

Landscape Design of Sustainable Recreational Areas Based on Topographic Height Differences

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Abstract—The paper focuses on the landscape design of sustainable leisure areas, and the problems faced are mainly based on the original site with a large inherent landscape and a large height difference, analyzing the geographical location and foundation problems of the design scope, and carrying out new design and transformation of the site landscape from several angles of landscape structure design, lighting design, plant design, material design and sustainable system design, and finally achieving sustainable leisure area landscape design according to local conditions.

Keywords-landscape; sustainable; leisure; height difference

1 INTRODUCTION

As an indispensable spatial composition, small leisure green space has both ecological benefits and comprehensive functions. As a public open space, in addition to providing users with public activities such as recreation, relaxation and leisure, it is more important to ensure its own sustainable development, and furthermore, it is to regulate the regional micro climate and enrich the regional environment. At the same time, it is constrained by various regional factors, such as climate, hydrology, human activities and other factors, and its design needs to be adapted to local conditions to a certain extent. The design of small leisure areas with fast, static design and a single strategy can no longer meet the needs of the current era, and the modern new leisure area design should contain more possibilities, such as sustainability, characteristics, etc. Through the design of the site, this paper creates a small green space for sustainable development based on terrain ecology, so as to provide users with a good place for leisure and team building, improve the sustainable development mode and space vitality of the site, and let everyone spontaneously love and maintain the site space, thereby promoting the sustainable development of ecological space and the harmony between man and nature.

2 DESIGN PRINCIPLES

2.1 Design principles adapted to local conditions

Design according to local conditions is a way to achieve a balanced development between people's subjective transformation and nature, which can not only meet the needs of providing

visual and sensory pleasure, but also meet the needs of the harmonious development of the creatures in the plot. ^[1]

Many modern designs have not achieved respect and appropriateness for the objects of transformation, and people believe that "people are determined to win the day", resulting in a large number of problems, such as environmental problems caused by a large number of accumulated industries, the lack of geological culture caused by the uniform development, and the engineering quality problems caused by insufficient terrain exploration. This design is designed for more special terrain plots, and the use of the particularity of the plot needs to be further strengthened on the basis of the ordinary design.

2.2 Sustainable design principles

The principle of sustainable design refers to the development of meeting the needs of the present without compromising the ability of future generations to meet their own needs. When designing new things, you can promote the use of green materials, reduce waste and reuse energy, and so on. Design should be good for the sustainable development of the planet.

With the development of the economy and the construction of a large number of cities, the problem of ecological sustainability is becoming increasingly serious. The application of design concepts such as environmental protection, ecology and sustainable development to landscape design in the new era not only meets people's functional requirements for the landscape environment, but also meets the inevitable requirements of sustainable social development.

2.3 Human-centered design principles

The design principle of 'people-oriented' is one of the guiding ideas of the foundation of landscape design. Designers should fully take into account human factors in design, and at the same time, when designing, they should take the existence and development of people as the fundamental, and should fully consider the needs of people's psychological habits, customs education, political economy and society, etc., coordinate and coordinate the corresponding relationships, realize the harmonious development of people and things, people and nature, people and society, and people and people themselves, and build and optimize the world of people. ^[2]

Leisure landscape is to a great extent for people to serve, leisure landscape users will spend a long time in the leisure landscape to relax themselves, the design of leisure landscape is actually essentially to create an environment, this environment is suitable for the use of the function and atmosphere required by the crowd. Therefore, 'people-oriented' is the design idea that must be observed in the transformation of leisure landscape design. The renovation design of the casual landscape must meet the various needs of the cultivators and create a natural, beautiful, practical, positive, reasonable planning layout and appropriate scale of the relaxing environment. ^[3]

3 PLOT ANALYSIS

3.1 Plot area

The design is located in a logistics transfer center park in southeast Hubei, with a design area of about 5,000 square meters, surrounded by logistics park related work areas, east and west of the logistics transfer center apron, north of the staff dining and resting place, south of the substation work area.

