Assessment of building structure block D of RS BMC Padang.

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Abstract. Padang city is the capital of West Sumatra province which is on the west side of the island of Sumatra, is an earthquake-prone area, it is near the confluence of the Asian Euro and Indo-Australia tectonic plates. In the last two decades, there have been two large earthquakes in West Sumatra, on March 6, 2007 (5.8 SR) and September 30, 2009 (7.6 SR). The earthquake on September 30, 2009 has caused severe damage in several areas in West Sumatra such as Padang Pariaman Regency, Padang City, Pesisir Selatan Regency, Pariaman City, Bukittinggi City, Padangpanjang City, Agam Regency, Solok City, and West Pasaman Regency. According to Satkorlak PB data, as many as 1,117 people were killed, the serious injuries reached 1,214 people, light injuries 1,688 people, and the missing 1 person. A total of 135,448 homes were severely damaged, 65,380 houses were moderately damaged, and 78,604 houses were lightly damaged. The earthquake has also caused dozens of multi-story buildings in Padang City to suffer damage, lightly, moderately, and severely damaged and some buildings were collapsed. Block D of RS BMC is one of the buildings of RS BMC Padang, which was built in early 2000. Design of the building structure of Block D of RS BMC used SNI 03-2847-1991 and SNI 03-1726-1989. Nowadays, the newest SNI is SNI 03-2847-2019 for reinforced concrete and SNI 03-1726-2019 for earthquake designs. The paper discusses the assessment of the building structure of block D of RS BMC using the new SNI 03-1726-2019 and SNI 03-2847-2019. The earthquake load used is a dynamic earthquake load using Padang city spectrum response and structural analysis using SAP2000 v.14 software. The analysis results obtained, structural elements of columns, beams, and plates are still able to resist the design loads according to the new SNI. The inter-story drift of floors, the effect of P-delta, the vertical irregularities of buildings, the concept of strong column weak beam, and mass participation are still following the newest SNI.

1 Introduction

The city of Padang is the capital of West Sumatra province which is on the west side of the island of Sumatra, is an earthquake-prone area, due to it is near the confluence of the Asian Euro and Indo Australia tectonic plates. In the last two decades, there have been two large earthquakes in West Sumatra, on March 6, 2007 (5.8 SR) and September 30, 2009 (7.6 SR). The earthquake on September 30, 2009 has caused severe damage in several areas in West Sumatra such as Padang Pariaman Regency, Padang City, Pesisir Selatan Regency, Pariaman City, Bukittinggi City, Padangpanjang City, Agam Regency, Solok City, and West Pasaman Regency. According to Satkorlak PB data, as many as 1,117 people were killed, the serious injuries reached 1,214 people, light injuries 1,688 people, and the missing 1 person. A total of 135,448 homes were severely damaged, 65,380 houses were moderately damaged, and 78,604 houses were lightly damaged. The earthquake has also caused dozens of multi-story buildings in Padang City to suffer damage, lightly, moderately, and severely damaged and some buildings were collapsed. Block D of RS BMC is one of the buildings of RS BMC Padang, which was built in the early year 2000. The design structure of this building is used SNI 03-2847-1991 for reinforced concrete and SNI 03-1726-1989 for earthquake resistant structure. Currently, the latest SNI 03-2847-2019 for reinforced concrete and SNI 03-1726-2019 for earthquake design have been published and used for earthquake-resistant building design in Indonesia. The paper discusses the assessment of the building structure of block D of RS BMC using the new SNI 03-1726-2019 and SNI 03-2847-2019. The earthquake load used is a dynamic earthquake load using Padang city spectrum response and structural analysis using SAP2000 v.14 software.

2 Building and Materials Data

2.1 Existing Condition of Block D Building

Fig.1 shows a building location of block D of RS BMC. The building located at Proklamasi Street No. 31 - 37 Padang, West Sumatra. The front and side view of the building is shown in Fig. 2 and Fig. 3. The building has 5 (five) floors with a reinforced concrete frame structure. Fig. 4 shows the typical floor dimension and column plan. The building floors has dimension with a length of 40 m and a width of 18.125 m. The beam's floor plan is shown in Fig. 5. The dimension of the column cross-section is 450 mm x 550 mm and the detailing of reinforcement is shown in Fig. 6. The beam's dimensions and their reinforcement is shown in Fig. 7.

