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Redesign Of The Panji Bako Sidikalang Stadium With An Approach To Contemporary Architectural Themes

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Abstract

In general, a stadium is a vital facility in soccer, serving as both a venue for matches and an entertainment hub for fans. The facilities and suitability of the stadium are crucial in attracting spectators, ensuring comfort, and providing an unforgettable experience. With comprehensive facilities and good management, a stadium can become a unique attraction. However, the Panji Bako Stadium in Sidikalang faces serious issues, namely inadequate facilities and low suitability levels, leading to a decline in spectator interest. Therefore, a comprehensive redesign is needed for this stadium. This redesign is expected to offer innovative and relevant solutions in accordance with contemporary demands, infusing a fresh and invigorating atmosphere into the long-standing stadium. The design process should consider various aspects, including enhancing facilities such as comfortable seating, commercial areas, and other supporting amenities. Moreover, sustainability aspects should ideally be integrated into the design, ensuring the stadium operates efficiently in terms of energy and environmental impact. Thus, the redesign will not only address existing problems but also open new opportunities for the development of soccer and entertainment in the area. Optimizing the stadium's function is expected to make it a proud icon that meets the expectations of players, fans, and the community.

Article History

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Key Words

Design, Panji Bako Stadium, facilities, sustainability

1. Introduction

Football is an incredibly popular sport worldwide, including in Indonesia, where it is rapidly developing and loved by various segments of society. FIFA and PSSI organize many prestigious tournaments that attract the attention of people from all walks of life. Football serves as a medium of communication and social interaction, with many people traveling from different regions to watch their favorite clubs, creating interactions among fans.

In Indonesia, the majority of the population loves football, from children to the elderly. This enthusiasm encourages the opening of Football Schools (SSBs) to nurture top talents. Stadiums play a crucial role as centers of performance and entertainment and must provide adequate facilities and comfort for spectators, players, and other users.

Jakarta International Stadium (JIS) is an example of an internationally standard stadium with a large capacity and advanced features, including a retractable roof system. In Sidikalang, Panji Bako Stadium faces challenges due to inadequate facilities, such as damaged seats and toilets, and a field that often becomes muddy. Although frequently used for various local events, the poor condition of the facilities reduces visitor comfort.

The redesign project of Panji Bako Stadium in Sidikalang is very important to enhance comfort and incorporate contemporary architecture, allowing visitors to enjoy football matches and various other events more comfortably.

1.1. Problem Statement

Referring to the previous context, the following are efforts aimed at addressing the existing challenges : How to depict a football stadium design that supports successful matches and other

activities? And How to integrate contemporary architectural concept into Sidikalang stadium, North Sumatra?

1.2. Objective of Study

References must be listed at the end of the paper. Do not begin them on a new page unless this is absolutely necessary. Authors should ensure that every reference in the text appears in the list of references and vice versa. Indicate references by [1] or [2,3] in the text. Some examples of how your references should be listed are given at the end of this template in the 'References' section, which will allow you to assemble your reference list according to the correct format and font size.

2. Literature Study

2.1. Football

Football is immensely popular worldwide, with Indonesia seeing rapid growth in its popularity. FIFA and PSSI organize prestigious global events, contributing to football's rapid development embraced across all societal segments. It serves as a global conversation topic and a medium for communication and social interaction. In Indonesia, football enjoys widespread love from children to the elderly, fostering enthusiasm for advancing the sport's industry. This enthusiasm drives the establishment of Football Schools (SSBs) aimed at nurturing exceptional talents.

2.2. Stadium

In the classification of stadiums according to the Guidelines for Stadium Building Technical Planning (1991), they are categorized into three types: type A, B, and C. Type A stadiums serve provincial/level 1 regional areas with a seating capacity of 30,000 - 50,000 spectators. Type B stadiums serve district/municipal areas with a capacity of 10,000 - 30,000, while type C stadiums serve sub-district areas with a capacity of 5,000 - 10,000.

The redesign of Panji Bako Stadium will adhere to applicable standards and serve the district area, thus falling under the classification of type B stadiums.

