

Lampiran 1. Perhitungan Berat Struktur Asli dengan Dilatasi (OD)

Lantai 1

Material	Berat jenis	Panjang (m)	Lebar (m)	Tinggi/ tebal (m)	Jumlah (buah)	Berat (kg)
Kolom						
50 x 70	2400	0.7	0.5	7.39	24	148982.4
60 x 80		0.8	0.6	7.39	31	263911.68
90 x 90		0.9	0.9	7.39	12	172393.92
80 x 90		0.9	0.8	7.39	14	178778.88
Balok						
40 x 70	2400	96	0.4	0.7		64512
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
		20.4	6.2	0.12		36426.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	185		2.25		37462.5
		232		5.14		107323.2
	90	305		2.25		61762.5
		240		5.14		111024
Plafon	11	98.6	19.3			20932.78
		20.4	6.2			1391.28
Penggantung plafon	7	98.6	19.3			13320.86
		20.4	6.2			885.36
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2698716.6

Lantai 3

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
50 x 70	2400	0.7	0.5	4.5	24	90720
60 x 80		0.8	0.6	2.25	26	67392
90 x 90		0.9	0.9	2.25	12	52488
80 x 90		0.9	0.8	2.25	14	54432
50 x 80		0.8	0.5	2.25	13	28080
80 x 80		0.8	0.8	2.25	13	44928
Balok						
40 x 70	2400	96	0.4	0.7		64512
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	260		2.25		52650
	90	265		2.25		53662.5
	90	390		2.25		78975
	90	420		2.25		85050
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2186752.14

Lantai 5

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
50 x 70	2400	0.7	0.5	4.5	24	90720
60 x 80		0.8	0.6	4.5	25	129600
50 x 80		0.8	0.5	4.5	13	56160
80 x 80		0.8	0.8	4.5	13	89856
Balok						
40 x 70	2400	96	0.4	0.7		64512
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	295		2.25		59737.5
		320		2.25		64800
		450		2.25		91125
		430		2.25		87075
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2247448.14

Lantai 6

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.35	25	125280
50 x 80		0.8	0.5	4.35	13	54288
80 x 80		0.8	0.8	4.35	13	86860.8
Balok						
40 x 80	2400	253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	275		2.1		51975
		295		2.25		59737.5
		470		2.1		88830
		450		2.25		91125
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1789272.78

Lantai 7

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	25	120960
50 x 80		0.8	0.5	4.2	13	52416
80 x 80		0.8	0.8	4.2	13	83865.6
Balok						
40 x 80	2400	253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	210		2.1		39690
		295		2.1		55755
		420		2.1		79380
		470		2.1		88830
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1752073.08

Lantai 8

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	25	120960
50 x 80		0.8	0.5	4.2	13	52416
80 x 80		0.8	0.8	4.2	13	83865.6
Balok						
40 x 80	2400	253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	230		2.1		43470
		210		2.1		39690
		460		2.1		86940
		420		2.1		79380
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1737898.08

Lantai 9

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	25	120960
50 x 80		0.8	0.5	4.2	13	52416
80 x 80		0.8	0.8	4.2	13	83865.6
Balok						
40 x 80	2400	253	0.4	0.8		194304
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	250		2.1		47250
		230		2.1		43470
		390		2.1		73710
		460		2.1		86940
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1739788.08

Lantai 10

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.1	25	118080
50 x 80		0.8	0.5	4.1	13	51168
80 x 80		0.8	0.8	4.1	13	81868.8
Balok						
40 x 80	2400	120	0.4	0.8		92160
30 x 50		153	0.3	0.5		55080
30 x 50		312	0.3	0.5		112320
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	140		2		25200
		250		2.1		47250
		270		2		48600
		390		2.1		73710
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1380929.28

Lantai Atap

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	25	129600
50 x 80		0.8	0.5	4.5	13	56160
80 x 80		0.8	0.8	4.5	13	89856
Balok						
30 x 50	2400	76	0.3	0.5		27360
30 x 50		288	0.3	0.5		103680
Dinding	90	140		2		25200
		270		2		48600
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	100	74.4	19.4			43300.8
JUMLAH						549737.28

Rekapitulasi Berat Tiap Lantai Struktur OD

Lantai	Berat (kg)
1	2698716.6
2	2281576.14
3	2186752.14
4	2228210.64
5	2247448.14
6	1789272.78
7	1752073.08
8	1737898.08
9	1739788.08
10	1380929.28
Atap	781901.8444
Berat Total Bangunan	20824566.8

Lantai 1

Lantai 2

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
50 x 70	2400	0.7	0.5	4.5	16	60480
60 x 80		0.8	0.6	4.5	24	124416
90 x 90		0.9	0.9	4.5	12	104976
80 x 90		0.9	0.8	4.5	12	93312
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	265		2.25		53662.5
		185		2.25		37462.5
		420		2.25		85050
		305		2.25		61762.5
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2158792.14

Lantai 4

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
50 x 70	2400	0.7	0.5	4.5	16	60480
60 x 80		0.8	0.6	4.5	24	124416
50 x 80		0.8	0.5	4.5	12	51840
80 x 80		0.8	0.8	4.5	12	82944
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	320		2.25		64800
	90	260		2.25		52650
	90	430		2.25		87075
	90	390		2.25		78975
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2140850.64

Lantai 6

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.35	24	120268.8
50 x 80		0.8	0.5	4.35	12	50112
80 x 80		0.8	0.8	4.35	12	80179.2
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	275		2.1		51975
		295		2.25		59737.5
		470		2.1		88830
		450		2.25		91125
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1754203.98

Lantai 7

[illegible]

Lantai 8

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	24	116121.6
50 x 80		0.8	0.5	4.2	12	48384
80 x 80		0.8	0.8	4.2	12	77414.4
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	230		2.1		43470
		210		2.1		39690
		460		2.1		86940
		420		2.1		79380
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1703376.48