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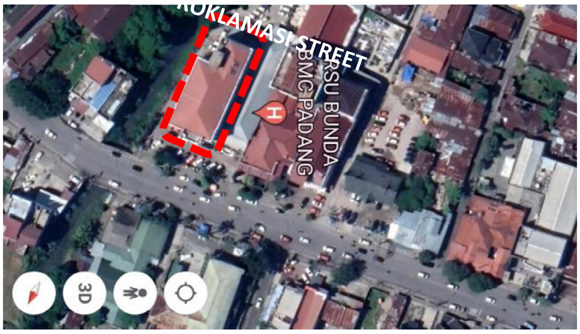


Fig. 1. Location of block D building of RS BMC Padang

Fig. 2. Front view of block D building

Fig. **3.** Side view of block D building

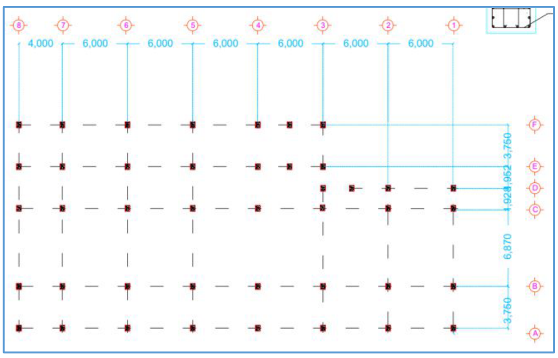


Fig. 4. Typical floor dimension and column plans

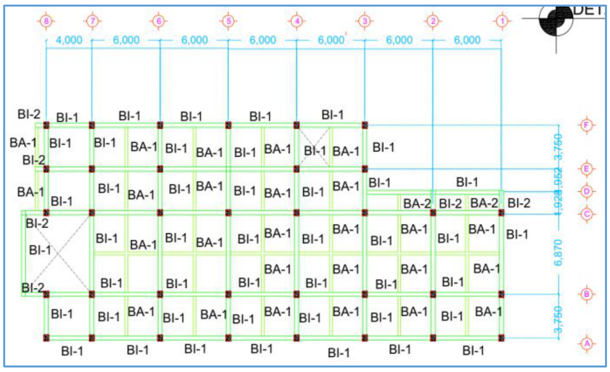
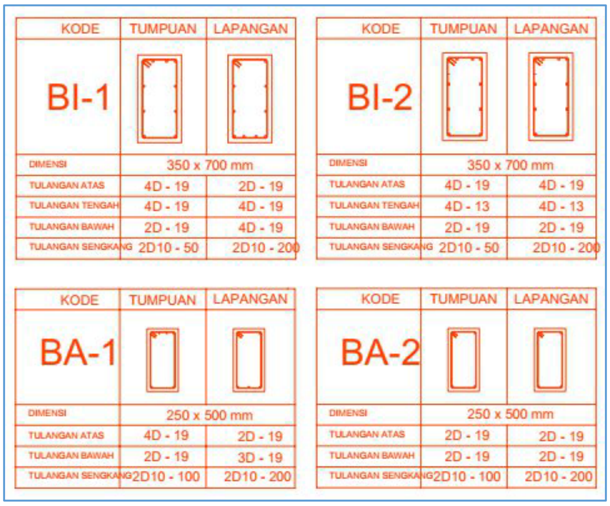


Fig. 5. Beams Floor Plan

	KOLOM ANAK LANTAI 1	
	SEPANJANG LO	DILUAR LO
DIMENSI	450 x 550 mm	450 x 550 mm
TULANGAN LONGITUDINAL	16D - 19	16D - 19
TULANGAN SENGKANG	4D10 - 50	4D10 - 100

