

# Research on Design Methods of Small-Sized Landscape Facilities in Urban Public Recreational Spaces

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**Abstract**—In the design of urban public spaces, some small-sized landscape facilities play a huge and important role, such as flower beds, tree pools, and hedges and so on, which are usually used to bear the weight of plant and division scope of plant landscapes; seats, stools, etc. are provided to visitors' rest and stay place; Settings of dustbins keep the place clean...In the urban public recreational space, these small-sized, operative or fixed facilities create a comfortable atmosphere like home, which enables the outdoor spaces to become an area for pleasant activities. By analyzing the functional composition and existing problems of these small-sized landscape facilities, come up with the specific design principles and design key points as references for design work.

**Keywords**—public leisure space, small-sized landscape facilities, design, principles, methods.

## I . INTRODUCTION

Public recreational space in urban outdoors is a location for public association of urban dwellers, which is one of the most important life areas. Such as urban square, park, pedestrian street and community public area, etc. They are a comfortable behavioral isotopic carrier for rest and recreation, and it has numerous participators in most of time, which mainly are pedestrians[1].

Under this kind of environment, the landscape elements with both practical and aesthetic function and the small-sized landscape facilities play a huge and important role in creating a comfortable atmosphere like home, which enables the outdoor spaces to become an area for pleasant activities like indoor spaces, thus serving as the material carriers fulfilling the recreational functions in landscape spaces, such as rest, entertainment and association, etc[2]. Therefore, people also call it as "street furniture." They become representative landscapes for reflecting urban culture, characteristics of the times and social concept with their respective integral artistic image and amiable environmental quality. Because greening plays a leading role, the landscape facilities which help to divide the scope of plant landscapes and rest it upon green landscape facilities become the absolute priority in design [3].

Some types of small-sized landscape facilities use widely, as well as have a significant effect. Thus, intensive disposals are needed in the landscape design work. Such as flower beds, tree pools, flower pots, planting pits, pergolas, hedges and other such combinations for dividing scope of plant landscapes and attaching it, seats and stools for providing to visitors' rest and stay place, and dustbins for

keeping the place clean...One of the important work of the designers is that what kind of principle and method should be utilized for these facilities.

## II . FUNCTIONAL COMPOSITION OF SMALL-SIZED LANDSCAPE FACILITIES

The functions of small-sized landscape facilities mainly include the following 4 aspects:

### A. Practical Function

It forms the main function of small-sized landscape facilities and serves for the general public, including several aspects of security, convenience and leisure, etc. This is the fundament of landscape facilities being existed and utilized, which provides a support for trees, flowers and plants. It divides the size and scope of them, thus creating the atmosphere of nature in the clusters of urban concrete architectures to satisfy the urban dwellers[4].

### B. Environment-Improving Intention

Small-sized landscape facilities supplement and strengthen the environmental spaces through their forms, quantity and compound styles. Gallery, for example, its repetition of timber frames and seats constitute a definite guidance to the entrance of square in space (Fig.1). This kind of auxiliary function works through the interaction between the forms of landscape facilities and the space environment around.



Fig.1 A space guidance of gallery for rest. Copyright 2013 JI Jianle, all rights reserved used by permission.

### C. Landscape Decoration

Small-sized landscape facilities play a decorative and beautified role on environmental space. This kind of decorative effect comes from the echoing and rendering effect of the combination of plants and the artistic aesthetics in the facilities and environment. The combination of plants, elements and architectures complement each other well. (Fig.2). Except for using to appreciate, decoration is not the main function of landscape facilities, but its decorative function has a huge impact on the urban public space.

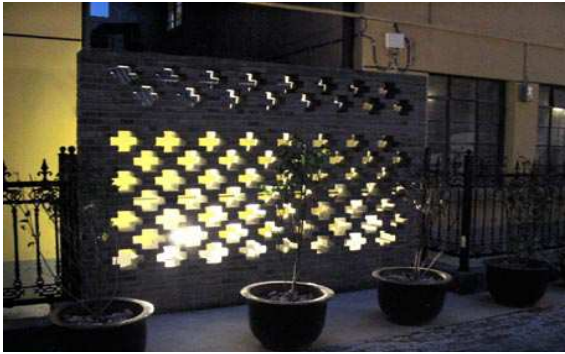


Fig 2 Decorative effect of enclosure. Copyright 2013 JI Jianle, all rights reserved used by permission.

### D. Comprehensive Functions

The functions of many small-sized landscape facilities are not single, for example, the flower stand has the functions of refreshment or vehicle block at the same time, etc. This plays an effective role in improving the quality of space and utility (Fig.3).



