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CONSTRUCTION AND STRUCTURAL SPECIFICITIES OF WARTIME RESTORATION OF EARLY 20TH-CENTURY HERITAGE BUILDINGS IN LVIV

Ihor BOKALO[1], Mariana KAPLINSKA[1], Iryna POHRANYCHNA [1], Bohdan CHERKES [2,*], Karol WYSZNACKI[3]

[1] Lviv Polytechnic National University, 12 Stepan Bandera Street, 79000, Lviv, Ukraine
[2] University of Agriculture in Krakow, Aleja Mickiewicza 21, 31-120, Kraków, Poland and Lviv Polytechnic National University, 12 Stepan Bandera Street, 79000, Lviv, Ukraine
[3] Lodz University of Technology Institute of Architecture and Urban Planning, 116 Zeromskiego St., Lodz, 90-924, Poland

Abstract

The article presents the results of an examination of residential buildings at 44 Konovaltsia Street and 62 Stryiska Street in Lviv, which were damaged as a result of Russian airstrikes on the city. These buildings are architectural monuments of local historical significance and require a comprehensive approach to their reconstruction. In accordance with the technical condition inspection reports, emergency and priority conservation work was carried out. Currently, scientific and design documents for the rehabilitation of the buildings have been developed. During the design work, the key point in the pre-project research was the calculation and scientifically based confirmation of the principles of operation of historical structural elements and the justification for the use of new structural schemes, as well as intervention in the authentic structure of the monument. For a detailed study of the objects, archival materials, acts of assessment of the character of destruction, and acts of technical condition of buildings, as well as digital documentation, were analyzed. The conclusions presented in the study demonstrate that restoration practice in wartime requires flexible technical solutions that ensure a balance between structural safety, the compatibility of modern and historical materials, and the preservation of historically formed architectural forms. The authors of the study argue that a scientifically based interpretation of modern construction schemes in practical restoration practice is justified when direct reproduction of historical structures is impossible.

***Keywords**: War-Damaged Listed Buildings; Architectural Heritage; Wartime Restoration; Early Twentieth-Century Construction Systems; Structural Repair in Conservation Practice; Authenticity; Conservation Philosophy Under Wartime Conditions*

Introduction

The protracted armed conflict in Ukraine has threatened the destruction of historical and architectural heritage objects. Russia's full-scale invasion of Ukraine, which began on February 24, 2022, has had serious destructive consequences far beyond the battlefield. Currently, the main task for Ukraine and the international community is to find ways and solutions to preserve part of the world's heritage, as well as to prevent and minimize the scale of destruction of cultural heritage sites. The loss of architectural objects is being tracked and analyzed as part of several national and international initiatives, such as [1], [2], and documented in studies [3], [4], [5]. The problem of preserving historical and architectural heritage, especially in the context of the Russo-

*Corresponding author: tscherkes53@gmail.com

Ukrainian war, is a significant challenge in contemporary conservation practice. Serious questions arise regarding methods of conservation and reconstruction of valuable historical buildings.

This study examines the constructional and structural specificities of wartime restoration through two case studies in the city of Lviv: a multi-apartment residential building at 44 Konovaltsia Street and a multi-apartment residential complex on Stryiska Street, both of which sustained severe damage as a result of missile strikes. The research aims to document the technical solutions adopted during the restoration process and to highlight the role of historical research and modern technologies in shaping decision-making in the conservation and reconstruction of damaged heritage structures.

Fig. 1. 64 Stryiska Street: view of the facade from the inner courtyard documented on 20 October 2023 (photo: Ihor Bokalo)

Fig. 2. Main façade of 44 Konovaltsia Street shortly after the missile attack, documented on 4 September 2024 (photo: Mariana Kaplinska)

Both buildings belong to key phases of Lviv's early twentieth-century architectural development, a period characterized by changes in building practice and approaches to residential design, the broader urban and architectural context of which is addressed in numerous writings, e.g., [6], [7]. According to periodization proposed in Ukrainian architectural historiography, the development of modern architecture in Lviv can be divided into an early phase (1890-1907) and a late phase (1907-1920s) [8]. This era was marked by the gradual introduction of fundamentally new construction materials into the building practice, most notably reinforced concrete, which coexisted with traditional masonry and wooden systems and significantly influenced structural design.

Materials and Methods

The study applies a qualitative, practice-based case-study design to examine constructional and structural specificities of wartime restoration in a functioning historic city. We focus on the two early twentieth-century residential heritage buildings in Lviv, as they represent a transitional period in construction technologies and housing typology, and they both suffered severe structural damage during this war. The buildings are situated within the dense historic urban fabric, and the availability of archival and technical documentation enables an evidence-based reconstruction of their original structural systems.

Sources of Data

The study is based on the following types of data:

- Archival documentation. Period drawings and historical records were used to reconstruct the original design (roofs, floors, and stairs) and material specifications.
- On-site documentation. Post-impact technical inspections and measurements helped to identify patterns of damage, to assess the remaining load-bearing capacity, and to evaluate the condition of surviving historic elements.
- Photographic documentation. Pre- and post-impact photographs (including those from the early emergency phase) were used to analyze the losses and to support reconstructions where physical evidence was missing.
- Digital documentation (3D scanning). A point-cloud dataset from a 2022 scan of a neighboring property was used as a reference for the lost façade and roof at 44 Konovaltsia Street. It was complemented by additional post-impact 3D scanning of the survived structures, enabling the verification and refinement of further reconstruction. Similarly, digital scanning of the survived sections supported the reconstruction of the group of buildings on Stryiska Street.
- Conservation project records. The available documentation related to the conservation works was examined to understand the engineering solutions applied on-site, such as masonry rebuilding, floor replacement, temporary shoring, and roof and stairs reconstruction.

