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# Preservation Scenarios for Post-War Concrete Architecture: The Case of Lithuania

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Adaptive reuse, comprehensive upgrade, concrete architecture, conservation, cultural value.

**Abstract**

Post-war concrete architecture is a valuable part of the 20th-century heritage spread worldwide with specific preservation challenges. This paper analyses three possible preservation scenarios: conservation, comprehensive upgrade, and adaptive reuse based on a broad legacy of post-war concrete architecture in Lithuania and the sustainability aspect. Even though several significant concrete objects are listed, they are protected very formally, and no comprehensive preservation is applied.

## Introduction

The roots of the distinctiveness of concrete architecture lie in the properties of the material: concrete is a composite material consisting of cement, aggregates, and water, which, pored to formwork, can take on a variety of forms and an essential attribute – artistic surfaces of raw concrete. The uniqueness of concrete (reinforced concrete) also lies in its strength, which allowed architects to cover large spaces with shells without additional supports and long thin beams enabled by prestressing, and these attributes "*became a distinctive sign of modern*" [7, *16*]. In addition to unique structural and aesthetic features, concrete is also an economical material and suited very well to the ideological, economic, and political context of the postwar years. Architects and urban planners were fascinated by the possibilities of forms and the idea of fast and efficient construction rebuilding destroyed cities, but at the same time, it became a tool for totalitarian regimes to introduce their programs. Moreover, "*concrete as an architectural material is a symbol of modernization and progress, but conversely, it is also associated with modernism's architectural and social failures*" [13, *6*].

In the post-war period, the technologies related to reinforced concrete spread very quickly and were widely used. Prefabricated (industrial production) – by casting in moulds unified concrete products at the factories, and monolithic reinforced concrete technology was used to implement unique, originally designed buildings on-site. In addition to the advantages of efficient construction and aesthetic diversity, concrete quickly began to show its disadvantages: as a vulnerable material, it deteriorates quickly and has more immediate maintenance challenges. Therefore, in recent decades, concrete architecture has increasingly become the target of international heritage specialists as a specific part of the heritage, and conservation of significant concrete objects is recognized as "*an emerging area of practice*" [2, *11*].

As a young heritage, post-war concrete architecture faces many challenges: lack of specific knowledge on how to treat concrete surfaces and structures while maintaining the authenticity of material; typological diversity; functional obsolesce, and the problem of aesthetic nonappreciation, which in Lithuania, has an additional weight of the Soviet era. Because of these issues, concrete buildings constantly appear at risk of demolition and low-quality renewal. Several significant buildings, like *Banga Café* and the Summer Stage in Palanga, have been demolished over the last decades in Lithuania without understanding their cultural value. Although several buildings are on the National List of Cultural Heritage, the post-war concrete objects face systematic problems in Lithuania's entire preservation process: the selection and representation of objects is not

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methodical, value assessment is superficial, and further preservation process is not described. Architectural historian M. Drėmaitė observes: "*Although there are not so few listed objects, a systematic approach to the evaluation and documentation of modernist architectural heritage has not been formed in Lithuania, and the gap between ongoing cultural and historical architectural research and the heritage preservation discourse represented by the List of Cultural Heritage is noticeable*" [6, *150*].

Another problem is that there is no practice for developing a conservation management plan (further – CMP) or guidelines on preserving, diagnosing, and treating even the listed significant concrete heritage. The Palace of Concerts and Sports in Vilnius – a listed icon of concrete architecture in Lithuania – stands abandoned and rapidly decays without finding a suitable scenario to preserve the building. *Lazdynai* – a prominent listed example of post-war mass housing and urban planning, telling us a valuable history of residential concrete architecture – is waiting for a proper preservation strategy and management plan, which could protect the complex's valuable attributes by reacting to contemporary society's needs.

Another critical task is to raise awareness of concrete architecture's value of all social groups, from heritage specialists to students, and promote a sustainable – zero demolition – approach to the broader public.

Considering these issues, the article explores approaches and challenges of concrete architecture as heritage and three preservation scenarios: conservation, comprehensive upgrade, and adaptive reuse, which are illustrated by the post-war concrete heritage objects of Lithuania. The scientific novelty of the article is related to the fact that post-war concrete architecture and its preservation issues are examined as a whole, including the typological diversity of buildings: from iconic public to mass housing residential areas. The article is based on relevant international ICOMOS, Getty Conservation Institute, DOCOMOMO documents [8], [9], [12], [16], [26] and relevant literature that explores the preservation issues of modern and concrete architecture [2], [6], [10], [11], [13], [17], [20], [21], [22], [24], [27]. The article is also based on the National Heritage Law [25], a list of valuable objects in Lithuanian SSR [19], the online database of the National Register of Real Heritage, field and archival research, and the experience of the InnovaConcrete and CONSECH20 projects.

## I. Current Situation of Post-War Concrete Architecture in Lithuania

There are about thirty significant representatives of post-war concrete architecture (1945–1990) in Lithuania: buildings, complexes, and sites of public, residential, and industrial typology [3]. Twelve objects of post-war concrete architecture are included in the National List of Cultural Heritage and are under state protection (see Table I). Three of them – the Complex of the Lithuanian Radio and Television Centre in Vilnius (1980, arch. V. Obydovas, K. Balėnas, engin. D. Basiladzė, D. Dortmanas), Kaunas 9th Fort Complex (1976–1984, arch. V. Vielius, G. Baravykas, sculpt. A. Ambraziūnas and others) and the Complex of Parliament Buildings in Vilnius (1982, arch. A. and V. Nasvyčiai, Č. Mazūras) – are of national significance. Other listed objects are of regional significance. The *Lazdynai* mass housing area in Vilnius (1969–1985, arch. V. E. Čekanauskas, V. Brėdikis, Č. Mazūras) is listed as a site of local significance. Two objects, Cinema *Vilnius* (1963, arch. J. Kasparavičius, engin. C. Strimaitis) and the Department of Statistics (1977, arch. A. Lukšas), have a façade protection.

