

**Ключові слова:** антична скульптура, архітектура, стародавня Греція, торгівельна символіка.

UDC 69.001.5

doi: 10.31650/2786-7749-2023-1-55-63

## RENOVATION OF INDUSTRIAL BUILDING AND ITS ADAPTATION TO THE MODERN URBAN ENVIRONMENT

<sup>1</sup>J.M. Sorokaty,

yarusyagg@gmail.com, ORCID: 0000-0003-1635-8317

<sup>1</sup>O.B. Vasylenko,

vasylenko@ogasa.org.ua, ORCID: 0000-0002-8261-3104

<sup>1</sup>*Odesa State Academy of Civil Engineering and Architecture, Ukraine*

**Annotation.** Analysis of the features of the formation of urban public space through the renovation of industrial zones, as well as the identification of the prospects of this process and its impact on the existing structure of the city, based on existing domestic and foreign experience. Method. In modern conditions, with limited financial and material and technical resources of the state, the emergence of global and complex tasks of renovation of existing buildings is an expedient solution from the point of view of reducing costs for new construction. However, this is possible with the application of a comprehensive approach, which aims to preserve the originality, authenticity, identity and historical resources of the urban environment, and also allows to achieve a high predicted efficiency in the implementation of reconstruction projects in the shortest possible time. Renovation of industrial buildings refers to environmental praxeology - one of the content blocks of the theory of harmonization of the architectural environment, which investigates methods of effective organization of activities with the improvement of the artificially created environment.

The results. As a result of the study, a comparative analysis of the domestic and foreign experience of renovation of industrial areas was carried out, and a number of factors affecting the renovation processes in the existing urban planning situation with the influence of all existing and possible processes were identified. It was found that depending on the tasks, different functional adaptation and direction of this or that industrial building or complex is possible, as well as its subsequent adaptation into the insuring system of the city.

Scientific novelty. Different approaches to the process of renovation of industrial territories were identified and the principles of transforming the existing industrial function into a public space were substantiated.

Practical significance. The analysis of the real state of industrial zones was carried out with the aim of an effective process of renovation of outdated and irrationally used industrial territory, which is located both in the structure of the city and outside it. All objects of renovation are considered in view of the time frame, the functional purpose of the buildings, the subject of the implementation of the investment project. Problems were studied and recommendations were made for the development of renovation in the capital and Ukraine in general, based on foreign experience and works.

**Keywords:** renovation; industrial zone; urban space; public space; urban planning situation; directions of renovation; modern approaches.

**Statement of the problem.** In the context of society's transition to the post-industrial era, which is reflected in the crisis status in the economic and social sectors, the full or partial loss of industrial enterprises and their production functions is an acute issue. This leads to a violation of

the compositional balance of the city, as these territories are not used in any way. However, with the emergence of a deficit of territories, there is a need to find new solutions for the development of the city. Thanks to the renovation, the industrial areas of the city are being adapted and their functional role is changing. As a result, there is a possibility of further use of these buildings. That is why, today, the renovation of industrial areas into buildings for various functional purposes is an important issue. After all, this process is gaining its expediency from the environmental, aesthetic and economic perspectives.

With the advent of the post-industrial society, enterprises have partially or completely lost their production functions, which subsequently led to gaps in the urban planning structure of the city. This study shows in detail that most industrial areas are abandoned and inefficient, which is why there is a need to adapt them to the modern urban environment. Most industrial facilities are light industry, which greatly facilitates their re-profiling. However, some of them remain occupied by hazardous waste and are becoming environmentally hazardous.

**Analysis of previous studies.** The issue of renovation has been studied since the 50s and 60s of the last century. The largest and first centers were cities such as New York, London, Berlin, and Paris. The main factor was the process of industrialization, with which industrial enterprises began to lose their production function. However, in the former Soviet Union, the renovation of industrial zones began later. Accordingly, the attention of scholars, both foreign and domestic, has been focused on this issue for a long time. And it remains relevant today. Among the Ukrainian authors and scholars who have dealt with the issue of renovation and revitalization of industrial zones are O. Drapikovskiy, I. Ivanov, A. Pankeev, Chelnokov O.V., as well as such architects and public figures as Olga Puzyr, Yaroslav Minkin, Iryna Babiy, Andriy Shulyar, Yulia Suprunovych and others (Suprunovych Y.O. 2007, Bronevyskyi A.P. 2016, Hnatiuk L.R., Melnyk M.V. 2019 and others).

