

PROCESS OF RELOCATION OF WOODEN BUILDINGS ILLUSTRATED WITH THE EXAMPLE OF SELECTED BUILDINGS IN POLAND

Aleksandra REPELEWICZ^{1,*}, Izabela MAJOR¹

¹ Czestochowa University of Technology, Faculty of Civil Engineering, Department of Civil Engineering,
3 Akademicka, Czestochowa 42-218, Poland

Abstract

The article presents the investment process of relocating wooden log-walled buildings using selected buildings from two counties in Poland as an example. The most common method of relocating this type of building is presented, which involves disassembling the building and reassembling it in a new location. The technical challenges facing investors were presented, but so were the ethical challenges of respecting the historical component while adapting to modern housing needs. Also presented is a review of the literature on the subject, a brief historical overview, and selected projects in Poland and around the world.

Keywords: Log houses; Relocation; Log cabins; Houses moving

Introduction

Wooden architecture is the oldest form of construction in Northern Europe. In Poland, it dominated almost until the middle of the 20th century. Wooden churches, mansions, inns, windmills, and cottages were common, especially in villages. Log-walled, half-timbered, vertical-post log, and Upper Lusatian structures were adapted to local resources and carpentry traditions. Regional varieties of wooden construction were numerous, and their type was determined by natural and cultural conditions, as well as raw material resources and the level of the economy. Today, many of these buildings are getting empty or are being used as fuel. However, there is growing interest in their relocation and reconstruction, thus preserving the cultural heritage, ecology, and esthetics of traditional architecture. Sale of such houses for relocation purposes is becoming increasingly popular. In January 2025, dozens of houses were offered on a popular Polish sales platform at prices ranging from symbolic to tens of thousands of zlotys. The largest number of offers came from Podlasie and Bieszczady. The chance of buying an inexpensive house, often in fairly good condition, is therefore significant. It allows one to obtain a house with a history, offering a specific interior atmosphere and total eco-friendliness of the materials used. In addition, it is a recyclable material. It helps preserve local heritage and protect material cultural monuments. The idea is in line with the tenets of sustainable development. The fashion for relocating and reconstructing old log houses is influencing the formation of esthetic sensibility and a sense of beauty rooted in the tradition and material culture of a particular region. It restores among rural local communities a sense of connection to and pride in ancestral traditions, along with an awareness of belonging to a particular heritage area.

* Corresponding author: aleksandra.repelewicz@pcz.pl

The available literature related to the relocation of wooden houses can be classified into three types: literature related to wood as a building material, literature related to the preservation and use of wooden houses, and literature related directly to the topic of relocating wooden buildings.

A compendium of knowledge on the physical and mechanical properties of wood is contained in a comprehensive 2009 publication [1]. One of the most recent Polish books on wood properties is a textbook published in 2023, intended for students of wood technology and forestry, as well as for workers in the wood and forestry industry. The script covers all the relevant topics in the field of wood anatomy [2]. In the context of the topic of this paper, the article on the properties of historic wood is very interesting. This is important for understanding what happens to an old, historic wooden building [3, 4].

There are also quite a few publications about using and repairing wooden buildings. They describe how to carry out an assessment of the technical condition of wooden buildings, what difficulties can be encountered during renovation, and how to take care of wooden houses so that they serve their inhabitants for as long as possible. The remaining papers [4] cover similar topics.

A reprint of the 1948 carpentry manual, published in 2024, is a very interesting item. In this richly illustrated book, in twelve chapters, the author presented the principles of erecting, finishing, and decorating wooden buildings. This is interesting illustrative material, especially in terms of recreating ancient carpentry techniques. Of course, the issues are present in literature around the world. An article on the renovation, reuse, and revitalization of traditional heritage buildings in a village in Jordan is presented in [5]. In turn, a methodology proposal for conservation of early wooden heritage structures in Australia was proposed in article [6], which presents architectural structures that were the first “vernacular” buildings built in Australia. They were built by European settlers and pioneers settling in the villages. Article [7] discusses the types of conservation measures used for protecting historic wooden architecture in spa towns. The topic is presented on the example of historic wooden buildings in Polish, Slovak, and Ukrainian spas. An extremely important factor is the proper impregnation of wood, especially wood already exposed to harmful agents. Novel methods of impregnating wood, especially historic wood, supported by extensive scientific research, are presented in articles [8, 9].

The issue of relocation of wooden buildings has not been described in as many studies as the previous two issues. It is usually presented in scientific and popular science articles.

