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Development of the structure of the Jamie Nurul Iman Sukaraja Mosque building based on the needs of congregation facilities

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ABSTRACT

Jamie Nurul Iman Mosque has an area of 208.39 m2, the mosque building currently has limited facilities, such as parking facilities for worshipers who still use the shoulder of the road and ablution facilities and special toilets for men and women must be separated, efforts to complete the facilities for the congregation then it is necessary to develop the building, due to the limited land owned, the development is carried out vertically into three floors. The research was conducted by testing the concrete quality (f'c) of existing columns, beams and slabs, the concrete quality values were obtained sequentially of 13.6 MPa, 11 MPa and 11.2 MPa, then modeled the existing structure using the ETABS application and the results showed that column structure, beams experiencing over strength (O/S) cannot withstand the loads acting on the building, so the existing building structure cannot be used for the development of a new three-story mosque building. The results of the structural analysis of the plan based on SNI obtained the dimensions of the new mosque building with a size of 11.25 meters x 18.8 meters, reinforced concrete structures, non-concrete roofs and enamel domes. The material specifications for the new mosque structure are concrete quality (f'c) 30 MPa, reinforcing steel quality (fy) 400 MPa and 280 MPa (BJTP). Column dimensions are 50x50 cm (first floor), column 40x40 cm (second and third floors), main beam dimensions are 30x60 cm, main beam is 30x50 cm, and child beams are 25x40 cm, floor slab thickness is 15 cm, roof slab is not 13 cm thick. The first floor is equipped with male ablution facilities with an area of 12.51 m2, female ablution facilities with an area of 9.7 m2, toilet facilities with an area of 2.84 m2, and vehicle parking facilities with an area of 99.93 m2. The second floor is equipped with men's prayer facilities with an area of 102.87 m2, book storage facilities with an area of 10.5 m2, logistics facilities with an area of 5.67 m2. The third floor is equipped with women's prayer facilities with an area of 72.9 m2. The budget plan for the construction of a three-story new mosque concrete structure is Rp. 717,990,500.00.

Keywords: structural analysis; mosque building; congregational facilities; budget plan; non-concrete.

INTRODUCTION

Jamie Nurul Iman Mosque has an area of 208.39 m2, located in Kampung Lima, RT 05/12, Pasir Jambu Village, Sukaraja District, Bogor Regency. The mosque building was established in 2015 with a one-story building, which is equipped with several facilities as shown in Table 1. The current mosque building has limited facilities, such as parking facilities for worshipers who still use the shoulder of the road and ablution facilities and special toilets for men and women. women must be separated, efforts to complete facilities for the congregation need to develop buildings. The development of a new mosque building in a horizontal direction is not possible due to limited land, so the development is carried out vertically into three floors.

Table 1. Availability of existing building mosque facilities

No.	Facilty	Wide (m^2)	description
1.	Congregational prayer room	88,02	For boys and girls
2.	Ablution room	6,125	For boys and girls
3.	Toilet room	3,308	For boys and girls
4.	Storage space 1	3,308	For logistics supplies
5.	Storage space 2	6,615	For logistics supplies

Source: Analysis results

The completeness of the space in the mosque is divided into two types based on its function and use, namely the core room and the supporting room (Susanta, et al, 2007). The core room is the main room that must exist in a mosque which consists of a prayer room, a room for purification (especially for ablution), and a terrace or porch, while the supporting room is a space to support the completeness and maximize the function of the mosque building which consists of a meeting room. , audio room, library room, business room, management office, youth mosque activity room, warehouse, parking facility, security post, tower, open field and park (Susanta, et al, 2007). The research objectives are to analyze the structure of the existing building against the working load as well as to design and plan the structure of the mosque building which has been equipped with new facilities based on SNI. This study is limited by several provisions including, structural analysis includes the upper structure, does not analyze the lower structure or foundation. Structural analysis using the Extended Three-Dimensional Analysis of Building Systems (ETABS) application, manual analysis using the Ms. Excel, and column analysis using the SPColumn application, as well as structural drawing design using the AutoCAD application.

Structural analysis based on SNI 2847-2019, Article 4.5 states that the rules of analysis aim to estimate the internal forces and deformations of the internal structural system and the deformation of the structural system and to ensure that the requirements for strength, serviceability and stability are met. The basic requirements in planning the building structure for the design strength are determined by the design strength must be greater than the necessary strength. Columns are the main structural elements that carry combined axial compression loads and bending moments. Columns are also the main structural element that plays the most important role in carrying lateral loads (especially earthquakes) on the building structure (Lesmana, 2020). Based on SNI 2847-2019, Article 10.6.1 states that the limit of the longitudinal reinforcement ratio must be at least 0.01 but must not exceed 0.08. Beams can be defined as one of the structural elements of the portal with a horizontal span, while the portal is the main framework of the building structure, especially buildings. The loads acting on the beams are usually in the form of flexural loads, shear loads and torsion (twisting moments), so that reinforcing steel is needed to withstand these loads. This reinforcement is in the form of longitudinal reinforcement or longitudinal reinforcement (which withstands bending loads) and shear reinforcement/begel (which withstands shear and torsional loads) (Asroni, 2010). Concrete slab is a structure that is generally used to distribute dead and live loads to other main structures, such as beams and columns. In general, concrete slabs are divided into two types, namely one-way slabs and two-way slabs. The difference is that the one-way plate is the type of plate that experiences deflection in one direction of its axis, while the two-way plate deflection occurs in two directions of the plate axis, so that the reinforcement is given in both directions (Lesmana, 2020). General requirements in SNI 2847-2019, Article 9.5.1 explains that for each combination of factored loads used, the design strength throughout the cross section must meet Sn≥U, including in numbers 1 to 4 below the interaction between load effects must be considered:

