Civil Engineering and Architecture 11(3): 1220-1233, 2023 http://www.hrpub.org
DOI: 10.13189/cea.2023.110308

# Development of the Architecture of Residential Buildings from the Beginning of XX to XXI Century (By the Example of Astana)

**Toishiyeva Almagul Almaganbetovna[1,*], Toishiyeva Altyn Daniyarovna[2], Mamedov Seimur Etibar Ogly[1], Harutyunyan Emma Papin[3], Khvan Yelena Nikolayevna[1], Amanbay Alua[1]**

[1]Department of Architecture, Faculty of Architecture and Construction, L. N. Gumilyov Eurasian National University, Astana, Republic of Kazakhstan
[2]LLP Azamir Time, Astana, Republic of Kazakhstan
[3]Department of Theory of Architecture and Heritage, National University of Architecture and Construction of Armenia, Yerevan, Republic of Armenia

*Received October 23, 2022; Revised January 4, 2023; Accepted January 28, 2023*

***Cite This Paper in the Following Citation Styles***

***(a):*** *[1] Toishiyeva Almagul Almaganbetovna, Toishiyeva Altyn Daniyarovna, Mamedov Seimur Etibar Ogly, Harutyunyan Emma Papin, Khvan Yelena Nikolayevna, Amanbay Alua , "Development of the Architecture of Residential Buildings from the Beginning of XX to XXI Century (By the Example of Astana)," Civil Engineering and Architecture, Vol. 11, No. 3, pp. 1220 - 1233, 2023. DOI: 10.13189/cea.2023.110308.*

***(b):*** *Toishiyeva Almagul Almaganbetovna, Toishiyeva Altyn Daniyarovna, Mamedov Seimur Etibar Ogly, Harutyunyan Emma Papin, Khvan Yelena Nikolayevna, Amanbay Alua (2023). Development of the Architecture of Residential Buildings from the Beginning of XX to XXI Century (By the Example of Astana). Civil Engineering and Architecture, 11(3), 1220 - 1233. DOI: 10.13189/cea.2023.110308.*



**Abstract** This work provides a historical overview of the formation of the architecture of residential buildings in Astana, where the stages of the period from the second half of the 1930s of the 20th century to the beginning of the 21st century are identified, the definition of features of which is characterized by the activity of housing construction and the importance of the role of the city in the socio-economic life of the country. As a result of the study, during the period under consideration, three stages were identified within which there was an active formation of residential development in Akmolinsk, Tselinograd, and Astana. The first stage from the 30s to the middle of the 50s of the XX century is characterized by the development of industry and the importance of the city as a railway junction in Central Kazakhstan. This stage of housing development implies three periods: pre-war (1936–1940), military period (1941–1945), and post-war period (1946–1953). The second stage from the mid-50s to the early 90s of the XX century is the development of Tselinograd and is associated with the development of virgin lands as well as with the current stage in the development of Soviet architecture. At the third stage (the end of the 20th and beginning of the 21st centuries), the city that has acquired the status of the capital of a sovereign state becomes its political, cultural, and spiritual center. The article is based on archival materials collected by one of the authors, Toyshiyeva A.A., in the state archives of Astana, as well as on the materials of a field survey of residential buildings in the city of Astana. As a result, the features of the construction of residential buildings within the established periods are shown, along with their formation in the wake of the search for new architectural and planning, space-spatial, and urban planning solutions in the context of socio-economic transformations in the development of society.

**Keywords** Residential Buildings, Architectural Environment, Housing Construction, Construction Stages, Building Materials

# 1. Introduction

Almost a quarter of a century has passed since Kazakhstan gained independence in 1991, and because of this, Kazakhstani cities began to change significantly in the market economy, a new geopolitical situation, and the internal policy of the state. First of all, essential changes in all respects occurred in the capital of sovereign Kazakhstan, which in a relatively short time became a completely different city, undergoing radical transformations, from the planning organization of the territory, transport and engineering infrastructure, to the architectural appearance of residential and public buildings.

It should be noted that the Soviet architectural environment that emerged in the image of the environment is typical of most small towns in the post-Soviet space.

Hence, Kalabin A.V. and Kukovyakin A.B. note in their work [1] that the rapid pace of construction, simplicity, and cheapness were the absolute properties of large-panel construction; not a single official document mentions the aesthetic qualities of residential buildings. By the mid-1960s, it became clear that the development of standard houses led to the formation of an extremely monotonous living environment. The authors emphasize that in the USSR during its existence, several hundred house-building plants were built, producing a variety of standard series of residential buildings for various natural and climatic conditions that were externally and internally not much different from each other.

Progressive methods of construction and the large, rapid scale of the construction of Akmolinsk and Tselinograd, which began in the second half of the 30s and lasted until the mid-90s, predetermined the prevailing picture of the monotonous architectural and spatial environment of residential development.

The book "Architecture of Kazakhstan" by A.I. Castagne and B.A. Glautdinov [2] revealed the development of Kazakh architecture in the context of the country's historical events, noting the 1930s as a significant stage in the republic's national economy and culture.

In his scientific work "Architecture of Kazakhstan of the XX century," Doctor of Architecture Samoilov K.I. [3] notes that the 20th century occupies a special place in the development of the country's architecture. Here the author emphasizes that "multidirectional social conflicts replace each other in a historically short period of time, accompanied by drastic changes in the way of life and ideology at the state and household levels, combined with an accelerated growth in the development of territories, incomparable with previous centuries, both in new zones of established settlements and in newly developed areas."

The number of stories of residential development in Akmolinsk did not exceed two or three floors until 1954. The city develops along the railway line in the northwest direction, and in terms of planning. It has a rectangular grid of streets with block buildings.

The new grand scale of construction, starting in 1954, is associated with the uplift of virgin lands as a new agricultural policy of the Soviet state. In this regard, there has been a significant increase in the population of a relatively small city, which required an urgent review of the urban structure of the city and the housing program.

