Translucent Structures Projects of Ruined Sites Revitalization (Foreign and Local Experience)

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Abstract. The article presents the latest tendencies in the process of ruined sites revitalization using translucent structures. It describes the main stages of developing the principles of translucent materials introduction into the projects of ruined sites renovation. Two basic types of projects that involve ruined sites renovation using translucent structures are defined. Foreign and local design experience and current trends in this method application are reviewed. Keywords: ruins, reconstruction, glass, Russian architecture, foreign architecture

1. Introduction
The purpose of this article is to establish technically and visually acceptable strategies to introducing translucent structures, including glass, to a ruined site under refurbishment, as well as to provide time-ordered systematization of the existing application examples. The article offers a hindsight analysis of the glass structures application in ruin museumification projects (in some cases without sacrificing the liturgical function of reconstructed religious buildings), developed between the 1960s and 2019. However, by far not every conceptual solution, once implemented, conforms to the intended design due to the technical or other specifics of construction. In all the examples provided below, where glass structures were incorporated into a ruined structure, the goal was to achieve a roughly identical combination of finishes. This can be observed in graphic representations of architectural concepts. Although, in some cases, the resulting structure lacks the envisioned expressiveness. This is due to a number of factors and technical characteristics of construction materials, which will be considered in the article.

2. Relevance, Scientific Merit and Brief Review of Literature
The relevance of the article is based on the need to study the methods of preservation of ruined cultural sites in the Russian Federation, along with alternative methods of their restoration and conservation. The concepts of museumification applied at various ruined sites (for example, the museumification concept of the Lower Dacha of Nicholas II in Peterhof, St. Petersburg, Russia) located in the Russian Federation show that the architectural and urban communities take interest in finding new ways of presenting such structures in a manner similar to foreign experience. The experience of using translucent structures offering new ways of exhibiting ruins within museumification projects is of prime importance.
The issue of handling ruins was considered in the scientific works on architecture of such authors as S. Villani, M. Davis, B. Dillon, G. Müller-Mencens, S. Ageyev, and I.M. Mineyeva. The author also published a review of the methods of architectural exposure of ruins in the article “Permeable” Constructions for Ruined Objects Exposure. However, the publications of the above authors rather provide a review of matters, whereas in this article, the issue of translucent structures interaction with ruined buildings is considered for the first on the basis of a contrastive analysis of theory and practice of foreign and local experience. Due to specific nature of the issue, a preliminary examination of the profile of historical, cultural, compositional and technical challenges is required.

3. Problem Statement
In accordance with the research objective, the following problems are stated:

1. A contrastive analysis of foreign and local practices of revitalizing ruined sites using translucent structures.
2. Evaluation of technical and visual components of architectural transformations.

4. Theoretical
Translucent structures preserve a fragile image of ruins, frozen on the verge of functioning and destruction. Due to adverse weather conditions, it is necessary to create a closed thermal envelope to improve all-year conditions of operation and exhibition of the ruins. There are different ways to create such a confined space. Within the context of the article, the examples of the implemented projects of ruined sites reconstruction using translucent structures could be conveniently divided into two types.

The first type includes translucent structures playing the role of an ancillary material for preserving the visual characteristics and permeability of the ruins when creating a closed thermal envelope. In this case, glass acts as a frame for a precious historical canvas and is perceived as a single mass of inactive material.

The second type includes translucent structures used to create a composite structure of contrasting materials. The plastic properties of the ruin being a natural and a man-made sculpture are lost in such projects, and the benefits and drawbacks of glass and its structural framing come to the fore. In this case, the newly incorporated structure becomes dominant; inside it the authors, intentionally or not, create internal contrasts that steal the attention from the historical site.

There is no doubt that the proposed types do not reflect the entire spectrum of possible architectural solutions of combining ruins with glass structures, yet they focus on the most relevant trends. It should be clarified that the article considers only those reconstruction projects, in which the percentage of translucent structures does not nominally exceed seventy percent.

The primary and the most frequently used technique is the implantation of a special glass holder into a ruined structure. The development and variations of this technique can be traced throughout the 20th and 21st centuries. In the twentieth century, the most popular and preferred technique of integrating the monuments with the predominant archaeological component was, without a question, the introduction of some material contrasting with masonry that satisfied the visual architectural requirements and served the needs of exhibition and conservation. This technique makes it possible to revive the ancient space not through literal restoration based on integrative reconstruction [1], but through an interpretation that becomes materialized with the help of recognizable architectural inclusions that are completely independent of existing structures, yet have their own architectural merits. In this case, it is important to preserve a “dialog” of surface finishes, not a “monologue” of a modern architectural solution, since the historical core should remain dominant.

