

2021 Guangzhou greenway Investigation Report

This report is divided into three sections: overview, data collation and analysis, and conclusions

1. Summary

Survey time: 2021.3-2021.8

Survey subject: Evaluation of Greenway use in Guangzhou, China

Analytical methods: Analytic hierarchy process and fuzzy evaluation method.

Survey methods: Collect original data by means of questionnaires and field visits.

Data sorting: Utilize the constructed evaluation model for data processing and analysis, and conduct comprehensive evaluations from users' perspectives.

Questionnaire survey: Seven questions were created from seven aspects, to investigate ordinary citizens; 1187 valid questionnaires were recovered; 450 valid suggestions were made by citizens.

Field survey: This study investigated 1700 km greenways in 11 districts of Guangzhou, performed field photography, and set up 27 survey points from seven unique aspects: coverage, safety, comfort, convenience, playfulness, continuity and communication status.

2 Data Sorting and Analysis

(1) According to the greenway map released by the Urban and Rural Development Commission in 2012, the field survey visited each road section and took more than 2000 on-site pictures. Each road section was investigated and collected original data from 27 angles. The field visit covered all 11 administrative regions of Guangzhou, over 1700 kilometers, and received 79 valid research forms. Among them, 52% were urban greenways, 42.67% were rural greenways and 5.33% were ecological greenways.

Data sorting, 27 perspectives were taken and summarized into 7 aspects, which basically simulate citizens' daily and holiday use of greenways, the problems and conditions that may be encountered when using greenways. For example, in the case of short-distance travel in work and life, outing and play in holidays, outdoor exercise, etc. Coverage: This survey is conducted from the perspectives of total mileage of greenways, length per square kilometer, layout balance, and connection between greenways and public transport lines.

1) Coverage: 100% coverage in 11 administrative regions.

2) Average mileage of Greenway: Guangzhou covers a total area of 7434 square kilometers. By 2020, 3500 kilometers of greenway will be built, with an average land area of 470 meters / square kilometers; greater than the 350 m / km² in New England (2013 data).

3) Balanced Layout: The greenway network relies on river channels and traffic trunk roads, and includes three levels of regional (provincial), urban and community greenways, with regional (provincial) Greenways being the backbone. These Greenways

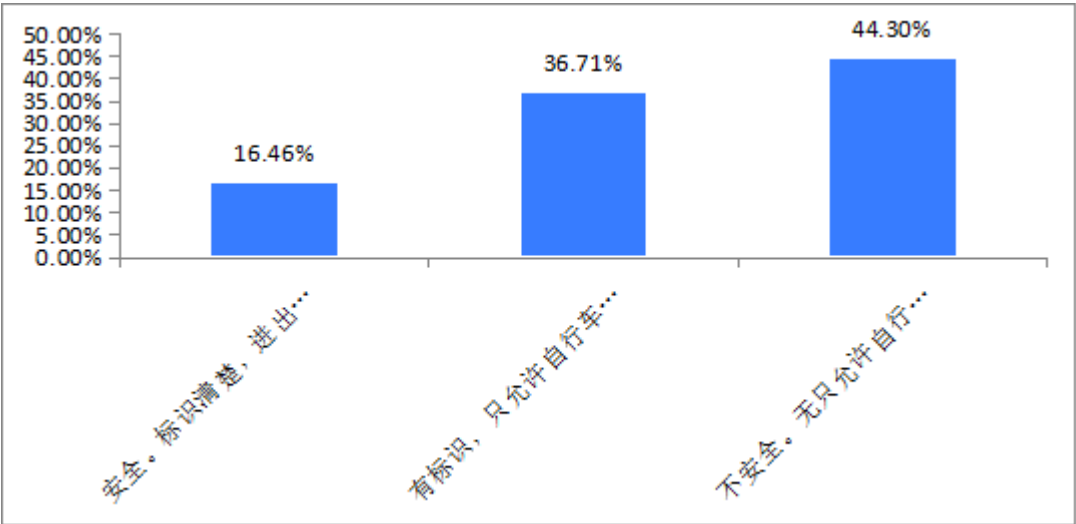
connect the main natural and cultural landscape resources in the city and connect the surrounding cities; urban greenways are the support lines that connect important functional groups; community greenways are a supplementary connection to communities and parks.

4) Urban greenways coincide with subway and bus lines to solve the problem of citizens' travel in their final kilometer of commuting.

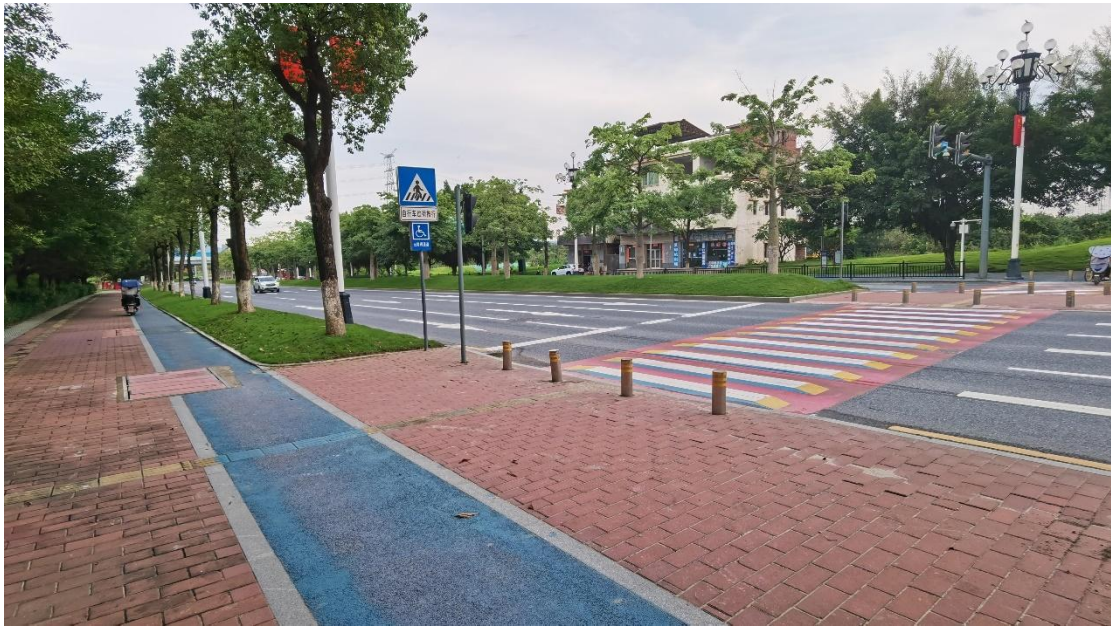
Analysis: According to the above data, Guangzhou has a wide coverage of greenways, high average mileage and balanced layout, which can effectively combine with urban public transport to form an effective auxiliary tool for citizens' travel, and the number of average mileage has exceeded the level of developed countries and regions.

