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DESIGN STRUCTURE GREEN BUILDING ANTAPURA HOTEL IN KUNINGAN REGENCY

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Abstract

Kuningan Regency is one area that is considered to have tourism potential with mountainous geographical conditions with various natural beauty and natural springs In order to get the best outcomes, Kuningan Regency needs competent and well-planned management. Kuningan Regency's commercially managed hotel, which offers lodging and service services to the local population, is one of the facilities that supports tourism. It is anticipated that the hotel's presence will blend in with the surrounding area and complement the location of the establishment. Kuningan's need for hotel services will rise in proportion to the number of visitors. Building a hotel in Manis Kidul, Jalaksana District, Kuningan Regency, West Java, is proposed in response to the growing demand for hotel accommodations. Collect primary and secondary data and then conduct pre-eliminary design,design and structure analysis used Etabs v19 application. Green construction, green building, and sustainable building are other names for green building. A concept called sustainable building is offered as a solution to issues like global warming and natural disaster damage. A «green building» is one that is constructed using sustainable materials, energy efficiency, and ecologically friendly design principles. As per the Green Building Council Indonesia, a green building is one that incorporates sustainable practices in its planning, construction, operation, and maintenance elements, hence conserving natural resources, preserving the building's quality, and safeguarding the environment. Natural resources, preserving the standard of indoor air quality and building quality, Its focus on the well-being of its residents, all of which are grounded in the ideas of sustainable development. From the design of the planning of Green Building Antapura Hotel in Kuningan Regency using reinforced concrete structures, obtained each dimension of the structure. Considering the budget plan's computation for

Green Building Antapura Hotel , it is estimated that it will cost Rp 29.227.700.000.00.

INTRODUCTION

The global construction industry is currently facing sustainability challenges, especially in the hospitality sector (Suryahani et al., 2024). Along with accelerating urbanization and increasing attention to environmental issues, the need for sustainable building practices is becoming more and more urgent. The design and construction of green buildings, such as hotels, has emerged as an important response to this global issue (Widyawati, 2019). Eco-friendly hotels, especially those that follow green building principles, reduce carbon footprints, save energy, and minimize environmental impact while offering modern amenities for guests. Indonesia is a country that has natural beauty and cultural diversity, so it is necessary to increase the tourism sector which plays an important role in regional income. Because tourism is a labor-intensive industry (Aprilia et al., 2025; Yuniarto, 2023).

Kuningan Regency is one area that is considered to have tourism potential with mountainous geographical conditions with various natural beauty and natural springs. Therefore, Kuningan Regency requires good and planned management in order to get optimal results. One of the tourism supporting facilities in Kuningan Regency is the construction of a commercially managed hotel by providing lodging facilities to the community with service facilities. Where the existence of the hotel is expected to be part of the environment and in harmony with the place where the hotel is located.

Several factors are contributing to the increased demand for sustainable building practices (Triani & Novani, 2023). These include rising energy costs, growing awareness of environmental issues, and increasingly stringent regulations regarding energy efficiency and waste management. In addition, the hospitality industry is under pressure to adopt practices that not only meet the needs of modern travelers but are also in line with global sustainability goals. In areas such as Kuningan Regency, where the tourism sector is a major economic driver, there is a growing recognition of the importance of integrating sustainability in hotel development to maintain competitiveness and attract environmentally conscious tourists.

The impact of these factors is multifaceted (Widiati, 2019). On the one hand, the implementation of green building practices can significantly reduce the environmental impact of hotels (Mbasera et al., 2016). On the other hand, continuous design integration results in long-term operational cost savings, improved energy efficiency, and higher guest satisfaction. However, while the benefits are obvious, there are challenges in implementing the practice, especially in developing areas where resources and knowledge may be limited.

The more tourists who visit Kuningan, the more demand for the use of hotel services will increase. Due to the increasing demand for hotel use, it is planned to build a hotel in Manis Kidul, Jalaksana District, Kuningan Regency, West Java. In planning a multi-story building that functions as a hotel, it is necessary to pay attention to comfort, economy, strength, and influence on the surrounding environment. Therefore, planning

must be planned as well as possible according to land limitations. From the problems above, the structure of the hotel building in Kuningan Regency will be designed. The hotel building with reinforced concrete construction is planned for 4 floors including a rooftop inside.

Based on the safety and comfort criteria, the loading planning process must comply with SNI 1727:2020, and the building structure planning must refer to SNI 2847:2019 for reinforced concrete which is the latest regulation adapted to the latest material technology developments by referring to the AISC (American Institute of Steel Construction), apart from the calculation of earthquake engineering, it must also refer to SNI 1726:2019. This study focused on designing the structure Green Building Antapura Hotel in Kuningan Regency Based on SNI 2847:2019, SNI 1727 : 2020, and SNI 1726:2019.

