CIVIL AND ENVIRONMENTAL ENGINEERING REPORTS

E-ISSN 2450-8594

CEER 2025; 35 (1): 0116-0141
DOI: 10.59440/ceer/199691
Original Research Article

THE RENOVATION OF THE FORMER ZAMOŚĆ ACADEMY BUILDING IN ZAMOŚĆ IN THE CONTEXT OF RENOVATION AND RESEARCH CHALLENGES

Krzysztof JANUS[1], Karol KRUPA[2]
[1] Lublin University of Technology, Faculty of Civil Engineering and Architecture, Department of Architecture, Urban Planning and Spatial Planning, Lublin, Poland
[2]Lublin University of Technology, Faculty of Civil Engineering and Architecture, Department of Contemporary Architecture, Lublin, Poland

A b s t r a c t

The article presents the challenges faced during the renovation works completed in 2024 on the building of the former Zamość Academy in Zamość. It focuses not only on the work conducted on this specific historic monument but also on the unexpected findings and discoveries made during the construction and renovation process. Among these discoveries were 18th-century illusionistic wall paintings in the chapel and the Jan Kanty Hall, floors from various periods, the foundations of older buildings on which the walls of the current academy were erected, as well as 18th-century recessed latrines preserved with wooden seating elements and risers. The article also discusses how, in the 19th century, attempts were made to deal with the effects of high wall moisture and the heating system used in the earliest periods of the building's history. Additionally, it explores the circumstances of the discoveries, their impact on the construction process, their significance for the history of the building, the city, and the region, and how the renovation work, which exceeded the scope of the original construction project, influenced the overall renovation process.

Keywords: renovation, Academy in Zamość, heritage, reconstruction

1. CIRCUMSTANCES OF THE FOUNDING OF THE ZAMOŚĆ ACADEMY

Zamość, as a city, came into existence somewhat by accident. Its founder, Jan Zamoyski (Grand Hetman and Chancellor of the Crown), initially planned to build a residential estate with prominent defensive features. However, in 1579, he decided to expand his project by adding a town to the estate. Shortly thereafter, Zamoyski's vision began to be realized by the Italian-born architect Bernardo Morando [1].

[1] Corresponding author: Lublin University of Technology, Faculty of Civil Engineering and Architecture, Department of Architecture, Urban Planning and Spatial Planning, Nadbystrzycka 40, 20-618 Lublin, Poland, k.janus@pollub.pl, +48 81 538 46 40

The entire complex was constructed on a greenfield site, "surrounded by walls in a marshy area." In 1580, the city received its founding charter, granting various privileges, including a 25-year exemption from taxes and tolls for its residents throughout Poland—one of the key factors in its growth. Initially, Zamość was intended to be a city for Catholics only, with a single church, the Collegiate Church, large enough to accommodate the entire population (around 3,000 people). However, Zamoyski soon changed his mind and invited wealthy foreigners (Sephardic Jews, Armenians, Greeks), who further accelerated the city's development. They built the grand Armenian houses and their own places of worship. The city grew rapidly, with 217 houses and only 26 vacant lots by 1591. Zamoyski's success can be attributed to his excellent education, intelligence, entrepreneurship, and skillful political maneuvering. While he inherited 3.5 villages from his parents, by the time of his death, he owned 11 cities and over 200 villages, while also managing 12 cities and 612 villages from royal estates [2].

Zamoyski's goal was to build a modern city that met the highest standards. It had a residence, a grand collegiate church, a commercial and defensive center, and even a private army. What was still missing was an academic institution (he himself had studied in Padua, where he served as rector), and he understood the need for such a center [3]. As early as 1580, Zamoyski wrote to the apostolic nuncio, outlining the concept of creating an academy [4]. It was intended to educate the nobility for governance roles in Poland. Zamoyski believed that the creation of a civic organism had to be based on a well-organized administration working closely with the Church. The endowment of the parish and the founding of the academy were priorities, with both institutions being interdependent. The term "academy" first appeared in his correspondence in 1593, noting that it was housed in the hipeum [5].

The process of establishing the academy turned out to be a lengthy and complex endeavor, one that was fully completed only by his grandson. The academy became the first private institution of higher learning in Poland, and the third after Krakow and Vilnius. In 1593, Szymon Szymonowic persuaded three professors from Krakow to work in Zamość: Wawrzeniec Starnigelius from Busko (Doctor of Philosophy), Jan Ursynus from Lviv (Doctor of Philosophy), and Melchior Stephanides (Doctor of Both Laws) [6]. On March 15, 1595, the academic year was inaugurated in temporary facilities that housed five departments, five lecture halls, and nine chambers [7]. That same year, a printing press was opened, with its first publication being a "Proclamation" on the founding of the academy and two textbooks for students [8]. Within two years, the academy offered a comprehensive range of subjects, conferred doctoral degrees, and had a library and bursary in separate buildings. The academy was open to both the poor, who did not pay for their education, and the wealthy nobility—one of its students was Jan Zamoyski's son, Tomasz. The Theology Department was established in 1603, led by the Franciscan Dominik Convalis. Fires in 1627 and 1633 caused significant damage, and in 1639, due to the poor condition of the building, Katarzyna Zamoyska initiated the construction of a new academy building, which likely survives in its present form. The work was completed around 1658 [9]. In 1702, St. John Cantius became the patron of the academy. The 18th century was not kind to the building. The difficult geopolitical situation contributed to its gradual moral and physical decline. For example, outbuildings were erected in the courtyard, where professors kept livestock. During this period, the academy had four faculties: theology, law, medicine, and philosophy. It wasn't until the mid-18th century that serious efforts were made to improve the building's condition and restore the academy's reputation. Despite significant endowments from the Zamoyski family and funds from professors' bequests, the academy struggled with financial stability. The deteriorating condition of the building in the mid-18th century necessitated extensive renovations, which lasted for a long time and, in many cases, caused irreparable damage. The renovations, based on designs by Andrzej Bem, began in 1752 [10]. At that time, most of the building's vaults were replaced, the external walls were strengthened or rebuilt, some cellars were either constructed or filled in, a mansard roof was installed, and the baroque, polychrome façade was completed. The academy was closed by Austrian authorities in 1784, after which a gymnasium operated

