



# Space-Planning Solutions for Buildings of Existing Funds for Residential Buildings

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## ABSTRACT

This article provides an overview of the size and planning solutions of existing housing stock, as well as the functional layout of the rooms. An analysis of the architectural and planning solutions of the first two "generations" of large-panel residential buildings showed that they do not meet modern requirements at all. The shortcomings of the buildings are especially evident in the lack of long-term scheduled repairs. Nevertheless, the period under study led to the beginning of mass intensive construction of housing, aimed at improving the living conditions of millions of people.

## Keywords:

Construction, Roofing, Panel Building, Balconies, Loggias, Porches, Cornice Blocks, Roofing, Prefabricated Reinforced Concrete, Bathrooms.

## Introduction

In the 1950s, industrial methods of construction (based on standard designs, maximum unification and typification of architectural solutions) were used as a solution to the problems of residential buildings in the country. The 1950s and 1960s were a time of great success in the construction of civil buildings in the republic. In less than 10 years, more than 100,000 four- and five-storey houses with a total area of 540 million square meters have been built in the country [1-3]. This has provided a new standard of living in the republic, ie the migration of the population from one-bedroom to one-bedroom apartments. Due to the high demand for residential buildings, the houses based on the new standards had to use maximum economic volume-planning solutions. The large scale and limited material and technical resources required to see residential buildings, in this

case, forced the use of low-cost construction methods.

## Materials and methods

It was necessary to limit the area and height of houses, to build buildings from industrial prefabricated structures made in maximum factories, to build buildings on the conveyor type in the form of "HBP (house-building plant) - construction site". Nevertheless, these buildings were built of durable and long-lasting (100-125 years) usable materials and structures and were equipped with the necessary engineering equipment. They were also influenced by the state policy for the construction of residential buildings at that time (1957) [4-5]. As the national wealth of the country has increased, so has the amount of money allocated to each family, and as a result, we have seen an increase in the area of rooms in households. This figure is shown in Table 1.

**Table 1. Total area of apartments according to design standards, m<sup>2</sup>.**

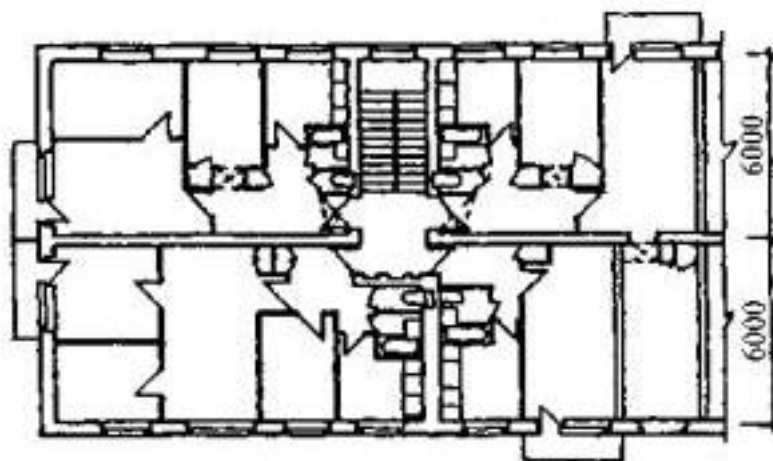
Years standards adopted	when were	Apartment type and number of rooms											
		1		2		3		4		5		6	
		A	B	A	B	A	B	A	B	A	B	A	B
1962		28	36	36	45	45	56	56	68	68	90	-	-
1971		28	36	41	48	58	63	70	74	84	91	-	-
1985		-	36	-	53	-	65	-	77	-	95	-	-
1989		28	36	44	53	56	65	70	77	84	96	96	103

The change in design standards was mainly due to changes in the design of the model and the provision of housing to the population. The ratio of the number of people living in a house to N and the number of rooms in a house to K in the 1960s is  $K = N - 2$ , and in later periods this figure is  $K = N - 1$  and  $K = N$ .

This practice is explained by the use of two options for designing apartments in the norms and model projects.  $K = N$  (small area) for type A apartment and  $K = N - 1$  (large area) for type B apartment.

