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Educational Tour of The Bamboo Village of Telagah With Ecological Architecture

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ABSTRACT

Bamboo is a plant that has many benefits. Bamboo is also easy to grow and cultivate and has flexible properties so bamboo plants are often used in curved structures. In the community, bamboo is usually only used as a tool in agriculture, and the processing of bamboo materials is also not studied very well. The author aspires to develop a tourism destination that educates visitors about bamboo plants as a result. The tourist destination in issue is a bamboo plant educational tourism destination where every activity is entwined with or associated with bamboo plants. As an illustration, consider the introduction of bamboo plants, bamboo farming, or bamboo crafts. There is also a resort in the region that serves as a temporary house and is constructed from bamboo plants. The author's chosen topic, which is ecological architecture, is reflected in the usage of bamboo in the home as structure and construction material. The term "ecological architecture" refers to architectural designs that utilize local materials and nearby natural resources. Because this research technique focuses more on gathering data that may be utilized to support the researcher's position, the author also employed a narrative review as part of the methodology for this study.

Keywords: bamboo, educational tourism, resort, structure

1 Introduction

Bamboo is a plant that has many benefits, both as a building structure material and as a raw material for crafts or household appliances. Bamboo has good flexibility so it can be used as a building structure material that is curved or twisted [1]. Telagah Village is a village located in the Sei Bingei sub-district and is located on the border of Langkat and Tanah Karo districts, with hilly soil conditions so that the area is very suitable for bamboo plant habitats. According to research namely bamboo grows more in places with The slope of the land is steep and steep. Some of the hills and mountains are also a habitat for bamboo plants. In addition, this study will take the theme of ecology because it wants to take advantage of the natural resources available in the Telagah village, one of which is bamboo plants [2]. By its meaning, Ecology is the science of structure and its dealings with nature, both in the form of relationships and interactions between organisms and the environment. Meanwhile, ecological architecture (eco-architecture) is planning that takes into account the environment, and whether it utilizes the potential of nature to the fullest. Then ecology is a study that connects energy, materials, and the natural surroundings that are utilized [3].

Bamboo is a material that is easy to get because it is a material that is easy to cultivate. But for industry or places of bamboo processing, either as a tourist spots or a place for bamboo processing, there are still few

found in Indonesia. Because of this, people are still unfamiliar with seeing the various potentials of existing bamboo, plus the lack of containers that can provide information about the bamboo plant. There are several characteristics of bamboo plants starting from the nature and response of bamboo to the surrounding environment [4]. Explains that there are several advantages and disadvantages if the building uses bamboo as a material [5]. So several considerations can be made in addressing the advantages and disadvantages of bamboo plants. Bamboo is also a building material that can be used as a structural material that can be shaped as desired, for example, if you want to use bamboo and want to apply it to curved buildings, bamboo is very suitable if used as a material. Bamboo has mechanical properties in the form of compressive strength, tensile strength, and shear strength.

As for the research conducted by I. N. Sinarta, namely calculating the mechanical properties of bamboo that is not preserved with bamboo that is preserved using borax, in his explanation bamboo that uses borax will certainly have more durability, both in terms of strength and durability of the bamboo itself [6]. From the characteristics, advantages, and disadvantages as well as the effect of bamboo preservation on the structure and durability of bamboo, the author wants to create a place that can make bamboo more useful, can be processed properly, and produce well-processed bamboo as well. And wants to show the community that bamboo is a plant that has many benefits, so the author designed a tourist area in the form of education about bamboo plants. Educational tourism is an accommodation in the form of a place that is used as a place to visit recreation and vacation as well as a place to add insight and knowledge.

