accomplished during the 20th century. There were no accurate reproductions until 1963, when the document was traced from a full-sized photograph by Manuel López Reche, draughtsman for the public technical bureau Oficina Técnica del Patronato (plano n° 2170, Archivo Planos Alhambra) (Gámiz

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¹ Madrid (Spain), Royal Library, ref. IX/M/242/2(1).

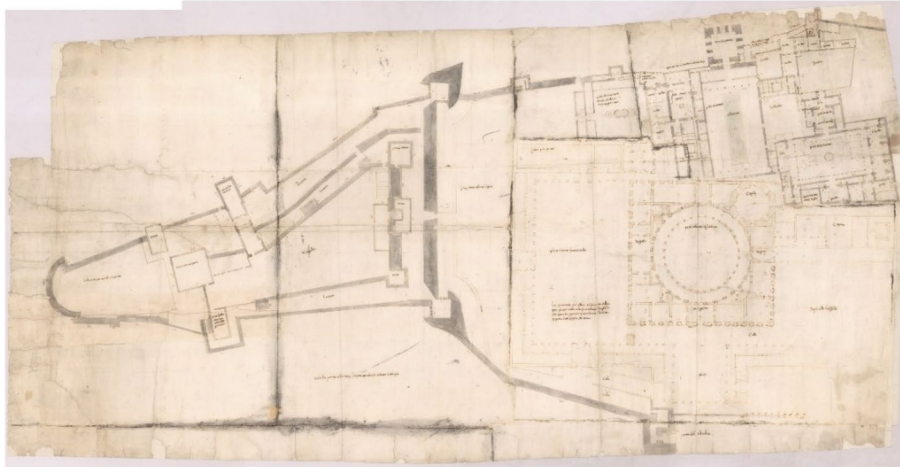


Fig. 1 c. 1532: layout showing the western area of the Alhambra citadel (north upside). (Source: Library of the Royal Palace of Madrid, ref. IX/M/242/2(1))



Fig. 2 c. 1930: Aerial photograph of the western area of the Alhambra citadel, showing that the palace of Charles V was still incomplete (north upside). (Source: unknown photographer, authors private collection)

1998, 333). For this reason, the architect Leopoldo Torres Balbás eliminated a wall drawn in the layout (Rosenthal 1988, 42) (Vilchez 1988).

Notably, since the mid-20th century, there has been an outstanding enhancement of architectural heritage as an essential part of cultural identity itself. To that end, accurate graphic documentation is essential for understanding, communicating, and preserving this heritage, according to the 1966 ICOMOS guidelines.² This is why it is necessary to compile and study all kinds of historical images of our architectural heritage. Although no

² <https://www.icomos.org/en/116-english-categories/resources/publications/382-colloque-sur-le-centre-de-documentation-conference-on-the-icomos-documentation-centre-1966> (accessed 16 March 2024).

image provides a completely objective view of reality, its graphic signs contribute valuable data on the perceptions of its creators, their interests and their skills, just by observing the graphic technique they used. Thus, graphic analysis provides new ‘windows to memory’, which allows us to understand and appreciate the value of heritage and transformation over time by integrating them into interdisciplinary approaches.

For these reasons, this research aims to highlight the heritage value of the ‘large plan’ as a foundational document to understand, preserve, and disseminate the most important palace of the early Spanish Renaissance, unfinished until the 20th century, together with its medieval surroundings. In addition to its architectural

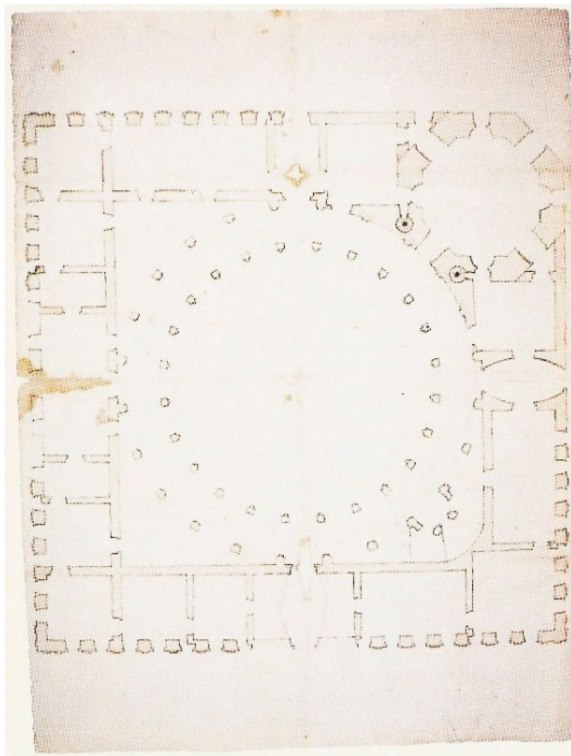


Fig. 3 c. 1528–1532: Floor layout of the Palace of Charles V (north upside). (Source: Archivo Histórico de la Nobleza de Toledo, Osuna, CP, 10, D.20)

interest, the graphic document conveys great heritage value, being one of the most important architectural plans in 16th century Europe, though its comprehension would be incomplete without the graphic aspects discussed here.

2 State of the art

The ‘large plan’ is one of the few known graphic documents illustrating the design process of the new Renaissance palace of Charles V in Granada. Due to its great value and preservation requirements, the piece is currently safeguarded in the safety vault at the Royal Palace of Madrid. There are two other 16th century plans depicting a smaller area, both anonymous and without specific dates. One of them represents only the palace and is preserved in the National Historical Archive³ (Fig. 3). The other plan includes the new edifice together with the arcaded squares that were never built, and it is considered

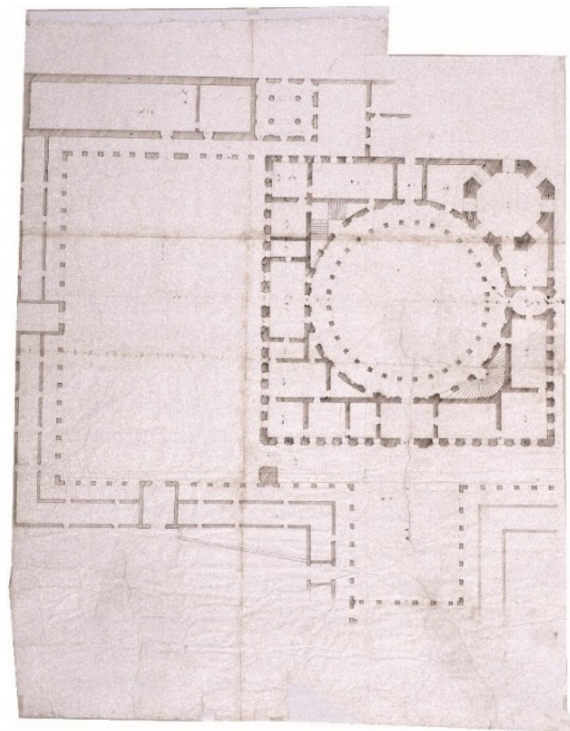


Fig. 4 c. 1532–1536: Floor layout of the Palace of Charles V (north upside). (Source: Library of the Royal Palace of Madrid, IX/M/242/2[2])

the last of the three plans known. It is also preserved at the Library of the Royal Palace of Madrid⁴ (Fig. 4).