**The purpose of the study.** To determine the peculiarities of the formation of urban public spaces through the renovation of industrial zones, as well as to identify the prospects of this process and its impact on the existing structure of the city, based on existing domestic and foreign experience.

**Research objectives:** 1. To study the experience of designing the renovation of industrial areas 2. To analyze the effectiveness of the implementation of this topical area. 3. To develop and implement organizationally effective mechanisms and methods for the renovation of abandoned industrial areas.

**Main text.** The main factors influencing the development of industrial zones renovation processes are: -limitation of the number of land plots for new development; -massive industrial areas in the central part of the city or on its outskirts; -reduction of funding for the construction of new facilities; -existence of a fairly universal space-planning structure of industrial facilities and its compliance with the requirements of public real estate; -satisfactory condition of the industrial facility to be renovated. For a full analysis and understanding of the possibilities for renovation of an industrial facility, it is necessary to assess and collect the available factors and influencing factors. In the West, the issue of renovation of non-functioning industrial buildings has long been relevant. Most often, they are transformed into structured objects - offices, studios, apartments, hotel rooms, as well as exhibition and shopping centers, galleries, etc. The article examines the global experience of reorganization and conversion of former industrial buildings into market structure objects, i.e. studio apartments, apartments, offices, and hotel rooms [1].

There are three different approaches to the re-functionalization (change of function) of industrial facilities:

1) preservation of the production function: the memorial way - complete, detailed restoration, reconstruction, preservation of the original appearance of the building (relevant for monuments of industrial architecture); improvement - introduction of new production and maintenance technologies into the existing building - reconstruction of the facility

2) partial functionalization: reconstruction of the planning structure, the main principle of

which is to identify and preserve the most stable planning characteristics; museumification or conservation of the object; inclusion of urban objects of a new type in the territorial-spatial structure of the historic industrial district;

3) complete re-functionalization: re-functionalization of industrial architecture monuments in accordance with current socio-economic and cultural criteria; environmental rehabilitation of the territory through rehabilitation and reclamation of disturbed areas, creation of new green spaces; complete demolition of an industrial building and use of the territory for the construction of a new facility.

The choice of the direction of the renovation object's functionalization is determined by a number of factors: urban planning and compositional characteristics of the object; urban planning, historical, architectural, cultural value; value of the object as a whole or its parts; primary function; space planning characteristics; orientation of the predominant axis and existing window openings to the cardinal points; materials of the building's structural elements. The main areas of industrial building functionalization include: housing; offices; hotels; art clusters, museums, tourist attractions; trade and catering facilities; cultural and entertainment centers; sports facilities; educational institutions; high-tech and knowledge-intensive production; and multifunctional use. A brief description of these areas is given below. Housing. Given the general problem of insufficient housing, changing the function of existing industrial facilities to housing can be considered one of the most effective. Existing experience shows that the use of technically suitable buildings and structures can significantly reduce the cost of building one square meter of housing compared to new buildings [2].

One of the most important patterns, which is inherent not only in Ukrainian cities but also in foreign ones, is that enterprises were usually located in the city center. For example, in Kyiv, we can see abandoned industrial areas in the Shevchenkivskyi district and Podil, which either do not function at all or are used as warehouses and hangars. Analyzing the location of industrial facilities in the structural map of the city, we can distinguish two main vectors of their location: - the city center, where the renovation is driven by the needs of society for spaces where people can relax, have fun and work [3]. So in this case, industrial zones are transformed into offices, shopping malls, sports grounds, galleries, museums and cultural centers; - the outskirts of the city or "sleeping area", where residential premises and offices for small and medium-sized businesses are usually created. The following foreign industrial districts can be considered vivid examples: - Soho district, New York City. It used to be the industrial center of the city, but today, most of the buildings have been reconstructed for residential development and film sets.

Since the industrial load in Ukraine is more concentrated in urban areas than in villages and suburbs, it can be concluded that a significant part of the city is occupied by industrial enterprises, accounting for approximately 30-40% of the total area [4].

