

Comparison and Reflection on Barrier-free Design of Urban Streets at Home and Abroad

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Abstract. Urban street barrier-free design is the embodiment of modern urban social civilization. The United States, Japan, Germany, Singapore and other countries have carried out systematic urban street barrier-free design in response to the daily travel needs of the elderly and the disabled. In this paper, the author analyzes the relevant experience of the barrier-free design of urban streets in foreign countries from the aspects of law and construction practice, summarizes and reflects on the design work of urban street accessibility in China, and puts forward some suggestions for improvement from the aspects of laws and regulations and construction practice.

1. Introduction

Urban street barrier-free design is to ensure that the disabled, the elderly, children and other people with mobility difficulties in the travel, can autonomously, safely, conveniently use and use the built material environment. By the end of 2017, the number of persons with disabilities in China was about 85.05 million, accounting for 6.34% of the total population, with an average of one disabled person in every 16 people. There are 158.31 million people over 65 years old, accounting for 11.4% of the total population, and the demand for barrier-free design of urban streets is more and more urgent. After more than 30 years of development, the design of barrier-free environment in China has made some achievements, but no matter in the city streets, there are still many defects and drawbacks in the legislation and practice of road barrier-free design. This paper focuses on the two aspects of law and construction practice, combining with the relevant experience of foreign countries, to summarize and reflect on the design work of our country's urban barrier-free design.

2. The construction of laws and regulations

2.1 Legal construction of barrier-free design of urban streets in foreign countries

The legal construction of barrier-free design in the United States started earlier. As early as the beginning of the 20th century, the United States began to study and formulate barrier-free laws and regulations, which gradually expanded from buildings, streets and facilities financed by the government to various types of buildings and facilities. The American National Standards Association (ANSI) concluded The Standard Specification for Accessible and Accessible Building, Facilities and Equipment for Persons with Disabilities in the United States in 1961, which is the world's first "barrier-free" design specifications. The Building Barrier Act, which was enacted in 1968, is the basic law for barrier-free design of public buildings and facilities, from which the American people began to understand the concept of "barrier-free design", which stipulates that all buildings designed, constructed and modified directly by the federal government or financed by the federal government, accessibility must be achieved. The United States Disability Act's accessibility implementation rules for Traffic vehicles, enacted in 1991, were amended in 1998, minimum accessibility standards for various transport facilities and vehicles are specified in detail. In addition,

state governments make local accessibility design regulations based on national regulations and state conditions.

In the early days of Japan, local self-government groups developed their own accessibility standards for welfare facilities for persons with physical disabilities, such as the Welfare of Persons with Physical Disabilities Act of 1949; In 1973, the implementation of the "Welfare City Policy" symbolized that Japan began to try to establish a unified national legal standard, on the basis of which, in 1982, the Standard for barrier-free Architecture Design was promulgated. In 1994, the relevant provisions on the accessibility of certain buildings were promulgated, known as the Love Building Act; in 2000, the Traffic accessibility Act was promulgated; in 2004, the basic Standards for the Construction of pedestrian Trades were promulgated; and in 2005, the "Love" will be issued. The Building Law and the Traffic accessibility Act were merged into the New accessibility Act, and the Traffic and Building accessibility regulations were issued in 2006. At present, 47 prefectures in Japan have made barrier-free laws and regulations are adjusted accordingly every five years.

In 1954, Germany promulgated the Federal Building Act, which deals with urban planning, land use, land allocation and consolidation, land development and confiscation, and land assessment. The Federal Act on Equality of Persons with Disabilities was enacted in 2002; The Federal Equal opportunities Act was enacted in 2006. In addition, the states, in accordance with the provisions of the Federal Building Act and in the light of the actual situation in their respective regions, formulate state building laws, such as the provisions of the Building Act adopted by the Berlin City Council, All public buildings must provide accessible access to persons with disabilities who are inaccessible.