A significant increase in population is observed in connection with the formation of the city in the 1960s and 1970s, as well as the formation of a large railway junction of the South Siberian Railway, with the development of the Virgin Lands. Akmolinsk was renamed Tselinograd in 1961 after becoming the center of the Virgin Territory. The city is being actively built up with 5-story panels and block houses for industrial production. In the late 1960s, nine-story houses were built, and in the mid-1970s, twelve-story houses. With the process of the collapse of the USSR and the associated changes in the social sphere and the national economy, there was a slight decrease in the pace of construction until the mid-1990s.

The formation of the architecture in the status of the new capital of sovereign Kazakhstan lies both in the new left-bank territory and in its parts, which are made up of fragments of buildings from different periods. The development of the observed city is based on the "symbiotic architecture" of Kisho Kurokawa, which is based on the generally accepted coexistence of the historical past and future, different cultures, architectures, and ideas of nature. According to the new master plan, the free territory of the city on the left bank of the Ishim River is being developed in order to create a new administrative and business center. It is in this part of the Australian capital that new, large residential complexes are located.

In their work, Belyakov V.A. and Kalistratova A.D. [4] emphasize that new cities in the country should be built and reconstructed according to new rules, formed according to the new legislative and regulatory framework, and the old city design system abandoned.

The development of the country's architectural and spatial environment is inextricably linked with the country's economy and geographical location and is associated with its features. In connection with socio-economic transformations in society, the quality of the living environment, typology, space-planning structure, style, and formation of original architecture also changed. Thus, the dynamics of the processes of transformation of residential planning units and the formation of a general picture of the development of the architecture of residential buildings in the area of prospective development are of scientific interest and are of undoubted relevance.

The relevance of the study is due to the search for design solutions for the formation of a residential environment that has developed as a result of the processes of socio-economic transformations in society and the need to predict its further development.

The study's goal was to identify the main architectural-planning and volume-spatial features of Astana's living environment formation, which arose from the identification of external manifestations in the process's

development.

Based on the specified purpose of the study, the observations made it possible to determine the main objectives of the study:

- conducting a field survey of residential planning units;
- Identification of historical and socioeconomic factors influencing the design of Astana's residential buildings;
- determination of planning, architectural, and spatial features of residential unit formation in a historical retrospective.

## 2. Materials and Methods

The study involves the use of methods of analysis, study, and field survey of residential buildings since the second half of the 1930s and the beginning of the XXI century. A comparative-historical review of the development of the residential sector of Astana is used, where characteristic architectural and planning, volumetric and spatial, and style features of residential buildings are revealed. Methods of researching literary sources on a given topic were combined with archival documents for a deeper analysis.

The research material is based on archival data collected by Toyshieva A.A. in 2014 in the State Archives of the Republic of Kazakhstan (Astana), the State Archives of the City of Astana, and the State Enterprise of the Real Estate Center for the city of Astana. A field survey of residential buildings, many of which have already been demolished (built between 1936 and 1950), was carried out by Toyshieva A.A. in 2014–2015.

## 3. Results and Discussion

### 3.1. Formation of residential development from the second half of the 30s to the beginning of the 40s. XX century (pre-war period)

The first stage includes three periods: pre-war (1936–1940s), military period (1941–1945), and post-war period (1946–1953).

Since 1936, there has been an increase in housing construction in the republic, which is characterized by the beginning of a wide design and construction of economical residential sections for mass housing. The formation of residential development in Akmolinsk in these years is associated with the construction of railway lines Akmolinsk-Borovoye and Akmolinsk-Kartaly, which caused the intensive construction of residential buildings for their specialists and hostels for workers. These changes had an impact on population growth due to the migration of rural residents to the city, as well as young people who arrived from the fraternal union republics. Table 1 [5] presents the dynamics of the city's population from 1824 to 1997.

**Table 1.** Figures of the population from 1824 to 1997

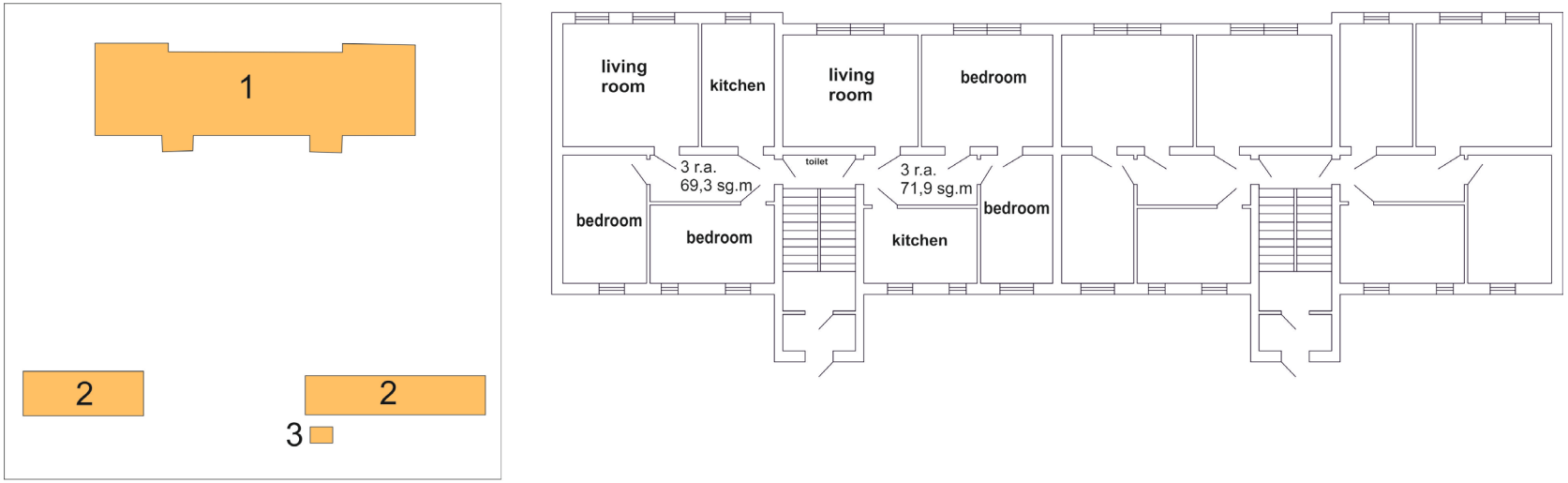
| Years | Population as of January 1, thousand people | Note |
|---|---|---|
| 1 | 2 | 3 |
| 1824 | | Year of foundation |
| 1897 | 9,7 | census |
| 1926 | 12,8 | census |
| 1939 | 32,1 | census |
| 1949 | 76,0 | census |
| 1959 | 102,3 | census |
| 1970 | 181,3 | census |
| 1979 | 233,6 | census |
| 1989 | 282,5 | census |
| 1992 | 293,5 | The year of the change of population growth to decline |
| 1997 | 277,1 | |

