

DESIGNING CONVENTION AND EXHIBITION CENTER WITH GREEN ARCHITECTURE APPROACH IN MEDAN CITY

Febriansyah¹, Wahyu Abdillah²

^{1,2} Departemen of Architecture, Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155, Indonesia

*Corresponding Author: febriansyh5@gmail.com¹, wahyu5@usu.ac.id²

Abstract (English)

The convention and exhibition center is a place to conduct MICE (Meeting, Incentive, Conference, and Exhibition) activities where the activities carried out are activities such as state conference meetings, meetings, art exhibitions, product exhibitions, concerts, and other events [1]. In the city of Medan, the facilities are still very limited along with the increase in population and the increasing need for meeting rooms and exhibition rooms, so the "Convention and Exhibition Center" was designed. The plan of this building is located on the street. H. Adam Malik, West Medan District, Medan City, North Sumatra. There are several problems in the West Medan area, namely an untidy environment and a lack of greenery in the area. Therefore, the application of Green Architecture was chosen to have a positive impact on residents and the surrounding environment by applying applicable principles. By carrying out several methods and design steps, this will present solutions to functional needs and green architecture solutions that answer design problems.

Article History

Submitted: 3 Maret 2025

Accepted: 10 Maret 2025

Published: 11 Maret 2025

Key Words

convention, exhibition, green architecture, Medan

1. Introduction

The city of Medan is the third largest city in Indonesia as well as the center of government, industry, trade, tourism and even as a business center in North Sumatra which is currently developing, making it a city with various activities, ranging from local to international standards [9]. This has aroused the interest of entrepreneurs in the field of services and services to improve accommodation facilities to meet the needs of the community and existing tourists. This condition opens up great business opportunities in the field of services and services.

The Convention & Exhibitio Center is a place that accommodates a need for the community to carry out activities such as state conference meetings, meetings, art exhibitions, product exhibitions, concerts, and other events [1]. Therefore, a city needs a Convention & Exhibitio Center to optimally facilitate the needs of a particular community or individual.

Table 1. Capacity of Convention & Exhibition Center Building in Medan City

Building	Capacity
Pardede Hall	4000 People
Medan International Convention Center	3000 People
Regale International Convention & Exhibitio Center	2500 People
Uniland	1000 People
Santika Convention & Exhibitio Center	2000 People
Danau Toba Convention Hall	1500 People
Griya Benn Convention Hall	2000 People
JW Marriot Hotel	1500 People
Adimulia Hotel	1500 People
Aston Hotel	1500 People
Mutiara Suara Nafiri Convention Hall	1000 People

From the table above, it can be concluded that in Medan City there are only a few convention centers that can accommodate the largest capacity of people, namely pardede halls and MICC (Table 1). The capacity of the building greatly affects various activities so that they can be carried out optimally. In addition, the rental rate of the convention center is very high, resulting in a queue for building rental or full booking starting from 1-3 months, and there are still some facilities that are not good. Therefore, a convention center with a capacity of more than 5000 people is still needed and can accommodate more than one convention event in one day in accordance with the standards of stand alone venues.

In the implementation of the design of the convention and exhibition center, there are several aspects that must be considered, such as planning, construction, operation and maintenance. This is still based on several criteria for the use of building materials such as protecting, saving, reducing the use of natural resources, by paying attention to the health of residents and the balance between the building and the environment.

In response to this, an appropriate architectural approach is needed. Green architecture is the right theme in developing the design of the convention and exhibition center in the city of Medan as a response to the current global warming. Some of the efforts that can reduce global warming include applying green principles through programs that utilize natural light, maximizing airflow, saving water, energy and the use of green materials.

2. Literature Review

2.1 Design

Design is the initial activity of a series of activities in designing a new system that can overcome the problems and difficulties faced by the project obtained from the analysis and sorting of system alternatives [2].

2.2 Konvensi

A convention is a meeting activity attended by a group with the aim of exchanging ideas, views, getting the latest information, discussing plans and facts for the common good [3]. Center comes from the English language, which in Indonesian means center. "Center is a place for particular activity", which means a place for a particular activity or a special activity [4]. Center can also be interpreted as a center of activity that is an attractive destination for many people. So, a convention center can be interpreted as a center/forum for meeting activities attended by a group for the common good. The convention center functions as a venue for meeting activities such as state conferences, company meetings, trade and industry exhibitions, and even entertainment events such as concerts and weddings. The convention center is a forum for MICE activities, namely meetings, incentives, conferences and exhibitions [1].

