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The Riverfront Conservatory (Conservatory Design in Kualanamu Region with Futuristic Architecture Approach)

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Abstract. A conservatory is both a tourism center and a place for plant preservation in which it is considered to be able to respond to both of the problems that Medan is facing, which are lack of feasibility of tourism and green space. With its function, the design aims to improve Medan tourism as well as to provide green space for the local community. The method used in designing this project is data collection through field surveys and literature studies. The location of the project is at Kualanamu Region as the need for the development of a tourism center in Kualanamu district as for the enhancement of the tourism becomes the busiest airport in Sumatera Utara. To reflect the concept of the conservatory, the theme of the project is futuristic architecture. As a large scale glass house, the main problem of the design is how to maintain the air temperature stable inside the building. The idea is to replace the use of glass with ETFE Panel, which is made from plastic and weighing only 1% of the glass. The project site is located near the river to support the green space concept. With various approaches towards design, this project is expected to be able to provide new opportunities for Medan tourism.

Keyword: conservatory, futuristic, green, Kualanamu, tourism

1. Introduction

Tourism development is undoubtedly happening in countries in the world, especially in developing countries such as Indonesia. Tourism ultimately brings a good impact in so many terms, including the economy and business. Unfortunately, many of Indonesia's tourism still can not fulfill the comfort of the users, especially in Medan, Sumatera Utara. Its natural wealth is not well developed, which makes tourism in Sumatera Utara still has not reached further to the international standard.

Moreover, the use of green space in Sumatera Utara is not functioning as it should be as the extreme weather became one of the factors. The local community exclaims the inconvenience of involving any outdoor area activity. This causes the green space turning out to be negative places for the city instead of making it pleasant. The conservatory planned to be built in the

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Kualanamu district to develop the area to be an Aerotropolis area. The project will be a tourism center that functions educationally that also provides a green space for the city.

2. Literature Review

Object Description

A Conservatory is a glass house for plant preservation, so it will not be affected by air temperature changes or weather as in nurseries [1]. Riverfront is one of the urban waterfront development concepts, which is an area along a river. The idea is to unite the buildings against the river [2]. Aerotropolis is a term for a city where its layout, infrastructure, and economy centered on the airport. Aerotropolis area usually supported by industrial manufacture, e-commerce, logistic, hotel, retail, entertainment center, and also offices for business interests [3].

Theme Review Theoretically

The futuristic architecture is an architectural style that moves toward the future. The futuristic architecture is utilizing the progress in technology by using new building materials such as steel, glass, and aluminum. Less is more, simple is a value in this style which makes ornament is something that assumed as less efficient. Nihilism, suppression on designing towards space, so the design becomes plain and simple. Materials are being exposed plainly and displayed as it is [4].

3. Methodology

The method used is a glass box that needs analysis from fields and literature studies to solve the design problems. To be precise design method used consists of two stages: The first stage is to select the location for the project based on a literature review to find out which one is suitable for the project. The second stage is the process of completing the design that starts with data collection. The data collected are primary data obtained from site surveys and secondary data acquired from various sources. The data are then analyzed to get a conclusion of the design.

4. Result and Discussion

To create a problem solved design, the conservatory is once again observed to find out how it functions and how it will adjust to the location. The comparative project is the Ecorium of Ecology Park in Korea. The concept is using the division of different climates from around the world. By the review, the idea of the project consists of three domes that have different characters. The allocation of the plants applied from the Köppen Climate Classification of Indonesian Forest [5]. By this concept, the conservatory also provides information for tourists about Indonesian plants and its richness. The sightseeing circulation starts from the driest forest, Savana Forest. Moving to the middle dome is The Tropical Monsoon Forest that leads to the last and largest dome, The Tropical Rain Forest, as the densest and moist Forest (Figure 1).

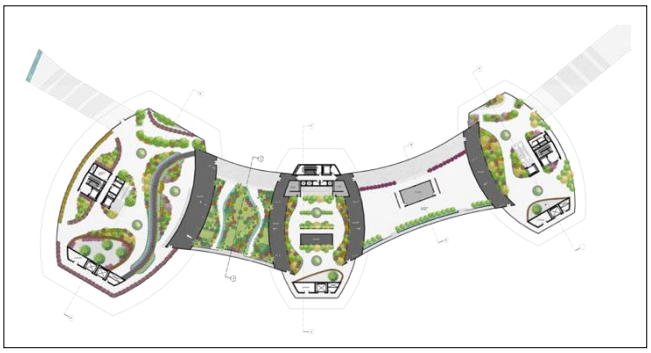


Figure 1. The implementation of Koppen Classification

Along with the theme, the design is exposing the mass as the character of the futuristic architecture. The project also has lots of green areas (Figure 2).

