The Complex of *villa rustica* Near Blagoevgrad, Bulgaria – Archaeology, Possible Reconstructions and Some Ideas Using New Technologies

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The largest archaeological site in Bulgaria was excavated near Blagoevgrad over the last two years (2017-2018) [Dimitrov et al. 2018, 374-377; Dimitrov et al. 2019, 380-382]. This is a huge Roman villa (an area of over 30 decares), with production centres for ceramics, metals and other materials, the family tomb and part of the nearby village. The chronology is the 1st–4th century AD. A Roman military diploma from the year 74 AD was also found there. The villa is located on the route of the new motorway from Bulgaria to Greece. That is why it is imperative to use all new technologies for digital documentation and repairs in these rescue excavations. In order to rescue these archaeological structures, which will soon be lost in the field, our large team carried out a complete photogrammetry of architectural complexes from the site, aerial photography, orthophotography and graphic reconstructions and produced a complete virtual tour of the separate premises of the villa and the tombs. The main idea of the scientists, excavating the villa, is to create a new museum (in situ), along the motorway, on that part of the site that will be preserved. This museum, which will expose the tombs and large parts of the villa, will offer virtual tours of the complex, exposed finds, graphic reconstructions, and most of all 3D visualisation of the villa complex.

INTRODUCTION

In this Roman *villa rustica*, discovered on the route of the new motorway from Sofia to Thessaloniki, Greece, all archaeological structures are localized very close to the town of Blagoevgrad [Dimitrov et al. 2018, 374-377]. The newly found site is 400 m. long. Therefore heavy rescue excavations have been carried out in these large complexes (Fig. 1).

Fig. 1. General view (panorama) of the whole site No. 2 along the route of the Struma Motorway, near Blagoevgrad, Southwestern Bulgaria. Excavations 2017-2018

All the archaeological complexes, layers and materials were unearthed during active archaeological excavation works, lasting for nine months in the period from April 2017 to July 2018. The excavations were carried out by the following team of archaeologists: Associate Professor Zdravko Dimitrov, PhD, team leader, Assistant Professor Milena Raycheva, PhD and Nikolay Rusev, PhD, deputy team leaders, and Associate Professor Lyudmil Vagalinski, PhD, all of them from the Department of Classical Archaeology of the National Archaeological Institute with Museum at the Bulgarian Academy of Sciences. Over 250 workers, 47 archaeologists and more than 20 interdisciplinary experts were involved in the excavation works.

In this particular case a large part of the complex could be preserved. The Roman villa, the bath to the villa, the family tomb and the church, constructed for the late antique village, are scheduled to be restored and displayed. However, the real field archaeological situation that was unearthed on a space of 60 decares cannot be completely preserved – on the one hand because the route of the future motorway runs across this area, and on the other hand – because the ground surface has been severely broken by deep ploughing. The land in the "Shirinite" (the "Widths") area was agricultural throughout the socialist period in Bulgaria.

Therefore, in view of preserving the original archaeological data, and also in view of producing a complete reconstruction of this huge archaeological complex consisting of a villa, tomb ensemble and a village, we need to make use of the new technologies – digital documentation, visualization and 3D reconstructions.

In the end the Ministry of Culture in Bulgaria decided that one third of the site should be allocated to the route of the motorway to Greece, another third of the site, bordering on the motorway, will be dedicated to a future museum, and the family tomb and the church will be transferred and reconstructed on the last third of the original site, next to the museum (Fig. 2).

Fig. 2. The new idea for preserving the site – the main building of the villa with bath, church and tomb form a huge museum centre in situ, next to the motorway

NEW METODS AND TECHNOLOGIES USED IN THE EXCAVATIONS

In order to rescue these archaeological structures, some of which will be shortly lost in the field, our interdisciplinary team produced a complete photogrammetry of the archaeological complexes on the site, aerial photos, orthophotos and graphic reconstruction, a complete virtual tour of the individual premises in the villa and the family tomb.

The main purpose of the scholars is to set up a new museum in situ, along the route of the motorway, on the part of the site that will be preserved. This museum, around which the tombs and large parts of the villa will be displayed, will offer virtual tours of the complex, will have various finds and graphic reconstructions on display, and above all – a 3D reconstruction of the villa complex.