The inheritance of modernist architectural objects began when Lithuania was part of the Soviet Union, when in 1984–1986, several dozen objects, many of them examples of concrete architecture, were included in the register of the Lithuanian SSR just a few years or decades after their construction [10], [19]. Four modernistic urban territories were included in this list: two prominent districts of concrete housing – *Lazdynai* and Žirmūnai, the Science Campus in *Saulėtekis* with separate building complexes of Vilnius and Vilnius Gediminas Technical Universities (former VISI), and student dormitories – the first high-rise buildings (1976–1980, arch. B. Krūminis; engin. J. Sidaravičius) known as "New York", and the New Public Centre on the right bank of the river Neris in Lithuania with several prominent buildings: Hotel *Lietuva* (1976–1984, arch. A. and V. Nasvyčiai), Central Department Store (1973, arch. Z. Liandzbergis, V. Vielius) and Household Service buildings (1975, arch. A. and V. Nasvyčiai) and Hotel *Turistas* (1974, arch. J. Šeibokas). Some complexes like the Ministry of Communications, the Government, and the Parliament were included in the list, as well as individual objects – Cinema *Vilnius*, Vilnius City Hospital, and the sculpture of Kaunas 9th Fort Complex. Interestingly, even several prefabricated panel buildings were listed, for example, the first 9-story panel building in Žirmūnai (1964, arch. E. Tomaševičius; engin. M. Bilevičius). Looking at the list, it is evident that a selection made in the 1980s is incomplete. For example, the Vilnius Concert and Sports Palace or National Opera House were not included in the list, although they were mentioned as significant objects of the era.

After the restoration of Lithuania's Independence in 1990, all the previously listed concrete architectural objects of the Lithuanian SSR were formally transferred to the National List of Cultural Heritage in 1993. A more significant concern for preserving post-war buildings did not occur until the first decade of the 21st century when real threats of building demolition and the need for faster development appeared.

**TABLE I**

**Listed and Delisted Objects of Post-war Concrete Architecture in Lithuania (presented chronologically) [by Aušra Černauskiene].**

| No. | Object title/ construction years/architect | Typology | Structure & technology | Surface | Legal status |
|---|---|---|---|---|---|
| 1 | Cinema *Vilnius*, 1963, arch. J. Kasperavičius; engin. C. Strimaitis | Public | Vertical folds on the façade; *pre-cast* | Architectural concrete façade elements (vertical folds with frame) | Listed in 1985; only the facade is preserved |
| * | City Hospital in *Antakalnis*, Vilnius, 1966, arch. E. Chlomauskas, Z. Liandsbergis | Public | Reinforced concrete frame structure with visible support elements; *pre-cast* and *cast-in-situ* | Raw concrete elements with formboard prints | Listed in 1985; delisted in 2010 |
| 2 | Hotel Žilvinas in Palanga, 1969, arch. A. Lėckas; engin. K. Augustinas | Public | Cantilever reinforced concrete frame structure; *cast-in-situ* | Raw concrete with formboard prints | Listed in 2013, a regional significance level |
| * | Žirmūnai residential area in Vilnius, 1962–1969, arch. B. Kasparavičienė et al. | Urban site, residential | Large scale panels; *pre-cast* (for 5 to 12-story buildings) | Concrete panels with exposed texture; architectural concrete elements | Listed in 1985 as site; and 9-story building; delisted in 2012 |
| * | Science Campus in *Saulėtekis*, Vilnius, 1966–1970, arch. Daunoravičius, R. Dičius, J. Jurgelionis, B. Krūminis | Urban site, public | Reinforced concrete frame structure; pleated concrete slabs; *pre-cast* and *cast-in-situ* | Raw concrete with formboard prints; architectural concrete façade elements | Listed in 1985 as a site and separate buildings; delisted recently |
| 3 | Palace of Concerts and Sports in Vilnius, 1965–1971, arch. E. Chlomauskas, Z. Liandzbergis and others | Public | Hanging roof, inverted arch structure, with visible vertical concrete supports; *cast-in-situ* | Raw concrete with formboard prints; grooved plaster (raw concrete imitation) | Listed in 2006; a regional significance level with extra historical value |
| 4 | Pier Building with Tower in Nida,1964–1972, arch. A. Paulauskas | Public | Reinforced concrete frame structure with V-form roof; *cast-in-situ* | Raw concrete with formboard prints (painted after renewal) | Listed in 2013; a regional significance level |
| * | New Public Centre on the right bank of the river Neris, 1962–1973, arch. A. and V. Nasvyčiai, V. Vielius, Z. Liandzbergis | Urban site, public | Reinforced concrete frame structure; *pre-cast* | Several types of architectural concrete façade elements | Listed in 1985 as site and separate buildings; delisted in 2012 |
| 5 | Department of Statistics, 1977, arch. A. Lukšas | Public | Vertical elements on the façade; *pre-cast* | Architectural concrete façade elements (vertical elements) | Listed in 1985; only the facade is preserved |
| 6 | TV Tower and the Lithuanian Radio and Television Building Complex in Vilnius, 1980, V. Obydovas, K. Balėnas | Public, engineering | Concrete shells; lower part frame structure; *cast-in-situ* and *pre-cast* | Raw, smooth concrete surfaces at a tower core; acquired architectural concrete façade elem. | Listed in 2012; a national significance level and extra historical value |
| 7 | Palace of Communication in Vilnius, 1979–1981, arch. J. Šeibokas; engin. G. Diržinskienė | Public | Reinforced concrete frame structure; the ground floor is suspended on columns *pre-cast* | Three types of architectural concrete façade elements (painted originally and during conservation) | Listed in 1984; a regional significance level |
| 8 | Palace of Government in Vilnius, 1976–1982, arch. V. Čekanauskas | Public | Frame structure with visible supporting structures; waffle-type slab in the main hall | Architectural concrete façade and interior elements | Listed in 1984; a regional significance level |
| 9 | Hotel *Pušynas* in Druskininkai, 1978–1982, arch. R. and A. Šilinskai | Public | Lift-up slab method; *cast-in-situ* and *pre-cast* | Architectural concrete façade elements | Listed in 2021; a regional significance level |
| 10 | The Complex of Parliament Buildings in Vilnius, 1980–1982, arch. A. and V. Nasvyčiai, Č. Mazūras | Public | Frame structure expanding upwards; waffle-type slabs; *pre-cast* | Architectural concrete façade elements (painted originally and during renewal) | Listed in 1984; national significance level |
| 11 | 9th Fort Complex in Kaunas, 1976–1984, arch. V. Vielius, G. Baravykas; sculptor A. Ambraziūnas; engin. C. Strimaitis, A. Gavelis. | Public: museum, monument | Reinforced concrete structures of inclined planes; *cast-in-situ* and *pre-cast* | Raw concrete with formboard prints on exterior and interior; concrete tiles | Monument listed in 1984; museum in 2016; with a national significance level (the administrative building is not listed) |
| 12 | Lazdynai residential area in Vilnius, 1969–1985, arch. V. E. Čekanauskas, V. Brėdikis, Č. Mazūras | Residential | *Pre-cast* (for 5 to 12-story buildings) and *cast-in-situ* (for towers) | Large-scale concrete panels with exposed texture; architectural concrete façade elements | Listed in 1984 as a site of local significance |

