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# Building Archaeology of the Alcazaba of Guadix (Granada, Spain): An Example of Implanting Power in the Urban Centres of *Al-Andalus*

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## ABSTRACT

The Alcazaba of Guadix (Granada, Spain) is an *Andalusi* urban fortress that underwent many transformations since the outset of its construction in the 11th century. It was analysed through the method of Building Archaeology, that is, by means of a combination of stratigraphic analyses and the characterisation of its constructive techniques. Each analysis is based on a three-dimensional photogrammetric map of the entire feature. The study also relied on the findings of a series of archaeological excavations to offer a vision of the changes its structures underwent over time in parallel with an increase of its importance by the succession of powers. The Alcazaba of Guadix is a remarkable example of the implantation of Andalusi power and its architectural expression in medium-sized cities following the reign of the Caliphate of Cordoba.

## ARTICLE HISTORY

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## KEYWORDS

Al-Andalus; building archaeology; fortification; historical building; Islamic architecture; medieval; photogrammetry; rammed earth; Spain

## 1. Introduction

The city of Guadix (Andalusia, Spain) is located on a high plateau (900 m asl) to the north of the Sierra Nevada in east of the Province of Granada (Figure 1). It has a long history starting with an *oppidum* from the 6th century BC that was subsequently built over by the Roman colony of *Iulia Gemella Acci*. This colony attained a high level of regional importance as evidenced by its temples and theatre before falling into a gradual decay at the outset of the 3rd century AD. It is scarcely cited in written sources from Late Antiquity and Early Middle Ages and the few archaeological remains of these periods suffered greatly from urban expansion (Martín Civantos 2010b; Ramírez Burgos 2017).

The ensuing arrival of the Muslims in this area in the 8th century did not lead to drastic changes. According to al-Udri, the region of Guadix received the name *Ursh al-Yaman* due to immigrants from Yemen (Sánchez Martínez 1976). However, in spite of the territorial changes provoked by the Arab conquest, urban life did not re-initiate and consolidate in Guadix until the 11th century, a unity that it maintained until the end of Middle Ages.

Rescue archaeology, including excavations of features from the Middle Ages, only sheds a partial light on Guadix's past. Moreover, the few ancient *Andalusi*

chronicles that offer information as to its Medina (Rouco Collazo 2017). They narrate that Guadix regained relevance under the Taifa of Granada in the 11th century. This development began, like the majority of Andalusian cities, as a steady growth that attained a peak with the Nasrid dynasty (13th–15th centuries). These narratives report that several Nasrid sultans were lodged in Guadix, an indication that the city played a major role in the organisation of the territory. There remain, nonetheless, many gaps in the evolution of Guadix's morphology and urban fabric.

The Alcazaba of Guadix, only partially excavated, is nonetheless the city's best preserved Andalusian monument. Applying the Building Archaeology method to its study yields a great amount of data not only as to its evolution, but of the adjacent Medina.

The initial aim of the current interdisciplinary study of Guadix's rich heritage carried out by the University of Granada is to contribute to its conservation and social development (<https://patrimonioguadix.es>).

The second objective is to analyse the Alcazaba as an archaeological manifestation of the new Andalusi State spreading its dominion over the territory (Figure 2). This fortress, in conjunction with the adjacent Medina, played a fundamental role in maintaining a rule over the territory during the successive dynasties. This study of this urban fortress also serves to shed light on the broader historical and social dynamics of south-eastern Al-Andalus.

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# **Building Archaeology of the Alcazaba of Guadix (Granada, Spain): an Example of the Implantation of Power in the Urban Centres of Al-Andalus**

## **Abstract**

The Alcazaba of Guadix (Granada, Spain) is an Andalusí urban fortress that underwent many transformations since the outset of its construction in the 11<sup>th</sup> century. It was analysed through the method of Building Archaeology, that is, by means of a combination of stratigraphic analyses and by a characterisation of its constructive techniques. Each analysis is based on a three-dimensional photogrammetric map of the entire feature. The study also relied on the findings of a series of archaeological excavations which offer a vision of the changes its structures underwent over time in parallel with an increase of its importance by the succession of powers. The Alcazaba of Guadix is a remarkable example of the implantation of Andalusí power and its architectural expression in medium-sized cities following the reign of the Caliphate of Cordoba.

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Building archaeology, fortification, al-Andalus, rammed earth, medieval, islamic architecture, Spain, photogrammetry, historical building.

## **1. Introduction**

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fundamental role in maintaining a rule over the territory during the successive of dynasties. This study of this urban fortress also serves to shed light on the broader historical and social dynamics of south-eastern Al-Andalus.

## **2. Materials and methods**

As mentioned above, this study chose an interdisciplinary approach (ethnography, anthropology, urbanism, geography, and art history) so as to gather the greatest quantity of data serving to interpret the transformations that took place to both the fortress and its urban context. The study mainly relied nonetheless on the method of Building Archaeology, also known as Archaeology of Architecture, itself a multi-disciplinary technique originated in Italy in the 1970s and 1980s, whose main objective is to reconstruct heritage through direct observations of building techniques (Mannoni 1990; 1994). This tool, with a long methodological and theoretical development, has been applied in Spain since the 1990's (Azkárate Garai-Olaun 2010). In the current study it relates principally to stratigraphic analyses of the walls and building techniques of the of Alcazaba of Guadix.

The data were mainly collected through new technologies (Benavides López 2017) to guarantee quality, accuracy and facilitate their integration into a GIS platform that yields broader and more complex findings.

### **2.1. Fieldwork**

#### **2.1.1. Georeferencing the Alcazaba**

The first step to georeferencing the Alcazaba consisted in procuring precise geolocations by determining the coordinates of the official georeferencing system (UTM-ETRS89). This was carried out by a real-time global positioning DGPS (Leica Smart Rover 1200) device linked to the Spanish reference network of the National

Geographic Institute. This service offers instantaneous corrections to the mobile receiver that captures the coordinates with a level of accuracy of 1 to 2 cm.

The great precision of the DGPS allowed geolocating both the ground points that serve as reference to the photogrammetric images captured by the UAV, and secondly the topographic base points to read the support points on vertical walls by topographic equipment applying laser distanciometry (Total Station Leica TS06). Capturing these points is an essential part of the process of generating metric models as they serve for the photogrammetric software to calibrate the scale, position and orient the model in a global reference system (Fig 3).

### *2.1.2. Image capture*

The first step before the UAV photogrammetric flight above the Alcazaba was to program the parameters so as to yield high quality radiometric images and an adequate longitudinal and transversal overlap. The shooting speed of the camera was adjusted to the velocity of the UAV and the lighting conditions to avoid blurry images. As a general rule, attaining such results requires a high trigger speed (1/1000 sec or greater) and a slow UAV velocity (3 m/sec or less). The UAV serving to take the photographs was a DJI Phantom 2 Vision drone equipped with a FC-200 camera set at a resolution of 14 Mpx with a sensor of 1/2.3".

A height of 35 m guaranteed that the UAV would not collide with the Alcazaba's features. This altitude also assured longitudinal and transversal overlaps of 90% and 70% respectively (Fig 4). The urban setting of the Alcazaba, surrounded by buildings and other obstacles at varying elevations (antennas, cables) impeded an automatic flight to capture the vertical walls. It was therefore necessary to carry out a manual flight to attain the more inaccessible areas. A total of 1,630 photographs were taken (650 vertical

and 980 inclined to horizontal). Prior to processing, 165 deficient images were eliminated reducing the total to 1465.

### *2.1.3. Archaeological analysis*

The Alcazaba was divided into two areas for the study: the numbers in the 10,000s correspond to the inner enclosure and barbican, whereas those in the 20,000 correspond to the exterior enclosure. Subsequently, for the analysis, the features were divided into three hierarchical levels (from major to minor):

- Structure Complex (SC): group of structures (S) considered as a unit of a certain function that make up a physical space (Fig 5).
- Structure (S): group of stratigraphic units (SU) that fulfil the same structural function (Fig 6).
- Stratigraphic Unit (SU): the lowest element that can be stratigraphically individualised by its composition and constructive technique (Brogiolo 1988, 12-20; Parenti 1995, 21).

The characteristics of these three elements were individualised, examined and recorded in sheets in the field. The assemblage of the Alcazaba therefore comprises 35 structure complexes (SC), 96 structures (S) and about 605 stratigraphic units (SU). The main facets taken into account, besides their individual descriptions, are their stratigraphic relationships.

These facets allow reconstructing the chronological succession, that is, establishing the relationship of anteriority and posteriority of the different features which subsequently determine the sequence of transformations affecting the entire feature. The resumed stratigraphic succession of each Structure SU's is schematically represented by means of the Harris matrix (Harris 1979; Harris, Brown and Brown 1993). Given the massive volume of the project, the number of restoration SUs from the Contemporary period

was simplified so as to avoid generating data devoid of chrono-structural sense.

Likewise, the diverse components of a unique feature from this Post-Civil War phase were not individualised (Brogiolo 1988, 71-77; Parenti 1988; Tabales Rodríguez 2002, 88-90).

Furthermore, the constructive techniques in the study were characterised by pre-defined terms depending on their materials, fabrics, dimensions and mortar type (Parenti 1996). These characterisations, in addition to the findings of the archaeological excavations, allowed to compare and contrast structure complexes, place them in different general regional chrono-typological contexts and advance absolute dates based on the findings of other research.