2.2 Legal system Construction of barrier-free Design of Urban streets in China

The first industry standard for barrier-free design in China was issued in April 1989 by the Ministry of Construction of the People's Republic of China, the Ministry of Civil Affairs and the China Federation of disabled Persons, which jointly promulgated the "guidelines for the Design of Urban roads and buildings for the disabled". In 2000 and 2001 respectively, the Ministry of Housing and Construction approved the new edition of the barrier-free design code to be issued and implemented, which added the design regulations for marking information, and revised the technical data on the reduction of maximum elevation difference between margin ramp and lane, and the reduction of blind ramp bulge height, etc. In the same year, the regulations on the Construction of Barrier-free Environment issued by the State Council on the occupation of barrier-free parking Facilities such as positions should be penalized. Depending on national regulations and industry standards, provinces and cities have also actively formulated relevant local laws and regulations and implementation rules. According to statistics, 438 provincial, prefectural and county-level barrier-free construction and management laws and regulations have been promulgated by 2017.

In the course of continuous exploration and practice, China has gradually established a legal system composed of laws and regulations, departmental standards and local standards to ensure and guide the smooth implementation of barrier-free design. However, due to the late start, the big countries draw lessons from foreign experience, the relevant norms and standards are not clear, the binding nature of the lack of; In addition, because of the overlapping of authority, different departments in the same area have different regulations on the same aspect, which leads to the disorder of construction in the later period.

3. Construction practice

3.1 Construction practice of barrier-free design of urban streets in foreign countries

Blind road is an important material space carrier in the practice of urban street barrier-free construction in foreign countries. In addition to emphasizing its safety and travel ability, blind road gradually presents the characteristics of universality, systematization and information.

Nowadays, most road sections in the United States do not lay blind roads alone, only "touchable warning" ground is laid in key areas such as intersections. In normal progress, the visually impaired can walk along walls, green belt edges, curbstones and separation zones.

In Japan, walking blind roads and warning blind roads are everywhere in public buildings and on living roads with close ties to residents, while warning blind roads are laid on overly busy streets. In addition, The continuity, systematicness and extensiveness of barrier-free design of urban streets are strong: emphasizing the building indoor blind road and the outdoor blind road to form an organic and coherent system, all the intersections are sloping; The main sections of the crosswalk are equipped with blind cross-street acoustics indicators; wheelchairs in public facilities have access to all places; all MTR stations are equipped with lifts with Braille buttons; each subway train All cars have wheelchair seats in special carriages; blind lanes go all the way from ground to subway station.

The barrier-free design of Singapore's urban streets also attaches great importance to the safety of vehicular entrances and sidewalks and the continuity between pedestrian entrances and urban roads: when part of the building's vehicular entrances and exits intersect with the sidewalks, Special pavement and arch slope with large friction force are adopted to make the unobstructed ramp realize flat slope connection, while the driving passage is arch slope, on the one hand, the right of passage of walking is placed in the highest position, which embodies the people-oriented; On the other hand, it also reduces the speed of cars passing through accessible ramps to ensure traffic safety. It also combines high technology, such as putting the IC chip in a blind channel or wall, when the person with the receiving end is visually impaired. In the near future, information such as road conditions will be received, or solar light storage materials or light-emitting bodies with power will be placed in blind channels to provide guidance to the visually impaired at night. German public transport company through the Internet and station signs and other ways, timely release of relevant information to the disabled, the road is equipped with the use of optical and tactile guidance system and audio traffic lights.

Apart from attaching importance to the construction of blind road itself, the design of inclusiveness and sharing between blind roads and normal lanes is becoming increasingly prominent. In Japan's accessible Traffic Law, the road design in urban planning should be as far as possible to enable people with obstacles to pass through the road independently, according to the Japanese Law on accessible Traffic. Does not affect the normal person's fast passage, does not cause the "barrier" to the normal passer. In the barrier-free design of Singapore, barrier-free entrances and exits are set together with normal entrances and exits. Ramps are generally not set on either side, but are made of U-shaped ramps or a zigzag ramp juxtaposed with the steps. This will avoid detours for the disabled and increase the use of ramps by the able-bodied. The frequency of the accessibility truly reflects the universal features of facilities. The same is true of the flat streets of Hamburg, Germany. Level streets are motor lanes, non-motorized lanes and sidewalks are roughly at the same level of street. It is a street where everyone feels safe and convenient, including children, the elderly, the blind, pregnant women, wheelchairs, crutches, and anyone else who may have special needs. On the level street, there is no blind road for the blind, but by paving, the materials distinguish their own areas and go their own way.