2. Safety: Conduct field investigation on the: actual situation of the safety indication system, safety guarantee measures at the entrance and exit of the greenway, and the flatness of the connection position between the greenway and other roads.

1) Greenway safety signs and corresponding facilities



Marked facilities 16.46% (attached figure)



36.71% with signs and no facilities (attached figure)



44.30% without a sign or facilities (attached figure)



2) Flatness of connection between greenway and pavement (with photos)



In 18.92% of the sections, the junction between the greenway and the highway is uneven, and there is a steep drop between the curb and pavement.



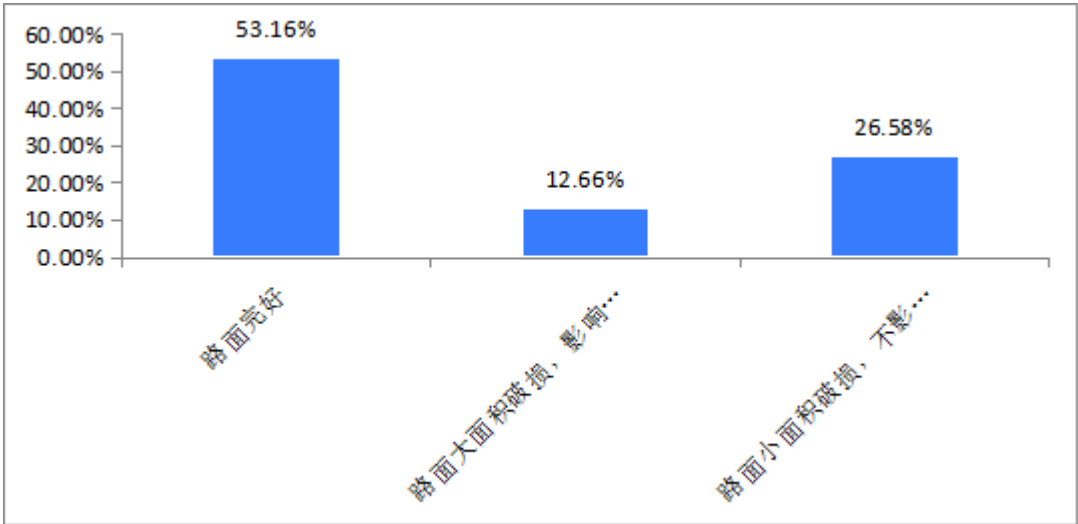
81.08% of the roads are smooth.

Analysis: Safety signs are present in 53.17% of the data, nearly half of the safety signs are unclear, and there is a lack of clear guidance for traffic participants. 16.46% of the safety guarantee facilities are seriously insufficient. There are serious potential safety hazards due to the random entry of electric vehicles on greenways and the mixed traffic of some greenways and motor vehicles. 18.92% of the sections have height differences at the junction of greenway and highway, and single vehicle

passing may cause safety hazards. The overall safety needs to be rectified and improved from the aspects of: marking systems, entrance and exit facilities, and pavement connections.

