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Study on the Sidewalk Width in Contemporary Beijing

Abstract : With the improvement of economy and living standards, people are increasingly pursuing high-quality urban public spaces, especially the pleasant living streets of traditional cities. In order to explore the sidewalk room in Beijing, the article is based on Active Design Guidelines: Promoting Physical Activity and Health in Design (City of New York, 2010), defining the sidewalk room, and taking the sidewalk width as the main purpose, investigating 60 sidewalks in the Third Ring Road of Beijing, which are expounded from three aspects: extreme width, space profile, and ground elements. The change in the width of the sidewalk reflects the humanization of the city and the change in urban cognition, which affects Beijing's urban development in all aspects.

Keywords : sidewalk room; accessibility; extreme width; space profile; ground elements

1 Sidewalk Room Definition

The street space dedicated to people has been around for thousands of years. In addition to the meaning of walking, the sidewalk is also an important material environment for people to carry out public activities. Jane Jacobs proposed as early as 1961 in *The Death and Life of Great American Cities* (Jan Jacobs,2005) and defined sidewalks as streets carrying pedestrians, while also including other uses. To explore the function and significance of sidewalks, it is necessary to take the perspective of people who actually use sidewalks as the research perspective, take the space where the sidewalks are located and various physical elements contained in the sidewalks as research objects, and analyze the dynamic behavior of pedestrians in the sidewalk space. In order to make the research content more concrete, according to the definition in Active Design Guidelines: Promoting Physical Activity and Health in Design (City of New York, 2010), the author takes the walking person as the center of the space, and defines the space walks it as "the sidewalk room", which has four planes: ground,

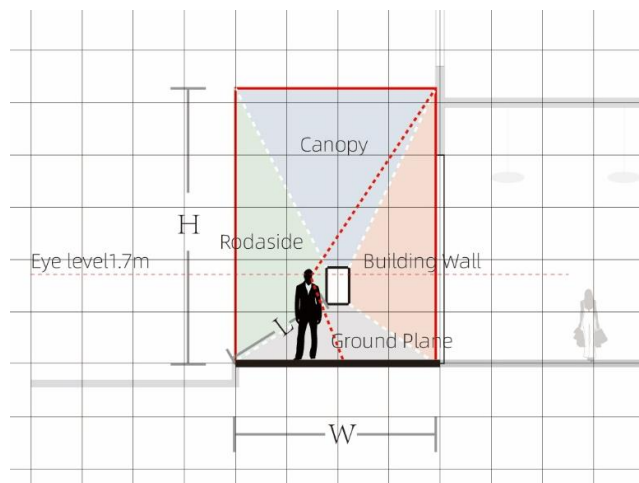


Figure 1 Schematic of sidewalk room

Image source: repaint it basing on Active Design Guidelines: Promoting Physical Activity and Health in Design

top, street, and building.

Definition of the height H of "the sidewalk room": Jan. Gail wrote in *life between buildings* (Jan Gale,2002) that when people walk on the sidewalk, their vision are usually only on the

ground floor, the ground and the sidewalk space of what is happening. The average sight height of pedestrians is 1.7m.

Definition of the length L of "the sidewalk room": Jan. Gail mentioned that 330 feet (100m) is usually a social vision of people, and this distance is usually that human eyes can see the longest distance of the object (Jan Gale,2002).

The definition of the width W of the "the sidewalk room" is exactly the main research content of this article—the width of the Beijing sidewalk. In order to study the traffic attributes and public space attributes of the Beijing sidewalk, The author defines the width of the sidewalk as the longest public relations space included in the non-passable vertical isolation surface (including the fence, building street wall, and river) calculated from the outside of the curbstone on the street boundary to the building wall.

