

Methodology for the study of the walls of the Patio de Santo Tomás, University of Alcalá

G. Barluenga, R. Undurruga, L. Ramón-Laca & F. Estirado
University of Alcalá, Alcalá de Henares, Madrid, Spain.

ABSTRACT: The main courtyard of the University of Alcalá, Patio de Santo Tomás, has undergone many transformations and changes of use since it was built in the 16th century. During the restoration works of the building, the wall renderings were removed, showing the building materials of the walls. It was observed that the historical building works were overlapped on the same plane of the wall. This exceptional event allowed a direct study of the historical evolution occurred on the building, through an analysis of the materials and the construction techniques.

The aims of the study were: first, finding out the shape and size, building techniques and materials of the original Patio; second, identifying the main elements and construction techniques of the different historical stages of the building; and third, surveying the successive building works undertaken in the building over the past five centuries. In order to achieve these goals, the methodology used combined historic and graphic documentation, stratigraphy, morphology and metric analysis and materials characterization.

1 INTRODUCTION

The University of Alcalá de Henares was founded by Cardinal Cisneros in 1495 and was declared World Heritage Site by UNESCO in 1998. The first stone of the Main College of San Ildefonso was placed by Cisneros in 1499 and his servant Gonzalo Fernández el Zegrí (Torre 1946), a formerly noble Nasrid baptised by Cisneros, was present in the event (Hefele 1869). The construction begins in 1501 under the direction of the architect Pedro Gumiel. The building was constructed using rammed earth, the cheaper and faster technique available in that moment. Cisneros referred to it with a famous sentence said to Ferdinand the Catholic: “Others will build with marble and stone what I have done with mud”. In 1670 the new cloister of the building, nowadays known as Patio de Santo Tomás de Villanueva, was crowned with this sentence in the inscription in Latin: “en luteam olim celebra a marmoream” (first in mud, now in stone).

In 1537 the main Façade of the building was substituted by the nowadays façade, designed by Gil de Hontañón. In 1599 a Clock tower located at the south wall of the patio is ordered to Juan de Ballesteros. The tower construction was involved in several building problems and finally was substituted by a smaller tower, designed by Fray Alberto de la Madre de Dios and constructed in 1615, under the supervision of Juan García Atienza. The cloister of granite that can be seen nowadays was designed by José de Sopeña and built up between 1656 and 1670.

The decline in the late XVIII century led to the relocation of the University to Madrid in 1836. The existing buildings were useless and abandoned until 1850 when was occupied by the army and later was transformed into a religious school (Priarist Fathers) that ran until 1931. At last, the university returned to Alcalá de Henares in 1977 and the main College returned to be the central piece of the renewed university.

During 2010-2011 new rehabilitation works were undertaken on the main foundational buildings, removing all the renderings of the walls. All of the constituent materials of the walls could be seen together for the first time. In order to study the history of the building through the mate-

rials and building techniques, a set of high quality photographs of all the four walls and several materials samples were taken. It was observed that the historical building works were overlapped on the same plane of the wall. From these new data, a research program was conducted, combining different techniques.

The main objectives of the study were: first, finding out the shape and size, building techniques and materials of the original Patio; second, identifying the main elements and construction techniques of the different historical stages of the building; and third, surveying the successive building works undertaken in the building over the past five centuries.

This study is part of the Program “Geomateriales. Durabilidad y conservación de geomateriales del patrimonio construido” (S2009/MAT-1629) funded by the Comunidad de Madrid.

2 METHODOLOGY

The study combined the study of historic and graphic documentation of the Patio, a planimetric survey (Undurraga 2012) of the walls (Fig. 1) and wall stratigraphy, a morphological analysis of the masonry and other building techniques, a materials characterization of samples extracted from the walls (Barluenga et al. 2010), a classification of the materials and building techniques and a metric analysis using Castilian foot and vara, according to those used in the XV century in Spain (3 Castilian feet = 1 Castilian vara = 83.59 cm). The aim of this multiple approach was to obtain results which can support feasible hypothesis on the original Patio and to identify a temporal sequence of the main events occurred during the last 500 years.

3 RESULTS AND DISCUSSION

Four chronological and constructive stages of the evolution of the Patio were identified:

3.1 *Stage 1: Foundation of the University (1499) and construction of the main Façade (1553)*

The original Patio was two stories high and was built with rammed earth (*tapial boxes*) placed between brick-work piles. The new façade was three stories high and the north side of the Patio was elevated one story more, as it can be observed in Figure 1.

The constructive techniques and materials identified which correspond to the original Patio were: 3 feet limestone baseboard, tapial boxes (rammed earth) of 3½ by 9 feet, with 3 to 4 putlog holes horizontally distributed, placed between brick-work piles of 4 to 6 feet width. The brick-work used bricks of 4 x 16-18 x 8-10 cm and limestone mortar. The walls were covered with a thin layer of limestone mortar which hid the putlog holes. The dimensions of the original windows were 4 ½ x 12 feet.