## **2.2. Laboratory tasks**

### *2.2.1. Three-dimensional modelling<sup>1</sup>*

The precision and resolution of the 3D model generated by multiple image photogrammetry, also called Structure from Motion (SFM), depends on several factors related to the photographs (Benavides López et al. 2016; Pereira Uzal 2016). It is a type of highly automated photogrammetry through computational vision from unstructured photographs that when joined avoids the great limitations of stereoscopic models. Likewise, it is necessary to control and correct the faulty geometric and radiometric variables of the images so as to guarantee a product of high quality. The following parameters, Ground Sample Distance (GSD, pixel size in terrain units), radiometry of the images, flight base-altitude relationship, texture of the model object, visibility of the control points, etc., play a decisive role in the quality of the final model.

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<sup>1</sup> The 3D model of the Alcazaba is available at <http://digibug.ugr.es/handle/10481/53732>

The process of obtaining the 3D models from these parameters resorting to Structure from Motion algorithms (Wu et al 2011; Tsai 1993), is well known and practically automatised (Benavides et al 2016, Rouco Collazo et al 2018) through modern software<sup>2</sup>.

### *2.2.2. Obtaining 3D graphic records*

The step following completion of the 3D model was to obtain a satisfactory graphic basis with which to carry out the study (Fig 7). Due to the Alcazaba's geometric and morphological complexity, its analysis could not be carried out as a whole. It required a systematised arrangement of two-dimensional images (orthophotos), a method combining image and dimension that has proven to be effective and inexpensive (Benavides López et al. 2016; Fernández-Lozano et al. 2018, Remondino et al. 2011). Orthophotography, moreover, offers valuable information as to the types of materials, stratigraphic relationships, state of conservation, pathologies, proportions, etc.

### *2.2.3. GIS management and analysis of the archaeological data*

After obtaining the orthophotographs and completing the alphanumeric documentation, the data were logged into a GIS allowing georeferencing of the information and its transfer to a database with absolute coordinates. Thus, the contours of each stratigraphic unit were delineated on GIS orthophotographs, a technique allowing real measurements, before being linked to the data of each SU. This was especially useful to carry out verifications in the laboratory (depending on the model quality) of the relation of features difficult to access in the field. This method therefore gathers all the SU drawings and each of their characteristics (in the form of descriptive tables and

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<sup>2</sup> The 3D model generated in this case was carried out with Agisoft Photoscan Pro (AGISOFT 2014) software.

orthoimages) into a georeferenced digital database. There are a number of advantages of having access to the GIS data. For one it facilitated its management and interpretation. Secondly, the excellent quality of the orthoimages allowed to measure the features of difficult access in the field and verify their relationships in the laboratory. Finally it also served generate planimetries of each structure.

The archaeological data of the Alcazaba were gleaned from three excavations. The first (1986) explored the inner area of the upper enclosure. The second (2005) was limited to the inner area of south-east Tower-Gate. The final intervention (2009) examined the access and the northern curtain wall (Martín Civantos and Raya García 2009; Raya de Cárdenas 1987; Sarr Marroco and Reyes Martínez 2006; Soler García 2013). All the findings of the three campaigns were added to the GIS.

The archaeological findings were complemented by notions gleaned from a few old written sources that cite the Alcazaba. The historical sources that serve to sketch the Medina's evolution throughout medieval times are for the most part, it must be noted, chronicles where Guadix is not the centre of attention. Moreover, a more recent view of the medieval city's history was gleaned from rescue operations of Guadix's urban centre.

### **3. Results**

The Alcazaba of Guadix is divided into three large enclosures: outer (Enclosure 3), barbican (Enclosure 2) and inner (Enclosure 1) (Fig 8). The latter is at the top of the hill and comprises five towers, including one considered a keep, and the curtain walls between them. The north-east area suffered greatly from contemporary terracing and does not retain any original surface. Enclosure 2 is to the south and formed by three towers and their walls backfilled with earth up to the level of the wall-walks. This barbican faced the outside of the *Andalusi* Medina. Finally, the outer wall is the largest of the complex. It has a U-shape and surrounds the other enclosures. Although it

underwent many modifications, five towers embedded in its walls apart from the Tower-Gate are discernible to the south-east (Martín Civantos and Raya García 2009; Martín García, Bleda Portero, and Martín Civantos 1999, 216-218).

### ***3.1. The building phases of the Alcazaba of Guadix***

The stratigraphic analysis of the entire fortress led to a break down of its features into a series of phases extending from medieval to present times. The construction sequence can be divided into four major phases: Middle Ages (I), Castilian (II), Napoleonic (III) and Contemporary (IV). The medieval phase, the most complex and perhaps the most compelling, is subdivided into seven subphases (Fig 9).

#### ***3.1.1. The Middle Ages (I)***

##### ***3.1.1.1. Subphase Ia***

The first medieval subphase (Ia) corresponds to the Alcazaba's initial founding in the 11<sup>th</sup> century under the Zirid dynasty. The fortification at this time was on the summit of the hill surrounded by a single outer enclosure with a *calicanto* (lime mortar and large or medium size stones) rammed earth wall (*tapias*). It had no barbican at this time and the enclosure was sealed by Towers 10011, 10013 and 10014 (Fig 5). It had two accesses. A first, to the south, faced the exterior, toward the Zenete trail (north face of the Sierra Nevada) and Almeria (Fig 10) while a second, to the north, communicated with the Medina (Fig 11) (Martín Civantos 2010a, 18-32; Rouco Collazo 2017). In both cases the features were of direct access flanked by quadrangular towers. The absence of towers to the east associated with the outer enclosure is odd as this side had no proper defensive flanking. The wall of this subphase presents a light brown finish and a whitish *calicanto* technique carried out with formwork boxes comprising many large and medium size stones and river gravel.



The chronology of the *calicanto* technique in this century is well established for the kingdom of Granada and is reinforced by the findings of the archaeological intervention of 2009 (Martín Civantos 2008, 2009). This excavation brought to light a sunken feature interpreted as a pit or silo under the curtain wall of the outer enclosure that contained pottery from the 10<sup>th</sup> century, thus offering a *post quem* for its construction (Martín Civantos and Raya García 2009). This dating is likewise confirmed by a reference to the Alcazaba in a document penned by the last Zirid Emir Abd Allah, the earliest reference to the fortress during the reign of King Badis (1038-1073AD) (Ibn Buluqqin 2005, 156-158).

#### 3.1.1.2. Subphase Ib

The southern flank was strengthened in Subphase Ib by the construction of the barbican's westernmost tower (SC10001), which was backfilled to the level of the wall-walks and opened through the back (half-tower). The feature measures 6.7 m in length by 5 m in width and 10.2 m high. Tower SC10014 was also reinforced, apparently by adding a western buttress giving it an odd "L" floor plan as can be seen today. The constructive technique applied to this *tapial* also comprised a *calicanto* with a continuous formwork with wedges to consolidate the horizontal support bars and vertical timbers. The shutterings are 0.78 m high and the space between the horizontal support bars ranges from 0.43 to 0.76 m. The extension applied to SC10014 appears to have been carried out with formwork boxes. Although apparently in the same period, this stage does not equate with that of Tower SC10001 and could have been undertaken by another workshop. The stretch of time between this subphase, based to this technique, was certainly not long after Subphase Ia, probably toward end of the 11<sup>th</sup> or the outset of the 12<sup>th</sup> century.

### 3.1.1.3. Subphase Ic

This flank to the south was also reinforced in Subphase Ic by raising a central tower along the Barbican (SC10007) and the curtain wall (SC10006) that joins it with the Tower SC10001. This tower (9.4 x 3.3 x 10.4 m), like that of SC10001, is open toward the interior. Both structural complexes were raised with very hard concrete *tapias*. They are light brown and show evidence of the continuous formwork technique. Its greyish mortar contained a great number of river pebble with larger ones at the corners and lower batches in each of the formwork boxes. The lifts are 0.6 m high, with successive batches only 0.07 to 0.08 m thick, and horizontal support bars spaced from 0.55 to 0.68 m. To this subphase belong three features (SC10015, 10016 and 10019) interpreted as footings reinforcing Towers SC10012 and 10011.

Thus a barbican was raised at the fortification's weakest point. The two towers of Subphases Ib and Ic functioned, from the poliorcetic perspective, as *albarranas* or polygonal towers offering an advanced defence protecting the line of the wall and breaking any attack in two. It is likely that these features also served as structural reinforcement due to the great unevenness of the terrain and its clayey substratum which weakened the foundations.

Since the date of the barbican is difficult to determine, this study advances the hypothesis, based on the indistinct use of concrete and rammed *calicanto* for its walls, that it was raised during the Almoravid period (first half of the 12<sup>th</sup> century). Another factor placing it in this timeframe is the typology of its two towers that project from the defensive line like polygonal towers in the shape of a ship's keel.<sup>3</sup> The frequent lack of

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<sup>3</sup> The use of concrete to raise *tapias* is characteristic of the great walled enclosures of the cities of south-western Iberia during the Almoravid-Almohad period (Gurriarán Daza and Sáez Rodríguez 2002). Pentagonal towers are recorded in Iberia since the 11<sup>th</sup> century, in

clarity between Almoravid and Almohads features is resolved in this case by chronicles that cite the existence of a barbican during the siege of Guadix in 1125 by Alfonso I of Aragon (Ibn al-Jatib 1976, vol. 1, 109-110; *Al-Hulal al-Mawšiyya* 1951, 127-128; *Crónica de los Estados peninsulares* 1955, 109-115). It is therefore logical to presume that this feature was raised at the beginning of the 12<sup>th</sup> century.

