DEFENSIVE ARCHITECTURE OF THE MEDITERRANEAN
XV to XVIII Centuries

Ángel Benigno GONZÁLEZ AVILÉS (Ed.)
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The round corner tower of Kyrenia's city walls (1211-1232)

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Abstract

A circular stone construction is still visible today within in the old city of Kyrenia, in Northern Cyprus. As far as we know the burg of Kyrenia was already fortified in Byzantine times but during the Longobard war, before the seize of the city, Frederick II’s party, under the direction of captain Philippo Genardo, improved the defences of the city: it is in this phase that we hypothesise the construction of the round south west corner tower of the city walls of Kyrenia. During the rule of Frederick II Hohenstaufen (1211-1250) there was a revolution in the design of city walls, the angular towers migrated toward the outside. In this time the so called “système Philippien” was improved introducing cylindrical corner towers for the city fortifications. Frederick was in Cyprus in 1228, during this time it is documented that his party built new fortifications in Cherines (Kyrenia). The tower includes some spolia apparently of Roman origin. The Venetians in the XVI century demolished the city walls and restored the Castle concentrating therein their defensive system. The remaining elements of the older defensive system include two other towers still visible today in the urban tissue of the city. It is possible therefore to reconstruct the complete perimeter of the city walls of Kyrenia overlapping data from the survey, the modern cadastre and the ancient city plans. The paper includes the digital survey of the round tower and the historical research on the tower ad Kyrenia’s defensive system in the middle ages.

Keywords: Cyprus, système Philippien, Middle Ages, military architecture

1. History and archaeology

The tower was built, like most of the architectures in this part of the island, using the local calcarenite; many extraction caves of that stone are visible in the surroundings of the old city and some were transformed in catacombs in late antique times. Without doubt, the singularity of this construction is given by the measure of its ashlar, most of them measure 1,30-1,50 m in length and 0,50 m in the other directions, a size that does not find equivalents in any other construction in the area. The upper part of the tower is also characterised by a rustic bugnato, another singular feature that we could not identify elsewhere in Cyprus. The building as it appears today is the angular tower of the city fortification. Its plan is circular expect in the facing the inside of the city walls.
In that part the plan follows a straight line, as often in XIII century corner towers (e.g. Flint Castle, 1277-1284, UK) but the lower layers of stone follow a cylindrical shape. This consideration leads to the hypothesis of a tower consisting of at least two different construction phases, one in the lower part, as a freestanding building, and another in the upper part as integrated in the construction of the city walls constituting a corner tower. The singular size of the ashlars could be therefore explained with the adoption of the measures of the *spolia* of the older building to be continued and transformed into a fortification. The huge blocks and the *bugnato rustico* are typical of Roman architecture. It is therefore possible to cautiously date the lower part of the tower to the I century AD. The lower part could belong to a funerary building, following a type largely employed in that time, e.g. the tomb of Cecilia Metella on the Appia near Rome (I b.C.) and the Plautii’s sepulchre at Ponte Lucano near Tivoli (I AD). These are the closest comparative examples we could find, by form, construction technique and ashlars measures.

Both comparative examples show strong analogies with the Kyrenia tower. Firstly the diameter of 29.5 m of Cecilia Metella resembles the size of this tower, and also both examples were transformed into fortifications during the middle ages. Another singular element in the Kyrenia tower is a semi-circular cornice in the lower part of the building, a feature quite unusual in military architecture, and common instead in the Roman mausoleums. Both comparative examples show a similar element. Perhaps the first reliable mediaeval reference to
the fortress of Kyrenia occurs in the travels of W. de Oldenburg, who visited Cyprus in 1211, during the reign of King Hugh I. He refers to Kyrenia as “a small town well-fortified, which has a castle with walls and towers” (Jeffery, 1918). In the middle Ages, the Lusignans planned the fortifications around the L shaped urban settlement of Kyrenia. The medieval town of Kyrenia was surrounded by defensive walls and towers. Some of these towers are still standing. In the south-western part of the city, there is a round tower (B) (fig. 16), the largest tower along the wall. The diameter of the tower is 17.9 meters and the height is 12 meters. The upper part of the tower is en bossage and built with massive stones. There is a semi-circular tower on the western part of the fortification (D). The plan of the tower is semi-circular from outside and rectangular inside. On the top of the tower still are visible the brackets of the machicolation, formed by a three quarter course, supported by a corbel. The distance between towers B to tower D is 62 m. The third and the smallest of the existing towers is named the beach tower (H) and is located at the south-west corner of the harbour. The chain tower inside the harbour (I) provided defence at the entrance to the port. Jean d’Ibelin, a crusader noble, enlarged the Byzantine Kyrenia Castle between 1208 and 1211.