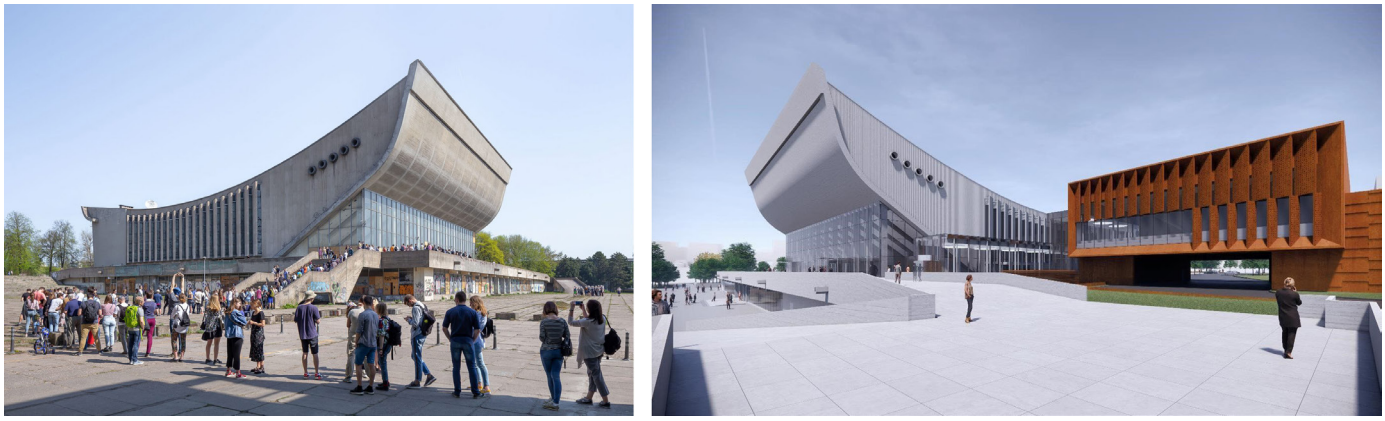

Fig. 1. The Palace of Concerts and Sports: on the left – the building during the Open House Festival [photo by Norbet Tukaj, 2020]; on the right – visualization of the building after conversion to the Congress Centre [figure by Sigitas Kuncevičius' Architecture Studio, 2016].

In 2006, due to the threat of demolition, the Vilnius Concert and Sports Palace was added to the list (1965–1971, arch. E. Chlomauskas, J. Kriukelis, Z. Liandzbergis; engineer. H. Karvelis, A. Katilius, A. Kamarauskas, S. Kovarskaja). The inscription was determined not only for a unique suspended roof structure with inclined façade supports or raw concrete surfaces with impressions of wooden formwork in façades but also for its historical, memorial value – the building hosted "*Sąjūdis*" congresses, which significantly contributed to the restoration of independence in Lithuania. The significance of the building is proven by international databases like "100 from the 20th" or "SOS Brutalism", which included the Palace as an iconic example of concrete architecture of brutalist style. The recognition of the building is increasing in Lithuania as well, as evidenced by the Open House Festival, during which the Palace attracted many curious visitors for several years (Fig. 1). In recent decades, various redevelopment solutions have been considered: conversion into a congress centre (Fig. 1) and adaption of the building into a Jewish Museum (as Vilnius Concert and Sports Palace was built in 1971 on the grounds of the former Jewish cemetery, and now only a memorial purpose is being considered). However, the Palace remains abandoned in the city centre, awaiting a suitable preservation scenario. Meanwhile, raw concrete surfaces rapidly deteriorate because of lack of maintenance, graffiti, weathering, and biological coating.