In addition, two elevations of the Palace of Charles V in the 16th century are also preserved, both anonymous and without a specific date. One of them is the west façade, which is known as the ‘Burlington’⁵ elevation. The other is an eastern foyer façade that was included in an album of drawings by Fray Eugenio de la Cruz in 1688.⁶

Among the numerous studies on the origins of the palace and its 16th century plans, the fundamental book by Rosenthal (1988) must be mentioned first, following the line of Gómez-Moreno (1885) and his son Gómez-Moreno Martínez ([1941] 1983). Other works by Tafuri (1987), Marías (1989, 369–387; 2018), Galera (1995), and Rodríguez (2000; 2001) contributed hypotheses on the poorly understood process of the genesis and implementation of the new palace in the Alhambra and its unknown designer. Additional sources include a monographic seminar on relevant historical data (Galera

⁴ Madrid (Spain), Royal Library, IX/M/242/2(2).

⁵ New York (USA), Metropolitan Museum of Art, num. 1981.1213.

⁶ San Lorenzo de El Escorial (Spain), Royal Library, Monastery of San Lorenzo de El Escorial, sign. 28-II-7, fol. 1.

³ Toledo (Spain), Archivo Histórico de la Nobleza, Osuna, CP, 10, D.20.

2000), a book by several authors (VV.AA. 2001, 226–234) with a comprehensive bibliographic review and exhibition catalogues such as the one by Galera and Frommel (2018), with important chronological data provided by Marías (2018).

Some graphic aspects of the 16th century palace plans were analysed by Rosenthal (1988, 23–46), Marías (2000, 420–425), Rodríguez (2001, 434), and Ortega (2001, 394). Gámiz-Gordo (1998) studied them together with other historical views of the Alhambra and analysed different architectonic aspects of the ‘large plan’ (Gámiz, 2001; 2008). Ramón-Laca (2004) compared the dimensions between the layouts, and an article by García and Gámiz (2022) examined the incised lines of the plan preserved in the National Historical Archive. In addition, another recent article from these authors (García and Gámiz, 2024) studies the other plan preserved at the Library of the Royal Palace of Madrid (Fig. 4).

There are not enough data to confirm the authorship of the palace or its layout plans. Rosenthal (1988, 31) conjectured that royal architect Luis de Vega participated in the first design, as he mentioned in documents prior to 1530. In the payments for the works accomplished after 1537, there are records of the name of the sculptor and architect Diego de Siloé, as an appraiser for Charles V, and painter Pedro Machuca, who was a master builder, although no other architectural works are documented under his name (Rosenthal 1988). Both had worked in Italy, and for this reason, Marías (1989), García and Gámiz (2022) attributed to Diego de Siloé the design of the floor plan preserved in the National Historical Archive. The ‘large plan’ object of this research has been attributed to Diego de Siloé and/or Machuca by Gámiz (2008), while Rosenthal (1988, 23–46) and Marías (1989, 369–387) ascribe it to Pedro Machuca.

It should be considered that the architectonical forms of the palace represented in the ‘large plan’ entailed an innovation in Spanish architecture during the first half of the sixteenth century, showing a clear association with the Italian Renaissance style of that moment, as explained by Rosenthal (1988, 169–235). The studies by Tafuri (1987; 1992) and Fiori and Tafuri (1993, 386–89) assume the existence of previous designs from the artistic circle of Rafael de Sanzio, possibly by Giulio Romano. This artist has also been suggested as a possible author by, among other scholars, Rodríguez (2001, 429–431). Another plausible inspiration of the layout is Baldassarre de Castiglioni, nuncio of Pope Clement VII, who cultivated a solid friendship with Rafael de Sanzio. Castiglioni accompanied Charles V to Granada, together with the Venetian ambassador Andrea Navagiero and outstanding men of letters such as Boscán and Garcilaso de la Vega (Rosenthal 1988, 10).

In addition, Tafuri (1987) and Galera (1995, 19; 2000, 215) have considered Villa Madama as a precedent model of the Palace of Charles V. The singular Roman palace was commissioned by Giulio de Medici, later Pope Clement VII, and its design by Raphael de Sanzio towards 1518 was known to Castiglione. Gómez-Moreno Martínez (1983) noted certain dimensional similarities between the two circular patios in both edifices. However, Rosenthal (1988, 171, 243–244, 267) considered that the coincidences may be derived from other previous drawings by Francesco di Giorgio and that the formal analogies are not foundational enough to establish a direct influence or a solid hypothesis on authorship.

3 Objectives and methodology

As previously discussed, the most recent and relevant research on the origins of the Palace of Charles V and its layouts has focused on historical and artistic aspects, the unknown authorship or possible formal references to its architecture. To date, there has been no comprehensive analysis of the graphic aspects of the ‘large plan’, which are essential to understanding. Thus, the main objective of this research is to analyse the graphic characteristics of the ‘large plan’, considering other contemporary drawings as a reference. From the results obtained, a better understanding of the design process of the ‘large plan’ and the professional profile of the artist will provide an additional step towards solving this complex dilemma.

The proposed graphic analysis followed a methodology that started with the direct examination of the original layout. A new, high-quality scan (600 PPI) was obtained from both sides of the document, with a much higher precision than the prior reproductions available. Different details of the layout were also photographed using a Canon EOS 100D reflex camera provided with an EF-S 60 mm f/2.8 Macro USM lens for high-precision close-ups.

The computer-aided design software used (AutoCAD Architecture/Autodesk) allowed us to relate both paper sides and to study the cutouts and overlaps among the different papers, as well as the relative rotation between them. Other elements considered were the folding marks, the direction in which the paper was laid, the existence and position of the manufacturer’s watermark, the different and unnoticed graphic scales, and the relative rotation between papers.