In Ukraine, the process of urban renewal dates back to the 2000s, and thus has been studied superficially and incompletely. To date, the most prominent examples are:

- UNIT city - located on the territory of a former motorcycle factory, is one of the largest platforms created for innovative training in the IT field;
- Cosmopolitan shopping center, located in one of the buildings of the Bolshevik plant. Unfortunately, in Ukraine, the issue of renovation of industrial zones is only beginning to gain popularity and publicity, although the number of facilities that need it is quite large;
- Kyiv Food Market on the territory of the Arsenal plant.

This is one of the largest projects that has been implemented recently. The architects managed to preserve not only the appearance of the buildings, but also save them from internal destruction by strengthening and reinforcing its structural system. In addition, you can see that this complex has become a public place in the capital (Fig.1, Fig.2, Fig.3, Fig.4).

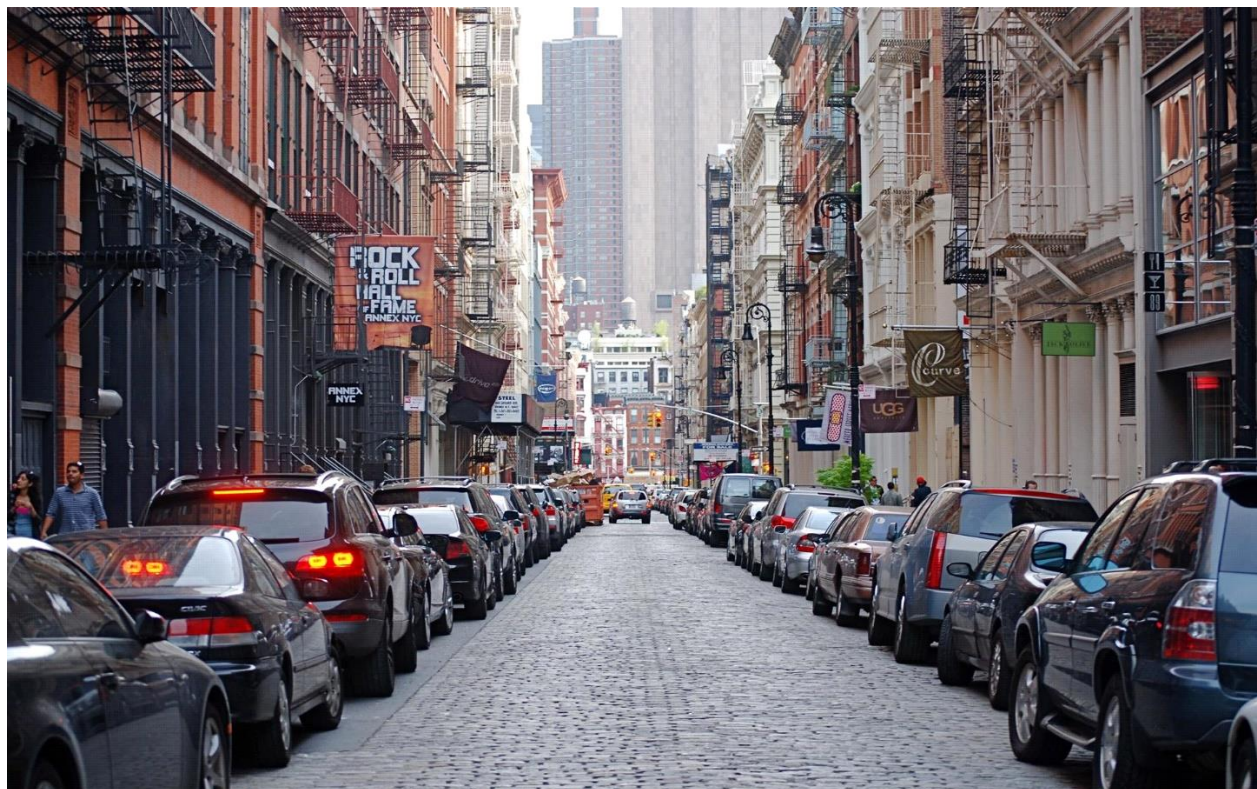


Fig. 1. Modern view, Soho district, New York City



Fig. 2. UNIT city school of innovative learning



Fig. 3. «Kyiv Food Market» on the territory of the Arsenal plant, modern look



Fig. 4. Cosmopolitan shopping and entertainment centre, modern view

A few centuries ago, Kyiv was a relatively small city and was very different from what we are used to seeing today. However, after the transition to post-industrialization, the city grew into new building belts and the percentage of the center gradually shifted (relative to the city's total area).