2 Sidewalk Width Matters

Jan Gail mentioned that walking is a slow-moving traffic movement which also requires street pavement space. Moreover, walking is mostly affected by people's subjective factors,

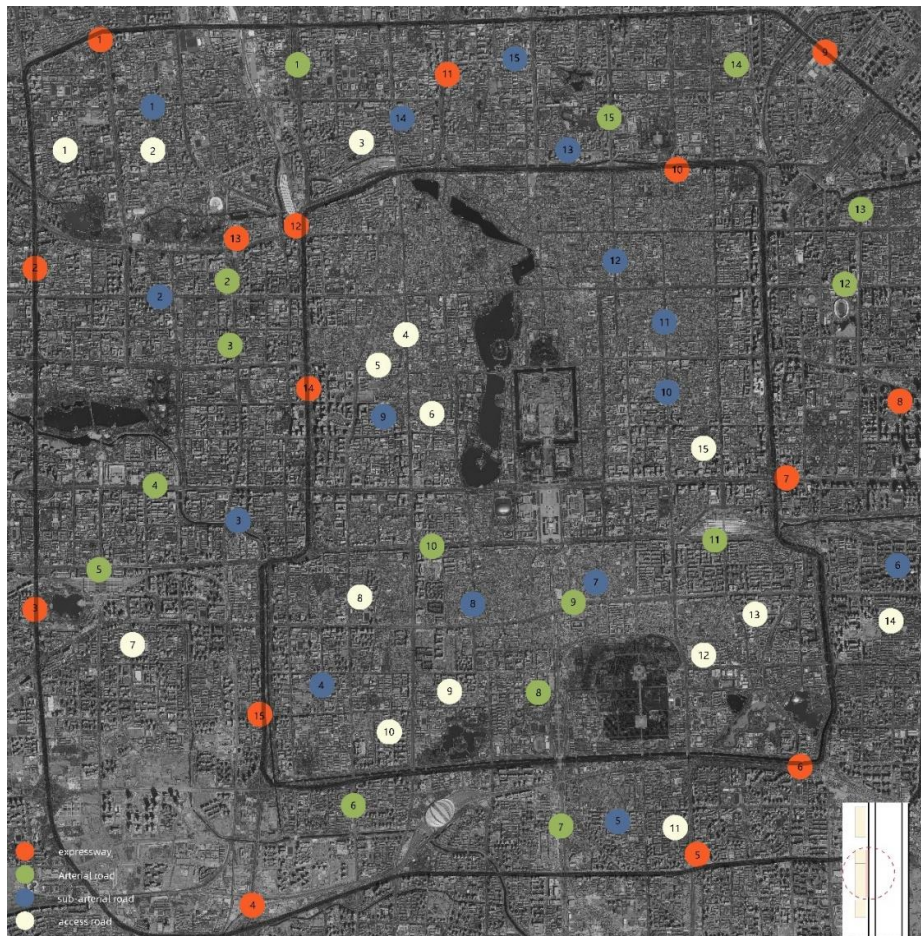


Figure 2 Survey the general sidewalk map

Source: author's drawing

that is, the quality of the sidewalk room has a lot to do with the distance people are willing to walk (Jan Gale,2002). The premise of the quality of the sidewalk room is the appropriate sidewalk width. The importance of sidewalk width to sidewalk room is self-evident.

Choosing the proper geographic location of the sidewalk sample is a prerequisite for mapping the sidewalk width. Modern urban roads are classified according to traffic volume and traffic engineering volume. According to the *Urban Road Engineering Design Specifications* (MOHURD,2016), roads are divided into expressways, main roads, secondary roads, and branch roads.

The author aims to study the width of sidewalks on the side of Beijing roads, explore the current situation and use of sidewalks, take the Third Ring Road within Beijing as the research area, select 15 sidewalks for roads of different grades, and a total of 60 sidewalk samples. The survey was carried out using Baidu map 3D streetscape and site investigation. The length of the selected sidewalk is about 100m and the side interfaces of the sidewalk buildings are relatively continuous, and the geographical position of the sidewalk is usually close to the middle of the road, and it is indicated on the general map in the form of points and legends.