According to Bolly, (2023) The application of the green building concept in resort hotels in Likupang can have a positive impact on the environment and the surrounding community. In addition to reducing negative impacts on nature, this hotel can also be an example for other tourism industries in maintaining environmental sustainability. Thus, the development of a 5-star resort hotel with a green building concept in East Likupang is expected to facilitate the needs of tourists and contribute to sustainable development in the region.

The novelty of this study lies in its application of modern green building principles to a hotel project in a developing area, where such practices are often underutilized. This research contributes to the body of knowledge on sustainable hotel construction by addressing the unique challenges faced by regions like Kuningan Regency and providing a practical framework for future developments. The urgency of this research is underscored by the rapid pace of urbanization and the need for environmentally responsible development in tourist destinations. By investigating the feasibility of a green hotel in Kuningan, this study provides insights into how local governments and developers can align their efforts with global sustainability goals.

The aim of this research is to find out what the criteria are green building, to design a new hotel building using concrete structure, to know the details of the dimensions, slab, beam, column and foundation accordingly, to find out how to analyze structure of a high rise buildings using ETABS 19 and to find out how to calculate the budget plan (RAB) of Antapura Hotel.

The scope of this research problem is only planning and designing the construction of the Hotel Building in Kuningan accordance with SNI 2847:2019 for Reinforced Concrete and SNI 1727:2020 for Loading, calculating the earthquake force that occurs in the building structure, not planning the installation of electricity, sanitation and ceiling,isualizing through 2D depiction, analyze building structures only on beams, columns, slabs, and foundations and calculating the Budget Plan (RAB) on the structure. The findings will also offer valuable lessons on the integration of green building practices into the hospitality sector, ultimately contributing to the creation of more sustainable and energy-efficient buildings in Indonesia and beyond.

METHOD

The research design starts with gathering and studying the literature related to planning. Collect data that will be used as data in objects. The design used in this study is as follows:

a. Existing data in the form of land area and building area and the function of the building to be planned.
b. Building image data
c. Literature study by collecting references from books and the internet, which are intended as preparation for the thesis.
d. SNI 2847:2019 (Structural concrete requirements for buildings)
e. SNI 1726:2019 (Procedures for earthquake resistance planning for building structures and Non-buildings)
f. SNI 1727:2020 (minimum load for building design and other structures)
g. Making conclusions and suggestions from the results of the study.

