

Research on Urban Road Quality Improvement

Zhanru Liu^{1,2,*}, Chuyi Xian¹

1 School of Transportation and Logistics, Southwest Jiaotong University, Sichuan Chengdu 610031, China

2 National United Engineering Laboratory of Integrated and Intelligent Transportation, Sichuan Chengdu 610031, China

*E-mail: liuzhanru@my.swjtu.edu.cn

*Corresponding Author

ABSTRACT. Under the current situation, urban roads generally have problems such as disrespect for pedestrian rights, extensive construction, and the separation of roads and building spaces. In order to study how to improve the quality of urban roads, this paper shares some excellent cases of urban road quality improvement in different regions, provides experience and reference, and proposes an improvement strategy of road safety quality, including: 1) construct a bicycle and walking system; 2) integrate the road space and public space; 3) simultaneously improve all factors of the road environment; 4) integrate and enhance the space environment.

KEYWORDS: Urban road, Road quality, Street design, Landscape design

1. Introduction

Roads are an important part of a city. As the city continues to urbanize, the public's demand for transportation has also changed. Driven by this demand, road construction should pay more attention to transportation functions and environmental landscapes. The construction of the building has gradually transformed the concept of building from “vehicle-oriented” to “people-oriented”; road construction has begun to change from “quantity” to “quality”. In order to improve road quality, improve road service quality, improve residents' travel experience, realize people-oriented concepts and qualitative changes in road quality, it is particularly important for the construction of sidewalks and non-motorized vehicle lanes, and the improvement of road landscape characteristics.

In the early 20th century, when the city beautification campaign was implemented in the United States, Charles Malford Robinson proposed for the first time that excessively wide roads should be restricted in order to provide citizens with more green areas[1]. Nowadays, the research on street space and the pursuit of quality transportation is increasing day by day[2]. Zhang Jie participated in the road quality improvement project in Shenzhen, and found that after the reconstruction, the slow traffic space of Shucheng road was released. The slow traffic quality was greatly improved, the traffic was orderly, and the overall quality was greatly improved[3]. Xu et al. proposes three approaches to enhancing road ecological quality: 1) Develop street plans according to environmental characteristics; 2) Develop new street surface materials through technological research; 3) Employ biological technology to enhance landscape's capacity[4]. Qin Guotian and Liang Liyu proposed that the balance of pedestrian, bicycle and motor vehicle traffic should be integrated into the landscape improvement[5].

2. Cases Study

2.1 Broadway, New York

Broadway is one of New York's most famous north-south streets, starting from Battery Park in the south and running across Manhattan Island from southeast to northwest. Since 2008, the US Department of Transportation has carried out the largest renovation of Broadway Avenue in Midtown Manhattan since the 20th century, returning the street space occupied by motor vehicles to pedestrians, making Broadway Avenue a continuous, rich and attractive public event space in New York.

(1) Reconstruct streets and advocate slow transport

The core of this transformation is to re-divide the space of Broadway, reduce the number of motor lanes and parking belts, increase the space of sidewalks and non-motorized lanes, and improve the status of pedestrians

and cyclists. In some key areas, closed roads are used to form a full pedestrian zone, and colored paint is applied to the original road surface to enhance visual differentiation.

(2) Fast and slow traffic isolation and human-vehicle conflict reduction

Broadway Street provides space isolation for pedestrians, bicycles, and other slow-moving traffic by setting parking facilities, buffer zones, or street view facilities along the street. At the intersection, the original angled intersection was redesigned in a simplified way. It's partly redesigned through pedestrianized transformation to remove redundant road branches; partly by changing the direction of the road at the intersection so that it intersects the intersection road at a right angle; partly by extending the corner curb stones to expand the waiting area and shorten the crossing distance. This type of design solves the problem of limited sight of the driver caused by the small intersection angle, and reduces the collision between people and vehicles.

2.2 London

London roads are narrow, curvy, crisscrossed, and there are many historical and ancient buildings along the road, which bring great difficulties to the use and management of road resources. In this regard, early in 1990, the London government set up a department responsible for planning the London regional space, predicting the future of road traffic development, and accumulated many successful experiences.

