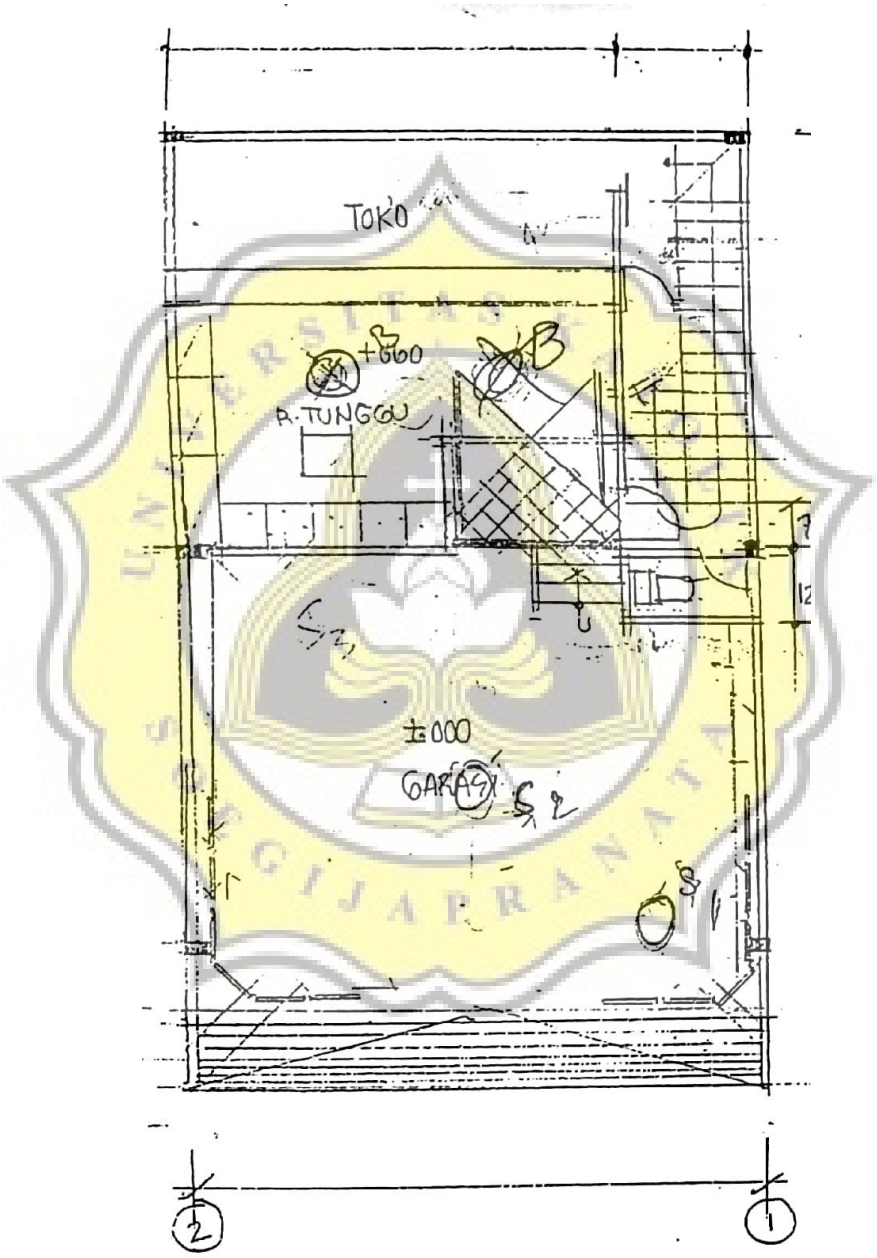
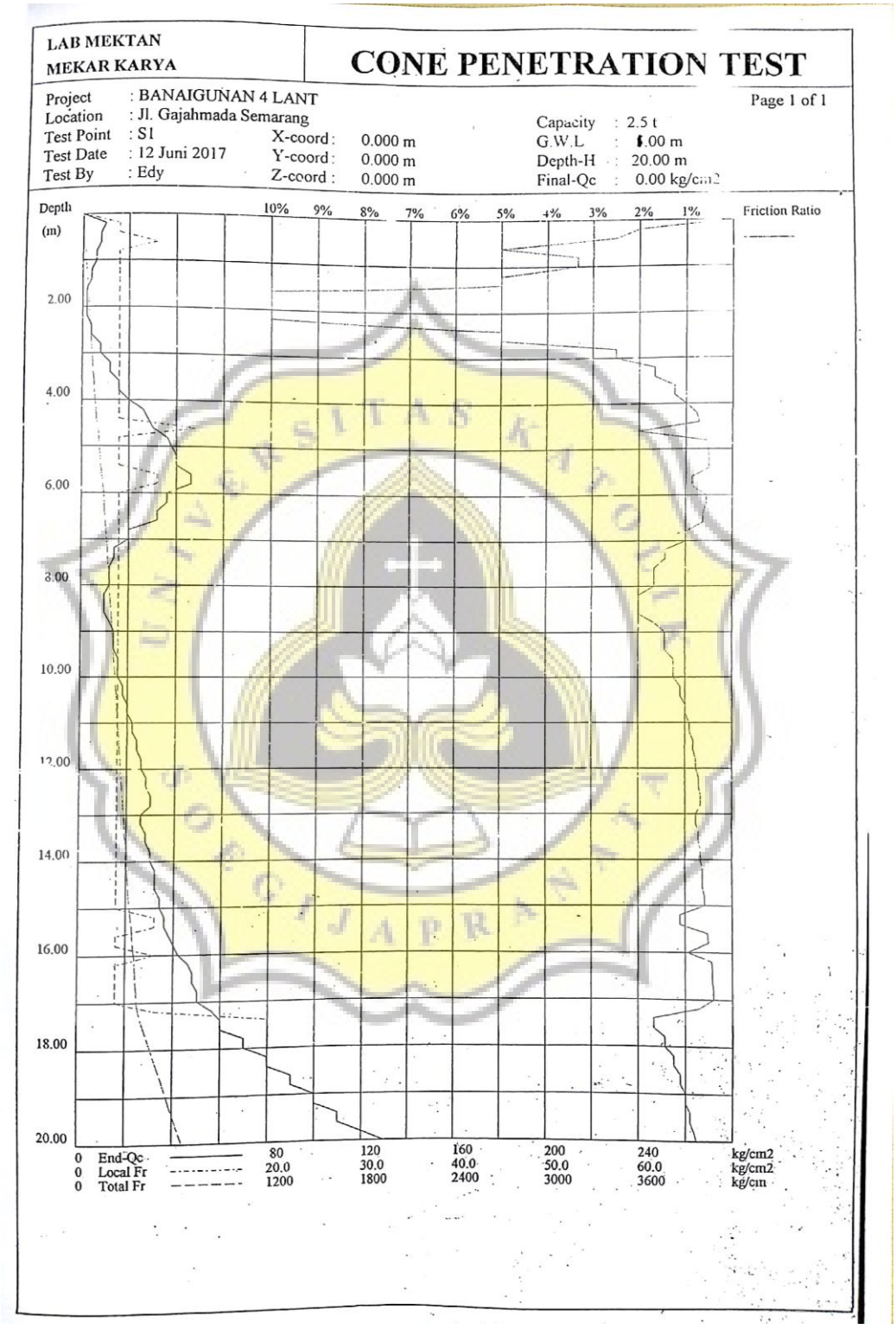
LAMPIRAN

Lampiran A Hasil Penyelidikan Tanah Jalan Gajahmada No. 18 Semarang

A.1 Titik Lokasi Sondir dan Bor



A.2 Grafik Sondir



LAB MEKTAN
MEKAR KARYA

CONE PENETRATION TEST

Page 1 of 1

Project : BANAIGUNAN 4 LANT
Location : Jl. Gajahmada Semarang
Test Point : S1
Test Date : 12 Juni 2017
Test By : Edy
X-coord : 0.000 m
Y-coord : 0.000 m
Z-coord : 0.000 m
Capacity : 2.5 t
G.W.L : 1.00 m
Depth-H : 20.00 m
Final-Qc : 0.00 kg/cm2

Depth (m)
10% 9% 8% 7% 6% 5% 4% 3% 2% 1%
Friction Ratio
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
0 End-Qc 80 120 160 200 240 kg/cm2
0 Local Fr 20.0 30.0 40.0 50.0 60.0 kg/cm2
0 Total Fr 1200 1800 2400 3000 3600 kg/cm

CPT V.2.0
Cone Penetration Test
Project : BANAIGUNAN 4 LANT
Location : Jl. Gajahmada Semarang
Job No : 025
Point : S1
Test No : S75
Test By : Edy
Test Date : 12 Juni 2017

No.	Depth (m)	R1	R2	LF	LFF	TF	FR
0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
1	0.2	10.00	12.00	0.20	4.00	4.00	2.00
2	0.4	8.00	10.00	0.20	4.00	8.00	2.50
3	0.6	8.00	12.00	0.40	8.00	16.00	5.00
4	0.8	6.00	8.00	0.20	4.00	20.00	3.33
5	1.0	6.00	8.00	0.20	4.00	24.00	3.33
6	1.2	4.00	6.00	0.20	4.00	28.00	5.00
7	1.4	4.00	6.00	0.20	4.00	32.00	5.00
8	1.6	2.00	4.00	0.20	4.00	36.00	10.00
9	1.8	2.00	4.00	0.20	4.00	40.00	10.00
10	2.0	2.00	4.00	0.20	4.00	44.00	10.00
11	2.2	2.00	4.00	0.20	4.00	48.00	10.00
12	2.4	4.00	6.00	0.20	4.00	52.00	5.00
13	2.6	4.00	6.00	0.20	4.00	56.00	5.00
14	2.8	8.00	10.00	0.20	4.00	60.00	2.50
15	3.0	8.00	10.00	0.20	4.00	64.00	2.50
16	3.2	12.00	14.00	0.20	4.00	68.00	1.67
17	3.4	12.00	14.00	0.20	4.00	72.00	1.67
18	3.6	16.00	18.00	0.20	4.00	76.00	1.25
19	3.8	16.00	18.00	0.20	4.00	80.00	1.25
20	4.0	20.00	22.00	0.20	4.00	84.00	1.00
21	4.2	26.00	28.00	0.20	4.00	88.00	0.77
22	4.4	28.00	30.00	0.20	4.00	92.00	0.71
23	4.6	30.00	36.00	0.60	12.00	104.00	2.00
24	4.8	36.00	38.00	0.20	4.00	108.00	0.56
25	5.0	38.00	40.00	0.20	4.00	112.00	0.53
26	5.2	40.00	42.00	0.20	4.00	116.00	0.50
27	5.4	40.00	42.00	0.20	4.00	120.00	0.50
28	5.6	46.00	50.00	0.40	8.00	128.00	0.87
29	5.8	46.00	50.00	0.40	8.00	136.00	0.87
30	6.0	36.00	38.00	0.20	4.00	140.00	0.56
31	6.2	36.00	38.00	0.20	4.00	144.00	0.56
32	6.4	32.00	34.00	0.20	4.00	148.00	0.63
33	6.6	32.00	34.00	0.20	4.00	152.00	0.63
34	6.8	20.00	22.00	0.20	4.00	156.00	1.00
35	7.0	20.00	22.00	0.20	4.00	160.00	1.00
36	7.2	14.00	16.00	0.20	4.00	164.00	1.43
37	7.4	14.00	16.00	0.20	4.00	168.00	1.43
38	7.6	12.00	14.00	0.20	4.00	172.00	1.67
39	7.8	12.00	14.00	0.20	4.00	176.00	1.67
40	8.0	12.00	14.00	0.20	4.00	180.00	1.67
41	8.2	10.00	12.00	0.20	4.00	184.00	2.00
42	8.4	10.00	12.00	0.20	4.00	188.00	2.00
43	8.6	10.00	12.00	0.20	4.00	192.00	2.00
44	8.8	12.00	14.00	0.20	4.00	196.00	1.67
45	9.0	14.00	16.00	0.20	4.00	200.00	1.43
46	9.2	14.00	16.00	0.20	4.00	204.00	1.43
47	9.4	14.00	16.00	0.20	4.00	208.00	1.43
48	9.6	16.00	18.00	0.20	4.00	212.00	1.25
49	9.8	16.00	18.00	0.20	4.00	216.00	1.25
50	10.0	16.00	18.00	0.20	4.00	220.00	1.25
51	10.2	18.00	20.00	0.20	4.00	224.00	1.11
52	10.4	18.00	20.00	0.20	4.00	228.00	1.11
53	10.6	20.00	22.00	0.20	4.00	232.00	1.00
54	10.8	20.00	22.00	0.20	4.00	236.00	1.00
55	11.0	22.00	24.00	0.20	4.00	240.00	0.91
56	11.2	22.00	24.00	0.20	4.00	244.00	0.91
57	11.4	24.00	26.00	0.20	4.00	248.00	0.83
58	11.6	24.00	26.00	0.20	4.00	252.00	0.83
59	11.8	26.00	28.00	0.20	4.00	256.00	0.77
60	12.0	26.00	28.00	0.20	4.00	260.00	0.77
61	12.2	28.00	30.00	0.20	4.00	264.00	0.71
62	12.4	28.00	30.00	0.20	4.00	268.00	0.71

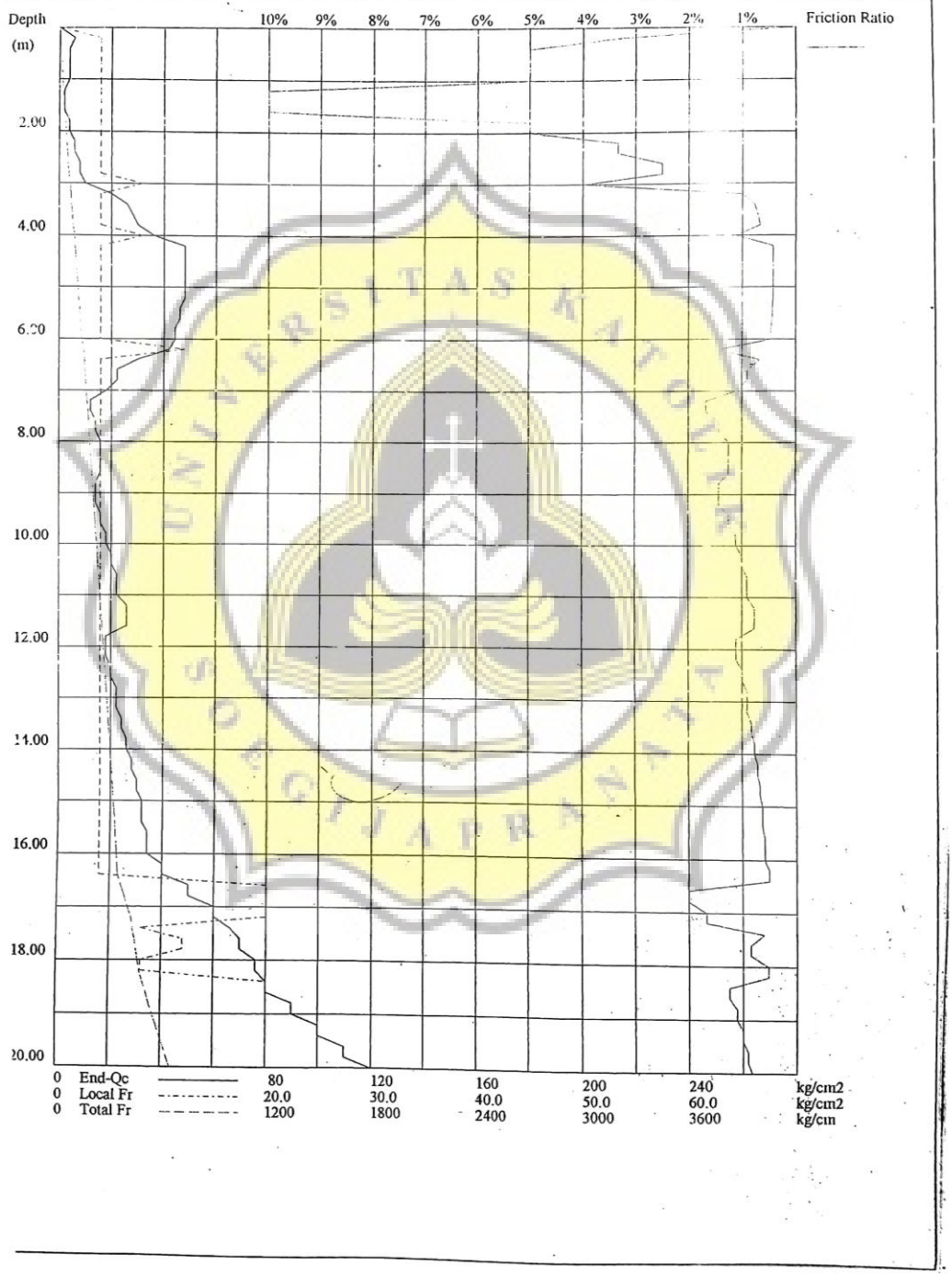
63	12.6	30.00	32.00	.20	4.00	272.00	0.67
64	12.8	30.00	32.00	.20	4.00	276.00	0.67
65	13.0	26.00	28.00	.20	4.00	280.00	0.77
66	13.2	26.00	28.00	.20	4.00	284.00	0.77
67	13.4	28.00	30.00	.20	4.00	288.00	0.71
68	13.6	28.00	30.00	.20	4.00	292.00	0.71
69	13.8	30.00	32.00	.20	4.00	296.00	0.67
70	14.0	30.00	32.00	.20	4.00	300.00	0.67
71	14.2	32.00	34.00	.20	4.00	304.00	0.63
72	14.4	32.00	34.00	.20	4.00	308.00	0.63
73	14.6	32.00	34.00	.20	4.00	312.00	0.63
74	14.8	34.00	36.00	.20	4.00	316.00	0.59
75	15.0	34.00	36.00	0.20	4.00	320.00	0.59
76	15.2	36.00	40.00	0.40	8.00	328.00	1.11
77	15.4	36.00	40.00	0.40	8.00	336.00	1.11
78	15.6	38.00	40.00	.20	4.00	340.00	0.53
79	15.8	40.00	42.00	.20	4.00	344.00	0.50
80	16.0	42.00	46.00	0.40	8.00	352.00	0.95
81	16.2	46.00	48.00	0.20	4.00	356.00	0.43
82	16.4	48.00	50.00	0.20	4.00	360.00	0.42
83	16.6	48.00	50.00	0.20	4.00	364.00	0.42
84	16.8	50.00	52.00	0.20	4.00	368.00	0.40
85	17.0	50.00	52.00	0.20	4.00	372.00	0.40
86	17.2	56.00	60.00	0.40	8.00	380.00	0.71
87	17.4	60.00	70.00	1.00	20.00	400.00	1.67
88	17.6	60.00	70.00	1.00	20.00	420.00	1.67
89	17.8	70.00	80.00	1.00	20.00	440.00	1.43
90	18.0	70.00	80.00	1.00	20.00	460.00	1.43
91	18.2	80.00	90.00	1.00	20.00	480.00	1.25
92	18.4	80.00	90.00	1.00	20.00	500.00	1.25
93	18.6	90.00	100.00	1.00	20.00	520.00	1.11
94	18.8	90.00	100.00	1.00	20.00	540.00	1.11
95	19.0	100.00	110.00	1.00	20.00	560.00	1.00
96	19.2	100.00	110.00	1.00	20.00	580.00	1.00
97	19.4	110.00	120.00	1.00	20.00	600.00	0.91
98	19.6	110.00	120.00	1.00	20.00	620.00	0.91
99	19.8	120.00	130.00	1.00	20.00	640.00	0.83
100	20.0	130.00	140.00	1.00	20.00	660.00	0.77

LAB MEKTAN
MEKAR KARYA

CONE PENETRATION TEST

Page 1 of 1

Project	: BANAIGUNAN 4 LANT			Capacity	: 2.5 t
Location	: Jl. Gajahmada Semarang			G.W.L	: 1.00 m
Test Point	: S2	X-coord :	0.000 m	Depth-H	: 20.00 m
Test Date	: 12 Juni 2017	Y-coord :	0.000 m	Final-Qc	: 0.00 kg/cm2
Test By	: Edy	Z-coord :	0.000 m		

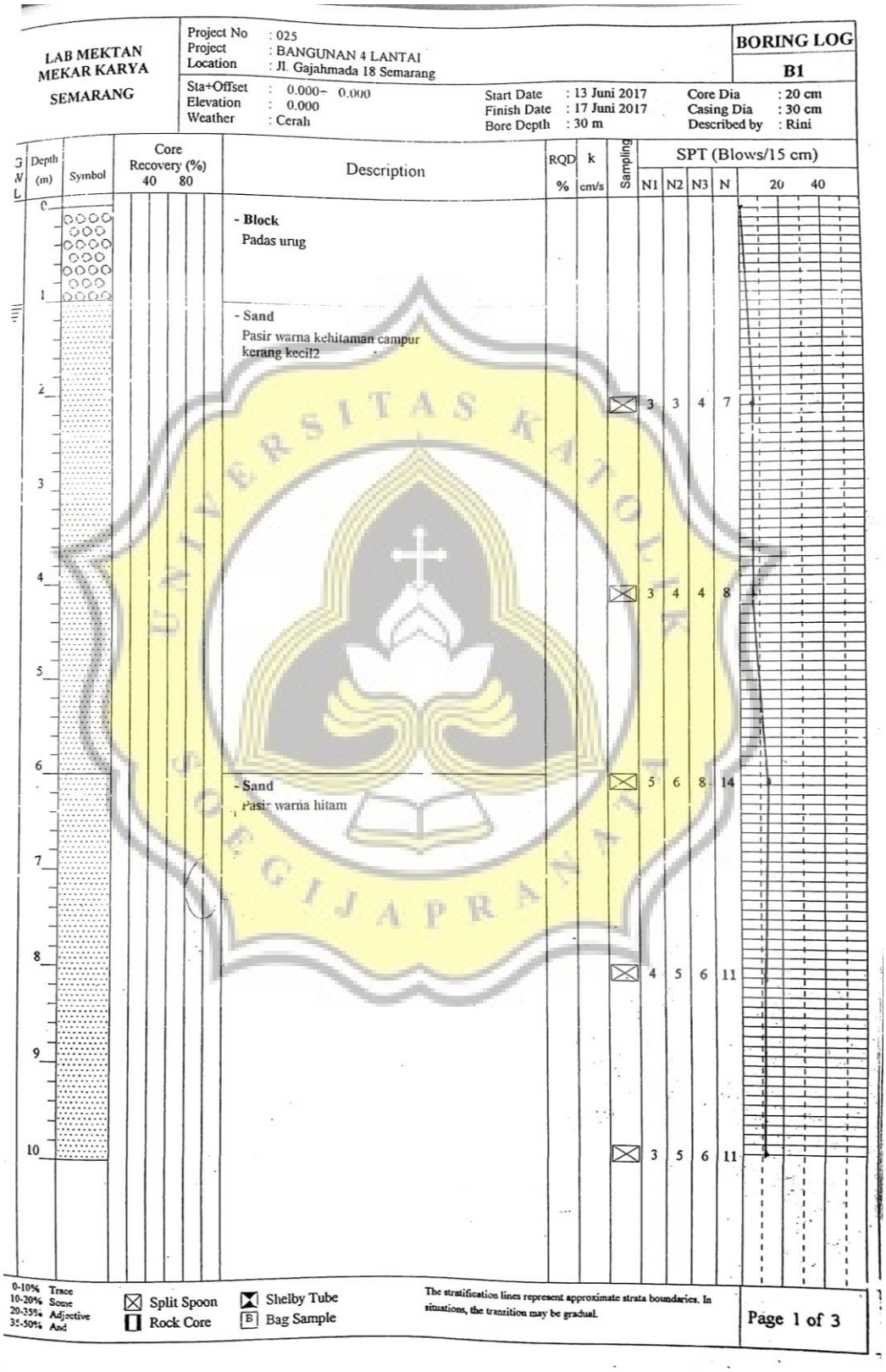


Cone Penetration Test
Project : BANAIGUNAN 4 LANT
Location : Jl. Gajahmada Semarang
Job No : 025
Point : S2
Test No : S76
Test By : Edy
Test Date : 12 Juni 2017

No.	Depth (m)	R1	R2	LF	LFF	TF	FR
0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
1	0.2	6.00	8.00	0.20	4.00	4.00	3.33
2	0.4	4.00	6.00	0.20	4.00	8.00	5.00
3	0.6	4.00	6.00	0.20	4.00	12.00	5.00
4	0.8	4.00	6.00	0.20	4.00	16.00	5.00
5	1.0	4.00	6.00	0.20	4.00	20.00	5.00
6	1.2	2.00	4.00	0.20	4.00	24.00	10.00
7	1.4	2.00	4.00	0.20	4.00	28.00	10.00
8	1.6	2.00	4.00	0.20	4.00	32.00	10.00
9	1.8	4.00	6.00	0.20	4.00	36.00	5.00
10	2.0	4.00	6.00	0.20	4.00	40.00	5.00
11	2.2	6.00	8.00	0.20	4.00	44.00	3.33
12	2.4	6.00	8.00	0.20	4.00	48.00	3.33
13	2.6	8.00	10.00	0.20	4.00	52.00	2.50
14	2.8	8.00	10.00	0.20	4.00	56.00	2.50
15	3.0	10.00	14.00	0.40	8.00	64.00	4.00
16	3.2	20.00	22.00	0.20	4.00	68.00	1.00
17	3.4	26.00	28.00	0.20	4.00	72.00	0.77
18	3.6	28.00	30.00	0.20	4.00	76.00	0.71
19	3.8	30.00	32.00	0.20	4.00	80.00	0.67
20	4.0	36.00	40.00	0.40	8.00	88.00	1.11
21	4.2	48.00	50.00	0.20	4.00	92.00	0.42
22	4.4	48.00	50.00	0.20	4.00	96.00	0.42
23	4.6	48.00	50.00	0.20	4.00	100.00	0.42
24	4.8	48.00	50.00	0.20	4.00	104.00	0.42
25	5.0	48.00	50.00	0.20	4.00	108.00	0.42
26	5.2	48.00	50.00	0.20	4.00	112.00	0.42
27	5.4	46.00	48.00	0.20	4.00	116.00	0.43
28	5.6	46.00	48.00	0.20	4.00	120.00	0.43
29	5.8	44.00	46.00	0.20	4.00	124.00	0.45
30	6.0	44.00	46.00	0.20	4.00	128.00	0.45
31	6.2	42.00	48.00	0.60	12.00	140.00	1.43
32	6.4	30.00	32.00	0.20	4.00	144.00	0.67
33	6.6	22.00	24.00	0.20	4.00	148.00	0.91
34	6.8	22.00	24.00	0.20	4.00	152.00	0.91
35	7.0	18.00	20.00	0.20	4.00	156.00	1.11
36	7.2	12.00	14.00	0.20	4.00	160.00	1.67
37	7.4	12.00	14.00	0.20	4.00	164.00	1.67
38	7.6	14.00	16.00	0.20	4.00	168.00	1.43
39	7.8	14.00	16.00	0.20	4.00	172.00	1.43
40	8.0	16.00	18.00	0.20	4.00	176.00	1.25
41	8.2	16.00	18.00	0.20	4.00	180.00	1.25
42	8.4	16.00	18.00	0.20	4.00	184.00	1.25
43	8.6	16.00	18.00	0.20	4.00	188.00	1.25
44	8.8	14.00	16.00	0.20	4.00	192.00	1.43
45	9.0	14.00	16.00	0.20	4.00	196.00	1.43
46	9.2	14.00	16.00	0.20	4.00	200.00	1.43
47	9.4	16.00	18.00	0.20	4.00	204.00	1.25
48	9.6	16.00	18.00	0.20	4.00	208.00	1.25
49	9.8	18.00	20.00	0.20	4.00	212.00	1.11
50	10.0	18.00	20.00	0.20	4.00	216.00	1.11
51	10.2	20.00	22.00	0.20	4.00	220.00	1.00
52	10.4	20.00	22.00	0.20	4.00	224.00	1.00
53	10.6	22.00	24.00	0.20	4.00	228.00	0.91
54	10.8	22.00	24.00	0.20	4.00	232.00	0.91
55	11.0	22.00	24.00	0.20	4.00	236.00	0.91
56	11.2	26.00	28.00	0.20	4.00	240.00	0.77
57	11.4	26.00	28.00	0.20	4.00	244.00	0.77
58	11.6	26.00	28.00	0.20	4.00	248.00	0.77
59	11.8	18.00	20.00	0.20	4.00	252.00	1.11
60	12.0	18.00	20.00	0.20	4.00	256.00	1.11
61	12.2	18.00	20.00	0.20	4.00	260.00	1.11
62	12.4	20.00	22.00	0.20	4.00	264.00	1.00