This study has opened a line of research that aims to provide new data about the ‘large plan’, taking other 16th century drawings located in several museums and institutions as comparative analytical references. The computer technologies of the 21st century have made it possible to consult these references online and

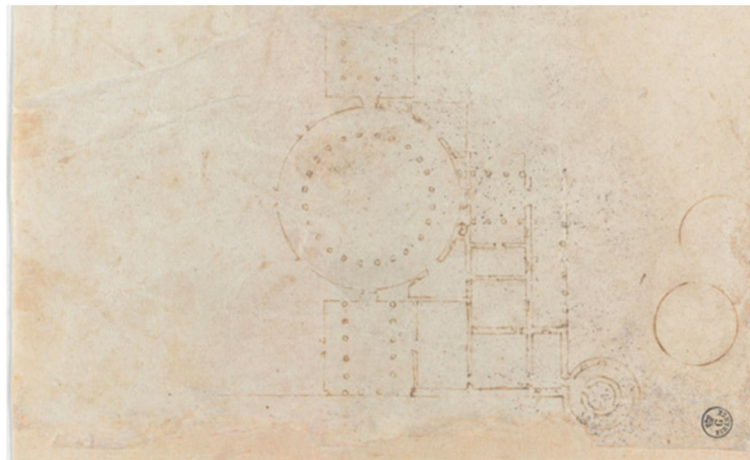


Fig. 5 Antonio da Sangallo il Giovane. 'Pianta per Villa Madama a Roma'. (Source: Gabinetto dei Disegni e delle Stampe degli Uffizi. inv. 1054 A)

to obtain digital reproductions to study them. Only a few of them were selected to illustrate this article, considering their relevance in relation to the aspects of the layout analysed here.

The drawings belonging to the Iberian Peninsula Gothic tradition were catalogued in comprehensive work by Ibáñez (2019). Among them, there is an interesting layout by Juan de Torollo for the Royal Monastery of Santa María de Guadalupe (Cáceres, Spain).⁷ The Portuguese selection from the early 16th century contains some interesting plans—due to their graphic characteristics and techniques—included in the book *Livro das fortalezas* by Duarte de Armas.⁸ The comparison of the document with other drawings by possible Spanish authors of the 'large plan' would have been very useful, but there are no similar documents by Diego de Siloé or Pedro Machuca, just a plain floor plan by Luis de Vega for a palace extension in Úbeda (Jaen, Spain).⁹

Another crucial step in this research was the consultation of the vast quantity of sources available at the Gabinetto dei Disegni e delle Stampe de la Galería degli Uffizi in Florence (Italy).¹⁰ A drawing by Baldassarre Peruzzi for a palace in Italy with a circular patio¹¹ has been located there, plus another two drawings by Antonio di Sangallo

il Giovani for the Villa Madama (c. 1518)¹² (Figs. 5, 6) with an arcaded patio similar to the one in the Palace of Charles V. Some of these drawings have been studied by Eiche (1992), facilitating their comparison with the 'large plan' analysed here.

The results of the graphic analysis are presented below, focusing on the main characteristics of the 'large plan': conformation of the graphic support with different papers, technique and graphics used to draw the architectural elements, representation system, metrology, graphical scale, aspects of dimensioning—such as units of measurement, Arabic or Roman notations, and the level of precision—and explanatory labels.

4 Graphic characteristics of the 'large plan'

4.1 Assemblage of the different pieces of paper

The 'large plan' of the palace of Charles V almost has the shape of a rectangle with irregular edges. The piece measures 1307×669 mm and is composed of nine pieces of laid paper cut from an original sheet with an estimated size of 587×435 mm, which is greater than the usual size (440×320 mm). Ortega (2001, 394) estimated a size of 570×415 mm, which this research calculated in a more precise manner by comparing the different pieces, the position of their original folding, and their watermarks. The piece shows small patches used for reparation and reinforcement. The direction of the pattern in which the paper was laid, the folds in the pieces, and the irregular perimeter of the plan evince the different orientations of the assemblage of papers.

⁷ Madrid (Spain), National Historical Archive, Clero, MPD, 28.

⁸ Lisbon (Portugal), Arquivo Nacional Torre de Tombo PT/TT/CF/159. <https://digitarq.arquivos.pt/details?id=3909707> (accessed 15 January 2024).

⁹ Simancas (Spain), Archivo General de Simancas, Mapas, planos y dibujos, 38, 083.

¹⁰ <https://euploos.uffizi.it/> (accessed 15 January 2024).

¹¹ Florence (Italy), Gabinetto dei Disegni e delle Stampe de la Galería degli Uffizi, inv. 456A.

¹² Florence (Italy), Gabinetto dei Disegni e delle Stampe de la Galería degli Uffizi, inv. 314A; inv. 1054A.

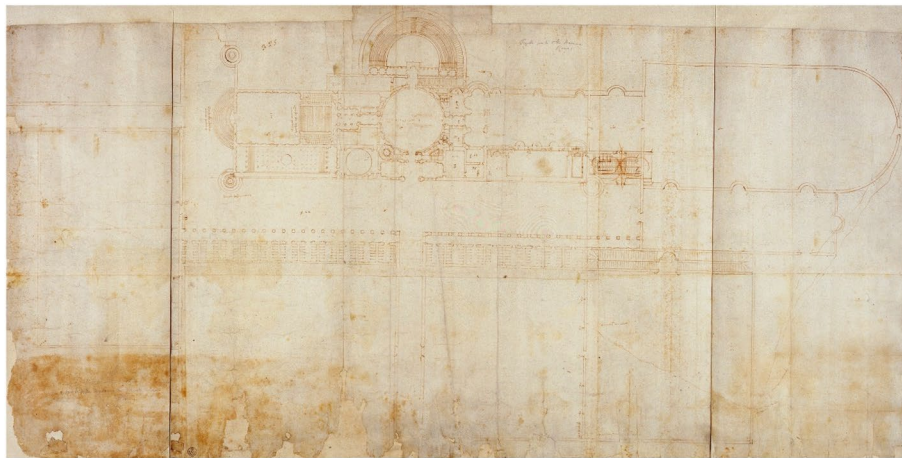


Fig. 6 Antonio da Sangallo il Giovane. 'Progetto in pianta della Villa Madama in Roma, con misure e note autografe'. (Source: Gabinetto dei Disegni e delle Stampe degli Uffizi, inv. 314A)

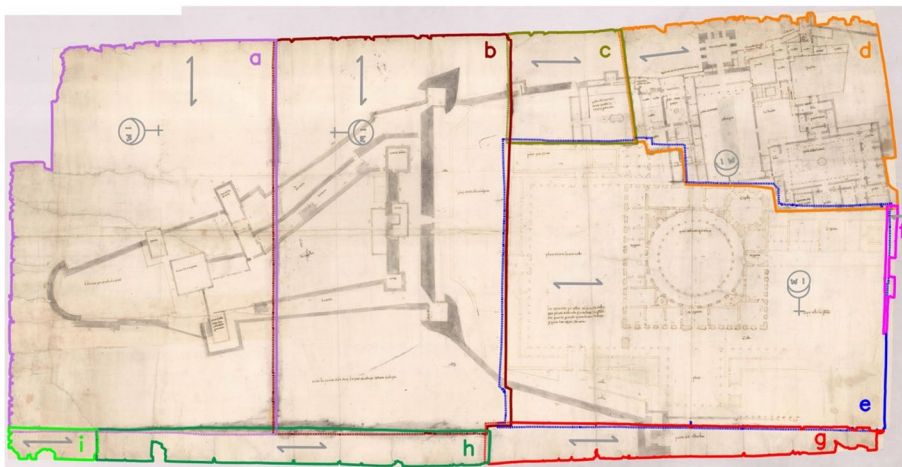


Fig. 7 The pieces of paper composing the 'large plan', overlapping (thin line), direction in which the paper was laid, and watermarks. (Source: the author, based on Fig. 1)

After years of going missing, when this layout was rediscovered and acquired for the Library of the Royal Palace of Madrid in 1912, it was bound together with other historical drawings (Rodríguez 2001, 420). This would explain the holes on the left margin and the overall folds, one longitudinal and two transversals. There are also folds that affect only one piece of paper, which would result from the folding of the original sheet of paper from which they were cut: on the larger papers, the folds are located towards the centre, perpendicular to the direction of the laid paper and at a similar distance from the watermarks on some of the pieces.

