

The road for people with visual impairments
research and suggestion



Introduction

What is the road for people with visual impairments?

It is tactile paving (also called truncated domes, detectable warnings, Tactile Ground Surface Indicators, detectable warning surfaces) is a system of textured ground surface indicator found on footpaths, stairs and train station platforms to assist pedestrians who are blind or visually impaired. Tactile warnings provide a distinctive surface pattern of truncated domes, cones or bars detectable by long cane or underfoot which are used to alert the visually impaired of approaching streets and hazardous surface or grade changes. [1]. In China, they are composed of two basic universal kinds of tactile tiles :

1. Tactile Directional Tiles

Composed of tactile strips, they are used to indicate straight ahead direction. Visually impaired persons may proceed in the direction of the tactile strips.

2 Tactile Warning Tiles

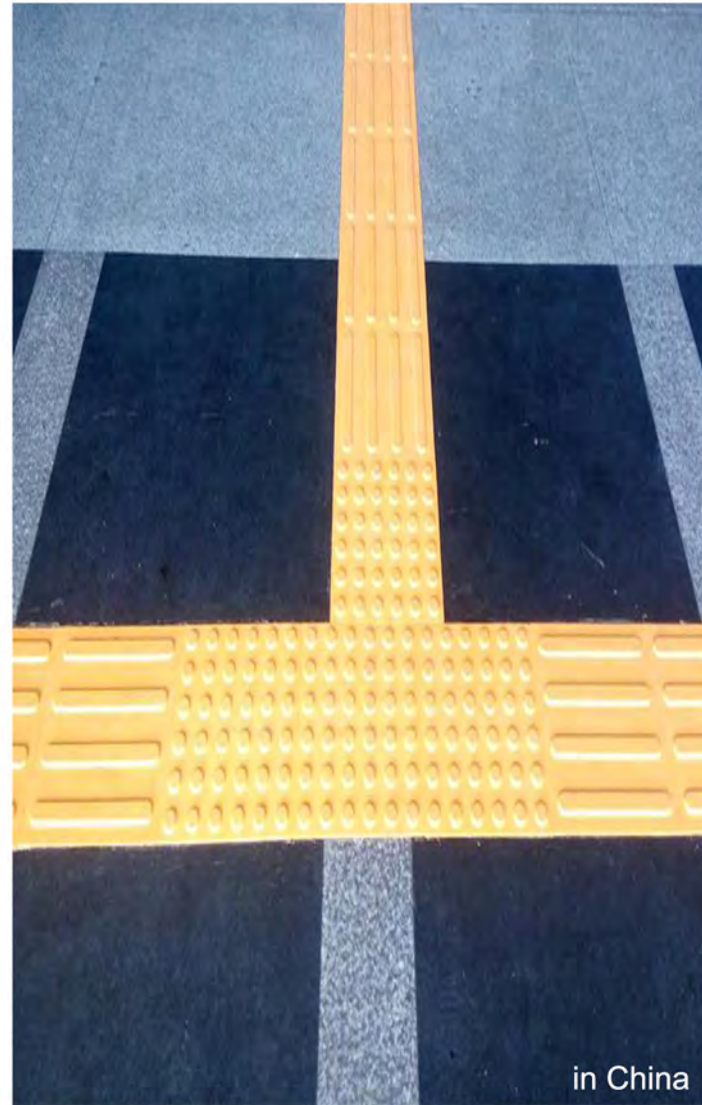
Composed of large blisters, they are used to give warning to the visually impaired people that the road conditions of the route ahead are different, they have arrived at a certain location, or that the route is to take a turn.

[1] https://en.wikipedia.org/wiki/Tactile_paving

Introduction



(the photo taken by myself at metro station of Stockholm)

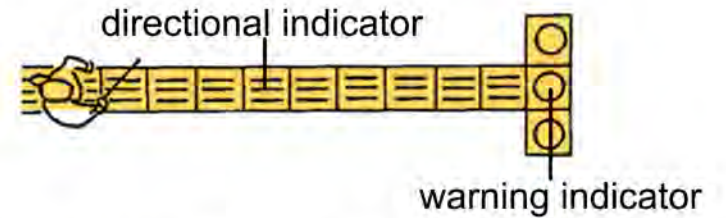
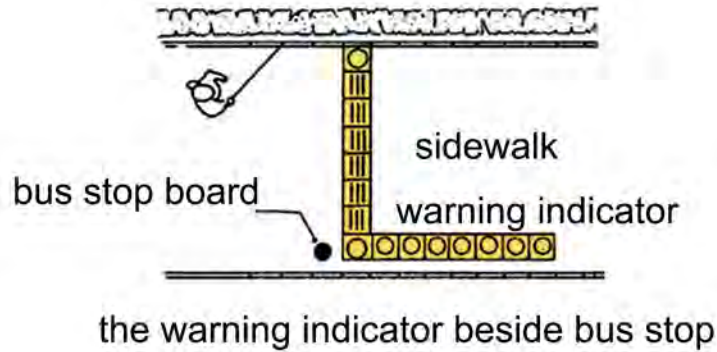
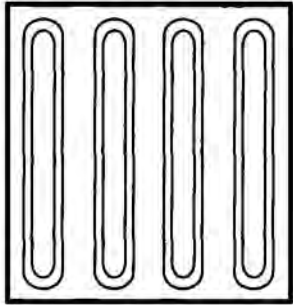


(1. https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:it,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=ZbHZVWro2CkPJM%3A)



(2. https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:it,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=d6v98oCHZHJvrM%3A)

Introduction



the warning indicator at the end or start of the sidewalk for people with visual impairments