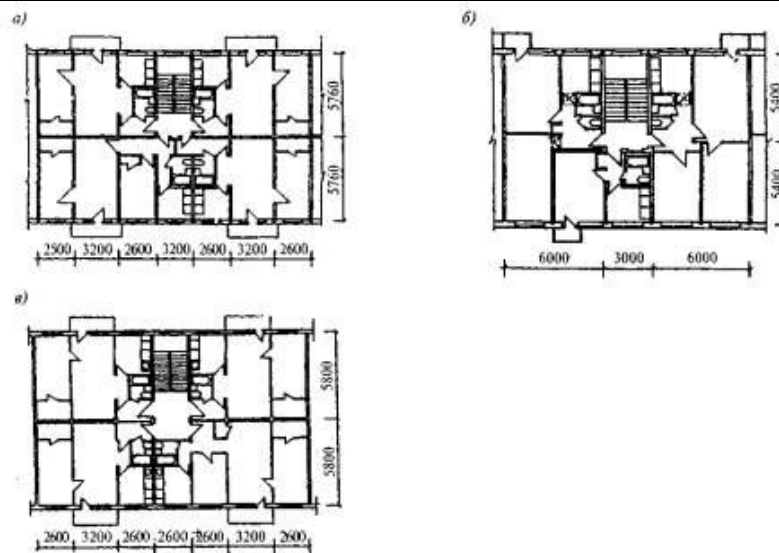
The exchange of new design standards has enriched the concept of "generation" of new projects, and today the "fourth generation" model projects are used in construction [6-8].

The period of mass construction of residential buildings was associated with the period of application of prefabricated reinforced concrete: in the construction of the first underground cycle of buildings - foundation pads and blocks, piles, grids, various panels, partitions, balconies in surface construction, loggias, porches, cornice blocks and roof coverings were made of prefabricated reinforced concrete. Before the widespread use of housing complexes, the design schemes of residential buildings, transverse and longitudinal walls were made of brick. The most common of these was the 1-447 series brick houses (Figure 1).

**Figure 1. Dimensional-planning solution of brick-walled 1-447 series residential buildings.**

From the 60s of the last century, the construction of prefabricated buildings began as the main type of construction. In such

residential buildings, mainly two structural schemes were built: prefabricated and frame-panel buildings (Figure 2).



**Figure 2. Dimensional-planning solutions of standard buildings.**

In frame-panel schemes, the building load is received by the carcass, while in panel schemes, the internal load-bearing panels (transverse wall panels and partitions) are accepted. The advantages of panel schemes of buildings are their low steel consumption (15-20%), ease of maintenance of the overall spatial integrity and priority of the building, high prefabrication of elements in factories and low labour costs in construction. The effective side of large prefabricated houses is due to the technical solution that expands the steps of the internal load-bearing walls (steps up to 6.0 meters). This, in turn, has allowed the use of

effective options in the planning of rooms, especially during the reconstruction of buildings [9-11].

An analysis of the architectural-planning solutions of the first two "generations" of large-panel residential buildings showed that they do not meet modern requirements at all. The reasons for their obsolescence are: the area of kitchens does not exceed 6 m<sup>2</sup>; the combination of bathrooms in a small area; low sound protection of interior walls and partitions; inconveniences in living rooms as a result of a violation of the heat and humidity regime; uniformity and unsightliness of building facades. (Figure 3).

