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Original Research Article

A Subway Control Center Fire Design Difficulties to Explore

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Abstract: This paper points out the difficulties in the design from the three angles of fire prevention zoning, safe evacuation and fire hazard by taking a subway control center as a research case, aiming to promote the strengthening of the fire prevention function of the subway control center.

Keywords: Subway control center; Fire protection design; Safe evacuation; Difficulty exploration

Methods: This paper takes a subway control center building as a research case, and makes a comparative analysis of the building in fire prevention area, safe evacuation channel design and other aspects with the current fire prevention design specification standard, to find out the existing problems and design difficulties. **Result:** This paper, through the analysis of the fire risk of the difficult problem existing in the fire prevention design of a subway control center, focusing on the design of the safe evacuation channel, it can be concluded that: the building monitoring hall is designed as an independent fire protection partition, and separated by a strict firewall, can effectively prevent the spread and intensification of the fire, the building inside the evacuation port design Can be for people to escape from the scene of the fire to obtain more escape time, can ensure the evacuation of people in the building to a safe and open area, so as to achieve the overall fire safety evacuation requirements. **Conclusion:** In the subway control center fire prevention design should follow the following two points: First, if you want to control the fire from the source must strengthen the management of flammable materials and electrical wiring failure, in accordance with the management of regular inspection and records; Always ensure the smooth flow of safe passages, the use of manual or functional broadcasting guidance personnel to evacuate in an orderly manner.

1. Basic briefing on the subway control center

As shown in Figure 1, the entire shape of the subway control center selected in this paper is cylindrical, 1 floor underground, 5 floors above ground, the total heightis3 6m2, the total area is8,0127m2, of which6,5588m2 aboveground, an average of 13117.6 m2,1,4539m2 underground. The selected buildings are a class of buildings, level one fire level, underground parking garage can accommodate1,96 cars, fire rating is level two, fire resistance level one.

Figure 1 Of the selected architectural appearance effects

2.The main difficulties and fire risk analysis of fire protection design

2.1 The difficulty of existence

According to the standard of building fire safety in our country, through the study of the layout, structure and function distribution of the building, the difficult problems in the whole fire prevention design are as follows:

doi: 10.18282/l-e.v10i4.2575

First, the fire zone 4d is too space, the total area is6,084m2, the total height is 18 meters, some building height can reachup to1 3 meters, in accordance with the "building regulations" on the requirements of fire prevention zone, to achieve the building's special layout, construction needs, building functions are more difficult to use, the design of fire protection zone is much larger than the fire standard 2000㎡.

Second, safe evacuation, part of the building has been evacuated from more than 30 meters, the evacuation distance is too long, so the time required for the crowd to reach the safe area is too long, and the safe exit is mainly distributed on both sides of the doorway, and when the crowd is in the middle of the arc, the time to the safe exit is longer than the time in the area on both sides, and The radius of the building circle is too long (the evacuation distance is long), so the escape time provided is less, making it difficult to complete the evacuation of all the population.

2.2 Fire risk analysis

Because the subway control center belongs to the very important public building, and concentrates a large number of people, the area of large number of combustibles and ignition sources, fire risk is mainly reflected in the following three aspects:

First, combustibles. The main functions of the subway control center include operation testing, meetings, computer room and daily office, there will be a lot of flammable materials in the office, such as computers, all kinds of paper, green plants and other office supplies, and these combustibles placed in a more concentrated, large number, so once the fire will spread rapidly.

Second, the ignition source. Generally speaking, a fire accident in this building is nothing more than aging, leakage, short circuit or overload of electrical equipment and cables, such as wire insulation aging, short circuit, or increased wire temperature caused by the load, and the use of open flames (smoking) violates management Regulations and fires caused by careless use of fire are ultimately fires caused by lightning strikes, static electricity, and arson with the least chance of occurrence.

3. Design plan and difficulty analysis

3.1 Fire fighting

The total height of the selected building is 18 meters, and the vertical transportation is mainly elevators. Generally, passenger elevators in public buildings are rarely equipped with professional fire-proof, smoke-proof and waterproof equipment and measures, so special fire-fighting can be arranged during the design process. Passages and elevators. In order to be able to rescue tourists in the first time, the design of the rescue window is very important. On the side of the fire rescue operation surface, a medium-sized window for firefighters to enter and exit will be set on each outer wall, and the window size must be greater than 1m×1m, and the distance between the lower end of the rescue window and the ground plane should also be controlled at 1.2 The distance between rescue windows should not be longer than 30 meters, so that it is convenient for firefighters to rescue and escape. In order to avoid serious fire spreading, the entire building is also equipped with professional fire alarms and automatic sprinklers, and all rescue windows adopt movable opening or easy-to-break glass windows, and special rescue identification will be pasted outdoors. Logo.

3.2 Strengthening measures

The automatic sprinkler system is optimized and upgraded. The monitoring hall of the control center adopts an automatic sprinkler system dedicated to a large space, and the water drops can reach any position in the hall at the same time in a short time, realizing a 360° no angle of view, covering any space and details. At the same time, it also has the conversion function between columnar and mist, which can intelligently identify whether to use misty water or columnar water according to the size of the smoke generated by the fire and the level of indoor temperature. When the fire lasts for more than 1 hour, there should be three fire extinguishing methods: automatic sprinkler, remote fire control and on-site manual operation for operation in different emergency situations.

The smoke exhaust system is optimized. It is well known that most people did not die by the fire when they encountered a fire, and the large amount of carbon monoxide and other toxic gases produced by the fire suffocated to death, so the smoke exhaust system is particularly important. The control center monitoring hall is equipped with intelligent mechanical smoke exhaust facilities and a supplementary air system. The smoke exhaust must be higher than 6 times an hour, and the supplemental air volume must also be higher than 50%.

Electrical fire protection requirements, the control center monitoring hall must use two or more fire alarm detection systems, such as infrared fire detection systems and ionizing smoke detectors, etc., and the monitoring hall must be equipped with a fire emergency broadcast system to provide orderly guidance Tourists are evacuated and equipped with an emergency lighting system to prevent the circuit from burning at night due to a fire, which may cause lighting failure.

References:

[1] Hou Tuan Zeng. Design of automatic fire alarm system for Shenzhen Metro Line 4 [J]. Theoretical research on urban construction (electronic version), 2014, (3).

[2] Luo Yuanchao, Dai Shiliang, Zhang Zhenfeng, et al. Design of automatic fire alarm and fire linkage system for subway [J]. Industrial control computer, 2012, (12). 15-16.

[3] Li Le, Xie Yuanyi, Hu zhongri. Experimental study on hot smoke in a subway station [J]. Fire science and technology, 2011, (10). 878-880895.

[4] Wang Haiyan, Guo Xiaomeng. Discussion on automatic fire alarm system of subway [J]. Fire science and technology, 2010, (3). 233-236.

[5] Zhang Cheng. Discussion on fire safety management of subway stations [J]. China Science and Technology Expo, 2015,0 (43). 179.

[6] Cao Wenli, Li Bai. Research on fire linkage control of subway transfer station [J]. China Science and Technology Expo, 2015,0 (43). 286-287.

[7] Yi Saili. Performance based fire smoke virtual simulation analysis of double deck subway transfer station [J]. Journal of system simulation, 2013, (4). 681-686.