Discussion on the Recycling of Construction Waste in Fengxi New City Sponge City Construction

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Abstract. With the acceleration of the urbanization process, the phenomenon of construction waste surrounding the city is becoming more and more serious, which not only pollutes the environment but also occupies a large amount of land resources. Based on the current situation of building treatment and resource utilization in China, this paper analyzes the existing problems and suggestions, and focuses on the recycling and utilization of construction waste and its application in sponge cities. The construction waste in the sponge city has a large space for recycling and utilization in China. The prospects for use are considerable.

Introduction

At present, the construction of China's sponge cities is in full swing. The sponge city is a new concept put forward in response to the serious water environmental problems in the process of rapid urbanization in China. Building a sponge city with natural accumulation, natural penetration and natural purification is to protect and improve the urban ecology. An important measure for the environment and the promotion of ecological civilization. Fengxi new city is the first batch of sponge city construction pilots in China. With the development of the integration of West and Salt in recent years, modernization of Fengxi new city in Xixian New District has generated a large amount of construction waste, as shown in Figure 1, the phenomenon of "construction of besieged cities" has become increasingly serious. How to deal with construction waste reasonably and effectively is a big problem to be solved urgently in front of government departments. The construction of Luxi New City as an ecological garden new area should put urban environment governance and improvement in a very important position, and deal with new concepts and innovative methods in the development and utilization of construction waste resources. For the construction of sponge cities, compared with natural aggregates, recycled aggregates have unique advantages. They are loose, porous, and lightweight, and are especially suitable for sponge city requirements for building materials. Therefore, if waste construction waste can be processed into recycled aggregates to replace natural aggregates, and construction waste can be turned into treasure, it will not only reduce costs, save mineral resources, alleviate the contradiction between aggregate supply and demand, but also reduce the impact of construction waste on the urban environment. It has obvious economic, social and environmental benefits.

Figure 1. Construction waste besieged the city.
Hazards of Construction Waste

At present, the treatment of construction waste in China is still in the relatively extensive stage of landfilling and stacking. The major harm to the environment is mainly reflected in the following aspects:

(1) The scattering of construction waste during the cleaning and transportation process leads to dust flying. At the same time, exhaust emissions from transportation vehicles will also cause environmental pollution;

(2) Landfill treatment in gully or landfill site will occupy a lot of land and waste the country's precious land resources;

(3) After the landfill of construction waste, the original surface soil structure will be severely damaged, causing the ground level to settle, especially the current construction waste is often mixed with domestic waste. In the future, if the landfill area requires highway planning or other construction needs, the construction waste landfill site must be excavated and treated;

(4) During long-term stacking and landfilling, due to the leaching and scouring of rainwater, harmful substances in construction waste will seep into the soil of the storage or landfill area through the landfill leachate, which will cause serious pollution to the soil, such as paints and coatings It contains toxic and harmful substances and heavy metal elements, which will not be easily decomposed after landflling, which will inevitably cause pollution to groundwater.

Status and Suggestions for the Treatment and Recycling of Construction Waste

Although many cities in China have successively promulgated construction waste treatment management methods, China's treatment of construction waste is basically in a relatively extensive manner. In particular, the construction waste and domestic waste in many places are in a mixed state, which brings great difficulties to the later separation and treatment. The reasons for these extensive disposal methods are as follows:

(1) There is basically no separate collection of construction waste and no centralized collection;

(2) At present, most cities in China still lack professional construction waste recovery and treatment institutions;

(3) Compared with advanced foreign countries, China's construction waste treatment and resource utilization technology is relatively backward;

(4) The government has limited support for the resource utilization of construction waste. Although a series of laws and regulations concerning construction waste management policies have been introduced in recent years, due to the limited capacity of construction waste disposal sites designated by the government, the construction waste treatment effect is not satisfactory.

Therefore, combined with the above-mentioned current situation of construction waste treatment and resource utilization in China, there are the following suggestions:

(1) At present, the industrialization of construction waste resources in China still needs the government's vigorous support and the establishment of relevant policies and regulations. The scope of China's existing construction waste laws and regulations focuses on the impact of construction waste on the city's appearance and environment, and does not involve the scope of construction waste resource utilization; and there is no unified and clear set of the main body of responsibility for construction waste disposal, and The penalties for laws and regulations are relatively small.

(2) The development of the construction waste resource industry requires financial support. The construction R & D industry has a huge investment in early research and development. Whether it is construction waste resource recycling technology, construction waste classification and recycled aggregate treatment technology, etc., a lot of investment is required. At present, the government's support for fixed investment in construction waste resource enterprises is still strong. There is room for improvement, and only some regions have introduced fiscal subsidy standards for fixed investment in related enterprises. Without adequate financial subsidies and policy guarantees, it is often difficult for private enterprises to achieve profitability through market mechanisms. The
government can formulate corresponding support policies to encourage the development of enterprises that use construction waste resources as resources through the use of awards, subsidies, and discounted loans.

(3) The construction waste recycling and management system should be actively improved. Although China generates a large amount of construction waste every year, due to the long transportation distance and high processing cost, most regions have not yet established a compulsory collection and transportation system, but no compulsory and unified recycling mechanism, channels and management systems have been established. Demolition, transportation and other companies often dump or landfill construction waste at will to reduce disposal costs.

(4) At present, China's domestic standard complete system for construction waste resource utilization or construction waste regeneration products has not yet been formed, and it needs to involve various engineering fields in urban construction, so that the application of renewable resources has a wide range and operability.