Educational tourism referred to in this study is a tourist area of knowledge about bamboo, both from the introduction of bamboo, processed bamboo products, preserving bamboo, and its application to buildings. Education is an activity carried out to provide information in the form of academic or non-academic knowledge. Education is also a process from not knowing to knowing. The education that will be discussed is in the form of processing bamboo plants from planting, and harvesting, to be processed into raw materials, be it for construction or accessories. A resort is a temporary place that is used as a place to stay to get new things that have never been obtained, whether it is getting a person's body and soul refreshed [7]. For the type of resort designed in this area, it is a type of mountain resort, which is a resort located in the mountains and hills with the main facilities adapted to the physical conditions of the mountains, for example, ice skiing, horse riding, hiking, climbing and so on [8].

Pearl Beach Lounge, Gili Trawangan

Pearl Beach Lounge is a restaurant located in Gili Trawangan, Lombok City. The application of bamboo in this building is also very striking, the curved forms on the roof of the building are formed by bamboo structures and make this building different from other buildings. This building uses the concept of 'The Nature Of Materials'. In the application of the structure of this building using bamboo as a distributor of the roof load to the foundation below, the laying of the columns on the roof is made to spread at several points so that the columns receive more evenly distributed loads on the building. The following is the application of the bamboo structure used in the Pearl Beach Lounge building (Figure 1).

Figure 1. Pearl Beach Lounge', Gili Trawangan, Lombok

Source: Pearloftrawangan [9].

Hay Hay Restaurant and Bar

The structure is envisioned as a tranquil, contemporary, tropical vacation community. The task is to integrate 80 bungalows, a hotel, six VIP villas, and further 20 villas on 3.4 acres of land. The idea behind the resort is to provide visitors physical and mental therapy in a natural setting while engaging them in healthy pursuits like yoga, beach sports, and spa treatments. This resort's architecture incorporates a harmonic fusion of vegetation, natural stone, and bamboo to create the ideal ambiance that enables visitors to practice the greatest amount of cleansing of body and soul (Figure 2).

Figure 2. Hay Hay Restaurant and Bar
Source: Archdaily [10]

The conical column consists of an inner straight bamboo column, which is locally called"Luong", and the outer surface made of bent bamboo is locally called "Tam Vong". The design adheres to the characteristics of each species of bamboo to get the most out of them all. Bamboo luong is more suited to overcoming wide spans since the poles may grow up to 8 meters in length and 100 millimeters in diameter. The best bamboo for bending is "Tam Vong" because it has a smaller diameter but a thicker skin, which makes the pole exceptionally flexible. The geometry of the structure, despite its curved appearance, is fairly straightforward. Its surface rotates in two directions like a cylinder. Only straight lines are required to create this curved surface, hence only straight bamboo is used. Only straight lines are required to create this curved surface, hence only straight bamboo is used. Due to its strength and length, which may exceed 8 meters, "Luong" bamboo is exclusively used in this hyperboloid configuration, which makes it ideal for supporting buildings up to 8.5 meters high (Figure 3).

Figure 3. Interior of Hay Hay Restaurant and Bar
Source: Archdaily [10]

The theme used in this bamboo tour is ecological architecture. Ecology comes from the Greek, oikos which means house, and logos is science, so it can be concluded that ecology is the study of households and living things [11]. Ecology is the science of structure and its relationship to nature, both in the form of relationships and interactions between organisms and the environment. Meanwhile, ecological architecture (eco-architecture) is a plan that takes into account the environment, and whether it utilizes the potential of nature to the fullest. Meanwhile, ecological architecture is an architectural design with the architectural concept of humanism that balances humans and the environment [12].

Green School, Bali, Indonesia

The concept of architectural ecology in this building is more prominent in the use of bamboo materials as building materials, the use of materials in the site environment for the construction of this green school as discussed in [13], that is, almost all parts of this building use bamboo as the main material, for example in the Heart building. of School and only some parts use bamboo, for example, the yoga room which uses wood (Figure 4).