Site no. 2 of Struma Motorway LOT 3.1. covers the distance between the villages of Pokrovnik and Zelen Dol on the right bank of the Struma River, right opposite Blagoevgrad.

The area of the rescue archaeological excavations in 2017-2018 covered 60 decares – 600 m long and 100 m wide. The remains of the Roman villa, the tomb and the village were spread on 38.4 decares (about 400 m long). The entire site was divided into three sectors: a "north" sector, a "central" sector and a "south" sector.

THE ARCHAEOLOGICAL REMAINS - VICUS, GRAVE COMPLEX AND ROMAN VILLA RUSTICA

In the "north" sector remains of a large village from the Roman imperial period were uncovered, dated to the 2nd-4th century AD. There we registered 26 non-solid buildings made of pebbles bonded with mud (Fig. 3).

Fig. 3. Aero-photography of the northern sector – Roman vicus next to the villa complex

Only the foundations of all of them have survived. In terms of functions these are residential buildings, small yards and streets between them, as well as a number of workshops and small storage premises. This outlines a typical provincial village from the Roman imperial period, meeting the production and daily needs of the adjacent large Roman villa.

The most interesting and best preserved architectural complexes were unearthed in the "central" sector. The archaeological structures in this place developed over a long period of time – from the 2nd-3rd c. AD to the middle of the 5th century AD and again in the Ottoman times in Bulgaria.

In general here were placed a huge grave complex – Building № I, the most interesting and the best preserved archaeological structure in the whole site. It is very close and well connected with the Roman *villa rustica* to the south. Here we registered four cultural layers (Fig. 4).

The first layer contained only remains of one or two buildings. It dates to the 2nd–3rd cc. AD. The second layer, which dates definitely to the 3rd c. AD, contains huge courtyard and the building inside. This is a large family tomb representing a burial memorial (mausoleum) in the centre surrounded with a wall (Fig. 5).
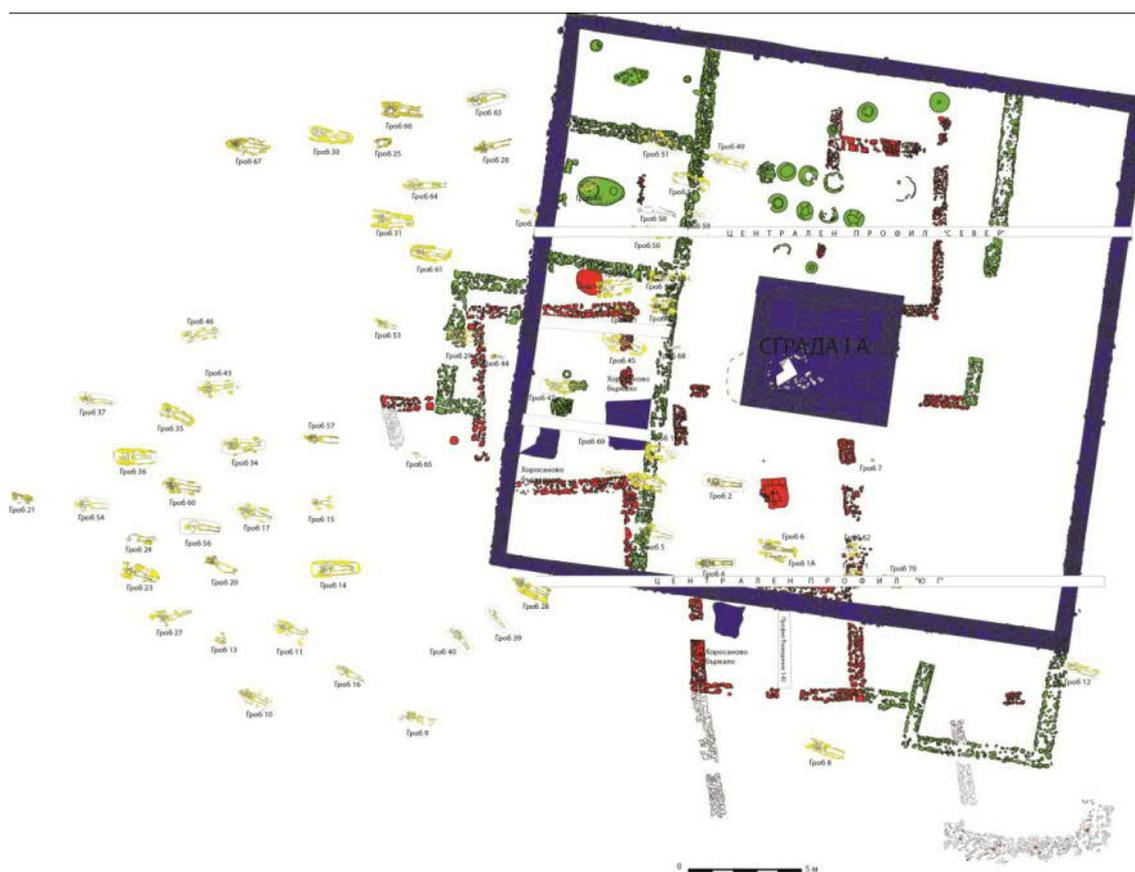
Fig. 4. General plan of the four cultural layers in the central sector – I layer (red): 1st construction period, structures before grave complex; II layer (blue): a grave complex, a Roman family tomb (mausoleum); III layer (green): storages from the late Antiquity; IV layer (yellow) – a necropolis from Ottoman period, the 17th-18th century