A typical example is the two- to three-story residential buildings made of brick, frame-reed, and log walls along Karasai-Batyr (formerly Pervomaiskaya) Street, Shyntas (formerly Krivoguz), and Kartalinskaya Street.

For example, the surveyed two-story, eight-apartment building, house number 9 on Shyntas Street (formerly Krivoguz). The walls of the residential building are timbered. The building was built in 1936. Built in line with constructivism, the dwelling has strictly geometric outlines for the main volume in the form of a parallelepiped, devoid of any decor. In the architectural and artistic image of the houses, no special decoration was attempted, both volumetric and colored, residential buildings of this period had a calm white and beige finish. The windows have a simple decorative framing element: wooden architraves on three sides, top and sides (Figure 1).

A simple, rectangular layout of a residential building consists of two identical sections and includes two three-room apartments on each floor. The area of three-room apartments is from 53.3 sq. m. to 65.4 sq. m., and the height of the living quarters is 2.5 m. The layout of the apartments does not include a bathroom. The total area of the site was 2311 sq. The organization of the territory of the yard space carried out simple functions: playgrounds for children's games and communication, and wooden outbuildings typical of this time: sheds with separate latrines (Figure 2).

**Figure 1.** Astana, a residential building built in 1936 at 9 Shyntas Street (formerly Krivoguz Street). Photo by A.A. Toishiyeva, 2014 (houses demolished in 2018)




Source: RGKP Real Estate Center of Astana, file 5016 (archived data by the author A.D. Toishiyeva, produced in 2014). 1- dwelling house; 2- utility building; 3- lavatory.

**Figure 2.** Plan of the 1st floor and site plan of the residential building at 9 Shyntas Street

It should be noted that individual houses of this era were oriented incorrectly to the cardinal points. Improvements within the quarters were not carried out in full (as can be seen from Figure 1). The low quality of locally produced building materials, violations of building codes and rules for the production of works, and the formality of technical supervision affected the quality of residential buildings [6].

Another example of a residential building from this period is a brick building on the Karasai Batyr 10 street (formerly Pervomaiskaya St.). According to its planning and volumetric solution, this building is made in compliance with compositional techniques based on the principles of constructivism with simplified classic decor elements. The horizontally elongated three-dimensional composition with a strict rectangular layout of the house is divided into four compositional axes, which are distinguished by high light openings illuminating the staircases. The triangular gables of a transverse gable roof protrude along the ends of the building (Figure 3). Of the decorative elements, there are shed umbrellas over the entrance groups, the crowning cornice, and decorative pediments located on the cornice along the main compositional axes of the building, which emphasizes the nature of the decorative elements (in a simplified version) of "Stalinist classicism."

The three-story residential building includes four sections. The layout of the sections is designed with two three-room apartments per floor, with one walk-through room (Figure 4), a bathroom without a separate toilet. The area of apartments varies from 47 to 49 sq. m., with a ceiling height of up to 3 meters. Each apartment has a "summer room," an open balcony next to the bedroom, which, taking into account local climatic conditions, is oriented to the south side of the facade. The building has a basement as well as a built-in premise on the ground floor, a shop with an area of 62.8 square meters. The apartments are oriented to two sides of the horizon, with the kitchen and common room facing the northern, courtyard side of the house. The building plot area is 6302 sq. m.

In conditions of acute housing need, in addition to residential buildings with a sectional structure, two-story dormitories for workers with a corridor type of layout were also built.

The living environment of this period, in connection with the new social conditions of society, was created according to the principle of the location of residential buildings near the place of work, namely, along the front of the street along the railway line.


**Figure 3.** Astana, a residential building built in 1937 at 8 and 10 Karasai Batyr Street (formerly Pervomaiskaya Street). Photo by A.D. Toishiyeva 2014. The house was demolished in 201

