Research on Highway Landscape Design Based on Regional Culture

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Abstract. In order to enhance the cultural beauty of highway landscape, the design method of highway landscape based on regional culture was studied. Firstly, the types of regional cultural elements in highway landscape are analyzed, and the carrier of regional culture and its adaptability are studied. Secondly, the principles and methods of regional culture presentation are discussed. Then, aiming at the tunnel and service area with the highest adaptability of the carrier, the highway landscape design points are analyzed. Finally, the application of regional culture in highway landscape design is studied in combination with Guangna expressway. The results show that landscape design based on regional culture is of positive significance to enhance the connotation of landscape culture and inherit the culture along the line.

1. Introduction

Highway landscape design has gradually changed from initial greening to multi-objective design with high efficiency, convenience and cultural connotation. Highway passes through many areas along the route and has relations with different regional cultures. It is a good carrier for displaying and publicizing various regional cultures, and also an important tool for the continuation and inheritance of regional cultures. Integrating regional culture into highway landscape will make it rise from a single material landscape to a more profound cultural landscape [1]. Therefore, this paper incorporates the regional human factors into the landscape design to enhance the aesthetic feeling and cultural value of highway landscape.

2. Regional cultural elements in highway landscape

The regional cultural elements in highway landscape are accumulated under the comprehensive influence of historical tradition, living customs, and geographical environment. They are the embodiment of humanities and have significant cultural value [2].

2.1 Architecture

Architecture is the most common expression element of regional culture in highway landscape. But not all buildings belong to the cultural category, usually refers to buildings with strong local customs, such as religious or popular buildings. In highway landscape design, reasonable integration of different architectural elements will make highway landscape more cultural.
2.2 Cultivation culture
Agricultural culture refers to the culture formed by peasants in different areas in the long-term production, which has a long history. Its main body includes customs, drama, folk songs, language and cultivation methods with natural attributes.

2.3 Clothes
Clothing directly reflects the characteristics of different nationalities, with rich cultural connotations, involving embroidery, raw materials, patterns, printing and color et al. Combining the characteristics of costume with landscape design is of positive significance for visually displaying regional culture.

2.4 Folk handicraft
Folk craft is the living art of popular folklore. It is the dual carrier of environment and culture. Folk craft contains rich material and spiritual cultural connotations. Through the form of material state, folk crafts are displayed in the highway landscape space to make it a craft culture of universal significance.

2.5 Natural landscape
The regional natural landscape is a landscape formed under the combined action of climate, hydrology, geology and landform. China is a vast country with unique mountains, rivers, lakes and seas, which fully reflects the peculiar beauty of the natural landscape. In highway landscape design, the above aesthetic types can be displayed by borrowing or reproducing scenery.

3. Regional culture carrier and its adaptability evaluation

3.1 Types of carriers of regional culture
Regional cultural elements have regional limitations, and the accessibility and interaction of highways will complement each other very well, and become an important carrier of displaying and disseminating regional culture. Common carriers of regional culture include: traffic facilities, greening structures, retaining walls, service areas, tunnels, bridges, slopes, etc [3].

3.2 Index weight of adaptability evaluation
The adaptability of highway carriers is studied quantitatively. Firstly, the weight of each evaluation index is determined by analytic hierarchy process. The evaluation index includes safety, representability and economy. The specific data are shown in Table 1.

| Evaluating indicator | Security | Representability | Economical efficiency | Weight |
|----------------------|----------|------------------|-----------------------|--------|
|                      | 1        | 2                | 3                     | 0.54   |
| Representability     | 1/2      | 1                | 2                     | 0.30   |
| Economical efficiency| 1/3      | 1/2              | 1                     | 0.16   |

3.3 Assessment of vector adaptability
Questionnaire survey was used to obtain the scores of each index, and the efficiency coefficient method was used to calculate comprehensively. The evaluation results of each highway carrier are shown in figure 1. The calculation process of efficiency coefficient method is as follows:

1) Determine each evaluation index: \( \chi_i (i = 1,2,\ldots,n) \), \( \text{Max}(\chi_i) \) and \( \text{Min}(\chi_i) \).

2) Calculating efficiency coefficient: \( F_i \), The calculation formula is as follows:

\[
F_i = \frac{\chi_i - \text{Min}(\chi_i)}{\text{Max}(\chi_i) - \chi_i}
\]

3) Calculating total efficiency coefficient: \( F \), and sort them out. The calculation formula is as follows:

\[
F = \frac{\sum_{i=1}^{n} F_i}{n}
\]
From Figure 1, it can be seen that the service area and tunnel as the carrier of regional culture have the highest adaptability, while the carrier adaptability of highway greening and slope is low, which is not suitable for the section of regional culture display.

4. The principle of regional culture presentation

4.1 Regionality.
Highway landscape design can select cultural elements according to local conditions or reproduce regional landforms. Secondly, the highway landscape design should be in line with the local history and culture in order to obtain a high degree of regional cultural identity [4].

4.2 Economical efficiency.
On the basis of guaranteeing the life cycle of the landscape, the principle of green energy-saving is followed to make the highway landscape obtain lasting vitality. In terms of material selection, the original ecological materials should be used in highway landscape design to make the landscape more economical and environmentally friendly.