The geometry requirements for a type B stadium are as follows:

FOR THE FOOTBALL FIELD

a. The shape of the field is rectangular.
b. The length of the field must be between 100 and 110 meters.
c. The width of the field must be between 64 and 70 meters.
d. The ratio of width to length of the field must be at least 0.60 and maximum 0.70.
e. The slope of the field surface must be between 0.50% and 1% in all four directions.
f. The clear zones on all sides of the field must have a minimum width of 2.00 meters, while behind the goal posts, it must have a minimum width of 3.50 meters with a minimum length of 11.50 meters for each goal post.

For The Athletic

a. The track must have a length of 400 meters, with a maximum limit of 400.03 meters.
b. The length of the track is measured from an imaginary line located 30 cm from the inside edge of the curve within the running track.
c. The longitudinal slope of the track (running direction) must be within the range of 0 to -0.1%, and the transverse slope within the range of 0 to 1%.
d. Each lane of the track must have a width of 122 cm.
e. The curves of the track must form a semi-circular arc.
f. The length of the straight sections of the track must be a minimum of 70 meters, with a maximum limit of 80 meters.
g. A photo finish system, consisting of a pipe conduit with underground cables to detect the winner of the race, must be installed beneath the final section of the athletic track.
h. The width of the track curb has a maximum limit of 5 cm and should not have sharp angles.
i. The width of the boundary of the track must be a minimum of 2.50 cm, with a maximum limit of 5 cm.

(2024), 3 (1): 609–622 **Scientica** 3021-8209

Jurnal Ilmiah Sain dan Teknologi

2.3. Stadium Existing

In the Sidikalang area, Panji Bako Stadium, inaugurated on April 14, 2009, has become a crucial asset for hosting various major events. This venue has played an essential role in bringing the community together, hosting sports events, concerts, and cultural festivals, which contribute to the local economy and community spirit. However, the stadium faces several challenges related to inadequate facilities. Many seats are damaged, reducing the comfort and capacity for spectators. The amenities are also lacking, with an insufficient number of toilets and other essential facilities to accommodate large crowds. These issues detract from the overall experience of attendees and limit the stadium's potential as a premier event location. Moreover, the swimming pool, which should be an attraction in Sidikalang, is not in optimal condition. It was intended to provide a recreational space for residents and visitors, enhancing the appeal of the area. Unfortunately, due to neglect and lack of maintenance, the pool has not been able to serve its purpose effectively. This has led to missed opportunities for the community, particularly in promoting health and fitness activities, swimming competitions, and other aquatic events. Addressing these infrastructural deficiencies is crucial for maximizing the stadium's value and ensuring it continues to be a significant landmark in Sidikalang.

2. Method

The methods used in this design begin with a field review, where the author conducts observations of the site and its surroundings. Then, the author conducts a literature review related to issues about stadiums and the standardization of stadium comfort. Next, the author conducts a comparative study, where the author analyzes several examples of buildings with similar functions and themes to make comparisons with existing stadiums, thereby assisting the author in considering the design to be applied.

3. Result and Discussion

4.1. Site Information

4.1.1. Location

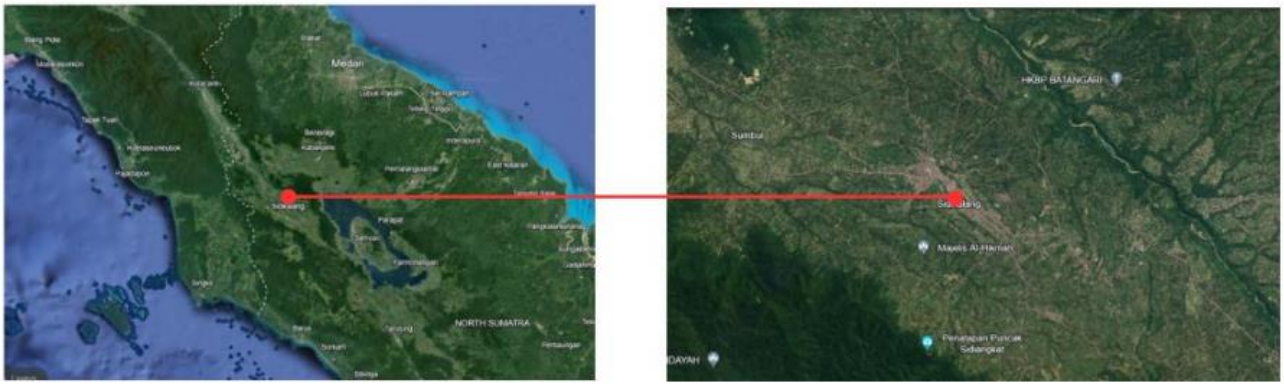

Figure 1 (a) map of north sumatra province; (b) Dairi district map. (Source: Google Earth)