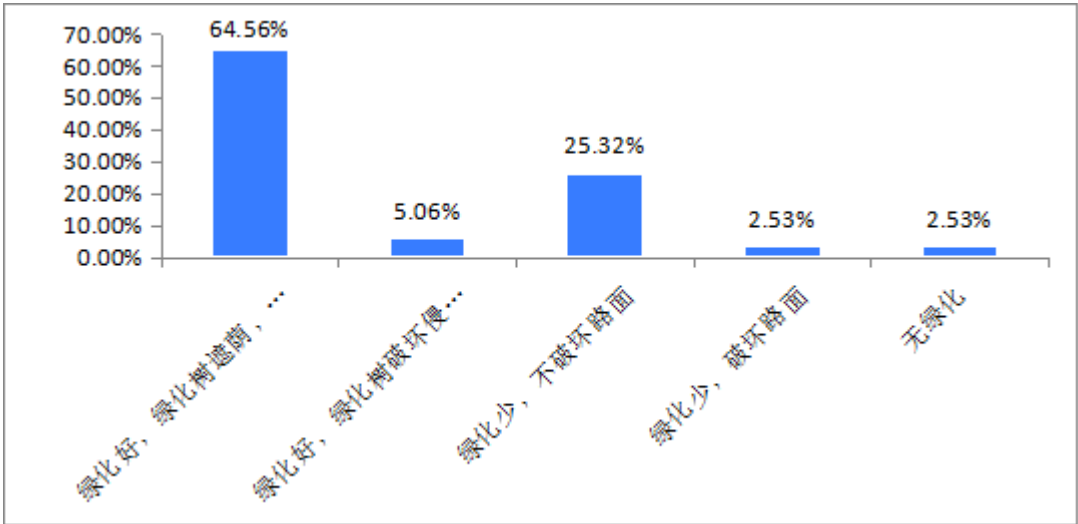
3. Comfort

1) Pavement condition



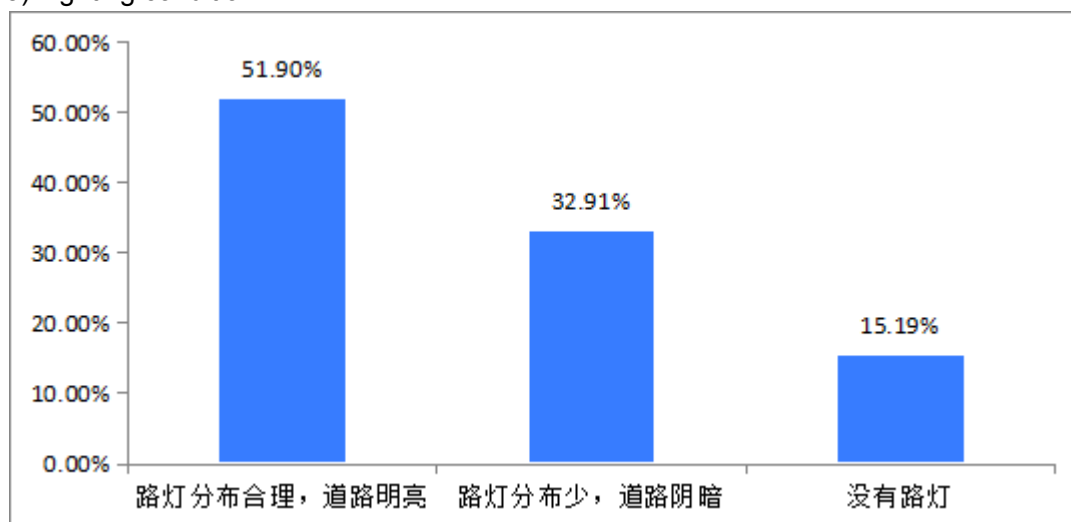
Analysis: Only 53.16% of the road surface is intact, and nearly half of the road surface is damaged, affecting the riding comfort. Moreover, 12.66% of the pavement was damaged in a large area, seriously affecting the rider experience. In addition, 17.72% of the pavement is occupied by other facilities, illegally parked cars and other obstacles. Finally, the overall pavement maintenance is insufficient.

2) Greening Status



Analysis: Good greening and shady pavement account for 69.62%, while approximately 1/3rd of the pavement is insufficient. Guangzhou has a subtropical climate with sufficient light and heat, long summers, high annual average temperatures and insufficient greening, which has a constant impact on riding and walking, and seriously affects travel comfort. In particular, there is no green shade along the embankment greenway. Riding on the bare embankment greenway in summer and autumn is not comfortable.

3) Lighting condition



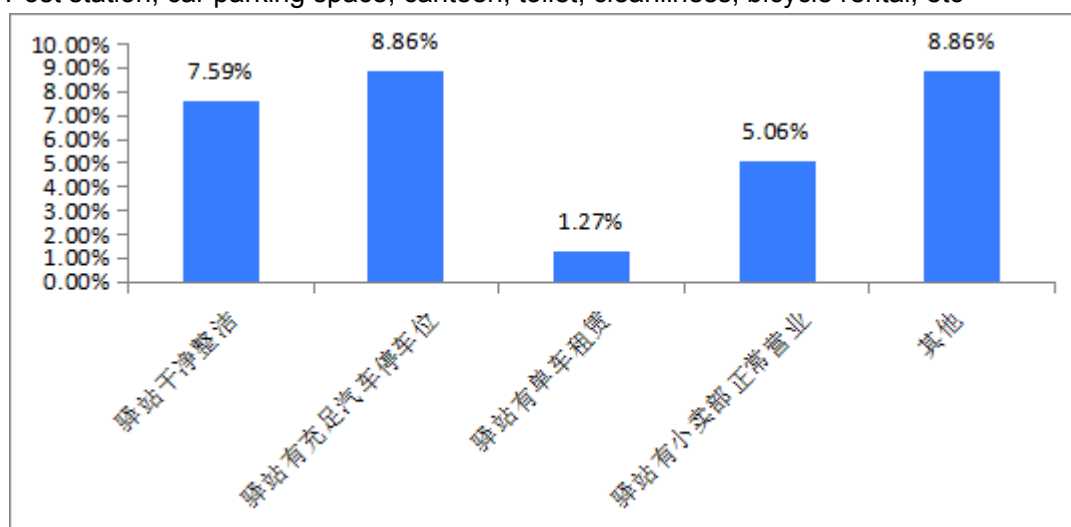
Analysis: The areas with insufficient distribution of street lights are primarily located on the roads far away from the urban area, such as country greenways and ecological greenways. These places are not easy to ride in the evening and at night. Insufficient lighting can promote or cause some riding hazards and personal safety concerns.

4. Convenience

1) Post stations

88.61% of the road sections have no post stations or the post stations are abandoned.

3) Post station, car parking space, canteen, toilet, cleanliness, bicycle rental, etc



Analysis: According to the premise of 11.39% having a post station, the post station facilities are as follows:

66.7% of the post stations are clean and tidy, 77.8% have sufficient parking spaces, 11.2% have bicycle rental, 44.4% have canteens operating normally, and 77.8% have toilets.