4.3 Applicability.
First of all, we should make a serious investigation along the highway to ensure the correct selection of regional cultural elements. Secondly, when borrowing historical heritage and other elements, we should consider its carrying capacity to the environment. Finally, the external aesthetics of highway landscape needs to be consistent with the intrinsic connotation of regional culture, so as to improve the cultural flavor of the landscape.

5. Highway landscape design based on regional culture

5.1 Tunnel

5.1.1 Cavern form
The form of tunnel entrance can be divided into end wall type and bamboo cutting type. End-wall openings are visually heavy. At the same time, its composition is relatively single, and most of the landscape changes of the cave entrance can only be reflected by color and decoration, so it is not
suitable for displaying regional culture [5]. The bamboo-cutting type can be used to cut the entrance upside down or obliquely to achieve harmony with the mountain topography, thus integrating with the surrounding natural landscape, making the landscape more harmonious.

5.1.2 Decoration of tunnel entrance
Decoration design of tunnel entrance is coordinated with the overall environment. In addition, the design of decoration shows the artistic conception and charm of regional culture, giving full play to the inheritance and regionality of culture. Specific forms of expression include murals, sculptures, paintings, colors and materials, etc. By introducing or reproducing the means to show the beauty of cultural artistic conception. For example, the tunnel entrance of Jiuan Tunnel integrates Lanzhou culture into decoration design, and successfully constructs a unique landscape with local customs.

5.1.3 Nameplate
The location of the tunnel nameplate can be set on the wall surface of the end wall type tunnel door. Stones can also be set in front of the bamboo-cutting tunnel door and their names can be written. The design of nameplate pays attention to the selection of font first [6]. The font should be simple. Secondly, the color of nameplate should be striking. Finally, the nameplate of the tunnel can also be set with a baseline to increase the sense of thickness and history, and the baseline can be selected with the local symbols of culture.

5.2 Service area
5.2.1 Architectural landscape
The architectural landscape in the service area should be integrated with the local traditional cultural elements. The expression of historical and cultural elements in the architectural landscape should be emphasized. Based on the ingenious refinement of regional culture, reasonable creation and extension are carried out to improve the cultural value of service area buildings [7]. In addition, the architectural landscape can also be designed according to the topography and landform, so as to achieve the effect of adapting measures to local conditions. For example, in mountainous areas, the architectural landscape can adapt to the terrain and improve the flexibility of the contours of slopes. In Lake areas, buildings can be built near the water to increase the affinity of the landscape.

5.2.2 Logo marking
As an important medium of information transmission in the service area, logo provides important information for the flow of people and vehicles in the service area. And it is an important carrier of regional culture. In addition to paying attention to intuition and practicability, logo design should also embody its characteristics. Firstly, the regional culture along the highway should be excavated and integrated into symbolic symbols. Symbol design mainly includes color, geometry and texture. Secondly, the symbols representing the local conditions and customs can be refined to form the symbols with strong regional culture, so as to refine the cultural beauty of the service area.

6. Engineering application
6.1 General situation of engineering
Guangna expressway starts in Guangnan county and ends in Nasa town. The total length of the route is 49.6 kilometers, including 41 medium-sized bridges and 12 tunnels. The ratio of bridge to tunnel is as high as 48.95%.

6.2 Natural and humanistic resources
There are 165 metal, 600 genera of wild plants and more than 40 species of wild animals deposits along Guangna expressway. Guangnan county is a famous historical city with advanced national
cultural relics work and provincial level. There are 11 nationalities in Guangnan County. Among them, the number of ethnic minorities outside the Han nationality is more than 60%, and the proportion of Zhuang nationality is more than 40%.

6.3 Demonstration effect of project

6.3.1 Tunnel
The end wall improves the landscape effect by texture treatment. Stone is taken as its main material, and weak volume is segmented horizontally. It is matched with local unique plants. The hole nameplate is written in dark green font, which shows the regional culture. The arch circle is made of circular arc shape, layered and elegant atmosphere. It adopts gradient waterproof paint from white to grey to unify visual effect. Plant restoration and topographic construction are done in the front of the cave, and the transition is coordinated with the surrounding environment, as shown in Figure 2.

Figure 2. Guangna Highway Tunnel

6.3.2 Service area
The color of the service area is extracted from the beautiful surrounding environment, unique cultural resources and rich tourism resources. The main tones of the whole line are blue and green, and the auxiliary colors are red, gray and white. They are used for painting and service area sign. The import sign is based on stainless steel imitation stone and wood, with copper drum element pattern. This design highlights local characteristics and cultural connotations, as shown in Figure 3.

Figure 3. Banmao Service Area

7. Conclusion
Integrating regional culture into highway landscape design can not only enhance the cultural connotation of landscape, but also continue and inherit regional culture. The main conclusions are as follows:

(1) Regional cultural elements include architecture, farming culture, clothing, folk crafts and natural landscape. Service area and tunnel have higher adaptability of carrier, while highway greening
and slope are lower.

(2) The combination of regional culture and landscape should follow the principles of regionality, economy and applicability.

(3) Landscape design of tunnel should focus on the form of tunnel entrance, the landscape of tunnel entrance, slope and nameplate, etc. Landscape design of service areas should focus on landscapes and signs.

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