1. $\phi M_n \geq M_u$
2. $\phi M_n \geq M_u$
3. $\phi T_n \geq T_u$
4. *Pn Pu*

Information must be determined in accordance with SNI 2847-2019 Table 21.2.1 regarding Strength Reduction Factors. Sn = moment strength (N), shear, axial, torque or nominal bearing; U= necessary strength (N), Pn= nominal axial strength of the section (N); Pu = factored axial force, taken as positive for compression and negative for tension (N); Mn= nominal flexural strength in cross section (N.mm); Mu= Factored moment in cross section (N.mm); Vu= Sectional factored shear force (N); Vn= nominal shear strength (N); Tn= nominal torsional moment strength (N.mm); Tu = factored torsional moment in section (N.mm).

RESEARCH METHODS

This research was conducted in the existing building of the Jamie Nurul Iman Mosque. The research time is from February 2021 to June 2021. The research stage is collecting data used in the form of

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primary and secondary data. Primary data includes the results of the concrete bounce test with a hammer test and building dimension measurements. Secondary data includes literature on building structures such as SNI 2847-2019 (Requirements for Structural Concrete for Buildings and Their Explanations), SNI 1726-2019 (Procedures for Planning Earthquake Resistance for Building and Non-Building Structures), SNI 1727-2020 (Design Loads) Minimum and Related Criteria for Buildings and Other Structures), and Guidelines for Loading Planning for Houses and Buildings (PPURG) in 1987. The next stage of structural analysis and modeling is carried out under two conditions, namely, analyzing the structure of the existing building condition to ensure the existing structure is suitable for reuse. for development or not and analyze the structure of the planned mosque building which has been equipped with new facilities for the congregation. Based on the comparison of seismic design categories (KDS) and structural systems, a special moment resisting frame system (SRPMK) is used.

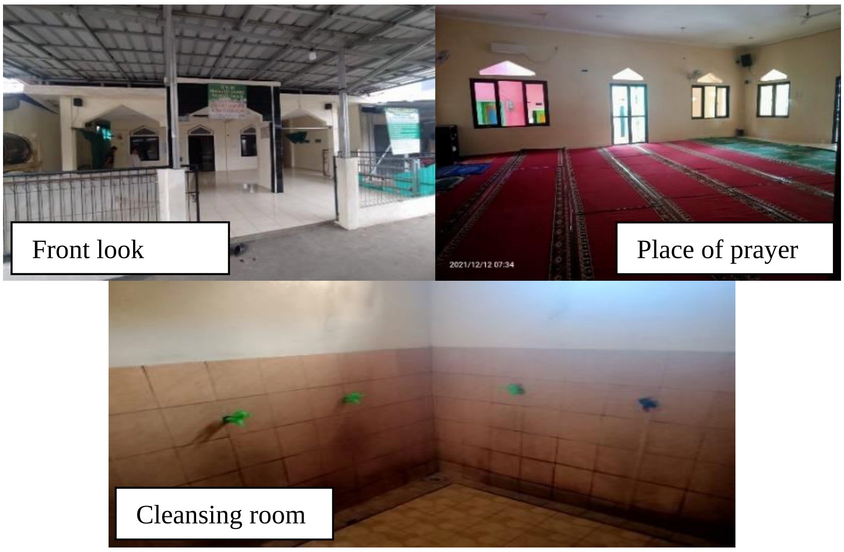

Figure 1. Photo of Jamie Nurul Iman Mosque Source: Personal documentation

The research stages are described in the research flow chart shown in Figure 2.