2.3 Exhibitions

An exhibition is an activity that involves many people and requires a room that is used as a place to exhibit and introduce the latest products of industrial equipment and services [5].

2.4 Green Architecture

Green architecture is not only limited to buildings with a lot of vegetation. The green architecture here emphasizes usability and user comfort in the building by minimizing the use of active systems, thus allowing the building to be realized with natural materials and passive ventilation [6]. In another concept, green architecture is a building that uses as few natural resources as possible, including energy, water, and materials, and has minimal negative impact on the environment. Green architecture is a step towards sustainable human life [7].

In the book Green Architecture Design for a Sustainable Future [8] states that green architecture has six principles, including Conserving Energy is a principle that uses energy correctly and appropriately. A good building must consider energy consumption before and after construction. Building plans must be able to influence and adapt to the environment energy building plans can be achieved. Then Working With Climate is a principle that utilizes

climate, nature and the environment in the form and function of buildings. Then Respect For Site is a design design referring to the interaction between the building and its location. The goal is to ensure that the building does not damage the environment in its structure, shape and function. After that, Respect For User is a very close relationship between users and green architecture. Given the need for green architecture, the condition of building users or residents must be considered. Furthermore, Limiting New Resources Buildings are designed by maximizing existing materials and minimizing the use of new materials. Meanwhile, Holistic is a combination of the above five points in one architectural design. In principle, the principles of green architecture are intertwined and inseparable.

2.5 Medan City

Medan City is the capital of North Sumatra Province which borders Deli Serdang district to the east, west and south, as well as the Strait of Malacca in the north. Medan is the third largest city in Indonesia which is dominated by Melayu. The city of Medan is the city with the largest population in North Sumatra, and a city that is the center of the largest economic activity. This can be shown by the existence of places such as shopping centers, markets, and also many hotels [9].

3. Methodology

This study uses scientific methods that involve the collection of primary and secondary data to find out and understand various aspects related to the architectural design of the convention and exhibition center. Primary data were obtained through observation and documentation studies. Observational study is a method that is carried out by observing and paying attention to a subject or object without intervening or influencing it, with the aim of understanding the behavior, activity, or phenomenon observed objectively. Documentation in the form of situational photos is used to clarify the data analyzed and serves as supporting evidence of the method. Secondary data were collected through literature studies, and comparative studies. Study literature involves collecting data from written sources such as books, articles, journals, and other textual sources related to the topic being discussed. The purpose of the literature study is to understand the history, theories, concepts, developments and problems relevant to the application of the design concept to be analyzed. Comparative studies are used to compare different aspects of building design, spatial layout, materials, architectural elements, and design concepts between different architectural works. This method helps in understanding differences and similarities, as well as gaining useful insights in building design. From some of these methods, they are analyzed and then obtained and applied to design concepts.

4. Result and Discussion

4.1 Location Description

Based on the analysis of several locations that have been carried out, this location is the most appropriate location because it has met the location criteria in this design. The design location is on Jl. H. Adam Malik, West Medan District, Medan City, North Sumatra with a site area of ± 2.6 hectares (Figure 1).

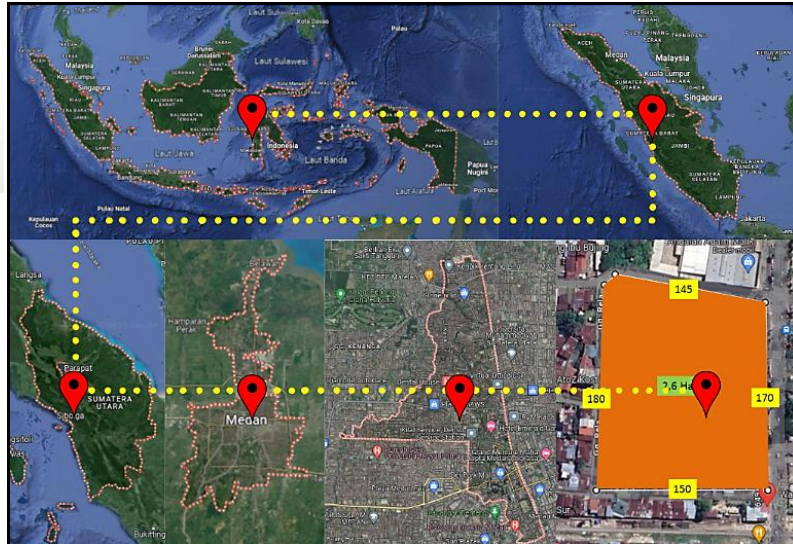


Figure 1. Location Map

4.2 Regulation

This site is a Commercial Zone (K-2) and a High Density Housing Zone (R-1) (Figure 2), so there are regulations that must be complied with in accordance with the Regional Regulations of Medan City for 2015 – 2035 [10], namely the classification of activity zones (Table 2).