63	12.6	20.00	22.00	0.20	4.00	268.00	1.00
64	12.8	22.00	24.00	0.20	4.00	272.00	0.91
65	13.0	22.00	24.00	0.20	4.00	276.00	0.91
66	13.2	22.00	24.00	0.20	4.00	280.00	0.91
67	13.4	24.00	26.00	0.20	4.00	284.00	0.83
68	13.6	24.00	26.00	0.20	4.00	288.00	0.83
69	13.8	26.00	28.00	0.20	4.00	292.00	0.77
70	14.0	26.00	28.00	0.20	4.00	296.00	0.77
71	14.2	28.00	30.00	0.20	4.00	300.00	0.71
72	14.4	28.00	30.00	0.20	4.00	304.00	0.71
73	14.6	30.00	32.00	0.20	4.00	308.00	0.67
74	14.8	30.00	32.00	0.20	4.00	312.00	0.67
75	15.0	32.00	34.00	0.20	4.00	316.00	0.63
76	15.2	32.00	34.00	0.20	4.00	320.00	0.63
77	15.4	32.00	34.00	0.20	4.00	324.00	0.63
78	15.6	34.00	36.00	0.20	4.00	328.00	0.59
79	15.8	34.00	36.00	0.20	4.00	332.00	0.59
80	16.0	34.00	36.00	0.20	4.00	336.00	0.59
81	16.2	40.00	42.00	0.20	4.00	340.00	0.50
82	16.4	40.00	42.00	0.20	4.00	344.00	0.50
83	16.6	50.00	60.00	1.00	20.00	364.00	2.00
84	16.8	50.00	60.00	1.00	20.00	384.00	2.00
85	17.0	60.00	70.00	1.00	20.00	404.00	1.67
86	17.2	60.00	70.00	1.00	20.00	424.00	1.67
87	17.4	66.00	70.00	0.40	8.00	432.00	0.61
88	17.6	70.00	76.00	0.60	12.00	444.00	0.86
89	17.8	70.00	76.00	0.60	12.00	456.00	0.86
90	18.0	76.00	80.00	0.40	8.00	464.00	0.53
91	18.2	76.00	80.00	0.40	8.00	472.00	0.53
92	18.4	80.00	90.00	1.00	20.00	492.00	1.25
93	18.6	80.00	90.00	1.00	20.00	512.00	1.25
94	18.8	90.00	100.00	1.00	20.00	532.00	1.11
95	19.0	90.00	100.00	1.00	20.00	552.00	1.11
96	19.2	100.00	110.00	1.00	20.00	572.00	1.00
97	19.4	100.00	110.00	1.00	20.00	592.00	1.00
98	19.6	110.00	120.00	1.00	20.00	612.00	0.91
99	19.8	110.00	120.00	1.00	20.00	632.00	0.91
100	20.0	120.00	130.00	1.00	20.00	652.00	0.83

A.3 Grafik Bor Log



LAB MEKTAN MEKAR KARYA SEMARANG

Project No : 025
Project : BANGUNAN 4 LANTAI
Location : Jl. Gajahmada 18 Semarang

BORING LOG
B1

Sta+Offset : 0.000- 0.000
Elevation : 0.000
Weather : Cerah

Start Date : 13 Juni 2017
Finish Date : 17 Juni 2017
Bore Depth : 30 m

Core Dia : 20 cm
Casing Dia : 30 cm
Described by : Rini

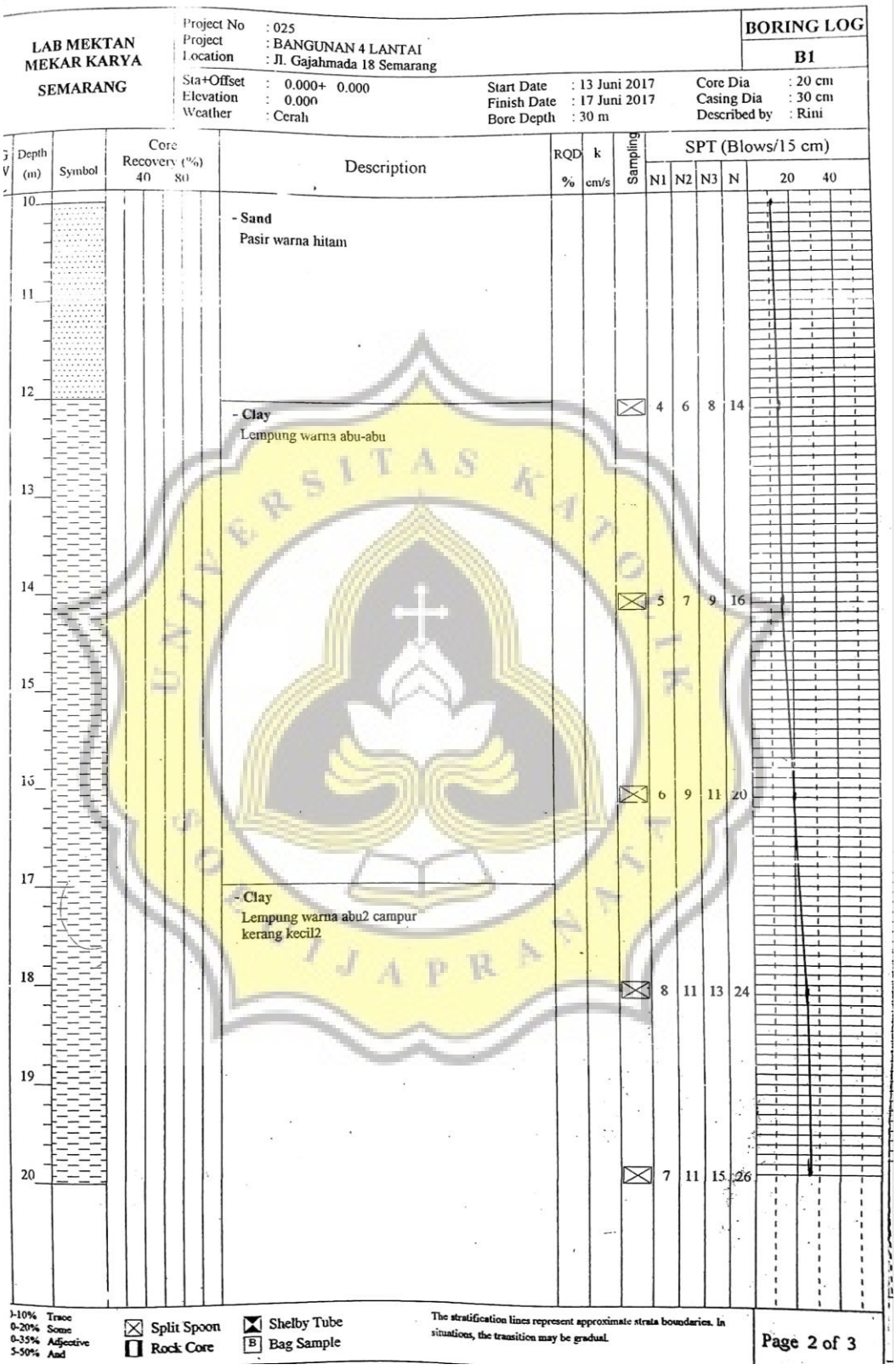
GWL	Depth (m)	Symbol	Core Recovery (%) 40 80	Description	RQD %	k cm/s	Sampling	SPT (Blows/15 cm) N1	N2	N3	N	20 40
	0			**- Block** Padas urug								
	1			- Sand Pasir warna kehitaman campur kerang kecil2								
	2						☒	3	3	4	7	
	3											
	4						☒	3	4	4	8	
	5											
	6			- Sand Pasir warna hitam			☒	5	6	8	14	
	7											
	8						☒	4	5	6	11	
	9											
	10						☒	3	5	6	11	

0-10% Trace
10-20% Some
20-35% Adjective
35-50% And

☒ Split Spoon
▮ Rock Core
⧓ Shelby Tube
B Bag Sample

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Page 1 of 3



LAB MEKTAN
MEKAR KARYA
SEMARANG

Project No : 025
Project : BANGUNAN 4 LANTAI
Location : Jl. Gajahmada 18 Semarang

Sta+Offset : 0.000+ 0.000
Elevation : 0.000
Weather : Cerah

Start Date : 13 Juni 2017
Finish Date : 17 Juni 2017
Bore Depth : 30 m

Core Dia : 20 cm
Casing Dia : 30 cm
Described by : Rini

BORING LOG
B1

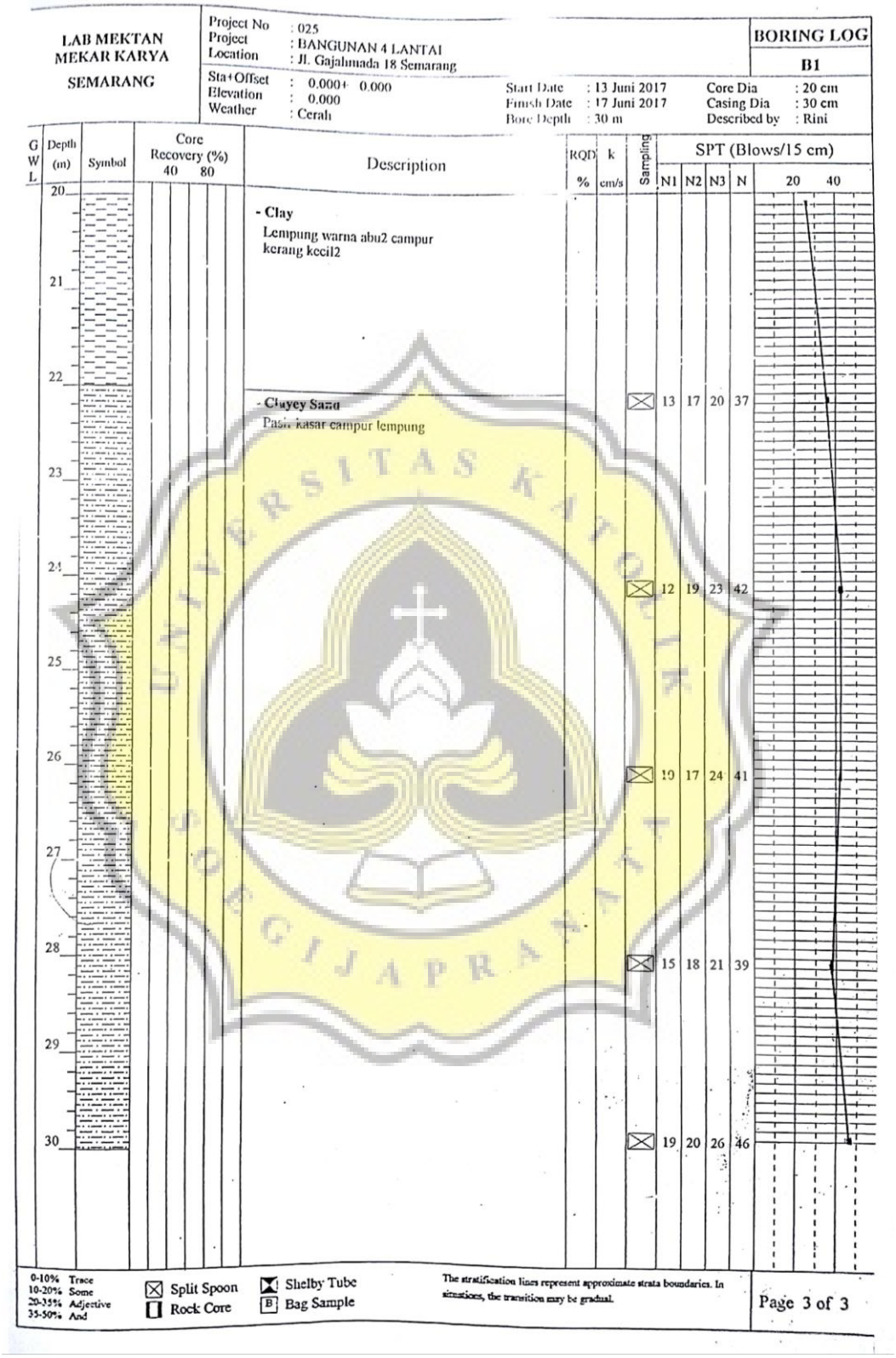
Depth (m)	Symbol	Core Recovery (%) 40 80	Description	RQD %	k cm/s	Sampling	SPT (Blows/15 cm) N1	N2	N3	N	20 40
10			- Sand Pasir warna hitam								
11											
12			- Clay Lempung warna abu-abu			☒	4	6	8	14	
13											
14						☒	5	7	9	16	
15											
16						☒	6	9	11	20	
17			- Clay Lempung warna abu2 campur kerang kecil2								
18						☒	8	11	13	24	
19											
20						☒	7	11	15	26	

0-10% Trace
0-20% Some
0-35% Adjective
5-50% And

☒ Split Spoon
▯ Rock Core
☒ Shelby Tube
B Bag Sample

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Page 2 of 3



LAB MEKTAN
MEKAR KARYA
SEMARANG

Project No : 025
Project : BANGUNAN 4 LANTAI
Location : Jl. Gajahmada 18 Semarang

Sta+Offset : 0.000+ 0.000
Elevation : 0.000
Weather : Cerah

Start Date : 13 Juni 2017
Finish Date : 17 Juni 2017
Bore Depth : 30 m

Core Dia : 20 cm
Casing Dia : 30 cm
Described by : Rini

BORING LOG
B1

GWL	Depth (m)	Symbol	Core Recovery (%) 40 80	Description	RQD %	k cm/s	Sampling	SPT (Blows/15 cm) N1	N2	N3	N	20 40
	20			- Clay Lempung warna abu2 campur kerang kecil2								
	21											
	22			- Clayey Sand Pasir kasar campur lempung			☒	13	17	20	37	
	23											
	24						☒	12	19	23	42	
	25											
	26						☒	10	17	24	41	
	27											
	28						☒	15	18	21	39	
	29											
	30						☒	19	20	26	46	

0-10% Trace
10-20% Some
20-35% Adjective
35-50% And

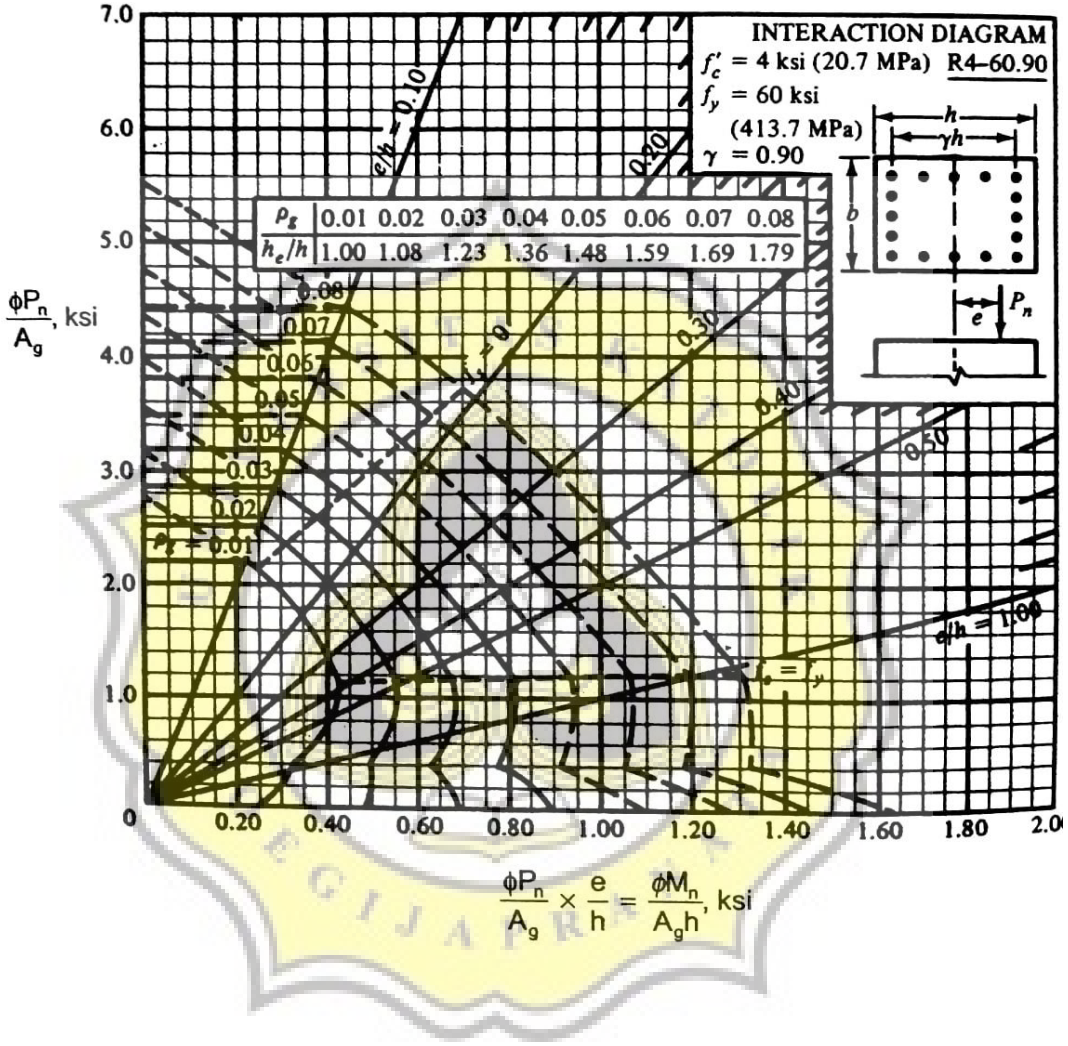
☒ Split Spoon
Rock Core
Shelby Tube
B Bag Sample

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Page 3 of 3

Lampiran C Acuan Perhitungan Struktur

C.1 Diagram Interaksi Kolom



C.2 Tabel Perhitungan Momen-Momen di Dalam Pelat

	l_y/l_x	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	2,0	2,1	2,2	2,3	2,4	2,5	>2,5
I	Mlx = + 0,001 $q l_x^2$ X	44	52	59	66	73	78	84	88	93	97	100	103	106	108	110	112	125
	Mly = + 0,001 $q l_x^2$ X	44	45	45	44	44	43	41	40	39	38	37	36	35	34	33	32	25
II	Mlx = + 0,001 $q l_x^2$ X	21	25	28	31	34	36	37	38	40	40	41	41	41	42	42	42	42
	Mly = + 0,001 $q l_x^2$ X	21	21	20	19	18	17	16	14	13	12	12	11	11	11	10	10	8
	Mtx = - 0,001 $q l_x^2$ X	52	59	64	69	73	76	79	81	82	83	83	83	83	83	83	83	83
	Mty = - 0,001 $q l_x^2$ X	52	54	56	57	57	57	57	57	57	57	57	57	57	57	57	57	57
III	Mlx = + 0,001 $q l_x^2$ X	28	33	38	42	45	48	51	53	55	57	58	59	59	60	61	61	63
	Mly = + 0,001 $q l_x^2$ X	28	28	28	27	26	25	23	23	22	21	19	18	17	17	16	16	13
	Mtx = - 0,001 $q l_x^2$ X	68	77	85	92	98	103	107	111	113	116	118	119	120	121	122	122	125
	Mty = - 0,001 $q l_x^2$ X	68	72	74	76	77	77	78	78	78	78	79	79	79	79	79	79	79
IVA	Mlx = + 0,001 $q l_x^2$ X	22	28	34	42	49	55	62	68	74	80	85	89	93	97	100	103	125
	Mly = + 0,001 $q l_x^2$ X	32	35	37	39	40	41	41	41	41	40	39	38	37	36	35	35	25
	Mty = - 0,001 $q l_x^2$ X	70	79	87	94	100	105	109	112	115	117	119	120	121	122	123	123	125
IVB	Mlx = + 0,001 $q l_x^2$ X	32	34	36	38	39	40	41	41	42	42	42	42	42	42	42	42	42
	Mly = + 0,001 $q l_x^2$ X	22	20	18	17	15	14	13	12	11	10	10	10	9	9	9	9	8
	Mtx = - 0,001 $q l_x^2$ X	70	74	77	79	81	82	83	84	84	84	84	84	83	83	83	83	83
VA	Mtx = + 0,001 $q l_x^2$ X	31	38	45	53	60	66	72	78	83	88	92	96	99	102	105	108	125
	Mly = + 0,001 $q l_x^2$ X	37	39	41	41	42	42	41	41	40	39	38	37	36	35	34	33	25
	mty = - 0,001 $q l_x^2$ X	84	92	99	104	109	112	115	117	119	121	122	122	123	123	124	124	125
VB	Mlx = + 0,001 $q l_x^2$ X	37	41	45	48	51	53	55	56	58	59	60	60	60	61	61	62	63
	Mly = + 0,001 $q l_x^2$ X	31	30	28	27	25	24	22	21	20	19	18	17	17	16	16	15	13
	Mtx = - 0,001 $q l_x^2$ X	84	92	98	103	108	111	114	117	119	120	121	122	122	123	123	124	125
VIA	Mlx = + 0,001 $q l_x^2$ X	21	26	31	36	40	43	46	49	51	53	55	56	57	58	59	60	63
	Mly = + 0,001 $q l_x^2$ X	26	27	28	28	27	26	25	23	22	21	21	20	20	19	19	18	13
	Mtx = - 0,001 $q l_x^2$ X	55	65	74	82	89	94	99	103	106	110	114	116	117	118	119	120	125
	Mty = - 0,001 $q l_x^2$ X	60	65	69	72	74	76	77	78	78	78	78	78	78	78	78	79	79
VIB	Mlx = + 0,001 $q l_x^2$ X	26	29	32	35	36	38	39	40	40	41	41	42	42	42	42	41	42
	Mly = + 0,001 $q l_x^2$ X	21	20	19	18	17	15	14	13	12	12	11	11	10	10	10	10	8
	Mtx = - 0,001 $q l_x^2$ X	60	66	71	74	77	79	80	82	83	83	83	83	83	83	83	83	83
	Mty = - 0,001 $q l_x^2$ X	55	57	57	57	58	57	57	57	57	57	57	57	57	57	57	57	57

		ly/lx	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	2,0	2,1	2,2	2,3	2,4	2,5	>2,5
I		(Mlx) = 0,001 q_{lx}^2 X	44	52	59	66	73	78	84	88	93	97	100	103	106	108	110	112	125
		(Mly) = 0,001 q_{lx}^2 X	44	45	45	44	44	43	41	40	39	38	37	36	35	34	32	32	25
II	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	36	42	46	50	53	56	58	59	60	61	62	62	62	63	63	63	63
		(Mly) = 0,001 q_{lx}^2 X	36	37	38	38	38	37	36	36	35	35	35	34	34	34	34	34	13
		– (Mty) = 0,001 q_{lx}^2 X	36	37	38	38	38	37	36	36	35	35	35	34	34	34	34	34	38
III	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	48	55	61	67	71	76	79	82	84	86	88	89	90	91	92	92	94
		(Mly) = 0,001 q_{lx}^2 X	48	50	51	51	51	51	51	50	50	49	49	49	48	48	47	47	19
		– (Mty) = 0,001 q_{lx}^2 X	48	50	51	51	51	51	51	50	50	49	49	49	48	48	47	47	56
IVA		(Mlx) = 0,001 q_{lx}^2 X	22	28	34	41	48	55	62	68	74	80	85	89	93	97	100	103	125
		(Mly) = 0,001 q_{lx}^2 X	51	57	62	67	70	73	75	77	78	79	79	79	79	79	79	79	25
		– (Mty) = 0,001 q_{lx}^2 X	51	57	62	67	70	73	75	77	78	79	79	79	79	79	79	79	75
IVB	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	51	54	57	59	60	61	62	62	63	63	63	63	63	63	63	63	63
		(Mly) = 0,001 q_{lx}^2 X	22	20	18	17	15	14	13	12	11	10	10	10	9	9	9	9	13
VA		(Mlx) = 0,001 q_{lx}^2 X	31	38	45	53	59	66	72	78	83	88	92	96	99	102	105	108	125
		(Mly) = 0,001 q_{lx}^2 X	60	65	69	73	75	77	78	79	79	80	80	80	79	79	79	79	25
		– (Mty) = 0,001 q_{lx}^2 X	60	65	69	73	75	77	78	79	79	80	80	80	79	79	79	79	75
VB	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	60	66	71	76	79	82	85	87	88	89	90	91	91	92	92	93	94
		(Mly) = 0,001 q_{lx}^2 X	31	30	28	27	25	24	22	21	20	19	18	17	17	16	16	15	12
VIA	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	38	46	53	59	65	69	73	77	80	83	85	86	87	88	89	90	54
		(Mly) = 0,001 q_{lx}^2 X	43	46	48	50	51	51	51	51	50	50	50	49	49	48	48	48	19
		– (Mty) = 0,001 q_{lx}^2 X	43	46	48	50	51	51	51	51	50	50	50	49	49	48	48	48	56
VIB	(Mlx) = – (Mtx) =	0,001 q_{lx}^2 X	13	48	51	55	57	58	60	61	62	62	62	63	63	63	63	63	63
		(Mly) = 0,001 q_{lx}^2 X	38	39	38	38	37	36	36	35	35	34	34	34	33	33	33	33	13
		– (Mty) = 0,001 q_{lx}^2 X	38	39	38	38	37	36	36	35	35	34	34	34	33	33	33	33	38

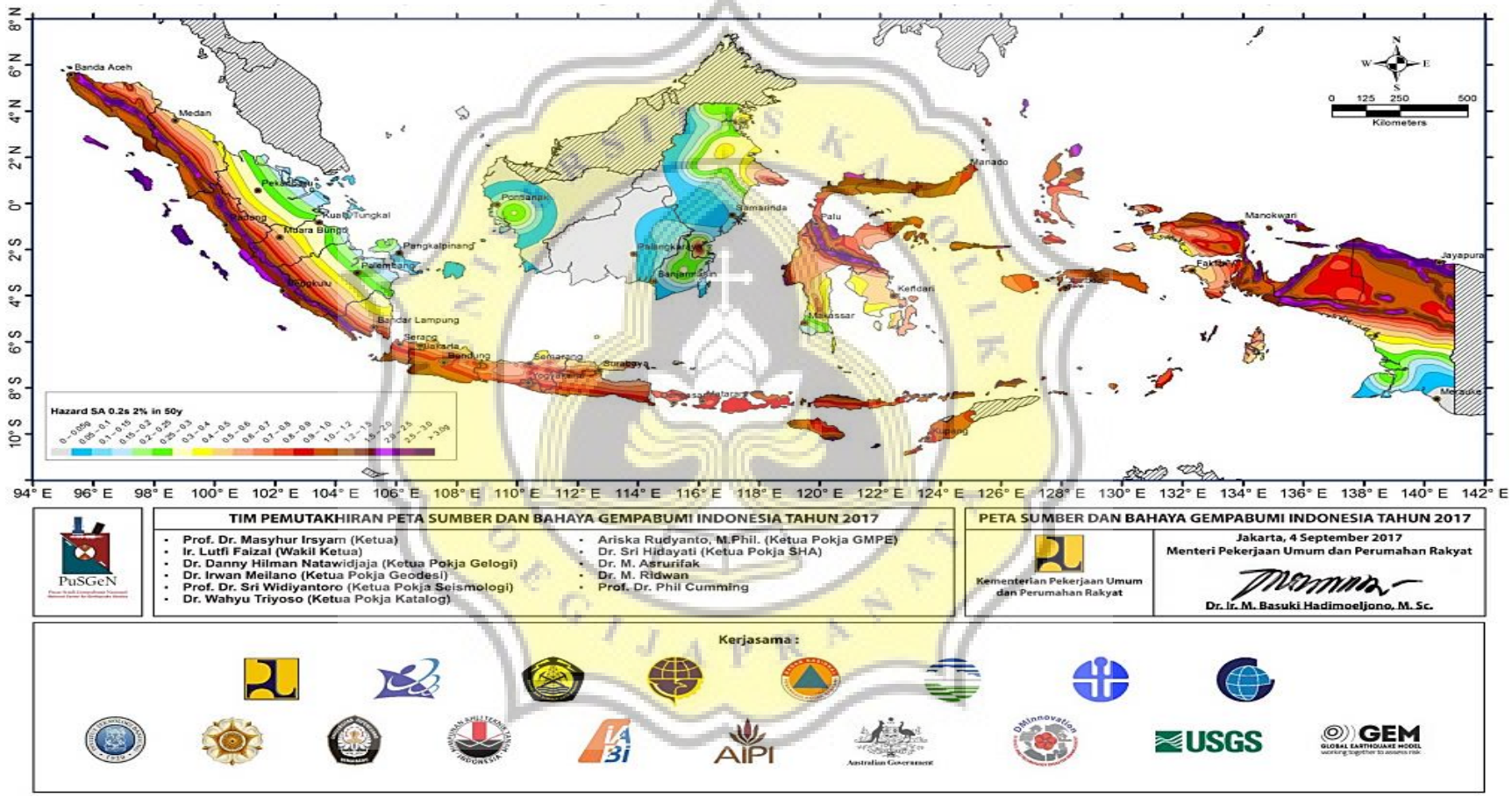
——— = Terletak bebas
——— = Menerus atau terjepit elastis

Lampiran E Acuan Perhitungan Gempa Berdasarkan SNI 1726-2012 dan Peta Sumber dan Bahaya Gempa Indonesia Tahun 2017