Close, direct observation of the original layout and its digital reproduction, comparing both of its sides, has allowed us to identify for the first time all the pieces of paper and their overlap (Fig. 7). The overlapping strip was marked in both parts with incised dots to fix the cutting lines and the part to be glued. The overlapping area did not exceed 4 to 5 mm, probably to facilitate the process of rolling the plan up.

Watermarks from the manufacturer forming the initials MI have been detected in four papers, as indicated in Fig. 7a, b, d, e and Rosenthal (1988, 30) identified this as a paper elaborated in Genoa in the decade starting

in 1520. These marks reveal that the papers were not all used in the same position: the eastern part of the Alcazaba [b] and the Nasrid palaces [d] were drawn on the front (the latter was drawn by rotating the paper 180 degrees), while the western part of the Alcazaba and the new palace and arcaded squares were drawn on the back part of the paper [a, e]. This would explain some of the differences in the watering ink technique applied to the walls given the contrasting texture of the paper on both sides.

Notably, some papers include architectural areas with a certain degree of autonomy. This is the case for the Nasrid palaces drawn on a single paper [d] or for the new Palace of Charles V with its porticoed squares [e]. The Alcazaba seems to have been drawn on two pieces of paper previously joined together [a, b]. Therefore, considering the relative rotation between some papers and the numerous incised graphic scales that have been detected, it seems that some areas would have been drawn before being joined together. This seems logical considering the complexity and extent of the area to be represented. In several instances [a, b, c, d], the drawing represented has the same orientation as the original paper fold and its laid texture (Fig. 7).

Other layouts of the same period reveal that the assemblage of different pieces of paper was a simple method to obtain more support material, as observed in two of the drawings for the Cathedral of Segovia (Spain)—attributed to Rodrigo Gil de Hontañón and completed between 1562 and 1577—located in the archives of this cathedral (Ibáñez 2019, 474 and 576). A similar process is observed in several drawings of the Villa Madama, such as the one coded 314A, which consists of seven papers glued together (Fig. 6). In other drawings, this joining would allow us to trace an occasional reform, as is the case for the extension of the apse of the parish church of Azcoitia (Guipuzkoa, Spain), towards 1522, and preserved in the council archives of this town (Ibáñez 2019, 474 and 576). The same technique was used to fold an elevation represented in a floor layout for a chapel of the church San Martín de Mendoza (Capilla de la Concepción in Álava, Spain)¹³ around 1550–1575 (Ibáñez 2019, 398).

The papers composing the ‘large trace’ were joined together to provide support of a greater size, but the assemblage is quite singular in the link between the Nasrid palaces and the new palace with its arcaded squares. The overlap was irregularly cut, and some of the buildings or walls were drawn on different pieces of paper, revealing a much more complex process than simply joining finished drawings. The directions of the laid paper did not coincide, and the previous folds of the different

papers were rotated towards each other. This procedure allowed us to test different options to try to address the complexity of the edifice implementation (Fig. 8).

All this seems to indicate that there was a design process that applied the collage method to assemble different partially drawn paper pieces and that they were completed once they were joined together. This innovative graphic resource, with no precedents known, would facilitate the representation of the vast complex of the Alhambra and the location of the new palace of Charles V in addition to the Nasrid palaces, which was not the final one. However, the union of old and new edifications was not accurately executed, and in the eighteenth century, architect José de Herosilla lamented the extravagant irregularity of the building assemblage (Rodríguez 1992, 106). Likewise, the Arabist Emilio García Gómez wittily expressed, towards the end of the twentieth century, that the Palace of Charles V had impolitely ‘nudged the old Nasrid palaces’ (García 1988, 200).

4.2 Drawing technique

The use of lines incised with a stylus as auxiliary lines prior to inking was a common graphic technique in the layouts of the time (Ibáñez 2019, 32–35). Sanguine was also used in auxiliary lines, though rarely in Spain. A palace by Peruzzi, also including a circular, arcaded patio, traced an auxiliary grid using sanguine prior to the drawing (Fig. 9).

The ‘large plan’ was traced first with thin incised lines with the help of a stylus; for auxiliary and main lines, the latter were then inked in sepia using a ruler or a compass divider. The smaller elements, particularly the curved ones, were drawn freehand following a common technique of that time. Thus, distances, line directions, corners, openings, or centres of circles were marked using incised dots. The possibility that the plan is a transcription of a previous drawing should be ruled out, as no ‘transference points’ or tracing incisions were detected.

Walls and other architectural elements were drawn using two types of filling, namely, watered-ink fillings to identify existing architecture and oblique hatching for new architectural proposals, although there are exceptions to this approach (Fig. 8). The watered-ink technique was applied once the whole drawing was completed, as many areas with this watered-ink filling were drawn between two pieces of paper. Such fillings in drawings were rare in Spain and were only located in the other two palace layouts (Fig. 2). A schematic plan for the extension of a palace in Úbeda (Spain) by the royal architect Luis de Vega—the only known extant plan by this architect—used an ink with a lighter shade for a previous, auxiliary delineation, and the final design was marked with more intense ink (Fig. 10) without filling in the walls.

¹³ Toledo (Spain), Archivo Histórico de la Nobleza, Osuna, cp. 11, d. 23.