Lantai 9

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	24	116121.6
50 x 80		0.8	0.5	4.2	12	48384
80 x 80		0.8	0.8	4.2	12	77414.4
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	250		2.1		47250
		230		2.1		43470
		390		2.1		73710
		460		2.1		86940
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1705266.48

Lantai 10

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.1	24	113356.8
50 x 80		0.8	0.5	4.1	12	47232
80 x 80		0.8	0.8	4.1	12	75571.2
Balok						
40 x 80	2400	120	0.4	0.8		92160
30 x 50		153	0.3	0.5		55080
30 x 50		312	0.3	0.5		112320
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	140		2		25200
		250		2.1		47250
		270		2		48600
		390		2.1		73710
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1365972.48

Lantai Atap

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	24	124416
50 x 80		0.8	0.5	4.5	12	51840
80 x 80		0.8	0.8	4.5	12	82944
Balok						
30 x 50	2400	76	0.3	0.5		27360
30 x 50	2400	288	0.3	0.5		103680
Dinding	90	140		2		25200
		270		2		48600
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	100	74.4	19.4			43300.8
JUMLAH						533321.28

Rekapitulasi Berat Tiap Lantai Struktur OND

Lantai	Berat (kg)
1	2523219
2	2158792.14
3	2102416.14
4	2140850.64
5	2160088.14
6	1754203.98
7	1717551.48
8	1703376.48
9	1705266.48
10	1365972.48
Atap	765485.8444
Berat Total Bangunan	20097222.8

Lampiran 3. Perhitungan Berat Struktur Alternatif Tanpa Bresing (Tipe A)

Lantai 1

Material	Berat jenis	Panjang (m)	Lebar (m)	Tinggi/ tebal (m)	Jumlah (buah)	Berat (kg)
Kolom						
60 x 80	2400	0.8	0.6	7.39	32	272424.96
90 x 90		0.9	0.9	7.39	12	172393.92
80 x 90		0.9	0.8	7.39	20	255398.4
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
		20.4	6.2	0.12		36426.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	185		2.25		37462.5
		232		5.14		107323.2
		305		2.25		61762.5
		240		5.14		111024
Plafon	11	98.6	19.3			20932.78
		20.4	6.2			1391.28
Penggantung plafon	7	98.6	19.3			13320.86
		20.4	6.2			885.36
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2594163

Lantai 3

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	31	160704
90 x 90		0.9	0.9	2.25	12	52488
80 x 90		0.9	0.8	2.25	18	69984
50 x 80		0.8	0.5	2.25	16	34560
80 x 80		0.8	0.8	2.25	12	41472
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	260		2.25		52650
		265		2.25		53662.5
		390		2.25		78975
		420		2.25		85050
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2167216.14

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	32	165888
50 x 80		0.8	0.5	4.5	20	86400
80 x 80		0.8	0.8	4.5	12	82944
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	320		2.25		64800
		260		2.25		52650
		430		2.25		87075
		390		2.25		78975
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2156402.64

Lantai 5

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	28	145152
50 x 80		0.8	0.5	4.5	16	69120
80 x 80		0.8	0.8	4.5	12	82944
Balok						
40 x 70	2400	64	0.4	0.7		43008
30 x 50		12	0.3	0.5		4320
20 x 40		64	0.2	0.4		12288
40 x 80		228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50	2400	195	0.3	0.5		70200
40 x 80		316	0.4	0.8		242688
25 x 45		48	0.25	0.45		12960
30 x 60		48	0.3	0.6		20736
Pelat	2400	98.6	19.3	0.12		548058.24
Spesi	63	98.6	19.3			119887.74
Keramik	24	98.6	19.3			45671.52
Dinding	90	295		2.25		59737.5
		320		2.25		64800
		450		2.25		91125
		430		2.25		87075
Plafon	11	98.6	19.3			20932.78
Penggantung plafon	7	98.6	19.3			13320.86
Beban Hidup	250	98.6	19.3			142723.5
JUMLAH						2137624.14

Lantai 6

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.35	24	120268.8
50 x 80		0.8	0.5	4.35	12	50112
80 x 80		0.8	0.8	4.35	12	80179.2
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	275		2.1		51975
		295		2.25		59737.5
		470		2.1		88830
		450		2.25		91125
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1754203.98

Lantai 7

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	24	116121.6
50 x 80		0.8	0.5	4.2	12	48384
80 x 80		0.8	0.8	4.2	12	77414.4
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	210		2.1		39690
		295		2.1		55755
		420		2.1		79380
		470		2.1		88830
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1717551.48

Lantai 8

[illegible]

Lantai 9

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.2	24	116121.6
50 x 80		0.8	0.5	4.2	12	48384
80 x 80		0.8	0.8	4.2	12	77414.4
Balok						
40 x 80	2400	228	0.4	0.8		175104
30 x 45		203	0.3	0.45		65772
30 x 50		147	0.3	0.5		52920
40 x 80		316	0.4	0.8		242688
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	250		2.1		47250
		230		2.1		43470
		390		2.1		73710
		460		2.1		86940
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1705266.48

Lantai 10

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.1	24	113356.8
50 x 80		0.8	0.5	4.1	12	47232
80 x 80		0.8	0.8	4.1	12	75571.2
Balok						
40 x 80	2400	120	0.4	0.8		92160
30 x 50		153	0.3	0.5		55080
30 x 50		312	0.3	0.5		112320
Pelat	2400	74.4	19.4	0.12		415687.68
Spesi	63	74.4	19.4			90931.68
Keramik	24	74.4	19.4			34640.64
Dinding	90	140		2		25200
		250		2.1		47250
		270		2		48600
		390		2.1		73710
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	250	74.4	19.4			108252
JUMLAH						1365972.48

