

Review and Prospect of Accessible Design Standards in China

Xiaoshan Zhang¹, *Weiyang Jia²

¹ School of Architecture, Tianjin University, Tianjin, 300072, China

² School of Architecture, Tianjin University, Tianjin, 300072, China

*Corresponding author. Email: Jiawei@163.com

ABSTRACT

Since 1980s, the accessible industry in China has witnessed many important achievements. However, problems such as the uneven development of accessible construction between cities, developed and underdeveloped regions in China, and the large population base demanding accessibility have become increasingly prominent, putting forward new requirements and challenges for urban accessible design. In September 2021, China issued a new version of the mandatory Engineering Construction Code for Accessibility for Construction and Municipal Engineering. Given the current situation of national accessible development, this paper summarized the development history of China's accessible industry based on the research of accessible design standards and accessibility guidelines, and forecasted the future development trend of accessible construction. It is hoped that through summary and analysis, workers in related industries can clarify the development direction of accessible design and devote to the humanized and sustainable development of social environment in China.

Keywords: Accessible Design Standards, 2022 BeiJing Accessibility Guidelines, Information Accessible, General Design

1. INTRODUCTION

According to the data released by the National Bureau of Statistics of China, as of the end of November 2020, the number of the elderly aged 60 and over in China had reached 264 million, accounting for 18.7% of the total population; as of the end of 2010, the total number of the disabled had reached 85.02 million, accounting for 6.4%. Thus it can be seen that the ageing trend tends to be serious, worsened by a large population base of the disabled. Although China's accessible environmental construction has been developing and advancing, accessible construction still faces tremendous pressure. Therefore, at this stage, the summary of accessible design standards and the study of future development trend lie as the top priority of the current accessible development.

2. THE DEVELOPMENT HISTORY OF ACCESSIBLE DESIGN STANDARDS IN CHINA

Compared with Western developed countries, the history of accessible environmental construction in

China is shorter with a lower starting point. However, the past four decades since 1980s did China experience a process from scratch to gradual standardization and continuous improvement [1]. Development and improvement have also been made in accessible standards alongside with the economic development and living standard improvement, embodied by the gradually enriched content and gradually intelligent and universal forms.

2.1. <Codes for the design of urban roads and buildings accessible to persons with disabilities>

Beginning from 1988, the implementation of accessible design standards in China was marked by the promulgation of the <Codes for the design of urban roads and buildings accessible to persons with disabilities>, which was designated as the standard for construction engineering industry and was also applied to the construction of urban roads and accessible facilities in important public buildings. Since the standards are mainly targeted at people with lower limb disabilities and visual disabilities[2], certain problems

concerning one-sidedness and inclusiveness in the audience emerged. Although problems do remain, the accessible design standards, as the first one in China, still plays an introductory role in the development of accessible industry and the standardization of accessible design.

2.2.<Codes for design on accessibility of urban roads and buildings>

<Codes for design on accessibility of urban roads and buildings>, a revised version with a number of JGJ 50-2001 based on the 1989 edition of the accessible Design Standards, is a resolving adjustment to the problems and deficiencies that emerged during the implementation process from 1989 to 2001. Compared with the first version, accessible design requirements for bridges, interchanges, schools, residential buildings and residential communities were added. In addition, the contents of curb ramps, blind paths, building entrances, accessible toilets and bathrooms and wheelchairs were revised with detailed explanations [3]. It can be seen from the table that the revised accessible design standards in 2001 is richer in content and more specific in detail than that in 1989, providing a basis for accessible design in a decade. (Table 1)

Table 1. Revised Contents of accessible Part in 2001.

Revised Item	Revised Content
Curb Ramp	Size standards concerning sectors, intersections, neighborhood intersections, crosswalk single-sided curb ramps, and corner single-sided straight curb ramps were added
Blind Path	Touch bar specifications of blind paths were added, the color was changed to medium yellow and the laying positions and sizes were refined
Building Entrance	The width of entrance platforms and door opening distance of various buildings were refined
Ramp	Straight-shaped and reentry-shaped ramps were added while the slope and width of various ramps were refined

The width of various doors were added while the accessible facilities and design requirements of elevator halls and cars were refined

Door and Elevator Part

The accessible facilities and size requirements for public toilets, specialized toilets and public bathrooms were added

accessible Toilet

The ratio requirements of the area and quality of wheelchair seats in different space were added

Wheelchair Seat

The design requirements of location, quantity, toilet, electric appliances and furniture were refined

Guest Room

Note: This table is compared and collated by the authors.

2.3.<Codes for Accessibility Design>

With the aging population and the introduction of advanced foreign accessible design concepts, it is difficult for the current accessible design standards in China to adapt to the national accessible environment. China, beginning to rewrite on original basis in 2010, completed and implemented <Codes for Accessibility Design> with a number of GB 50763-2012 in 2012, upgrading the accessible design standards from construction industry standard to a national one. Compared with the 2001 edition of accessible design standards, great changes have been made in this compilation.

