Construction of Architectural Structures in Cultural Heritage Protection Zones

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Abstract. The article raises issues of constructing contemporary architectural structures in cultural heritage protection zones, using the case study of a building located within the campus of the University of Warmia and Mazury in Olsztyn, Poland. Questions revolving around the construction of this building arise from the need to preserve the surrounding historic heritage, and deal with landscaping, architectural and construction solutions as well as interior design. All these problems grow in importance when dealing with such unique buildings like the discussed example of a laboratory building for the Civil Engineering Department, built on a site within a conservation zone of the university campus. The specific character of the building and the specialist equipment with which it was to be furnished (a resistance testing machine, a 17-meter-long wave flume) necessitated a series of analyses. In turn, the fact that the new building was to be erected in the conservation zone meant that collaboration with the Heritage Conservation Office had to be undertaken at the stage of making the plan and continued during the construction works.

The Heritage Officer’s recommendations concerning the building’s shape, divisions, dimensions, materials used, etc., created a situation where the team of designers and architects had to become engaged in the process of landscape and spatial management. The above requirements concerned the functions of the building and its siting on a land parcel that was difficult to handle, also because of the protected trees growing there. Other constraints included the small size of this site, the developed surroundings, and the pre-defined programme of functions and use of the new building. All the above circumstances made the task difficult and demanded good coordination between individual teams of engineers and architects, both at the stage of making the plan and during the construction works.

Many of the heritage protection zones are spoilt with inappropriate buildings and structures. The historic part of the university campus in Olsztyn, in the town’s suburb called Kortowo, is an example. Some of the architecture in this area present features characteristics for socialist realism, which causes disharmony with the remaining late-19th century buildings. This paper is dedicated to the question of how to harmonise new buildings with historic ones, and how to strive towards maintaining spatial order. The case discussed in this article proves that such efforts, even when drastic solutions like demolition are needed, can be successful.
1. Introduction
A development process that consists of raising buildings or other structures in a cultural heritage protection zone entails constraints that must be taken into consideration during the early stage of concept designs and verified later when making a construction design. These limitations regard elements of landscaping, architecture, design and installation solutions as well as interior decoration works. The obligation to collaborate with cultural heritage officers often goes beyond the stage of making blueprints and continues throughout the execution of a construction project. One reason is that the investor or developer can make changes to the original design or replace certain construction materials with other, often less expensive ones. Also, it is not rare to make some alterations to the planned functions and use of a constructed building.

It is not an easy task to harmonise new structures with historic buildings in an area designated as a cultural heritage protection zone. The recommendations of the locally competent heritage protection office concerning the building’s form, divisions, size, materials, etc., must be followed by the team of architects and designers, who are therefore specifically engaged in the process of spatial management. Despite such restrictions, negative examples of new buildings inadequately incorporated into cultural heritage protection zones are easy to find. Let us consider the oldest part of the campus of the University of Warmia and Mazury in Olsztyn, Poland, located in the town’s suburb called Kortowo [1]. Some of the buildings feature traits characteristic for socialist realism ‘figure 1’, and clearly do not blend with the space defined by the preserved architecture dating to the late 19th century ‘figure 2’. The historic part of the university campus, located in a cultural heritage protection zone, is what has survived from the compound occupied by a psychiatric hospital. The whole area of the former hospital complex has been designated as a protection zone and listed as a monument architectural and urbanistic complex in 1985.

![Figure 1. The building of the Faculty of Environmental Management and Agriculture UWM in Olsztyn;](image)

Unfortunately, it is quite common to see such post-war buildings erected over the past decades ago that do not correspond to the surroundings [2]. But is it not possible to avoid this in cultural heritage protection zones? An attempt to ‘correct’ the space by demolishing a structure that did not fit in and constructing a new building in a historically defined space is the question discussed in this paper.
2. Spatial management
The oldest part of the campus in Olsztyn has been designated the status of a cultural heritage protection zone. Some of the buildings within this zone are listed [3]. The high land development saturation in this area practically precludes new projects. This, however, does not rule out a possibility or even necessity to improve this space. There are too many stark contrasts between different architectural forms ‘figure 3’. According to the specifications of the local development plan, efforts should be made to erase these structures which cause disharmony in the historically developed space because of their form, shape or design. What ought to be done is to either re-model them or demolish completely [4].

