

ARCHITECTURAL AND URBAN PLANNING ASPECTS OF CITY RENEWAL IN UKRAINE

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Abstract. Cities that are at the epicenter of military conflicts find themselves in an extremely difficult situation. In addition to the most terrible – human losses, the infrastructure of cities, housing stock and industry are destroyed. An extremely difficult task for such territories is their post-war reconstruction. This process can be successful only when there is an understanding of the main approaches and mechanisms for restoration work in such cities. The necessary solution is the development of effective strategies and programs for the reconstruction of cities. This determines a number of priority tasks, namely: analysis of the experience of recovery of the countries of the world after similar destructions and study of the peculiarities of housing reconstruction, as the most acute problem.

The article examines the main directions of post-war reconstruction of cities, since post-war reconstruction is an extremely difficult task for any city and country. And for this, it is necessary to determine the priority directions of the restoration and development of cities, depending on the characteristics and nature of their destruction. The restoration of cities should not be limited to reconstruction, but should be decided on a case-by-case basis, taking into account the degree of destruction, the economic component and social reintegration. The experience of countries that have gone through the stages of war and reconstruction is of considerable importance in creating programs for the reconstruction of cities. The set of measures that will contribute to the implementation of programs of reconstruction and provision of housing for the population accretes the world experience. Therefore, the article examines the world experience of the restoration of war-ravaged cities.

For partially destroyed cities with a preserved urban environment, it is possible to develop an actual design solution that will take into account the type of reproduction – restoration, reconstruction, or new construction. For territories that have suffered severe destruction, possible options for the implementation of the reconstruction program and provision of housing for the population are: new construction, housing rental, temporary construction of modular or container facilities, formation of a replacement housing fund, compensation for housing.

An approach to architectural and town-planning solutions has been developed, which consists in mastering the underground space, the spatial composition of the courtyard space, and the architectural solutions of the buildings.

Key words: reconstruction, residential buildings, residential development, city, reconstruction of urban development, building typology, restoration.

Introduction. The war destroyed millions of square meters of housing in Ukraine. The factor of IDPs (internally displaced persons), whose total number reaches 7-8 million people, is also added to the problem. Taken together, all the factors caused by the war form a huge problem – both in the current time and in the distant future. The vast majority of people who have lost their homes do not have financial opportunities or financial resources to independently solve the housing problem. Therefore, the problem requires the participation of the state, including in solving the post-war reconstruction of the residential environment. The functions of the state cannot be reduced to "distribution of apartments". The state must regulate, create conditions, provide administrative resources for recovery, and support rational financial programs and recovery projects.

Post-war reconstruction, as world experience shows, is an extremely difficult task. For many countries, post-war recovery was not always successful. World experience shows that for successful recovery, it is necessary to form further development comprehensively, using approaches and mechanisms that correspond to the circumstances and the current situation and take into account the existing features. Each military conflict has its own characteristics. Its consequences in terms of duration, intensity and scale of destruction, starting positions and resources for recovery in terms of existing infrastructure and human capital are different. Armed conflicts are always present in human civilization.

Some experience of their completion has been accumulated, but it is not appropriate to assume that there is a single correct solution or model acceptable for Ukraine. It should also be taken into account that for large-scale conflicts, post-war recovery is not limited to the reconstruction of a physically destroyed environment. Depending on the definition of the conditions for the end of the war, the restructuring of the socio-economic structure that existed before the beginning of the conflict is also conditioned by political decisions. Prolonged conflict transforms society, a return to the past may be impossible or undesirable. There is a need to form new conditions for the functioning of peacetime society. Therefore, post-war reconstruction is considered broadly and includes, in addition to physical reconstruction, economic recovery, institutional development and social reintegration [1].

According to experts of the KSE Institute project "Russia will pay", as of September 1, 2023, the total amount of direct and documented losses is \$151.2 billion. USA. The war continues, the destruction continues, which leads to an increase in the total amount of damage. Of the total share of direct losses, 1/3 falls on the housing stock – \$55.9 billion. As a result of hostilities (Fig. 1), a total of 167.200 housing stock objects were destroyed or damaged, of which 147.800 are private houses; 19.1 thousand multi-apartment multi-story residential buildings, another 0.35 thousand – dormitories.

