



## Improving Earthquake Reduction Methods

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**Abstract:** *This article is about construction in the modern world. And the seismic and fire safety of facilities is one of the most important issues; the losses and consequences of strong earthquakes are analyzed in detail. In the 21st century, there is an increase in seismic activity on the planet, in this regard; the speech is going on that there is a need to improve the development of new types of passive and active seismic protection systems to prevent unexpected earthquakes and fires.*

**Keywords:** *natural and technological emergencies, accidents and collapses, seismic waves, seismic zoning, geological hydrological disasters.*

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We all know that building and structure earthquake and fire safety is one of the most pressing challenges in the world today. Hundreds of thousands of earthquakes occur around the world each year, the most of which are minor earthquakes detected only by seismographs and affecting thousands of people, while devastating earthquakes occur in the hundreds. Earthquakes are more common in tectonically active mountain ranges around the world (such as the Tien Shan, Uzbekistan).

Seismic activity on the world has increased in the twenty-first century. To prevent unexpected earthquakes and fires, it is necessary to improve the creation of new types of passive and active seismic protection systems. Earthquake forecasting, as well as the development of new forms of active and passive seismic protection systems, play a vital role in assuring the fire and seismic safety of buildings and structures, as well as strengthening the resistance to shocks, explosions, and dynamic impacts.

Because no system for providing precise seismic information has yet been developed, it is currently impossible to forecast when, where, and at what magnitude an earthquake will occur. Only earthquake-related alterations have been identified. Furthermore, there are numerous indicators of an earthquake. For instance, forshok (waves that occur before an earthquake). According to academician Kahhorbek Abdullabekov, head of the laboratory of the Institute of Seismology of the Uzbek Academy of Sciences, one or two small earthquakes were recorded daily in the Pop district of the Namangan region in January 1984, and the number of such earthquakes increased to 100-150 per day a month later. The local authorities was then alerted that an earthquake had happened, and that an earthquake of magnitude 8 had occurred in Pop. However, forks are not always used. There were no aftershocks on the eve of the 1966 Tashkent earthquake, only aftershocks. The Alay earthquake occurred 120 kilometers south of Andijan in 1978. The groundwater content and magnetic fields had altered at the time, and the last time the local authority was alerted of the earthquake hazard was 6 hours before the earthquake. Leaders in Andijan waited until 24:00, but everyone went home, not

believing that an earthquake would occur in the end. However, at 01:50, the region was jolted by a magnitude 6.0 earthquake.

Online earthquake data is available from organizations such as the United States Geological Survey and the European Mediterranean Seismological Center. The National Information Center of neighboring countries, in particular Kazakhstan, regularly provides information on earthquakes in Central and South Asia on its website. While the Institute of Seismology under the Academy of Sciences of Uzbekistan coordinates the work of scientists conducting research in this area, the Tashkent Central Seismic Station collects information about earthquakes across Uzbekistan, which is published in the Uzbek digital seismic network.

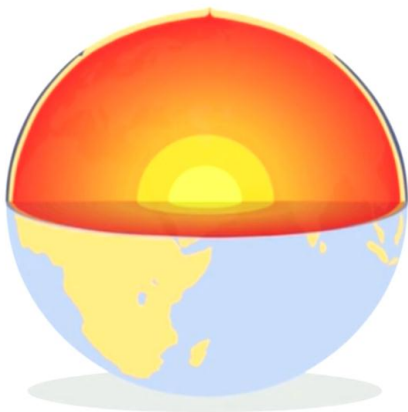
In Uzbekistan, earthquakes with magnitudes up to 7.5 on the Richter scale have been recorded. In seismically risky areas of Uzbekistan, there are around 330 towns and 120 cities. As a result, earthquakes and the disasters that result from their destruction are not ruled out.

80% of the territory of the Republic of Uzbekistan is located in a seismically active zone, where 70% of the population of the Republic of Uzbekistan lives in a seismically active zone. Earthquakes are one of the most terrifying forces on earth. Because fires, floods, landslides, volcanic eruptions, landslides as a result of earthquakes can cause great damage to this natural phenomenon. Its effects depend on relief, soil, condition of buildings, population density, and so on.

The magnitude of the earthquake is measured on a 12-point MSK-64 Richter scale. Depending on its appearance on the surface, earthquakes are evaluated as follows:

1-3 points-weak; 4-5 points-noticeable; 6-7 points-strong; 8-10 ball-destroyer; 11-12 points is fatal.

How does an earthquake occur? The globe is made up of four layers: the crust, the mantle, the outer core, and the inner core.