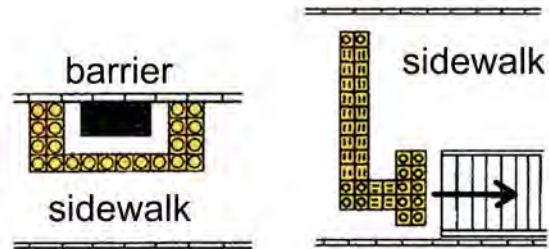
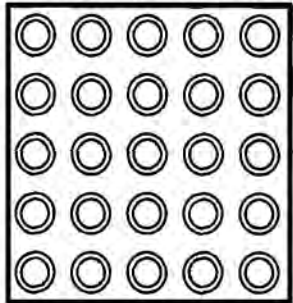
directional tiles
(directional indicator for the visually impaired people)



the warning indicator at intersections



the directional indicator beside curb

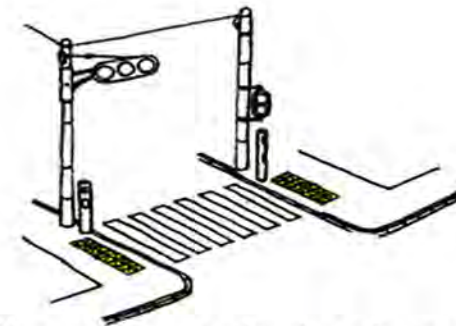


the warning indicator beside a barrier

the warning indicator at the entrance of a metro station

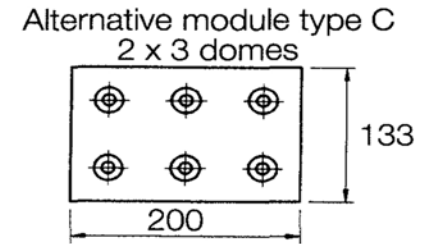
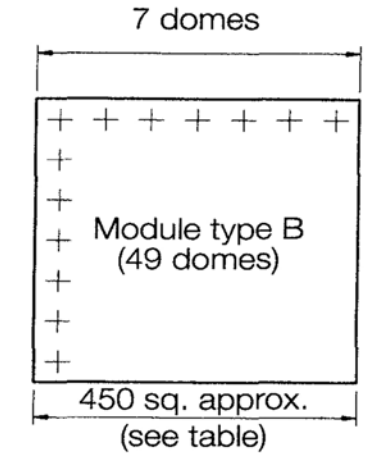
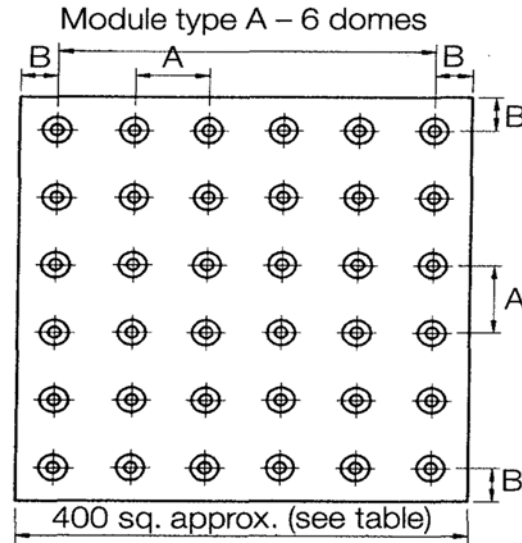
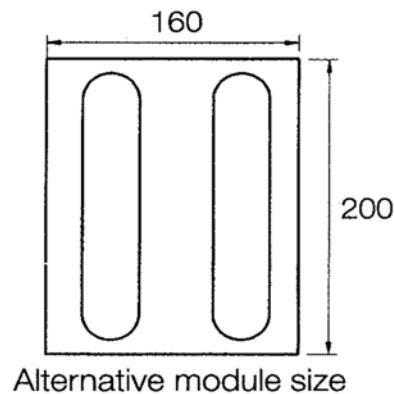
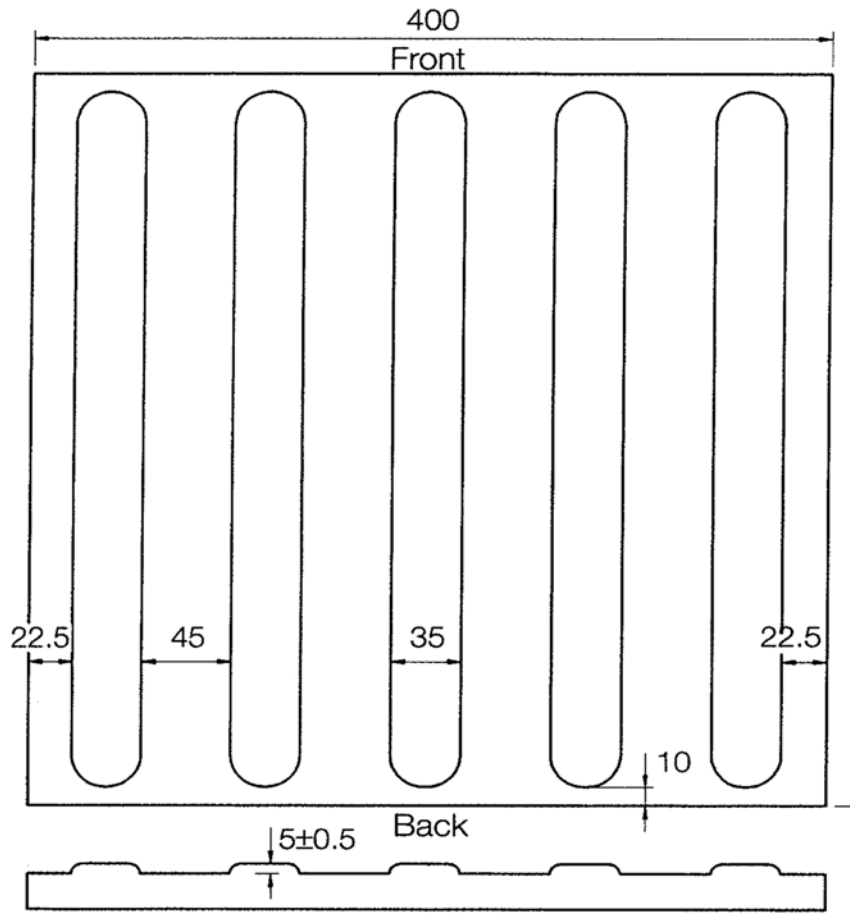


warning tiles
(warning indicator for the visually impaired people)