Fig.3 The small-sized landscape facilities complex with the functions of flower bed, rest, recreation and appreciation. Copyright 2013 JI Jianle, all rights reserved used by permission.

## III. EXISTING MAJOR PROBLEMS IN THE DESIGN FOR SMALL-SIZED LANDSCAPE FACILITIES OF THE URBAN PUBLIC RECREATIONAL SPACES

### A. Monotonous Forms

It is quite a common problem of neglecting personality in designing and building current urban outdoor space. Similar and monotonous constructions without features can be found everywhere. For example, once the sitting

flower beds, tree pools and flower stands with similar style appear somewhere, others will follow suit in China, which is quite lack of personality and innovation.(Fig 4)



Fig 4 Sculptures with the same styles appear in Beijing Wangfujing and Nanjing Lion Bridge. Copyright 2013 JI Jianle, all rights reserved used by permission.

### B. Lack of humanized designs

Due to the large streams of people in urban public space, it must be equipped with rationally structured and abundant facilities to satisfy people's various kinds of demands and to fulfill its multi-functions. However, there are many designs lack of considering for humanized demand. For instance, the areas for lawns and shrubs are so large that they block traffic arteries or are tramped by pedestrians for the sake of convenience, which destroys the greening landscape; the corners of green areas or the flower beds are built with hard materials and the chamfers are not built well, posing a potential hazard to pedestrians, etc. Such as Confucius Temple in Nanjing, only a few seats in the central plaza of the entire block. A great number of visitors choose to have a rest on the peripheral handrails with a ceiling of shops and river banks behind them, which can't guarantee their security. (Fig 5)



Fig 5 A certain hazard exists to pedestrians when sitting on the handrails. Copyright 2013 JI Jianle, all rights reserved used by permission.



### C. Rough Construction and Poor Maintenance

Like other urban utilities, the rough construction and lack of final management and maintenance always leave the actual situation of greening landscape facilities unsatisfactory. For instance, there are no relevant fixation and blocking measures for the mud in the tree pool, which will loosen and drop the mud out of the tree pool and accumulate sewage to splash out, causing many inconveniences for the pedestrians; lack of other ancillary facilities, like dustbins, also leads to appear much rubbish around trees, destroying the beauty of the environment, etc.

## IV. THE DESIGN PRINCIPLES FOR SMALL-SIZED LANDSCAPE FACILITIES IN PUBLIC RECREATIONAL SPACES

The pros and cons of design in all kinds of small-sized landscape facilities have a very important influence on the quality of urban public leisure space. As an environmental designer, some basic principles of the design in landscape facilities should be considered for the purpose of better conducting the plan of public space, as well as providing a more abundant and superior selection to people's life.

### A. Humanized Design Principles

Small-sized landscape facilities directly face people, function and serve for people. Therefore, its design must be based on the multi needs of the physical, spiritual, physical and mental aspects for people[5]. Firstly, it must provide rational and ample green existences to satisfy the mental and physical needs of people; besides, the size of facilities should accord with ergonomics so as to be felt warm, pleasant and comfortable; thirdly, the landscape facilities' forms with different sizes and types should create different spaces which are open, semi-private to meet people' needs for different recreational activities; at last, green facilities should be humanization in all aspects: it should be barrier-free to provide convenience for the disabled[6].

### B. The Design Principle of Integrity

The repetition of the same design element in some recreational space can run through the whole design, which presents people with sense of vision and touch on the whole, creating an integral spaciousness. For example, in a large-scale recreational space, the landscape facilities in every landscape area are designed with mutual-independent style and the similar materials and colors with the seats or street lights and flower beds in this area, which put the whole area in an integrity tone (Fig.6). Besides that, integrated designs can also be made between greening facilities and artificial rockeries, landscape walls, seats, vehicle barriers and lamp poles to develop integral and multi-functional recreation space .

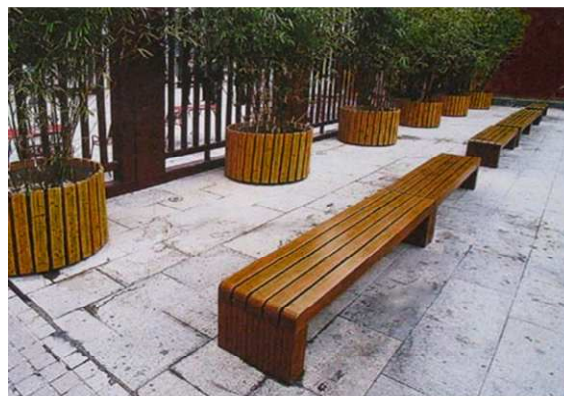


Fig.6 Adopting the greening facilities and seats with the same materials and colours. Copyright 2013 JI Jianle, all rights reserved used by permission.