Methods of analysis

This research consisted of three stages.

The first stage involved historical and architectural research of the buildings: by analyzing archival drawings and scientific literature, it was possible to formulate brief historical references for each of the destroyed buildings. In addition to the basic structural schemes, at this stage, the main building materials used during the construction of the examined buildings were determined.

The second stage involved analyzing documentation recording the condition of buildings after air attacks. This was necessary to determine how technical damage affected structural elements and their load-bearing capacity within the building system. Damage was recorded at the level of the main load-bearing elements and key connections: walls, floors, stairwells, and roof structures. The collected materials were then compared between the two buildings that had been bombed.

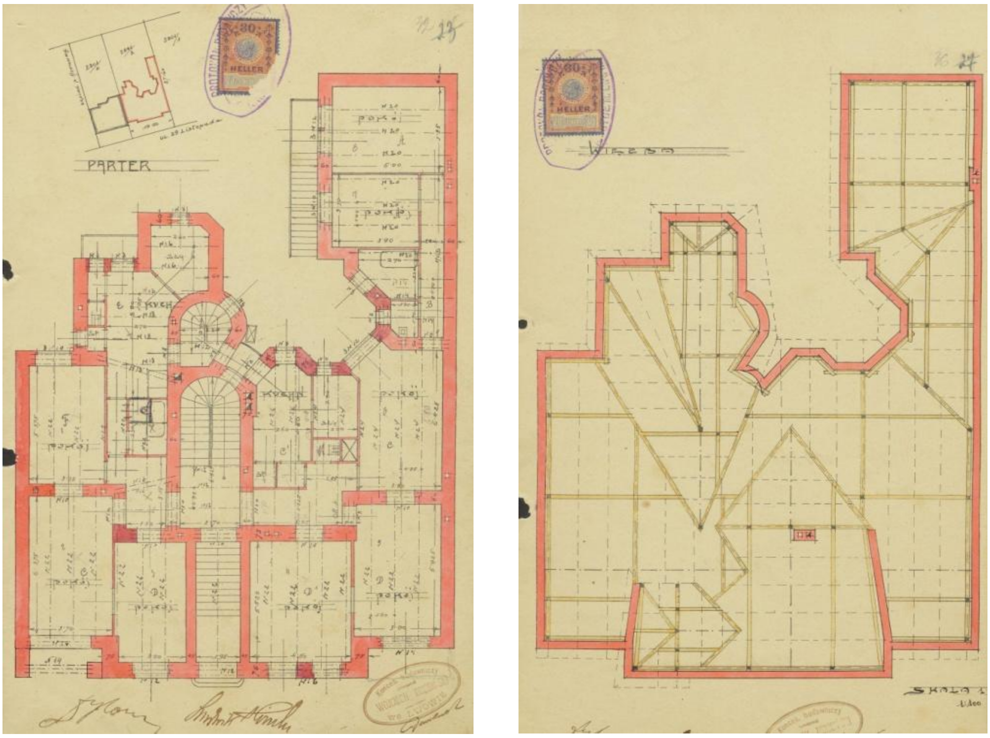
The next stage involved analyzing national and abroad approaches to building restoration. The most characteristic stage in the military period, after recording the damage and ensuring the structural stability of the surviving parts of the building, is the process of building conservation. After that, in order to develop a professional project for the reconstruction of buildings, the compatibility of modern and historical materials and technologies was analyzed, as well as the role of archival research and digital documentation in making decisions regarding restoration. The analysis was supplemented by a review of relevant literature on cultural heritage restoration and post-war reconstruction and restoration, with reference to conservation principles [9]-[16], urban context [17], [18], [19], and documentation practices [2]-[22].

Results and discussion

Since 2022, Lviv has periodically experienced missile strikes. Although targeted less frequently than many other Ukrainian cities, the city is characterized by an exceptionally dense concentration of historically and architecturally valuable buildings, which makes its unique architectural heritage especially vulnerable to such attacks. On 6 July 2023, a Russian missile struck the residential complex at 50-76B Stryiska Street (Fig. 1). Later, on 4 September 2024, Lviv was attacked by Kinzhal missiles, resulting in damage to multiple protected heritage buildings in two districts of the city. The epicenter of one of the strikes was located at 44 Konovaltsia Street (Fig. 2). The following analysis focuses on the two affected sites

44 Konovaltsia St.

The house was constructed in 1911 and designed by architect Jan Bagienski; the building represents an early phase of Lviv modern residential architecture (Fig. 3). It forms part of a continuous street frontage. However, the architect pursued a restrained architectural expression articulated through carefully modeled volumes. Its architectural composition is based on principles of asymmetry, emphasized through an accentuated gable, projecting bay window, loggias and balconies, and subtle plastic modeling of the façade planes. The internal layouts reflect the social hierarchy typical of early twentieth-century urban housing. Each floor originally accommodated two large apartments, with a clear separation between representative and service zones. Circulation within the building was organized through two independent staircases: a main stone staircase serving the principal residential spaces and a secondary, narrow metal service stair intended for auxiliary circulation.



a **b**

Fig. 3. Archival project of 44 Konovaltsia Street, designed by Jan Bagienski in 1911: ground floor plan (a); plan of the attic (b) [23]

Original Construction System and Structural Characteristics

Beyond its architectural and spatial characteristics, the building is notable for its constructional system that combines established masonry traditions with early experimental (hybrid) structural solutions. It is based on a cellular load-bearing wall system, with the principal vertical load transfer concentrated in the longitudinal external walls and the central longitudinal internal wall. The foundations, walls, and internal partitions were constructed of solid ceramic brick with a historic format of approximately 280x130x75 mm. Along the principal façade, the basement level was faced with dressed sandstone blocks with an average thickness of about 100 mm (Fig. 4).

