

Supplementary Material

Table S1: The dimension of RC beams

Beam Type	I_e	Dimension based on zones							
		10	11	12	13	14	15	16	19
A. Concrete area (A_C), in mm ²									
Tie Beam	1.00	60,000	60,000	60,000	60,000	60,000	60,000	80,000	80,000
	1.25	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	1.50	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Floor Beam	1.00	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	1.25	100,000	100,000	100,000	100,000	120,000	120,000	120,000	120,000
	1.50	100,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Roof Beam	1.00	50,000	50,000	50,000	50,000	60,000	60,000	60,000	60,000
	1.25	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
	1.50	60,000	60,000	60,000	75,000	75,000	75,000	75,000	75,000
B. Reinforcement area (A_R), in mm ²									
Tie Beam	1.00	567	586	586	600	714	767	713	641
	1.25	696	728	716	747	807	934	923	877
	1.50	793	822	809	816	1,056	1,200	1,236	1,148
Floor Beam	1.00	679	684	691	692	714	734	754	738
	1.25	747	754	767	769	889	908	919	907
	1.50	819	888	904	907	959	1,000	1,110	1,000
Roof Beam	1.00	381	381	381	381	380	388	397	393
	1.25	381	385	390	392	399	409	454	409
	1.50	393	460	463	465	515	538	502	497
C. Longitudinal reinforcement ratio (RL), in %									
Tie Beam	1.00	0.95	0.98	0.98	1.00	1.19	1.28	0.89	0.80
	1.25	0.70	0.73	0.72	0.75	0.81	0.93	0.92	0.88
	1.50	0.79	0.82	0.81	0.82	1.06	1.20	1.24	1.15
Floor Beam	1.00	0.68	0.68	0.69	0.69	0.71	0.73	0.75	0.74
	1.25	0.75	0.75	0.77	0.77	0.74	0.76	0.77	0.76
	1.50	0.82	0.74	0.75	0.76	0.80	0.83	0.93	0.83
Roof Beam	1.00	0.76	0.76	0.76	0.76	0.63	0.65	0.66	0.66
	1.25	0.64	0.64	0.65	0.65	0.67	0.68	0.76	0.68
	1.50	0.66	0.77	0.77	0.62	0.69	0.72	0.67	0.66

Table S2: The dimension of RC columns

Column Type	I_e	Dimension based on zones							
		10	11	12	13	14	15	10	19
A. Concrete area (A_C), in mm ²									
1st Floor	1.00	62,500	62,500	62,500	62,500	90,000	90,000	90,000	90,000
	1.25	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
	1.50	90,000	90,000	90,000	90,000	122,500	122,500	122,500	122,500
2nd Floor	1.00	62,500	62,500	62,500	62,500	90,000	90,000	90,000	90,000
	1.25	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
	1.50	90,000	90,000	90,000	90,000	122,500	122,500	122,500	122,500
B. Reinforcement area (A_R), in mm ²									
1st Floor	1.00	2,268	3,054	3,402	3,402	1,608	2,036	2,512	2,268
	1.25	1,608	1,608	2,412	2,412	3,054	3,768	4,561	3,768
	1.50	2,036	3,054	3,402	3,402	1,884	3,054	3,041	2,512
2nd Floor	1.00	904	1356	1,356	1,356	904	904	904	904
	1.25	904	904	1,356	1,356	1,356	1,356	1,356	1,356
	1.50	904	1356	1,356	1,356	1,356	1,356	1,232	1,232
C. Longitudinal reinforcement ratio (RL), in %									
1st Floor	1.00	3.63	4.89	5.44	5.44	1.79	2.26	2.79	2.52
	1.25	1.79	1.79	2.68	2.68	3.39	4.19	5.07	4.19
	1.50	2.26	3.39	3.78	3.78	1.54	2.49	2.48	2.05
2nd Floor	1.00	1.45	2.17	2.17	2.17	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.51	1.51	1.51	1.51	1.51	1.51
	1.50	1.00	1.51	1.51	1.51	1.11	1.11	1.01	1.01