#### 3.1.1.4. Subphase Id

The next Subphase (Id) corresponds to the greatest of the Alcazaba's medieval transformations. These included a continuous formwork *tapia* whose section reveals use of the *calicostrado* (lime-crustrated rammed earth) technique at the top of each batch. The wall is light brown and reddish with formwork 1.2 m high and batches 0.2 m thick. The horizontal support bars are spaced between 0.7 and 0.8 m. Putlog holes preserving plaster (serving to hide them) bearing spike-shaped incisions are visible at certain points. This type of rammed earth technique, often characteristic of the Almohad period, equates this subphase with 12<sup>th</sup> or outset of the 13<sup>th</sup> century, equally the beginning of the Nasrid dynasty (Martín García 2009).

The inner enclosure was erected during this phase and the weakest points of the fortification, the gates, were reinforced. A large tower (SC10004) identified as a keep (10.5 x 5.4 x 18 m) was then raised in the northern area of this new space. Its typology, including the *calicostrado* technique, places its construction in the 12<sup>th</sup> century.

Although the stratigraphic relationship is masked by contemporary plastering, it is in Subphase Id, according to poliorcetic logic, when Tower 10020 would have been

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particular along the border separating Muslims from the Christians beginning in the 12<sup>th</sup> century (De Juan García 2016, 311-314; De Mora Figueroa 2006). Polygonal towers were raised at the outset of the 12<sup>th</sup> century by the Almoravids at sites such as Marrakech (Allain and Meunié 1957; Marcos Cobaleda 2015, 118-125).

raised to the west of the Tower 10014. SC10002, the lower wall that acted as a *fausse-braye* between the Keep and the western tower of the barbican, creating an outer ward. This feature is also a creation of this Subphase, according to the few discrete remains in one corner of a *calicostrado* wall. Elsewhere, the north-eastern area of the inner enclosure was completely razed by contemporary terracing erasing any potential medieval features. This area probably comprised at least one tower and the curtain walls joining it to seal the perimeter. This is also most likely the position of the features to access the upper enclosure, as they have not been identified anywhere else.

A group of features interpreted as a cistern and pipes leading to it were observed in this enclosure during archaeological excavation in 1985. However, from the photographs of the intervention, and the existence of a small fountain at one of its smaller sides, the feature most likely served as a recreational pool. The fact that the Keep is the only tower of the enclosure that is hollow and that there are putlog holes on the northern façade of Tower 10012 suggests this was a domestic space dedicated to the Nasrid royalty.

In addition to the design of an upper enclosure, the other major intervention of Subphase Id was the reform of the two gates. This served two purposes. First of all it increased the defensive capacities at these points in response to the latest advances in poliorcetic strategies. And secondly it monumentalised the Alcazaba's access.<sup>4</sup> The archaeological intervention of 2009 identified the construction in the northern area of a bent entrance ramp (Fig 12) defended by an advanced structure whose base was also unearthed during the excavation (Martín Civantos 2010a, 18-22). This probably was a barbican that reinforced the entrance and also simultaneously bolstered its

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<sup>4</sup> Bent entrances, although recorded earlier, become widespread throughout *Al-Andalus* in the Almohad period.

monumentality. In the southern gate, there is no access ramp preserved due to the digging under the wall of Contemporary cave dwellings. Yet given the slope between the fortification and the exterior, there was a ramp probably similar to that of the North Gate. The barbican here was also completed with the Tower 10009 (6.5 x 3 x 10.6 m) together with curtain walls so as to flank the access and bolster its defence in case of siege. Moreover, unlike the north gate, at this time the original towers from the outset of Subphase Ia were heightened and enlarged toward the interior, also gaining in splendour (Rouco Collazo, Martín Civantos, and Benavides López 2018). In short, the different constructions at this time at each of the gates had the same object: reinforce defence and elevate their majesty.

#### 3.1.1.5. Subphase Ie

The next chronological phase, Subphase Ie, corresponds to repairs carried out at the north-west corner of the Keep. These consisted of raising a *calicostrado* wall differing, as evidenced by its lighter colour, from that of Subphase Id. The height of each of its formwork boxes is only 0.5 m, the distance between its horizontal supports is 0.4 m and the batches range in thickness from 0.2 to 0.25 m. A reconstruction of such magnitude, most certainly dating to the Nasrid period dating (13<sup>th</sup> century), implies a collapse of the Tower and a swift repair. There are no records of an attack against the Alcazaba or the Medina during this period that explain the damage, nor does the collapse appear to be the result of an earthquake since similar damage was not detected elsewhere. In spite of the fact that the Tower's foundation reveals no signs of reinforcement, and there are no visible fissures or cracks in its lower half, the origin of the problem may have been structural.

#### 3.1.1.6. Subphase If

Subphase If corresponds to another Nasrid reform carried out in the western corner of the outer enclosure at Tower SC20010. Its southern façade (S 20020) was coated with a rubble masonry of quartzites alternating with two horizontal courses of header and stretcher brick-work. There are also remains of partial tear-shaped sealings bearing an incised spike decor. This ornamentation also survives in a fragment of the southern façade (S10046) of Tower SC10011. Both constructive and decorative techniques are characteristic of the Nasrid period (13<sup>th</sup>-15<sup>th</sup> centuries). In addition, a potsherd bearing a turquoise green glaze typical of this period was identified inside the foundation footing (Melero García 2012). This feature therefore served to reinforce the union between the wall of the Medina and that of the Alcazaba.

#### 3.1.1.7. Subphase Ig

Subphase Ig, the last dating from Middle Ages, is found only in the southern access to the Alcazaba (SC20014). It is marked by the construction of a *calicostrado* wall in the space between the upper parts of the two gate towers that were founded on four embedded logs at a height of 4.5 m above the level of the gate. This construction yields a sort of murder hole. This feature's precariousness (it partially collapsed in 2005 after an earthquake), suggests it was executed with haste, perhaps due to an imminent attack. In any case, this feature 11 m long, 6 m wide and up to 15.7 m high is behind its popular name of 'Tower-Gate' to this SC20014.

#### 3.1.2. The Castilian phase (II)

Phase II corresponds to the reforms carried out subsequent to the Castilian conquest of 1489, before the fortress wall fell into disuse in the 16<sup>th</sup> century. The reforms of structural nature and do not represent new defensive additions with the exception of the Northern Gate. The main repairs of this phase were carried out at the

South Tower-Gate. These consisted of talus reinforcements of the foundations by English bonded brickwork. This phase also saw the fashioning of a loophole in the bastion of the North Gate (Martín Civantos 2010a).

### *3.1.3. The Napoleonic phase (III)*

Phase III saw the second greatest amount of reforms at the Alcazaba since those of Subphase Id. Moreover, these reforms have conditioned the image of the Alcazaba that has endured until today. This period coincides with the stint (1810-1812) in which the Napoleonic troops were quartered in this fortress. This occupation led to the destruction of the features standing inside the complex and the flattening of its interior. Many elements were looted and reused to raise new curtain walls aligned next to the walls in the space between the towers so as to gain useful space (Martín Civantos and Raya García 2009). These walls feature a mixture of masonry (including fragments of *tapia* used as masonry) with rows of brickwork bonded by a grey mortar. The looting left gaps both in the upper part of Tower 10014 and in the interior of walled up Towers 20002 and 20004 of the North gate.

The Alcazaba still retains features built by the French troops. The interior of the Tower-Gate (SC20014) was covered with a half-barrel brick vault filling in the murder hole, and its access was walled from the outside converting the space into a room. A new access was fashioned through the eastern curtain walls of the Tower-Gate, which probably led to the demolishing of the wall from the Zirid period. It was built with an oriental-styled brick forming a segmental arch wide enough to allow access of carts and artillery batteries. Unfortunately, this rare example of Spanish Napoleonic military architecture was demolished during the last decade (Martín Civantos and Raya García 2009).

#### *3.1.4. The Contemporary phase (IV)*

The final Phase IV of the Alcazaba corresponds to restorations carried out after the Spanish Civil War (1936-1939). Guadix, an important point of communication of the interior of Andalusia and the Levant, remained through the conflict loyal to the Republic. This led to great destruction by the Fascist aviation. The end of the war saw an extensive reconstruction program throughout the city including restoration of the Alcazaba. It became the courtyard of the Minor Seminary that functioned as a school, with barracks and football courts (Fig 13).

These post-Civil War reforms, attempting to imitate the original materials, were carried out without any scientific criteria at times resorting to reused materials and cement mortars. These reforms affected in particular the parapets, battlements and the totality of certain curtain walls (e.g. S10006 of SC10004). Plasterwork was also applied on all the structures. A second body was also added to the Keep serving as a base for a statue depicting Immaculate Conception. Although these newer features mask and complicate the reading of the earlier medieval structures, they are also recorded in this study as they form part of the history of the fortification.

#### **3.2. Key structures to determine the archaeological sequence**

After identifying the main sequence of the Alcazaba's construction, this study now briefly turns to its specific stratigraphic complexes that are key in defining its chronological periods. These are structures 10014, 20014 and the northern gate (SC20002, 20003 and 20004).

Complex 10014 (Fig 14) corresponds to the western tower of the inner enclosure, the feature subject to most reforms throughout history. It presents a strange L-shaped layout, a maximum width of 11.2 m along its south-west façade and a



minimum length along its north-east face of 5.7 m. On the whole it measures 9.5 m in length and a maximum height of 5.8 m.

