



Urban renewal of the city of Zagreb models of renovation of private protected buildings

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Abstract

2020 Zagreb earthquake and 2020 Petrinja earthquake raised the topic of urban renewal process and possible renewal models for damaged buildings. The paper presents the author's research from the first semester of the Postgraduate doctoral scientific study programme Architecture and Urban Planning at the Faculty of Architecture in Zagreb. The main goal of urban renewal is the process of modernization that has to be in accordance with preservation of cultural heritage and city's identity. Renewal models for private buildings under conservation protection are researched, as well as their impact on the process of integral urban renewal of the city of Zagreb. Renovation models are researched interdisciplinary from the aspect of urban planning, architectural practice and theory, civil engineering, art history and sociology. The advantages and disadvantages of each renewal model are analysed, as well as the possibilities of their implementation. Each renewal model has different impact on visual identity of the city and different level of possibility for implementation of deep renewal which includes adaptive reuse, upgrade of earthquake resistance and fire protection, energy retrofit, improving accessibility for the disabled, parking area extension, interior renovation, yard renovation, etc. Four possible renewal models have been identified for apartment buildings within the protected area of the Zagreb Lower Town: Model A - renovation of existing structures, Model B - demolition of existing buildings and reconstruction with preserving only the original appearance of the street facade, Model C - demolition of existing buildings and construction of completely new buildings, Model D - demolition of existing buildings and gaining benefits from spatial voids. The research also deals with the topic of preserving the city's identity and paradoxical relations arising from conservation rules, as well as with the impact of urban rules and legislation on the urban renewal implementation. Reconstruction of Warsaw after the WWII and interventions in the attics in Vienna are shown as examples.

Key words: urban renewal, Zagreb, renewal models, heritage, private buildings, preservation, protection, modernization

1 Introduction

The paper deals with the analysis of possible models of renovation of private buildings in Zagreb's Lower Town and their relations to the entire process of urban renewal of the City of Zagreb. Models of renovation simultaneously contain architectural, civil engineering, economic, legal and sociological aspects of the renovation, and are observed on a scale from individual buildings to the level of the entire Lower Town. Under the term renovation, not only the current topic of renovation after the earthquake is considered, but also the complete, deep renovation of the buildings. Emphasis is placed on the area of the Lower Town, which suffered the greatest damage in the devastating earthquake on March 22nd, 2020, and whose renovation is extremely complex due to numerous causes. First of all, it is about the renovation of the very center of the city, the architecture of which is a symbol and main element of the identity of the whole city. Furthermore, the reconstruction of the Lower Town is complex due to the fact that the renovation is mainly connected to private buildings of great age that are located within the protected historical urban area of the city of Zagreb. This area is inhabited mostly by the elderly population, and unresolved legal relations are frequent, which further complicate the reconstruction process. This paper does not deal with the topic of renovation of public buildings such as educational institutions, hospitals or buildings of national interest (Croatian National Theatre, University of Zagreb building, cathedral, HAZU, museums, etc.) for which the renovation models are mostly known, but emphasizes to private, predominantly residential buildings, which make up the largest share in the area of the Lower Town. The vast majority of private buildings, unlike public buildings, do not have the status of individually protected cultural property. Also, the topic of the paper are not models of urban renewal related to the conditions of its organization and implementation, but related to specific architectural models of renovation of individual buildings, groups of buildings or entire streets, blocks, etc. Although the paper emphasizes the area of the City of Zagreb and the Lower Town, models of renovation could also be applied for the area of the center of the city of Petrinja, which was severely damaged in the earthquake on December 29th, 2020.

2 Identified models of renovation

Models of renovation have been identified on the basis of known renovations from the past, but also on the basis of recent professional literature, reviews and interviews on the topic of urban renewal of the City of Zagreb after the March 2020 earthquake. According to their architectural, civil engineering, economic, legal and sociological aspects, four basic models of reconstruction have been identified:

- Model A: renovation of the existing buildings
- Model B: new construction with the reconstruction of the street façade only
- Model C: brand new construction (infill, "interpolation")
- Model D: permanent demolishing of the existing buildings, gaining benefits from voids

