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# Research on Key Technologies of Green Road Environmental Protection House-Keeper in Urban Areas

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**Abstract:** Under the background of rapid promotion of green highway construction, while highway construction pursues efficiency, quality and engineering durability, environmental protection has been raised to a very important level. Taking the Huadu-Dongguan expressway as the research object, this paper explores the key technologies of environmental house-keeper under the concept of urban green highway. From the innovation of environmental management technology system, the improvement of technical means and the application of unmanned aerial vehicle remote sensing, the establishment of urban environmental protection manager index system, so that the expressway in the construction period of environmental protection to achieve construction dust, noise control.

## 1. Introduction

Green highway is an important part of green transportation. According to system theory and cycle cost theory, the main purpose of green highway is to use the least resources and have the least impact on the environment. Green highway's construction runs through the whole cycle, including planning, design, construction and operation.

However, after several years of green highway construction practice and green highway construction and evaluation standard research, found that although green highway construction has a relatively complete construction program and good expectations, but the proposed green highway construction characteristics, green technology, green concept is difficult to achieve. Especially in the process of green highway construction, prominent environmental problems and illegal construction occur frequently, which fail to reflect the protection of the environment and the restoration of nature. Therefore, this paper combines the environmental problems in the construction process of green highway and the concept of environmental stewardship to realize the environmental supervision during the construction period of green highway and provide scientific basis and effective technical support for the environmental supervision during the construction period of green highway.

The concept of environmental stewardship was first put forward by the former ministry of environmental protection in the guidance of the author on actively giving play to environmental protection and promoting supply-side structural reform (circular atmosphere [2016] no. 45). The proposal is to promote the development of environmental consulting services and encourage qualified industrial parks to hire third-party service companies as "environmental butlers" to provide integrated environmental services and solutions such as monitoring, supervision, construction and operation of environmental protection facilities and pollution control.



Currently, there is no widely accepted unified definition of environmental stewardship, and there is some controversy. Some scholars believe that environmental stewardship is "contract environmental service". Environmental service enterprises provide comprehensive environmental protection service in the form of contract to enterprises, and charge fees according to the final pollution treatment effect or income. Also the scholar thinks environmental butler service scope is limited. The environmental house-keeper should belong to the third party environmental services companies use of talent, technology, capital and other resources for the government, enterprises, park, etc. The service object to provide professional, systematic and personalized environment protection, resource conservation and ecological restoration, environmental protection related services. The environmental stewardship service model is still in its infancy and has no precedent in the road construction industry.

## **2. Study area**

The Huadu-Dongguan expressway project is a key construction project of Guangdong province and Guangzhou city, and it belongs to the seventh important highway in Guangzhou high speed expressway network. The route starts from the south exit of Baiyun airport in Guangzhou and is connected to the airport expressway. It goes east through Renhe town and Zhongloutan town in Baiyun district, Zhongxin city and Jiulong town in Huangpu district, China-Singapore town, Yongning Street, Xiancun town and Shitan town in Zengcheng district, and ends at Shitan town and is connected to Zengguan Shenzhen expressway. The completion of this project will better enhance the traffic capacity of Baiyun international airport and is of great significance to the economic development of Guangzhou airport economic zone, China-Singapore knowledge city and Zengcheng national economic development zone.

## **3. The main problems in the construction of green highway are as follows**

(1) In the process of highway construction, supervision is more about the construction quality and construction management. The environmental protection issues are provided by environmental supervision and environmental monitoring units with some reports and data. During the construction period, environmental monitoring cannot supervise the construction process in real time for the passive measures that have produced or are producing pollution. Even when monitoring the occurrence of pollution events, there are basically no repair and treatment measures. The supervision of ecological and environmental problems in the construction process is basically absent.

(2) Especially in urban highways, construction dust problems, road construction team air impact mainly includes early moving demolition dust, material yard dust, construction machinery and transport vehicle emissions of waste gas pollution, road laying produced by the asphalt smoke, residue site temporary dust and transport vehicles caused by the secondary dust. Dust is easy to spread in the air, often did not wait until the inspectors arrived at the scene has spread, and it is difficult to monitor the scene.

