

3D Reconstructions of Roman Buildings from the 1st century BC on the Celtic Hillfort in Bratislava

Margaréta MUSILOVÁ¹ | Jana MINAROVIECH²

¹ Municipal Monument Preservation Institute Bratislava | ² STUDIO 727 BRATISLAVA

Abstract: Recent discoveries of Roman buildings on the Northern terrace of the Bratislava castle and in the Castle courtyard from 1st century B.C., brought new questions and challenges. Roman construction techniques were brought into the milieu of Celtic settlements of Central Europe far from the Roman Empire. The Bratislava *oppidum* had an excellent strategic position; it was located on the Crossroads of Amber and Danube roads. The Celts who inhabited the *oppidum* with the Acropolis on the top of the Castle Hill had very close relationship with the Romans before the conquest of the Central Danube region. Archaeological research on the Bratislava Castle hill was conducted in the years 2008-2010 by the Municipal Monument Preservation Institute in Bratislava and in the years 2013-2014 in cooperation with a private archaeological company VIA MAGNA s. r. o. The first constructions identified by the archaeological research performed between 2008 and 2010 were Roman type buildings I and II, it means they must have been constructed for the Celts by Roman builders. Both masonry relics, dated to the period of 50/40 – 30/20 BC were found during rescue excavations on the northern terrace of the Castle Hill. This study presents for the first time a hypothetical reconstruction of two habitation constructions and an amphorae storehouse. On the basis of analogical situations and the information available up to now we propose a hypothetical reconstruction of these two buildings, which are situated in immediate proximity. A 3D model was created by the STUDIO 727 Bratislava, using laser 3D scanning.

Keywords: Early Roman architecture, Celtic oppidum, Bratislava

Archaeological research

Several Roman architectures from the 1st century BC were found during the recent reconstruction and renovation of the Bratislava Castle (Slovakia) (Fig. 1). The excavation works there had begun in 2008 and are ongoing to date, with an interruption in 2010-2013 (Figs. 2, 3). They were part of the Acropolis of the Celtic *oppidum*, stretching over the territory of the Old City of Bratislava (98 ha). The Bratislava *oppidum* played probably an important role up to the end of the later La Tène era. There are no parallels to these constructions to the North of the Alps (MUSILOVÁ & LESÁK & RESUTÍK 2012, 197-201). They have to be searched for either in Italy or in France, Austria and Spain. Such remains of monumental stone architectures were found for the first time in history in the Central Europe albeit there was a find of a huge masonry built gate found in Kapitulska Street 2a in the years 1965-67 and interpreted by the founder A.Vallašek and B. Novotny as a La Tène entrance gate so called Zangentor into the oppidum (VALLAŠEK 1973, 12-15; NOVOTNÝ 1979, 205-211). At this time, 50 years ago, it was a very courageous idea, but nowadays with the finds on the Bratislava Castle Hill it gives us a sense.

The archaeological research revealed an extensive construction complex built with the use of roman techniques of the late Republican and early Augustan Age and stretched over the entire area of the castle grounds. The architectures built by Roman architects included: stonework masonry with perfectly preserved wall coatings and mortar floors of terrazzo type, polychrome frescoes and a great hall with „*opus signinum*“ pavement, popular in Republican Rome and Early Imperial Rome from 2nd century B.C. – 1st century A.D (Fig. 4) (DE FRANCESCHINI et al., in print).

A particularly exciting discovery was a treasury of 22 golden and silver Celtic coins on the floor of the entrance hall of the *domus*, in the former Winter Riding Hall. The golden stater-coins bear the names of the Celtic rulers Biatec and Nonnos, dated between 60 – 40 BC. (Fig. 5) (MUSILOVÁ 2011, 187-206).