(2024), 3 (1): 609–622 **Scientica** 3021-8209

Jurnal Ilmiah Sain dan Teknologi

Figure 2 (a) Sidikalang City Area; (b) Site Area. (Source: Google Earth)

The stadium design location is at Jl. Subulussalam - Sidikalang No.31, Panji Dabutar, Sitinjo, Dairi, North Sumatra. This location is highly suitable due to its proximity to downtown Sidikalang. Geographically, Sidikalang is situated between 2°43’ - 2°42’ north latitude and 98°21’ - 98°01’ east longitude, sloping northward and located at an altitude of 1,066 meters above sea level. The estimated temperature ranges from a minimum of 15°C to a maximum of 27°C, with humidity levels between 35% and 65%.

4.1.2. Regulation

Based on the measurement results from Google Earth, the site area measures 6.5 hectares. The site is located in Sidikalang City, Dairi, and according to GISTARU, the data obtained is as follows:

Location: Jl. Subulussalam - Sidikalang No.31, Panji Dabutar, Sitinjo, Dairi, North Sumatra, Site Area: 8 hectares, Contour: Flat, Building Coverage Ratio (KDB): 60%, Building Height (GSB): 4 meters, Road Width: 7 meters, Floor Area Ratio (KDH): Minimum 20%, The site previously served as a stadium; due to this redesign project, the site is designated for a stadium.

4.1.3. Context and Connetivity

4.1.3.1. Luasan

Figure 3 Site Location Perspective. (Source: Google Earth)

Sidikalang is located between 2°43’ - 2°42’ latitude north and 98°21’ - 98°01’ longitude east, sloping northward and situated at an altitude of 1,066 meters above sea level. The estimated temperature ranges from a minimum of 15°C to a maximum of 27°C, with humidity levels between 35% and 65%. The project area covers 8 hectares with flat terrain.

4.1.3.2. Site Selection Criteria

a) Urban Structure Assessment

This building is planned to be constructed at Jl. Subulussalam - Sidikalang No.31, Panji Dabutar, Sitinjo, Dairi, North Sumatra. The location is situated near the city center.

b) Accessibility

In terms of accessibility, this location can be accessed easily by both private vehicles and public transportation.

c) Service Area

The available service area in this location includes residential housing. The surrounding environment supports each other's functions with the designed buildings, such as public and residential buildings.

4.1.3.3. Location Requirements

The location criteria based on the needs that can be used as a benchmark standard to consider when selecting the space are:

- Land allocation for sports field functions must comply with the Dairi District Spatial Plan (RDTR).
- Having a good environmental character.
- Accessibility convenience for visitors, managers, and service vehicles.
- Proximity to main roads.

4.1.3.4. Location Selection Analysis

The basis for consideration in determining the design location selected include:

- Accessibility
- Close to the crowds
- Calm atmosphere but not quiet
- Close to public traffic (Library Introduction, Drs. M. Sabirin Nst.)

4.1.3.5. Area Boundaries

Figure 4 (a) community plantation; (b) community plantation. (Source: Google Earth,2023)

Figure 5 (a) community plantation; (b) residential area. (Source: Google Earth,2023)

(2024), 3 (1): 609–622 **Scientica** 3021-8209

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4.1.3.6. Existing Land Condition