As for English-language literature, a book should be noted that was published in 2006, which is a guide to the history, practices, and considerations of house relocation. It is addressed to both property owners and conservation organizations that need to make informed decisions about the relocation of a building. It describes examples of “last-chance” relocations of several exceptionally significant historic houses and the use of “best practices” [10].

Liżewska's 2009 article [11] addresses the respect for the original technical and spatial solutions in relocated buildings. It touches on issues bordering on ethics, describing the far-reaching changes made to relocated buildings, nullifying their historical value. Similar issues were raised in Wesołowski's text [12].

In 2019, an article was published that introduced the topic of relocating the structures made with different technologies and materials. According to the author, the difficulty with relocation is influenced by the technical condition of the structure, its weight, and the planned duration of relocation. The article shows the complexity of the discussed issue [13]. A similar subject of different concepts of adaptation and reuse is presented in a subsequent article that analyzed the available bibliometric data [14].

A positive example of a relocation carried out in Podlaskie Province is described in article [15]. Its purpose was to present the process of relocation of wooden buildings and the associated technical problems on the basis of a case study – a house being moved from the village of Boćki to the village of Gneciuiki.

The purpose of this paper is to present the process of relocating wooden log houses, with an indication of the organizational, technical, and ethical problems that occur. The issue will be

presented using the example of houses in Janowice, Limanowa County, and Pabianice, Częstochowa County. They are positive examples of saving old wooden houses, which are not only material and cultural heritage but also technical monuments, presenting old technical thought and carpentry traditions. All data on the investment process in the presented projects was obtained on-site by the site manager for those buildings, who is a co-author of this article. The conclusions will include indications for the investment process of relocating log-walled buildings to preserve their unique qualities in the new locations and with new dedications.

Historical outline of buildings relocation

Relocating buildings has been taking place for a relatively long time, although in the past it had nothing to do with preserving cultural values. In the 18th century there was a house market in Moscow, where carpenters sold wooden log houses of various sizes. Once such a house was purchased, it was dismantled and transported (or floated) to its permanent destination. Similar fairs also existed in 19th-century Europe in Sweden, England, and Switzerland, among others. The first historical reference to the relocation of a building appears in a 1598 description of London, while the first accurate description dates back to 1799 and concerns the relocation of a small wooden building that served as a local prison. It took place in the city of Philadelphia, on North American soil. A wooden frame with wooden wheels was built, and then the structure was moved to its destination using a large number of mules and horses. One of the best-known cases of relocating a wooden house was the displacement, by about 70 meters, of a historic 15th-century house that stood in Exeter, Devon County, England [16].

Moving wooden buildings of different structures was also popular in North America. It was almost a folk tradition there. It was mainly true for mining communities in gold-bearing areas, with a high population turnover. An example is Dawson City in Yukon. Since 1971, the Parks Canada organization has been actively involved in preserving historic structures in Dawson to commemorate the Klondike gold rush. In addition to preserving buildings in their original locations, in 1982-1984 Parks Canada moved 9 buildings to new locations [17]. Another example of relocation is the recreated 19th-century pioneer village in Lawrence County, Indiana. Most of the structures were brought to this reconstructed village – an open-air museum – from nearby villages, while others were built from scratch using logs from other damaged historical structures in the area [18].

Building relocation is also popular in the fast-growing US cities. Austin, Texas, served as a testing ground for contemporary research on house relocation and their reuse in a closed loop. Researchers illustrated a process that addresses a number of challenges, including demolitions in cities, housing shortages, exponential population growth, and still unmet zero-waste goals [19].

In what is now Poland (formerly East Prussia), the first building to be relocated for conservation reasons was the medieval Wang Church, relocated in 1841 from Norway to Karpacz. The grand opening of the building took place in 1844. Moving wooden houses was also popular in Poland in rural areas. In the Polish folk dialect, this phenomenon was called “*przesypywanie*” (literally: “pouring”) of houses and was related, among others, to migration of the population as a result of ownership changes, agrarian reforms, or resettlements.

In the second half of the 20th century, the relocation of buildings mostly concerned wooden architectural monuments for protection purposes. The destinations were open-air ethnographic museums, where wooden houses, manors, churches, inns, and windmills were given new life, serving educational purposes. There are 54 such outdoor museums in Poland [20]. It was the buildings transferred to open-air museums that provided valuable experience, and the technology for transferring wooden buildings was developed on its basis. Nowadays, it is becoming increasingly popular for individuals to relocate their houses. This is especially true for investors who want to live in harmony with nature and appreciate the atmosphere of traditional old buildings.