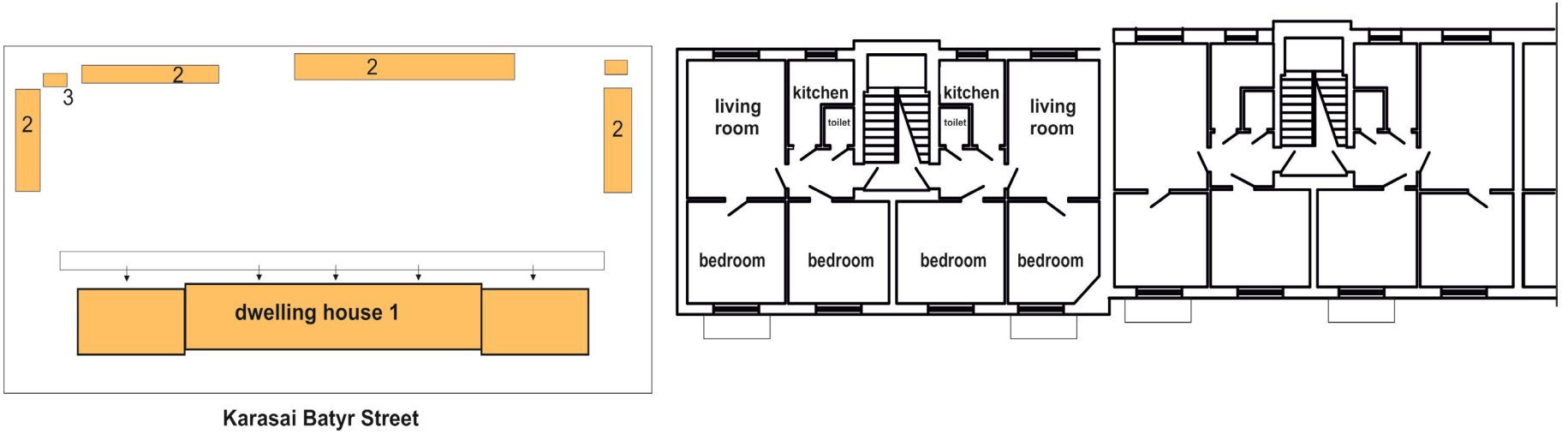



**Figure 4.** Model plan of a residential building (two sections of five) on Karasai Batyr Street (formerly Pervomaiskaya Street) 8 and 10 with a site plan. **Source:** State Enterprise Real Estate Center of Astana archive file 11815 (archived by the author A.D. Toishiyeva in 2014). 1 - dwelling house; 2 - household building; 3 - latrine.

### 3.2. War period (1941-1945)

During the Great Patriotic War, the construction of residential buildings in Akmolinsk was accelerated due to the relocation of industrial enterprises and the evacuation of the population from the western (enemy-occupied) regions of the country to the cities of northern Kazakhstan. The city received tens of thousands of people, and the construction of residential buildings was temporary but preserved the low-rise structure of the city. These circumstances in the town planning plan predetermined the division of urban areas into two zones: industrial and residential.

### 3.3. Formation of residential development from the second half of the 40s to the beginning of the 50s. XX century (post-war period)

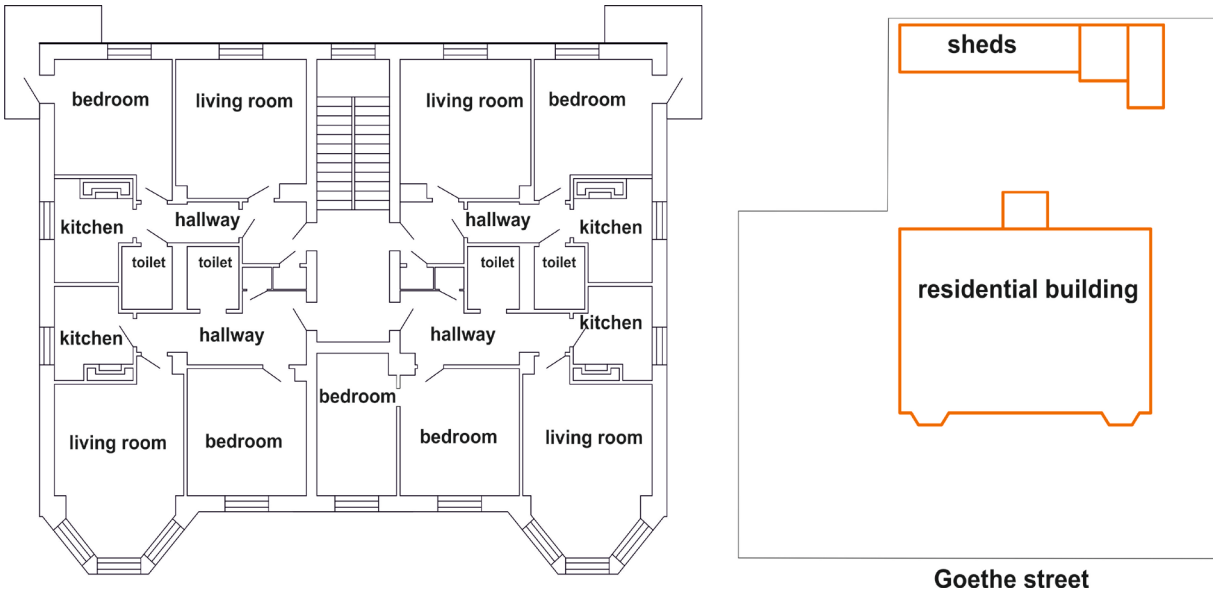
The post-war recovery period predetermined the rapid pace of post-war housing construction, which necessitated the transition to standard projects and series.

The main mass type of residential buildings in the 40s and 50s were residential buildings built according to Series 207, "Project 207-1." Most of the dwellings remain two- or three-story houses built of brick and frame-reed walls, usually arranged in rows. Several such houses can be seen around the central square or along the railway station [7]. In the architectural decoration of ordinary, 2-3-story buildings, made in the style of "simplified classics," there are simple classical decorative elements and details in the form of inter-floor crowning cornices, rosettes, sandrails, brackets, and panels. The color scheme of the facades remains white and beige. The orientation of the apartments is two-sided, with some violations of the norms for the orientation of rooms to the cardinal points; for example, some bedrooms are oriented to the north side of the horizon and the living room to the south (Figure 5).

According to local historian Dubitsky A.F. [8], until 1961, Akmolinsk could not boast of special beauty and had a very unappealing appearance.

Groups of houses were located both along the fronts of the streets and mixed, forming entire blocks. The architectural and planning solution for residential buildings has a more compact structure and consists of one section, which includes four apartments on one site. The outer walls of the houses are made of cinder block brick, and the thickness of the entire layer is 750 mm. The total area of two-room apartments was 54 sq. m. on average, and 71 sq. m. for three-room apartments. The apartments have a bathroom without a bathroom. The quality of the landscaping of the yard space remains low (Figure 6).