In terms of the content of the standards: the accessible design requirements for urban squares, greenbelts and historical preservation buildings were added. And the further increase in the scope of application equips the accessible design and renovation in these places with traces and regulations to follow.

In terms of the audience: In addition to the physically disabled and visually disabled people targeted in the 2001 standards, the 2012 version specified the audience as ‘people in need’, the trend of which also clearly pointed out the direction for accessible design.

In terms of the field: Information accessibility was proposed for the first time, which guaranteed the convenience for all kinds of people to obtain information. However, information accessibility failed

to take up much in this version. With relevant regulations briefly described, it is pointed out that information accessibility facilities should be set according to the actual situation in each region. Other than that, no specific requirements were stipulated [4].

2.4. <Accessibility Guideline for Beijing 2022 Winter Olympic Games and Paralympic Games>

In order to promote the construction of accessible environment for the 2022 Winter Olympics and Paralympics and the host city, the Beijing Winter Olympic Organizing Committee and the China Disabled Persons' Federation have compiled and completed the <Accessibility Guideline for Beijing 2022 Winter Olympic Games and Paralympic Games> (Hereinafter referred to as <Accessibility Guidelines>) in Sept.2018. Considering the requirements of special events, the <Accessibility Guidelines>, in the scope of application, not only includes the relevant contents of China's current <Accessible Design Standards>, but more introduces the venues, transportation, services, and information for the Winter Olympics and Paralympics. There are the following differences from the current Accessible Design Standard:

1. Content

The <Accessibility Guidelines>, more complete than the existing design standards in terms of content, elaborates on the principles, purposes, scope of application, relationship with other related standards, various obstacles and auxiliary methods.

2. Pertinence

The <Accessibility Guidelines>, a more targeted guideline, adds accessible standards for the stadiums and accommodations of the Winter Olympics and Paralympics. The guideline also clearly puts forward the requirements for accessible transportation, and provides corresponding accessible design standards for different modes of transportation, aiming to form a "seamlessly connected chain of accessible transportation facilities". Requirements for information accessibility related to network, publication, telecommunication system and identification system have also been proposed.

In addition, the pertinence of the < Accessibility Guidelines> is also reflected in the characteristics of the events. It is in Chapter 7 that the concept of accessible traffic safety is put forward. Given the huge human traffic during the event, the content of "safety inspection" is introduced to ensure the safety of people in need of accessibility.

3. Detail

The <Accessibility Guidelines> proves to be more specific in detail. Not only have some terms that not yet

been involved in the current standards been included, some existing terms have also been refined. For example, items like the setting ratio of accessible toilets and lighting illumination which fail to be reflected in the current standards are given clear standards in the design guidelines [5]. Stricter in the requirements for the accessible environment, the net width of the door entrance and the longitudinal slope of the ramp have been improved, enabling people with accessible needs to conduct more quick and convenient behavior activities.

Table2.Content Comparison between <Codes for Accessibility Design> and <Accessibility Guidelines>.

Terms	<Codes for Accessibility Design>	<Accessibility Guidelines>
The Setting Ratio of Accessible Toilets	-	One accessible closet pan and one accessible urinal for 15 people in need;
Courtesy Seats	-	The number of courtesy seats guaranteed to be 1%, set at both ends of each row
Light Illumination	-	The leading edge of the stair≥100lux; Elevator Cars≥100lux; Escalators≥200lux
The Net Width of Door Entrance	≥800mm,≥900mm with conditions	≥850mm, ≥950mm recommended, ≥800mm when restricted
The Longitudinal Slope of the Ramp	1 : 8~1:20	≤1:20 recommended, 1:8~1:12 when restricted

Note: This table is compared and collated by the authors.

To sum up, the <Accessibility Guidelines>, overtopping the current accessible design standards in China, includes not only the contents already mentioned in the current design standards, but also the facility accessibility, information accessibility and service accessibility and other related contents for the Beijing Winter Olympics and Paralympics. Such a guideline has played a certain role in promoting the development of design standards in China, providing certain reference

value for the revision of the next edition of the accessible design standards in the future.

In the host cities of Beijing and Zhangjiakou, the accessible facilities constructed and renovated under the guidance of the <Accessibility Guidelines> will serve all kinds of people during the event. After the event, the facilities, as valuable heritage, will continue to be convenient for all kinds of people to use. In addition, this practice serves as a model and reference for other regions in China, which is of practical significance for reducing the gap in the level of accessible facilities in various regions, promoting the development of accessible industry, and improving the quality of accessible environmental construction in China.