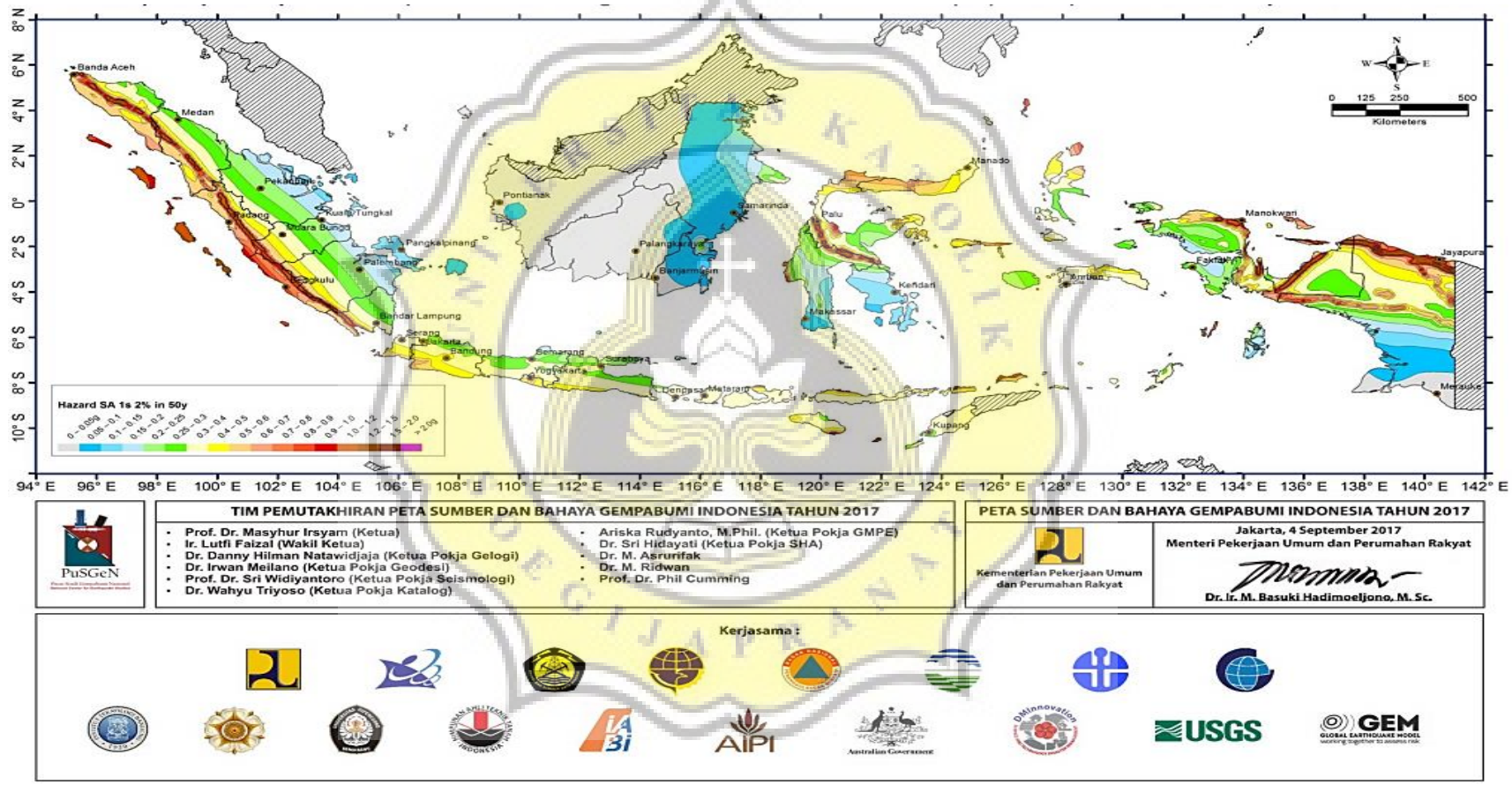
E.1 Tabel Kategori Resiko Bangunan untuk Beban Gempa

Jenis pemanfaatan	Kategori risiko
Gedung dan non gedung yang memiliki risiko rendah terhadap jiwa manusia pada saat terjadi kegagalan, termasuk, tapi tidak dibatasi untuk, antara lain: - Fasilitas pertanian, perkebunan, perternakan, dan perikanan - Fasilitas sementara - Gudang penyimpanan - Rumah jaga dan struktur kecil lainnya	I
Semua gedung dan struktur lain, kecuali yang termasuk dalam kategori risiko I,III,IV, termasuk, tapi tidak dibatasi untuk: - Perumahan - Rumah toko dan rumah kantor - Pasar - Gedung perkantoran - Gedung apartemen/ rumah susun - Pusat perbelanjaan/ mall - Bangunan industri - Fasilitas manufaktur - Pabrik	II
Gedung dan non gedung yang memiliki risiko tinggi terhadap jiwa manusia pada saat terjadi kegagalan, termasuk, tapi tidak dibatasi untuk: - Bioskop - Gedung pertemuan - Stadion - Fasilitas kesehatan yang tidak memiliki unit bedah dan unit gawat darurat - Fasilitas penitipan anak - Penjara - Bangunan untuk orang jompo Gedung dan non gedung, tidak termasuk kedalam kategori risiko IV, yang memiliki potensi untuk menyebabkan dampak ekonomi yang besar dan/atau gangguan massal terhadap kehidupan masyarakat sehari-hari bila terjadi kegagalan, termasuk, tapi tidak dibatasi untuk: - Pusat pembangkit listrik biasa - Fasilitas penanganan air - Fasilitas penanganan limbah - Pusat telekomunikasi Gedung dan non gedung yang tidak termasuk dalam kategori risiko IV, (termasuk, tetapi tidak dibatasi untuk fasilitas manufaktur, proses, penanganan, penyimpanan, penggunaan atau tempat pembuangan bahan bakar berbahaya, bahan kimia berbahaya, limbah berbahaya, atau bahan yang mudah meledak) yang mengandung bahan beracun atau peledak di mana jumlah kandungan bahannya melebihi nilai batas yang disyaratkan oleh instansi yang berwenang dan cukup menimbulkan bahaya bagi masyarakat jika terjadi kebocoran.	III
Gedung dan non gedung yang ditunjukkan sebagai fasilitas yang penting, termasuk, tetapi tidak dibatasi untuk: - Bangunan-bangunan monumental - Gedung sekolah dan fasilitas pendidikan - Rumah sakit dan fasilitas kesehatan lainnya yang memiliki fasilitas bedah dan unit gawat darurat - Fasilitas pemadam kebakaran, ambulans, dan kantor polisi, serta garasi kendaraan darurat - Tempat perlindungan terhadap gempa bumi, angin badai, dan tempat perlindungan darurat lainnya - Fasilitas kesiapan darurat, komunikasi, pusat operasi dan fasilitas lainnya untuk tanggap darurat - Pusat pembangkit energi dan fasilitas publik lainnya yang dibutuhkan pada saat keadaan darurat - Struktur tambahan (termasuk menara telekomunikasi, tangki penyimpanan bahan bakar, menara pendingin, struktur stasiun listrik, tangki air pemadam kebakaran atau struktur rumah atau struktur pendukung air atau material atau peralatan pemadam kebakaran) yang disyaratkan untuk beroperasi pada saat keadaan darurat Gedung dan non gedung yang dibutuhkan untuk mempertahankan fungsi struktur bangunan lain yang masuk ke dalam kategori risiko IV.	IV

E.2 Peta Percepatan Spektrum Respons 0,2 Detik dengan Redaman 5% di Satuan Dasar (SB) untuk Probabilitas Terlampaui 2% dalam 50 Tahun

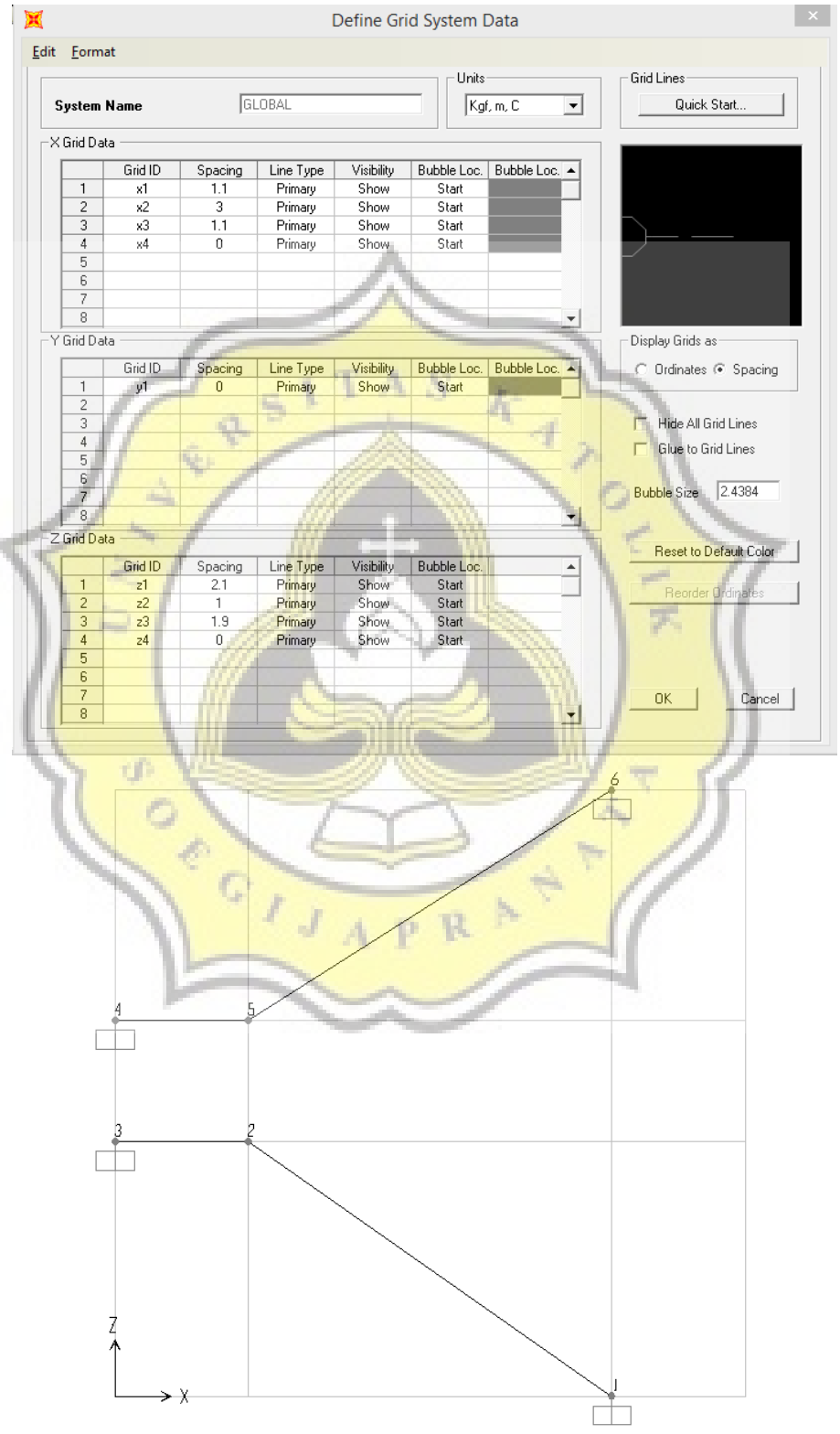


E.3 Peta Percepatan Spektrum Respons 1,0 Detik dengan Redaman 5% di Satuan Dasar (SB) untuk Probabilitas Terlampaui 2% dalam 50 Tahun



Lampiran F Hasil *Output* Program SAP Struktur Hotel Quin

F.1 Hasil *Output* SAP Tangga



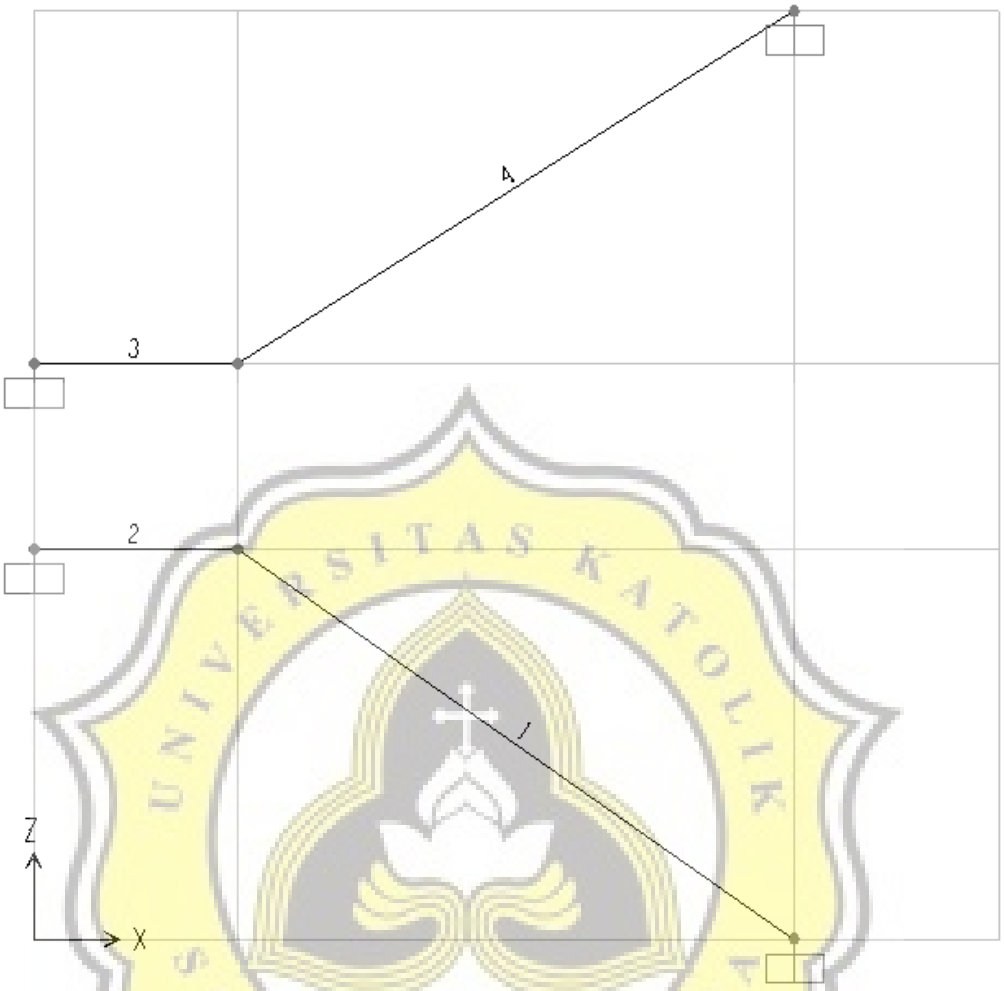


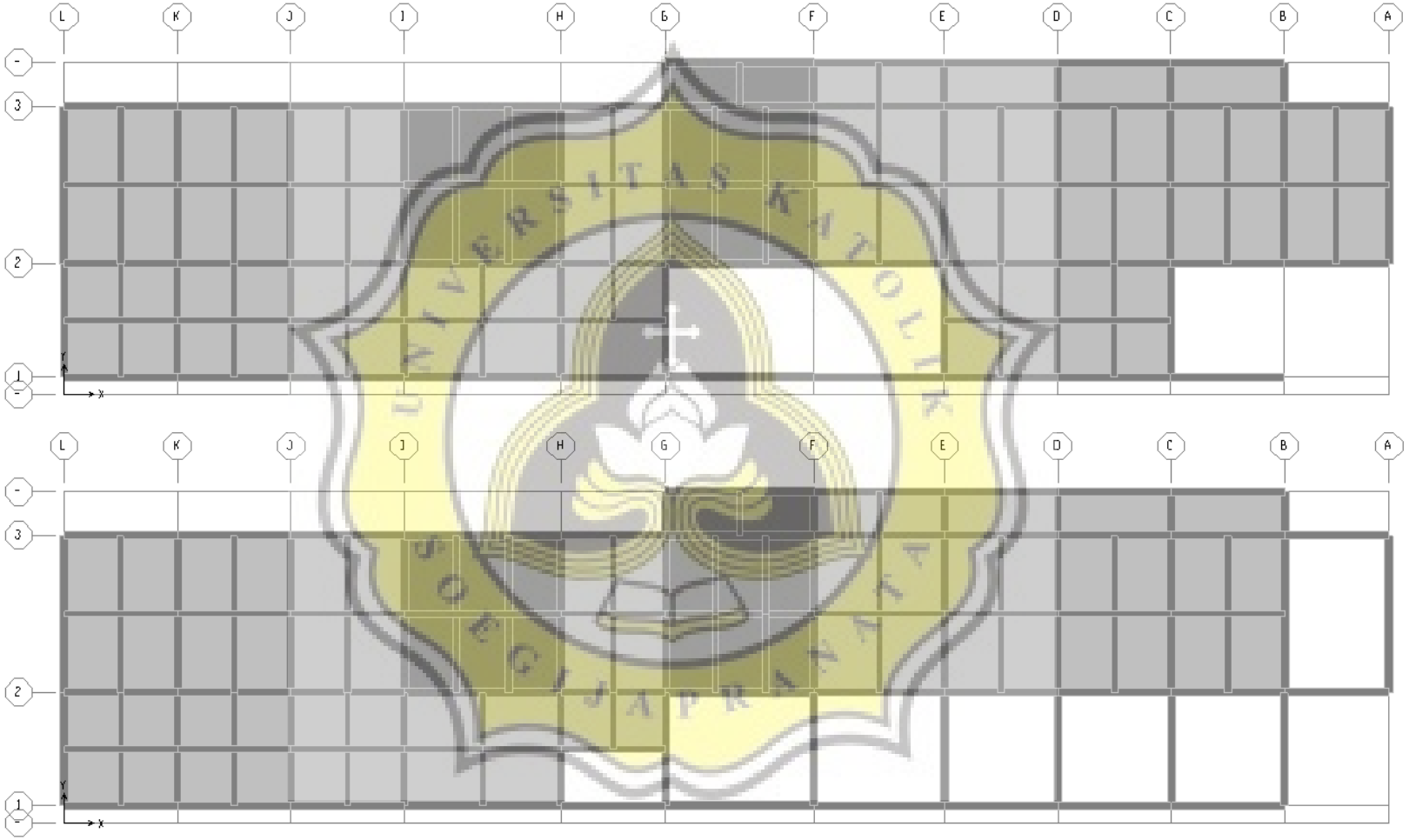
TABLE: Joint Reactions

Joint	OutputCase	CaseType	F1	F3	M2
Text	Text	Text	Kgf	Kgf	Kgf-m
1	1.2DL + 1.6LL	Combination	-5702,21	8096,4	2355,87
3	1.2DL + 1.6LL	Combination	5702,21	957,68	-864,74
4	1.2DL + 1.6LL	Combination	-5833,11	1122,14	-950,52
6	1.2DL + 1.6LL	Combination	5833,11	7714,03	2332,2

TABLE: Element Forces - Frames					
Frame	**Station**	**OutputCase**	**P**	**V2**	**M3**
Text	m	Text	Kgf	Kgf	Kgf-m
1	0,00	1.2DL + 1.6LL	-9314,41	-3362,83	-2355,87
1	1,83	1.2DL + 1.6LL	-7251,38	-415,65	1103,29
1	3,66	1.2DL + 1.6LL	-5188,35	2531,54	-833,79
2	0,00	1.2DL + 1.6LL	-5702,21	-901,41	-833,79
2	0,37	1.2DL + 1.6LL	-5702,21	-281,71	-616,89
2	0,73	1.2DL + 1.6LL	-5702,21	337,99	-627,2
2	1,10	1.2DL + 1.6LL	-5702,21	957,68	-864,74
3	0,00	1.2DL + 1.6LL	5833,11	-1122,14	-950,52
3	0,37	1.2DL + 1.6LL	5833,11	-502,45	-652,68
3	0,73	1.2DL + 1.6LL	5833,11	117,25	-582,06
3	1,10	1.2DL + 1.6LL	5833,11	736,95	-738,66
4	0,00	1.2DL + 1.6LL	5322,23	-2498,43	-738,66
4	1,78	1.2DL + 1.6LL	7188,78	448,75	1080,97
4	3,55	1.2DL + 1.6LL	9055,33	3395,94	-2332,2

TABLE: Element Joint Forces - Frames						
Frame	**Joint**	**OutputCase**	**CaseType**	**F1**	**F3**	**M2**
Text	Text	Text	Text	Kgf	Kgf	Kgf-m
1	1	1.2DL + 1.6LL	Combination	-5702,21	8096,4	2355,87
1	2	1.2DL + 1.6LL	Combination	5702,21	-901,41	-833,79
2	2	1.2DL + 1.6LL	Combination	-5702,21	901,41	833,79
2	3	1.2DL + 1.6LL	Combination	5702,21	957,68	-864,74
3	4	1.2DL + 1.6LL	Combination	-5833,11	1122,14	-950,52
3	5	1.2DL + 1.6LL	Combination	5833,11	736,95	738,66
4	5	1.2DL + 1.6LL	Combination	-5833,11	-736,95	-738,66
4	6	1.2DL + 1.6LL	Combination	5833,11	7714,03	2332,2

