

# North Sumatera Athletes Hotel with Ecological Practices Implementation

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## ABSTRACT

The North Sumatera Athlete Hotel's design with Ecological Architecture approach is intended to meet the need for supporting facilities in accommodating athletes who will compete in the upcoming XXI / 2024 national sports event (PON). This is a North Sumatera Province self-preparation form as one of the hosts in accommodating this event. The building design includes supporting facilities, outdoor and indoor sports facilities, a restaurant, and a convention centre. In terms of function, hotel building design and facilities are open to athletes and the public. In terms of the design theme, the theme approach is carried out through the application of concepts in the form of natural ventilation, natural lighting, shading with using vegetation, overhangs, balconies, and secondary skin which are applied through consideration of the orientation of the building to the incoming sunlight.

**Keywords:** athlete, ecology, hotel, North Sumatera



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## 1. Introduction

Athlete Hotel has the fundamental function of providing lodging for athletes when sports events occurred. North Sumatera Athlete Hotel is placed in the area filled with sports facilities neighbourhoods of the province itself. It is built on the 25000 m<sup>2</sup> area, with KDB 60%, and with the Ecological Architectural practices implemented in the designs.

Athlete Hotel provides lodging and facilities for athletes and guests on a short term basis. In North Sumatera Athlete hotel provides facilities that the athletes and the regular guests can access. The facilities are the indoor and outdoor sports centres, lounge, restaurant, meeting rooms, and a convention centre. The location of the hotel is built in the sports neighbourhood area.

There are numerous practices to conceive and specify an ecological architecture, and in this ambience, it is inevitable to contemplate as architecture is more than just building. Still, the environment is also designed with green guidelines [1] [2]. As currently perceived and processed, architecture must be contemplated overtime on the user and user behaviour as concomitant necessities, not as individual objectives [3] [4]. In other words, it is based on minimizing the number of resources consumed in the building's construction, as

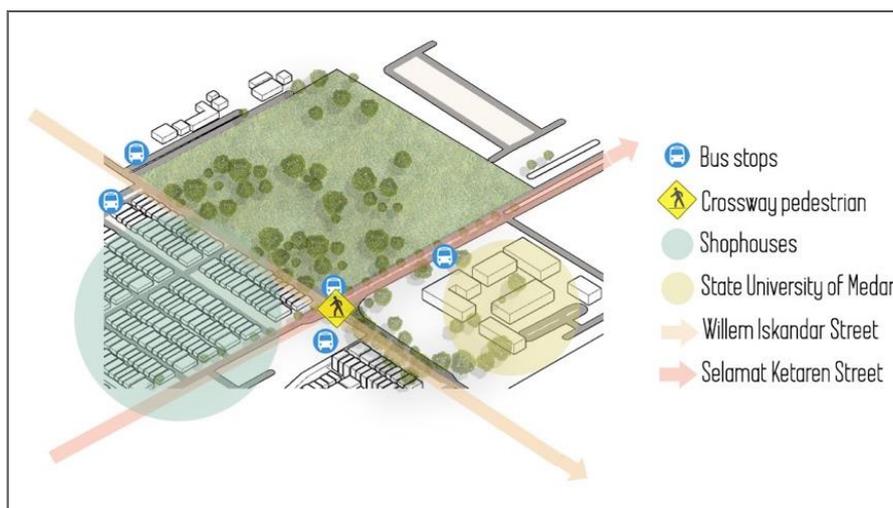
well as curtailing the impacts on the natural environment through emission, and providing indoor conditions conducive to the user for creating a better life as the ultimate model for all their activities [5] [6] [7].

Approaching the ecological practices, ecological hotels are nature-oriented that use nonconventional methods and seek to reduce the negative impact on the environment [9]. The eco-friendly hotel is a lodging property that incorporates and follows environmentally sound programs and practices. Ways of achieving environmentally responsive designs include passive cooling concepts (climate responsive designs). They refer to technologies or design features used to cool buildings naturally, including solar shading, orientation, siting of buildings, appropriate greeneries (vegetation), shape and size of buildings, choice of appropriate materials, and ventilation to minimize or prevent heat gain in buildings [8] [9] [10].