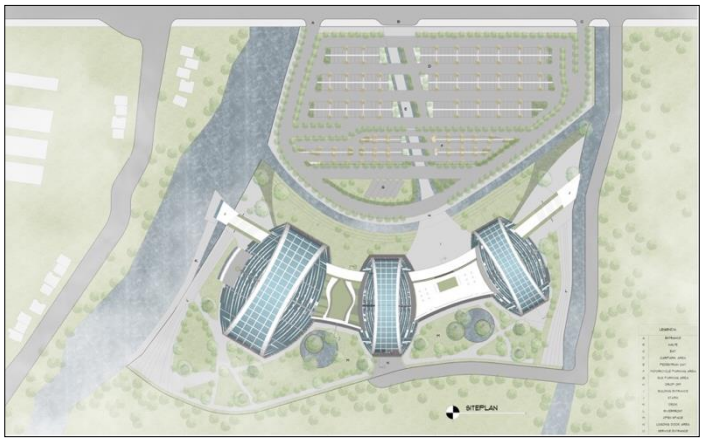


Figure 2. Siteplan

Building Mass Concept

The mass concept is developed based on the form of the project site. Based on the Köppen Classification, the building is designed into three separate domes. Two connecting masses are put in between that indirectly formed the green space for the project. A circulation that forms a pedestrian for visitors designed on the second floor. The three domes are using steel frames and ETFE panels as cover (Figure 3).

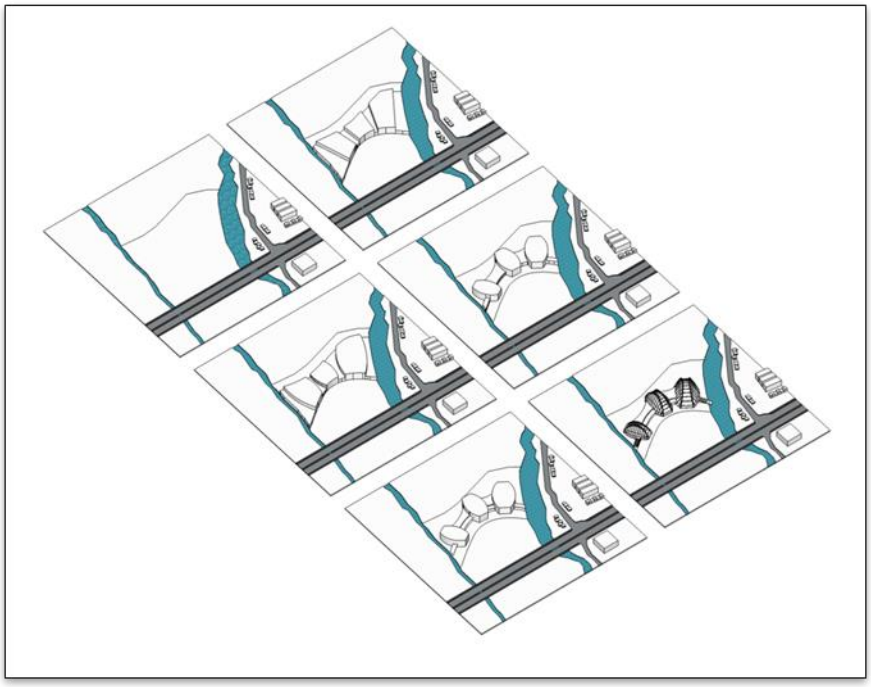


Figure 3. Building Mass Concept

Futuristic Architecture Application

As the characteristic of the theme, the building is exposing the structure. This conservatory is using ETFE Panel that weighing only 1% of glass heft, which indirectly preventing the use of a bigger steel frame for the structure. It also made from plastic, which helps in maintaining the temperature inside and will be reducing the deficiency of glass use (Figure 4).