Its sequence begins in Subphase Ia (Fig 15). At this moment stratigraphic units 10192 of S10030 and 10198 of S10036 are fashioned of *calicanto*. Its original layout, nonetheless, reveals that it was first a small a massive quadrangular tower (4 x 4 m). Subsequently, the south-western of the area saw construction of an extension to the *calicanto* wall of Subphase Ib. This is evidenced by the wall that leans on, and is hence stratigraphically later than, SU10198. It is worth noting that this coincides with the construction of the western tower of the barbican. The aim of this extension, which accounts for the tower's "L" floor plan, was therefore to further strengthen this delicate point.

Another extension was carried out with *calicostrado* in the south-east area of structures 10036 and 10037. This is visible on most of S10030 due to the deterioration of its exterior plaster coating revealing its earthen core (S10038). According to this constructive technique, it corresponds to Subphase Id dating from the 12<sup>th</sup> or 13<sup>th</sup> century.

The south-west corner of the complex required repairs in the Castilian phase (II) that were carried out with a mixture of brick and masonry (S10029). Later, the interior of S10037 broke and most of the *calicanto* was extracted probably by the French troops (Period III) who, according to the findings of the excavation of 2009, sought to reuse it (Martín Civantos 2010a). Finally, Phase IV saw the restoration of the whole of the tower, with the construction of a staircase leaning against S10035 and S10036 accessing the tower's upper area.

The constructive sequence of this tower allows, therefore, to observe, apart from the typological comparisons, a stratigraphical succession indicating that the Alcazaba's

*calicanto* wall raised with the formwork boxes technique is older than the wall applying the continuous formwork technique, and that both are followed by the *calicostrado* technique.

The overlap of *calicostrado* on the *calicanto* is also clearly manifest by another key structure, Tower-Gate (SC20014),<sup>5</sup> the complex bearing the greatest number of modifications (Fig 16).

The sequence begins with two formwork *calicanto* towers raised in Subperiod Ia that flanked the gate (Fig 17). Subsequently, in Subphase Id, the towers were heightened and expanded toward the interior with the *calicostrado* technique.

More recently, in SU20217 of S20027 there is a *calicostrado* wall that leans against the walls of the earlier Subphase Id and fills the space between the two towers yielding a murder hole (Fig 18). This is therefore an example of the use of the *calicostrado* technique in a different timeframe (Subphase Ig).

The Tower-Gate was subsequently restored during the Castilian phase due to structural problems, presumably not long after Subphase Ig. This took on the form of an English bond brick talus wall visible in structures 20023 and 20024. Next, inside the structure complex, a brick Napoleonic vault (S20036 and S20037 of Phase III) was raised leaning against (hence later than) walls of Subphases Ia, Id and Ig and reforms of Phase II. Access to the exterior was then sealed. Finally, the parapets of the tower and the battlements were reconstructed in Phase IV with reused materials.

This section concludes the detailed analysis of the chronological sequence through the presentation of the northern access of the Alcazaba whose structures were

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<sup>5</sup> See Rouco Collazo, Martín Civantos, and Benavides López (2018) for the complete archaeological analysis of the Tower-Gate.

identified and recorded during the excavation of 2009. Noteworthy is the overlap among these structures of calicostrado on calicanto.

The sequence begins with the remains of two *calicanto* towers, hollow up to their middle, attached to the remains of the wall of Subphase Ia. Northern Tower (SC20002; 10.45 x 4.5 x 10 m) is larger and higher than its southern counterpart (SC20004; 6.1 x 4.4 m x 6 m) set on a steep slope. There are also two embedded parallel *calicanto* walls 1.5 m thick projecting outwards from each of the gate's towers that could either form part of an access ramp or a part of a feature linked to an advanced defence. It is not possible to interpret them more precisely due to later constructions.

A *calicostrado* wall dating from Subphase Id was then raised on top of the southern *calicanto* wall. Another very deteriorated angled feature (2 x 1.5 x 1.5 m) applying this technique was raised in front of the towers, toward the current street. These features could correspond, according to their position and dimensions, to the façade of a bastion with a rectangular floor plan that reinforced the access. This structure featured a Ramp 3 m wide with a double bend made of brick leaning on the *calicanto* towers that were filled to a level of use above the walking level of that of Subphase Ia (Fig 12).

The defence of the southern *calicostrado* walls of Phase II were reinforced with a brick and masonry flared loophole, probably shortly after the conquest, and in particular after the attempted assault of the Alcazaba by the Mudejares in 1490 (Espinar Moreno 2004, 188-198). Moreover, there is evidence of domestic activities inside the gate suggesting that by the middle of the 16<sup>th</sup> century this access had already lost its defensive function. This coincided with the moment when the whole of the Alcazaba probably no longer played a military role.

In Napoleonic times (Phase III), the interior of the two towers flanking the access was dismantled to reuse its materials, and a masonry wall was raised sealing the gate.

#### **4. The Alcazaba of Guadix in its historical context**

After having briefly presented the evolutionary sequence of the Alcazaba, this study now turns to analyse its role in the historical process of the Medina and in the succession of the *Andalusi* kingdoms of the south-east of the Iberian Peninsula since the initiation of its construction in the 11<sup>th</sup> century. The study also attempts to define the function of the fortress in the framework of power and collection of taxes in *Al-Andalus*.

The first point to highlight is that, despite the existence of written sources citing the construction of a fortress in Guadix in the 9<sup>th</sup> century, which appears to have dominated other fortresses later in the 10<sup>th</sup> century,<sup>6</sup> there is no material evidence of an older feature occupying the Alcazaba's current location that confirms this notion.

Both the notions gleaned from written sources and the urban archaeological interventions suggest that the urban resurgence of the old Roman colony only took place in the 11<sup>th</sup> century with the raising of the Alcazaba and the urban walls (Martín Civantos 2007, 584 and 688). The surrounding population was certainly drawn to this Medina as it occupied a strategic crossroad stretching from the Guadalquivir and Genil River Valleys to the Levante and the harbour of Almería. It is undoubtedly this dominant geographical position that prompted the Zirid dynasty to erect the Alcazaba at this location. The urban fortifications in *Al-Andalus* played an important role both as the

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<sup>6</sup>Written sources suggest the presence of a fortress when narrating the campaigns of Abd al-Rahman II and Abd al-Rahman III around Guadix. The first refers to 'the fortresses of Guadix' while the second, from 913, advanced "...to the fortresses of Guadix, that for fear evacuated their lords" (Ibn Hayyan 1954, 341, 1981, 61).

seat of political and military power and as a centre to collect taxes from the agricultural surplus of the surrounding territories.

It is for this reason that Guadix and its Alcazaba played a fundamental role in governing the territory during the Zirid dynasty. According to written sources, a number of fortifications and their surrounding territories, including those of Hoya and Zenete, depended on this Medina and its *qaid* (commander or chief). Thus, Guadix served as the district's military, fiscal and judicial capital,<sup>7</sup> a situation that endured until the end of the Nasrid kingdom (Martín Civantos 2007, 607).

Guadix became a strategic point for the Zirids according to the chronicle penned by Abd Allah, the dynasty's last monarch. Under the rule of Emir Badis (1038-73), the vizier Yusuf Ibn Nagrila persuaded Badis to hand over the city government, much to the detriment of the al-Qarawi family. His argument was that he could contribute 100,000 dinars a year to the public treasury. This passage therefore evidences that the city was once an economic and commercial centre. During the reign of Badis the vizier offered the city to the Taifa of Almeria obliging the Zirid king to request the aid of al-Ma'mun, the ruler of the Taifa of Toledo in central Iberia, to retake Guadix, offering Baza in exchange. Abd 'Allah states in his memoirs that 'six treasury halls were emptied to cover the expenses of the siege' (Ibn Buluqqin 2005, 125) more evidence of the great strategic value of Guadix and its fortress to the monarch.

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<sup>7</sup>“syenpre oyo desir a personas viejas e antiguas como el alcaide que avia sydo e hera de la dicha çibdad de Guadix solia poner e ponía los alcaides en los castillos de los dichos lugares de Xeres e de los otros lugares del termino e juridiçion de la dicha çibdad” (Trillo San José 2007, 283) which paraphrased is “...the witness always heard that the leader of the city of Guadix appointed the leaders of Jerez [del Marquesado] and other places under the jurisdiction of Guadix”.

The construction of the Alcazaba in the 11<sup>th</sup> century therefore formed part of a broad plan of action throughout the Zirid kingdom to develop its administration and guarantee its power. A number of projects were thus carried out applying an identical construction technique introduced at this time: the *calicanto* wall. The intentional link between certain constructive techniques and projects of the different *Andalusi* authorities has often been highlighted by specialists, especially for the Umayyad period (Azuar Ruiz 1995; García Porras 2016, 230-236; Gurriarán Daza 2018; Malpica Cuello 1996, 1998). Construction techniques are therefore closely linked to the founding by the ruling powers of new cities and fortresses that protected the boundaries of the territory.

The use of specific types of construction materials in state projects continued throughout the Taifa kingdoms, in the 11<sup>th</sup> century, serving as elements of legitimation.<sup>8</sup> This is the case of resorting to *calicanto* to raise the *tapia* of the Alcazaba of Guadix during the Zirid period. This technique is well dated archaeologically in constructions promoted directly or linked to this Berber dynasty such as the *almunia* (rural palace) unearthed under the *madrassa* (educational institution) of Granada (Malpica Cuello et al. 2015). It is also noteworthy that this technique was applied to raise the key fortifications serving to gain territorial dominion and exploitation. This is the case of Guadix itself as well as the Alcazabas of Baza and Granada, the kingdom's capital (Fig 10) (Martín Civantos 2009, 219-220). The technique also served at specific strategic

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<sup>8</sup> A multiplication of efforts (architecture, inscriptions, numismatics, art, etc.) took place to legitimise the powers that be from the period of the Taifas to the end of the *Al-Andalus*. This is due to the fact that none of these rulers could either claim direct ancestry from the family of the Prophet or justify the growing surge of taxes imposed on the population to finance state functions, for the most part not sanctioned by the Quran and considered illegal by Islamic legal tradition. See the studies of Clément (1997, 194-195), Chalmeta (2013), and García Porras (2015).

points beyond the urban environment. This is the case of Alquife fortress that controlled a vast series of mines and that of Cabrera that protected the route between Granada and Guadix and Baza Basins (Malpica Cuello 1987, 214-215; Martín Civantos 2001, 2002). *Calicanto* walling can thus be identified as a technique serving for Zirid constructions that became a sort of element of propaganda that observers associate with this dynasty.