Fig. 6. Column dimensions



KODE	TUMPUAN	LAPANGAN
BI-1		
DIMENSI	350 x 700 mm	
TULANGAN ATAS	4D - 19	2D - 19
TULANGAN TENGAH	4D - 19	4D - 19
TULANGAN BAWAH	2D - 19	4D - 19
TULANGAN SENGKANG	2D10 - 50	2D10 - 200

KODE	TUMPUAN	LAPANGAN
BI-2		
DIMENSI	350 x 700 mm	
TULANGAN ATAS	4D - 19	4D - 19
TULANGAN TENGAH	4D - 13	4D - 13
TULANGAN BAWAH	2D - 19	2D - 19
TULANGAN SENGKANG	2D10 - 50	2D10 - 200

KODE	TUMPUAN	LAPANGAN
BA-1		
DIMENSI	250 x 500 mm	
TULANGAN ATAS	4D - 19	2D - 19
TULANGAN BAWAH	2D - 19	3D - 19
TULANGAN SENGKANG	2D10 - 100	2D10 - 200

KODE	TUMPUAN	LAPANGAN
BA-2		
DIMENSI	250 x 500 mm	
TULANGAN ATAS	2D - 19	2D - 19
TULANGAN BAWAH	2D - 19	2D - 19
TULANGAN SENGKANG	2D10 - 100	2D10 - 200

Fig. 7. Beam types and dimensions

2.2 Codes and Materials Specification

In this assessment, the newest Indonesian National Standard (SNI) for reinforced concrete design and earthquake resistant buildings design is used, namely SNI 2847-2019 Structural Concrete Requirements for Buildings and SNI 1726-2019 for Earthquake Resilience Design Procedures for Building and Non-Building Structures. The newest SNI for structural load is using SNI 1727-2018 for Minimum Load for The Design of Buildings and Other Structures.

The average concrete strength (f_c') which is collected by hammer test is 25 MPa and the reinforcing steel strength (f_y) is 390 MPa. The beam dimensions (BI1 and BI2) are 350 mm x 700 mm and 250 mm x 500 mm (BA1 and BA2). The floor thickness is 120 mm.

2.3 Structural Modelling and Loads Design

Fig 8. shows the 3D structural modelling of block D building using SAP2000 v.14. The gravitational loads are used according to SNI 1727-2018 namely, DL (dead load), LL (live load), and rain load (R).

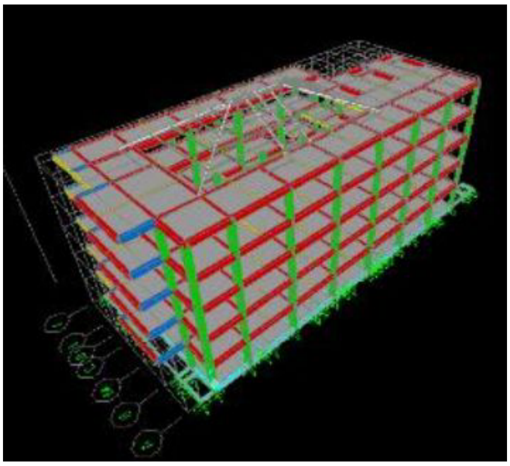


Fig. 8. The 3D Structural Modelling of block D building

For earthquake loads, according to SNI 1726-2019, the earthquake parameters which were used are :

- Hospital building: Risk Category IV
- Priority factor (Ie) = 1,5
- Site classification: SC (hard soil, very dense and soft rock)

Fig. 9 shows the earthquake response spectrum which is used for the block D building (2019 Response spectrum of PUSKIM PU)

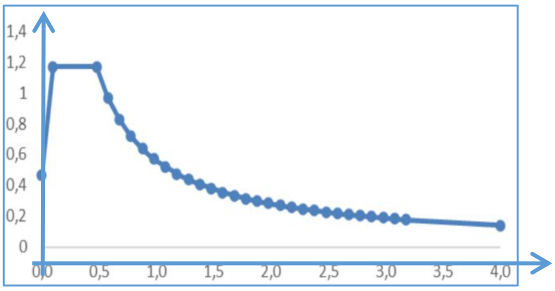


Fig. 9. Response Spectrum of Block D RS BMC Padang

The earthquake parameters which are used for a calculation were :