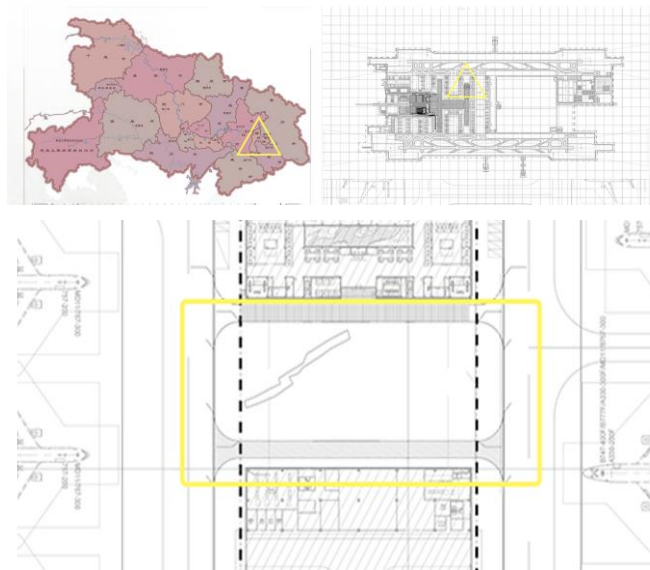


Figure 1. Design area scope

3.2 Terrain issues

There are large stone landscapes in the site, and the ground in the area around the stones is high in the south and low in the north, and high in the west and low in the east. At the tail of the stone block (south side), there are some rocks above 24.000 protruding building contour lines, and the minimum elevation around the ground around the stone block is 18.390 and the maximum elevation is 24.360. The maximum drop around the stone block is 6 meters, and the terrain becomes a major problem in the design of small sites without large-scale soil filling and digging.

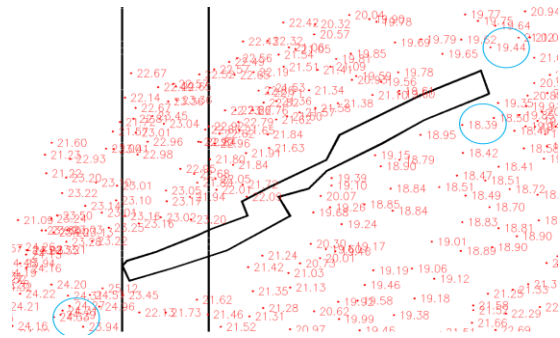


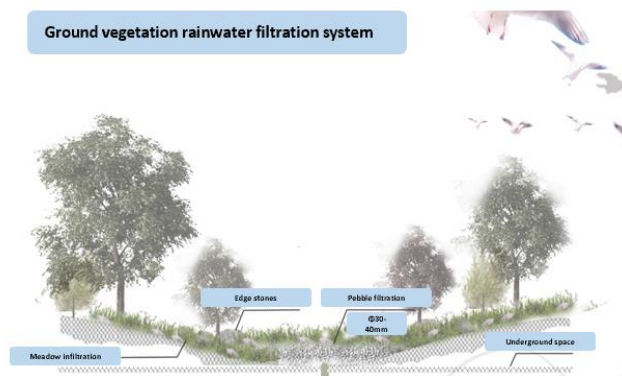
Figure 2. The height difference around the rock

4 SUSTAINABLE DESIGN ANALYSIS

4.1 System design

First of all, in the sustainable circulation system, a rainwater infiltration system is manufactured, filtered through layers of pebbles and sand and gravel to achieve the effect of collection and reuse, and the system stores water in the rainy season and then waters it in times of drought.

Secondly, landscape rocks and plants form the largest ecological complex in the leisure area, which performs photosynthesis under the sun's illumination, which can achieve the effect of absorbing carbon dioxide and releasing oxygen, while providing an interactive landscape structure with a balanced balance of light and shade.