A striking case in point is the project of museumification of the Villa Romana del Casale near Piazza Armerina, lit. “Square of Arms”, Enna (Sicily), implemented by Franco Minissi in the late fifties (1957). This is one of the first and most paradigmatic cases of architectural intervention, not aimed at reconstruction in a strict sense, but rather at showing the lost forms through a new perception without overshadowing the ruins (Fig. 1). According to Luigi Prestinenza Puglisi, “a skillful renovation is unanimously considered as one of the masterpieces of modern museum design” [2],
which, without a doubt, is a key element in the history of exhibiting archaeological sites in museums, offering a “modern yet modest” solution. The Villa was built at the end of the 3rd – beg. of the 4th century AD.

Fig. 1 Villa del Casale, Piazza Armerina (Italy): a) general view; b), c) interior

The architect developed a single roof coating solution for the entire site; the roof layout is historically accurate, but made from modern materials. The goal of the project, besides demonstrating archaeological findings, was to show the unique mosaic floors to a broad public under optimum conditions [3]. A lightweight, transparent roof coating structure consists of thin metal guides and modular fiberglass; the walls are made from acrylic glass. This decision was meant to materialize the discussion about the restoration and the synergy between architecture and restoration, the new and the old. All the leading scientists of that time following World War II were involved [4] (C. Brandi [5], B. Zevi, K.L. Ragghianti). Despite the imperfect technical quality of inclusions in comparison with modern projects, the completed structure is, nevertheless, perceived as a frame for the presented work of architecture.

Next in the list are utopia n projects of the 1960-1970s. These include the studies of Musmeci, who proposed to cover the Arch of Constantine and the Arch of Septimius Severus in Rome with a glass and steel structure, or the project that involved an installation of a folding canopy held by metal arches that would be used over the Sphinx in Giza during dust storms [7] (Fig. 2b). Here, we can also mention a transparent dome intended to protect the Acropolis of Athens from smog (Fig. 2a), designed by a group of architects from Switzerland, or the entire series of projects dedicated to preservation of Italian historical centers (1972): a collection of ironic solutions to problems, which together shaped a sort of a negative utopia. These projects overlook “permeability” as a visual characteristic acquired by the ruin, giving way to a demonstration of technical and constructive achievements and ideas. The visual and ideological component of the new “cocoon” dominates.

Fig. 2. Utopian projects of 1960-1970-s: a) a transparent dome protecting the Acropolis of Athens; b) a folding canopy over the Sphinx in Giza

Pozzuoli Cathedral (Rione Terra, Naples, Italy) is a monument that includes an ancient temple with transformations in Baroque style [8,9]. Two missing peripter columns were partially recreated
within the 1974 project through anastylosis, while the others were partially reconstructed by means of glass trunks of smaller diameter, which, possibly, came into collision with the established tectonic and visual characteristics of the order. The peripter liturgical space is separated from the remainder of the space by a glass structure, which somewhat reconstructs the border between exterior and interior, leaving unchanged the connection between the temple and a valuable architectural environment that was established after the temple was ruined.

Fig. 3. Pozzuoli Cathedral (Campania, Italy): a) general view – concept; b) implementation – interior

The structural system chosen for the project, consisting of virtually invisible inconspicuous cables, spider fittings and bonds, together with an intricate combination of various glass finishes, made it possible to clearly distinguish between the new and historical through the contrast of massive ancient stones and the new weightless structures. The reversibility of reconstructive interventions and delicacy of the chosen design solution made it possible to create an easily perceived image of the “support” and to exhibit historic material to its best advantage without the dominance of technical innovations. By the 1980s, the authors of the projects aspired to demonstrate technological and structural achievements, while the preservation of substantial visual and contour characteristics of ruins became secondary. One of such examples is the building of Etzel Museum in Tel Aviv, Israel (Fig. 4). It shows how the use of translucent materials could create an effect of “stifling” a monument, shifting the emphasis to the structures that were designed only to envelop the core of a new museum, rather than steal the attention.