The Medina of Guadix continued to grow during the Almoravid period. It is possible to deduce from the campaign of Alfonso I of Aragon in 1125 that the city already had suburbs and a barbican. This also suggests that the Northern African empire also considered the Alcazaba and the city of Guadix as important enough to bolster its defences. The Aragonese monarch attempted three unsuccessful assaults of the city before laying a siege lasting a month. Confronted with the impossibility of a successful attack, he finally lifted his siege and departed (*Al-Hulal al-Mawšiyya* 1951, 111 and 114).

Guadix was already fully developed in the 12<sup>th</sup> century. Its growth is also evidenced at the Alcazaba by the enormous undertakings of Subphase Id when the fortification was transformed both physically and functionally by the addition of the upper enclosure, which serves to hierarchise its inner space. The two gates were also fortified and monumentalised, complicating the access to the whole. These changes enhanced even more the stratification of the seat of power with respect to the rest of the city. This process of segregation is identified at other fortresses from this period, as well as other sites from the Almohad and early Nasrid periods (12<sup>th</sup>-13<sup>th</sup> c). It has been interpreted as the material embodiment of a social change brought about by the greatest power of the Islamic state and its delegated officials, in particular the *qa'id* (Acién Almansa 1999; García Porras 2016).

Its role and function in *Al-Andalus*, especially in the Nasrid era, is object of debate as it was a key actor in the relationship between the peasant communities and the central state (Fábregas García 2015, 2016; Guichard 1986). The *qaada* (plural of *qaid*) possessed broad military, criminal justice, and taxation powers throughout their territory.<sup>9</sup> Those of the main medinas and fortifications were members of kingdom's powerful families, appointed directly by the Emir of Granada.<sup>10</sup> They had the prerogative to appoint minor *qaada* to the smaller fortresses, as in the case of Guadix. They were the interlocutors of the community with the powers at hand as evidence indirectly by Castilian sources at the end of the 15<sup>th</sup> century that recount numerous examples of *qaada* representing their community that agreed, after a dialogue, to surrender their positions to the Christian kings (González Arévalo 2016).

The *qaada* either resided in the fortresses or at least they had the right to. The construction of the inner enclosures known as *saluqiya* is directly linked to palatial functions. These features could correspond to the reforms carried out in Guadix and explain the construction of the Keep with a height that towers above the horizontality of the rest of the fortification. Moreover, its hollow interior could have been inhabited. These notions, together with the traces of a pool linked to a fountain and a paving in the inner enclosure unearthed during the excavations of 1985, and the open putlog holes of

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<sup>9</sup>“E hera publico e notorio que el dicho alcaide [de Guadix] que hera e solia ser en la dicha çibdad cobrava e cobro las rentas, pechos e derechos que al rey moro pertenecían de los dichos lugares del Çenete e de los otros lugares de la tierra de la dicha çibdad” (Trillo San José 2007, 283) which paraphrased is “And it was well-known that the ruler of Guadix imposed and collected taxes from Zenete and its other localities that belonged to the moorish king”.

<sup>10</sup> Several families linked to leaders and other official positions in Guadix are cited in written sources. This is the case, for example, of the Nasrids Banu Asqilula and Banu al-Qabsani families (Martín Civantos 2007, 701; Peinado Santaella 1993, 701).



S10040 serving to attach a structure, evidence the existence of a prestigious residential area and bolster the hypothesis of a greater hierarchical level of this space probably corresponding to the residence of a *qaada* and his entourage and even occasionally serving to accommodate royal family. This last point is evoked in Nasrid written sources that affirm that ‘their fortress belongs to the people of the crown and serves as a royal seat’ (Ibn al Jatib 1997, 130-131).

The process of fortification that began in the Almohad and continued into the Nasrid era was therefore widespread throughout *Al-Andalus* both in the main cities and in rural areas, and served as a means for the territory to achieve a greater political and defensive reach while simultaneously assert the legitimacy of the Almohads (Azuar Ruiz 2000; Martín Civantos 2013; Torró 1998). In this way, the introduction of the *calicostrado* technique in *Al-Andalus* at this time can, as in the case of the earlier *calicanto tapia* technique, serve as a seal of identity of power. The construction of large keep towers serving as residences of the *qaada* in this period of transition between the Almohad and Nasrid power is also archaeologically recorded at other *villas*, fortresses and medium-sized cities similar to Guadix. An example is the Keep dominating the city of Moclín or that of the Alcazaba of Loja. This last example, raised with ashlar, has a monumental floor plan with an entrance arch and a domed living quarters that served as a hall for receptions, administration of justice, and ceremonial protocols (García Porras 2015; Márquez Bueno and Gurriarán Daza 2010). Moreover, given the great modifications of Phase IV, it cannot be ruled out that the Keep of the Alcazaba of Guadix originally featured even more monumental aspects linked to a residential space.

The fortification, following this transformation, acquired a great strategic value for the new Nasrid dynasty. Its first monarch, Muhammad I, was named in 1232 as ‘*Qaid* of Guadix’. Furthermore, it became a refuge for sultans such as Muhammad V or

Nasr who were forced, due to conspiracies, to abandon Granada. According to Ibn al-Khatib, the latter was buried in 1310 in the Alcazaba itself. The fortress also served as a base for rebels such the Abencerrajes family or El Zagal in their struggle against the powers of the Alhambra (Sarr Marroco 2011). The highest authorities were also often present in the Alcazaba and the Medina of Guadix, sites that attain at this time their maximum urban and commercial splendour, a notion evidenced by the fact of possessing their own mint.<sup>11</sup> A generalised demographic expansion also took place throughout the entire Nasrid territory with concentrations in fortified centres near the border which in turn yielded new walled suburbs.<sup>12</sup> The dominion and influence of Guadix on its surrounding rural areas also reaches its peak at this time. An example of this influence is that part of the mineral extracted at Zenete was smelted at Guadix (Martín Civantos 2010c). The modifications of the fortification, however, in terms of volume, are not very striking. They consist of reinforcing the union between the urban and outer enclosures (Subphase If) and, above all, repairs to the extensive damages to the Keep (Subphase Ie).

## **5. Conclusions**

The Alcazaba of Guadix still requires an in depth archaeological study after removal of at least part of its contemporary restorations. Nevertheless, the analyses carried out so far throw light on the question on the implementation of the Islamic State in urban contexts and how power is expressed through architecture. The Alcazaba was raised at

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<sup>11</sup> Guadix, according to the geographer Al-Idrisi, is “a mid-size city surrounded by walls where much commerce takes place” (1901, 41).

<sup>12</sup> According to Malpica Cuello and Martín Civantos (2006) and Sarr Marroco and Mattei (2011), the population was concentrated both in mid-sized cities (Baza, Loja, Antequera or Vera) and in smaller fortified settlements (Moclín, Castril or Montefrío).

the highest point of the Medina at the moment of the reactivation of life at this urban site as well as the building of its walls.

This resurgence in the 11<sup>th</sup> century took place after the breakdown of *Andalusi* unity, a moment when the new Taifa powers attempted to mark their presence in the territory and consolidate their dominance. Guadix then became the head of the surrounding territory with its *qaid* residing in the Alcazaba wielding political, fiscal and military jurisdiction over both the smaller fortresses and the surrounding rural sites, a process repeated in other sectors of the Zirid kingdom (Martín Civantos 2009). Guadix therefore became a point to collect tribute from the rural production and where most of the surplus of the countryside was commercialised and manufactured. An example is that of the iron mines of Alquife (Granada), a type of production that was actually outweighed by that of silk. The Medina was, therefore, a fundamental strategic enclave that did not remain unaffected by the conflicts between neighbouring Taifas.

The founding of the Alcazaba of Guadix in the 11<sup>th</sup> century is evidenced by the archaeological intervention of 2009 (Martín Civantos and Raya García 2009) that identified an official constructive program by the Zirid kings resorting to rammed earth *calicanto* (Martín Civantos 2008, 2009). Other finds from the Alcazaba and the city of Guadix bolster this interpretation. Moreover, the floor plan of the Alcazaba's first level raises numerous questions as to the function of the building beyond that of defence. It leads to the question as to the relation between the stately powers and the local authorities and inhabitants, as well as the Alcazaba's larger role in the territory.

Consolidation of urban life in the Almoravid and Almohad periods, and the general process of fortification identified since the 12<sup>th</sup> century, is evident both in the city and in the Alcazaba of Guadix. This is expressed through the reinforcement of its defences by constructing a barbican and later with alterations to its two gates. The fundamental transformation of the fortress took place in the second half of the 12<sup>th</sup> or at the outset of the 13<sup>th</sup> century with a wide range of reforms generating a new hierarchical

compartmentalisation. Archaeological finds suggest that the inner enclosure was a luxurious residence that stood out from the rest of the Alcazaba by its monumental Keep. The presence of dignitaries and monarchs in the fortress is certified by Nasrid written sources. This occurs at a moment when Guadix attained its greatest level of influence. The change in the building's floor plan with respect to that of the previous design dating from the 11<sup>th</sup> century raises the issue of its function as a residence and symbol of political power that becomes now even more evident.

