

Study on Traffic Improvement at the Intersection of Zhongxing Road and Jihua Road

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Abstract: At its core, road safety is about human safety. Shifting the focus back to every road user—particularly vulnerable pedestrians and cyclists—and enhancing the safety, convenience, and human-centered design of slow-traffic systems to eliminate potential risks are critical steps in strengthening the urban safety network and embodying the people-oriented governance philosophy. This case study focuses on the Zhongxing Bridge–Jihua Road intersection, aiming to "ensure dedicated paths for cyclists and further encourage cycling" through comprehensive optimization spanning engineering design and management controls. Following the upgrades, the area has not only seen a significant reduction in accident risks but has also been transformed into a safe, comfortable, and friendly slow-traffic space, tangibly improving citizens' travel experience and sense of fulfillment.

Keywords: Road Safety; Slow-traffic Systems; Eliminate Potential Risks.

1. Introduction

The Zhongxing Bridge–Jihua Road intersection is located within the jurisdiction of Buji Subdistrict, Longgang District, Shenzhen. It serves as a critical transportation node in the area, characterized by complex traffic conditions and significant functional importance. The uniqueness of this intersection stems from a combination of geographical and historical planning factors. On one hand, the Buji area where it is situated is significantly physically divided by an east-west railway line, making Zhongxing Bridge the only major thoroughfare connecting the eastern and western sectors of the region. This grants it an irreplaceable role as a transportation link. On the other hand, the original design of Zhongxing Bridge did not adequately account for the needs of non-motorized traffic, failing to incorporate independent, continuous slow-traffic lanes. As a result, motor vehicles and non-motorized vehicles have long shared the same road space without clear right-of-way demarcation, leading to frequent conflicts[1].



Fig 1. Non-motorized vehicles illegally entering motor vehicle lanes.

This structural contradiction has become increasingly pronounced in recent years with the rapid adoption of electric bicycles. Statistics indicate that the average daily flow of electric bicycles crossing the bridge alone has reached approximately 5,000 trips. The substantial volume of non-

motorized traffic intertwines with motor vehicle flow on the limited and mixed-use bridge deck, not only significantly reducing traffic efficiency but also creating notable safety hazards, with accident risks persistently rising. Therefore, implementing systematic traffic optimization at this node has become an urgent task to ensure regional travel safety and enhance the resilience of the road network.



Fig 2. The current condition of the intersection.

2. Improvement Measures

2.1. Add Non-motorized Vehicle Lanes on the Bridge

Zhongxing Bridge is a two-way, four-lane structure featuring diverse cross-sectional designs along its entire length. The maximum width of its standard motor vehicle lanes is only 16.7 meters, and both motor vehicle and non-motorized vehicle traffic demands are relatively high. After multiple on-site surveys and continuous refinement and testing of the solution, the final plan was determined as follows: "Ensure the full-length continuity of the non-motorized vehicle lane with consistent width; maintain one motor vehicle lane on the bridge while keeping two motor vehicle lanes at the entrance." This plan is complemented by detailed, "micro-surgical" measures such as removing greenery at the Zhongxing Bridge intersection to widen the

road surface, moving the stop line forward, installing lighting under the bridge, adding smart road studs, and optimizing traffic signal controls at the intersection. These adjustments not only ensure traffic safety at the intersection and along the road section but also maintain the intersection's traffic capacity.

After the renovation, the net width of the non motorized vehicle lane on the north side of Zhongxing Bridge section is 1.6m, and the net width of the non motorized vehicle lane on the south side is 2m [2, 3]. The separated non motorized vehicle lane can better meet the traffic of non motorized vehicles on the bridge.



Fig 3. Add non motorized vehicle lanes on the bridge

2.2. Improve the Convenience of Bicycle Crossing the Street

To effectively facilitate bicycle crossings and ensure the continuity of non-motorized lanes, a 4-meter-wide bidirectional blue anti-slip bicycle crossing channel has been added at the intersection of Jihua Road and Zhongxing Bridge, connecting with the existing slow traffic channel of Jihua Road. This creates a three-dimensional crossing system that includes pedestrian bridges and flat bicycle crossings.