Figure 4. Green School Bali, Indonesia
Source: Tripadvisor [14]

The picture above is an activity at Green School Bali, visitors are invited to do outdoor activities and play in the open. So that visitors get new things on their vacation or all the activities carried out in that place. In meeting energy needs, this school has 3 sources of energy, namely biogas, turbine generators, and solar energy. This school uses 108 photovoltaic panels which are placed on poles arranged neatly between the main building which has a cathedral shape. These panels are arranged as far as 6 kilometers. The Minang Bridge is the main access to the green school complex, and parents can only take their children to this bridge because this bridge is the limit for vehicles to enter, this is done to preserve the environment and reduce vehicle fumes (Figure 5).

Figure 5. Green School Tours
Source: Tripadvisor [14].

2 Methodology

The method used in this study is a qualitative descriptive method, which is a method in which this study seeks to describe a symptom, an event that is happening at present, or an actual problem about a problem. Then according to [15], The descriptive method, according to some, is a technique used to explain or interpret a study result, although the research results themselves are merely utilized as supporting evidence. For this research, a final design project has been produced so that the data obtained is also sufficient for writing the following work. Below is a literature review scheme that will be used in this study (Figure 6).

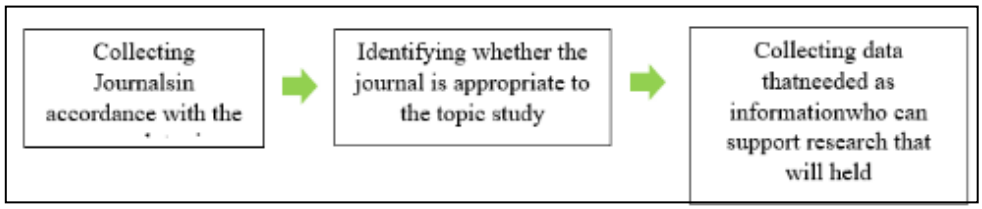

Figure 6. Schematic of Research Methods
Source: J. Chem. Inf. Model [16].

3 Results and Discussion

3.1 Project Description

The location of project is carried out in Telagah Village, precisely on the road to the Karo Land Border, +-70km from Medan City Center, the Capital of North Sumatra Province. 98°22'55.5"E to 98°22'59.1"E with the northern boundary bordering hilly land leading to the center of the Telagah village, then the eastern boundary bordering the hills (forest/community fields), and the southern part bordering the community's agricultural land (leading to the Tanah Karo border), then the western boundary is bordered by the swimming pool tourist area and the Telagah village highway. Below is a general data table on the bamboo tourism area design project (Figure 7).

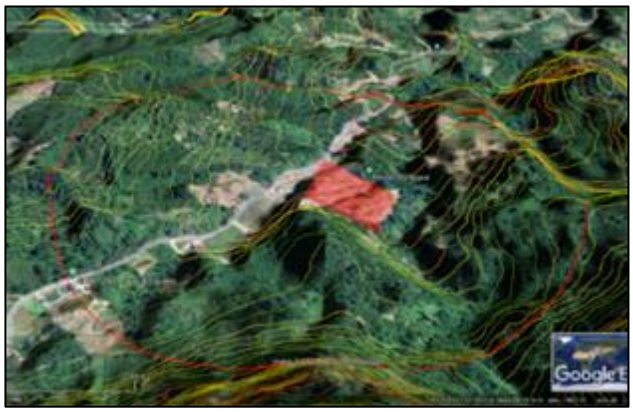

Figure 7. Project Location
Source: Google Earth [17]

From the contour image data above, the author processes the data and then generates contour elevation data for the design site area, here is the processed data from the contour image above, which can be seen from the image below (Figure 8).

