

Research and Application of Urban Landscape Planning in Slow-moving System—Based on the Case Study of Hong Kong

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Abstract—This paper in-depth analysis of one typical case which have succeeded to implement slow-moving system, performs a study on Hong Kong from three perspectives (Slow-moving network, Slow-moving facility and slow-moving facility), and refines the various means proposed thereof, thus laying basis for putting forward the construction approaches for slow-moving system in the future.

Keywords—Slow-moving system, Walking system, Cycling system, Hong Kong.

I. INTRODUCTION

CURRENTLY the researches in our country mainly focus on the perspective of urban traffic planning by concentrating on the slow-moving network construction, and ignore the slow-moving landscape and slow-moving facilities. Because of the lack of good coordination and corporation among these three elements, the existing slow-moving system has not achieved the desired effect. However, the theoretical system can not represent the development situation of every city and may have some differences with the actuality. The successful slow moving system in Hong Kong has been duplicated by many cities both at home and abroad. Its success can be ascribed to many reasons. In this paper, from the slow-moving network, landscape, and facilities, the reasons for its success are analyzed.

II. BACKGROUND OF SLOW-MOVING SYSTEM IN HONG KONG

Though Hong Kong is a conservation-oriented city with less land yet numerous people and vehicles, it still provides a vast ecologic system with vast green land despite the limitations in land use and extremely dense buildings. Moreover, Hong Kong has successfully applied slow-moving system, making it a representative city in terms of the mode of public traffic plus pedestrian traffic. In Hong Kong, over 53% people use public traffics and 36% cycle or walk. In this chapter, the existing slow-moving system in Hong Kong will be analyzed, and the reasons for its success are summarized [1].



Fig. 1 Metro line map in Hong Kong
Picture source: <http://www.com/baidu>.

III. CONSTRUCTION OF SLOW-MOVING NETWORK

A. Combination of slow-moving system with the surrounding area

Hong Kong has also been built with an efficient public traffic network. In its urban planning, railway is taken as the backbone of traffic network.

The high-density building area is fused with the railway stations, accordingly enhancing its economic profit. Besides, consummated pedestrian route system has also been built to go through the high-density area. Therefore, the public can reach most of their destinations at ease. The slow-moving network planning in Hong Kong generally follows two rules to reach the maximal synchronization of public traffic and land use:

Rail lines all go through the urban strategic development area.

Land-use planning is appropriately adjusted in accordance with rail transit construction [1].

Through these ways not only reinforce the connection between New Towns and the mother city of Hong Kong and Kowloon, build a new urban pattern, but also construct an urban structure with large-scale network and nodes, form a urban pattern depending on rail transit and a living style closely fusing with rail transit.

B. Connectivity of pedestrian network

In addition to the combination of rail tracks with the surrounding land, the subway stations are also linked with the underground floor of the surrounding buildings, forming a development mode of "station plus property" that achieves fusion of subway stations and surrounding properties. Within the range of 600-1000m's walking, high-density and diversified buildings are constructed. From the figure, the properties along the rail ways and the floor areas of the buildings can be observed [1].

Name of rail track	Office/(ten thousand m ²)	Shopping mall/(ten thousand m ²)	Residential / (unit)	Others/(ten thousand m ²)	Total Gross Floor Area(million m ²)
Downtown Line	23.4	29.9	31366		2.6
Airport express	61.1	30.7	28473	29.2	3.5
Tseung Kwan O Rail Line	0.5	10.5	30414		2.3
East rail line	6.7	11.3	4771	11.3	0.7
West rail line	4.1	14.3	18652	6.1	1.5
Ma on shan line		6.5	10686	3.8	0.9
Light rail transit		5.3	9108		0.6
Total	96.1	108.8	133470	50.3	12.1

Fig.2 Development purpose and floor areas of the properties along the subways in Hong Kong

Picture source: Liu, H. T. and Zhou, T. (2011)



Fig.3 Connection between the properties in Hong Kong

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IV. BUILDING OF SLOW-MOVING FACILITIES

A. Seamless transfer facilities

Through the unique design and construction of rail transit transfer stations in Hong Kong, more convenient traffic means are provided. These stations guarantee not only the convenient shift between different rail lines, but also the seamless transfer to different traffic means. Through building the stations of different traffic means together, comprehensive regional traffic hubs are constructed.

Besides, many stations have also been built with transfer facilities for citizens to transfer to subways from private cars (mode P+R). Developed and convenient transfer facilities are one of the important reasons for the success of rail transit in HK.