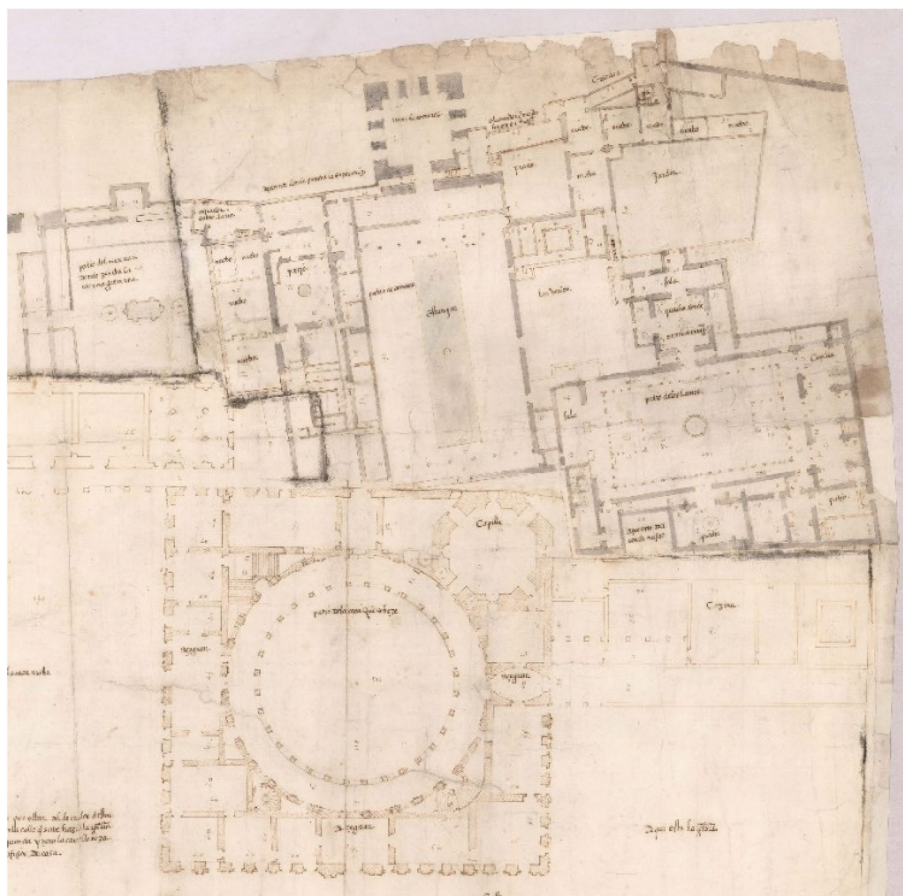


Fig. 8 Details of the 'large trace' papers showing the Nasrid palaces and the new palace (the irregular assemblage and paper folding can be observed in the image). (Source: Library of the Royal Palace of Madrid, ref. IX/M/242/2[1])

The filling technique in wall sections was rarely used in the Iberian Peninsula until the mid-16th century. Except for minor elements and details, the first example was dated from 1537, and was a plan of the Royal Chapel of the Cathedral of Seville (Spain)¹⁴ (Ibáñez 2019, 312–15). Nevertheless, it was a standard practice in Italian Renaissance drawings, as it was a much clearer and more expressive way to represent the new architectural forms and interiors (Castellanos 2010, 172), as illustrated in the drawing by Baldassarre Peruzzi (Fig. 9).

4.3 Representation system

The 'large plan' used exclusively orthographic projection. Other resources common to the Gothic tradition in the Iberian Peninsula, such as drawings using several levels or superimposed floor plans or superposed drawings of vertical elements, were discarded. This graphical

technique, where vertical shapes are folded to depict them together with horizontal projection, was frequently used for doors, as in the plans of the cited book *Livro das fortalezas* by Duarte. The profile of the vaults was rabatted in some instances, as in the case of the layout by Torollo for the Royal Monastery of Santa María de Guadalupe (Fig. 11). The constructions of several floors represented in the 'large plan' were represented mainly through their floor plan, although sometimes the upper floor appears, such as in the chambers attached to the Cuarto Dorado, in the Patio del Harem at the Palacio de los Leones, or in the new rooms in the Patio de Lindaraja.

4.4 Metrology and graphical scale

One of the labels observed in the 'large plan' that is of a strictly technical nature refers to the unit of measurement used for the annotated dimensions: '*toda la quenta desta traça son pies de a terçia de vara cada pie*' [all the dimensions in this plan are feet of third of a *vara*]. This expression was frequently used in

¹⁴ Seville (Spain), Archives of the Ducal House of Medinaceli (Casa de Pilatos), Partido de Sevilla, legajo 9, doc. 64.

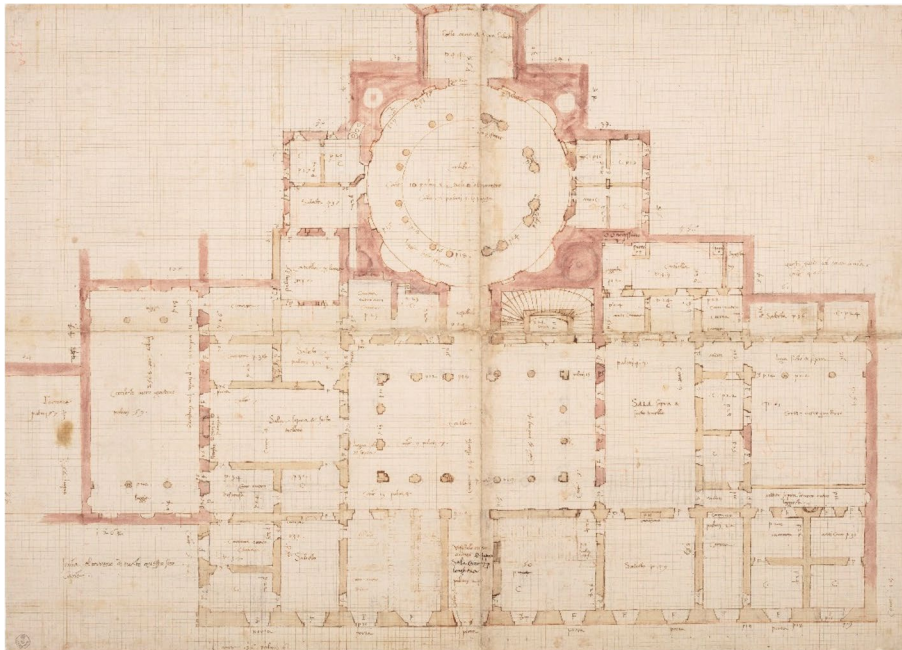


Fig. 9 Baldassarre Peruzzi, c. 1530. 'Pianta di grandioso palazzo per Conde di Pitigliano con misure e indicazioni'. (Source: Gabinetto dei Disegni e delle Stampe degli Uffizi, inv. 456A)