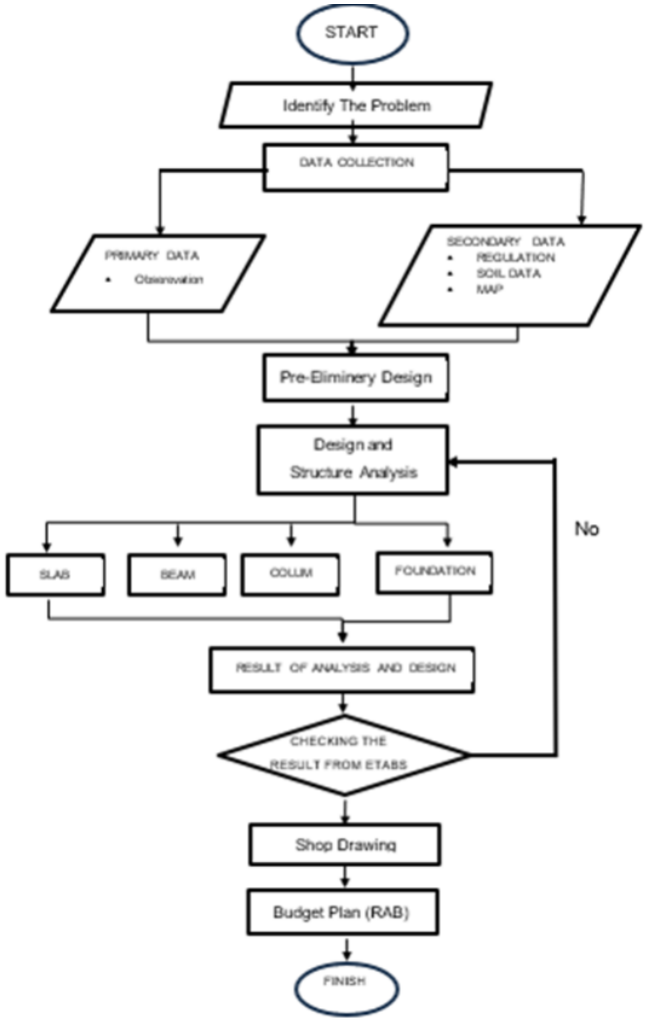

Figure 1. Flowchart

Figure 2. Research Location

RESULTS AND DISCUSSION

Green Building

Green construction, green building, and sustainable building are other names for green building (Asih & Qomarun, 2020; Sheth, 2016). A concept called sustainable building is offered as a solution to issues like global warming and natural disaster damage (Bungau et al., 2022; Kibert, 2016). A green building is one that is constructed using sustainable materials, energy efficiency, and ecologically friendly design principles (Ragheb et al., 2016). attempts to create an effective use of resources at every stage of the building's life cycle, including design, construction, operation, maintenance, refurbishment, and demolition.

A green building is defined by the World Green Building Council as one that, by its planning, execution, or use, minimizes or eliminates adverse effects while generating beneficial ones on the environment and (Basri, 2024; Ching & Shapiro, 2020; Zhang et al., 2019).Green construction, green building, and sustainable building are other names for green building. A concept called sustainable building is offered as a solution to issues like global warming and natural disaster damage. A green building is one that is constructed using sustainable materials, energy efficiency, and ecologically friendly design principles (Ragheb et al., 2016). attempts to create an effective use of resources at every stage of the building's life cycle, including design, construction, operation, maintenance, refurbishment, and demolition.

A green building is defined by the World Green Building Council as one that, by its planning, execution, or use, minimizes or eliminates adverse effects while generating beneficial ones on the environment and climate (Li et al., 2023). Can have a favorable effect on the ecology and climate. Green construction enhances our standard of living while protecting priceless natural resources. As per the DKI Jakarta Governor's Green Building Regulation No. 38/2012, A green building is one that uses resources and the environment responsibly during all phases of construction, including planning, implementing, using, maintaining, and dismantling. As per the Green Building Council

Indonesia, a green building is one that incorporates sustainable practices in its planning, construction, operation, and maintenance elements, hence conserving natural resources, preserving the building's quality, and safeguarding the environment. Natural resources, preserving the standard of indoor air quality and building quality, Its focus on the well-being of its residents, all of which are grounded in the ideas of sustainable development. Of development that is sustainable.preserving the standard of indoor air quality and building quality.

Building Structure Data

1. Building Specification

a. Building Functions : Hotel
b. Type of Structure : Reinforced Concrete Structur
c. Number of Floors : 4 Floors
d. Buildings Height : 15 m
   1) 1st Floor : 3 m
   2) 2nd Floor : 3 m
   3) 3rd Floor : 3 m
   4) 4th Floor : 3 m
   5) Finish Roof : 3 m
e. Building Area : 7108 m^2
   1) 1st Floor : 1476 m^2
   2) 2nd Floor : 1408 m2
   3) 3rd Floor : 1408 m2
   4) 4th Floor : 1408 m^2
f. Location : Kuningan Regency
g. Soil Type : Tanah Lunak (Lose Soil)

2. Material Specification

a. Specifications of Concrete Quality
   1) Slab : fc' = 30.000 kN/mm^2
   2) Beam : fc' = 30.000 kN/mm2
   3) Column : fc' = 30.000 kN/mm2
   4) Foundation : fc' = 30.000 kN/mm^2
b. Specifications of Steel Reinforcement
   1) Longitudinal : 42.000 kN/mm^2
   2) Transversal : 28.000 kN/mm^2

Pre-Eliminary Design

1. Beam

a. Beam Data
   1) Quality of Concrete (fc') = 30.000 kN/mm^2
   2) Steel Yield Stress (fy) = 42.000 kN/mm2
   3) Rebar Transversal (ds) = 12 mm

4) Rebar Longitudinal (ls) = 22 mm
5) Concrete Covers (c) = 40 mm
6) Dimension Column (C1) = 600 mm

2. Two way Slab

a. Slab Data

1) Observed slab = Slab Type 2
2) Dimension slab
   Lx (Shortest span) = 4000 mm
   Lnx (Lx-b.BI 3) = 3750 mm
   Ly (Longest span) = 4400 mm
   Lny (Ly-b.BI 1) = 4150 mm
   β $= \frac{LY}{LX} = \frac{4400}{4000} = 1{,}1$
3) Quality of Concrete (fc) = 30 Mpa
4) Steel Yield Stress (fy) = 420 Mpa
5) Thickness of slab (hf) = 125 mm
6) Concrete Cover = 20 mm
7) Rebar Diameter (ø) = 12 mm
8) Beam Wide (bw) = 250 mm
9) Beam Height (hb) = 350 -125
   = 225 mm