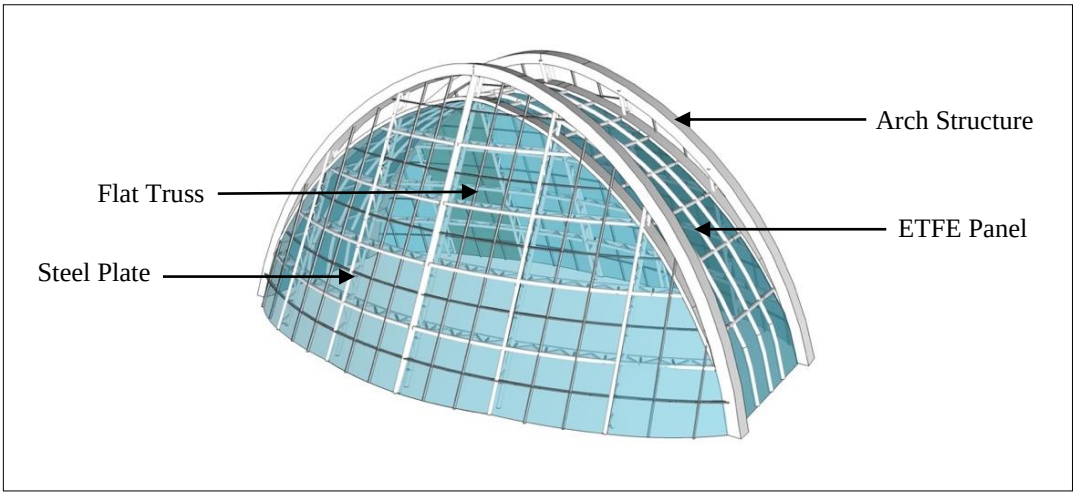


Figure 4. Application of Exposed Frame and ETFE Panel

Other than applying futuristic architecture on the facade, the theme also applied in several ways throughout the building to support the function of the project, such as solar panel, sun shading, and bioswale system (Figure 5).

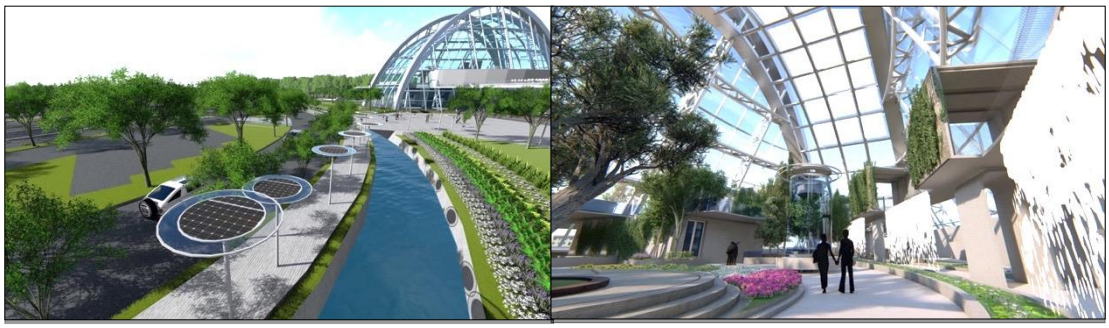


Figure 5. Application of Solar Panel and Sun Shading

Zoning

The landscape arrangement is divided into three parts starting from the front to the back of the project site. The first layer functioned as the parking space and entrance. The second layer is the building, which is separated by water and green barrier to affirm the privacy of the area. The last layer is open space to let the visitors relax, that leads to both riverfront areas (Figure 6).

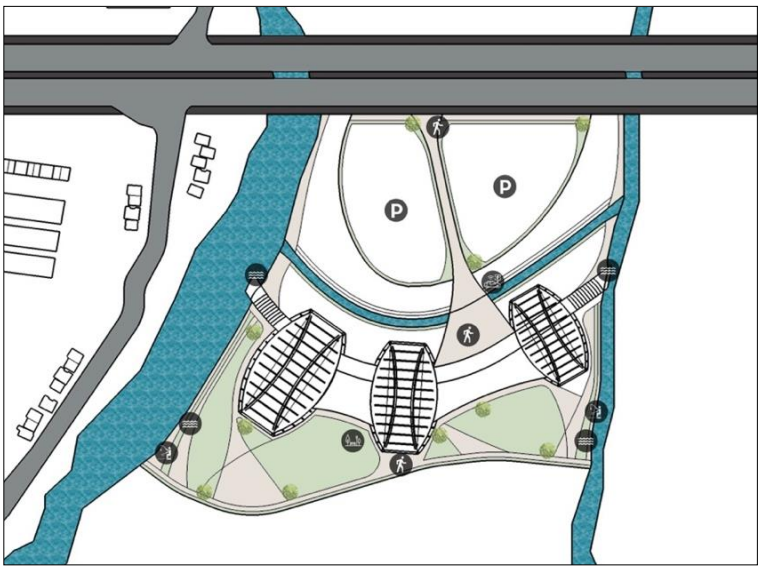


Figure 6. Outdoor Layout Plan

The riverfront conceptualized as a landscape attraction; there is two riverfront area on each side of the project site. The west side riverfront has waterfall and deck that leads visitors closer to the river (Figure 7).