Of particular note is the original façade finishing, which employed a through-colored lime-sand plaster pigmented with finely dispersed soot collected from chimneys—an expected solution in a city entirely dependent on stove-based heating. This method ensured a uniform grey tone resembling exposed cement without the application of a surface paint layer (Fig. 5).

Fig. 4. Sandstone block on the main façade of 44 Konovaltsia Street (photo: Mariana Kaplinska)

Fig. 5. Plaster decoration of the main façade of 44 Konovaltsia Street (photo: Mariana Kaplinska)

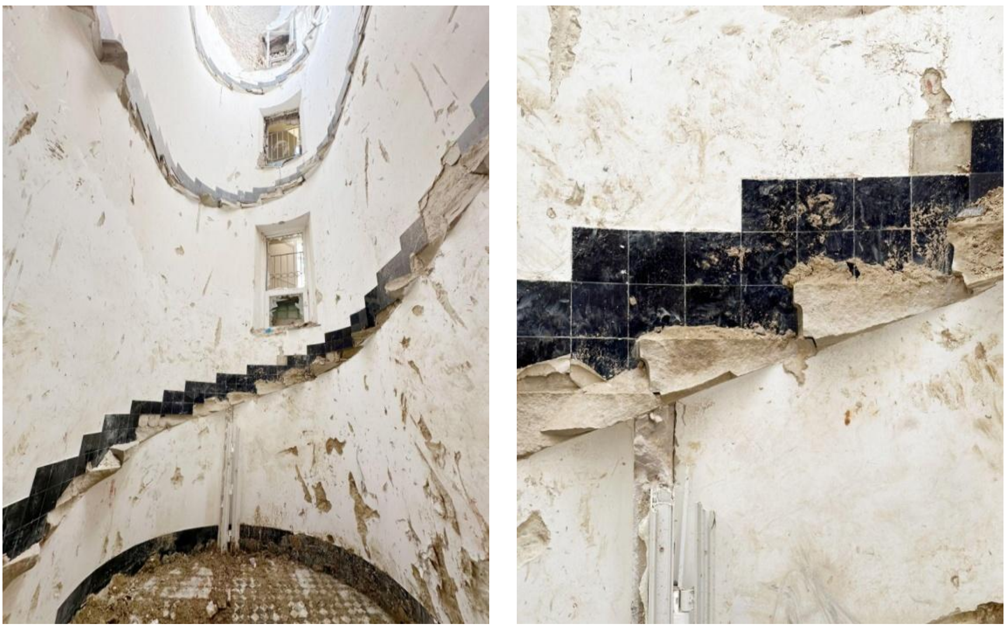
The floor structure above the basement level was executed as a brick jack-arch floor system, a construction method that originated in the nineteenth century and became commonly employed in Central European building practice toward its end (known in Central European literature as the Klein system, codified within the German-speaking construction context of the Austro-Hungarian Empire). Between the residential floors, an early form of reinforced concrete (here referred to as proto-concrete) was applied (Fig. 6), with metal I-beams spaced at roughly 1 m, reinforcement bars in a grid with an approximate spacing of 20x20 cm, and the infill consisting of a lime-sand-cement mixture with crushed brick used as aggregate instead of gravel. Timber joists and plank flooring were laid above the slab.

The main stairwell was designed as three continuous structures with semi-circular turning zones incorporating winder steps at each floor level. The sandstone treads were anchored directly into the load-bearing masonry walls, requiring exceptional precision at both the design stage and on-site execution (Fig. 7). A secondary service stair is located at the rear façade adjacent to the main stairwell. It was designed as a narrow metal spiral staircase with two full rotations per story. It used to provide service access to kitchens, either via a balcony or directly into the apartment, depending on the floor layout.

The roof has a complex spatial configuration determined by the irregular and asymmetrical plan of the building. The original timber roof structure was covered with natural ceramic tiles, while valleys, eaves, and junctions were executed in metal. Over time, due to the loss of skilled craftsmanship and recurring material shortages, the roof geometry was simplified and the tiles largely replaced by various metal coverings, including standing-seam metal roofing and profiled metal sheets. Authentic ceramic tiles have survived only partially, notably on the parapet of the main façade gable and along the concavely curved eastern side of its roof. By 2024, the roof consisted of a heterogeneous and diachronically layered assemblage of roofing materials and alterations, reflecting successive phases of repair and replacement, and was in poor technical condition. Degraded drainage systems associated with balconies and loggias contributed to persistent moisture ingress into the masonry walls.

a b

Fig. 6. Early reinforced concrete at 44 Konovaltsia Street: view of the third floor (a) an fragment of the ceiling (b), documented on 28 January, 2025 (photo: Ihor Bokalo)



a b

Fig. 7. The main stone staircase at 44 Konovaltsia Street, ruined by the attack: general view (a) and close-up (b). Documented on 04 September, 2024 (photo: Mariana Kaplinska)

Damage

A direct missile impact caused a progressive collapse of the main staircase, followed by the total loss of the roof structure, the attic story, the third floor, and partial damage to the second floor.