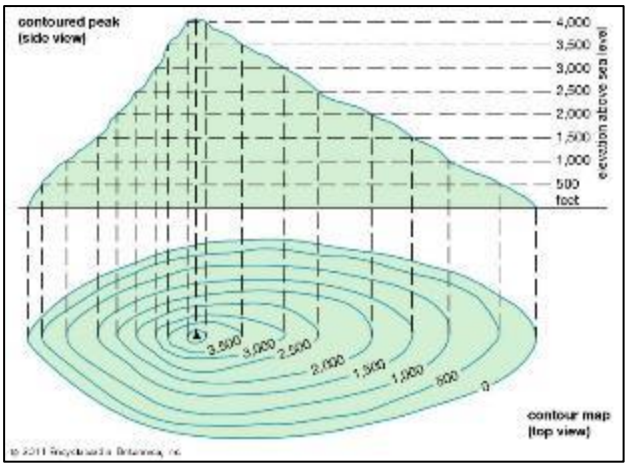

Figure 8. Contour Map
Source: nationalgeographic [18].

3.2 Mass and Surface Analysis

Adapting from the shape of the design site, the author takes some basic forms used in designing the mass of the building, for example, the main building takes the form of a leaf and from that shape produces a curved roof (prone) as the main roof shape, this also adjusts to the materials used (Figure 9).

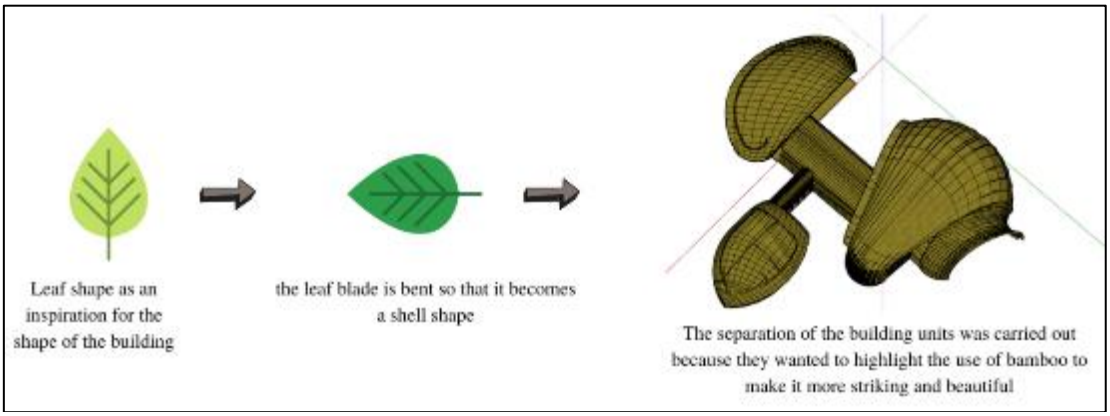

Figure 9. Building Concept

Then the resort units also use the basic form of leaves as the basic form of the building, especially on the roof. This is done because it utilizes bamboo materials that can be used as a structure that can follow the shape of the design curved (Figure 10).

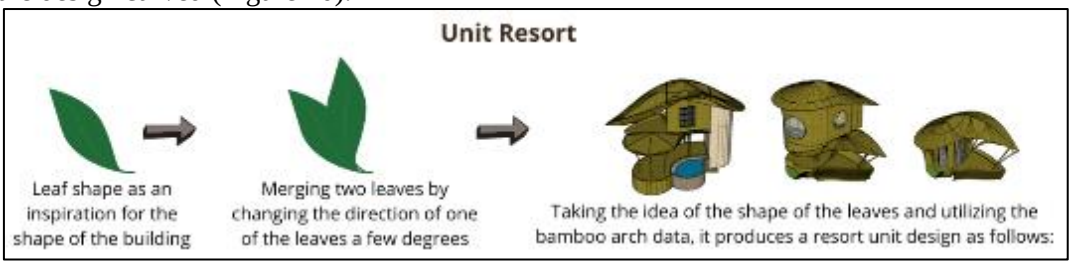

Figure 10. Building Concept Resort

The basic concept in landscape arrangement is to adjust the shape and contours of the design land, for example, land on the edges of cliffs is used as a resort location, while in areas that tend to be flat, it is used as the main building and parking area. As for the valley part of the design site, it will be used as a place for the education (processing) of bamboo plants (Figure 11).