The lack of horizontal rows of bricks between the rammed earth boxes is not a usual *tapial* solution in the area of Madrid (Maldonado et al. 1997). However, this type of construction can be found in the south of Spain, as it has been described in the literature (Graciani & Tabales 2008, Jaquin et al. 2007). In fact, the walls of rammed-earth boxes between brick-work piles and without horizontal rows of bricks between the boxes are typical in the Spanish-Muslim architecture (Pavón 1999). The use of this technique in the building can be explained based on the active involvement of Cardinal Cisneros in the conquest of the kingdom of Granada in 1492 and the subsequent baptism of the converse Muslims. It can be highlighted the presence of his right-hand man, a formerly noble Nasrid, in the placement of the first stone of the university.

With regard to the original building shape and size, the results point out that originally the four sides of the Patio were not of the same height, even before the new façade was built up. The original north side of the Patio reached 43 feet (Fig. 1), while the other three sides barely reached 31 ½ feet of height. Furthermore, the first floor of the north side was, at least, 1 vara (3 feet) above the others (20 feet above the Patio). This different position of the floors makes us to think that the original corridor of the Patio did not run uniformly along the four sides of the Patio. Actually, it is very probably that there was no gallery on the north side of the Patio, because the first floor was quite surely the main Library of the College and the access was through a staircase inside the building.

3.2 Stage 2: Improvements in the XVII century: Clock tower (1599) & granite cloister (1670)

The cloister reached the height of the side parts of the main façade and the other three walls of the Patio were elevated to three stories. The clock tower emphasized the north-south axis and the cloister provided an internal façade and a centre to the Patio.

To raise the walls of the Patio a different type of bricks were used. The dimensions of the bricks were 4 x 26 x 14 cm and the thickness of the mortar layers also increases, reaching 4 cm. However, the composition of both was very similar to the former of the XVI century.

In contrast, the materials used for the Clock tower largely differ from the others. It has been observed that, although the size and shape was the same as the former brickwork, the composition of the bricks and the mortars were different. The manufacturing temperature has been measured to be clearly higher than on the other bricks and the type of sand of the mortar had a different chemical composition (Barluenga 2012). This fact could be explained considering the troubles reported to occur during the tower construction. According to the historic documents, the tower was planned to be very high (133 feet) and during the construction structural problems emerged. As a consequence, the architect was dismissed, the tower design was changed (96 feet) and the brick-work was demolished and reconstructed, probably with another contractor.

3.3 Stage 3: Rehabilitation works in the XIX century (army & Priest Fathers School)

Many new voids were opened in the four walls of the Patio, accordingly to the new uses of the spaces (bedrooms, classrooms, canteen, kitchens, stores and stables) (Iglesia 1844).

The brickwork was constructed using thicker bricks 5 x 24 x 12 cm and mortar layers of 1.5 cm. The chemical composition and heating temperature greatly differ from the previous. The works are located mainly on the sides of the voids and new timber lintels were used to raise the doors in order to reach the high of the former windows. The some brickwork can be found closing several former voids and strengthen the east wall. The preserved voids and the new ones follow the rhythm of the archery of the granite cloister, unifying the architectural composition.

3.4 Stage 4: Restoration and refurbishment works in the XX century

Several interventions of restoration were accomplished and the Clock tower was demolished.

The height of the voids was drastically reduced including first a false arch and, afterwards, lowering the lintels. The width of the voids was enlarged in all of them, but the two main entrances of the Patio, some voids were closed and a new granite band is placed as a skirting board and framing the voids. In this stage, reinforced concrete elements were integrated in the walls in some specific areas, and the remaining rammed-earth walls were covered with hollow brick masonry in order to provide a support for a continuous rendering.

4 CONCLUSIONS

In this study, the different stages of the evolution during the last 500 years of the Main courtyard (Patio de Santo Tomás de Villanueva) of the original building of the Alcalá University (College of San Ildefonso) have been identified through the study of the original materials, metric and constructive techniques of the walls of the Patio.

A multiple researching approach, combining historical documentation and planimetric survey of the walls, materials characterization, a morphological and a metric analysis, allows a scientific interpretation of the data obtained directly from the nowadays walls' constitution. This methodology has proved to be a very useful tool to study historical buildings and can be a practical method to analyse other examples of the architectural heritage.

The morphological and metric analysis indicates that the north side of the College was from the beginning higher than the other three sides and it could even have an independent functionality. The original Patio was organised according to an east –west sequence and the nowadays north-south axis was defined later through the refurbishment works during the XVI and the XVII centuries. The constructive techniques used in the original Patio corresponded to Spanish-Muslim architecture: walls of rammed-earth boxes between brick-work piles and without hori-

zontal rows of bricks between the boxes. Although, as far as the available data can reach, the Patio was not built in the Cisneros-style (Spanish-Muslim decoration) as some of other parts of the College were, as the San Ildefonso Chapel or the Trilingual Auditorium.