In 2012, the Vilnius TV Tower complex was included in the list for the same reasons, not only for the uniqueness of the architecture or constructions but also for the historical value, because significant events during the struggle for independence took place in January 1991 next to the building. Other objects, such as the Nida pier with a tower, Hotel Žilvinas in Palanga, and Hotel *Pušynas* in Druskininkai, were included in the list due to the preservation of remaining valuable properties to control the scale of possible redevelopments.

However, being on the national list does not guarantee qualitative preservation, and in the case of controversial objects, like mass housing areas and residential towers, it is even more complicated. Several representatives of concrete heritage were delisted in recent decades due to changes in valuable features. The reverse wave – removing the protection status – emerged in Lithuania

Fig. 2. From the left: Vilnius University (VU) complex from the side of the pedestrian alley; in the middle – VU connecting volume from the inner yard; on the right – entrance to the student dormitory [photos by Aušra Černauskiene, 2021–2023].

Fig. 3. Objects of the Complex of Kaunas 9th Fort, 1976–1984, architects V. Vielius, G. Baravykas; sculptor A. Ambraziūnas; and engineers C. Strimaitis, A. Gavelis: from the left: monument, museum, and administrative building [photos by Aušra Černauskiene, 2023].

in 2010–2012. At that time, some prominent examples like the Žirmūnai housing area (1962–1969, arch. B. Kasperavičienė and others), the New Public Centre of the right bank of the river Neris in Vilnius (1962–1984, arch. A. ir V. Nasvyčiai, V. Vielius, Z. Liandzbergis, J. Šeibokas) and hospital in Antakalnis (1966, arch. E. Chlomauskas, Z. Liandzbergis) were delisted due to change of valuable features. In recent years, the protection of Science Camp of *Saulėtekis* (1966–1970, arch. Daunoravičius, R. Dičius, J. Jurgelionis, B. Krūminis) has also disappeared (see Table 1, delisted objects are marked with *). Moreover, the removal of protection of the site or the changed buildings of the complex is understandable due to the new development that has taken place, but, for example, the removal of the Vilnius University buildings (1971–1979, arch. J. Jurgelionis, R. Dičius, G. Dindienė; const. C. Strimaitis) from the register is incomprehensible because the group of buildings has retained its authentic, innovative structure and materiality (Fig. 2). It is worth mentioning, that the former part of the protected site of *Saulėtekis* – the 16-story student dormitories (1976–1980, architects B. Krūminis, J. Sidaravičius), which were the first concrete high-rise buildings in Lithuania – were upgraded in 2013. Their aesthetic uniqueness, formed with triangular balconies, was preserved only after the active involvement of the community of academics and architects. Unfortunately, the buildings' original materiality (textured concrete panels with white stones) has been lost, and only a few fragments of raw concrete elements have been preserved (Fig. 2).

When examining the list of significant concrete objects, several observations arise further. For example, the

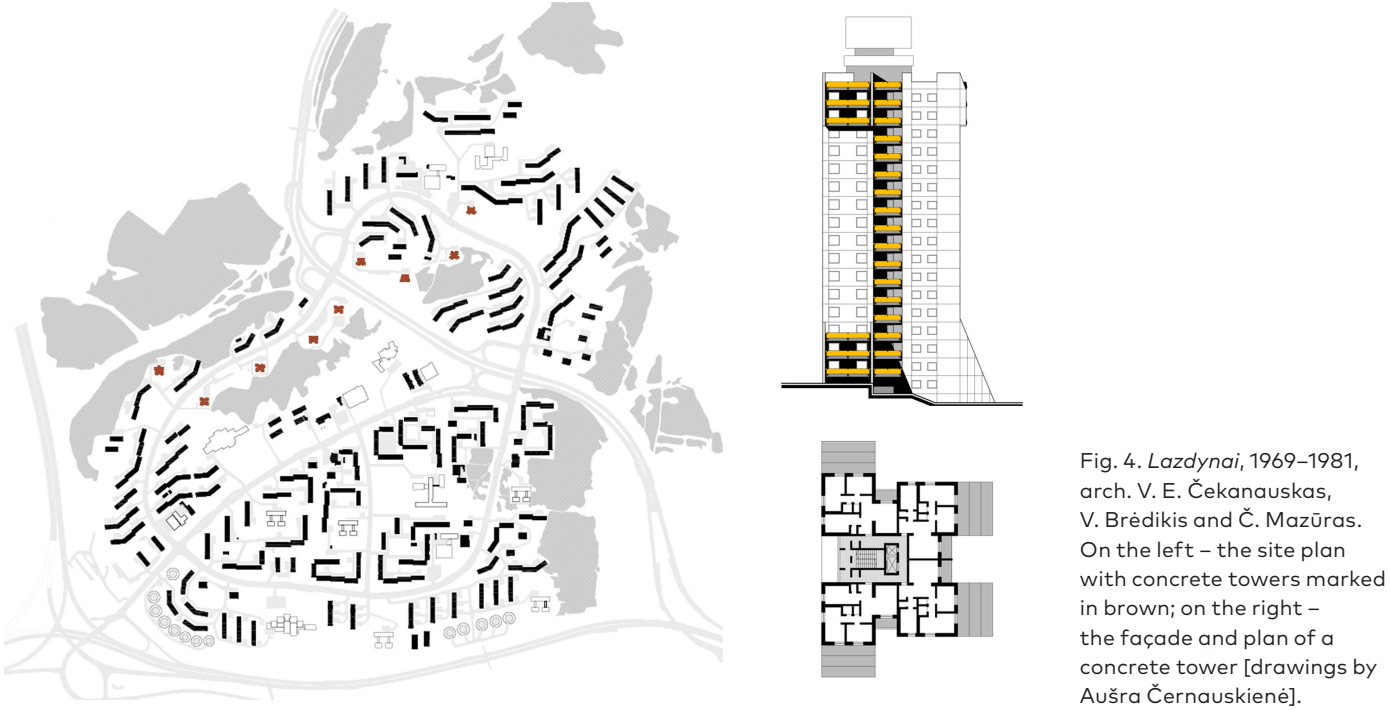

Fig. 4. *Lazdynai*, 1969–1981, arch. V. E. Čekanauskas, V. Brėdikis and Č. Mazūras. On the left – the site plan with concrete towers marked in brown; on the right – the façade and plan of a concrete tower [drawings by Aušra Černauskienė].