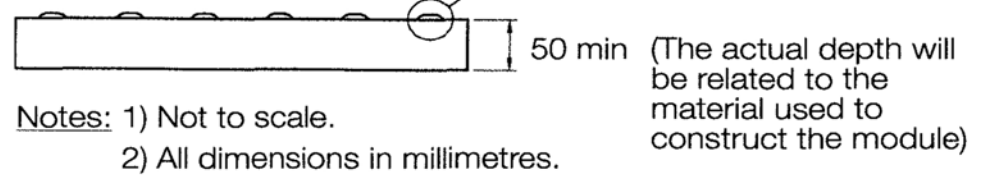
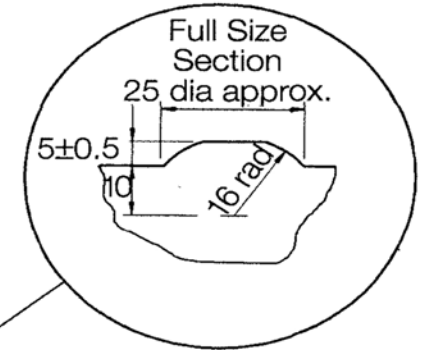


the warning indicator at a crossing

Introduction



Module Type	Size	Pitch Dimensions	
		A	B
A	400 sq.	66.8	33
B	450 sq.	64	33
C	200x133	67	33



Notes: 1) Not to scale.
2) All dimensions in millimetres.

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2) All dimensions in millimetres.

Introduction

The history and development of the tactile paving

Today, tactile paving are found underfoot at all major intersections, crosswalks, and transportation platforms and stations across the United States. Since 1991, federal guidelines outlined in the Americans with Disabilities Act Accessibility Guidelines standardized the type and placement of detectable warning surfaces required on roadways and in transit stations. However, America was not the first country to implement widespread accommodations for disabled individuals in such a way, in fact, the true history of detectable warning surfaces as they are used today dates back to the late 1960s, when tactile paving was developed and implemented in Japan.

The original tactile warning tile was designed by Seiichi Miyake in 1965. These tiles were first implemented in Okayama, Japan, in 1967, after which their use slowly spread to other cities throughout the country. Tactile warning surfaces were quickly picked up and installed throughout the Japanese transit system, in particular Japan National Railways, today called Japan Railway. In 1985, the tactile warning system was formally adopted throughout Japan as the Hazard Guide for the Visually Impaired, and included two types of tiles: truncated dome patterns and directional guidance patterns. Although the color of the tactile warning tiles originally used was often modified in accordance with the surrounding area, this led to confusion and the color of modern tactile warning tiles in Japan has since been standardized.[2]

In Beijing, China, 1990, a visually impaired man fell into a sewage well, which led to the government allocated funds to build a non-standard tactile paving in 1991. It became the first road for people with visual impairments in China, gradually becoming an essential content in the process of constructing a modern city. Today, tactile paving are used in both public and private spaces to ensure accessibility and safety for all.

[2] <http://adatile.com/blog/a-brief-look-at-the-history-of-detectable-warning-surfaces/>

Purposes

The sense of hearing and touch are primary senses to people with visual impairments. There are many emerging high-tech equipments which can aid them in navigation, but the most common mobility aid used by pedestrians with poor sight to facilitate their independent mobility is still a long white cane. **The tactile paving offer them a safer and more convenient special sidewalk when they walk individually with a white cane, which bring them much sense of safety. It is also of importance to the whole society, which embodies the society's care for the visually impaired people.**

It is a fact that **the tactile paving system** has been implemented in public streets, walkways, and other property in many countries, which provide people with visual impairments with the most basic help. However, **the question if the system effectively play its true value, is there some problems with the system in practice, as well as how to optimize the system if there are some problems with it in some situations?** I decided to explore them in this study.

