

Aims and restrictions regarding the illumination of the Roman Emperors Route in Serbia

Aleksandra M. Cabarkapa¹ and Lidija S. Djokic²

¹ University of Belgrade, Faculty of Architecture, Belgrade, Serbia, lidija@arh.bg.ac.rs

² University of Belgrade, Faculty of Architecture, Belgrade, Serbia, aleks@arh.bg.ac.rs

Abstract - A series of archaeological sites containing ancient Roman city remains which are constantly revealed from the past is located along the Danube river in Serbia. Even though the preservation process is timely, most of these sites have a number of visitors daily. In order to prolong the visiting hours, their illumination is extremely important. Torn between the aims and restrictions regarding the illumination of the archaeological sites belonging to the Roman Emperor's route in Serbia, this research culminated in a set of general recommendations for the illumination of such settlements. Special attention is given to the lighting of the site borders and its walls, entrances, towers, palaces, temples and monuments.

Keywords - archaeological sites, illumination, recommendations, Roman remains, Serbia

I. INTRODUCTION

THE Danube is one of the largest European rivers with a wide riverbed on its water course through Serbia. Far from Rome, on the unreliable and moody Danube, the Roman Empire established its eastern border, the Limes. In this area roads and military fortifications were built and used by the Roman legions in their campaigns against the barbarian tribes across the river.

The troops were followed by traders and craftsmen and soon towns sprang up along all major roads. Upper Moesia and Lower Pannonia roughly match Serbia's territory today. Starting from the 3rd century, over a period of some two hundred years, they developed from marginal border provinces to places of central events in the Roman Empire.

The Roman provinces in this area gave 8 emperors and among them were Constantine I the Great, Trajan Decius, Galerius and Aurelian (Fig. 1). Born either in the rich towns of the Limes, or in the rugged country land, some of them were to change the face of the world as it was known.

Along the Danube river in Serbia, the cultural route of the Roman emperors reveals ancient Roman settlements, roads, ruins and artefacts, among which is not only Felix Romuliana, included by UNESCO on the World Heritage list [1], but also Sirmium, Singidunum, Viminacium, Diana, Pontes, Trajan's memorial plaque, Naissus and Justiniana Prima (Fig. 2) [2].

Two archaeological sites will be presented below, in order to illustrate the importance of the Roman cities founded in the Danube region.



Figure 1. Roman emperors from the Danube region



Figure 2. The Roman emperors' route

II. VIMINACIUM

Once a Roman city and military camp, and now underneath crop fields, Viminacium covers an area of 450 hectares, with an inner city territory of 220 hectares (Fig. 3). In the last 30 years of the 20th century excavations revealed 13500 graves. The multidisciplinary team is expecting that the squares, temples, theaters, hippodrome, baths, streets and city districts emerge from the fields they have been covered by for centuries and become not only pieces of world cultural heritage, but also a recognizable symbol of the Danube region (Fig. 4 shows some of the artefacts) [3].



Figure 3. A model of Viminacium



Figure 4. Protected artefacts in Viminacium

Viminacium was the capital of the Roman province Moesia Superior, in late antiquity named Moesia Prima. Its six centuries long history shows dynamic development and a meeting point of the east and west cultures, due to which various artistic workshops emerged. As a result, some of the most valuable works of fresco painted mausoleums of late antiquity can be seen at this location. The Viminacium amphitheater was first built in the 2nd century, entirely out of wood. Later in the 2nd century a new one was built from wood and stone. It contains an oval arena, where the games were held. The capacity of the amphitheater was for around 7000 people. The reconstructed amphitheater is shown in Fig. 5.



Figure 5. The reconstructed amphitheater today

The settlement gained a city (municipality) status in the 2nd century under the reign of Hadrian, becoming Viminacium Aelium Hadrianum. In the 3rd century Viminacium became a colony with a right to mint coins. Through the 4th century Viminacium was an important episcopacy center. Ruined in the 5th century by the Huns, it was never re-established as a city.

III. FELIX ROMULIANA

Galerius who became the Emperor of Rome (293 311 AD) built a palace in the town of his birth and named it after his mother Romula. It was once a large urban settlement with numerous luxurious public and private buildings (Fig. 6). The complex of Felix Romuliana is walled by a double

fortification, an older one nested inside a younger one. The floors of the palace were covered by impressive and high quality mosaics, walls decorated with luxurious frescoes and facings of precious stone, as well as niches filled with sculptures carved of rare stone, such as the porphyry. The preserved east and west gates unite the two fortification walls. City gates with octagonal towers are rare and therefore significant. The arched entrances have been restored and they are accompanied with niches (Fig. 7) [1], [4].