3 Sidewalk Width Elaboration

The width of the sidewalk belongs to the ground plane of the "sidewalk room". The ground plane transportation network constructs the urban slow-moving system to travel, and bears most of the pedestrian traffic. And the width of the sidewalk is directly related to the basic attribute of the sidewalk-traffic attributes. From the perspective of pedestrians, unobstructed passage is the minimum requirement for sidewalk space, but oversized sidewalks are also a waste of urban land resources.

3.1 Extreme Width

In order to clearly show the change in the width of the sidewalk room, the author calculated

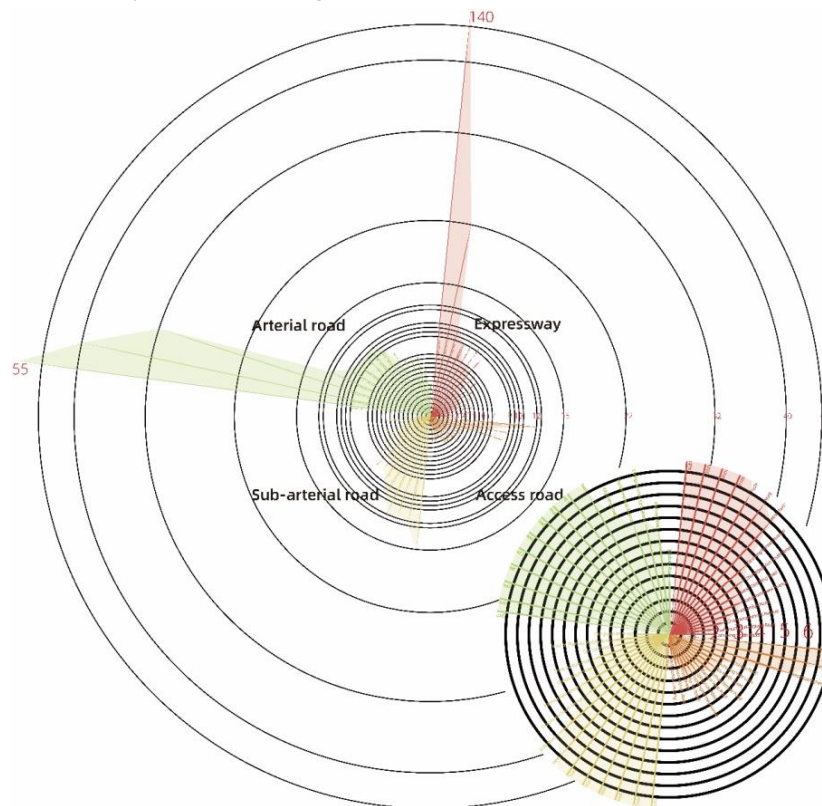


Figure 3 Summary of survey sidewalk width
Picture source: Self-painted by the author

the data of the width of the 60 sidewalks investigated, and plotted them in the four quadrants according to the four road levels.

Beijing 's newly revised *Code for planning & design on urban road space* (BJGHY,2015) stipulates that the minimum sidewalk width shall not be less than 2m. The author found from the data that a total of 5 (8%) sidewalks are less than 2m wide, especially one sidewalk on the side of the Malian road is extremely small, only 0.5m. And the survey width data includes the dimensions of sidewalk trees and some urban furniture such as trash cans, that is, to some extent, the width of the sidewalk room is smaller. The width of an evacuated stream of people stipulated in the *Uniform standard for design of civil buildings* (MOHURD,2019) is only 0.55 meters. The narrow width of the sidewalk of Malian Road cannot even reach the basic evacuation index of the building design, and it has lost its traffic significance. The author specifically defines the magnitude of the minimum outdoor sidewalk width as 0.5m, and all pedestrian spaces with a width less than 0.5m are no longer defined as the sidewalk room. At the same time, during the investigation, the author also found that the sidewalk on the side of the turn of the expressway had experienced a short drop of sidewalk sharply below 0.55m and even disappeared at the end. Although it will not completely change the width of the sidewalk room, it will affect the pedestrian's passing experience to a certain extent.