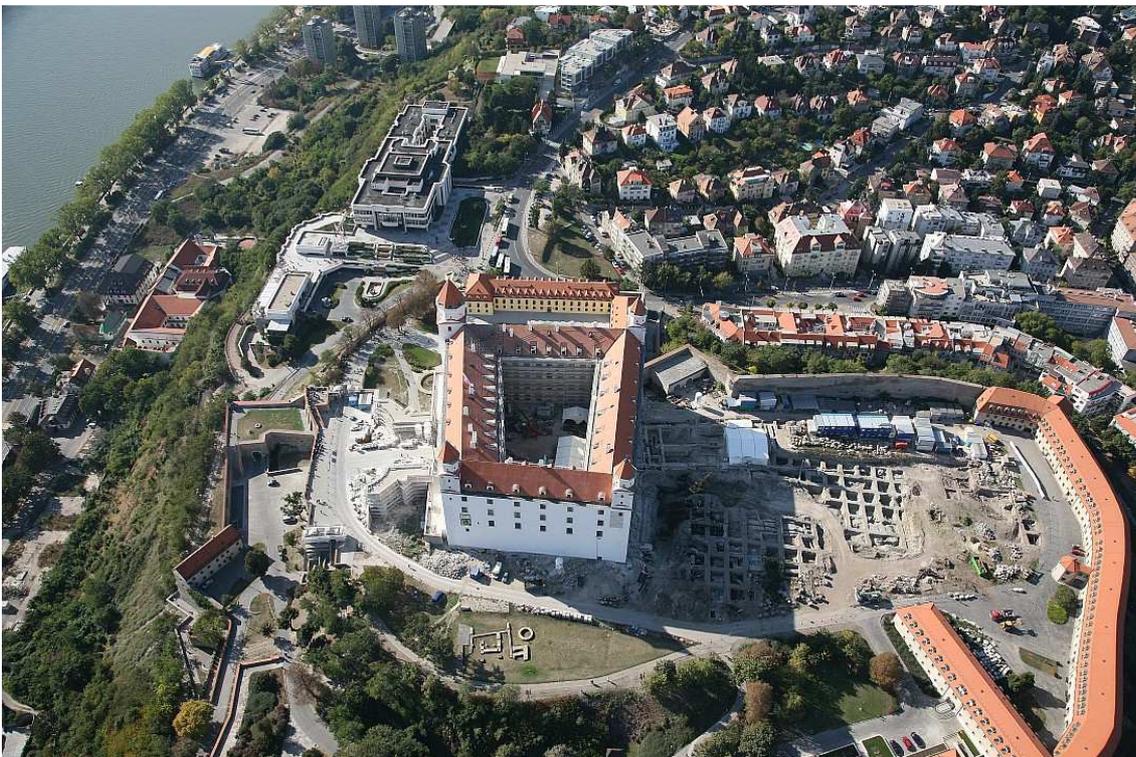


Fig. 1 – Bratislava, aerial view on the site. Foto: P. Chromek.

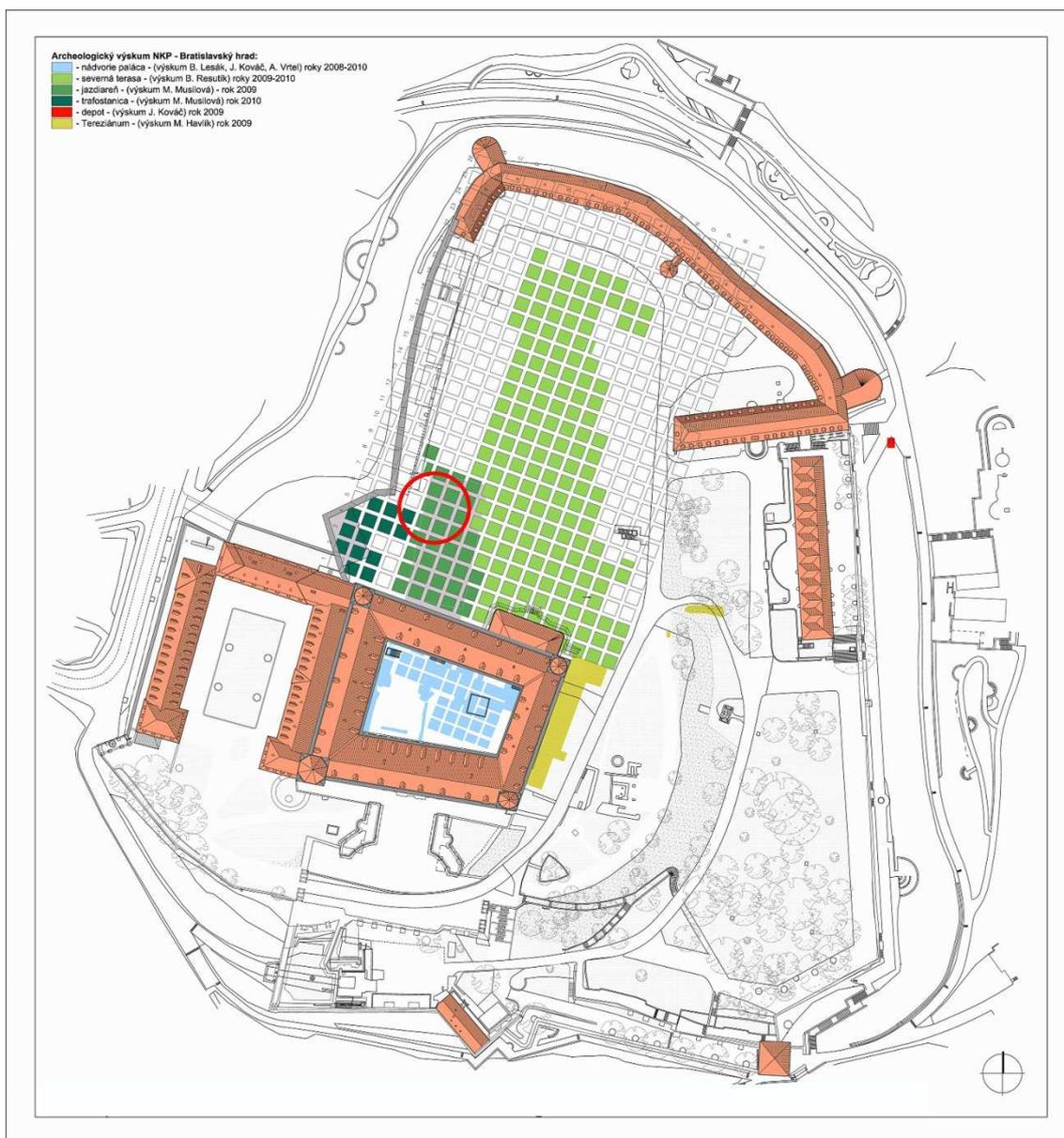


Fig. 2 – Ground plan of the Bratislava's castle area with archaeological excavation sites (M. Šabík, B. Gabura).