### C. The Design Principle of Flexibility

People always look forward to make the surrounding things more flexible and more easy to use. It is exactly this point promotes people to improve, so do the landscape facilities. Try to let people can utilize it in flexibility, which is one of the main principles in the work of the designers.

In most cases, outdoor recreation spaces are crowded with people. If the facilities for rest are integrated in the design of green facilities, then the crowdedness of seats can be greatly improved. For example, the seats around plants can be designed by using the tree pools and with flower beds surrounded (Fig.8). Compared with special seats, this kind of seats adds the flexibility of green facilities in form and improves its functions, which provides people with multiple choices at the same time.

One should consider the update and mobility in use when designing other small-sized landscape facilities. For example, the design of pulleys at the end of large flower pots can vary according to arrangement and combination, which gives people freshness for recreation space (Fig.9). If there are some activities in need of a large space in this area, the convenience of moveable greening facilities can be seen clearly. It is the moveable greening facilities that makes it possible to transform flexibly.



Fig.8 Seats are designed around the trees. Copyright 2013 JI Jianle, all rights reserved used by permission.



Fig.9 The planting vessels with pulleys under the bottom can move and combine in everywhere. Copyright 2013 JI Jianle, all rights reserved used by permission.

#### D. The Design Principle of Regional Style

Every country, every nation and every region boast their unique local customs; likewise, different climates, terrains and customs create different regional symbols[7], such as the paper-cut in northwest and Sizhu (traditional stringed and woodwind instruments) in the region south of the Yangtze River, etc[8]. People will have instinctive connections and deduction out of seeing these things for a long time. Therefore, designers should integrate this kind of regional symbols into the design of green facilities with representative patterns, colors and materials and other decorative forms, which will play its role in improving charm of culture, business, tourism and other aspects in this landscape space. (Fig. 10)



Fig.10 Landscape facilities with characteristics of the Chinese traditional culture. Copyright 2013 JI Jianle, all rights reserved used by permission.

#### E. The Design Principle of Aesthetics

Apart from the utility in the design of small-sized facilities, it should also accord with the general rules for form beauty in terms of unity, balance, proportion and rhythm to bring the feeling of beauty to people's mind and body. Its formative design should be established in the function of performance's objects and the understanding of nature. In design, one should perform the inner design by ingenious patterns, styles and space combinations, in which the aesthetical effect in integral form can be achieved by combining the different forms of shrubs, arbors, flowers, hedges and grasses with plants in different colors[9]. Designers for the settings of the small-sized landscape facilities in urban public recreational space should be good at trade-offs, and give the suitable combinations for the number of space and specifics without too little or too much piling up, and thus play a better role of his embellishment effect.(Fig.11)



Fig.11 Moderate quantities of plants, lamps and lanterns, kiosks, etc. have a favorable decorative effect on the public recreational space. Copyright 2013 JI Jianle, all rights reserved used by permission.

#### F. The Design Principles of Combination of Decoration, Manufacturability and Science

Modern greening facilities are a part of industrial products, the designers of which should integrate decoration, manufacturability and science into the design of greening facilities. In the design of cellular structured facilities with the function of ornament, one should be exquisite and fine in choosing materials and be more delicate in manufacturing than the relatively-large facilities, only by which the balanced decorative effects can be achieved.



## V. DESIGN METHODS OF SMALL-SIZED LANDSCAPE FACILITIES

Compared with the design for facilities in other spaces, the designs of small-sized landscape facilities in urban public recreational space have much common with the former one but many differences in design. For example, the landscape facilities on ordinary roads is comparatively large in size and concise and outstanding in style and color, which can leave impression on the fast moving people. However, people in recreational space are mainly walking slowly or staying, which is necessary to provide small sized and exquisite landscape facilities for tasting. Therefore, one must consider the speciality of recreation space in specific design. Small-sized landscape facilities in urban public space have a great varieties and different functions. Due to the limitation of length, there is only a discussion on the common design methods of the main facilities, specific as follows:

### A. *Small-sized Landscape Facilities for Greening*

Greening is a key factor of the constitution of urban landscape, which plays an ecology regulative function on the public space with dense personnel. It also can purify air, relieve annoyance and give double improvement on physiology and mentality for pedestrians.