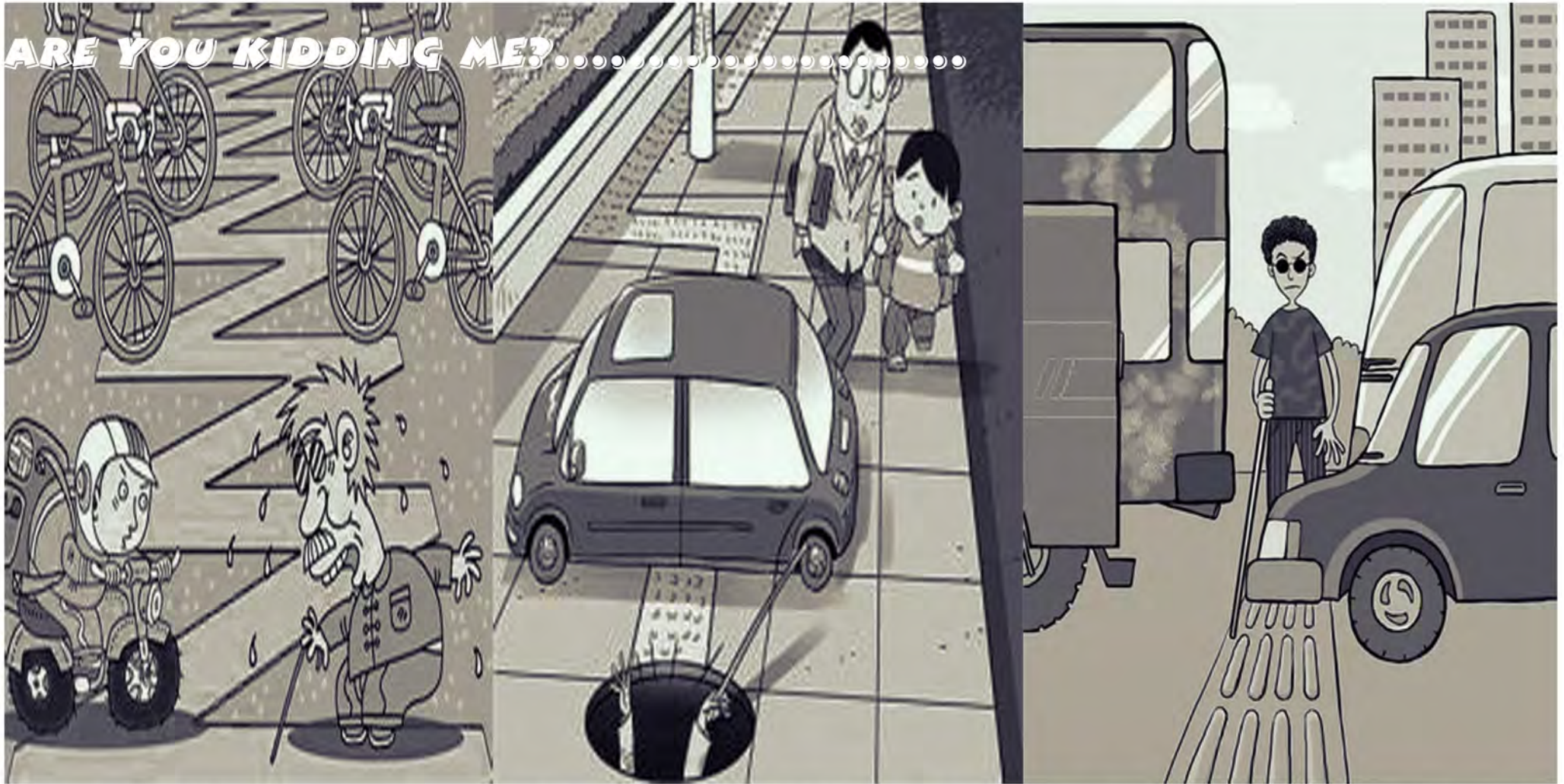
I tend to choose the paving systems in Beijing, China as my target for 3 reasons below:

1. There is the largest population of visually impaired people in China, by the end of 2010, the number of the group has increased to 12.63 million. In 2012, the statistics show that China has about 13.5 million people with visual impairments, the growth is nearly equivalent to 1 person/minute. As the population expands, the number of the group will continue to increase. Therefore, the construction of tactile paving system of high-quality is pretty urgent and necessary for the society. [3]

2. the most common mobility aid used by people with visual impairments is still a white cane, since the high-tech equipments or a guide dog are kind of expensive for the majority. Therefore, the tactile paving system is essential for them.

3. From the angle of construction quantity, Beijing has achieved a leading level all over the world. However, there are still many problems with the accessibility of the system, even threatening the people's safety, which need to be solved as soon as possible. Thereby, this study will be much helpful to a more effective design on accessibility of urban roads and buildings.

Purposes



(4. http://image.baidu.com/search/detail?ct=503316480&z=undefined&tn=baiduimagedetail&ipn=d&word=%E7%9B%B2%E9%81%93&step_word=&ie=utf-8&in=&cl=2&lm=-1&st=undefined&cs=1238679963,1252127633&os=3746942929,87436309&simid=4285244225,844177069&pn=123&rn=1&di=110976880740&ln=1719&fr=&fmq=1479912804986_R&fm=&ic=undefined&s=undefined&se=&sme=&tab=0&width=&height=&face=undefined&is=0,0&istype=0&ist=&jit=&bdtype=0&adpicid=0&pi=0&gsm=5a&objurl=http%3A%2F%2Fwww.gog.com.cn%2Fpic%2F0%2F11%2F22%2F54%2F11225429_996309.jpg&rpstart=0&rpnum=0&adpicid=0&ctd=1479912909237^3_1903X935%1)

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(6. http://image.baidu.com/search/detail?ct=503316480&z=undefined&tn=baiduimagedetail&ipn=d&word=%E7%9B%B2%E9%81%93&step_word=&ie=utf-8&in=&cl=2&lm=-1&st=undefined&cs=879637505,3576763844&os=2055290881,359638421&simid=3497553908,265274097&pn=463&rn=1&di=107428065250&ln=1719&fr=&fmq=1479913325907_R&fm=&ic=undefined&s=undefined&se=&sme=&tab=0&width=&height=&face=undefined&is=0,0&istype=0&ist=&jit=&bdtype=0&adpicid=0&pi=0&gsm=1a4&objurl=http%3A%2F%2Fimg1.cache.netease.com%2Fcatchpic%2FB%2FB8%2FB858AF826F3A52804D70E1BC1CD2BF0D.jpg&rpstart=0&rpnum=0&adpicid=0&ctd=1479913379017^3_1903X935%1)



“The implementation of tactile paving is not only detail of a city, what is more, it also shows that the city managers and builders’ care for the special groups. However, it is hard to believe that there are so many traps set for the visually impaired people on the paving without a field study.”