Through seamless transfer facilities, the accessibility of rail transit has been improved, and the properties and public traffic near the subway stations become more appealing [2].

B. Humanist design of the entrances and exists for rail transit station

Through close connection between subway exit/entrance and the surrounding shopping malls, hotels and residence areas, pedestrians can shuttle among these areas easily. Most of the stations in Hong Kong are shielded with platforms, bridges and tunnels, accordingly achieving separation between pedestrians and vehicles, seamless transfer and human-oriented subway exit/entrance design [1].

V. SLOW-MOVING LANDSCAPE CONSTRUCTION

Through the previous analysis, it can be concluded that Hong Kong reached the goal of building a successful slow-moving system through street landscape design, clear and perspicuous road signs, afforestation and environment construction, provision of orderly street facilities, re-pavement of pedestrian ways, and improvement of road signs, sufficient illumination and addition of public artistic factors.



Fig.4 Street views in Hong Kong

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A. Most of the pedestrian space is planted with green plants

Including the ground, street flyover, and any places that we can see. Located in the subtropical area, Hong Kong has abundant tree varieties. Coupled with the delicately-designed seats, lamp posts and other facilities, people can not only be satisfied in needs, but also gain a kind of visual enjoyment [3].

B. Detailed processing and construction of pedestrian space

All the elements of pedestrian ways, such as the shapes, sizes and materials of the railings and seats, have all reflected people's use requirements. Pedestrian ways are built with elevators wherever there are flyovers, and conveyors are also provided for horizontal long-distance walking, achieving faster and more comfortable walking experience. In the management of pedestrian space, "human-oriented" concept can be clearly observed. For example, at the crossroad, the signal of pass (green light) is also hinted with sounds, offering convenience to the blind. Safety islands are built in the middle of road on the

zebra crossing[4].



Fig.5 Pedestrian way landscape in Hong Kong

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C. Consideration of scale in pedestrian space

Buildings in Hong Kong are highly dense and roads are very narrow. However, people never feel depressed when walking on the street. This is mainly because of the planners adopted double scales in design, including the urban scale and small scale serving the pedestrian space around buildings. Through the delicate stages under the buildings, gardens and seats, people can have a relaxed feeling when walking in such environment. Besides, in order to soften the boundaries of buildings and enlarge the space between buildings and pedestrian space, horizontal green belts are built at the bottom of buildings, weakening the sense of dimensions between pedestrians and buildings.

D. Decoration and pavement of pedestrian ways

In most of the cities in China Mainland, zebra crossings usually paved with colorful and patterned floor tiles. In fact, the major function of floor tile is anti-slippery. On the pedestrian ways in Hong Kong, the floor tiles used are red or gray ones which are simple and plain in appearance yet very functional.

VI. SUMMARIZATION& ANALYSIS

Based on the detailed introduction and analysis of the slow-moving system in Hong Kong, it can be learned that the correct evaluation and the long-term efforts of local government and departments are indispensable. I summarizes the construction of the slow-moving systems, and refines the various means proposed thereof, thus laying basis for putting forward the construction approaches for slow-moving system in the future. Firstly to make divisions for the contents involved in the construction of slow-moving systems of the two cities; secondly, to perform analysis on the construction elements of the slow-moving system, including slow-moving network, slow-moving landscape, and slow-moving facilities.

A. Compositions of Slow-moving System

On one hand, pedestrian traffic system is relatively independent from non-motor vehicle traffic system; but on the other hand, they share some commonness whether in facilities

or in space. Pedestrian system is mainly composed of sidewalk, Pedestrian Street, walking lanes, pedestrian overpasses, and pedestrian tunnels, etc.; while non-motor vehicle system mainly consists of non-motor vehicle driveways, non-motor vehicle parking facilities, non-motor vehicle rental facilities and other elements. However, in terms of distribution of right of roads upon cross sections, slow-moving street crossing planning (including plane street-crossing at road sections, street-crossing at intersections, and three-dimensional street-crossing), traffic calming measure formulation, gateway settings and management, etc., integrated co-ordination and determination are needed for pedestrian system and non-motor vehicle system. For slow-moving system, analysis needs to be conducted based on slow-moving network, slow-moving landscape, and slow-moving facilities. The so-called "network" of the two cities mainly include the municipal road pavement, non-motor vehicle driveways and slow-moving exclusive ways with independent rights of roads, as well as other linear elements; "landscape" mainly refers to the landscape design of space involved in slow-moving network; "facility" means slow-moving street-crossing facilities, bicycle rental service points, bicycle parking sites, traffic calming measures and other point-like elements. Both the two cities inter-connect and coordinate the "network", "landscape", and "facilities" to comprise the municipal slow-moving systems.