The post station should be suitable for the national conditions and social development, while also considering the economy. Drinking water, rest, going to the toilet, shading and rain protection should be present at 100% of the post stations. Currently, the post station needs to be improved.

2) Repair tools

There were no bicycle repair tools.

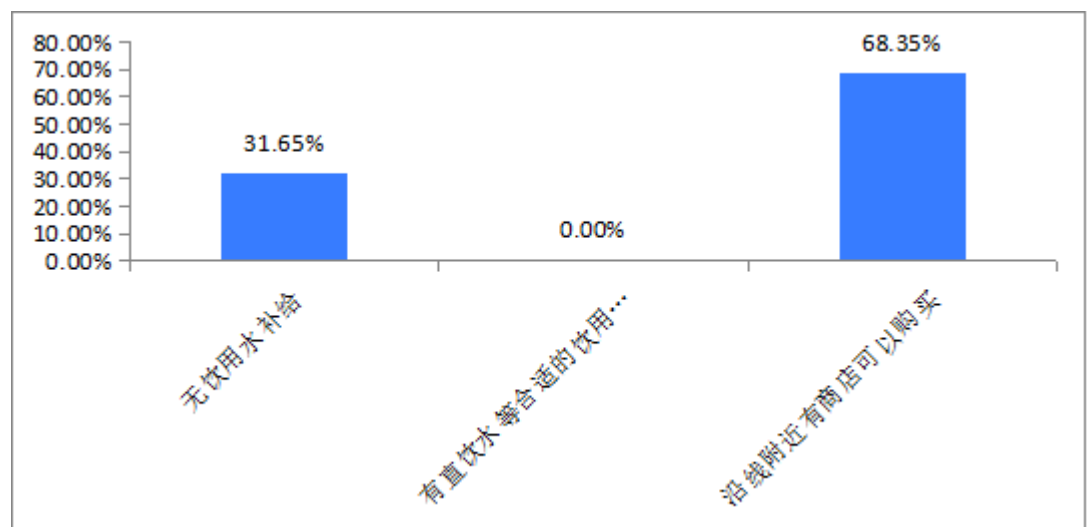
Analysis: Guangzhou's urbanization process changes with each passing day. However, in the urban areas, it is difficult to see bicycle repair shops. Country greenways and ecological greenways are far away from people. Simple tire and air repairs are the basic guarantee for cycling. The complete absence of repair tools is a lack of function on Guangzhou's greenway.

3) Drinking water along the line

There was no drinking water faucets found on the Greenway

31.65% could not solve the problem of drinking water

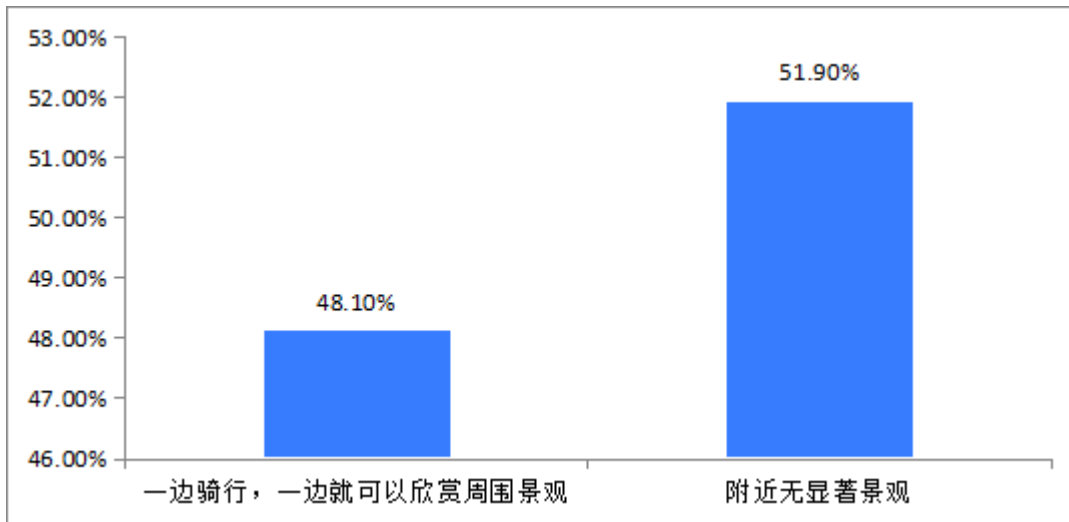
68.35% can be purchased with the help of nearby canteens to support drinking water



Analysis: Guangzhou is located in a subtropical monsoon climate environment, thus travel, sports and drinking water are the most important basic offerings. 31.65% of the cycling lines cannot provide drinking water, which is a serious challenge to Greenway cycling. A dry greenway will not be able to attract citizens to actively use it.