There used to be, until recently, an example of such a building, located in the western part of the campus. It was a one-storey, flat-roof and metal cladded building, which ironically housed the school of civil engineering ‘figure 4’. In 2008, the university authorities decided to have it demolished and to have a new building erected in its place. The construction design for the building, by winning a public bid, was developed in 2008. The building’s architecture was designed by the architect Marek Zagroba.

The major problems when designing a new building stemmed from the requirement to preserve the architectural heritage, and revolved around the question of how to adapt the building’s functions to the specific nature of civil engineering as a course of study (laboratories) and how to create an architectural form which would harmonise with the historic architecture of this part of the campus [5]. It was also important to respect the urbanistic layout of Kortowo, which at present only partly reflects the original grid of streets and built-up spaces. Some original buildings were ruined at the end of World War Two and the empty land parcels were subsequently developed without respecting the remaining historic structures. An example is the one-storey building mentioned above, which has recently been replaced by a new structure that blends well with the surroundings. Pursuant to the map excerpt from the local spatial management plan for Kortowo, this one-storey building violated the provisions of the cultural heritage protection law. The document recommended that it should be demolished.
The problems encountered while making a design and then constructing the building arose from the need to adapt the pre-defined programme of functions and uses to the heritage preservation requirements, which included a detailed specification of the building’s scale, shape, surface area, composition and construction materials. It was very difficult to incorporate the building into the relatively small land plot and to preserve the trees that were nature protected objects ‘figure 5’. Nearly everything on the land parcel planned for development was protected – even the birds. Because of migrating birds, at some point during the construction of the building, in autumn, some works had to be halted for three weeks.

This historic area of the Kortowo campus is seen as a prestigious one, which is probably why the heritage protection officer requested two hearings to reconcile the design blueprints. This is not a standard procedure. Reconciliation of the design documentation with the Municipal Heritage Protection Office took place twice: at the stage of design concept making and at the stage of drawing construction designs and blueprints. Apart from the heritage preservation requirements, the approval decision
collided with the technical solutions, which necessitated further hearings, for example regarding the location of air intake and exhaust vents.

Figure 5. The land development project of the laboratory building of the Civil Engineering School in the UWM in Olsztyn;

The conditions issued by the Heritage Protection Office stated that air intake and exhaust vents should not be located on the roof but on the level of the ground. This decision constituted a bridge of the technical conditions and had to be approved of by the State District Sanitary Officer. Another problem appeared during the construction works, when the investor requested that the air intake and exhaust be relocated. As a result, certain elements had to be re-designed, possible collisions spotted and resolved, and the changes approved again by the Office of Reconciliation of Project Documentation (Polish acronym: ZUDP).

3. Architectural and construction solutions
The specific character of the building’s functional plan (laboratories, lecture and seminar rooms, staff rooms), connected to its programme of use, forced some division of the structure ‘figure 6’. An opportunity then appeared to make a reference to Kortowo’s historic architecture and create some public space at the entrance to the building. In order to create the adequate conditions for a civil engineering construction laboratory, the building was divided into two parts spanned with a glass patio between ‘figure 7’. The laboratory contains a resistance-testing machine, whose operation parameters required a special floor (80 cm thick, resting on a grid of reinforced concrete binding joists) and some technical room directly underneath.
Another challenge was to design a wooden roof rafter frame over a lecture theatre seating 220 persons ‘figure 8’. The cultural heritage preservation constraints limited the span of the outer walls enclosing what was to be the largest room in the whole building (floor area of 240 m²). Some compromise had to be reached between the architects and constructors when deciding how to support the posts for the roof structure. There were many other problems to be solved during the construction work. For example, it was difficult to execute the solution of building layer walls ‘figure 9’ with clinker brick cladding (the heritage preservation requirement). The changes in the construction materials to be used, accepted during reconciliation hearings, forced the architects and constructors to review and change the previous design. They needed to solve such problems as how clinker bricks would be laid on the walls. Also, some architectural detail had to be adjusted, e.g. quoins, cornices, water tables, dripstones, lintels and roof gable ends.
Furnishing the building with specialist equipment led to other engineering problems. A 17-meter-long water wave flume or a resistance-testing machine are pieces of equipment which – due to their dimensions or operating conditions – required some adaptation of the building ‘figure 10’. On the other hand, the concept of installing natural gravity ventilation was dismissed in favour of other solutions for the sake of making the building more energy-saving. However, the new solution meant that more space was needed for large mechanical ventilation and air-conditioning installations. Having to meet all the above expectations while maintaining the functional and accommodation, technological and heritage preservation requirements meant that this investment project was a difficult one in terms of design and construction.
4. The construction of the building