Fig. 5. The grave complex – a family tomb built like a mausoleum complex surrounded by the wall (peribolos)

These burial ensembles date to the second half of the 3rd century AD and were in use till the early 4th century. AD at the latest[1]. In the next, third layer, of this zone the mausoleum was abandoned after the population converted to Christianity and all the complex was transformed to a storage facility (Fig. 6).

Fig. 6. Reconstruction of the complex in Late Antiquity – storage premises with many pithoi in situ

New premises from the 4th-the first half of the 5th century AD and over 30 pithoi dug into the ground were localized here. These last complexes were raised to ashes during a huge fire in the middle of the 5th century AD, most probably during the raids of the Huns in the 40s[2].

The last, fourth layer, consists of a huge necropolis with 70 graves from the Ottoman period (17th–18th century AD), placed accidentally here and dug into the ancient ruins.

Exactly the mausoleum from the second layer is the most important archaeological complex in the whole site. This Roman family tomb consists of a big surrounding wall, which shapes the whole sacral space enclosing it in a wide yard of about 1 decare.

The cult building itself was localized in the centre of the yard – a mausoleum consisting of two parts: a structure above the ground made of mortared stones and bricks (*opus mixtum*) and a structure under the ground (*hypogeum*) which is the tomb (Fig. 7).

The structure above the ground was erected high above the surface level (resembling an antique temple – outer dimensions: 6.5 m in the east-west direction and 5.75 m in the north- south direction). This cult and tomb structure was richly decorated. The team unearthed two thresholds (within the building itself) and an Attic-Ionic base (found not far away in the field (Fig. 8)) attesting the configuration and decoration of the building. Moreover, two big limestone blocks (found also not far away in the field) seem to have belonged to this "temple" section of the mausoleum complex as well.

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[1] At this early stage of the study, this is just a general chronology. It will be specified after the analysis of the finds and bones of the tomb.