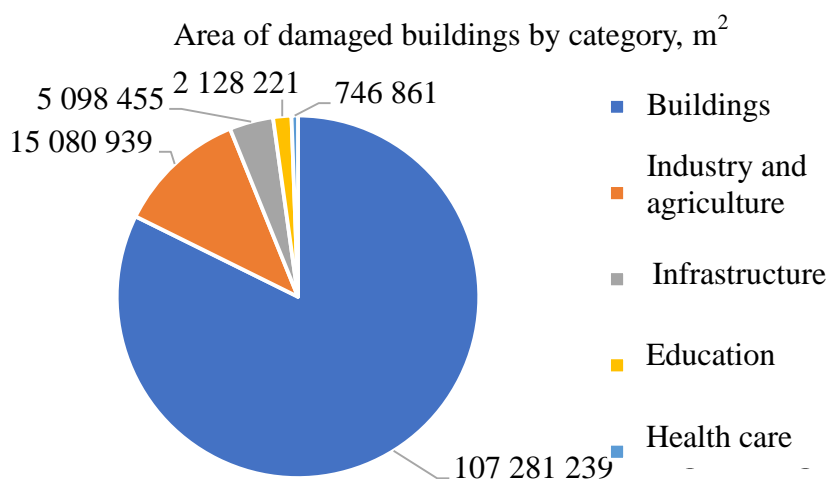


Fig. 1. Consequences of destruction

It should be noted that Donetsk, Luhansk, Kharkiv, Kyiv, Mykolaiv, Chernihiv, Kherson, and Zaporizhia regions experienced the greatest destruction of the housing stock.

As can be seen from the Table. 1, damages caused to infrastructure and industry and losses of enterprises amount to \$36.6 billion and \$11.4 billion, respectively. Since the beginning of the war, 18 airports, 344 bridges, more than 25.000 km² of state and local highways have been damaged [2].

\$10.1 billion in damage was caused to the education sector. 1.223 medical facilities were destroyed or damaged, including 384 hospitals and 352 outpatient clinics (Fig. 1).

Table 1 – Damage assessment by industry in monetary terms, as of September 1, 2023

Property type	Estimated direct losses, billion US dollars	%
Residential buildings	55.9	37.03
Infrastructure	36.6	24.25
Enterprise assets, industry	11.4	7.55
Education	10.1	6.69
Energy	8.8	5.83
Agricultural industry and land resources	8.7	5.76
Forest fund	4.5	2.98
Vehicles	3.1	2.05
Health care	2.9	1.92
Housing and communal services	2.7	1.79
Trade	2.6	1.72
Culture, tourism, sports	2.4	1.59
Administrative buildings	0.5	0.33
Digital infrastructure	0.5	0.33
Social sphere	0.2	0.13
Financial sphere	0.04	0.03
Total:	150.94	100

Analysis of recent research and publications. Since before the full-scale invasion of the Russian Federation into Ukraine, there was no pressing issue of developing strategies for the reconstruction of cities in the post-war period, the number of publications, scientific and practical programs and developments devoted to the problems of the reconstruction of Ukraine increased only in the last year. Among the scientists dealing with these issues should be noted: U.D. Amosov, V.V. Basilevich, O.S. Honcharenko, I.N. Dudar, M.M. D'omin, I.V. Dreval', A.M. Mamedova A.M., O.I. Meneilyuk, O.P. Pekarchuk, K.I. Vyatkin, O.I. Synhayivs'ka. [3-13]. The works are dedicated to: planning organization of temporary settlements for displaced persons; achieving the goals of sustainable development during the reconstruction of Ukraine; restoration of destroyed infrastructure; economic consequences and problems of post-war recovery; European experience in building modular settlements. The research was helped by the analytical document "Coordination of the reconstruction and recovery process with the policy of regional development in Ukraine" created with the support of the European Union and EU member states – Germany, Poland, Sweden, Denmark, Estonia and Slovenia. And also the study "Experience of the post-war reconstruction of the world's cities: lessons for Ukraine" was carried out with the support of the American people, provided through the United States Agency for International Development (USAID), within the framework of the USAID Project "Economic Support of Ukraine" [2].

The purpose of the work is to study the problems, prerequisites, principles and tasks of the restoration of residential buildings in cities of Ukraine that suffered as a result of hostilities. The main tasks of the work are defined as: analysis of the world experience of restoration of territories destroyed as a result of military operations; study of features of urban reconstruction; definition of architectural and urban planning aspects of urban renewal in Ukraine.

Research materials and methods. The following were used: urban planning analysis, system analysis, statistical research.

Results of the study. Since the Second World War, Europe has not faced such a scale of destruction, which was caused by the military aggression of the Russian Federation.