Fig. 3 – Bratislava Castle. Situation with the plans of Celto-Roman buildings on northern terrace discovered by research between the years 2008 and 2014. (M. Šabík and B. Gabura, P. Horanský).

Interpretation of the constructions

The Roman building I (*domus*) found in the locality of the baroque Riding hall, was oriented in the North-South direction and partially destroyed from the North by a medieval quarry (Fig. 6). The remaining 50 cm high walls of the two-room building consist of outer faces of quarried granite stones, laid in rows and limestone ashlars on the corners, bound by good quality gravel-and-lime mortar. The inner filling is of Roman concrete. The entrance, the so called Windfang (downwind), is located from the East, because of very strong winds coming from the North-West. The entry of the house was protected against cold and rain. Its raised doorsteps, which provided protection against rainwater running down the rocky slope, was cut low during the Baroque construction works and ground levelling for the Riding Hall project. At least two construction stages may be identified at the entrance or in the anteroom area (LESÁK & MUSILOVÁ & RESUTÍK 2013, 58).



Fig. 4 – Bratislava Castle, Winter Riding Hall, Roman building I. View of the antechamber from the east. Foto: M. Musilová.

The nearest analogies to that type of entrances and buildings from the 1st century BC we can find in Austria, Magdalensberg (SCHÜTZ 2003, 71-72). The largest stone buildings are - *principia*, representative house, temple, with four building phases from the pre-augusteian up to the claudian era (SCHÜTZ 2003, 59-66). The thickness of the preserved walls is about 30, 60 and 90/100 cm, which were multiples of the Roman foot. More massive walls, whose thickness ranged from 90 – 100 cm, were probably built to support the upstairs floors. The height of the building was approximately up to 10 m high (MUSILOVÁ & MINAROVIECH 2014, 73-95). This hypothetical reconstruction represents a building with one storey, with a saddle roof covered with wooden tiles. The height of the saddle roof was chosen because of possible snow fall and lot of rain precipitations. It is not excluded that terracotta tiles were used instead, but we did not find any of them. Access was probably provided by a wooden staircase and a massive timber doorway. The 190 cm wide anteroom passage was bent at a right angle and led to a large room of about 107m². The large hall (probably a storage room for precious commodity) was accessed by a set of steps made of hewn blocks. There was found a limestone ashlar (57×35×20cm) in the main hall. We suppose that it was part of the door treshold construction positioned under the door and proposed a double winged wooden door which could be opened into the entrance hall (*foris*). We can see this stone on the 3D model with texture (Fig. 7).



Fig. 5 – Treasure of gold and silver coins. Roman building I. Bratislava Castle 2009. Late La Tène period (80-60 AD). Foto: L. Lovíšková.

The interior face of the walls was plastered, small fragments of polychrome frescoes were found inside and outside of the building. Fragments of the Egyptian blue colour were found in the entrance corridor (MUSILOVÁ & MINAROVIECH 2014, 82). A whole blue pigment ball was also found in the Roman building II (BARTA et al. 2011, 94). It is a typical pigment colour found also on other Celtic sites like Corent, France (POUX 2011, 230) or Magdalensberg, Austria (KENNER 1985, Taf.26). There were found outside of the Roman building I small fragments of various coloured wall plasters together with terrazzo type mortar floor pieces, during the excavations in 2014 (MUSILOVA et al. 2014). Through Ramanospectral analysis were detected various pigments: white, yellow, blue and red (GREGOR 2014). Appearance of *marmorino* gives to it a special bright lustre effect (MUSILOVÁ & MINAROVIECH 2014, 83). We used the red coloured plaster with a white band for decoration of the main room. The inspiration was taken from Pompei (Casa dei Casti Amanti) even it was made there in a different later period (CAROLIS 2005, 325). The interior could have been decorated also in the second Pompei style, like it is know from Magdalensberg (Haus der Iphigenie) (KENNER 1985, 133-134).

We suppose that the upper partition walls were made of *Fachwerk* type using wattle, as we know it from Magdalensberg (SCHÜTZ 2003, 73), Herculaneum (ADAM 2005, 216), or Corent (POUX 2011, 51).

There are two types of poured hydraulic mortar flooring (proto-cement) that have been preserved in the spacious two-room building. The first type I was made of small pebbles extracted from the Danube and set in an about 10 cm thick layer of firm lime mortar poured directly on the underlying rock. The other type of mortar floor, found in the anteroom, consists of two layers; the upper one consists of black and white crushed stones while the bottom one was made of river pebbles too. In addition, a third and most sophisticated type of floor (*terrazzo*) was later found in a secondary position (LESÁK & MUSILOVÁ & RESUTÍK 2013, 59-61). This was the reason why we proposed an upper floor, based on the finds of a third terrazzo type of mortar flooring (Fig. 8).

The debris in the ruins contained pieces of late La Tène pottery and a huge amount of Roman wine and even oil amphorae of Adriatic and Tyrrhenian type from the second third of the 1st century BC. As no later-period potsherds were found, it is estimated that the building was destroyed sometime in the 1st century AD. On the picture (Fig. 9) we can follow the process of the creation of the 3D model of an amphora. We created a typological sort of an amphora from various amphorae sherds. In the Roman times the amphorae were made after a certain type, so it was not difficult to make reconstruction of the e.g Lamboglia 2 or Dressel 6A or Dressel 1C, 2, or 4 types (KYSELA & OLMER 2014, 167-188). The texture was copied from the original pictures of found amphorae (Fig. 9).