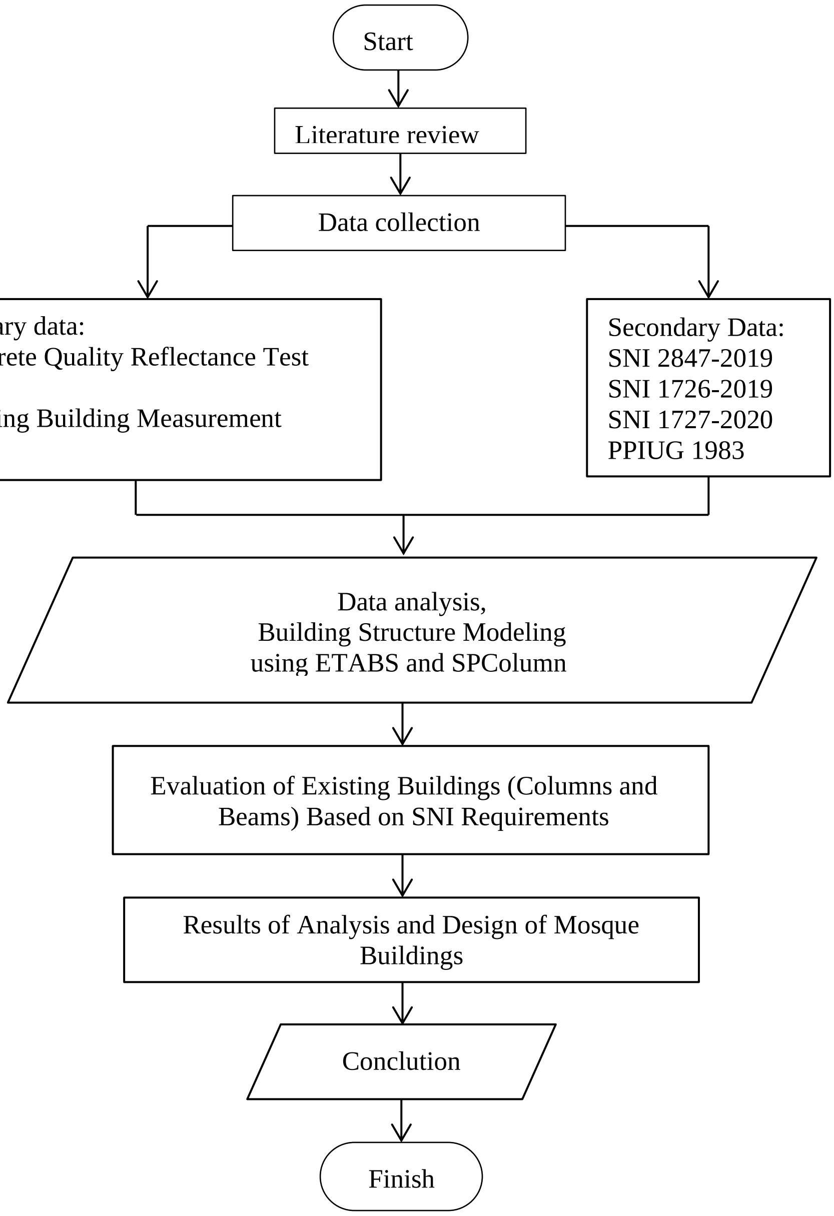

Figure 2. Research flow chart Source: Personal documentation

RESULTS AND DISCUSSION

Structural Analysis of Existing Conditions

The existing plan can be seen in Figure 3, the column dimensions are K20x20 cm, the main beam dimensions are B20x25 cm, the beams are B15x20 cm, the thickness of the concrete slab for the corridor is 10 cm thick with an elevation of +3.60 m, the reflection test of the concrete quality with a hammer test is obtained. column concrete (f'c) 13 MPa, beam (f'c) 11.2 MPa, slab (f'c) 11.5 MPa (test points of columns and beams are shown in Figure 4, marked in red).

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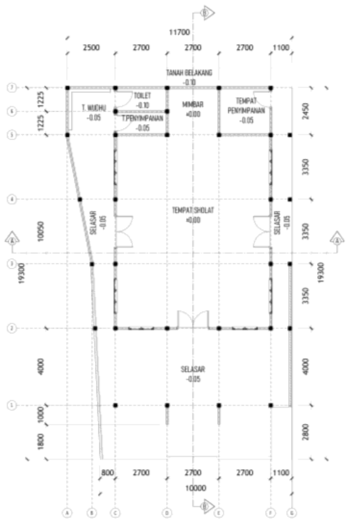

Figure 3. Existing floor plan of the mosque
Source: Personal documentation

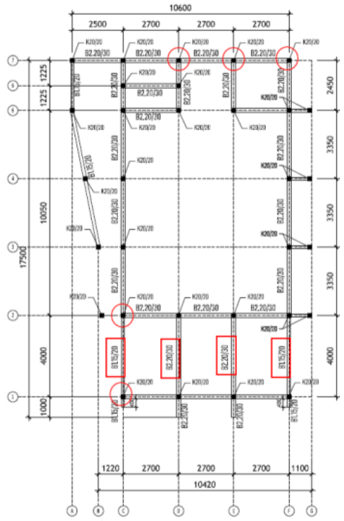

Figure 4. Plan of the existing columns and beams of the mosque
Source: Personal documentation

Figure 5. Testing the quality of concrete. Source: Personal documentation

Dead Load and Live Load Existing Building

The analysis is carried out by entering loading data, dead loads are entered automatically in the ETABS application, but there are additional dead loads which are given the SIDL (Super Input Dead Load) notation and live loads acting on the building structure can be seen in Table 2.

Table 2. Dead load and live load of existing building

1. SIDL dead load	**2. Live load**
a. Roof Ceiling+hangers = 18 kg/m2 Roof tiles = 50 kg/m2 Dome (GRC) = 20kg/m2	a. Roof Load People = 100 kg/m2 (SNI 1727-2020)

Source: PPPURG 198

Earthquake Load

The lateral and vertical earthquake resisting system used is SRPMK, so that the response modification coefficient (R): 8, system strength factor (Ω):3, deflection amflation coefficient (Cd): 5.5. The determination of the response spectrum used to analyze the dynamic load is taken from the application of the Indonesia 2021 design response spectrum.

