Research on the current situation and Countermeasures of fire safety management of high-rise buildings

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Abstract: with the acceleration of urbanization and the rise of various high-rise buildings, the fire safety management of high-rise buildings has gradually attracted the attention of all walks of life. Generally speaking, the scale of high-rise buildings is large, and there are relatively many kinds of pipelines and facilities used inside. In addition, it is difficult to evacuate people in case of fire, which poses a great threat to residents' property and personal safety. In order to reduce the fire safety hazards of high-rise buildings and ensure the use safety of the public, we should pay attention to the analysis of the current situation of fire safety management and take targeted countermeasures. Therefore, combined with the author's practical experience, this paper studies the current situation and Countermeasures of fire safety management of high-rise buildings, in order to provide reference for relevant management work.

Key words: high rise building; Fire safety management; Current situation; Countermeasure research

Compared with ordinary buildings, high-rise buildings are further away from the ground, and fire safety management is more difficult, especially to protect the safety of the top floor. In order to ensure the safety of personnel and materials in the building to a greater extent, reduce the incidence of disasters, and control the fire more quickly when the fire occurs, it is necessary to take corresponding countermeasures based on the principle of prevention and timely rescue as much as possible and combined with the difficulties and current situation of fire safety management in high-rise buildings.

1 difficulties in fire management of high-rise buildings

(I) rapid fire spread

Generally speaking, high-rise buildings are large in scale, with many internal pipelines and facilities, which are more likely to contribute to the fire in case of fire. First of all, a large number of pipe shafts, air ducts and exhaust pipes in high-rise buildings will accelerate the spread of fire and increase the difficulty of fire management. Secondly, the high-rise building itself is relatively large. If the fire starts from the high-rise, it will take more time for firefighters to reach the commanding height, which will leave more time for the spread of the fire and make it more difficult to control the fire. Thirdly, the internal structure of some high-rise buildings is not conducive to fire safety management, and the fire isolation design is not scientific and reasonable enough, which is difficult to effectively prevent the spread of fire. Generally speaking, the fire spreads upward and gradually forms a three-dimensional combustion to the buildings, and its speed can reach half a meter per second in high-rise buildings. If the fire can not be controlled quickly, it will often lead to the whole high-rise building falling into the sea of fire, causing a large number of casualties and property losses. When the fire in the building spreads through the pipeline, the speed can be as high as 4 meters per second, and the huge diffusion speed increases the difficulty of control. If the building interior decoration materials lack high temperature resistance, or belong to combustible materials, the fire spread will further accelerate, leading to a significant increase in fire management.

(II) difficult evacuation

The safety distance between high-rise buildings and the ground is larger, which leads to greater obstacles for personnel evacuation after the fire. First of all, the internal structure of high-rise buildings is also relatively complex, so it is inevitable that people will be more concentrated during evacuation, resulting in greater pressure on evacuation work. Secondly, there are many pipelines in high-rise buildings, and the fire spread faster, leaving a shorter time for personnel evacuation. The characteristics of long distance from the safe ground, large number of people to be evacuated, crowded safety passages, and short safety evacuation time greatly increase the difficulty of personnel evacuation. Generally speaking, the height of the highest point of high-rise buildings from the ground can reach nearly 200-300 meters, and it takes about 3-6 hours to complete the evacuation in case of fire. At this time, if the elevator can be used normally, it can accelerate the evacuation and reduce the relevant working pressure. However, the normal operation of elevators is often damaged in the process of fire spread, and firefighters can only evacuate the crowd through dedicated passages, resulting in a reduction in the overall evacuation speed. Once the fire spread to the fire passage, it is likely to cause the normal evacuation of people.

2 Current situation of fire safety management of high-rise buildings

(I) deficiencies in fire safety design

There are many links involved in the whole process of high-rise building from project design to house delivery and use, and each link needs to be standardized in strict accordance with the corresponding building fire rating. In fact, the design and construction process of high-rise buildings are often affected by a variety of objective factors, market factors, external factors and subjective factors. Many times, there are natural fire safety hazards in the design of different functional zones of buildings, and they are often hidden and not easy to be found. Generally speaking, these hidden dangers are reflected in the following four ways. First, there is a reserved space between the wall and the building floor, but the space is lack of flame retardant materials. Second, in order to pursue artistry in design or decoration and beautification

effect in construction, the need for fire prevention is ignored, resulting in the building failing to meet the fire safety management standards of high-rise buildings. Third, the air conditioning installation site and the pipeline in the building are not designed for structural plugging according to the fire protection requirements. Fourth, a large number of combustion supporting and combustible materials are used inside the building.

(II) property fire management is not in place

Generally speaking, developers will conduct fire and safety management for residential areas or buildings by bidding for property agencies. In the specific management work, these property agencies tend to pay more attention to whether the owners pay the property fees on time, and are not concerned about whether the fire passage is unblocked and whether a large number of sundries are stacked in the corridor. Moreover, the property management structure will be equipped with a small number of professional fire safety personnel to manage and monitor the fire safety in the area, and some areas will not even be equipped with professional fire safety personnel. In the management of some high-rise buildings, only elderly people with simple production knowledge are equipped as security personnel. In this case, once a building fire occurs, it is difficult for the security personnel to assist in the evacuation or participate in the fire fighting, which leads to the reduction of the fire safety level of high-rise buildings to a certain extent.

(III) occupied fire dredging site

Property fire management is not in place, and residents' awareness of fire safety is low, resulting in the long-term occupation of the fire dredging site around high-rise buildings. In this case, when a fire occurs, the fire truck or professional firefighters often cannot reach the rescue position at the first time, which delays the valuable rescue time. In addition, some high-rise buildings are not provided with obvious safety signs after they are put into use, resulting in that the fire dredging site is often occupied by private cars. Once a high-rise building fire event occurs, and the fire truck can not reach the operation site quickly, it will often cause unimaginable consequences.