Lantai Atap

Material	Berat jenis	Panjang	Lebar	Tinggi/tebal	Jumlah	Berat
		(m)	(m)	(m)	(buah)	(kg)
Kolom						
60 x 80	2400	0.8	0.6	4.5	24	124416
50 x 80		0.8	0.5	4.5	12	51840
80 x 80		0.8	0.8	4.5	12	82944
Balok						
30 x 50	2400	76	0.3	0.5		27360
30 x 50		288	0.3	0.5		103680
Dinding	90	140		2		25200
		270		2		48600
Plafon	11	74.4	19.4			15876.96
Penggantung plafon	7	74.4	19.4			10103.52
Beban Hidup	100	74.4	19.4			43300.8
JUMLAH						533321.28

Rekapitulasi Berat Tiap Lantai Struktur Tipe A

Lantai	Berat (kg)
1	2594163
2	2201992.14
3	2167216.14
4	2156402.64
5	2137624.14
6	1754203.98
7	1717551.48
8	1703376.48
9	1705266.48
10	1365972.48
Atap	765485.8444
Berat Total Bangunan	20269254.8

Lampiran 4. Perhitungan Berat Struktur Tipe B, C, D, dan Tipe E

Perhitungan berat struktur Tipe B, C, D dan E menggunakan berat struktur Tipe A sebagai dasar perhitungan, namun ada penambahan berat bresing pada tiap lantai struktur. Perhitungan masing-masing jenis struktur disajikan sebagai berikut:

Perhitungan Berat Bresing Tiap Lantai Struktur Tipe B

Lantai	Material	Berat Jenis (Kg/m)	Panjang (m)	Jumlah	Berat (Kg)
1	WF 100.50.5.7	9.3	9.51	2	176.886
2	WF 100.50.5.7	9.3	9.18	2	170.748
3	WF 100.50.5.7	9.3	9.18	2	170.748
4	WF 100.50.5.7	9.3	9.18	2	170.748
5	WF 100.50.5.7	9.3	9.18	2	170.748
6	WF 100.50.5.7	9.3	9.18	2	170.748
7	WF 100.50.5.7	9.3	9.04	2	168.144
8	WF 100.50.5.7	9.3	9.04	2	168.144
					1366.914

Rekapitulasi Berat Tiap Lantai Struktur Tipe B

Lantai	Berat (kg)
1	2,594,339.89
2	2,202,162.89
3	2,167,386.89
4	2,156,573.39
5	2,137,794.89
6	1,754,374.73
7	1,717,719.62
8	1,703,544.62
9	1,705,266.48
10	1,365,972.48
Atap	765,485.84
Berat Total Bangunan	20,270,621.72

Perhitungan Berat Bresing Tiap Lantai Struktur Tipe C

Lantai	Material	Berat Jenis (Kg/m)	Panjang (m)	Jumlah	Berat (Kg)
1	WF 100.50.5.7	9.3	9.51	4	353.772
2	WF 100.50.5.7	9.3	9.18	4	341.496
3	WF 100.50.5.7	9.3	9.18	4	341.496
4	WF 100.50.5.7	9.3	9.18	4	341.496
5	WF 100.50.5.7	9.3	9.18	4	341.496
6	WF 100.50.5.7	9.3	9.18	4	341.496
7	WF 100.50.5.7	9.3	9.04	4	336.288
8	WF 100.50.5.7	9.3	9.04	4	336.288
					2733.83

Rekapitulasi Berat Tiap Lantai Struktur Tipe C

Lantai	Berat (kg)
1	2,594,516.77
2	2,202,333.64
3	2,167,557.64
4	2,156,744.14
5	2,137,965.64
6	1,754,545.48
7	1,717,887.77
8	1,703,712.77
9	1,705,266.48
10	1,365,972.48
Atap	765,485.84
Berat Total Bangunan	20,271,988.63



Perhitungan Berat Bresing Tiap Lantai Struktur Tipe D

Lantai	Material	Berat Jenis (Kg/m)	Panjang (m)	Jumlah	Berat (Kg)
1	WF 100.50.5.7	9.3	6.51	4	242.172
2	WF 100.50.5.8	9.3	6.02	4	223.944
3	WF 100.50.5.9	9.3	6.02	4	223.944
4	WF 100.50.5.10	9.3	6.02	4	223.944
5	WF 100.50.5.11	9.3	6.02	4	223.944
6	WF 100.50.5.12	9.3	6.02	4	223.944
7	WF 100.50.5.13	9.3	5.8	4	215.76
8	WF 100.50.5.14	9.3	5.8	4	215.76
					1793.41

Rekapitulasi Berat Tiap Lantai Struktur Tipe D

Lantai	Berat (kg)
1	2,594,405.17
2	2,202,216.08
3	2,167,440.08
4	2,156,626.58
5	2,137,848.08
6	1,754,427.92
7	1,717,767.24
8	1,703,592.24
9	1,705,266.48
10	1,365,972.48
Atap	765,485.84
Berat Total Bangunan	20,271,048.22