A wine cellar, probably an amphorae warehouse, was found south of the *domus* (Roman building I). It was long 15,11 m, 1 – 1, 2 m wide and 775 cm deep, hewn into the bedrock. The short sides were oriented East-West. The house with the amphorae warehouse we suppose, belonged to a wealthy merchant, either of Roman origin or one that was used to Roman habits of food preparation and consumption (Fig. 10a, b). The architectures are dated preliminarily to the period of 50/40 – 30/20 BC. Similar building of a wine cellar was found in France in the location Corent (POUX 2011, 122-126, 85). The ground plan found in Bratislava has a very resembling plan with Corent. The Celts from Bibracte (Mount Beuvray in France) had very similar wine cellars too (MUSILOVÁ & MINAROVIECH 2014, 90, fig. 24). The concept of a wine cellar comes from ancient Rome (POUX 2011, 130). One *cella vinaria* was found under the Sallustius gardens, near Porta di Popolo (Porta Flaminia), also hewn into the bedrock. Groundplan of this winecellar was documented by Jean Baptiste Séroux d'Agincourt (POUX 2011, 131) at the beginning of the 19th century.

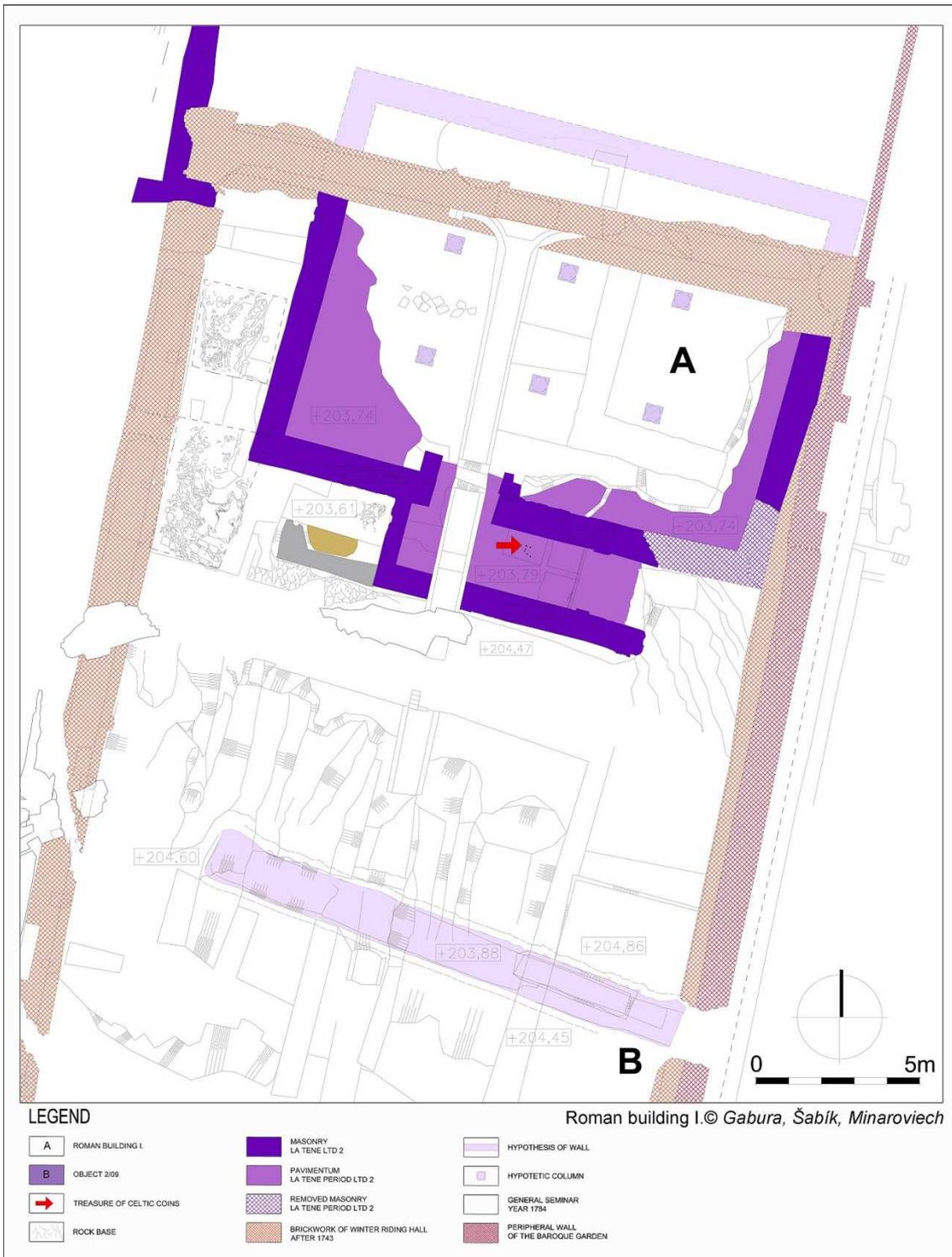


Fig. 6 – Plan of the Roman building I. (B. Gabura, M. Šabík, J. Minaroviech).