Log-Walled Buildings

Wood is a valuable, natural, renewable resource. It combines esthetic with technical qualities. It is characterized by considerable toughness, with a fairly low specific gravity, favorable thermal properties, high electrical resistance, and good sound insulation. Wood construction has a long and rich tradition in Poland, and the most popular type of construction was based on logs. Log-walled buildings were used as early as during the Neolithic period. The wall consists of horizontally stacked beams joined at the corners by locks with or without beam ends. These were the ends of the beams that protruded beyond the outline of the house walls. A space was left between the differently shaped beams, usually about 2cm. The space was filled with straw, ropes, wad, moss, or clay mixed with chaff. The roof structure was based on the highest beam of the wall, known as the cap. Wooden walls were set on stone or brick foundation walls. The span between the log wall fixings was 4 to 6 meters to avoid wall warping. To prevent this, vertical double-sided braces were used (usually in the middle of the wall span). The inner walls were connected to the outer walls in so-called “dovetail” joints. It is these types of buildings that are most often relocated nowadays, as they are relatively easy to dismantle and reassemble in a new location.

The Investment Process of Relocating Log-Walled Buildings

There are two ways of relocation: moving the building in its entirety, using specialized vehicles and a crane to lift it, or disassembling and reassembling the building. From a conservation point of view, the former method is the most perfect one, as it allows to best protect the building's qualities and preserve all the elements in their original form. Due to the technical complications, caused mainly by the size of the building, this method is rarely used. The latter method of dismantling the building and reassembling it is used much more often. Therefore, this paper will describe the investment process for such a scenario.

When deciding to relocate a building, one should check with the Municipality Office (Urząd Gminy) to see if the building is under conservation protection. If it is entered in the register of historical monuments, the investor is obliged to comply with conservation recommendations during the relocation process itself as well as during the finishing of the house in its target location. Much simpler procedures apply in the case of a building that is not listed in that register.

Polish construction law does not stipulate special procedures for moving existing houses to a new location, so the investor must obtain a construction permit under the same rules that apply to erecting a brand-new building.

The investment process is as follows:

- Searching for a suitable building and preparing a technical condition assessment and inventory;
- Preparing a construction design based on the inventory;
- Obtaining a construction permit and then constructing the foundations and foundation walls [24];
- Marking (e.g., with numbers) all the wooden parts of the structure in a legible and permanent manner. The numbering of the elements will allow the building to be accurately reconstructed on its new site;
- Disassembling the building and transporting its elements to the new plot (it is best to avoid long storage of structural elements, as it is then necessary to properly protect them from moisture);
- Conducting a careful visual inspection of the materials obtained. Logs that bear traces of wood pests should be treated with appropriate chemicals (it is best to commission this task to specialized companies). Sometimes it is worth replacing the heavily infested logs;

- Assembly of the house, together with replacement of the most damaged elements. It is estimated that typically 20 to 40% of structural components need to be replaced. The roofing and window frames are also usually replaced. Very rarely, and only with very careful disassembly, it is possible to preserve old windows and doors that can be re-framed after restoration;
- Protection of wood against biological corrosion. Before sealing the walls, they should be impregnated, i.e., the gaps between the logs should be filled, since the upper and lower parts of the logs will be inaccessible after sealing [13].

Traditionally, sealing log houses is called mossing, and the word comes from the oldest known method: laying a layer of moss between the logs. The second cheap and simple method was to seal the logs with clay. Various organic clay fillers were used, from chaff to “reinforcement” with straw or wad. Another traditional way of “mossing” houses, widespread especially in mountainous regions, is to seal them with “wood wool,” i.e., spruce wood chips that were planed in a specific manner. The shavings were then rolled into decorative braids and hammered into the gaps between the logs.

A major challenge is insulating the walls of a log house. The thickness of the logs in the houses being moved varies from a dozen to more than twenty centimeters. Wood of this thickness does not meet current Polish requirements for thermal insulation of building partitions [21]. And while it would seem logical that as historic buildings (if they are not even listed as monuments), they should be subject to special regulations allowing the walls to be left in their original shape, they are treated as newly designed buildings, which makes this impossible. It is therefore necessary to decide whether to insulate the house from the outside or from the inside. It should be added that insulating from the inside causes far more technical problems. The remaining building finishes can be varied. More often than not, the decision to move the house rather than build a new one stems from the investors' love of tradition, and the interior finish is kept in a rustic style. Amenities are introduced to accommodate the modern needs of residents, and the extent of these changes affects the building's character and style to varying degrees.