(Lv Jing, 2005, “Research for tactile paving development”)

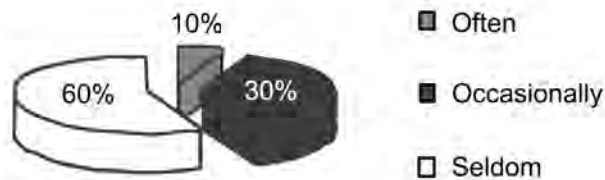
“The tactile paving should not only meet the universal standard, but also the society are supposed to pay more attention to the optimization of them. The design of the paving should be more user-friendly in the future.”

(Li Guangyu, 2013, School of Fine Arts, Tsinghua University, “Study on optimization design of the paving for people with visual impairments in Beijing Subway”)

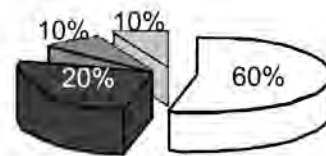
It is time to explore the existing problems of the paving for the visually impaired group, and optimize them as possible as we can.

Research

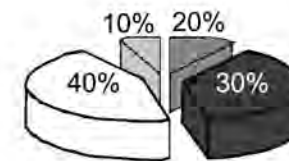
I did a research about the **usage condition and the existing problems** of the paving for visually impaired people in the way of telephone interviews and email questionnaires, which include telephone interviews for 10 people with visual impairments, and email questionnaires for 30 general people.



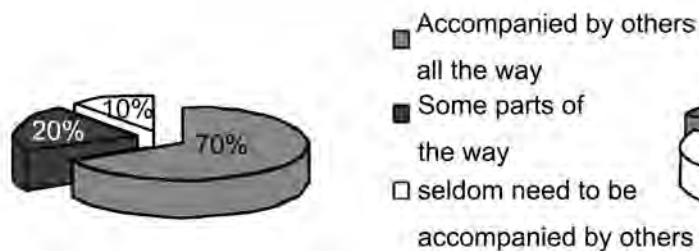
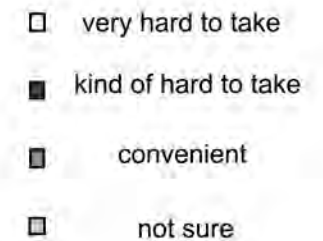
The frequency of going outside



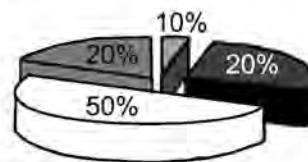
The range of going outside



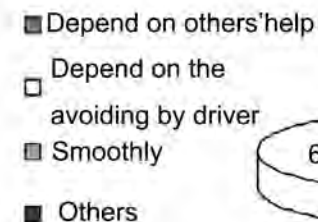
The situation of going outside by bus



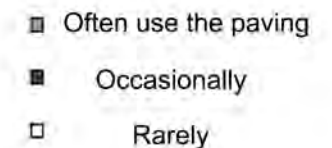
Whether people with visual impairments need to be accompanied when they go outside



The situation of the people going across a crossroad



The usage condition of the tactile paving for visually impaired people



From these diagrams we can find that it is still difficult for the visually impaired people to go outside independently although there are much of the tactile paving. But why they are not willing to go outside independently with the tactile paving?

Research

According to the feedback of the interviewed people, I summed up several main existing problems of the paving for visually impaired people.

1. The problems of the design of the tactile paving

(1) The confusion of color



Research

(3) The shortage of tactile warning paving

The shortage of tactile warning paving at bus stops and the entrance of some public buildings. which is very not convenient for people with visual impairments to get on board.

