

Manhole cover design based on eco-community

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Abstract. By conducting a thorough review of manhole cover development in more advanced regions, conducting extensive field research, and utilizing comparative analysis of typical cases, we have successfully formulated innovative and culturally-rooted manhole cover design schemes. These designs are not solely focused on functionality, but also strive to enhance the overall landscape atmosphere and amplify the exhibition of unique eco-community cultural elements. Our primary objective is to provide a concrete and invaluable reference for future landscape design projects, encouraging the seamless integration of cultural aesthetics into practical eco-community infrastructure. By doing so, we aim to foster a more harmonious and culturally vibrant urban environment that not only meets the functional needs of its inhabitants but also reflects and celebrates the rich tapestry of eco-community culture. Ultimately, our goal is to contribute to the creation of cities that are not only functional and efficient but also visually stunning and deeply connected to their cultural heritage.

1. Introduction

A significant trend in landscape environment design domestic and oversea is to focus on unique landscape design[1]. Specialized design is to quickly enhance the overall landscape environment[2], reflecting the city, region, enterprise[3], industry and other cultural and humanistic care of the details of the design[4], under certain conditions and even the formation of a specific landmark culture[5], manhole cover design as one of the specialized design of the landscape, the integration of beautiful environment and cultural manifestation, there is a large degree of positive impact. This paper proposes that under the premise of not affecting the everyday use function of manhole cover, the three-dimensional modelling, with an identifiable plane pattern, combined with the cover material, according to the size and shape of the manhole cover, adjusting the graphic surface design of the optimization of the manhole cover solution, so that it blends into the environment, landscaping, and highlighting the culture of a eco-community, to transform the site's disadvantages into the highlights of the landscape. At the same time, the function, combined with two-dimensional code scanning, network connectivity, and other techniques to increase the interaction of landscape space, is also more convenient for intelligent maintenance and management.

2. Manhole cover culture

2.1 Development of manhole covers abroad

Manhole cover culture is a general term for all the cultural contents related to it, including humanities, arts, technology, crafts and other related content. Manhole cover culture has been prevalent since the 1960s, and some cities in the United States, France, Germany, Poland, Finland, Korea, Japan, Norway, Brazil, Canada and other countries have their own unique manhole cover culture. Many foreign historical and cultural cities have elevated the healthy cover culture to the height of the city card.

The Asian region, Japan, is more advanced; some manhole cover have a specific collection value and specially established associations and museums to promote and manage them. The elegant cover plate design makes the city's distinctive colour and image more vivid.

Excellent cases abroad combined with the material of the manhole cover for graphic design, some scenes of the cover three-dimensional more robust; bold and appropriate colour, there are specific rules of colour matching, the design of the landscape combined with a more systematic—foreign more mature design application examples, such as Figure 1~4.

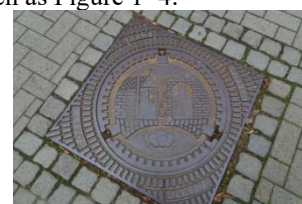


Fig. 1 European Manhole Cover Design 1[6]

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Fig. 2 European Manhole Cover Design 2[7]



Fig. 3 Japanese manhole cover design 1[8]



Fig. 4 Japanese manhole cover design 2 (Photo by author)

2.2 Development of manhole covers in China

In recent years, the domestic attention to cover design gradually increased, often seen at urban streets, parks, "scars" and "wounds" manhole cover applications or upgrade transformation; there have been several application examples, but the design form, the presentation of the same as some of the more mature cover design abroad. However, there still needs to be a gap between the design form and presentation method and some mature cover designs in foreign countries. The unique design of the manhole cover is an essential means and measure for designing landscape details to enhance the landscape environment design. The exploration and presentation of manholecover design is significant to landscape design.

2.2.1. General status of manhole covers in the country

Domestic manhole cover general status quo, the overall planning and arrangement of less overall considerations,

but also due to the different functionality of the manhole, size, style, but most of the styles are only primary functional design considerations, so most of the environment and landscape is poor, such as Figure 5.



Fig. 5 Example of manhole cover (photo by author)

2.2.2. Designed applications of manhole covers in the country

Domestic manhole cover of painting type design application, there is grass between the cover plate painted green to weaken its contrasting sense of incongruous existence; there are according to the cultural environment of painting; there are also two-dimensional or three-dimensional cartoon painting style, the manhole cover plate in the form of artistic beautification to present, enrich the landscape environment, such as Fig. 6~9.