House in the Limanowa County

In 2015, the investor purchased a wooden log house situated in Kasina Wielka, dating back to the 1930s, dedicated for demolition (Fig. 1).



Fig. 1. Original wooden log house in Kasina Wielka (photo author)

A major problem was the ecological disposal of the building's covering in the form of asbestos sheets, the dismantling and disposal of which is commissioned to specialized companies. In the same year, a construction design was created with several changes from the original, thus improving its functionality. The cottage was adapted to modern needs by eliminating the wall between the kitchen and the so-called “black room” and replacing it with a pillar-based binder. The result was a living room with a kitchenette. The previous “chamber” (pantry) was turned into a bathroom. In addition, a covered arcade terrace has been designed. After obtaining a building permit, the building was dismantled and transported to a village 15 kilometers away from Kasina.

Thanks to the labeling of each element of the house, its assembly by a four-man brigade on previously prepared footings and foundation walls took two weeks (Figure 2). The most damaged logs were replaced. Due to the use of clay tiles, the rafter spacing was reduced where Eternit roofing was originally placed, and several new pairs of rafters with increased cross sections were added. The new rafters were placed at regular intervals between the original ones. The building was covered with century-old ceramic tiles of local manufacture from a demolished building, which were purchased a few kilometers from the construction site.



Fig. 2. Installation of marked construction elements in a new location (photo author)

After the building was covered with a roof, the sealing of the walls began. A novel method of sealing with low-pressure foam and Styrofoam façade adhesive was used [22]. A huge advantage of this technology is its relatively low cost and the fact that it can be done in-house (Fig. 3). In the described house of the area of 84m², the total length of the “mossed” joints was 710 linear meters, which, with the price of two-sided “wood wool” mossing, would result in a cost of ca. PLN 36,000 (2016). The cost of low-pressure foam and Styrofoam glue mossing, conducted in-house, was ca. PLN 3,000. A light clay-colored façade paint was used to finish the “mossing” on the plastered foam joints. This allowed the building to retain its traditional appearance, despite the use of unusual and very contemporary materials (Fig. 4).

The original windows and doors could not be preserved. They were made by a local carpenter. The traditional shape of the doors and division of windows was retained, while insulated glass was used for better thermal insulation.



Fig. 3. Different phases of the process of sealing logs on one of the walls of the building (photo author)



Fig. 4. The cottage after being moved, view from the new terrace (photo author)

All functional changes were made during the design phase, with great respect for traditional solutions. The floor on the ground and the roof slopes were very carefully insulated, which did not affect the appearance, and thus the style of the building, but significantly reduced heat loss. The electrical and water systems have been placed in the floor and ceiling. Inside, modern and safe chimney systems were masked under a layer of clay.

Houses in Częstochowa County

From 2012 to 2017, three log-walled residential buildings were erected on an agritourism farm on a rather large and topographically diverse plot of land located in the Kraków-Częstochowa Upland region. All three were brought from the Bieszczady region, making it a rather cumbersome and expensive process to transport the disassembled buildings. The big advantage, however, was the very good technical condition of all three houses, so that only a few beams needed to be replaced, including, in each case, ground beams. The investor opted for the traditional method of sealing the logs – mossing. Each time, it was possible to retain some of the moss from the existing cottage ceilings; the remainder was supplemented with new hand-dried material. This was possible due to the relatively small gaps between the logs (in the case of the previously described building, some gaps were several centimeters wide, and the building was

originally sealed with clay with chaff). Also, the impregnation of logs was traditional for the area of origin of the buildings – the crude oil that was bought was commonly available in the Subcarpathian region, where the buildings were originally constructed. Demolition tile from the 1920s and 1930s from the local “Bracia Kolos” brickyard was used for roofing.