Table 3. Design value of Indonesian spectra

Class	**T0**	**Ts**	**Sds**	**Sd1**
SD-Medium Soil	0,15	0,77	0,73	0,56
Longitude / Longitude	106.81148451259			
Latitude / Latitude	-6.52910387639351			

PGA	0,467
ss	0,9994
S1	0,4588
tl	20

Source: http://rsa.ciptakarya.pu.go.id/2021/

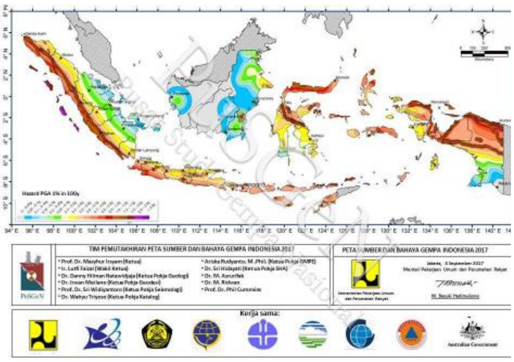

Figure 6. Map of earthquake zones
Source: http://rsa.ciptakarya.pu.go.id/2021/

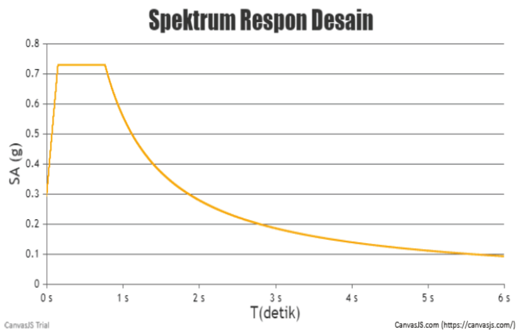

Figure 7. Graphics of the design response spectrum
Source: http://rsa.ciptakarya.pu.go.id/2021/

Loading Combination

Load factors and load combinations used in the design process of reinforced concrete structures, based on SNI 2847-2019. According to SNI 2847-2019 concerning Load Factors and Load Combinations Article 5.3, the required strength U must be at least equal to the effect of the factored load in Table 4 as follows:

Table 4. Combination of loads

Load combination	Equality	Main Load
U=1,4*D*	(5.3.1a)	*D*
U= 1,2D+1,6L+0,5(*Lr* atau *R*)	(5.3.1b)	*L*
U=1,2*D*+1,6(*Lr* atau *R*)+(1,0*L* atau 0,5*W*)	(5.3.1c)	*Lr* atau *R*
U=1,2*D*+1,0*W*+1,0*L*+0,5(*Lr* atau *R*)	(5.3.1d)	*W*
U=1,2*D*+1,0*E*+1,0*L*	(5.3.1e)	*E*
U=0,9*D*+1,0*W*	(5.3.1f)	*W*
U=0,9*D*+1,0*E*	(5.3.1g)	*E*

Source: SNI 2847-2019 concerning Load Factors and Load Combinations, Article 5.3
Where:
U = combination of factored load, kN, kN/m' or kNm
D = dead load, kN, kN/m' or kNm
L = live load, kN, kN/m' or kNm
Lr = live load of the roof, kN, kN/m' or kNm
R = rainwater load, kN, kN/m' or kNm
W = wind load, kN or kN/m'
E = earthquake load, kN or kNm.

Existing Structure Modeling Results

The results of the modeling of the existing building structure after inputting data on structural elements, loads acting on the building and load combinations based on SNI obtained many columns and beams that experienced over strength (O/S). Over strength factor is the value of excess strength produced by reinforced concrete structural elements due to the achievement of the ultimate cross-sectional capacity compared to the cross-sectional capacity when yielding / the required ultimate capacity has been achieved (Aswin, 2019).

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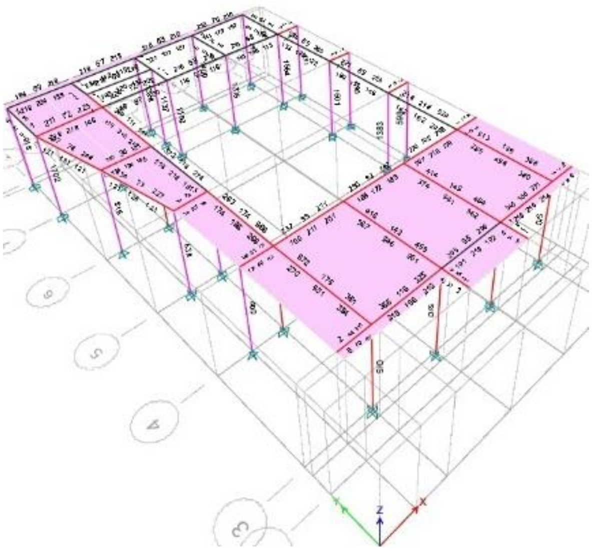

Figure 8. Results of modeling the existing structure Source: ETABS

Modeling the condition of the existing mosque building in Figure 8 it can be seen that the column elements experiencing (O/S) are marked in red, namely in columns C-3, D-3, E-3, F-3, C-4, D-4 , E-4, F-4, C-6. Blocks experiencing (O/S) are marked in red, namely blocks BC-3, CD-3, EF-3, FG-3, BC-4, CD-4, DE-4, EF-4, FG-4 , BC-5, FG-5, BC-6, FG-6, AC-7, FG-7.

