

# Construction of Ecological Campus from the Perspective of Sponge City-- Taking Yaohu Campus of Jiangxi Normal University as an Example

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**ABSTRACT.** *The concept of sponge city is gradually recognized by the public in the context of the sustainable development of contemporary society, and ecological campus construction is the basic embodiment of practicing sustainable development from the perspective of sponge city. Based on the concept of sponge city, this paper analyzes the problems existing in ecological construction of The Luhu Campus of Jiangxi Normal University, and realizes the goal of ecological campus construction by transforming drainage facilities, pavement paving, green space system, etc.*

**Keywords :** *Sponge City; Eco-Campus; Flood Control and Drainage*

## 1. Introduction

Rapid urbanization has brought a lot of problems, the city's impermeable ground more and more, every heavy rain, heavy rain or continuous rain, the city drainage system is under a lot of pressure, there is "at home to see the sea", "road swimming" and other strange phenomena. In order to ensure the healthy development of the city, in 2017, the government officially proposed the construction of a "sponge city". The university campus is a part of the city, which has an important influence on the construction of the city, and it is beneficial to the construction of ecological campus to carry out reasonable natural accumulation of rain and flood and infiltration purification in the campus area.

## 2. Overview of the Concept of Sponge City

Sponge has good adsorption function, so sponge to compare the city to the natural environment, rainwater adsorption capacity, is the city's ability to cope with floods, rain and flood. The document points out that sponge cities have the same "elasticity" as sponges, which can respond well to environmental changes and natural disasters and recycle water resources through water absorption, water storage, water seepage, water purification[1]. In short, sponge urban construction

mainly includes the protection and restoration of the original ecosystem, improve the original water quality and environment[2]. The use of low-impact development measures to build the ecological environment, it ensures the ecological safety of buildings, green spaces and roads, but also for the water storage, slow release and absorption of rainwater has played a positive auxiliary role, for the city's rainwater runoff and natural purification, storage is beneficial[3].

### **3. Eco-campus construction method based on the perspective of sponge city**

#### ***3.1 The construction of ecological environment should be people-oriented***

When building ecological campus, we should consider the relationship between man and nature, carry out scientific layout according to human needs, and put people first. In the campus area and area of the connection, through the micro-terrain processing methods and the high and low changes of landscape, to provide teachers and students with a unique ecological campus environment. In the process of construction should also follow the laws of nature, the construction of artificial facilities and natural adaptation.

#### ***3.2 Ensuring the balance between supply and demand carried by resources***

The purpose of ecological campus construction is to promote the coordinated development of urban and water resources, and to maximize function while protecting the environment. The school's drainage system is planned and built according to the number of people who will grow over a certain period of time, and is sufficient to meet the water discharge requirements to the extent permitted by the plan. With the rapid expansion of the number of colleges and universities in recent years, in the face of rapid expansion of the number of people, campus construction can only expand from the horizontal floor space to meet the demand, but, the underground drainage system of additional space is limited, the development speed of the above-ground and the influx of students, increased the pressure of the drainage system, The long-term overload operation of the drainage system can easily cause problems such as internal flooding.

### **4. Analysis of the construction status of Jiangxi Normal University**

Jiangxi Normal University is located in Nanchang, the capital of the province, with a subtropical monsoon climate with an average annual precipitation of about 1600 ml, but the rainy season, which lasts about 3 months, accounts for about half of the annual precipitation. During the rainy season, in the traditional municipal drainage mode, it is easy to cause some areas of water level rise, while canteens, teaching buildings and other areas will also form waterlogging, seriously affecting the normal life and study of students.

#### ***4.1 Poor management of drainage facilities***

Due to the changing number of schools and construction equipment, the long-term use of the drainage system has caused a great loss, but the school has not paid attention to the management and maintenance of drainage facilities. School management and maintenance system is not perfect, daily repair and inspection awareness is weak, resulting in the infrastructure cannot be repaired in a timely manner, it is easy to cause flooding on campus. In normal weather, schools should organize relevant personnel to carry out regular pipe inspection, after the flood situation before taking emergency repair and protection action is not a long-term solution.

#### ***4.2 Poor drainage of campus paving***

The paving of the surface affects the surface runoff. When it rains, the water runoff is relatively small under the pavement with high permeability, while the low permeability of the pavement will turn the water into surface runoff, causing water pollution, water and so on. At present, the campus floor is mainly cement and concrete brick, is low penetration of hard paving, poor water seepage capacity, rain, low-lying places easy to form water, restricting the passage of vehicles and pedestrians.

### **5. Key measures for the construction of ecological campuses**

#### ***5.1 Strengthen the maintenance of drainage facilities***

Ecological campus construction needs schools to pay enough attention to the work of organizations, develop corresponding plans and real-time supervision. Schools should establish and improve the system of maintenance of drainage facilities, set up drainage facilities maintenance and supervision team, regular maintenance of drainage system, to ensure the rapid discharge of water bodies in the school in the event of heavy rainfall. At the same time, in the process of strengthening the maintenance of facilities can be built according to the situation on campus low-impact development of rainwater system, which can not only promote the efficient development of rainwater treatment work, but also improve the status quo of excessive dependence on tap water, improve the utilization rate of water resources, reduce rainwater runoff pollution load.

#### ***5.2 Renovation of pavement design paving***

In the paving design, the hard gravel, tiles, etc. can effectively relieve the water to the surface of the water, maintain the surface structure, but also the rain water for primary filtration, intercepting the rainwater in the large particles of pollutants. Therefore, the use of gravel and other materials to the surface paving can not only

improve soil erosion, but also achieve the primary purification of rainwater. In the campus construction, can create a “permeable” ground, campus sidewalks using permeable cement concrete, permeable asphalt concrete, gravel, etc. Parking lot can be used with grass bricks, while increasing the number of mingditch, as far as possible to reduce the flow of the surface.

### ***5.3 Increase the construction of green space system***

In view of the low utilization rate of campus landscape, we can effectively control the rainwater runoff and realize the recovery and reuse of rainwater by transforming the green space around the plant. Through the scientific analysis and calculation of data such as the rate of seepage, the rainwater capacity, the rainfall and the runoff speed of the green space, the landscape such as gravure green space and rain garden are designed. At the same time, improve the design of the lower layer of planting soil, laying more sand, gravel, etc., so that when rainfall green space can play a role in water storage, plants, sand and purification, can improve the groundwater environment, while another part of the purification of rainwater can be discharged into the school lakes, supplement the landscape water, Invigorate the natural ecological cycle of the campus.

## **6. Conclusion**

Campus construction should be integrated into the “sponge city concept” while maintaining its own development needs, carrying out relevant transformation, controlling the stormwater runoff, making it a natural accumulation, penetration and purification, which is not only a “win-win” for the protection of the campus ecological environment, but also an effective supplement to the theoretical understanding of “sponge city” and a useful exploration to promote the construction of ecological campus.

## **References**

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