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Fostering Urban Cohesion: Exploring Morphological Adaptations in Budapest's IX District through a Typological Survey

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Abstract: In response to the imperative to enhance urban structures for global sustainability and improved quality of life, the European Union has diligently established parameters and policies fostering urban cohesion and territorial integration. Embracing the guidelines conceived by the European Commission, this research presents a case study examining morphological conditions in the IX District of Budapest, Hungary—a strategically chosen area undergoing renovation. The primary goals of the intervention are to address social and spatial segregation, enhance urban performance, and promote global resilience. Employing a Typological Survey methodology, an in-depth assessment was conducted and translated into a Geographic Information System (GIS) database. Consequently, the morphological analysis successfully identified five distinct types of elements composing the urban structure of the studied area. This analysis revealed a highly heterogeneous constitution characterized by dynamic and continuous changes, reflecting the evolving nature of the urban landscape. Findings indicate noteworthy improvements in the performance and quality of public spaces while preserving the historical morphological characteristics that have long defined this area and its urban landscape.

Keywords: urban green infrastructure; urban renewal; urban morphology; gentrification; urban density; land use; urban landscape

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1. Introduction

Europe has undergone significant political, social, and economic transformations since the late 1990s, gradually aligning its guidelines with the process of globalization. As a result, there has been an increase in sociocultural diversity in urban contexts. However, the emergence of supranational government institutions, such as The International Monetary Fund and the European Union, has represented an antagonist trend towards the aforementioned, promoting homogenization and cohesion of the European territory [1].

The socioeconomic complexity of the European structure is evident in urban conditions found in different regions, especially when considering the contrast between the east and west of the continent. Post-socialist cities faced physical and morphological restructuring challenges, which diminished their ability to diversify their identity [2]. Despite efforts to mitigate these discrepancies, disturbances still reverberate in these territories.

Under the communist regime, Eastern European countries prioritized affordable housing and other social security aspects as the backbone of their welfare state. However, the political transition initiated in 1989 led to a rise in social inequality. These changes notably affected Budapest, with an increase in social disparities and poverty concentration, especially observed during the initial years of political transformation. These shifts directly influenced the physical and cultural composition of the urban environment, resulting in new patterns of urban segregation.

In this context, Budapest is distinguished by its comparatively diverse population and social stratification among Eastern European cities. As recently as the early 2000s, different inner-city neighborhoods in Budapest were experiencing unique social mobility trends. Some areas showed signs of isolation, while others progressed towards higher income brackets, enhanced social standing, and more elevated general integration. At present, many of the most stigmatized areas have either completed or are currently undergoing urban revitalization initiatives [3].

The restructuring movement of urban territories is understood at an international level as one of the essential guidelines for strengthening the European bloc. These measures aim to support cultural multiplicity, emphasizing the individuality of the different social configurations that compose the block, thus promoting community well-being. By stimulating the development of underdeveloped areas and avoiding large migratory movements that disrupt social and economic stability in the region, homogeneous economic growth is fostered. Imbalance in this systematic arrangement results in more competitive urban centers with difficulty in absorbing the intense migratory flow, challenging urban planning and development resources. In contrast, less competitive cities suffer from shrinkage and decay [4].

In addition to economic growth, preserving cultural heritage and protecting the urban landscape are increasingly recognized as essential factors for constructing a people's cultural identity. Historic buildings are critical for economic growth through urban renewal [5]. In a broader context, urban renewal offers an opportunity to reevaluate strategies for facilitating sustainability and resilience within a community. This process is a means to tackle the potential for integrating sustainable and resilient development principles into historical environments, considering the contemporary need to achieve the maximum potential of use and performance of existing urban areas while preserving the integrity of the original architectural heritage [6].

Hungary's urban development strategies have changed significantly towards creating more livable spaces since the country's entry into the European Union. This shift has brought about a new economic and financial context, increasing attention on heritage conservation, sustainable practices, and democratic use of cultural assets. Notably, there is a growing emphasis on improving urban spatial quality as a key element of urban governance. In this context, landscape architecture has become a powerful tool in shaping contemporary urban design. As Hungary aligns with European standards, landscape architecture becomes more crucial in creating urban spaces that increase urban connectivity and prioritize the community's well-being and the environment [7].

The growing concern for sustainability in urban centers also boosts renewal strategies that aim to contain carbon emissions, minimize resource consumption (natural and environmental), and manage waste and energy consumption more efficiently. Energy insecurity has been a central agenda in international discussions about the energy crisis on the European continent, highlighting the challenges that have recently been enhanced in the regional political articulation to consolidate a compliant society with the concepts of the circular economy, proving economic prosperity and the viability of the social structure currently existing in Europe [8].