In addition to the capital, it is worth paying attention to the cities adjacent to it. While renovation processes in Kyiv are gaining momentum every year, industrial areas in the cities

adjacent to it continue to be abandoned [5].

Just 30 years ago, one of the regional industrial centers was the city of Brovary, which had about 17 complexes of various kinds, most of which were related to heavy industry (aluminum and building structures, mechanical engineering, chemical industry). Today, none of the plants are operating at full capacity, meaning that some hangars are leased to small and medium-sized businesses for offices and warehouses, and some of them are simply abandoned areas that are not interesting even to tenants [6].

However, due to the rapid population growth, there is a need for new public multifunctional spaces. Since the city has a certain shortage of new territories and funds for the construction of new facilities, the right solution may be to transform industrial complexes into places that are necessary for residents. The city has several industrial hubs located in different districts. However, each of these industrial hubs is quite large and can easily turn into a separate district, which, thanks to renovation processes, could become an independent structural unit of the city. Thus, the city will create an even distribution of the population, depending on the needs, across the districts. That is why the problem of irrational use of industrial zones can be solved by renovating these buildings. Thus, properly rebuilt industrial complexes will solve the problem of pendulum migration in the city, caused by the constant passenger flow in several directions "from dormitory areas to the center" and vice versa. New spaces can be created not at random, as is the case with modern urban planning, but using the best international experience. According to which an industrial zone can become a place where a person lives and works, has fun, etc. at the same time [7, 8].

However, due to the rapid population growth, there is a need for new public multifunctional spaces. Since the city has a certain shortage of new territories and funds for the construction of new facilities, the right solution may be to transform industrial complexes into places that are necessary for residents. The city has several industrial hubs located in different districts. However, each of these industrial hubs is quite large and can easily turn into a separate district, which, thanks to renovation processes, could become an independent structural unit of the city. Thus, the city will create an even distribution of the population, depending on the needs, across the districts. That is why the problem of irrational use of industrial zones can be solved by renovating these buildings. Thus, properly rebuilt industrial complexes will solve the problem of pendulum migration in the city, caused by the constant passenger flow in several directions "from dormitory areas to the center" and vice versa. New spaces can be created not at random, as is the case with modern urban planning, but using the best international experience. According to which an industrial zone can become a place where a person lives and works, has fun, etc. at the same time [7, 8].

Although the process of renovation is long and legally complicated, we can see that Ukraine is rapidly gaining momentum and is beginning to implement progressive foreign approaches and methods of renovating industrial zones instead of building new real estate [9,10].

While it is difficult to convert large span industrial architecture into medical or educational buildings for preschool children, they are being converted into shopping centers, housing, catering facilities, or sports or cultural facilities. The determination of the functional direction of a building to be renovated is influenced by a significant number of factors, including:

- location of the building in the city system and its connection with transport and pedestrian connections;
- connection with the main nodes of concentration of values of different directions;
- historical and cultural value;
- space-planning structure and structural system of the object.

Achievement of the objectives of renovation of the space-planning structure of the object is achieved through the use of such methods as the extension and completion of individual elements and entire buildings, the addition of several and attic floors, layering of structures on the facades and dismantling of elements and sections, replacement of structures. The total use of the principle

of strength and renovation methods in the process of reconstruction at the volumetric and planning level forms the principle of reconstruction of the elements of the renovation object (Sokolovska Y.S., 2016). Thus, based on the existing domestic and foreign experience, it can be noted that Ukraine is beginning to gain momentum in the design and renovation of industrial zones and complexes.

In addition, today there are the following negative factors that hinder the development of renovation in Kyiv and the country as a whole:

- "industrial" thinking of a large number of people, as a legacy of the Soviet era, for whom the transformation of a plant into a public facility is unpleasant;
- slow economic development in the country;
- lack of state and local programs to stimulate the development of abandoned industrial areas;
- low awareness of potential investors in revitalization;
- low level of technological support for the construction industry in the country;
- unsatisfactory state of property rights guarantees;
- deterioration of the city's engineering infrastructure and a limited number of available engineering capacities;
- lack of a clear urban planning policy for the development of industrial areas (Bronevyskyi A.P., 2016).