Kaunas 9th Fort Complex (fort, memorial, and museum) is recognized as an object of national cultural significance. The concrete monument was added to the register of the Lithuanian SSR in 1984 and then transferred to the National list in 1993. The museum was included in the national list several decades later in 2016. Paradoxically, an administrative building built simultaneously with a museum and in the same style of using raw concrete aesthetics is not listed yet (Fig. 3). Now, the museum building is in the process of inner space renovation, and a roof maintenance project is planned.

Another example of listed objects is the iconic residential area of *Lazdynai*, "*a breakthrough in Soviet residential design*" [5, *169*]. *Lazdynai* was included in the Lithuanian SSR list in 1984, then transferred to the List of Cultural Heritage in 1993 as a site. The valuable attributes of *Lazdynai* include a unique urban structure of 5 to 12-story prefabricated panel houses (series I-464-LI) with nine landmarks of 16-story residential towers implemented using *cast-in-situ* concrete (Fig. 4). The typical pre-cast buildings were creatively adapted to *Lazdynai* relief. The towers were the first high rises implemented using *cast-in-situ* concrete technology, leaving raw concrete surfaces with yellow painted balconies and entrance elements as an aesthetical choice (1979–1984, arch. Č. Mazūras). *Lazdynai* represents the part of a concrete heritage, which is almost always considered too controversial to qualify for conservation strategies. However, a respectful renewal of residential areas is still needed because the area was designed by standards of modernism by prominent Lithuanian urban planners and architects. In addition, the high-rise buildings of *Lazdynai* are visible from the entrance perspective to Vilnius, shape the townscape, and are worth more than the spontaneous upgrade of separate buildings.

Thus, it becomes clear that a single preservation scenario is insufficient just by examining the diversity and problematics of the Lithuanian concrete heritage included in the list (not to mention others). Besides, from today's perspective, cultural heritage objects, following traditionally perceived aspects of value like artistic, social, technological, and historical, acquire another value – to contribute to future sustainability.

## II. Challenges of Postwar Concrete Architecture as Part of the 20th-Century Heritage

Post-war concrete architecture, being part of the 20th-century heritage, faces challenges common to all modernist heritage: a lack of time to understand cultural significance; abundant and diverse typology; functional and material obsolescence; experimental, innovative use of materials and technologies; the dilemma of time patina and a narrow perception of preservation. Jukka Jokilehto poetically considers the challenge of time: "*In the case of modern heritage, the distance is still short, and judgment is difficult. Even though our surroundings largely result from the work of the Modern Movement, we have difficulty in assessing them, considering that we are really judging ourselves*" [11, *108–109*]. In the case of concrete architecture, lack of time is related to the lack of appreciation. Concrete is ageing ugly and, due to the free planning principles of modernism, is associated with social problems. In Lithuania, the lack of appreciation has additional negative associations with the Soviet era and traumatic experiences related to nationalized property, lack of choice, lack of qualitative building materials and workmanship, and lack of everyday maintenance.

Besides, concrete architecture is abundant and typologically diverse, from iconic public buildings to mass housing areas. Many buildings' functions were introduced at that time – rest houses for factory workers, physiotherapy clinics, and cultural and sports halls became unnecessary or had lower standards due to changes in the political and economic situation, so the need to change the function of the building became more urgent. In addition, the concrete material ages much faster, so several years after construction, in many cases, raw concrete surfaces and structural elements have already been replaced, painted, or insulated. In this way, concrete architecture questions many traditional conservation assumptions: How much can be changed? Is it authentic enough to be preserved? Is the conservation method suitable for all types of buildings? Is the materiality of concrete a value?

Another specific challenge is the vulnerable nature of concrete. Concrete is a composite material, alkaline, usually with steel reinforcement, more or less porous material. That is why concrete is sensitive to climate and pollution, like acid rains, freezing cycles, and daily reactions with air. An aggressive environment causes concrete deterioration and decay, which is related to the carbonization process. The surface of the concrete reacts with water and air, forming calcite crystals, causing the decrease of the concrete's alkaline medium, creating conditions for corrosion and cracking of the concrete surface. As concrete is a porous material, biological species like lichens and mosses often grow on it (Fig. 5). Digital tools such as the online expert of MDCS are important in recognizing the damage types and causes of concrete architecture [4].

Specific challenges of concrete heritage are, on the one hand, very practical and related to the vulnerable nature of the material, poor quality components and workmanship, and lack of knowledge of how to conserve and repair fair-faced concrete surfaces. On the other hand, it is very theoretical and educational – to raise awareness of owners of heritage properties as well as conservation architects and specialists on how to preserve it correctly.

The questions related to the preservation of modern architecture have been actively promoted since the

Fig. 5. Damaged raw concrete surfaces: on the left and in the middle – with opened reinforcement due to a thin decorative concrete layer; on the right – biological coating and sediments [photos by Aušra Černauskienė, 2019–2023].