The escalating temperatures within urban environments, exacerbated by the confluence of climate change and urban densification—even in transitional areas such as the analyzed area of Ferencváros—generate substantial health risks. Mitigating these risks requires strategic interventions, among which urban green infrastructure is vital, integrating urban green infrastructure functions as a mechanism for natural temperature moderation, water management, and improved conditions for urban biodiversity. In the context of climate-induced urban challenges, expanding urban green infrastructure emerges as an imperative for the existence of health-resilient urban communities [9].

In this scenario, urban renewal strategies play an essential role in Europe's political, cultural, and social conformation and in the subsistence of urban centers in this region [10]. However, in Eastern European countries, such as Hungary, the renewal process tends

to occur more slowly and on a lower scale of intervention. This process intensified in Hungary around 2010 when funds from the European Union for urban renewal were accessible, in parallel with the increase in private investments in various sectors, including the real estate sector. The renewal of District IX, Ferencváros, in Budapest (see Figure 1) was based on the use of tools for the adaptation of urban fabric, including its intrinsic morphological qualities, through the implementation of mixed-use enterprises, primarily real estate, in a comprehensive and articulated manner with a new green infrastructure layer and public spaces.

Figure 1. The Ferencváros District in Budapest is delineated in red on the map, showcasing its comprehensive reach spanning from the central areas of the Hungarian capital to the more sparsely populated city zones. The highlighted red patch denotes the focus of the research site, which is adjacent to a low-density zone that acts as a buffer, delineating the urban core from the suburban periphery. Historically, this belt accommodated small-scale industries and railway lines, many of which have since been deactivated.

At the same time, the special opportunity for rehabilitation was that the properties were largely under state ownership. In addition to tidying up the public spaces, the aim was to break up the very dense 19th century fabric of courtyards by linking them together to allow for a more livable use of the shared internal green spaces.

The interventions sought to differentiate the external and internal communal and transitional spaces by creating small mini piazzas with small setbacks to the street space, thus improving the wetting of the street and the rear frontage. A qualitative differentiation of some community spaces would also improve community life [11].

However, despite its very careful and planned nature, the successful regeneration process, as described in Figure 2, has been criticized by sociologists for the strong gentrification that has accompanied the process [12].

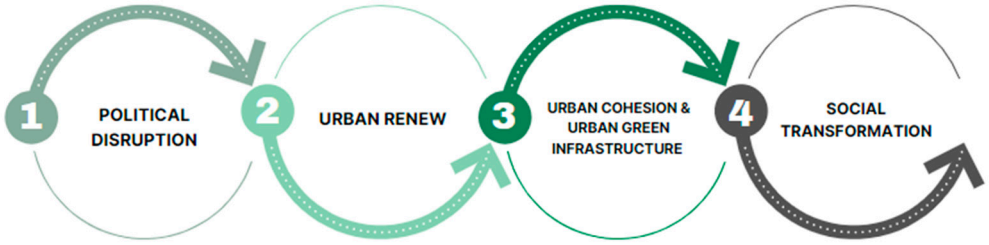

Figure 2. Diagram depicting the order of events in the urban renewal process in Ferencváros.

2. Materials and Methods

In this research, aiming to interpret the urban structure and morphological adaptations implemented in the renovation of District IX in Budapest, a typological study was employed to comprehensively understand, categorize, and evaluate the interventions both individually and collectively [13].

The survey assessment presented in Figure 3 is divided into four evaluation subgroups:

A. Land Use—this subgroup examines factors related to the layout and spatial organization of blocks, as well as the constitution of the urban landscape. The assessment of these aspects directly impacts the quality, accessibility, and complexity of the public space and its spatial connections [14].
B. Commerce and Service Unity—this section investigates the physical aspects of existing commercial and service units within the surveyed urban territory, emphasizing how they contribute to promoting habitable public spaces. Additionally, it analyzes how the distribution and articulation of the service network at the street level impact the fluidity and permeability of the territory [15].
C. Residential—this subgroup focuses on elements related to the residential function of analyzed buildings. Given that residential use had the most significant prominence and predominance in the Ferencváros renovation process, the elements of this subgroup seek to identify how residential buildings, whether new or renovated, have adapted to the existing urban form and structured the conformation of space [16].
D. Urban Landscape and Greenscape—this subgroup is designed to identify and characterize the constituent elements of the urban landscape. The implementation of green infrastructure was one of the tools used in the renovation of District IX, which significantly impacted not only the urban form and landscape but also the quality of public and semi-public spaces [17].