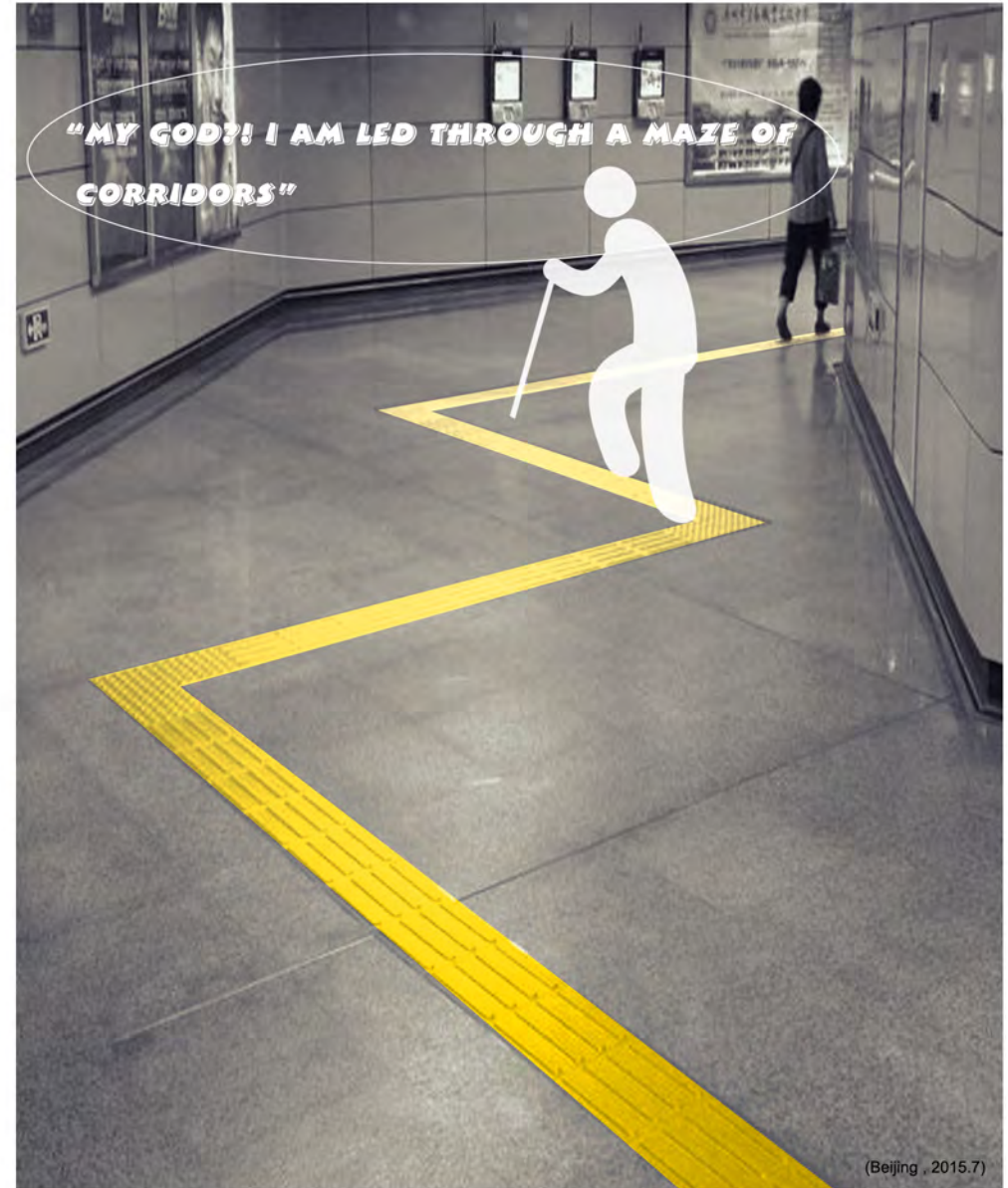
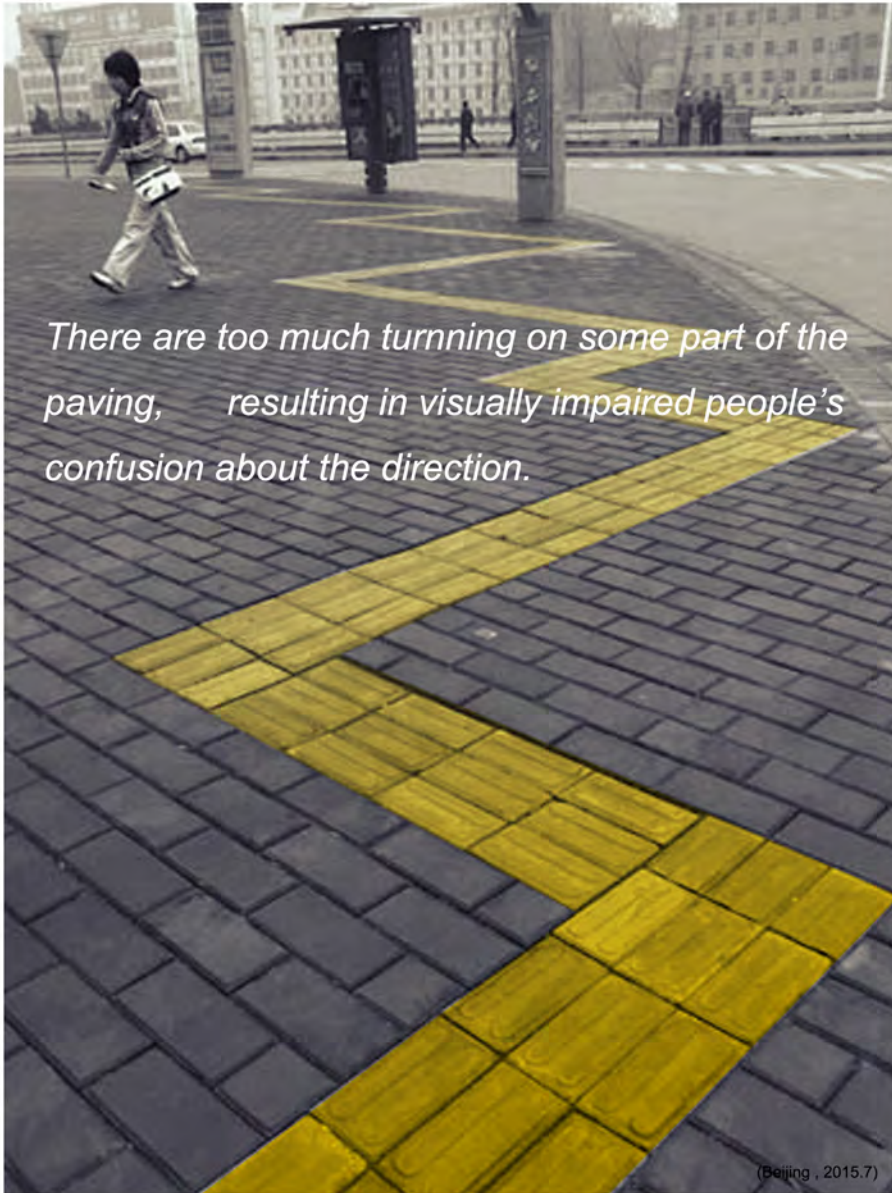