**Figure 5.** Building on Goethe Street 18, 20. Houses were built in 1947. Photo by A.A. Toishiyeva, 2014




**Source:** RGKP Real Estate Center for the City of Astana file 4850-5 (archived data by the author A.A. Toishiyeva produced in 2014).

**Figure 6.** Plan of a typical floor plan of a residential building, 20 Goethe Street (formerly Elevatornaya Street), site plan

Investigated residential buildings of the first stage are from the 30s until the middle of the 5th century. The twenty-first century has been revealed:

- The main urban development type is line building, i.e., a linear arrangement along the railway line and along the front of the main streets, which created the monotonous character of the residential development of this period;
- The main planning type of residential buildings are two-three-storey sectional houses. A new standard project of the 207-1 series is introduced in the post-war period, from the second half of the 1940s to the beginning of the 1950s, in connection with the recovery period of societal development;
- The main type of plan of the studied residential buildings from the second half of the 30s to the beginning of the 40s is an elongated rectangular shape. From the second half of the 40s to the beginning of the 50s, the form of the plan changes slightly (Series 207-1): it has a more compact structure, a bay window appears in the layout of apartments to increase the area of the room, and its glazing around the perimeter improves illumination;
- A common feature of all apartments at this stage: a rational layout for one family (taking into account the resettlement standards at that time), a small area of kitchens and bathrooms, without a bathroom;
- Since the post-war period (from the second half of the 1940s to the beginning of the 1950s), the area of apartments has been increasing compared to the previous period: the area of two-room apartments was equal to the area of three-room apartments of the previous period;
- In the architectural and artistic image of houses in the second half of the 30s to the beginning of the 40s, no special decoration was undertaken, both volumetrically (slightly with elements of a "simplified" classic) and in color. Residential buildings of this period had a calm white and beige finish, which created a monotonous character for residential buildings of this period;
- The architectural composition of the facades has a symmetrical solution.

### 3.4. From the mid-1950s to the early 1990s, residential development was formed

This stage determines the development of Tselinograd and is associated with the development of virgin lands as well as the current stage in the development of Soviet architecture. Thus, the city is once again at the center of such events as the construction boom and rapid population growth.

In this regard, in 1957, the Council of Ministers of the Kazakh SSR approved a city planning project (architects E.K. Dyatlov and V.Sh.) due to the placement of large objects on them. According to the new planning structure, the city is developing while maintaining a rectangular grid of streets along the railroad in the western and slightly southeast directions. Thus, along the newly built highway of Mira Street (now Beibitshilik Street), which connects the station area with the city center, five-story panel residential buildings of industrial production of the 1-335-4 series are being actively erected (Figure 7).

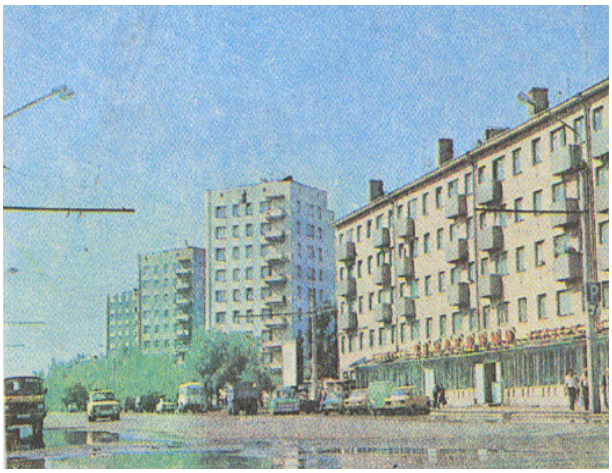


**Figure 7.** Tselinograd. Victory Avenue (photo 1969). Photo by D. Slashchev

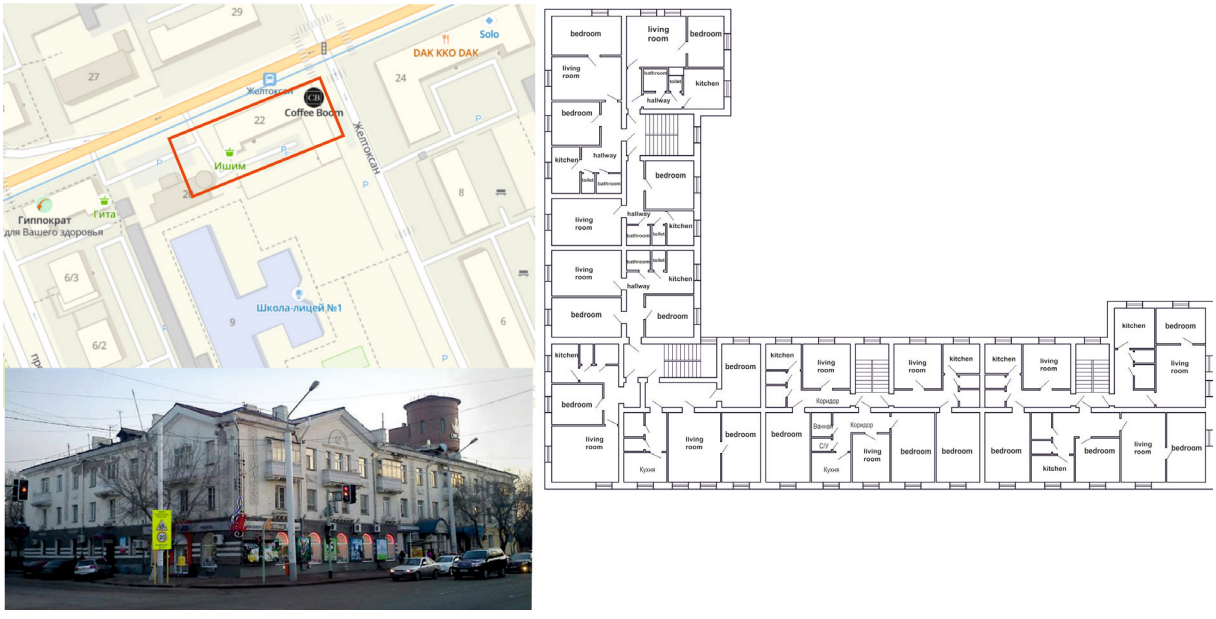
The rapid growth of the economy and cultural level of the Virgin Islands required the development in 1962 of a new planning project, which was carried out by Lengorstroyproekt together with the Research Institute of Urban Planning, with the participation of Promstroyproekt, Promtransproekt, and other institutions. The project used such progressive trends as functional zoning of the territory and comprehensive consideration of natural and climatic conditions [9]. Since the 1960s, microdistricts and quarters have been actively built up with typical 5-story residential buildings, taking into account the climatic features of the region. But the main type of construction at this time remains low-rise housing. The houses, designed in the style of simplified classics, are made with a strict composition and with the inclusion of simple classical elements in the decor, preserving the general style of architecture of this period.