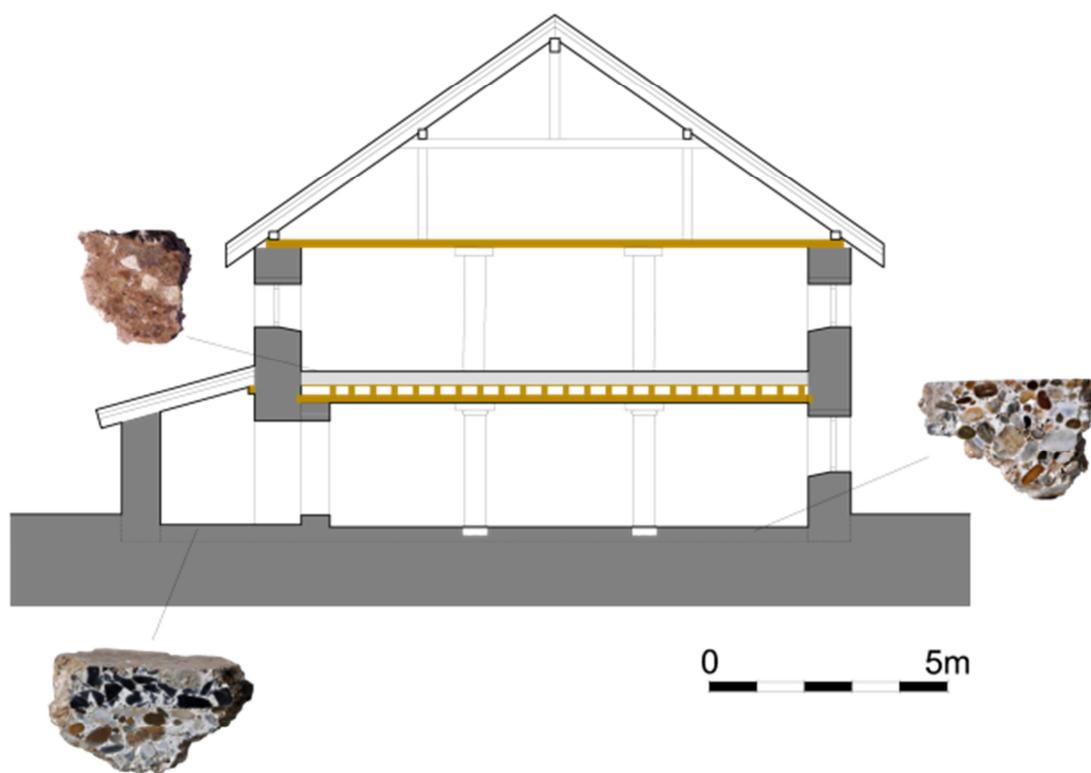


Fig. 7 – Hypothetical reconstruction of Roman building I according to the research of M. Musilová. Design: J. Minaroviech. Fragments of the discovered pavements No.1, 2, 3.



Fig. 8 – Interpretation of the sill stone with pivot. Foto: M. Musilová. Design: J. Minaroviech, J. Šimún.

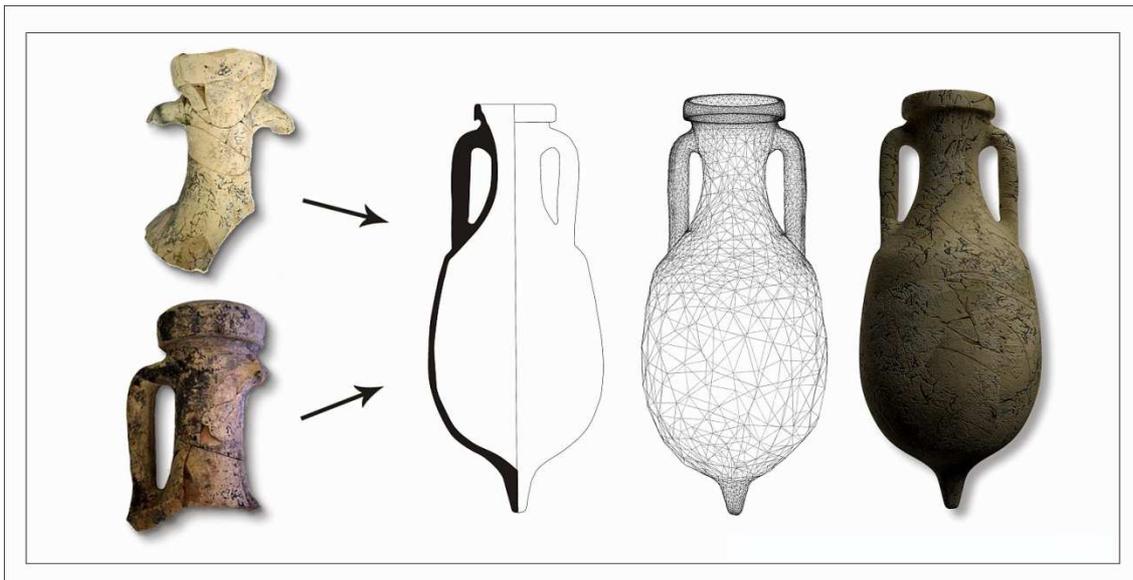


Fig. 9 – Design of the amphora. Design: J. Kysela, J. Šimún.



Fig. 10^a – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09) according to the research of M. Musilová and J. Minaroviech, visualization: J. Šimún.