(4) Incomplete supporting facilities



Research

(5) The guidance is not clear



Research

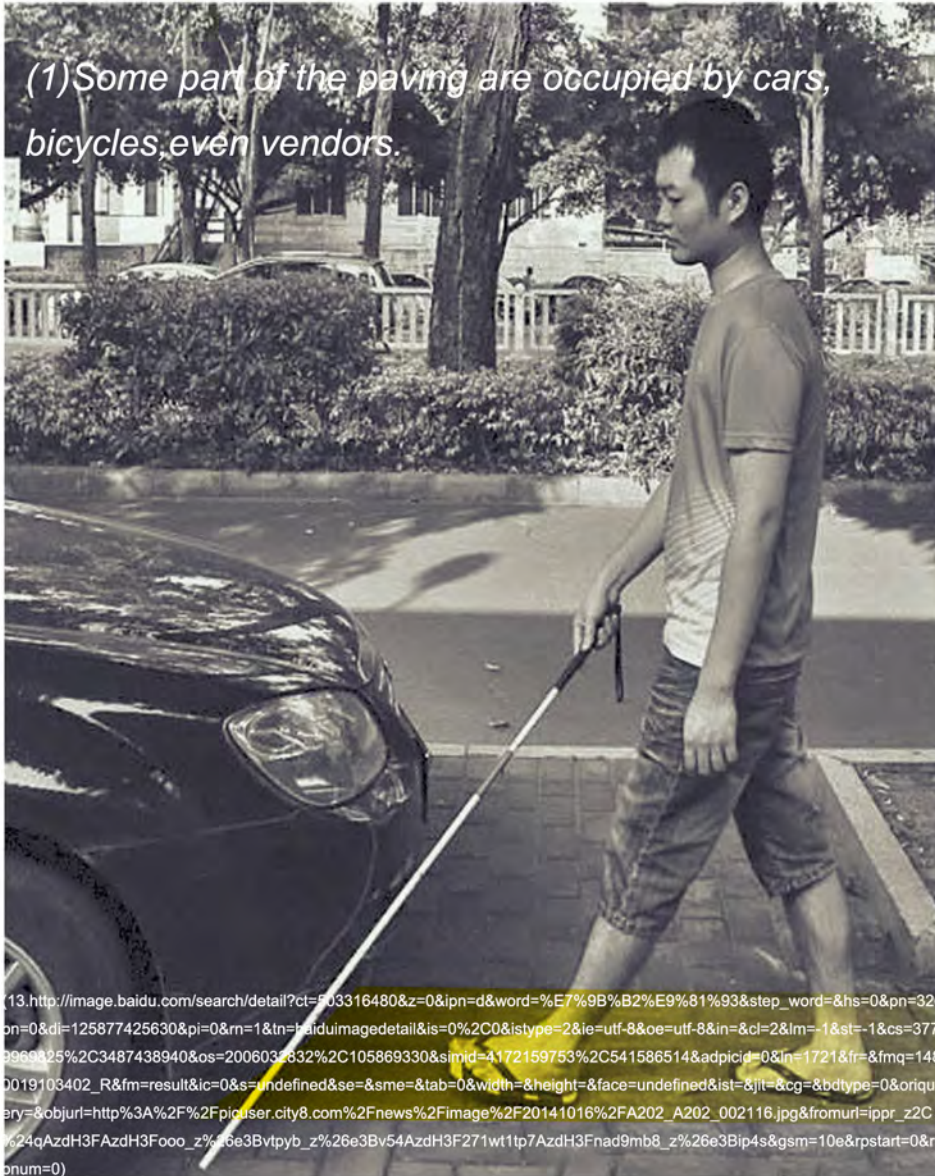
2.The problems of the laying of tactile paving

(1) The paving is excessively close to the surrounding facilities, which can be dangerous for the people.



Research

3.The problems of the management of tactile paving



Research

4.The lack of the public awarness of accessibility

Based on the **feedback of the questionnaire survey**, only 10% of the surveyed people are impressed about the tactile paving for people with visual disabilities, 20% of the people are often aware of it, however, half of them are rarely aware of the paving, and even 20% of them never pay attention to it.

Besides, 60% of them agree that the tactile paving do help the visually impaired people, but the rest doesn't think it help the people as what we expect.

Finally, 80% of them agree that the paving shouldn't be occupied by any other things, but they didn't do anythings to resolve this problem; only a few of them were willing to take measures to solve it.

Thus,the lack of the public awareness of accessibility is also one of the primary causes we need to pay attention to.

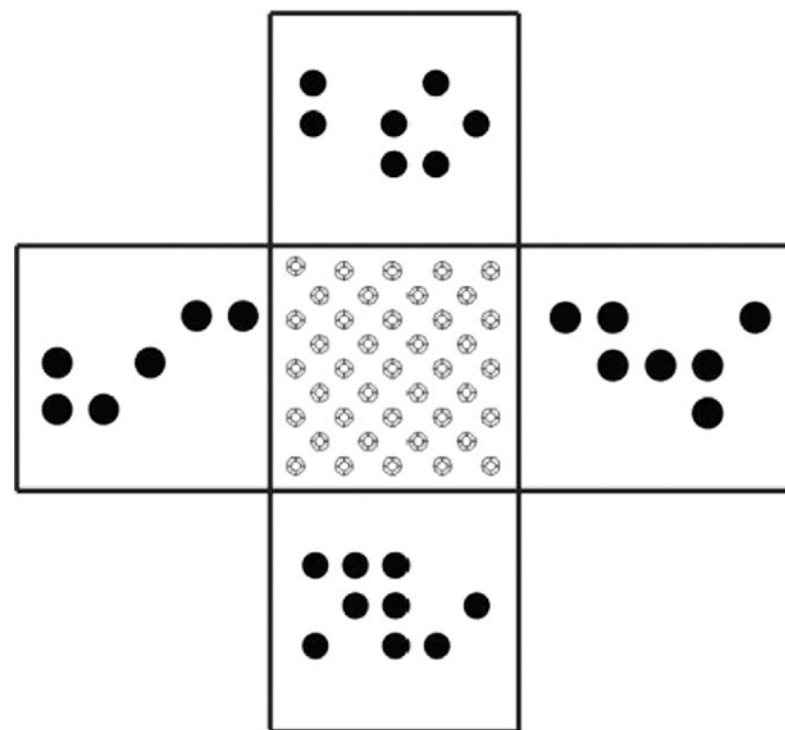
Suggestions

1.The improvement of the design

- 1.The color and texture of the paving should be clearly different from the surroundings. Besides, the material of the paving should be suitable for local context. For example, we should select antiskid material to build the paving in the open in cold regions.
- 2.The tactile warning tiles cannot be ignored at bus stops,metro stations ,and important public buildings. (Implemented completely at the start,the end,the turning, the crossing and the entrance of the paving.)
- 3.The design of the paving should be more user-friendly, which should guide the visually impaired people more effectively.