in the building [11]. In 1809, the military moved in, and for nearly 60 years, it was the sole occupant of the structure. During this time, numerous repairs improved the technical condition but stripped the building of its original stylistic features (all the polychromes were painted over, most of the stone portals were removed, the roof was changed, the arcades were bricked up, etc.). Currently, efforts are underway to restore the building to its former glory state.

2. UNEXPECTED DISCOVERIES DURING THE WORKS

The renovation process of the former Zamość Academy building in Zamość proved to be complicated from the very beginning, starting with the project and extending to the execution. This led to formal and legal turbulence, as the original project was created in 2013, while the construction work commenced based on a building permit issued in 2018. The COVID-19 pandemic also posed challenges, including a lack of progress in the work, a change in the original contractor, skyrocketing construction material prices, and inflation, all of which contributed to uncertainty regarding the completion of the project within the planned timeline. However, for nearly a year, the building has been functioning in its almost original capacity. Below, the most significant renovation and research challenges arising from the unique character of the building are presented.

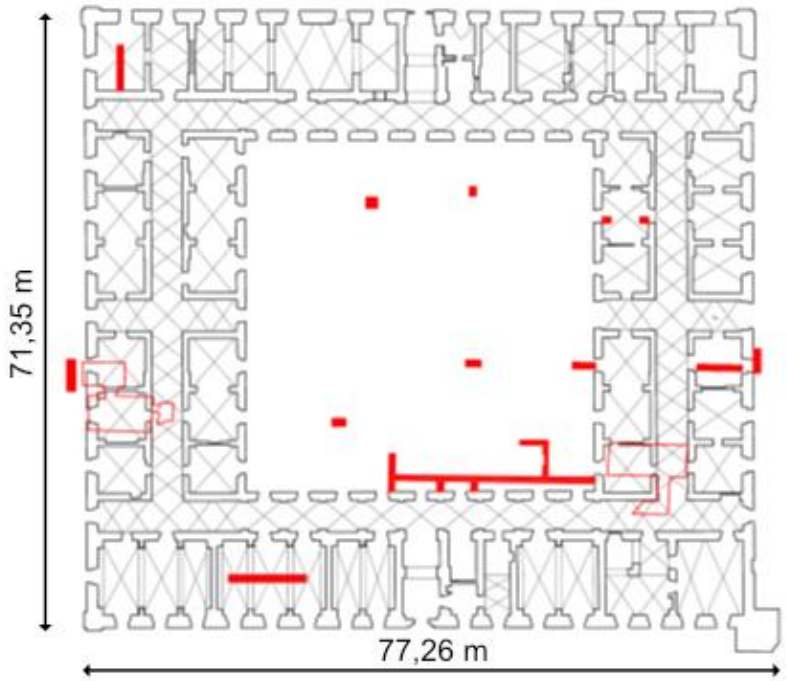

Fig. 1. Ground floor plan – location of walls and remnants of the structures existing before the academy building in its current form, drawn by K. Janus

2.1. Foundations

Before the renovation work began, it was known that the academy building was constructed on the site of residential development and chancellery infrastructure referred to as hipeum. Figure 1 shows the known and uncovered remnants of the earlier buildings that predate the current structure, while Figure 2 depicts a hypothetical layout of the block development in the area of the discussed building within the scale of the city.