The post-impact assessment has been conducted during a joint ICCROM-UNESCO mission (Fig. 8) and within the framework of the restoration project development (Fig. 9).

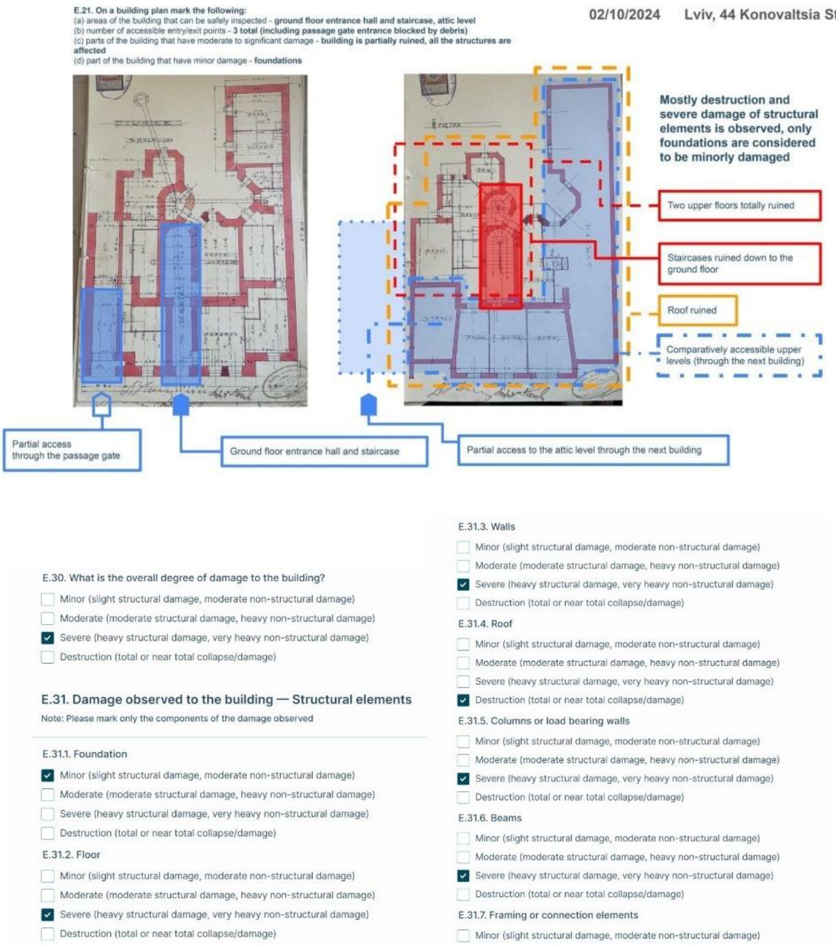


Fig. 8. Damage mapping diagram of 44 Konovaltsia Street, developed for the joint ICCROM–UNESCO mission, 2–10 October 2024 (by Mariana Kaplinska)

Restoration Methods

The external walls are being reconstructed using contemporary brick masonry, as the original historic bricks had been removed by municipal services during the initial emergency clearance following the destruction. Modern solid bricks available on the market, with standard dimensions of 250x120x65 mm, are incompatible with the historic brick format and wall thicknesses. Walls originally constructed with a two-brick thickness measured approximately 600 mm in masonry, while reconstruction using contemporary solid brick would have reduced this to about 510 mm, resulting in a reduction of approximately 90 mm in wall thickness. To address this discrepancy while maintaining thermal performance comparable to the historic walls, hollow clay masonry units of increased format (referred to locally as 2 NF, denoting “normal format”) were adopted for wall reconstruction (Fig. 10, 11). This solution, however, introduced challenges related to modular compatibility, which were particularly critical in the reconstruction of chimney shafts, where contemporary brick formats did not correspond to the historic masonry module.

Fig. 9. Damage mapping diagram of the main façade of 44 Konovaltsia Street, developed for the restoration project in 2025 (source: Ihor Bokalo, IE)

Fig. 10. Main façade of 44 Konovaltsia Street during the restoration works, documented on 5 January 2026 (photo: Bohdan Cherkes)

Fig. 11. Rear façade of 44 Konovaltsia Street during the restoration works, documented on 5 December 2025 (photo: Ihor Bokalo)

For the reconstruction of floor structures, modern reinforced-concrete slabs were introduced. The main engineering challenge was that conventional formwork could not be supported through the lower floors (the first floor and part of the second floor), where authentic interior finishes and residents' property had survived and required full protection. To address this, a system of load-relieving secondary beams was introduced. Temporary strengthening blocks were installed within the floor zones of the second and third levels to support the formwork props and redistribute the loads from freshly cast concrete directly to the load-bearing masonry walls, bypassing the preserved historic floor structures. This approach allowed new monolithic slabs to be cast and rigid horizontal structural diaphragms to be formed without disturbing the preserved apartment interiors.

New stairs for the main stairwell were constructed in monolithic reinforced concrete and subsequently clad with 40 mm thick natural sandstone slabs, as reconstructing the original cantilevered stone steps anchored into the masonry walls was not technically feasible under post-impact conditions.

The roof was reconstructed based on archival drawings, which allowed the restoration of its original geometry that had been altered over time (Fig. 12). Timber roof structures with ceramic tile covering were employed, although the system required certain adjustments to accommodate contemporary roofing materials. Due to the relatively low pitches of some of the historic roofs (approximately 15-30°), a continuous boarding system and an additional waterproofing membrane were introduced beneath the ceramic tiles.