2.1 Model A - renovation of the existing buildings

Model A implies only the renovation of existing buildings, which includes their adaptation to modern standards (earthquake resistance, energy retrofit, interior adaptation, etc.). Model A is applied to individually protected buildings, in cases when the conservation conditions explicitly prohibit the reconstruction of existing buildings (demolishing of existing buildings and rebuilding according to the original appearance), when legal issues are not resolved, or when there is no consensus of tenants to move out from the building. In terms of construction, only those interventions are allowed that allow the tenants to stay during the entire renovation process or their minimal absence. Due to the preservation of the existing load-bearing structure and facade, the possibilities for architectural transformations are minimal, and the possibility of deep renovation is limited (thermal insulation must be applied on the internal side of the street facade, large thickness of existing walls, addition of elevators is often impossible). Adaptive reuses are possible in the form of transformation of residential into business areas (which leads to the problem of the decrease of residential areas in city centers) or the conversion of residential areas into the tourist accommodation units. It is also possible to convert servant spaces (attics, basements) into residential or business spaces, but with implementation of strict conservation conditions, their quality would be extremely questionable. Without significant interventions in attics or basements, the problem of lack of windows is evident (which limits natural light and ventilation) and the accessibility of the attic without the addition of elevators is also a problem.

Significant interventions (conversions, additions, etc.) with retaining the existing load-bearing structure are possible, but are not cost efficient. One of the examples of the renovation with planned preservation of the load-bearing structure was the conversion of the Ferimport building in Zagreb into the Academy of Music, where the tender program insisted on preserving the existing structure. Later during construction it was noticed that load-bearing structure was in very poor condition and had to be demolished. A completely new load-bearing structure was constructed, but the design was not fully adapted to the new purpose of the Academy of Music, instead it followed the design of the structure of the demolished "Ferimport" office building.

All models except model A imply the consensus of all co-owners / tenants so that there can be a complete eviction (temporary or permanent, which implies a change of ownership) from a particular building and the possibility of new construction in its place. Achieving the mentioned consensus is difficult with the increase of the number of co-owners and heterogeneity of users, and is often endangered due to numerous legal problems which is a characteristic of the Lower Town (tenancy rights, abandoned business units, city / state units, etc.)

If the return of evicted tenants to a newly constructed building is expected, it is necessary to provide them with temporary accommodation during the construction of the new building. The expected duration of construction of at least one year can be a prob-

lem due to the necessary relocation and probable change of environment, which in sociological terms leave a significant impact on tenants, especially preschool and school age children (changing kindergarten/school, socialization, etc.) or the elderly. It is likely that some tenants would choose to move permanently and leave their former homes as a more rational life decision, or for example the elderly would decide to go to nursing homes. This would lead to changes in the ownership structure (the existing place of residence is sold solely for property gain, the existing owners have no reason to consider the impact of the future owner on the process of urban renewal), which inevitably leads to changes in the structure of users and possible adaptive reuses.

2.2 Model B - new construction with the reconstruction of the street façade only

Model B seeks to meet the requirement of preserving the city's identity by reconstructing street facades (removing existing facades and building their replicas), and building completely new buildings behind. New buildings are fully adapted to modern requirements, both in functional and in a technological sense, which directly affects the cost effectiveness of the project. Due to the evolution of residential architecture, it is not likely to expect implementation of a model of renovation in which buildings will be reconstructed by demolishing the existing structures and building their exact modern replicas (interior and exterior facsimiles). Model B involves the design of brand new buildings with the reconstruction of the existing street façade only, while all other urban rules are the same as for new buildings. In the architectural sense, this model completely abolishes the integrity of the interior and exterior of the existing structures and is therefore often called "scenographic approach" in architectural jargon. The "scenography" is considered to be the process of preserving the original street façade appearance with a completely new architectural design that takes place behind. However, it is also a fact that due to a numerous adaptations of lower-town blocks throughout history, the integrity between the interior and the exterior has already been partially abolished, i.e. it has already become partially "scenographic". Adapting the interior to the modern demands and affinities of the owner is an inevitable process and it is not realistic to expect that behind the original historical facades of the buildings, owners will preserve original interiors in their private apartments or business premises. To a certain extent, today, due to the preservation of the load-bearing structure, the original spatial concepts (e.g. enfilades) have been retained, but in the vast majority of spaces, adaptations have been made to modify the original interior concepts. Likewise, many buildings have undergone conversions, and within the former apartments today there are business premises, hostels or touristic accommodation units.

A glaring example of the adaptive reuse that caused significant disintegration of interior and exterior of the renovated building is located on the Zagreb's main city square (Trg bana Josipa Jelačića 8, Müller shopping center). It is easy to notice the discrepancy between the three floor facade and the interior consisting of four floors. Windows of the

street façade are permanently closed and affixed with advertising stickers, because of the fact that behind them there are store shelves placed in the interior space.