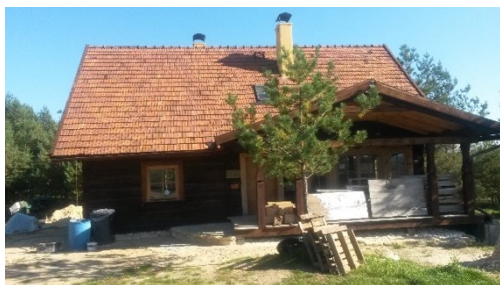


Fig. 5. House No. 1 in Częstochowa County



Fig. 6. House No. 2 in Częstochowa County



Fig. 7. House no. 3 under construction



Fig. 8. House no. 3 in open shell state

Due to the planned use of the buildings, more functional changes were made than in the previously described building, involving changes in internal partitions, the use of binders to increase the area of ground floor rooms, and the use of attics for guest rooms. In addition, in each case a terrace was created at the building, and in each case the location and design of the terrace were different (Figures 5-8), which was due, among other things, to the location of the buildings in terms of cardinal directions. The walls were insulated on the inside with mineral wool covered with drywall on an aluminum grid. As a result, the original logs are only visible inside only in a few interior walls. One of the buildings (the owners' house) was additionally insulated from the outside with mineral wool covered with overlapping larch boards, which made the original logs invisible from the outside as well.

Despite the many functional changes, adapting the buildings to current needs, all activities were undertaken with great respect for the existing substance of the buildings. The buildings have retained their rustic character and great charm, making together a picturesque habitat. The provided street furniture refers to the idyllic character of the entire farmyard, as well as the furnishings and equipment of the houses, referring to the traditions of rural homesteads.

Conclusions

The process of relocating old log houses is an idea developed to preserve material cultural relics and give them new life. A relatively cheap building material is gained, old wood has a unique character, and a building with history is created in a new place, looking as if it had stood there for years. The construction process is accompanied by an educational one related to the discovery of historical, and now considered valuable, techniques for building, decorating,

furnishing, and operating such buildings. It is a solution that is gaining popularity not only for its cost-effectiveness but also for the values it promotes. This process helps to grow the environmental awareness of both users and neighbors. Such activities are part of the idea of sustainable development and all pro-environmental initiatives related to shaping attitudes of respect for the environment.

It is also an opportunity to improve the technical condition of the building. The same houses left in their original locations, even repaired, would have a shorter lifespan, as some of the damage to the beams is only visible after the structure is taken down. Moving the house provides an opportunity to evaluate each beam and decide whether to replace or repair it or to remove wood pests. In addition, each piece can be carefully impregnated on all sides.

Conversations conducted with many builders of relocated log houses, and also the literature dedicated to these issues, indicate that everyone who decides to build this way gains a new passion. They do much of the work themselves, not only due to the lack of professionals in this niche field of construction but also because they want to take an active part in the creation of such an original habitat. With reverence, they protect and restore the inscriptions, dates, and various floral and geometric motifs carved on the beams. They look for old second-hand hinges, handles, and other accessories to match the style of the cottage. They select modern technologies in such a way as to minimize interference with the original fabric and, without sacrificing comfort and functionality, to preserve the character of the rural homestead.

In the case of houses that are not listed as historical monuments but are decades old and are a testament to their time, there remains an ethical issue to be resolved: how much can one interfere with the construction and finishing of the building so as not to lose its original character? It is clear that the building should be brought up to modern standards (bathrooms, which were usually absent in such houses; modern and safe chimney systems; modern installations; terraces, etc.). However, interference with the existing fabric and the original appearance of the building should be as minimal as possible, and the designer should suggest such solutions to investors. An example is the terraces added at all the buildings described here. They do not disturb the structure of the building and could theoretically be taken down in the future, and the buildings would regain their original shape (Figure 8). This type of interference seems most ethical, allowing the building to adapt to modern requirements.

In Poland, a major problem when relocating a building is the need to have a construction design prepared for the relocated building, the same as in the case of a completely new building. It seems that the fact that the construction law does not allow the possibility to move an old house to a new location is a loophole. This complicates the investment process and also forces some procedures that change the nature of the buildings, such as insulating the walls. It seems that such buildings should be treated as historic, with the possibility of leaving the walls without any interference other than that resulting from the need to replace some of the logs. Undoubtedly, a discussion on this topic is worth initiating.

References

- [1] G. Tsoumis, **Science and Technology of Wood: Structure, Properties, Utilization**, Kessel Publishing House, Remagen, 2009, p. 494.
- [2] W. Kokociński, **Wood Anatomy**, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań 2023, p. 162 (in Polish).
- [3] T. Nilsson, R. R. Rowell, *Historical wood – structure and properties*, **Journal of Cultural Heritage**, **13**(3), 2012, pp. S5-S9. DOI:10.1016/j.culher.2012.03.016.
- [4] P. C. Raposo, J. A. F. O. Correia, D. Sousa, M. E. Salavessa, C. Reis, C. Oliveira, A. de Jesus, *Mechanical properties of wood construction materials from a building from the 19th century*, **Procedia Structural Integrity**, **5**, 2017, pp. 1097-1101. DOI:10.1016/j.prostr.2017.07.087.