F.2 Hasil *Output* SAP Struktur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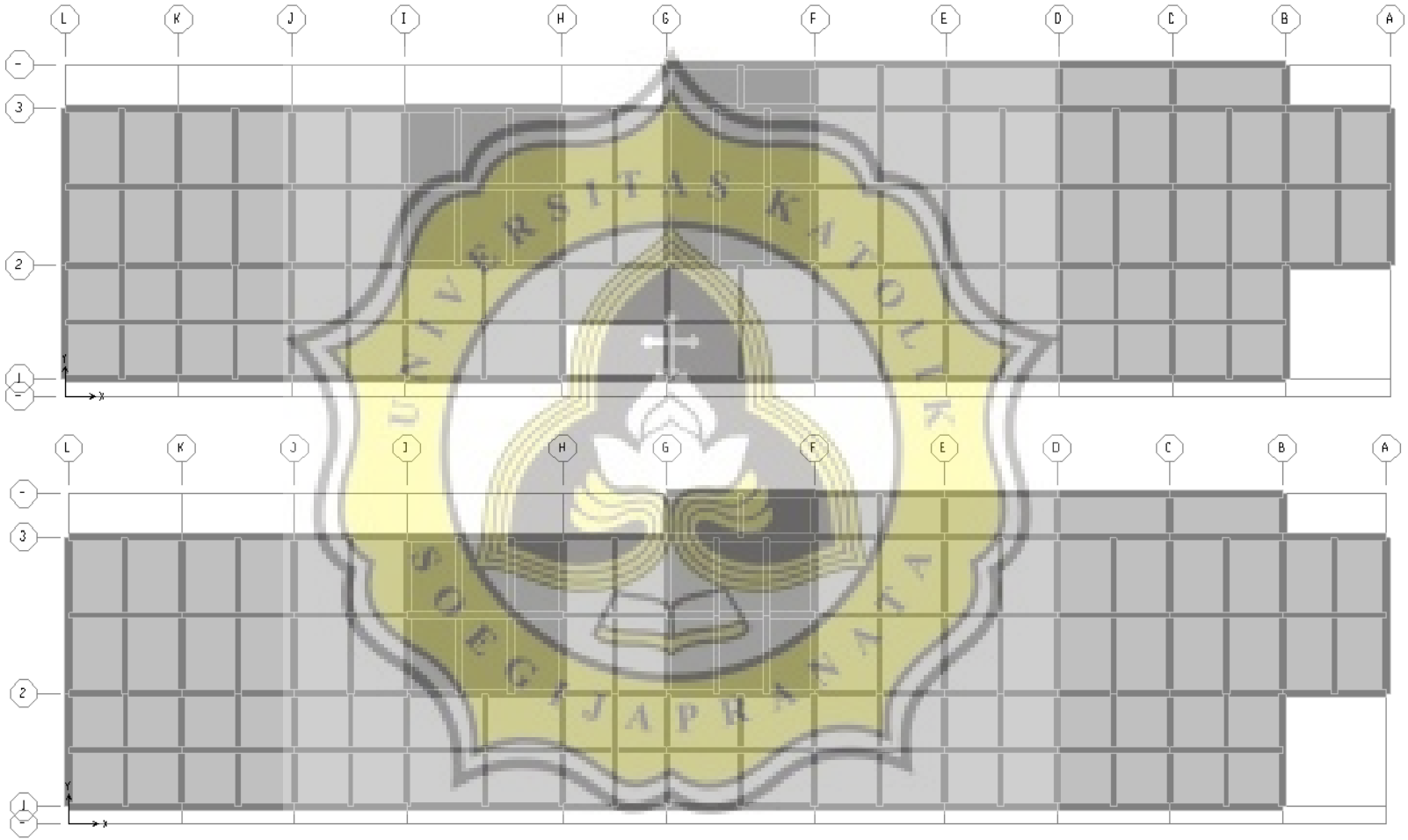
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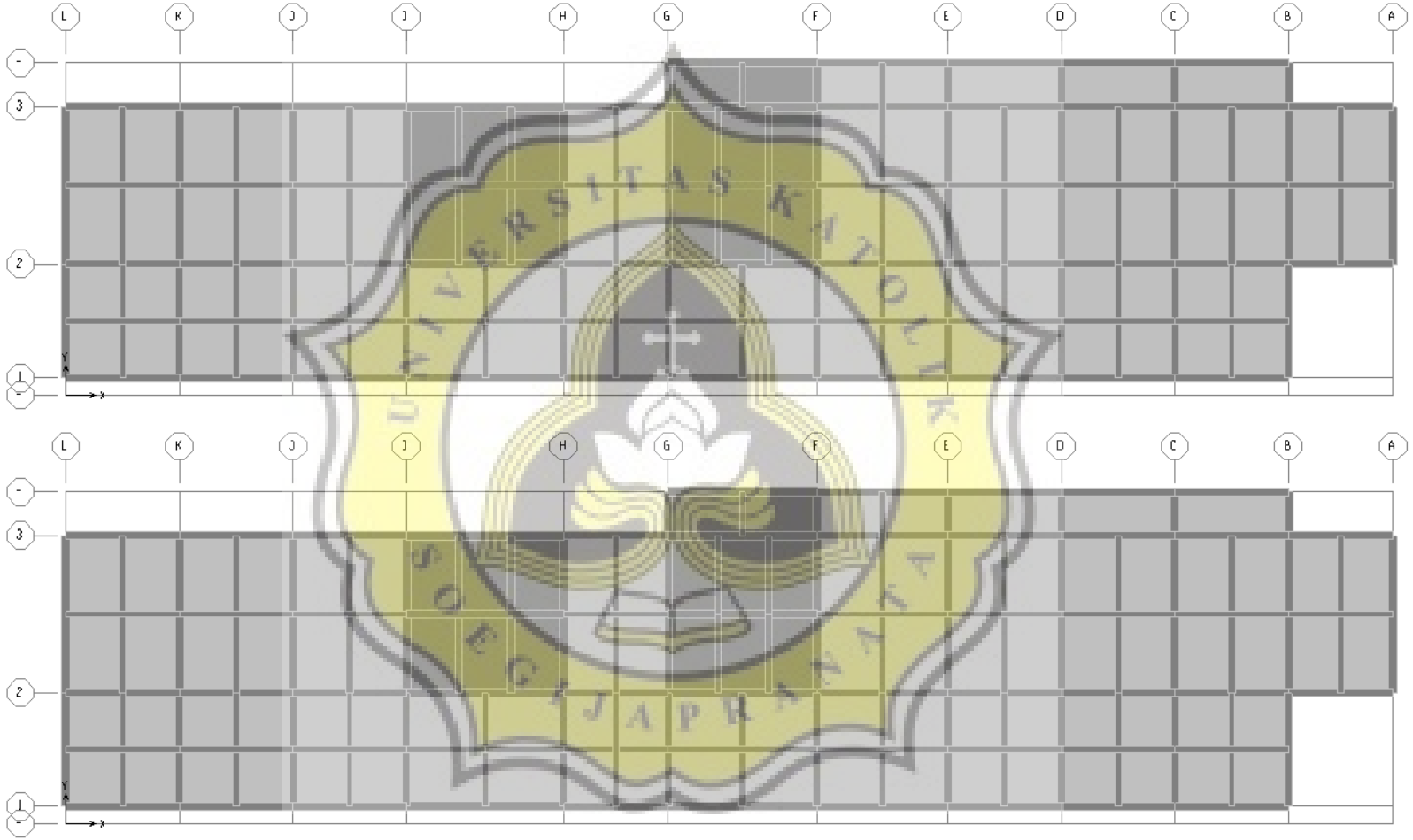
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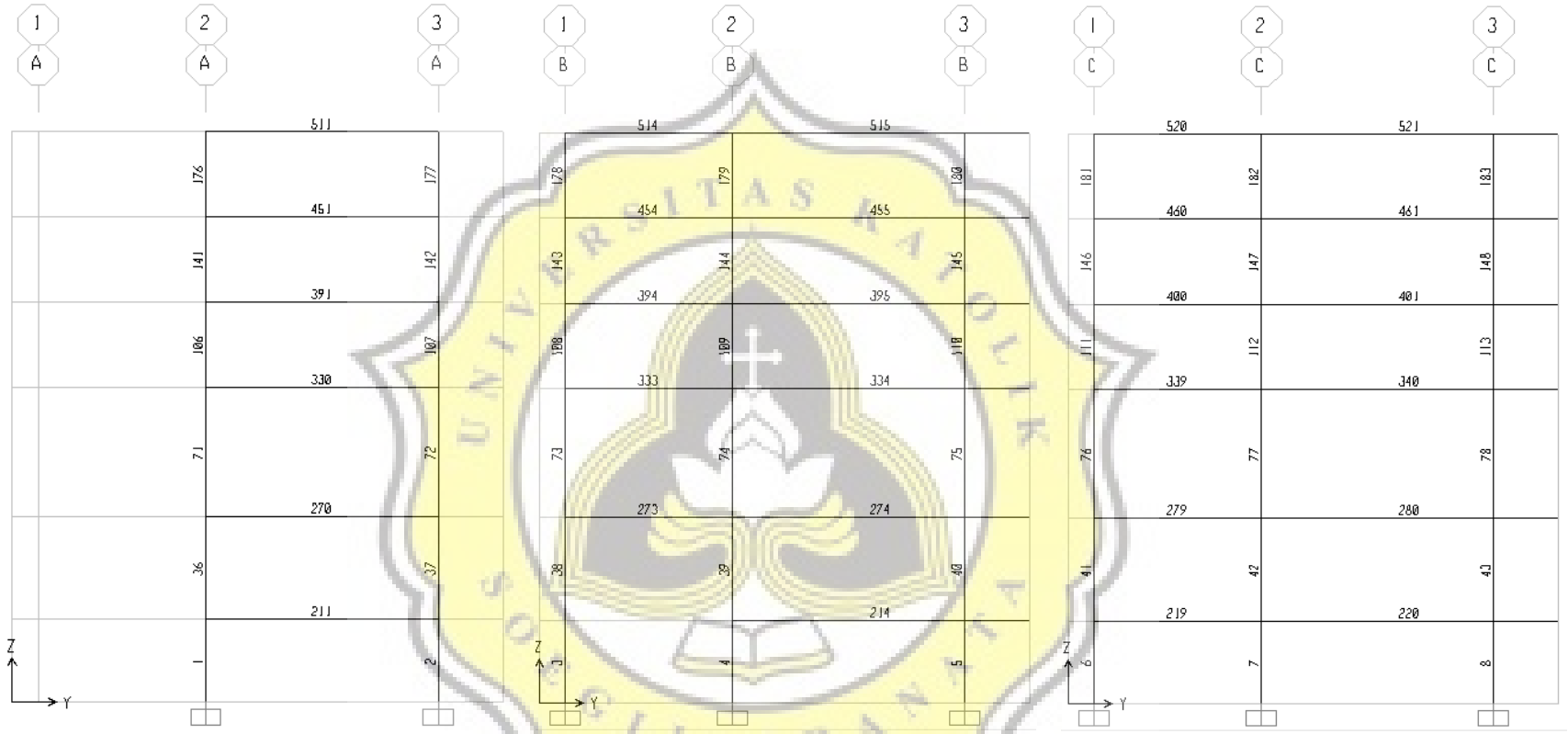
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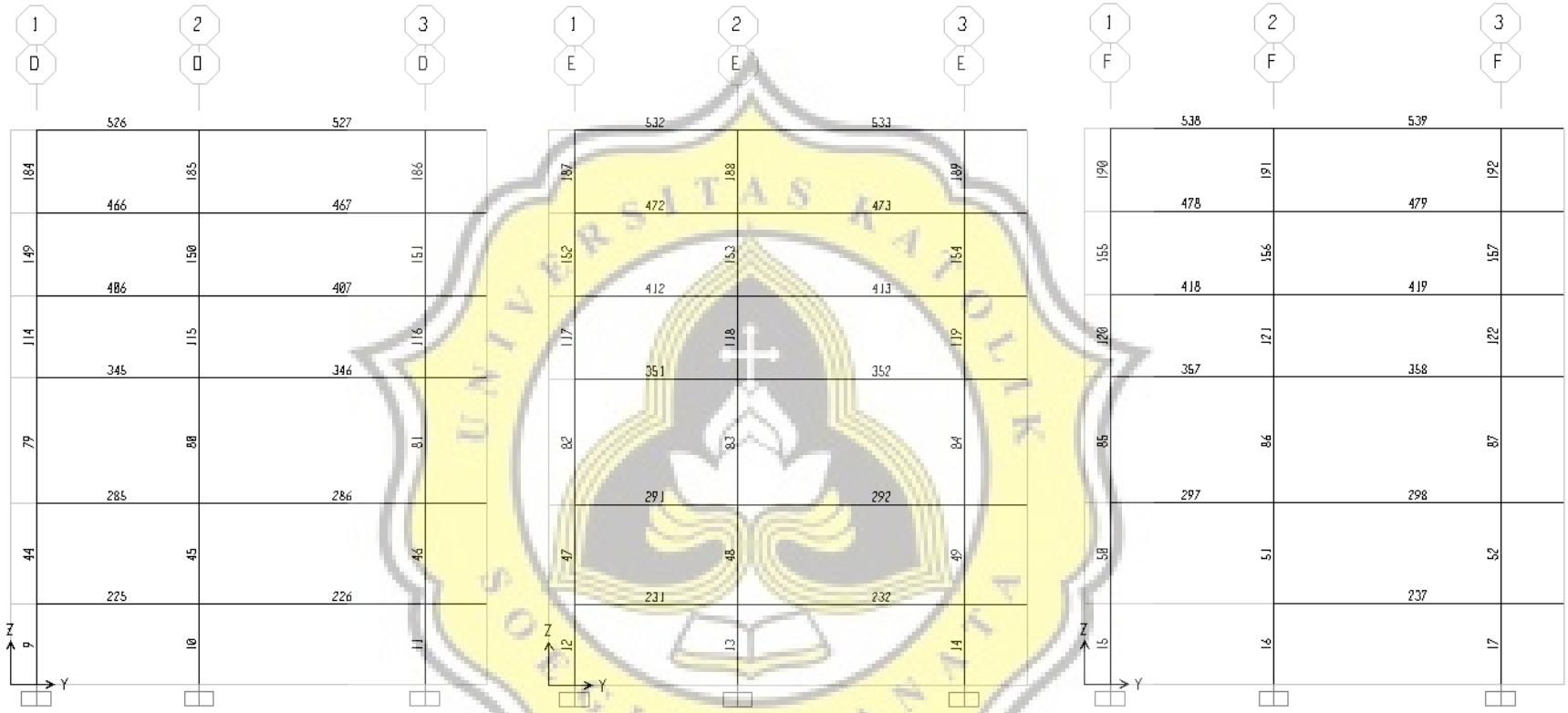
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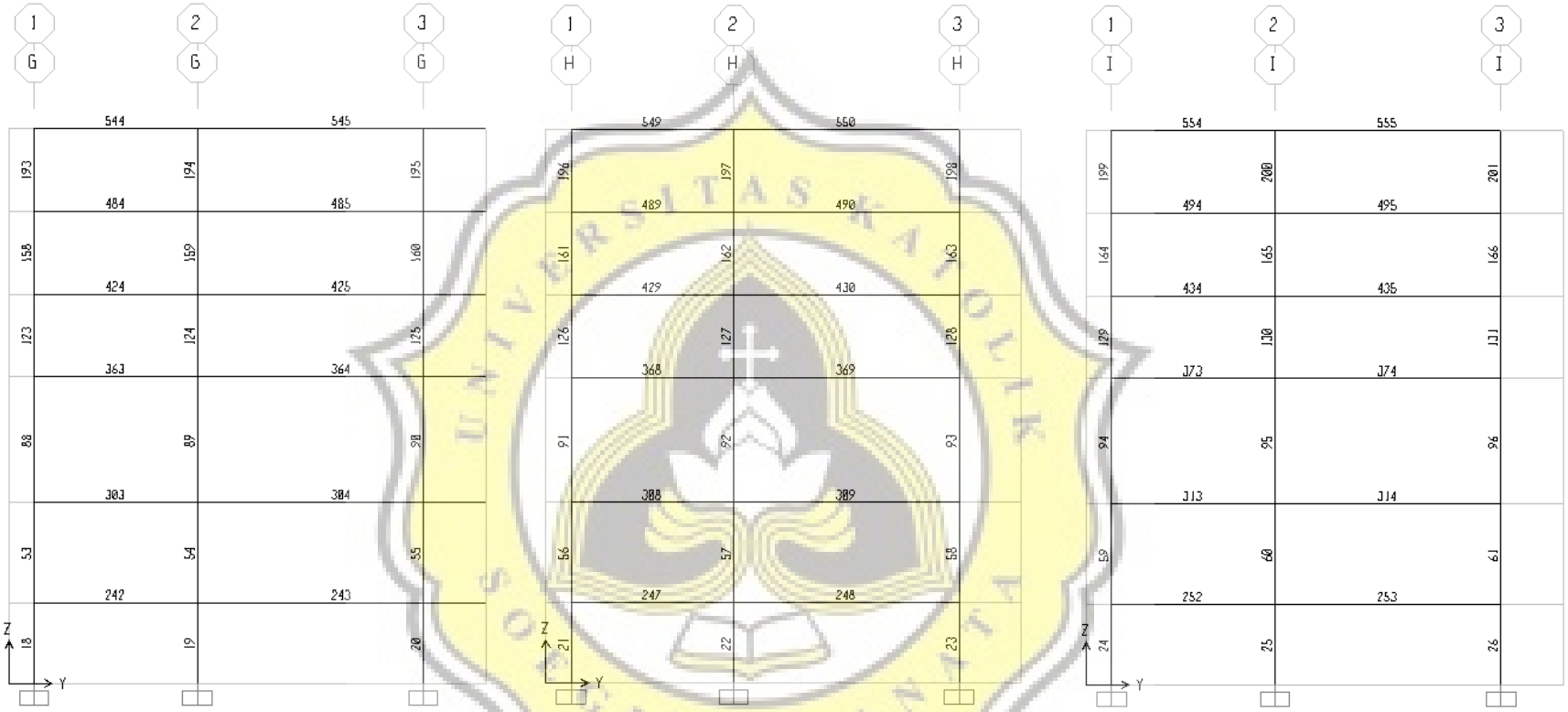
Y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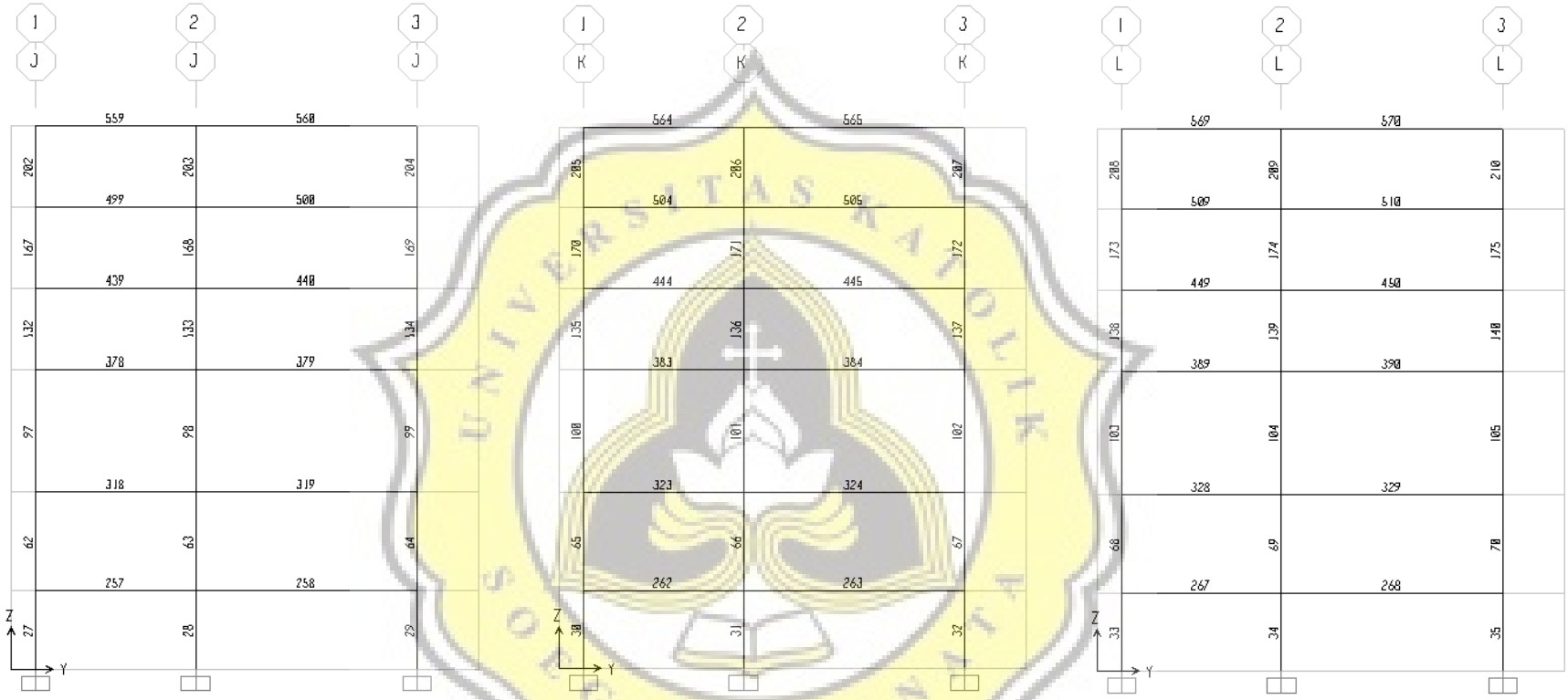
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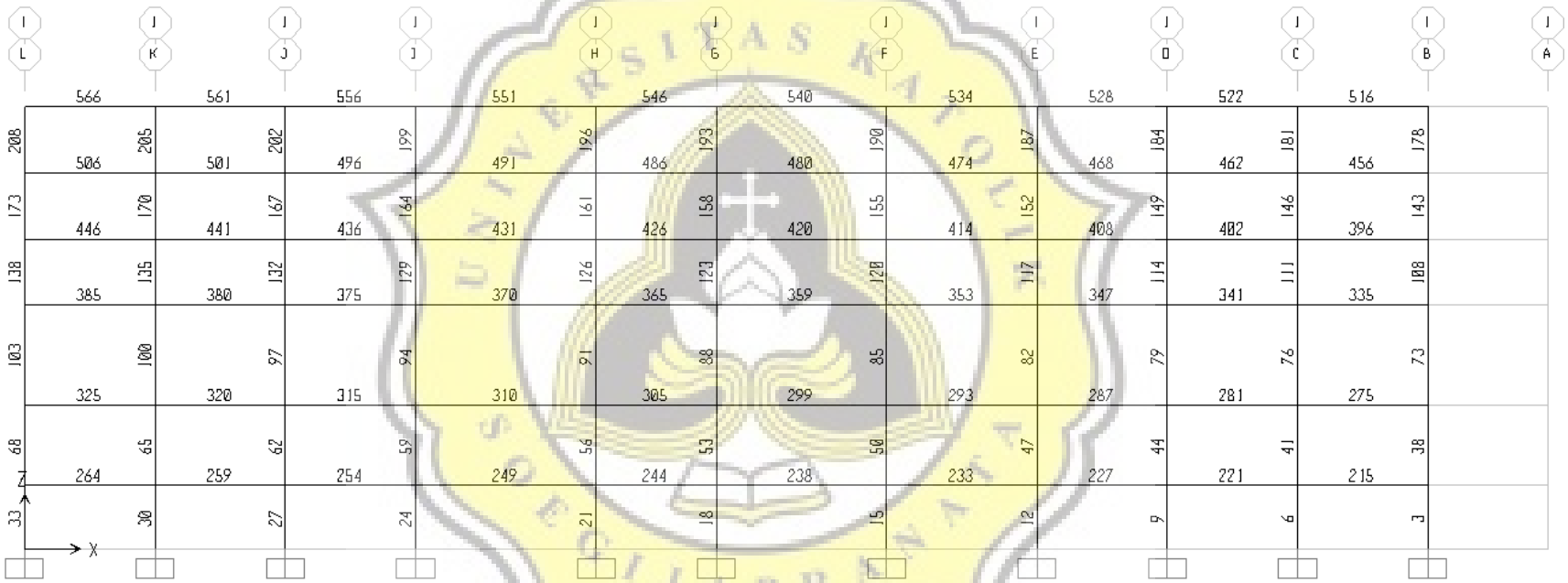
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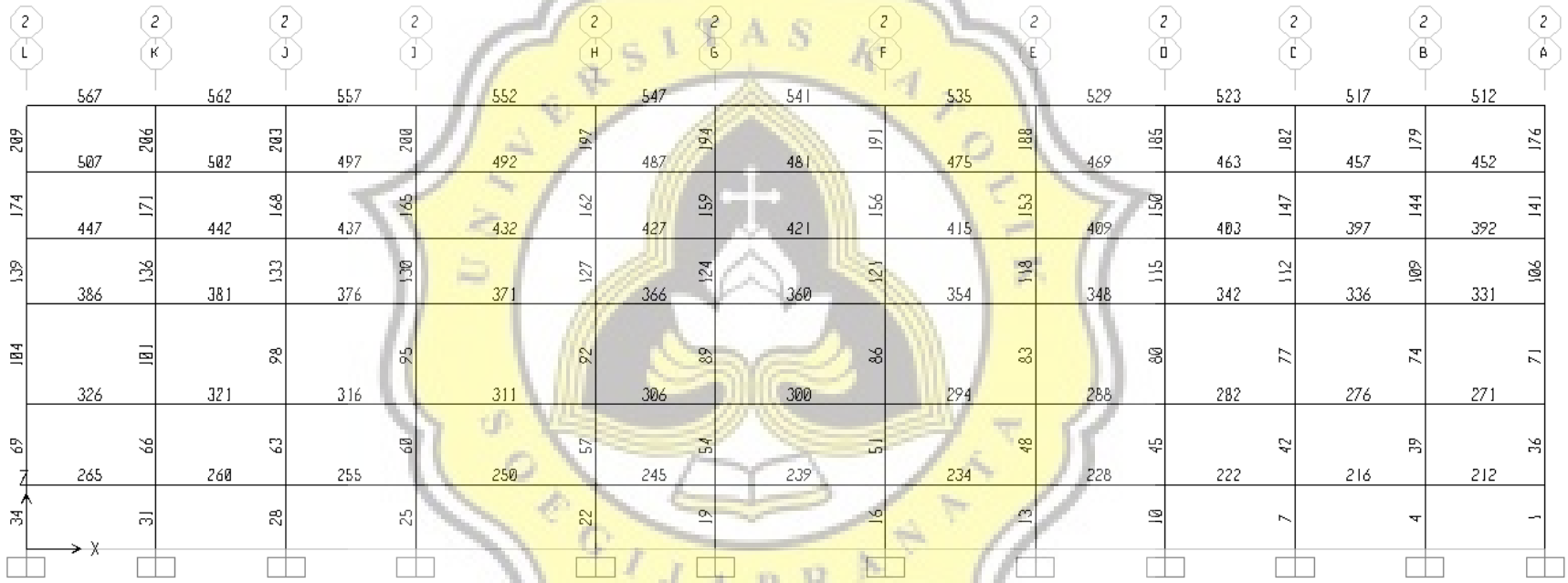
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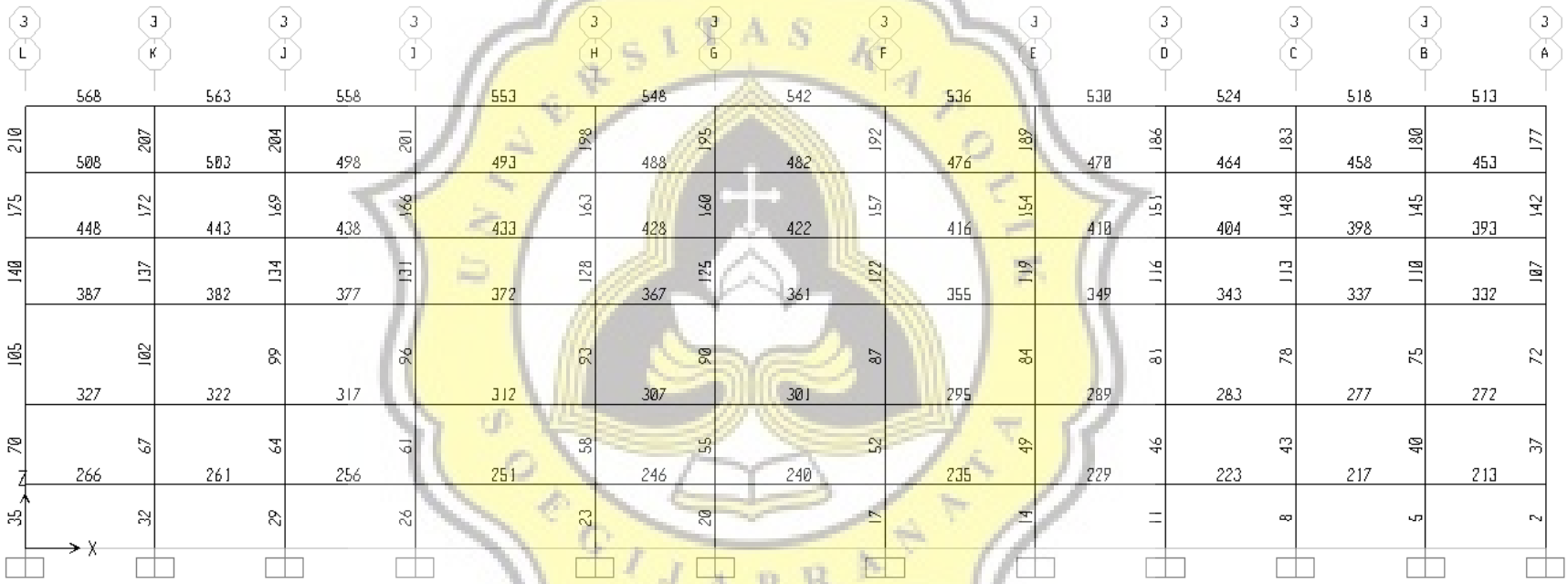
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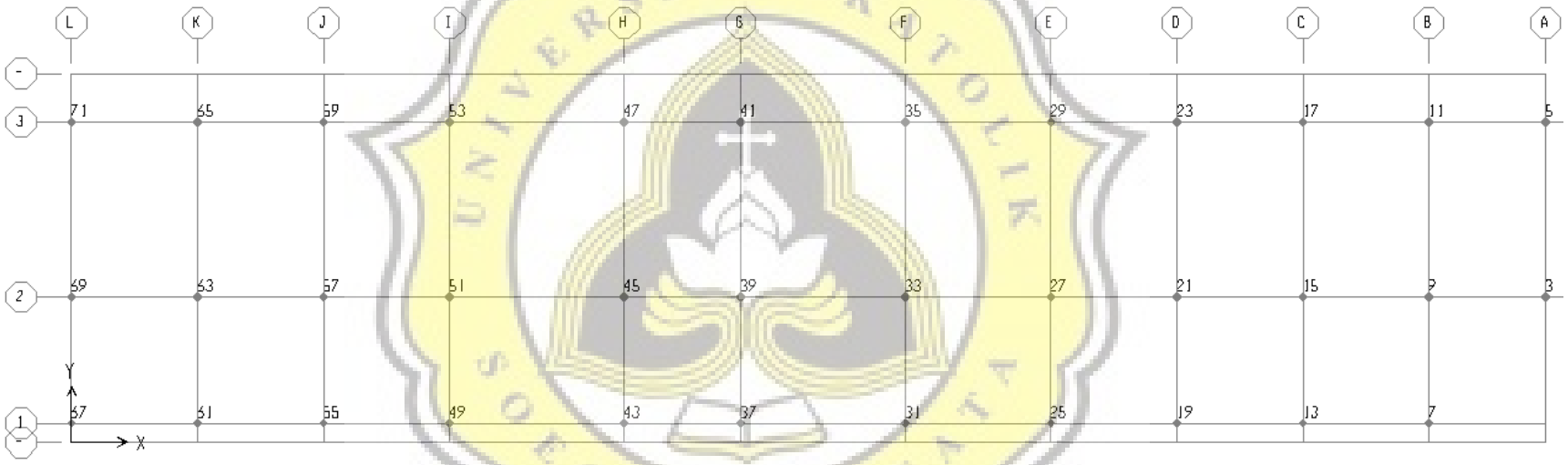
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TABLE: Base Reactions

OutputCase	CaseType	StepType	GlobalFX	GlobalFY	GlobalFZ	GlobalMX	GlobalMY	GlobalMZ
Text	Text	Text	Tonf	Tonf	Tonf	Tonf-m	Tonf-m	Tonf-m
1.4D	Combination	Max	2,703E-12	-3,466E-12	10548,6171	100957,2048	-392509,47	-2,066E-10
1.4D	Combination	Min	2,703E-12	-3,466E-12	10548,6171	100957,2048	-392509,47	-2,066E-10
1.2D + 1.6L	Combination	Max	4,333E-12	-2,971E-12	12990,7069	123968,8167	-336436,69	-1,771E-10
1.2D + 1.6L	Combination	Min	2,317E-12	-3,444E-12	9041,6718	86534,74697	-486070,65	-2,256E-10
1.2D + 1E + 1L	Combination	Max	960,7366	-2,152E-12	9041,6718	86534,74697	-249563,849	-1,41E-10
1.2D + 1E + 1L	Combination	Min	2,317E-12	-960,7363	6747,9043	66912,88196	-336436,69	-44994,491
1.2D - 1E + 1L	Combination	Max	2,708E-12	960,7363	9041,6718	86534,74697	249563,8487	44994,49071
1.2D - 1E + 1L	Combination	Min	-960,7366	-2,971E-12	-6747,9043	-66912,882	-336436,69	-1,771E-10
0.9D + 1E	Combination	Max	960,7366	-2,228E-12	6781,2538	66912,88196	-249563,849	-1,328E-10
0.9D + 1E	Combination	Min	1,737E-12	-960,7363	6747,9043	64901,06022	-252327,518	-44994,491
0.9D - 1E	Combination	Max	1,737E-12	960,7363	6781,2538	64901,06022	249563,8487	44994,49071
0.9D - 1E	Combination	Min	-960,7366	-2,228E-12	-6747,9043	-66912,882	-252327,518	-1,328E-10

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
3	1.4D	Combination	Max	-8,175	6,735	339,909	3,1715	-26,8687	-0,4429
3	1.4D	Combination	Min	-8,175	6,735	339,909	3,1715	-26,8687	-0,4429
3	1.2D + 1.6L	Combination	Max	-7,007	13,144	410,904	2,7184	-23,0303	-0,3796
3	1.2D + 1.6L	Combination	Min	-12,472	5,773	291,351	-15,8627	-40,9771	-0,4818

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
3	1.2D + 1E + 1L	Combination	Max	41,906	8,215	291,351	426,5426	344,4087	-0,3011
3	1.2D + 1E + 1L	Combination	Min	-7,795	-55,712	217,9	-9,9142	-25,6107	-0,5873
3	1.2D - 1E + 1L	Combination	Max	-7,007	55,712	291,351	2,7184	-23,0303	0,5873
3	1.2D - 1E + 1L	Combination	Min	-41,906	5,773	-217,9	-426,5426	-344,4087	-0,3796
3	0.9D + 1E	Combination	Max	41,906	4,329	218,513	426,5426	344,4087	-0,2847
3	0.9D + 1E	Combination	Min	-5,255	-55,712	217,9	2,0388	-17,2727	-0,5873
3	0.9D - 1E	Combination	Max	-5,255	55,712	218,513	2,0388	-17,2727	0,5873
3	0.9D - 1E	Combination	Min	-41,906	4,329	-217,9	-426,5426	-344,4087	-0,2847
5	1.4D	Combination	Max	-7,616	-19,316	341,795	85,3638	-22,8132	-0,4429
5	1.4D	Combination	Min	-7,616	-19,316	341,795	85,3638	-22,8132	-0,4429
5	1.2D + 1.6L	Combination	Max	-6,528	-16,557	412,942	108,6855	-19,5541	-0,3796
5	1.2D + 1.6L	Combination	Min	-11,839	-26,332	292,967	73,1689	-36,4854	-0,4818
5	1.2D + 1E + 1L	Combination	Max	41,19	-16,457	292,967	482,8598	345,0947	-0,3011
5	1.2D + 1E + 1L	Combination	Min	-7,399	-73,562	225,924	67,9284	-22,8034	-0,5873
5	1.2D - 1E + 1L	Combination	Max	-6,528	73,562	292,967	73,1689	-19,5541	0,5873
5	1.2D - 1E + 1L	Combination	Min	-41,19	-16,557	-225,924	-482,8598	-345,0947	-0,3796
5	0.9D + 1E	Combination	Max	41,19	-12,417	225,924	482,8598	345,0947	-0,2847
5	0.9D + 1E	Combination	Min	-4,896	-73,562	219,725	54,8767	-14,6656	-0,5873
5	0.9D - 1E	Combination	Max	-4,896	73,562	219,725	54,8767	-14,6656	0,5873
5	0.9D - 1E	Combination	Min	-41,19	-12,417	-225,924	-482,8598	-345,0947	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
7	1.4D	Combination	Max	-4,579	-5,535	264,75	40,0263	-16,9151	-0,4429
7	1.4D	Combination	Min	-4,579	-5,535	264,75	40,0263	-16,9151	-0,4429
7	1.2D + 1.6L	Combination	Max	-3,266	-4,744	298,121	41,7913	-13,1034	-0,3796
7	1.2D + 1.6L	Combination	Min	-3,925	-5,769	226,929	34,3083	-14,4987	-0,4818
7	1.2D + 1E + 1L	Combination	Max	42,821	-3,606	226,929	435,6064	345,1956	-0,3011
7	1.2D + 1E + 1L	Combination	Min	-3,925	-59,365	165,367	26,1196	-14,4987	-0,5873
7	1.2D - 1E + 1L	Combination	Max	-2,042	59,365	226,929	34,3083	-8,1896	0,5873
7	1.2D - 1E + 1L	Combination	Min	-42,821	-4,744	-165,367	-435,6064	-345,1956	-0,3796
7	0.9D + 1E	Combination	Max	42,821	-3,558	170,196	435,6064	345,1956	-0,2847
7	0.9D + 1E	Combination	Min	-2,943	-59,365	165,367	25,7312	-10,874	-0,5873
7	0.9D - 1E	Combination	Max	-2,943	59,365	170,196	25,7312	-10,874	0,5873
7	0.9D - 1E	Combination	Min	-42,821	-3,558	-165,367	-435,6064	-345,1956	-0,2847
9	1.4D	Combination	Max	0,669	14,943	668,601	-24,5817	1,6129	-0,4429
9	1.4D	Combination	Min	0,669	14,943	668,601	-24,5817	1,6129	-0,4429
9	1.2D + 1.6L	Combination	Max	1,574	28,341	847,573	-21,0701	4,2569	-0,3796
9	1.2D + 1.6L	Combination	Min	0,573	12,808	573,087	-65,8307	1,3825	-0,4818
9	1.2D + 1E + 1L	Combination	Max	53,167	17,713	573,087	403,0277	380,6776	-0,3011
9	1.2D + 1E + 1L	Combination	Min	0,573	-49,039	426,768	-41,1442	1,3825	-0,5873
9	1.2D - 1E + 1L	Combination	Max	0,984	49,039	573,087	-21,0701	2,6606	0,5873
9	1.2D - 1E + 1L	Combination	Min	-53,167	12,808	-426,768	-403,0277	-380,6776	-0,3796