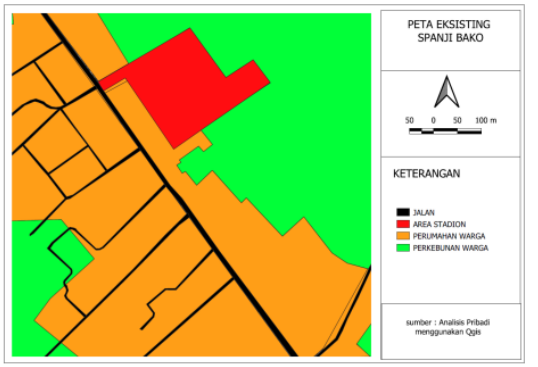
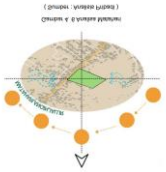
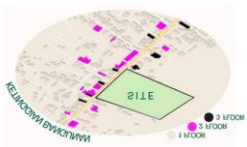
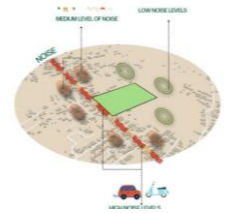
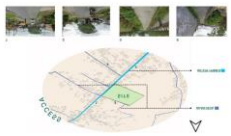
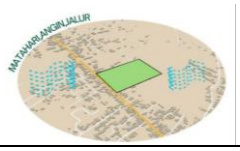


Figure 6 (a) map of exixting land conditions. (Source: Author,2024)

4.1.4. Site Analysis

Table 1 Site Analysis table.

Element	Analysis	Image
Analysis of Achievement and Circulation	The main access to the site is via Subulussalam - Sidikalang Road, which is located in front of the stadium entrance. Proper traffic management is necessary to prevent congestion. The site is easily accessible by public transportation, private vehicles, and two-wheeled vehicles.	
Solar Analysis	Solar analysis can influence the orientation of the building and the physical shape of the building that will later be designed. Things to pay attention to: 1. Potential, Using sunlight as lighting during the day. 2. Problem, An increase in the temperature of the sun's heat at certain times. 3. Solution, Providing trees in certain areas to reduce exposure to direct sunlight on the site and reduce excessive heat temperature increases	
Vegetation Analysis	1. Potential, Using vegetation to reduce solar heat and strong winds. 2. Problem, Tree roots can cause damage to foundations and drainage systems in buildings 3. Solution, Arranging the landscape and reducing surrounding trees that are at risk of damaging the foundation and drainage system	
Analysis of the Height of Surrounding Buildings		

Noise Analysis	1. Potential, The East, South and North have low noise levels. 2. Problem, The greatest noise level comes from the west, namely Jalan Sisingamangaraja, which is the main road. 3. Solution, Place trees around the site to reduce noise	
Accessibility Analysis		
Wind Analysis	1. Potential, Proper air circulation will provide a cool and comfortable impression for visitors. 2. Problem, Excessive air can also cause discomfort for visitors. 3. Solution, Provide openings and ventilation in certain parts to regulate the entry and exit of air	

4.2. Program

Table 2 Detailed Area Program.

Room Type	Name Room	Source	Wide (m2)
Football Field	Football Field	FIFA	7.140
	Field Free Zone	FIFA	2.295
	Security Zone	FIFA	14.100
	Total		23.535
Players and officials Area	Player Tunnel	FIFA	90
	Reserve Player Seats	FIFA	44
	Officials Seats	FIFA	4
	Player Warm Up Area	FIFA	180
	Total		318
Player Changing Room Area	Players Changing Room	FIFA	300
	Showers	FIFA	24
	Manager Room	FIFA	50
	Technical Team	FIFA	40
	Coaching and Technical	FIFA	48
	Indoor Heating Area	FIFA	200
	Referees and Officials 1	FIFA	24
	Referees and Officials 2	FIFA	16
	Cleaning Equipment Warehouse	FIFA	9
	Sports Equipment Warehouse	FIFA	20
	Message Room	FIFA	12
	Whirlpool Room	FIFA	18
	Rinse Room	FIFA	15
	Sauna	FIFA	10
	Lavatory	FIFA	4
	Fitness Room	FIFA	38
	Total		828
Facility Area Medical	Briefing Room	FIFA	25
	First Aid and Treatment Room	FIFA	50
	Total		75
Control Area Doping	The waiting room	FIFA	20
	Medical Office	FIFA	12
	WC/Toilet	FIFA	4
	Total		36

