Application Prospect of CAD-SketchUp-PS Integrated Software Technology in Landscape Planning and Design

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Abstract. With the deepening of information technology, technology media is deeply affecting the current landscape design, comprehensive software has been widely used in the current landscape design. For landscape design, the use of modern high-tech technology has become a new trend of vigorous development of auxiliary landscape planning and design. Therefore, from the drawing of CAD plan to the creation of SketchUp model, and then to the PS processing of the effect drawing, not only can the landscape planning designers more intuitive and in-depth creative ideas, but also the best way to show the landscape. This paper briefly introduces CAD, SketchUp and PS, analyzes the application process and file transfer of CAD SketchUp PS software in landscape planning and design, and comprehensively expounds the application skills and application prospects of CAD SketchUp PS software in landscape design.

Keywords: CAD-SketchUp-PS; Design Process; Landscape Planning; Deepening Design; Application Prospect
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1 INTRODUCTION

The development of the landscape design industry is inseparable from the increasingly mature computer technology. The first computer graphics system was born in the United States in the 1950s, and passive computer-aided design technology with simple graphics output began to appear, and the design industry began to match computer-aided design technology [1]. Many complicated, meticulous, and difficult-to-modify hand-drawn design drawings and construction drawings are gradually replaced by computer graphics, which not only improves the efficiency of the designer's drawing, but also expands the design field for the designer. Designers began to use computer-aided design technology to complete highly difficult, complex, and multi-form design schemes [2]. In recent years, the universal application of 3D modeling software and the popularity of post-effect

production software have made the expression of design schemes richer and more specific, and more detailed and detailed in spatial processing. Pre-design, model establishment, and post-effects are commonly used as the process of modern landscape design. There are many small-scale landscape constructions in landscape planning, design, and construction. Discussing an effective design process can greatly improve design efficiency, reduce design costs, and accelerate the pace of construction.

At present, the planning and design industry has generally used computer software technology for auxiliary design, but it is mostly used to do some basic design and drawing work. The pros and cons of design site analysis have a significant impact on the design plan, which in turn depends to a large extent on the designer's professional experience and skills, and Müller, U found that lacks a set of more scientific and rational means and methods [3]. At the same time, design analysis methods and design expressions are highly subjective, related data processing efficiency is low, many do not have real-time dynamic modification functions, Brings, J et. al pointed out that the design software can not directly follow up the designer's thinking and show them in real time [4]. The modeling speed of most design software can't keep up with the designer's thinking, and the designer can directly control too few links, so the accuracy and efficiency of the design plan are at a low level.

With the rapid economic development, the continuous deepening of urbanization and the rapid growth of urban construction, the landscape industry has also ushered in a beautiful era, but the contradictions that followed have also arisen, and landscape design started late in China. The weak foundation puts great pressure on landscape design education. It is precisely based on the above-mentioned embarrassing situation of landscape design in my country that this thesis is based on the landscape design of higher vocational education, using CAD-SketchUp-PS integrated software technology to improve design efficiency and design level, so that it is oriented to higher vocational students in the design and production line. In the future design practice can be competent for many complex design tasks. Use CAD to draw the well-thought-out plan, and then convert the drawn CAD drawing to the 3D software to produce 3D effects. In the past, SketchUp was used more, but SketchUp needs to be modeled, modeled, and rendered. The rendering time is very long, and it is difficult to stop modifying the plan in the middle, while SketchUp can continuously modify the plan in the process of conception. After the CAD file is imported, the three-dimensional effect can be quickly produced. It adapts to the current situation of landscape design, and provides a faster and more intuitive design method for the entire landscape design process.

2 THE CONNOTATION AND ELEMENTS OF LANDSCAPE PLANNING AND DESIGN

2.1 The Connotation of Landscape

A landscape is the scenery of a certain geographic area or a certain type of scenery, where the scenery mentioned here can be either natural scenery or artificially created scenery. The English translation of landscape is "landscape". From a literal analysis, landscape is always inseparable from land. At the same time, the landscape is inseparable from human labor practices, analyzed in terms of types, Liang, X. Y et. al think there are two types of landscapes [5]. One is natural landscapes, which mainly include natural landscapes and human landscapes, and include natural landscapes. It is worth mentioning that the natural landscape mentioned here is not a landscape that has never undergone any changes, but a landscape that has not undergone significant changes due to human activities. The second is artificial landscapes, which are landscapes that have undergone significant changes in their natural appearance due to long-term direct or indirect human activities [6]. According to the definition, urban landscape should be included in the category of human landscape. To be precise, the process of humans transforming nature is long, and it is not appropriate to distinguish between natural landscapes and artificial landscapes solely on the impact of human activities on the landscape. In other words, it is difficult to define natural landscapes and artificial landscapes. From this perspective, the urban landscape should be regarded as a complex combination of natural landscape and artificial landscape.