The Alcazaba is assuredly a material expression of power and dominion over the surrounding community. This is patent through the use of two constructive techniques (rammed earth *calicanto* and *calicostrado*) that clearly identify the promoter of each of the works. Architecture, like monetary currency, inscriptions and literature of the court, is an expression of power. Although the most costly to carry out due to the need to mobilise ample material and human resources, it is also the most perennial.

The Alcazaba is also a centre of administration and serves as a bond with the inhabitants of the Medina and can, as occurred in rural areas, serve as a refuge for the population. This opens a compelling debate, always very present in the historiography of *Al-Andalus*, which justifies the diachronic study of the Alcazaba to shed light on the organisation of the *Andalusi* socio-political fabric.

The archaeological analyses also raise questions as to the role of this fortification after the Castilian conquest. Certain very early refurbishments were observed in the excavation of 2009 and when exploring the Tower-Gate. Archaeological excavation also unearthed signs of what appears to be an abandonment of the Alcazaba's defensive and military functions in the 16<sup>th</sup> century probably following the Moorish rebellion. The apparent decline of the Alcazaba could have gone hand in hand with the crisis generated after their expulsion. In any case, as can be gleaned from both the excavation of 2009 and from the stratigraphical analysis, the site was practically abandoned and fell into ruin until its reoccupation by Napoleonic troops. The old

fortress then underwent a series of transformations to accommodate a modern military camp. These include thickening the towers and walls and the ensuing dismantlement of certain features, the razing of the interior, the closing of the gates and the opening of a new access for the arrival of carts. This last feature, unfortunately, was recently demolished.

Finally, the Alcazaba in the 20<sup>th</sup> century took on a new use as its courtyard served as a patio for the Minor Seminary in the aftermath of the Spanish Civil War. This was undertaken in the framework of an ample refurbishment involving reconstructions, coatings and patching that have given rise to the current image of the fortress.

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## Figures

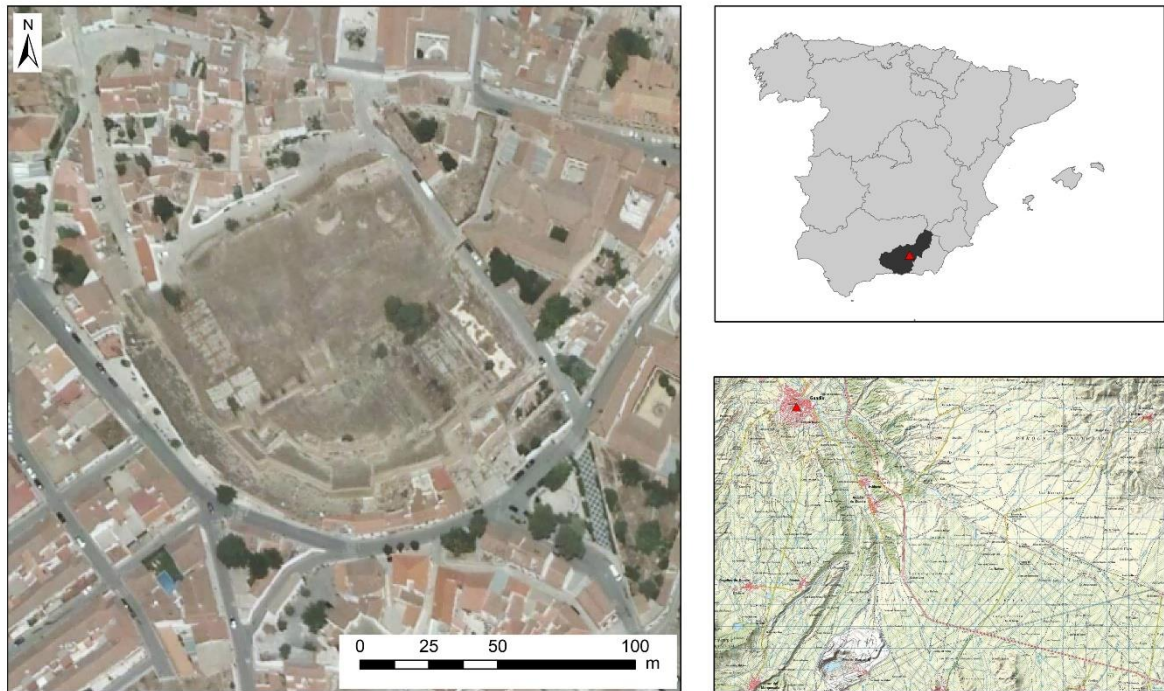


Figure 1. Location and aerial view of the Alcazaba of Guadix. J. Rouco Collazo. Base map: National Geographic Institute.

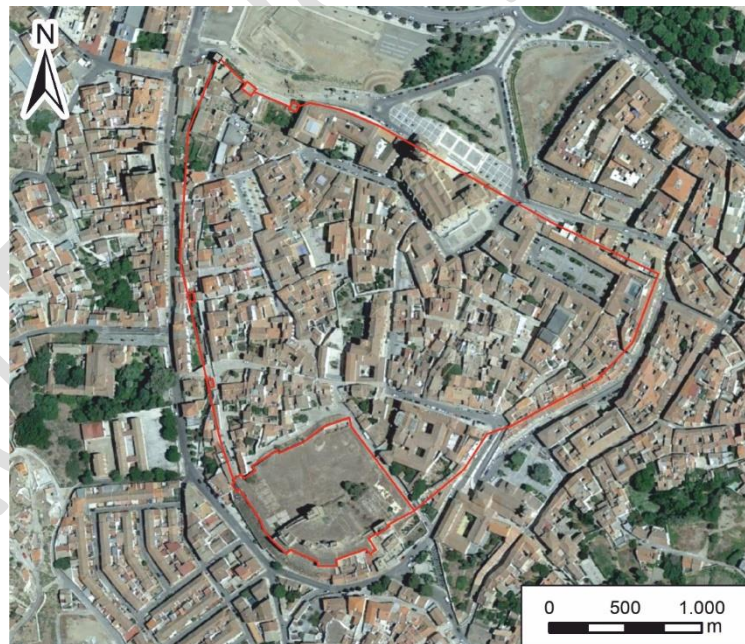


Figure 2. Aerial view of the Alcazaba and the walls of the Medina of Guadix. J. Rouco Collazo. Base map: National Geographic Institute.





Figure 3. Surveying the topographic points of the Alcazaba of Guadix. J. A. Benavides López.



Figure 4. Aerial view of the Alcazaba with the position of the parallel trajectories programmed for the Unmanned Aerial Vehicle (UAV) by the Litchi app for Android <https://flylitchi.com>. J. A. Benavides López.

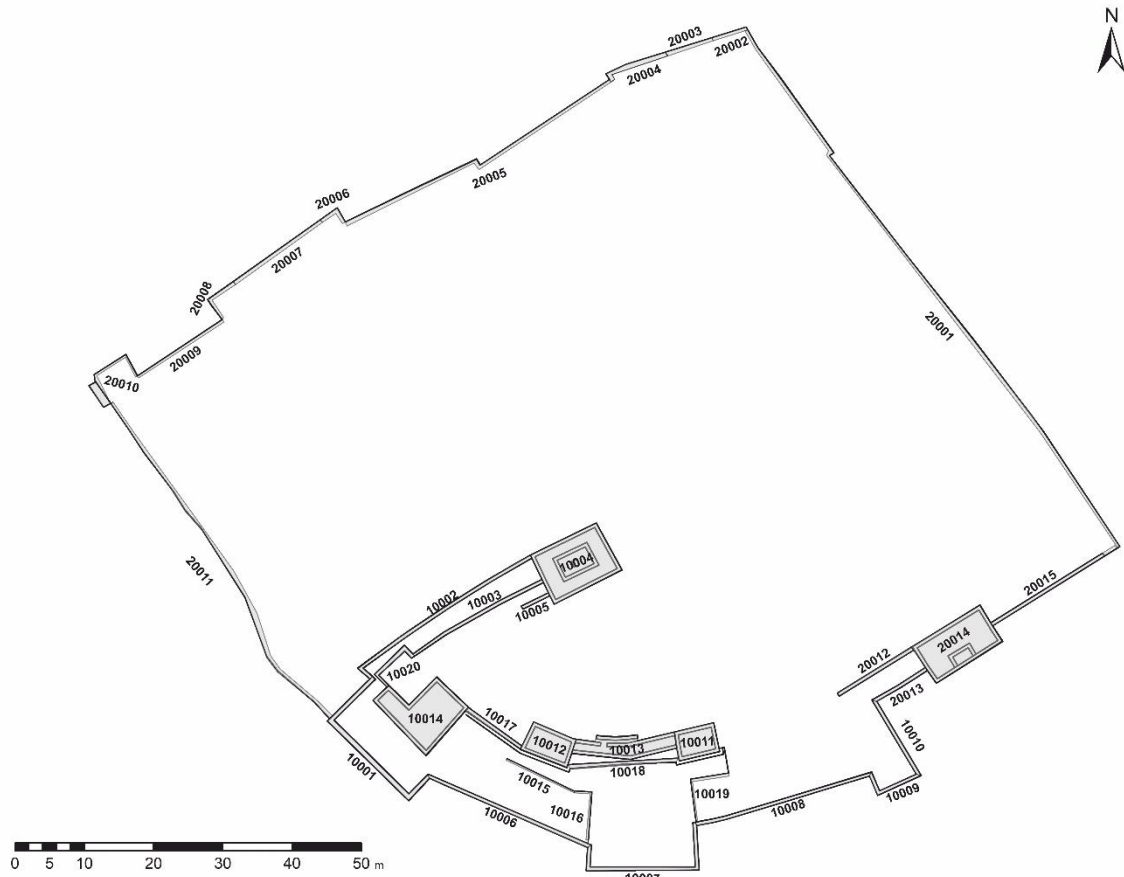


Figure 5. Map of the structure complexes (SC) of the Alcazaba of Guadix. J. Rouco Collazo.