Evaluation of the analysis of the existing building structure

The quality of the concrete from the test results is stated that the existing concrete quality does not meet the requirements of SNI 2847-2019 Article 19.2.1.1 states that the minimum normal concrete quality is 17 MPa. The column dimension requirements refer to SNI 2847-2019, Article 18.7.2.1 column width dimensions, namely b>300 mm, in the existing building the column dimensions are b=200 mm, the column dimension requirements do not meet SNI. Checking the axial force of longitudinal reinforcement with a size of 10 mm, As= nxπ/4xdb2= 314.2 mm2. Check the reinforcement ratio = As/bxh = 314.2/(200x200) = 0.0079, then the existing reinforcement ratio does not meet the requirements of SNI 2847-2019 Article 10.6.1. Checking the beam Mu = 11,099 kNm (ETABS output), Mn = 7,424 kNm (beam capacity moment), so that the requirements Mn Mu, = 0.9x7,424 = 6,682 < 11,099 do not meet the requirements of SNI 2847-2019 Article 19.5.1. Based on the results of the evaluation, it was stated that the existing structure of the mosque could not be used for the development of a new mosque.

Structural Analysis of Plan Conditions

Jamie Nurul Iman Mosque is planned with a reinforced concrete structure with a concrete quality (f'c) of 30 MPa, the quality of the main yield steel reinforcement (fy) 400, shear yield reinforcement (fy) 240. Based on the available land area, the mosque is planned to be 11.25 wide. m, 18.8 m long, 3 floors typical of 4 m, already equipped with the necessary facilities for the congregation. The planned mosque facilities are shown in Table 4.

Table 4. Planned mosque building facilities

No.	Facility	wide (m^2)	description
1.	Parking space	99,93	On the first floor
2.	Men's ablution room	12,51	On the first floor
3.	Women's ablution room	9,7	On the first floor
4.	Male toilet room, 2 rooms	2,84	On the first floor
5.	Female toilet room, 2 rooms	2,84	On the first floor
6.	Prayer room for male congregation	102,87	On the second floor
7.	Jumaah prayer room for women	72,9	On the third floor

8.	Book storage room	10,5	On the second floor
9.	Logistics equipment storage room	5.67	On the second floor

Source: Analysis results

The specification of the plan structure refers to SNI 2847-2019. The dimensions of the ground floor columns are K50x50 cm, the dimensions of the 2nd and 3rd floor columns are K40x40 cm, the dimensions of the main beam are B30x60 cm, the dimensions of the main beam are B30x50 cm, the dimensions of the child beams are B25x40 cm, the floor plate thickness is 15 cm and the roof plate thickness is not 13 cm.

The design plan of the Jamie Nurul Iman Mosque is shown in Figure 9.

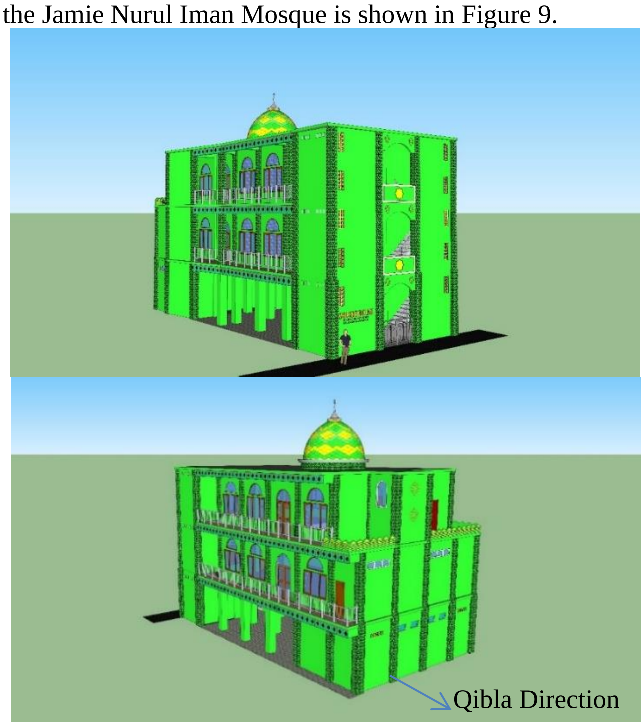

Figure 9. Jamie Nurul Iman Mosque 3D Design Source: Personal documentation

The plan for the Jamie Nurul Iman Mosque is shown in Figures 10 to 12.