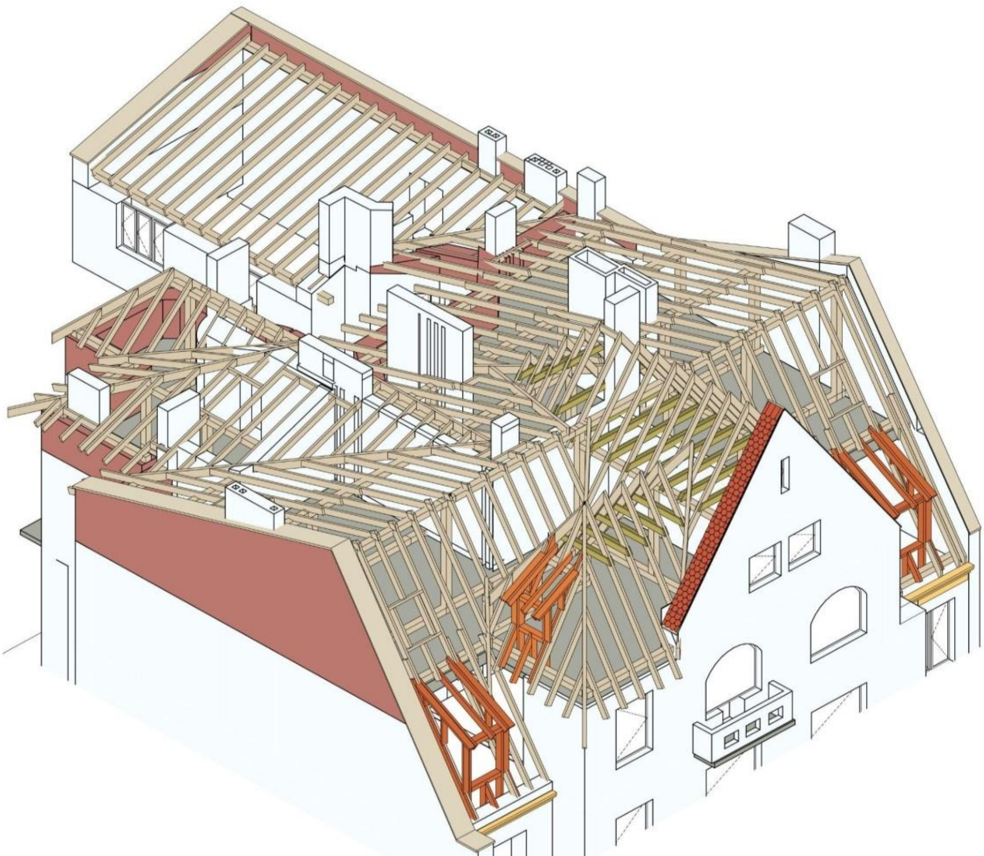


Fig. 12. 3D diagram of the roof structure of Building No. 44 on Konovalets Street, developed for the restoration project in 2025 (source: Ihor Bokalo, IE)

Three-dimensional scanning data from a neighboring building at 47 Konovaltsia Street, acquired in 2022 by Skeiron, were used to reconstruct the main façade and roof geometry up to the central ridge and to verify height parameters and overall proportions. Although the building was captured only incidentally and at a relatively low resolution, the dataset provided sufficiently reliable geometric information for these purposes.

62-68 Stryiska Street

The residential complex on Stryiska Street was designed by Michał Ryba and developed between 1926 and 1930 as housing for the academic staff of Lviv Polytechnic. Conceived as a unified architectural and urban ensemble, it represents the interwar approach to multi-apartment residential development. The ensemble occupies a trapezoidal plot and is organized around a shared inner courtyard used as a semi-private garden. Access to the courtyard is provided through a single controlled entrance, from which all residential sections can be entered.

Architecturally, the four-story brick buildings, some with attic accommodation, display a restrained but carefully composed design (Fig. 13). Although the overall expression is modest, the façades are articulated with accentuated gables, horizontal cornice bands, and rhythmically placed vertical elements, creating a balanced composition. The architecture combines elements associated with Art Deco and early functionalist principles.

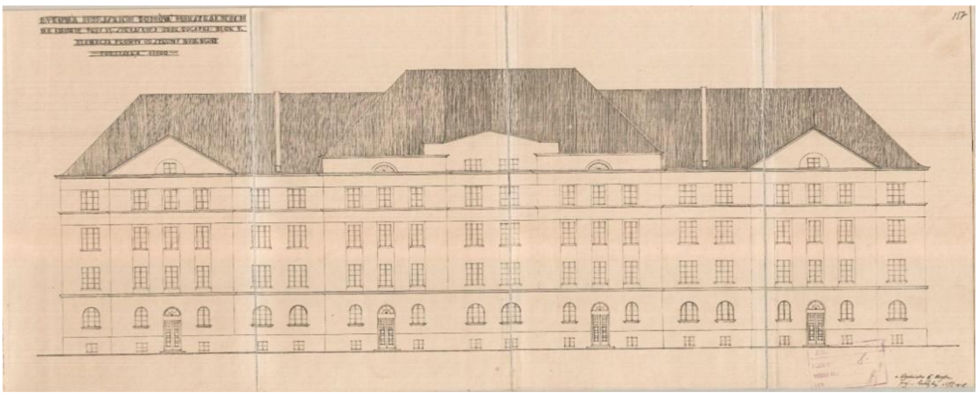


Fig. 13. Main façade of buildings Nos. 58, 60, 62, and 64 on Stryiska Street. Design by Michal Ryba, 1928 [24]

A significant part of the architectural expression of the site is carried by its chimney stacks. Although the complex was built at the same time as other functionalist housing projects on Stryiska Street that already employed centralized heating, these particular buildings relied on individual stove heating, which required a large number of chimneys. Due to the exposed urban position of the complex and its visibility from multiple long-distance viewpoints, the chimneys became an important compositional feature, shaping the roofscape and overall appearance of the complex.