3.2 Construction practice of barrier-free design of urban streets in China

At present, blind roads are mainly used in the design of streets in China, and almost all the main streets in cities are equipped with blind roads. However, the real situation of urban street blind road construction in China is not optimistic: most of the blind roads that have been built are idle, and the utilization rate is very low; Blind track is intercepted by telephone pole, well cover, etc., and the blind track is missing at the junction with the road, and the blind track is tortuous or incomplete ; The ramp at the junction of the sidewalk and the carriageway is too steep, and the end of the ramp still has a height difference from the connected carriageway.

Although the subway station has set up elevators and special passageways for the disabled, the ordinary pedestrians are competing to use them, which makes the disabled unable and unwilling to use these barrier-free facilities and unable to provide the necessary facilities for the special people. In

addition, most of China's urban streets are not well accessible, and only a few cities are equipped with partially extensible support equipment and wheelchair-only buses. Few bus stops have Braille bus stop signs and blind walkways combined with bus stops.

4. Comparative analysis of barrier-free design of Chinese and foreign urban streets

4.1 Law construction

From the point of view of the formulation of national and local laws and regulations, the barrier-free legal systems of various countries are relatively perfect. Except for Japan's adoption of bottom-up, the order of development from local standards to national laws and regulations, the United States, Germany and China all adopt the top-down approach. Order from national legislation to local standards; From the law making process, foreign countries pay more attention to public participation and scientific research guidance legislation, China is led by experts, foreign experience guidance is the main; The object of the legal protection is mainly for the physically disabled and the elderly, and abroad has been extended to the physically and mentally handicapped, children, the elderly, pregnant women and any person who may have special needs. In terms of the mode of implementation, there are generally sound management systems at all levels, strict working procedures and financial management systems abroad. China is free from obstacles for capital construction examination and approval and has punishment regulations, but the maintenance management and punishment measures are often not in place.

4.2 Construction practice

Under the guidance of their respective laws and regulations, Chinese and foreign countries have different plans and effects. For example, because of the small area per capita in Japan, many intelligent facilities such as elevators are used to solve the general practice of building barrier-free facilities because the street area is not satisfied with the construction of barrier-free facilities, and for example, the laying of large ramps to ensure the continuity of accessibility; The United States because of the earliest laws and regulations, relatively perfect, and the United States is in the forefront of economic science and technology in the developed countries, for the new era of intelligent barrier-free construction to provide a better concept and economic foundation; Germany, on the other hand, has the particularity of its national concept. For example, German nationals are more exclusive of motor vehicles, advocating non-motor vehicles and pedestrian-based modes of transport, so the concept of "flat streets" is proposed. China's urban street barrier-free construction draws lessons from foreign experience, but due to the limitations of its own development stage, concept, management system and construction funds, new construction projects are well implemented, but maintenance and management are often not in place, accessible blind areas, chaotic areas, bad areas are often visible.

5. Reflection and suggestions

By analyzing the laws and regulations of barrier-free design of urban streets at home and abroad and the construction practice, it can be seen that:

First, from the beginning of the 20th century, the United States began to focus on barrier-free design, and more countries, especially developed countries, began to build barrier-free environment. From the promulgation of relevant documents to the implementation of laws and regulations of various ministries, from the national level to the local level of the refinement of the provisions, gradually improved laws and regulations in the maintenance and protection of the barrier-free environment. Therefore, a complete, tight, logical and interconnected legal system is the foundation of the construction of barrier-free environment. And targeted professional scientific research is the legislative basis and support of barrier-free laws and regulations.

Secondly, according to the practical experience of the developed countries, the truly meaningful and valuable barrier-free design should be the one closest to the exact needs of the people with

obstacles, and it is a design that meets the needs of humanity and versatility. It can reflect the continuity of street and street barrier-free construction and street and building barrier-free construction, at the same time, it can be integrated into high-tech, intelligent equipment for modern design.

Thirdly, the public's understanding of accessibility is an important link in the construction of barrier-free environment. Lin Yuhan and other scholars show that: "because of the low utilization rate of barrier-free facilities and people's lack of understanding, they do not attach importance to them, and the low utilization rate further strengthens the idea that barrier-free facilities are useless." Therefore, it is necessary to raise the awareness of the construction of barrier-free facilities, ease the ideological and moral construction of barrier-free design, and make everyone's mind free from designers to defenders to the masses.

Finally, we should strengthen the supervision and management of the whole process of construction and implementation in the later period, do not approve the facilities that do not abide by the standard, and severely punish the behavior of jerry-building in the later period.

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