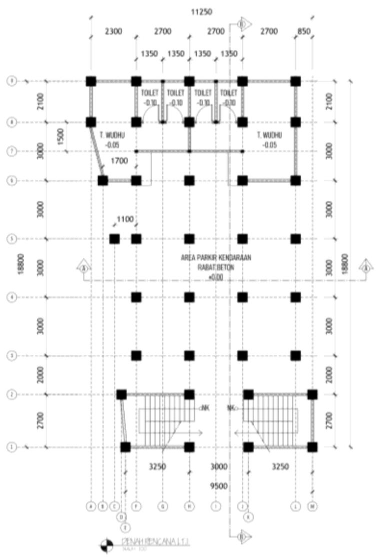

Figure 10. First floor plan

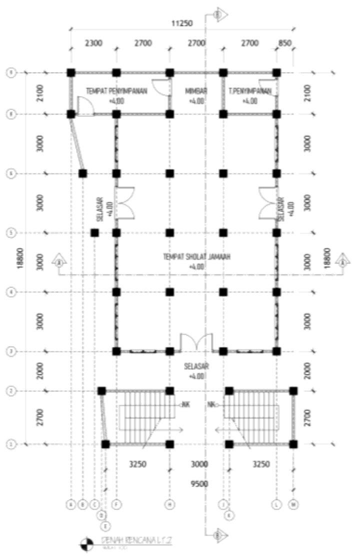

Figure 11. Second floor plan

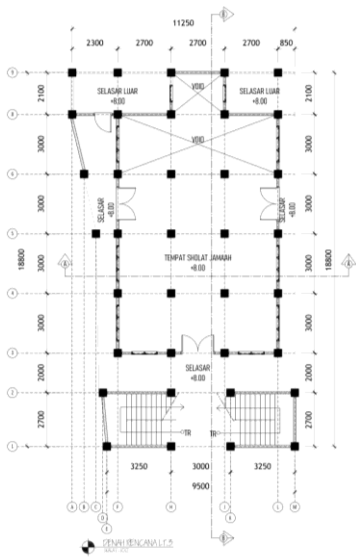

Figure 12. Third floor plan

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Source: Personal documentation Source: Personal documentation Source: Personal documentation

Additional dead load (SIDL) and live load

The process of analyzing the design structure takes into account additional dead loads, live loads and earthquake loads. Details of additional dead loads and live loads on the design building are shown in Table 5.

Table 5. Design dead load and live load

1. SIDL dead load		2. Live load	
a.	2nd Floor Ceramic weight = 24 x 1 = 24 kg/m2 Mixture weight = 21 x 2 = 42 kg/m2 Ceiling weight + hanger = 18 kg/m2 Electrical installation weight = 25 kg/m2 The weight of clean and dirty water pipes = 10 kg/m2 Wall weight 4 x 250 = 1000 kg/m2	a.	2nd Floor Mosque building = 479 kg/ m2 (SNI 1727-2020)
b. c.	3rd floor Ceramic weight = 24 x 1 = 24 kg/m2 Mixture weight = 21 x 2 = 42 kg/m2 Ceiling weight + hanger = 18 kg/m2 Electrical installation weight = 25 kg/m2 The weight of clean and dirty water pipes = 10 kg/m2 Wall weight 4 x 250 = 1000 kg/m2	b.	3rd floor Mosque building = 479 kg/ m2 (SNI 1727-2020)
c.	Roof Roof weight on slab Ceiling weight + hanger = 18 kg/m2 Electrical installation weight = 25 kg/m2 The weight of clean and dirty water pipes = 10 kg/m2 Water Proofing = 5 kg/m2 The weight of the dome on the beam The weight of the frame structure = 20 kg/m2 The weight of the enamel roof = 35 kg/m2 Ceiling weight + hanger = 18 kg/m2 Makara weight = 300 kg/m2	c.	Roof Load People = 100 kg/m2 (SNI 1727-2020)

Source: PPPURG 1987

Earthquake load

The stages of the earthquake load of the design building are the same as the stages of the analysis of the existing building structure, then the load combination is also the same as referred to in Table 4.

Plan Structure Modeling Results

The results of modeling the structure of the planned mosque building using the ETBAS modeling application were declared safe against the influence of external forces in the absence of structural elements experiencing (O/S), shown in Figure 10, then entered the manual calculation stage for the analysis of beam, column and slab elements. concrete in order to re-check and take into account the need for reinforcement.

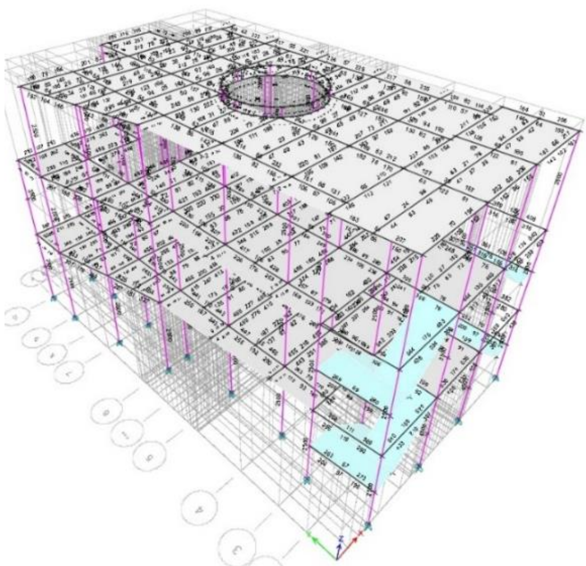


Figure 10. The results of modeling the structure of the plan Source: ETABS

Calculation of design beam reinforcement

Calculation of reinforcement requirements on design beam elements using the Ms application. Excel by entering the output of the ETABS application to obtain the necessary moment (Mu) and the necessary load (Vu) and torsion load (Tu) to determine the flexural and shear reinforcement. structural modeling in the form of internal forces is shown in Table 6.