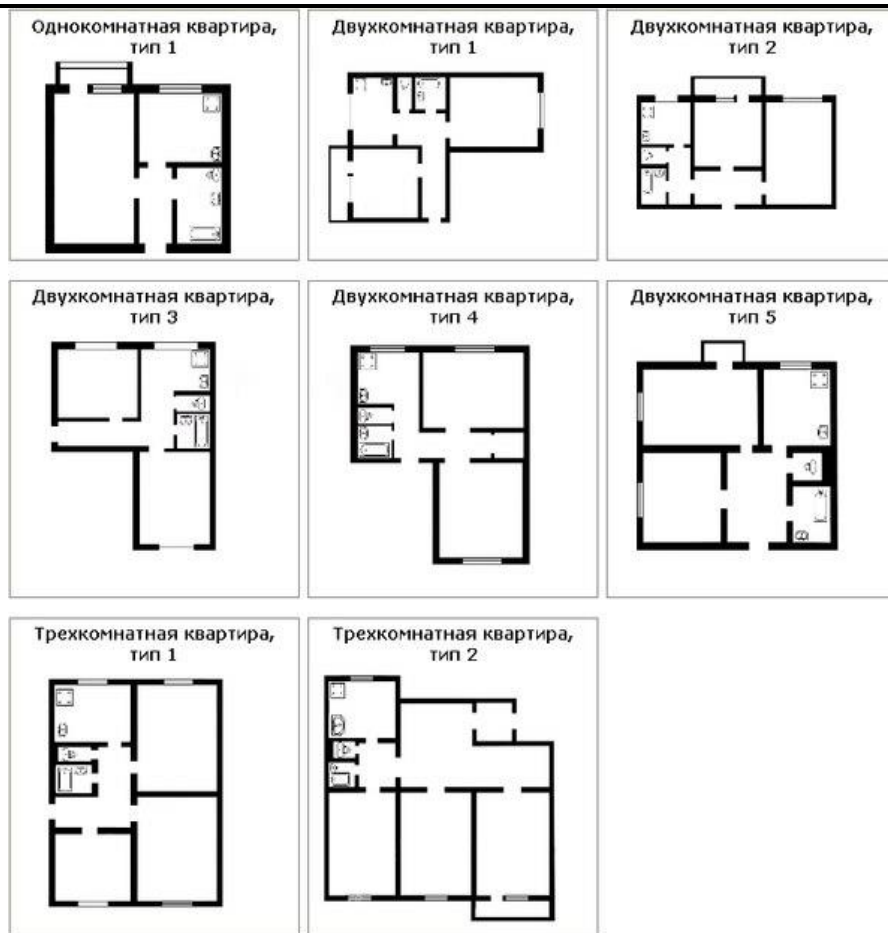


**Figure 3. Planning solutions for residential buildings.**

It should be noted that large-panel buildings built in the early years of industrialization of construction (five-story in the 60s) are difficult to reconstruct, provided that the structural reliability is sufficient. This is especially true of buildings with small internal load-bearing walls. The spiritual and aesthetic shortcomings of the five-story buildings are that they were multi-section houses and were built without taking into account the demographic, historical and architectural traditions of the settlements and their climatic characteristics. The disadvantage of such buildings is that they do not take into account the natural landscape and architectural features of the buildings. Among the shortcomings of the five-story buildings built at this time is that all of them do not meet the requirements for sound protection of interior walls, partitions and curtains. As a result of errors in the design calculations of the flat roofs used in them, the constant humidity

in the rooms on the upper floors of buildings complicates the living conditions of the occupants. The shortcomings of such buildings are particularly evident in the lack of long-term scheduled repairs [11-14]. Nevertheless, the period under study led to the beginning of mass intensive construction of housing, aimed at improving the living conditions of millions of people. Today, the basic capital housing stock of Uzbekistan consists of the following types of buildings:

1. Residential buildings built in the Republic before 1959 (Stalinka and PG-full-size apartment), which have 3-5 floors, the rooms in the apartment are separated from each other, the total area of apartments in the three-room apartment -110 m<sup>2</sup>, up to 40 m<sup>2</sup> in the rooms. The apartments in these houses have separate bathrooms, and wide stairwells, and most of the houses are made of brick. The types of flats are shown in Figure 4.



**Figure 4. Plans of PG-type dwelling houses**

2. These are 4- or 5-storey residential buildings (Khrushchevki), built between 1959 and 1985, as mass and affordable housing. Some of them have separate bathrooms, kitchens have been expanded to 8 m<sup>2</sup> and have walk-in closets.

3. Tip. or St. (standard or standard plan) residential buildings, built on 5-9 floors, with drainage ditches and elevators. Most of these houses are built of reinforced concrete panels (Figure 5).

4. The residential buildings of this time (French planning) were 9-storeyed, and the panels used in them were made in reinforced concrete factories built based on the French project. Such buildings are distinguished by the fact that the rooms in the apartment are separated, there are balconies and loggias, and they have garbage holes and elevators.



Figure 5. St. types of living quarters

5. Residential buildings of the “brick-special plan” type built in the 60s and 80s of the last century (these are 5-6-storey beautiful brick buildings with the area of 2-room apartments of 70-95 m<sup>2</sup>, three rooms are planned from 90 to 125 m<sup>2</sup>, four-room from 135 to 165 m<sup>2</sup>), which are distinguished by elevators, high ceilings and unique plans. Most homes have several bathrooms, spacious living rooms and utility rooms, and the walls of the buildings are made of two bricks. In the residential buildings built in the following years, several amenities for the residents were used in the projects, and such elegant and art-level buildings could add splendour to any city.

### Conclusion

Analysis of architectural-planning solutions of multi-storey large-panel residential buildings in 1959-1985, which has many disadvantages. These include urban, moral, aesthetic and physical shortcomings of 4-5-storey houses. The main disadvantages of the dilapidated condition of the buildings are: the small area of the kitchens; integration of bathrooms in small areas; low sound protection of interior walls and enclosures; formation of discomfort in the rooms as a result of a violation of the heat and humidity regimes of living rooms; the diverse

and unsightly facades of the building are a clear example of this.

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