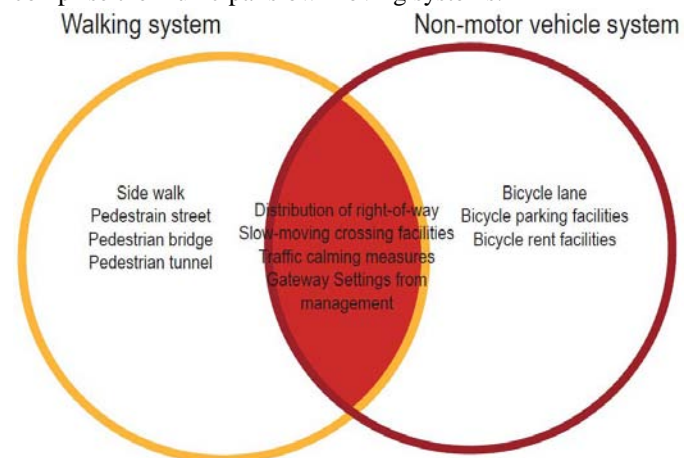


Fig.6 Schematic Diagram of Slow-moving System

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B. Slow-moving network construction

For case study, analysis is made on the factors that the slow-moving network needs to satisfy, which are summed up as:

- 1) Giving easy access to public transport nodes.
Path arrangement of slow-moving network is not only the basic need for slow-moving system, but also constitutes the major form for inter-connecting slow-moving spaces. At the intersections between slow-moving and motor traffic, slow-moving nodes come into being, for which, the municipal public system needs to be well-accessible, as this is the basis for effective operations of slow-moving network. Although the approaches for building slow-moving network by the two cities are differed, there is

a common aim, i.e. to make slow-moving smoother and continuous[5].

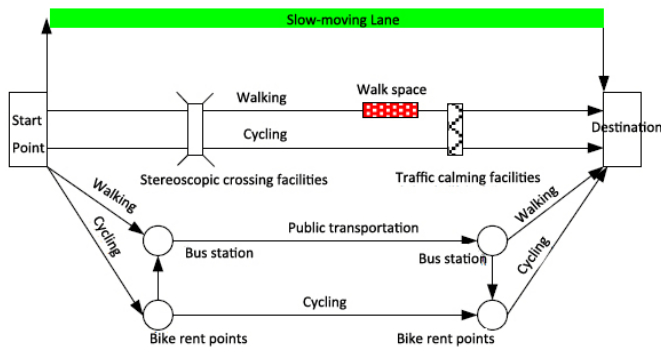


Fig.7 Sketch for Relationship between Slow-moving Network and Slowing-moving Facilities
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2) Layout of Cycle network

Link with key destinations at city level and/or at local level. There are two network types: the first type is mainly intended to enable slow-movers to reach the intended destination rapidly (i.e. routes are direct and allow for traveling with high speed), which is also called as commuting-oriented slow-moving network, such as the express cycle route in Copenhagen, which mainly serves the group who need to arrive at destinations rapidly. Such network arrangement should avoid detour to greatest extent, and priority should be given to efficiency; while another type is non-communicating slow-moving network layout including entertainment, leisure, shopping and so on, such as the green lanes of Copenhagen, which need for agreeable environment, safety, accessibility to various regions, and more importantly, comfortableness (as shown in the figure). The primacy of slow-moving network has to be highlighted for both the two network arrangements. Besides, public space and walkways also need to be accessible to the slow-moving system.

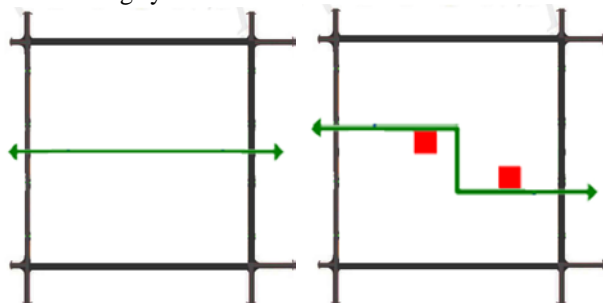


Fig.8 Sketch for Commuting Network and non-communicating Network
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3) Walking Network Layout

Pedestrian network needs to pass through areas that people stop and stay. For example, it has to go through living areas, and there have to be active areas surrounded which can attract walkers to stop by (Invitations to stop and take part

in the activities along the route). For example, Copenhagen attaches importance to connecting walkways with the surrounding leisure square and green space, and taking into account of surrounding environment while constructing pedestrian network.

