CONDUCTING CONSTRUCTION WORKS IN URBAN AREAS ANALYZING THE CONSEQUENCES OF A STRONG EARTHQUAKE

Buzrukov Zakiryo Sattikhodjaevich
Namangan Engineering Construction Institute, The Republic of Uzbekistan
Abdurahmonov Adkhamjon Sultonboyevich
Namangan Engineering-Construction Institute, Senior lecturer,
Egamberdiyeva Tutiyo
Namangan Engineering, Construction Institute

Abstract: *The article analyzes the terrible earthquake that occurred in Turkey in 2023 and its consequences, as well as the causes of damaged buildings from a structural point of view. It also provides information about the location of tectonic plates in the country and their movements. The article contains opinions on measures to prevent the repetition of the mistakes made in the reconstruction of buildings destroyed by the earthquake in Turkey and measures to protect the population from seismic hazards.*

Keywords: *Seismic hazard, seismic activity, tectonic plates, aftershock, seismic wave, modernization, safety of buildings, seismic strength.*

INTRODUCTION

Ensuring the reliability of buildings and structures in seismically dangerous areas remains one of the urgent issues of modern construction. Soil types and other adverse conditions often complicate the design and construction of seismic areas. The most dangerous situation occurs in the construction of buildings and structures in conditions of high seismic activity. In particular, one of the regions with such complex conditions is Turkey.

About 50,000 people died and more were injured as a result of a strong earthquake that occurred in Turkey and Syria on February 6 of this year. Turkey is located in a seismically dangerous area, and this area experienced strong earthquakes in 1939-1999. In general, at least 76 earthquakes have been recorded in this country since 1900, and the number of their victims has reached more than 90 thousand people.

To understand why earthquakes occur repeatedly in Turkey and some other regions of the world, it is necessary to consider that the earth's crust is a kind of puzzle, and at the same time it has a relatively dynamic nature consisting of many parts, that is, it consists of several huge oceanic plates and several continental plates of the earth's crust. should be taken.

In seismically active areas, it has been known for a long time, but it is still impossible to accurately predict the time of an earthquake. But we can prepare for them.

Among scientists, there is no clear opinion on the number of small and smallest plates. However, it has already been proven that these plates are constantly moving

several centimeters per year. In this process, they either move away from each other, or rub against each other, or one plate falls under the other and undergoes a strong deformation. Then the continents above them begin to move. These plates are called tectonic plates.

As determined by the Italian National Institute of Geophysics and Volcanology, the natural disaster in Turkey caused a 150-kilometer rift in the lithosphere and the Arabian plate moved 3 m southwest toward the Anatolian plate. Scientists say that the new location of these plates has not yet been determined, so the aftershocks are said to continue for several more months.

The study of the territory of Turkey has been of interest to seismologists for a long time. Germany's Geological Sciences Research Center (GFZ) in Potsdam has been installing measuring equipment and conducting seismic monitoring in Turkey since the 1980s. These observations show that the earthquake risk is particularly high in the entire region around the Sea of Marmara. Istanbul is located on this coast.

Fig. 1. The most seismically dangerous regions of Turkey where tectonic plates are located

The main importance of the construction method and soil type during earthquakes.

According to experts, the best protection against earthquakes is to build earthquake-resistant buildings. Unfortunately, it is very expensive, so the question arises: which is more convenient - modernization or building from scratch? According to some reports, more than 6,000 buildings were destroyed in Turkey alone as a result of the recent earthquakes in the Turkey-Syria border region. in ensuring the safety of buildings during an earthquake.

Results: As can be seen from the rates, some of the collapsed buildings may have been built before modern earthquake safety regulations came into force. These buildings are not designed for earthquake forces of this magnitude (Figure 2).

Figure 2. View of the building destroyed by the earthquake.

The method of their construction and the soil layer used as the ground are important

Earthquakes are extremely powerful, and due to their close proximity to the Earth's surface, they generate a large amount of destructive earthquake power. We need to carefully study the fallen buildings and learn from this terrible event. Only in this way can we make our buildings and cities safe against future earthquakes.