Figure 2. Map of RDTR Medan City

In the classification of activity zones (Table 2), the design of convention and exhibition centers in some high-density housing zones (R-1) received permits to be built on the condition that they meet relevant provisions and regulations.

Table 2. Activity Zone Classification

NO	KLASIFIKASI ZONA KLASIFIKASI KEGIATAN	Zona Perumahan		
		R-1	R-2	R-3
	DAFTAR KEGIATAN	tinggi	sedang	rendah
1	2	22	23	24
9	Jasa Percetakan	B	X	X
10	Gedung Pertemuan/Auditorium/Jambur	B	B	B

The intensity of space utilization is written that in the commercial service zone the maximum KDB is 70%, the **maximum** KLB is 10, the minimum KDH is 20% and the maximum building height is 15 floors or equivalent to 60 m (Table 3).

Table 3. Intensity of Space Utilization

No	Zona	KDB Maksimum	KLB Maksimum	KDH Minimum	Ketinggian Bangunan Maksimum*)	Keterangan
1	2	3	4	5	6	7
13.	Perdagangan	80%	8	20%	13 Lantai/ 51 M	Khusus untuk perdagangan jenis toko dan bangunan deret dibatasi ketinggian maksimal 5
14.	Jasa Komersil	70%	10	20%	15 Lantai/ 60 M	Sesuai kelayakan persyaratan bangunan gedung Untuk Pusat Kota dan SPK dalam RTRW berlaku KLB maksimum 21 sepanjang sesuai kelayakan persyaratan bangunan gedung
15.	Perkantoran	60%	6	20%	13 Lantai/ 51 M	Untuk Pusat Kota serta SPK dalam RTRW, KLB dan ketinggian bangunan dapat melebihi ketentuan sepanjang sesuai kelayakan persyaratan bangunan gedung
16.	Industri dan Pergudangan	50%	1,5	30%	*	** sesuai kelayakan persyaratan bangunan gedung
17.	Sarana Pelayanan Umum	60%	6	20%	13 Lantai/ 51 M	
18.	Khusus	40%	1,2	50%		Ketinggian disesuaikan dengan kebutuhan dan ketentuan yang berlaku

The design location is on Jalan Artei Secondary, namely Jl. H. Adam Malik, District. West Medan, Medan City, North Sumatra which has a road width of 26 m and a GSB of 15 m (Table 4).

Table 4. Rencana Fungsi Jalan

No.	Jalan	Lebar Jalan	GSB	Trase/Jalur
B	Jalan Arteri Sekunder			
1	Jalan Sicanang	26	10	Jalan K.L. Yos Sudarso – Jalan Lingkar Marelani Sisi Barat (rencana)
2	Jalan Lingkar Marelani Sisi Barat (rencana)	26	15	Jalan Sicanang – Jalan Rahmad Budin
3	Jalan Marelani Raya	26	10	Jalan Rahmad Budin – Batas Kota
4	Jalan K.L. Yos Sudarso	26	12,5	Jalan Kolonel Bejo – Jalan Bambu II
5	Jalan H. Adam Malik	26	15	Jalan K.L. Yos Sudarso – Jalan T. Amir Hamzah
6	Jalan T. Amir Hamzah	26	12,5	Jalan Adam Malik – Jalan Gaperta
7	Jalan Kapten Muslim	26	10	Jalan Gaperta – Jalan Jenderal Gatot Subroto
8	Jalan Sunggal	26	15	Jalan Jenderal Gatot Subroto – Jalan Dr. Setia Budi
9	Jalan Dr. Setia Budi	26	9,5	Jalan Sunggal – Jalan Dr. Mansyur
10	Jalan Dr. Mansyur	26	12	Jalan Dr. Setia Budi – Jalan Letjend. Jamin Ginting
11	Jalan Terusan Dr. Mansyur	26	12	Jalan Letjend. Jamin Ginting – Pusat Kota (CBD Polonia)
12	Jalan Armada	40	4	Jalan Brigjend. Katamso – Jalan Sisingamangaraja
13	Jalan H.M. Joni	40	5	Jalan Sisingamangaraja – Jalan Bakti
14	Jalan Bakti	26	6	Jalan H.M. Joni – Jalan Halat/Megawati