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
9	0.9D + 1E	Combination	Max	53,167	9,606	429,815	403,0277	380,6776	-0,2847
9	0.9D + 1E	Combination	Min	0,43	-49,039	426,768	-15,8025	1,0368	-0,5873
9	0.9D - 1E	Combination	Max	0,43	49,039	429,815	-15,8025	1,0368	0,5873
9	0.9D - 1E	Combination	Min	-53,167	9,606	-426,768	-403,0277	-380,6776	-0,2847
11	1.4D	Combination	Max	-3,148	-15,493	723,638	71,4466	-8,4232	-0,4429
11	1.4D	Combination	Min	-3,148	-15,493	723,638	71,4466	-8,4232	-0,4429
11	1.2D + 1.6L	Combination	Max	-2,698	-13,28	910,174	112,6587	-7,2198	-0,3796
11	1.2D + 1.6L	Combination	Min	-3,021	-28,231	620,261	61,2399	-8,0888	-0,4818
11	1.2D + 1E + 1L	Combination	Max	88,686	-13,28	620,261	481,4777	498,0559	-0,3011
11	1.2D + 1E + 1L	Combination	Min	-2,698	-73,904	434,816	61,2399	-7,2198	-0,5873
11	1.2D - 1E + 1L	Combination	Max	-1,888	73,904	620,261	70,4117	-5,0555	0,5873
11	1.2D - 1E + 1L	Combination	Min	-88,686	-17,644	-434,816	-481,4777	-498,0559	-0,3796
11	0.9D + 1E	Combination	Max	88,686	-9,96	465,196	481,4777	498,0559	-0,2847
11	0.9D + 1E	Combination	Min	-2,023	-73,904	434,816	45,93	-5,4149	-0,5873
11	0.9D - 1E	Combination	Max	-2,023	73,904	465,196	45,93	-5,4149	0,5873
11	0.9D - 1E	Combination	Min	-88,686	-9,96	-434,816	-481,4777	-498,0559	-0,2847
13	1.4D	Combination	Max	-4,947	1,412	421,27	16,0984	-18,1022	-0,4429
13	1.4D	Combination	Min	-4,947	1,412	421,27	16,0984	-18,1022	-0,4429
13	1.2D + 1.6L	Combination	Max	-4,24	4,704	495,509	13,7986	-15,5162	-0,3796
13	1.2D + 1.6L	Combination	Min	-8,335	1,21	361,088	6,5607	-29,4268	-0,4818

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
13	1.2D + 1E + 1L	Combination	Max	46,329	2,94	361,088	427,0549	356,4952	-0,3011
13	1.2D + 1E + 1L	Combination	Min	-5,209	-57,5	259,534	4,1005	-18,3918	-0,5873
13	1.2D - 1E + 1L	Combination	Max	-4,24	57,5	361,088	13,7986	-15,5162	0,5873
13	1.2D - 1E + 1L	Combination	Min	-46,329	1,21	-259,534	-427,0549	-356,4952	-0,3796
13	0.9D + 1E	Combination	Max	46,329	0,908	270,816	427,0549	356,4952	-0,2847
13	0.9D + 1E	Combination	Min	-3,18	-57,5	259,534	10,349	-11,6371	-0,5873
13	0.9D - 1E	Combination	Max	-3,18	57,5	270,816	10,349	-11,6371	0,5873
13	0.9D - 1E	Combination	Min	-46,329	0,908	-259,534	-427,0549	-356,4952	-0,2847
15	1.4D	Combination	Max	-5,28	6,057	807,382	1,4425	-17,5462	-0,4429
15	1.4D	Combination	Min	-5,28	6,057	807,382	1,4425	-17,5462	-0,4429
15	1.2D + 1.6L	Combination	Max	-4,526	12,963	1061,453	1,2365	-15,0396	-0,3796
15	1.2D + 1.6L	Combination	Min	-9,127	5,192	692,042	-19,4982	-30,2054	-0,4818
15	1.2D + 1E + 1L	Combination	Max	49,15	8,102	692,042	429,0517	367,7399	-0,3011
15	1.2D + 1E + 1L	Combination	Min	-5,704	-58,133	519,415	-12,1864	-18,8784	-0,5873
15	1.2D - 1E + 1L	Combination	Max	-4,526	58,133	692,042	1,2365	-15,0396	0,5873
15	1.2D - 1E + 1L	Combination	Min	-49,15	5,192	-519,415	-429,0517	-367,7399	-0,3796
15	0.9D + 1E	Combination	Max	49,15	3,894	519,415	429,0517	367,7399	-0,2847
15	0.9D + 1E	Combination	Min	-3,394	-58,133	519,031	0,9273	-11,2797	-0,5873
15	0.9D - 1E	Combination	Max	-3,394	58,133	519,031	0,9273	-11,2797	0,5873
15	0.9D - 1E	Combination	Min	-49,15	3,894	-519,415	-429,0517	-367,7399	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
17	1.4D	Combination	Max	0,659	-2,592	883,746	28,7315	3,8367	-0,4429
17	1.4D	Combination	Min	0,659	-2,592	883,746	28,7315	3,8367	-0,4429
17	1.2D + 1.6L	Combination	Max	0,565	-2,222	1144,877	59,4102	3,2886	-0,3796
17	1.2D + 1.6L	Combination	Min	-0,943	-12,047	757,497	24,627	-1,3968	-0,4818
17	1.2D + 1E + 1L	Combination	Max	102,692	-2,222	757,497	454,3943	543,1622	-0,3011
17	1.2D + 1E + 1L	Combination	Min	-0,59	-66,165	581,586	24,627	-0,873	-0,5873
17	1.2D - 1E + 1L	Combination	Max	0,565	66,165	757,497	37,1314	3,2886	0,5873
17	1.2D - 1E + 1L	Combination	Min	-102,692	-7,529	-581,586	-454,3943	-543,1622	-0,3796
17	0.9D + 1E	Combination	Max	102,692	-1,666	581,586	454,3943	543,1622	-0,2847
17	0.9D + 1E	Combination	Min	0,424	-66,165	568,123	18,4702	2,4665	-0,5873
17	0.9D - 1E	Combination	Max	0,424	66,165	568,123	18,4702	2,4665	0,5873
17	0.9D - 1E	Combination	Min	-102,692	-1,666	-581,586	-454,3943	-543,1622	-0,2847
19	1.4D	Combination	Max	-0,508	7,255	436,394	-4,3473	-3,8061	-0,4429
19	1.4D	Combination	Min	-0,508	7,255	436,394	-4,3473	-3,8061	-0,4429
19	1.2D + 1.6L	Combination	Max	-0,436	14,482	522,542	-3,7263	-3,2623	-0,3796
19	1.2D + 1.6L	Combination	Min	-0,613	6,219	374,052	-26,4787	-4,5573	-0,4818
19	1.2D + 1E + 1L	Combination	Max	50,877	9,051	374,052	411,7399	371,1408	-0,3011
19	1.2D + 1E + 1L	Combination	Min	-0,436	-53,491	271,652	-16,5492	-3,2623	-0,5873
19	1.2D - 1E + 1L	Combination	Max	-0,383	53,491	374,052	-3,7263	-2,8483	0,5873
19	1.2D - 1E + 1L	Combination	Min	-50,877	6,219	-271,652	-411,7399	-371,1408	-0,3796

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
19	0.9D + 1E	Combination	Max	50,877	4,664	280,539	411,7399	371,1408	-0,2847
19	0.9D + 1E	Combination	Min	-0,327	-53,491	271,652	-2,7947	-2,4468	-0,5873
19	0.9D - 1E	Combination	Max	-0,327	53,491	280,539	-2,7947	-2,4468	0,5873
19	0.9D - 1E	Combination	Min	-50,877	4,664	-271,652	-411,7399	-371,1408	-0,2847
21	1.4D	Combination	Max	-0,166	1,268	818,328	14,5423	-1,0748	-0,4429
21	1.4D	Combination	Min	-0,166	1,268	818,328	14,5423	-1,0748	-0,4429
21	1.2D + 1.6L	Combination	Max	-0,001907	4,299	1082,987	12,4648	-0,8181	-0,3796
21	1.2D + 1.6L	Combination	Min	-0,142	1,087	701,424	5,6514	-0,9213	-0,4818
21	1.2D + 1E + 1L	Combination	Max	53,809	2,687	701,424	438,959	382,7423	-0,3011
21	1.2D + 1E + 1L	Combination	Min	-0,142	-62,118	530,042	3,5322	-0,9213	-0,5873
21	1.2D - 1E + 1L	Combination	Max	-0,001192	62,118	701,424	12,4648	-0,5113	0,5873
21	1.2D - 1E + 1L	Combination	Min	-53,809	1,087	-530,042	-438,959	-382,7423	-0,3796
21	0.9D + 1E	Combination	Max	53,809	0,815	530,042	438,959	382,7423	-0,2847
21	0.9D + 1E	Combination	Min	-0,107	-62,118	526,068	9,3486	-0,691	-0,5873
21	0.9D - 1E	Combination	Max	-0,107	62,118	526,068	9,3486	-0,691	0,5873
21	0.9D - 1E	Combination	Min	-53,809	0,815	-530,042	-438,959	-382,7423	-0,2847
23	1.4D	Combination	Max	2,062	-2,523	851,31	26,5025	8,3533	-0,4429
23	1.4D	Combination	Min	2,062	-2,523	851,31	26,5025	8,3533	-0,4429
23	1.2D + 1.6L	Combination	Max	3,895	-2,162	1104,624	54,853	14,1848	-0,3796
23	1.2D + 1.6L	Combination	Min	1,767	-11,296	729,694	22,7165	7,1599	-0,4818

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
23	1.2D + 1E + 1L	Combination	Max	104,776	-2,162	729,694	447,1266	549,8747	-0,3011
23	1.2D + 1E + 1L	Combination	Min	1,767	-64,706	529,269	22,7165	7,1599	-0,5873
23	1.2D - 1E + 1L	Combination	Max	2,434	64,706	729,694	34,2831	8,8655	0,5873
23	1.2D - 1E + 1L	Combination	Min	-104,776	-7,06	-529,269	-447,1266	-549,8747	-0,3796
23	0.9D + 1E	Combination	Max	104,776	-1,622	547,271	447,1266	549,8747	-0,2847
23	0.9D + 1E	Combination	Min	1,325	-64,706	529,269	17,0373	5,37	-0,5873
23	0.9D - 1E	Combination	Max	1,325	64,706	547,271	17,0373	5,37	0,5873
23	0.9D - 1E	Combination	Min	-104,776	-1,622	-529,269	-447,1266	-549,8747	-0,2847
25	1.4D	Combination	Max	2,405	2,034	437,24	10,116	5,5761	-0,4429
25	1.4D	Combination	Min	2,405	2,034	437,24	10,116	5,5761	-0,4429
25	1.2D + 1.6L	Combination	Max	5,668	5,285	515,227	8,6709	15,6718	-0,3796
25	1.2D + 1.6L	Combination	Min	2,062	1,743	374,777	0,3519	4,7795	-0,4818
25	1.2D + 1E + 1L	Combination	Max	55,414	3,303	374,777	424,1222	385,7544	-0,3011
25	1.2D + 1E + 1L	Combination	Min	2,062	-58,26	273,358	0,22	4,7795	-0,5873
25	1.2D - 1E + 1L	Combination	Max	3,543	58,26	374,777	8,6709	9,7949	0,5873
25	1.2D - 1E + 1L	Combination	Min	-55,414	1,743	-273,358	-424,1222	-385,7544	-0,3796
25	0.9D + 1E	Combination	Max	55,414	1,307	281,083	424,1222	385,7544	-0,2847
25	0.9D + 1E	Combination	Min	1,546	-58,26	273,358	6,5031	3,5846	-0,5873
25	0.9D - 1E	Combination	Max	1,546	58,26	281,083	6,5031	3,5846	0,5873
25	0.9D - 1E	Combination	Min	-55,414	1,307	-273,358	-424,1222	-385,7544	-0,2847
27	1.4D	Combination	Max	2,607	6,17	835,97	-2,9338	7,8562	-0,4429

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
27	1.4D	Combination	Min	2,607	6,17	835,97	-2,9338	7,8562	-0,4429
27	1.2D + 1.6L	Combination	Max	3,947	14,109	1100,378	-2,5147	11,8989	-0,3796
27	1.2D + 1.6L	Combination	Min	2,235	5,289	716,546	-27,4894	6,7339	-0,4818
27	1.2D + 1E + 1L	Combination	Max	58,452	8,818	716,546	428,6341	397,6963	-0,3011
27	1.2D + 1E + 1L	Combination	Min	2,235	-59,69	541,794	-17,1809	6,7339	-0,5873
27	1.2D - 1E + 1L	Combination	Max	2,467	59,69	716,546	-2,5147	7,4368	0,5873
27	1.2D - 1E + 1L	Combination	Min	-58,452	5,289	-541,794	-428,6341	-397,6963	-0,3796
27	0.9D + 1E	Combination	Max	58,452	3,966	541,794	428,6341	397,6963	-0,2847
27	0.9D + 1E	Combination	Min	1,676	-59,69	537,409	-1,886	5,0504	-0,5873
27	0.9D - 1E	Combination	Max	1,676	59,69	537,409	-1,886	5,0504	0,5873
27	0.9D - 1E	Combination	Min	-58,452	3,966	-541,794	-428,6341	-397,6963	-0,2847
29	1.4D	Combination	Max	-4,107	-0,745	948,856	18,8846	-11,5123	-0,4429
29	1.4D	Combination	Min	-4,107	-0,745	948,856	18,8846	-11,5123	-0,4429
29	1.2D + 1.6L	Combination	Max	-3,52	-0,639	1222,846	52,1337	-9,8677	-0,3796
29	1.2D + 1.6L	Combination	Min	-7,308	-11,127	813,305	16,1868	-21,894	-0,4818
29	1.2D + 1E + 1L	Combination	Max	87,094	-0,639	813,305	450,881	492,9275	-0,3011
29	1.2D + 1E + 1L	Combination	Min	-4,567	-66,741	641,022	16,1868	-13,6838	-0,5873
29	1.2D - 1E + 1L	Combination	Max	-3,52	66,741	813,305	32,5836	-9,8677	0,5873
29	1.2D - 1E + 1L	Combination	Min	-87,094	-6,954	-641,022	-450,881	-492,9275	-0,3796
29	0.9D + 1E	Combination	Max	87,094	-0,479	641,022	450,881	492,9275	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
29	0.9D + 1E	Combination	Min	-2,64	-66,741	609,979	12,1401	-7,4007	-0,5873
29	0.9D - 1E	Combination	Max	-2,64	66,741	609,979	12,1401	-7,4007	0,5873
29	0.9D - 1E	Combination	Min	-87,094	-0,479	-641,022	-450,881	-492,9275	-0,2847
31	1.4D	Combination	Max	-3,289	-3,214	476,329	24,3548	-12,7606	-0,4429
31	1.4D	Combination	Min	-3,289	-3,214	476,329	24,3548	-12,7606	-0,4429
31	1.2D + 1.6L	Combination	Max	-2,819	-2,755	555,768	23,9667	-10,9377	-0,3796
31	1.2D + 1.6L	Combination	Min	-3,153	-3	408,282	20,8756	-12,7366	-0,4818
31	1.2D + 1E + 1L	Combination	Max	50,369	-1,875	408,282	423,2481	369,5051	-0,3011
31	1.2D + 1E + 1L	Combination	Min	-2,819	-58,958	298,313	14,9792	-10,9377	-0,5873
31	1.2D - 1E + 1L	Combination	Max	-1,97	58,958	408,282	20,8756	-7,9604	0,5873
31	1.2D - 1E + 1L	Combination	Min	-50,369	-2,755	-298,313	-423,2481	-369,5051	-0,3796
31	0.9D + 1E	Combination	Max	50,369	-2,066	306,212	423,2481	369,5051	-0,2847
31	0.9D + 1E	Combination	Min	-2,114	-58,958	298,313	15,6567	-8,2033	-0,5873
31	0.9D - 1E	Combination	Max	-2,114	58,958	306,212	15,6567	-8,2033	0,5873
31	0.9D - 1E	Combination	Min	-50,369	-2,066	-298,313	-423,2481	-369,5051	-0,2847
33	1.4D	Combination	Max	-5,97	15,542	918,538	-34,8238	-19,7692	-0,4429
33	1.4D	Combination	Min	-5,97	15,542	918,538	-34,8238	-19,7692	-0,4429
33	1.2D + 1.6L	Combination	Max	-3,209	23,344	1127,198	-29,849	-11,1463	-0,3796
33	1.2D + 1.6L	Combination	Min	-5,118	13,322	787,318	-59,15	-16,9451	-0,4818
33	1.2D + 1E + 1L	Combination	Max	52,196	14,59	787,318	395,5957	377,5483	-0,3011

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
33	1.2D + 1E + 1L	Combination	Min	-5,118	-50,194	601,768	-36,9688	-16,9451	-0,5873
33	1.2D - 1E + 1L	Combination	Max	-2,006	50,194	787,318	-29,849	-6,9664	0,5873
33	1.2D - 1E + 1L	Combination	Min	-52,196	13,322	-601,768	-395,5957	-377,5483	-0,3796
33	0.9D + 1E	Combination	Max	52,196	9,991	601,768	395,5957	377,5483	-0,2847
33	0.9D + 1E	Combination	Min	-3,838	-50,194	590,489	-22,3867	-12,7088	-0,5873
33	0.9D - 1E	Combination	Max	-3,838	50,194	590,489	-22,3867	-12,7088	0,5873
33	0.9D - 1E	Combination	Min	-52,196	9,991	-601,768	-395,5957	-377,5483	-0,2847
35	1.4D	Combination	Max	-8,236	2,474	1076,338	6,4072	-24,811	-0,4429
35	1.4D	Combination	Min	-8,236	2,474	1076,338	6,4072	-24,811	-0,4429
35	1.2D + 1.6L	Combination	Max	-2,923	2,121	1272,64	41,1666	-7,7725	-0,3796
35	1.2D + 1.6L	Combination	Min	-7,06	-8,451	922,575	5,4919	-21,2665	-0,4818
35	1.2D + 1E + 1L	Combination	Max	54,841	2,121	922,575	445,9695	389,0584	-0,3011
35	1.2D + 1E + 1L	Combination	Min	-7,06	-66,16	716,986	5,4919	-21,2665	-0,5873
35	1.2D - 1E + 1L	Combination	Max	-1,827	66,16	922,575	25,7291	-4,8578	0,5873
35	1.2D - 1E + 1L	Combination	Min	-54,841	-5,282	-716,986	-445,9695	-389,0584	-0,3796
35	0.9D + 1E	Combination	Max	54,841	1,59	716,986	445,9695	389,0584	-0,2847
35	0.9D + 1E	Combination	Min	-5,295	-66,16	691,932	4,1189	-15,9499	-0,5873
35	0.9D - 1E	Combination	Max	-5,295	66,16	691,932	4,1189	-15,9499	0,5873
35	0.9D - 1E	Combination	Min	-54,841	1,59	-716,986	-445,9695	-389,0584	-0,2847
37	1.4D	Combination	Max	4,339	3,055	461,351	1,9454	11,8034	-0,4429

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
37	1.4D	Combination	Min	4,339	3,055	461,351	1,9454	11,8034	-0,4429
37	1.2D + 1.6L	Combination	Max	3,719	4,228	531,419	1,6675	10,1172	-0,3796
37	1.2D + 1.6L	Combination	Min	1,832	2,619	395,444	-1,6954	3,3151	-0,4818
37	1.2D + 1E + 1L	Combination	Max	95,171	2,642	395,444	415,1106	513,792	-0,3011
37	1.2D + 1E + 1L	Combination	Min	1,145	-57,484	243,494	-1,0596	2,072	-0,5873
37	1.2D - 1E + 1L	Combination	Max	3,719	57,484	395,444	1,6675	10,1172	0,5873
37	1.2D - 1E + 1L	Combination	Min	-95,171	2,619	-243,494	-415,1106	-513,792	-0,3796
37	0.9D + 1E	Combination	Max	95,171	1,964	296,583	415,1106	513,792	-0,2847
37	0.9D + 1E	Combination	Min	2,789	-57,484	243,494	1,2506	7,5879	-0,5873
37	0.9D - 1E	Combination	Max	2,789	57,484	296,583	1,2506	7,5879	0,5873
37	0.9D - 1E	Combination	Min	-95,171	1,964	-243,494	-415,1106	-513,792	-0,2847
39	1.4D	Combination	Max	7,708	11,773	909,553	-25,5591	24,2813	-0,4429
39	1.4D	Combination	Min	7,708	11,773	909,553	-25,5591	24,2813	-0,4429
39	1.2D + 1.6L	Combination	Max	6,606	15,893	1077,108	-21,9078	20,8125	-0,3796
39	1.2D + 1.6L	Combination	Min	4,944	10,091	779,617	-38,5011	15,1105	-0,4818
39	1.2D + 1E + 1L	Combination	Max	63,19	10,091	779,617	408,0464	412,9567	-0,3011
39	1.2D + 1E + 1L	Combination	Min	3,09	-55,245	580,441	-24,0632	9,444	-0,5873
39	1.2D - 1E + 1L	Combination	Max	6,606	55,245	779,617	-21,9078	20,8125	0,5873
39	1.2D - 1E + 1L	Combination	Min	-63,19	9,933	-580,441	-408,0464	-412,9567	-0,3796
39	0.9D + 1E	Combination	Max	63,19	7,568	584,712	408,0464	412,9567	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
39	0.9D + 1E	Combination	Min	4,955	-55,245	580,441	-16,4308	15,6094	-0,5873
39	0.9D - 1E	Combination	Max	4,955	55,245	584,712	-16,4308	15,6094	0,5873
39	0.9D - 1E	Combination	Min	-63,19	7,568	-580,441	-408,0464	-412,9567	-0,2847
41	1.4D	Combination	Max	17,537	-7,893	911,562	36,4874	58,1934	-0,4429
41	1.4D	Combination	Min	17,537	-7,893	911,562	36,4874	58,1934	-0,4429
41	1.2D + 1.6L	Combination	Max	16,348	-6,766	986,891	60,359	54,2898	-0,3796
41	1.2D + 1.6L	Combination	Min	15,032	-15,441	781,339	31,2749	49,88	-0,4818
41	1.2D + 1E + 1L	Combination	Max	72,971	-6,766	781,339	448,3808	447,4455	-0,3011
41	1.2D + 1E + 1L	Combination	Min	10,217	-68,029	582,054	31,2749	33,9311	-0,5873
41	1.2D - 1E + 1L	Combination	Max	15,032	68,029	781,339	37,7244	49,88	0,5873
41	1.2D - 1E + 1L	Combination	Min	-72,971	-9,65	-582,054	-448,3808	-447,4455	-0,3796
41	0.9D + 1E	Combination	Max	72,971	-5,074	586,004	448,3808	447,4455	-0,2847
41	0.9D + 1E	Combination	Min	11,274	-68,029	582,054	23,4562	37,41	-0,5873
41	0.9D - 1E	Combination	Max	11,274	68,029	586,004	23,4562	37,41	0,5873
41	0.9D - 1E	Combination	Min	-72,971	-5,074	-582,054	-448,3808	-447,4455	-0,2847
43	1.4D	Combination	Max	-9,032	8,397	512,152	-16,7655	-31,2559	-0,4429
43	1.4D	Combination	Min	-9,032	8,397	512,152	-16,7655	-31,2559	-0,4429
43	1.2D + 1.6L	Combination	Max	-7,741	13,552	636,021	-14,3704	-26,7908	-0,3796
43	1.2D + 1.6L	Combination	Min	-10,017	7,198	438,988	-33,1352	-34,845	-0,4818
43	1.2D + 1E + 1L	Combination	Max	88,488	8,47	438,988	402,1169	492,2686	-0,3011

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
43	1.2D + 1E + 1L	Combination	Min	-7,741	-54,146	365,993	-20,7095	-26,7908	-0,5873
43	1.2D - 1E + 1L	Combination	Max	-6,261	54,146	438,988	-14,3704	-21,7781	0,5873
43	1.2D - 1E + 1L	Combination	Min	-88,488	7,198	-365,993	-402,1169	-492,2686	-0,3796
43	0.9D + 1E	Combination	Max	88,488	5,398	365,993	402,1169	492,2686	-0,2847
43	0.9D + 1E	Combination	Min	-5,806	-54,146	329,241	-10,7778	-20,0931	-0,5873
43	0.9D - 1E	Combination	Max	-5,806	54,146	329,241	-10,7778	-20,0931	0,5873
43	0.9D - 1E	Combination	Min	-88,488	5,398	-365,993	-402,1169	-492,2686	-0,2847
45	1.4D	Combination	Max	-14,975	8,223	1010,081	-16,2171	-48,7696	-0,4429
45	1.4D	Combination	Min	-14,975	8,223	1010,081	-16,2171	-48,7696	-0,4429
45	1.2D + 1.6L	Combination	Max	-12,836	8,761	1221,754	-13,9004	-41,8025	-0,3796
45	1.2D + 1.6L	Combination	Min	-15,737	7,049	865,784	-18,0182	-51,4918	-0,4818
45	1.2D + 1E + 1L	Combination	Max	49,37	7,049	865,784	415,4054	368,4479	-0,3011
45	1.2D + 1E + 1L	Combination	Min	-12,836	-58,357	648,203	-13,9004	-41,8025	-0,5873
45	1.2D - 1E + 1L	Combination	Max	-9,835	58,357	865,784	-11,2614	-32,1824	0,5873
45	1.2D - 1E + 1L	Combination	Min	-49,37	5,476	-648,203	-415,4054	-368,4479	-0,3796
45	0.9D + 1E	Combination	Max	49,37	5,286	649,338	415,4054	368,4479	-0,2847
45	0.9D + 1E	Combination	Min	-9,627	-58,357	648,203	-10,4253	-31,3519	-0,5873
45	0.9D - 1E	Combination	Max	-9,627	58,357	649,338	-10,4253	-31,3519	0,5873
45	0.9D - 1E	Combination	Min	-49,37	5,286	-648,203	-415,4054	-368,4479	-0,2847
47	1.4D	Combination	Max	-8,919	-24,326	722,335	86,4791	-27,0107	-0,4429

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
47	1.4D	Combination	Min	-8,919	-24,326	722,335	86,4791	-27,0107	-0,4429
47	1.2D + 1.6L	Combination	Max	-7,645	-20,851	793,293	104,3461	-23,1521	-0,3796
47	1.2D + 1.6L	Combination	Min	-9,436	-30,022	619,145	74,1249	-28,7493	-0,4818
47	1.2D + 1E + 1L	Combination	Max	49,767	-18,764	619,145	476,3979	372,7175	-0,3011
47	1.2D + 1E + 1L	Combination	Min	-7,645	-77,689	459,808	65,2163	-23,1521	-0,5873
47	1.2D - 1E + 1L	Combination	Max	-5,898	77,689	619,145	74,1249	-17,9683	0,5873
47	1.2D - 1E + 1L	Combination	Min	-49,767	-20,851	-459,808	-476,3979	-372,7175	-0,3796
47	0.9D + 1E	Combination	Max	49,767	-15,638	464,358	476,3979	372,7175	-0,2847
47	0.9D + 1E	Combination	Min	-5,734	-77,689	459,808	55,5937	-17,364	-0,5873
47	0.9D - 1E	Combination	Max	-5,734	77,689	464,358	55,5937	-17,364	0,5873
47	0.9D - 1E	Combination	Min	-49,767	-15,638	-459,808	-476,3979	-372,7175	-0,2847
49	1.4D	Combination	Max	5,096	7,842	541,182	-17,7988	14,2427	-0,4429
49	1.4D	Combination	Min	5,096	7,842	541,182	-17,7988	14,2427	-0,4429
49	1.2D + 1.6L	Combination	Max	7,065	13,119	698,565	-15,2561	20,1697	-0,3796
49	1.2D + 1.6L	Combination	Min	4,368	6,722	463,87	-34,7949	12,208	-0,4818
49	1.2D + 1E + 1L	Combination	Max	58,748	8,199	463,87	396,743	396,491	-0,3011
49	1.2D + 1E + 1L	Combination	Min	4,368	-53,612	348,283	-21,7468	12,208	-0,5873
49	1.2D - 1E + 1L	Combination	Max	4,416	53,612	463,87	-15,2561	12,6061	0,5873
49	1.2D - 1E + 1L	Combination	Min	-58,748	6,722	-348,283	-396,743	-396,491	-0,3796
49	0.9D + 1E	Combination	Max	58,748	5,042	348,283	396,743	396,491	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
49	0.9D + 1E	Combination	Min	3,276	-53,612	347,903	-11,4421	9,156	-0,5873
49	0.9D - 1E	Combination	Max	3,276	53,612	347,903	-11,4421	9,156	0,5873
49	0.9D - 1E	Combination	Min	-58,748	5,042	-348,283	-396,743	-396,491	-0,2847
51	1.4D	Combination	Max	13,716	9,775	1022,223	-23,8957	43,6304	-0,4429
51	1.4D	Combination	Min	13,716	9,775	1022,223	-23,8957	43,6304	-0,4429
51	1.2D + 1.6L	Combination	Max	15,228	10,871	1286,708	-20,482	48,2316	-0,3796
51	1.2D + 1.6L	Combination	Min	11,756	8,378	876,192	-27,704	37,3975	-0,4818
51	1.2D + 1E + 1L	Combination	Max	69,448	8,378	876,192	407,0301	433,1089	-0,3011
51	1.2D + 1E + 1L	Combination	Min	9,518	-56,873	671,522	-20,482	30,1448	-0,5873
51	1.2D - 1E + 1L	Combination	Max	11,756	56,873	876,192	-17,315	37,3975	0,5873
51	1.2D - 1E + 1L	Combination	Min	-69,448	6,794	-671,522	-407,0301	-433,1089	-0,3796
51	0.9D + 1E	Combination	Max	69,448	6,284	671,522	407,0301	433,1089	-0,2847
51	0.9D + 1E	Combination	Min	8,817	-56,873	657,144	-15,3615	28,0481	-0,5873
51	0.9D - 1E	Combination	Max	8,817	56,873	657,144	-15,3615	28,0481	0,5873
51	0.9D - 1E	Combination	Min	-69,448	6,284	-671,522	-407,0301	-433,1089	-0,2847
53	1.4D	Combination	Max	9,714	-23,395	714,856	80,7581	32,997	-0,4429
53	1.4D	Combination	Min	9,714	-23,395	714,856	80,7581	32,997	-0,4429
53	1.2D + 1.6L	Combination	Max	9,41	-20,053	823,98	99,526	31,9463	-0,3796
53	1.2D + 1.6L	Combination	Min	8,326	-29,454	612,733	69,2212	28,2831	-0,4818
53	1.2D + 1E + 1L	Combination	Max	64,356	-18,409	612,733	469,1946	419,6992	-0,3011