Kevin Lynch mentioned in *Site Planning* (Jan Gale,2002) that good urban space rarely appears at a spatial scale of more than 110m. Squares are often representative of such spaces. According to the author's definition of the sidewalk width, the widest sidewalk must be connected to large public open spaces such as squares. The survey results prove the same. The survey found that the widest sidewalk is located on the side of the Beijing Exhibition Center, and its horizontal square is a fully expanded sidewalk with a width of 140m. It is true that the square, as an important node of the sidewalk transportation system, not only can gather people, but also public activities of people will naturally follow. But increasing the width also causes some problems. Oversized squares are obviously not crowded due to lack of seats and some urban furniture or unreasonable placement. William H. White mentioned in *Social Life in Small Urban Spaces* (William .H. White) that people are most attractive. People always move in the flow of people, and a lot of communication happens at the center of the flow of people. The lack of a crowded square makes the square itself even more deserted. Furthermore, low-utilization sidewalk space, including sidewalks and squares, will also take up long-term excess space such as motor vehicles or bicycles. Waste of land resources will also affect the safety of pedestrians. On the contrary, some hotel office buildings and commercial activity squares in front of high-rise dwellings have attracted a lot of people while expanding the width of the road by 10-40m. For example, the public square in front of Beijing West Railway Station and the square next to Kaizhi Mall in Xizhimen. pedestrians will enter the square while they are walking, and they will leave from the other end of the square after playing and not deviating from their walking route.

3.2 Space Profile

Pedestrians walking on the sidewalk room is a dynamic experience, including vision, smell, touch and so on. This article focuses on the physical properties of the sidewalk room—the sidewalk width. The limiting effect of the side walls of the building on the sidewalk room is undoubtedly huge.



Figure 4 Pedestrian space profile

picture source: repaint it basing on Active Design Guidelines: Promoting Physical Activity and Health in Design

The author adopts static two-dimensional graph-sectional graph of 60 sidewalks investigated and record the typical space 's one-point perspective. It also showed the morphological relationship between pedestrians, sidewalk floors, and building sides. Due to the difficulty in collecting height data, the height of the building floor is 3m on the ground floor, which is 2.8m above the ground floor, and the building height is expressed by the number of floors.

Of the 60 sidewalk data collected, when the building's ground floor is commercial, the building directly faces the sidewalk space, and there is no full contact between the two. The shape of the sidewalk space is usually flat and long, and the ground is wide so that pedestrians can interact with the building interface. However, among the sample sidewalks with commercial buildings on the ground floor, 4 walkways were occupied by motor vehicles for a long time. To a certain extent, the occupation of vehicles weakens the mutual penetration of the sidewalk room and the building interface.

When the building side is full of residential buildings, the building's ground floor will usually be set up with green areas to retreat the building to maintain a certain privacy between the building and the sidewalk. If no fences are set up for the greening of the community, although the greening of the community belongs to the space of the building interface in the space field, to a certain extent, the internal greening of the community penetrates into the sidewalk room by participating in the process of externalization, and pedestrians can interact with the

greening. Therefore, the author also included it in the sidewalk room.

As there is no more data to prove the exact width of the sidewalk in Beijing. However, due to the permanent population of more than 20 million in Beijing, relatively wide sidewalks will undoubtedly attract more people and promote the development of pedestrian traffic.

3.3 Ground Elements

The ground plane of the sidewalk is the most used interface of the sidewalk room, and the ground plane is the basis of the existence of the sidewalk. The ground is composed of various elements, such as the ground pavement. However, the author found a large number of objects that were not on the sidewalk during the investigation. Because the sidewalk is full of many and complicated elements, it is not yet exhaustive. Based on the 80 kinds of objects that are currently observed, the author divides all the object elements into five categories,