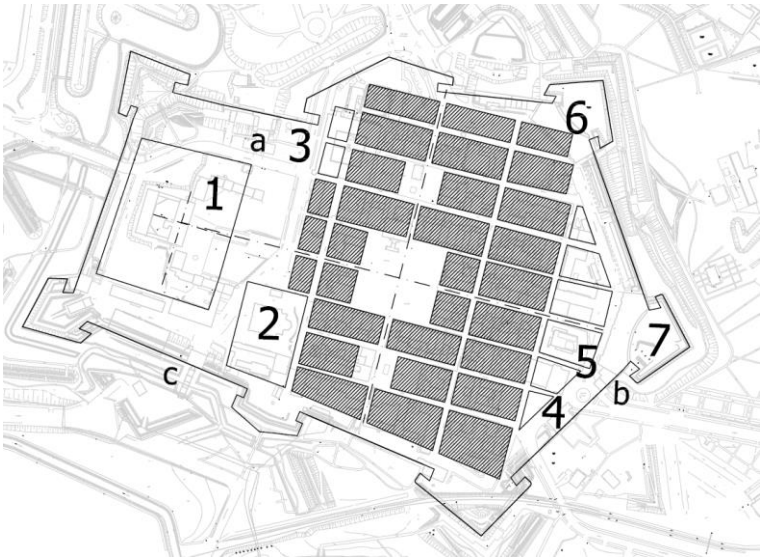

Fig. 2. Attempt to reconstruct the urban layout of the city at the end of the 16th century (1 – palace, 2 – collegiate church, 3 – hipeum/chancellor's stables on the site of the current Zamość Academy, shading – location of residential buildings), drawn by K. Janus

2.2. Foundations insulation

The original foundation walls of the academy building lacked waterproof insulation. In some places, it appears that a layer of clay adhered to the walls; however, whether this was an attempt at insulation or a random occurrence cannot be determined. It is known that the area is exceptionally damp. The issue of moisture in historic buildings in Zamość has been described since the 18th century, and in the 20th century, the term "hetman mold" was first used to describe a type of mold that is particularly difficult to remove and troublesome to deal with. In the 19th century, military engineers attempted to mitigate the effects of moisture in the academy building by implementing ventilated floors, which consisted of floors on large joists supported by a grid of brick columns, combined with openings in the subfloor space that allowed for free ventilation between the rooms and the outside (Fig. 1, 20) [12]. It turned out that the wooden beams were remarkably well preserved; however, some of the brick columns were washed out, tilted, and even "overturned." The renovation works planned for the removal of these structures and their replacement with floating floors on insulation layers.

The renovation works included the insulation of all external walls using a slurry application for vertical insulation and injection for horizontal damp-proofing. During the work, it was discovered that some of the walls had a form of insulation whose exact type could not be determined. The new vertical insulation was supplemented in areas where it was missing or uncertain. The horizontal damp-proofing was applied around the entire perimeter of the building, including stone thresholds, bricked-up recesses, and openings to non-existent basements, although the material condition was not fully considered.

From a research perspective, the uncovering of the foundations revealed that the academy building in its current form was constructed as a single structure during one construction phase. The only unresolved question was whether both the residential and chancellery buildings were demolished, or only the residential one, or if part of it was adapted. In almost every deeper excavation, remnants of older walls were uncovered, marking earlier structures that had not been known before. Certainly, the underground structure contains more undiscovered and unknown elements that could further deepen the

understanding of Zamość history and its transformations. This aspect was not thoroughly explored during the renovation works.

Fig. 3. Visible ventilation opening between the rooms of the ventilated floor and the beams/joists of the floor, photo by K. Janus, 2021

2.3. Reconstruction of the arcades

The academic courtyard originally featured two open arcade walls at the ground level. This was not a typical solution for that period; however, no information could be found about an alternative layout. The courtyard arcades were bricked up in the 19th century by the military. Their traces were discovered by Professor Zin in the 1970s [4]. During the current renovation, the removal of 19th-century infill and the restoration of the arcades were planned (Fig. 6, 7). The original columns were constructed on a point foundation, and the arcades were additionally supported by a brick arcade (Fig. 4).

The work on the reconstruction of the arcades primarily involved strengthening the wall structure and the foundation of the arcade columns. The adopted solution included the use of micro-piles in tubular shafts of 10.5 meters in length, as well as reinforced concrete (Fig. 4). Additionally, spaces for reinforced concrete pins were cut between the arcades (Fig. 5) to relieve the load on the entire structure. The execution of this construction was a significant intervention in the building's structure; however, the structural engineer's recommendation indicated that such actions were absolutely necessary. Therefore, the only feasible action for the researchers was to thoroughly document the elements before they were modified.

During the research, the presence of pilasters on the courtyard side and an impost band connected to the pilasters (which did not encircle the entire column) was confirmed. The pilasters extended only to the level of the inter-story cornice, which was higher by one course of bricks. Above the cornice, at the first-floor level, no continuation of the divisions from the ground floor could be confirmed (there were no traces of the pilasters being removed). It seems unlikely that in the 17th century, the vertical division of the façade would not have been continued along its entire height, which suggests that the divisions may have been executed, for instance, in plaster, or that the entire first-floor wall above the arcades was replaced. The uncovered arrangement, lacking a gallery/loggia with arcades on two façades, is a highly unusual solution, even considering the architectural standards of Zamość.