Figure 11. Building Facade

Then for the appearance of this tourist area, it prioritizes and displays bamboo as the main part, be it as a structure, interior, or building facade. It can be seen in the picture above that bamboo is a striking part and is made to blend with the natural surroundings.

3.3 Application of the Ecological Theme

The application of the ecological theme in this tourist area is to use bamboo as the material main. The bamboo comes from around the design project, by the principles of ecological architecture, namely utilizing the available resources around the design project. Maximizing the use of bamboo and on educational tours

also continues to explore bamboo plants, starting from planting, harvesting, processing, and applying processed products to buildings in the project.

3.4 Outdoor Concept

For zoning on the outer space of the bamboo educational tourism area, the author adjusts the arrangement of buildings (resort units, etc.) according to the contours or elevations of the design site. Can be seen in the picture below is the zoning of outdoor space in the design of this area (Figure 12).

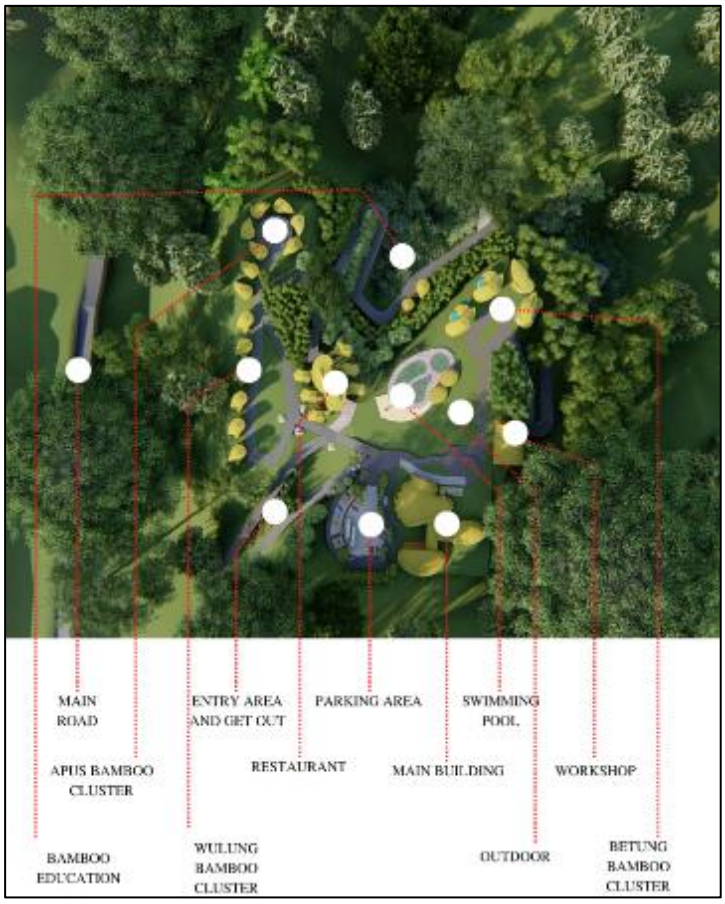

Figure 12. Landscape

The placement of resort units on the outskirts of the site aims to take advantage of the contours of the site in the form of cliffs so that the resort units look attractive, then for recreation and education areas also use the valley in the middle of the site to be used as an outbound facility. The laying of main building is located in the middle of the site and aims to simplify all matters, be it administration or activities that support the activities of guests and management staff (Figure 13).

Figure 13. Outdoor site

3.5 Interior Design

On the inside of the building, also displays (exposes) the material used, namely bamboo. This is done to show the connections used and become a separate attraction (Figure 14).

Figure 14. Interior Design

3.6 Educational tours

In this project, apart from prioritizing bamboo, there is also an educational center for bamboo processing. Bamboo plant education contains the processing of bamboo plants, including several ways of preserving and processing bamboo into works of art, as well as learning for bamboo tourism visitors. The following is a description of the processing of bamboo plants in this tourist area (Figure 15).