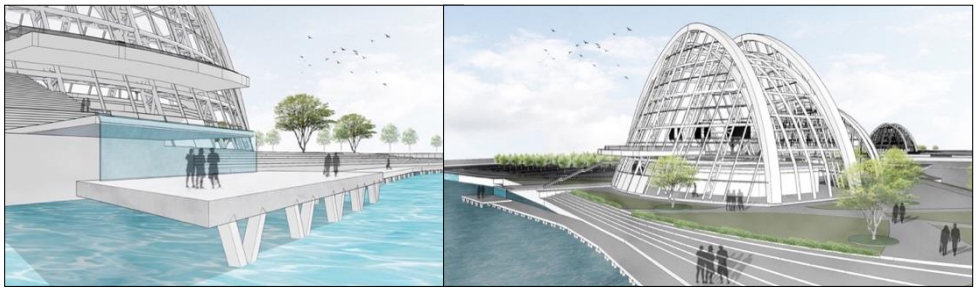


Figure 7. Riverfront Areas

Circulation

The circulation among the conservatory is in two parts, vehicles which is on the front part of the site, and pedestrian which designed through the riverfront area. The flow within the building is using a linear concept so the visitors could experience every room without missing any [6]. Starting from the ticketing area to gallery, Savana Forest, Rooftop Bistro, Tropical Monsoon Forest, Rooftop garden, Tropical Rain Forest, and ended in Gift and Plant Shop. This linear circulation used so the visitors could experience every room without missing any.

Inner Area

The first dome consists of the ticketing area, visitor center, office, and a gallery that designed as the entrance to the second floor. The middle dome is where the coffee shop and utility room located. Multipurpose room, gift and plant shop are located on the third dome. Meanwhile, a prayer room located in the second connection building (Figure 8).

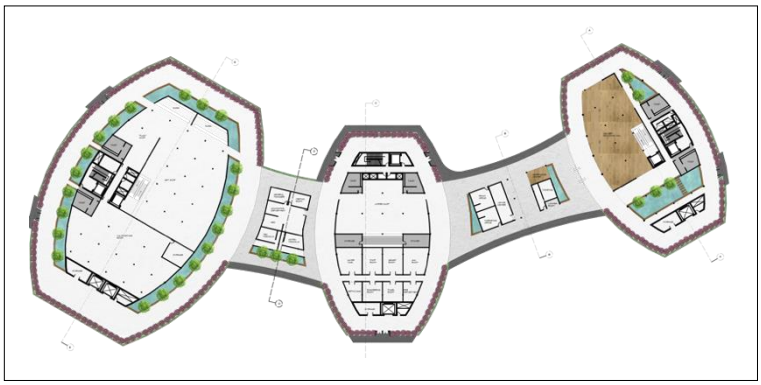


Figure 8. First Floor Plan

The plant displayed starts on the second floor, which goes from the driest kind of plant all the way through the densest one. There is a connecting gallery to connect each dome that is conceptualized to give visitors a more intimate feeling so that visitors could feel various kinds of experiences. The theater located on the second dome. A bistro designed on the third dome facing the riverfront area to get the best view possible (Figure 9).

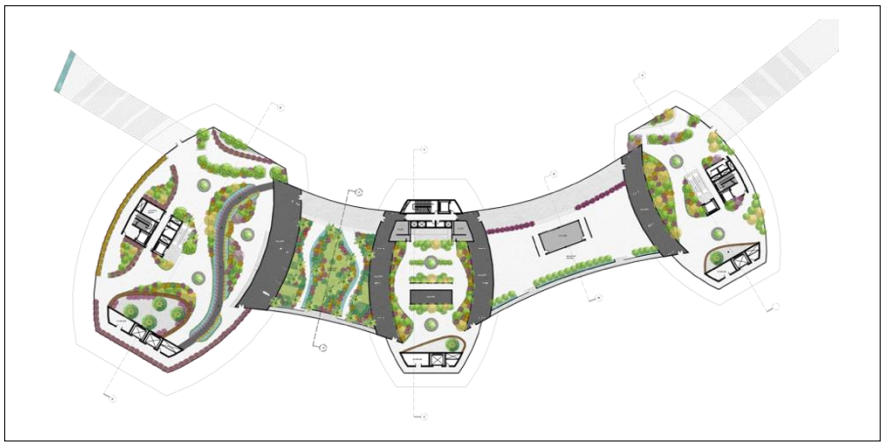
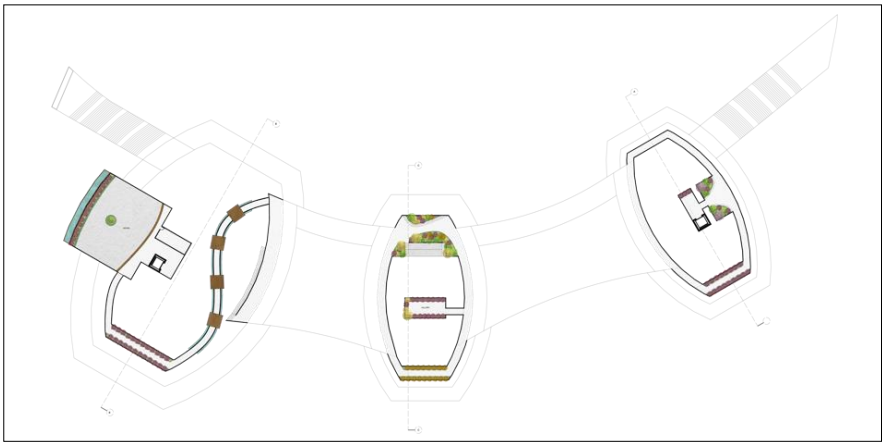