Facility Area Medical	Vvip Tribune	FIFA	300
	Vip Tribune	FIFA	300
	Vip Medical Area	FIFA	45
	VIP Kitchen	FIFA	45
	Vip Reception Area	FIFA	30
	General Tribune	FIFA	13,500
	Main Hall	FIFA	75
	Ticket Box	FIFA	48
	Cleaning Equipment Warehouse	FIFA	120
	Sports Equipment Warehouse	FIFA	120
	Lavatory	FIFA	1,280
	Circulation 30%	FIFA	4,770
	Total		20,633
Room Manager	Daily Chairman's Room	FIFA	27
	General Manager's Room	FIFA	27
	Secretary's Room	FIFA	20
	Manager's Room	FIFA	20
	Public Relations Room	FIFA	20
	The waiting room	FIFA	12
	Taste Room	FIFA	45
	Lobby	FIFA	20
	Pantry	FIFA	12
	Lavatory	FIFA	6
	Circulation 30%	FIFA	90
	Total		299
	Director's Room	FIFA	27
	Secretary's Room	FIFA	15
	Public Relations Room	FIFA	15
	Head of Stadium Room	FIFA	15
	Maintenance Staff Room Field	FIFA	12
	Technical Staff Room	FIFA	12
	Operational Staff Room	FIFA	12
	Fireman's Room	FIFA	30
	Security Room	FIFA	30
	Head of Training Room	FIFA	15
	Staff Fitness Room	FIFA	12
	Head of Club House Room	FIFA	15
	Reception Room	FIFA	10
	Laundry Staff Room	FIFA	12
	Staff Cattering Room	FIFA	12
	Lobby	FIFA	30
	Circulation 30%	FIFA	82
	Total		356
Facility Addition	Banks/ATMs	FIFA	200
	Rental Space Unit	FIFA	200
	Circulation	FIFA	26
	Club House	FIFA	400
	Supporters Association Room	FIFA	24
	Total		950
Areas Journalist	Newsroom	FIFA	200
	Press Conference Room	FIFA	100
	Tv Studio Room	FIFA	80
	Circulation 30%	FIFA	121
	Total		501

Mechanical	Central Panel Room	FIFA	20
	Generator Room	FIFA	60
	Pump and Reservor Room	FIFA	60
	System Space	FIFA	9
	Central Telephone Room	FIFA	9
	Circulation 30%	FIFA	47
	Total		205
	TOTAL OVERALL ROOM		47,676

5. Design Result

1. Massing

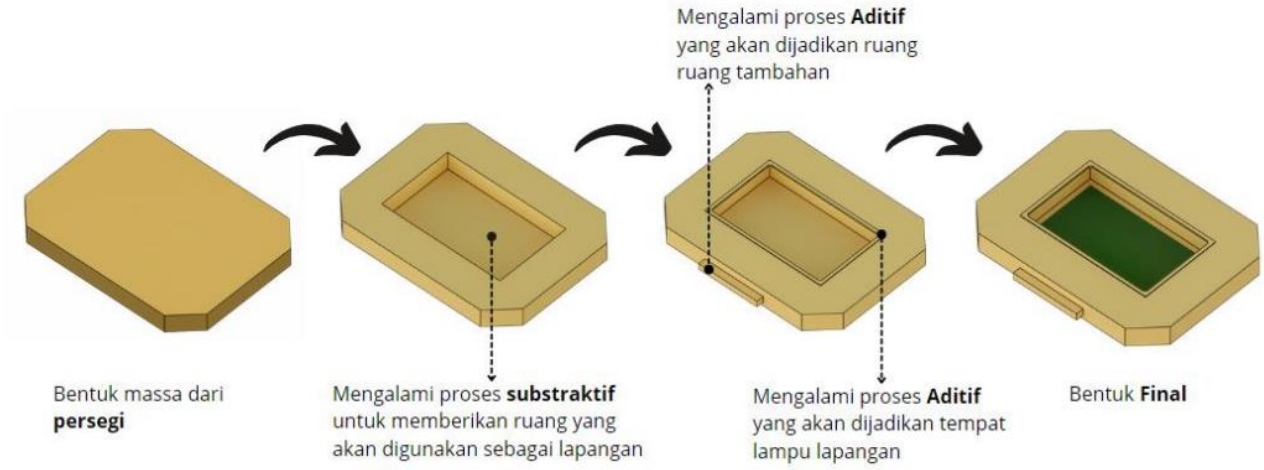


Figure 7 Mass Composition (Source: Author,2024)