Fig. 4. North-East corner of the courtyard with visible original point foundations and brick arch during reinforcement works on micropiles, photo by K. Janus, 2023

Fig. 5. Arcades during reconstruction, with the red arrow indicating the locations of the grooves for wall reinforcement, photo by K. Janus, 2022

Fig. 6. View of the academy courtyard from the east before the renovation began, photo by K. Janus, 2021

Fig. 7. View of the academy courtyard from the east after the renovation works were completed, photo by K. Janus, 2024

2.4. Original openings

The original openings in the academy building followed a consistent design. On one side, they featured stone frames/portals, and above these stone elements were relieving arches half a brick thick, but only above the stone components (Fig. 10, 11). On the other side, classic lintels were constructed in the form of brick arches, which transferred the load from the wall. Such openings were created both in internal and external walls. Before the renovation, one window opening with a stone frame (in a blind window on the first floor of the northern façade) was exposed, along with two door portals in the corridor on the

upper floor, which were almost entirely stripped of their decorative details. The most recent renovation also revealed two additional complete stone frames in the courtyard (though in very poor condition) as well as several individual stone elements, which served as lintels and thresholds or fragments thereof, lacking any decoration (Fig. 8, 9). Aside from the window surrounds or their remnants, only three original window lintels, which had neither been replaced nor rebuilt, were additionally uncovered. These works were carried out in the 19th century and were likely associated with the very poor technical condition of the building. After exposing the stone surrounds, the first action should have been to secure the element and preserve as much of the heritage material as possible. During the works, most of the exposed stone lintels were removed, and even one complete stone surround from the courtyard was replaced with reinforced concrete lintels. The repair of such elements should involve potentially constructing load-bearing lintels to relieve the stonework, rather than replacing it with a new lintel. The stone element itself does not bear loads, as the structural functions are performed by the load-bearing arch, so replacing them was of little significance. Elements in an agonal state can be reinforced or even tied to the lintel constructed above the stonework; other actions are simply non-conservation measures. Based on the identified characteristic construction of the window surrounds, and more specifically the arrangement of the adopted lintels, it was possible to determine the contemporaneity of the creation of all external walls of the building, except for the eastern one (on which the plaster had not been removed), as being constructed according to a single architectural concept.

Fig. 8. Remains of the preserved stone lintel of the window surround in the courtyard, photo by K. Janus, 2024

Fig. 9. Remains of the preserved stone lintel of the window surround in the courtyard, photo by K. Janus, 2024

Fig. 10. Remains of the stone lintel beam, photo by K. Janus, 2024

Fig. 11. Damaged stone portal with a visible relieving arch (blue arrow) and the negative of the vault (black arrow), photo by K. Janus, 2021

2.5. Floors

At the first-floor level, wooden floors have been preserved from both the 19th and 20th centuries. On the ground floor, at least four types of historical floors were uncovered, ranging from wooden floors preserved in the form of a "negative" of the laid wood to several types of brick flooring at different levels. The oldest were found at the lowest level and were made of interwoven square and rectangular

tiles (Fig. 12). These bricks were placed directly on the building's base, and their condition was incredibly poor. In many areas, they had sunk, with the brick structure cracked, and in some places, it was almost powdery and crumbling during cleaning. This floor had been supplemented at least several times with ordinary bricks laid vertically. At higher levels, additional brick floors were uncovered, arranged vertically in an alternating pattern and in a herringbone design. The most interesting floor was not associated with the academy building but with the older urban development (Figs. 12, 13) upon which the discussed building was constructed. It was made of bricks laid flat in a caro pattern with a border that delineated the external wooden wall of the original building. The surface of the floor bore traces of burning and melted lead, indicating the tragic end of the building. This floor could have functioned for only a few years, but it can certainly be stated that it is the best-preserved (and perhaps the only) 16th-century floor in Zamość.

The uncovered historical floors, as the only elements, did not conflict with any aspect of the renovation works. From a research perspective, they allowed for determining the dimensions of the non-existent development preceding the academy building and for establishing older usable levels. Due to the uniqueness of the brick floor, a fragment of it was highlighted and covered with glass (Fig. 13).

Fig. 12. Floor of a residential/craft building from the 16th century, photo by K. Janus, 2020

Fig. 13. Floor of a residential/craft building from the 16th century after cleaning and exhibition, photo by K. Janus, 2023

Fig. 14. Fragment of a brick floor from the 17th century in the corridor, photo by K. Janus, 2023

2.6. Privies in the southeast corner of the building

The first mention of privies in the academy building dates back to 1694. In the 18th century, a servant is described as being responsible for cleaning the "loca secreta" and sprinkling lime over the "pit." During the current renovation works, bricked-up privy niches were uncovered on both the ground and first floors (Fig. 15, 16). On the first floor, the niches measured 116 cm in depth, 70 cm in width, and 340 cm in height (Fig. 17), and nearly complete boards with anatomically cut openings and directed

footrests were preserved (Fig. 18). On the ground floor, remnants in the form of arches were found, and it was also possible to determine the depth. The remaining part of the wall had been largely rebuilt and modified. Initially, waste was directed into a tank (evidenced by preserved channels), and later, a brick channel was constructed with an outlet beyond the city walls. The find was so unusual that no one questioned the necessity of its exhibition. This decision was made despite maintaining the room's function as a classroom (Fig. 19). A question arose regarding how students would interact with such objects, given that workers utilized their original function. Currently, one original board and the remaining niches have been reconstructed, but only on the first floor.