Figure 6. A model of Felix Romuliana



Figure 7. The east gate viewed from the inside

The center of each of the architectural compositions is a temple, showing how significant sacred buildings were in the palace complex. Felix Romuliana contains buildings from different periods. The monumental palace with elaborate halls, peristyles and smaller chambers was erected at the end of the 3rd and the beginning of the 4th century. A spacious peristyle with a fountain leads to the most important room with an apse (Fig. 8).



Figure 8. Peristyle with a fountain

In the central part of the palace, later, at the end of the 5th or the beginning of the 6th century, an Early Christian church was built.

The materials used for building the complex were brick and stone. Except for the Early Christian church, built only from stone, all other buildings were built combining brick and stone.

IV. ILLUMINATION OF ARCHAEOLOGICAL SITES

Illumination of archaeological sites is applied to emphasize their cultural significance during the night. However, archaeological site lighting is limited by the fact that the entire complex is subject to strict conservation rules, meaning that electrical installations and luminaires are absolutely not allowed to affect the ancient surfaces (Fig. 9).



Figure 9. Archaeological remains in museum conditions

Usually luminaires can only be mounted on the recently constructed parts of the site, which are not subject to the protection rules. This results in numerous restrictions in the choice of luminaires and their positioning within the archaeological complex. Very often the solution is in freestanding luminaires on the ground, which can with some luck be hidden behind walls or columns.

If slanted roofs and domes need to be illuminated, the best solutions are reached by placing the luminaires at a

distance. On small surfaces appropriate effects are achieved by spot lights (Fig. 10), and for wide surfaces wide beam reflectors are a better solution. Nevertheless, a lot of archaeological sites in Serbia are not located in urban areas and the space in their immediate surroundings is fairly void, so setting up poles to carry luminaires is very often inappropriate.



Figure 10. Spotlights for emphasizing details

In each case it is important to analyze in detail the distinctive qualities of the space in order to form a lighting concept which stresses all site values in an attractive way. There are some general points which can be made and are usually employed in archaeological site lighting. For instance, it is important to distinguish from which distance and directions the site and its details can be seen, for it will affect the lighting solution. Also, if distinction between surfaces cannot be achieved by luminance, a contrast in colour appearance is also an acceptable solution. Shadows are necessary to emphasize important details, but harsh shadows can degrade the overall impression.

V. RECOMMENDATIONS FOR LIGHTING ARCHITECTURAL REMAINS WITHIN ARCHAEOLOGICAL SITES [5] - [7]

There are some general recommendations which can help the lighting designer when dealing with an archaeological complex:

When defining the lighting concept, it is necessary to evaluate both its close and distant views. In the former case details should be emphasized, and in the latter the form of the building or object being lit.

If luminance cannot achieve a distinction of the building from its surroundings, the application of monochromatic light may be considered. It can also help to stress the depth of objects being lit.

Illumination of fortification walls can be effective if adequate luminance levels are achieved and if the upper line of each wall is stressed. This way the observer is clearly informed about the position of the walls, especially if they exist in various spatial planes (Fig. 11).



Figure 11. A fortress in Colombia

Long monotonous surfaces, like fortification walls, can be illuminated uniformly or rhythmically. Luminaires with asymmetrical reflectors should be applied and their distance adjusted, so that big differences in luminance between the upper and lower parts of the wall are avoided. An alternative would be the use of two sets of luminaires: a narrow-beam set intended for the upper, and a wide-beam set for the lower parts of the wall.

When walls, fortresses or castles are located outside of the urban fabric, and their surroundings are void from other buildings, there is no competition for the illuminated objects. Since they are surrounded by darkness, low luminance is sufficient for an attractive effect.

Archaeological sites in Serbia, represented by the remains from the Roman period, include buildings and style elements with details which can be considered common for a number of sites. Although the following recommendations were made for buildings and elements repeatedly appearing within the archaeological sites in Serbia, they can be of help to other illumination tasks regarding the Roman remains throughout the world.

A. *Marking the complex borders*

Since the archaeological sites are usually large complexes, in which the buildings are rarely preserved in their full height, it is useful to illuminate the remains appearing at the edges of the complex. Usually the edges and corners are represented by walls and towers. Interesting light installations in these areas may be considered. Additionally the outer fortification wall should be illuminated from the outside, as well as from the inside of the complex, for the length which can be seen.