[2] The latest coin under these destructions is from the first half of the 5th century AD (No. 1677/2018; diameter 14 mm; sector M 87; level 334.70 m, probably Theodosius II (408-450).
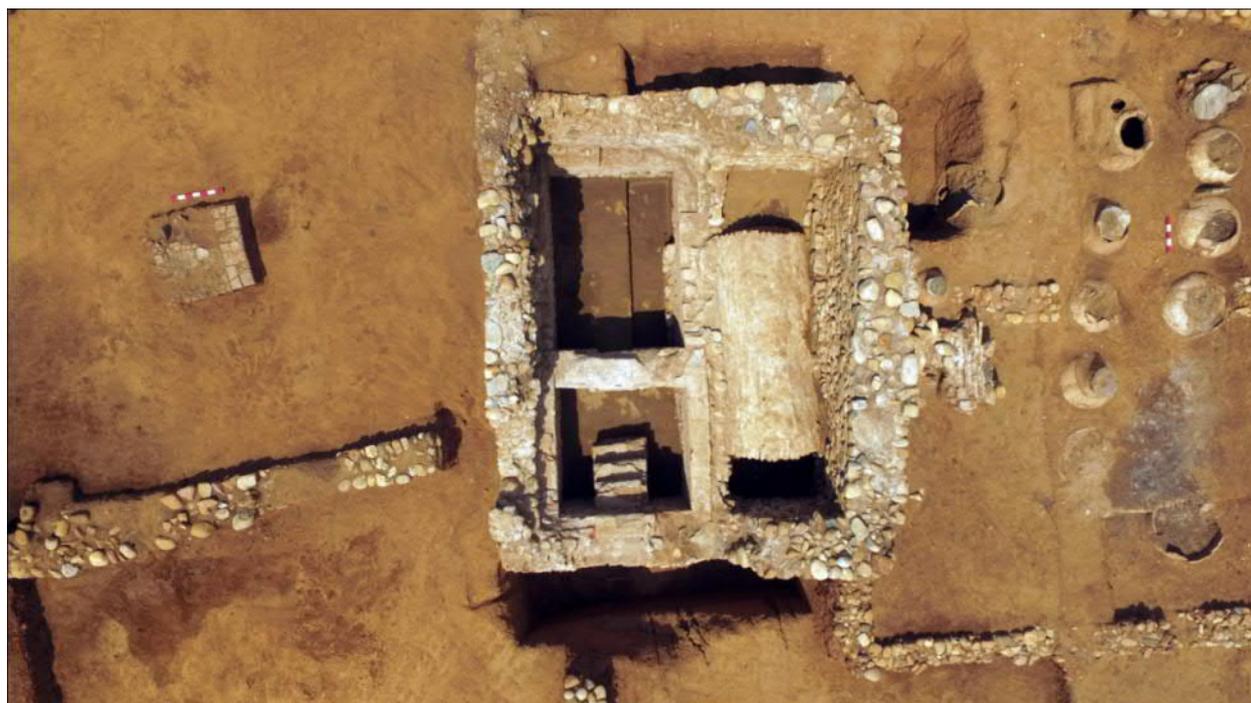
Fig. 7. Inside the mausoleum – burial chambers, stairs and construction of the hypogeum part

The following were uncovered in the underground part (*hypogeum*): stairways (3 big steps made of bricks), an antechamber and two burial chambers – one of which was robbed in Antiquity, and the other one has survived intact (Fig. 9).

Fig. 8. An Ionic base from the Attic type found on the terrain next to the mausoleum

Destructions from the roofing were found in the first burial chamber (measuring – 2.20 m x 1.97 m), which was a barrel tomb; however, a golden ring was also unearthed, perhaps from the burial inventory. The robbers failed to collect it. The bones in this burial chamber were found in disorder in the antechamber. The bones are believed to have belonged to several individuals, yet the bones are subject to an anthropological analysis. The second burial chamber has survived intact from the time of the funeral (measuring: 3.30 m x 1.40 m outside; 2.30 m x 0.90 m inside). It was carefully excavated for 7 days.

Fig. 9. The tomb complex, hypogeum inside – two chambers, antechamber and stairs

The architectural structure consists of a barrel vaulted burial chamber with a brick floor. It was built entirely of Roman bricks bonded with mortar. The foundations are made of rough stones, with no bonding at all, which are dug in the clay layer under the burial chamber.

In the burial chamber proper, bodily remains of a man were found along with a number of objects in situ, the way they must have been laid during the funeral ritual (inhumation, performed on the clay floor, the body was aligned in the west-east direction). The burial inventory consists of two glass vessels (Fig. 10), a clay lamp (Fig. 11) and bronze objects, which are writing tools (Fig. 12). Several textile fragments were unearthed in this important archaeological situation, yet they are difficult to interpret before being reconstructed. Chances are that these are not only fragments of the clothes of the deceased, but also of the material the body was wrapped in (a shroud or any other enveloping garment in which a dead person is wrapped for burial).

All the material found in the tomb dates back to the end of the 3rd century AD- the beginning of the 4th century AD – writing tools, glass vessels and clay lamp [Eckardt 2018, p. 38-39, fig. 2.8; Isings 1957, 157-158, Form 127; Fünfschilling 2015, p. 101, Abb. 128,2; Kuzmanov 1981, p.10-20].