Fig. 15. Floor of a residential/craft building from the 16th century after cleaning and exhibition, photo by K. Janus, 2023

From a research perspective, the rarity of this find was undeniable. Such objects have not survived to the present day. The introduction of privies into the interior of buildings in the 17th and 18th centuries was, from a practical standpoint, inadvisable. Privies of this kind, lacking access to running water, sewage systems, and easily washable surfaces, were difficult to maintain and operate. Ventilation for the academy's privies was provided by a constantly open window (both in summer and winter), which practically resulted in high temperatures during the summer, leading to discomfort. In winter, the temperature inside matched that outside, resulting in numerous signs of freezing and damage visible across the entire surface of the walls; this season alleviated the unpleasantness of odors and insects. These privies likely functioned for several decades before the military deemed them impractical and unsanitary. It can be assumed that this was a kind of architectural and sanitary experiment, the realization of which necessitated the demolition of the entire external wall of the building, the vaults, the removal of the basement, and the rebuilding of a new structure with niches. A surprising discovery was the openings in the boards, which not only had anatomical cutouts but also varied shapes (ranging from circular to oval to heart-shaped). That they have survived to this day is due to an extraordinary coincidence (Fig. 18).

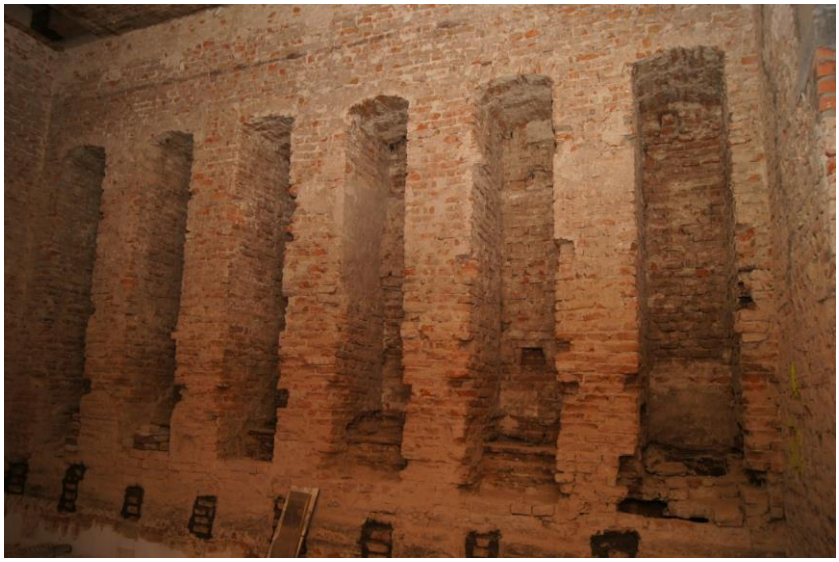

Fig. 16. Uncovered niches in the first-floor room, photo by K. Janus, 2022

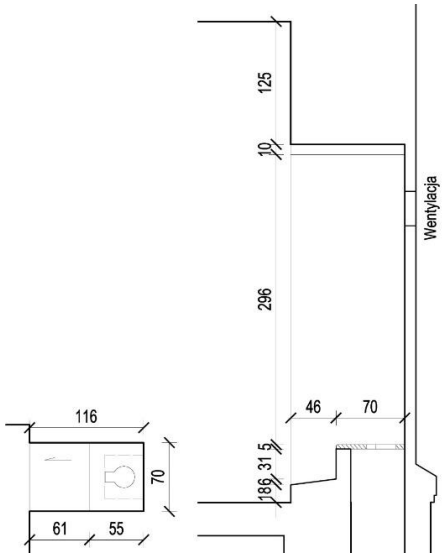

Fig. 17. Plan and section of the uncovered toilet niche, elaboration K. Janus, 2023

Fig. 18. Floor of a residential/craft building from the 16th century after cleaning and exhibition, photo by K. Janus, 2023

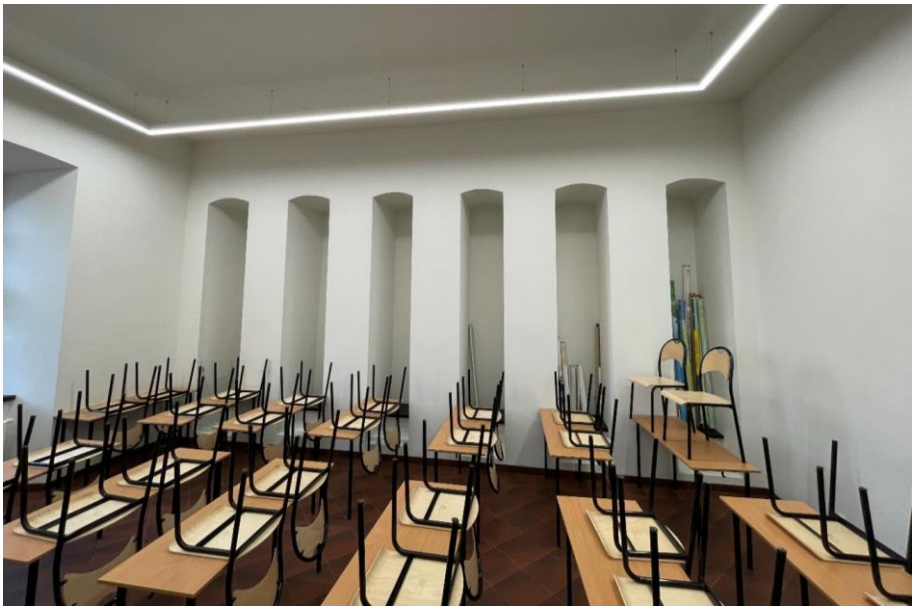

Fig. 19. Toilet niches after the completion of renovation work, photo by K. Janus, 2023