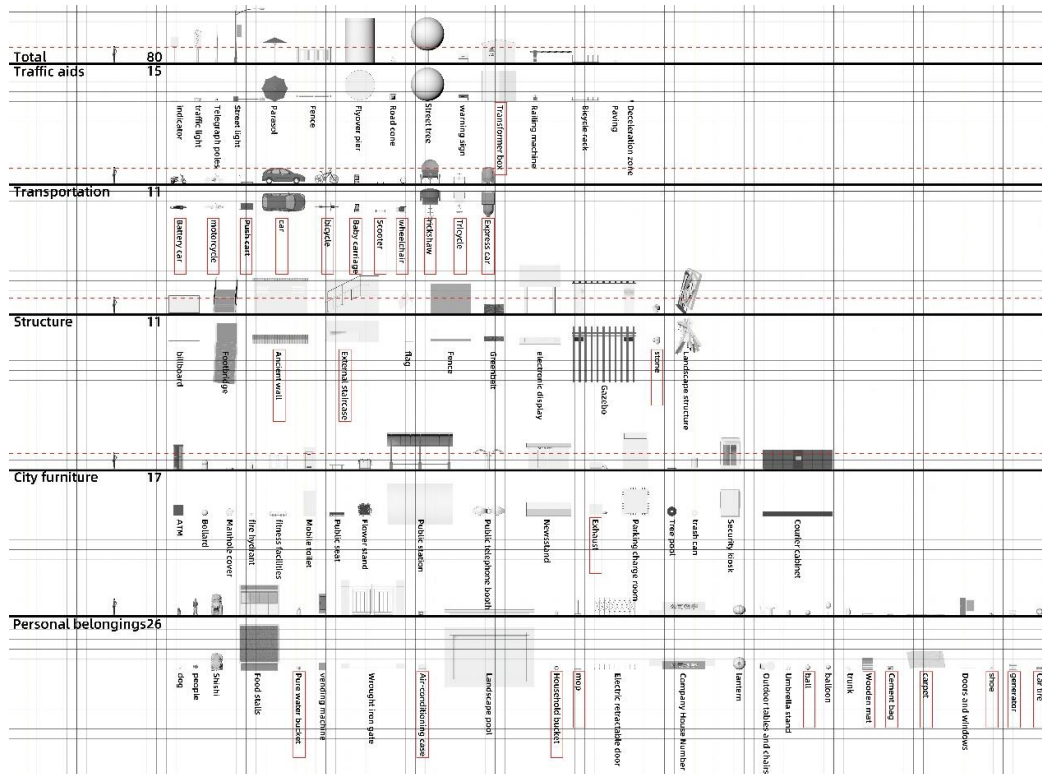


Figure 5 Sidewalk element statistics
Picture source: Self-painted by the author

namely transportation assistance facilities, vehicles, structures, urban furniture, and private items and draw a statistical map of the ground elements of the Beijing sidewalk.

The author found that a total of 27 types (33.8%) of objects are not at all sidewalks, such as motorcycles, automobiles and other motor vehicles. Although some urban furniture or traffic assistance facilities are closely related to the sidewalk, the facilities in many places are chaotic and lack of management. For example, this is a transformer box to improve the problem of electric poles, but I found that most of them are in the middle of the sidewalk and originally served the city. The public facilities of the sidewalk have reduced the width of the sidewalk to a certain extent. These wrong disposal facilities have seriously affected the service capacity of the sidewalk. If the relevant departments carry out overall management and coordination,

restore the right of the sidewalk, mainly use the sidewalk space system, coordinate other facilities to be effectively attached to the sidewalk, and enhance the urban residents' awareness of publicity. This will surely play the role of sidewalks and provide pedestrians with Safe and convenient public space.

4 Summary

Urban road space is an important public space in the city. As an important part of urban roads, sidewalk room carries most of the citizens' sustainable and healthy living content, showing a positive urban style and spirit. However, in the past two decades, the design of urban roads has been centered on motor vehicle traffic. Sidewalks have been constantly squeezed, and the width of the sidewalk room has been continuously occupied. This situation runs counter to Beijing's overall urban planning. Relevant departments should change the development mode of urban transportation, achieve a "people-oriented" approach to the sidewalk system, improve the supply capacity and service level of urban public transportation, encourage green travel, and make sidewalks public. The living green corridor creates a masterpiece of capital construction, strives to enhance the sense of gain among the people, and makes new contributions to the overall urban planning of Beijing.

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