Perhitungan Berat Bresing Tiap Lantai Struktur Tipe E

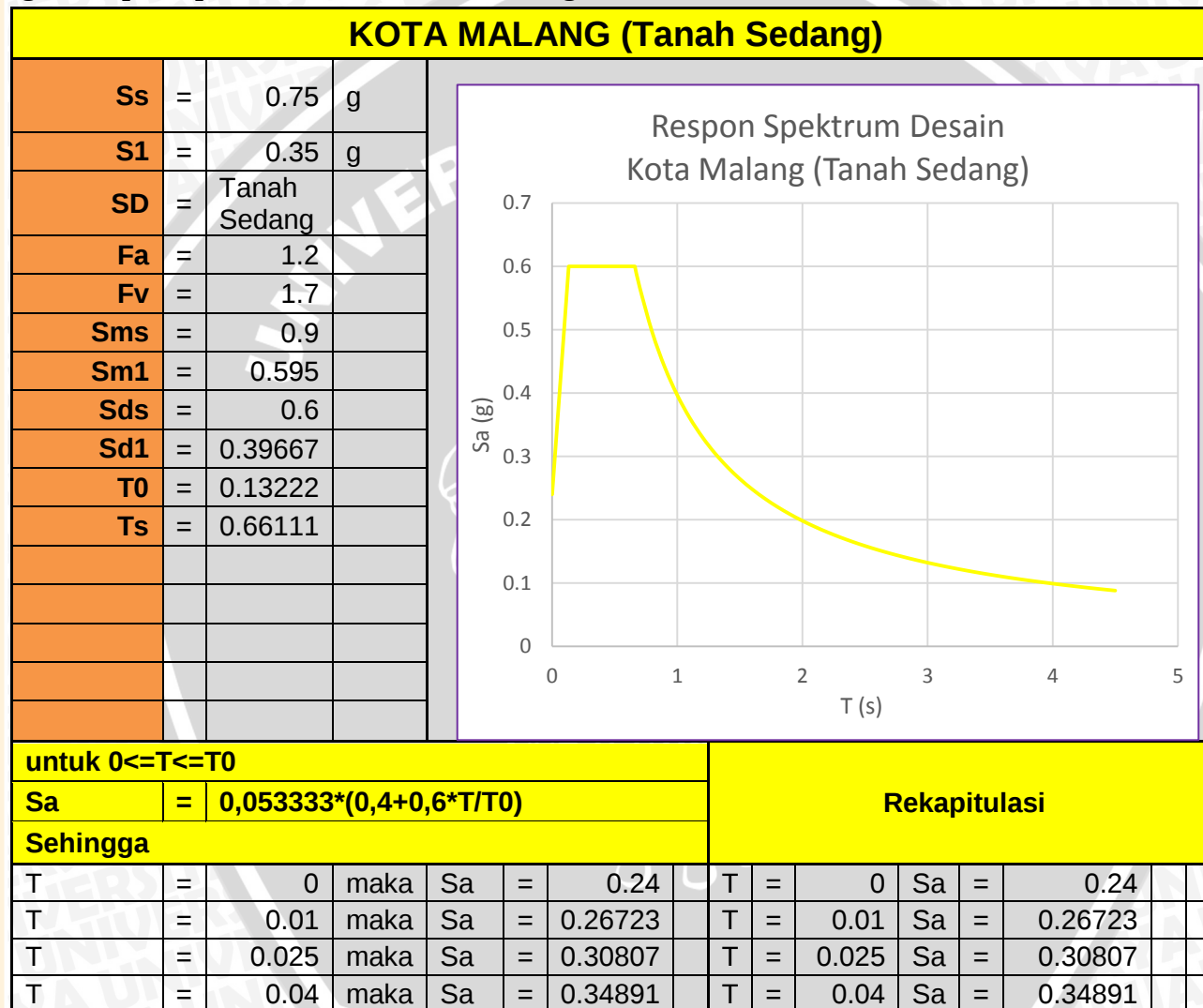
Lantai	Material	Berat Jenis (Kg/m)	Panjang (m)	Jumlah	Berat (Kg)
1	WF 100.50.5.7	9.3	6.51	4	242.172
2	WF 100.50.5.7	9.3	6.02	4	223.944
3	WF 100.50.5.7	9.3	6.02	4	223.944
4	WF 100.50.5.7	9.3	6.02	4	223.944
5	WF 100.50.5.7	9.3	6.02	4	223.944
6	WF 100.50.5.7	9.3	6.02	4	223.944
7	WF 100.50.5.7	9.3	5.8	4	215.76
8	WF 100.50.5.7	9.3	5.8	4	215.76
					1793.41

Rekapitulasi Berat Tiap Lantai Struktur Tipe E

Lantai	Berat (kg)
1	2,594,405.17
2	2,202,216.08
3	2,167,440.08
4	2,156,626.58
5	2,137,848.08
6	1,754,427.92
7	1,717,767.24
8	1,703,592.24
9	1,705,266.48
10	1,365,972.48
Atap	765,485.84
Berat Total Bangunan	20,271,048.22



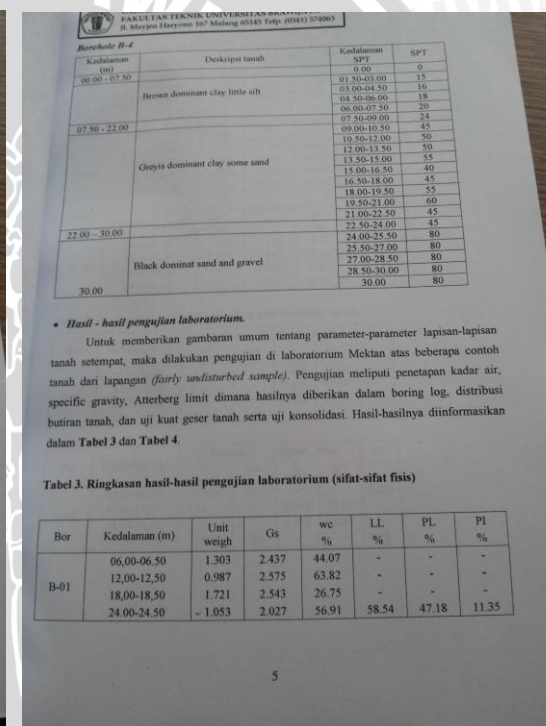
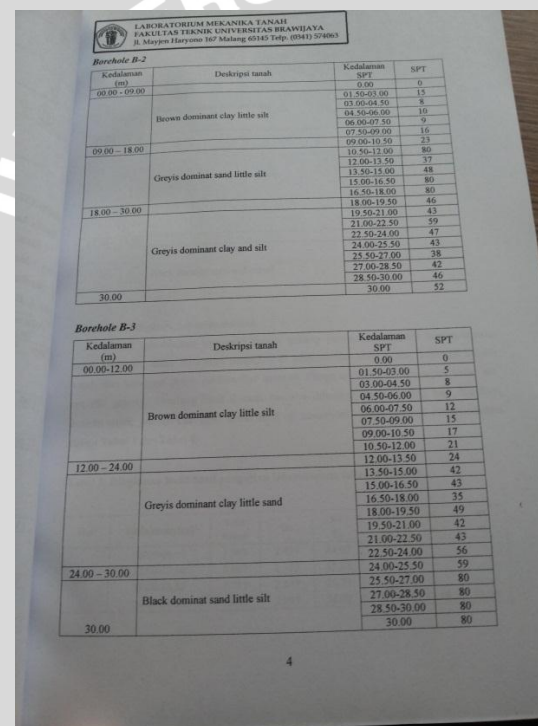
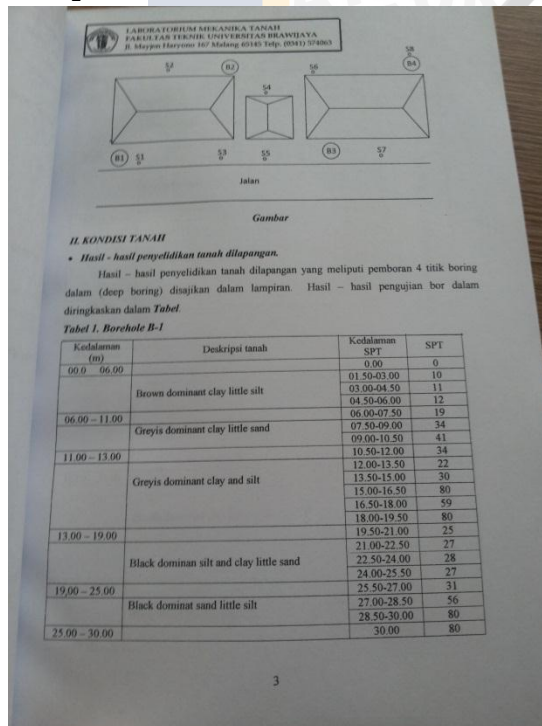
Lampiran 5. Perhitungan Respon Spektrum Desain Kota Malang



