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Analysis of the factors of existing building safety and disposal measures

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Abstract: In order to improve the safety of existing housing construction, extend the service life of housing structure. This paper analyzes the influencing factors and some chaos of the structural safety of existing houses in China, and proposes corresponding measures to reduce the impact of these factors on existing houses.

Key Words: Existing housing construction; Security; Influencing factors; Disposal measures

1. Introduction

With the continuous development of China's housing construction industry and the continuous improvement of people's living standards, people's safety requirements for the existing housing buildings are increasing. The safety of the building structure is usually affected by many factors, such as the natural environment, the use environment, and the properties of various materials. In recent years, due to the private change of the existing building structure and the change of the natural environment, housing safety accidents occur frequently, which not only poses a serious threat to the life safety of the people, but also causes huge economic losses. In order to ensure that the existing building building under normal use condition is not destroyed and maintain good performance, it is necessary to analyze the influence of building safety factors, and explore what effective disposal measures to avoid or reduce the influence of these factors, so as to extend the service life of building construction, the purpose of protecting personal property safety.

2 Factors affecting the safety of the existing house buildings

Changes in the nature of the house

At present, it is very common to "housing change business", "factory change" and "housing change", and there is a trend of further increase in the future. According to the statistics of Shanghai Real Estate Economics Association, the phenomenon of unauthorized change of the nature of residential use in Huangpu District is more prominent. As early as the end of 2005, the number of "housing to business" houses reached 5,000 [1]. In the building structure load code, different use properties of the building on the floor can bear the load requirements. For example, the live load of residential and dormitory shall not be less than 2.0 kN/m^2; the live load of classroom and restaurant shall not be less than 2.5 kN/m^2; high traffic buildings such as shops and stations have higher requirements for floor load, and the load of commercial buildings with large traffic flow is more than 50% higher than that of residential buildings. Therefore, unauthorized change of the nature of the house is easy to lead to the overload use of the house floor, affecting the overall safety of the house, but also will have a bad impact on the social security and regional environment around the house.

Impact of construction of adjacent works

With the increasing shortage of urban ground space, the development and utilization of urban underground space are gradually paid attention to. However, due to improper construction methods, improper design scheme and other reasons, the safety of adjacent buildings has been seriously affected, such as uneven settlement of adjacent houses foundation, deformation of piles, etc. In 2003, the water seepage collapse of a tunnel in Shanghai Metro due to the change of construction excavation sequence, resulting in settlement, tilt, wall cracking and even collapse of many

surrounding houses; in 2005, the foundation pit of a square in Haizhu District, Guangzhou turned the original supporting pile into the foot pile, which failed to play a good supporting role, resulting in the foundation pit landslide, the collapse of ocean hotel, and the emergency evacuation of many merchants and residential buildings due to the tilt of the houses. It can be seen that the impact of adjacent construction on the safety of existing houses should be highly valued.

Illegal transformation

In order to make the living more comfortable and the house more beautiful, private excavation of the basement, random demolition of load-bearing and non-load-bearing structure, roof construction and other illegal transformation phenomena are common. The existing building structure has been scientifically designed, planning and construction, illegal transformation is easy to break the load-bearing balance of the original building, resulting in damage to the building foundation, wall cracking and even the overall collapse of the house, seriously threatening the safety of people's lives and property. In 2021, the auxiliary room of a catering company in Jiangsu Province blindly dismantled the load-bearing transverse wall and longitudinal wall, resulting in the continuous collapse of the three-storey auxiliary house from bottom to top; in 2022, the original 5 floor of a self-built house in Jinping Community, Changsha City, Hunan Province was illegally expanded to 8 floors, and the bottom beam and column beyond the ultimate bearing capacity caused the house to collapse and caused a large number of casualties. In recent years, frequent accidents caused by illegal renovation of housing, once again sounded the alarm for the safety of housing renovation.

natural calamities

The occurrence of natural disasters such as earthquakes, landslides and debris flows is uncontrollable. Once present, it often has the characteristics of strong destructive nature and short action time, which has a significant negative impact on the safety of the existing building structure. Take the earthquake as an example, the damage of the earthquake to the building is caused by the form of seismic wave, which is divided into longitudinal wave and transverse wave. The horizontal wave will cause the horizontal shaking of the building and produce the horizontal round-trip force. If the ground floor shear resistance is insufficient, it is easy to cause the house dumping; the longitudinal wave will cause the turbulence of the building. If the ground floor is insufficient, it is easy to cause the continuous collapse of the house. Longitudinal waves and transverse waves often exist simultaneously, so earthquakes are extremely destructive to existing buildings. In addition, there are still a large number of old buildings that cannot meet the seismic grade requirements in China, [2]. At the same time, human beings can not accurately predict the occurrence of the earthquake, even if can accurately forecast, the earthquake damage caused by the secondary disasters and economic losses will be huge, so the earthquake prevention and mitigation work has a long way to go [3].