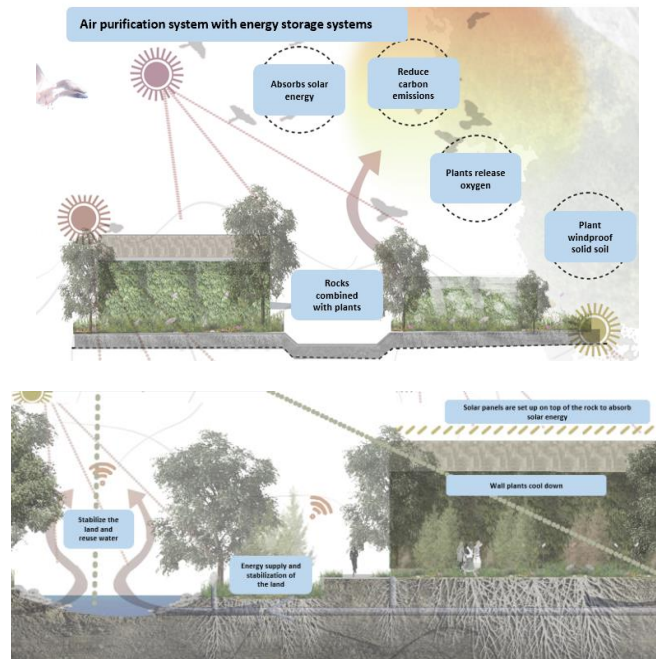


Figure 3. Sustainable System design analysis

Finally, the installation of solar energy collection and reuse on the top of the rock can support the energy demands of the leisure area as much as possible, while not affecting the visual effect of the leisure area due to the limitation of the line of sight.^[4]

4.2 Landscape structure design

4.2.1 Functional partition design

Based on the actual situation analysis of the user population and the native plot, this design is based on the principle of dynamic and static, public and private, open and closed principles to divide the content and general scope, which are located in the landscape tour area in the west-north - the core landscape construction area of the site; Landscape recreation area in the east-south - a more open viewing interaction area; Leisure and exchange area to the west; Relaxing area to the east – a more private and quiet area of the grounds.

4.2.2 Traffic flowline design

The goal of streamline analysis is also very clear, the streamline design of the site is mainly based on the native terrain and functional partition design, because the main source of people is located in the north-south direction, so the main streamline is to penetrate the north and south for the purpose, the secondary streamline is to average, through the site as the main purpose interspersed in all corners of the site, all traffic streamlines at the same time for the

construction and optimization of traffic nodes and landscape nodes to provide support, so that its streamlines and facilities layout is more reasonable.

4.2.3 Landscape node and line of sight design

The corresponding landscape nodes are equipped with corresponding landscape facilities and viewpoints, and a rich visual experience is set up for the resting places.

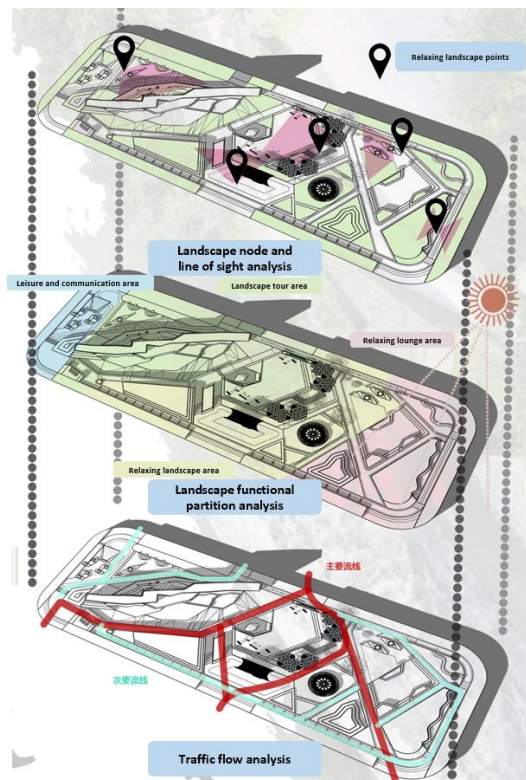


Figure 4. Landscape structure design

4.3 Lighting and plant design

The design is located in the southeast of Hubei, with abundant rainfall, sufficient sunshine, four distinct seasons, high temperature in summer, concentrated precipitation, and slightly cool and wet in winter. The characteristics of the plot determine the frequency of use of the plot mainly concentrated in the leisure practice of noon and other work, so the site is designed for lighting characteristics and time.