1990s by DOCOMOMO, UNESCO World Heritage Center, ICOMOS International Scientific Committee on the Twentieth Century Heritage ISC20C (further ICOMOS ISC20C), and the Getty Conservation Institute (further GCI). The most prominent documents defining how to evaluate and examine modern architecture as heritage are the Eindhoven Statement (1990), Madrid (2011), and Madrid-New Delhi documents (2017) with a value-based approach and a promotion of conservation management plan before any intervention; expanded Burra Charter (2013), which defines a broader concept of conservation and The Twentieth Century Historic Thematic Framework (2021), which proposes to examine the recent heritage through thematic groups.

Regarding the preservation of concrete architecture, "*conflict with traditional heritage and conservation principles, technical/practical challenges, knowledge gaps, and other issues like cost*" are evident [13, *09*]. That is why postwar concrete architecture, as a separate part of the heritage of the 20th century with specific problems, began to be analyzed more widely in the last decades. The first impulse was in 2013 when GCI organized a colloquium as part of the Conserving Modern Architecture initiative, during which a lack of modern materials conservation research, methods, and case studies was identified [18]. Concrete was identified as one of the key materials with critical conservation challenges. In 2017, GCI established the *Concrete Conservation Project,* and in 2019, as a result of the project – the book of case studies of successful renewal cases of concrete heritage [2] was published. The *Conservation Principles for Concrete of Cultural Significance*, which summarized all GCI studies, was published in 2020 [12]. Another document essential for preserving concrete architecture appeared almost simultaneously – the Cádiz document (2021), resulting from the InnovaConcrete project in cooperation with ICOMOS ISC20C [8]. Guidelines for the conservation of concrete heritage are explained very carefully in eight steps: 1) develop understanding and assess the significance; 2) identify an experienced interdisciplinary project team; 3) develop preliminary knowledge of site-specific issues; 4) perform a detailed condition assessment; 5) develop sustainable repair approaches and policies; 6) develop a repair program and implementation plan; 7) develop a maintenance program and monitoring; 8) promote and celebrate the concrete heritage. According to the document, besides value aspects, the assessment of concrete heritage should include comparative analyses and respect for the patina of age; careful investigation of physical condition should be performed, and the last step – promoting and celebrating the concrete heritage – is also very important for the Lithuanian context.

All the steps mentioned above are essential because each object of concrete architecture is different, and the intervention must be determined individually. One object requires only the preservation of valuable façades; in another case, a strategy is needed for the whole area; in one case, pre-cast concrete elements need to be renewed, which can be easily replaced; in another – unique monolithic raw surfaces must be conserved. Therefore, deciding the preservation for each case individually is essential, assessing which method is best suited to preserve objects of different scales and significance levels.

## III. Preservation Approaches to Post-War Concrete Architecture

Many preservationists and historians studying 20th-century heritage agree that modernist architecture has expanded the boundaries of heritage preservation and needs more flexible approaches [6], [11], [17], [20], [21], [22]. Th. Prudon said: "*Understanding and creative interpretation of original design intent and the use of new technologies, replacement materials, and more frequent reconstructions in combination with the search for*

*updated programs and uses must play an essential role in preserving modern architecture*" [21, *75*]. It means that more than one preservation scenario might be relevant to concrete architecture because, in frequent cases, it is necessary to foresee major transformations, additions, and purpose changes, or for residential objects, the traditional conservation strategy – as less intervention as possible – is economically irrelevant (too expensive). Architectural historian V. Petrulis, examining the conflicts of the 20th-century architectural heritage in Lithuania, reveals several relevant preservation concepts, such as "*classical preservation*", "*preservation as interpretation*", and "*preservation as creativity*" [20, *162–181*], where the first concept could be related to the traditional conservation and other two – to adaptive reuse. Other authors emphasize preservation by developing and analyzing *conservation* and *conversion* scenarios [22].

Considering the challenges, approaches, and context of concrete heritage in Lithuania, three preservation scenarios – *conservation*, *comprehensive upgrade*, and *adaptive reuse* – will be discussed further as possible methods, considering which typologies, social circumstances, and value statuses are best suited. Important factors will be considered: cultural value statuses, typology, scale of intervention, and aspects of economy and sustainability.

### A. Conservation

The first scenario – *conservation* – is the most widely used and described in recent international documents as a strategy for preserving highly significant concrete buildings recognized internationally and nationally [8], [12]. In the case of conservation, interventions, and additions are allowed to ensure the proper functioning of the building, the purpose of the building should be selected as similar to the original as possible, and suitable methods to keep fair-faced concrete surfaces and structures are available and economically possible.

One of the first attempts to apply a conservation strategy for public concrete buildings in Lithuania was for the former Hotel *Lietuva* (2003, by Swedish and Lithuanian architects A. Saaks and R. Palekas' studio) [2, *79*]. Conservation of façade architectural concrete elements was performed: elements were cleaned and painted. A similar conservation method was applied to the pre-cast façade elements of the Complex of Communications (2017–2019, by conservation architects I. Kliobavičiūtė, V. Zilinskas, and engineer J. Mendelevičius) [1]. Polychromic analysis of the original colour was done (elements were painted originally and repainted several times), and repair of architectural concrete elements (surface cleaned, seam-sealed, broken pre-cast elements fixed, repainted, and covered with a hydrophobic coating) (Fig. 6).

The text by J. Šeibokas about the possible future transformations and the ambiguous description of valuable features in the act, for example, naming a valuable feature – architectural concrete type – allows doing significant transformations in the future.

The pier building with the Tower in Nida (1969, arch. Alfredas Paulauskas) is another example of a typical concrete conservation "tradition" in Lithuania. The building was renewed several times, and part of the premises was converted to a restaurant in 1985. During the recent renewal of the building (2019, arch. G. Vieversys, A. Šablevičius), raw concrete surfaces with formboards were painted grey to protect surfaces from further decay (Fig. 7).