Fig. 10. A glass amphora in situ by the excavations in the tomb chamber No. 2 – 25.04.2018

The bath was added to the villa complex (Fig. 14). This structure was built in the *opus mixtum* technique bonded with mortar. On the terrain we found seven premises from this bath and two construction periods, dated back to the 4th century AD.

The biggest architectural remains in site no. 2 were found in the "south" sector. On an area of over 8 decares we found remains from a Roman *villa rustica* having more than 40 premises (Fig. 13), two interior peristyles and two exterior peristyles for the cargo carts.

Fig. 11. A clay lamp in situ by the excavations in the tomb chamber Nr. 2 – 25.04.2018

Fig. 12. Bronze objects – writing tools (stilus, box, ink cartridge and little chain) in situ in the tomb chamber Nr. 2 – 25.04.2018

Fig. 13. The Roman villa rustica – general chronology from the 3rd-5th century AD

During the latest stage of living in the area (5th-6th century AD) there was an early Christian church in the easternmost section of the site. This is a single-apse, single-nave church (Fig. 15). The two very intriguing architectural complexes (the bath and the church) date to different periods. For instance the bath was appended to the villa in the 4th century AD and was reconstructed and rebuild after the middle of the century. It belongs to the second, third and fourth construction periods of the villa (4th-first half of the 5th century AD). At least four construction periods were identified in the whole villa – from the second half of the 3rd century to the 5th century AD (Fig. 16). Certain zones of the villa were destroyed by fire just like building no 1 (the family tomb).

Fig. 14. The bath – built in the northern part of the Roman villa complex in 4th century AD

Fig. 15. The early Christian church (5th-6th century AD) – built over the ruins of the Roman villa

On the other hand, the early Christian church was built after the villa was abandoned. It is the cult building of the late village (post-villa settlement), which was built in the ruins of the old Roman villa in the 5th-6th century AD.

It was precisely after these invasions in the second half of the 5th century, quite likely by the Huns, that the lifestyle in this place changed – people returned to settle in the ruins of the big villa, but lived in a much more primitive way. The so-called post-villa micro-vicus appeared. During this new development stage the ruins of the big building were reused to erect a small church for the population that had already converted to Christianity (Fig. 14).

This place was inhabited by peasants in the vicinity from the second half of the 5th century AD to as late as the reign of Justinian (527-565), the period to which the latest finds and coins from the site date.

In these uncertain times people lived in the former villa and the vicus, appearing on top of it, only in peaceful periods. However, as the settlement was not fortified, a fortress was built not far away – 2.5 km to the northwest, near the village of Zelen Dol. The peasants from the Struma River valley hid behind the walls of this fortress during the numerous invasions by the Huns, Avars and Slavs, which were commonplace in these lands in the 5th-6th century AD.

ANALOGIES AND SUMMARY OF THE ARCHAEOLOGICAL RESULTS

Finally, in conclusion, it is possible to mention that the Roman *villa rustica* near Blagoevgrad is a typical villa complex for the provincial system of the Roman Empire. The main models started from Italic aristocratic homes and residences and developed in the provinces [McKay 1998, 100-114, fig. 38-42; Ward-Perkins 1994; Percival 1987, 527-546; Mielsch 1987]. Although there is no luxury in it, it is one of the largest in Bulgaria, compared with villas in Montana, Armira and Madara [Dinchev 1997, 32, 34-35, 38, 55-60, 74-79]. This new complex is a major contribution to the study of villa ensembles in the western part of Bulgaria.