In 1232, during the longobard war opposing Frederick II party to the Ibelins, we have a precise notice of construction works to the fortifications of Kyrenia, “Philippo Genardo restò capitania a Cerines con cinquanta cavalieri et appresso 1000 fanti tra balestrieri e marinari, haveva tra essi molti maestri ingenieri et fece far molti ingegni e machine et trabochi, et fece vardar assai bene il castello et il borgo et diffenderli longamente” (Amadi, 174; Gestes, 108). So it is possible to date the tower to the year 1232. In the narration of the Gestes follows

Fig. 5- Decorated corbel on the doorway of the tower, (Enlart, 1913, 424).

Fig. 6- The beach tower (Dreghorn, 1977).

Fig. 7- Beach tower, cadastral plan (Department of Lands and Surveys, 1918, revised 1930).
the seize description and the capitulation of Kyrenia. The castle and borough holders, who did not receive any imperial help from Frederick II, after 1 year of seize capitulated in the hands of Philippe de Navarra and left the castle sailing to Sur. In 1303 on the 8th of August, a very strong earthquake damaged Cyprus, (Amadi, 239), we believe that the huge cracks passing across the wall of the tower were originated in that moment. In 1310 Piero de Scandelion and Belmonte of Crel landed with their ships at 2 leagues of distance from Cherines, because Cherines was in the hands of the opposite party of la Dame de Sur. In 1373 the Genoese attack severely damaged the Kyrenia Castle. In 1489 the Serenissima Repubblica of Venice took control of Cyprus and in 1540 Venetian engineers enlarged the Kyrenia Castle, giving it its present-day appearance.

The inside of the tower presents a massive dome with a circular opening, the function of the central opening is still unclear to us.

Some authors hypothesised the presence of a staircase through the circular hole, which would be quite untypical not providing protection from the rain in the inside, unless the tower was originally covered with a roof. On the top of the construction, where the survey was not very accurate, it was possible to spot the traces of triangular crenellations. These are very similar to those above the Venetian round tower of the Kyrenia castle, usually employed to divide the space dedicated to each cannon of a battery. If this interpretation is correct it means that in Venetian times the building was restored and reused as a cannon battery defending the harbour from above. Today inside the building there is a private shop, restoration works including the glass window on the oculus were accomplished in 1987, even though it was not possible to find any documentation the works. The building is in good conditions hence its continuous modern use.
1.1. Photoscan digital survey

The sequence of data acquisition and survey aims to improve the knowledge of the artefact for its historical interpretation. We conducted the survey integrating a massive technology with the traditional direct survey. We used a Structure from Motion and Image Matching (SfM/IM) software to build a cloud point from photographs and then a 3D model of the Kyrenia tower.

![Fig. 11- Dense point cloud of the tower (Griffo, 2017).](image1)

To reconstruct the spatial connection of the outside and the inside, 2 separate 3D models were created. In the first phase images were processed into 2 separate dense point clouds (Fig.11, 12); in the following sequence, two separate digital models were exported to a 3D processing software to build mesh surfaces (Fig.13). Finally both models were texturized utilizing the RGB data derived from the photographs (Fig.14). We processed 161 pictures for the outside and 64 for the inside, shot with a Nikon 60D using a Sigma 10-20mm 1:4-5.6 EX DC HSM optics, and manual settings at a 3872 x 2592 pixels resolution. Pictures were processed with Agisoft PhotoScan generating a sparse cloud of 651,683 point and a dense cloud of 5,447,139 points.

![Fig. 12- Dense point cloud of the tower (Griffo, 2017).](image2)

A mesh was generated in Agisoft PhotoScan, and exported to Meshlab reducing the polygons to 5,000,000 with the quadratic edge collapse decimation algorithm. The accuracy of the model was then calibrated using several direct onsite measurements done with a Leica Disto 3a BT laser meter. The 3D model of the outer part is quite accurate: dimension and preservation state of ashlars can be easily read. The interior model gave different results for the bad light conditions. It was difficult to reconstruct the inner space for the noise in the cloud point. The room encloses a number of objects partially covering the walls, and the inside space is fragmented by a wooden mezzanine. For these reasons the inner 3D model resulted in accurate and with several errors, so it was possible to use it only to reconstruct the geometry of the dome, while the lower part was thoroughly integrated with a direct survey. The resulting drawings are published at the end of the paper as a scientific documentation to support further researches on the round tower of the city walls of Kyrenia.

![Fig. 13- Mesh surface of the tower (Griffo, 2017).](image3)

![Fig. 14- Textured model of the tower (Griffo, 2017).](image4)
Fig. 15- Kyrenia round tower, digital survey, ground plan (Griffo, 2017).

Fig. 16- Kyrenia’s fortification system, plan (Baydur, 2017).
Fig. 17- Kyrenia round tower, digital survey, section (Griffo, 2017).

Fig. 18- Kyrenia round tower, digital survey, elevation (Griffo, 2017).
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