Research on General Design of Public Transportation Buildings from the Perspective of Guangzhou Hub-type Cultural Network System

Xiao-lin JIANG1, Xiao-xue HE, Zhao-zhen ZENG, Bi-xin LIN, Ying-yan CHEN and Pu-hua YAN*  
1School of Mechanics and Construction Engineering, Jinan University, Guangzhou, 510632, PR China  
*Corresponding author

Keywords: Rail transit building, General marking, Guide system.

Abstract. The Ninth Plenary session of the tenth session of the Guangzhou Municipal Committee of the Communist Party of China (CPC) proposed that Guangzhou should build a "hub-type network city". Guangzhou focuses on becoming a national center city and an irreplaceable strategic hub in the global economic, social and cultural development, such as New York, London, Beijing and Shanghai. The Municipal Party Congress also proposed that in the next five years, the structure of the hub form network city should be basically formed, the functions of the three major international strategic hubs should be strengthened, and the comprehensive network system of large transportation should be improved. The design of public transport building logo is a part that cannot be ignored. [1]

Introduction

The public transportation building design is an important method to perfect the comprehensive traffic network system. In order to embody the principle of people-oriented and to solve the contradictions existing in public transport buildings, so as to meet the different needs of all types of space users and to minimize the cultural, environmental and crowd differences, it requires that the design of building logo of public transport should not be limited to the barrier-free design that has many defects, but should develop towards the direction of more adaptable and inclusive universal design that conforms to the characteristics of the times.

Overview of General Design

The concept of "general design" was first proposed by Mace (Ronald L. Mace), director of the general design center of North Carolina State University in the 1980s. "He believes that the objects should not be limited to a particular group, that is, the design should not only consider people who are disabled, but should regard the" general public "as the starting point of the product design. So that, the environment, space and products of the design can be used by all. "Universal design is the development of barrier-free design. [2] It makes up for the defect that barrier-free design is too specific for a particular group and inconveniences to others. It shifts to seek the commonness between the special group and the general group. The service object of the universal design is not limited to a particular population, but based on the needs of all space users (i.e. "the whole public"). It weakens the "special" care for the special population and eliminates the implied prejudice of barrier-free design. The logo design can be used for a wide range of people, at the same time, can create a convenient, safe use space to provide a comfortable, equal use experience.

Compared with the traditional logo design, the universal logo design is more in line with the developing times for the requirements of humanization, its scope of use is wider, and meets with the economy. Universal design is spreading and developing rapidly all over the world. To some extent, the development of universal public design has become one of the important standards to measure the progress of social civilization.
The Exploration of the General Design of Traffic Building Marking System

The Basic Techniques of General Logo Design: Multilingual/Graphic/Arrowhead/Color Collocation

With urban rail transit buildings’ internal structure becomes more complicated and the space function becomes more diverse, more and more attention needs to be paid to the marking system in the building. The marking system mainly plays the function of transmitting spatial information to people. It plays a direct role in people’s behavior of path finding, cognitive environment and use space. The marking system and environmental construction are complementary to each other. The development of Guangzhou’s rail transit construction makes its position as a transportation hub to rise day by day. Guangzhou railway transport hub is one of the four major railway transport hubs (Beijing, Shanghai, Guangzhou, Guangzhou and Guangzhou) of China. What’s more, Guangzhou Baiyun International Airport is one of the three major airports of China, one of the world’s top 100 major airports. Therefore, the service of traffic building needs to be more efficient and convenient, to improve the efficiency of large-scale passenger flow distribution, and also to provide targeted services to various groups of people, which put forward a higher demand for the design of the marking system.

The identification can be divided into graphic mark, arrow mark, text mark, sound mark and so on by constituent elements. A complete logo is usually composed of the above elements. Figure is the main way to transmit information by visual logo. It often transmits information through the form of pictogram or symbolism. The standardization and readability of graphic logos enable it to serve more users with different borders and ages. At present, the design principle of standardization is the mainstream of guide graphics design in many countries. Among them, the widely used and influential standardized guide graphics standards are: ISO graphic standard, American public transportation guide standard. The recognition system (MTA) and the Japanese industry standard guide icon system (JIS). The graphic identification simplifies the exaggerated expression of the original information by abstracting the concrete features of the entity, so that it has a clear guiding meaning. In practical application, the general graphic logo will develop towards the direction of more diversification and localization based on the field. But most of the graphic marks usually deformed appropriately according to standard shape.

Arrowhead is currently one of the most widely used patterns to guide the direction of space. People from different countries, ages and cultural backgrounds have a better understanding of the pointing meaning of arrowhead. Tanaka Naoto pointed out that linear arrows such as "upper, lower, left and right" are easy to understand and should be selected first, while the U arrow is prone to misunderstandings, and should be carefully chosen in application.

![Arrowhead]

Figure 1. Readability of arrow identifiers.

(Photo source: painted by the author)
In the aspect of writing design, in order to enable more people to read and choose a variety of languages, the order of importance are: national language, international common language, neighboring languages and so on. The text mark can supplement the missing information of the graphic mark, which is usually used in combination. In terms of size, the larger the text is, the easier it is to distinguish, but it also depends on the specific size of the mark. Too large a text may squeeze the space of other elements, resulting in incomplete of other information.