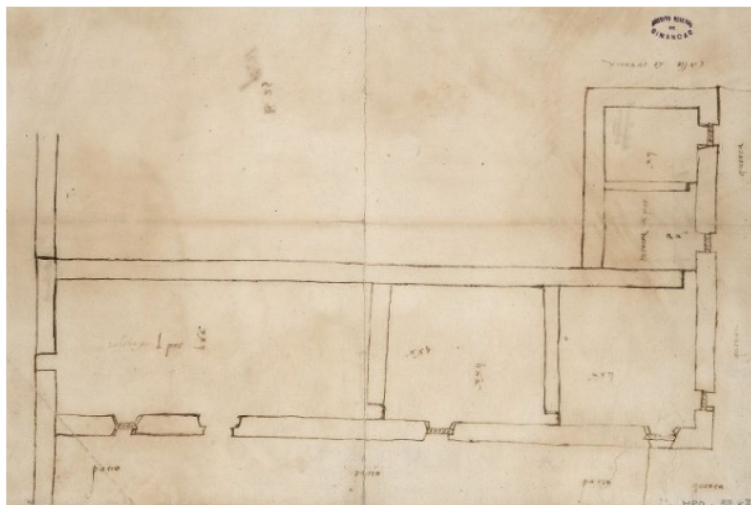


Fig. 10 Luis de Vega, 1532. Palace extension by Francisco de los Cobos in Úbeda (Jaén, Spain). (Source: Archivo General de Simancas, Spain, Mapas, planos y dibujos, 38, 083)

Spanish plans from the 16th century to specify the type of foot, given the heterogeneity in the metrological systems at that time. Although it is not specified which kind of *vara* was used, it would probably be Castilian (83.59 cm); therefore, the indicated *pie* would measure 27.86 cm. This hypothesis is supported by a similar expression that appears under the graphical scale

of a 1594 floor plan, '*casa del Conde de Lemos en La Coruña*',¹⁵ indicating that the third of a foot specifically refers to the *vara castellana*.

¹⁵ Simancas (Spain), Archivo General de Simancas, Mapas, planos y dibujos, XVI-177, <http://www.mcu.es/ccbae/es/consulta/registro.do?id=180436> (accessed 15 January 2024).

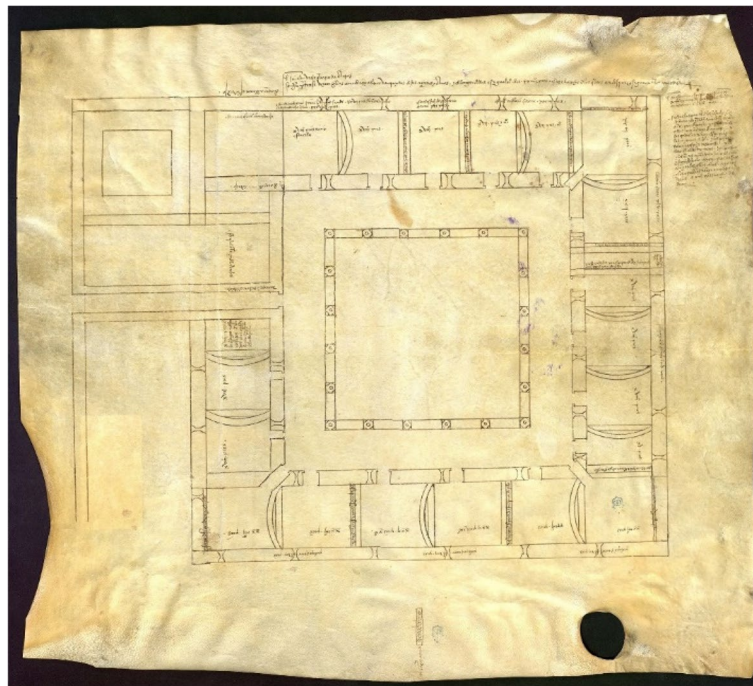


Fig. 11 Spanish Gothic plan with dimensions indicated in Roman numerals, vault folding, wall sections without filling, and graphical scale in feet. Juan de Torollo, c. 1520. Project for the new infirmary of the Royal Monastery of Santa María de Guadalupe (Cáceres, Spain). (Source: National Historical Archive, Madrid, Clero, MPD, 28)

This measurement unit was the most commonly used in Spain, particularly in Andalusia. In Italy, measurement units were different, although some of them could share similar terminology: *cana*, *braza*, *pie*, *palmo*, etc. The Spanish unit of measure must be accounted for a possible attribution of the authorship of this trace. The accuracy of the dimensioning precision has been demonstrated, although many measurements are not consistent with what was ultimately built, indicating that the drawing was constructed prior to the beginning of the works, as in the case of the plan preserved at the Library of the Royal Palace (García and Gámiz 2024) (Fig. 4).

The 'large plan' also included a graphical scale drawn on a wall section located at the bottom right, marking one hundred feet, with the first and last subdivided (92 mm equals 100 feet, assuming a scale of 1/303). According to Jiménez (2011, 403), in Spain, there was hesitation between marking minor subdivisions in the first and last intervals, while the two of them are used here. It was depicted as a graduated ruler, similar to many Italian Renaissance plans. This representation as a graduated ruler was not commonly used in the Iberian Peninsula but became widespread in the 16th century. During the first third of this century, it was usually drawn very schematically with simple, equidistant dots, sometimes only incised and not inked.

In addition to the previously mentioned scale used in the southern section of the new palace, this research detected ten discrete graphic scales of incised, uninked dots on the paper. Until recently, these scales were not known because they are barely visible to the naked eye or in photographic reproductions. Seven of them have been located in the area representing the Nasrid palaces, whose architecture is formally more complex. The others are situated in the Alcazaba, in the so-called Puerta de la Justicia and in the new palace with arcaded squares. Due to their position and characteristics, they would have been used to conveniently draw different areas. All of them are consistent with one another, just varying the marked subdivisions for the draughtsman's convenience (1, 2, 3, 5 or 10 feet). It is possible that the scale drawn as a graduated ruler was finally added after the papers were assembled. Although it is consistent with the other, only incised scales, the numbers do not resemble those of the dimensioning, it has subdivisions marked with a thicker stylus that were then inked with a broad, careless trace in a different ink from the remaining drawing. This would diminish its accuracy, in contrast to the greater precision of the other barely visible working scales.

There is some instance of graphic-scale coexistence on the Iberian Peninsula with different representations. A layout by Juan Torollo in 1520 for the new infirmary