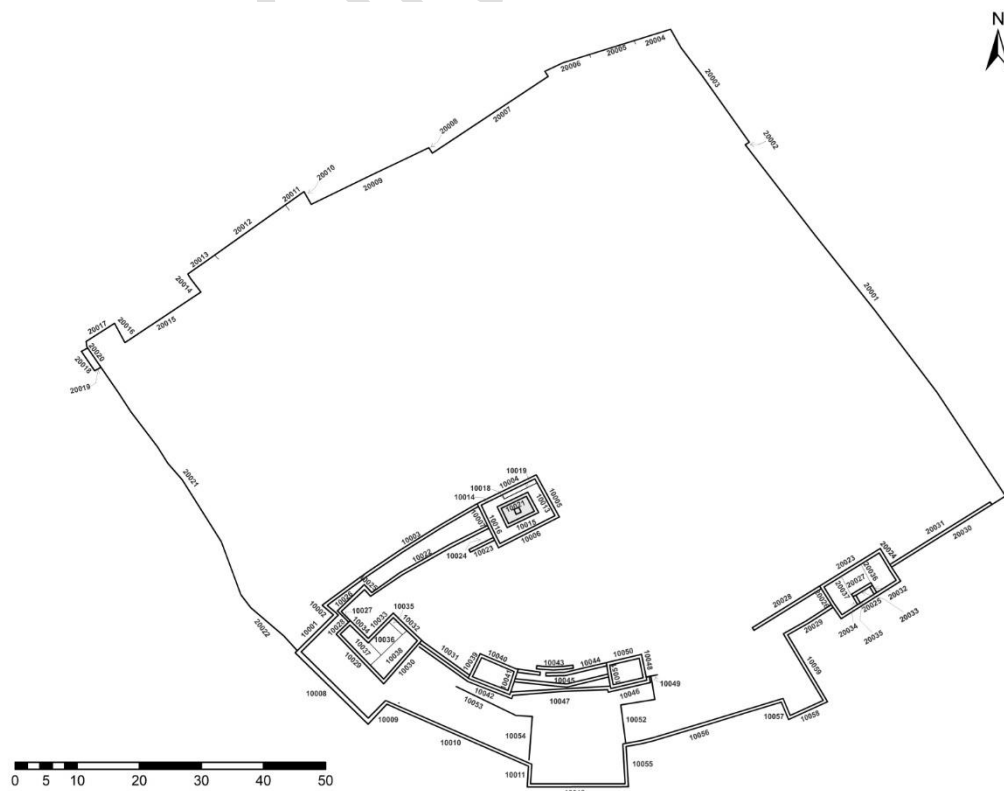


Figure 6. Map of the structures (S) of the Alcazaba of Guadix. J. Rouco Collazo.



Figure 7. 3D model of the Alcazaba and its surroundings based on a cloud point (44,875,872 points). View from the south. J. A. Benavides López.

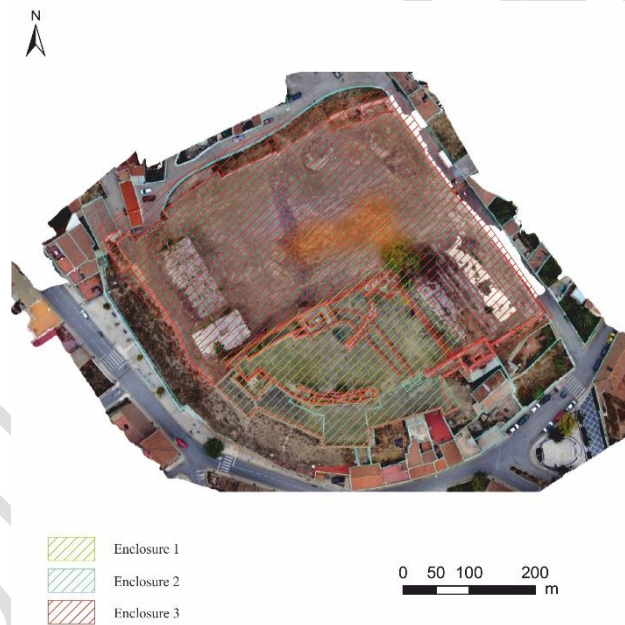


Figure 8. View of the enclosures of the Alcazaba of Guadix. J. Rouco Collazo. Base map National Geographic Institute.



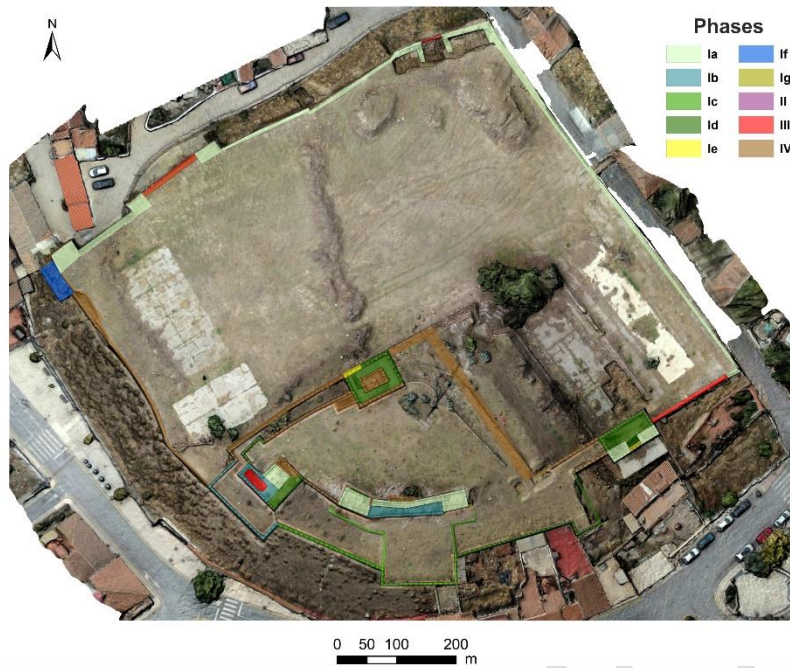


Figure 9. Building Phases of the Alcazaba of Guadix (summarized). J. Rouco Collazo. Base orthophoto J. A. Benavides López.

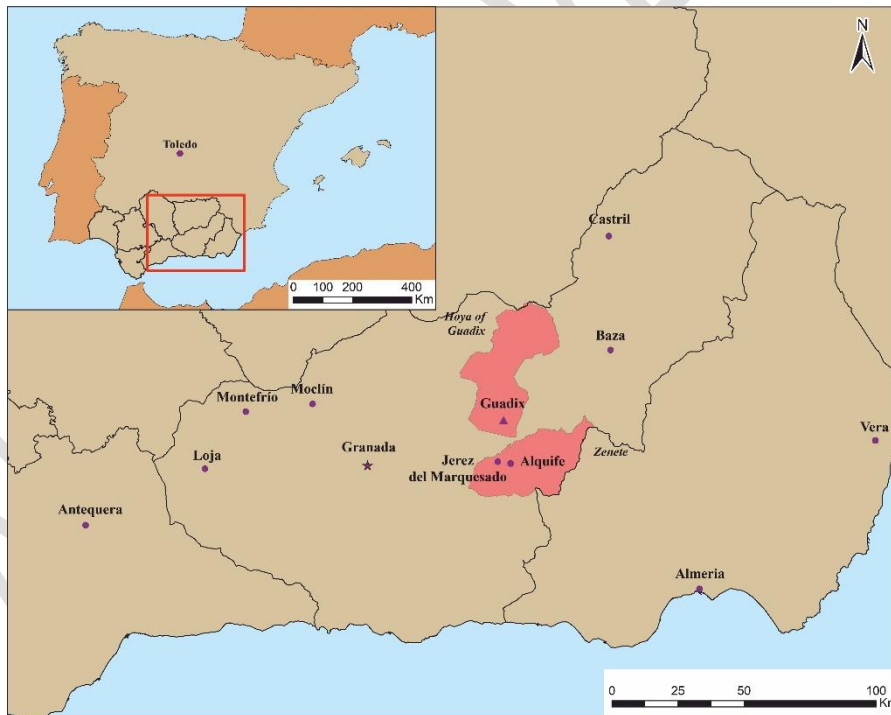


Figure 10. Places cited in text with the division of modern provinces of Andalusia region. J. Rouco Collazo. Base map National Geographic Institute.





Figure 11. Features of the North Gate of the Alcazaba during the archaeological excavation of 2009. This gate, flanked by two hollow *calicanto* towers (Subphase Ia) offered a direct access to the fortress from the Medina. J. M<sup>a</sup>. Martín Civantos.



Figure 12. Remains of the bent entrance ramp with the forward bastion that protects the North Gate (Subphase Id). J. M<sup>a</sup>. Martín Civantos.

