

# Architectural Analysis of the First Mosque in Aleppo Using Terrestrial Laser Scanning (Al- Shuaybiyya Mosque)

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**Abstract.** Al- Shuaybiyya Mosque in the old city of Aleppo is recorded in Arabic chronicles as the first mosque built in the city by the Muslims. Its position commemorates the location of their first prayer. It is suggested that it was built on over Roman remains, then rebuilt in Zengid period during the reign of Nur al-Din al- Zengi. It underwent a renovation in the 14th century, and possibly most of the surviving structure either dates to the Ayyubid or the Mamluk period. However, to our knowledge, this mosque has not been explored in the context of an analytical architectural study to trace the remains of each period. This paper aims to examine the architectural development of the mosque using terrestrial laser scanning to identify the elements of the previous structures. The use of laser scanning offers highly accurate survey results, in addition to a better identification of architectural elements and their relation to the structure and the modern-day city. The conducted survey-study suggests the chronology of the building (phases of construction and their limits), based on the architectural analysis of the digital model and consultation of previous studies and historical text.

**Keywords:** Mosques, Old City of Aleppo, Terrestrial Laser Scanning, Architectural Analysis.

## 1 Introduction

Al- Shuaybiyya Mosque is located west of the old city of Aleppo, in the square behind Bab Antakya. In accordance with many Arabic historians, the Muslim conquerors performed their first prayer in that location upon the surrender of the city in 637 CE. (Ibn al- Shuhna, p. 112). Later, on the same location, a mosque was built under the patronage of Omar ibn al-Khattab (Burns, p. 131). In 1150 CE, Nur al- Din al- Zingi rebuilt the mosque (Burns, p. 131), retrofitted it as a Madrassa and commissioned a water fountain resting on the exterior walls of the buildings as part of his water supply project in Aleppo. Furthermore, the inscriptions on the entablature explicitly includes the year 1150 (Herzfeld, p. Pl. XCI. inscription 105). After the invasion of Timur, the madrassa

was renovated and incorporated a congregational mosque and used for Friday preaching and prayer (Ibn al- Shuhna, p. 112).

The origin of the mosque has long been disputed. Jean Sauvaget suggests that it was built by closing the bays of an existing Roman Triumphal Arch situated at the beginning of the Decumanus of the intra-mural Aleppo. (Sauvaget, pp. 74- 75). This claim might have been supported by the distinctive classical looking entablature on the entrance façade and the two drop arches that define the porch (**Fig. 2.(C)**). A later detailed study of the entablature by Herzfeld suggested that it dates to the Islamic period (Herzfeld, p. 225).

## **2 Terrestrial Laser Scanning Survey**

The laser scanning survey was carried out in 2017, under the patronage of the Directorate General of Antiquities and Museums, Syria. Using FARO 330x, a total of 39 scans were recorded. The resolution of the scans ranged according to the level of details from 1/10 at a distance between 1- 3 m to 1/1 at a distance between 1-10 m. The scans were registered in Autodesk Recap, then imported in Photoscan for meshing. The meshed models were rendered in Rhino 6. Two spaces were inaccessible during the period of the survey, the rooms of the muezzin and the *Imam* (**Fig. 1 (a)** space I and II respectfully).

This paper examines the mosque in the light of the technological advancements, employing terrestrial laser scanning to conduct an architectural analysis of the building and its elements, and propose possible phases of construction and their boundaries.

### **2.1 Advantages of Using TLS**

The TLS survey enabled the recording of a digital copy of the building, which the study allowed to:

- Compare the floor level of the building with the surrounding street levels, without the need for additional surveying instruments, in a considerably short time.
- Record the inscriptions, arabesques, carved details of the entablature and the capitals of the columns with increased accuracy.
- Delete late installations that hinder other types of documentation, in this case: two water tanks, furniture and people.
- Examine the model from inaccessible angles, isolate elements of the building and investigate their relation to lesser observed features, such as thickness of the walls and ceilings, and the relation among the structural elements of the roofing system, through repetitive sectioning of the model, which reveals details that are difficult to acquire using any other method.