City planners and urban planners have not actually encountered a situation where entire cities have been destroyed. A partial analogy can only be disasters caused by large-scale earthquakes (for example, according to the Turkish government, the total cost of damage caused by an earthquake in Turkey in 2023 is 103.6 billion US dollars. But even in this case, there are fundamental differences due to causal factors.

A moderately continental climate with a distinct winter period is also a relevant adverse factor for Ukraine.

Some IDPs lost their jobs. Moreover, jobs may be destroyed as a result of hostilities. Different options are possible – a city-forming enterprise that has ceased to exist, or a business that was based on a certain type of resource. In this case, there is a problem of the expediency of returning IDPs back.

Both "push" and "attraction" factors work.

At the initial stage, the push factor definitely worked. Accordingly, the number or percentage of returning IDPs will be smaller than the initial base and will depend on the influence of gravity factors.

It is clear that the conditions that would shape the action of attraction factors must be provided by the state.

It should be noted separately that the mobility of the population is currently the highest both since the times of the USSR and during the entire period of independent Ukraine. This largely makes it impossible to use administrative levers to direct population flows. Forced, semi-forced resettlement programs are impossible in modern conditions [3].

The first wave of immigrants to the Donbas and other regions with cities – the centers of industry – was largely provided by the Ukrainian countryside – dispossessed and peasants fleeing starvation. The second wave of workers was provided by the so-called "labor recruitment" – young people, graduates of vocational and technical education institutions, universities received referrals according to the so-called distribution for employment, when they were obliged to work for several years.

Donbas had and still has the highest density of correctional facilities, which also fell under the paradigm of providing industry with labor.

Analysis of the theory and practice of refugee resettlement shows the existence of different approaches to choosing the type of housing solutions.

Temporary settlements of the modular type as an alternative to housing for long-term use have their distinct disadvantages. In European countries, the cost of building such settlements is 1.000-2.000 euros per square meter. It is not cheap, even for developed countries, and it does not cover the full scale of the refugee resettlement problem. The study includes figures related to the construction of towns with a total capacity of 1-2 thousand people in Germany, Belgium, Switzerland, etc. Against the background of the number of refugees in several million, this is obviously not enough [4].

The preferred planning and construction solutions of such modular settlements are the simplest – container and modular houses of 1-3 floors, corridor type, with public premises. That is, the minimum level of price and comfort. A projected stay of 5 years or more means making new decisions after 5 years.

This experience is undesirable for Ukraine. Temporary solutions are therefore unsuccessful, because they do not ensure sustainable development.

Ukraine has experience in building temporary housing for a quick solution to the housing problem. It consists in the practice of building houses of the first mass series of industrial buildings, i.e. "Khrushchevka". At one time, it may have been a palliative solution – when the country faced the acute problem of providing housing for the population after the war.

A simplified solution made it possible to partially solve the problem and postpone complications for the future.

In modern conditions, they are trying to solve the problem of "Khrushchev" in a comprehensive manner. The complicating aspects are:

- urban planning problems – blocks of linear buildings with imperfect planning solutions;
- architectural problems – morally outdated architectural and planning solutions.

Planning and construction decisions limit the possibilities of reconstruction on modern foundations.

The scale factor is a significant volume of buildings located in urban areas.

Socio-economic problems – residents mostly do not have financial resources.

Accordingly, the question is excessively expensive, which makes simple solutions impossible. Thus, it can be concluded that palliative solutions produce an accumulation of problems in urban planning.

World experience shows that the country's post-war economic weakness and social disunity increase its vulnerability and insecurity from military and social conflicts. Countries that failed to effectively implement the post-war recovery process, as a rule, faced new conflicts: political, economic, social. The consequences of which were the crisis and degradation of these countries [4, 14].

After the end of the Second World War, the reconstruction of Europe took place according to the well-known program of recovery and development – the Marshall Plan, at the expense of American economic aid.

Briefly, the plan provided for the implementation of the following main tasks: infrastructure modernization; restoration and increase of production volumes; ensuring a more even geographical distribution of heavy industry; increasing production efficiency in agriculture; rationalization of production in light industry; monetary and financial stabilization in Europe. Europe has already felt the consequences of the implementation of the comprehensive, balanced and resource-provided plan in the 4th year of its implementation. However, the reconstruction of cities took much longer. In addition to large-scale new housing construction, the experience of reconstruction showed that much of what was built during the initial chaotic phase of reconstruction, immediately after the end of the war, when the task was simply to clear all the ruins and put a roof over people's heads, was unsuccessful from the point of view of architecture and urban planning.