T	=	0.055	maka	Sa	=	0.38975		T	=	0.055	Sa	=	0.38975		
T	=	0.07	maka	Sa	=	0.43059		T	=	0.07	Sa	=	0.43059		
T	=	0.085	maka	Sa	=	0.47143		T	=	0.085	Sa	=	0.47143		
T	=	0.13222	maka	Sa	=	0.6		T	=	0.132	Sa	=	0.6		
untuk $T_0 \leq T \leq T_s$								T	=	0.132	Sa	=	0.6		
Sa	=	Sds						T	=	0.15	Sa	=	0.6		
Sehingga								T	=	0.3	Sa	=	0.6		
T	=	0.13222	maka	Sa	=	0.6		T	=	0.6	Sa	=	0.6		
T	=	0.15	maka	Sa	=	0.6		T	=	0.661	Sa	=	0.6		
T	=	0.3	maka	Sa	=	0.6		T	=	0.661	Sa	=	0.6		
T	=	0.6	maka	Sa	=	0.6		T	=	0.7	Sa	=	0.56667		
T	=	0.66111	maka	Sa	=	0.6		T	=	0.8	Sa	=	0.49583		
untuk $T_s \leq T \leq T_{ak}$ hingga								T	=	0.9	Sa	=	0.44074		
Sa	=	0,08/T						T	=	1	Sa	=	0.39667		
Sehingga								T	=	1.1	Sa	=	0.36061		
T	=	0.66111	maka	Sa	=	0.6		T	=	1.2	Sa	=	0.33056		
T	=	0.7	maka	Sa	=	0.56667		T	=	1.3	Sa	=	0.30513		
T	=	0.8	maka	Sa	=	0.49583		T	=	1.4	Sa	=	0.28333		
T	=	0.9	maka	Sa	=	0.44074		T	=	1.5	Sa	=	0.26444		
T	=	1	maka	Sa	=	0.39667		T	=	1.6	Sa	=	0.24792		
T	=	1.1	maka	Sa	=	0.36061		T	=	1.7	Sa	=	0.23333		
T	=	1.2	maka	Sa	=	0.33056		T	=	1.8	Sa	=	0.22037		
T	=	1.3	maka	Sa	=	0.30513		T	=	1.9	Sa	=	0.20877		
T	=	1.4	maka	Sa	=	0.28333		T	=	2	Sa	=	0.19833		
T	=	1.5	maka	Sa	=	0.26444		T	=	2.1	Sa	=	0.18889		
T	=	1.6	maka	Sa	=	0.24792		T	=	2.2	Sa	=	0.1803		
T	=	1.7	maka	Sa	=	0.23333		T	=	2.3	Sa	=	0.17246		
T	=	1.8	maka	Sa	=	0.22037		T	=	2.4	Sa	=	0.16528		
T	=	1.9	maka	Sa	=	0.20877		T	=	2.5	Sa	=	0.15867		

T	=	4.9	maka	Sa	=	0.08095													
T	=	5	maka	Sa	=	0.07933													
T	=	5.1	maka	Sa	=	0.07778													

Lampiran 6. Gambar Dokumen Investigasi Tanah



LABORATORIUM MEKANIKA TANAH
FAKULTAS TEKNIK UNIVERSITAS BRAWIJAYA
Jl. Mayjen Haryono 167 Malang 65145 Telp. (0341) 574063

Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-02	06,00-06,50	1.339	2.354	50.36	47.86	40.02	7.84
	12,00-12,50	0.682	2.301	75.77	-	-	-
	18,00-18,50	1.466	2.718	18.59	-	-	-
	24,00-24,50	1.449	2.278	37.63	43.77	32.73	11.05

Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-03	06,00-06,50	1.706	2.768	44.60	63.90	62.48	1.42
	12,00-12,50	0.971	2.028	81.46	51.35	49.99	1.37
	18,00-18,50	1.399	2.005	12.98	-	-	-
	24,00-24,50	0.726	2.345	61.90	-	-	-

Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-04	06,00-06,50	1.262	2.142	51.77	39.06	36.06	3.00
	12,00-12,50	1.450	2.649	37.61	-	-	-
	18,00-18,50	1.067	2.649	33.81	-	-	-
	24,00-24,50	1.076	2.307	56.69	-	-	-

Tabel 4. Ringkasan hasil-hasil pengujian sifat mekanis tanah.

Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-01	06,00-06,50	-	0.139	22.64
	12,00-12,50	-	0.185	23.90
	18,00-18,50	-	0.122	23.90
	24,00-24,50	0.281	7.46	0.71

Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-02	06,00-06,50	0.249	7.91	0.286
	12,00-12,50	-	0.194	21.33
	18,00-18,50	-	0.092	28.43
	24,00-24,50	0.249	7.91	0.283

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Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-02	06,00-06,50	1.339	2.354	50.36	47.86	40.02	7.84
	12,00-12,50	0.682	2.301	75.77	-	-	-
	18,00-18,50	1.466	2.718	18.59	-	-	-
	24,00-24,50	1.449	2.278	37.63	43.77	32.73	11.05

Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-03	06,00-06,50	1.706	2.768	44.60	63.90	62.48	1.42
	12,00-12,50	0.971	2.028	81.46	51.35	49.99	1.37
	18,00-18,50	1.399	2.005	12.98	-	-	-
	24,00-24,50	0.726	2.345	61.90	-	-	-

Bor	Kedalaman (m)	Unit weigh	Gs	w _e %	LL %	PL %	PI %
B-04	06,00-06,50	1.262	2.142	51.77	39.06	36.06	3.00
	12,00-12,50	1.450	2.649	37.61	-	-	-
	18,00-18,50	1.067	2.649	33.81	-	-	-
	24,00-24,50	1.076	2.307	56.69	-	-	-

Tabel 4. Ringkasan hasil-hasil pengujian sifat mekanis tanah.

Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-01	06,00-06,50	-	0.139	22.64
	12,00-12,50	-	0.185	23.90
	18,00-18,50	-	0.122	23.90
	24,00-24,50	0.281	7.46	0.71

Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-02	06,00-06,50	0.249	7.91	0.286
	12,00-12,50	-	0.194	21.33
	18,00-18,50	-	0.092	28.43
	24,00-24,50	0.249	7.91	0.283

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Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-03	06,00-06,50	0.144	9.31	0.325
	12,00-12,50	0.123	12.52	0.240
	18,00-18,50	-	0.223	15.51
	24,00-24,50	-	0.118	23.91

Bor	Kedalaman (m)	Triaxial C kg/cm ²	Direct shear Ø °	Cc
B-04	06,00-06,50	0.097	12.90	0.277
	12,00-12,50	-	0.097	27.38
	18,00-18,50	-	0.088	26.27
	24,00-24,50	-	0.164	23.90

III. KAJIAN TEKNIS

• Perencanaan Tiang Pondasi

Daya dukung maksimum sebuah tiang pondasi dihitung berdasarkan pada hasil Standart Penetration Test (SPT) dengan menggunakan metode dari Luciano Decourt (1982).

$$Q_L = Q_p + Q_s = [N_p \cdot K \cdot A_p] + \left[\frac{N_s}{3} + 1 \right] A_s$$

Q_p = daya dukung dari unsur point bearing

Q_s = daya dukung dari unsur skin friction

N_p = harga rata-rata SPT di sekitar 4B diatas dan dibawah dasar pondasi (B = diameter tiang pondasi)

N_s = harga rata2 SPT di sepanjang tiang yang terbenam (D), dengan batasan : $3 \leq N \leq 50$.

A_p = luas penampang dasar tiang (m²)

A_s = luas selimut tiang = $\pi \cdot B \cdot D$ (m²)

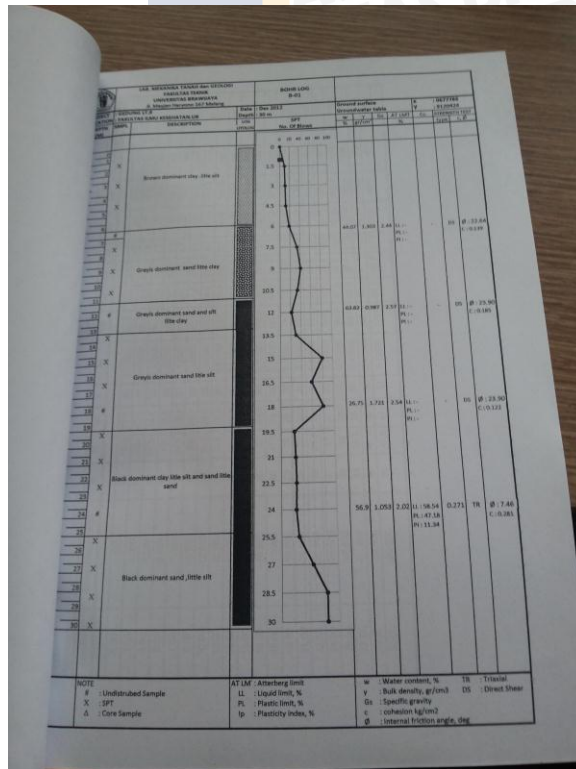
K = koefisien karakteristik tanah :

12 t/m², lempung

20 t/m², lanau berlempung

25 t/m², lanau berpasir

40 t/m², pasir



Daya Dukung Tiang Pancang Terhadap SPT (QL,ton)