### 3 Architectural Description and Analysis

The main question regarding the style of choice is “why was the building influenced by the classical style rather than by the Seljuk or Iranian styles, which were dominant during that period?”. Julian Raby, indicates that the creation of classical-like elements in the building has been explained by mainly two theories: one suggesting an architectural classical revival, a theory he himself promotes, while the other is a theory of survival and continuity of the building tradition from the classical times to the Islamic period (Raby, 2004, p. 289). While Terry Allen suggests that the classical elements were used in locations where classical remains had already been present (Gonnella, 2010), and an arch with Greek inscriptions is historically reported next to Bab Antakya (Ibn al-Shuhna, p. 19). On the other hand, according to Ross Burns, it was meant to display “the triumph of Islam over the era of the temples and multiple deities; it urges Muslims to shun false gods” (Burns, p. 132). Yasser al-Tabbaa argues that Nur al-Din commissioned it as a “victory monument to commemorate his victories against the Crusaders of Antioch” (Tabbaa, p. 39). Hence, it is possible that in terms of architecture, as he patronaged the rebuilding of Aleppo, he intended to associate himself with the great civilizations of the classical periods and claim their heritage and superiority. As a result, the style was meant to express the revival of the city as the Seleucids once did. Nonetheless, the execution of the classical style would not have been possible without masons who are still familiar with the craft, proportions, and features of the classical elements. Building religious institutions also aided the agenda of Nur al-Din as the protector of the faith and therefore, the legitimate ruler of the Islamic region.

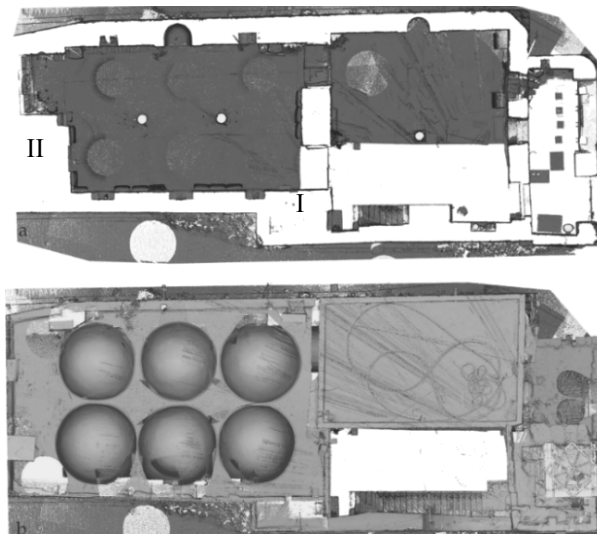
#### 3.1 The Plan

The plan is rectangular 10 m\* 26 m, it consists of a narrow entrance covered with two adjacent cross vaults (Fig. 1.(a)). The water fountain (*Qastal*) is located rightward on the exterior wall, while an elongated ablution fountains spread on the interior. The entrance leads to a small courtyard with a stone staircase. A small arched niche is built within the staircase to shelters a water collecting cistern. Two equilateral arches define the flat-roofed *Iwan*, they rest on two long wooden plates embedded with its walls. The column and the capital that support the arches are clearly Spolia carved from a single basalt stone. The *Iwan* contains a narrow *Mihrab* topped with a *Muqarnas* in the southern wall (Fig. 3), in addition to an exterior filled-in doorway. The courtyard contains an opening for a spring fountain that is lidded with a free-standing capital.

The prayer hall lies axial to the entrance, it is formed by two longitudinal bays defined by two repurposed yellow-granite columns, with differently carved basalt capital, supporting two arched resting on two differently carved jutting impost stones. The columns and the impost stones are separated from the base of the arch by square-shaped thick wooden plates, one of which is embedded in the wall. Transversely, the hall is divided by six diaphragm arches, creating the totality of eight bays; seven of which are visually connected, and one is separated by a wall to form the room of the *Imam*. The first six bays from the door are covered by domes, three above each longitudinal bay,

(Fig. 1.(b)), and the last two are covered with two barrel vaults, which are separated from the supporting jutting impost by the wooden cross beams.

The staircase in the courtyard leads to the square minaret through a small landing that also provides a small connection to the rest of the roof. The roof itself has four different levels (Fig. 1.b), (Fig. 2.(c)): The stair landing, the flat roof of the *Iwan*, the domed and vaulted roof of the praying hall, and finally the roof of the (*Qastal*).



**Fig. 1** The plans of the mosque from the point cloud, rendered in Autodesk Recap. (a) Ground plan (inaccessible rooms I and II). (b) Roof plan.