- [5] R. Seiseh, Y. Abu Alhassan, A. Hussein Mohamed, N. Farhan Alsoukhni, M. Abed Almashkhi, W. Al Sekhaneh, *Spatial development plan of heritage building strategic investment of adaptive reuse in northern Jordan "Samad village" in alula in Saudia Arabia*, **International Journal of Conservation Science**, **15**(3), 2024, pp. 1229-1242.
- [6] T. Tomaszek, C. Fry, *Preserving Australia's timber heritage – some preliminary guidelines for the conservation of slab huts*, **International Journal of Conservation Science**, **13**(1), 2022, pp. 117-130.
- [7] E. Węclawowicz-Bilska, M. Wdowiarz-Bilska, E. Kráľová, M. Vaščák, Y. Kryvoruchko, *Historical timber health resort architecture. Contemporary condition and state of conservation*, **International Journal of Conservation Science**, **13**(2), 2022, pp. 351-366.
- [8] P. V. Alfieri, G. Canosa, *Wood decay resistance employing nanoparticle protective systems*, **International Journal of Conservation Science**, **14**(3), 2023, pp. 773-782. DOI: 10.36868/IJCS.2023.03.01
- [9] J. Abbasi, K. Samanian, M. Afsharpour, *Consolidation of historical woods using polyvinyl butyral/zinc oxide nano-composite: investigation of water absorption, wettability, and resistance to weathering*, **International Journal of Conservation Science**, **11**(1), 2020, pp. 15-24.
- [10] P. Paravalos, **Moving a House with Preservation in Mind**, Rowman & Littlefield Publishers, 2006, p. 168.
- [11] I. Liżewska, *Translocation of historic buildings and new utility, spatial and social functions*, in: B. Szmygin (ed.), **Adaptation of Historic Buildings to Contemporary Utility Functions**, Lubelskie Towarzystwo Naukowe, Międzynarodowa Rada Ochrony Zabytków iCOMOS, Politechnika Lubelska, Warszawa – Lublin, 2009, pp. 83-86 (in Polish).
- [12] Ł. Wesołowski, *Relocation of buildings – rationale and implementation potential*, **Journal of Heritage Conservation**, **47**, 2016, pp. 40-51.
- [13] W. Drozd, *Structure relocation*, **Civil and Environmental Engineering Reports**, **29**(4), 2019, pp. 176-184.
- [14] C. Takva, E. Özkan Yazgan, *A bibliometric analysis of the concepts and methods used in the adaptive reuse*, **International Journal of Conservation Science**, **15**(1), 2024, pp. 479-496. DOI: 10.36868/IJCS.2024.01.07
- [15] M. Sulima, A. Jelska, *Relocation of wooden buildings on the example of a house from the village of Boćki in the Podlaskie voivodeship*, **Housing Environment**, **47**, 2024, pp. 26-44.
- [16] <https://exploringgb.co.uk/blog/exeterhousethatmoved> [accessed 11.03.2025].
- [17] A. Powder, G. Castellarin, *Lifting and moving wooden buildings: a low-tech approach*, **Bulletin of the Association for Preservation Technology**, **18**(1/2), 1986, pp. 86-93. DOI:10.2307/1494084.
- [18] T. J. Matheus, J. T. Maxwell, J. Oliver, M. Thornton, M. Hess, G. L. Harley, *A dendrochronological evaluation of three historic pioneer cabins at Spring Mill Village, Indiana*, **Dendrochronologia**, **43**, 2017, pp. 12-19. DOI:10.1016/J.DENDRO.2016.11.004.
- [19] S. Gamble, *House relocation: A redevelopment tool for rapidly changing urban environments*, **Cities**, **154**, 2024, Article Number: 105233. <https://doi.org/10.1016/j.cities.2024.105233>.
- [20] * * *, https://pl.wikipedia.org/wiki/Kategoria:Skanseny_etnograficzne_w_Polsce [accessed 22.12.2024].
- [21] * * *, *Regulation of the Minister of Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location (as amended)* (in Polish).
- [22] A. Repelewicz, *Sealing Log Houses*, **IOP Conference Series: Materials Science and Engineering**, **471**, 2019, Article Number: 082006. DOI:10.1088/1757-899X/471/8/082006.

Received: February 10, 2025

Accepted: November 03, 2025