An example is the brick three-story residential buildings along Kenesary Street (former Karl Marx) (Figure 8), as well as houses along Yesenberlin Street (former Monina).

Here, the design of the facades' decorative elements and details of simplified classics are also observed. The color in the solution of the architecture of the facades is a calm beige tone. This is a 33-apartment, four-access residential building. The section includes three apartments on one landing. The apartments have an area: two-room apartments, from 46.0 to 47.7 sq. m.; three-room apartments, from 65.7 to 75.1 sq. There are bathrooms in this layout. The height of the premises from floor to ceiling is 3 m. The outer walls of the houses are made of cinder block brick, and the thickness of the entire layer is 750 mm.

Building heights have begun to rise to nine or more floors since 1975, with some already reaching 12 floors. Geographically, the city expands and moves to the eastern bank of the Salt Balka stream (now Akbulak), where new quarters and microdistricts are being built.

Until 1997, the housing stock was primarily determined by a low number of storeys, up to five floors, which accounted for 59.4% of the total building. 6–9- and above-storey buildings accounted for 9.4%. The wall materials used are mainly panels and bricks.




Plan of the 1st floor, source: RGKP Real Estate Center of Astana (archived data by the author Toishiyeva A.A., produced in 2014).

**Figure 8.** Residential building built in 1956 at 22 Kenesary Street

**Table 2.** Data on the housing stock as of 01.01.1997

| Planning area | Type of building, number of floors of houses | | | | Total |
|---|---|---|---|---|---|
| | high | average | small | manor | |
| Central | 9% | 69% | 5% | 17% | 100% |
| North | 0% | 0% | 0% | 100% | 100% |
| South-East | 14% | 71% | 4% | 11% | 100% |
| South | 0% | 6% | 22% | 72% | 100% |
| Northwest | 7% | 29% | 6% | 59% | 100% |

According to the materials of the National Archives of the Republic of Kazakhstan, average and high-rise residential buildings until 1997 remained mainly in the Central and South-Eastern planning districts of the city. Housing stock data are given in Table 2 [10].

The collapse of the once-mighty state of the USSR affected the development of the city. The pace of construction in the city decreased significantly, and the situation did not change until 1997.

As a result of a study of the development of the architecture of the residential environment in the second stage from the mid-50s until the beginning of the 90s, based on the growth of socio-economic and cultural development in society, it was revealed:

- A new city planning project is approved; the city expands, and new quarters appear;
- The main town-planning type of building is preserved, namely small-quarter low-rise buildings. Residential buildings of large-panel construction are grouped, forming quarters and micro districts from five or more up to 12-story buildings, forming more enclosed spaces while taking the nature of the climate and prevailing strong winds into consideration;
- For planning purposes, the most common types of residential buildings are two- to three-story brick sectional houses and industrial panel houses in the 1-335-4 series;
- Plan types change; in addition to the rectangular geometry of the plan, an L-shaped form appears, forming a more compact structure for the yard space (important for the northern city);
- The increase in area of the apartments in the studied houses is a common feature: two-room apartments have an average area of 47 sq. m.; three-room apartments have an area of 75 sq. m. Sanitary and hygienic conditions are improving; bathrooms with a separate bathroom now;
- In the architectural and artistic design of 3-story brick residential buildings, decorative elements and details of simplified classics are observed, and the ordinary building of panel residential buildings is characterized by calm neutral forms.

### 3.5. Formation of residential development from the 20th to the beginning of the 21st century

This stage is associated with the relocation of Kazakhstan's capital from Almaty to Astana, as well as the subsequent processes of active construction of buildings and structures, particularly new residential complexes. With the acquisition of the status of the capital, there was a sharp jump in the increase in the urban population, which was a prerequisite for the active construction of residential buildings. Thus, by January 2000, the population was 321.6 thousand, which is 49 thousand more than in 1997 [10]. Today, the population of Astana, according to the 2020 census, is 1,136,156 people.

The city is being built up both in its old part and in the new left-bank territory, i.e., a new administrative, business, and cultural center of the capital is being created. According to the State Archives, the area of urban areas is increasing from 258 sq. km. (as of January 2000) up to 710 sq. km. [11]. The architectural environment of the young capital is formed by imposing a new planning fabric on an existing structure, which consists of fragments of buildings from different time periods: buildings of pre-revolutionary construction in the "modern" style, "brick style," Soviet classics, and modern architecture.

Today, the modern architecture of the city's residential environment, as well as the master plan with its planning structure, is formed on the basis of the author's concept of "symbiotic architecture" by the Japanese architect Kisho *Kurokawa,* which contains one of the philosophical ideas of creating a "symbiosis" between an urbanized territory and the natural system of the city. The main natural landscape element of the city is the Ishim River, along which "green" recreational spaces, walking sidewalks, and pedestrian and bicycle-pedestrian bridges are being introduced.