Diameter : 0.400 m

Depth(m)	Elevation(mLWS)	N	N'	Np'	K	ujung					geser		B1	
						Ap	Qp	Ns1	Ns	qs	As	Qs	QL (ton)	Qall (ton)
1.50	-1.500	10	12.5	12.8	20	0.12560	32.0	10.0	10.0	4.3	1.88	8.2	40.2	13.4
3.00	-3.000	11	13	13.0	20	0.12560	32.7	11.0	10.5	4.5	3.77	17.0	49.6	16.5
4.50	-4.500	12	13.5	14.5	30	0.12560	54.6	12.0	11.0	4.7	5.65	25.4	81.0	27.0
6.00	-6.000	19	17	18.3	30	0.12560	69.1	19.0	13.0	5.3	7.54	40.2	109.3	36.4
7.50	-7.500	34	24.5	23.2	30	0.12560	87.3	34.0	17.2	6.7	9.42	63.5	150.8	50.3
9.00	-9.000	41	28	25.7	30	0.12560	96.7	41.0	21.2	8.1	11.31	91.1	187.8	62.6
10.50	-10.500	34	24.5	24.0	20	0.12560	60.3	34.0	23.0	8.7	13.19	114.4	174.6	58.2
12.00	-12.000	24	19.5	22.2	20	0.12560	55.7	24.0	23.1	8.7	15.08	131.3	187.0	62.3
13.50	-13.500	30	22.5	29.8	20	0.12560	74.9	30.0	23.9	9.0	16.96	152.1	227.0	75.7
15.00	-15.000	80	47.5	35.7	30	0.12560	134.4	50.0	26.5	9.8	18.85	185.4	319.7	106.6
16.50	-16.500	59	37	44.0	30	0.12560	165.8	50.0	28.6	10.5	20.73	218.7	384.4	128.1
18.00	-18.000	80	47.5	34.8	30	0.12560	131.3	50.0	30.4	11.1	22.62	252.0	383.2	127.7
19.50	-19.500	25	20	29.5	20	0.12560	74.1	25.0	30.0	11.0	24.50	269.5	343.7	114.6
21.00	-21.000	27	21	20.8	20	0.12560	52.3	27.0	29.8	10.9	26.39	288.4	340.7	113.6
22.50	-22.500	28	21.5	21.2	20	0.12560	53.2	28.0	29.7	10.9	28.27	307.9	361.0	120.3
24.00	-24.000	27	21	21.8	20	0.12560	54.8	27.0	29.5	10.8	30.16	326.7	381.6	127.2
25.50	-25.500	31	23	26.5	20	0.12560	66.6	31.0	29.6	10.9	32.04	348.1	414.7	138.2
27.00	-27.000	56	35.5	35.3	20	0.12560	88.8	50.0	30.7	11.2	33.93	381.4	470.1	156.7
28.50	-28.500	80	47.5	43.5	30	0.12560	163.9	50.0	31.7	11.6	35.81	414.7	578.6	192.8
30.00	-30.000	80	47.5	47.5	30	0.12560	179.0	50.0	32.7	11.9	37.70	448.0	627.0	209.0

Diameter : 0.500 m

Depth(m)	Elevation(mLWS)	N	N'	Np'	K	Ap	Qp	Ns1	Ns	qs	As	Qs	Qs (ton)	Qall (ton)
1.50	-1.500	10	12.5	12.8	20	0.19625	50.0	10.0	10.0	4.3	2.36	10.2	60.3	25.1
3.00	-3.000	11	13	13.0	20	0.19625	51.0	11.0	10.5	4.5	4.71	21.2	72.2	24.1
4.50	-4.500	12	13.5	14.5	30	0.19625	85.4	12.0	11.0	4.7	7.07	33.0	116.4	38.5
6.00	-6.000	19	17	18.3	30	0.19625	107.9	19.0	13.0	5.3	9.42	50.0	158.2	52.7
7.50	-7.500	34	24.5	23.2	30	0.19625	136.4	34.0	17.2	6.7	11.78	75.0	215.7	71.9
9.00	-9.000	41	28	25.7	30	0.19625	151.1	41.0	21.2	8.1	14.14	113.9	255.0	88.3
10.50	-10.500	34	24.5	24.0	20	0.19625	94.2	34.0	23.0	8.7	16.49	140.9	227.1	79.0
12.00	-12.000	24	19.5	22.2	20	0.19625	87.0	24.0	23.1	8.7	16.85	154.1	251.2	83.7
13.50	-13.500	30	22.5	23.8	20	0.19625	117.1	30.0	23.9	9.0	21.21	190.1	307.2	102.4
15.00	-15.000	80	47.5	35.7	30	0.19625	210.0	50.0	28.5	9.8	23.94	231.7	441.7	147.2
16.50	-16.500	59	37	44.0	30	0.19625	259.1	50.0	28.6	10.5	25.82	273.3	532.4	177.3
18.00	-18.000	80	47.5	34.8	30	0.19625	205.1	50.0	30.4	11.1	28.27	314.9	520.0	173.3
19.50	-19.500	25	20	29.5	20	0.19625	115.8	25.0	30.0	11.0	30.63	336.9	482.7	158.9
21.00	-21.000	27	21	20.8	20	0.19625	81.8	27.0	29.8	10.9	32.99	360.5	484.1	164.7
22.50	-22.500	28	21.5	21.2	20	0.19625	83.1	28.0	29.7	10.9	33.34	384.8	494.1	164.7
24.00	-24.000	27	21	21.8	20	0.19625	85.7	27.0	29.5	10.8	37.70	408.4	494.1	164.7
25.50	-25.500	31	23	26.5	20	0.19625	104.0	31.0	29.8	10.9	40.06	435.1	538.1	176.7
27.00	-27.000	56	35.5	35.3	20	0.19625	138.7	50.0	30.7	11.2	42.41	476.7	615.4	205.1
28.50	-28.500	80	47.5	43.5	30	0.19625	256.1	50.0	31.7	11.6	44.77	518.4	774.5	258.2
30.00	-30.000	80	47.5	47.5	30	0.19625	279.7	50.0	32.7	11.9	47.12	560.0	839.8	279.8