The mentioned model, which includes the disintegration of the interior and exterior, residents of Zagreb do not recognize as problematic. As taught by previous experiences of the interventions in the city center that changed its identity (skyscraper on Ban Jelačić Square, Centar Cvjetni, BAN centar, building in Preradovićeve Street 11) we can imagine very negative reactions that would be caused by the demolishing of the building on the main city square and the construction of a completely new designed structure. Also, it is noticeable that the main element of the Lower Town urban identity are street facades, while the back sides of the buildings or the interior of the blocks are completely uninteresting areas.



Figure 1. Reconstructed building at Trg bana Josipa Jelačića square 8 (Müller) - absurd affixed windows

The advantage of the Model B is also the possibility of designing underground areas (e.g. underground parking garages) and connections, which does not affect the visual identity of the city. New construction according to model B, which applies all the modern requirements and standards, is unsuccessful if an adequate parking area is not designed. The relocation of the parking lots in the underground garages would significantly stimulate renovation of lower city streets and courtyards. It is necessary to take into account the possible car access areas, given that most of the lower-town buildings do not have adequate gateways from which car access could be achieved. This indicates that the minor alterations to the original façade designs would be necessary if individual garages were planned (each building with its own underground garage).

The possibility of merging ownership, i.e. uniting adjacent buildings / plots into one unity is one of the major advantages of Model B and Model C. The investor is able to buy several adjacent buildings, reconstruct their original façade appearance, and in the same time achieve much greater flexibility by connecting them (underground and / or above the ground), which is not shown externally, given that the whole complex is "covered" with the reconstructed original "facade canvases" of each building. In the Lower Town, there are already several examples in which partial connection of the adjacent buildings into one complex has been achieved (for example, the DM store located on the ground floor of the Britanski trg 2 and 3 buildings).

Also, uniting adjacent buildings / plots into one unity is a great advantage in the context of geotechnical engineering, especially for the construction of the underground levels when the diaphragm walls or other adequate excavation pits protection solution are needed. Building a new construction with underground levels (underground garages) is very complicated when the plot is small in area and width, not only because of the necessary protection of the construction of adjacent buildings, but also because of the necessary large areas for access ramps or car elevators.

One of the biggest shortcomings of Model B is legible at the level of architectural theory, and it refers to the question of identity and the relation between interior and exterior. The question is whether the design of a new buildings with reconstructed original facades is only a burden, or an act of partial satisfaction in the form of preserving the city's identity, which is in Zagreb predominantly experienced through the appearance of the street facades. Reconstruction of the original facades involves the construction of replicas of mostly plastered facades, with all the details, ornaments, rustic, etc., and has only the function of preserving the city's urban identity. In the new construction designs, reconstruction of the original facades is only an aggravating fact (because of predefined cross section, position and size of openings/windows, complications in building technology, etc.). It is also questionable to what extent the existing condition of the buildings is in accordance with their original designs. Although located in a protected area, many buildings in the Lower Town have been modified throughout history and no longer correspond to their original state, so it raises the question of whether buildings should be reconstructed at the level of existing state, original design or new creative combination of existing / original state and contemporary architecture. After the devastating earthquake in Zagreb in March 2020, damaged facades were recognized as one of the major safety problems, and some of the façade elements have already been removed from many buildings and demolished without their prior documentation, so there is not adequate documentation to make exact replicas.

Model B could be connected with the reconstruction of Warsaw Old Town after the World War II destruction. In 1980, Warsaw's Old Town was placed on the UNESCO's list of World Heritage Sites as "an outstanding example of a near-total reconstruction of a span of history covering the 13th to the 20th century [1]. Due to that fact, the reconstruction of Warsaw Old Town often stands out as one of the best examples of reconstruction in which the identity of the historic old town was preserved. On the other hand, a more detailed analysis of the reconstruction shows that there were inevitable differences between the existing and the original state of the buildings. Warsaw Old Town was not reconstructed to the level of the existing state just before the destruction in the World War II, but was "reconstructed" to the level of its "golden age". Various archival documents were used in the reconstruction process, but it is particularly interesting that extremely precise paintings by the Italian painter Bernardo Bellotto, Canaletto's nephew, who made several paintings of Warsaw in the 18th century, were largely used.

It can be concluded that Warsaw has been reconstructed and that its historical urban identity has been preserved, but the fact is that the “reconstruction” created a replica of a historic city that never existed in such a state.