Urban regeneration programs are developed and implemented primarily to improve people's quality of life. It is impossible not to solve the problems of providing housing and employment for demobilized military personnel and temporarily displaced persons. Urban regeneration always requires the development and adoption of a concept/strategy for their development [15].

The world practice of aid is based on existing and updated urban planning documents. Unfortunately, many cities of Ukraine still do not have updated master plans. During the period of reconstruction of cities, this state of affairs is unacceptable [5].

Housing problems in almost all cities that have suffered destruction as a result of the war are generally similar – and this is the low supply of housing for residents. Different cities approached the solution of the housing problem in different ways.

There are well-known examples of attempts to quickly build cheap and standard housing instead of destroyed buildings. This experience turned out to be ineffective. Already 10-15 years after the construction of this type of housing, it requires significant reconstruction or replacement.

Architectural and planning solutions for residential buildings are quite diverse. Studies have established that the unchanging core of any multi-story building is a block of stairs, kitchens and bathrooms. The so-called free planning decisions are still grouped into these fixed elements of the planning structure.

This principle also works for temporary housing - the primary cell should be the utility block and the entrance space.

In European countries, the option of housing refugees in rented apartments is also implemented. Refugees receive housing and social benefits financed by state or municipal programs. This approach has a time frame, but it provides for the option of integrating refugees with their employment, obtaining a permanent residence permit and, in the future, citizenship.

Obviously, this approach does not ensure the return of Ukrainian citizens. However, it forms the framework and conditions for the method of solving the problem: determining the status of a person in need of housing; provision of housing for long-term stay at the expense of existing programs; provision of assistance for the period of reintegration; employment assistance.

We can state that a similar scheme has not yet been implemented in Ukraine.

The problem to which attention is drawn [6] is the legal component of housing ownership.

For de-occupied cities, there will be an issue with apartments, the ownership rights of which will be uncertain.

This will require extensive but urgent work to update homeowners. Such activity will allow to form a reserve // maneuvering // fund. The issue needs to be agreed at the legislative level, since a conditional apartment in a multi-story residential building will require maintenance costs. A collision is formed when there is an object – an apartment, which requires expenses for its maintenance, but the owner (subscriber) is not determined (or is temporarily unreachable due to many reasons). In this case, it is not clear at whose expense all expenses are incurred, and the order (algorithm) of compensation for this.

The standard legally weighted recommendation in such a case – to act in accordance with the CCU (Civil Code of Ukraine) and obtain a decision in court is incorrect and will lead to chaos. The result is the degradation of residential buildings, a decrease in the value of apartments and the attractiveness of residential quarters (city plots). In the language of economics, this means a depreciation of the asset, which will certainly provoke an impoverishment trap.

The issue of housing reconstruction will be especially relevant in cities that have suffered significant destruction.

Point destruction for the cities of Kyiv, Kharkiv, Dnipro, Odesa is not a difficult problem. In the conditions of the preserved urban environment, it is possible to develop an actual design solution that takes into account the functional type of the reconstruction object, the type of reproduction – restoration, reconstruction, new construction. The legal points of ownership, compensation conditions, etc. will be resolved sufficiently correctly. For such situations, the infrastructure and engineering support systems are kept. The urban planning restrictions within the framework of the urban planning justification for the construction object do not change. For a large city, there will be no problems related to the organizational and technical component of construction. Simplified – solving the problem requires money comparable to traditional construction. The differences and peculiarities consist in the implementation of the stage of disassembly of the destroyed object [7].

For cities whose scale of destruction reaches critical values, two problems arise, two directions of activity: 1 – maintenance of the existing (surviving) housing stock; 2 – determination and solution of the tasks of reconstruction of the destroyed housing stock (Fig. 2).

The amount of replacement (3) is part of the existing housing stock (1) and consists of buildings in a state of emergency; morally outdated level; housing that leads to exclusion zones; quarters of perspective reconstruction (reconstruction).

The stages of development and implementation of the program for reconstruction of the residential environment are as follows:

1. Preparatory – creating a register of destroyed housing.
2. Preparation of promising sites.
3. Development of project proposals, typological solutions of construction objects.
4. Implementation of the construction complex.

The reconstruction program should be considered comprehensively – as a program of reconstruction and provision of housing for categories of the population that apply (have the right to receive housing).