Figure 9. Second Floor Plan

The third floor formed as a mezzanine, which is an upper pedestrian way that allows the visitors to view the dome from above. Upper gallery located in the third dome; this gallery



conceptualized as a pedestrian way that has four stop boxes as the gallery (Figure 10).

Figure 10. Third Floor Plan

The inner area is divided vertically into three parts as the Rumah Bolon concept to include local wisdom into the design. Rumah Bolon is a traditional Bataknese house that conceptualized different functions on each level of the house (Figure 11).

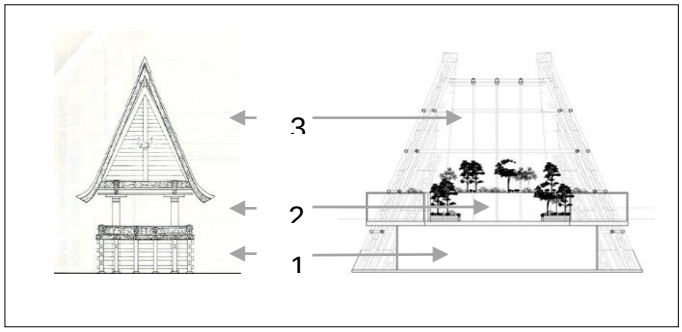


Figure 11. Rumah Bolon Application Schematic
(Source: Author, 2018)

Structure

Arch is the main structure used in the design that holds other frames on forming the mass building (Figure 12).

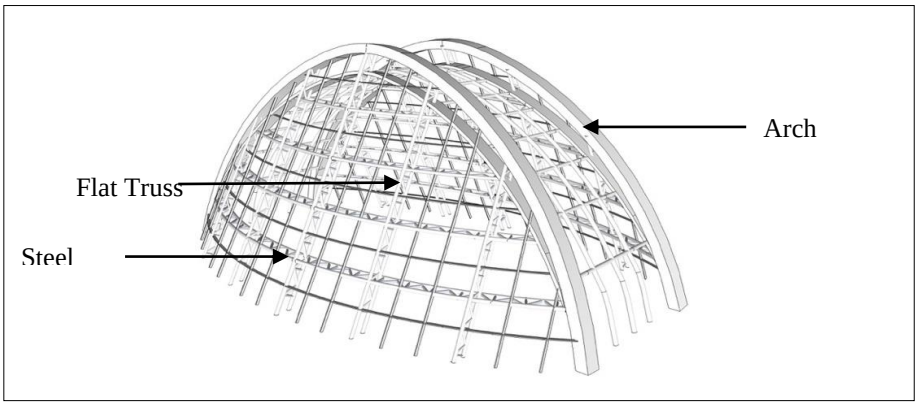


Figure 12. Structure System Concept

Utility

Other than using ETFE Panel and Sun Shading as a solution, the design also has various utility system approaches to maintain the temperature inside the building. The building is using Liquid Desiccant System for the air conditioner system that processes humid air into cold air. Another approach is to design electrically controlled panels on the roof; this ventilation will open in the evening to let the hot air out from the building (Figure 13).