The municipality of District IX implemented a renovation strategy that was divided into stages and gradually implemented in the most degraded urban areas, which were considered the "centers of gravity" [18,19]. These areas were targeted with new guidelines for urban renewal, and improvements were expected to radiate to other regions within the intervention polygonal [20].

As a first stage of approach and experimentation, a typological study was conducted in two of the leading "Centers of Gravity" identified by the district municipality. These areas had worse general physical conditions of public spaces and buildings and were characterized by a fragile social situation, with families in profound social vulnerability.

The survey was carried out in collaboration with students of the Master's course in Landscape Architecture at the Hungarian University of Agriculture and Life Sciences (MATE) as a proposed workshop activity. In this case, the typological investigation was used as a method aimed to consolidate important concepts about morphology and urban structure and raise the consciousness of young professionals and city residents about their surroundings, contributing simultaneously to the formation of informed and self-aware community members [21].

In order to make the elements collected in Figure 2 more understandable for the students involved in the typological survey of the analyzed urban blocks, graphic icons

were created. This approach aimed to reduce the probability of error in their judgments of the physical structure of the place. Some of the icons used can be seen in Figure 4.

A	LAND USE								
	USE	RESIDENTIAL	0	COM/INST/SERV	0	EMPTY PLOT	0	MIXED	1
	STOREY	01 FLOOR	0	02 FLOORS	1	03 TO 05 FLOORS	0	06 TO 10 FLOORS	0
	COURTYARD	NOT APPLICABLE	0	COMMON	0	PRIVATE	1		
	FRONTAL SET BACK	NOT APPLICABLE	1	WITH GREEN ELEMENTS	0	WITH NO GREEN ELEMENTS	0		
	LATERAL SET BACK	NOT APPLICABLE	1	ONE SIDE	0	BOTH SIDES	0		
B	COMMERCE/SERVICE UNITY								
	NUMBER OF ACCESSES	NOT APPLICABLE	0	1 ACCESS	1	02 ACCESS	0	MORE THAN 02	0
	TYPE OF ACCESS	NOT APPLICABLE	0	PUBLIC STREET	1	GREEN ALLEY/COURTYARD	0	STREET AND ALLEY/COURTYARD	0
	EXTENSION COMPONENT	NOT APPLICABLE	0	TO PUBLIC STREET	1	TO ALLEY/COURTYARD	0		
	EXTENSION CHARACTER	NOT APPLICABLE	0	PERMANENT	1	SEASONAL	1		
	COVERED PROMENADE	NOT APPLICABLE	1	UP TO 02 PASSING UNITIES	0	ABOVE 02 PASSING UNITIES	0		
	GROUND FLOOR SERVICE	NOT APPLICABLE	0	80% - 100%	1	50% - 80%	0	LESS THAN 50%	0
	ACCESS LEVEL	NOT APPLICABLE	0	STREET LEVEL	0	BELOW STREET LEVEL	0	ABOVE STREET LEVEL	1
C	RESIDENTIAL								
	TYPE OF ACCESS	NOT APPLICABLE	0	PUBLIC STREET	1	ALLEY/COURTYARD	0	COMBINED	0
	NUMBER OF ACCESSES	NOT APPLICABLE	0	1 ACCESS	1	02 ACCESS	0	MORE THAN 02	0
	GREEN TERRACE	NOT APPLICABLE	1	YES	0	COMMON USE	0		
	BUILDING AGE	NOT APPLICABLE	0	BEFORE 1970	1	1970 TO 1990	0	1990 TO 2021	1
	GARAGE	NOT APPLICABLE	1	GROUND FLOOR	0	UNDERGROUND	0	COURTYARD	
	BALCONIES	NOT APPLICABLE	1	TOWARDS STREET	0	TOWARDS ALLEY/COURTYARD	0	STREET/ALLEY/COURTYARD	
D	URBAN LANDSCAPE/GREENSCAPE								
	FACADE OPENINGS	<30%	0	<50%	1	>50%	0		
	ACCESS TO COURTYARD	COMMON OPEN GATE FROM STREET	0	COMMON CLOSED GATE FROM STREET	0	THROUGH RESIDENTIAL ACCESS	1	COMBINED	1
	PHISICAL BARRIER TO COURTYARD	NOT APPLICABLE	0	VISUALLY PERMEABLE	0	NOT VISUALLY PERMEABLE	1	NOT VISUALLY PERMEABLE (GREEN)	0
	SIDEWALK	TRADITIONAL	1	PERMEABLE/NOT LEVELED	0	SHARED PAVEMENT/PERMEABLE	0		
	FRONTAL SET BACK	NOT APPLICABLE	1	IMPERMEABLE SURFACE	0	PERMEABLE SURFACE	0	WITH GARDEN	0
	PITCHED ROOF	NOT APPLICABLE	0	YES	1	COMBINED	0		
	MANTAINANCE STATUS	NOT RENEWED	0	RENEWED	1	UNDER RENIVATION	0	NEW (BUILT AFTER 200s)	0

Figure 3. Typological survey assessment used in field research.