Table S3: The quantity of work for RC beams

Beam Type	I_e	Dimension based on zone							
		10	11	12	13	14	15	16	19
A. Concrete quantity (Q_c), in m ³									
Tie Beam	1.00	16.86	16.86	16.86	16.86	16.86	16.86	22.48	22.48
	1.25	28.10	28.10	28.10	28.10	28.10	28.10	28.10	28.10
	1.50	28.10	28.10	28.10	28.10	28.10	28.10	28.10	28.10
Floor Beam	1.00	28.10	28.10	28.10	28.10	28.10	28.10	28.10	28.10
	1.25	28.10	28.10	28.10	28.10	33.72	33.72	33.72	33.72
	1.50	28.10	33.72	33.72	33.72	33.72	33.72	33.72	33.72
Roof Beam	1.00	14.05	14.05	14.05	14.05	16.86	16.86	16.86	16.86
	1.25	16.86	16.86	16.86	16.86	16.86	16.86	16.86	16.86
	1.50	16.86	16.86	16.86	21.08	21.08	21.08	21.08	21.08
B. Reinforcement quantity (Q_R), in kg									
Tie Beam	1.00	3,075	3,075	3,075	3,075	3,484	3,484	3,387	3,387
	1.25	4,242	4,242	4,267	4,267	4,267	4,953	4,917	4,242
	1.50	4,242	4,242	4,267	4,267	4,953	4,953	5,889	4,953
Floor Beam	1.00	4,242	4,242	4,242	4,242	4,242	4,242	4,242	4,242
	1.25	4,242	4,242	4,242	4,242	4,267	4,267	4,404	4,404
	1.50	4,242	4,242	4,242	4,242	4,953	5,116	5,280	5,116
Roof Beam	1.00	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520
	1.25	2,520	2,520	2,520	2,520	2,520	2,520	3,030	2,520
	1.50	2,520	3,030	3,030	3,030	3,030	3,030	3,030	3,030
C. Formwork quantity (Q_F), in m ²									
Tie Beam	1.00	252.90	252.90	252.90	252.90	252.90	252.90	337.20	337.20
	1.25	337.20	337.20	337.20	337.20	337.20	337.20	337.20	337.20
	1.50	337.20	337.20	337.20	337.20	337.20	337.20	337.20	337.20
Floor Beam	1.00	337.20	337.20	337.20	337.20	337.20	337.20	337.20	337.20
	1.25	337.20	337.20	337.20	337.20	337.20	337.20	337.20	337.20
	1.50	337.20	337.20	337.20	337.20	337.20	337.20	337.20	337.20
Roof Beam	1.00	210.75	252.90	210.75	210.75	252.90	252.90	252.90	252.90
	1.25	252.90	252.90	252.90	252.90	252.90	252.90	252.90	252.90
	1.50	252.90	252.90	252.90	252.90	252.90	252.90	252.90	252.90

Table S4: The quantity of work for RC columns

Column Type	I_e	Dimension based on zone							
		10	11	12	10	14	15	10	19
A. Concrete quantity (Q_C), in m ³									
1st Floor	1.00	11.00	11.00	11.00	11.00	15.84	15.84	15.84	15.84
	1.25	15.84	15.84	15.84	15.84	15.84	15.84	15.84	15.84
	1.50	15.84	15.84	15.84	15.84	21.56	21.56	21.56	21.56
2nd Floor	1.00	11.00	11.00	11.00	11.00	15.84	15.84	15.84	15.84
	1.25	15.84	15.84	15.84	15.84	15.84	15.84	15.84	15.84
	1.50	15.84	15.84	15.84	15.84	21.56	21.56	21.56	21.56
B. Reinforcement quantity (Q_R), in kg									
1st Floor	1.00	4,497	5,808	6,470	6,470	3,372	4,158	4,968	4,497
	1.25	3,372	3,372	4,714	4,714	5,893	7,250	8,791	7,250
	1.50	4,158	5,893	6,549	6,549	3,841	6,030	6,090	5,062
2nd Floor	1.00	1,809	2,438	2,438	2,438	2,132	2,132	1,809	1,809
	1.25	1,954	1,954	2,587	2,587	2,855	2,855	2,587	2,587
	1.50	1,954	2,587	2,587	2,587	2,992	2,992	2,422	2,422
C. Formwork quantity (Q_F), in m ²									
1st Floor	1.00	176.00	176.00	176.00	176.00	211.20	211.20	211.20	211.20
	1.25	211.20	211.20	211.20	211.20	211.20	211.20	211.20	211.20
	1.50	211.20	211.20	211.20	211.20	246.40	246.40	246.40	246.40
2nd Floor	1.00	176.00	176.00	176.00	176.00	211.20	211.20	211.20	211.20
	1.25	211.20	211.20	211.20	211.20	211.20	211.20	211.20	211.20
	1.50	211.20	211.20	211.20	211.20	246.40	246.40	246.40	246.40