Quite a few similarities in the architectural plan can be noticed in the villas of Mursalevo and Montana [Dimitrov 2017, 73-88; Alexandrov 1980, 12, fig. 1; Alexandrov 1981, 50; Alexandrov 1984, 12, fig. 1], as well as in the large residences of Kostinbrod and Nis [Dinchev 2003, 8-61, fig. 5-7; Petrovich 1993, 30, fig. 9].
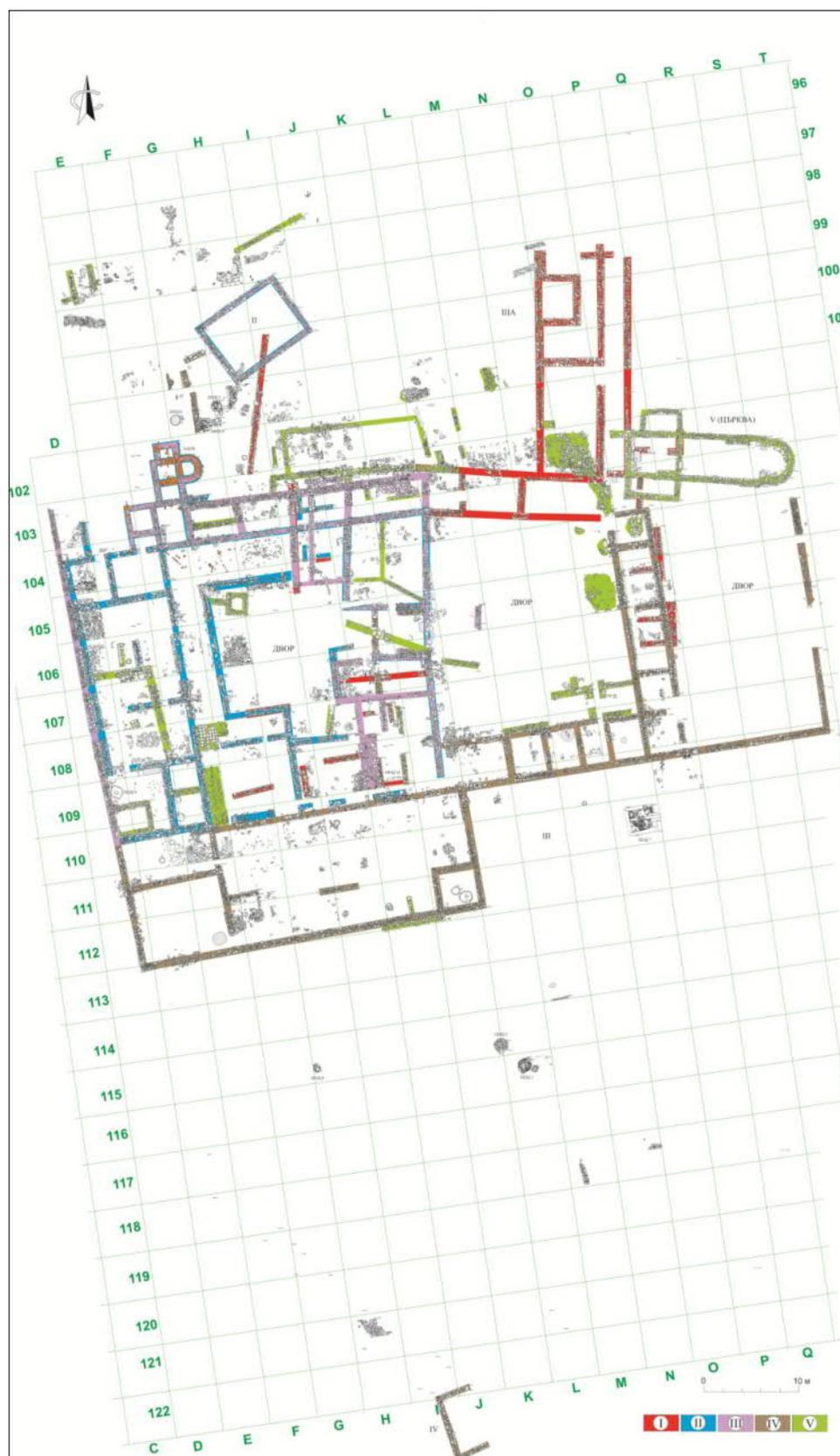
Fig. 16. Five cultural layers in the zone of Roman villa – I layer (red): buildings before the late Roman villa was constructed; II layer (blue): the Roman villa, 1st period, the first half of the 4th century AD; III layer (purple): the Roman villa, the second period, after the middle of the 4th century AD; IV layer (brown): the Roman villa, the third period, the end of the 4th-5th century AD; V layer (green): the vicus, post-villa living in the area, the second half of the 5th-6th century AD

A total of 2700 finds were unearthed in this big architectural complex along the Struma Motorway: coins, ceramics, jewellery, household objects, weapons and even a large fragment of a Roman military diploma dating to 74 AD.

