
Reuse of Discarded Container in Tourism Landscape Design

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Abstract

In this paper, based on the ecological concept of sustainable development in tourism landscape design, with macro thought in landscape planning and design for control, starting from the particularity of the subject discarded container, combining with the characteristics and advantages of the container itself, we make innovative research on the discarded container and use the discarded container to make a reconstruction design.

Keywords

Tourism Landscape Design; Discarded Container; Container House; Reuse.

1. Significance of discarded container reuse topic

In recent years, with the land price, building materials prices and labor costs continue to soar, container, as a large vessel with certain strength, stiffness and specifications for turnover use, its biggest advantage is its product standardization. In fact, container manufacturing industry itself is a high energy consumption and high pollution industry, but because of the convenience and huge profit brought by the container to international trade, it has been produced in a large amount. Retired container, due to paint off, deformation and other boxes, its maintenance costs increased, which is forced to withdraw from the circulation field. But this does not mean that the discarded containers cannot be used. Instead, these discarded containers, since the main frame is still good, four angle bearing, and high safety, have the characteristics of seismic resistance, wind prevention, rain prevention, fire prevention, and heat preservation ability, and most can also continue to be used for 5 ~ 10 years [1]. In consequence, the discarded container has a huge recyclable value and necessity.

As a special design form and structure, it is reminiscent of the tent and RV. Its nature of the modular provides an extremely free and creative space in the buildings use. As long as a little transformation, it can make use of the most basic monomer elements to construct a set of container houses, temporary venues, mobile exhibition hall, art gallery or commercial exhibition space, mobile store and so on, even deconstruct and reorganize it, and it will bring people endless reverie and possibility. At the same time, it effectively prolongs the service life of the container, to meet the needs of city construction and building multi-development, and fully meets the national solid waste pollution prevention and control principle of "reduction, recycle and harmlessness". Resource-orientation of discarded containers slowed the adverse effect as scrap tried again on resources consumption and environment, thus effectively enhancing the environment quality, product value and enterprise benefit [2].

Compared with the traditional buildings, container building has better land adaptability and security. The originally designed anti-disaster ability for shipping added somewhat domineering - 10 hurricane and 8 earthquakes in land operation. At the same time, the modular prefabricated structure of container buildings make it save more than 40% in construction time, greatly shortening the construction period; it saves more than 96% water and reduces 99% construction and renovation waste compared with brick construction housings; at present, it can increase 4% (container wall with insulation layer, 50mm ~ 70mm, much thinner than the traditional 240mm thick walls) use area is really humanization design [5];

finally, the container type building, based on user needs, can make the overall relocation, any combination, and modification design, and it can satisfy the personalized needs of users.

Therefore, although the discarded container only has ordinary, simple appearance and concise characteristics, it is popular in the majority of designers because of its simplicity [3]. In the design examples of construction wastes "garbage siege" and "mountain landscape", discarded container, as a new member of the construction wastes, we believe that it can use its advantages to innovate and develop new functions and directions in the face of complex and changeable tourism landscape design under the premise of insisting on sustainable development and the concept of "treasure".

2. Reuse value and application of discarded container

In today's society, we cannot abandon those advanced technologies and materials have been possessed to make constructions completely attributable to the nature, let alone to put down all economic interests but to the embrace of nature. Whereas, with a variety of contradictory factors, either the environment or human beings still maximize the desire for freedom, green and nature. As a result, starting from a single element - the discarded container, we can maximize the delay of the service life of the buildings, delay the generation cycle of wastes, and try to find a modular, integrated and rapid implementation construction plan through a variety of ways, to make the abandoned huge objects play the greater potential value through some transformation and utilization.

As one of the youngest branches of the building structure system, the container building is the most widely used, with various categories and appearances. But personality based on commonality, the biggest common feature of the container is standardized. It can be like Lego, creating completely different results with a fixed monomer structure through any combination. The containers are perfect temporary buildings, public buildings, family residential or other mixed use building, even the reborn art. Whether it is new construction or renovation, projects diversity and high-quality successfully make the metal box have qualitative progress, like a butterfly, showing creative, flexible, and modernized unique temperament of container design. We should be more concerned about how to use and transform the discarded containers, rather than to build something by using them.

The container building is suitable for the sustainable development demand of the city - easy installation, modular production, energy saving, time saving, and flexibility. Relative to traditional housing, it can provide more choices for housing and experienter, thus a tin box made house full of fashion. This building form conforms to the trend of modern city new residential, which is advocating green consumption to meet the modern society needs. It will play a strong role in demonstration and economic pull in the requirement of innovative urban construction development, the promotion of green living houses, as well as environmental protection and energy conservation in modern buildings.

In the face of various container sizes, most of them have the space size fit for living, able to make space combination according to the needs; the variety of appearance can perform various style design and change, bright and beautiful. Therefore, containers are often used by artists and designers as creation, design, and display platform. For example, art temporary venue, mobile exhibition art hall or commercial display, mobile shops and other recyclable projects are favored by sports, outdoor, catering, automotive, technology and other industries.

In our country, in recent years, environmental pollution becomes serious, ecological development level is imbalanced, soil erosion, landslide and debris flow result in the frequent occurrence of natural disasters. We can convert the containers into a temporary housing after disaster, mobile hospitals and schools. With the continuous improvement of social economy, the rising premium and people's curiosity about new things, the container can also be converted into a nursery, student dormitory, studio, service station, temporary landscape and facilities of tourism landscape areas and so on.