Original Construction System and Structural Characteristics

As in the case discussed above, the buildings of the Stryiska Street complex are organized according to a cellular structural system, with load-bearing external and internal masonry walls forming enclosed structural bays. The foundations are constructed in brick masonry laid on reinforced-concrete footings, ensuring an even distribution of structural loads (Fig. 14). External and internal load-bearing walls, stairwell enclosure walls, and chimney shafts were built of solid ceramic bricks measuring 280x130x75 mm. Internal partitions were constructed of gypsum blocks, with a finished thickness of approximately 100 mm.

The inter-story floor structures were originally executed as a jack arch system (Fig. 15). Between the basement and the ground floor, the arches are infilled with solid brick, while the upper floors employ hollow ceramic block infill, forming shallow ceramic jack arches approximately 70 mm thick. Above the arches, a leveling lime-sand screed with the addition of cement was applied, serving as a base for the subfloor and parquet flooring. This solution provided effective thermal and acoustic insulation.

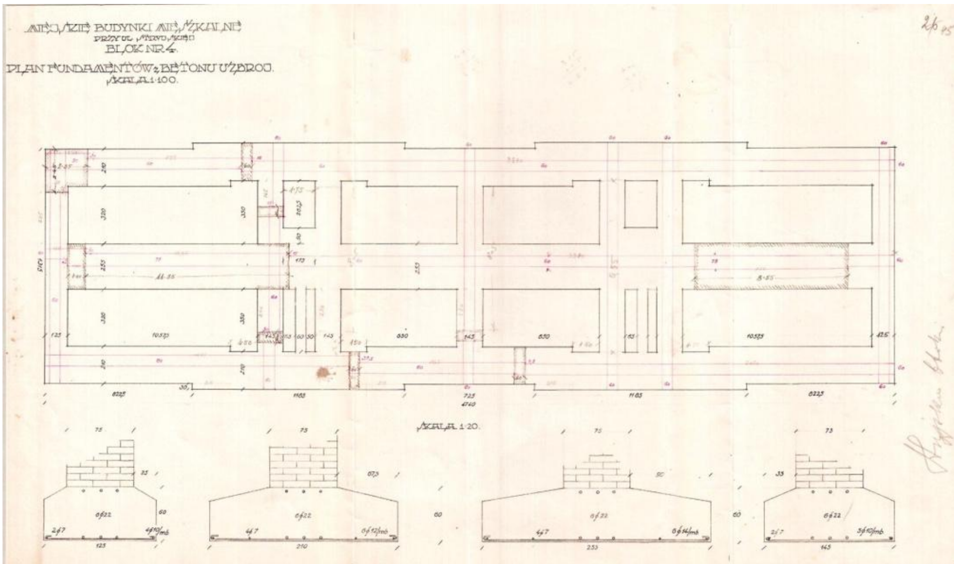


Fig. 14. Plan of the foundation structures of the buildings on Stryiska Street. Design by Michal Ryba, 1928 [24]

Fig. 15. Hollow brick jack arch floor structure on metal I-beams and a gypsum block partition in Building No. 64 on Stryiska Street after the missile strike, documented on 20 October 2023. (photo: Ihor Bokalo)

Fig. 16. Historic stairs finished in terrazzo in Building No. 68 on Stryiska Street during the restoration works, documented on 11 June 2025 (photo: Ihor Bokalo)

The staircases are two-flight structures supported on steel I-beam stringers. The steel framework was covered with metal lath and plastered, with the finish shaped into decorative recessed panels. Prefabricated reinforced-concrete treads were mounted onto the steel structure, with factory-applied bush-hammered surfaces intended to provide a mechanical key for the finishing layer (Fig. 20). The final finish was executed in the terrazzo technique: an on-site applied marble-chip mortar layer approximately 10 mm thick was polished, resulting in high wear resistance and a durable finished surface (Figs. 116 and17).