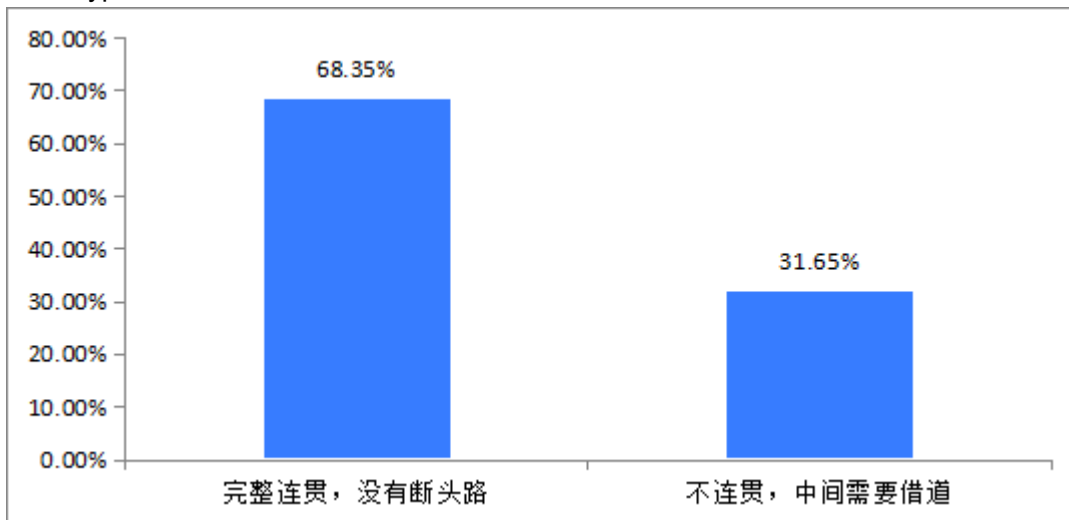
5. Playfulness

Analysis: 48.10% of greenways have ornamental landscape, while 51.90% have no ornamental landscape. From the pictures taken on the spot, the urban greenway can enjoy the river and city scenery in the core area of the city, and the country and ecological greenways are mainly on the riverside and mountains, which has a certain ornamental value. The main function of more than half of the greenways is to facilitate travel and solve the 'last kilometer of travel' issue.



6. Continuity

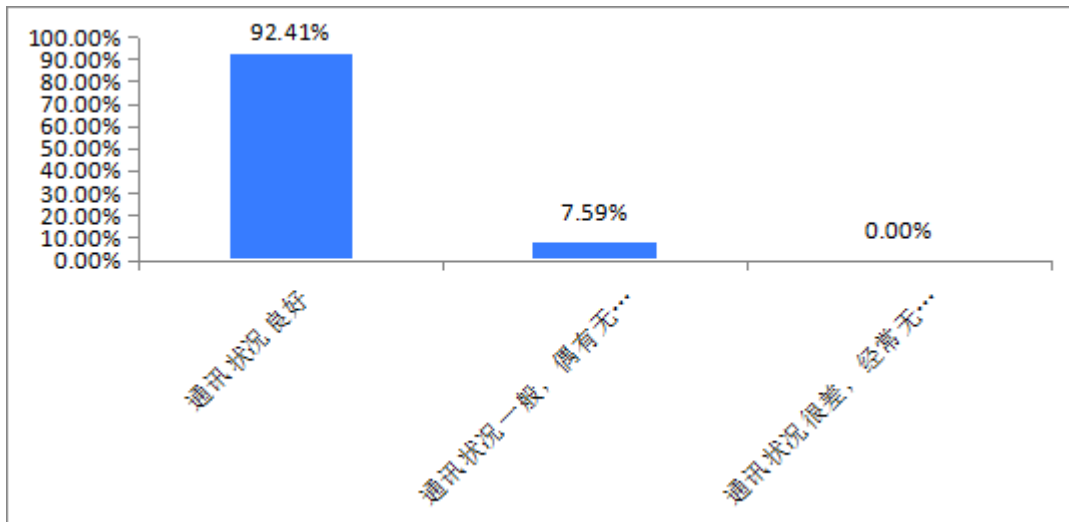
68.35% of the roads are coherent, and 31.65% of the roads are discontinuous and need to be bypassed or borrowed.



Analysis: Up to 31.65% of the pavement is discontinuous, which poses a serious obstacle for travelers' use of greenways. According to field data, the primary reason for the pavement discontinuity pavement is the truncation of the road, which shows that in the process of urban construction, we did not pay enough attention to the greenway, and did not effectively implement effective measures, such as greenway maintenance and construction re-routing.

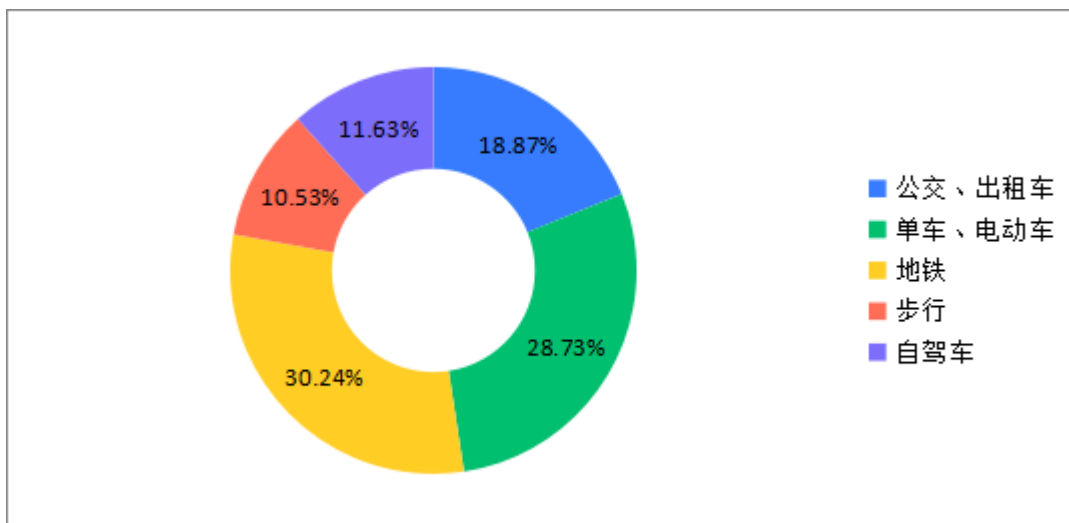
7. Communication along the greenway

The detection method is limited to the random use of mobile communication services provided by the three major mobile communication providers, which basically meets the daily use conditions of ordinary citizens. 92.41% of the road communication is in good condition, and 7.59% occasionally have poor signal conditions in some places. The overall communication condition is excellent.