3. Container specific features and advantages

Currently, container houses become a new area and new market of container development. Container housing construction is time-saving, fast in transportation, and convenient in installation, and it has the advantages of either alone or combination use. As building units, its potential mainly concentrates on the possibility of modular combination. The combination requirement is to create greater use space and solve the two basic problems of composite function. Container has a standard size [4], and there are two kinds commonly seen, as shown in table 1.

Table 1. Container standard size parameters

Container types	External size (mm)		Inner size (mm)		Inner volume (m ²)	Container quality (kg)	Load weight (kg)
	Length	Width	Length	Width			
Large container (40ft)	Length	12192	Length	12032	28.28	3800	21800
	Width	2438	Width	2350			
	Height	2591	Height	2390			
Small container (20ft)	Length	6058	Length	5898	13.86	2200	26680
	Width	2438	Width	2350			
	Height	2591	Height	2390			

The advantages of the container are shown as the following aspects:

- (1) Strong mobility. The framework is generally based on steel structure, supplemented by wood structure, with good stability and safety. Compared with the ordinary residential which cannot replace the site once bought, it is more flexible;
- (2) Strong modular. Structure uses welding or bolt connection, fast in construction speed, small in noise, able to be reused, with less construction wastes;
- (3) Good thermal insulation. Container box with insulation layer, insulation effect is obvious. For houses constructed with it, compared with the traditional masonry structure houses, the insulation performance is better;
- (4) Personal and changing appearance. Owners can transform and paint according to their preferences; compared with ordinary residential development program, it is more personal;
- (5) Certain wind resistance, earthquake resistance, disaster resistance ability, can be used for post-disaster reconstruction work;
- (6) High container housing area utilization rate; the box wall thickness less than the thickness of the masonry structure wall;
- (7) Overall quality of building with containers is lower than that of ordinary buildings having small pressure on foundation.



Figure 1. Appearance of containers after renovation

4. Advantages of discarded container temporary residence

As residential forms become diversified, more and more residential come to people's eyes, but container residential with unique ideas and new forms has always been paid close attention to. It has a high popularity in some developed city in the south, and the movable temporary housing once is popular with the public from its generation, which frequently appeared in the streets of the city. On the reason of its rapid promotion analysis, we can generally summarize four advantages [6]:

(1) Low construction cost and short modular prefabrication period

The biggest characteristic of container residential is that the unified standard brings the efficiency improvement. Compared with the general residential form, the required time is very short, and the application of the materials are also very saving, which can achieve the requirements of large-scale production. For ordinary people, housing in this way is the most affordable, and compared with the cost of renting and even buying a house, the cost is greatly reduced.

(2) Integration of design and function

Container integration as an important characteristic, the link of its structure and image is very close that it can complete the design objectives in meeting the function. For designers, under the premise of ensuring customer demand, they can improve and display each link of container renovation through various design methods and art forms [7]. On this point of view, we can see some clues from the major exhibitions.

(3) Meeting the requirements of super height and span

Because of the material, its internal strength is high, and the safety factor is very high. Coupled with the steel structure little quality, compared with the general residential form, its height and span are much larger.

(4) Characteristics of recycling

The development of container residential is very helpful for the current resource tensions, mainly because of its unlimited recycling advantage. It is necessary to know that its material is derived from a large number of discarded container products, so it can also play a very good energy-saving and environmental protection role in the mitigation of environmental pressures.

5. Advantages of discarded container renovation in tourism landscape design



Figure 2. Combination of discarded container with the environment

Containers used for container renovation usually have two categories. One is discarded freight containers; one is containers produced for temporary constructions. The obvious difference between the two is that the freight container has a container door, while the customized container does not. At the same time, in addition to the size of the customized container, in structure and other aspects, it does not necessarily follow the container standards, because it does not need to bear the freight load, and does not stack like the freight containers. Container renovation mainly includes three aspects [8]: on the surface

of the container, opening doors and adding windows; the interior surface processing (the ground, me tope and ceiling): the power supply, lighting and air conditioning and ventilation equipment installation. In addition, apart from the renovation of the container itself, if there is a fixed site and special environmental requirements, it also needs to pay particular attention to solving the problems between container, site, and environment, such as ground leveling, the heat insulation, thermal keeping and so on.

6. Conclusion

Container, from the beginning of the birth to the present industrialization, this transport loading tool has become an inspiration source for designers. From the perspective of modern aesthetic design, standard box with horizontal vertical cross contains the beauty of simplicity of modern designs. In addition, flexible and interesting building way is full of children's interest when building blocks. These personalized temperament gives "container design" a unique attraction. Most of the container buildings before are placed in the construction site to serve as a temporary building, or parallel construction as an Econo Hotel. Along with the development of container characteristics, temporary building is not its main function - art exhibition hall, campus dormitory, personalized retail, specialty stores, creative bridges and sculpture, even emergency building or welfare housing designed for major natural disaster victims, containers, with its simple shell, build a beautiful and new kingdom for mankind.

In short, in the face of the new environment and new object, there are many possibilities and implementation in the cooperation and development for container reconstruction design and tourism landscape environment. Whether as the landscape elements of tourist areas, or temporary buildings or landscape facilities serving people, the completely-new container products will attract visitors with its simplest characteristics and become an essential element in tourism scenic spot.

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