Figure 15. Educational Bamboo

3.7 Structural connection

In bamboo plants, the connection structure should not be arbitrary, here are some connections used in buildings in the Telagah village bamboo tourism area [19] (Figure 16).

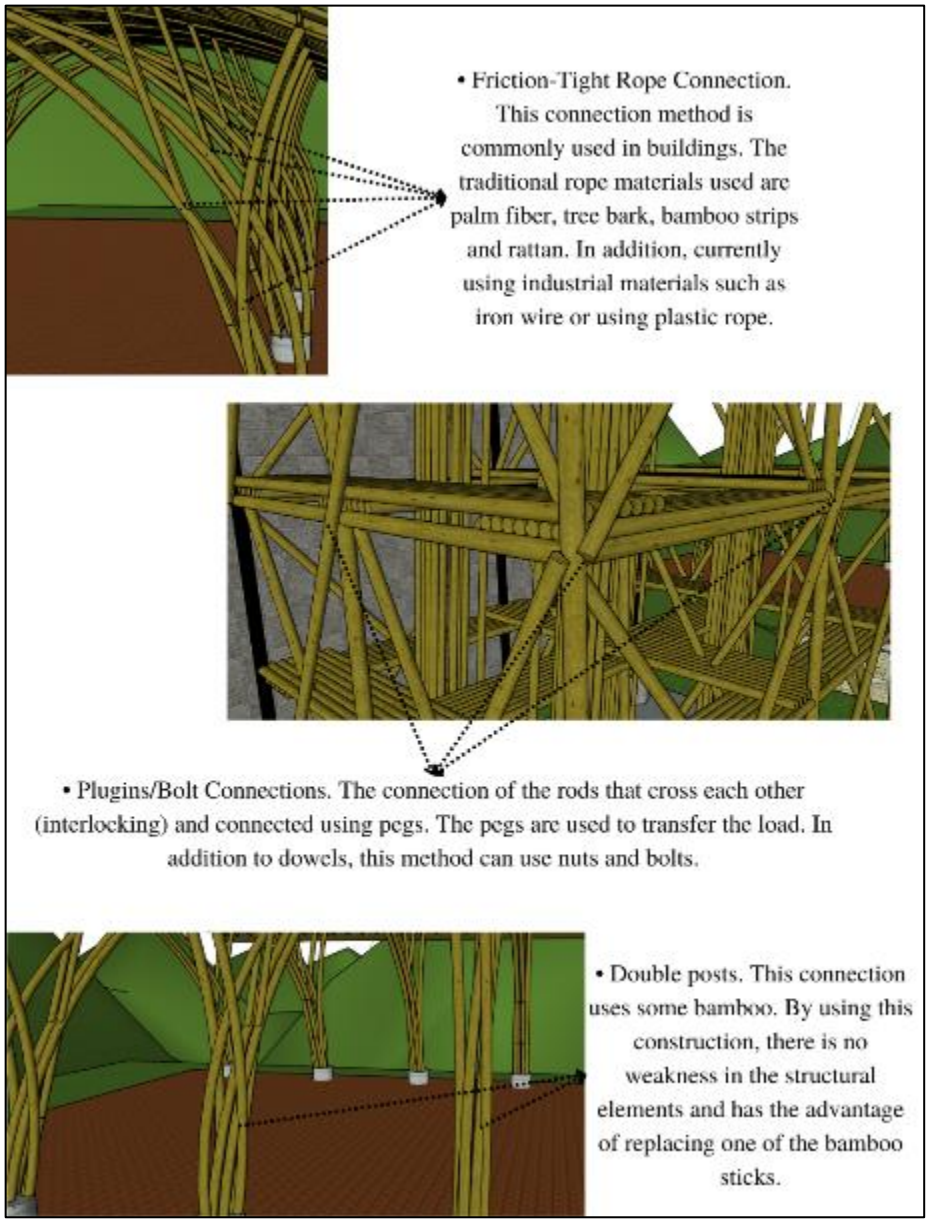

Figure 16. Structural Connection Bamboo

3.8 Roof structure

The roof structure that will be used is a bamboo structure that blends with the column, the column in the bamboo building can usually be used as a roof structure at once, this is because the bamboo structure can be shaped as desired and adjust the aesthetics of the building mass (Figure 17).