Astana was conceived as a symbiotic city in the sense that the past and the future were to be harmoniously combined in it. The landscape of the new city was supposed to fit into a specific natural steppe environment, by analogy with which the sparseness of the city body (emptiness) creates an amazing feeling of open space. The city must adapt flexibly to temporary changes, representing an architectural environment of constant renewal, which should be facilitated by the linear zoning system incorporated in the project. The modern architecture of Astana did not provide for a dominant style; it was planned to use numerous repetitions, eclectic techniques, hyper-symbolism, and ahistoricism [12].

Along the embankment, at the initial stage of the construction of the new capital, a new residential area was built for the resettlement of civil servants. The array includes seven 16-story residential buildings overlooking the embankment, with a distinctive color palette of warm tones (yellow, brown, and orange) combined with white [13].

The main principle of the development of the city should be the awareness of the unity of man and nature. In this case, any action against nature is perceived as especially dangerous, and the spatial development of urban areas without taking into account the interests of nature, even with the use of the most advanced technologies, becomes harmful to the environment and humans [14].

A striking representative of the new modern architecture of residential buildings, which reflects national identity, is the Millennium Park complex. The residential complex belongs to the "comfort" class. The architecture of the complex demonstrates elements of national culture, where Kazakh ornaments are included in the decoration of the facades (Figure 9).

The residential complex represents 19–24-story buildings. The complex belongs to the category of business-class housing and includes one-, two-, and three-room apartments. The area of an apartment, on average, varies from 43 square meters up to 95 square meters, depending on the number of rooms. The kitchen area reaches up to 15.4 sq. m.

The public space in the structure of the complex includes various premises: cafes, shops, ateliers, bank branches, etc. The project provides for parking and underground parking. The following innovations are used in the complex: energy-efficient technologies; a green exploitable roof, which can also be used to landscape a residential yard; energy-saving stained-glass windows and windows that allow you to keep warm in the winter; and ecological building materials on the exterior, ivory travertine. The color scheme of the facades, travertine combined with the blue color of the stained-glass windows and windows, is based on the linking of the national architectural color, giving the city's architecture a new regional character. The structural system of the complex is a monolithic frame with brick walls, as in most buildings built at this stage.

At the present stage of development of the new capital, a large number of residential complexes have been built, demonstrating various styles. Thus, the residential buildings of the Nur-Saya complex were erected in the neoclassical style. For example, the Northern Lights complex and the Talan Towers multifunctional complex were made in the hi-tech style (Figure 10). In accordance with the diversity of styles in the modern architecture of residential buildings in Astana, there is an expansion of colors, in compliance with the historically established visual and color perception of architecture.


**Figure 9.** "Millenium Park" residential complex, 2018

**Figure 10.** Residential complexes "Northern Lights", "Nur-Saya", "Talan Towers"

At this stage, in the development of the architecture of the residential environment from the 20th to the beginning of the 21st centuries, the following changes occur:

The city is rapidly expanding, and the left bank of the Ishim River is being developed for the development of a new large administrative and business center, as well as new residential areas;

- Multifunctional residential buildings and complexes are being built that adhere to the idea of multifunctionality of the first floors (developed by architect Ginzburg during the Soviet era);
- Town-planning type of residential development: a closed, independent residential unit; multifunctional high-rise residential complexes of the tower type (as a town-planning accent in the structure of the city); and a mixed number of storeys;
- Sectional houses remain the main types of residential buildings, and there are also gallery houses (for example, the Raduga residential complex). Socio-economic changes in modern society have formed a new approach to housing design: a new typology is characterized by a division into housing classes that form different types of layouts to choose from, making demands on comfort, architectural and artistic expressiveness, constructive solutions, the choice of material for facade decoration, etc.;
- Market relations in the housing sector are formed by the presence of various layouts, from 1-room to 4-room apartments, as well as the presence of public functions in the residential complexes, for example, labor, sports, trade, etc.
- an increase in apartment area; for example, in the Millennium Park comfort class studied residential complex, a one-room apartment has 40-45 m2, while a three-room apartment has 85 $m^2$
- The architectural and artistic aspect of modern housing implies a variety of forms and styles (neoclassic, high-tech, eclectic), as well as the use of various materials in the exterior decoration of facades.

# 4. Conclusions

As a result of a historical analysis of the development of the architecture of residential buildings in Nur-Sultan, three main stages were identified:

The first stage was from the second half of the 30s to the beginning of the 50s (until 1954). The 20th century was characterized by the development of industry and the importance of the city as a railway junction in Central Kazakhstan. The first stage is defined by three periods, identified due to changes in the development of architecture: the pre-war (1936–1940s), military period (1941–1945), and post-war period (1946–1953)

*The second stage*, from 1954 to the beginning of the 1990s of the XX century, constitutes the development of Tselinograd and is associated with the development of virgin lands as well as with the current stage in the development of Soviet architecture.

The third stage is from the end of the 20th to the beginning of the 21st centuries. The city that acquires the status of the capital of a sovereign state becomes its political, cultural, and spiritual center.

The historical analysis made it possible to establish that at the first stage (the second half of the 30s to the early 50s (until 1954) of the XX century), the economic factor and engineering and technical capabilities played a key role in the formation of the residential structure, which formed the characteristic features of the residential buildings of this period:

- low-rise block buildings;
- small apartments;
- low level of improvement of residential yards and sanitary and hygienic conditions;
- architectural, artistic, spatial and typological uniformity (image, color, planning solutions);
- the majority of building materials (reeds, bricks, and panels) are made locally.

At the second stage (from 1954 to the early 1990s), social needs are gradually taken into account, resulting in a new type of living environment: a collection of multi-apartment residential buildings organized into a quarter, or microdistrict. The architecture of the residential environment in this period is characterized by:

- territorial development;
- an increase in the number of residential storeys (from 5 to 9 floors);
- an increase in apartment size;
- better sanitary and hygienic conditions;
- the monotony of residential architecture of panel and block execution in industrial production.

