

PRESERVATION AND PROTECTION OF ARCHAEOLOGICAL SITES, MEDIEVAL STRUCTURES AND THEIR REMAINS

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ABSTRACT

In contemporary architectural and conservation practice, the focus is on sustainable preservation of cultural heritage and the functional integration of historical buildings. It is essential to secure and protect sites containing archaeological remains and the ruins of medieval buildings from further deterioration. This type of protection aims to preserve these sites from disintegration caused by earthquakes, fires, weather conditions, or general wear and tear.

Interventions can include constructing temporary or permanent canopies or other forms of structures to protect the site from the direct effects of atmospheric conditions (rain, snow), solar radiation, and pollution. Such measures not only mitigate ongoing decay but also create conditions conducive to conservation work, allowing rehabilitation and reconstruction efforts to progress without obstruction.

The objective of this study is to develop a comprehensive methodology for designing and building temporary protective structures. By observing and analysing existing approaches and evaluating their results, the study establishes guidelines for planning, design, and implementation of future protective structures, as well as recommendations tailored to different site contexts. These guidelines prioritize the integration of all relevant site management factors.

Moreover, permanent protective structures at archaeological or medieval sites can enable new uses, such as exhibition spaces. Incorporating these historical remains into modern museum environments, the preserved ruins can be reimagined as vibrant cultural assets that blend historical authenticity with contemporary design.

KEYWORDS _ *Cultural heritage, protection of static stability of the remains of existing structures, temporary protective structures, permanent protective structures, heritage site management*

INTRODUCTION

This paper will present different ways of protecting the remains of structural elements as well as different ways of protecting entire buildings or sites by erecting protective structures. To build a protective structure designed for temporary or permanent covering of a facility or a site belongs to a special kind of operations with a function to cover an area, facility or remains of a building without compromising their static stability. The design of protective structures for monuments and their remains is as old as the tradition of their care and preservation. This topic is becoming increasingly important given the need to protect the remains of monuments from the harmful effects of weather conditions (rain, snow, ice), solar radiation, municipal pollution, earthquakes and fires. All construction works, procedures, and materials used for protective structures to secure and cover the buildings or certain parts of their structure, as presented by this Case Study, are reversible procedures. It is the method that could return these buildings to their original state without any damage. The objective of this study:

- to improve the knowledge about the significance of preserving medieval buildings and their remains as well as potentials of these monuments (resource),
- to undertake active participation in researching local sites to contribute to the protection and conservation of monuments, as well as site management,
- to use the obtained information on protective structures to form certain recommendations for conserving this type of monuments and make the results of this study available for professional use.

Based on theoretical and practical experience regarding protective structures, the following guidelines have been made:

- specificity of the site where protective structures are to be erected,
- constructive solution,
- stability and flexibility,
- speed and ease of construction,
- possibility of reusing,
- cost effectiveness.

LITERATURE REVIEW

A country's cultural heritage is characterized by the current values that reflect its historical legacy, which should be preserved in its authentic form for future generations, when possible. Archaeological sites, as key components of cultural heritage, must be conserved in their entirety to provide a diverse range of information about past societies (Kaplan et al., 2013). The need to preserve archaeological sites was first articulated at the 1904 Madrid Conference (Recommendations of the Madrid Conference, 1904).

Preserving authenticity is achieved through specialized techniques and conservation practices designed to protect heritage, ensuring that it can be understood, revealed, and interpreted in future periods while maintaining cultural continuity. Authenticity involves credibility, truthfulness, and originality. In terms of conservation methods, evaluating the authenticity of historical heritage is a crucial qualitative factor in determining its historical value. The authenticity element serves as a core criterion in most conservation requirements, as preserving authenticity is considered the ultimate goal of conservation. Understanding the elements of authenticity is essential when studying cultural heritage, planning conservation activities, or meeting the criteria for inclusion on the World Heritage List. The concept of authenticity was formally defined with the release of the Nara Document on Authenticity in 1994. Assessing authenticity involves various parameters, such as style, connotation, function, material, form, tradition, context, spirit, and heritage. The evaluation of authenticity, along with comparative analysis with other similar properties, helps to determine the universal value of a monument or site (region).