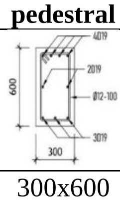
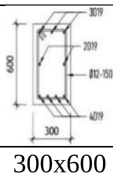
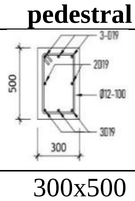
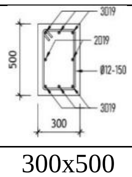
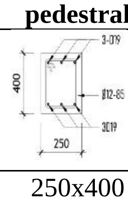
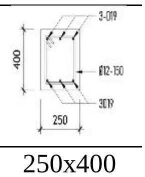
Table 6. Output force in beam

Beam	Mu Pedestral (-) (kNm)	Mu Pedestral (+) (kNm)	Mu field (-) (kNm)	Mu field (+) (kNm)	Vu pedestral	Vu field (kN)	Vg pedestral (kN)	Tu (kNm)
B30x60	-79,4088	54,5097	-2,4459	22,3046	94,992	39,9366	32,8889	20,0958
B30x50	-76,174	61,5541	-31,3698	41,6519	104,0932	48,643	26,8203	11,331
B25x40	-42.627	36.4145	-3.3915	12.412	73.9471	29.5438	17.7892	2.5362

Source: Analysis results

From this data, calculations are then carried out based on SNI 2847-2019 Article 9.5.1, namely Sn≥U, the reinforcement of the plan beam is shown in Table 7.

Table 7. Details of design beam reinforcement

	B30x60		**B30x50**		**B25x40**	
	pedestral	**field**	**pedestral**	**field**	**pedestral**	**field**
Figure (mm)						
Dimensions	300x600	300x600	300x500	300x500	250x400	250x400
Top reinforcement	4-D19	3-D19	3-D19	3-D19	3-D16	3-D16
Middle reinforcement	2-D19	2-D19	2-D19	2-D19	2-D16	2-D16

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Bottom reinforcement	3-D19	4-D19	3-D19	3-D19	3-D16	3-D16
Shear Reinforcement	Ø12-100	Ø12-150	Ø12-100	Ø12-150	Ø12-85	Ø12-150

Source: Analysis results

Plan column reinforcement calculation

Calculation of column elements by checking the output of the ETABS application in the form of internal forces using the Ms. application. Excel to obtain the maximum load and moment is shown in Table 8.

Table 8. Output column force K50x50

Story	Load Case/Combo	P (kN)	M2 (kNm)	M3 (kNm)
Story 1	Comb5 Y d Max	112.0467	21,2835	107,7153
Story 1	Comb5 Y d Max	333.0526	67,6088	31,2704
Story 1	Comb7 Y d Max	524,2224	41,4334	19,0207

Source: Analysis results

Based on Table 8 then entered into the SPColumn application to create a column interaction diagram shown in Figure 11.

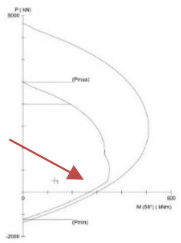


Figure 11. K50x50 column interaction diagram. (Source: SPColumn analysis results)

The loading point is still in the interaction diagram, the column is declared safe, indicated by the arrow in Figure 11. The results of the K50x50 column analysis using SPColumn are the K50x50 column ratio value that meets the requirements of 1.36% according to SNI 2847-2019 article 10.6.1 and the value of Mn /Mu>1.0 which indicates that the column capacity is greater than the external load acting. Reinforcement is shown in Table 9.

Table 9. Output column force K40x40

Story	Load Case/Combo	P (kN)	M2 (kNm)	M3 (kNm)
Story 2	Comb7 Y Max	238,7442	20,3871	20,0243
Story 2	Comb5 Y d Max	64,9638	43,5875	9,9509
Story 2	Comb5 Y d Max	197,7441	14,3413	64,0066

Source: Analysis results

Based on Table 9, it is obtained that the maximum load and moment are colored red. The data is used to find the column interaction diagram with the SPColumn application shown in Figure 12.

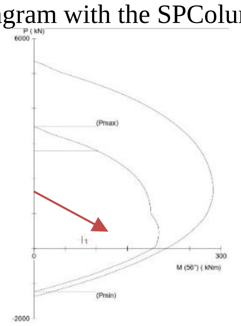
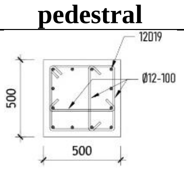
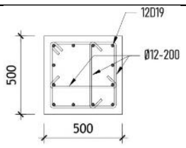
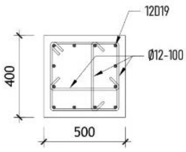
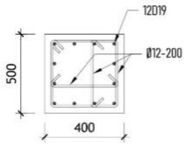


Figure 12. K40x40 . column interaction diagram Source: SPColumn analysis results

The loading point is still in the interaction diagram, the column is declared safe, indicated by the arrow in Figure 12. The results of the K40x40 column analysis using SPColum are the K40x40 column ratio value meets the requirements of 2.13% according to SNI 2847-2019 article 10.6.1 and the value of Mn /Mu>1.0 which indicates that the column capacity is greater than the external load acting. It can be concluded that column K40x40 is declared safe, the recapitulation of reinforcement is shown in Table 10.