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
53	1.2D + 1E + 1L	Combination	Min	5,881	-76,576	469,27	62,2037	19,9665	-0,5873
53	1.2D - 1E + 1L	Combination	Max	8,326	76,576	612,733	69,2212	28,2831	0,5873
53	1.2D - 1E + 1L	Combination	Min	-64,356	-20,053	-469,27	-469,1946	-419,6992	-0,3796
53	0.9D + 1E	Combination	Max	64,356	-15,04	469,27	469,1946	419,6992	-0,2847
53	0.9D + 1E	Combination	Min	6,245	-76,576	459,55	51,9159	21,2123	-0,5873
53	0.9D - 1E	Combination	Max	6,245	76,576	459,55	51,9159	21,2123	0,5873
53	0.9D - 1E	Combination	Min	-64,356	-15,04	-469,27	-469,1946	-419,6992	-0,2847
55	1.4D	Combination	Max	-0,84	8,264	458,358	-21,1395	-4,8736	-0,4429
55	1.4D	Combination	Min	-0,84	8,264	458,358	-21,1395	-4,8736	-0,4429
55	1.2D + 1.6L	Combination	Max	-0,72	13,168	585,347	-18,1195	-4,1774	-0,3796
55	1.2D + 1.6L	Combination	Min	-0,957	7,083	392,878	-37,1371	-5,6669	-0,4818
55	1.2D + 1E + 1L	Combination	Max	50,699	8,23	392,878	385,2105	370,5696	-0,3011
55	1.2D + 1E + 1L	Combination	Min	-0,72	-50,802	293,53	-23,2107	-4,1774	-0,5873
55	1.2D - 1E + 1L	Combination	Max	-0,598	50,802	392,878	-18,1195	-3,5418	0,5873
55	1.2D - 1E + 1L	Combination	Min	-50,699	7,083	-293,53	-385,2105	-370,5696	-0,3796
55	0.9D + 1E	Combination	Max	50,699	5,313	294,659	385,2105	370,5696	-0,2847
55	0.9D + 1E	Combination	Min	-0,54	-50,802	293,53	-13,5896	-3,133	-0,5873
55	0.9D - 1E	Combination	Max	-0,54	50,802	294,659	-13,5896	-3,133	0,5873
55	0.9D - 1E	Combination	Min	-50,699	5,313	-293,53	-385,2105	-370,5696	-0,2847
57	1.4D	Combination	Max	-0,758	8,347	851,118	-21,4007	-2,9818	-0,4429

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
57	1.4D	Combination	Min	-0,758	8,347	851,118	-21,4007	-2,9818	-0,4429
57	1.2D + 1.6L	Combination	Max	-0,65	13,551	1145,937	-18,3434	-2,5558	-0,3796
57	1.2D + 1.6L	Combination	Min	-0,904	7,154	729,53	-38,3463	-3,7218	-0,4818
57	1.2D + 1E + 1L	Combination	Max	52,914	8,469	729,53	399,5931	379,8618	-0,3011
57	1.2D + 1E + 1L	Combination	Min	-0,65	-55,361	549,177	-23,9664	-2,5558	-0,5873
57	1.2D - 1E + 1L	Combination	Max	-0,565	55,361	729,53	-18,3434	-2,3262	0,5873
57	1.2D - 1E + 1L	Combination	Min	-52,914	7,154	-549,177	-399,5931	-379,8618	-0,3796
57	0.9D + 1E	Combination	Max	52,914	5,366	549,177	399,5931	379,8618	-0,2847
57	0.9D + 1E	Combination	Min	-0,487	-55,361	547,147	-13,7576	-1,9169	-0,5873
57	0.9D - 1E	Combination	Max	-0,487	55,361	547,147	-13,7576	-1,9169	0,5873
57	0.9D - 1E	Combination	Min	-52,914	5,366	-549,177	-399,5931	-379,8618	-0,2847
59	1.4D	Combination	Max	0,302	-20,642	591,386	70,0622	2,6854	-0,4429
59	1.4D	Combination	Min	0,302	-20,642	591,386	70,0622	2,6854	-0,4429
59	1.2D + 1.6L	Combination	Max	0,289	-17,693	761,374	100,3994	2,5704	-0,3796
59	1.2D + 1.6L	Combination	Min	0,259	-30,424	506,903	60,0533	2,3018	-0,4818
59	1.2D + 1E + 1L	Combination	Max	52,397	-17,693	506,903	452,7192	381,1855	-0,3011
59	1.2D + 1E + 1L	Combination	Min	0,18	-72,199	380,777	60,0533	1,6065	-0,5873
59	1.2D - 1E + 1L	Combination	Max	0,259	72,199	506,903	62,7496	2,3018	0,5873
59	1.2D - 1E + 1L	Combination	Min	-52,397	-19,015	-380,777	-452,7192	-381,1855	-0,3796
59	0.9D + 1E	Combination	Max	52,397	-13,27	380,777	452,7192	381,1855	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
59	0.9D + 1E	Combination	Min	0,194	-72,199	380,177	45,04	1,7263	-0,5873
59	0.9D - 1E	Combination	Max	0,194	72,199	380,177	45,04	1,7263	0,5873
59	0.9D - 1E	Combination	Min	-52,397	-13,27	-380,777	-452,7192	-381,1855	-0,2847
61	1.4D	Combination	Max	-0,473	8,758	478,455	-24,7095	-3,6927	-0,4429
61	1.4D	Combination	Min	-0,473	8,758	478,455	-24,7095	-3,6927	-0,4429
61	1.2D + 1.6L	Combination	Max	-0,405	13,73	586,627	-21,1796	-3,1652	-0,3796
61	1.2D + 1.6L	Combination	Min	-1,685	7,507	410,105	-41,0972	-8,0107	-0,4818
61	1.2D + 1E + 1L	Combination	Max	50,804	8,581	410,105	380,7879	370,9059	-0,3011
61	1.2D + 1E + 1L	Combination	Min	-1,053	-50,245	296,852	-25,6858	-5,0067	-0,5873
61	1.2D - 1E + 1L	Combination	Max	-0,405	50,245	410,105	-21,1796	-3,1652	0,5873
61	1.2D - 1E + 1L	Combination	Min	-50,804	7,507	-296,852	-380,7879	-370,9059	-0,3796
61	0.9D + 1E	Combination	Max	50,804	5,63	307,579	380,7879	370,9059	-0,2847
61	0.9D + 1E	Combination	Min	-0,304	-50,245	296,852	-15,8847	-2,3739	-0,5873
61	0.9D - 1E	Combination	Max	-0,304	50,245	307,579	-15,8847	-2,3739	0,5873
61	0.9D - 1E	Combination	Min	-50,804	5,63	-296,852	-380,7879	-370,9059	-0,2847
63	1.4D	Combination	Max	-3,551	12,635	903,317	-36,9412	-11,9768	-0,4429
63	1.4D	Combination	Min	-3,551	12,635	903,317	-36,9412	-11,9768	-0,4429
63	1.2D + 1.6L	Combination	Max	-3,044	14,979	1157,992	-31,6639	-10,2658	-0,3796
63	1.2D + 1.6L	Combination	Min	-3,583	10,83	774,272	-45,0395	-12,3502	-0,4818
63	1.2D + 1E + 1L	Combination	Max	52,725	10,83	774,272	393,9271	379,2521	-0,3011

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
63	1.2D + 1E + 1L	Combination	Min	-3,044	-54,41	562,409	-31,6639	-10,2658	-0,5873
63	1.2D - 1E + 1L	Combination	Max	-2,239	54,41	774,272	-28,1497	-7,7189	0,5873
63	1.2D - 1E + 1L	Combination	Min	-52,725	9,362	-562,409	-393,9271	-379,2521	-0,3796
63	0.9D + 1E	Combination	Max	52,725	8,123	580,704	393,9271	379,2521	-0,2847
63	0.9D + 1E	Combination	Min	-2,283	-54,41	562,409	-23,7479	-7,6994	-0,5873
63	0.9D - 1E	Combination	Max	-2,283	54,41	580,704	-23,7479	-7,6994	0,5873
63	0.9D - 1E	Combination	Min	-52,725	8,123	-562,409	-393,9271	-379,2521	-0,2847
65	1.4D	Combination	Max	-3,119	-24,258	621,869	79,4586	-8,3317	-0,4429
65	1.4D	Combination	Min	-3,119	-24,258	621,869	79,4586	-8,3317	-0,4429
65	1.2D + 1.6L	Combination	Max	-0,888	-20,792	765,071	99,2301	-1,2192	-0,3796
65	1.2D + 1.6L	Combination	Min	-2,674	-30,747	533,03	68,1074	-7,1414	-0,4818
65	1.2D + 1E + 1L	Combination	Max	52,526	-19,217	533,03	448,1426	381,6032	-0,3011
65	1.2D + 1E + 1L	Combination	Min	-2,674	-71,594	387,911	62,0188	-7,1414	-0,5873
65	1.2D - 1E + 1L	Combination	Max	-0,555	71,594	533,03	68,1074	-0,762	0,5873
65	1.2D - 1E + 1L	Combination	Min	-52,526	-20,792	-387,911	-448,1426	-381,6032	-0,3796
65	0.9D + 1E	Combination	Max	52,526	-15,594	399,773	448,1426	381,6032	-0,2847
65	0.9D + 1E	Combination	Min	-2,005	-71,594	387,911	51,0805	-5,3561	-0,5873
65	0.9D - 1E	Combination	Max	-2,005	71,594	399,773	51,0805	-5,3561	0,5873
65	0.9D - 1E	Combination	Min	-52,526	-15,594	-387,911	-448,1426	-381,6032	-0,2847
67	1.4D	Combination	Max	4,828	5,228	311,139	-15,5813	13,3799	-0,4429

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
67	1.4D	Combination	Min	4,828	5,228	311,139	-15,5813	13,3799	-0,4429
67	1.2D + 1.6L	Combination	Max	8,307	7,524	356,002	-13,3554	24,1681	-0,3796
67	1.2D + 1.6L	Combination	Min	4,138	4,481	266,69	-23,7039	11,4685	-0,4818
67	1.2D + 1E + 1L	Combination	Max	50,482	4,702	266,69	382,6646	369,8688	-0,3011
67	1.2D + 1E + 1L	Combination	Min	4,138	-51,685	193,706	-14,8149	11,4685	-0,5873
67	1.2D - 1E + 1L	Combination	Max	5,192	51,685	266,69	-13,3554	15,105	0,5873
67	1.2D - 1E + 1L	Combination	Min	-50,482	4,481	-193,706	-382,6646	-369,8688	-0,3796
67	0.9D + 1E	Combination	Max	50,482	3,361	200,018	382,6646	369,8688	-0,2847
67	0.9D + 1E	Combination	Min	3,104	-51,685	193,706	-10,0166	8,6014	-0,5873
67	0.9D - 1E	Combination	Max	3,104	51,685	200,018	-10,0166	8,6014	0,5873
67	0.9D - 1E	Combination	Min	-50,482	3,361	-193,706	-382,6646	-369,8688	-0,2847
69	1.4D	Combination	Max	13,566	6,495	570,696	-19,5792	43,148	-0,4429
69	1.4D	Combination	Min	13,566	6,495	570,696	-19,5792	43,148	-0,4429
69	1.2D + 1.6L	Combination	Max	19,026	8,95	677,337	-16,7821	60,4606	-0,3796
69	1.2D + 1.6L	Combination	Min	11,628	5,567	489,168	-28,2032	36,984	-0,4818
69	1.2D + 1E + 1L	Combination	Max	56,755	5,593	489,168	393,6875	392,23	-0,3011
69	1.2D + 1E + 1L	Combination	Min	11,628	-55,179	354,22	-17,627	36,984	-0,5873
69	1.2D - 1E + 1L	Combination	Max	11,891	55,179	489,168	-16,7821	37,7879	0,5873
69	1.2D - 1E + 1L	Combination	Min	-56,755	5,567	-354,22	-393,6875	-392,23	-0,3796
69	0.9D + 1E	Combination	Max	56,755	4,175	366,876	393,6875	392,23	-0,2847

TABLE: Joint Reactions

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft
69	0.9D + 1E	Combination	Min	8,721	-55,179	354,22	-12,5866	27,738	-0,5873
69	0.9D - 1E	Combination	Max	8,721	55,179	366,876	-12,5866	27,738	0,5873
69	0.9D - 1E	Combination	Min	-56,755	4,175	-354,22	-393,6875	-392,23	-0,2847
71	1.4D	Combination	Max	12,479	-12,75	413,691	41,14	41,9041	-0,4429
71	1.4D	Combination	Min	12,479	-12,75	413,691	41,14	41,9041	-0,4429
71	1.2D + 1.6L	Combination	Max	11,886	-10,928	462,417	52,5828	39,9193	-0,3796
71	1.2D + 1.6L	Combination	Min	10,697	-16,656	354,592	35,2629	35,9178	-0,4818
71	1.2D + 1E + 1L	Combination	Max	53,483	-10,41	354,592	424,2844	384,6828	-0,3011
71	1.2D + 1E + 1L	Combination	Min	7,429	-64,877	253,417	32,8642	24,9496	-0,5873
71	1.2D - 1E + 1L	Combination	Max	10,697	64,877	354,592	35,2629	35,9178	0,5873
71	1.2D - 1E + 1L	Combination	Min	-53,483	-10,928	-253,417	-424,2844	-384,6828	-0,3796
71	0.9D + 1E	Combination	Max	53,483	-8,196	265,944	424,2844	384,6828	-0,2847
71	0.9D + 1E	Combination	Min	8,022	-64,877	253,417	26,4471	26,9383	-0,5873
71	0.9D - 1E	Combination	Max	8,022	64,877	265,944	26,4471	26,9383	0,5873
71	0.9D - 1E	Combination	Min	-53,483	-8,196	-253,417	-424,2844	-384,6828	-0,2847

G.2 Analisis Harga Satuan Dasar (HSD)

Harga Satuan Pekerjaan (HSP) terdiri atas biaya langsung dan tidak langsung. Biaya langsung terdiri atas upah, alat dan bahan yang masing-masing ditentukan sebagai Harga Satuan Dasar (HSD) untuk setiap pengukuran standar, agar hasil rumusan analisis yang diperoleh mencerminkan harga aktual di lapangan. Analisis HSD untuk AHSP bidang Cipta Karya tahun 2018 mengacu pada Permen PUPR Nomor 28/PRT/M/2016.

Komponen tenaga kerja berupa upah yang digunakan dalam mata pembayaran tergantung pada jenis pekerjaannya. Faktor yang mempengaruhi HSD tenaga kerja antara lain jumlah tenaga kerja dan tingkat keahlian tenaga kerja. Penetapan jumlah dan keahlian tenaga kerja mengikuti produktivitas peralatan utama. Tenaga kerja yang terlibat dalam suatu jenis pekerjaan pada proyek Hotel Quin dapat dilihat pada Tabel 1.

Tabel 1 Kodefikasi Tenaga Kerja

No.	Tenaga Kerja	Kode
1	Pekerja	L.01
2	Tukang	L.02
a.	Tukang batu	
b.	Tukang kayu	
c.	Tukang besi	
3	Kepala tukang	L.03
4	Mandor	L.04

Dalam sistem pengupahan digunakan satu satuan upah berupa standar orang hari yang disingkat orang hari (OH), yaitu sama dengan upah pekerjaan dalam 1 hari kerja (8 jam kerja) yang terdiri atas 7 jam kerja (efektif) dan 1 jam istirahat. Jumlah hari efektif selama satu bulan yang digunakan adalah 25 hari kerja.

Komponen alat digunakan dalam mata pembayaran tergantung pada jenis pekerjaannya. Faktor yang mempengaruhi HSD alat antara lain: jenis peralatan, efisiensi kerja, kondisi cuaca, kondisi medan, dan jenis material atau bahan yang dikerjakan. Untuk pekerjaan tertentu, kebutuhan alat sudah dimiliki oleh tenaga

kerja karena umumnya pekerjaan dilaksanakan secara manual (misal cangkul, roskam, sekop dan lain-lain). Untuk pekerjaan yang memerlukan alat berat, misal untuk pemancangan tiang beton atau pipa baja ke dalam tanah, penyediaan alat dilakukan dengan sistem sewa. Jenis peralatan yang digunakan dalam proyek Hotel Quin dapat dilihat pada Tabel 2.

Tabel 2 Jenis Alat-Alat Mekanis

No.	Uraian	Kode
1	*Bulldozer*	E.01
2	*Crane*	E.02
3	*Excavator*	E.03
4	*Pile Driver Hammer*	E.04
5	*Tower Crane*	E.05
6	*Trailer Truck*	E.06

Bahan yang digunakan di dalam proyek ditentukan pula dalam perhitungan Harga Satuan Dasar. Faktor yang mempengaruhi HSD bahan antara lain kualitas bahan, kuantitas bahan, dan lokasi asal bahan. Faktor-faktor yang berkaitan dengan kuantitas dan kualitas bahan harus ditetapkan dengan mengacu pada spesifikasi yang berlaku. Data harga satuan dasar bahan dalam perhitungan analisis ini berfungsi untuk kontrol terhadap harga penawaran penyedia jasa. Masukan (input) harga bahan yang dibutuhkan dalam proses perhitungan HSD bahan yaitu harga komponen bahan per satuan pengukuran. Satuan pengukuran bahan tersebut misalnya m^1, m^2, m^3, kg, ton, zak, dan sebagainya.

Contoh analisis HSD tenaga kerja dan alat dapat dilihat pada Tabel 3. Tabel tersebut membahas mengenai pekerjaan galian struktur dengan kedalaman 0-2 meter yang diambil dari AHSP tahun 2018.

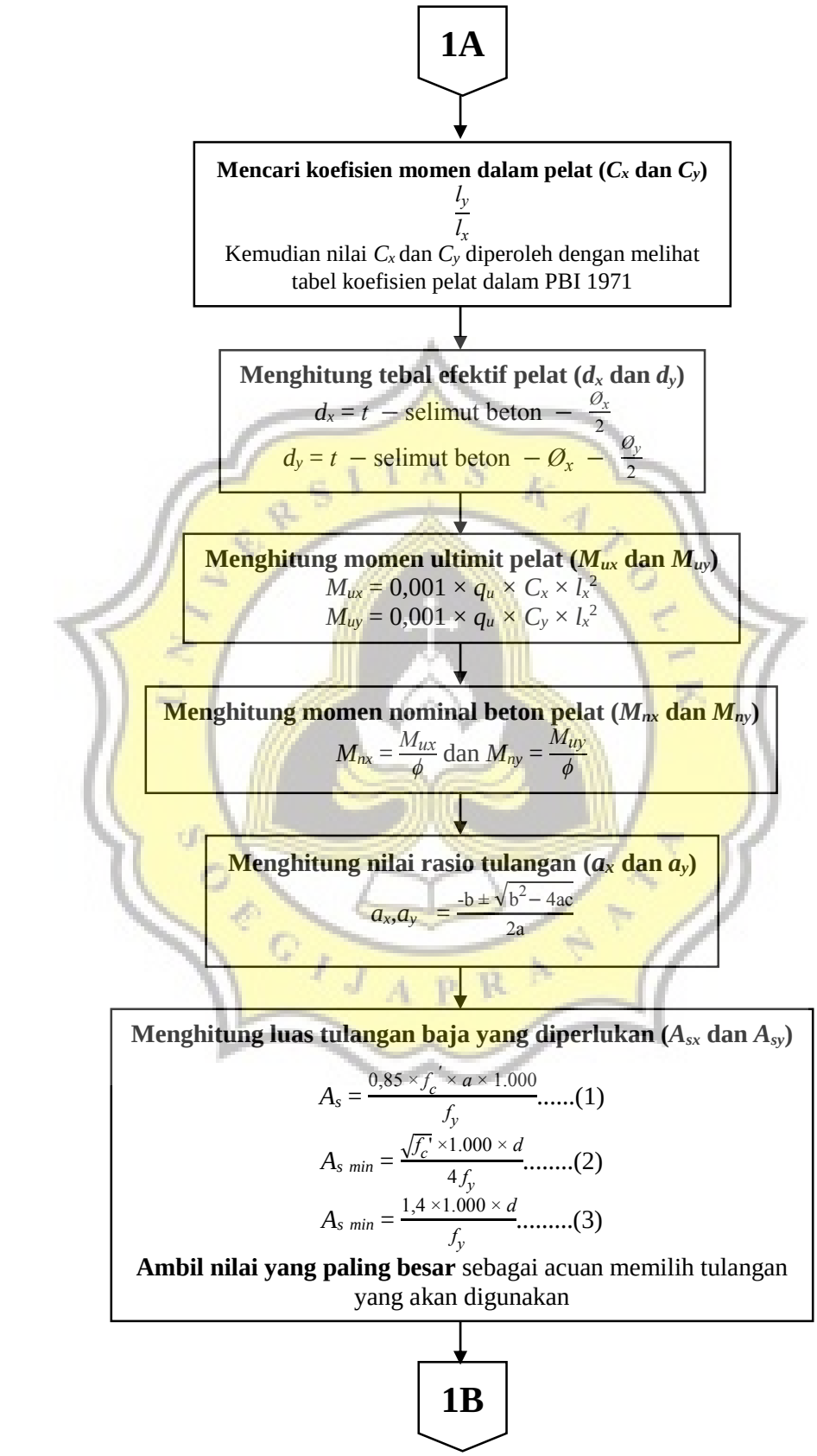
Tabel 3 HSD Pekerjaan Galian Struktur dengan Kedalaman 0-2 Meter

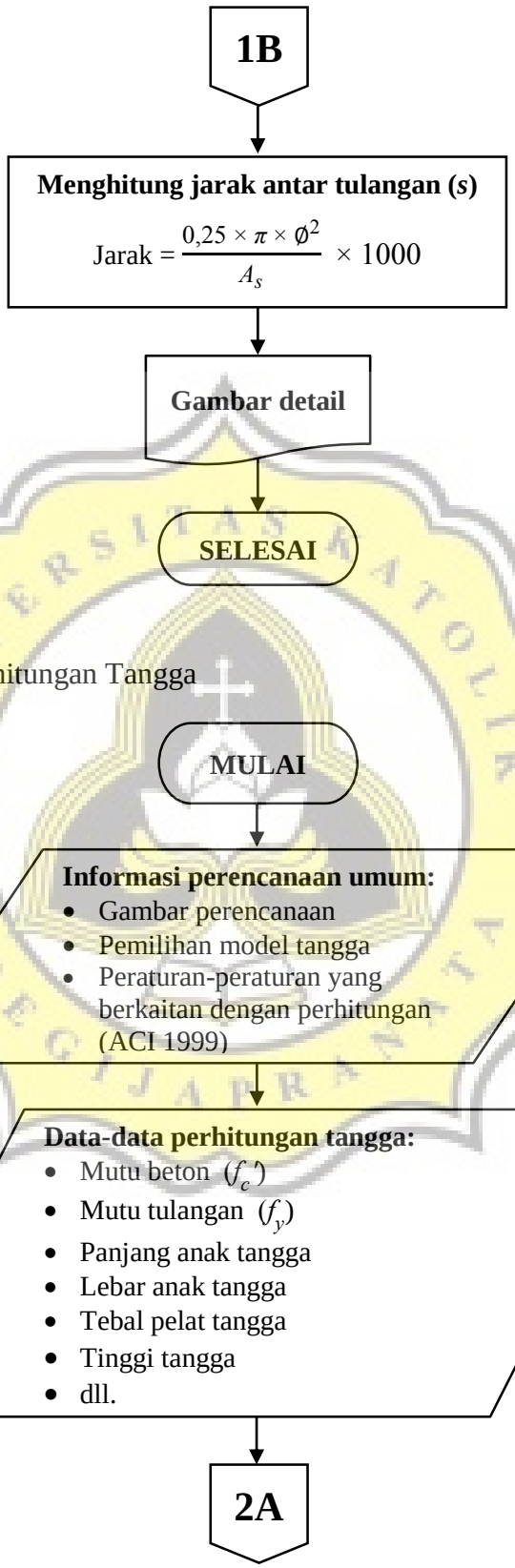
ITEM PEMBAYARAN NO.	: 3.1.(3)				Analisa EI-313
JENIS PEKERJAAN	: Galian Struktur dengan kedalaman 0 - 2 meter				
SATUAN PEMBAYARAN	: M3				URAIAN ANALISA HARGA SATUAN
No.	**U R A I A N**	**KODE**	**KOEF.**	**SATUAN**	**KETERANGAN**
I.	**ASUMSI**				
1	Pekerjaan dilakukan secara mekanis				

ITEM PEMBAYARAN NO.	**: 3.1.(3)**					Analisa EI-313
JENIS PEKERJAAN	**: Galian Struktur dengan kedalaman 0 - 2 meter**					
SATUAN PEMBAYARAN	**: M3**					URAIAN ANALISA HARGA SATUAN
No.	**U R A I A N**			**KODE**	**KOEF.**	**SATUAN**	**KETERANGAN**
2	Lokasi pekerjaan : sekitar jembatan						
3	Kondisi Jalan : baik						
4	Jam kerja efektif per-hari			Tk	7,00	Jam	
5	Faktor pengembangan bahan			Fk	1,20	-	
7	Pengurugan kembali (*backfill*) untuk struktur			Uk	50,00	%/M3	
II.	**METHODE PELAKSANAAN**						
1	Tanah yang dipotong berada disekitar lokasi						
2	Penggalian dilakukan dengan menggunakan alat Excavator						
3	Bulldozer mengangkut/mengusur hasil galian ke tempat pembuangan di sekitar lokasi pekerjaan			L	0,1000	Km	
4	Bahan pengaman tebing galian (bahan kayu)						
III.	**PEMAKAIAN BAHAN, ALAT DAN TENAGA**						
1.	**BAHAN**						
	- Urugan Pilihan (untuk *backfill*)	= Uk x 1M3		(EI-322)	0,50	M3	
						M3	cek item 3.1(6)
2.	**ALAT**						
2.a.	EXCAVATOR			(E10)			
	Kapasitas Bucket			V	0,93	M3	
	Faktor Bucket			Fb	1,00	-	
	Faktor Efisiensi alat			Fa	0,83	-	
	Faktor konversi (kedalaman < 40 %)			Fv	0,90	-	
	Berat isi material			Bim	0,85	-	
	Waktu siklus						
	- Menggali, memuat, lain-lain (standar)			T1	0,32	menit	
	Waktu siklus = T1 x Fv			Ts1	0,29	menit	
	Kap. Prod. / jam =	$\frac{V \times Fb \times Fa \times 60 \times Fk}{Ts1}$		Q1	192,98	M3/Jam	
	Koefisien Alat / M3	= 1 : Q1		(E10)	**0,0052**	Jam	
2.a.	BULLDOZER			(E04)			
	Faktor pisau (blade)			Fb	1,00	-	
	Faktor efisiensi kerja			Fa	0,83	-	
	Kecepatan mengupas			Vf	3,00	Km/Jam	
	Kecepatan mundur			Vr	5,00	Km/Jam	
	Kapasitas pisau			q	5,40	M3	
	Faktor kemiringan (grade)			Fm	1,00		
	Waktu Siklus			Ts			
	- Waktu gusur	= (L x 60) : Vf		T1	2,0	menit	
	- Waktu kembali	= (L x 60) : Vr		T2	1,2	menit	
	- Waktu lain-lain			T3	0,05	menit	
				Ts	3,25	menit	
	Kapasitas Produksi / Jam =	$\frac{q \times Fb \times Fm \times Fa \times 60/Ts}{Fk}$		Q2	68,95	M3	68,95
	Koefisien Alat / M3	= 1 : Q2		(E04)	**0,014502**	Jam	
2.d.	ALAT BANTU						
	Diperlukan alat-alat bantu kecil						Lump Sump
	- Pacul	= 2 buah					
	- Sekop	= 2 buah					
3.	**TENAGA**						
	Produksi menentukan : EXCAVATOR			Q1	192,98	M3/Jam	
	Produksi Galian / hari = Tk x Q1			Qt	1.350,83	M3	
	Kebutuhan tenaga :						
		- Pekerja		P	4,00	orang	
		- Mandor		M	1,00	orang	
	Koefisien tenaga / M3	:					
		- Pekerja	= (Tk x P) : Qt	(L01)	**0,0207**	Jam	
		- Mandor	= (Tk x M) : Qt	(L03)	**0,0052**	Jam	

