Renovation of mass residential development in late 1950s-early 1970s in St. Petersburg: problems and perspectives

Y S Yankovskaya, A G Vaytens
Department of Urban Development, Faculty of Architecture, Saint Petersburg State University of Architecture and Civil Engineering (SPbGASU), 4 Vtoraya Krasnoarmeiskaya str., Saint Petersburg 190005, Russia

E-mail: jul3203226@gmail.com

Abstract. This article is devoted to the problem of transformation of morally and physically outdated mass residential development of the 1950-60-ies of St. Petersburg. This problem is particularly acute for the first series of panel dwelling development, the life of which is coming to an end. In this article the concept of space development of the residential panel dwellings of the “first generation” (the 1950-ies – the 1960-ies), based on the modern tendencies and the European experience is presented. The important points are the permeability of residential development, focus on the formation of social contacts; the concept of yard-garden and active implementation of the green component, the cultivation of pedestrian and road traffic.

1. Introduction

The formation of a comfortable living environment is one of the priorities of modern urban planning. However, the uncontrolled growth of residential areas of large and largest cities of Russia, occurring during the recent decades due to the development and accession to the city of new territories, has a negative impact on the structure of the city and the possibility of its full-bodied development. For St. Petersburg, Moscow and a number of other large and largest cities of Russia, where the cost of land is high, the renovation of areas of obsolete residential buildings of the 1950s and 60s and the refunctioning of the former industrial zones of the city is the resource that can be used to form new full-fledged residential areas in the If the transformation of the former industrial zones of the “Gray belt” of St. Petersburg held several competitions of different levels [1] and a number of research [2], the transformation of areas of mass panel construction of five-storey “Khrushchev” panel dwelling is currently not given due attention.

In this regard, Moscow became the first one [3,4]. On the order of the mayor Sergei Sobyanin, the Committee on architecture and urban planning of Moscow held in 2017-2018, The Architectural and urban planning Competition for renovation of the dwelling blocks for 5 pilot sites (Kuzminki, Golovinsky, Tsaritsyno, Vernadsky Avenue and Khoroshevo-Mnevniki) in different districts of the capital [5].

For St. Petersburg, which has a rich architectural and urban heritage and a unique historical planning structure of the city, the development of a unique and appropriate «spirit» of the city approach to the transformation of areas of mass panel building «Khrushchev period» is an important architectural and urban planning task.
In this article, the authors set and solve the following tasks: the definition of the most promising areas of transformation of the five-storey panel building and the development of a set of techniques and tools corresponding to the «genetic code» of St. Petersburg historical development, to form a modern comfortable and decent urban tradition of St. Petersburg living environment in these areas. The authors are of the opinion that for large, medium and small cities of Russia it may be a question of partial rehabilitation, reconstruction of residential panel dwellings of the «Khrushchev period» and complex improvement of the territory. As for St. Petersburg, it is necessary to develop a kind of strategy for the complete transformation of this building as a dissonant with the historical appearance of the city.

2. Materials and method
In this section, we consider two aspects:

The first – the defining of the allocation of territories for architectural and urban transformation of the mass panel dwellings of "Khrushchev period." We use the method of historical and urban studies of literature and documents characterizing the areas of mass development, applied series, performance characteristics of these series (design and real). The criteria for determining the most perspective sites are-their inclusion in the existing urban structure, external infrastructure security (transport and major networks, cultural facilities). Also the degree of wear and tear and its dependence on the applied series (series) of this panel development is taken to the account.

The second aspect is related to the development of a set of design methods for the transformation of these territories and the development of methods of organizing the living environment corresponding to the "genetic code" of the city of St. Petersburg, its unique urban structure and architectural appearance. This aspect is associated with the historical and theoretical analysis of the architectural and urban organization of the historical residential development of St. Petersburg, the identification of specific features of the "St. Petersburg residential quarter", which arose on the site of historical urban estates with developed green garden and Park spaces. On the basis of this analysis and generalization of foreign experience in the formation of a modern living environment in the reconstructed and refunctionalized areas of large historical European cities, a set of techniques and means of organizing modern and comfortable residential development corresponding to the architectural and urban tradition of St. Petersburg is proposed.