Slow-moving routes are divided into different parts. Those areas with frequent slow-moving activities are categorized as primary slow-moving area, such as the business slow-moving area and pedestrian plaza in Copenhagen. Therefore, through an analysis on Hong Kong and Copenhagen, the slow-moving network is composed of three elements, i.e. “points” – slow-moving nodes, “lines”—slow-moving routes, and “planes”—slow-moving areas.

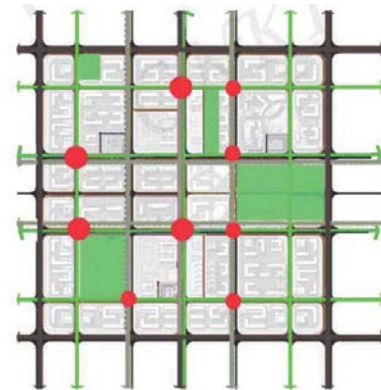


Fig.9 Sketch for Slow-moving Network Compositions Green circle represents slow-moving paths; Red: slow-moving nodes
Green square: slow-moving areas
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C. Slow-moving Landscape Construction

The slow-moving landscapes of Hong Kong mainly divided into two aspects: commuter path landscape and leisure path landscape. First of all, for commuter path landscape, priority should be given to the visual requirements of slow-movers. Essentially, the landscape design of slow-moving passages attached to city roads should achieve the effect of separation of road alignment, ramps, and motor vehicle lanes, continuity, smoothness, naturality, and visual excellence of greening and other soft and hard landscape, which are also needed to be accessible to surrounding environment. On the other hand, recreational landscape is mostly arranged along the coastline and surrounding the green space, which dominated with rectangular and linear shapes, such as the green cycle route in Copenhagen, on either side of which are surrounded by lush tree to form a space with beautiful environment. Besides, the sidewalks along the coastline are also a perfect combination of leisure environment and slow-moving systems [6].

D. Slow-moving Facilities

Construction of slow-moving facilities plays a significant role for the effective operation of slow-moving systems. Slow-moving facilities enable slow-movers to travel more conveniently and comfortably. The design of slow-moving facilities should be built from the user-friendly perspective,

giving full consideration of people's needs. It can be divided into several parts: bicycle access facilities, public bicycle rental facilities, slow-moving roads and lighting facilities, and pedestrian street-crossing facilities, etc..

VII. CONCLUSION

As for the case study, involves the selection and network planning of slow-moving traffic routes, slow-moving landscape construction, and researches of slow-moving facility and space environment. These researches are of some directional significance to slow-moving construction in our country. Through analysis, presents the practical methods for the design, offering an empirical basis to planning of slow-moving system, it proved the importance of slow-moving system's fusion with the surrounding environment, and demonstrated that the construction of slow-moving system should surround the three elements of slow-moving network, slow-moving landscape and slow-moving facilities. These three elements are equally important and indispensable. Only by unified and coordinated development of the three elements, it is possible to design truly attractive system to citizens. The main content of slow-moving system design mainly includes the following aspects:

A. Slow network should connect the city landscape nodes

The layout of slow-moving system should be combined with the surrounding land use, while going through the development area of a city, the slow-moving system should also connect the sparsely deployed landscape resources to form a green slow-moving network[7].

B. Design of slow-moving landscape and its combination with slow-moving network

Slow-moving landscape should be designed as per the features of slow-moving network. Slow-moving commuting network should focus more on construction of street landscape to form distinct street views so as to attract pedestrians to stay. As for slow-moving leisure ways, usually the system should go through the various attractions. Therefore the landscape design should be in consistent with natural ecologic principle, reduce artificial landscape, and allow slow-movers to have close contact with the nature.

Slow-moving facilities take a significant position in design of slow-moving system design. Its design should be reasonable, functional and most importantly, meet people's humanized design. Both the bicycle renting centers and the parking places should start from users' convenience and meet their psychological needs. The slow-movers will be willing to use bicycles and citizens will be attracted to use slow-moving system [8].

Urban slow-moving system is in fact a very complicated systematic project involving the designs, users, manager and constructors of urban traffic. This paper only gives a shallow and exploratory research on the construction of slow-moving system. Whether the research conclusion is helpful to the development of slow-moving system, to some extent depends on people's obedience to the relevant traffic rules. To build a

perfect, high-quality urban slow-moving traffic, further construction implementation and assessment work are also need [9].

C. Decoration and pavement of pedestrian ways

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