There are several basic principles of industrial area renovation, based specifically on domestic experience:

- the principle of priority (determination of the direction vector on which the space-planning solution depends);
- the principle of complexity is a set of measures that will be aimed at transforming the functional direction and planning decisions;
- the principle of forming a barrier-free environment (creation of open spaces for comfortable location and stay of people with disabilities);
- the principle of adaptation is based on the possibility of adjusting industrial areas to the city structure;
- the principle of humanization is the creation of a new, comfortable environment, depending on human needs, in which spaces will be created to meet certain needs.

**Conclusions.** Thus, having analyzed the experience of domestic and foreign works, we can conclude that such a process as renovation is a very important aspect in the formation of modern architecture and urban planning. Thanks to renovation, currently abandoned industrial areas change their functional purpose and adapt to the existing urban planning system as an independent structural unit of the city. First of all, this plays a positive role in several aspects:

- environmental (reducing the negative impact of industrial waste),
- economic (reducing the cost of building new real estate and creating jobs) and social (increasing public spaces and restoring passenger traffic to a particular part of the city).

It is a process such as renovation that will allow for the creation of new high-quality buildings within the city, unlocking the potential of industrial center locations from a different perspective.

### References

- [1] Suprunovich Y.O. Ob'emno-prostorova organizaciya tovgovel'nih kompleksiv na osnovi renovacii promislovih budivel': dis. kand. arhitekturi: 18.00.02 Suprunovich Y.O. — K., 2007. – 172 s.
- [2] SHERISHEVSKIY I.A. Konstruirovaniye promyshlennykh zdaniy i sooruzheniy. - M.: Arhitektura-S, 2004.
- [3] Tuflina O.E. Razvitiye ob"ektov nezhilogo fonda na osnove principov redevelopment. Avtoreferat disertacii na zdobuttya vchenogo stupenya kandidata ekonomichnykh nauk. – M.,

- 2009.
- [4] Mazur T., Korol E. «Promislovi teritorii yak rezerv funkcional'no-planuval'nogo rozvitku central'noi chastini m.L'vova» s.164-179, 2011.
  - [5] Barmashina L.M., Kisil' S.S. Napryami renovacii moral'no ta fizichno zastarilih promislovih budivel'. – Vipusk 24. 2010.
  - [6] Sokolovs'ka YU.S. Ob'emno-planuval'ni principi i metodi renovacii masovoï zhitlovoi i gromads'koï zabudovi. – «Molodij vchenij» 1(28) CHastina 3, sichen' 2016 r.
  - [7] Gnatyuk L.R., Mel'nik M.V. Revitalizaciya promislovih ob'ektiv na prikladim.Kiïv. – Teoriya i praktika dizajnu. Tekhnichna estetika. Vip. 16. 2019.
  - [8] Pestrikova A.V., Burda E.A. Re-novaciya promyshlennyh territorij kak odin iz effektivnyh metodov uluchsheniya gorodskoj sredy. – Dnepr – 2019.
  - [9] Sen'kovs'ka YA.T. Funkcional'noplanuval'na restrukturizaciya teritorij promislovih ob'ektiv mista (na prikladi m. L'vova). Disertaciya na zdobuttya naukovogo stupenya kandidata arhitekturi. – L'viv – 2017.
  - [10] Rudenko M.O. Arhitekturno-planuval'na organizaciya gromads'kih budinkiv i sporud na teritorii rekul'tivovanih kar'eriv (na prikladi Krivbasu). Avtoreferat disertacii na zdobuttya naukovogo stupenya kandidata arhitekturi. – L'viv – 2017.
  - [11] Wei Zhang. Local culture on the reuse of old buildings in industrial area. Karlskrona, Sweden. May 2012.
  - [12] Evan Sugden. The adaptive reuse of industrial heritage buildings. Waterloo. Ontario, Canada – 2017.