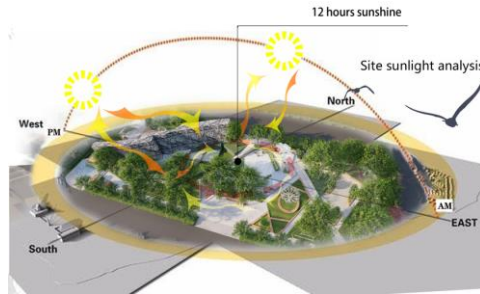


Figure 5. Light analysis

In the north of the site of the central plot is the closest to the staff canteen, there will be employees at noon to come to the sun and other leisure activities, so this place is mainly set up as a square space, no matter the morning, middle and evening most of the time the sun is abundant, if you need shade, you can walk to the east or south, the east is mainly a tree-lined and rest area trail, quiet and shady, the south is surrounded by trees and flowers, and the west is surrounded by rocks and plants.^[5]



Figure 6. Plant analysis

4.4 Material design

The pavement design uses its visual effects to enrich the visual effects of the landscape to guide the visitor's line of sight. In the venue, more linear line paving is used to guide tourists forward; In places where tourists need to stay, paving without direction or stability is used; When visitors need to pay attention to a certain attraction, a pavement that gathers in the direction of the attraction is used. In addition, the sense of space can be enhanced by changing the paving line, such as emphasizing the depth of the paving surface with lines parallel to the horizon. The width is emphasized with paved lines perpendicular to the horizon, and this function is used wisely to visually adjust the spatial effect.

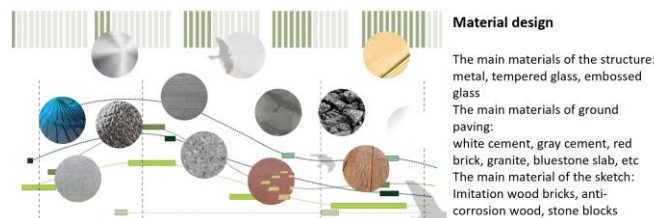


Figure 7. Material analysis

5 CONCLUSION

The leading idea of this landscape design is to be sustainable, leisure, concise, generous and beautify the environment as the basic idea, so that the terrain and greening, structures, etc. are integrated with each other, complementing each other, and at the same time making the environment a continuation of local characteristic culture.



Figure 8. Floor plan and aerial view

Its design features include as follows: give full play to the benefits of green space, meet the requirements of logistics center employees, create a leisure and elegant environment, beautify the environment, cultivate sentiments, adhere to "people-oriented", and fully reflect the modern ecological and environmental protection design ideas.



Figure 9. Design diagram display

The plant configuration is mainly based on local tree species, which is dense and appropriate, and the height is staggered, forming a certain sense of hierarchy; Rich in color, mainly with evergreen tree species as the "background", flowers and shrubs of different colors are matched, so that the plot reaches the four seasons and is often green, and the colors are rich.



Figure 10. Design diagram display

The road in the plot strives to be smooth, smooth, convenient and practical. And appropriate combination of terrain to place environmentally friendly green structures and landscape sketches, sketch design strives to be creative in shape and practice. The surrounding green space, plant structures and sketches play an extension and background, and are independent of the scene.



Figure 11. Design diagram display

Around the original cultural stone, create a cultural environment with connotations, a comfortable and pleasant leisure environment, a harmonious and unified ecological environment and an open communication environment.



Figure 12. Design diagram display

The full application of sustainable design in the landscape based on site foundation, material use, technology adaptation, energy conservation, etc.

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