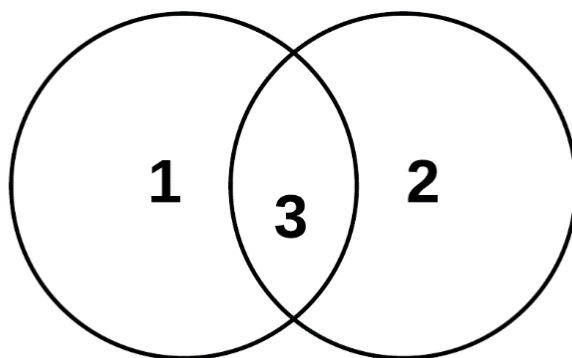


Fig. 2. Scheme for determining the volume of the housing stock:
 1 – Maintenance of the existing (surviving) housing stock; 2 – Determination and resolution of the tasks of reconstruction of the destroyed housing stock; 3 – Substitution volume

Possible options for the implementation of the program of reconstruction and provision of housing for categories of the population that apply (have the right to receive housing) are:

1. New construction.
2. Housing rent.
3. Temporary construction of modular or container facilities.
4. Formation of a replacement housing fund.
5. Compensation for dwelling.

For citizens of Ukraine, refugees, displaced persons in the post-war period, the model of behavior can have several options (Fig. 3), with multidirectional consequences.

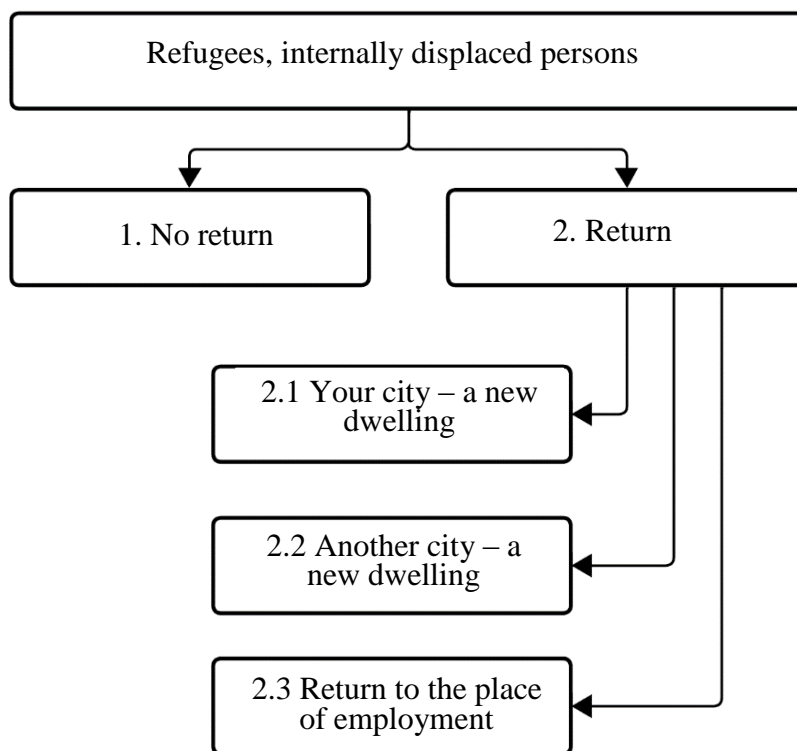


Fig. 3. Behavioral model of IDPs at the stage of return

The compensatory format only provides a return (2). Return options:
 2.1. The city creates demand for new housing and ensures development.
 2.2. Another city for new housing \ demand within the existing city.
 2.3. Return to the place of employment.

A compensation procedure is possible in the distant future \ monetary form.

Only clause 2.1 is system-forming.

P. 2.2 and 2.3. has the local effect of fueling demand in uncertain regions.

It is expedient for the state to create conditions for the combination of factors 2.1 and 2.3, which can have a system-forming character with a synergistic effect.

It is recommended to implement architectural and planning solutions for new construction that provide flexibility of form, multifunctionality, and high adaptability.

It is advisable to use houses of medium story 5-7 \ 3-5 \ brick or with s/b monolithic frame. Such solutions make it possible to design and build expressive architectural residential buildings with modern planning solutions on a single material and technical base with a high level of localization of local building materials [8].

Within the residential quarter, it is advisable to form closed and semi-closed courtyard spaces with a wide use of built-in and attached volumes on the first floors.

The introduction of underground urban planning is relevant. Buildings should be designed with full basements for dual purposes. It is necessary to use the experience of designing windows of underground and semi-underground premises with the arrangement of pits and dual-purpose half-ramps.