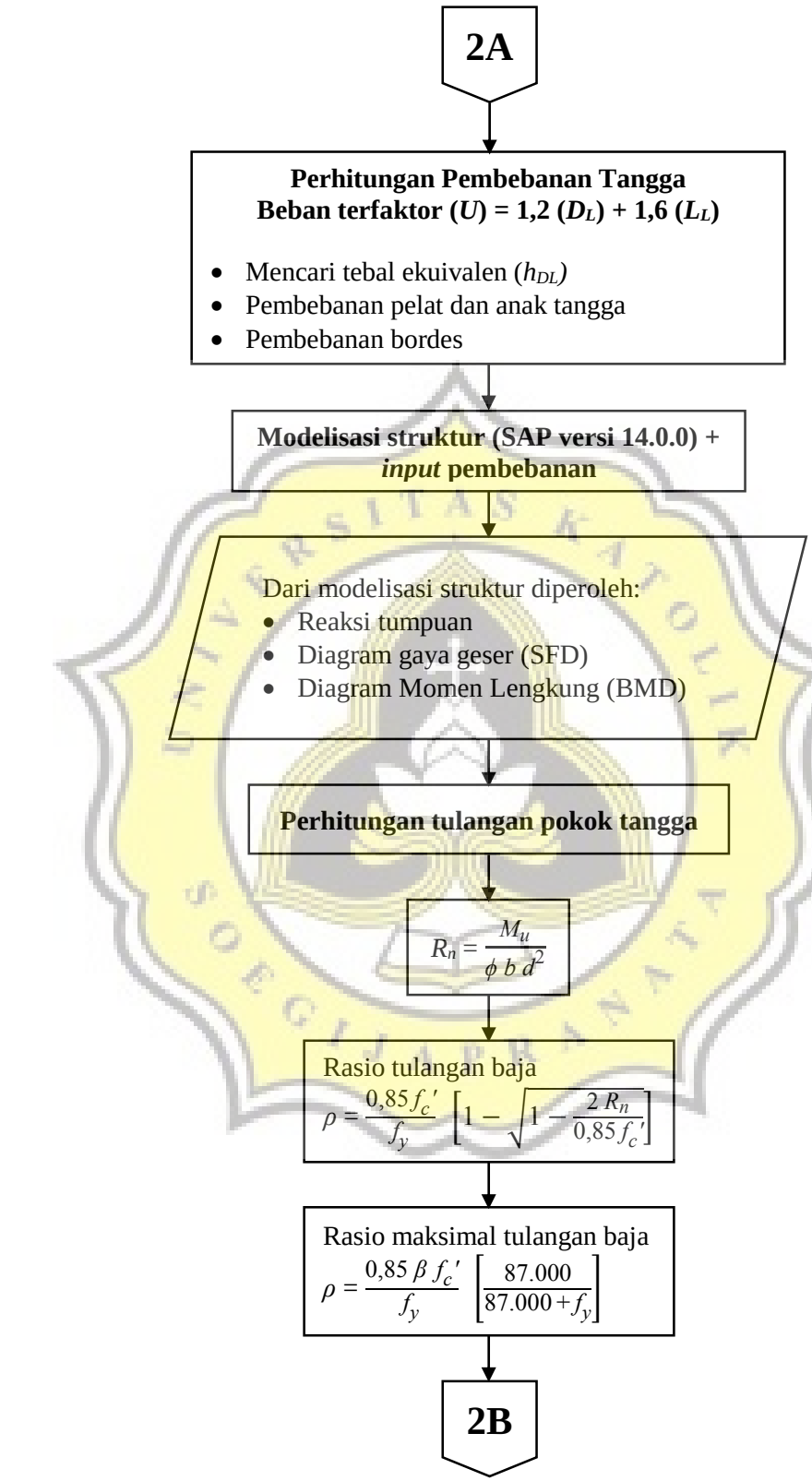
Lampiran H Bagan Alir Perhitungan Struktur

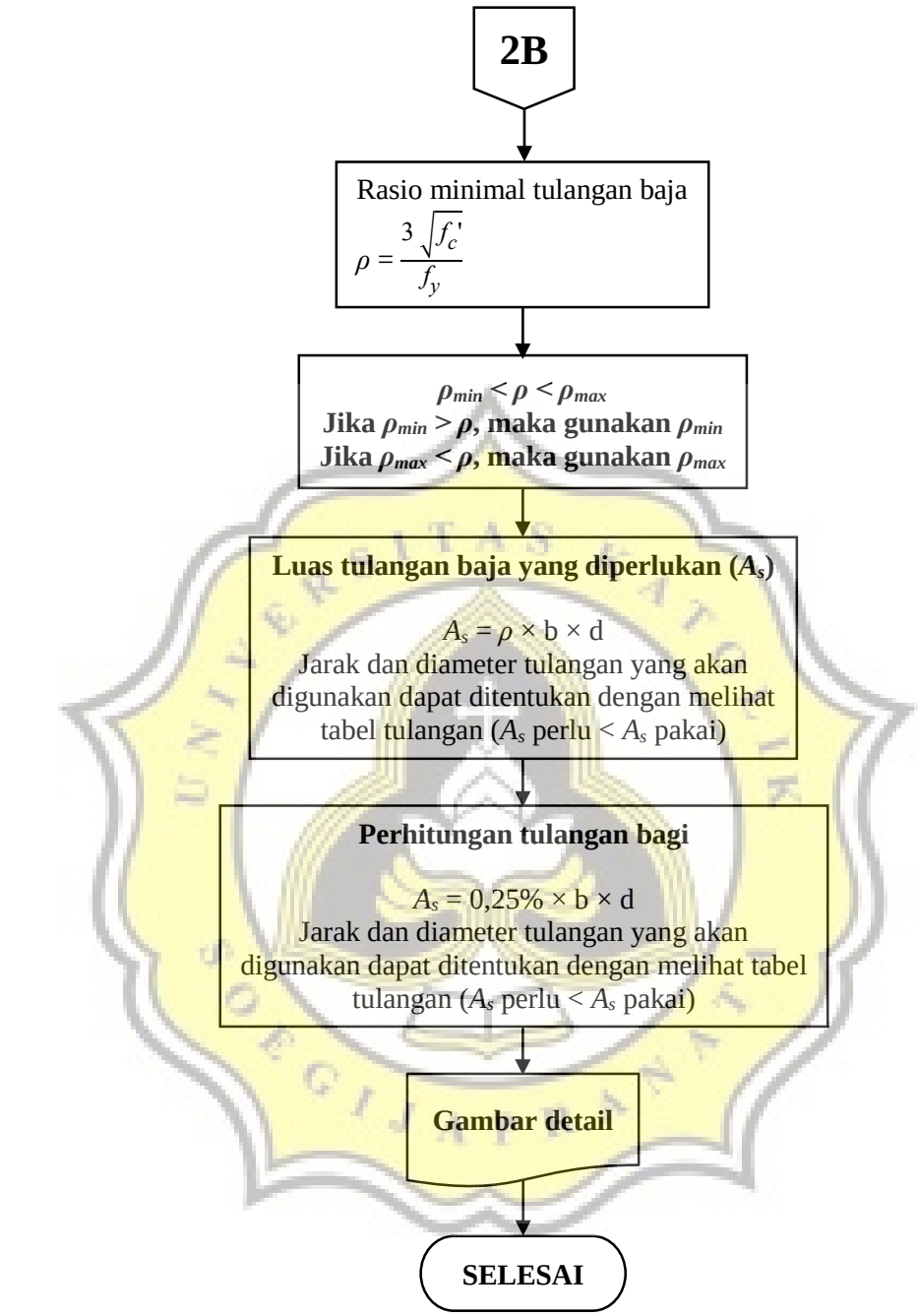
H.1 Bagan Alir Perhitungan Pelat Lantai


1A
Mencari koefisien momen dalam pelat (C_x dan C_y)
$\frac{l_y}{l_x}$
Kemudian nilai C_x dan C_y diperoleh dengan melihat tabel koefisien pelat dalam PBI 1971
Menghitung tebal efektif pelat (d_x dan d_y)
$d_x = t$ − selimut beton − $\frac{\emptyset_x}{2}$
$d_y = t$ − selimut beton − $\emptyset_x$ − $\frac{\emptyset_y}{2}$
Menghitung momen ultimit pelat (M_{ux} dan M_{uy})
$M_{ux} = 0{,}001 \times q_u \times C_x \times l_x^2$
$M_{uy} = 0{,}001 \times q_u \times C_y \times l_x^2$
Menghitung momen nominal beton pelat (M_{nx} dan M_{ny})
$M_{nx} = \frac{M_{ux}}{\phi}$ dan $M_{ny} = \frac{M_{uy}}{\phi}$
Menghitung nilai rasio tulangan (a_x dan a_y)
$a_x, a_y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Menghitung luas tulangan baja yang diperlukan (A_{sx} dan A_{sy})
$A_s = \frac{0{,}85 \times f_c' \times a \times 1.000}{f_y}$.....(1)
$A_{s\ min} = \frac{\sqrt{f_c'} \times 1.000 \times d}{4 f_y}$.....(2)
$A_{s\ min} = \frac{1{,}4 \times 1.000 \times d}{f_y}$.....(3)
Ambil nilai yang paling besar sebagai acuan memilih tulangan yang akan digunakan
1B

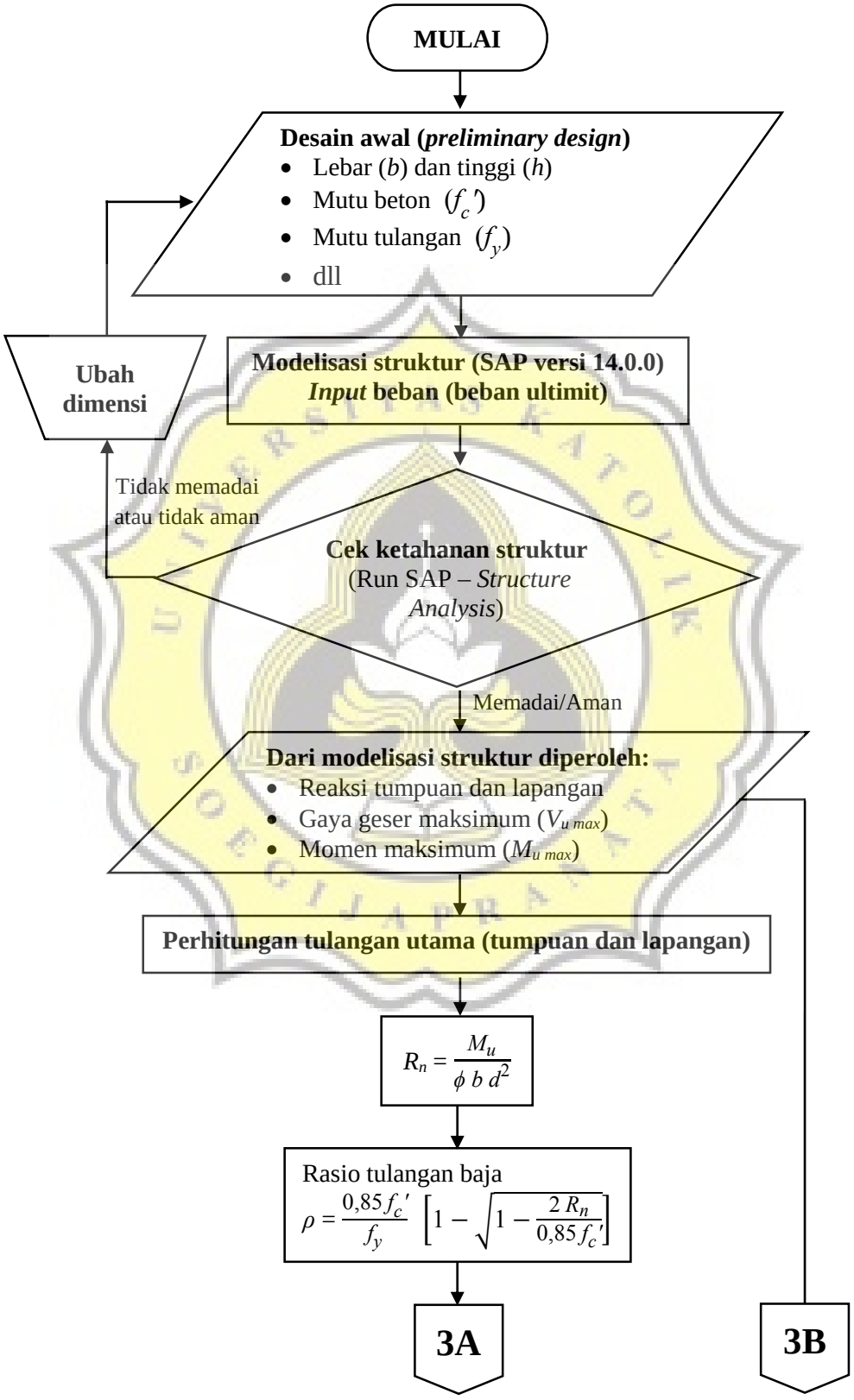


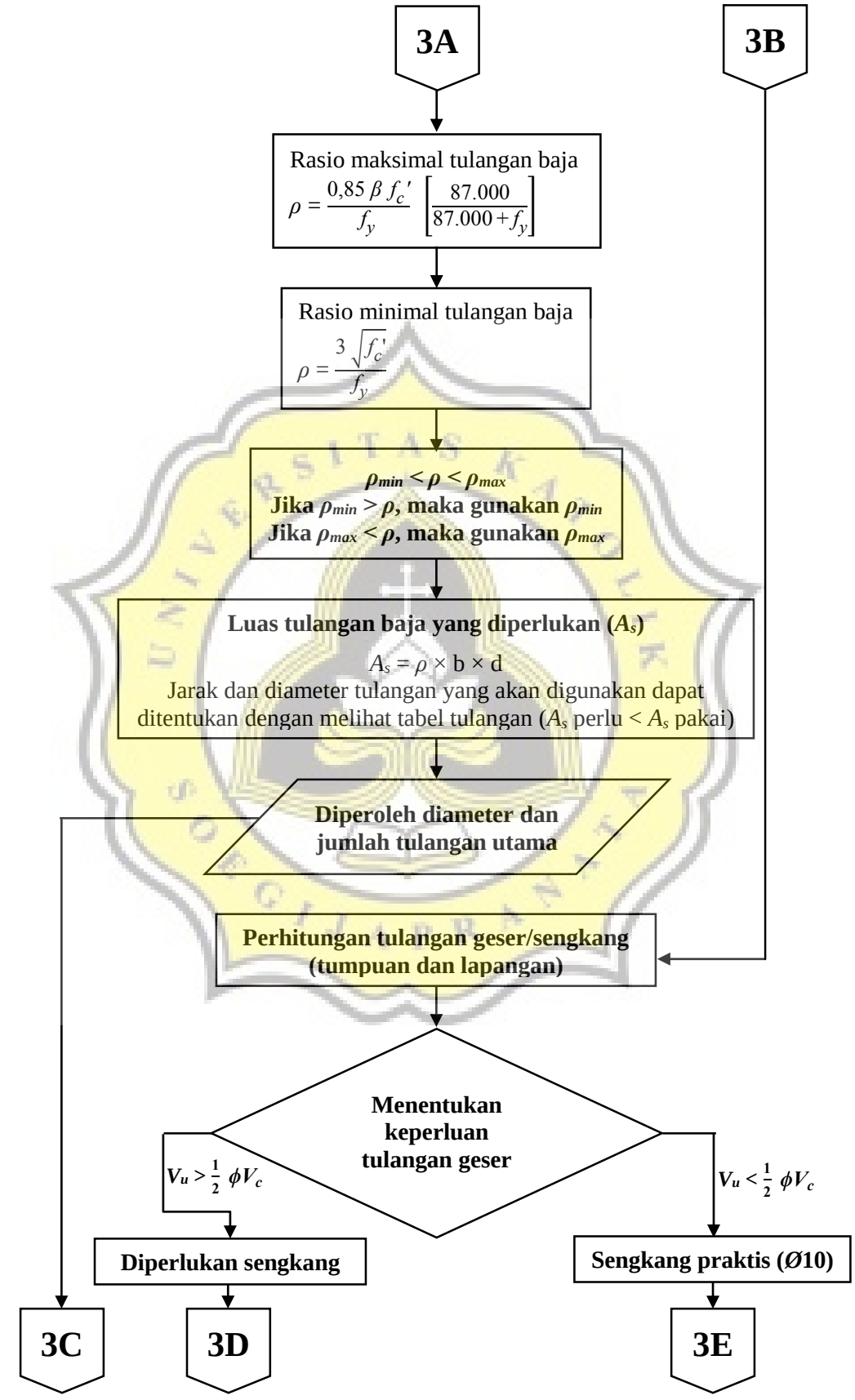
H.2 Bagan Alir Perhitungan Tangga

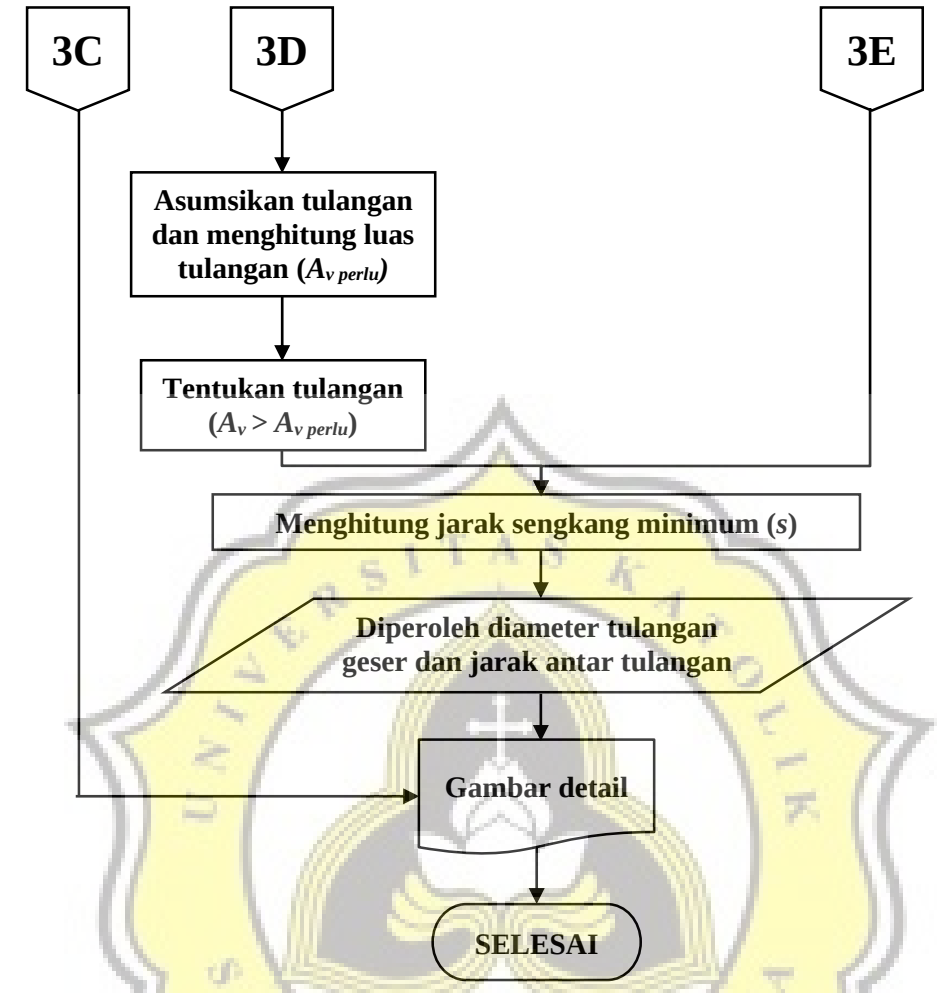

2A
Perhitungan Pembebanan Tangga
Beban terfaktor (U) = 1,2 (DL) + 1,6 (LL)
Mencari tebal ekuivalen (hDL)
Pembebanan pelat dan anak tangga
Pembebanan bordes
Modelisasi struktur (SAP versi 14.0.0) + input pembebanan
Dari modelisasi struktur diperoleh:
Reaksi tumpuan
Diagram gaya geser (SFD)
Diagram Momen Lengkung (BMD)
Perhitungan tulangan pokok tangga
$R_n = \frac{M_u}{\phi\, b\, d^2}$
Rasio tulangan baja
$\rho = \frac{0{,}85 f_c'}{f_y}\left[1 - \sqrt{1 - \frac{2 R_n}{0{,}85 f_c'}}\right]$
Rasio maksimal tulangan baja
$\rho = \frac{0{,}85 \beta f_c'}{f_y}\left[\frac{87.000}{87.000 + f_y}\right]$
2B


2B
Rasio minimal tulangan baja
$\rho = \frac{\sqrt[3]{f_c'}}{f_y}$
$\rho_{min} < \rho < \rho_{max}$
Jika $\rho_{min} > \rho$, maka gunakan ρ_{min}
Jika $\rho_{max} < \rho$, maka gunakan ρ_{max}
Luas tulangan baja yang diperlukan (A_s)
$A_s = \rho \times b \times d$
Jarak dan diameter tulangan yang akan digunakan dapat ditentukan dengan melihat tabel tulangan (A_s perlu < A_s pakai)
Perhitungan tulangan bagi
$A_s = 0{,}25\% \times b \times d$
Jarak dan diameter tulangan yang akan digunakan dapat ditentukan dengan melihat tabel tulangan (A_s perlu < A_s pakai)
Gambar detail
SELESAI

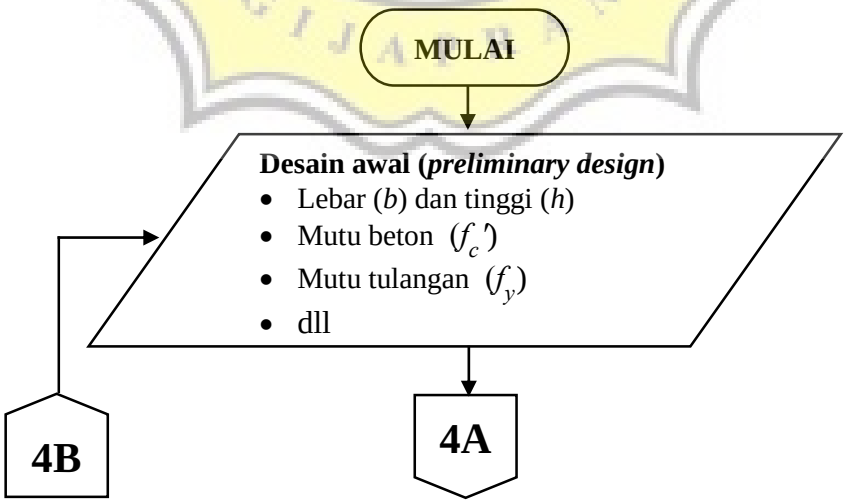
H.3 Bagan Alir Perhitungan Balok

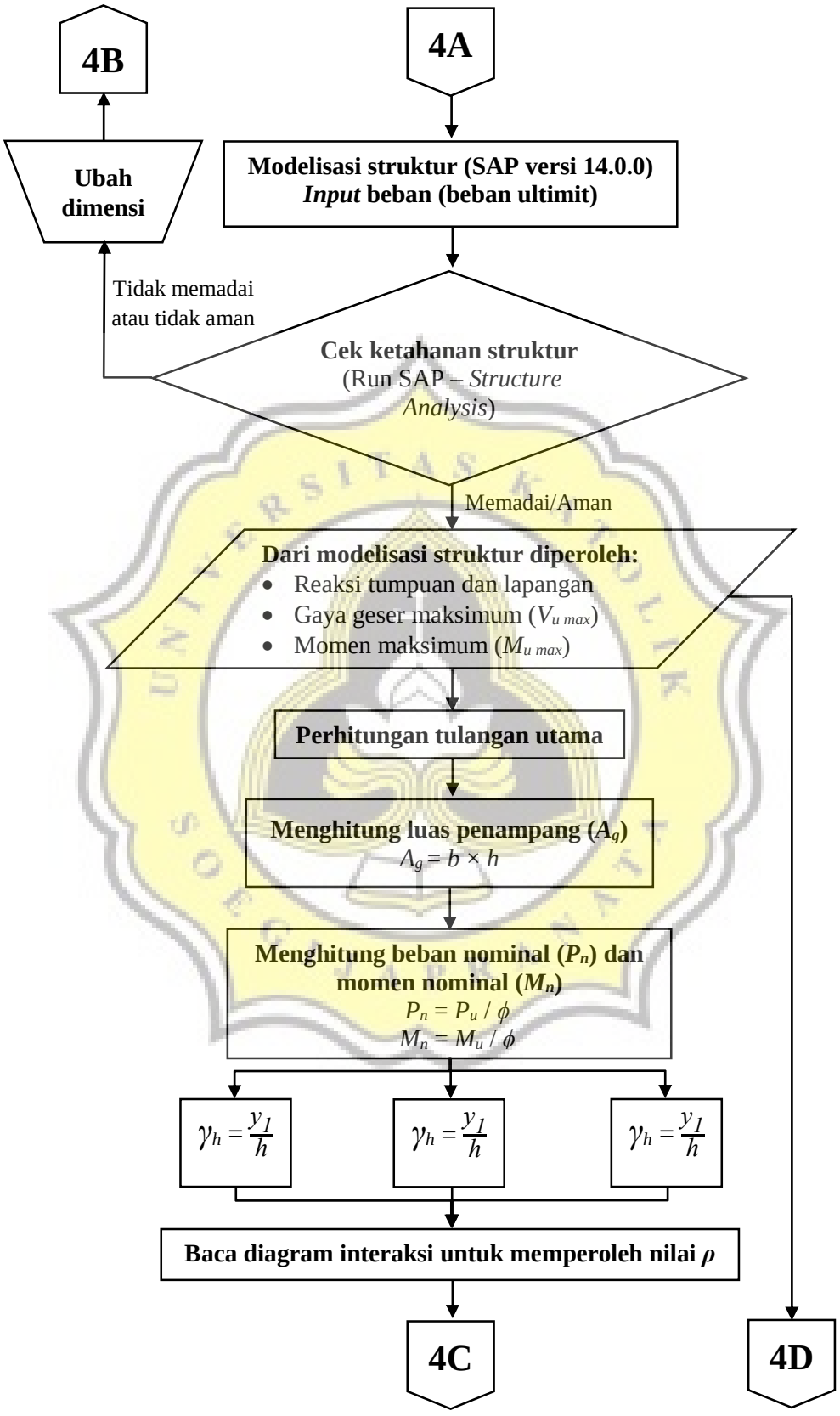


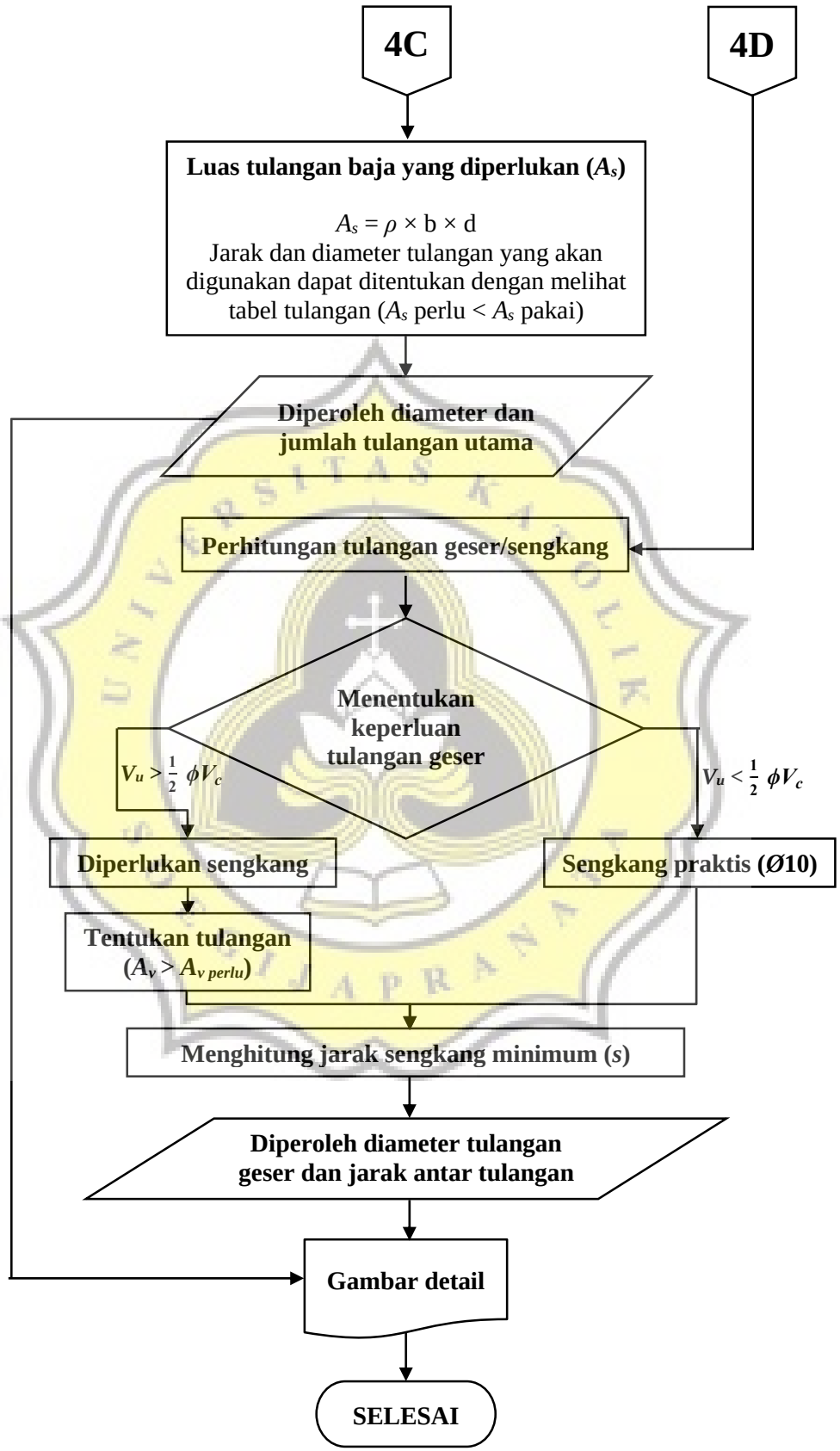

3A
3B
Rasio maksimal tulangan baja
$\rho = \frac{0{,}85\,\beta\,f_c'}{f_y}\left[\frac{87.000}{87.000+f_y}\right]$
Rasio minimal tulangan baja
$\rho = \frac{3\sqrt{f_c'}}{f_y}$
$\rho_{min} < \rho < \rho_{max}$
Jika $\rho_{min} > \rho$, maka gunakan ρ_{min}
Jika $\rho_{max} < \rho$, maka gunakan ρ_{max}
Luas tulangan baja yang diperlukan (A_s)
$A_s = \rho \times b \times d$
Jarak dan diameter tulangan yang akan digunakan dapat ditentukan dengan melihat tabel tulangan (A_s perlu < A_s pakai)
Diperoleh diameter dan jumlah tulangan utama
Perhitungan tulangan geser/sengkang (tumpuan dan lapangan)
Menentukan keperluan tulangan geser
$V_u > \frac{1}{2}\,\phi V_c$
$V_u < \frac{1}{2}\,\phi V_c$
Diperlukan sengkang
Sengkang praktis (Ø10)
3C
3D
3E