Prior to the commencement of any development and construction process, an investor must obtain approvals, decisions and permits issued by relevant administration organs supervising development and construction works. An undertaking that envisages building a structure in an area listed as a cultural heritage protected zone requires that a building permit be preceded by an additional permit (approval) to carry out such works. The submitted design solutions are assessed, after which the locally competent Heritage Officer for the Province or the Municipality, as appropriate, passes a decision or opinion, in which guidelines are stated as to how the planned investment project should be performed. These recommendations often pertain to both the building itself and the landscaping of its surroundings, if the whole area is under protection.

As early as the stage of gaining consensus on construction conditions for the planned building or structure, should it be raised on a land parcel in a listed area, an opinion (e.g. conditions or recommendations) must be obtained from the locally competent Heritage Office. The issuing of these recommendations or constraints is preceded by some research, mostly on the character of historically grounded urban or rural layouts as well as complexes of historic buildings. Most often, it is not required to conduct architectural, urbanistic and landscape investigations and analyses. However, an opinion issued by the Heritage Office specifies the ways and degree to which a new development project can interfere with a protected area. This document contains guidelines pertaining to the spatial order, and especially the height of a planned building, the width of the frontage, the permissible angle of the roof slopes, recommended construction materials, and other information which is essential for the final shape of the building. If a construction project is to be executed in an area listed as a cultural heritage protection zone, the above recommendations are created so as to make a reference to the existing buildings and landscaping solutions. The technical documentation elaborated in line with the guidelines mentioned above must be submitted to and reconciled with the Heritage Office. The Heritage Office will then issue either a decision or place a stamp on the submitted documents with a note of approval, and the whole construction process will be overseen by a heritage officer.

Such a challenging investment project as constructing a new building with classrooms and laboratories for the Civil Engineering School at the UWM in Olsztyn, which was planned to stand within a cultural heritage protection zone required some serious preparations, including economic, architectural
and urbanistic analyses. They were carried out to determine what space would be needed to meet the functional requirements set for the new building, which arose from the teaching methods used at the civil engineering course (laboratories, lecture and seminar rooms) and from the research conducted in this field. It was important to take into account the estimated numbers of students enrolling in the school and continuing their education. These data were needed to determine the space divisions in the building. Considering the constraints imposed by the small size of the building plot and a number of nature-protected trees growing on it, these analyses had to be repeated several times, especially that the construction works were partly funded from the EU funds and the total floor space had been determined previously.

The reconciled guidelines underlying the design had to be instantly verified against the standards used in architecture and in Building Law, for example the acceptable number of users per sanitary facilities, or the required width and length of corridors and passages in the building, etc. These norms weighed heavily on the process of designing the building’s architectural shape of the building, the searching for a form and composition of the building.

The urbanistic layout of this part of the university campus predetermined the spatial solutions proposed for the new building. Its location among historical buildings imposed the shape of the new building as well as the building materials used, which were also precisely defined in the conditions issued by the heritage office. Owing to these efforts, the new building has become an integral part of the urbanistic and architectural complex, which lies in a cultural heritage protection zone ‘figure 11’.

![Figure 11. The building of the Civil Engineering School at the UWM – a view from the outside;](image)

5. Final remarks
It is not an easy task to build a modern university building which will satisfy the expectations of users (suitable space for teaching and conducting research) and the investor. In respect of the building described in this paper, the biggest challenge lay in the location itself – a small land plot in a cultural heritage protection zone, among some rather disorderly developed land plots. However, the discussed case of designing and constructing a teaching and research building in a protection zone proves that efforts bordering on revitalization and revalorization should accompany the spatial development pursued in the oldest part of Kortowo campus. The main objectives should be to bring order to the architectural forms and landscape solutions and to remove or re-design structures which are disharmonious with the
Attaining these goals may have a positive effect on the development of school and research buildings on campus, and will improve the quality of science and work outputs.

Having to meet the contemporary standards imposed on functions performed by university buildings and cultural heritage preservation requirements determines the choice of design solutions. By operating modern instruments of expression, an architect is able to bring harmony between a new architectural structure he is creating and the adjacent historic buildings. The case presented in this article clearly proves that it is possible to make an effort to create spatial harmony in cultural heritage protection zones, even if rather drastic methods are implemented (demolishing a building) and succeed.

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