Figure 2. John's House in Warsaw - from left: John's House as depicted by Bellotto, c. 1768; John's House on Castle Square in the 1920s; John's House After the 1948 reconstruction; source: <http://99percentinvisible.org/episode/episode-72-new-old-town/>

2.3 Model C - brand new construction (infill, “interpolation”)

Model C fully meets all the modern requirements and significantly changes the city's identity. The advantage in comparison to Model B is that the interior and exterior form a logical whole and that the buildings can be designed without aggravating factors.

In Model C, the relation between the existing buildings or buildings that will be renovated according to Model A and Model B and new buildings is particularly important. In the Lower Town there are several examples of infill or so-called “interpolations” and there is a well-established system of architectural competitions aimed at finding the best architectural designs for new construction, in accordance with the competition program and urban and conservation rules. The challenge is to design contemporary buildings that are adapted to the dimensions and characteristics of adjacent buildings. It can be concluded that there are many recent examples of buildings completed according to Model C, that were usually erected instead of extremely dilapidated old buildings without any historical value. However, after the recent earthquakes, it will be necessary to adopt clear criteria and strategies for deciding which buildings can be completely demolished and which must be renovated according to Models A and B.

In Model C, unlike Model B, the merging of adjacent buildings/plots can be a big problem because demolishing several adjacent buildings and designing a new complex on the site of several buildings removed, would significantly disrupt the original urban scale, rhythm and identity of the city. One recent example that has often been criticized because of the scale is the Ban Centar building on European Square, which has been designed as a massive compact form, devoid of fragmentation and adaptation to the spatial rhythm of adjacent buildings.

2.4 Model D - permanent demolishing of the existing buildings, gaining benefits from voids

Model D recognizes demolition as a possible method of creating new qualities in urban space. The demolition of individual buildings, groups of buildings or even entire city blocks, can bring completely new, radically changed spatial relations on an urban scale. Demolished above-ground structures can be imperceptibly replaced by constructing buildings at the same location in the underground or by constructing buildings at other locations. One of the examples of permanent removal of the above-ground structure in the city of Zagreb, with the aim of achieving a new spatial quality, is the demolition of Bakačeva kula tower and the wall in front of the cathedral in 1906. After the mentioned demolition, the cathedral was finally revealed and the effect of a plaza, a large empty space, a kind of pre-square that enables a complete view of a tall building and its optimal relationship to the surrounding area was achieved. Throughout history, natural disasters or war destruction have often been the driving force behind vigorous development and urban renewal. Due to many aggravating circumstances, the realization of Model D is unlikely at the larger scale, but speculative analyses that would show which spatial qualities (traffic, bioclimatic conditions, green infrastructure, city identity) could be achieved by radical interventions are possible. For example, the question arises whether it is possible to imagine the complete demolition of one Zagreb city block, in whose place a park or square would appear, with replacement construction in the underground floors (garages, shops, business premises, etc.)

3 The question of the identity of the city

Observing several recent renovations of facades in Lower Town that were performed according to conservation rules, the question of identity in the context of renovation, or the level of originality stands out. The building at Prilaz Gjüre Deželića 61, on which two floors have been added throughout history, is today, with its recently renovated turquoise façade (according to conservation rules), an element of discord in the street. This example testifies that a change in the identity of the city is possible even in the case of the reconstruction of the facade, in this case due to the "original" color treatment of the facade. This renovation draws attention to the fact that it is also necessary to renovate the facades of adjacent buildings and the entire city block, also according to the specific conservation rules for each building, and that the appearance of the renovated block would be far from the existing state. Just as the Acropolis in Athens was not restored in original polychrome appearance, it is hard to define the level of originality that the Zagreb facades should be restored to. The identity of the city is primarily defined by the existing condition of buildings and collective consciousness, not by the original historic state of buildings. In sociological or even psychological terms, historical facts are often disproved by collective consciousness, although often historically incorrect. For

example, the vast majority of Zagreb residents still colloquially use the term “džamija” (Croatian for mosque) when talking about Home of Croatian Artists, although the building was a mosque for only 4 years in its 82 years history.



Figure 3. a) Kačićeva street 8, new building (author Matej Bender) adjacent to Kačićeva street 6, old building with a recently renovated façade - infill, “interpolation” b) Prilaz Gjüre Deželića 61, old building with a facade renovated according to conservation rules; building has two floors that were added throughout history

4 The impact of conservation and urban rules on the process of urban renewal

The current conservation and urban rules largely determine the possibilities of renovation of individual buildings, and thus urban renewal as a whole. Renewal of the city is observed almost exclusively through legislation, and there are no creative urban planning and architectural proposals that should be the basis for creating the concept of urban renewal, and later its implementation.