Human factors in the construction stage

The construction unit, the construction unit and the design unit are all the participants of the housing construction, among which the construction unit is the key link to ensure the quality of the project. The risk avoidance in the construction stage mainly depends on the consciousness of the construction unit and the supervision of the corresponding management department, but there is a contradiction between less risk management investment and the pursuit of high profit [4]. In the process of construction, the human factors that affect the safety of the building mainly include three aspects: first, the technical reasons, the unreasonable construction technology or method is the common technical factor for the housing quality accident, the construction unit, the construction management system, and the design drawings.

3 Disposal measures

Unauthorized change of the nature of the house disposal measures

For the behavior of changes the nature of the house without authorization, first of all, give full play to the role of the administrative competent department,

increase the intensity of administrative punishment, adopt administrative punishment method, order the parties to rectify within a time limit, restore the original state, for the behavior of refuses to perform, can apply to the court for compulsory execution. Secondly, we should fully mobilize the enthusiasm of owners and property, use the way of civil litigation to solve the problem of illegal "housing to business", "factory reform" and "office to residence", and resolutely ban them. Finally, a joint special group, mainly in towns or streets, involving planning, industry and commerce, housing and construction departments, can be established to coordinate the problems encountered in the disposal of the change of housing properties [5].

Dynamic monitoring for adjacent projects

In the construction around the existing building, the corresponding safety management measures should be formulated according to the surrounding environment of the existing house and the proposed project and the allowable deformation of the existing building design. Before construction, in order to ensure the safety of the existing houses, it is necessary to invite the investigation unit to conduct field investigation, understand the soil structure, groundwater level conditions, foundation bearing capacity of the construction site, and accordingly formulate the proposed construction plan and the foundation pit reinforcement plan. At the same time, the testing unit is invited to carry out the whole-process dynamic monitoring of the existing houses, and set up multiple monitoring points on the facade of the building structure to observe whether the inclined deformation of the existing houses before, during and after the completion of the proposed construction is in line with the allowable deformation of the building design. In addition, it is necessary to issue a test report on the structure, location, structural deformation of the adjacent houses before the construction and the depth and scope of each floor of the house, so as to facilitate the comparative analysis of the existing houses in the whole process and the formulation of the reinforcement scheme, which is conducive to the smooth construction of the new building.

improve laws and regulations and strengthen supervision over the whole process of housing renovation

From the application, examination and approval, design, construction and acceptance, a perfect system of regulations should be established to strengthen the safety supervision of the whole process of housing construction renovation, clarify the main responsibilities of all parties involved in the renovation, and continuously implement the daily supervision responsibility of the competent department of the renovation work, especially the supervision in advance. Once the illegal renovation becomes a fact, it will not only affect the overall safety of the building structure, but also the investigation and rectification of the violations will cost a lot of costs, and the difficulty is relatively increased. Before the house reconstruction, the renovation content should be reasonably determined, prohibit unauthorized modification of drawings, and "design while construction"; set up a complaint reporting channel, listen to the transformation opinions of all parties, mobilize the masses to participate in the supervision of the project reconstruction, and effectively improve the quality and safety level of the project.

Old houses reinforcement in areas prone to natural disasters

Earthquake is the most casualties of natural disasters in our country, to reinforce the existing building building, and the surrounding earthquake prone or frequent area using earthquake early warning technology, on the one hand to predict the earthquake, on the other hand can improve the seismic ability of building, effectively reduce the harm of the earthquake. Masonry structure building under earthquake damage is mainly due to its earthquake capacity insufficient [6], so commonly used masonry structure building reinforcement way mainly reinforced cement mortar surface reinforcement method (plywood wall reinforcement method), reinforced concrete wall reinforcement, fiber reinforced composite materials, outside steel reinforcement, prestressed bar reinforcement method such as [7], in order to improve the wall stiffness and bearing capacity. Reinforced concrete

structure building for part is not seismic fortification intensity design or domestic parts of seismic fortification intensity increase, in order to building safety and extend the service life of the reinforcement, the current for reinforced concrete structure reinforcement way mainly add shear wall, layout steel support, expand column section [8], the choice of the scheme to consider the structure bearing capacity whether significantly insufficient, whether interlayer displacement Angle is too large, economic cost and other factors.

Improve the management system of personnel in the construction stage

In the housing construction stage, a perfect construction quality management system should be constructed, the theoretical knowledge, professional skills and safety awareness training of technical management personnel and construction personnel should be strengthened, and the construction should be carried out in strict accordance with the correct construction technology, design drawings and construction plan. In addition, strengthen the supervision of the material procurement personnel, requiring the procurement personnel to be familiar with the quality inspection methods and procurement process of each material, and regularly organize the relevant personnel or departments to carry out spot checks. In order to ensure the implementation of the housing construction quality management work, the post responsibility system is formulated, that is, by the special departments and personnel responsible for, all the construction unit personnel clear their own work responsibilities, management authority, to ensure that the work of the project can be completed with both quality and quantity.

conclusion

Through the analysis of the use nature and structural changes of the existing houses, natural disasters and human factors in the construction stage, it is found that the above changes directly affect the service life and human life safety of the existing houses in China. Then, it is proposed to improve the safety of the existing houses in China from strengthening the supervision, strengthening the dynamic monitoring and strengthening of the existing houses, and perfecting the personnel management system in the construction stage, so as to prolong the service life of the building structure.

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