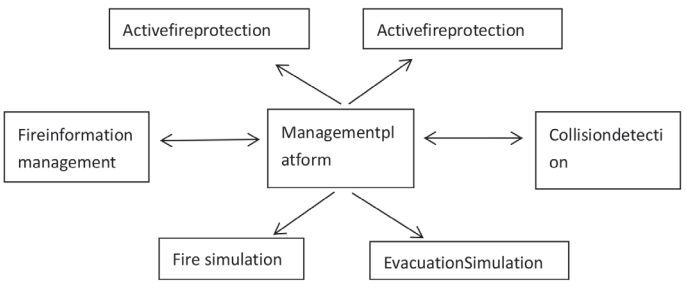
3 fire safety management countermeasures for high-rise buildings

(I) actively solve problems left over by history

In view of the unreasonable internal design and older facilities of some high-rise buildings, we should actively implement a comprehensive inspection and carefully analyze the hidden fire safety hazards in the building. First of all, the relevant management personnel should list the main fire safety problems existing in the buildings on the basis of field research, and gradually take corresponding improvement measures according to their priorities to formulate a complete and feasible fire safety plan. Secondly, the relevant management personnel should carry out the fire control work according to the procedures to ensure that the decoration and structural design in the building reach the corresponding fire safety level. Thirdly, the existing old buildings should be removed and rectified in combination with relevant policies to meet the use requirements.

(II) ensure automatic switching between active fire prevention mode and passive fire prevention mode

Improve fire prevention measures based on BIM platform to realize automatic switching between active fire prevention mode and passive fire prevention mode. The specific design idea is shown in Figure 1. Among them, the design idea of the active fire prevention mode is to install corresponding fire-fighting facilities inside the high-rise building, reduce the possibility of fire, and try to control the fire at the early stage of the fire, such as installing automatic fire extinguishing, smoke control and smoke exhaust, fire alarm and other devices. The design idea of passive fire protection mode is to analyze the fire protection requirements of high-rise buildings before construction, put forward the fire protection performance requirements of building materials, and reasonably design the fire passage and fire compartment, so as to quickly and effectively control the fire and smoke spread in case of fire, and improve the overall fire protection performance of the building. In order to ensure the smooth automatic switching between the two, we should pay attention to collision detection. From the design of high-rise buildings to the later operation and maintenance, it needs to go through multiple links, requiring multiple disciplines such as water heating and electricity, structure and architecture to cooperate to complete the operation. Moreover, the layout of pipelines in the building is complex, and the geometric relationship between different disciplines is complex, which is easy to conflict in the design scheme. Therefore, it is necessary to input the design scheme information of each discipline into the BIM model, With the help of auto desk rev it software, collision detection is carried out to avoid the impact of pipeline layout on fire safety.



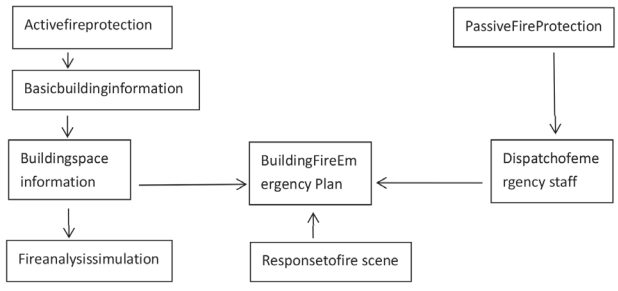


Figure 1 Schematic diagram of fire protection mode design Figure 2 Schematic diagram of fire plan management process

(III) Prepare fire protection plan for high-rise buildings

In order to promote the rational allocation of various resources involved in the fire safety management of high-rise buildings, a fire

prevention plan should be formulated according to the characteristics of the building and its surrounding environment. The flow diagram is shown in Figure 2.

As shown in the above figure, both the active and passive fire prevention modes of high-rise buildings point to the fire prevention plan, so as to achieve the purpose of effective rescue and rapid evacuation of people. When arranging firefighters, the management responsibilities, contents and rescue plans shall be clearly defined in combination with building fire prevention, fire-fighting facilities and fire compartment. In order to further optimize the fire emergency plan design of high-rise buildings, BIM Technology can be introduced to quickly capture the building information, and the building can be displayed in a more three-dimensional and intuitive way in combination with the fire compartment map and the plan, so as to improve the accuracy of on-site decision-making of the plan. At the same time, the BIM model can also be used to simulate the fire scene, and the evacuation plan and fire fighting and rescue plan can be preset according to different fire scenarios.

(IV) strengthen the investigation of fire hazards

First, we should strengthen the joint law enforcement efforts of the planning, construction, safety supervision and other departments in view of the fire protection problems commonly faced by high-rise buildings, and promote them to form a management force. Second, all departments should regularly and irregularly organize relevant special activities, systematically carry out management work, and eliminate fire safety hazards as much as possible. Third, we should strictly implement the approval system and orderly promote relevant reconstruction projects; Inspect and rectify all unauthorized public places; Mandatory measures shall be taken according to law to urge all parties to fulfill their fire protection responsibilities.

Conclusion

In a word, the larger the scale of high-rise buildings, the more complex the internal structure, the more internal pipelines, and the greater the vertical distance from the ground, the fire safety management work faces more difficulties, and the loss caused by fire or even out of control is also greater. In order to prevent the trouble before it happens, control the fire and evacuate the crowd in time when the fire occurs, it is necessary to comprehensively improve the building safety level, and better protect property and personal safety by actively solving the problems left over by history, ensuring the automatic switching between active and passive fire prevention modes, formulating reasonable fire prevention plans for high-rise buildings, and strengthening the investigation of fire hazards.

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