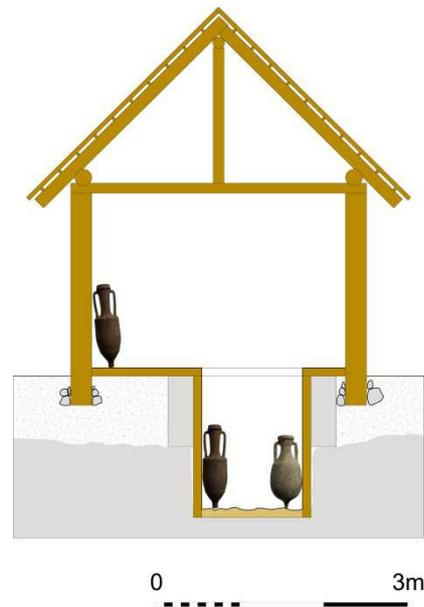


Fig. 10^b – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09), design: J. Minaroviech.

3D modelling

There was elaborated a geodetically documentation in AutoCAD programme and photogrammetric measurement during the archaeological surveys (Fig. 11). The advantage of such a graphical output is the possibility of using of vectors by creating additional technical documentation.

3D space scanning, by the laser scanner RIEGL (STUDIO 727), was performed on the Roman building I by the end of the excavation process, in autumn 2009, also using the photogrammetry images (Fig. 12). The final modification of the laser outputs was made by Cyclone software. Post processing was done by Autodesk Maya and MeshLab softwares. On the figure 13 we can see a mesh-model regenerated from LIDAR data (Fig.

13). 2D documentation was made by AutoCAD. We use as well program Capture Reality which is capable to create 3D model on the base of pictures and LIDAR data. Tiff or png files are available for creating 2D documentation. On the basis of the analogical situations and the information available up to now, we propose a hypothetical reconstruction of these two buildings, which are situated in immediate proximity to each other. The hypothetical reconstruction represents the building with one story, with a saddle roof covered by wooden tiles. Since the building is incomplete from the Northern side, we calculated the overall ground plan using similarities with the Roman building II (RESUTÍK 2014, 153-166) on the Northern terrace of the Bratislava castle (Fig.14). The 3D models created by the STUDIO 727 Bratislava were possible thanks to the financing through the SEE Danube Limes Brand project 2012-2014.



Fig. 11 – Photogrammetric measurement of the Roman building I. (B. Gabura, M. Šabík).



Fig. 12 – Scanning by the laser scanner RIEGL. Foto: M. Musilová.

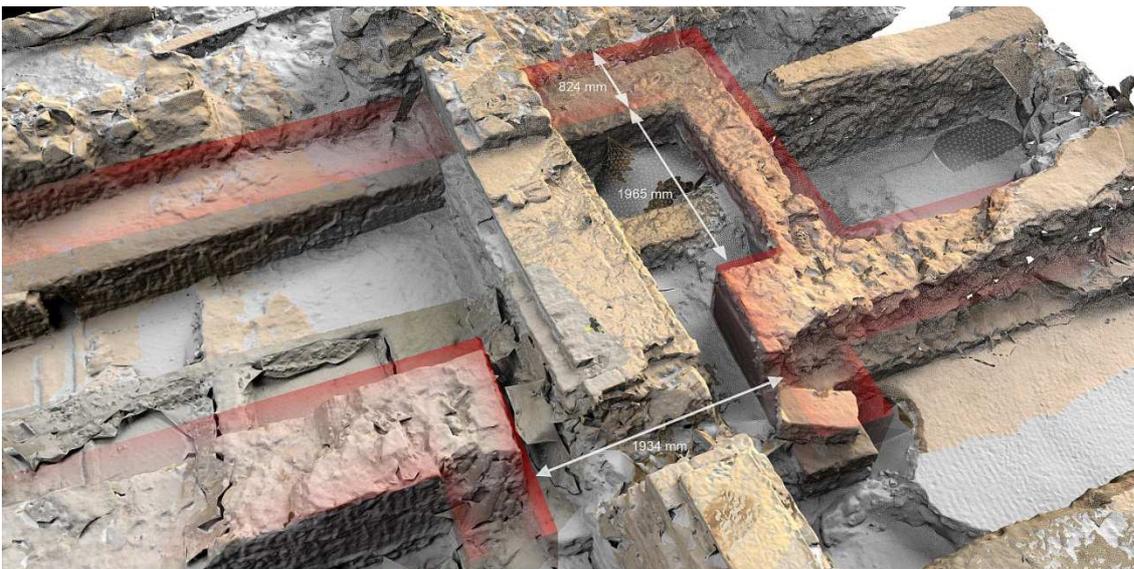


Fig. 13 – Draft model of the Roman building I. Visualization: M. Hazlinger.

Conclusion

The contributions are based on the present state of architectural knowledge. They attempt to create a hypothetical model of the buildings RSI, RSII and of the deposit of amphorae based on the preserved walls, plasters, paving and individual construction elements. We are aware of the fact that these hypothetical ideas are not final. The model may evolve through further material study and through analogy comparisons. Discussion raised concerning such models will contribute to their perfection. It is essential to start somewhere. The architectures are now backfilled for their protection (because of construction works going on the site), they should be reopened in the near future. Some unclear points may be clarified and specified. Future research on the site cannot be excluded, either.