Depth(m)	Elevation(mLWS)	N	N'	Np'	K	Ap	Qp	Ns1	Ns	qs	As	Qs	Qs (ton)	Qall (ton)
1.50	-1.500	10	12.5	12.8	20	0.19625	50.0	10.0	10.0	4.3	2.36	10.2	60.3	25.1
3.00	-3.000	11	13	13.0	20	0.19625	51.0	11.0	10.5	4.5	4.71	21.2	72.2	24.1
4.50	-4.500	12	13.5	14.5	30	0.19625	85.4	12.0	11.0	4.7	7.07	33.0	116.4	38.5
6.00	-6.000	19	17	18.3	30	0.19625	107.9	19.0	13.0	5.3	9.42	50.0	158.2	52.7
7.50	-7.500	34	24.5	23.2	30	0.19625	136.4	34.0	17.2	6.7	11.78	75.0	215.7	71.9
9.00	-9.000	41	28	25.7	30	0.19625	151.1	41.0	21.2	8.1	14.14	113.9	255.0	88.3
10.50	-10.500	34	24.5	24.0	20	0.19625	94.2	34.0	23.0	8.7	16.49	140.9	227.1	79.0
12.00	-12.000	24	19.5	22.2	20	0.19625	87.0	24.0	23.1	8.7	16.85	154.1	251.2	83.7
13.50	-13.500	30	22.5	23.8	20	0.19625	117.1	30.0	23.9	9.0	21.21	190.1	307.2	102.4
15.00	-15.000	80	47.5	35.7	30	0.19625	210.0	50.0	28.5	9.8	23.94	231.7	441.7	147.2
16.50	-16.500	59	37	44.0	30	0.19625	259.1	50.0	28.6	10.5	25.82	273.3	532.4	177.3
18.00	-18.000	80	47.5	34.8	30	0.19625	205.1	50.0	30.4	11.1	28.27	314.9	520.0	173.3
19.50	-19.500	25	20	29.5	20	0.19625	115.8	25.0	30.0	11.0	30.63	336.9	482.7	158.9
21.00	-21.000	27	21	20.8	20	0.19625	81.8	27.0	29.8	10.9	32.99	360.5	484.1	164.7
22.50	-22.500	28	21.5	21.2	20	0.19625	83.1	28.0	29.7	10.9	33.34	384.8	494.1	164.7
24.00	-24.000	27	21	21.8	20	0.19625	85.7	27.0	29.5	10.8	37.70	408.4	494.1	164.7
25.50	-25.500	31	23	26.5	20	0.19625	104.0	31.0	29.8	10.9	40.06	435.1	538.1	176.7
27.00	-27.000	56	35.5	35.3	20	0.19625	138.7	50.0	30.7	11.2	42.41	476.7	615.4	205.1
28.50	-28.500	80	47.5	43.5	30	0.19625	256.1	50.0	31.7	11.6	44.77	518.4	774.5	258.2
30.00	-30.000	80	47.5	47.5	30	0.19625	279.7	50.0	32.7	11.9	47.12	560.0	839.8	279.8



Diameter : 0.600 m

Depth(m)	Elevation(mLWS)	N	N'	Np'	K	Ap	Qp	Ns1	Ns	qs	As	Qs	Q _L (ton)	Q _{all} (ton)
1.50	-1.500	10	12.5	12.8	20	0.28260	72.1	10.0	31.6	11.5	2.83	32.5	104.8	34.3
3.00	-3.000	11	13	13.0	20	0.28260	73.5	11.0	30.6	11.2	5.65	63.4	136.9	46.9
4.50	-4.500	12	13.5	14.5	30	0.28260	122.9	12.0	29.8	10.9	8.48	92.8	215.7	71.9
6.00	-6.000	19	17	18.3	30	0.28260	155.4	19.0	29.4	10.8	11.31	122.1	277.5	92.9
7.50	-7.500	34	24.5	23.2	30	0.28260	196.4	34.0	29.6	10.9	14.14	153.4	349.8	116.8
9.00	-9.000	41	28	25.7	30	0.28260	217.6	41.0	30.0	11.0	16.96	196.6	404.2	134.7
10.50	-10.500	34	24.5	24.0	20	0.28260	135.6	34.0	30.1	11.0	19.79	218.7	354.3	116.1
12.00	-12.000	24	19.5	22.2	20	0.28260	125.3	24.0	29.9	11.0	22.52	248.3	373.9	124.9
13.50	-13.500	30	22.5	29.8	20	0.28260	168.6	30.0	29.9	11.0	25.45	279.3	447.3	148.3
15.00	-15.000	80	47.5	35.7	30	0.28260	302.4	50.0	30.8	11.2	28.27	316.7	619.1	206.4
16.50	-16.500	59	37	44.0	30	0.28260	373.0	50.0	31.2	11.4	31.10	354.8	727.9	242.8
18.00	-18.000	80	47.5	34.8	30	0.28260	295.3	50.0	31.8	11.6	33.93	393.7	889.0	296.7
19.50	-19.500	25	20	29.5	20	0.28260	166.7	25.0	31.6	11.5	36.76	424.0	980.7	326.9
21.00	-21.000	27	21	20.8	20	0.28260	117.8	27.0	31.5	11.3	38.58	454.3	972.8	320.8
22.50	-22.500	28	21.5	21.2	20	0.28260	119.6	28.0	31.4	11.3	42.41	485.3	906.5	300.8
24.00	-24.000	27	21	21.8	20	0.28260	123.4	27.0	31.3	11.4	46.24	516.5	839.3	275.3
25.50	-25.500	31	23	26.5	20	0.28260	148.8	31.0	31.2	11.4	48.17	548.9	888.4	292.9
27.00	-27.000	56	35.5	35.3	20	0.28260	198.7	50.0	31.7	11.6	52.99	599.3	998.0	333.1
28.50	-28.500	80	47.5	43.5	30	0.28260	288.8	50.0	32.2	11.7	55.72	632.4	999.2	333.1
30.00	-30.000	80	47.5	47.5	30	0.28260	402.7	50.0	32.7	11.9	58.55	672.0	1074.7	356.2