Construction Waste Recycling Methods

According to statistics, the utilization rates of construction waste resources in Europe and the United States and Japan and South Korea are 90% and 95%, while the utilization rate of construction waste resources in China is less than 10%. Foreign countries implement a "construction waste source reduction strategy", that is, before construction waste is formed, it is reduced by scientific management and effective control measures. Regarding the construction waste generated, it is mainly processed and broken into recycled waste aggregate for construction waste, and recycled aggregate is used to prepare recycled aggregate concrete. The utilization level is relatively high. Due to different national conditions and differences in building structure forms, the main component of foreign construction waste is concrete, and most of China's brick-concrete construction waste is mainly bricks, which also directly leads to the partial utilization of construction waste resources in China. Low. On the other hand, the low utilization rate of resources also shows that there is a lot of room for improvement in the utilization of construction waste in China, and it has great potential for follow-up.

Through the sorting process of air separation, magnetic separation, manual picking of debris, and subsequent crushing, multi-level sieve screening, and water washing processes, 95% of construction waste can be converted into recycled aggregates of different particle sizes. Recycled aggregate can be said to be the main product for the recycling of construction waste. It has good water permeability, does not freeze up when it encounters water, does not shrink, and can completely replace natural aggregates such as sand and gravel. At present, after the regeneration of construction waste in China, it is mainly used for processing and producing recycled aggregates, making non-burning bricks, building waste landscaping, ground reinforcement treatment, road subgrade filling, pavement base, and recycled concrete, such as Nancui in Tianjin Ping Park and Wenjinghill Park in Xi’an use construction waste piles for landscaping, build artificial mountains and green; the Shanghai World Expo Park Park uses soil consolidation agent to consolidate construction waste residue for road paving, and the road uses recycled permeable bricks. The use of construction waste for landscaping, etc.; ecological and environmental-friendly permeable bricks were also widely used in the 2008 Olympic venues; the Xixian Beihuan Expressway in Shaanxi Province is China's first "technological demonstration of construction waste as the main road building material Project", successfully applied 6 million tons of construction waste recycled materials in five aspects: roadbed filling, special foundation treatment, pavement base, small prefabricated components, construction access roads and site hardening, of which roadbed filling uses construction waste recycled materials 4.2 million; Hebei Provincial Cangzhou Municipal Engineering Company uses recycled aggregate as road base material. Forest Avenue municipal road construction and other widely used, while using recycled brick sidewalks were more than permeable type, can reduce the urban road hardening caused by rainwater disasters, urban drainage to reduce the pressure.
Application Scenarios of Construction Waste in Sponge Cities

Current research shows that when the construction waste recycled aggregate is used in the aquifer, its water storage and absorption capacity are several times or even hundreds of times that of natural aggregate. Therefore, the potential of using construction waste in the construction of sponge cities is huge. Combining the "sponge city" and "resource utilization of construction waste", using construction waste to produce water storage materials for municipal roads in sponge city. After the construction waste is regenerated, it can be applied to green squares in municipal public areas, permeable roads in parks, permeable roads in residential areas, permeable parking lots, green squares in public areas, green spaces in parks, park water systems, municipal roads at all levels, etc. Spongy body. The specific application scenarios of construction waste in Sponge City are:

1. At present, recycled aggregates can be applied to different LID facilities such as rainwater gardens, ecological retention grass ditches, aquifers, infiltration pipes/wells, and gravel retention systems, as shown in Figure 2. Utilizing the good water permeability and porous properties of construction waste, smaller debris in construction waste can be used as gravel to pave the ground to absorb rainwater and replenish soil water content; or as a filler for seepage wells to promote the efficiency of water treatment. Or, as the main filler for constructing the artificial wetland matrix, the sewage flows through the gap of the recycled aggregate filler in the bed body, and plays a role of sewage purification.

![Figure 2. Application of recycled aggregate in LID facility in sponge city.](image)

2. Recycling aggregates from construction waste can also be used to produce non-sintered blocks or non-sintered bricks, such as recycled permeable bricks, recycled slope protection bricks, recycled hollow blocks, thermal insulation blocks, etc. These are all used to construct sponge cities. Important basic materials. After the construction waste is recycled, it is used in permeable paving structures such as permeable bricks and permeable concrete in sponge cities, mainly in areas such as non-motorized driveways, residential pavements, parking lots, and urban squares in sponge cities. It can quickly rainwater infiltrate the ground and restore it to groundwater. The timely replenishment of groundwater resources can alleviate the discharge pressure of urban sewers and reduce urban waterlogging.

3. Recycled mortar and recycled concrete prefabricated components made of recycled construction waste aggregates can be applied to permeable floors, ground paving, grass planting bricks, river slope protection, curb stones, retaining walls, garden landscapes, etc.

In summary, in the construction of sponge cities, recycled aggregates and products used in construction waste are widely used and used in a wide range. Recycled aggregates can be used as recycled backfill materials, recycled road materials, recycled permeable bricks, and permeable pavilions in the construction of sponge cities. The equipment, osmosis layer, biological retention pool, etc. have broad application space in the construction of sponge cities.

**Conclusion**

With the prominent urban environmental problems in recent years, the comprehensive utilization of construction waste has become an urgent task. The resource utilization of construction waste not only significantly reduces the pressure on urban waste, improves the urban environment, but also makes...
waste into treasure and promotes the development of circular economy. China has a huge space for the utilization of construction waste resources. According to the "Leading Action for Circular Development", by 2020, the treatment rate of urban construction waste resources in China will reach 13%. Recycling construction waste in sponge cities can effectively solve the problem of construction waste disposal. Under the environment of low-carbon environmental protection and sustainable development, the next step is that the country will vigorously support the promotion of the construction of waste resources. At the same time, the construction of China's sponge cities is in full swing. Therefore, there is a large space for the reuse of construction waste in the sponge cities. It will be more impressive.

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