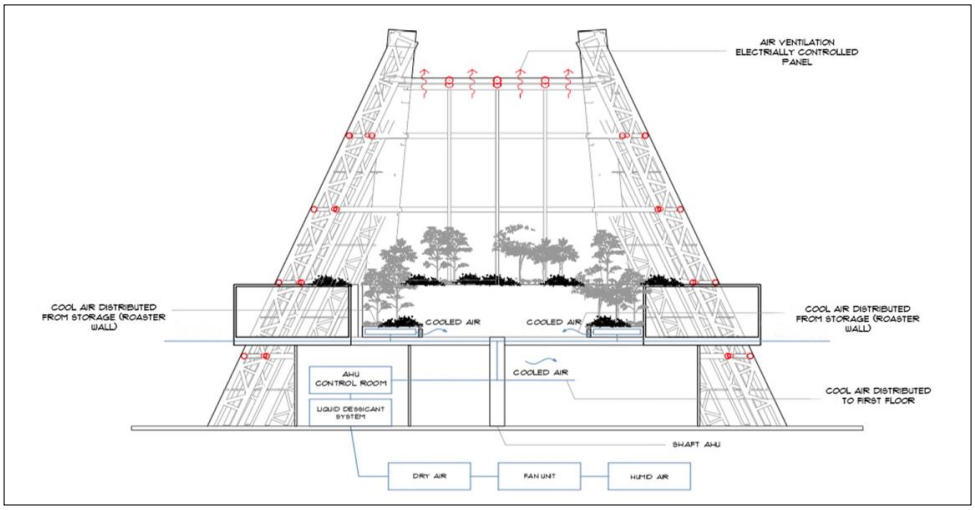


Figure 13. Ventilation System

Besides using PDAM as the water source, this conservatory also using rainwater, which will be accommodated in the reservoir and later distributed to the building and river water that channeled into the air temperature generator pool, then treated in a water treatment system before pumped inside (Figure 14).

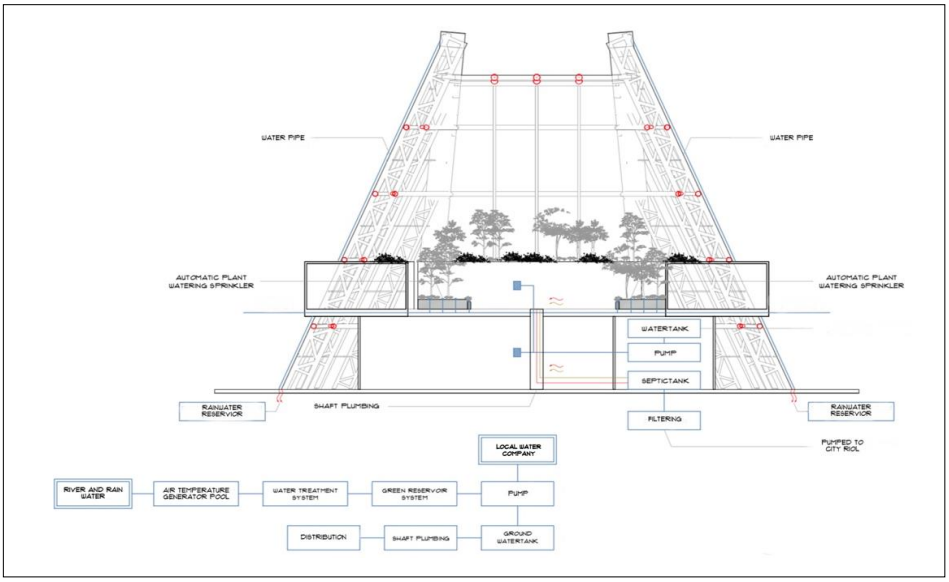


Figure 14. Plumbing System

3D Impression

From the concept as explained, the realization of the design shown in the building form and

facade (Figure 15).

Figure 15. Conservatory Exterior Perspective

The conservatory designed into two different sizes based on the Köppen Classification; the largest one is at the West Side, which will become the end of the journey in this recreational center.

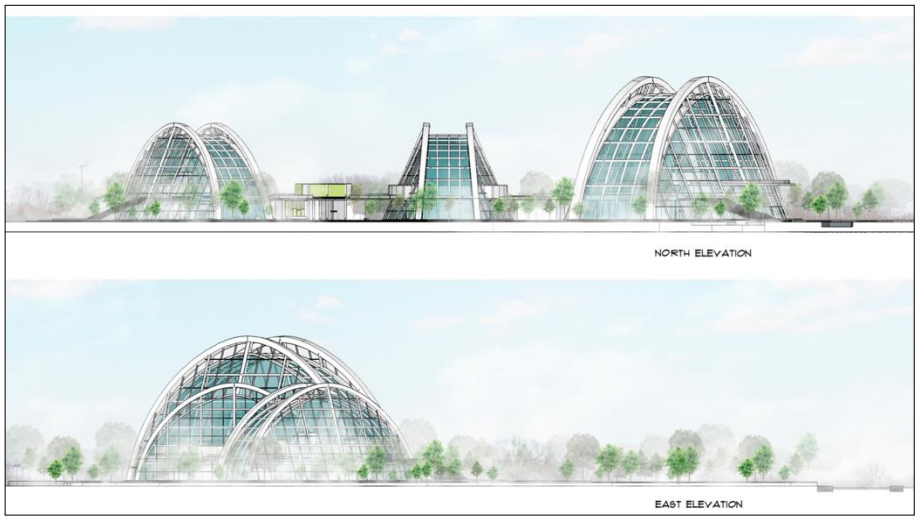


Figure 16. Front and Side Elevation

The first floor of the conservatory consists of supporting functions such as ticketing area, coffee shop, and gift shop. While the plant display located on the second floor. These levels connected by elevator and escalator (Figure 17).