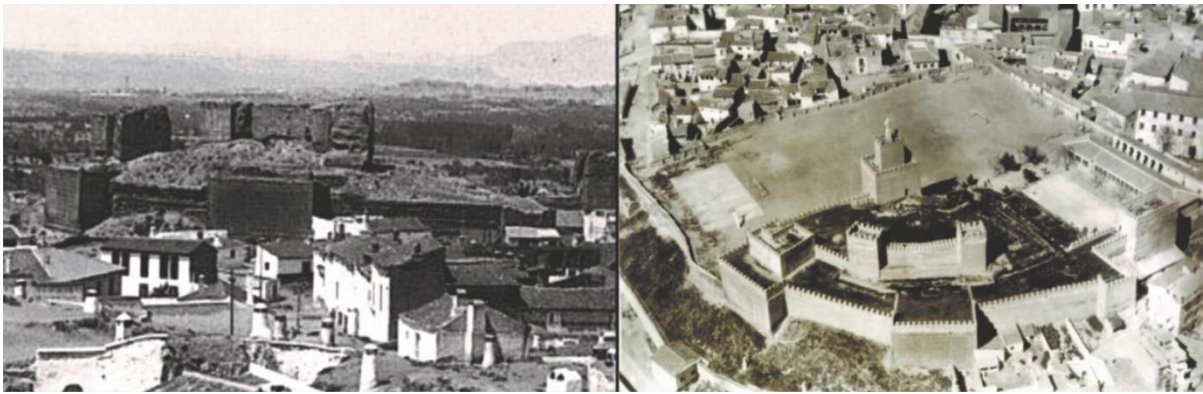


Figure 13. Transformations of the Alcazaba in the 20<sup>th</sup> century. a) The fortress at the outset of the 20th century. b) Renovations after the Spanish Civil War (1936-39).

Photographs: a, General Archive of the Administration. b, patrimonioguadix.es.

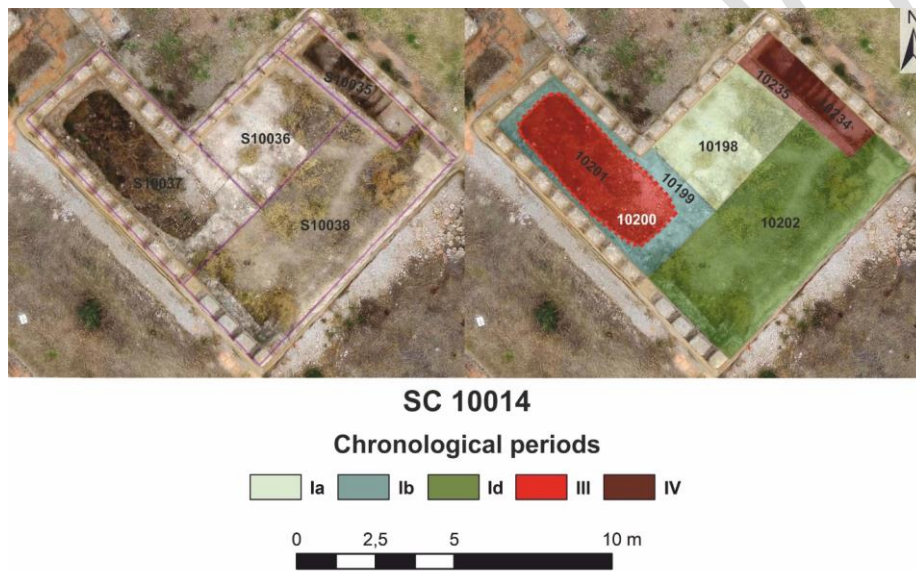


Figure 14. Evolution of Tower 10014. J. A. Benavides López and J. Rouco Collazo.

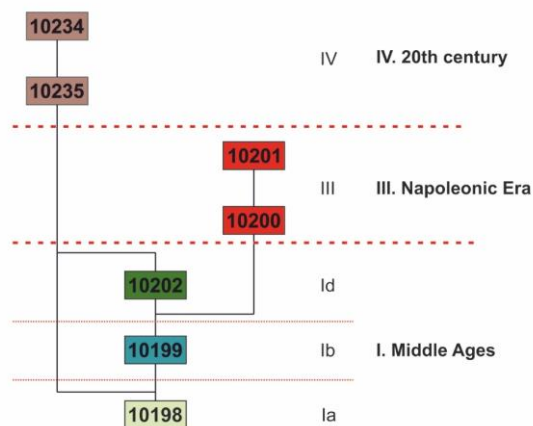


Figure 15. Matrix Harris of Tower 10014. J. Rouco Collazo.

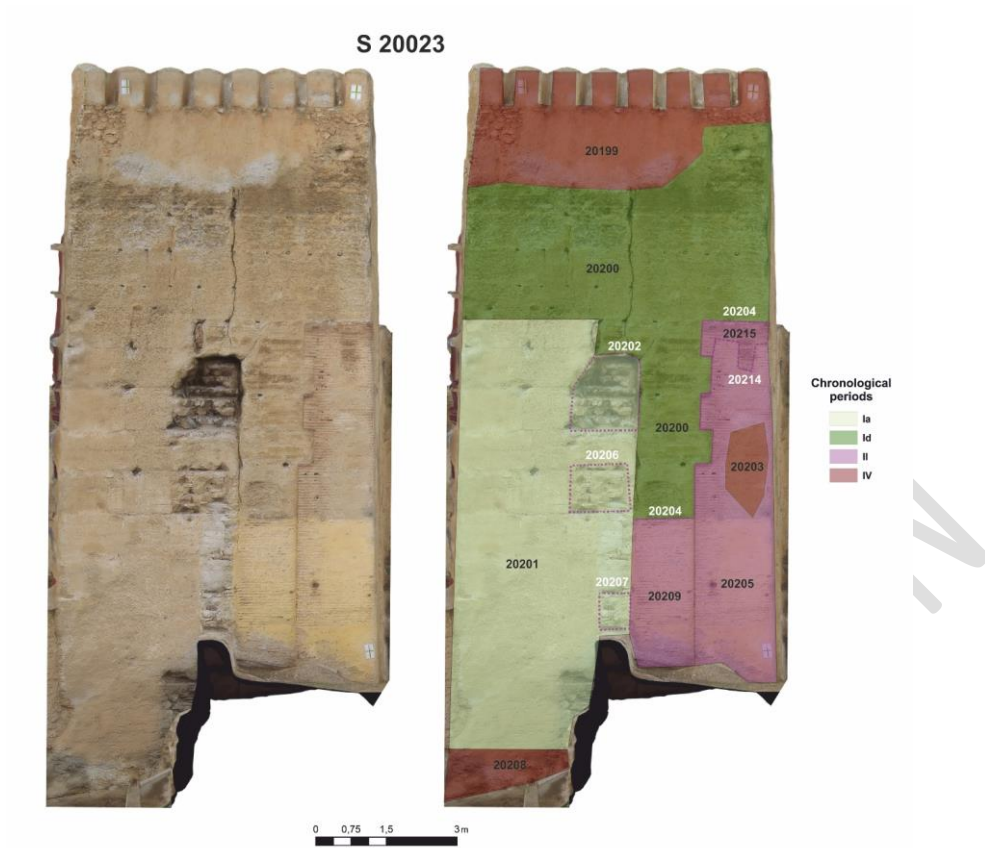


Figure 16. Evolution of Structure 20023 of Tower 20014. J. A. Benavides López and J. Rouco Collazo.

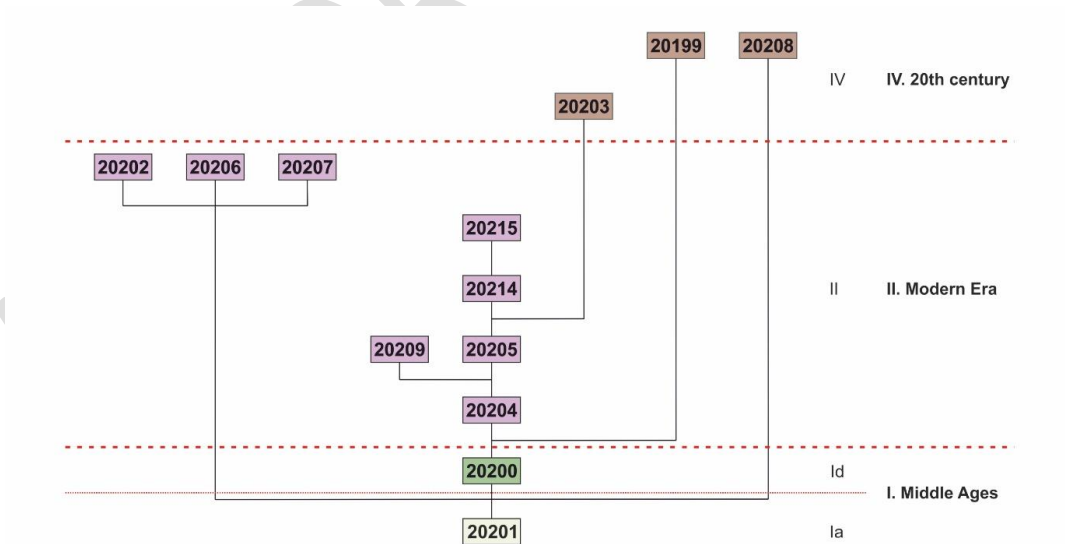


Figure 17. Chronological sequence of Structure 20023 based on the Harris matrix. J. Rouco Collazo.





Figure 18. *Calicostrado* wall (SU217) that forms the murder hole of Tower 2014 (Subphase Ig). J. Rouco Collazo.

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