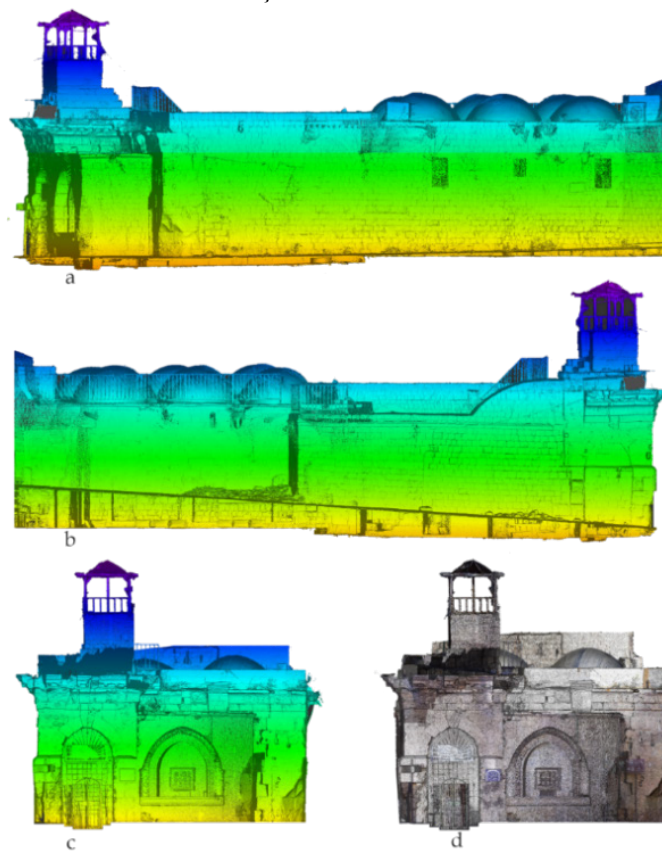
### 3.2 The Façades

#### The Exterior Façades

The main (western) façade (Fig. 2.(c, d)) is dominated by the drinking fountain, which roof and façade were built in a late period (Herzfeld, p. 223). It consists of two drop arches, the inner one is free standing and newly added. The southern-west edge is chamfered in the middle and decorated with a four-tiers *Muqarnas*. Behind and on top of the fountain, there is a central window cut into the entablature, that is partially open from the other side of the *Iwan* (Fig. 5). The entablature and the decoration continue around both sides of the window.

The drop-arched entrance is located to the left of the fountain, the stones under the arch are more protruding than the rest of the entrance façade, but they remain in the same vertical plane with the fountain. The key stone of the arch bears Kufic inscription of the name of the architect or mason. The façade is topped with Classical-looking entablature, spanning over the three sides of the entrance porch, the fourth side is over the fountain and partially covered by it. It is decorated with Kufic inscriptions interweaved with flora pattern, and arabesque decorations.

The northern façade (*Fig. 2.(b)*) is composed of three apparent sections, the first one is that of the entrance where we observe an archway filled in with non-matching stones, identical to the one of the entrance -as they both support the cross vault over the porch- notably, some of its stones bear masons' marks. There is also a reused projecting impost at the base of the arch. The second section is plain except for a narrow *Cymatium* at the top of the wall. It is built with smaller and less smoothly dressed stones; the connection line between the two sections is quite visible a vertical builder stepping. The last section has bigger and well-dressed stones. Traces of masons' marks are recognized; they are matching with famously reported marks in other buildings such as in Bab Qinnasrin and the adjacent bastion. Furthermore, a significant rise in the street level is observed, (*Fig. 2, (b)*) where sections of the façade is buried.



**Fig. 2** The façades of the mosque, rendered from point-cloud in elevation and RGB view. (a) The southern façade; (b) The northern façade; (c) The western façade; (d) The western façade in RGB view.

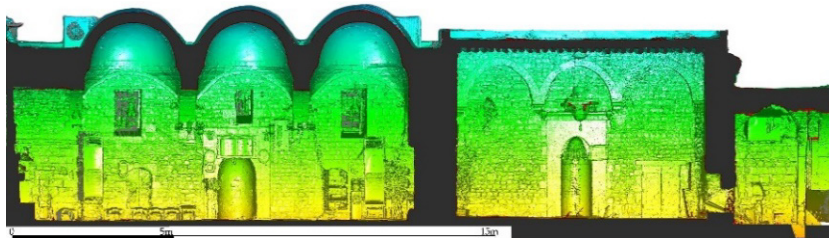
The southern façade is more plane (*Fig. 2.(a)*), the fountain section has two types of stonework and a central carved rain drain. The hind wall of the fountain is protruding, and chamfered closer to its base with a simple two-tier *Muqarna*Ò. It contains a filled-in segmental-arched doorway that seems to continue below the modern-day street level.