At the third stage (from the end of the 20th to the beginning of the 21st centuries), the social factor has a significant impact on the architectural and planning decisions of the residential environment, which contributes to the expansion of the architectural typology of residential buildings, forming a multifunctional residential complex that complements the residential structure with public and business functions, creating an independent urban element. Characteristic features of residential development during this period

- building height (up to 44 floors, for example, in the "Northern Lights" residential complex);
- a set of different apartment layouts by type and class of housing, accompanied by an increase in the area of apartments;
- multifunctionality, i.e., inclusion in the structure of a residential building of premises with a public function;
- high level of innovation (technical equipment, energy-efficient technologies, "green" architecture);

- variety of styles, as well as with the use of elements of national color;
- The color range of the architecture of residential buildings has expanded;
- The architectural environment of the capital city acquires an individual, diverse character. Along with modern forms characteristic of global trends in architecture, architecture with elements of Kazakh national culture is being formed.

It should be noted that the formation of a new type of living environment is based on the historical protolith of this structure [15].

Thus, the conducted retrospective analysis of the architecture of residential buildings develops that:

- A socioeconomic factor influences the transformation of the living environment, resulting in the formation of a new type of residential structure;
- The dynamic growth of social needs contributes to the formation of an independent residential complex that combines the main urban planning functions in its volume, increasing the level of comfort of these structures and decreasing their reliance on urban functions;
- A wide range of socioeconomic requirements contributes to the expansion of residential structure classification and diversity, resulting in different levels of living comfort;

Multifunctionality is the main characteristic of modern residential complexes, which contributes to their diversity in volumetric composition and architectural and planning solutions.

As a result of this research, the following characteristics of each type of residential building were identified: urban planning, typological techniques, architectural style, architectural and planning, constructive, emphasizing the nature of the development of residential unit architecture within the established periods of research and the effectiveness of decisions made at each stage of the city's development, allowing to expand knowledge in the field of formation of the city.

In the course of the study, the main promising areas of architectural and planning solutions for residential complexes were identified based on historical analysis, field studies, and the study of modern literary sources on the formation of housing at the international level.

As a result of the historical analysis of the evolution of the living environment, it has been established that any changes in the residential structure are mainly related to the socio-economic conditions of a certain period. It is these conditions that have a constant impact on the living environment and set tasks for scientific, technical, urban planning, and environmental factors.

It must be noted the logic, consistency, and validity of the decisions made in the construction of residential buildings at each historical stage, which later positively influenced the development of the city of Astana as a whole.

# REFERENCES

[1] A.V. Kalabin, A.B. Kukovyakin, «Mass residential development. Problems and prospects», Journal "Academic Bulletin of UralNIIproekt RAASN", no.3(34), pp. 55-60, 2017. http://uniip.ru/wp-content/uploads/2018/12/11_3_2017.pdf. DOI: https://doi.org/10.25628/UNIIP.2017.34.8103

[2] A.I. Castanier and B.A. Glautdinov, "Formation of socialist architecture of Kazakhstan" in "Architecture of Kazakhstan". Almaty, "Oner baspasy", Vol. 7, 2012, pp. 138-142. https://eruditor.io/file/1246245/grant/

[3] Samoilov K.I., "Introduction" to "Architecture of Kazakhstan of the XX century (development of architectural and artistic forms). Moscow-Almaty, "M-ARi" design, 2004. pp. 4-930. ill. ISBN 9965-576-17-3. http://tehne.com/assets/i/upload/library/samoilov-arhitektura-kazakhstana-20-veka-2004.pdf.

[4] Belyakov V.A., Kalistratova A.D., "Search for solutions to modern urban planning problems in the design of the city", Modern Construction and Architecture, no. 2(02), pp. 8-11, 2016. http://modern-construction.ru/index.php/mc/article/view/39. DOI: https://doi.org/10.18454/mca.2016.02.5

[5] National Archive of the Republic of Kazakhstan. ON RK. F. 90. Op. 1. D. 1. L. 15.

[6] K.G. Tokzhumanov, "Astana. In search of the image of the ideal city", A new look. International Scientific Bulletin, No. 3, pp. 7-16, 2014. https://www.elibrary.ru/item.asp?id=21401856.

[7] National Archive of the Republic of Kazakhstan. ON RK. F. 90. Op. 1. D. 2. L. A-16.

[8] Dubitsky A.F., "The transformation of the city" into "The City on Ishim". Alma-Ata, "Kazakhstan", 1986, pp. 96-100. https://clib.me/b/152777-andrey-fedorovich-dubitskiy-gorod-na-ishime/readp.

[9] Architecture and construction of Kazakhstan: Photobook. Almaty: editorial office of the Golden Book, 2004.1- 488 p., with ill., Russian.

[10] National Archive of the Republic of Kazakhstan. ON RK. F. 90. Op. 1. D. 2. L. A-5.

[11] National Archive of the Republic of Kazakhstan. ON RK. F. 90. Op. 1. D. 2. L. A-7.

[12] S.M. Tyurin, Yu.V. Nazarov, A.A. Kornilova, "Formation of the artistic and communicative environment of Astana city in the context of the implementation of the Kise Kurakawa urban development project", Academia. Architecture and Construction, No. 3, pp. 100-106, 2018. https://aac.raasn.ru/article/view/66. DOI: 10.22337/2077-9038-2018-3-100-106

[13] National Archive of the Republic of Kazakhstan. ON RK. F. 90. Op. 1. D. 2. L. A-14.

[14] V. A. Ilyichev, V. I. Kolchunov, N. V. Bakaeva, «Urban

planning architectura», Russian Journal of Construction and Architecture, no. 4 (48), pp. 76-88, 2021. http://vestnikvgasu.wmsite.ru/ftpgetfile.php?id=772. DOI: https://doi.org/10.36622/VSTU.2020.48.4.008

[15] O.A. Ivanova, "Features of the formation of the architectural image of Astana, the new capital of Bulletin of the BSTU, V.G. Shukhova, No. 2, pp. 97-105, 2017. http://dspace.bstu.ru/jspui/handle/123456789/1478. DOI: https://doi.org/10.12737/23814