Chimneys proved to be the most dangerous architectural elements in 2020 Zagreb earthquake, because of their age, slenderness and heterogeneity, so they destroyed many roofs by collapsing. Also, the lower city gables suffered the most damage in the earthquake. In most cases, gables are masonry walls that are structurally cantilevered (without adequate earthquake resistance elements - concrete confinements, etc.), because they are not connected to the timber construction of the pitched roofs. Those are the reasons why they collapsed, often destructing the roof of a lower, adjacent building. The difference in height of buildings is a specificity of Zagreb’s lower town city blocks that is recognized and protected in the General Urban Plan of the City of Zagreb (“*maintaining the existing diversity of heights of street buildings, especially having in mind the value and shape of buildings*”). Numerous gables, which are usually un-plastered and exposed to the rain, arise from different heights of adjacent buildings. Gables in Zagreb lower city were neglected and forgotten architectural elements until the moment when they were exposed by a devastating earthquake.

The earthquake also revealed that numerous attics of buildings in the lower-city blocks were neglected and mostly acting as dusty storage areas. The conversion of large unused attic areas into residential areas (apartments), would bring many benefits to existing tenants (co-owners) who would sell unused area of the attic at the price of luxurious

residential units in the city center. This financial benefit would be significant contribution in renovation of the entire building. In addition to many legal problems, the biggest obstacle to the conversion of the attics are the conservation and urban rules which almost completely limit the possible interventions on the exterior of existing buildings, including attics that are almost invisible from a pedestrian perspective.

In the Zagreb city center, there are many cases in which openings (windows) could be made on the gables of taller buildings, which would enable the possibility of successful conversion of the attic into very exclusive residential or business premises. If it is known that a new taller building is not planned (allowed) on the site adjacent to the lower building (which is regulated by urban planning rules), then there are no arguments that the gable wall, at least in the attic zone, should not contain window openings. However, the current conservation, legal and urban planning rules prescribe the construction of full gable walls towards the adjacent plots, and in many damaged buildings gables have already been reconstructed as masonry walls.



Figure 4. Zagreb, Ilica street, attic after the March 2020 earthquake, author Ivana Rakamarić source: <https://www.24sata.hr/news/od-velike-rupe-u-zidu-napravila-terasu-imam-pogled-na-ilicu-693876>

In comparison, a tragic gas explosion occurred in 2014 in a building at Mariahilfer Straße 182 in Vienna, damaging the building far more than the buildings in Zagreb were damaged after the 2020 earthquake. According to the design of the *Trimmel Wall Architekten*, the building was reconstructed and deeply renovated in 2018 to the most modern construction standards (e.g. passive house energy standard). This reconstruction is an example of a renovation with a reconstructed original façade and an attic that has been designed as a new valuable space with contemporary exterior design.

One of the most famous examples of the contemporary renovation of a historic building attic in the city center is the design of the Coop Himmelblau in Vienna, on the corner of Falkestrasse / Biberstrasse. The design was made in the period from 1983 to 1987, and was finished in 1988. The law office located in that building wanted to expand the business premises by building a meeting room and additional office spaces. The project was part of the Deconstructivist Architecture exhibition held in New York at MOMA in 1988.

“The remodelling of this rooftop was especially difficult, because we were not allowed to change the material or slope of the roof. So we showed the model to the mayor of Vienna and asked him whether he thought it was architecture. He said “Looks more like art to me.” And we said “Thank you very much,” because art is not subject to the rules of the building code-Wolf D. Prix [2]



Figure 5. a) Vienna, reconstruction and renovation of the Mariahilfer Straße 182 building after the gas explosion, by Trimmel Wall Architekten, realized in 2018. 2018 [3, 4], b) Rooftop Remodeling Falkestrasse, by Coop Himmelblau, 1983 - 1988 [5]

In addition to the mentioned example, which is perceived as radical due to its de-constructivist design, there are a number of other examples of additions and interventions on existing historical structures which changed the appearance of historic buildings to an even greater extent. In the context of urban renewal of Zagreb, it is clear that such interventions are not expected for individually protected cultural properties, but the question arises whether significant extensions and corrections of original designs are possible in the implementation of the Model B.

5 Conclusion

It can be concluded that further analysis of the identified reconstruction models and the possibilities of their implementation is needed. Each individual model is more or less suitable for a certain type of building and for a certain level of heritage protection. Further research of architectural, conservation, engineering, economic, legal and sociological aspects of models of reconstruction should bring clear conclusions on the basis of which final decisions on the implementation of the urban renewal process will be made.

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