## 2. Methods

The approach to the problem-solving design method used in the 'Hotel Athlete' project is the descriptive method, specifically presenting data, describing, explaining. Both primary and secondary data are in the form of literature studies and comparative studies based on existing facts, then analyzed and synthesized. Furthermore, data analysis is qualitatively analyzed by analyzing the activity actors' aspects, space requirements, spatial planning, and circulation. Then it will be analyzed quantitatively with space capacity and the amount of space as well as the approach regarding the location and size.

North Sumatera Athlete Hotel is built on a 25000 m<sup>2</sup> area, placed in the area surrounded by shophouses, State University of Medan, and sports facilities, making it is easier to reach the site as there are many bus stops can be found. These are known as issues identification by conducting relevant issues about the site, such as the circulation on the sidewalks path and pedestrian movement pattern, natural physical features (Figure 1).

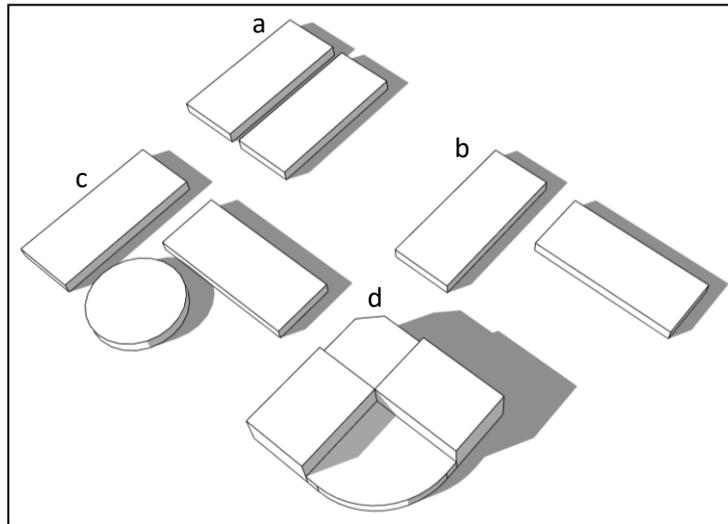


**Figure 1.** Site Analysis

## 3. Results and Discussion

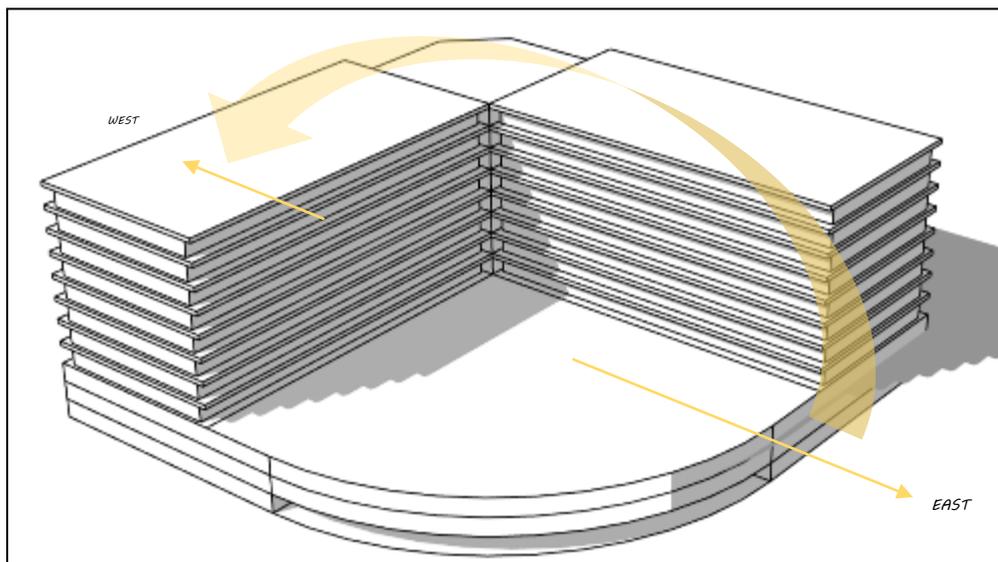
### 3.1 Building Mass Concept

The design starts with choosing the shape of two rectangles on the tower (Figure 2a). The square shape was chosen because it has a fixed base that provides efficiency in hotel room space. The tower is formed into two parts, namely two rectangles forming a 90o angle as a differentiator and a barrier to user functions (Figure 2b). The mass is in thin shape so that every space gets adequate natural light and reduces artificial light during the day. Adding a circle shape as a podium and joining the corners between the two towers (Figure 2c). The circle has a centred shape to reflect its function as the centre of its environment (Figure 2d).