4.3 Mass Concept

The shape of the building mass was initially rectangular and hexagonal which then underwent a transformation of the shape of subtraction and addition. The shape was chosen because it prioritizes functionality according to the function of the building itself, namely the hexagon was chosen as the basic shape of the auditorium which is suitable for one of the auditorium models according to [3], in addition the basic shape of the rectangle was chosen to function as a convention room, exhibition and parking building. The difference in color in the shape of the square/beam as a marker of floor zoning (Figure 3).

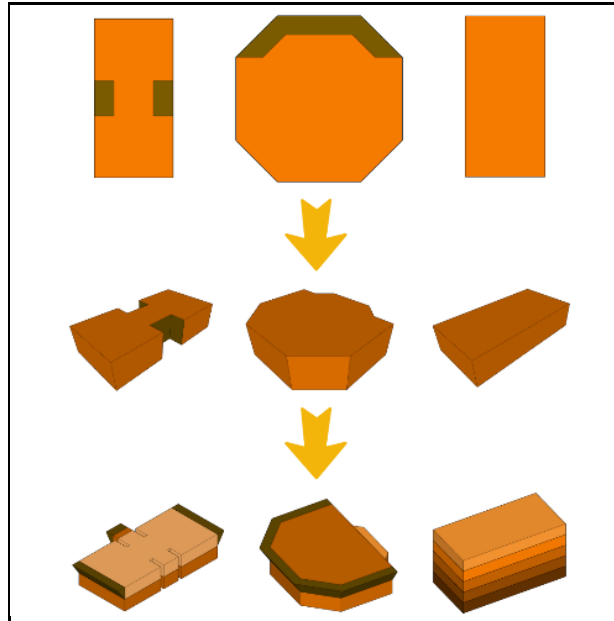


Figure 3. Mass Concept

4.4 Site Context

On the right side of the building, there are several functions, namely the convention hall, exhibition hall, food court and supporting functions. The middle part of the building functions as an auditorium room, the left part only functions as a parking building, in addition to that the front part functions as an entrance and park, while the back part has a technical building and a loading dock path and a building manager (Figure 4).

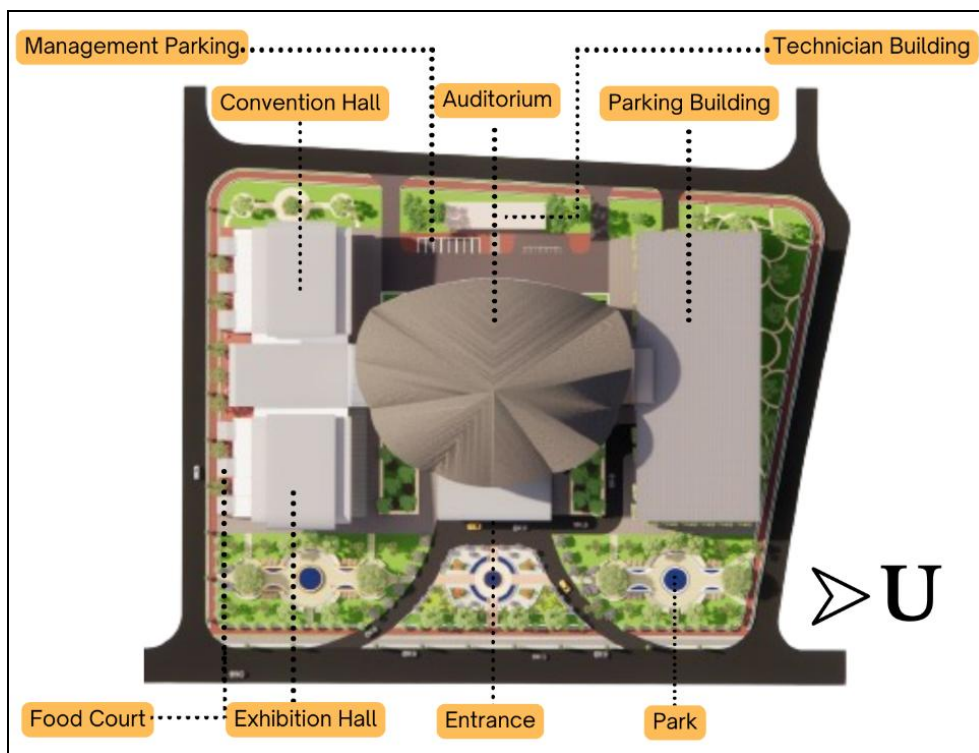


Figure 4. Site Context

4.5 Facade

The façade of this building was formed because it was influenced by the principles of green architecture such as the use of double glass walls, windows, air vents and several forms

of sloping buildings. This building is dominated by brown, beige and white colors, while the roof of this building uses a zincalume roof (Figure 5).