2.2 Elements of the Landscape

From the constituent elements analysis, urban landscape mainly includes the following parts: first, topography. As an important carrier of other landscape elements, terrain is often compared to "skeleton". According to different scales, the terrain can be divided into three types: the first is the topography with relatively large geographical area, such as mountains, hills and plains; the second is small terrain, Xiao, Y et. al found which occupies a relatively small geographical area, and the common ones are platform, flat land and ramp [7]. The third is microtopography, which mainly includes the topography formed by the change of grassland, sand dune and stone. Of course, the terrain can be divided into flat land, sloping land, mountains, rocks, etc. Second, water body. There is no doubt that water is one of the important elements in urban landscape, and it is also an essential element. According to different forms of water body, it can be divided into two categories: one is moving water, mainly including streams, waterfalls, fountains, rivers, etc.; the other is still water, such as lakes, lakes, wells, pools, etc. Feng, X found different from other elements of urban landscape, water is invisible and tangible [8]. It is this characteristic that makes water have thousands of changes and makes the endless landscape of urban landscape. Third, plants. Different from other elements of urban landscape, plants are the most vital and varied elements, and their ornamental value is immeasurable. The element of plant is not unchangeable. It often changes in different forms with the change of seasons. The use of this feature can bring better ornamental effect to urban landscape design. Fourth, the weather scene. The weather scene can also be regarded as the atmospheric environment. The effect of urban landscape in different time periods is different. It can be a different time of the day or different seasons of the year. No matter what, the shape effect is dynamic. Such as the change of the time of day and night in the morning and evening, the seasonal change of spring, summer, autumn, and winter, etc. Therefore, people often compare the beauty of the landscape with flowing natural image, which is the art of space-time interaction. Fifth, landscape facilities [9]. It is no exaggeration to say that landscape facilities are an important part of urban landscape. All artificial facilities that can bring convenience to people's life, entertainment and leisure can be basically classified as landscape facilities. On one hand, landscape facilities should be able to meet the needs of the public, on the other hand, landscape facilities and their environment can be integrated, echo each other, and show a sense of beauty.

2.3 The Intention Shaping of Landscape

In landscape design, space shaping is the soul of deepening design, which is a kind of soul singing of artificial landscape and natural beauty. A good landscape space should have ideas. The more top-level landscape design is, the more it needs the assistance and deliberation of software. It integrates the concept of landscape design and landscape regional culture into the design.

The application of comprehensive software is one of the most complex design forms in landscape deepening design. In the form of design expression, it integrates two-dimensional plane, elevation, and three-dimensional design factors [10]. Subjectively, it is the planning and implementation of design theory and specific time-space relationship of the project. The space shaping activity in SketchUp is just like a musical. It can show the aesthetic intention of space to the designer in a short time. Moreover, it can directly express the climax and theme of landscape design, and communicate and interact with designers in the whole landscape design process (Figure 1).

Excellent landscape design is good space intention shaping, so we should pay attention to two modeling elements in landscape deepening design: one is space, the other is modeling, and these two elements can be directly displayed in comprehensive software. To a certain extent, we compare the diversified landscape space to the body and skeleton of landscape design, while the original art modeling activities are considered as the soul of landscape deepening design, so it is necessary for designers to establish their own unique space intention in SketchUp software according to their own clear design ideas. Specifically speaking, the unique and concise interface of integrated software can be mastered by designers in a short time [11]. Convenient push-pull function, can let the designer through a graphic can be convenient to generate three surrounding images. It can quickly generate the elevation and section of any location, so that the designer can clearly understand the internal

structure of landscape design, to facilitate the designer to process and optimize the space design in the deepening design.