Table 10. Plan column reinforcement details

Type column	**K50 x 50**		**K40 x 40**	
	pedestral	**field**	**pedestral**	**field**
Picture column details				
Dimensions, mm	500x500	500x500	400x400	400x400
Main reinforcement	12-D19	12-D19	12-D19	12-D19
Shear reinforcement	Ø12-100	Ø12-200	Ø12-100	Ø12-200

Source: Personal analysis

Calculation of plate reinforcement

Calculate the need for reinforcement on the concrete slab which is planned as a two-way concrete slab by displaying the output moment value on the floor slab, the following results are obtained:

Obtained Mu = 6.131 kN-m
P10-150. plain reinforcement is used
Area of reinforcement used, As = 1/4 x x d2 x b/S = x 3.14 x 102 x 1000/150 = 523.33mm2
Strain block height, a = As x fy / 0.85 x fc' x b = 523.33 x 240 / 0.85 x 30 x 1000 = 4.93
Nominal moment, Mn = As x fy x (d – a/2) = 523.33 x 240 x (85 – 4.93/2) = 10366679.2 Nmm = 10.4 kNm
Conditions: Mn Mu, then 0.8 x 10.4 = 8.29 > 6.131, then it is declared OK, meets the requirements.

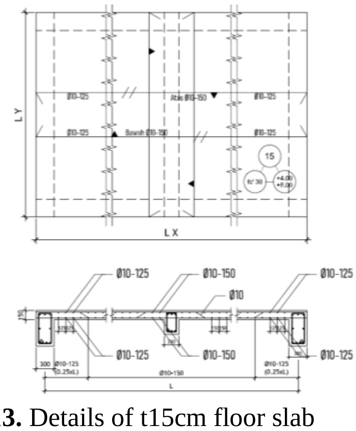


Figure 13. Details of t15cm floor slab reinforcement Source: Personal documentation

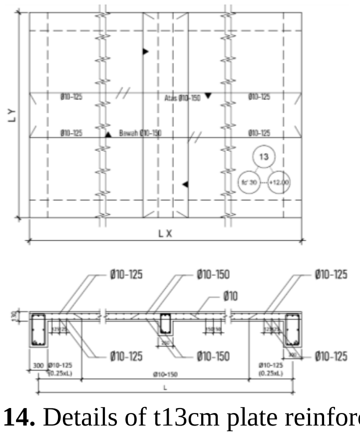


Figure 14. Details of t13cm plate reinforcement Source: Personal documentation

Budget plan

The budget plan required for the structural work of the Jamie Nurul Iman Mosque is shown in Table 11.

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Table 11. Budget Plan (RAB)

No.	Job description	Unit	Volume	Unit price (Rp.)	Total price (Rp.)
A.	**Demolition Work**				
1.	Dismantling of roof tiles + frames	m^2	101,25	22.900,00	2.318.625,00
2.	Demolition of brick walls	m^2	180,3	36.000,00	6.490.800,00
3.	Demolition of reinforced concrete	m^3	9.98	750.000,00	7.485.000,00
4.	Disassembly cleaning from start to finish	Ls	1,00	5.000.000,00	5.000.000,00
				Sub-Total	21.294.425,00
B.	**Concrete Structure Work**				
1.	Reinforced Concrete K50x50 cm	m^3	36,00	4.463.562,00	160.688.232,00
2.	Reinforced Concrete K40x40 cm	m^3	43,08	4.463.562,00	192.290.250,96
3.	Reinforced Concrete B30x60 cm	m^3	32,97	4.015.857,00	132.402.805,29
4.	Reinforced Concrete B30x50 cm	m^3	27,47	4.015.857,00	110.315.591,79
5.	Reinforced Concrete B25x40 cm	m^3	9,16	4.015.857,00	36.785.250,12
6.	Reinforced Concrete Plate Dak t = 15 cm Elv. +4.00, +8.00	m^3	7,53	5.392.926,00	40.608.732,78
7.	Roofing Sheet Reinforced Concrete	m^3	3,14	5.392.926,00	16.931.630,47
8.	t =13 cm Elv. +12.00	m^3	3,36	1.986.151,00	6.673.467,36
				Sub-Total	696.695.960,77
				Total	**717.990.385,77**
				Rounded	**717.990.500,00**

CONCLUSION

Based on the results of structural analysis and design modeling of the existing building, it was found that the structural elements of the building on the columns and beams experienced Over Strength and the results of the reflection test of the quality of the existing concrete were below the SNI standard, so that the structure of the existing building could not be used for the development of a new three-story mosque building. The results of the structural plan analysis based on SNI obtained the dimensions of the new mosque building with a size of 11.25 meters x 18.8 meters, three floors, reinforced concrete structures, non-concrete roofs and enamel domes. Specification of concrete material (f'c) 30 MPa, reinforcing steel quality (fy) 400 MPa (BJTS) and 280 MPa (BJTP). Column dimensions are 50x50 cm (first floor), column 40x40 cm (second and third floors), main beam dimensions are 30x60 cm, main beam is 30x50 cm, child beams are 25x40 cm, floor slab thickness is 15 cm and slab thickness is not 13 cm. The first floor is equipped with male ablution facilities with an area of 12.51 m2, female ablution facilities with an area of 9.7 m2, toilet facilities with an area of 2.84 m2/ one toilet, and vehicle parking facilities with an area of 99.93 m2. The second floor is equipped with men's prayer facilities with an area of 102.87 m2, book storage facilities with an area of 10.5 m2, logistics facilities with an area of 5.67 m2. The third floor is equipped with women's prayer facilities with an area of 72.9 m2. The budget plan for the construction of a three-story new mosque concrete structure is Rp. 717,990,500.00.

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