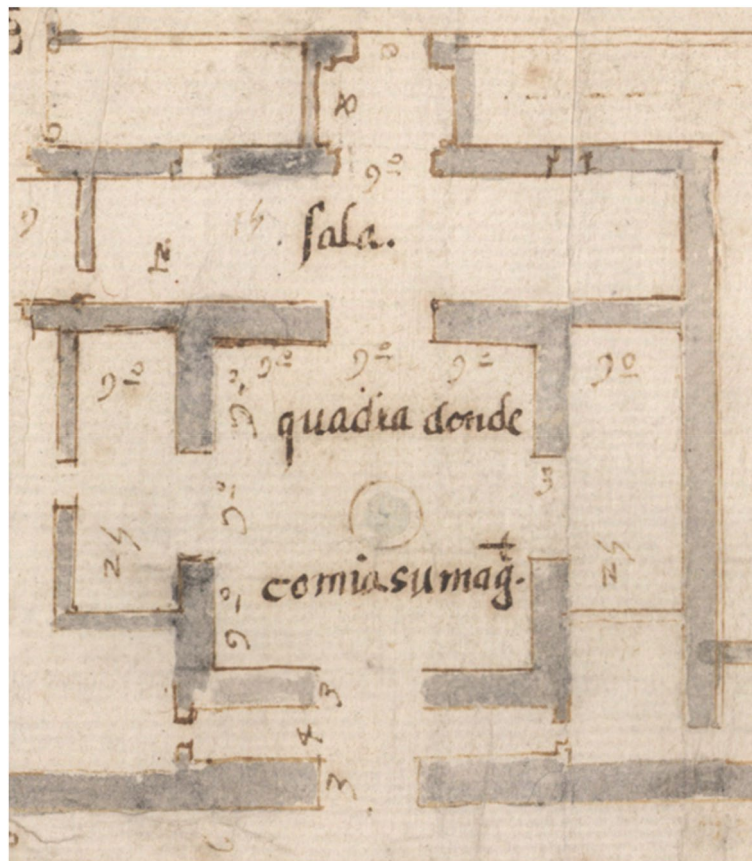


Fig. 12 Dimensioning, labelling, and wall filling in the Sala de las Dos Hermanas. Details of the 'large plan'. (Source: Library of the Royal Palace of Madrid, ref. IX/M/242/2[1])

of the Royal Monastery of Santa María de Guadalupe (Cáceres, Spain)¹⁶ (Ibáñez 2019, 248) shows the coexistence of a scale drawn with dots and a remarkable one that seems inspired by nautical charting.

4.5 Dimensioning

The 'large plan' includes numerous labelling indications in *pies* (feet), which specify the dimensions of spaces, wall lengths, and just some of the openings and thicknesses in walls. Even though they have a variable orientation, all of them were labelled following the direction of measurement, without using auxiliary lines (Fig. 12).

Although those auxiliary lines were frequent in the Italian plans, they were rarely used in Spain until the plans for the Escorial,¹⁷ which were made from 1564 onwards. It is also noteworthy that the Arabic numerals used in the 'large plan', while in Spain, Roman numerals were used during the period, as shown in the plans of Luis de

Vega (Fig. 10) and Juan de Torollo (Fig. 11). The other layout document depicting the palace of Charles V and preserved at the Library of the Royal Palace in Madrid (Fig. 4) also contains Arabic numerals.

During the first half of the 16th century, Arabic numerals were very rarely used in the Iberian Peninsula, and the only instances were inconsistently combined with Roman numerals. Some examples of exclusive use have been identified in the drawings of the book *Livro de las Fortalezas* written by Duarte de Armas¹⁸ around 1509–10 (Ibáñez 2019, 191–216). In Spain, they were used on a plan layout for the Royal Chapel of the Cathedral in Seville¹⁹ dating from 1537 (Ibáñez 2019, 61). Arabic symbols were undoubtedly imported from Italy, where they were widely used in commercial transactions and architectural layouts (Ceriani 2015, 2). As an example, the

¹⁶ Madrid (Spain), National Historical Archive, Clero, MPD, 14.

¹⁷ Madrid (Spain), Royal Library, IX/M/242/1(1–30).

¹⁸ Lisbon (Portugal), Arquivo Nacional da Torre do Bombo, PT/TT/CF/159, Caixa Forte, Ms. 159.

¹⁹ Seville (Spain), Archives of the Ducal House of Medinaceli, Partido de Sevilla, legajo 9, doc. 64.

drawings for the villa Madama (Fig. 6) can be mentioned. In some of the Italian instances, the Roman numbers were retained, while others had dimensioning duplicated with both notations, as seen in some of the preserved drawings by Peruzzi.²⁰

According to Ceriani (2015, 3), at that time, decimal values were not used. The ‘large plan’ has some instances of half-foot markers, indicated with the abbreviation ‘o’ in superscript. This is observed with the dimensions indicated for the Sala de las Dos Hermanas (Fig. 12), Sala de los Reyes, and other areas. Although it could be interpreted as a measurement labelled in the orthogonal direction, this would not be consistent with the drawing, so it is more likely to be an abbreviation characteristic of the Spanish context. Its interpretation as a ‘medio pie’ is related to the 9° dimension (265 cm) in Sala de las Dos Hermanas (Fig. 12) and its real measurement (263–267 cm).

This abbreviation is derived from ‘m°’, referring to ‘medio’, which is frequently used in contemporary Spanish plans. However, those plans are all marked with Roman numbers (Ibáñez 2019, 180, 251, 280, 304), and it never appears in drawings with Arabic numerals, highlighting the uniqueness of the analysed plan. The abbreviation avoided the use of smaller measurement units or fractions, which were in fact not used in Spain until the already mentioned plans for the works of El Escorial. However, until now, it has not been found in the Italian Renaissance drawings consulted. In these documents, values below the unit were indicated by means of fractions or other smaller metrological units, as in the drawing by Peruzzi (Fig. 9), measured in *canas* and *palmos* (the 10th part).

4.6 Labelling

The ‘large plan’ includes numerous reference markers that facilitate the understanding of the represented architectural setting. In opposition to the measurements, these labels share the same direction, and they are consistent with an interpretation of the plan showing the north upwards. All of these labels seem to have been drawn by the same hand and using the same ink, though they are different from the drawing and labelling dimensions. It seems that letters were added after those, as some of them were adapted to the spaces left by the dimensioning, as in the case of the eastern foyer in the new palace.

Towards the western side of the Old Royal House, in the area that is called today *patio de Machuca*, the annotation reads ‘*patio del Mexuar donde posaba la rreyna*

germana’ [Mexuar patio where queen Germaine of Foix rested], a reference to the chambers of the second wife of King Ferdinand the Catholic. This labelling confirms that in the Islamic era, the Mexuar or main public access to the Nasrid palaces dispel all doubts about its location (Gámiz 2008, 46). Similarly, the so-called Golden Chamber was labelled ‘*aposeno donde posaba la emperatriz*’ [chamber where the empress rested], and the Patio del Harem at Patio de los Leones, ‘*aposeno del Conde Nasao*’ [Count Nassau’s chamber], referring to Count Henry III of Nassau-Dillenburg, upper chamberlain for Charles V. It was also indicated that the emperor ate in the Sala de las Dos Hermanas, ‘*quadra donde comia su magt.*’ and that he ordered that the gallery of the Patio de la Reja be built. All this information demonstrates that the author of the labelling had a perfect knowledge of the different spaces in which the imperial court stayed in 1526, as well as knowledge of the uses and details of the royal chambers depicted, which indicates that this person would be someone close to the power sphere in the city.