Structure Reinforcement

1. Slab

Jenis Strutktur		Arah X			Arah Y		
		Diameter Tulangan - Jarak Tulangan (mm)	Luas Tulangan (mm²)		Diameter Tulangan - Jarak Tulangan (mm)	Luas Tulangan (mm²)	
			Dibutuhkan	Digunakan		Dibutuhkan	Digunakan
Plat Lantai Tipe 1 (4.4m x 4.4m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	42
	Tumpuan	Ø8 - 150	337	335	Ø8 - 150	310	335
Plat Lantai Tipe 2 (4m x 4.4m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	335	Ø10 - 150	310	335
Plat Lantai Tipe 3 (3.6m x 4.4m)	Lapangan	Ø8 - 150	337	310	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	310	Ø8 - 150	310	335
Plat Lantai Tipe 4 (4m x 2.2m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	335	Ø8 - 150	310	335
Plat Lantai Tipe 5 (4m x 4.3m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	335	Ø8 - 150	310	335
Plat Lantai Tipe 6 (3.6m x 2.2m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	335	Ø8 - 150	310	335
Plat Lantai Tipe 7 (4.4m x 2.2m)	Lapangan	Ø8 - 150	337	335	Ø8 - 150	310	335
	Tumpuan	Ø8 - 150	337	335	Ø8 - 150	310	335
Plat Atap Tipe 1 (4.4m x 4.4m)	Lapangan	Ø8 - 200	287	251	Ø8 - 200	260	251
	Tumpuan	Ø8 - 200	287	251	Ø8 - 200	260	251
Plat Atap Tipe 2 (4m x 4.4m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251
Plat Atap Tipe 3 (3.6m x 4.4m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251
Plat Atap Tipe 4 (4m x 2.2m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251
Plat Atap Tipe 5 (4m x 4.3m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251
Plat Atap Tipe 6 (3.6m x 2.2m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251
Plat Atap Tipe 7 (4.4m x 2.2m)	Lapangan	Ø8 - 200	253	251	Ø8 - 200	227	251
	Tumpuan	Ø8 - 200	253	251	Ø8 - 200	227	251

Figure 1. Recapitulation of Slabs Reinforcement

2. Coloumn

Table 2. Recapitulation of Column Reinforcement

COLUMN TYPE	DIMENSIONS (mm)	REINFORCEMENT

		Longitudinal			Shear		
K1	600x600	13	D	19	Ø	13	- 200
K2	500x500	6	D	19	Ø	13	- 150
K3	300x250	3	D	19	Ø	13	- 100

Source: Data processed

Table 3. Recapitulation of Beam Reinforcement

Structure Element		Reinforcement Plan					
		Longitudinal Reinforcement			Shear mm		
TIE BEAM 1 (450x300)	Support	4	D	19	Ø	13 -	150
L = 4.4 m	Field	3	D	19	Ø	13 -	150
TIE BEAM 2 (450x200)	Support	2	D	19	Ø	13 -	150
L = 4.3 m	Field	2	D	19	Ø	13 -	150
TIE BEAM 3 (450x200)	Support	4	D	16	Ø	10 -	120
L = 2.2	Field	4	D	16	Ø	10 -	120
TIE BEAM 4 (300x200)	Support	3	D	16	Ø	10 -	120
L = 2.1	Field	3	D	16	Ø	10 -	120
TIE BEAM 5 (400x200)	Support	2	D	19	Ø	13 -	150
L = 4 m	Field	2	D	19	Ø	13 -	150
TIE BEAM 6 (300x175)	Support	2	D	19	Ø	13 -	120
L = 3.6 m	Field	2	D	19	Ø	13 -	120
BALOK INDUK 1	Support	4	D	19	Ø	13 -	150
L = 4.4 m	Field	4	D	19	Ø	13 -	150
BALOK INDUK 2	Support	2	D	19	Ø	13 -	150
L = 4.3 m	Field	2	D	19	Ø	13 -	150
BALOK INDUK 3	Support	2	D	19	Ø	13 -	150
L = 4 m	Field	2	D	19	Ø	13 -	150
BALOK INDUK 4	Support	2	D	16	Ø	10 -	120
L = 2.2 m	Field	2	D	16	Ø	10 -	120
BALOK INDUK 5	Support	3	D	16	Ø	10 -	120
L = 2.1 m	Field	3	D	16	Ø	10 -	120
BALOK INDUK 5	Support	2	D	19	Ø	13 -	120
L – 3.6 m	Field	2	D	19	Ø	13 -	120