2. Context

Context refers to all the factors and conditions that influence the design and development of a stadium building or structure. This includes the physical, environmental, social, cultural, and historical aspects present around the project site. Implementing contemporary architecture and sustainable concepts in the design of this stadium results in a design that is not only aesthetic and functional but also relevant and sustainable within the environment where the building is situated. Furthermore, understanding the local community's needs and preferences is essential in the design process. This ensures the stadium not only serves as a sports facility but also as a community hub that fosters social interaction and engagement. By integrating advanced technologies and environmentally friendly materials, the stadium can achieve higher energy efficiency and reduced environmental impact, contributing to the overall well-being of the area.

3. Theme Implementation

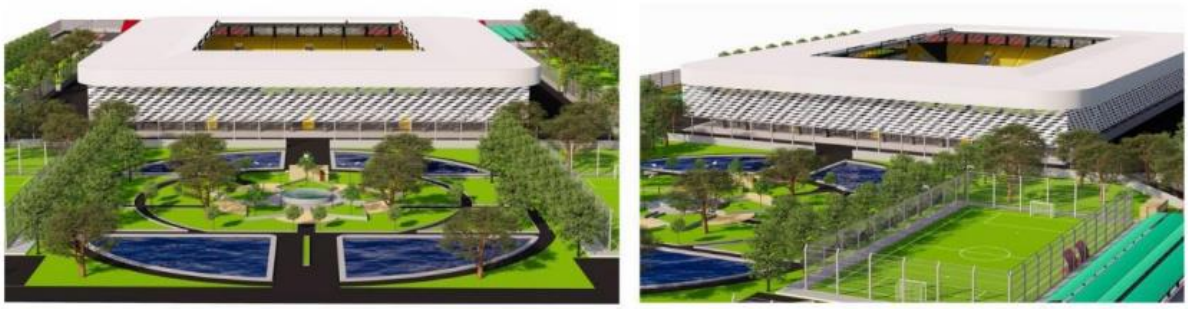


Figure 8 (a) Lanskap Stadium Design; (b) Lanskap Stadium Design Perpective. (Source: Author,2024)

The façade concept in this design creates contrasting shapes and colors to become a point of view on the site, covered with the latest technology roofing material, polycarbonate. The use of lightweight polycarbonate structures can enhance the design, sustainable energy, and building performance, as well as applying a secondary skin with GRC material, ensuring that the building not only stands out visually but also incorporates modern sustainability practices and improved structural efficiency.

4. Site Plan

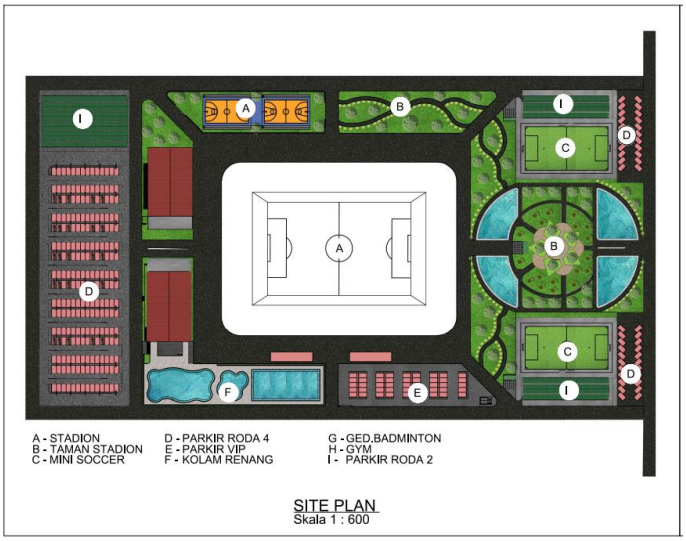


Figure 9 (a) site plan. (Source: Author,2024)