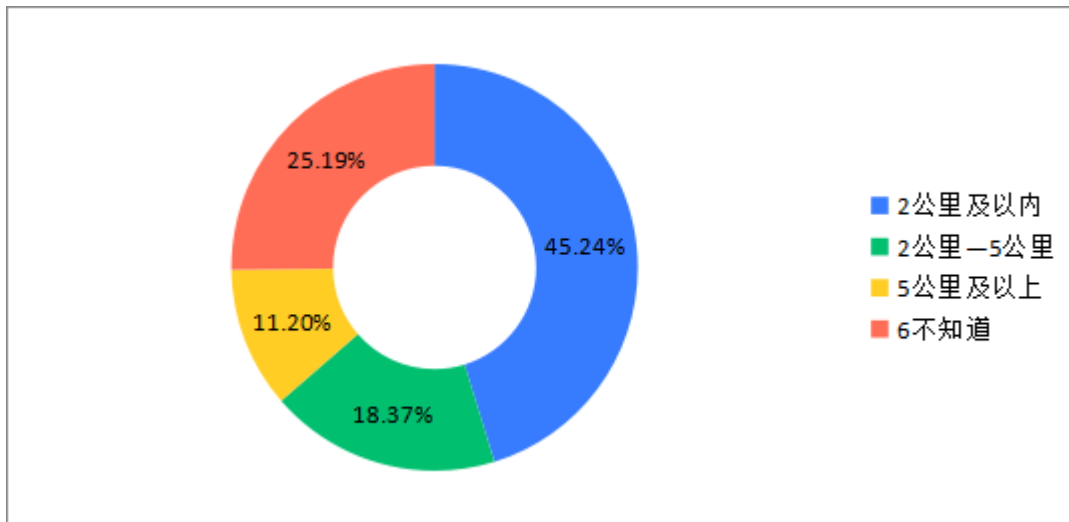


2 The online questionnaire survey set up seven questions, filled in six multiple-choice questions and one multiple-choice question. The questionnaire was distributed through social media and offline to permanent residents in Guangzhou, paying special attention to the balance amongst the elderly, middle-aged, students and citizens' income. 1187 valid questionnaires were recovered and 450 valid suggestions were filled in by citizens.

The proportion of the most commonly used travel modes of 1187 valid questionnaires is evenly distributed, which can basically represent the majority of Guangzhou citizens.

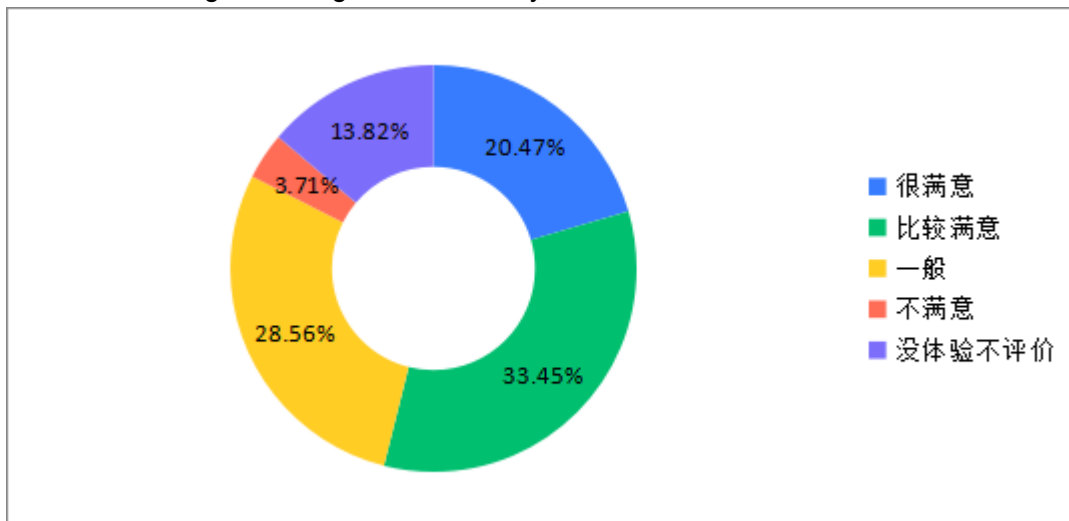


1 The distance from the address to the greenway,



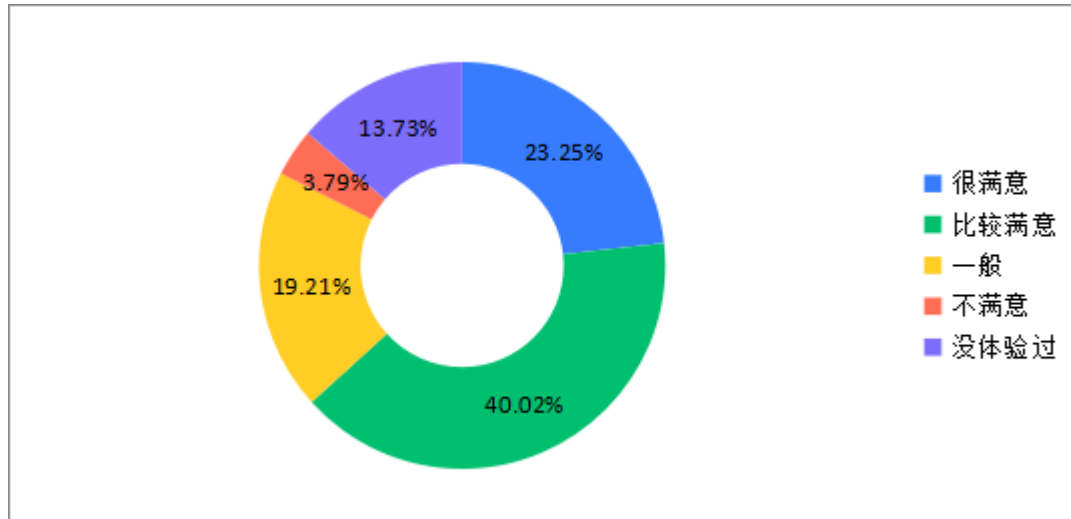
Analysis: With regard to the accessibility of the greenway, one aspect is the accessibility in the physical sense, i.e. the distance between the distribution of greenway network and residential and office areas, and the other is the accessibility of citizens' psychological cognition. The primary purpose of this questionnaire is to understand the citizens' accessibility. According to the data, 25.19% of citizens do not understand the surrounding greenways at all, and only 45.24% think there are greenways within 2km. The accessibility of the whole psychological cognition is seriously insufficient, which does not match the actual construction results of greenways in Guangzhou