In 1829, a Frenchman with visual impairment Louis Braille invented the Braille, which is a symbol system composed of six bumps. Visually impaired people can distinguish different characters through the number of points and the positions, which can be changed into 63 different graphic symbols.[4] It is universally used in modern life by people with visual impairments. Because Braille also rely on tactile perception, therefore it determines the Braille theory can be applied in the tactile paving.

The Braille can be used to show where the people will go, and also this innovative design may be a beautiful scenery for the city.

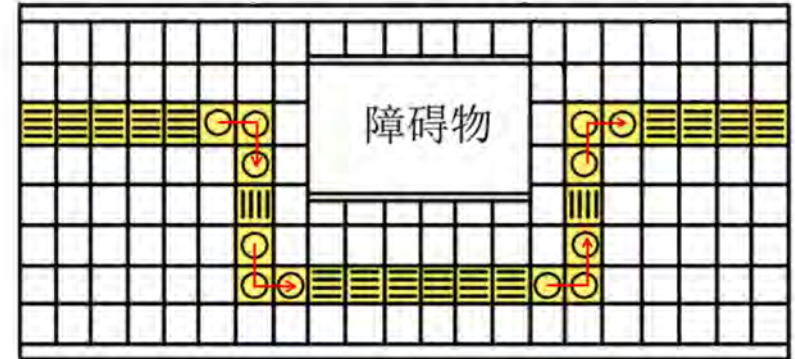


Suggestions

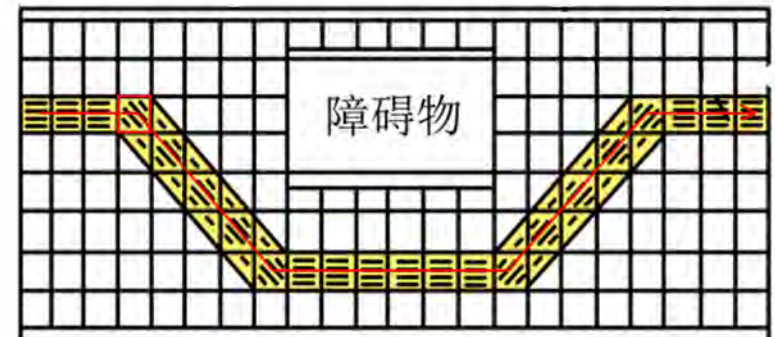
2.The improvement of the laying

1. Keep continuity in the whole paving system, with paving connected to the entrance of a public building, the warning paving connected to the directional.

2.Strictly regulate the process of laying and make the route more user-friendly.



the original route
too close to the barrier
too many turnings
not convenient



the improved route

Suggestions

3. More positive attitude towards the regulations on the tactile paving

The road condition is more complicated and crowded in China, we need to stage some feasible regulations to control the paving system. Maybe we can learn somethings which are applied in regulating another urban roads. For example, we can set some traffic signs to warn people not to park a car on the tactile paving and also not to invade at any time.



Conclusion

1. There are many existing problems of the tactile paving system in Beijing which are urgent to be addressed as soon as possible. And the root reason actually is that we didn't think about the design on accessibility at the beginning of building a city, thereby, the tactile paving system cannot well integrated into the context. There is still a large gap between the urban plans and the design of the paving system.

2. The paving system is not independent, which is influenced by the surrounding buildings, facilities and even human activities. Therefore, we should take into account these factors in the process of design rather than just to design for universal standards so as to create a user-friendly tactile paving system for people with visual impairments.

Sources

Pictures

- [1. \(https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:lt,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=ZbHZVWro2CkPJM%3A\)](https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:lt,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=ZbHZVWro2CkPJM%3A)
- [2. \(https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:lt,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=d6v98oCHZHJvrM%3A\)](https://www.google.com.hk/search?q=%E7%9B%B2%E9%81%93&safe=strict&biw=1920&bih=935&tbm=isch&source=Int&tbs=isz:lt,isl:svga&sa=X&ved=0ahUKEwj699_ktLnQAhUEuRoKHT7ID-AQpwUIFA&dpr=1#imgrc=d6v98oCHZHJvrM%3A)
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About research

1.I made a telephone interview for 10 Chinese elderly people with visual impairments, and also sent 30 emails to my friends who are currently studying or working in Beijing for my questionnaire survey.

2.I promised them anonymity.

3.Three multiple choice questions were included in my questionnaire.

1. Have you been well aware of the tactile paving system for visually impaired people in Beijing?

1. impressed about it () 2. Often be aware of it () 3. Unluckily, rarely be aware of it () 4. Never pay attention to it ()

2.Do you think the tactile paving system is helpful to people with visual impairments?

1.Yes, of course () 2. I'm afraid not ()

3.Do you agree that the paving shouldn't be occupied by any other things and have you did any helpful things to solve this problem in your daily life?

1.I couldn't agree more , but the problem may be ignored by myself() 2. Yes, I couldn't agree more,I have tried something to avoid the problem ()

All 30 respondents answered the questions(100%)