**Figure 2.** Mass Concepts

The choice of the form of the podium is also the result of the consideration to maximize natural lighting. The placement of the three masses is perfected to produce a determination of the form arrangement used. Its longest side is not oriented on the east-west axis, but still some parts are exposed to direct sunlight, and hence each hotel room is given a balcony as shading of sunlight accents the appearance of the building (Figure 3).

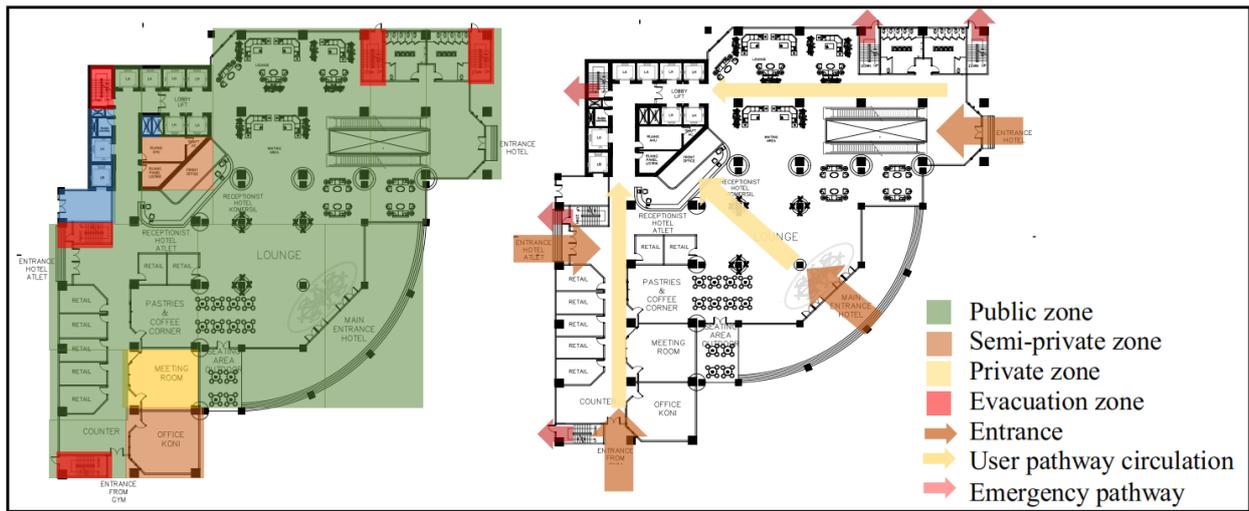


**Figure 3.** Final Mass Concept

### 3.2 Zoning and Circulation

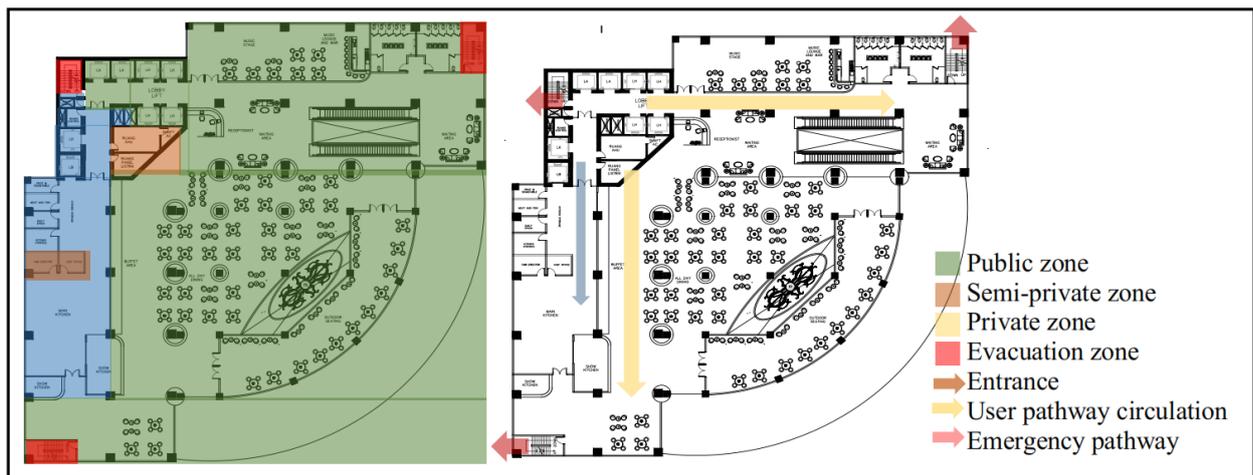
Outer space zoning is divided into several types. The building area is located on the site to show building's image. The parking lot for hotel guests is located in the eastern part of the building, while the parking lot for service lanes, workers, and administrators is in the western part because of its smaller typology. The garden is located around the building for aesthetics and shading. The following plans are considered by various data obtained from books and personal analysis, applied to the design [11] [12] [13] [14] [15].