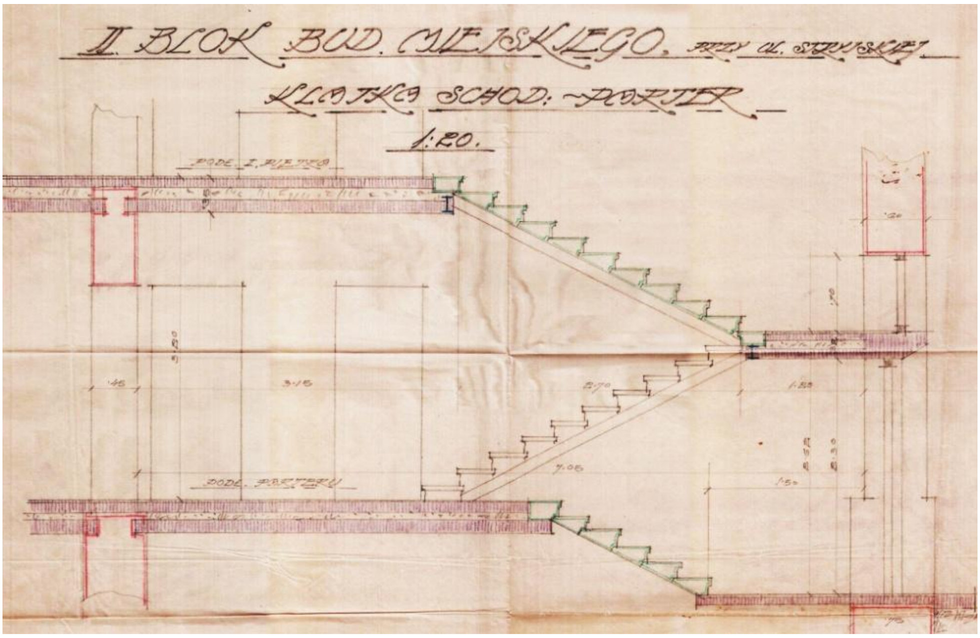


Fig. 17. Project detail. Section through a fragment of the stairwell of Building No. 62 on Stryiska Street. Design by Michl Ryba, 1928 [24]

The roofs of the complex were originally covered with natural ceramic tiles. Over the course of prolonged use and due to the lack of systematic professional maintenance, the seventeen buildings gradually lost their unified roofing system. By 2023, prior to the missile strike, the roofs consisted of a heterogeneous combination of standing-seam metal sheets, profiled metal decking, and metal tiles, resulting in a loss of architectural coherence and deficiencies in the performance of the rainwater drainage systems.

Damage

As a result of the missile strike, the residential complex on Stryiska Street sustained severe structural damage, the extent of which varied depending on the distance of individual sections from the explosion epicenter. The most extensive destruction occurred in Building No. 64, where the three upper stories and the roof structure were completely destroyed. In the adjacent sections, Buildings No. 62 and No. 66, floor structures between the third, fourth, and attic levels collapsed. In Building No. 68, the blast wave caused the total destruction of the roof truss system and partial damage to the attic floor.

Restoration Methods

The reconstruction of the walls initially relied on historic bricks salvaged from the collapse debris generated by the missile strike (Fig. 18). Following the dismantling of unstable wall sections, the rubble was sorted on site within the inner courtyard of the complex, allowing reusable masonry units to be recovered. The reconstruction process included mechanical cleaning of the salvaged historic bricks, which made it possible to reuse them in the rebuilding of Building No. 64 up to the level of the third story, as well as in the reconstruction of historic ventilation and chimney shafts.

Fig. 18. Rear façade of Building No. 64 on Stryiska Street during the restoration process, documented on 20 October 2023 (photo: Ihor Bokalo)

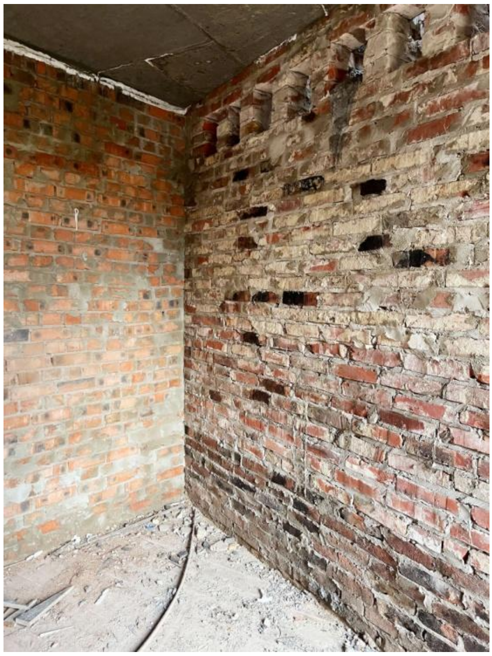


Fig. 19. Wall masonry composed of contemporary and historic bricks at 64 Stryiska Street, documented on 20 October 2023 (photo: Ihor Bokalo)

The use of reclaimed historic brick was not limited to conservation considerations but was also informed by material compatibility requirements. Its application allowed the masonry to be rebuilt in continuity with the original bonding logic, maintaining joint thicknesses and wall connections consistent with the historic fabric. However, the quantity of salvaged material proved insufficient. As a result, the subsequent use of contemporary bricks with differing dimensions (250x120x65) led to local reductions in wall thickness and to misalignment of masonry courses (Fig. 19). The bonding of new masonry to the existing historic walls was resolved through anchoring with steel rods.

Prior to the missile strike, the buildings were predominantly equipped with individual stove heating systems. In a limited number of apartments, the original stoves had been dismantled during earlier alterations and replaced with individual heating boilers. Following the damage, only a small number of historic stoves could be preserved and retained in use. In the majority of apartments, the heating system was modernized through the installation of dual-function gas boilers. This transition enabled a reduction in the number of active flue channels. Redundant flues were lined and subsequently adapted for natural ventilation of the apartments.

Destroyed inter-story floors were reconstructed in reinforced concrete, replacing the original jack arch systems, which could not be reproduced under current technical and organizational conditions, as they rely on bespoke construction techniques and specialized craftsmanship that are no longer readily available. The use of reinforced concrete therefore enabled the reinstatement of the floor structures within a shortened construction timeframe, while the new slabs act as rigid horizontal diaphragms that tie together the load-bearing walls, ensuring their collective structural performance following impact-related damage.

Where the historic floor structures were not completely destroyed but had undergone structural deformation, they were strengthened by casting a 120-mm reinforced-concrete slab directly over the existing structure within the original floor build-up and in replacing previous timber joists and subfloor boards. This solution enabled structural reinforcement without altering finished floor levels and ensured effective load transfer to the load-bearing walls through a continuous reinforced-concrete layer.