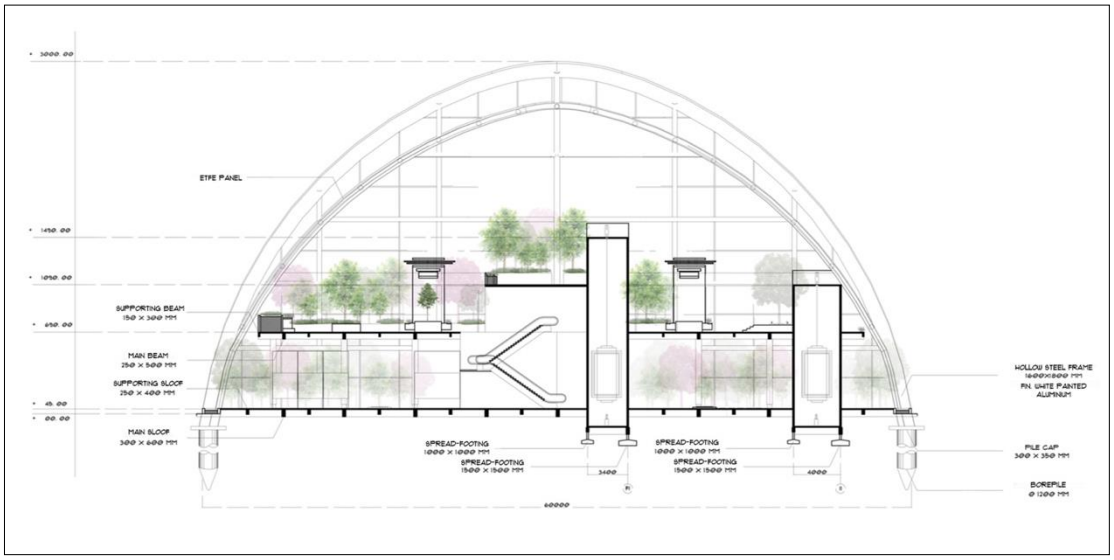


Figure 17. Section

There is a different kind of attractions such as waterfall way, upper gallery, birdcage, and aquarium that completes the plant displays. Birdcage and aquarium are for birds and fishes from different habitat from each province so the visitors not only will be seeing plants but also some animals from a different origin. These attractions presented with futuristic architecture style (Figure 18).

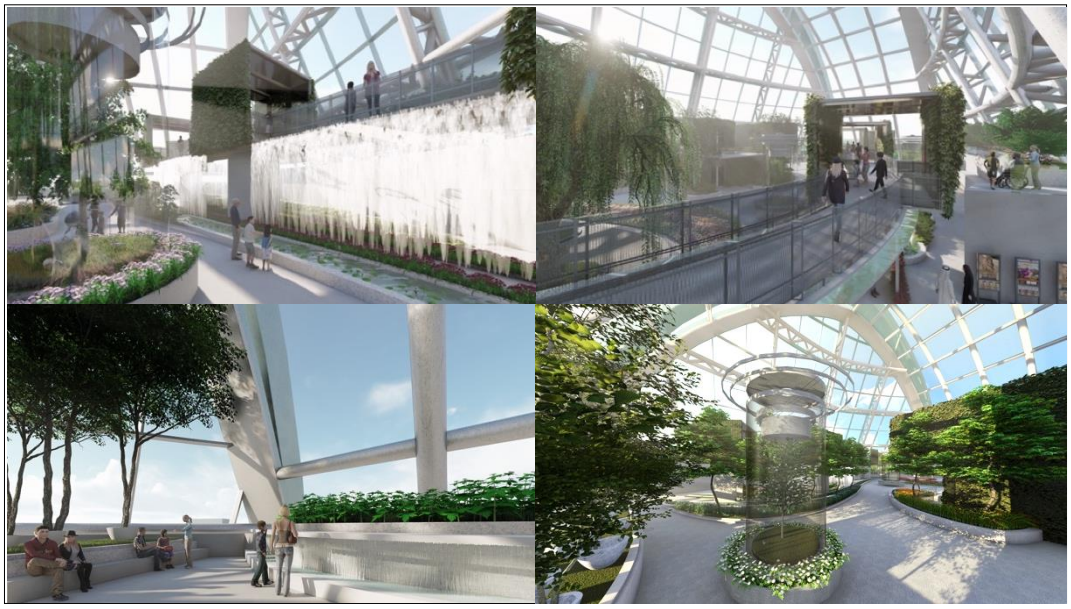


Figure 18. Dome Interior Perspective

Other than the plant display area, the interior of the conservatory also including a gallery, bistro, ticketing area, and theater. The gallery is conceptualized more intimate than the plant display area so the visitors will have a different experience (Figure 19).