In the space with hard ground as major materials, flower beds and flower pots are important means for greening, whose positions are always the focus of attention. Other decorations cannot compare with the colorful and vigorous flowers. As decorations at both sides of the roads or corners, flower beds and flower pots can also divide space in square. The flower stands can be built with a 30-50 cm height which is convenient for people to sit on. (Fig.12) The street trees can provide shelter and shade for people in the walking space as well as cover the unsatisfactory building façade and beautify the environment in this space. If the facilities for rest are set around trees, its utilization rate will be higher than in other positions. A special pavement, metals or concrete grate is used on the surface of tree pools, whose obstruction for raindrops escaping into the ground is relatively small, helping trees to grow. Its advantages are to fix earth and level off the ground.



Fig.12 The colored ponds with suitable weight of seats.  
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In arranging greening facilities, designers should first consider the plants in terms of different forms and features, color variation in four seasons and the effect of combination among different breeds to satisfy the environmental needs. Or to arrange some movable flower plants alternatively according to their characteristics in different time to maintain an ever-green landscape. From the design for greening landscape facilities and the quantity and arrangement of flowers and trees, people can feel that the environment designers and administrators pay much attention to the quality of landscape spaces and humanized concerns for urban dwellers.

### B. *Small-sized Landscape Facilities for Rest*

The common small-sized landscape facilities for rest in urban public recreational space include seats, stools and other things to sit on. These facilities for the people who state in the conditions of outdoor activities are indispensable.

When people use the landscape facilities for rest, they continuously and directly contact with it. Therefore, when planning the position of public space, designers should fully give a consideration of selecting landscape points, bring people in the best position and enjoy the most beautiful streetscape.

Chairs and stools are the main and the most form in the landscape facilities for rest, which arrange in the position of opening up in front and trees or flower beds at the back. Or it can be in the position of ranking in the middle with linear and dividing the bilateral walking routes. In the larger area of space joint, it is fit to set and provide a long-term recreational space to people. Seats in here should be designed into a certain form that has privacy and is convenient for communication. Setting in single or combinational design with tables is available. Style of seats can adopt the characteristic forms with the local traditional culture, developing into a visual focus in the space. (Fig. 13)



Fig.13 Seats with the Chinese traditional image of drums.  
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On weekends and holidays, the situation of the house is crowded in every part always appears in the urban public recreational space. In most cases, seats and benches can't meet people's requirements. Therefore, the design of landscape facilities for rest can make the recumbent function integrate into the design of flower beds, sculptures, waterscapes and cars' barriers. In this way, minor facilities for rest with multifunction can be developed. For instance, surround the seats around the trees not only can protect trees, but also can create a recreational space with shady, cool, and pleasure.

The sitting height of chairs and benches in outdoors should be 35-40cm and with a width of less than 40cm. Its length should be depended on the seating capacity and scale of space environment. The most comfortable angle of the seat back is the angle of inclination in 100-110 degree. Materials in common use for chairs and benches of Commercial Pedestrian Street are woods, concretes, metals, plastics etc[10]. which is made with the single form or combinational form. Wood, with its favourable tactile impression and affinity, gives comfortable physiological and mental feelings, but its durability is worse. (Fig. 14) The character of concrete materials is firm that is difficult to damage and is liable to process. Due to the rough and plain texture, it usually constitutes the body of benches in the combinational forms with other materials. Metal materials with its favourable ductility and flexibility have more advantages than other materials in the modelling. The price of plastic seats is in low cost, but it is easy to be tender and fading after under the exposure of sunlight in outdoors. Thus, it is better to use in combination with other materials[11].



Fig.14 Texture of woods is plain and comfortable.  
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### C. Small-sized Landscape Facilities for Hygiene and Convenience

Small-sized landscape facilities for hygiene and convenience are the important facilities for maintaining clean and tidy environment and providing conveniences to people. And to some extent, whether it improves or not can reflect the urban level of civilization. These kinds of facilities with the characteristics of unique modelling, bright in colour and easily to recognize are great varieties and have broader distribution of surface, main including dustbins, drinking bowl and so on.

It seems that the dustbins with the difficulties of hard to appear in the elegant places are a part of urban landscape, which embodies the urban level of civilization and artistic appreciation of dwellers from the side. Its relationship of good and bad is related to the quality of spare and public health. Considering from the perspectives of enhancing actual effect, the dustbins should be built in the place where people will stay for a long time. Such as the nearby of facilities for rest in the public space and the areas of the fate of grocery store and vending machine and so on. Its modelling and position should not excessively dazzle the eyes, and a plain and salubrious feeling should be given to people. Except for its self-existence, dustbin also can conduct combinational design with seats, lamp poles etc. other facilities.