The Celts liked the hardly reachable elevated sites, which made it easier for them to control the area. We assume that the urban design of the Bratislava acropolis was similar to the Magdalensberg estates. Around the central area the remaining buildings were grouped. The Bratislava acropolis was probably inhabited by the social elite, the commander's family and priests. The Celts kept contacts with the Greeks, Etruscans and the Romans, and their advanced construction technologies may have inspired the Celts to hire the Roman builders. Our findings indicate these as well.

The architectures found so far on the territory of the Slovak Republic from the La Tène period were mostly built of wood. The Celts on the South-East of Slovakia usually dwelt in earth-wooden and wooden buildings (PIETA 2008, 89-108). The castle research indicated this type of buildings, either in the former research of T. Štefanovičová and B. Polla from the 1960s (POLLA & ŠTEFANOVIČOVÁ 1959) or in the research of the team B. Lesák, J. Kováč and A. Vrteľ in the courtyard of the castle (VRTEĽ et al. 2014, 41-67). Architectures discovered in Bibracte and Magdalensberg indicate that the Celts in the 1st century BC would change their building technologies. The corner lime ashlar, line masonry bound with quality hydraulic lime mortar, polychrome plasters, quality pavement of the opus *signinum* and *terrazzo* type, column beads are all elements imported to us. In the period of the 1st century BC only craft workshops, masters were able to perform the crafts activities; they would travel for the job to the place of destination. The answer to the question whether the Celts were able to build such houses by themselves is that the given “crafts-industrial know-how” was imported to us as early as in the 1st century BC. Fashion trends, which were common in the whole Roman Empire, arrived to the region far from the Centre of Rome with certain time delay.



Fig. 14 – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09) and Roman building I according to the research of M. Musilová and J. Minaroviech, visualization: J. Šimún.

The buildings discovered are a part of the ancient buildings complex on the Bratislava castle hill, discovered by research in the period of 2008-2014. The finds bear the testimony to the period when the Bratislava Celts got into first touch with the economic and political interest of the Roman Empire back in the times of its

aspirations lying far north of the Danube and before the emergency of its border fortification concept. As the archaeological research results indicate, at the turn of the millennia, the Bratislava Castle hill saw its prime days and played a prominent role in a broader European context of political and historical development. The boom, however, was soon followed by a sharp decline. The Romans changed their plans to conquer the North, the border line was set up along the Danube River and its vigilant guards prevented any attempts at re-settlement of the abandoned *oppidum* for several centuries (LESÁK & MUSILOVÁ & RESUTÍK 2013, 68). Thanks to the scanned data we can return to the scanned object and eventually measure again the problematic data. There is still the possibility to change the 3D model on the basis of newly gotten information. The original buildings will be presented in the near future thanks to the interventions of the professional researchers and wide public interest.

References

- ADAM, J. P. (2005). *La construction romaine*. Paris. Picard, 216.
- BARTÁ et al.: BARTA P., B. LESÁK, M. MUSILOVÁ, B. RESUTÍK (2011). *Svedectvo času (Z najnovších a starších nálezov na Bratislavskom hrade)*. Katalóg výstav. SNM-Historické múzeum. Bratislava 2011.
- CAROLIS, E. de (2005). *Vila mystérií*. In *Pompeje. Historie, život a umění zmlzelého sveta*. Ed. PANETTA, M.r., garamont 2005, 315-337.
- DE FRANCESCHINI et al.: DE FRANCESCHINI M., B. LESÁK, M. MUSILOVÁ (2016). *An opus signinum pavement in the Celtic oppidum of Bratislava: a unique testimony of the links between the Middle Danube valley and Roman Italy in the 1st c. BC*". In: *Bibracte: Publication des actes du colloque tenue en Toulouse 2.-4.octobre 2013, intitulée: Les modèles italique en architecture d'Ind e 1er siècle en Gaule et dans les régions voisines*. Bibracte, in print.
- GREGOR M., D. PIVKO (2010). *Mineralogicko-petrografická charakteristika plniva dlažby z Bratislavského hradu - zimnej jazdiarne*. Predbežná správa z výskumu. Bratislava 2010. Nicht publizierte Handschrift.
- KENNER, H. (1985). *Die römischen Wandmalereien des Magdalensberges*. Klagenfurt, Verlag des Landesmuseums für Kärnten, Taf. 26, 229.
- KYSELA, J., F. OLMER (2014). *The Roman amphorae discovered in the excavation of the Bratislava castle – a preliminary study*. In: *Bratislavský hrad dejiny, výskum a obnova*. Eds. Musilová, M. – Barta, P. – Herucová, A., Bratislava: MÚOP, 167 – 188.
- LESÁK, B., M. MUSILOVÁ, B. RESUTÍK (2013). *Bratislava Castle – The First Roman Monumental Architecture from the 1st century BC*. In: *Frontiers of the Roman Empire. Slovakia*. Eds. Jílek S., Musilová, M. Rajtár, J., Bratislava MÚOP, 48-69.
- NOVOTNÝ, B. (1979). *Das Oppidum von Bratislava*. In: P. M. Duval/V. Kruta (zost.): *Les mouvements celtiques du Ve au 1er siècle avant notre ère. Actes du XXVIII colloque organisé à l'occasion du IX^e Congrès International des Sciences Préhistoriques et Protohistoriques, Nice, le 19 septembre 1976*. Paris 1979, 205-211.
- MUSILOVÁ, M. (2011). *Bratislavaer Burg - Arx Boiorum im Lichte der neuesten Archäologischen Funde, Archäologische Forschung – Winterreithalle*. In: *ANODOS. Studies of the Ancient World 10/2010*. Trnava, 187 – 206.
- MUSILOVÁ, M., B. LESÁK, B. RESUTÍK (2012). *Prienik rímskej kultúry do neskorolaténskeho prostredia. Najnovšie výskumy na Bratislavskom hrade*. In *Dejiny Bratislavy 1, Brezalauspurc na križovatke kultúr*. Eds. Šedivý, J. – Štefanovičová, T., Bratislava: Slovart, 197-201.
- MUSILOVÁ, M., J. MINAROVIECH (2014). *Hypothetical reconstruction of the Roman building I and the amphorae warehouse at the Winter Riding Hall on the Bratislava Castle hill*. In *Bratislavský hrad dejiny, výskum a obnova*. Eds. Musilová, M. – Barta, P. – Herucová, A., Bratislava: MÚOP, 73 – 95.