The first proper conservation approach to raw *cast-in-situ* concrete surfaces was performed for the Kaunas 9th Fort monument, which was selected as a case study of the Innova Concrete project (2018–2021). The international and interdisciplinary project team determined the cultural value of the sculpture with a detailed historical analysis of structure, concrete composition, and formwork; took destructive and non-destructive tests; and created a geometrical 3D definition with concrete decay mapping with simulation of a climate impact. Laboratory investigations determined high-quality concrete and no active signs of concrete decay. Also, it denied the widely held opinion that only low-quality concrete was used in Lithuania during the Soviet era. The biggest problem for the monument's future is the environmental impact of moisture and freezing cycles. Several experimental

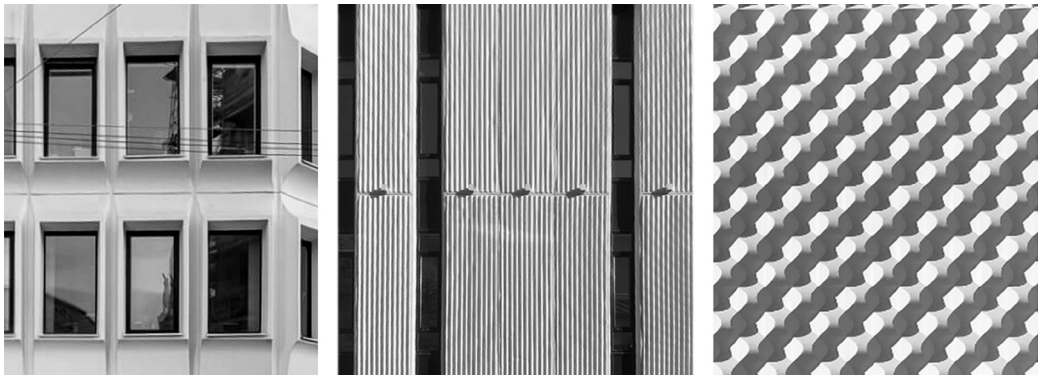

Fig. 6. Pre-cast architectural concrete elements of the façade after conservation [photo collage by Aušra Černauskienė, 2021].

Fig. 7. The Pier building in Nida. On the left – fragment of the building; on the right – raw concrete surfaces with the print of wooden boards painted grey [photo by Aušra Černauskienė, 2023].

hydrophobic products for the raw concrete surfaces were applied and monitored thrice during 2018–2021.

Unfortunately, a further preservation strategy was not formulated for the monument or the whole complex after the project. Despite that, a case study of the conservation attempt of the Kaunas monument could become a good impulse for further fair-faced concrete conservation practice in Lithuania. The project represented the whole process of proper conservation – gathering an interdisciplinary team, detailed assessment of cultural significance and physical condition, setting the conservation goal, implementation, and monitoring with a compilation of a photo archive. Such an experience could help prepare a conservation management plan for the whole complex of Kaunas 9th Fort, including the monument, museum, and administrative building, for the Hotel Žilvinas in Palanga, and for the Vilnius Concerts and Sports Hall.

B. Comprehensive Upgrade

The second scenario – *comprehensive upgrade* – might be suitable for residential buildings and complexes which need improvement of the environment, engineering systems, energy consumption, and accessibility requirements, but it is too expensive to conserve the buildings in full scope. Several terms – renovation, renewal, and modernization – are used to describe the renewal of residential buildings in Lithuania. Instead, this article suggests the term *comprehensive upgrade,* as it represents the suitable scope of renewal – not only improvement of façades and engineering systems but also covers the upgrade of the whole area, including public spaces, and a negative image of mass housing areas.

One of the first experimental projects for upgrading the 5-story apartment building from large-scale concrete I-464A panels in Žirmūnai was performed in 2004 (arch. S. Pamerneckis, D. Ruseckas, V. Bakanovas) [23, *82–83*]. At that time, Žirmūnai was listed as a site, and solutions were sought on how to update the buildings properly, keeping valuable attributes of the site. Ventilated facades were installed, loggias were glazed, and the nearest environment was upgraded (Fig. 8). The project's strength is that the authors emphasized the need for a complex approach rather than individual renovations. However, such a complex upgrade of residential areas proceeded slowly and chaotically in Lithuania.

After the experimental upgrade project of Žirmūnai, since 2004, an approved program for the renovation (modernization) of multi-apartment buildings has been operating in Lithuania. Since 2021, the long-term Renovation Strategy of Lithuania, approved by the LT Ministry of the Environment, is valid. Nevertheless, buildings are renewed spontaneously, regardless of the identity of the districts. For example, high-rise residential towers (1974–1985, architect Č. Mazūras) in *Lazdynai*, well seen from entrance panoramas, characterized by raw concrete surfaces and yellow-painted elements, were also among the first residential buildings to experience spontaneous upgrades, ignoring valuable features like original colours or special-volumetric features of concrete architecture like rounded corners (Fig. 9).

However, looking at these upgrade projects and the national policy of renovation, it can be concluded that there is no comprehensive and value-based approach to the renewal of mass housing areas designed by prominent

Fig. 8. Experimental upgrade project of a 5-story panel apartment building in Žirmūnai. Photo of the main entrance and yard facades [photo by Danas Ruseckas, 2004].

Fig. 9. Residential concrete towers in Lazdynai. On the left: the variety of upgrade styles and levels [photo by Bronius Jablonskas, 2020]; on the right – upgrade with ventilated façade ignoring the rounded elements [photo by Aušra Černauskienė, 2019].

Lithuanian architects and urban planners, using typical and available resources of the time with a hefty dose of creativity. Each district has valuable attributes, such as unique urban structures, decorative concrete balcony partitions, and monolithic towers designed for each area individually. Therefore, the question arises: are concrete surfaces with exposed texture, division of panels into squares, and decorative elements of façades valuable? (Fig.10).