5. Floor Plan

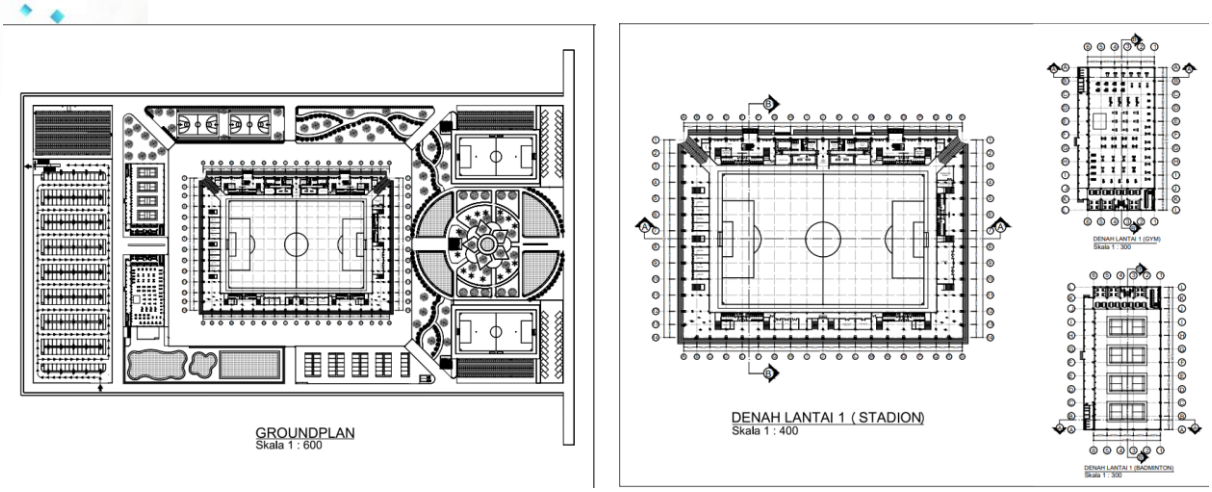


Figure 10 (a) ground plan; (b) first floor plan. (Source: Author,2024)

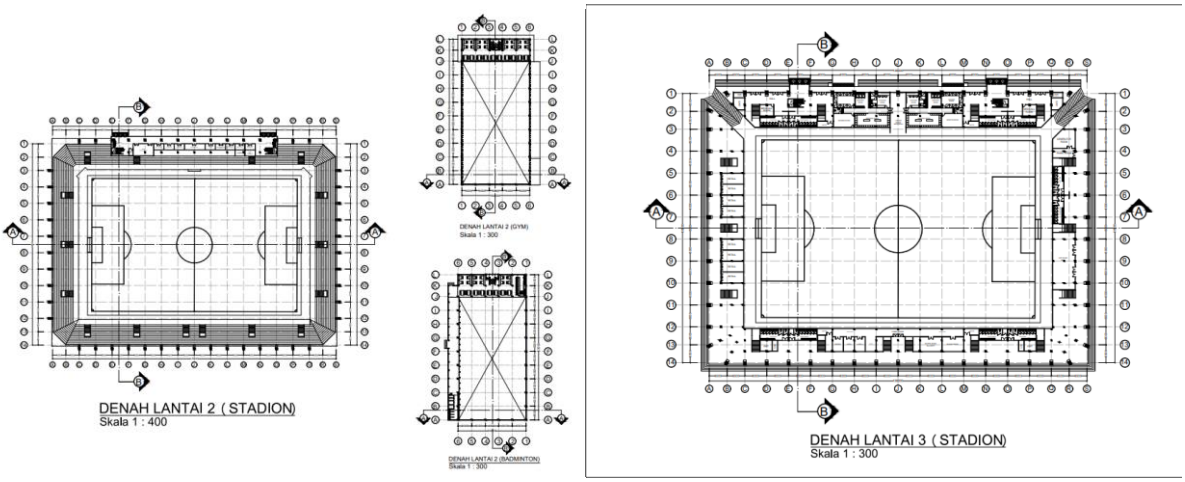


Figure 11 (a) Second Floor plan; (b) third floor plan. (Source: Author,2024)

6. Elevation

Figure 12 (a) front Elevation; (b) Rear Elevation. (Source: Author,2024)

Figure 13 (a) Left Elevation; (b) Right Elevation. (Source: Author,2024)