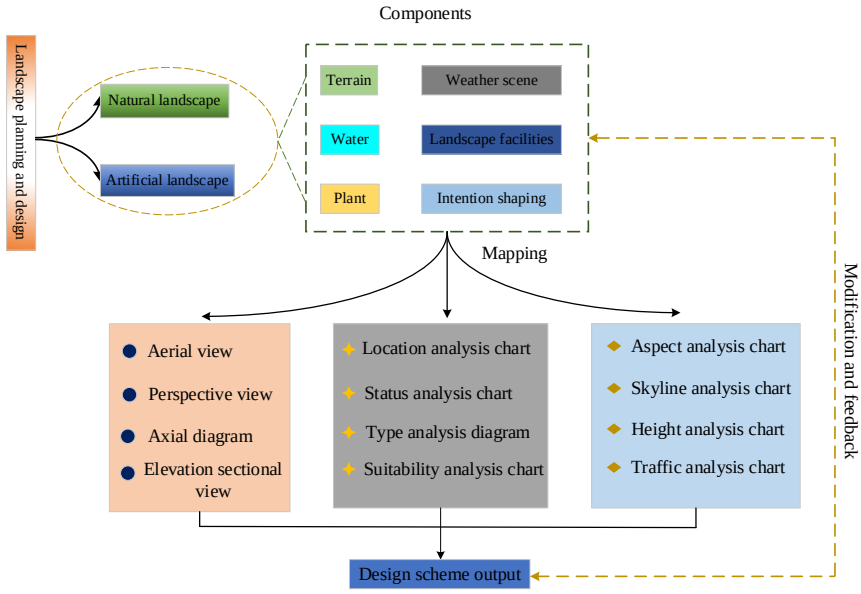


Figure 1: Connotation and elements of landscape planning and design.

3 APPLICATION OF CAD-SKETCHUP-PS SOFTWARE

3.1 CAD

CAD, also known as computer-aided design, is mainly to help designers complete the required design, using computer and graphics equipment to achieve the design work. It is generally applicable to construction and civil engineering, as well as machinery and other fields. Its basic technology involves graphic transformation, interaction, surface modeling, solid modeling and so on. In landscape design, CAD is mainly used for three-dimensional mapping. Its basic functions are: plane drawing, drawing auxiliary tools, editing graphics, dimensioning, writing text, layer management, 3D drawing, network access and graphic image data exchange.

3.2 SketchUp

SketchUp is a design process-oriented software to solve the problem of design expression. It is easy to operate and three-dimensional intuitive. It can generate section construction drawings and show different hand-painted effects. It can be used in interior, architecture, landscape, planning and industrial design. SketchUp is a set of design tools directly facing the landscape deepening design and creation process. Its creation process can fully express the designer's ideas, and can communicate with customers instantly. It is an excellent tool for landscape in-depth design and creation, and is also respected and used by landscape designers.

3.3 PS

PS is short for Photoshop. Photoshop is the most successful image processing software launched by Adobe company in the United States. Photoshop is the most popular image processing software running on PC and MAC computers. As soon as Photoshop 3.0 was put into the market, it brought a

revolution to the image processing industry and set off an upsurge of computer image processing in the world. It is widely used in art, advertising design, color printing, typesetting, multimedia, animation production, photography and text effect processing and many other fields. In the landscape design, it is mainly used for the post-processing of the effect drawing.

4 APPLICATION PROCESS OF CAD-SKETCHUP-PS SOFTWARE IN LANDSCAPE PLANNING AND DESIGN

In the early stage of urban landscape design, the data collection should be done first, and the basic data should be preliminarily analyzed to improve the accuracy [12]. Then, based on other relevant data, analysis results and design ideas, the design draft should be composed. In the early stage of design, the relevant data of natural environment, ecological environment, artificial facilities, social and economic development should be actively collected and determined Design theme and core, convenient for subsequent design [13]. The application software initially determines the design theme, and determines the spatial image shaping around the landscape design requirements. After the preliminary determination of the scheme, it is necessary to enter the stage of scheme improvement, modification, and optimization. The three-dimensional modeling is completed by SketchUp software. After the design sketch is completed, the detailed planning and design shall be carried out according to the design site conditions and landscape requirements, and the optimization and adjustment shall be carried out at any time. After the spatial model is established in interface, the actual landscape effect and organization relationship are continuously optimized according to the design concept and environmental conditions, and the possible problems in the scheme are found actively [14]. During modeling, the redundant lines and surfaces should be deleted as far as possible, and the clear hierarchical and organizational relationship should be maintained, so that the modeling process can be completed efficiently and quickly. In the scheme modification stage, it is necessary to improve and modify the scheme according to the requirements of Party A, clearly mark out different functional areas, provide design contents including functional zoning diagram, general layout, node diagram, etc., and render the perspective view. In the feedback and modification of the design scheme, timely adjust according to the feedback information of Party A, to express the design intention more accurately, and finally complete the drawing of construction drawing and the task of urban landscape deepening design. The flow chart of landscape design with CAD-SketchUp-PS was shown in Figure 2.