The field of architectural heritage protection has evolved significantly in the past century. Architectural interventions are carried out on relics to enhance their preservation, aiming to safeguard their historical information (Lambrinou, 2010). In-situ preservation has become increasingly common for archaeological sites (Corfield, 1996). The preservation of historical relics encompasses the protection of their typological, structural, constructional, functional, aesthetic, formal, historical, and symbolic values. Analyzing built heritage identifies the most important values to be preserved. This process also supports better decision-making regarding the selection of preservation methods, including protective structures. These factors are integrated into the planning of conservation projects, providing a systematic methodology to evaluate the project's outcomes objectively (Gómez Robles, 2010). Protective structures are built as a preventive measure to extend the life of exposed remains and to showcase objects of cultural significance (İpekoğlu & Çetin, 2013). Protective structures are divided into the following categories, according to their form (shape) (Vozikis, 2005):

- temporary protections,
- protection roofs,
- partly enclosing protective structures,
- all-side closed constructions (buildings).

When selecting a type of protective structures, it is of vital importance to carefully consider not only the materials being protected and environmental conditions of the location itself, but also the very fabric from which a shelter is to be constructed, since a site can affect the longevity of both the shelter and the artifact (Ivanović-Šekularac, Čikić Tovarović, & Šekularac, 2017). The site conditions are to be assessed at the very beginning of the whole process (Jerome, 2014). Previous research in this area was mostly focused on construction and aesthetic criteria for protective structures of archaeological sites in Greece and their categorization (Vozikis, 2005). In the past, little attention was paid to the quantitative and qualitative impact on the preservation of locations (site) over time (Agnew, 2002).

Formal methodologies for the design of protective structures have never been used before. These protective structures used to be built as separate, independent parts on most archaeological sites. A lot of design processes used to be carried out in spite of the risk of collapsing, which could have damaged those relics. In order to avoid such unsystematic procedures, it is necessary to develop a methodology that is based on the accepted principles of design and site management, and to apply decision-making processes that include modern programming and assessments (Ioakeimopoulou, 2014). Whether or not to build a protective structure on archaeological sites or above medieval relics is the decision that must be made in accordance with all the factors of site management. A great number of protective structures throughout the world were built as a form of temporary protection. However, these structures gradually became permanent protection for site presentations. Therefore, the process of designing a protective structure should be regarded as research with the primary goal to preserve the building itself as well as its environment (Aslan, 1997).

Cultural heritage of a place and its recognized and protected values (aesthetic, scientific, historical, economic, social and educational) is regarded as the most important goal of the management plan for monuments (Ioakeimopoulou, 2014).

Protective structures

Protective structures represent a special type of auxiliary constructions whose main role is reflected in the possibility of its installation over an already existing construction or a larger open space (archaeological site) which is necessary to cover, with a possibility to overcome a large span and without a possibility of compromising (constructively or physically) the existing construction or a facility to be protected. Designing a protective structure is a challenging task from the outset, as its primary goal is to safeguard the remains being protected while preserving their natural appearance.

Classification of protective structures by the character of protection

The type of protective structure is determined depending on the subject of protection, i.e., the kind of building that should be covered. Protective structures for roofing, depending on the type of facility, location, its importance, character of the future setting, and the material from which it is made, can be divided into:

- protective structures of a permanent character
- protective structures of a temporary character.

Permanent protective structures

Permanent protective structures are implemented over archaeological sites and the ruins of medieval buildings. In addition to shielding these sites from atmospheric elements and potential solar radiation, they also serve as the foundation for a permanent exhibition space (Figure 1). In this way, erecting the permanent protective structure facilitates, if necessary, further exploration and excavation within the site itself; but also presenting the site to visitors. This aspect of protection and therefore the selection of the type of protection is performed for a longer period, so it becomes a permanent solution; thus, it has a character of a permanent protective structure. The very design of a permanent protective structure affects the selection of the material to be applied – whether it will be steel, wood, laminated wooden girders, glass, polycarbonate-based materials, or a combination of materials.