3. Determination of territories for renovation of five-storey panel residential buildings of 1950-1970-ies
In Leningrad (now St. Petersburg) from 1955 to 1964 was built 10 million m2 of housing, at that time it was a progressive trend of resettlement of communal apartments and mass provision of apartments [6,7]. Currently, there are more than 2,400 five-storey residential buildings in St. Petersburg, built using a series of panel housing [8,9]. In this article we consider as objects of primary modernization five-storey houses of the first panel series.

The development of the panel five-storey dwellings since the end of the 1950-ies up to the middle of the 1970-ies could be generally divided into two stages:

1 stage (1956 – 1969). The construction of the first generations of the panel dwellings of the series OD, GI, 1-335, 1-505, 1-506, 1-507. It were 5-storey dwellings, except the houses of the serie G-5, which were the 9-storey ones.

2 stage (1969 – 1974) The construction of the second generation of the panel dwellings of the series 1-528 (5-storey) and 1-LG -600 (5 and 9-storey ones).

In accordance with the decree of the Central Committee of the CPSU, the Council of MINISTERS of the USSR FROM 31.07.1957 N 931 «ABOUT the development of housing construction in the USSR» [10], the life of the prefabricated houses first series was assumed not more than 25 years. As we can see, the service life laid down in the project has been exceeded more than twice and soon we will face complete decay and massive natural destruction of houses of the first series.
The first sections built in 1956-1958 with the use of the first «Leningrad» series 1-506 panel five-storey buildings (for projects that Seri has built 35 houses): quarters at St. Louis; the blocks 122 and 123 in the area of Semenovka (as well as the development of Elizarova Avenue); construction of Kantemirovskaya str. in Leningrad was used at home nationwide series 1-335 they were built 12 quarter of Malaya Okhta; further building of houses in this series were conducted from 1956-1968. Also in the following stages of mass panel housing used series: a series of OD (1959-1965), a series of GI (1959-1971), a series of 1 mg 507 (1959-1974 gg.). The order of development of territories of Leningrad panel five-storey residential buildings [11] marked on the map (Figure 1). All areas marked on the map are built up with panel houses, the planned life of which is 25 years, it has long been exhausted even for buildings of the 1970s.

As we see in urban planning, the belt of five-storey panel «Khrushchev» follows the «Gray belt» and represents a huge reserve for the development of modern and comfortable residential areas within the existing city limits [12].

Currently, the Committee for the construction of St. Petersburg handed over to the Commission on urban economy of the St. Petersburg Parliament a list of 13 quarters for renovation in the Kalinin, Moscow, Kirov, Nevsky, Primorsky and Krasnoselsky districts. It is planned that the deputies will prepare amendments to include these addresses in the law «development of built-up areas in St. Petersburg». However, the area of planned transformations is much smaller than the area of mass panel five-storey residential buildings (Figure 2). It should be noted that the area of planned renovation zones is local and does not provide a comprehensive architectural and urban planning solution to such a complex problem.

According to the authors, the problem of renovation of areas of panel «Khrushchev» building should be solved in conjunction with the transformation of the «Gray belt» and the formation on its basis of the centers of business and cultural activity, which will contribute to the formation of St. Petersburg as a «polycentric city», unloading the historical center and reducing the pendulum migration (Figure 3). We offer a comprehensive town planning approach, based on the gradual rolling settlement rolling settlement of these residential areas (in the same sequence as they were mastered in the 1950s-1970s), together with the comprehensive transformation of the «Grey zone» for public and business centers (with a minimum inclusion of a residential component), the development of «green belt» - a kind of «lung» of the city and the strengthening of transport infrastructure due to the
formation of transport-logistics hubs with Park-and-ride Parking lots. Social and business centers with transport and logistics centers will provide employment, leisure activities and transport equipment for new residential areas in the areas of complex renovation of a mass five-storey panel residential development.