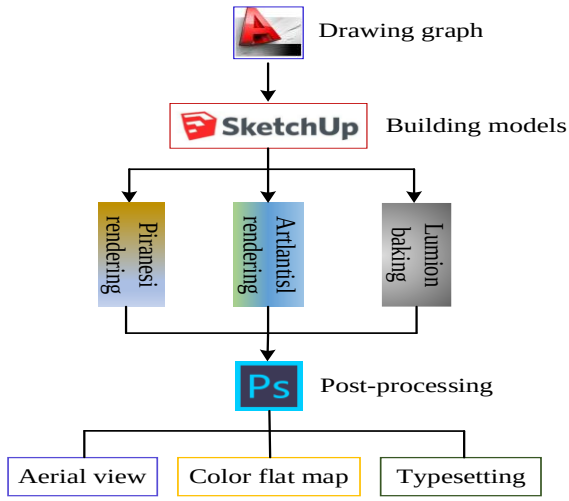


Figure 2: The flow chart of landscape design with CAD-SketchUp-PS.

In the urban landscape design, the simple and unique design interface and powerful functions of the software provide a good platform for designers to practice their own themes and creativity, which can not only be widely used in the design of various urban landscapes, its convenient push-pull function is conducive to the designer to quickly establish a clear and intuitive 3D form. Without complex 3D modeling, it can quickly generate a section map of any location. It is convenient for designers to understand the landscape, the internal structure and external form of the building, and can quickly complete the import and cooperation with AutoCAD to process the section drawing. SketchUp software and a variety of design software such as the combination of Revit, 3DMAX, Piranesi, etc. can better realize the design concept, realize the perfect combination of effect drawing and construction drawing, enhance the artistic effect of design with the advantages of detail optimization and material texture processing, facilitate the formation of video animation in the production process, better show the designer's ideas, different display modes, space dimensions and text marks the designer oriented functions such as note further enhance the convenience of its application. There are five steps in the process of landscape design from concept conception to final drawing. CAD, SketchUp and Photoshop software play an important role in each stage. The cooperation of the three software's continuously feeds back to the designer and modifies the design scheme, which makes the scheme more reasonable and beautiful no matter from two-dimensional or three-dimensional perspectives.

4.1 Hand Sketching Stage

Great designs are all evolved from the original ideological sketches. The pen is moved by heart. At the beginning of the design, we should still use hand-painted to conceive ideas, because hand-painted sketches can directly reflect the design intent and form. In the early stage, with the help of computers, the design ideas are easy to be limited, and the design lines will be more rigid.

If the depth of the garden is about 1 m, the foundation of the garden with a depth of about 5 m is not regular, and there is one case of the ground subsidence of about 1 m. The present situation is simple, and the design idea is open and unrestricted. In the early stage of the design, some ideas should be taken to solve the height difference of 5m, so that the participants can feel the spatial beauty brought by the small-scale landscape. The drawings are printed out in the scale of 1:500, attached with the sketch, and then the drawings are scanned into the computer. Although the design at this time is mainly presented in the form of plane expression, the design itself needs to have a certain ability to grasp the space, and can draw some sections and effect drawings to assist the vertical design.

4.2 CAD Drawing Line Draft Stage

The drawings scanned into the computer are entered into the current drawing CAD in the form of raster images, and the design drawings are aligned with the original status drawings more accurately by using the align password. In this stage, we should not only respect the original intention of the design, but also make appropriate adjustments according to the correct scale and scale. Different design elements establish layers and colors to facilitate later modification. Due to the strong sense of spatial enclosure of sunken garden landscape, the original intention of the design is to treat the scarp of the pit with the terrain shaping method of earth art. In the same site, the open and semi closed space are strongly compared to enhance the visual impact. Therefore, the terrain processing needs to be completed by many complex contour lines. One contour line of 1m or 0.5m can be used. The more detailed the contour line is, the more delicate the terrain will be. The CAD line drawing is shown in Figure 3.