2.7. Polychrome decorations

During the renovation works, a series of wall paintings were uncovered, located throughout the building (Fig. 26, 27). Both the original frescoes and later coatings, such as teaching aids like a philosophical tree (Fig. 28), as well as illusionistic polychromes in Kant's Room and the chapel, were revealed. The process of uncovering the polychromes began in 1994, when many rooms with paintings were uncovered, but it was decided to exhibit only two of them (Fig. 21). During the most recent renovation

work, it was decided to remove all cement plasters and examine the work in terms of polychromes and older color schemes. In practice, it turned out that the largest and most magnificent rooms with illusionistic polychromes were not included in the funding. Thus, it was only during the work that funds were found for their conservation. Both small fragments of polychromes, such as the emphasized flows of the vaults along with the plasters (Fig. 24, 25), and painted portals above the doors (Fig. 22, 23) and teaching aids in the form of drawings of philosophical trees were subjected to exhibition and conservation. Most of the polychromes were preserved to only half or even less, which was due to both military work and the activities of electricians and plumbers from the 20th and 21st centuries.

2.8. Saint John Kanty's room and the former chapel

In both cases, partially preserved illusionistic polychromes were uncovered, for which the existing vaults were created. They were constructed in the 18th century, painted over by the military in the 19th century, later partially removed in places where new ribs were added, and seriously damaged during installation work in the 20th century (Fig. 20). The project anticipated the removal of the ribs but not the reconstruction of the polychromes. The investor understood the necessity of their exhibition, but it was only thanks to external funding that this task was completed. The characteristic "smoothing" of the vault with a lunette facilitated the work of the illusionist painter, but structurally significantly weakened its durability. The designer anticipated reinforcing the vaults by stitching them from below, but ultimately it ended with cutting the joints from above and strengthening them without the use of impact tools.

2.9. Wall painting above the entrance

The wall painting was uncovered during the final phase of the renovation. After the removal of secondary elements and bricking, the original niche was revealed, followed by two layers of polychromy (Fig. 29). It was known from drawings from the early 19th century that there was a painting there; however, it was not thought to be a polychromy but rather a painting on wood/canvas. The location turned out to be above the main entrance to the building, which lost its original function only in the 19th century. This area was one of the most representative, thus it has been a significant decoration since ancient times. The niche with polychromy and the portal, known from historical drawings, was created in the mid-18th century and commemorated the figure of St. John Kanty. The image, when viewed up close, may not have been the most impressive work, but it was certainly noticeable from a pedestrian's perspective. The polychromy complemented the portal, which was somewhat integrated into the narrative of the 18th-century building with a polychromed façade. This polychromy was painted over with the eagle of the Congress Kingdom (Fig, 30), which had already been painted by the artist but on a substrate that was practically not bonded to the plaster. It survived thanks to its bricking. During the recent renovation, a decision was made to expose the polychromy featuring John Kanty and to transfer what remained of the Congress eagle after conservation work. (Fig. 31)

Fig. 20. Kanty's Room before the start of conservation work, showing the ventilated floor, photo by K. Janus, 2021

Fig. 21. Former chapel after the completion of conservation work, photo by K. Janus, 2023

Fig. 22. Former chapel during the uncovering of polychromes, photo by K. Janus, 2021

Fig. 23. Former chapel after the completion of conservation works, photo by K. Janus, 2023

Fig. 24. Entrance to the former chapel during conservation works, photo by K. Janus, 2021

Fig. 25. Entrance to the former chapel after the completion of conservation works, photo by K. Janus, 2023

Fig. 26. One of the walls of the former library with fragments of interwar polychromy, photo by K. Janus, 2021

Fig. 27. One of the walls of the former library with fragments during conservation work, by K. Janus, 2022

