IMPROVING WAYS TO RAISE EARTHQUAKE SUSTAINABILITY OF THE INDIVIDUAL BUILDINGS IN UZBEKISTAN

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Annotation

As more than 63.7% of the population of Uzbekistan (about 24 million people) live in seismic zones with a magnitude of 8-9, their lives and health are at risk in emergencies associated with a strong earthquake (greater than 5). Construction of earthquake-resistant buildings and structures is one of the important tasks in order to reduce risks and minimize losses [13].

Unfortunately, the principles of earthquake resistance are currently being grossly violated in the construction of most private houses (individual buildings). Even simple dimensional and design requirements for seismicity remain unfulfilled. Therefore, because they are not earthquake-resistant, they are severely damaged during a strong earthquake, and even some are highly likely to be completely destroyed. The consequences of strong earthquakes in the second half of the XX century and the first twenty years of the XXI century in the territory of Uzbekistan are a clear evidence of this.

In this regard, it is important to assess and ensure the seismic safety of low-rise buildings made of local materials, to develop methods to increase their strength in seismically active zones of the Republic of Uzbekistan.

Keywords: Project, seismic vulnerability, static loads, risk, elasticity, average damage.

Introduction: Population of the Republic of Uzbekistan 63.7 percent live in rural areas. Most of them live in areas at risk of severe destructive earthquakes, so the problem of seismic safety of low-rise buildings remains one of the most pressing tasks today.

It is known that the reduction of damage in earthquakes directly depends on the accuracy of the assessment of the seismic resistance of the object. Analysis of the consequences of earthquakes in the territory of the Republic of Uzbekistan shows that the main part of the destruction and damage fell on low-rise buildings made of local materials.

In this regard, it is important to assess the seismic safety of low-rise buildings made of local materials and develop methods to increase their reliability in seismically active zones of the Republic of Uzbekistan.

Methods of construction of low-rise buildings from local building materials

The main component that ensures the reliability of buildings against seismic impact is the materials of these structures. For the majority of the rural population, the purchase of quality wood, cement, reinforcement and other building materials remains a challenge. Therefore, the process of building housing from local materials is still ongoing. Given that the population growth rate is increasing every year, it is natural that the seismic risk will also increase. Taking this into account, the Academy of Sciences of the Republic of Uzbekistan The Institute of Seismology, the Institute of Mechanics and Seismic Strength of Structures, is conducting research on the problem of finding the most optimal and relatively inexpensive ways to build housing in rural areas from local materials.

In some parts of the Republic of Uzbekistan, houses are mostly built of weak clay. Even a small earthquake can cause great damage to houses that have large walls and whose walls are poorly connected to each other. For a stone house to be seismically safe, at least a high-quality cement product should be used for the wall [1,2,3].

Without analyzing the true nature of the demolition, the properties of the materials used in the construction, without knowledge of the design schemes, it is impossible to assess the general behavior of the buildings under seismic influence. Therefore, research on further development of the theory of calculation of buildings according

to seismic impact, the properties of materials included in the properties of load-bearing structures, taking into account the earthquake resistance, is relevant for both science and practice.

The strength and deformation properties of complex building walls under the combined action of vertical and horizontal loads depend on many factors: the strength of brick and mortar and their adhesion to each other, the structure and amount of reinforcement of the wall in the vertical and horizontal directions , the degree of compression of the wall with a vertical load, and so on.

It should be noted that in Uzbekistan, clay materials and buildings made of natural stone have a number of serious shortcomings. Most of these buildings were built individually without design and accordingly without taking into account seismic effects [1,4,5,6].

Due to the widespread use of local building materials in rural areas of the Republic of Uzbekistan, such as natural stone and clay, the study of the strength properties of these materials and the study of seismic safety of buildings made of local building materials is a topical issue. The consequences of recent earthquakes, such as Andijan (1902), Tashkent (1966), Gazli (1976), have shown that in rural and mountainous areas of the country not enough attention is paid to the construction of buildings from local building materials. Therefore, it should be noted once again that the construction of natural stone material, mortar with clay materials requires special attention by the builder during construction and operation, which primarily creates the need to protect the structure from moisture.

The problem of using local materials in the construction of buildings will not go away, so it is natural that the construction of such houses continues.

The results of the study of areas affected by strong earthquakes in the past showed that in most cases, residential and ancillary buildings built using mud materials were

severely damaged and destroyed. At the same time, houses with mud-brick walls suffered more damage.