First, inner space's zoning divides the main room, namely the commercial hotel lobby and athletes. The main area is in the main commercial hotel lobby as the main entrance to the building (Figure 4). The hotel lobby for the athlete is in the northern part of the building, accessed via the hotel service line. Access both the commercial hotel and the athlete hotel rooms is in one area but separated by a partition to limit the hotel visitors and athletes' atmosphere.



**Figure 4.** Ground Plan Zoning and Circulation

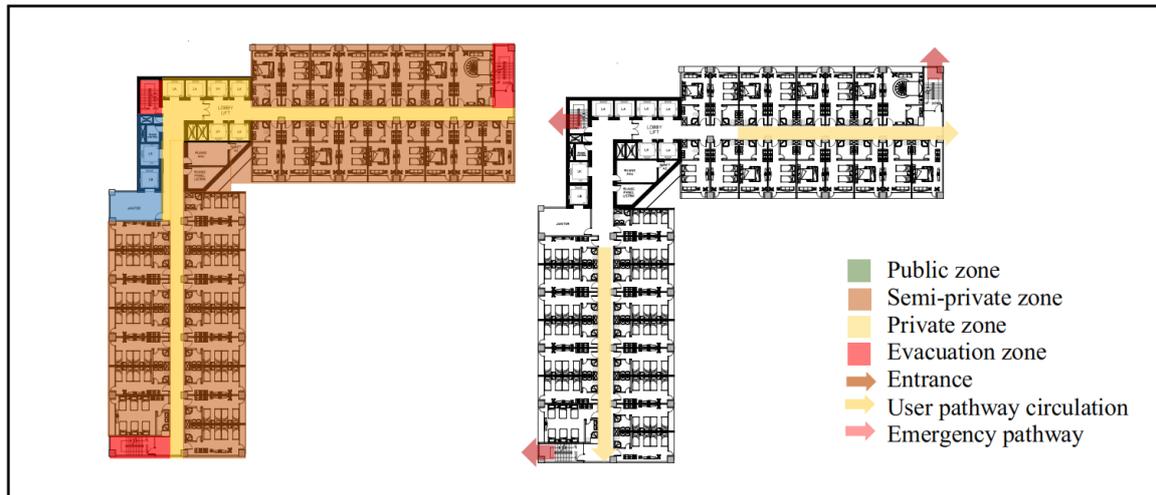
The entry point for office employees for administration is also distinguished from other entry points. The front office is located on the ground floor, and the management administration office is located on the third floor. The service line and utility area are located adjacent to the receiving area parking to facilitate all servicing activities. The facilities such as the restaurant and bar are shown in Figure 5, the meeting rooms and convention centre are shown in Figure 6, and the hotel area is shown in Figure 7.