- S_s = 1,463 g
- S_1 = 0,600 g
- T_L = 20 sec
- F_a = 1,200
- F_v = 1,400
- S_{ms} = 1,755 g
- S_{m1} = 0,840 g
- S_{ds} = 1,170 g
- S_{d1} = 0,560 g
- T_0 = 0,096 sec
- T_s = 0,479 sec
- Earthquake load reduction (R) = 8
- System stronger factor (Ω_0) = 3
- Deflection enlargement factor (C_d) = 5,5
- Earthquake factor scale = 1839,38 mm/sec²
- Seismic Design Criteria (KDS) : D
- System Structure : SRPMK (Special Moment in Frame System)

2.4 Loads Combination

There are 26 (twenty six) load combinations which are used in this assessment as below :

1. 1,4 DL
2. 1,2 DL + 1,6 LL + 0,5 Lr
3. 1,2 DL + 1,6 LL + 0,5 R
4. 1,2 DL + 1,6 Lr + 1 LL
5. 1,2 DL + 1,6 Lr + 0,5 W
6. 1,2 DL + 1,6 R + 1 LL
7. 1,2 DL + 1,6 R + 0,5 W
8. 1,2 DL + 1 W + 1 LL + 0,5 Lr
9. 1,2 DL + 1 W + 1 LL + 0,5 R
10. 1,434 DL + 1,300 EQX + 0,390 EQY + 1 LL
11. 1,434 DL + 1,300 EQX - 0,390 EQY + 1 LL
12. 1,434 DL - 1,300 EQX + 0,390 EQY + 1 LL
13. 1,434 DL - 1,300 EQX - 0,390 EQY + 1 LL
14. 1,434 DL + 0,390 EQX + 1,300 EQY + 1 LL
15. 1,434 DL + 0,390 EQX - 1,300 EQY + 1 LL
16. 1,434 DL - 0,390 EQX + 1,300 EQY + 1 LL
17. 1,434 DL - 0,390 EQX - 1,300 EQY + 1 LL
18. 0,666 DL + 1,300 EQX + 0,390 EQY
19. 0,666 DL + 1,300 EQX - 0,390 EQY
20. 0,666 DL - 1,300 EQX + 0,390 EQY
21. 0,666 DL - 1,300 EQX - 0,390 EQY
22. 0,666 DL + 0,390 EQX + 1,300 EQY
23. 0,666 DL + 0,390 EQX - 1,300 EQY
24. 0,666 DL - 0,390 EQX + 1,300 EQY
25. 0,666 DL - 0,390 EQX - 1,300 EQY
26. ENVELOPE

where: DL = Dead Load ; LL = Live Load ; Lr = reduction of Live Load; R = Rain Load ; W = Wind Load ; EQX and EQY = Earthquake Load in X and Y direction.

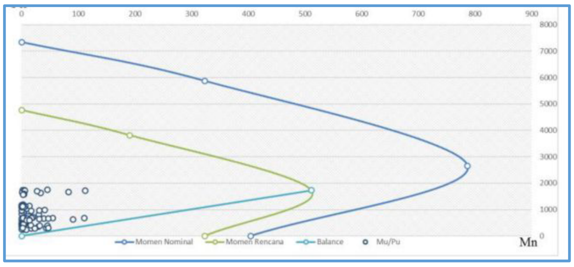
3 Results and Discussions

3.1 Column Capacity (P- M Interaction Diagram)

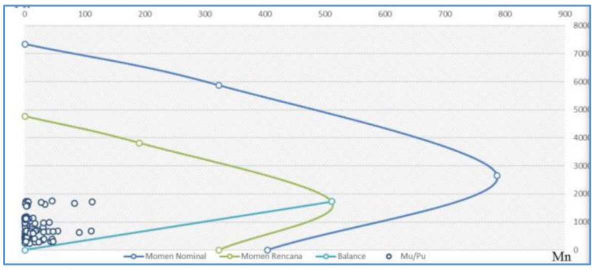
Fig.10 (a) - (d) shows the P-M diagram interaction of building columns and Table 1 shows the column shear steel reinforcement capacities for all building floors. From figure 10 and Table 1, it can be concluded that the existing column dimension and longitudinal and shear reinforcements are still capable to resist the load's combination according to the new SNI.