Figure 4. Icons created to facilitate visual identification by association in the research field.

Furthermore, to enhance students' understanding of spatial assimilation and its correlation with morphology and urban spatial organization concepts, they were instructed to conduct photographic and graphical analyses in groups (see Figure 5). These analyses aimed to identify the key elements influencing the area's urban configuration and green infrastructure while emphasizing the potential ecosystem services it offers. In a chapter written for Teaching Urban Morphology (2018), Michael Barke argues the following:

(**a**) (**b**) (**c**)

Figure 5. Pictures collected during a site visit to analyze the green infrastructure and layout of the studied urban blocks. (**a**) View from the pedestrian passage between Páva Street and Berzenczey Street. In this image, emphasis is placed on a semi-private space that serves as a connecting link between streets crossing through courtyards. This area grants local residents access to green spaces and extends its benefits to passersby. (**b**) View from Ferenc Square. The image showcases solutions implemented in Ferenc Square, Ferencváros, highlighting the strategic incorporation of green elements for spatial-functional zoning. These elements effectively segregate vehicular traffic from recreational spaces, both visually and functionally. The varied scales and features of the green elements create a nuanced gradation of use, offering protection to public space users. (**c**) View from a square at Páva Street in a building frontal setback originated after urban renewal intervention. In the image, the utilization of green public spaces is depicted as a buffer zone between residential buildings and streets. They enhance the quality of the pedestrian network and contribute significantly to the urban landscape. These green spaces play a dual role by creating a visually appealing buffer, promoting a sense of urban aesthetics, and improving the overall quality of the built environment.

> *"The importance of urban morphology is argued from three perspectives—philosophical, cultural, and practical. Urban morphology makes sense of the world around us, [...] demonstrates the importance of 'ways of seeing,' arguing for a philosophical approach that integrates physical, social, and cultural dimensions of cities. Culturally, understanding urban morphology is a prerequisite to an awareness of urban aesthetics and the layers of meaning attached to townscapes. Through such appreciation, its study adds to the quality of life. Practically, the study of urban morphology performs a vital educational function. Through the detailed study of urban form, we learn both what not to do and how to do things better, a vital objective in achieving successful and holistic urban management. Urban morphology provides an appreciation and unique training for integrating closely related fields of practical application such as urban design, planning, architecture, and conservation."* [22]

3. Typological Analysis

After outlining the four evaluation subcategories—Land Use, Commerce/Service Unity, Residential, and Urban Landscape/Greenscape—the stage of interpretation and cross-referencing of the preliminary results began. The typological survey served as a study

tool to correlate concepts and define parameters for evaluation systematically. This process facilitates theorizing by identifying significant subcomponents of distinctive attributes [23].

Despite the diverse physical characteristics of the analyzed buildings and their surroundings when viewed individually, the first stage of the typological study identified high percentages of coinciding elements and urban trends. The values found in the evaluation assessment were visually linked to images of the study area in Figure 6, symbolizing and validating the data. These findings were also transcribed into graphics charts found in Figure 7.

D	URBAN LANDSCAPE/GREENSCAPE								
	FACADE OPENINGS	<30%	0	<50%	1	>50%	0		
2	ACCESS TO COURTYARD	COMMON OPEN GATE FROM STREET	0	COMMON CLOSED GATE FROM STREET	0	THROUGH RESIDENTIAL ACCESS	1	COMBINED	1
	PHISICAL BARRIER TO COURTYARD	NOT APPLICABLE	0	VISUALLY PERMEABLE	0	NOT VISUALLY PERMEABLE	1	NOT VISUALLY PERMEABLE (GREEN)	0
4	SIDEWALK	TRADITIONAL	0	PERMEABLE/NOT LEVELED	0	SHARED PAVEMENT/PERMEABLE	1		
5	FRONTAL SET BACK	NOT APPLICABLE	0	IMPERMEABLE SURFACE	0	PERMEABLE SURFACE	0	WITH GARDEN	1
	PITCHED ROOF	NOT APPLICABLE	0	YES	1	COMBINED	0		
7	MANTAINANCE STATUS	NOT RENEWED	0	RENEWED	0	UNDER RENIVATION	0	NEW (BUILT AFTER 200s)	1