It should be noted that houses built using mud bricks are much better, although some of them are severely damaged until the walls collapse. Consequently, a significant proportion of the raw bricks used to restore the walls remain intact [1].

The causes of damage to buildings built on standard designs are gross deviations from design decisions, violations of construction technology, the use of poor quality building materials. In most cases, the main wooden frames of the houses are not damaged, but the clay parts of the walls are damaged [7,8,9,10,11].

Thus, the construction of such buildings is still ongoing and they are widespread in rural areas.

Technology of building houses from local materials

Wooden houses usually consist of a stone foundation in a mud solution, brick walls and a floor space above the wood filled with wood, and an insulating layer in the mud solution. The clay mass is set at a height of about 50-60 cm on the foundation to obtain monolithic walls in a certain wet state and compacted by hand. The clay mass should have optimal moisture, fluidity and plasticity. Between the installation of the layers, a technological break is established, which is necessary to dry the built-up layer. The main disadvantage of such walls is that after the mud mass dries, the walls shrink, resulting in deformation of the building. The appearance of cracks significantly reduces the strength properties of the walls, leading to great damage and destruction during earthquakes. It is known that the development of each administrative region of the republic has its own characteristics, which include the lifestyle, customs, financial capabilities of the population, as well as the availability of local building materials.

The most common method of housing construction in the villages of the Republic of Uzbekistan is the construction of houses using unbaked bricks of the correct shape. The dimensions of the brick are as follows: 12 × 12 × 6.5 cm; 25 × 12 × 10 cm; 40 × 30 × 10 cm; It can be 36 × 17 × 11 cm. For the preparation of raw bricks, the clay mass is prepared in advance, mixed well, processed by foot and stored for a certain period of time. Plants such as wheat or rice can also be added to the prepared clay from straw husks. This serves to increase the strength of the mud.

For the production of unbaked brick products are used bottom boxes with wooden handles, ie molds. Before filling the clay mass, the mold is moistened with water and sand is sprinkled on the walls, then the clay mass is taken and thrown into it by force, the mold filled with the clay mass is squeezed by hand at the corners and excess mud is removed. The mold is then removed and the bricks are dried for about 10-15 days. The bricks are then piled up next to the house under construction, and the excess is stored under a canopy in reserve. Dried brick should be able to withstand falling to the ground from a height of 1.5–2 m. Construction of brick houses is carried out on the basis of a weak solution with the same base as the mass of clay poured brick. Depending on the design thickness, the walls are made of 1 or 1.5 bricks, rarely 2 bricks [12,1].

When building stone houses, the stones are usually bonded with a mud solution. The thickness of the walls is usually at least 50 cm. The structure of the wall can be made of hard stone or two light outer rows, filling the space between them with small stones or broken bricks. The peculiarity of such walls is that the sufficiently strong stones are connected to each other by a weak mud solution, so the weakest parts of the walls are the connecting joints, in which the destruction of buildings during an earthquake is observed.

Such houses are built as complex structures with walls installed, special gaps left between them, then concreted or concrete carcasses poured and the holes then filled with a wall made of mud bricks. The use of reinforced concrete frames to

build a house whose walls are made of mud materials is the most optimal method to ensure the reliability of the building during strong earthquakes.

CONCLUSION

In Uzbekistan, buildings made of clay and natural stone have a number of serious shortcomings. Most of these buildings are built individually without design and accordingly without taking into account seismic effects.The significant share of 1-2-storey buildings in the housing stock of the Republic of Uzbekistan, and the high level of use of raw and baked bricks, small blocks, cotton and wood siding as wall materials in most of these buildings and individual buildings restored from these materials It is necessary to increase the number of separate applications required to ensure seismic stability.

Ensuring that the physical and mechanical properties of the materials supplied for construction, provided with a factory passport, and in the absence of such a document, the construction organization itself to provide methodological recommendations for testing the material in accordance with the requirements of GOST to establish.

Study and continuous improvement of construction technology of individual buildings built in the Republic. Unfortunately, given that not all villagers have the financial means to build reinforced concrete frame houses, further improvement of the work on the widespread introduction of the above-mentioned modern construction methods into practice. That is, recommendations for expanding the use of basalt reinforcement products, which are considered to be local raw materials, instead of steel reinforcement used in seismic works, and for the joint use of container houses and tire foundations, which are conquering the world with a new approach to construction. development

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