Due to the larger human being flow within the public recreational space, the capacity of dustbins should not undersize. Its general height is between 60-80cm and its width is about 50-100 cm. The throw opening has a distance from ground, which is about 60-90cm better and suitable for the throwing height of walkers. Many materials



Fig. 15 The setting of dustbin classification makes for environmental protection. Copyright 2013 ZHU Lixing, all rights reserved used by permission.



can be made to manufacture dustbins, including iron sheets, cast irons, cements, plastics and glazed potteries, etc, which is selected on the basis of space environmental situation. If only the texture is firm and resistance loss can suffer from the roughly utilization in the public places. It is better to have sleeve or removable plastic bags that can be fetched out, which is beneficial to the daily clean. A system for dealing with rubbish should be classified and marked, and let everyone can easily to know about the rubbish in his hand should be put into the right barrel. This type if structure is good for environmental protection. (Fig. 15) The ground materials in the surrounding of dustbins should be smooth surface, which is difficult to deposit and dirt and easily to sweep.

Public telephone booth with the characteristics of cheap expenses and high quality of connection is a significant facility in Commercial Street for communication and still has a very high utilization rate in the developed wireless communication' today. The telephone booth usually arranges in the two sides of streets or closes to seats, but it won't interface with transportation. In the landscape of Pedestrian Street, telephone booth belongs to embellishment and subordination. The modelling and colour should be striking, as well as coordination with the surroundings should be paid attention to. Telephone booths usually have several types of closed boxes and covered-form columns, etc. At present, our country adopts columnar telephone booths for the reason of its convenience to use and space saving. However, it has the problems of bad sound insulation and easily to damage. The materials of columnar telephone booths usually are metals and organic glasses with the height of about 2m and the width of about 0.5-0.9m. It is first-rate to have a scoring table for people's convenience to use.

In addition, inquiry service system of urban electronic information can be designed into the telephone booth with the telephones. Thus, it can more rapidly issue valid resources information and increase efficiency of sightseeing.

The drinking bowl is a facility that supplies portable water to pedestrians. Nowadays, it does not that much popularize in our countries' Commercial Pedestrian Street. If setting up some drinking bowls in grocery stores or near the facilities for rest, it can enhance the comfort level of streets and in favour of the fitness of urban dwellers. Because of drinking bowls ordinary are case-hardened products, styles that coordinated with environment should be chosen. Mat formation on the nearby ground should have a certain gradient and guide the water flow in the pavement flow into the drain opening. Settings of drinking bowls should be far away from dustbins, public toilets, etc.

#### *D. Small-sized Landscape Facilities for Information and Identification.*

Signs, bulletin boards and signboards as a public information media, offer guidance for the people who live in the cities, which functions are absolutely necessary. These kind of small-sized landscape facilities convey information and express through characters, diagram forms and signs, etc[12]. The literal expression has the

most accurate significance, while signs have the most direct effects and strong visual impact. Diagram form is suitable for behaving orientation. All these methods should be comprehensive utilization and give play to respective pros and cons, making the pedestrians understand the expressional information showed in the signboards. In its modelling and colour, it should be simple and striking to the greatest extent and it is clear at a glance but can express accurately. Signboards are a part of public space environment. Its design style should be coordinate with the around buildings, including pleasant measures, proper position, convenient for pedestrians watching, conspicuous but without holding up the traffic (Fig.16).



Fig.16 Signboards in Chinese traditional style. Copyright 2013 Ji Jianle, all rights reserved used by permission.

## VI. CONCLUSION

Public recreational space in Chinese contemporary cities is the main place for dwellers' public interaction activities. It has multiple functions of pros and cons, such as rest, recreation and perfect supporting service. The main isotopic carriers of these functions----are all types of small-sized landscape facilities. The all kinds of qualitative activities in the street space mostly rely on it. Whether its design conforms to the actual requirements or not decides the space quality of the entire pedestrian street[13].

Designers of landscape should abide by humanization, the overall, region, aesthetics and technologies, etc. various design principles. In order to realize the design purpose and achievement of best utilization for participators, he should combine with characteristics of sites and human behavioural psychology principles to in-depth design all kinds of small-sized landscape facilities from multi-angle[14].

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