(3) The contents of urban expressway construction generally include subgrade and pavement engineering, pipeline engineering, some of which also involve bridge engineering and pre-stage moving and dismantling engineering. During the construction period, the noise mainly comes from civil construction, bridge construction, demolition and relocation construction and transportation vehicle noise, etc., especially the old road digging, building demolition, bridge pile foundation construction and concrete pouring, etc., which has a significant impact on the public (especially the close-range sensitive buildings) along the road.

## **4. Green highway measures in urban areas**

(1) Aerial photography of construction process is carried out regularly by unmanned aerial vehicles. Supervision frequency is customized according to actual conditions to summarize and reflect construction status and construction environment problems.

(2) Through fixed-point environmental monitoring, the sensitive areas of construction environmental pollution are monitored, such as the schools and hospitals near the highway for real-time monitoring of air quality and noise, and the monitoring data are analysed.

(3) The surrounding of the construction site shall be no less than 2.5m high. It shall be firm, smooth, clean and beautiful.

(4) Construction enclosure appearance beautification, lighting, "civilized tree new style" public service advertising area accounted for more than 80%.

(5) Dust screen shall be used to cover the exposed ground on the construction work surface, or temporarily stored for a long time or more than one day, or adopt greening and solidification measures. The weft density of dustproof mesh shall be greater than 3 pieces/cm.

(6) Fine particle building materials which are easy to produce dust should be stored or covered in a closed way. Other construction materials should be classified and neatly arranged according to relevant requirements.

(7) Effective dust control measures, such as covering or temporary greening, shall be taken on the bare land of the site where construction has stopped.

(8) For earthwork, wet methods such as dust removal by fog gun and water spraying by sprinkler are adopted in the excavation process. The exposed ground after excavation shall be solidified or covered in time.

(9) In the construction site, a special person is responsible for the sanitation and cleaning, increasing the frequency of sprinkling water, keeping the ground moist and ensuring that there is no floating dust.

(10) The temporary installation, enclosure and garbage of the construction site must be cleaned up in time, and effective dust removal measures must be taken during the cleaning.

(11) The main roads in the construction site shall be hardened, and the surface materials shall be concrete, fine stone and steel plate after the earth layer is compacted.

(12) Material storage area, large template storage area and other sites flat compaction, surface materials with concrete, fine stone, etc.

(13) The main entrances and exits of earthwork construction sites in the region are equipped with a car wash basin to prevent vehicles from entering and leaving the site with mud on the road.

(14) "Three guarantees" (including cleanliness, order and beautification) will be implemented on both sides of the 100m pavement at the exit of the mixing station and the rebar processing plant. Special personnel will be responsible for washing and cleaning to ensure "no dust discharge, no dirt on the road surface, no mud on the vehicle and no dust on the surrounding area".

## 5. Conclusion

With the rapid development of economy, China has gradually increased the construction of urban roads and other infrastructure, which plays an important role in the development of urban economy and the improvement of residents' living conditions. However, in the process of road construction, it will inevitably cause adverse effects on the surrounding environment, especially noise and dust pollution. With flowers to Dongguan road construction noise and dust control increasingly strict, the traditional noise and dust pollution prevention and control measures, on the basis of should further more effective noise reduction of dust suppression measures, protect the environment on the construction site, minimize the city highway construction noise and dust pollution, provide the public with quiet, comfortable living environment, promote the coordinated development of national economy and social environment. Development trend of green highway should comply with the environmental protection, carry out "green housekeeping service mode, while the service mode is still in the starting period, trying to promote future stage may also face with the problem of policy, economy, technology, but from the point of long-term development," environmental stewardship "to help enterprises reduce environmental risks, promote environmental awareness and management level, improving the efficiency of pollution control, promote the overall environmental management level of ascension, truly maximize economic, social and environmental benefits.

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