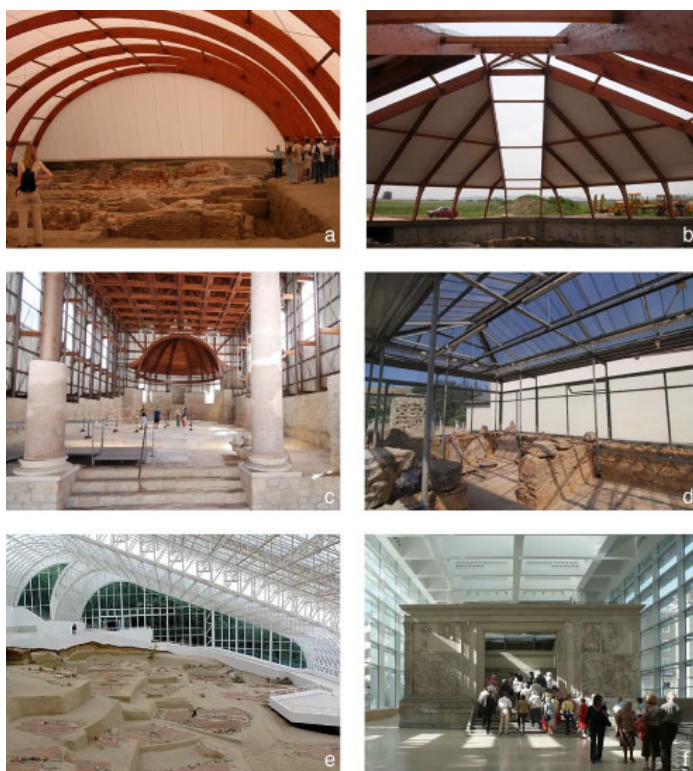


Figure 1: Permanent protective structures: a, b. Protective structure, Viminacium, Serbia, c. Roman Villa del Casale, Piazza Armerina, Sicily, Italy, reconstruction in 2012., d. Roman Villa del Casale, Piazza Armerina, Sicily, Italy, e. Permanent protective structure, archaeological site Lepenski Vir, (650-550BC) near the town Donji Milanovac, Serbia, f. The interior of the Museum Ara Pacis, Rome, Italy. Source: Authors.

Temporary protective structures

Temporary protective structures are mounted over archaeological sites during the excavation and exploration, as well as over medieval facilities during their rehabilitation and reconstruction, and only for a limited period during the work on the mentioned facilities (Figure 2).

The types of protective structures shown in this study were implemented in a combination of different materials. The choice of the type of material from which the protective structure will be made is influenced by the type of object that is the subject of protection, its specificities, the type of protection (whether it is permanent or temporary protection), as well as the design solution that we want to achieve. If it is a permanent protective structure, the choice of the type of material and the attractiveness of the structural solution itself affects the aesthetic and spatial experience of both the structure itself and the entire space in general. The examples given in this paper included structures made of glued laminated timber (Figure 1a), structures made of lightweight lattice wooden beams (Figure 1c), structures made of hot-rolled steel profiles (Figure 1b), and structures made of tubular steel scaffolding (Figure 2a-d).



Figure 2: Temporary protective structures: a. Temporary protective structure, Knossos, Crete, b. Temporary protective structure of chimneys within the Hilandar monastery, c, d. Temporary protective structure, Forum Romano, Rome, Italy, e, f. Permanent protective structure, the town of Kos, Kos, Greece. Source: Authors.

CONCLUSIONS

The selection and installation of an appropriate structure to physically protect, cover, and shelter a space (whether a building or site) is of great significance. A well-chosen protective structure has a substantial impact on the future work to be conducted at the site or building, including research, conservation, rehabilitation, reconstruction, or the presentation of the final setting and archaeological site. An improper or poorly chosen protective structure jeopardizes the very object of protection (the location or building), as inadequate, heavy, or massive construction can lead to ground subsidence, potentially causing static instability and making the site or building we aim to protect more vulnerable. In the event of an inappropriate choice of a heavy protective structure, its subsequent removal in a manner that ensures the safety of the site or protected subject remains uncertain.