2 valuation on signs and signs of Greenway

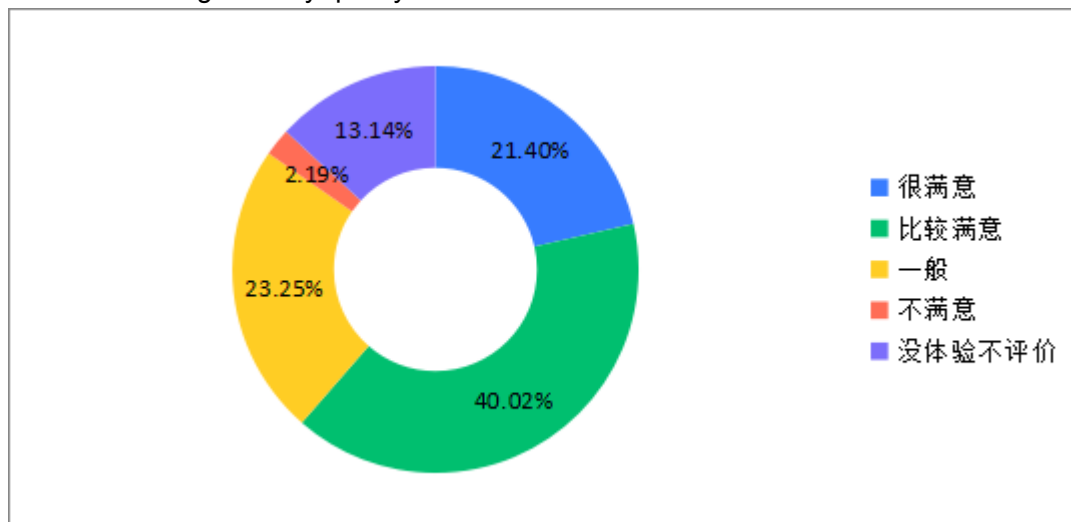


Analysis: 13.82% of the citizens have no experience at all, and 46.08% of the citizens are dissatisfied with the identification system, which is basically consistent with the field research results.

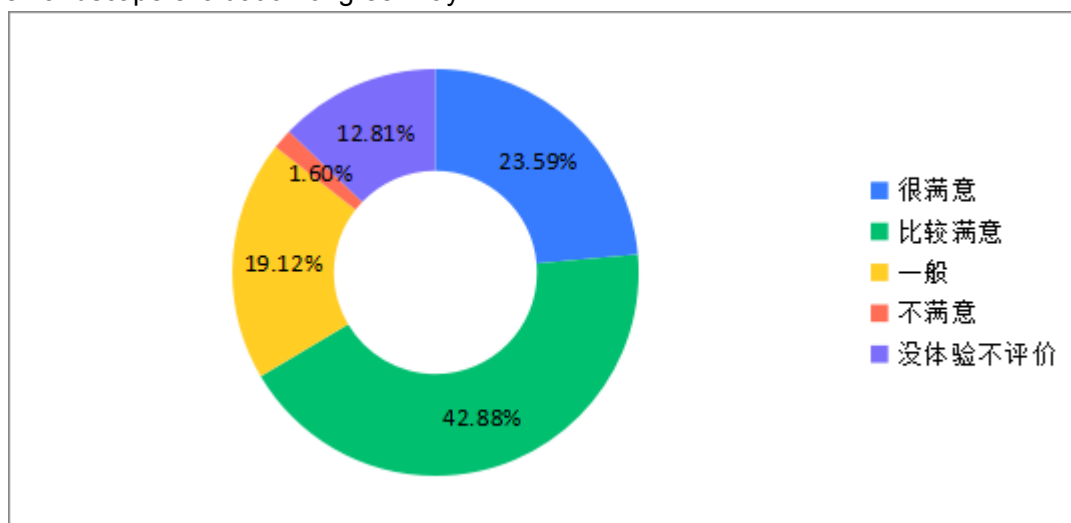
3 Traffic experience on greenway



4 Evaluation of greenway quality



5 Landscape evaluation of greenway



Analysis: 60% of the citizens report a satisfactory greenway traffic experience, quality and landscape. This data is basically consistent with the field survey data, which proves the current situation of Greenway from another aspect.