3.2 Beams and Plates Capacity

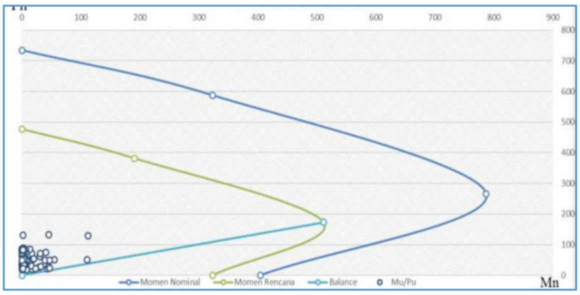
Tables 2 and 3 show the moment and shear capacities of building beams. From this table, it can be concluded that the beams existing could resist the load's combination according to the new SNI. The moment capacities of plate reinforcement are shown in Table 4. From this table, it can be concluded that the existing plate and reinforcement is still can resist loads according to the new SNI.



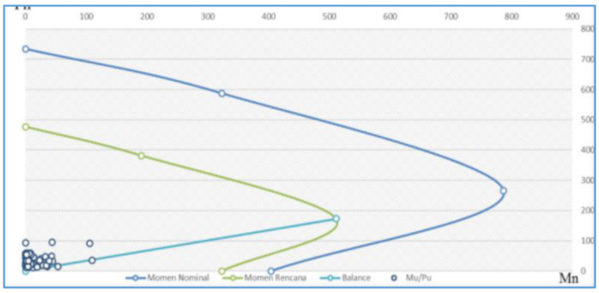
(a). 1st Floor Column



(b). 2nd Floor Column



(c). 3rd Floor Column



(d). 4th Floor Column

Fig. 10. P-M Diagram Interaction of Building Column

Table 1. Column Shear Reinforcement Capacity

Floor	Code	Width (mm)	Height (mm)	Main Reinforcement		Shear Reinforcement		Vr (kN)	Vu (kN)	Remarks
				Support	Middle	Support	Middle			
1	K1	450	550	16D19	16D19	4D10-50	4D10-100	311,021	69,752	OK
2	K1	450	550	16D19	16D19	4D10-50	4D10-100	311,021	61,721	OK
3	K1	450	550	16D19	16D19	4D10-50	4D10-100	311,021	65,252	OK
4	K1	450	550	16D19	16D19	4D10-50	4D10-100	311,021	62,080	OK
5	K1	450	550	16D19	16D19	4D10-50	4D10-100	311,021	104,537	OK

Table 2. Moment Capacity of Beams Reinforcement

Floor	Code	Width	Height	Comp Reinf.	Tensile Reinf.	ϕ Mn	Mu	Remarks
		(mm)	(mm)			(kN-m)	(kN-m)	
1	BI-1	300	700	4D-16	4D-16	325.513	235.143	OK
	BI-2	300	700	4D-16	2D-16	400.409	262.953	OK
	BA-1	250	500	4D-16	3D-16	444.642	386.046	OK
	BA-2	250	500	2D-16	2D-16	112.705	74.252	OK
2	BI-1	300	700	4D-16	4D-16	325.513	251.964	OK
	BI-2	300	700	4D-16	2D-16	400.409	263.810	OK
	BA-1	250	500	4D-16	3D-16	244.606	134.358	OK
	BA-2	250	500	2D-16	2D-16	112.705	74.852	OK
3	BI-1	300	700	4D-16	4D-16	325.513	263.282	OK
	BI-2	300	700	4D-16	2D-16	400.409	148.888	OK
	BA-1	250	500	4D-16	3D-16	244.606	87.354	OK
	BA-2	250	500	2D-16	2D-16	112.705	95.484	OK
4	BI-1	300	700	4D-16	4D-16	325.513	174.752	OK
	BA-1	250	500	4D-16	3D-16	244.606	61.993	OK
5	BI-1	300	700	4D-16	4D-16	325.513	111.986	OK
	BA-1	250	500	4D-16	3D-16	244.606	58.572	OK