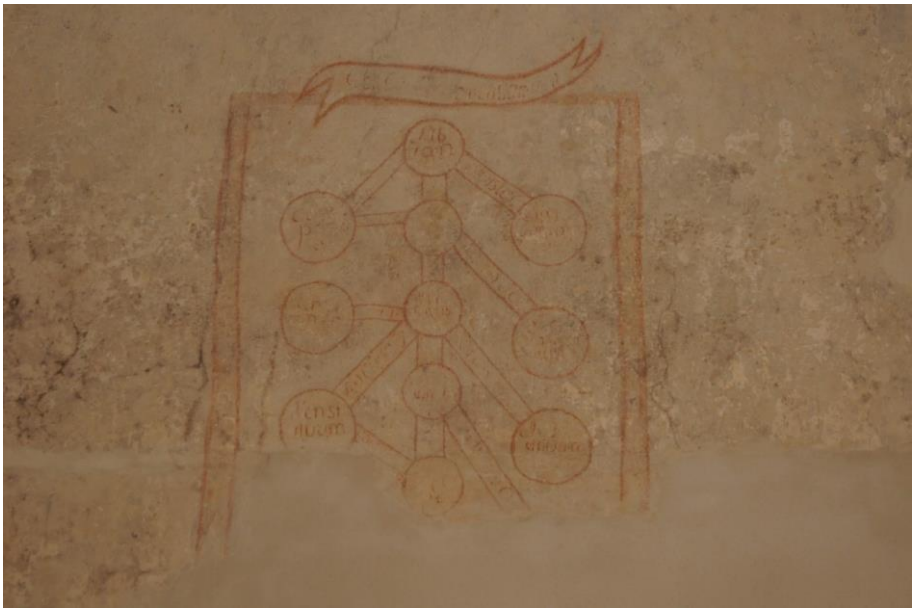

Fig. 28. Fragment of the philosophical tree after conservation work, photo by K. Janus, 2023

Fig. 29. Niche above the entrance on the western side shortly after discovery, photo by K. Janus, 2023

Fig. 30. Niche above the entrance on the western side with the uncovered Congress Eagle, photo by K. Janus, 2023

Fig. 31. Niche above the entrance on the western side after conservation excavations, photo by K. Janus, 2023

3. CRITICAL TECHNICAL CHALLENGES AND METHODS OF REPAIR

Technical issues that, in the worst case, lead to structural failure must be analyzed in terms of cause-and-effect relationships. The foundation of all renovation and conservation activities is the identification of factors causing and exacerbating the degradation of individual elements. To classify potential threats,

a typology was adopted that distinguishes causes of deterioration as meteorological, hydrological, geotechnical, biological, astrophysical, anthropogenic, and those resulting from climate change [13]. These categories encompass the full range of sources for structural failures, which occur at rates dependent on the specific nature of the threat.

From a general perspective on historic buildings, the weakest elements are roofs and areas in contact with the ground. Degradation in these two zones often triggers technical issues in other structural components. Stopping this process requires precise identification of the causes of damage, with each historic structure treated as a unique case [14].

In the context of the Zamość Academy building, based on archival materials and documentation of its preservation state, the following threats have been identified:

- meteorological: intense precipitation, strong winds, hailstorms, heatwaves, fires caused by lightning strikes,
- hydrogeological: flooding due to rainfall, changes in groundwater levels, and sudden inundations,
- geotechnical: alterations in soil moisture conditions, increased structural loads, and nearby construction activities,
- biological: pest activity, algae growth, invasive vegetation, or corrosion,
- anthropogenic: fires, military actions, infrastructure failures, improperly conducted renovations and construction work, as well as design or execution errors,
- climate change: shifts in precipitation patterns.

Particular attention must be paid to threats caused by human activity, as these often result in technical problems for historic buildings. These issues arise from the use of materials and technologies inappropriate for the long-term context of the structure. Even when buildings were constructed according to the best practices of their time, they often require significant renovations over time, frequently involving substantial rebuilding or changes in usage. The history of the Zamość Academy building reflects this, with numerous modifications, reconstructions, and structural changes.

The most common technical issue concerning the foundations of historic buildings is the lack of waterproofing. The absence of such protection, whether due to unavailable technology during the building's construction or improper application during subsequent renovations, can lead to a wide range of consequences. These range from damage to plasters and wooden elements, increased moisture levels in rooms, and reduced user comfort to emergency structural damage. Protecting historic masonry from water damage is a particularly challenging task, often impossible to achieve fully.

In assessing the causes of structural degradation, the impact of moisture must be considered. This includes capillary action drawing water from the ground, poor management of rainwater, and insufficient protection against atmospheric water. Horizontal isolation methods include mechanical and chemical approaches. The most commonly used system for preventing moisture-related damage in foundation areas is chemical injection to create a horizontal barrier. Mechanical methods, such as inserting a secondary horizontal layer (e.g., metal sheets) into existing masonry, are imprecise and prone to significant execution errors. Complementary to horizontal protection is vertical isolation, achieved using mineral-based coatings or slurries designed for damp masonry.

Proper management of rainwater typically involves improving the technical state of roofing and drainage systems. Ensuring this scope is performed correctly provides effective protection against atmospheric factors. Analyses of dampness in historic structures often reveal significant contributions from improperly constructed or deformed plinths or other hard surfaces around the building. These issues highlight the destructive effects of both capillary and atmospheric moisture. However, the mentioned protective methods cannot entirely eliminate these effects. Additional problems may arise

from foundation settlement, material degradation (e.g., biological corrosion of wooden ceilings or masonry spalling), and more.

A significant challenge in the Zamość Academy building was the state of architectural details, such as stone portals and window or door frames. The original builders designed stone lintels as decorative elements, not load-bearing ones, and incorporated brick relieving arches above them for structural support. Studies revealed that the deterioration of these details was often caused by their weight or the worsening condition of neighboring structural elements. In similar cases in other historic buildings, the best approach involves reinforcing existing brick arches and lintels, sometimes suspending stone elements using anchors.