- MUSILOVÁ et al.: MUSILOVÁ M., A. ŽITŇAN, J. KOVÁČ, M. HORŇÁK (2014). Výskumná dokumentácia z archeologického výskumu NKP Bratislavský hrad – Severná terasa, plocha II a V. 1, 29/13. Pamiatkový úrad SR.
- PIETA, K. (2008). Keltské osídlenie Slovenska. Mladšia doba laténska. *Archaeologica Slovaca Monographiae* 11, Nitra, 89-108.
- POLLA, B., T. ŠTEFANOVIČOVÁ (1959). Historicko archeologický výskum Bratislavského hradu roku 1958. Nálezová správa V2, 1959. SNM-AM. Bratislava. Unpublished.
- POUX, M. (2011). *Corent. Voyage au Coeur d'une ville gauloise*. Paris: editions Errance, 230.
- RESUTÍK, B (2014). Celtic – Roman building II in light of the Mediterranean importation in a Celtic environment. In: *Bratislavský hrad dejiny, výskum a obnova*. Eds. Musilová, M. – Barta, P. – Herucová, A., Bratislava: MÚOP, 153 – 166.
- SCHÜTZ, M. (2003). Eisenfunde aus der Stadt auf dem Magdalensberg. Klagenfurt 2003.
- VALLAŠEK, A. (1973). Poznámka k najstaršej kamennej architektúre Bratislavy. *Pam. Prír.* 2, 1973, 12-15.
- VRTEL et al.: VRTEL A., B. LESÁK, J. KOVÁČ, I. STANÍK (2014). Neskoroláténske osídlenie na nádvorí paláca bratislavského hradu. In: *Kolektívna monografia prednášok z konferencie Bratislavský hrad - dejiny, výskum a obnova, konanej v dňoch 22. - 23. 9. 2014 na Bratislavskom hrade v rámci projektu SEE Danube Limes Brand*, Bratislava, 41-67.

Pictures/graphics

Fig. 1 – Bratislava, aerial view on the site. Foto: P. Chromek.

Fig. 2 – Ground plan of the Bratislava's castle are with archeological excavation sites (M. Šabík, B. Gabura).

Fig. 3 – Bratislava Castle. Situation with the plans of Celto-Roman buildings on northern terrace and courtyard of the palace discovered by research between the years 2008 and 2014. According to survey of M. Šabík and B. Gabura, adapted by P. Horanský.

Fig. 4 – Bratislava Castle, Winter Riding Hall, Roman building I. View of the antechamber from the east. Foto: M. Musilová.

Fig. 5 – Treasure of gold and silver coins. Roman building I. Bratislava Castle-Winter Riding Hall 2009. Late La Tène period (80-60 AD). Foto: L. Lovíšková.

Fig. 6 – Plan of the Roman building I. (B. Gabura, M. Šabík, J. Minaroviech).

Fig. 7 – Hypothetical reconstruction of Roman building I according the research of M. Musilová. Design: J. Minaroviech. Fragments of the discovered pavements No.1, 2, 3.

Fig. 8 – Interpretation of the sill stone with pivot. Foto: M. Musilová. Design: J. Minaroviech, J. Šimún.

Fig. 9 – Design of the amphora. Design: J. Kysela, J. Šimún.

Fig. 10 – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09) according to the research of M. Musilová and J. Minaroviech, visualization: J. Šimún.

Fig. 11 – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09), design: J. Minaroviech.

Fig. 12 – Scanning by the laser scanner RIEGL. Foto: M. Musilová.

Fig. 13 – Draft model of the Roman building I. Visualization: M. Hazlinger.

Fig. 14 – Hypothetical reconstruction of the amphorae storehouse (building No. 2/09) and Roman building I according to the research of M. Musilová and J. Minaroviech, visualization: J. Šimún.

Imprint:

Proceedings of the 20th International Conference on Cultural Heritage and New Technologies 2015 (CHNT 20, 2015)

Vienna 2016

<http://www.chnt.at/proceedings-chnt-20/>

ISBN 978-3-200-04698-6

Editor/Publisher: Museen der Stadt Wien – Stadtarchäologie

Editorial Team: Wolfgang Börner, Susanne Uhlirz

The editor's office is not responsible for the linguistic correctness of the manuscripts.

Authors are responsible for the contents and copyrights of the illustrations/photographs.