Table 3. Shear Capacity of Beams Reinforcement

Floor	Code	Width (mm)	Height (mm)	Shear Reinf. Support	Shear Reinf. Middle	Vr (kN)	Vu (kN)	Remarks
1	BI-1	300	700	2D10 - 50	2D10 - 200	232.606	171.421	OK
	BI-2	300	700	2D10 - 50	2D10 - 200	232.606	191.892	OK
	BA-1	250	500	2D10 - 100	2D10 - 200	147.745	134.463	OK
	BA-2	250	500	2D10 - 100	2D10 - 200	147.745	62.352	OK
2	BI-1	300	700	2D10 - 50	2D10 - 200	232.606	178.533	OK
	BI-2	300	700	2D10 - 50	2D10 - 200	232.606	188.678	OK
	BA-1	250	500	2D10 - 100	2D10 - 200	147.745	97.314	OK
	BA-2	250	500	2D10 - 100	2D10 - 200	147.745	62.102	OK
3	BI-1	300	700	2D10 - 50	2D10 - 200	232.606	172.597	OK
	BI-2	300	700	2D10 - 50	2D10 - 200	232.606	126.006	OK
	BA-1	250	500	2D10 - 100	2D10 - 200	147.745	65.051	OK
	BA-2	250	500	2D10 - 100	2D10 - 200	147.745	61.285	OK
4	BI-1	300	700	2D10 - 50	2D10 - 200	232.606	136.650	OK
	BA-1	250	500	2D10 - 100	2D10 - 200	147.745	57.995	OK
5	BI-1	300	700	2D10 - 50	2D10 - 200	232.606	97.054	OK
	BA-1	250	500	2D10 - 100	2D10 - 200	147.745	60.552	OK

Table 4. Moment Capacity of Plate Reinforcement

Floor	Dimension (m)	Reinforcement Support	Reinforcement Midspan	M_{max} Location Support kN.m/m	M_{max} Location Midspan kN.m/m	φM_n Support kN.m/m	φM_n Midspan kN.m/m	Remarks Support	Remarks Midspan
1	3,5 x 4,6	D10 - 150	D10 - 150	13.789	7.751	16.576	16.576	OK	OK
	4,25 x 4,6	D10 - 150	D10 - 150	13.420	6.884	16.576	16.576	OK	OK
	3 x 4,6	D10 - 150	D10 - 150	11.055	4.149	16.576	16.576	OK	OK
	3 x 1,5	D10 - 150	D10 - 150	3.192	2.003	16.576	16.576	OK	OK
	3 x 4	D10 - 150	D10 - 150	6.982	4.068	16.576	16.576	OK	OK
2	3,5 x 4,6	D10 - 150	D10 - 150	13.431	7.710	16.576	16.576	OK	OK
	4,25 x 4,6	D10 - 150	D10 - 150	13.322	6.938	16.576	16.576	OK	OK
	3 x 4,6	D10 - 150	D10 - 150	11.067	4.142	16.576	16.576	OK	OK
	3 x 1,5	D10 - 150	D10 - 150	3.756	2.749	16.576	16.576	OK	OK
	3 x 4	D10 - 150	D10 - 150	7.006	4.089	16.576	16.576	OK	OK
3	3,5 x 4,6	D10 - 150	D10 - 150	13.407	7.793	16.576	16.576	OK	OK
	4,25 x 4,6	D10 - 150	D10 - 150	13.240	6.945	16.576	16.576	OK	OK
	3 x 4,6	D10 - 150	D10 - 150	6.563	1.703	16.576	16.576	OK	OK
4	3,5 x 4,6	D10 - 150	D10 - 150	13.445	7.817	16.576	16.576	OK	OK
	4,25 x 4,6	D10 - 150	D10 - 150	13.186	6.975	16.576	16.576	OK	OK
	3 x 4,6	D10 - 150	D10 - 150	6.539	1.672	16.576	16.576	OK	OK
5	3,5 x 4,6	D10 - 150	D10 - 150	11.499	5.894	16.576	16.576	OK	OK
	4,25 x 4,6	D10 - 150	D10 - 150	14.022	6.837	16.576	16.576	OK	OK
	3 x 4,6	D10 - 150	D10 - 150	10.269	4.327	16.576	16.576	OK	OK