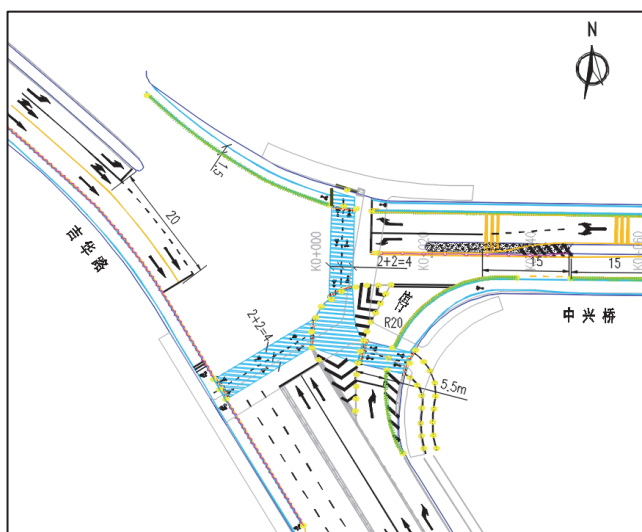


Fig 4. Design Plan for Non-Motorized Vehicle Crosswalk Facilities at Intersections

Additionally, to enhance the safety of non-motorized vehicles crossing at intersections, traffic signals for non-motorized vehicles were installed, and signal control was implemented for right-turning vehicles at the east entrance of

the intersection. Furthermore, dedicated waiting spaces for non-motorized vehicles were set up at the intersections of bicycle crossings, with stainless steel bollards added to ensure safety.



Fig 5. Pedestrians and non motorized vehicles go their separate ways

2.3. Install Bridge Bottom Lighting

Lighting optimization serves as a critical engineering measure to enhance the safety of the Jihua Road-Zhongxing Bridge intersection[4]. In response to the existing issues of insufficient illumination in the under-bridge area and significant nighttime traffic hazards, this retrofit project has involved the installation of additional lighting fixtures (mounted on the bridge sides due to site constraints) at the intersection, thereby improving overall illumination and ensuring lighting safety.

2.4. Add Smart Road Lights

Adding smart road lights is an active warning and refined control measure to enhance the safety of key nodes on Jihua Road. Underground yellow flashing road lights will be installed at the intersection of Jihua Road and Zhongxing Bridge, and solar powered road lights will be installed at the auxiliary intersection of Buji Overseas Chinese Federation Building to proactively warn vehicles to slow down and ensure the safety of citizens crossing the street.

2.5. Improve the Efficiency of Motor Vehicle Traffic at Intersections

In order to improve the efficiency of intersection traffic and ensure traffic safety, this renovation will move the stop line of the north entrance straight lane at the intersection of Jihua Road and Zhongxing Bridge forward, and optimize the signal timing at the intersection to enhance the efficiency of motor vehicle traffic at the intersection [5].

3. Summary

The traffic hazard remediation at the intersection of Zhongxing Bridge and Jihua Road is a systematic safety enhancement project that integrates "infrastructure upgrades, technology empowerment, and behavioral guidance." This initiative not only significantly improved traffic safety infrastructure through physical interventions such as optimizing slow-traffic lanes, installing intelligent lighting, and adding smart road studs but also systematically enhanced intersection efficiency and order through technical measures

like optimized signal timing and controlled right-turning vehicles. It effectively addressed the public's urgent need for safe and convenient travel, leading to a notable improvement in the safety of non-motorized vehicle passage.

It is important to note that the improvement of the traffic environment relies not only on the enhancement of physical infrastructure but also on the collective elevation of safety awareness among all road users. Despite the full deployment of the new facilities, vigilance in risk prevention must not be relaxed. Pedestrians and non-motorized vehicle users must proactively strengthen their self-protection awareness, adhere to safety principles such as "staying away from blind spots of large vehicles, obeying traffic signals, and following designated paths." By combining behavioral self-discipline with technical safeguards, the comprehensive remediation outcomes at this intersection can be sustainably consolidated, achieving a deeper transformation of the urban slow-traffic system "from safety to reassurance."

References

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