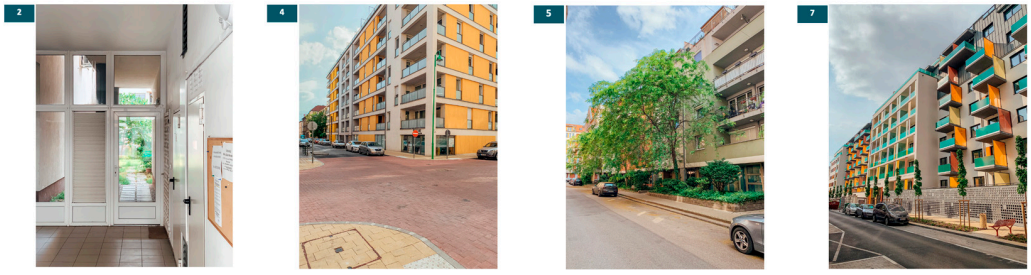

Figure 6. Evaluation criteria of the typological survey linked to photos of the study area exemplifying the findings.

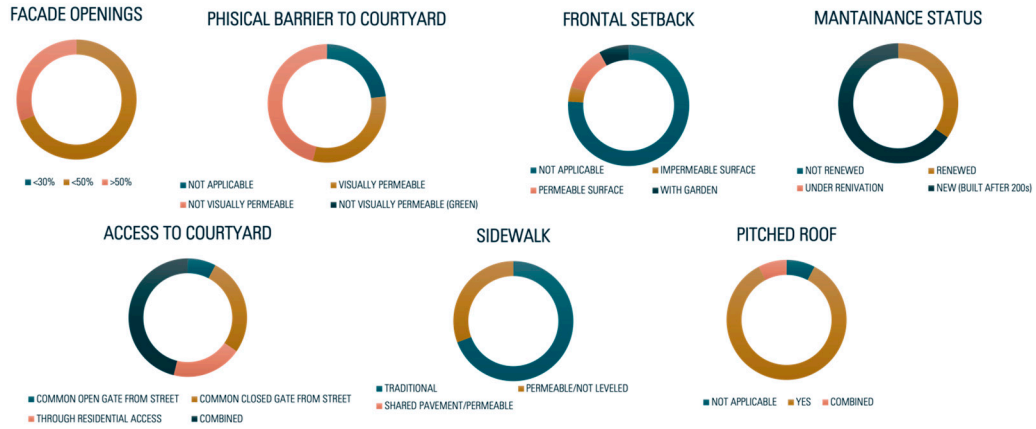

Figure 7. The graphs, derived from the data compilation, pertain to specific elements within the typological survey subgroups (refer to Figure 3). These highlighted elements exhibit some of the most distinct characteristics observed in the study area.

As an outcome of this first experience, it was observed that most of the evaluated buildings are new but have essential historical references to the maintenance of existing morphological conditions [24], such as the prevalence of pitched roofs and courtyards. Most of them do not have a frontal setback, an uncommon characteristic in this urban context, which, on the other hand, has shown to be a growing trend. New real estate developments in the region aim to generate more green and permeable public access areas and improve the urban landscape's general appearance. Changes were also identified in the materiality of exteriors, both on the facades—with the increase in glazed surfaces—and on the sidewalks, which tend to be composed of materials permeable to water in newer buildings.

Urban Elements Categorization

The subsequent investigation stage involved categorizing the subcomponents found in the study area based on the typological study's data analysis. Five categories (T1, T2, T3, T4, and T5) were developed to capture the different types of buildings and other elements that constitute the urban fabric. This process of grouping the subcomponents aimed to achieve a more cohesive understanding of the study area, similar to the zoom-out technique in observational analysis. Here are the descriptions of the categories:

- T1—Newly constructed building (compliant with urban renewal requirements)

These buildings present diverse uses and were built after the 2000s. They usually conform to the regulations set by the construction code guidelines established for urban renewal (see Figure 8).

(**a**) (**b**)

Figure 8. Residential buildings located on Lenhossék Street. (**a**) A juxtaposition of a renovated traditional historical building (T2) and a contemporary, newly constructed building (T1)—both entirely residential—defines a typical urban landscape in Frencváros. The noticeable distinctions in scale and constructive standards between the two buildings also add a dimension layer to the urban composition; (**b**) shared courtyard maintained by the residents of the newly built and renovated historic buildings.