4.3 SketchUp Space Modeling Stage

As a computer-aided design, CAD software plays an important role in the whole process of landscape design, but it is still limited. It often brings designers into two-dimensional design level. If the aesthetic feeling of plane design cannot be extended to the space, visitors can not feel the beauty.

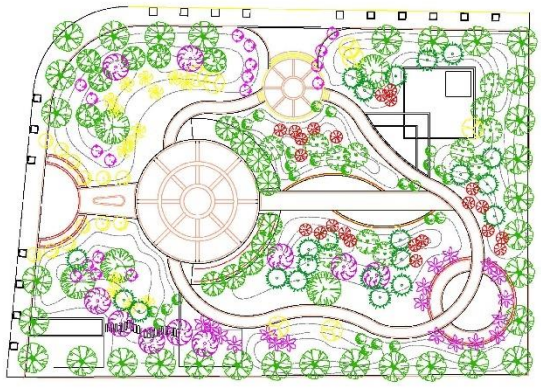


Figure 3: CAD drawing of scenic spot planning and design.

Therefore, for landscape designers, the first thing to design is to grasp the environment of the site and the space feeling it brings. With the continuous improvement of SketchUp software functions and more and more related plug-ins, SketchUp can be competent for landscape space design.

The CAD line draft is imported into SketchUp software and plugins plug-in is installed. The line draft can be automatically generated into a surface, and then the block modeling is made according to the design content. The models of water body, pavement site, bridge, landscape wall, terrain and plants need to be established and manufactured separately to facilitate the later modification, while the small components such as railings can be made and assembled. Because build is a kind of command that changes one group of models, the other copied models will change, while the group command changes one of them, the others will not change. It is helpful to further deepen the model to distinguish the difference between the formation and the group.

The production of terrain is often a time-consuming part of SketchUp to build landscape model, and it is also a time to test whether contour lines are drawn accurately. Each contour line can be raised according to the elevation, and the contour line drawn by CAD can be transformed into terrain surface by "generating surface with contour line", as shown in Figure 4.

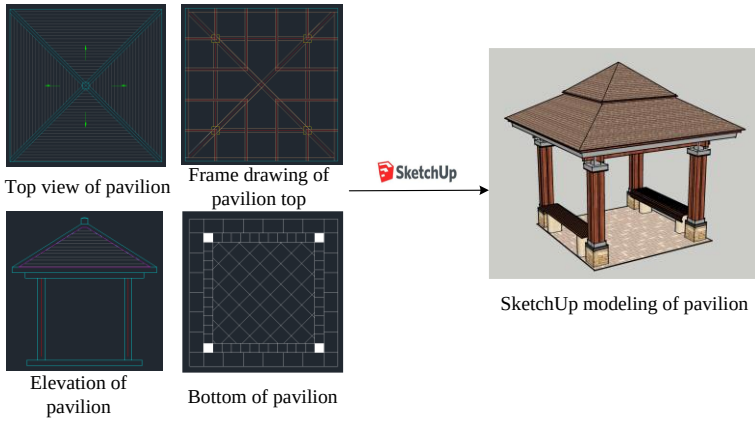
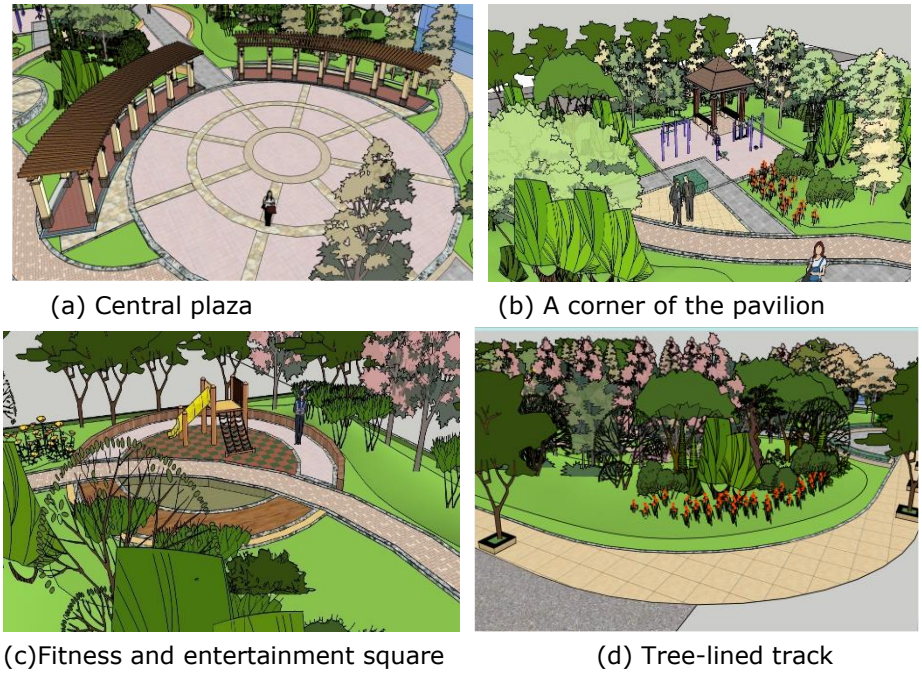