On the main compositional axes, the dominants or centers of the composition are placed public buildings, shopping centers, administrative buildings, etc.

It is advisable to carry out construction with a setback from the red lines. Potential zones of yellow lines should be designed for the allocation of pedestrian zones, bicycle areas, parking lots and vehicle parking lots.

The set of measures that will contribute to the implementation of the program of reconstruction and provision of housing for the population accumulates accumulated global experience and provides for:

- development of state programs for preferential lending to persons who lost their homes as a result of the war;
- compensation to landlords for the cost of housing rent by displaced persons (as a rule, it was carried out at the expense of the state budget);
- construction of temporary towns and centers for resettlement;
- construction of social housing at the expense of state and local programs, implementation of international aid;
- stimulation of individual construction, including simplification of issuing construction permits, provision of free land plots, establishment of developer support offices, providing developers with discounted local building materials;
- consistency of local infrastructure development parameters with housing reconstruction (updating of city master plans).

Conclusions:

1. Having analyzed the world experience of restoring territories destroyed by war, it was established that the restoration of cities should not be limited to reconstruction, but should be decided on a case-by-case basis, taking into account the degree of destruction, the economic component and social reintegration.

2. Peculiarities of urban reconstruction were studied and it was determined that the primary task is to provide the population with a housing fund, as well as to restore the engineering infrastructure of the city. For this, a number of solutions are proposed depending on the degree of destruction. The issue of housing restoration in conditions of significant destruction and the urban development situation in general is particularly difficult. Establishing that in order to solve this issue, it will be necessary to provide the population with new construction, the possibility of renting housing, provision of temporary construction of modular or container facilities, the formation of a replacement housing fund, as well as compensation for housing.

3. The architectural and town-planning aspects of the restoration of cities in Ukraine, consisting in the development of the underground space, the spatial composition of the courtyard space, and the architectural solutions of the buildings, have been determined.

4. The conducted research will make it possible to rationally plan urban development and develop architectural and planning solutions to ensure the restoration of construction objects of our State, which will be considered in future publications.

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АРХІТЕКТУРНО-МІСТОБУДІВНІ АСПЕКТИ ВІДНОВЛЕННЯ МІСТ В УКРАЇНІ

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Анотація. Міста, які знаходяться в епіцентрі військових конфліктів, опиняються в надскладній ситуації. Окрім найстрашнішого-людських втрат, руйнується інфраструктура міст, житловий фонд та промисловість. Надзвичайно складним завданням для таких територій є їх післявоєнне відновлення. Цей процес може бути успішним лише тоді, коли є уявлення про основні підходи та механізми до відновлювальних робіт у таких містах. Необхідним вирішенням є розробка ефективних стратегій та програм відбудови міст. Це визначає ряд пріоритетних завдань, а саме: аналіз досвіду відновлення країн світу після подібних руйнувань та дослідження особливостей відбудови житла, як найбільш гострої проблеми.

В статті досліджено основні напрямки післявоєнного відновлення міст, оскільки післявоєнна реконструкція є надзвичайно складним завданням для будь якого міста та країни. А для цього, є необхідним визначення пріоритетних напрямків відновлення та розвитку міст в залежності від особливостей та характеру їх руйнувань. Відновлення міст не повинно обмежуватись лише реконструкцією, а вирішуватись конкретним випадком, враховуючи ступінь руйнувань, економічну складову та соціальну реінтеграцію. Неабияке значення у створенні програм по відбудові міст має досвід країн, які пройшли етапи війни та відновлення. Комплекс заходів, що сприятиме реалізації програм відбудови та забезпечення житлом населення акумулює накопичений світовий досвід. Тому, у статті досліджено світовий досвід відновлення зруйнованих війною міст.

Для частково зруйнованих міст зі збереженим міським середовищем, можна розробити актуальне проектне рішення, яке буде враховувати тип відтворення – реставрація, реконструкція, чи новобудова. Для територій, що зазнали важких руйнувань можливими варіантами реалізації програми відбудови та забезпечення житлом населення є: нове будівництво, оренда житла, тимчасове будівництво модульного або контейнерного об'єктів, формування фонду підмінного житла, компенсація за житло.

Розроблено підхід до архітектурно-містобудівних вирішень, що полягає в освоєні підземного простору, просторової композиції дворового простору та архітектурних вирішеннях будівель.

Ключові слова: відбудова, житлові будинки, житлова забудова, місто, реконструкція міської забудови, будівельна типологія, відновлення.

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