Fig. 6 Domestic Manhole Cover Design Example 1 (Photo by author)



Fig. 7 Domestic Manhole Cover Design Example 2[9]



Fig. 8 Domestic Manhole Cover Design Example 3 (Photo by author)



Fig. 9 Domestic Manhole Cover Design Example 4[10]

Domestic manhole cover plate combined with the pattern of material design application, to Changxing Badujie manhole cover as an example, Badujie famous for ancient ginkgo, is the local characteristics of the seasonal ornamental points, landscape detail design more prominent this local feature, in addition to the combination of the material concave and convex surface of the text information and logo expression of the manhole cover design selection of colour and graphic imprints are also ginkgo characteristics as a highlight (such as Figure 10), so that manhole cover better integration in the surrounding landscaping, so that the environmental atmosphere is more holistic, emphasizing the localized qualities.



Fig. 10 Manhole Cover Design at Badujie (Photo by author)

3. Landscape cover design

3.1 Manhole Cover Style Analysis

3.1.1. Theme and Design Strategy

Landscape cover design has a variety of themes. It is mainly divided into two categories: the theme strategy that highlights the environmental atmosphere and the theme

strategy that is related to the environmental atmosphere but has its storytelling system. The theme design strategy that highlights the environmental atmosphere is mainly applied in enterprise parks, theme parks and other areas that emphasize corporate culture and relatively straightforward themes; the theme design strategy that is related to the environmental atmosphere but has its storytelling system is applied in general streets, parks with dispersed functions and unclear themes, and general pedestrian streets and so on. The themed series that can be fused with the surrounding environment is identified in the landscaping design of manhole covers, which can add colour and colour to the overall environmental ambience. Add colour and colour.

3.1.2. Pattern Form Analysis

Cover design can be done in various forms, not limited to the shape, pattern, colour, style, and other characteristics of the cover itself. The combination of the surrounding environment can also provide a multi-angle approach to integration. First of all, to meet the primary function of the cover as a prerequisite, according to the landscape atmosphere planning, design, highlighting the cover style or weakening the existence of the cover form, are to beautify the environment for landscape optimization, one of the performance methods. Adapting to local conditions, according to the environment, depends on selecting landscape performance suitable for the environment.

Manhole Cover the landscape optimization of the environment is not limited to the display of a single product; cover the theme of the logo on the landscape nodes, the environment of the whole plot of land to play a reinforcing role in the atmosphere; cover the remainder of the logo can be a guiding role in the landscape; such as cover the public welfare signs and another interactive role because of the number of characteristics, and for the landscape environment to add a dynamic one.

3.2. Color matching of the manhole cover

Graphic colour matching considers the unified composition of base colour, complementary colour, and emphasis colour so that it is more visually intuitive to feel the intention of the colour scheme and highlight the style of the design area. Choose the colour tone and collocation form according to the different thematic strategies.

3.3. Cover design

3.3.1. Implementation methods

The implementation of the manhole cover design should be convenient and easy, economical and reasonable. The following methods are mainly used:

- (1) Hand-painted;
- (2) Lamination;
- (3) Precast concrete cover moulded into the figure;
- (4) Standing mould casting, and so on.

3.3.2. Design Sample

Manhole cover plate design sample based on the thematic nature of the landscape setting, as shown in Figure 11.

Combined with the environmental application of materials and flat design around the cover, optimize and enhance the landscape features, strengthen the sense of ambience of the immersive experience, and transmit the style.

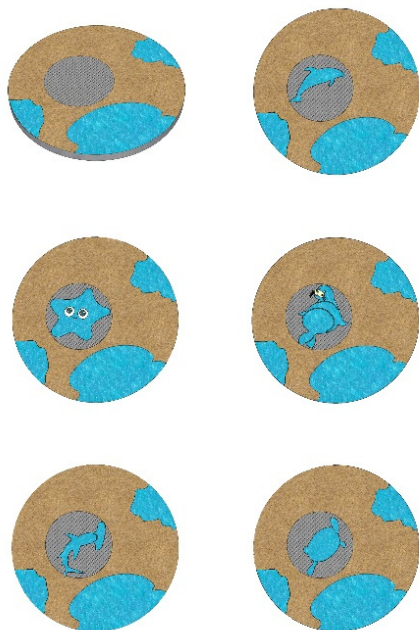


Fig. 11 Manhole cover sample

4. Conclusion

The cover design is in the landscape design category, so the landscape environment design is rich in vivid details, beautifies the environment at the same time, better expresses the design intention, and shows a rich humanistic connotation.

Looking to the future, for "environmental landscaping, landscape identification" to open up new roads, how to combine the cover design, from the perspective of its use in-depth study to strengthen the function of the cover, such as conventional use of the convenience of opening and closing, safety, and pipeline information, such as the Internet of Things links, will be the next step of the research direction.

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