Night Lighting of Citania De Briteiros

Preliminary Approach to Night Lighting Study

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Introduction

Citania de Briteiros is an archaeological site that occupies a small mountainous elevation (S. Romao Hill) which is situated on the right bank of the Ave river in the municipality of Guimaraes in northwestern Portugal. The designation of the site as 'Citania', a word applied to large fortified towns of the pre-Roman period, is derived from this circumstance. The most evident and monumental archaeological remains correspond to the protohistoric occupation of the place during the beginning and later Iron Age. From 1875 onwards Fransisco Martins Sarmento carried out annual excavation campaigns in the site, which ended up justifying the purchase of almost the entire hillfort area, at his own expense. The curiosity and interest of Fransisco Martins Sarmento allowed the development of a pioneer project in research and preservation as well as the first trial of an archaeological park.

Aim of the lighting study in Citania de Briteiros

During this experimental phase in the research, the illumination of the central cobbled path that leads to the top of the mount (acropolis) as well as the illumination of the two reconstructed residencies and their surrounding area are proposed.

In order to obtain real time photometrical data, portable led luminaires were placed in specific distance from each other along the cobbled path. The illumination level is being kept within the international standards of safe passage for the visitors of the monument.

Regarding the illumination of the two reconstructed circular residencies, several portable luminaires were placed circumferentially and in 10m distance, slightly elevated so as to cover the whole masonry. The outcoming data from this experimental phase will be of later help for the design of the final study on this part (or more extensive) of the monument.

The fundamental criteria regarding the design of the lighting study are:

a) The overall image of the visitors during full moon nights. After extensive observation, not only on this specific site but also to other sites and monuments, it was found out that when the atmosphere is clear and is not being obscured by lights of nearby populated areas, someone can clearly identify the outline of the mount as well as architectural details within long distance. It is already known that the illumination level/intensity during full moon ranges between 0.5 to 0.8 lux. Consequently, if a maximum and minimum level regarding the night lighting of monuments is defined, then the possibility for calculation and definition of the extension of the brightness of the studied monuments could be achieved. A crucial factor for the latter is the light of the moon and what is being displayed only with natural light during the night (Full Moon Light).

b) The specific location(s) that the monument is being visible (by car, on foot or nearby settlements) and if the lighting of the monument is affected by the lights of nearby populated areas.

c) The color temperature (K). In order to define the light color, certain measurements were carried out on the color temperature and the reflection coefficients on both the main path's stones and the ones in the circular reconstructed houses. According to the results, luminaires with color temperature 4000K are suggested.

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d) The protection of flora and fauna. The electricity path shall be separated in electrical networks. The luminaires of each electrical network can cover up to 50m in length on the main path and be operated through motion sensors and dimmers.

e) Energy saving. Low energy consumption lamps (approximately 5 watt) will be installed in the luminaires thus providing longer life span.

Conclusions

According to the lighting tests in both the paths and circular houses, it is believed by authors that a future project on lighting of Citania de Briteiros is feasible. This study can be a standard for safe visits, an amplification of the projects that take place annually in the area (Citania Viva, night visits, etc) as well as a proper enhancement through night lighting of the structures and areas of the hillfort.

Attention shall be drawn on the route of the electricity path as well as in the selection of the location for the luminaires. The suggested luminaires shall be mounted on short (up to 50cm) wooden or metallic poles along the cobbled path.

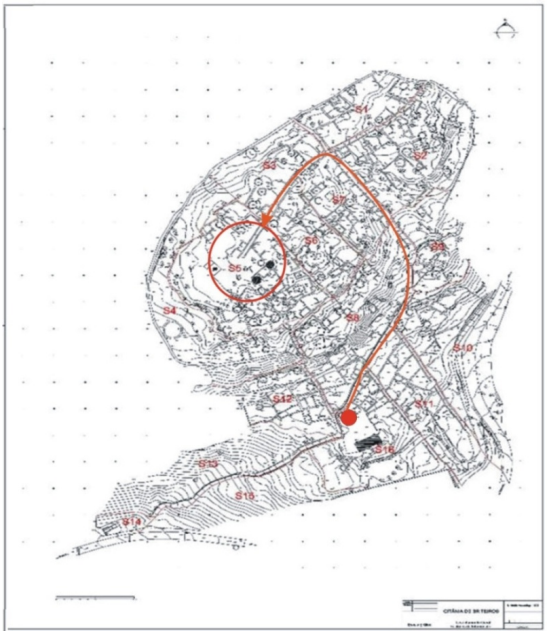

Fig. 1. Citania de Briteiros map. Main path and visitors' route (© Sociedade Martins Sarmento)

a b

Fig. 2. Lighting test in the path. a) Proposed location for installation of the luminaires b) Luminaire in 0,5m from the path with diffused light (©Sociedade Martins Sarmento)