Figure 3. The problem of renovation of areas of panel «Khrushchev» building should be solved in conjunction with the transformation of the «Gray belt».

4. The concept of architectural and spatial organization of renovation areas
In the authors opinion, the idea of renovation of «Khrushchev's» panel development for St. Petersburg should have the historical roots in the architecture of «Petersburg yards» - the concept of order and strict hierarchy of spaces that link history and geometry, nature and culture, Russian and European urban culture. The urban fabric of the historical part of the city of St. Petersburg consists of complex of connected spaces of passageways with closed courtyards. This urban fabric is quite specific and carries a double historical subtext: a) quarter as a means of forming a uniform development of streets, which appeared on the site of estates with developed green garden and Park spaces; b) double overlay – quarter development, in the internal structure of which appear green spaces of the preceding urban estates.

It is supposed to form a specific for St. Petersburg strict hierarchy of living spaces. The basis for the formation of a humane living environment of the district or a large complex is a developed «green frame» [13], which unites the leading public and private spaces, improves the quality of living the presence of Park of the residential area adjacent to the residential development. The specificity of the use of public spaces determines the nature of access and social control, as well as builds the attitude and gradation of belonging of the territory in the opposition «public-private».

The leading public spaces structurally and compositional define the main planning axes of the residential complex:
- the district Park is a major recreational center, the main potential for the development and investment attractiveness of residential education;
- mainly axial pedestrian spaces, connect with the Park residential development and are areas of public sports and leisure infrastructure of the complex, they are complemented by a system of
recreational spaces that form a «green» zone with the predominant placement of children's and educational institutions.

Besides the social and affordable elements of a green framework, one should adopt a system of public and private gardens of neibourhood; which bound in objects of everyday services (childcare, clubs, gyms, beauty salons, etc.), oriented for use by residents of the adjacent houses.

Public spaces of the neighboring society form the main linear connections and local planning elements [14,15]:

- green residential streets and network connecting residential areas and a system of public and private gardens; the lower floors of residential streets form a system of daily public service for all residents of the street (hairdresser, Shoe repair, dentistry, grocery store, pharmacy, atelier, etc.);
- squares — pedestrian zone, located between the residential houses out of the yard, they are private in nature and focused on the residents of the adjacent houses. The gardens overlook a small private facilities, daily service is a family cafe, a mini-bakery, family shops, etc., that creates a relaxed atmosphere of neighborly contacts and at the same time, defines the social control of the territory;
- courtyards-gardens-recreational pedestrian space available exclusively to residents of the house, forming a closed circuit of the yard space.

The General concept that determines the heights of residential blocks is the concept of a historic city. High-altitude performance homes, based on the concept of «historical city» - 18-25 metres from ground level require the use of mansard floors in the structure of the house. Thus, an architectural and urban planning environment reaches the human scale. Transport is taken out of the yard: storage in the underground level, communication system of residential streets with open "guest" Parking and Parking for people with disabilities.

The proposed hierarchical system forms " porosity and permeability of the dwelling development for pedestrians, which is expressed in the following solutions:

- construction of residential areas is permeable for pedestrians through a system of arcades and continuous pedestrian communications;
- the formation of pedestrian flows will contribute to the sustainable development of service functions necessary for residents;
- functional division of the public infrastructure objects placed in the first floors of houses into the enterprises: the General daily demand and the General use placed along residential streets; and the family mini-enterprises focused on needs of inhabitants of adjacent houses and placed in a zone of squares and public and private gardens.

When developing this concept, we focused on the analysis of foreign practice of complex formation of the urban environment, carried out within the framework of renovation and refuctioning of territories for residential construction, as well as the experience of development and integrated development of new residential areas of large European cities. From the closest to the large-scale structure and approaches to environment, we can mention the integrated development of residential areas Westerdok, Oostenburgervaart, Ertshaven, Uilenburgergracht in Amsterdam and a building area of Sluseholmen in Copenhagen. Basically, the contests and the construction of these areas occurred in 2000 — 2010. The main significant moments, combining architectural and town-planning decisions in these areas — dense building blocks with pedestrian walkways, green courtyards and private gardens, well-developed public infrastructure in the area of the first floor. The ideas that can be traced in the complex construction of residential areas of the Nordic countries are close to us both for historical reasons and for natural and climatic features.