The annotation ‘*casa que se hace*’ seems to indicate that the construction works of the new palace were in progress, as opposed to their graphical representation in a different location from the actual one in which it was finally built after the works that began in 1532. In this sense, an inscription on the reverse side of the plan reading ‘*la trat de grenada madaraz touledo*’ would be related to sending the document to Toledo, perhaps in 1542 (Rosenthal 1988, 285). However, a labelling mark on the Alcazaba reads ‘*torre de Añasco*’, referring to a personality who had granted the use of said tower between 1545 and 1551 (Vilar 2016, 115). This detail and the different graphics in the wall fillings led Rodríguez (2001) to consider that this was a survey of works already in progress, without considering their inconsistencies with the built reality. All these data indicate that the labelling could have been added after the drawing was completed, even years later.

5 Discussion and conclusions

The ‘large plan’ is the first known representation of the whole Alhambra citadel and therefore represents a great tool for studying the architecture of the time, as well as the later transformations of that architecture. The ‘large plan’ is one of the very few graphic documents preserved that features the design process of the new Renaissance palace of Charles V, particularly its unique placement in addition to the Nasrid palaces. The representation of its surroundings constitutes an instance of great documentary value, rare in other plans from this period and much more detailed than ordinary plans. The document can be considered one of the most important architectural plans of Europe in the 16th century and should be

²⁰ Florence (Italy), Gabinetto dei Disegni e delle Stampe degli Uffizi, inv. 357A, inv. 559°, inv. 613A.

regarded as essential for an adequate understanding, preservation, use, and communication of this heritage legacy.

Most previous research on the palace of Charles V and its 16th century representations has focused on the historical-artistic aspects of the 'large plan', its unknown authorship, or the formal references of the architecture it features. However, there has been no study on the graphic aspects of the 'large plan', which are essential for understanding the document. To accomplish this research, the original plan was examined, its digitalisation was produced in high resolution, and other drawings from the same period were considered for reference. This allowed a better approximation of its materiality and main graphic characteristics: support material, drawing technique, representation system, measurement unit and reference metrological system, graphical scale, dimensioning, and labelling.

To carefully construct a vast, very complex architectural environment, several pieces of paper were combined, and this research identified and graphically transcribed the papers for the first time. Both sides of the papers were examined, analysing their overlap, direction in which the papers were laid, watermarks, size, and folds. This method helps to explain the process of elaborating a plan in which crucial architectural decisions are made from a completely new angle.

The link between the papers depicting the Nasrid palaces and the new palace and its arcaded squares is very strange. The direction of the forms of the laid paper is different, showing the twist between them, and their connection shows an irregular cut. Unlike other contemporary plans, the papers were not only put together to obtain a larger support material, as it would not be logical to join them rotated together. It seems that a process of designing superimposed fragments of drawings following the collage technique took place. However, the superimposed traces on several pieces of paper show that some areas were drawn once they were joined together. This complex graphic process, with no known precedent at the time, was used to study the arrangement of the new palace before work began. Eventually, when the works were executed, the new Renaissance palace and the Nasrid palaces were united in an unusual turn, similar to the odd connections among the papers. Thus, the 'large plan' becomes a key element for understanding the complex incorporation of the new 16th century Renaissance palace within the medieval citadel of the Alhambra, a subject of great historical interest. This is all discussed here for the first time, starting from the process of plan elaboration.

Other graphical aspects provide some interesting data, such as the use of marked incised lines made with a stylus

to trace the drawn auxiliary lines, a common practice at the time. The possibility of the trace being a transcription of a previous drawing was ruled out, as it lacks the incised points this process requires. Two graphic markers were used to fill the walls: watered-ink fillings for the existing architectures and a striped area to indicate new architectural solutions, although these criteria bear some exceptions. This wall filling was rare in the Iberian Peninsula, in contrast with many Italian Renaissance plans that use this technique.

The 'large plan' exclusively shows a representation system based on a rigorous orthogonal projection, eliminating the need for frequently used drawing resources of the Gothic tradition of the Iberian Peninsula, such as the superimposition of several floor plans or the rabatting of vaults and doors. The use of the graduated graphical scale, or the detailed dimensioning using Arabic numerals, which were frequently used in Italy but not common in the Spanish Gothic drawing tradition, where Roman numbers were still used, should also be highlighted.

To indicate the dimensions, the measurement unit used was the *pie castellano* (27.86 cm), equivalent to one-third of the *vara castellana* (83.59 cm). This was a common unit in Spain but different from the measurement units used in Italy at the time. At that time, decimal numbers were not used to indicate values below one unit, but the 'large plan' contains indications for half feet, marked with the abbreviation 'o' in superscript characters. This measurement was frequent in the Iberian Peninsula but not in Italy, where fractions and smaller units of measurement were used. In addition, the use of graphic scales with incised dots, barely visible, was common in many layout designs in Spain, where the graduated scale was not generally represented, as in the case of the analysed plan.

All the labelling instances seem to have been drawn by the same hand, which must have belonged to someone close to the power elite of Granada, as this person proves to be not only a connoisseur of all the different areas of the Alhambra where the imperial court was accommodated in 1526 but also demonstrates knowledge of their uses and specifics.

Finally, it should be noted that the analysed characteristics of the 'large plan' allow us to further explore the complex enigma of material authorship in addition to the possible formal references of the palace. The unknown draughtsman would master the Italian Renaissance drawing and its drawing conventions, the dimensioning indicated with Arabic numerals, and the graduated scale representation. All of these aspects became widespread in the Iberian Peninsula in later decades of the sixteenth century. However, other characteristics suggest Spanish training: the use of the Castilian unit of measurement, dimensioning without fractions or smaller units, and

numerous graphic scales marked with small, sometimes almost imperceptible dots, which are very common in Spain.

Thus, although the modern architectural shapes of the new palace are typical of the Italian Renaissance, the studied plan has graphical features that are hybrids of Italian and Spanish characteristics. Its anonymous, actual author would have a professional profile reflecting training in both Italy and Spain. He could be in fact Diego de Siloé or Pedro Machuca, as already considered in previous research. Both architects had professional stays in Italy, they were documented in Granada during those years, and they made supervised payments for their work in the new palace. Nevertheless, no other similar drawings allow us to connect their authorships from a graphical point of view. It should also be considered that, due to the extension and complexity of the drawing task and the architecture represented, a long, conscientious stay at the Alhambra would have been necessary to elaborate this large plan. For all these reasons, it is possible to disregard the hypothesis of Italian authors whose presence in Granada has not been documented. Although there are recordings of Jacopo Torni, known in Italy as *L'Indaco Vecchio*, staying in this city around 1520–1525, he died in 1526; therefore, Siloé and Machuca were the only possible authors.

There are still many questions ahead that need to be answered, but nevertheless the contributions of this research to the characteristics of the 'large plan' should be considered in future studies of the Palace of Charles V, paramount example of the early Spanish Renaissance. This is a core document to understand and preserve an edifice that currently is included, together with its surroundings, on the UNESCO²¹ World Heritage List.

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²¹ UNESCO. Alhambra, Generalife and Albayzín, Granada [World Heritage List]. Available online: <https://whc.unesco.org/en/list/314> (accessed 15 January 2024).

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