2.5<General Codes for Accessible in Construction and Municipal Engineering>

In order to further implement the relevant national policies, improve the construction of accessible environment, enhance the quality of the living environment of the disabled, and ensure that people with accessible needs can safely, quickly and smoothly carry out various activities, China promulgated <General Codes for Accessible in Construction and Municipal Engineering> in Sept.2021, and will be formally implemented in Apr.2022, which further enriched the content of China's accessible design standards.

It can be seen from the changes in names that compared with the previous version, this version has moved further towards the direction of universal design. The specific revisions are as follows: Focus on raising the systematic problems of accessible design, including the emphasis on the accessible streamline, and the whole process of accessible design, construction, acceptance and maintenance; The expanded audience. It is pointed out in the standards that meet the demand of disabled people, the elderly and "people in need", among which "people in need" can be understood as visually impaired, hearing impaired, people in wheelchairs or people with impaired motor functions, as well as the elderly, children, people with strollers or luggage who share the same needs; The increased content of information accessibility, and further improved the construction requirements of information accessibility according to the development of Times and technological; The indicators of wheelchair ramps, doors, ground holes, accessible vehicle parking space and landing areas, curb ramp, wheelchair seats will be mainly improved; Basic provisions shall be made on the acceptance and post-maintenance of accessible facilities, requiring the construction unit to systematically check and acceptance of accessible facilities and clarify the responsible maintenance person and maintenance measures.[6].

As the first full-text mandatory standard specifically for the construction of accessible facilities in China, the classification of accessible facilities in the specification is basically consistent with the international general classification, and the requirements of technical indicators have basically reached the international advanced level. Through the above-mentioned revisions, the content of the accessible design standards is more complete with a wider coverage and a wider service population. The strengthening of this general design concept reflects the social development and the progress of The Times.

2.6. Summary

In summary, it can be seen from the progress from the <Code for the design of urban roads and buildings accessible to persons with disabilities> in 1989 to the <General Codes for Accessible in Construction and Municipal Engineering> in 2021, from industry standard to national mandatory standard, from certain audience to people in need and also the addition of information accessibility that the accessible standards in China are constantly experiencing revisions and changes, advancing with the times.

3. THE FUTURE DEVELOPMENT TREND OF ACCESSIBLE DESIGN STANDARDS IN CHINA

3.1 General Theory of Accessibility

General theory of accessibility includes new concepts of accessibility such as universal design and inclusive design, which refers to the environmental design convenient for everyone to use to the maximum extent regardless of gender, age or ability. The audience of universal design that originated in the United States is not limited to the "everyone" of the disabled, but includes the deepening and development of accessible design [7]. Japan has a long history of accessible construction with more complete laws and systems. It has also developed from the early barrier-free design to the current general design stage. The inclusive design born in the UK connects products and services with accessibility, and emphasizes the commercial and aesthetic value of accessible design.

Some regulations in China's current accessible design standards also include the concepts of universal design. For example, the accessible entrance ramp of the building is preferred to use flat slopes with a slope $\leq 1:20$. The purpose of such a requirement is to guarantee no difference between the wheelchair riders, stroller drivers, the elderly and able-bodied persons. It is mentioned in the <Accessibility Guidelines> that everyone, regardless of their physical condition or mobility, should be ensured to have the same experience

and service level. Thus, both the accessible design standards and accessibility guidelines are approaching the general theory of accessibility. However, more in-depth research is needed in the follow-up stage to comprehensive universality in the standards.

3.2 Information Accessibility

Nowadays, our daily life is inseparable from information. With the rapid development of the Internet, the network and smart devices have become the main ways we obtain information, and become increasingly integrated in the architectural and landscape environment. In addition, accessible signs and guidance systems are also important carriers of accessible environment information, integrating information technology and equipment. Therefore, the accessibility of various information media should be emphasized to ensure that normal people, the disabled, and the elderly can obtain information smoothly. In order to ensure that vulnerable groups can obtain information on an equal and convenient basis, the future revision process of accessible design standards should adapt to the latest developments in society and technology, and increase corresponding specific requirements as appropriate.

3.3 Software Accessibility

Software accessibility refers to the promotion of accessible services and the construction of accessible mechanisms and accessible culture in addition to the hardware facilities within the environment. And the future revision process should be revised and gradually improved in combination of the software accessibility requirements mentioned in the <Accessibility Guidelines >.

In addition, in order to facilitate the participation of the disabled in social activities, the public participation mode should be emphasized in the future revisions of standards and accessible design to form a good situation in which the norms restrict designers, designers design for the disabled, and the disabled participate in the design.

4. CONCLUSION

Through combing and researching the development process of accessible design standards, the development direction of accessible design standards should be approaching the general theory of accessibility. At the same time, attention should be paid to combining the latest technology, user evaluation and public participation to fully reflect the superiority and humanity of accessible services. As long as the industry and the disabled work together to devote to the construction and improvement of domestic accessible environment, our world will definitely be more friendly.

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