B. *Illuminating the entrances*

It is important to illuminate the arched entrances emphasizing their depth. Illumination of the niches which usually accompany the entrances will contribute to the overall effect. In order to present the entrance adequately and attractively, since the arches are mostly made of stone or brick and the walls usually of a combination of the two materials, lamps emitting warm white light with very good colour rendering are recommended. Usually this assumes the use of metal-halide or LED light sources which can most realistically present the Roman masonry. A major problem is adequate positioning of the luminaires, which

need to be directed towards the surfaces which are being lit, but not mounted on them in order to preserve the original structure. Also, the entrance is an opening through which the visitors are frequently passing, which is why the reduction of glare is very important.

C. Illuminating towers

Very often towers accompany entrances. Towers are usually highlights of the border fortification walls. If they are located next to entrances, they should be stressed more in order to attract attention. Openings (windows) on towers enable views of the interior, which should therefore be illuminated to a degree which allows the observer to gain an impression of the space behind the façade. This effect is easily achieved by using a very small number of luminaires, directed towards the interior walls (and only those which will reflect light outside). Frequently, windows are very small in comparison to the façade walls, so the use of a different colour of light than the one used to illuminate the façade helps to strengthen the sense of depth. If the openings are extremely small, they can be marked with monochromatic light, just to show the size and shape of the openings. The luminaires in the interior can simply be set on the floor surface, without damaging the walls in any way.

D. Illuminating palaces

Palaces are among the most important buildings on archaeological sites and, if sufficiently preserved, can be very attractive. In order to show their size and shape, the facades which can be seen by visitors need to be illuminated. Roman palaces often possess colourful ornaments on their facades which need to be emphasized according to their artistic values. In order to achieve the best effect, lamps of warm white colour of light and excellent colour rendering should be employed. The intensity of light should be in accordance with the significance of the palace, the luminance of its immediate surroundings and the distance from which it can be seen. If the interior is open to the visitors, it should also be illuminated, stressing the important elements (wall paintings, mosaics, etc.) and details. Again a major problem represents positioning of luminaires, which should be as invisible as possible. The colour rendering is a crucial quality factor of interior illumination, since the floors and walls are usually rich in colour.

Light of slightly higher intensity should be devoted to the entrance of the palace, especially if visitors are allowed to see the interior.

E. Illuminating temples, other buildings and monuments

Temples and other buildings on archaeological sites should be illuminated according to their significance and values. For temples and other buildings the exterior can be of major importance, and very often the interior does not need to be illuminated, for it cannot be seen. However, if the façade wall has openings, the interior should not be left in the dark. It should be marked by light in a way which reveals the depth of the interior and maybe the quality of the interior surfaces. A different colour of light used for the interior than the one used for the exterior usually emphasizes the three-dimensional building context.

Monuments are usually set to be important landmarks and therefore deserve attention (Fig. 12). The lighting

solution should stress their position, size and form. Since generally they can be illuminated from the ground with the light directed upward, it is very important to pay attention to the reduction of glare (usually by using adequate luminaires with shields).



Figure 12. Lighting of archaeological artefacts

VI. CONCLUSIONS

In order to provide pleasant impressions illuminating archaeological sites, it is necessary to evaluate their contents and distinguish their functionally or artistically significant parts and details. Attractive illumination of an archaeological complex assumes that the lighting concept respects the hierarchy of the archaeological monumental values. General recommendations regarding the proper use of light sources in regards to different materials, or the ways to illuminate certain objects or buildings are always helpful, but do not have to be literally carried out. Even though the archaeological sites in Serbia originating from the Roman period have not yet been enriched with sufficient artificial lighting, they have in fact experienced enlightenment due to their constant physical emergence from the past.

VII. REFERENCES

- [1] <http://whc.unesco.org/en/list/1253>
- [2] <http://www.srbija.travel/kultura/arheoloska-nalazista/>
- [3] <http://viminacium.org.rs/>
- [4] <http://muzejzajecar.org/en/felix-romuliana/>
- [5] L.Djokic, B.Obradovic and M.Kostic, "Recommendations for Decorative Lighting of Buildings" (invited paper), *The Fourth Conference Balkan Light 2008*, Ljubljana, Slovenia, 2008. Proceedings pp. 201-204.
- [6] A. Kostic and L. Djokic, "Subjective impressions under LED and metal-halide lighting", *Lighting Res. and Tech.* Vol. 46 (3), pp. 293-307, 2014.
- [7] L.Djokic, A. Kostic and M.Kostic, "Subjective impressions as quality indicators of ambient lighting", *Proceedings of the CIE Centenary Conference: Towards a new century of light*, Paris, april 2013, pp. 1107-1111.