At the same time, from the point of view of the safety of buildings during earthquakes, not only the construction method, but also the ground surface on which the buildings are built plays an important role. Therefore, the harder the soil is, the better. If the soil layer is made of granite, it is a solid ground , if it consists of sedimentary rocks, such as sand or clay, it is considered unsuitable as a soil.

According to experts, adverse conditions related to increased surface movement are more likely to occur in soft soils, which cause a condition known as the "crush effect". As an example, if you press down on a sandy soil over and over again, water will collect there, "and the soil will become unstable."

According to experts, the amazing collapse of houses in Turkey can be due to various reasons. In particular, geodesists and designers say that in some cases in the republic, a beamless frame system was used, relying only on columns without supporting beams. As a result, a unified spatial system that received horizontal and vertical seismic forces was not created.

Experts say that one of the main reasons is that the built houses may have been built taking into account weaker earthquakes, or it is concluded that they lost the necessary seismic strength during the use of the buildings. Even if the building is built correctly, after some time, due to the influence of natural conditions, a case of loss of seismic priority can be observed. Therefore, it is necessary to develop a system of continuous monitoring of the technical condition of houses in seismic areas and to implement its control.

Before the start of construction, it is necessary to conduct additional special seismological and seismotectonic studies by the ordering organizations. Traditional

methods of increasing the seismic resistance of buildings and structures include the creation of a reinforced concrete system, reinforcement with shotcrete, the introduction of additional reinforced concrete and metal frames, and the use of reinforcement systems based on external reinforcement using carbon and basalt fibers. Most importantly, one should not forget about the quality control of construction materials brought to the construction site.

In recent years, large-scale comprehensive measures have been implemented in our country to develop the fields of seismology, ensuring the seismic strength and seismic safety of structures, as well as to radically increase the efficiency of the organizations of the sector. Today, it is important to consistently continue reforms in these areas, to introduce new methods of ensuring seismic safety of the population.

In particular, in this regard, it is important to create a strong school aimed at carrying out earthquake-resistant constructions in our country.

In order to further improve work in this regard, on May 30, 2022, Decree No. PF-144 of the President of the Republic of Uzbekistan "On measures to further improve the system of seismic safety of the Republic of Uzbekistan" was adopted. The concept of improvement until 2025" was developed.

Of course, based on this decree and concept, the strategic goals, priorities, tasks, medium- and long-term plans for the development of the field of seismology, seismic strength and seismic safety of structures in the Republic of Uzbekistan were defined.

Therefore, there is a need to improve the legal basis for ensuring the seismic safety of the population and the territory of our country, to define the powers of the responsible state bodies in this regard, and to prepare for strong earthquakes and develop specific mechanisms for eliminating their consequences.

For this purpose, the supervision inspectorate in the field of construction under the Ministry of Construction is assigned the task of creating electronic technical passports of all types of newly constructed buildings and structures, as well as multi-apartment housing, and ensuring their permanent entry into the platform.

Conclusions and recommendations. The analysis shows that even in well-studied areas, the location, timing, and magnitude of future catastrophic earthquakes remain elusive. Currently, there are no answers to these and many other questions, and humanity has only one way to protect itself - it is necessary to improve and develop earthquake-resistant construction in areas where strong earthquakes occur.

James Jackson, Head of Science at Cambridge University, said: “It's important to understand that earthquake prediction is not necessary to save lives. You can save them only by building buildings that can withstand earthquakes. Buildings kill people, not earthquakes."

Therefore, in order to build earthquake-resistant buildings and structures in our country in the future, it is urgent to carry out the necessary research to solve the following important issues:

- Creation of a perfect system of building monitoring;
- development of the seismic activity map of the regions based on various bases;
- development and practical use of tested seismic protection tools designed to reduce seismic impact;
- development of special constructions of foundations;
- to solve the issues of placement of buildings (microseismic fogging) taking into account soil parameters.

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