Figure 4: Transformation from CAD drawing to SketchUp modeling.

Any stage of SketchUp modeling can be used as an intuitive three-dimensional finished product, which is convenient to observe the model in an all-round way or observe the space from the human perspective at any time, to adjust the scheme at any time. The adjustment of model scheme needs

to be fed back to CAD plane at any time. One method is to modify it directly in CAD, and then import the modified part into SketchUp model. You can also use the "export" command of SketchUp to import it into CAD format, and then modify the plane in CAD. An example of scenic spot planning and design drawing based on SketchUp modeling is shown in Figure 5.



(a) Central plaza (b) A corner of the pavilion

(c)Fitness and entertainment square (d) Tree-lined track

Figure 5: An example of scenic spot planning and design drawing based on SketchUp modeling.

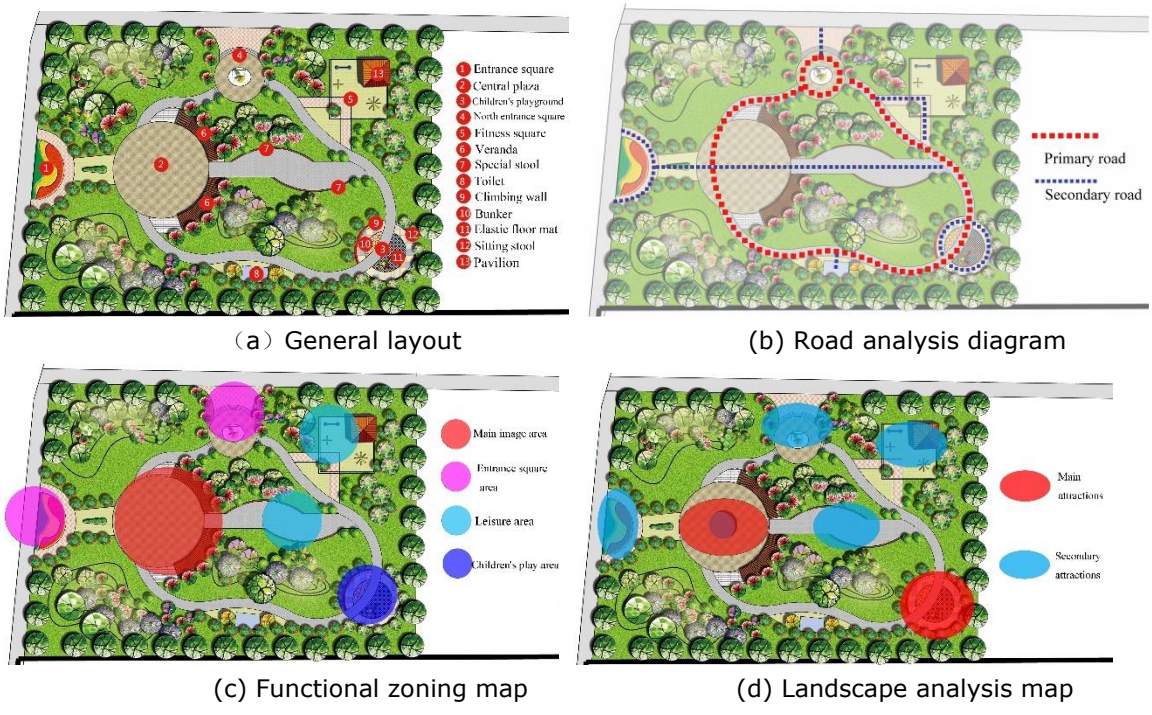
After the scheme is finally determined, SketchUp model needs to select some three-dimensional perspectives that can express the design intention, including bird's-eye view angle and human view angle. Sometimes the pictures derived from these angles can be directly used as the effect drawing, sometimes as the base map of the later effect drawing. SketchUp model has many drawing styles, which can express the design features of small landscape. Some foreign companies often use SketchUp model as effect drawing to express the scheme in some small projects. In the case of sunken garden, different styles can have different effects from a fixed angle, as shown in Figure 5. This method is fast and convenient, so that designers can avoid spending a lot of time on the production of late effects, and can mainly focus on design; but the disadvantage is that it needs to establish a more detailed model, trees and pavement materials should have, which virtually increases the demand for computer memory. If you want to pursue the effect picture of the real scene, you can establish a relatively simple model. It only need to include terrain and land, and different plots can be given different materials or color blocks. You don't need to plant trees. Then install the V-Ray rendering plug-in in SketchUp, and adjust the parameters in the rendering plug-in to render a more realistic scene with light perception and texture. Of course, such a surface is only a semi-finished product, but also need to add sky, trees, grass, and other materials in Photoshop.