6. The public filled in their opinions regarding the renovation of greenways and 620 of them were recovered, 450 of which had clear opinions, while 347 had specific and clear opinions on the construction of greenways. These 347 were regarded as highly effective opinions and classified into 12 aspects:

- 1) It is suggested to build 89 more greenways, accounting for 25.65%
- 2) 83 greenways were damaged or disconnected, accounting for 23.91%
- 3) 59 motorcycles were in danger, accounting for 17.00%
- 4) 25 rest areas, sunshades and convenience stores provided drinks and snacks, accounting for 7.20%
- 5) There were 19 greenways with better shade, accounting for 5.48%
- 6) 18 greenways were seriously occupied, accounting for 5.19%
- 7) 18 unclear marks, which accounted for 5.19%
- 8) Less than 13 publicity articles, which accounted for 3.75%
- 9) 8 greenway street lamps were damaged or there was not enough light, which accounted for 2.30%
- 10) It was suggested that 4 items can be identified on map and other application software, which accounted for 1.15%
- 11) It was recommended to set up 4 dog dung collection areas, which accounted for 1.15%
- 12) 3 greenways were too narrow and inconvenient to travel, which accounted for 0.86%

Analysis: 25.65% wanted to increase the number of greenways, 23.91% proposed to improve the quality of greenways, 17% were dissatisfied with the traffic safety of greenways, and the first three topics of public concern expressed the hope for more greenways with better quality and good traffic order.

Conclusions and viewpoints

in summary:

The survey lasted half a year. Based on the data of 1700km and 1187 valid questionnaires, we put forward the following conclusions and suggestions for Guangzhou greenway:

1. Wide coverage, weak coherence and insufficient diversity. After more than 10 years of construction and development, Guangzhou greenway has formed a good situation with wide coverage, balanced layout, high average mileage and both practicability and appreciation. According to the survey data, 31.65% of greenways in Guangzhou are discontinuous, need to bypass or take a detour, and the connection function is artificially blocked. Greenway is a linear, open corridor with a certain width and connecting various open spaces; Linear connection is the basic function of greenway.

Suggestions: 1) During urban construction, pay attention to greenway traffic and try to avoid blocking greenway; It is really unavoidable to do a good job in the corresponding detour instructions and detour road construction to ensure the continuity of the greenway. 2) Strengthen the maintenance of the greenway facilities, avoid the failure of greenways due to the damage of the greenway identification system and pavement, and maintain the continuity of greenway linear space. 3) In the planning and design of greenway, we should consider enriching the functions, not limited to cycling and slow walking, learn from the advanced, more experience public utility areas of Europe and America, increase the outdoor sports and fitness facilities of the greenway and increase the popular science role of the greenway.

2. Insufficient safety, poor comfort and insufficient hardware maintenance. The survey shows that nearly half of the greenways have the problems of lack or insufficient safety facilities and poor pavement maintenance. There are generally new greenways with good quality and complete facilities, but many old greenway identification systems are old and damaged, and the road surface is damaged.

Suggestions: 1) Strengthen the safety instructions of the sign system to give clear guidance to all parties involved in greenway travel; 2) enhance the road safety facilities to ensure the the safety of Greenway space from the hardware level. 3) Strengthen the greening beside the greenway, or add sun shading and rain protection facilities to improve the travel comfort of the greenway.

3. The greenway traffic order is chaotic - electric vehicles are the biggest hidden danger. The survey found that it is a very common phenomenon that greenways are occupied by electric vehicles. The high quality and fast speed of electric vehicles bring potential safety hazards to greenway traffic, resulting in a very poor greenway traffic experience. Electric vehicles and bicycles are close in shape, which can not be solved by existing roadblocks; At the same time, electric vehicles have replaced bicycles as a short-distance travel tool for citizens. In the face of this problem, blocking the greenway is not the solution, while maintaining the status quo will only cause greater hidden dangers.

Suggestions: 1) Urban greenways are responsible for supporting the function of citizens' casual travel. It is unrealistic to absolutely prohibit electric vehicles from going on greenways. We hope to limit the speed of electric vehicles in greenways through legislation and reduce the potential safety hazards caused by fast speed. 2) Hardware facilities and indication systems are used for ecological greenways and rural greenways. Electric vehicles are strictly prohibited to go on the road to ensure the traffic order of greenways. Greenways in America are very mature and well-kept, which is a good example to learn from.

4. The basic needs of Greenway traffic are: convenience, service awareness, drinking water, toilet availability, sun/rain protection, and occasional car repair services. According to the survey results, 88.61% of the road sections have 'no post stations or abandoned post stations'. The above-mentioned basic needs must be supplemented with facilities outside the greenway space, and the traffic must be rectified to allow public convenience. In addition, there are no greenway drinking water fountains and no bicycle repair shops. These traffic conditions greatly reduce citizens' desire to use greenways.

Suggestions: 1) According to the conditions of the greenway and surrounding space facilities, suggest to build new facilities or clearly guide the use of nearby facilities to solve the basic functions of greenway, such as drinking water and toilets. 2) According to the greenway location and surrounding environment, add fixed single vehicle repair tools to solve occasional emergency repair situations.

5. Excellent communication hardware and lack of informatization benefit from the wide coverage of communication construction. Only a few areas of the greenway have poor communication capabilities, which contrasts most greenways in the United States. It was impossible to search for complete information of the Guangzhou greenway on the Internet, obtain the complete information of greenway routes, and search greenways on commercial maps. Every year, greenway network information is basically a few online Red punch in greenways with limited publicity. For 3500 km greenways, the degree of informatization is very low, the publicity is seriously insufficient, and the public awareness is also insufficient.

Suggestions: 1) Increase the overall publicity of the greenway and strengthen the publicity of Greenway travel and outdoor sports; 2) At the same time, move the greenway map to the Internet to keep up with the pace of the information age. 3) Make it easier for citizens to contact, understand, use and jointly participate in the maintenance of greenways.