Fig. 4. Etzel Museum, Jaffa, Israel

The museum was designed on the ruins of a building that was once a part of the Menashiya neighborhood outside Jaffa. When describing a design concept, the architects explain that they were
looking to “freeze the ruins in time” [10], reflecting in poetic terms on the destroyed remains of the building and on how they were exposed to on-shore winds for a long time. They wanted to install a “glass box” inside the ruin to create a new museum. This was supposed to allow the ruin to remain what it is and to “fuse” together the old and the new. S. Rotbard wrote the following about the architectural solution in his book White City, Black City: “… In a strange way, the building uses the ruin and its aesthetics to cover the destruction and hide it. The building tells the truth about the destruction of Jaffa, but at the same time, it lies using the drama of ‘architecture’ and ‘environmental art’.” [10] The design solution involved a geometrically simplified reconstruction of the volume lost by 70% using an active inclusion of tinted glass and metal. Consequently, by analyzing the project and the public reaction to it, it is possible to understand which conceptual viewpoints were introduced by the authors, but it is also clear that the aesthetics of the ruin was lost in this project, and the glass created an impression of an unnecessary and inappropriate orderliness and completeness of shapes. The balance between glass and stone is reasonable on the front facade: 75% of stone and 25% of glass. Besides, the historical part made of stone has a rather opulent ornamental and patterned molding, which draws the eye and leaves the glass in the background. However, looking at the rear facade, the visitor sees simply too much glass, which creates a piercing dissonance due to the dominance of a smooth, characterless surface. The intrusion of new active walls into the rhythm of a ruined, irregular structure largely diminished aesthetic expressiveness and led to a symbolic collapse. The ruins became a flat screen with a new volume instead of the gist of this place. This site should be classified as the second type of the reconstruction projects defined at the beginning of the article – the glass does not frame the historical structure, but is independent and has its own system of internal contrasts.

In 1996, a Municipal Cultural Center Ruins Park was opened in Rio de Janeiro, Brazil. The ruin itself is the remains of a palace of Murtinho Nobre, built between 1898 and 1902.

The volume created by the authors of the reconstruction project contrastively interacts with the existing historical volume and finish. However, since the new design is only “put on” the avant-corps of a ruined manor and does not penetrate the front of the main compositional core with transparent material, it is perceived as an alien element that steals the attention. Moreover, the general form and positioning of the imposts and sashes with their extension into the front plane in a glass insert creates an image of a greenhouse (Fig. 5), the inclined roof and a self-sufficient shape of which does not, in any way, fit into the ensemble of the Baroque manor, even a ruined one. In all likelihood, given the technical capabilities of working with glass at the time the combined structure was developed (1996), it was possible to create a more laconic volume, which would not be qualified as dominant neither due to the internal contrast between the glass plane and sashes, nor due to the self-sufficient shape. The resulting building does not look uniform; the new glass inclusion seems alien and “suppresses” the
historical volume. There is no doubt that in this case we are dealing again with the second type of reconstructions, since glass and metal structure dominates, and not the historical masonry.

The project developed to renovate the ruins of St. Pauli Church in Dresden, Germany (Dähne Architekten 2012) also involves a conditionally designated “glass holder”, but the joints between an irregular outline and a modern translucent structure are executed quite distinctively. The project objective was not to display the achievements of modern architectural design, but simply to complete the job of fixation, conservation and closing of the thermal envelop. It is important that during the design phase the Dähne Architekten firm decided against a bold but harsh competitive decision developed in 2009 in favor of a plainer image, moving away from “fashionable” to “intelligent” [11] (Fig. 6a). According to the authors, their task was to keep transparency and permeability, which would inevitably be lost if the initial project had been implemented due to the introduction of bulky space structures.

Projects aimed at the revitalization of ruined cultural sites using glass are developed in Russia as well. All of them were developed within the last decade.