The successive interventions on the Patio shown a relationship among them, as far as the general dimensions of the Patio remained constant over time. The main façade built in the XVI century fixed the height of the granite cloister constructed a century later and the height, size and location of the main voids. Some important differences in the materials and brickwork techniques have been also identified.

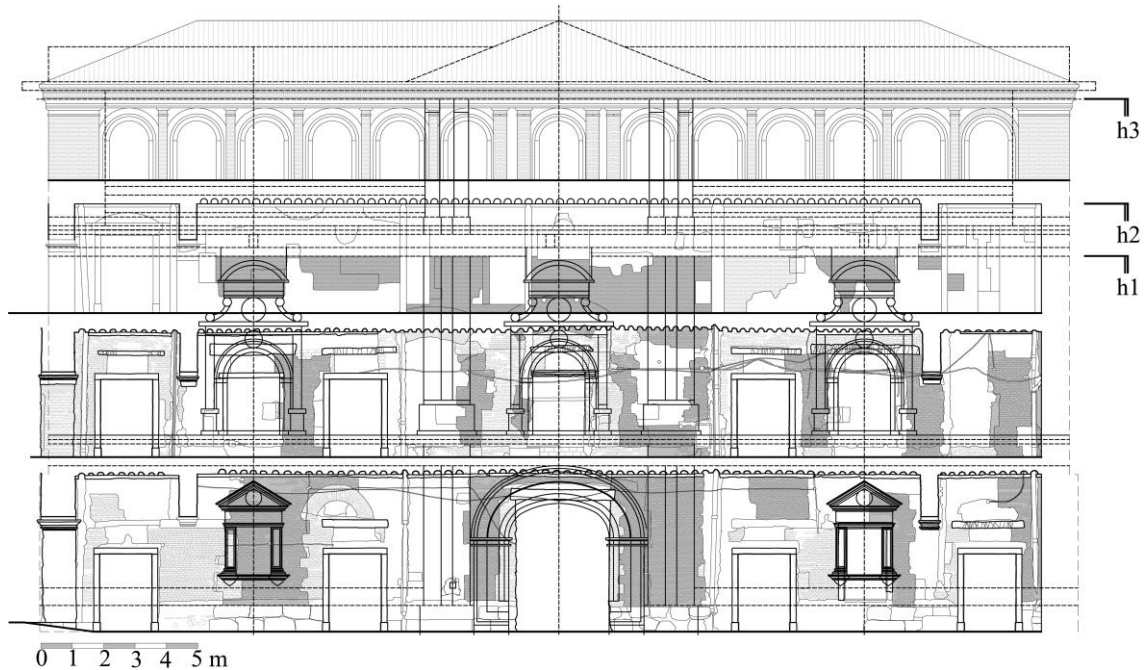


Figure 1. North wall of the Patio. The main façade of the building has been superimposed. It can be observed the coincidence of some of the present voids of the Patio with the windows of the façade. h1: original height: 43 feet (1508); h2: cloister height: 49 feet (1670); h3: façade height: 61 feet (1553).

REFERENCES

- Barluenga, G. et al. 2010. Estudio de los paramentos del Patio de Santo Tomás del Colegio Mayor de San Ildefonso. *Proceedings of 18th International Congress on Heritage Conservation, Granada 9-11 November 2011*: 155-158.
- Barluenga, G. et al. 2012. Bricks and mortars from the “Patio de Santo Tomás”, Alcalá University (Madrid, Spain): a combined study of fabric characterization and building morphology. This volume.
- Graciani, A. & Tabales, M.Á. 2008. El tapial en el área sevillana. Avance cronotipológico estructural. *Arqueología de la arquitectura* 5: 135-158.
- Hefele, K. J. von 1869. *El Cardenal Jiménez de Cisneros y la Iglesia Española a fines del siglo XV y principios del XVI para ilustrar la historia crítica de la Inquisición*. Imprenta del Diario de Barcelona.
- Iglesia, de la A. 1844. *Proyecto del Colegio General de Todas las Armas, 24 August 1844, Alcalá de Henares*. Archivo General Militar de Madrid (IHCM).
- Jaquin, P. et al. 2007. Historic Rammed Earth Structures in Spain, construction techniques and a preliminary classification. *Proceedings of International Symposium on Earthen Structures, Bangalore, India, 22-24 August 2007*. Bangalore: Interline Publishing.
- Maldonado Ramos, L., Castilla Pascual, F.J. & Vela Cossio, F. 1997. La técnica del tapial en la Comunidad Autónoma de Madrid. Aplicación de nuevos materiales para la consolidación de muros de tapia. *Informes de la construcción*, 49 (452): 27-37.
- Pavón, B. 1999. *Tratado de Arquitectura Hispanomusulmana II Ciudades y Fortalezas*. Madrid: CSIC.
- Torre, A. 1946. Servidores de Cisneros. *Hispania* 23: 179-241.