5. Results
In this article the concept of renovation of mass housing development of the late 1950s-early 1970s for the city of St. Petersburg, based on the similar European experience of architectural-town-planning and historical-architectural researches is offered.
The authors' innovations are: a) the proposal of complex urban transformation of two zones of St. Petersburg: «gray belt» (former production zones) and the belt of morally and physically outdated mass development of «Khrushchev» times; b) the stages of renovation of this development should be chosen in accordance with the stages of its construction; C) the hierarchical system of organization of the living environment of the renovated areas on the basis of «green frame» and the concept of transfer of «historical code of St. Petersburg yards» and the scale of residential formations.

6. Conclusions
The article raises the problem of complex transformation of areas of mass panel five-storey dwelling development in St. Petersburg, taking into account the status and historical significance of the city. The author's vision of the solution of this problem by architectural and town-planning means is offered. The results of the work are tested in experimental and educational design at the Department of Urban planning of SPbGASU, in the future-discussion of the proposed developments in the profile Committees of the Administration of St. Petersburg.

References
[1] Committee for Urban Planning and Architecture 2017 Transforming the Grey Belt (St Petersburg: ID Balticom) pp 14–25
[2] http://old.kgainfo.spb.ru/greybelt/main.html
[3] https://www.mos.ru/programmarenovacii.pdf
[4] https://www.mos.ru/city/projects/renovation/
[5] http://tehne.com/event/koncepty/20-proektov-konkursa-koncepciy-renovacii-zhilyh-kvartalov-moskvy
[6] Academy of construction and architecture of the USSR, Leningrad branch 1960 Urban development problems of the Leningrad (Leningrad: State publishing house of literature on construction, architecture and building materials) pp 3–17, 32–62
[7] Vaytens A G, Volchok Yu P, Vyazemtseva A G, Dukhanov S S, Kazus I A, Konysheva E V, Meirovich M G, Starostenko Yu D, Shchenkov A S 2018 Soviet town planning (Moscow: Progress-Tradition) chapter 5 pp 831–987
[8] Retrieved from https://berolux.ru/renovacija-v-spb/
[9] Retrieved from http://rtz.spb.ru/about/istoriya/
[10] Retrieved from http://pravo.levonevsky.org/baza/soviet/sssr6142.htm
[11] Vaytens A G 1993 Questions of reconstruction of five-storey residential building of Leningrad in 1950-1960 (Architecture: interuniversity thematic collection of works) ed L P Lavrov (St Petersburg: SPbGASU) pp 23–29
[12] Vaytens A G 2018 Urban and master plans of Petrograd - Leningrad as a spatial paradigm for the development of the city in 1920-1980 (Science, education and experimental design at the Moscow architectural Institute) ed D O Shvidkovskiyi, G V Esaulov, ECAVJOB Г.В., V I Ivanovskaya (Moscow: Moscow architectural Institute) pp 46–47
[13] Vaytens A G and Yankovskaya Y S 2018 Saint-Petersburg landscape scenarios and green architecture in the strategy of urban development (MATEC Web of Conferences Num. «Business Technologies for Sustainable Urban Development») (EDP Sciences) 02001
[14] Merenkov A V and Yankovskaya Y S 2016 Social housing: prospects for improvement (Architecture and construction of Russia № 1-2) pp 58–67
[15] Yankovskaya Y S and Merenkov A V 2019 Modern trends in the formation of residential development in renovation (New Ideas of the New Century: Proceedings of the International Scientific Conference) ed E M Samsonova (Khabarovsk: Publishing house of Pacific National University) vol 1 pp 426–430