The first example is a project of conserving the ruins of the Church of the Annunciation on Gorodishche (2016-2018). The project involved a display of the archaeological remains of the 12th century cathedral in the interior of the 14th century church. The project included a restoration or reconstruction of the floor and smalt [12],[13],[14]. For the purposes of museumification, it was necessary to create a covering over the 14th century volume, which had to be invisible from the outside, unobstructive to the visual perception of the preserved ruins of an older cathedral. In this project, we deal exclusively with the objective of exhibiting fragments of a ruined structure having the highest security status [15]. There is no question that in terms of reconstructing masonry, exhibiting valuable interior elements, and a subtle archaeological approach, the site is definitely a major milestone in the museum affairs of the Russian Federation. However, the result does not comply with the defined project concept in terms of glazing. If we compare the ratio of masonry and glazing in the doorways, as proposed and implemented (Fig. 7 a, d), we can see that during the implementation there appeared some sashes that were not in the defined project, which disrupts the general system of interaction between materials and finishes. The inner bright contrast of glass and the new inclusion installed between metal imposts at the level of the front plane has an adverse effect on the overall perception of glass incorporations as an exclusive means of closing the thermal envelop. As in the case of Brazilian project on Ruins Park developed in 1996, the metal structure that guides the glass in the window assembly design and the coating is too active and does not evoke a sense of weightlessness and conventionalism required to expose a valuable component of the structure. At the same time, the recreated slit-shaped window assemblies executed as wooden window sashes with round mica sheets add the necessary finish to the preserved combination of the 12th and 14th century walls [16], since they quite literally reconstruct the missing windows in the historical quarter repeating their shape and location.
The glazing pattern of large archways most likely was intended to either recreate the missing one, or be implemented without any external imposts and sashes, forming a uniform smooth glass surface, recessed relative to the historical position in the quarter (as it was planned in the design concept). In this case, we can conclude that, while the project is classified as the first type within the proposed concept, the site lacks in expressiveness and exhibition subtlety in regards to the glazing due to an imperfect technical execution of window assemblies (most likely associated with the lack of funding). The second example is the reconstruction of the Angular Tower (Varlaamovsky Ugol) in Pskov in 2019. The tower, which was almost completely destroyed twice (in 1667 and in the 1930s) has existed as a ruin for 90 years. The best practices of combining reconstruction with museum conservation provided a new outlook on restoration of the angular tower complete volume without disrupting the ultimate clarity of the genuine material. Glass structures shape the riverfront, which is the most visible. Since the monument remained in ruins for a long time, the image of the incomplete tower shape is deeply seated in the memory of the local population and tourists. Therefore, a reconstruction of the entire volume with brickwork, in this case and with the current building technologies used in museumification, seemed less appropriate than the chosen option. The result of the transformation within this project was a complex site incorporating a museum architectural exhibit and a showcase for a massive indoor exhibition required for the Pskov Kremlin Museum (1300 sq. meters were added to the display space) [17]. A sizable area of full glazing required an installation of rather large, in terms of cross section, load-bearing structures that would not disrupt the general idea of an “opened” front with an internal exhibition. That is why, the project authors used the capping trusses in a horizontal plane, turning the truss chord towards the foreside (Fig. 8, a), thus visually narrowing the section of dense elements of a giant showcase as much as possible.

Vertical trusses were also erected with a narrow chord facing the foreside and visually hidden behind the joints of the glazing units from the inside. This translated into the glass looking one-piece...
and more like a showcase that does not dominate the historical tissue but, on the contrary, gives it a good showing as if it were an enlarged museum exhibit.

5. Conclusion
Combining the analysis of the above examples, we can reveal a number of trends. On the one hand, it is easy to understand why glass structures are chosen for reconstruction projects and, on the other, their use is, perhaps, too obvious and is not always equal to expectations in terms of conceptual consistency (Etzel Museum in Jaffa, Ruins Park in Rio de Janeiro, Church of the Annunciation on Gorodishche in V. Novgorod, Russia). Material improvement, evident in the context of the time-ordered systematization of the implemented projects of both defined types, definitely has a positive effect on the integration of modern architectural elements into ruined cultural sites. There appear more sophisticated and reversible methods of incorporating and joining of materials. However, even in the modern application examples, there is no analysis of the technical execution of translucent structures used the middle of the past century. A contrastive analysis of foreign and local experience allowed for the identification of general trends in the translucent structures application in architecture. The technical aspects of transformations are extremely important. The most critical point in this case is the execution of structures that carry glass. The practical relevance of the work consists in the discovery of the incorrect use of bright-colored imposts placed on the outer wall surface directly in front of the glass surface in translucent structures introduced into the ruined structure. The experience of the Etzel Museum (Jaffa) and the Church of the Annunciation on Gorodishche (Veliky Novgorod) makes it possible to conclude that the imposts and sashes should either be hidden behind the glass surface (the Angular Tower, Pskov, Russia), or executed in the same material as the filling, i.e. in glass (e.g. Pozzuoli Cathedral, Naples, Italy). Otherwise, it leads to an aesthetic dissonance resulting from the fact that the bright reflecting surfaces of the imposts create a contrast inside new inclusions, thereby destroying the system of contrast based on the interaction between the old and the new. As a result, translucent fillings and new forms do not frame the historical material, in a conceptual sense, but suppress it, thus, depreciating museumification. According to the performed analysis, glass and its supporting structures when used in a ruined building turned into a museum, considering modern technological capabilities could and should look as a weightless means of creating a thermal envelop inside a valuable ruined structure, keeping its fragile image of incompleteness unchanged.

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