As a result of the excavations in building no 1 (the Roman family tomb), building no 3 (the Roman *villa rustica*), building no 5 (the Early Christian church), the adjacent more than 25 buildings (belonging to the Roman *vicus* to the north) and 18 pottery kilns (Fig. 17) we have obtained excellent data, which provides wonderful opportunities for potential virtual reconstruction. The cultural layers have been fully examined, the horizontal and vertical planning of the building has been perfectly identified. We also have many architectural details, various wall tracts and a drain-channel system that allow us to make a variety of reconstructions.

ADDED REALITY AND RECONSTRUCTIONS OF THE GRAVE COMPLEX

The modern busy life and the rapid development of high technologies provide new opportunities to display the archaeological finds. At the same time the archaeological site must be tourist-friendly, so that tourists can understand what is displayed and can appreciate the significance of the finds. The new technologies allow for more flexibility, better visibility and more details without damaging the finds.


Fig. 17. Pottery kiln no 18 – the region of building XXIII (A-B 56-57), a general view at the end of the excavations

The 3D visualizations, the "Added Reality" (AR), virtual tours and documentaries help tourists understand better the job the archaeologists have done. It is similar to the case of the mausoleum complex, where it is possible to make very good reconstructions of the main grave-building (Figs. 18, 19) and of the whole courtyard also (Fig. 20). These reconstructions are close to reality and by using some new technologies and virtual effects it could be much more intriguing for the visitors. The objective of the team is to have high technologies in place so that while looking at the ruins the visitors can effortlessly gain an overall understanding of the whole context. It is often the case that tourists have limited time to spend in a museum, therefore the information should be dynamic and the ideas should be easy to see. For instance, an added reality by a 3D holographic effect can demonstrate on the basis of the remains of a kiln what the whole kiln looked like and what it was used for, thus arousing a stronger interest in the site.

This will be coupled with reconstructions, acted and graphic alike, and shown at the site itself, rather than broadcast on a special program. In such an environment the film would be easy to understand and useful, and the tourists will not be bored. The team is developing a complete vision about the particular site at the Struma Motorway: a virtual tour can take the tourists back to the time when the archaeologists unearthed the finds before the motorway was constructed; 3D visualizations will develop the whole building, inside and outside, starting from pictures of the ruins; and actors can add information about the functions of the building. This is a very fast and appealing visualization with multiple effects: Interest arousing, clear and understandable message about the period, an enjoyable learning process. Our purpose is to make tourists willing to come back to the site, because tourists see the site as significant, accessible and fun.

Fig. 18. An ideal graphic reconstruction of the complex of the Roman mausoleum
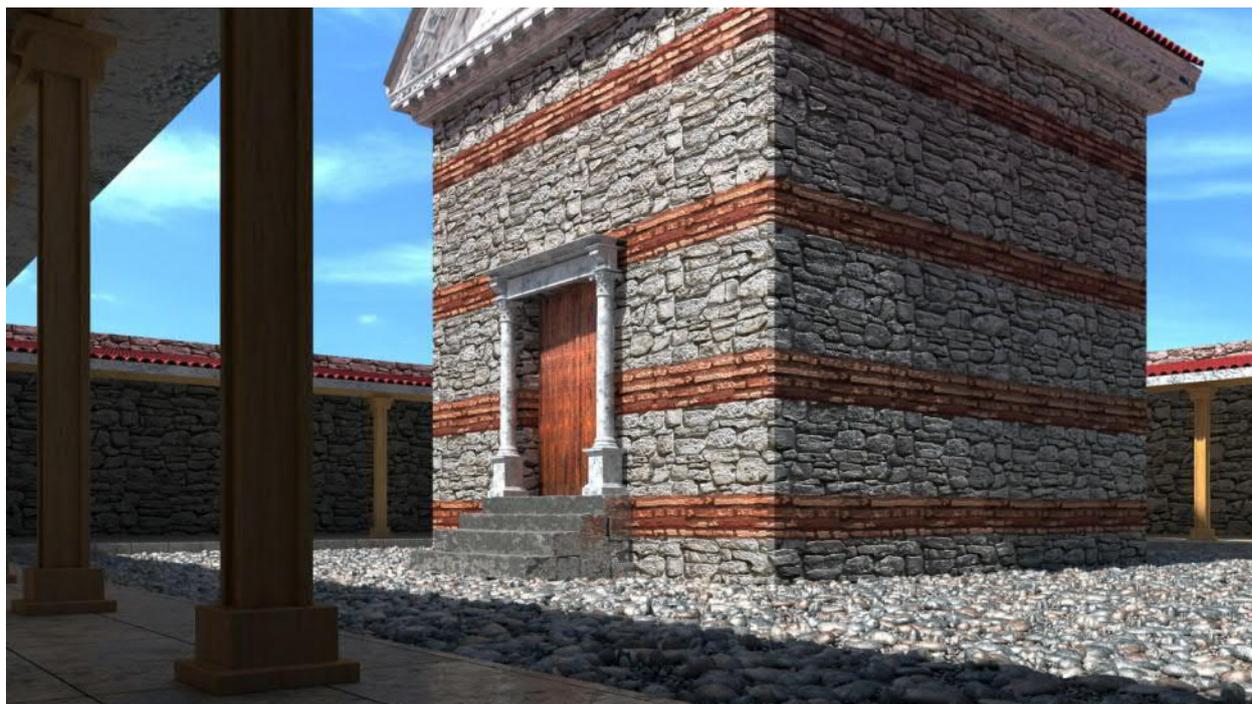
Fig. 19. The main façade of the mausoleum complex – view from the east