Lintel repairs may range from filling minor cracks to more invasive procedures. Among the various engineering solutions available, the chosen method should strive to preserve as much historic material as possible [15]. Moderate interventions include injection, wedging, or stitching. Regardless of the type and extent of damage, structural repairs should aim to halt the destructive processes.

4. CONCLUSIONS

At the beginning of such a vast renovation in one of the older academic buildings in Poland, unforeseen discoveries that could reveal its history and fragments of its past life were to be expected. Traces of transformations, fires, reconstructions, and other changes that shaped the current appearance and layout of the building were found.

One of the most important conclusions is that the structure, built in the 17th century, still meets almost all technical requirements for educational facilities (except for ventilation, the fire resistance of wooden ceilings, and the length of evacuation routes). Research showed that the current academic building originated in the 17th century on the site of two or four building quarters, where there were chancellor stables/hipeum as well as brick and brick/timber urban structures. Relics of these structures were known before the renovation, but the current works revealed the scale of the buildings. The original academy building was made of brick, plastered with thin-layer plaster, and each opening had a more or less decorative stone window/door frame, sometimes a portal. In the 18th century, a massive renovation took place, during which most structural elements of the building were replaced. The majority of weathered and time-worn stone details were also removed, and their fate was sealed by military actions in the 19th century.

The most interesting discovery during the renovation work was the polychromies dating from the 17th, 18th, 19th, and 20th centuries. These polychromies were mainly associated with the functioning of the academic institution and were used as teaching aids (philosophical tree) , as well as for practical applications (chapel) or places of exceptional adoration (Kanty's Hall). Also found were plaster remnants, original plaster several millimeters thick, brick flooring, and traces of ceilings.

An unexpected and even rare find was the uncovering of privies with seats dating back to before 1804, which can be considered the oldest preserved wall toilets in an academic building in Poland, and perhaps even in Europe. They must have functioned for a relatively short period (several decades), creating significant usability problems that the military immediately recognized and addressed by replacing them with classic wooden toilets.

REFERENCES

1. Herbst, S 1954. Zamość. Warszawa: Wydawnictwo Budownictwo i Architektura.

2. Janus, K, Chachaj, J and Krupa, K 2022. Life of Saint John Cantius unveiled in a wall painting at the former Zamoyski Academy in Zamość. *European Journal of Science and Technology* **18**, 125-144.
3. Łempicki, S 1980. *Mecenat wielkiego kanclerza: studia o Janie Zamoyskim [Patronage of the great chancellor: studies on Jan Zamoyski]*. Warszawa: Państwowy Instytut Wydawniczy.
4. Zin, W, Grabski, W, Pawlicki, and Kadłuczka, A 1973. *Badania architektoniczno-konserwatorskie Akademii Zamojskiej [Architectural and conservation study of the Zamojska Academy]*, Kraków.
5. Sawa, B 2018. *Noce i dnie Zamościa XVI-XX w. [Nights and Days of Zamość 16th-20th centuries]*. Zamość: GreenART Jacek Kardasz.
6. Kochanowski, J 1900. *Dzieje Akademii Zamojskiej 1594-1784 [History of the Zamojska Academy 1594-1784]*. Karków: Druk W.L. Anczyca i Spółki.
7. Myśliński, K 1969. *Zamość i Zamojszczyzna w dziejach i kulturze polskiej [Zamość and the Zamojszczyzna region in Polish history and culture]*. Zamość: Zamojskie Towarzystwo Przyjaciół Nauko w Zamościu.
8. Buchwald-Pelcowa, P 1983. *Drukarnia Akademii Zamojskiej [Printing House of the Zamojska Academy]*. W: Kowalczyk J., (ed) *Czterysta lat Zamościa [Four hundret years of Zamość]* Wrocław, 70.
9. Soroczyńska, B and Szponar, J 1986. *Akademia w Zamościu.* Dokumentacja naukowo-historyczna.
10. Kowalczyk, J 1980. *Zamość – miasto idealne [Zamosc - the ideal city]*. Lublin: Wydawnictwo Lubelskie.
11. Sawa, B 2018. *Zamość 1772-1866*, Zamość: Bogumiła Sawa.
12. Rysunek szczegółowy prac przeprowadzonych w koszarach nr. 28, 1855 r., Kopia cyfrowa pozyskana przez Bogumiłę Sawę z Moskwy, RGWIA sygn. F. 349 Op. 12 D. 7283.
13. Marconi-Betka, A and Furmaniak, B 2020. *Zarządzanie ryzykiem katastrof w światowym dziedzictwie[Managing a World Heritage Disaster]*, Warszawa: Narodowy Instytut Dziedzictwa.
14. Drobiec, Ł 2022. Przyczyny awarii i katastrof obiektów zabytkowych [Causes of failures and disasters of historic buildings]. In: Kaszyńska, M, *Awarie budowlane: zapobieganie, diagnostyka, naprawy, rekostrukcje [Construction failures: prevention, diagnosis, repair, reconstruction]*. Szczecin: Wydawnictwo Uczelniane Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie, 33-52.
15. Dimes, F and Ashurst 1998. *Conservation of Building and Decorative Stone*, Routledge, 1998.