Simultaneously with efforts to enhance integration and accessibility to urban green spaces, a noticeable decline in occupational density has been observed in urban blocks with a higher concentration of such buildings. This phenomenon is particularly prevalent in post-socialist cities, such as Budapest. The process of urbanization in post-socialist nations since 1990 has often led to a reduction in the density of existing urban structures, while land use patterns at the expanding peripheries of city regions have started to sprawl [25].

- T2—Traditional historical building (renovated)

These buildings have various uses and physical features typical of the city's central areas. They are part of the "typological" buildings that follow the patterns of the historical urban morphology replicated in the inner city (see Figure 9). This category includes buildings that have been renovated to fit the new urban context while maintaining their aesthetic identity, modularity, and materiality [26].

Figure 9. Buildings at Gát Street highlight the heterogeneous character of the area. The distinctions between the two mixed-use buildings within the same complex arise from their conservation status. The structure on the left side of the image has recently undergone renovation, whereas the one on the right awaits refurbishment.

Preservation involves the essential duty of safeguarding the authenticity, character, and operational effectiveness of historical buildings. The urban renovation in Ferencváros was conducted under the idea that the renovation must present an opportunity to restore and enhance the practical utility of our architectural heritage, preventing its decline. Customized interventions can simultaneously elevate building preservation, diminish energy consumption, and improve user comfort, ensuring the enduring relevance of these structures and the resilience of their urban surroundings [27].

- T3—Traditional historical building (not renovated)

These buildings have various uses and physical features typical of the central areas of the city. They are part of the "typological" buildings that follow the patterns of the historical urban morphology replicated in the inner city. This category exclusively includes non-renovated buildings that are close to their original conformation. In many cases, these buildings are in poor condition and may pose risks to their users due to the potential collapse of their components (see Figure 10). Moreover, several are not fully integrated and adapted to their surroundings' physical and sociocultural conditions, leading to land-use fragmentation.

The current state of this building type, especially concerning the ones located in the IX District, is strongly connected to the significant urban decay that affected specific central areas of Budapest, particularly during the period spanning from 1970 to the mid-1980s. This decay was primarily a consequence of rapid urbanization under the late communist development guidelines and modernist constructive techniques in a period marked by the construction of housing estates, followed by the proliferation of condominiums and other residential resolutions [26].

Starting in the 1960s, Ferencváros encountered substantial obstacles in its revitalization initiatives. The lack of significant rehabilitation during the socialist era exacerbated these issues. By 1989, the accumulated cost of postponed maintenance in Budapest was estimated to reach as high as HUF 200 billion or approximately USD 3.3 billion, which amounted to roughly 10 percent of the country's annual GDP in that period.

Figure 10. Structures at Viola Street vacated and isolated by the local municipality have languished for years, awaiting renovation efforts. Local residents were either compensated or relocated to alternative housing managed by the municipality while awaiting the completion of the construction works. However, this strategy intensifies challenges tied to urban gentrification, furthering the displacement of vulnerable populations to the city's outskirts.

An additional key element influencing the current status of historic buildings in the area under study is the 1993 Housing Law [26]. This law granted the local municipalities the discretion to forgo the requirement of privatizing their tenement properties as long as rehabilitation projects were accepted. This strategic measure afforded the Ferencváros municipality substantial control over the real estate speculation encircling these properties, then earmarked for either demolition or renovation as part of the district's revitalization efforts. Consequently, buildings falling within this typological category remain in their original state, awaiting interventions.

- T4—Large-scale institutional building

These buildings are intended for institutional use and are larger than the typical subcomponents of the pattern identified in the analyzed urban region. They usually deviate from the conventional configuration of implantation and land use, although in some cases, they present typological elements that approximate the local morphological characteristics. They often serve as landmarks that stand out in the urban fabric and are crucial in constructing the symbolic imaginary of the urban context's users (see Figure 11). It is also worth underscoring that in this district region, there is a notable presence of educational institutions, making this area one of the centers of this activity in the city.

- T5—Urban Void

These are vacant urban spaces that resulted from demolishing previously existing buildings on the site. The demolition may have been due to incompatibility with the ongoing urban renewal requirements, inadequacy, decay of the original use, or real estate speculation (see Figure 12). Many urban voids identified in District IX resulted from the deactivation of former medium- and small-sized industrial facilities [18].