### Література

- [1] Супрунович Ю.О. Об'ємно-просторова організація торговельних комплексів на основі реновації промислових будівель: дис. канд. архітектури: 18.00.02 Супрунович Ю.О. — К., 2007. – 172 с.
- [2] Шерешевський І.А. Конструювання промислових будівель та споруд. - М: Архітектура-С, 2004.
- [3] Туфліна О.Е. Розвиток об'єктів нежитлового фонду з урахуванням принципів редевелопмента. Автореферат дисертації на здобуття вченого ступеня кандидата економічних наук. - М., 2009.
- [4] Мазур Т., Король Є. «Промислові території як резерв функціонально-планувального розвитку центральної частини м. Львова» с.164- 179, 2011.
- [5] Бармашина Л.М., Кисіль С.С. Напрями реновації морально та фізично застарілих промислових будівель. – Випуск 24. 2010
- [6] Соколовська Ю.С. Об'ємно-планувальні принципи і методи реновації масової громадської забудови. – «Молодий вчений», 2016 р.
- [7] Гнатюк Л.Р., Мельник М.В. Ревіталізація промислових об'єктів на прикладі м.Київ.Теорія і практика дизайну. Технічна естетика. Вип. 16. 2019.
- [8] Пестрікова А.В., Бурда Є.А. Реновація промислових територій як із ефективних методів поліпшення міського середовища. – Дніпро – 2019
- [9] Сеньковська Я.Т. Функціонально Планувальна реструктуризація територій промислових об'єктів міста (на прикладі м. Львова). Дисертація на здобуття наукового ступеня кандидата архітектури. – Львів – 2017.
- [10] Руденко М.О. Архітектурно-планувальна організація громадських будинків і споруд на території рекультивованих кар'єрів (на прикладі Кривбасу). Автореферат дисертації на здобуття наукового ступеня кандидата архітектури. – Львів, 2017.
- [11] Wei Zhang. Local culture on the reuse of old buildings in industrial area. Karlskrona, Sweden. May 2012.
- [12] Evan Sugden. The adaptive reuse of industrial heritage buildings. Waterloo. Ontario, Canada – 2017.

## РЕНОВАЦІЯ ПРОМИСЛОВОЇ ЗАБУДОВИ ТА ЇЇ АДАПТАЦІЯ ДО СУЧАСНОГО МІСЬКОГО СЕРЕДОВИЩА

<sup>1</sup>Я.М. Сорокати́й,

yarusyagg@gmail.com, ORCID: 0000-0003-1635-8317

<sup>1</sup>О.Б. Васи́ленко,

vasylenko@ogasa.org.ua, ORCID: 0000-0002-8261-3104

<sup>1</sup>Одеська державна академія будівництва та архітектури, Україна

**Анотація.** Аналіз особливостей формування міського громадського простору, шляхом реновації промислових зон, а також виявлення перспектив даного процесу та його впливу на існуючу структуру міста, на основі існуючого вітчизняного та зарубіжного досвіду. Методика. В сучасних умовах при обмежених фінансових та матеріально-технічних ресурсах держави виникнення глобальних та складних задач реновації існуючої забудови є доцільним рішенням з точки зору зменшення витрат на нове будівництво. Проте це можливо при застосуванні комплексного підходу, який має на меті збереження самотності, автентичності, ідентичності та історичних ресурсів міського середовища, а також дозволяє домогтися високої прогнозованої, ефективності реалізації проектів реконструкції в можливо короткі строки. Реновація промислової забудови відноситься до середовищної праксеології – одного із змістових блоків теорії гармонізації архітектурного середовища, що досліджує способи ефективної організації діяльності з удосконаленням штучно створеного довкілля.

В результаті дослідження здійснено порівняльний аналіз вітчизняного та зарубіжного досвіду реновації промислових територій, а також виявлено ряд чинників, що впливають на процеси реновації в існуючій містобудівній ситуації з впливом усіх існуючих та можливих процесів. Виявлено, що в залежності від задач, можливе різне функціональне пристосування та спрямування тієї чи іншої промислової споруди або комплексу, а також його наступна адаптація в існуючу систему міста.

Виявлено різні підходи до процесу реновації промислових територій та обґрунтовано принципи перетворення існуючої промислової функції під громадський простір. Практична значимість. Аналіз реального стану промислових зон був проведений з метою ефективного процесу реновації застарілої та нераціонально використаної промислової території, яка знаходиться, як в структурі міста, так і поза ним. Всі об'єкти реновації розглянуті з огляду на часові рамки, функціональне призначення будівель, суб'єкта реалізації інвестиційного проекту. Вивчено проблеми та надано рекомендації для розвитку реновації в столиці та Україні загалом, на основі закордонного досвіду та праць.

**Ключові слова:** реновація; промислова зона; міський простір; громадський простір; містобудівна ситуація; напрямки реновації; сучасні підходи, архітектура.