Colors’ attributes play a very important role in visual logo design. By adjusting the three elements of color: hue, brightness and purity—hue can highlight the information to be conveyed, brightness can express the level of the object, determine the coordination of the color, and the purity can bring rich color feeling which is the perception of the bright degree of the color—can highlight the information to be delivered. The marking uses high purity and high contrast color, which makes the relationship between the bottom of the image clear. Different color with different size of the area, can also achieve the communication effect of the master-slave relationship of information. At the same time, different colors can make people feel and associate differently in psychology, for example, environmental protection often uses green. Warning is red, and blue and white match is usually a sense of security choice.

The Design of the Integration of Environment and Architecture by Architectural Marking

The floor, wall, ceiling, pillar and so on are all important space elements, that users can directly contact and view. According to the information conveyed by these elements, the shape, relevance and significance of the space can be understood.

As far as the ground is concerned, we can often see the representation method of using the ground sticker and color, but the key information interface is not easy to see in the chaotic space with lots of walkers. The floor is the place where the aid instruments such as crutches and wheelchairs contact directly. For this reason, there are also the design of visual and other sensory techniques such as using echo, changing the color and texture of decoration materials.

The wall is the most often marked part of the guide sign class, and as the building space, it is the most important part of the door and window. And it is the most easy to produce the sense of partition of the place. The surface shape, color and material of the wall are designed skillfully, and the important parts such as corner, entrance and exit are considered at the same time. The change of light intensity is also used to indicate the change of space.

The type of hanging logo from the upper part of the ceiling is often used. The height, the size and content of the information interface are often problems. It is usually hoped to convey the meaning of the space by changing the height and the shape of the roof surface. Color, lighting design interactive experiment are usually take into consideration to achieve the guidance effect.

The runway logo image design of the third terminal of Narita Airport in Japan is a good example of the integration of building space and logo. The smooth linear and uniform color of the runway coordinates all the functional areas in the terminal building and forms the turning signal and continuous distribution of the ground runway at the corner and prescribes the route of the passengers. At the same time, the racetrack gives a hint of “race speed”, which matches the usual perception of the scene, to promote the rapid flow of people. Secondly, the runway uses a variety of colors to awaken people's biological response. The grayish ground is matched with a brownish red and blue runway. Brownish red indicates the ground color which shows the airport exit, the blue runway represents the sky, refers to the gate. This coloring arrangement is closely related to people's memory associations. Passengers can travel along the runway and reach their destination smoothly under the guidance of coherent information from different interfaces such as the ground, ceiling, wall, etc. [4]
The Use of the Five Senses

80% of the information we get in our lives comes from vision, so that there are more visual considerations in accessibility design. For example, in order to prevent the occurrence of step hollowing, changing the step color to make people recognize. But as a universal logo, not only for vision, but also for the other feelings of the user.

For people with hearing impairments, it is necessary to replace the visual and tactile information of the hearing. On the contrary, for visual impairment, hearing and tactile play important roles in obtaining information. For those who have a certain sense of obstacles in one aspect, they should be allowed to use the other feelings which they are good at to obtain information. Some common building languages can serve as signs, for example, by changing the height of the ceiling to tell people where they stop and where they are, by changing the shape of the floor or decoration material to give a sense of direction and position.

Blind channels are designed using tactile markings. Blind people’s "retrograde" phenomenon is very common on blind road. Therefore, at the beginning and end of the road and around the corner, the laying of directional indicative blind road brick can help the blind to identify the direction through the foot feeling and reduce the probability of wrong travel. At the same time, through reasonable design, can also help healthy people to identify the direction. In Braille, the destination name can be marked, and the slashes on the right side of the guide sign denotes distance. According to Chinese traffic regulations, one slant represents distance of 50 meters, and three channels denotes distance of 150 meters.
Inscribing Braille on armrest and other positions is also the main means of logo design by tactile, but the location of Braille inscription and the size of Braille need to be considered. The general Braille is placed directly under the ordinary logo, the text must be located above the 122mm level from the ground, the bottom line of the touchable figure must not be lower than the height of the 152mm, in order to be convenient for the blind to touch.

![Figure 6. Dalian metro braille.](http://www.sohu.com/a/123965280_349556)

Because of the small proportion of total blind patients in the group of visual impairment, the use of light and color in identification is still of great help to the group of amblyopia. While maintaining the integrity of information on the panel, the font size is enlarged and the contrast of color is improved to ensure the luminous or reflective degree of the marking under different illumination conditions can effectively help the visually impaired groups (except the whole blind patients) to identify the logo. In addition to light and color signals, sound signals can better speed up the reaction of blind people. For example, the new Japanese warning system, which uses magnetic induction between a blind cane and a blind track, makes sounds and vibrates at points of divergence.