Source: Data processed

3. Foundation

Table 3. Recapitulation of Foundation Reinforcement

TYPE FONDATION	PILE CAP DIMENSION (Lx x Ly x h) (m)	n PILE	REINFORCEMENT	
			X Direction	Y Direction
PILECAP 1	2,4 x 2,4 x 0,7	4 PILE	D20 - 150	D20 - 150
PILECAP 2	2,4 x 2,4 x 0,6	4 PILE	D19 - 200	D19 – 200

Source: Data processed

BUDGET PLAN

Table 4. Budget Plan

RECAPITULATION OF DORMITORY BUDGET PLAN COST OF HOTEL AT KUNINGAN				
NNo.	**Work Description**	**Sum**		**Weights (%)**
11	2	3		4
aA	PREPARATION WORK	Rp. 18.108.979,52	29.227.779.290,90	0.00062
bB	PILE FOUNDATION WORK			
	Mobilization and Demobilization of pile Tools	Rp. 40.000.000,00	29.227.779.290,90	0.00137
	Stake Material	Rp. 43.328.000,00	29.227.779.290,90	0.45600
	Joint and Welding	Rp. 85.860.000,00	29.227.779.290,90	0.00191
	Pilecap concrete casting Work	Rp. 572.766.390,23	29.227.779.290,90	0.01960
CC	FLOOR STRUCTURE WORK			
31.	BASE/PEDESTAL	Rp. 135.247.901,45	29.227.779.290,90	0.00463
32.	1ST FLOOR			
3	Column Work	Rp. 1.100.317.286,38	29.227.779.290,90	0.03765
3	Sloof Work	Rp. 842.297.306,54	29.227.779.290,90	0.02882
33.	2ND FLOOR			
	Column Work	Rp. 1.009.334.053,28	29.227.779.290,90	0.03453
	Beam Work	Rp. 1.482.267.035,40	29.227.779.290,90	0.05071
	Slab Work	Rp. 1.213.977.615,32	29.227.779.290,90	0.04164
4.	**3RD FLOOR**			
	Column Work	Rp. 1.009.334.053,28	29.227.779.290,90	0.03453
	Beam Work	Rp. 1.482.267.035,40	29.227.779.290,90	0.05071
	Slab Work	Rp. 1.213.977.615,32	29.227.779.290,90	0.04164
55	**4TH FLOOR**			
	Column Work	Rp. 1.009.334.053,28	29.227.779.290,90	0.03453
	Beam Work	Rp. 1.460.168.625,87	29.227.779.290,90	0.04006
	Slab Work	Rp. 1.213.977.615,22	29.227.779.290,90	0.04164
6	ROOF TOP			
	Column Work	Rp. 182.135.468,25	29.227.779.290,90	0.00623
	Beam Work	Rp. 784.542.776,28	29.227.779.290,90	0.02684
	Slab Work	Rp. 4.073.866.540,92	29.227.779.290,90	0.03674
5	SUM (A)	Rp. 29.227.779.290,90	29.227.779.290,90	1.00
6	PPN 10% (A)	Rp. 2.922.777.929,09	29.227.779.290,90	

RECAPITULATION OF DORMITORY BUDGET PLAN COST OF HOTEL AT KUNINGAN			
7	SUM (A + PPN) = B	Rp. 32.150.557.219,99	29.227.779.290,90
8	IMB = 1*1*1,1*1*1, *21*(2((1/1000))*(A))	Rp. 46.296.802,40	
9	TOTAL BUDGET AMOUNT	Rp. 32.196.854.022,38	

Source: Data processed

CONCLUSION

The design and design of the structure for the construction of the Antapura Hotel Green Building in Kuningan Regency, West Java, in response to the increasing demand for hotel services in line with the development of the tourism sector. In this study, the concept of green building is applied which prioritizes the use of sustainable materials, energy efficiency, and environmentally friendly design principles, with the aim of reducing negative impacts on the environment and improving indoor air quality and occupant comfort. The hotel's design uses a reinforced concrete structure with four floors, referring to the latest SNI standards related to reinforced concrete, load planning, and earthquake calculation. The design results include structural dimensions such as columns, beams, slabs, and foundations designed to meet safety and comfort criteria. The estimated cost of building this hotel reaches around IDR 32.15 billion, including taxes and other costs. This research also suggests that the application of green building principles in developing areas such as Kuningan can be an example for the development of hotels and other buildings that are more environmentally friendly and can encourage sustainable development that is in line with global goals.

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