It also features the three windows of the prayer hall, the central of which is square-shaped, while the peripheral ones are rectangular. The used stones are consistent with the middle section of the northern façade. The stunted square minaret is mainly the *Muezzin* balcony, elevated from the stairs landing by five steps. The balcony is surrounded by wooden rails and topped a wooden pyramid roof missing its end ornament.

### The Interior Façades

The interior façades result from three cross sections. The longitudinal ones are divided to three smaller façades following the interior divisions. The southern interior façade is composed of (*Fig. 3*) (from left to right):

- The prayer hall: Characterized by the same small rough stones, it contains three windows, atop of three non-axial niches, one of which constitute a *Mihrab*, wider and shorter than the one of the *Iwan*. The niches, however, have different vousoirs styles. To the left side, a projecting wall marks the end of the domed space as it is covered with a pointed barrel vault.
- The *Iwan*: The same stone type continues, three blind arches resting on projecting imposts stretch across the southern wall as a form of “Lombard band”. In the center of the wall, there is an elongated semi-cylindrical *Mihrab*. Another filled-in exterior door is located to the right. And although this doorway is arched on the exterior façade, it appears flat on the inside, containing a wooden door and capped by a lintel.
- The ablution space: A wall of small rough stones, in its center there is a small arched niche.



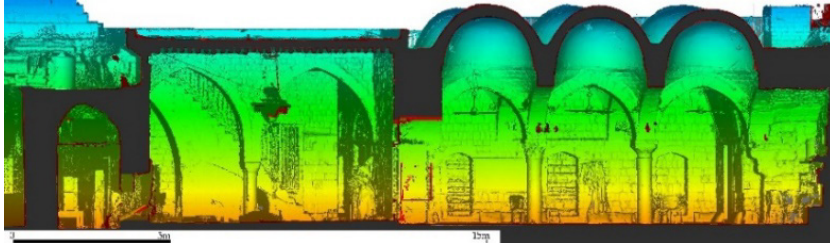
**Fig. 3** A section across the mosque showing the southern interior façade, detailing the multi-level roofing system and the two *Mihrabs*, rendered from the point-cloud elevation view.

The northern interior façade (*Fig. 4*) is composed of (from left to right):

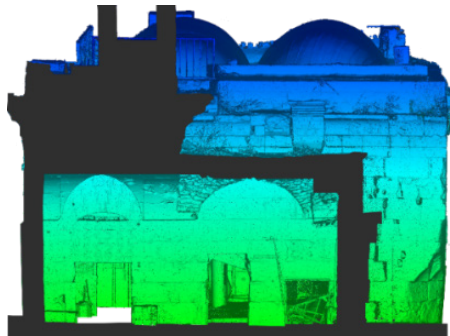
- The ablution space: Includes the filled-in drop-archway.
- The courtyard: It is dominated by the double equilateral arches which columns are of a different height than those of the prayer hall. The stair ascends behind the arches to the minaret and the roof. It is supported by a quarter arch, under which there is a rectangular niche with a wooden lintel. To the right, there is the water cistern and its arched enclosure. The landing of the stairs is supported by a carved bracket above the quarter arch. The stairs and the supporting arch are built with smoothly dressed ashlar, while the rest of the façade is dominated by smaller rougher stones.

- The prayer hall: It is dominated by the three arches supporting the domes, on the hind wall, three non-axial arched niches are present with a third different voussoirs style. The only window is a small elevated rectangular window under the middle dome.

As for the transversal interior façades, we will only discuss the eastern façade of the ablution space, which is the most interesting. The remarkable detail of this façade is the presence of three openings on the same wall (*Fig. 5*). The biggest one has a relieving arch, its flat arch consists of interlocking voussoirs of a geometrical pattern, while the arched section consists of interlocking zigzag voussoirs. The middle door has a flat lintel leading to the *Iwan*, it is meant for the worshipers to reach the ablution area, while preserving the Islamic rites “purity”. The final opening is also topped with a flat lintel, yet it was more affected by the raised level of the ablution platform, making it unusable due to its low overall height. Notably, the other side of the three openings, is arched and displaying the flat lintels of the opposite side.