4.4 Drawing Plan with Photoshop

The post-processing of computer is equivalent to the retouching and modifying process in the manual drawing. For the landscape rendering, the post-processing is very important, because there are

many unfinished contents in the perspective drawing obtained by rendering, which also emphasizes the post-processing of technology. The post-processing usually takes a long time and consumes a lot of human resources. For some background perspective effect drawing, it is necessary to refer to the perspective changes of the building road in the rendering drawing, and adjust some background images through corresponding experience. Therefore, the designer can rely on certain experience to adjust the background image by adjusting the color and size. In the processing of different texture maps, we not only need to pay attention to the height and position of different things, but also need to perfectly unify the hue and style of the whole surface with each material. In order to ensure the realistic image quality, it is necessary to consider the reflection and shadow of each design element. When drawing with Photoshop, if you need to increase the shadow of trees, you can first copy the material of trees, reduce the corresponding values, such as brightness and saturation, to increase the transparency of shadow layer; then, twist and rotate the shadow, so as to draw realistic tree shadow. For the operation of reflection, the general operation is the same, but its color saturation is greater than the shadow, and needs to be blurred. Photoshop also has an advantage in post-processing, that is, it is very convenient to use Photoshop to modify landscape drawings if they are not satisfied with local aspects. This is because Photoshop can do a good job of placing different images of the same file in layers, so the same level of image operation and processing will not for designers, it can simplify a lot of work and improve the design efficiency.

Print the CAD drawing to EPS file and import it into Photoshop, then you can fill in the color plan. Different plane types will build layers separately. When drawing a plan, we should first formulate the style and color of the plane according to the overall design style, and then fill in all kinds of color blocks, and then gradually refine the material and details. Finally, the scale, compass and legend are marked to complete the plane design. Figure 6 shows the different functional line diagrams made by PS.



（a）General layout

(b) Road analysis diagram

(c) Functional zoning map

(d) Landscape analysis map

Figure 6: Different functional line diagrams made by PS.

When all the drawings are drawn, they often need to be arranged on one or several drawings. A good layout can brighten the viewer's eyes and add a lot of color to the design. At this time, we can use Photoshop to show the drawings in a certain logical order, pay attention to the overall tone and composition ratio, store them in JPG format and print them out. Color drawing output from PS of park landscape design is shown in Figure 7.

Figure 7: Color drawing output from PS of park landscape design.

5 CONCLUSIONS

CAD, SketchUp, Photoshop design software combined to form the landscape design process, can provide landscape designers with a more suitable space sensory design method, not only save drawing time, but also can simplify the design steps and improve work efficiency. The application of SketchUp software in the deepening design of urban landscape has the advantages of shaping space image, optimizing detail deduction and convenient material texture comparison. The design effect is outstanding and can fully express the designer's creative idea. It has positive significance for the improvement of designer's design level and urban landscape planning design, and has great application prospect.

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