The *comprehensive upgrade* scenario requires an urbanistic and integrated approach, a precise definition of the site's identity attributes, which must be preserved, an acceptable limit of transformations (of the ground floor and other elements) should be determined, and precise identification of suitable upgrade materials and colours for the entire area and each building type separately. Regarding the latter issue, modular or panel renovation was introduced in Vilnius this year, and it could be an impulse to determine suitable materials and colours for mass housing areas and develop the comprehensive upgrade management plan for *Lazdynai* where all identity attributes and acceptable intervention would be described. Besides, conservation methods should also be employed for the significant concrete elements (for example, balcony partition and entrance details), leaving them authentic signs of the modernist era.

C. Adaptive Reuse

The third scenario – *adaptive reuse* – might be suitable for significant concrete objects with an outdated, no longer relevant function, which needs a major transformation to meet a new purpose. It combines conservation and reconstruction approaches to concrete surfaces and structures, where "must keep" and "recommended to keep" attributes should be determined precisely [24]. According to Th. Prudon, "*Scenario of rehabilitation and adaptive reuse of buildings gained more popularity in Europe than strict conservation, except for the small number of iconic objects*" [19, *13*]. The reliability of Prudon's statement reinforces the DOCOMOMO conference held in 2016, dedicated to adaptive reuse as a strategy that ensures the sustainable survival of Modern Movement buildings [25]. Moreover, the sustainability factor played a crucial role, discussed at the latest ICOMOS ISC20C symposium in 2023, where demolishing and replacing new structures was considered insufficient.


Fig. 10. Residential pre-cast 5 to 9-story buildings in *Lazdynai*. From the left: the transformation of the ground floor apartment; exposed texture of concrete panels; and decorative concrete element at the entrance [photo by Aušra Černauskienė, 2022].

Fig. 11. Former Physiotherapy Clinics in Druskininkai: on the left – a view of the building [photo by M. Baranauskas, 1983]; on the right – a view after the reconstruction [photo by Norbert Tukaj, 2023].

One of the first examples of saving a public building from demolition by adapting it to another function was the conversion of former Physiotherapy Clinics to the Aqua Park in Druskininkai in 2006. The Physiotherapy Clinics was designed by "poets of concrete", architects Aušra and Romualdas Šilinskai, and was built in 1981 using an innovative lift-up slab method with many curvilinear pre-cast concrete elements and details produced directly on the site. After 1990 and the introduction of the market economy, the original function of the building became obsolete, and for several years, the building was abandoned. The repurposing project was introduced in 2003. The impressive Water tower was demolished during the reconstruction, extensions were added with new façades, inner yards were covered, and a new tower was built (Fig. 11).

The adaptive reuse of the Physiotherapy Clinics was a case when the building was not listed as cultural heritage in time, resulting in the loss of many valuable features as it is one of the most expressive concrete architecture examples in Lithuania, which could be preserved more qualitatively.

Another building designed by Šilinskai in Druskininkai (former Hotel *Pušynas*,1982) is being reconstructed by converting the hotel rooms into apartments. The building was listed in 2021, seeking to save the last most authentic building designed by Šilinskai, even though several significant attributes like a recessed ground floor or vertical sizer cut in the volume were already lost at that time. However, the building still features an original façade solution created by the lift-up slab method and pre-cast elements, and the structure of the rotunda plan is divided into rooms (Fig.12). Such a situation is common in Lithuania when a building is added to the list too late when many valuable properties have already been lost.

Many industrial areas were also adaptively reused, especially those in the centres of towns in Lithuania, by transforming into residential lofts and flats, integrating pre-cast concrete structures as distinctiveness-forming attributes.

## Conclusions

Post-war concrete architecture, a unique and valuable part of the 20$^{th}$-century heritage in Lithuania, has undergone different scales of past interventions, and lessons from the past should be learned. Many concrete buildings, complexes, and sites require feasible preservation strategies for sustainable and qualitative survival. Three preservation scenarios, with a clear definition of each, could help to protect concrete architecture more efficiently.

Fig. 12. Former Hotel *Pušynas* in Druskininkai: on the left – general view of the building [photo by Norbert Tukaj, 2023]; on the right – a detail of the façade [photo by Aušra Černauskienė, 2023].

The *conservation* method is primarily suitable for rare and unique representatives of the concrete architecture of national significance, which features decorative raw concrete surfaces and structures with the minimum intervention possible. In the case of conservation, raw concrete surfaces must be preserved with respect, using innovative technologies and products that allow authentic concrete surface survival. The additions and extensions are allowed in case of conservation to ensure the proper functioning of the building; the new function should be as similar to the original as possible.

The method of a *comprehensive upgrade* is mainly suitable for large-scale residential areas when it is economically impossible to implement a full-scale conservation strategy. This scenario must integrate a complex and value-based approach, which should become a part of national renovation policy, and a clear strategy for each residential area must be formulated with "must keep" identity attributes concerning urban design, colours, materials, time patina, and detailing. The limits of the intervention (ground floors, balconies, entrances) and the available upgrade materials must also be defined clearly.

The *adaptive reuse* method represents preservation through a development scenario. It is primarily suitable for prominent concrete buildings with an obsolete function of any typology of regional and local significance when major intervention is needed to meet a new purpose. "Must keep" identity attributes with conservation and "recommended to keep" attributes must be determined carefully and contextually.

For each postwar concrete architecture's preservation scenario – conservation, comprehensive upgrade, or reuse – the preservation process must correspond to the most recent Cádiz or GCI documents, and for each case, a conservation management plan should be developed, where the agreement of all interested parties related to the heritage, the acceptable intervention and further preservation steps are defined.

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