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3.2 Inter story drift

Tables 5 and 6 show the calculation of building inter-story drift. The value of every floor drift (Δ_i) is less than allowable drift (Δ_{all}). It can be concluded that the building inter-story drift is qualified according to the newest SNI.

Table 5. Drift in the X direction

Floor	hsx	h	δ_e	Δ	Δ_i	Δ_{all}	Re-marks
	(m)	(mm)	(mm)	(mm)	(mm)	(mm)	
5	16	4000	26,778	98,186	23,588	30,769	OK
4	12	4000	20,345	74,598	29,740	30,769	OK
3	8	4000	12,234	44,858	29,344	30,769	OK
2	4	4000	4,231	15,514	15,514	30,769	OK
1	0	4000	0,000	0,000	0,000	30,769	OK

Table 6. Drift in the Y direction

Floor	hsy	h	δ_e	Δ	Δ_i	Δ_{all}	Re-marks
	(m)	(mm)	(mm)	(mm)	(mm)	(mm)	
5	16	4000	25,648	94,043	23,588	30,769	OK
4	12	4000	19,234	70,525	26,932	30,769	OK
3	8	4000	11,889	43,593	26,836	30,769	OK
2	4	4000	4,570	16,757	16,757	30,769	OK
1	0	4000	0,000	0,000	0,000	30,769	OK

3.2 Check of P- Δ effect

Tables 7 and 8 show a calculation of the P-Δ effect. From this table, it can be seen that the value of the stability coefficient (θ) is smaller than 1.0. According to SNI 1726:2019 article 7.8.7, if the value of the stability coefficient (θ) is smaller than 1.0, then the calculation due to the P-Δ effect could be ignored. It can be concluded that the effect of P-Δ on the structure has been stable and could be ignored.

Table 7. P-Delta Effect in the X direction

Floor	hsx	Δi	P	Vx	θ	q_{max}	Re-marks
	(m)	(mm)	(kN)	(kN)			
5	16	23,588	10.168	744	0,0055	0,091	Stable
4	12	29,740	18.257	983	0,0126	0,091	Stable
3	8	29,344	27.569	1162	0,024	0,091	Stable
2	4	15,514	34.877	1263	0,029	0,091	Stable

Table 8. P-Delta Effect in Y direction

Floor	hsx	Δi	P	Vx	θ	q_{max}	Re-marks
	(m)	(mm)	(kN)	(kN)			
5	16	23,588	10.168	776	0,0055	0,091	Stable
4	12	29,740	18.257	1049	0,0110	0,091	Stable
3	8	29,344	27.569	1256	0,0200	0,091	Stable
2	4	15,514	34.877	1263	0,029	0,091	Stable

3.4 Irregularity of Vertical Direction

Due to the shape of the building floor plan is not symmetrical for the vertical direction, it is necessary to check the irregularities of the vertical direction. Tables 9 and 10 show the irregularity of soft-level stiffness in x and y-direction. The weight irregularity calculation is shown in Table 11. From this table, the vertical and weight irregularities of the building are still following the requirements.

Table 9. Irregularity of soft-level stiffness (x-direction)

Floor	hsx	h	δe	Δ	70%	Rem	80%	Rem
	(m)	(mm)	(mm)	(mm)				
5	16	4000	26,778	98,186	0,017	Ok	0,020	Ok
4	12	4000	20,345	74,598	0,013	Ok	0,015	Ok
3	8	4000	12,234	44,858	0,008	Ok	0,009	Ok
2	4	4000	4,231	15,514	0,003	Ok	0,003	Ok
1	0	4000	0,000	0,000	0,000	Ok	0,011	Ok

Table 10. Irregularity of soft-level stiffness (y-direction)