Figure 11. Contemporary aspect of the facade of the Semmelweis College building at Thaly Kálmán Street.

Figure 12. Urban void at Lenhossék Street, undergoing preparations for residential development scheduled to start in 2023.

The extensive economic transformation experienced by post-socialist nations led to significant deindustrialization while driving the growth of consumer and producer services. This process created a surging demand for commercial and residential spaces, such as new offices, retail facilities, and mixed-use buildings in and around urban centers. As a result of these shifts, there was a substantial increase in suburbanization, urban expansion, and, consequently, the occupation of underutilized former industrial areas [28].

As depicted in Figure 13, only a minority of historic buildings in the study area did not undergo any requalification. As a result, these subcomponents are poorly integrated into the established urban fabric after the intervention. These buildings are organized around private and closed courtyards and generally require restoration. However, most historic buildings underwent restoration and adaptation procedures to fit the new urban proposal. For instance, some buildings were integrated into the network of green areas (primarily for semi-public use) by creating green pedestrian alleys and integrating courtyards. The study area also has a relatively high percentage of buildings intended for institutional use, which reflects the purpose to generate new uses/flows and connect the location to the regional scale.

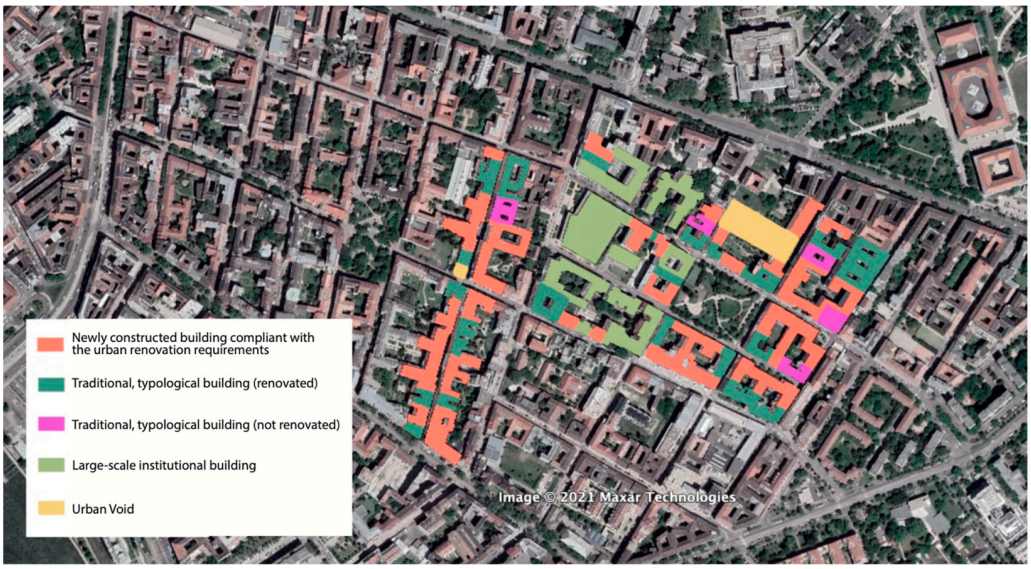

Figure 13. Buildings in the study area identified according to the categorization of typological subcomponents.

Despite this region's wide variety of institutions, educational organizations stand out in number and scale. The Semmelweis University Center of Theoretical Medicine, for example, was opened on 6 November 2008, in Tűzoltó Street. The significance of this establishment extends beyond its academic role, as it has become a symbol of district revitalization. Due to its size and prestige, it has brought a substantial influx of individuals, including many international students and instructors, to an area previously in a state of decline. Thus, its architectural characteristics also differ drastically from those found in its surroundings, not only because of its scale but mainly due to its architectural characteristics and contemporary construction solutions—with emphasis on its large glazed facades and skylights, which allow transparency and connection with the exterior, and its flat slim concrete roof with sections covered in green for water retention. This facility is strategically located within walking distance of other essential components of the Faculty of Medicine, including dormitories, clinics, and hospitals, thereby integrating it into a robust network of medical and healthcare institutions at the regional level.

To further enhance the analysis of the findings, we conducted a comparative assessment by examining areas situated in the southern region of the study polygonal, which have experienced minimal impact from the urban renewal process. It allowed us to speculate on the ripple effects of renewal initiatives, especially in terms of the quantity and quality of green spaces. It is important to note that these areas remain in a state of high heterogeneity, primarily consisting of buildings categorized as T3 (Traditional historical buildings that have not undergone renovation).