Fig. 20. Reconstruction of the courtyard of the complex

In Bulgaria there are many remains from ancient towns, fortresses and temples. A lot of ruins have survived from the Thracian kingdoms, the Roman Empire, the First and the Second Bulgarian Kingdoms. The archaeological excavations reveal the layout of the buildings, whose remains are at best not higher than 1-2 metres or only the foundations were localized.

On the other hand the ordinary visitor finds these structures, even conserved, difficult to understand.

In order to provoke the interest of the mass visitors it is necessary to restore the presumable shape and height of the building. This would convey a better idea of the building and the history would be easier to perceive by interpreting it in a certain context.

The reconstruction of any building on the basis of scarce archaeological finds is a complex and risky job. The point is that apart from the relatively accurate layout and the eventual finds inside or around the building, there are no other data about it.

It is more easily, more effective and less expensive to solve the problem with the preservation and "displaying" of the site by employing interactive and accessible contemporary information technologies through multimedia. The virtual buildings are easy to change at later stages, when new data may be obtained from the current studies or archaeological excavations regarding the architecture of the monument. Moreover, the different stages of the existence of the monument can be sown dynamically. For this purpose first of all high-quality content needs to be created as a 3D model, and afterwards it needs to be visualized in the most appropriate way for the visitors, so that they can have a really great experience and learn something new about the history of the visited monument.

I believe that it is most appropriate to use the AR technology to visualize a cultural monument, considering the following:

The AR-software overlays virtual objects on video footage captured with a camera and gives users the impression that virtual objects actually exist in real-world environments and allows comparison of virtual and real-world objects.

Visualization with AR creates a sense of real dimensions of the virtual reconstruction, something that is difficult and expensive to achieve with pure VR technology.

Parts or walls of the actual cultural site may be used in order to visualise the added information.

A scenario for cultural heritage reconstruction and visualization by using the AR technology based on mobile technology, and by using mobile devices (tablets, smartphones) to display the added content. The advantage of this option is that it does not require expensive specialised equipment for terminal devices. Users can have it independently on their mobile devices if they install the special software. With this option, 3D visualizations can be combined with an interactive guide to the archaeological site.

This requires a very good 3D model of the building from all possible angles throughout the site.

The "Virtual Reality" (VR) technology has already reached a level of maturity that allows it to be introduced into the liberal arts like education and cultural heritage. Recently, due to the significant research, the AR technology has been making a good progress. It expands the VR systems by mixing real and virtual elements into a continuous composite scene. By combining virtual reality with real-time video processing and computer visualisation technology, the AR systems deliver a natural view of real scenes and objects enriched with virtual objects and scenes. So today we have the potential to make the cultural and historical monuments of Bulgaria more accessible, more interactive and more interesting to the ordinary visitors.

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