Smell can trigger memories of different circumstances and feelings. Such as adding a "smelling agent" to carbon monoxide to prevent gas poisoning. At the same time smell is also a way to identify different places. A major feature of the New York subway is olfactory orientation, through the association of life, to discover the representative smell in different environments. For example, the moist smell of vegetation and soil, the smell of toilet, the smell of food, etc, to indicate the conversion of different environments.
Visual Marking

The sensitivity of vision is affected by the complexity of the logo. And the human body responds to the color earlier than the shape, so the correct use of color is more conducive to the concentration of people's attention to better extraction of information in the large traffic buildings with complex routes and environment with many elements. There are many factors that affect the color perception of the marking system, such as the light environment, the human emotion, the elements of the marking system, the material and the technology, and so on.

Color is the product of light. Objects with the same color illuminated by different colors of light, creating different color feelings in the mind. Similarly, different colors also convey different emotions. In the case where it is not suitable to use a large-area painting color, the use of color light can make the color feeling more soothing, and at the same time, it is suitable for the expression of the atmosphere of the whole space. All lighting, partial lighting, and decorative lighting corresponding to the identification system will produce different color effects, such as local lighting, which can form strong shadows around the logo, thus highlighting the information by the contrast of light and shade.

In terms of human emotions, the use of color is required to be coordinated with the macro environment, and the tone and style of the logo are based on the atmosphere of the built environment and the urban environment. Refining the urban architectural logo color system and determining the overall environmental color personality characteristics of the traffic building is conducive to providing color matching guidance for the logo planning. Due to the climatic conditions of heavy rain and sunshine in Guangzhou, the buildings use light colors with light colors, high brightness, low purity, and traffic buildings with a white tone of cement primary colors. The color of modern Guangzhou city is mostly composed of yellow gray, blue green gray, blue purple gray and achromatic color. \[6\]
In terms of the color selection of the logo, in addition to catering to the humanistic color of the city, it is more necessary to ensure that the logo is conspicuous and easy to read. In order to better understand the status quo of the use of logo color in Guangzhou traffic buildings, we selected two major transportation hub buildings, Guangzhou South Railway Station and Baiyun Airport, as representatives. The marking system of Guangzhou South Railway Station is more complicated. The colors are mostly blue-gray, green and white. The light environment is mostly white light. The interior color tone of the building is light gray, and the self-illuminating light card logo is less used. The degree of so oldness of the logo leads to inconsistent marking wear. The Guangzhou Baiyun Airport signage system uses black and khaki and white contrast colors to highlight the logo, and uses yellow
lighting to coordinate the overall atmosphere. The overall material panel is unified. The combination of khaki and black gives a sense of weight and firmness. Compared with Guangzhou South Railway Station, it is brighter and more comfortable.

Figure 12. Color extraction of logo of Guangzhou South Railway Station.

Figure 13. Color extraction of Baiyun airport logo.

(Photo Source: Self-made by the author)

Identification of the Combination of Software and Hardware

Multimedia Technology

In recent years, the multimedia technology that uses optoelectronic technology to disseminate the information of guidance has gradually matured. Using the remote control and the guidance mark made by multimedia technology, the guidance information can be changed according to the changes of the environment. The comprehensive multimedia logo can realize “visual-auditory-tactile”. Integrated service. LED screen is an emerging material of multimedia technology, with online programming, remote control, high safety factor, low volume and low energy consumption.
GPS Mobile Location Technology

GPS satellite positioning and navigation technology is integrated into the guidance system. The guidance technology enters the information age. Through the GPS system, we can obtain the guidance information of its location, surrounding environment information, destination route and so on. For example, Guangzhou South Railway Station's “Wisdom Guangzhou South Station” public number provides navigation services in Guangzhou South Railway Station. It can provide services for people from different locations and different time periods, and has good adaptability. It is effective for guiding universal design. Auxiliary means.

Figure 14. Screenshots of navigation system of smart Guangzhou south station.
(Photo Source: “Wisdom Guangzhou South Station” public number)

Acknowledgement

"Challenge Cup" Competition of Jinan University in 2018 (18111013); Research results of the 13th Five-Year Plan of philosophy and Social Sciences Development in Guangzhou (2017GZYB18)

References

[1] Focus of Guangzhou Sohu. City state planning committee: Guangzhou to form a hub-type network city pattern in the next five years. 2017.
[2] Jianjun Wang. Individual differences and General Design in Curriculum Development. Courses. Teaching materials Shariah, 2004 (11): 22-27.
[3] Wentao Fu. Study on the General Design of Urban Public Space Environmental guidance system [D]. Zhejiang University of Technology, 2015.
[4] Ling Yang, Mumeng Yang. A Cognitive Psychological Analysis of the Design of the third Terminal orientation in Narita Airport, Japan [J]. Packaging Engineering, 2018 (2): 259-263.
[5] Li Tan. A study on the Design of Public signs for visually impaired groups [D]. Nanjing normal University, 2010.
[6] Jiale Huang. Urban Color Planning-take Guangzhou as an example [D]. Central South University, 2014.
[7] Tanaka Naoto. Identify the general design of the environment. Building Industry Press, 2004.