Table S5: The cost of RC beams components

Beam type	I_e	Cost of RC components per zone (in thousand IDR)							
		10	11	12	13	14	15	16	19
A. Concrete works									
Tie beam	1.00	20,806	20,806	20,806	20,806	20,806	20,806	27,742	27,742
	1.25	34,677	34,677	34,677	34,677	34,677	34,677	34,677	34,677
	1.50	34,677	34,677	34,677	34,677	34,677	34,677	34,677	34,677
Floor beam	1.00	34,677	34,677	34,677	34,677	34,677	34,677	34,677	34,677
	1.25	34,677	34,677	34,677	34,677	41,613	41,613	41,613	41,613
	1.50	34,677	34,677	34,677	41,613	41,613	41,613	48,548	41,613
Roof beam	1.00	17,339	17,339	17,339	17,339	20,806	20,806	20,806	20,806
	1.25	20,806	20,806	20,806	20,806	20,806	20,806	20,806	20,806
	1.50	20,806	20,806	20,806	26,008	26,008	26,008	26,008	26,008
B. Reinforcement works									
Tie beam	1.00	55,044	55,044	55,044	55,044	62,847	62,847	60,101	60,101
	1.25	75,952	75,952	76,440	76,440	76,440	89,522	88,830	75,952
	1.50	75,952	75,952	76,440	76,440	89,522	89,522	107,380	89,522
Floor beam	1.00	75,952	75,952	75,952	75,952	70,600	70,600	70,194	70,194
	1.25	75,952	75,952	75,952	75,952	76,440	76,440	78,597	78,597
	1.50	75,952	79,086	75,952	79,086	89,522	92,189	94,856	92,189
Roof beam	1.00	94,639	94,639	94,639	94,639	94,639	94,639	94,639	94,639
	1.25	94,639	94,639	94,639	94,639	94,639	94,639	94,639	94,639
	1.50	94,639	94,639	94,639	94,639	94,639	94,639	94,639	94,639
C. Formworks									
Tie beam	1.00	41,143	41,143	41,143	41,143	41,143	41,143	54,857	54,857
	1.25	54,857	54,857	54,857	54,857	54,857	54,857	54,857	54,857
	1.50	54,857	54,857	54,857	54,857	54,857	54,857	54,857	54,857
Floor beam	1.00	44,918	44,918	44,918	44,918	48,225	48,225	47,578	47,578
	1.25	47,578	47,578	47,578	47,578	48,225	48,225	51,160	47,578
	1.50	47,578	53,740	47,578	53,740	61,119	61,119	59,152	59,152
Roof beam	1.00	59,149	59,149	59,149	59,149	70,979	70,979	70,979	70,979
	1.25	70,979	70,979	70,979	70,979	70,979	70,979	70,979	70,979
	1.50	70,979	70,979	70,979	70,979	70,979	70,979	70,979	70,979

Table S6: The cost of RC columns components

Column type	I_e	Cost of RC components per zone (in thousand IDR)							
		10	11	12	13	14	15	16	19
A. Concrete works									
1st Floor	1.00	13,575	13,575	13,575	13,575	19,548	19,548	19,548	19,548
	1.25	19,548	19,548	19,548	19,548	19,548	19,548	19,548	19,548
	1.50	19,548	19,548	19,548	19,548	26,607	26,607	26,607	26,607
2nd Floor	1.00	13,575	13,575	13,575	13,575	19,548	19,548	19,548	19,548
	1.25	19,548	19,548	19,548	19,548	19,548	19,548	19,548	19,548
	1.50	19,548	19,548	19,548	19,548	26,607	26,607	26,607	26,607
B. Reinforcement works									
1st Floor	1.00	84,225	109,257	121,882	121,882	62,363	77,365	93,223	84,225
	1.25	62,363	62,363	87,976	87,976	110,479	136,365	165,789	136,365
	1.50	77,365	110,479	122,989	122,989	70,929	112,706	114,239	94,623
2nd Floor	1.00	32,936	44,949	44,949	44,949	38,712	38,712	32,936	32,936
	1.25	35,313	35,313	47,400	47,400	52,499	52,499	47,400	47,400
	1.50	35,313	47,400	47,400	47,400	54,727	54,727	44,238	44,238
C. Formworks									
1st Floor	1.00	47,590	47,590	47,590	47,590	57,108	57,108	57,108	57,108
	1.25	57,108	57,108	57,108	57,108	57,108	57,108	57,108	57,108
	1.50	57,108	57,108	57,108	57,108	66,626	66,626	66,626	66,626
2nd Floor	1.00	47,590	47,590	47,590	47,590	57,108	57,108	57,108	57,108
	1.25	57,108	57,108	57,108	57,108	57,108	57,108	57,108	57,108
	1.50	57,108	57,108	57,108	57,108	66,626	66,626	66,626	66,626