**Figure 5.** First Floor Zoning and Circulation



**Figure 6.** Second Floor Zoning and Circulation

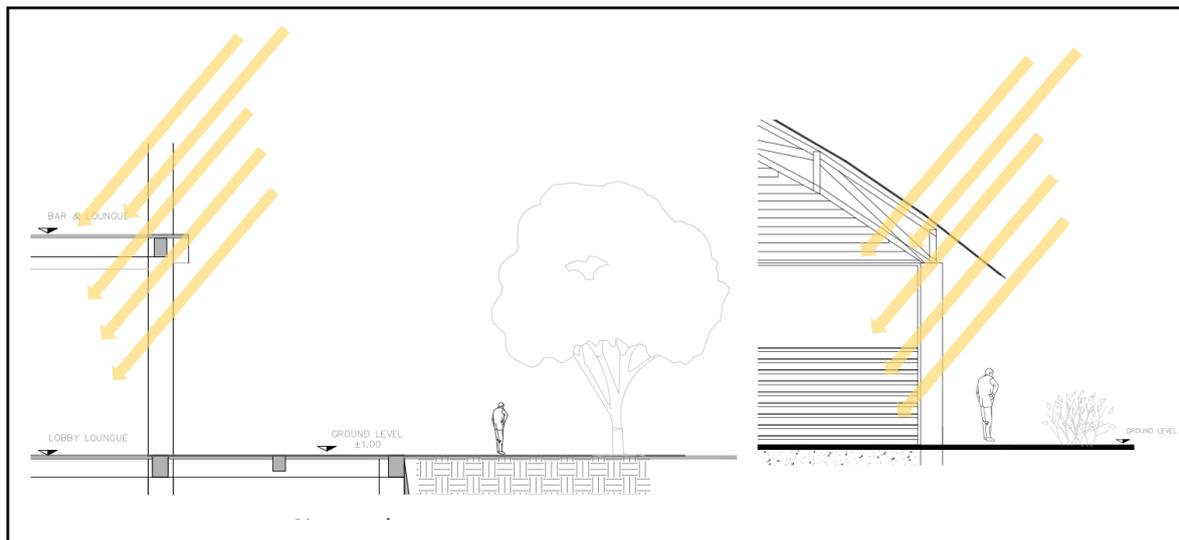


**Figure 7.** Typical Floor Plan Hotel Zoning and Circulation

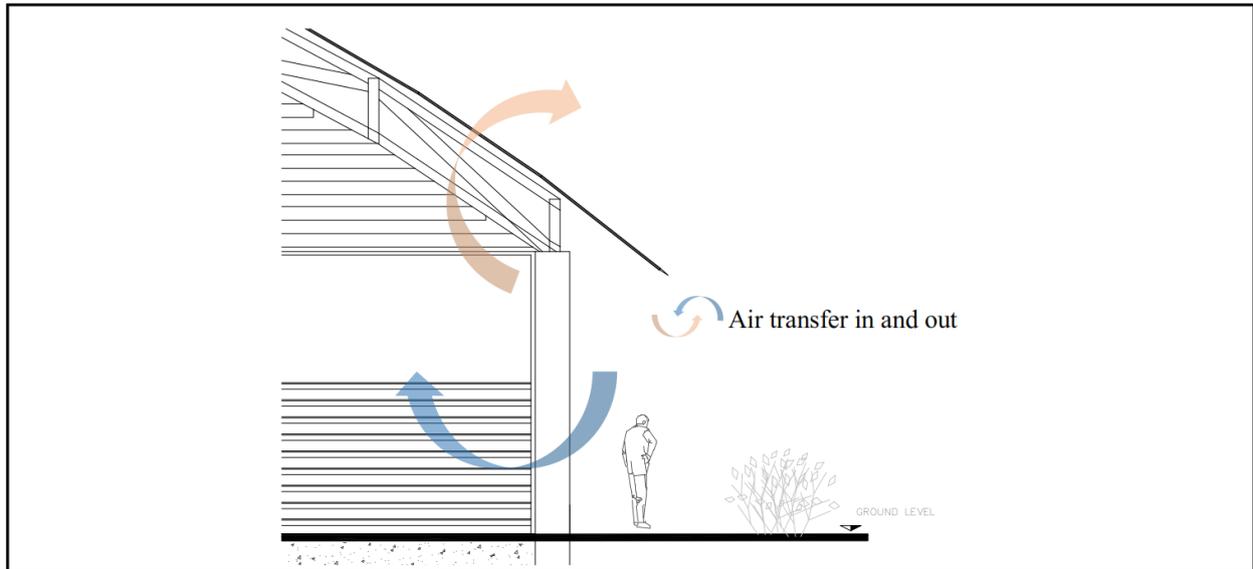
### 3.3 Concepts Implementation

Passive cooling is the process by which a building heats up or cools down itself naturally without the use of mechanical driven devices is called. Unlike active cooling, which ensures the use of energy to maintain a balanced interior condition. Passive cooling takes full advantage of the microclimate, using climate responsive design parameters such as orientation, shape, fenestration, landscape.