**Fig. 4** A longitudinal section showing the northern interior façade, rendered from the point-cloud in elevation view.



**Fig. 5** A section in the ablution area showing its eastern façade, rendered from the point-cloud, in elevation view.

#### 4 Phases of Construction

The phases of construction can be closely related to the architectural style expressed in building techniques and construction material. Stones of different sizes and dressing styles allow for the identification of the different phases of construction and restoration.

As a result of the previous examination of the stonework in the mosque, five types of stonework are recognized, four on the exterior and one exclusively on the interior:

- The first one is the oldest, big, and well-dressed limestone ashlar, they are mostly located within the entrance porch, and in the ablution space. Masons' marks are observed on a few of them. They are consistent with the inscribed entablature; therefore, they date to time of commissioning in 1150.
- The second type is smaller in size, less-smoothly-dressed lime stones. It is used to fill in the archways in façades. It is also present in the walls of the fountain, the middle section of the northern façade, the totality of the southern exterior façade, the northern interior wall of the prayer hall, and as a blind for the arch that supports the stairs.
- The third style is present in the third section of the northern façade. Medium sized, well-dressed limestones. It sometimes bears famous mason's marks. It is similar to the ashlar used in Bab Qinnasrin and the defensive bastions of the southern walls of the city.
- The fourth style is characterized by the newer stones used to enclose the western side and the roof of the fountain.
- The fifth style is characterized by the usage of rough non-dressed rubble stones of different colours and sizes. It is present in the southern wall of the *Iwan* except for the *Mihrab* and its frame. In addition to the exterior and interior walls of the prayer hall including the vault. But it is not present in the *Mihrab*, the southern interior wall nor the northern interior wall. This hasty and cheap stonework is not consistent with the Ayyubid period and possibly dates to the Mamluk period.

#### 4.1 Discussion

An architectural reading of the surviving architectural features and the phases of constructions aid the understanding the periods of construction.

The basalt capitals suggest repurposing of pre-classical spolia, like the ones used in the neighboring "al-Qiqan Mosque", which are thought to belong to a lost Hittite temple.

Regarding the multiple doorways to the street at each façade, the northern and western ones conform with the Zengid phase, while the southern one belongs to a later period.

The presence of a door in the southern wall of the *Iwan* suggests that it may be a special gate for the governor of the city, a practice famous in the design of mosques. The gate normally leads to the praying hall, indicating that the *Iwan* could have been a main praying hall, and the bigger prayer hall might have been added later. This fact is supported by the double width of wall separating the *Iwan* and the prayer hall (**Fig. 4**) and the direct access between the ablution area and the *Iwan*. In addition to the orientation of the stairs that provides access solely to the minaret and the roof of the *Iwan*.

The wooden crossbeams separating the capitals and the impost stones from the bases of the arches are known to be a technique to mitigate the implementation of Spolia within a buildings, they also proved to be an earthquake resistance technique employed



later in many Ayyubid buildings such as al- Madrassa al-Úahiriyya, Madrassat al- Firdaws and Khanqah al- Farafrah. They are also used in an improved manner in the construction of the courtyard of al- Bimaristan al- Araguni in Aleppo, which was built during the Mamluk period. Thus, the use of Spolia and the crossbeams suggests that this phase of construction was likely carried out during the Ayyubid or Mamluk period.

## 5 Conclusions

The mosque is a unique example of employing an amalgamation of a classical entablature with Kufic script and arabesque decorations. Consequently, many theories were proposed to explain this architectural deviation. The date in the inscription, historical accounts and scholarly consensus suggest that the fountain and the Mosque were built by Nur al- Din. Only the porch has survived from this period without any trace of the first mosque commissioned by Omar ibn al- Khattab. Both Zengids, Ayyubids and Mamluks repurposed carved stones, such as columns, capitals, and jutting imposts stones.

The prayer hall demonstrates multiple architectural features that could be identified with different periods such as the stonework and earthquake resistance practices. However, a change of usage was introduced in the Mamluk period. Therefore, it might have required an expansion project of the mosque to adopt it to its new function as a Friday congregational mosque as mentioned in the historical text. As a result, it is very likely that the addition of the prayer hall was commissioned in the Mamluk period.

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