(1) Control speed and pursue the goal of “zero death”

London is a member of the Vision Zero program. The plan recommends that cities implement maximum speed limits of 30km/h and 50km/h at places where pedestrians and vehicles or vehicles may conflict, to improve the safety of pedestrians and non-motorized vehicles. At present, London has reduced the speed limit of schools and construction areas to 40km/h, and discussed the feasibility of speed limits in residential areas in May 2019.

3. Strategy of Improving Street Quality

In order to achieve the above goals, a series of changes in concepts, technologies and other elements need to be realized. the following promotion strategies are proposed:

(1) Pay attention to Human Environment Interaction and man's living modes, strengthen the construction of non-motored vehicle system and pedestrian system.

The fundamental purpose of urban transportation is to achieve a positive and smooth flow of people and things. However, in the current planning, construction and management of roads, the idea of “vehicle-oriented” has not been fundamentally changed. In road engineering design specifications and practices, the efficiency of motor vehicles is still the main consideration. To truly realize “people-oriented” in concept, it is necessary to fully pay attention to people's communication and lifestyle, and to apply systematic methods to consider the slow traffic and motor vehicle traffic as a whole. Roads should be made as places to carry out many types of activities, not just spaces for motor vehicles. When allocating road space, priority should be given to ensuring the demand for pedestrian traffic and non-motorized vehicle traffic, and strengthening the construction of bicycle lanes and pedestrian systems.

(2) Extend the view beyond Red-Line Layout, realize the integrated improvement of urban road space and public space.

The traditional planning and design take the road red line as the boundary, the traffic and road design work is concentrated within the road red line, and the planning and landscape design work is concentrated outside the road red line. The design, construction and management of different units inside and outside the red line often lead to a disconnection between the road design and the design along the road, which is not conducive to the integrity of the road space. The goal is to improve the efficiency of the use of road space, and to build streets that meet the demand for activities along the route and meet the conditions of the style along the route. In order to achieve this goal, it is necessary to discard the red line of the road, extend the scope of planning and design from the red line to the public space outside the red line, achieve the overall improvement of road space and public space. The integrated design of transportation, greening, architecture, landscape and other elements should be completed.

(3) Embody street characteristics with different space environment.

Under the new circumstances, the problems of urban road space are complex and interrelated, and a single optimization of road facilities cannot solve the comprehensive problems of “walking, cycling, and green space

occupied”, “degradation of road ecology, landscape, and environmental function”. In order to improve the overall quality of urban road space and create a pleasant travel environment, it is necessary to plan all functions of the road as a whole and synchronize all elements of road facilities, safety facilities, landscape greening, street furniture and other factors.

(4) Integrate and enhance the space environment of streets with different attributes.

Aiming at different attributes of the streets, it is necessary to organically integrate elements such as municipal facilities, landscape environment, buildings along the street, and historical features. Highlight the humanistic characteristics of the street, shape the personality of the street, achieve the harmonization of design and function, and improve the overall service level of the street.

4. Conclusions

Under the new circumstances, the problems of urban road space are complex and interrelated. Streets are not only of traffic functions but also public places. In order to improve the quality of roads, we should: 1) pay more attention to the construction of bicycle lanes and walking systems in concepts; 2) improve the utilization of road space and construct streets that meet the needs of activities along the route and conditions of the style along the route; 3) improve the overall quality of urban road space and create a pleasant travel environment; 4) highlight the humanities of the street and shape the personality of the street.

References

- [1] Charles Mulford Robinson (1902). *The Improvement of Towns and Cities: Or the Practical Basis of Civic Aesthetics* (1901) [J], pp.12-13.
- [2] Ebenezer Howard (2009). *Garden Cities of Tomorrow* [M]. The Commercial Press.
- [3] Zhang jie (2020). Integration and Optimum Design of Facilities Belt in the Process of Urban Road Quality Improvement [J]. *Traffic & Transportation*, vol.36, no.1, pp.24-28.
- [4] XU Wenzhen, XIE Huaijian (2013). Research on Improving Ecological Quality of Urban Streets [J]. *Urban Development Studies*, vol.20, no.8, pp.54-59.
- [5] Qin Guotian, Liang Liyu (2019). Overview of Quality Transportation and Its Practice in Shenzhen: A Case Study of Street Quality Improvement of Futian CBD, Shenzhen [J]. *Urban Transport of China*, vol.17, no.2, pp.54-61.