Natural lighting is used by implementing low-emissivity glass walls with transparent properties that directly transmit sunlight into the building (Figure 8). Natural ventilation is accomplished by using the concept of cross ventilation in the building of the hotel gym facilities and given openings in the form of windows on the balconies in each of both athletes and commercial hotel rooms (Figure 9).



**Figure 8.** Natural Lighting Concept

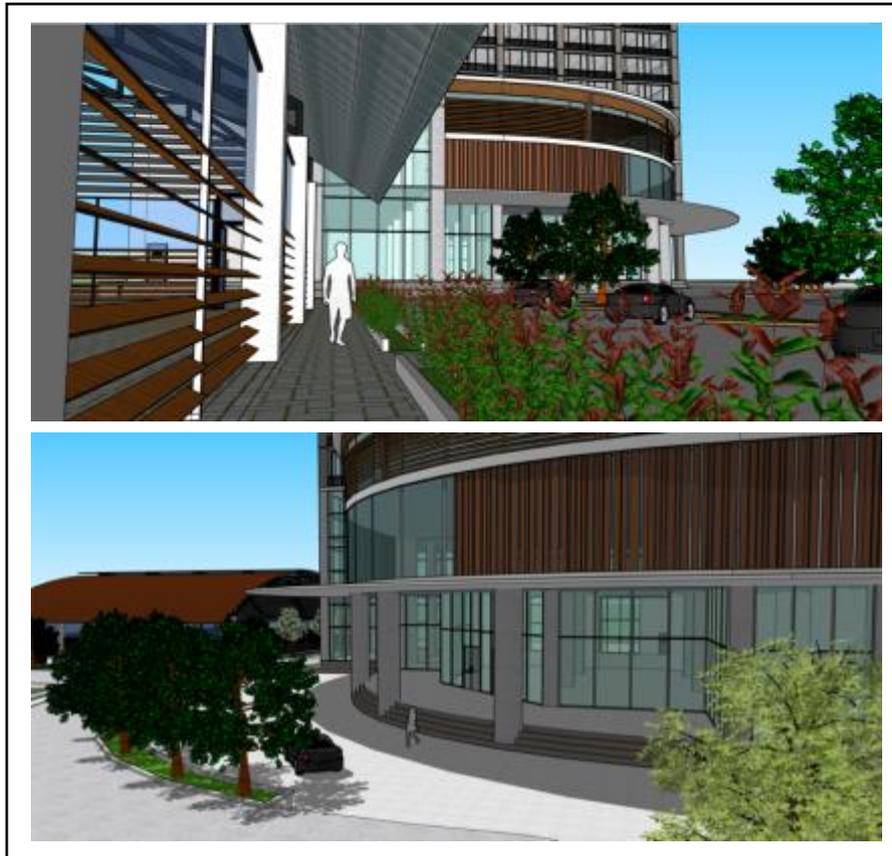


**Figure 9.** Natural Ventilation

Shading is the effort to prevent excessive heat absorption by filtering sunlight beforehand so that the room is not exposed to direct sunlight, which can cause the temperature in the room to increase. It can be implemented using vegetation, overhangs and canopy, secondary skin, and building orientation. Shading using vegetation to protect the surface of walls and windows from exposure to direct sunlight reduces the surrounding air temperature (Figure 10). Shading using overhangs and canopy. Overhangs are designed to effectively block direct sunlight to reduce sun and heat ingress in buildings (Figure 11).



