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PROBLEMS OF TECHNICAL OPERATION OF RESIDENTIAL AND INFRASTRUCTURE BUILDINGS IN SEISMOACTIVE AREAS

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ABSTRACT

This article analyzes the technical condition, seismic strength and spatial viability of residential and infrastructure facilities, as well as analyzes the effects of earthquakes in which measures are taken to strengthen the structural elements of the structure.

KEY WORDS- ***buildings, infrastructure facilities, technical condition, effects of earthquakes***

INTRODUCTION

Currently, rapid population growth affects the growing demand for housing, utilities and utilities infrastructure, the further development of production processes and modern technologies, changes in the environmental impact on humans, and therefore the level and methods of use on housing, public and industrial buildings are also changing.

Increased demand for modern buildings and structures will lead to the emergence of new standards and requirements in the construction industry, old built buildings are physically outdated. This in turn complicates the process of technical operation.

Similar problems are more common in areas with difficult engineering and geological conditions, in residential buildings that are not built in accordance with the requirements of SNiP or in a local style, based on building materials that do not have sufficient strength, do not meet seismic requirements.

Therefore, the time has come to reassess the technical condition of residential and infrastructural buildings built in a local style based on existing seismic standards, to develop measures for the structural strengthening of buildings with insufficient strength and spatial integrity.

The article [1] examined the effect of an earthquake of various intensities and frequency in nature on the seismic resistance of a wooden building. Based on experimental and theoretical calculations, it was found that the frequency composition of the seismic impact significantly affects the seismic resistance of frame buildings.

The work [2] is devoted to the calculation of a two-story reinforced concrete frame frame with crossbars with initial stresses. It is believed that the frame structure in question is susceptible to emergency impact. Using the finite element method, the values of internal forces in structural elements are found.

In works [3,4], free and forced vibrations of the box-like structure of a large-panel building were studied. The box-shaped structure of a building is considered as a system consisting of beam and panel elements.

RESEARCH METHODOLOGY

In seismically active areas there are specific difficulties in the technical operation of housing and infrastructure. As a result of the July 20 earthquake in the Ferghana region, mainly buildings that were not built in accordance with the requirements of earthquake resistance were seriously damaged.

As a result of scientific and technical research, it turned out that the individual housing stock of the Ferghana region is divided into categories: 40% of residential buildings are made of raw brick, 34% of wood, 15% of burnt bricks, 10% of plywood, wood cladding. In addition, the levels of damage and destruction of buildings during earthquakes of magnitude 7, 8 and 9 that can occur are determined on a normative basis: Level 1 - minor damage (eliminated by routine repairs); Level 2 -

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serious injury (requires perfect repair); Level 3 - severe injuries (requiring rehabilitation); Level 4 - malfunctions (reconstruction and strengthening of structures is required); Level 5 - fragments (it is recommended to demolish the building).

The results of the study showed that a possible earthquake of 7 points can damage 60% of individual houses in the region, an earthquake of 8 points can damage 76% of individual houses, and an earthquake of 9 points can damage almost 100% of individual houses.

Defects, space-planning decisions, insufficient strength of building materials, physical and mechanical properties of base soils, non-compliance with the effects of groundwater and violation of technical operational requirements lead to damage and destruction of residential buildings in seismically active areas.

The parts of the building that need to be inspected are: floor and foundations, load-bearing structures, roof, exterior decoration of the building, interior decoration of the building, water supply networks, sewer networks, power supply networks and electrical equipment, heating networks and equipment, gas supply networks and equipment, adjacent territory, fire safety elements.

To reduce the cost of maintaining residential and infrastructure buildings in seismic areas, it is necessary to optimize maintenance and overhauls.

The purpose of the technical assessment of buildings is to determine the supporting structural system of buildings, the basic geometric parameters, the seismicity of the district and the district in which the building is located, and to verify the compliance of the main parameters of the building with spatial strength and seismic construction requirements.

Assessment of the technical condition of buildings includes an initial technical inspection and verification of equipment in kind. In both processes, attention should be paid to the degree to which the technical condition of the building parts meets the requirements of the relevant SNiP standards.

Assessment of the technical condition of a particular building SNiP 2.01.16-97. According to the "Rules for assessing the physical deterioration of residential buildings" [5] is performed on the example of table 1 below.

Table 1
Generalized demolition parameters building structural elements

№	Structural elements and parts of the building	Share of building construction price:Ki,%	Demolition level in technical assessment: Pi, %	Percentage of drift (multiplying 3 and 4 tables):Ki*Pi , %
1	2	3	4	5
1	Foundations	7	20	140
2	Supporting structures (walls or building frames)	36	20	720
3	Partitions	6	20	120
4	Coatings and overlappings	12	20	240
5	Roof	3	40	120
6	Floors	6	60	360
7	Doors and windows	4	60	240
8	Interior finishes	5	60	300
9	Outdoor finishes	3	60	180
10	Engineering equipment	12	80	960
	Other items	6	30	180
	Total:	100	-	3560

As a result of the calculation performed on the basis of Table 1, it was found as a sample that the total degree of damage to the building is 35.6%:

$$P = \sum K_i * P_i/100 = 3560/100 = 35{,}6\% \quad (1)$$

It is recommended to determine the total financial cost of the costs of reinforcing, restoring and repairing the capital structures of the building based on the generalized demolition indicators based on the following formula:

$$C_1 = C*P*N_i \quad (2)$$

where: C1 - the total cost of strengthening, restoration and repair of building structures; C is the financial value of the building, obtained on the basis of cadastral documents; R is the general indicator of damage to the building; Ni is the indexation

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coefficient adjusted for the transition from the last determined cadastral value of the building to the current value of the year.

If it is necessary to find the value of the total cost of strengthening, restoration and repair of damage to a particular part or structural element of the building, it is recommended to use the following formula:

$$C_{1i} = C*K_i*P_i*N_i/100 \quad (3)$$

where: C1i is the value of the total cost of strengthening, restoring and repairing damage to the i-structural part or structural element of the building; C is the financial value of the building, obtained on the basis of cadastral documents; Ki - i - the share of the structural part or structural element in the value of the building; Pi is the degree of erosion, determined by the technical assessment of the design; Ni is the indexation coefficient adjusted for the transition from the last determined cadastral value of the building to the current price.

CONCLUSION

It should be noted that the data presented in column 3 of table 1 have generalized details and do not provide sufficient accuracy in assessing the real situation, determining the costs of reconstruction of a particular building. Therefore, when compiling design estimates for buildings, we recommend that you include a clause to determine the proportion of individual structural elements in the building. Information about this object should also be included in the technical passport of the building accepted for use. Changes in the share of structural parts in the value of the building as a result of major repairs and reconstruction of the building should also be recorded in the passport of the building. As a result, we will have a reality in determining the cost of the next major overhaul and reconstruction of buildings operating in seismic areas.

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