The roof trusses were reconstructed on the basis of archival drawings and 3D scanning data from comparable preserved neighboring buildings. In those buildings where the jack arch floor structures between the fourth story and the attic remained intact, traditional timber roof framing with ceramic tile covering was reinstated, ensuring the proper transfer of the forces to the load-bearing walls (62 & 68 Stryiska Street). Where new monolithic reinforced-concrete floor slabs were introduced, the structural capacity of the supporting level permitted the use of steel roof framing, which was adopted as an optimal solution under pressing implementation constraints in a wartime context and completed with ceramic tile roofing (64 & 66 Stryiska Street).

In Building No. 64, where the stairwell had been completely lost, the reconstruction aimed to reproduce the historic appearance of the staircases, although the construction technology necessarily differed (Fig. 21). The stair treads were produced as prefabricated elements using specially prepared molds. A marble-chip mixture was first applied to the mold surfaces, after which the reinforced-concrete treads were cast. Once cured, the elements were polished and installed onto steel I-beam stringers. The surrounding stairwell finishes were subsequently reinstated using plaster to reproduce the original architectural articulation. In the remaining buildings of the complex, the staircases sustained only fragmentary damage. Here, losses were addressed through local recasting of reinforced-concrete elements, while the terrazzo finish was carefully patched and integrated to maintain continuity with the historic fabric.

Fig. 20. Historic prefabricated reinforced concrete stair treads with factory-applied bush-hammered surfaces, intended as a base for the terrazzo finish, in Building No. 68 on Stryiska Street, documented on 19 March 2025 (photo: Ihor Bokalo)

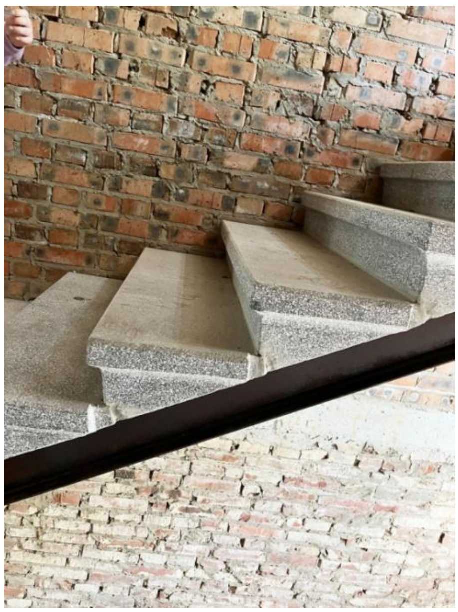


Fig. 21. Reconstructed contemporary prefabricated reinforced concrete stair treads installed on steel stringers in Building No. 64 on Stryiska Street during the reconstruction process, documented on 29 April 2024(photo: Ihor Bokalo)

Fig. 22. View of the restored residential complex on Stryiska Street from the north, documented on 9 January 2025 (photo: Mariana Kaplinska)

Conclusions

Heritage conservation efforts in Ukraine are taking place under conditions that set our context apart from most post-conflict restoration scenarios. Conservation interventions are being implemented during an active war and under a high degree of uncertainty, without a clear temporal horizon and with a persistent risk of renewed damage. At the same time, attempts to safeguard architectural heritage are carried out amid severe constraints affecting the availability of materials, construction technologies, and skilled labor. Within this environment, conservation practice must balance the principles of authenticity and heritage preservation [25], [26] with the fundamental need to deliver restoration in practice, ensuring the return of residential use and preventing the persistence of ruin within a living urban fabric.

The conservation project for the residential buildings at 44 Konovaltsia Street and the complex of buildings on Stryiska Street demonstrates a comprehensive approach to repairing war damage and illustrates how the balance between preserving historical heritage and rebuilding destroyed buildings can be achieved in practice. The project provides for the preservation of authentic elements that have survived, and, based on archival research and digital documentation, the reconstruction of lost elements and structural diagrams of those elements that could not be preserved.

Both buildings belong to a transitional phase in early twentieth-century construction, marked by the coexistence of traditional masonry and timber systems with early experimental and innovative technologies. Addressing war damage in such buildings requires a precise understanding of their hybrid construction logic to guide decisions on replacement, strengthening, and material substitution.

The conservation of partially destroyed listed residential buildings in their pre-war architectural forms also carries a strong practical rationale. Under conditions of acute pressure, when displaced residents await the possibility of returning to their homes and, in some cases, continue to inhabit damaged buildings, the reinstatement of historically established architectural forms provides a viable framework for action. Working with an existing architectural solution enables faster decision-making and implementation than the development of new, heritage-compatible designs. In this sense, the Ukrainian experience offers an additional, practice-based perspective to a broader international debate on authenticity and historical reconstruction, complementing the principles expressed in documents such as the Riga Charter.

Beyond the scale of individual buildings, the interventions discussed in this study have clear urban significance. The completion of the Stryiska Street complex restored the integrity of an entire historic urban block (Fig. 22), while the reinstatement of 44 Konovaltsia Street re-establishes the continuity of the historic street frontage. Notably, the neighboring building at 44a Konovaltsia Street had already been damaged during the Second World War and subsequently restored in its original architectural form, marking a rare continuity of wartime damage and restoration at the same location.

Taken together, these case studies indicate that wartime heritage conservation in Ukraine functions simultaneously as a conservation practice, a structural response, and a form of urban resilience. Within contemporary conservation philosophy, the integration of historical research, digital documentation, and pragmatic engineering solutions makes it possible to address loss and damage in a manner that remains architecturally credible, technically sound, and socially responsive, even under conditions of prolonged war and profound uncertainty.

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