**Figure 10.** Shading Using Vegetations

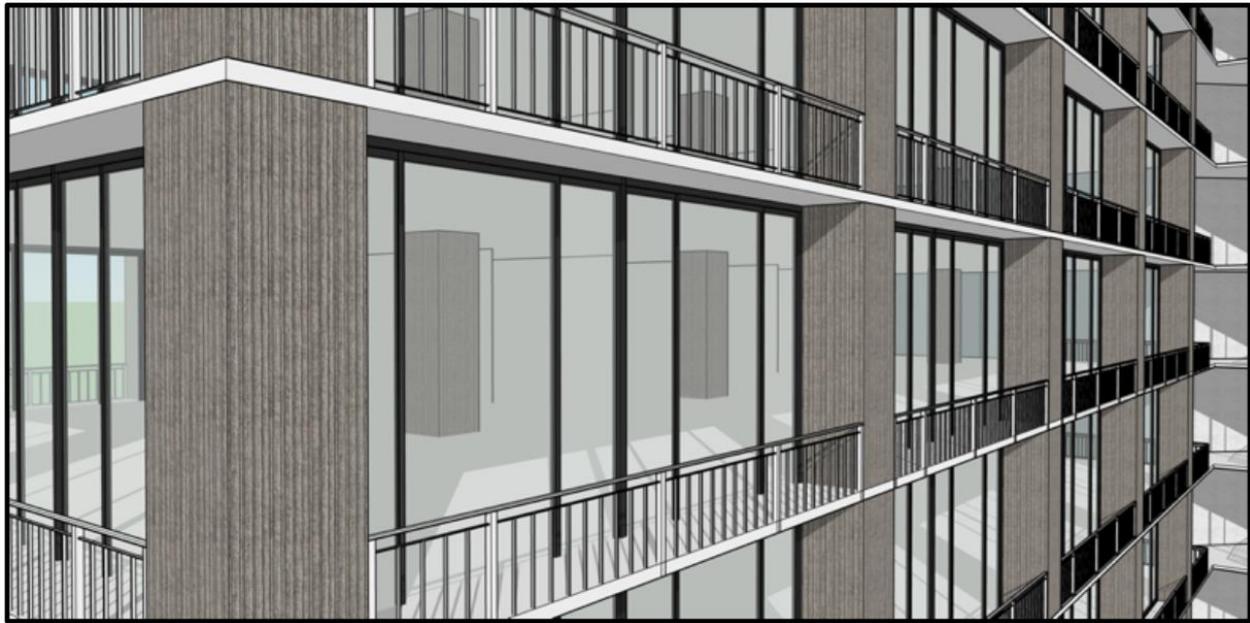


**Figure 11.** Shading Using Overhangs and Canopy

Shading using secondary skin gives a shadow effect on the interior of the room to prevent excess solar radiation; besides that, the benefits obtained from this implementation provide different attractive shadows according to the sun's movement to provide varied aesthetics (Figure 12). The North Sumatra Athlete Hotel building's building orientation is considered in its application, namely by placing the longest side of the building not oriented on the east-west axis. However, there are still parts of the building that are exposed to direct sunlight. So, given a balcony on the part of the hotel tower exposed to direct sunlight (Figure 13).



**Figure 12.** Secondary Skin



**Figure 13.** Balconies

#### 4. Conclusion

The North Sumatra Athlete Hotel's design is intended to meet the need for supporting facilities in accommodating athletes who will compete in the upcoming XXI / 2024 national sports event (PON) and reserved for the public. The hotel rooms are 272, and they are designed for athletes and the public. In the athletes' section, the room capacity is divided into two types, a room with a capacity of 4 athletes and the other for six athletes. The bedroom is divided into a suite bedroom, a standard twin room, and a standard double room on the commercial side. The North Sumatra Athlete Hotel design is provided with several supporting facilities, such as an indoor and outdoor sports training centre, a swimming pool, a restaurant, and a meeting room.

In designing the North Sumatra Athlete Hotel, using an environmentally architectural approach as a fundamental theory makes buildings responsive to their environment, which is a tropical climate, to achieve thermal comfort for building users. The theme approach is carried out through abstract concepts in the form of ventilation of natural lighting concepts and shadow concepts using vegetation, overhangs, balconies, and secondary skins, which are applied by considering the building's orientation to incoming sunlight. The analysis shows that the width of the building that can be passed by sunlight is 15 meters. Ventilation is done naturally in indoor sports facility buildings; in the tower, hotels are provided with large glass windows, which also become natural lighting during the day.

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