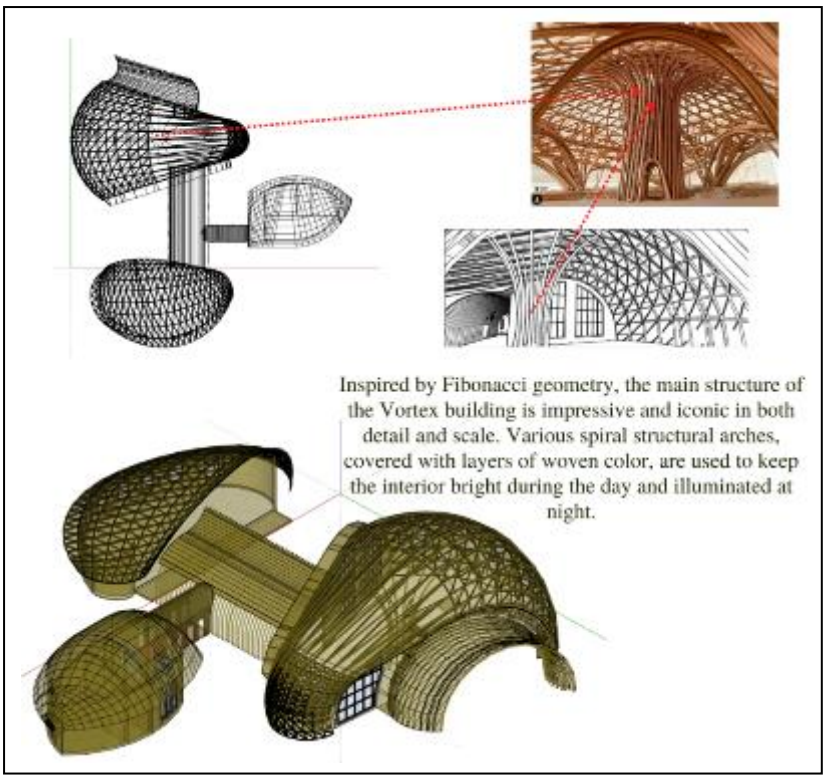

Figure 17. Roof structure

3.9 Utility system

The clean water network used in this bamboo tour comes from rainwater collected in a shelter, then the water is treated with special treatments so that the water can be used. The treated water is pumped to storage reservoirs located in the hills, which are around resort units. Then the water is distributed to buildings. Below is the scheme for the circulation of clean water and dirty water on bamboo education tours.

4 Conclusion

Bamboo is a plant that has many benefits and can be used as a building material. But to be used as a feasible material and in accordance with the needs of processing the plant so that it becomes a good material, preservation is needed to make bamboo durable. In the community, bamboo plants are only used as a supporting material for farming, the lack of education about bamboo plants makes bamboo plants less attractive as building materials. There needs to be socialization or education to the community that bamboo plants can be used and utilized as materials such as structures in buildings. With education, it is hoped that the community will not underestimate the bamboo plant. Buildings made using bamboo structures also have unique shapes, so they can be used as an attraction for buildings that use bamboo as raw material. The arrangement of outer space is also arranged in such a way that it follows and adapts to the design area. It is hoped that the design above can be an inspiration and useful for many people.

5 Acknowledgment

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6 Conflict of Interest

The authors whose names are listed below certify that the manuscript do not have conflict of interest.

Kurnia Ardiansyah

This statement is signed by all the authors to indicate agreement that the above information is true and correct (a photocopy of this form may be used if there are more than 10 authors):

Author's name (typed)	Author's signature	Date
Kurnia Ardiansyah		10 Juni 2023

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