7. Section

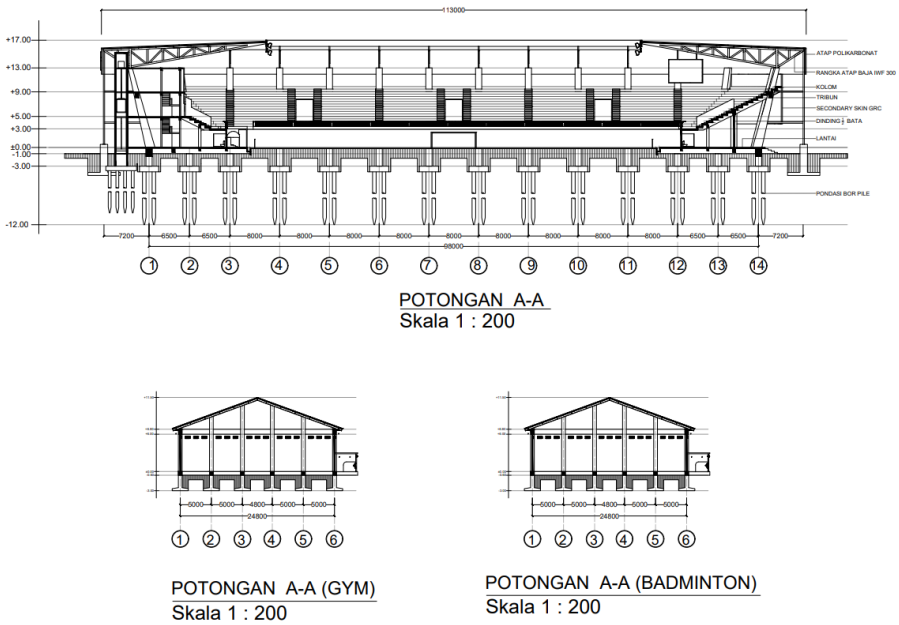


Figure 14 A-A Section. (Source: Author,2024)

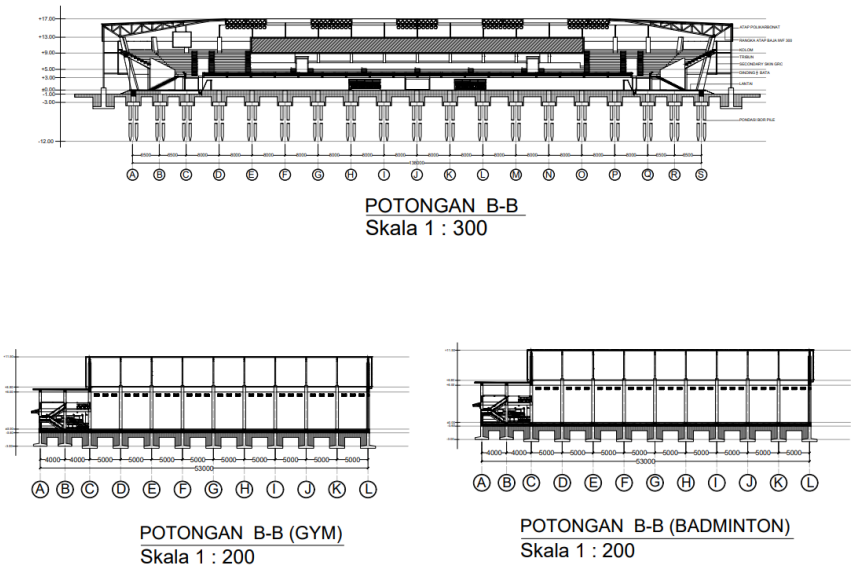


Figure 15 B-B Section. (Source: Author,2024)

6. Conclusion

Football is highly popular in Indonesia, fostering social interaction and community enthusiasm across all age groups. Prestigious tournaments by FIFA and PSSI attract widespread attention. The Jakarta International Stadium (JIS) exemplifies modern stadium standards, while Panji Bako Stadium in Sidikalang suffers from inadequate facilities, affecting visitor comfort.

The redesign of Panji Bako Stadium aims to improve comfort and integrate contemporary architectural elements, ensuring it supports successful matches and events. The project will adhere to type B stadium standards, serving the district with a capacity of 10,000 - 30,000 spectators.

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