Figure 5. Facade

4.6 Theme Implementation

This design applies a green architecture approach, among others, by applying green principles, namely conserving energy, respect for site, respect for user, working with climate and limiting new resources (Figure 6). Some things to consider in designing a hotel in Medan City with a green architecture approach include, conserving energy applies openings on the walls of the auditorium so that air can enter the room, in addition to the use of glass walls as natural lighting and the use of LED lights to save electricity use. There is an opening on the roof of the auditorium so that air can enter the room which can reduce the use of air conditioning. Then respect for site by reducing carbon dioxide (CO₂) emissions by absorbing air pollution and reducing noise from the road in the form of trees/vegetation in parks and parking buildings. In addition to being close to the city center, access to the building is also very pedestrian friendly because it provides such as pedestrian paths, parking and bicycle paths. Then respect for user by applying the use of sun shading to provide comfort for users so that they are not exposed to excess sunlight. After that, working with climate by making the glass tilted so that sunlight is reflected downwards so that the user is not exposed to direct sunlight and the room is not too hot. Furthermore, limiting new resource uses Low E Glass, which stands for "Low Emissivity" glass. It is clear glass that has been coated with an invisible layer of metal oxide. This coating can significantly reduce the amount of heat and ultraviolet (UV) and infrared rays entering the home as well as the use of wood materials on some exterior and interior of the building.



Figure 6. Theme Implementation

4. Conclusion

The design of the convention and exhibition center is used for various meeting activities such as seminars, conferences, exhibitions, performances and others. The location of this building is on Jalan H.Adam Malik. The target of visitors is business actors or entrepreneurs and the community, both from the region and internationally. Green architecture is applied to this building in accordance with the principles that apply to minimize various building influences that can harm human health and the environment.

5. Acknowledgements

The author would like to thank Mr.Wahyu Abdillah, ST.,MT., as the supervisor. Mr. Firman Eddy,ST.,MT.,IAI.,IPM and Mr.Dr.Anthoni Veery Mardianta,ST.,MT., as final project examiners who have shared their knowledge with the author, and not to forget also to parents, family, friends, and all those who have given prayers, support, and encouragement to the author.

6. Conflict of Interest

The authors whose names are listed below state that the manuscript has no conflict of interest. As for certain parts of writing this thesis that I quote from the works of others, the sources have been clearly written in accordance with the norms, rules, and ethics of scientific writing.

REFERENCES

-
- [1] Shidiqi. (2019). Convention And Exhibition Center.
 - [2] Ladjamudin, Al-Bahra (2005). Analisis dan Desain Sistem Informasi. Yogyakarta: Graha Ilmu.
 - [3] F. R. Lawson. Conference, convention, and exhibition facilities: a handbook of planning, design, and management. Butterworth-Heinemann. 1981.
 - [4] Oxford University Press. (2016). English Oxford Living Dictionaries. Diambil kembali dari English Oxford Living Dictionaries.
 - [5] Utomo, W., (2020). Convention and Exhibition Center Di Kota Malang Tema: Arsitektur Kontemporer. Pengilon: Jurnal Arsitektur, Vol 4 No 02 (2020): Pengilon : Jurnal Arsitektur, 149–160.
 - [6] Ardiani, Y. Mila (2015). Sustainable Architecture: Arsitektur Berkelanjutan. Jakarta: Erlangga.
 - [7] Karyono, Tri Harso (2010). Green Architecture: Pengantar Pemahaman Arsitektur Hijau di Indonesia. Jakarta: PT Raja Grafindo Persada.
 - [8] Vale, Brenda, et.al (1996). Green Architecture Design for Sustainable Future. London: Thames & Hudson.
 - [9] Sujatmoko, Koko (2015). Survey Awal Pengembangan Potensi Kota Medan sebagai Kota Wisata. Universitas Sumatera Utara.
 - [10] Peraturan daerah Kota Medan tahun 2015 – 2035