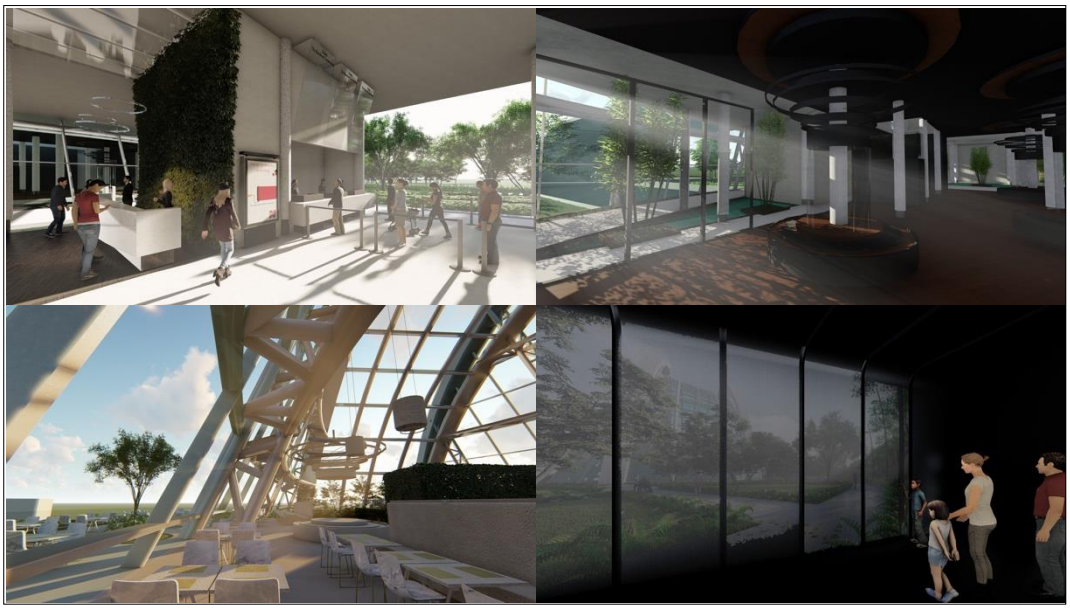


Figure 19. Conservatory Interior Perspective

The pedestrian area designed with a canopy that has a solar panel on it and completed with the green lane as a barrier between the user and vehicle. The open space area located at the back of the building that connects to each riverfront. The open space completed with outdoor seating and pools (Figure 20).

Figure 20. Conservatory Interior Perspective

5. Conclusion

The Riverfront Conservatory is a tourism center that targeting not just domestic tourists and the local community but also international tourists. A conservatory designed to escalate Indonesian tourism. With Kualanamu being the busiest airport in Sumatera Utara, this project is located at Kualanamu district to support the purpose of the building. Both sides of the project site bordered by the river, so this design integrated to both of them with utilizing it by not only using it as green spaces and attractions but also using it as a water source.

The theme of the design is futuristic architecture, which is applied clearly on the mass concept of the building. The building designed with unusual shape yet simple and completed by exposing the steel as structure and panels as cover. As a large scale glass house, this design focused on maintaining the air temperature inside of the building. With various analyses, the building is using the ETFE panel instead of glass since this panel offers many solutions to the design problems. The roof is also using sun shading to help maintain the temperature. Another approach is to design few controlled ETFE panels on top, which automatically open to let the hot air out. Pedestrians designed with canopies completed with solar panels, so other than to protect the user, the solar panel absorbs the heat of the sun to later being used as the energy for the building – a bioswale system installed on the green lane along with the pedestrian and parking space to prevent a flood.

With various approaches of analysis and literature, The Riverfront Conservatory is expected to be a tourism center as well as a green space that functions responsively towards the environment and fulfill the needs of tourists and the local community.

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REFERENCES

[1] Kamus Besar Bahasa Indonesia (KBBI), 2017. [Online]. Available: https://kbbi.kemdikbud.go.id. [Accessed March 2018].

[2] Jane Amidon (Edit), *Michael Van Valkenburg Associates; Allegheny Riverfront Park, 2005.*

[3] John D. Kasarda, Greg Lindsay, *Aerotropolis; The Way We'll Live Next*, 2011, p. 21.

[4] Tiffany, *Futuristic Architecture*, 2012.

[5] Wladimir Köppen, *Köppen Climate Classification*, 1918.

[6] Francis D.K Ching, Volume 3, *Arsitektur: Bentuk, Ruang, dan Tatanan*, Jakarta: Erlangga, 1979, p. 256.