A temporary protective structure, in addition to ensuring safety during use, must also meet the requirements of easy assembly and disassembly once the work is completed. Hence, it is concluded that each structure designed like this should have the following features: a lightweight design of prefabricated elements, that can be assembled and disassembled in the shortest possible time and without requiring significant financial resources. Since there is a diversity of buildings and sites, the likelihood of a specific protective structure being used in multiple situations is low. Therefore, it is recommended to use a temporary protective structure made of individual elements. These elements, such as tube-shaped scaffolding, offer flexibility for various combinations based on the specific task. The structure should also include suitable stiffening elements to resist horizontal forces, such as wind and seismic activity, as well as adequate covering.

The complexity of the task to make a protective structure is also reflected in the fact that the selection of the type and the sort of protective structure should involve representatives from various professions: archaeologist, conservationist, architect, structural engineer and geologist. They all must have adequate knowledge of conservation because only together they can bring the best solution to the unique and unprecedented problems they encounter at each site.

Protective structures of a permanent character, besides their basic protective function, should also meet high aesthetic requirements, being located in protected sites and environments. What else should be emphasized is that, from an architectural point of view, the type of construction should not dominate the area where it is located. Its architectural and formal solution should be integrated into the environment in the best possible way. The emphasis should be on the subject of protection (object, archaeological site, etc.), not on the newly built protective structure.

Designing protective structures is a complex challenge, as it presents a major contradiction: while we aim to protect the remains of a building or site with a light, delicate material, we also want to preserve the original structure's appearance, surroundings, and perception. Protective structures play a key role in the preservation of archaeological sites and building remains, which have been a topic of both theoretical debate and practical implementation for over a century, with varying results. Historically, both temporary and permanent solutions were used—ranging from simple canopies to entire buildings designed to protect archaeological sites—leading to mixed opinions, both positive and critical, within professional circles and the public.

LITERATURE

- Agnew, N. 2002. *Methodology, Conservation Criteria and Performance Evaluation for Archaeological Site Shelters*. Conservation and Management of Archaeological Sites, 5(1-2): 7-18.
- Aslan, Z. 1997. *Protective Structures for the Conservation and Presentation of Archaeological Sites*. Journal of conservation and museum studies, 3: 2-3.
- Corfield, M. 1996. *Preventive Conservation for Archaeological Sites*. Studies in Conservation, 41(1): 32-7.
- Gómez Robles, L. 2010. *A Methodological Approach Towards Conservation*. Conservation and Management of

Archaeological Sites, 12(2): 146-169.

- Ioakeimopoulou, A. 2014. *Protective Shelters for Archaeological Sites: A Management Process*, In: E. Korka, ed. *The Protection of Archaeological Heritage in Times of Economic Crisis*. Newcastle upon Tyne: Cambridge Scholars Publishing, pp. 214-22.
- İpekoğlu, B. & Çetin, Y. F., 2013, *Impact of transparency in the design of protective structures for conservation of archaeological remains*. *Journal of Cultural Heritage*, 14(3): e21-e4.
- Ivanović-Šekularac, J., Čikić Tovarović, J. & Šekularac, N., 2017. *Protective Structures for the Preservation of Medieval Buildings and their Remains: Case Studies from Monastery Hilandar and Mount Athos*, *Conservation and Management of Archaeological Sites*, pp. 30-54.
- Jerome, P. 2014. *Parameters for designing and constructing protective shelters for archaeological sites*, In: E. Korka, ed. *The Protection of Archaeological Heritage in Times of Economic Crisis*. Newcastle upon Tyne: Cambridge Scholars Publishing, pp. 223-33.
- Lambrinou, L. 2010. *Preserving a Monument: The Example of the Parthenon*. *Conservation and Management of Archaeological Sites*, 12(1): 60-74.
- Recommendations of the Madrid Conference, 1904, Accessed April, 2016. http://www.getty.edu/conservation/publications_resources/research_resources/charters/charter01.html
- The Nara Document on Authenticity, 199, Accessed April, 2016. <http://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/386-the-nara-document-on-authenticity-1994>
- Vozikis, K. T. 2005. *Protective Structures on Archaeological Sites in Greece*. In: W.-Z. Lin. & J. Krope, eds. *WSEAS International Conference on Environment, Ecosystems and Development*. Venice, World Scientific and Engineering Academy and Society (WSEAS), pp. 120-5.