Floor	hsy	h	δe	Δ	70%	Rem	80%	Rem
	(m)	(mm)	(mm)	(mm)				
5	16	4000	25,648	94,043	0,016	Ok	0,024	Ok
4	12	4000	19,234	70,525	0,012	Ok	0,024	Ok
3	8	4000	11,889	43,593	0,008	Ok	0,021	Ok
2	4	4000	4,570	16,757	0,003	Ok	0,017	Ok
1	0	4000	0,000	0,000	0,000	Ok	0,011	Ok

Table 11. Weight Irregularity

Floor	Weight (kg)	150% W	W < 1,5 Wt	W < 1,5 Wb
5	256,745	385,118	-	Ok
4	262,635	393,953	Ok	Ok
3	295,683	443,525	Ok	Ok
2	312,433	468,649	Ok	Ok
1	313,563	470,34	Ok	-

Table 12. Strong Column Weak Beam Calculation

Flo-or	ØMc	ØMbR	ØMbL	ΣMc	ΣMb	ΣMc / ΣMb	Stan-dard	Re-ma-rk
5	363.85	157.38	157.38					
				727.70	314.76	2.31	1.20	Ok
4	363.85	157.38	157.38					
				727.70	314.76	2.31	1.20	Ok
3	363.85	157.38	157.38					
				727.70	314.76	2.31	1.20	Ok
2	363.85	157.38	157.38					
				727.70	163.82	4.44	1.20	Ok
1	363.85	81.91	81.91					

3.5 Strong Column Weak Beam Checking

Following article 18 SNI 2847:2019, it is explained that the capacity of the column must be greater than the beam, or according to the formula: $\Sigma M_{column} \geq (6/5) \times \Sigma M_{beam}$. Table 12 shows the strong column weak beam calculation. From the results in Table 12, it can be concluded that the column capacity is greater than 1.2 beam capacity.

3.6 Mass Participation Checking`

Following article 7.9.1.1 SNI 1726:2019, the number of natural vibrations must be 100% of the structural mass and in the period before 0.05 seconds. The calculations of building mass participation are shown in Table 13. From thi table, the mass participation in the X direction and Y direction is 100% in the 86th mode and it is still following SNI 1726:2019.

Table 13.Building mass participation calculations

Case	Mode	Period sec	UX	UY	UZ	Sum UX	Sum UY	Sum UZ	RX	RY	RZ
Modal	77	0	0,0012	0,01119	0	0,0012	0,01119	0	0,00797	0,01442	0,0025
Modal	78	0,001	0,5425	0,65	0	0,5437	0,66119	0	0,00929	0,00013	0,529
Modal	79	0,001	0,1102	0,22	0	0,6539	0,88119	0	0,01404	0,01953	0,456
Modal	80	0,005	0,00001025	0	0	0,65391	0,88119	0	0,00907	0,00255	0,0034
Modal	81	0,007	0,2405	0,001	0	0,89441	0,88219	0	0,00275	0,00041	0,234
Modal	82	0,008	0,1022	0,02	0	0,99661	0,90219	0	0,02026	0,11264	0,1544
Modal	83	0,008	0,00002273	0,03	0	0,996633	0,93219	0	0,01938	0,04759	0,0024
Modal	84	0,009	0,0004	0,00189	0	0,997033	0,93408	0	0,00131	0,00274	0,0268
Modal	85	0,01	0,002667	0,00519	0	0,9997	0,93927	0	0,00219	0,00015	0,0233
Modal	86	0,02	0,0003	0,06073	0	1	1	0	0,00875	0,00806	0,004

4 Conclusions

From the assessment which has done, the following could be concluded :

1. The analysis results of the capacity of structural elements (columns, beams, and plates) of Block D RS BMC Padang, are still able to support the design loads, according to the newest SNI (SNI 1726-2019 and SNI 2847-2019).
2. The results of checking the performance of the building structure against the inter-story drift, the P-Δ effect, and irregularities in the vertical direction, the concept of strong column weak beam, and mass participation showed that it is still following the newest standards (SNI 1726-2019)

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