The Earth's crust and mantle form a cold-hard layer, the lithosphere. The earth's crust is made up of plates and the mantle causes them to move in different directions.

#### *Causes of earthquakes:*

- Most earthquakes occur as a result of plate collisions. As a result of the collision, one of the plates rises on the opposite plate, and this has been the case for thousands of years, resulting in the formation of mountains.
- Lava seeps out of the mantle to fill the crack created when the subsurface plates move in the opposite direction (separate), and a new crust is formed as a result of cooling.
- As a result of other types of movements on the ground, friction is generated and the accumulated energy dissipates as an earthquake, and its furnace is called a hypocenter. Wave propagation is divided into 3 types. The “P” type occurs first and lasts a short time. An “S” type wave occurs after 2-3 seconds and lasts longer. The wave propagating across the earth's surface starts from the center of the epicenter and propagates after the "P" and "S" waves.

Vertically propagating waves cause greater losses than horizontal ones. The propagation of an earthquake wave on the earth's surface is at an average speed of 8 km/s. Earthquakes can generate such force that they could even be 100 times more powerful than the atomic bomb dropped on Nagasaki in 1945. An unpleasant odor can be emitted from water channels before an earthquake, due to the formation of underground gases.

These gases can cause the temperature at the bottom of the water to rise. According to world statistics, 13 million people have died as a result of earthquakes and fires, floods and landslides in

the last 4,000 years. More than 500,000 earthquakes occur each year. Of these, 100,000 can be felt and more than 100 can cause casualties. The most devastating earthquake occurred in Chile in the 1900s. He scored 9.5 points, creating a huge tsunami that washed away everything that came out of the tsunami up to 10,000 km. More than 1,500 earthquakes occur every year in Japan. The earthquake of 1201 is one of the strongest earthquakes to date. The quake killed 1 million people. The quake lasted an average of 1 minute. The longest-lasting earthquake occurred in the Indian Ocean in 2004 and lasted 10 minutes. An earthquake on December 16, 1811 caused the Mississippi River to flow backwards for a short time. The height of Everest dropped by 2.5 cm as a result of the 2015 earthquake in Nepal.

### **Earthquake in the territory of the Republic of Uzbekistan:**

On April 8 and May 17, 1976, two major 9-10 magnitude earthquakes occurred in the village of Gazli, 40 km northwest of Bukhara, 40 km from the epicenter. The village of Gazli was completely destroyed. On July 20, 2011, a magnitude 8 earthquake shook the Kyrgyz Republic, Uzbekistan and Tajikistan. The epicenter was 10 km from the village of Kon in the Kyrgyz Republic.

**Tashkent earthquake.** At 5:23 a.m. local time on April 26, 1966, an earthquake in Tashkent damaged and destroyed tens of thousands of buildings and structures. The magnitude of the



earthquake was 8 points. 78,000 families were left homeless. Residents of Tashkent lost at least 2 million square meters of housing. Two days before and 30 minutes before the earthquake, a satellite was launched into orbit that could provide a high-precision earthquake forecast with a high degree of accuracy in order to create an earthquake warning system in the Russian Federation for earthquake prevention and early detection and similar measures, using them to obtain long-term (several years) or medium-term (several months) earthquake forecasts, increase the stability of the economy and infrastructure, strengthen residential buildings and structures, prepare the population, inform the population about the risk of earthquakes and their consequences it will be possible to take appropriate measures to ensure the stability of the system.

In conclusion, based on the above, in order to reduce the secondary consequences of strong earthquakes in Uzbekistan, to ensure seismic safety of the population and the region, the following measures can be identified:

- ✓ The seismic zoning of the country makes it expedient to build our houses on the basis of this seismic zoning map to withstand earthquakes at this point.
- ✓ Development and implementation of scientifically based actions to prevent and respond to emergencies in advance in accordance with the periodic earthquake forecasts by the functional services included in the state system of emergency response and response.
- ✓ Introduce mandatory seismic resistance requirements in the construction and overhaul of individual residential buildings among the population living in a seismically active area.
- ✓ Creation of an interactive mobile application designed to teach all segments of the population in the country, including tourists, how to behave properly in an earthquake, and its widespread use in practice (with the support of communications companies).

- ✓ To create practical skills for the population to act properly in strong earthquakes in remote and mountainous areas of the country, to create a mobile earthquake simulator to cover all segments of the population with training and to introduce their use in each seismically active area.
- ✓ Creation of educational and material base on preparation of the population for the correct action in case of earthquake in the republic, including regular carrying out of competitions on educational and material base at the city, regional, republican level. This will improve the quality of the system of training the population to act properly in earthquake-related emergencies.

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