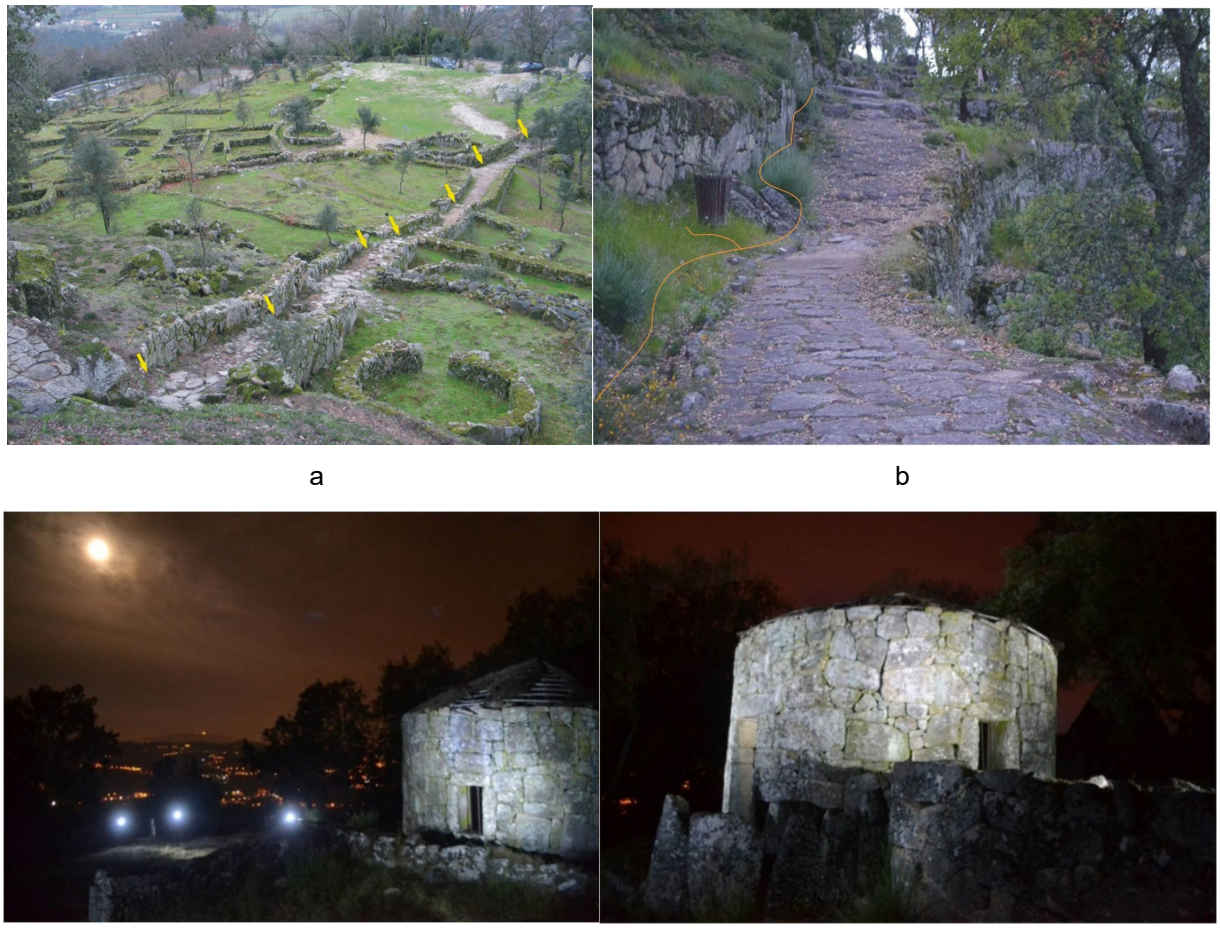

Fig. 3. a-b) Indicative position of the luminaires and electricity path, c-d) Lighting tests on the circular houses (©Sociedade Martins Sarmento)

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