Consequently, this particular area presents a blend of architectural elements that contribute to a diverse urban landscape, which is also reflected in the varying qualities of green infrastructure. Using Landsat 8 satellite data from 2 August 2022, an NDVI analysis was conducted (see Figure 14). This analysis revealed that modern housing estates predominantly occupy the greenest urban blocks, while the urban blocks consisting mainly of historic buildings that have not yet undergone renovation exhibited the poorest NDVI results.

Figure 14. NDVI analysis highlighting the prevalence of green areas in renovated areas as well as in sections occupied by modernist housing estates. These insights were derived from a workshop on Urban Planning held at the Hungarian University of Agriculture and Life Sciences in 2023.

While the modern residential complexes show significant potential for transformation, they remain in a state of relatively low preservation. These areas still need to undergo substantial interventions within the broader context of ongoing urban renewal efforts in the neighborhood. It is worth noting that regions with a higher prevalence of green features tend to be situated in areas where urban renewal efforts have been more comprehensively implemented, particularly in the northwest study areas.

The prevalence of green areas within blocks undergoing advanced urban renewal is directly linked to the accelerated pace of gentrification and population displacement. Typically associated with urban renewal strategies in relatively small, central areas [29], gentrification takes on a nuanced character in this case. The analyzed area in District IX, with its heterogeneous nature and comparably lower population density than more central areas of the same district, underscores the need to reassess the industrial and railway belt encircling the city—a pattern observed in other European cities with similar configurations.

It is essential to note the diverse pressures exerted on local populations, whether directly or indirectly, compelling them to relocate to the outer rings of Budapest. While the significance of urban greening is widely acknowledged for fostering sustainability and climate resilience in cities [30,31], introducing new green infrastructure may inadvertently contribute to the ongoing gentrification dynamics [32,33].

4. Conclusions

In conclusion, the case study presented in this article demonstrates the effectiveness of using a typological survey combined with a GIS database to analyze morphological conditions in urban areas undergoing renovation. By assessing the area in place and collecting data through this method, it is possible to draw a parallel between the social and spatial segregation within the IX District of Budapest and the work developed in the past decades toward increasing urban performance and promoting global resilience. Therefore, categorizing urban elements can aid in identifying recurring patterns in the structure of cities and, consequently, make it feasible to derive benchmarks for renewing and expanding existing urban territories.

Moreover, the categorization through urban typological analysis can help identify areas that need improvement or revitalization. By analyzing the different categories of urban elements, it is possible to identify areas that lack infrastructure, public spaces, or green elements and develop strategies to fill these gaps [34]. In the case of Ferencváros, typological study revealed the municipality's renovation strategy, which involved prioritizing

the renovation or replacement of existing urban sub-elements to achieve a more cohesive urban fabric. It is a viable method for documenting dynamic changes within urban spaces. This approach proves particularly valuable when examining architectural ensembles in urban environments undergoing rapid transformation. Consequently, this methodology extends its utility to the study of the adaptability of spaces, aiming to foster physical and social resilience, possibly dealing with political or environmental disruptions [35].

Furthermore, the documentation of physical transformations in the urban environment can be further complexified from the perspective of their social unfoldings. In the case of the region analyzed in Ferencváros, there are significant indications of gentrification tendencies despite the application of some preventive measures to avoid the displacement of the local population during the renovation process. The typological survey can identify changes in urban patterns and the emergence of new trends. However, as in the analysis of the gentrification phenomenon, the typological study must consider the broader context, encompassing both neighborhood-specific factors and the impact on the entire city, when analyzing new construction projects [36].

Therefore, the execution of this study presented challenges linked to its nature. It may not comprehensively address the complex interplay of social and economic factors influencing urban development, as it focuses on the physical spatial configuration. Also, its accuracy relies on the quality and completeness of the data collected by the students who collaborated on its execution. While foundational concepts regarding renewal and resilience of urban forms and morphological analysis have been effectively transferred to the students, incorporating the Typological Survey methodology presents a nuanced challenge. Despite the provision of assistance and supervision throughout the process, the inherent character of the Typological Survey methodology introduces a degree of subjectivity into the analysis. As a result, interpretations of urban elements may exhibit variability among different analysts, emphasizing the need for continued refinement and standardization in the application of this method.

This analysis highlights the challenges and opportunities of integrating historic buildings into urban renewal projects. The preservation and revitalization of historic buildings can be a valuable asset in urban renewal projects, contributing to creating more livable and sustainable urban environments [37]. However, this requires careful planning and implementation to ensure cultural heritage preservation while meeting contemporary society's needs and aspirations.

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