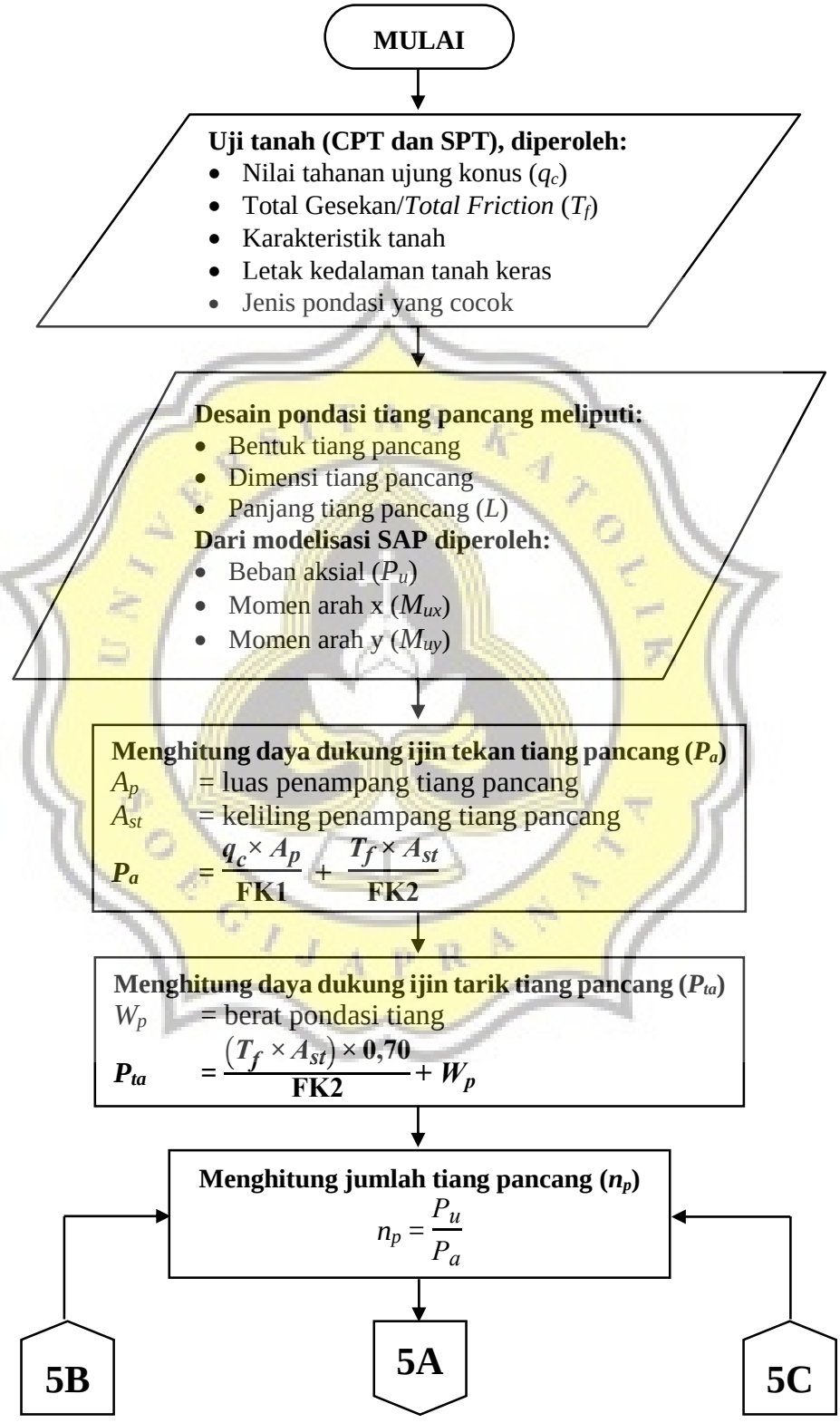
H.4 Bagan Alir Perhitungan Kolom

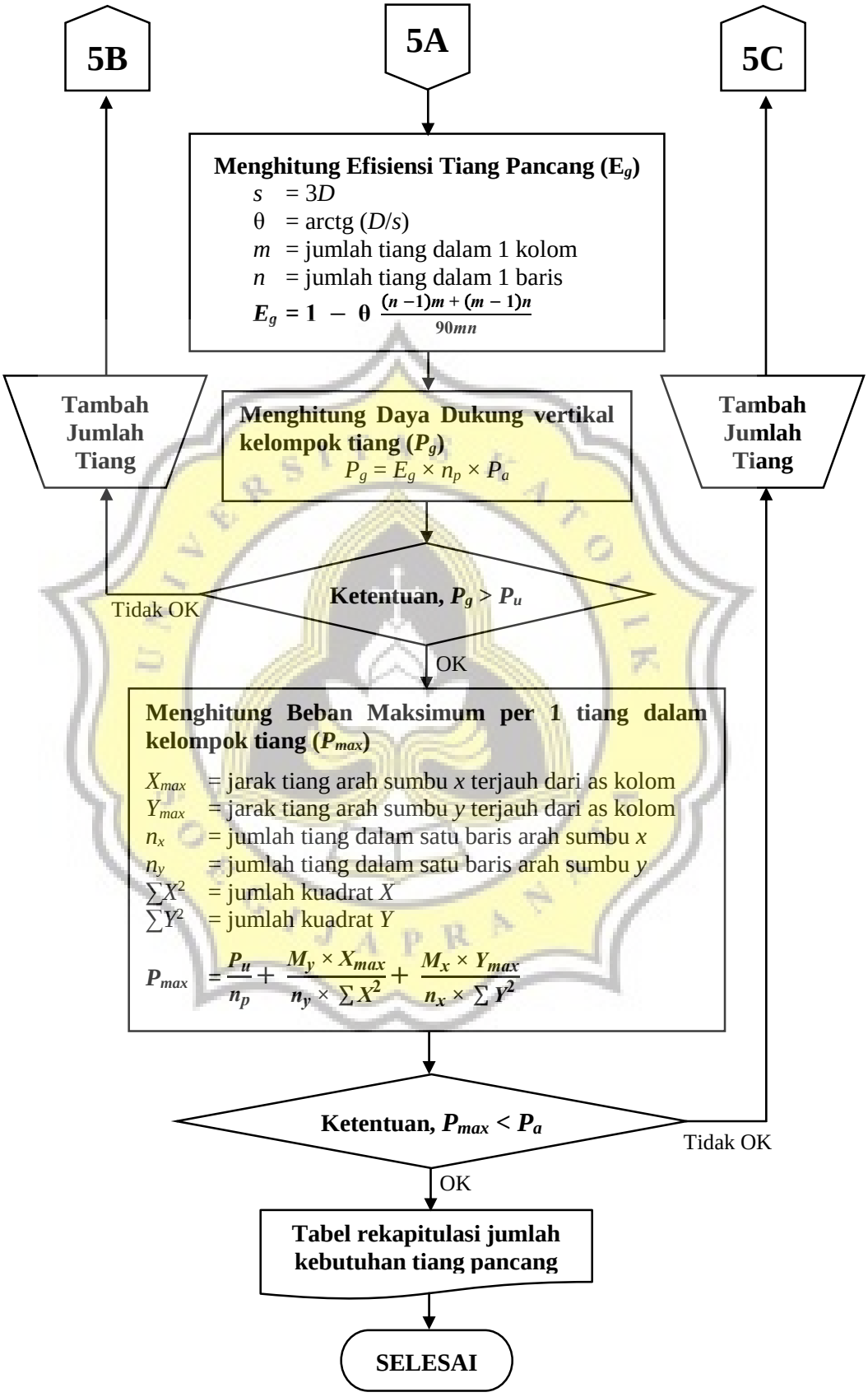



4B
4A
Ubah dimensi
Modelisasi struktur (SAP versi 14.0.0)
Input beban (beban ultimit)
Tidak memadai atau tidak aman
Cek ketahanan struktur
(Run SAP – Structure Analysis)
Memadai/Aman
Dari modelisasi struktur diperoleh:
Reaksi tumpuan dan lapangan
Gaya geser maksimum ($V_{u\ max}$)
Momen maksimum ($M_{u\ max}$)
Perhitungan tulangan utama
Menghitung luas penampang (A_g)
$A_g = b \times h$
Menghitung beban nominal (P_n) dan momen nominal (M_n)
$P_n = P_u / \phi$
$M_n = M_u / \phi$
$\gamma_h = \frac{y_1}{h}$
$\gamma_h = \frac{y_1}{h}$
$\gamma_h = \frac{y_1}{h}$
Baca diagram interaksi untuk memperoleh nilai ρ
4C
4D

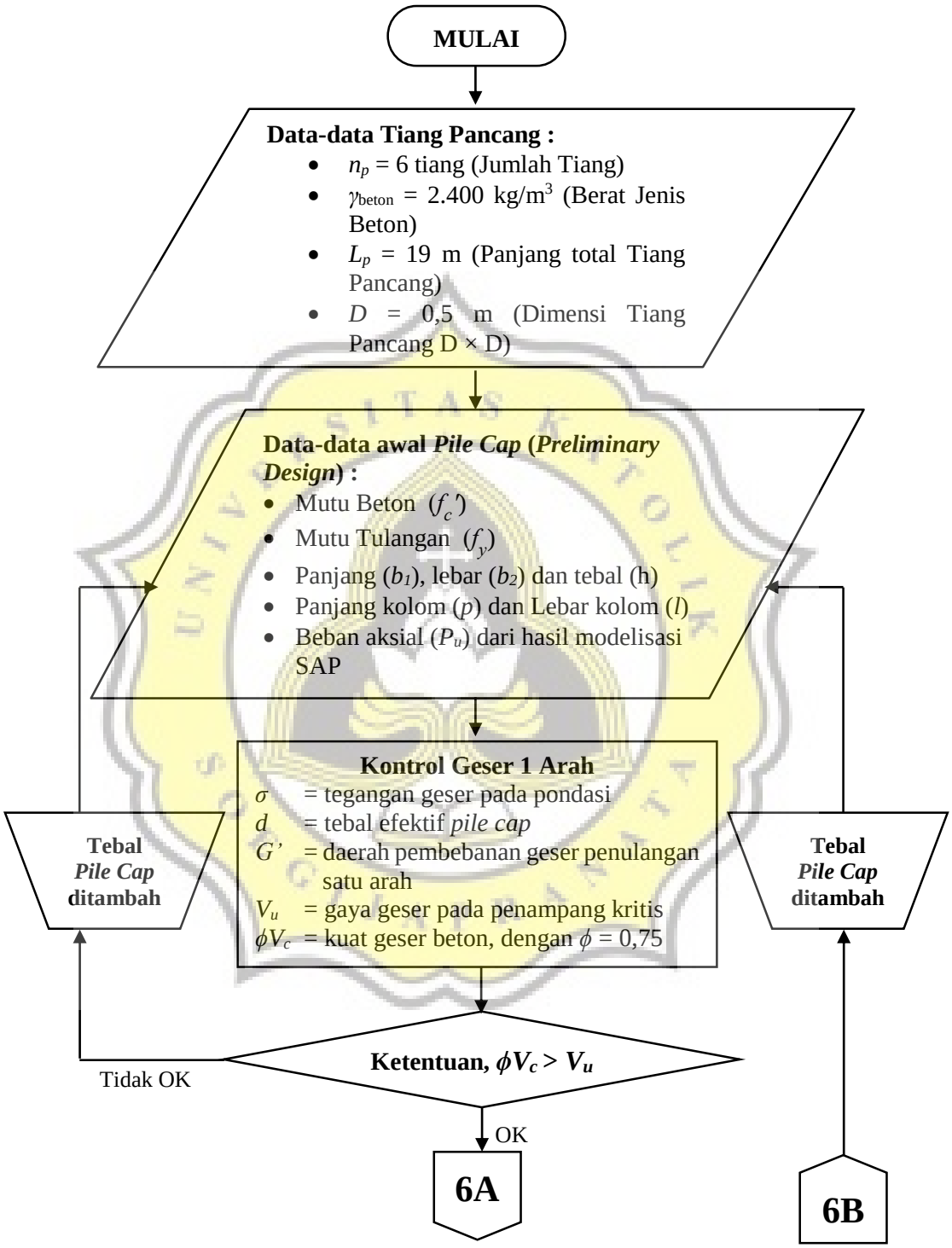

4C
4D
Luas tulangan baja yang diperlukan (A_s)
$A_s = \rho \times b \times d$
Jarak dan diameter tulangan yang akan digunakan dapat ditentukan dengan melihat tabel tulangan (A_s perlu < A_s pakai)
Diperoleh diameter dan jumlah tulangan utama
Perhitungan tulangan geser/sengkang
Menentukan keperluan tulangan geser
$V_u > \frac{1}{2}\phi V_c$
$V_u < \frac{1}{2}\phi V_c$
Diperlukan sengkang
Sengkang praktis (Ø10)
Tentukan tulangan ($A_v > A_{v\ perlu}$)
Menghitung jarak sengkang minimum (s)
Diperoleh diameter tulangan geser dan jarak antar tulangan
Gambar detail
SELESAI

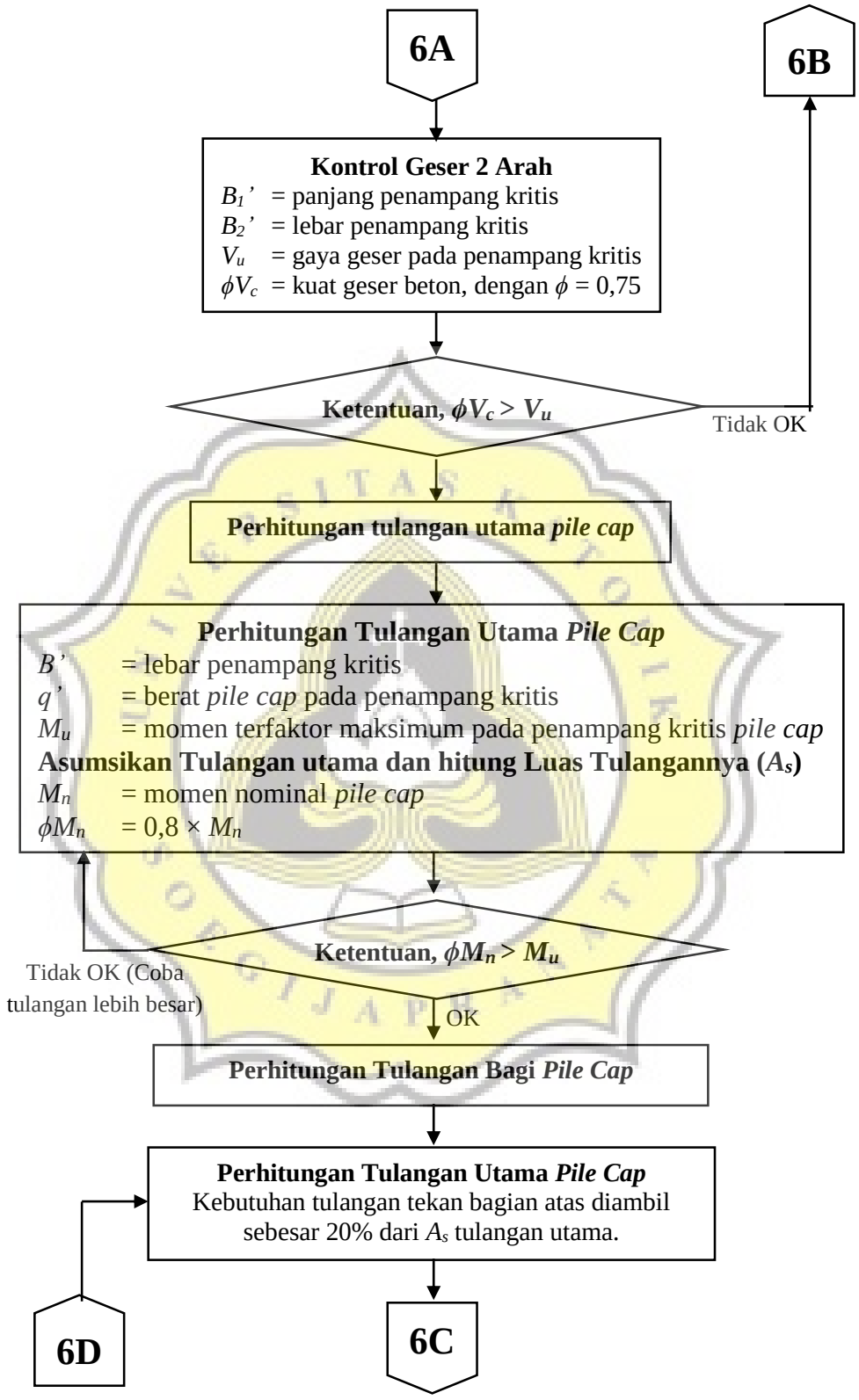
H.5 Bagan Alir Perhitungan Pondasi Tiang Pancang

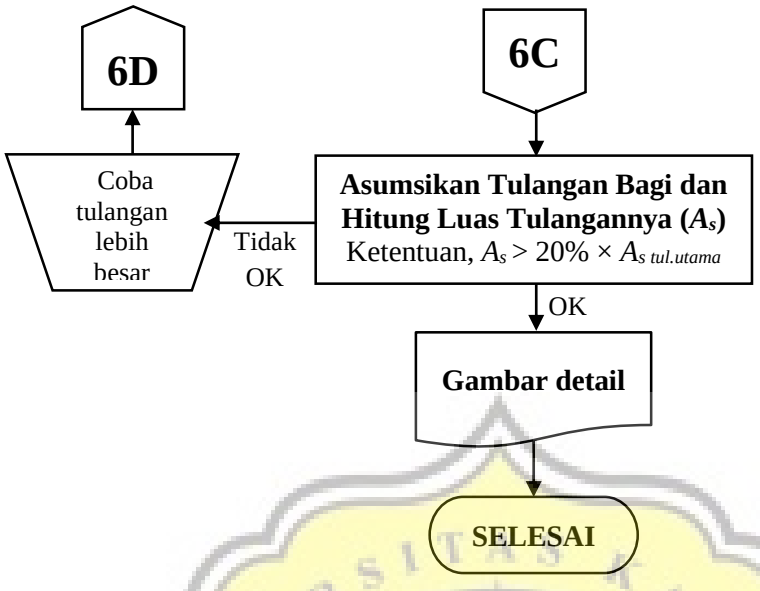



5B
5A
5C
Menghitung Efisiensi Tiang Pancang (E_g)
s = 3D
θ = arctg (D/s)
m = jumlah tiang dalam 1 kolom
n = jumlah tiang dalam 1 baris
$E_g = 1 - \theta \frac{(n-1)m + (m-1)n}{90mn}$
Tambah Jumlah Tiang
Menghitung Daya Dukung vertikal kelompok tiang (P_g)
$P_g = E_g \times n_p \times P_a$
Tambah Jumlah Tiang
Tidak OK
Ketentuan, $P_g > P_u$
OK
Menghitung Beban Maksimum per 1 tiang dalam kelompok tiang (P_{max})
X_{max} = jarak tiang arah sumbu x terjauh dari as kolom
Y_{max} = jarak tiang arah sumbu y terjauh dari as kolom
n_x = jumlah tiang dalam satu baris arah sumbu x
n_y = jumlah tiang dalam satu baris arah sumbu y
$\sum X^2$ = jumlah kuadrat X
$\sum Y^2$ = jumlah kuadrat Y
$P_{max} = \frac{P_u}{n_p} + \frac{M_y \times X_{max}}{n_y \times \sum X^2} + \frac{M_x \times Y_{max}}{n_x \times \sum Y^2}$
Ketentuan, $P_{max} < P_a$
Tidak OK
OK
Tabel rekapitulasi jumlah kebutuhan tiang pancang
SELESAI

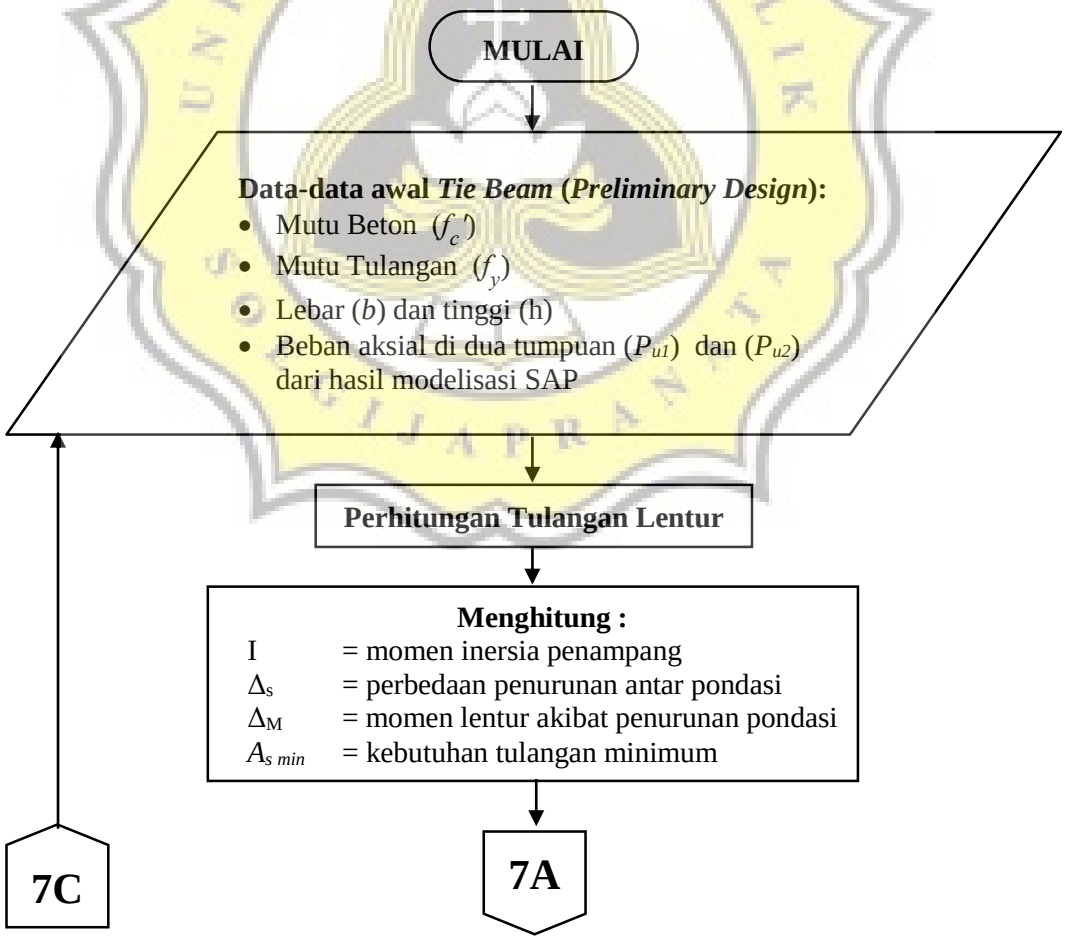
H.6 Bagan Alir Perhitungan *Pile Cap*

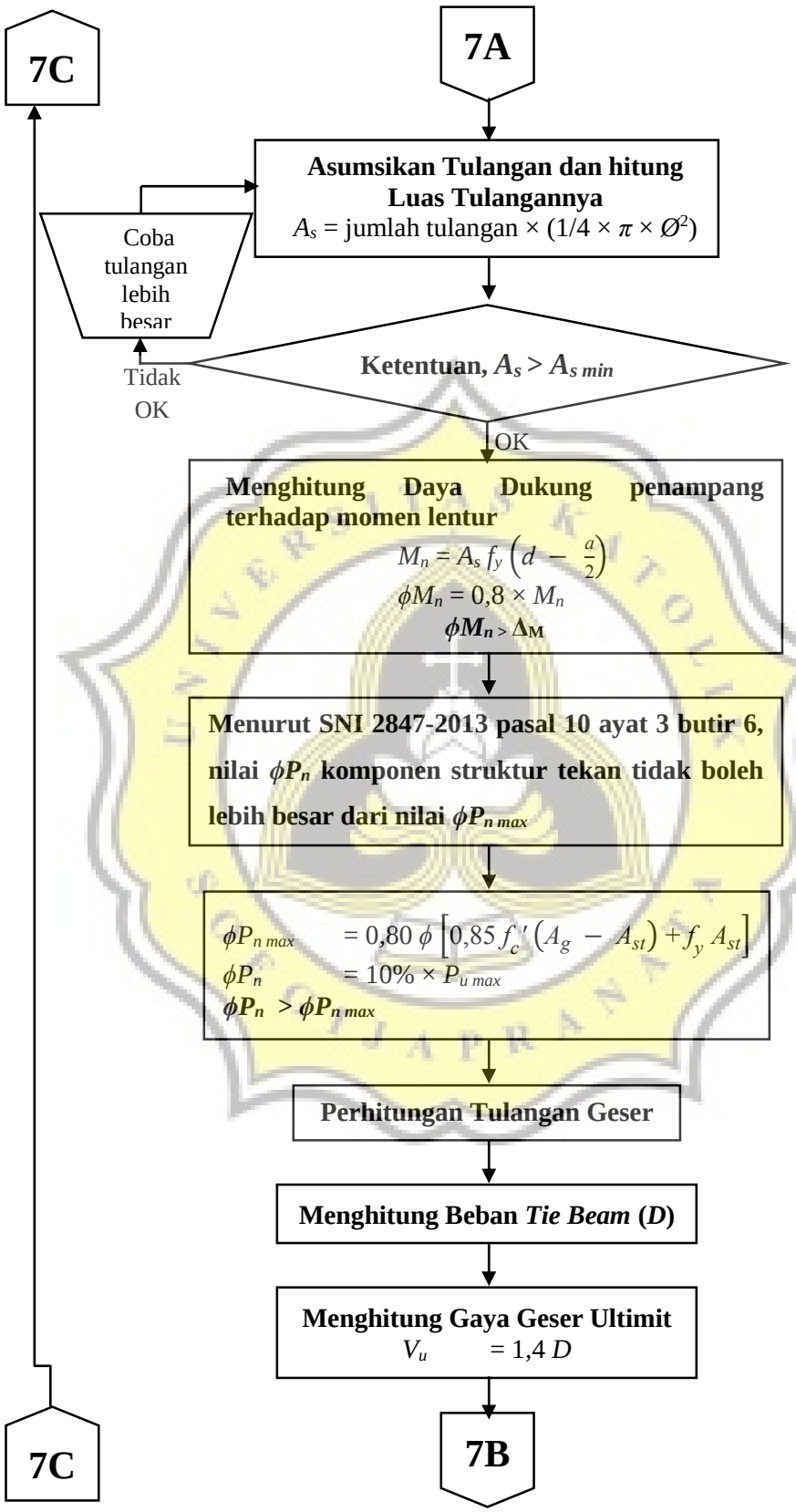


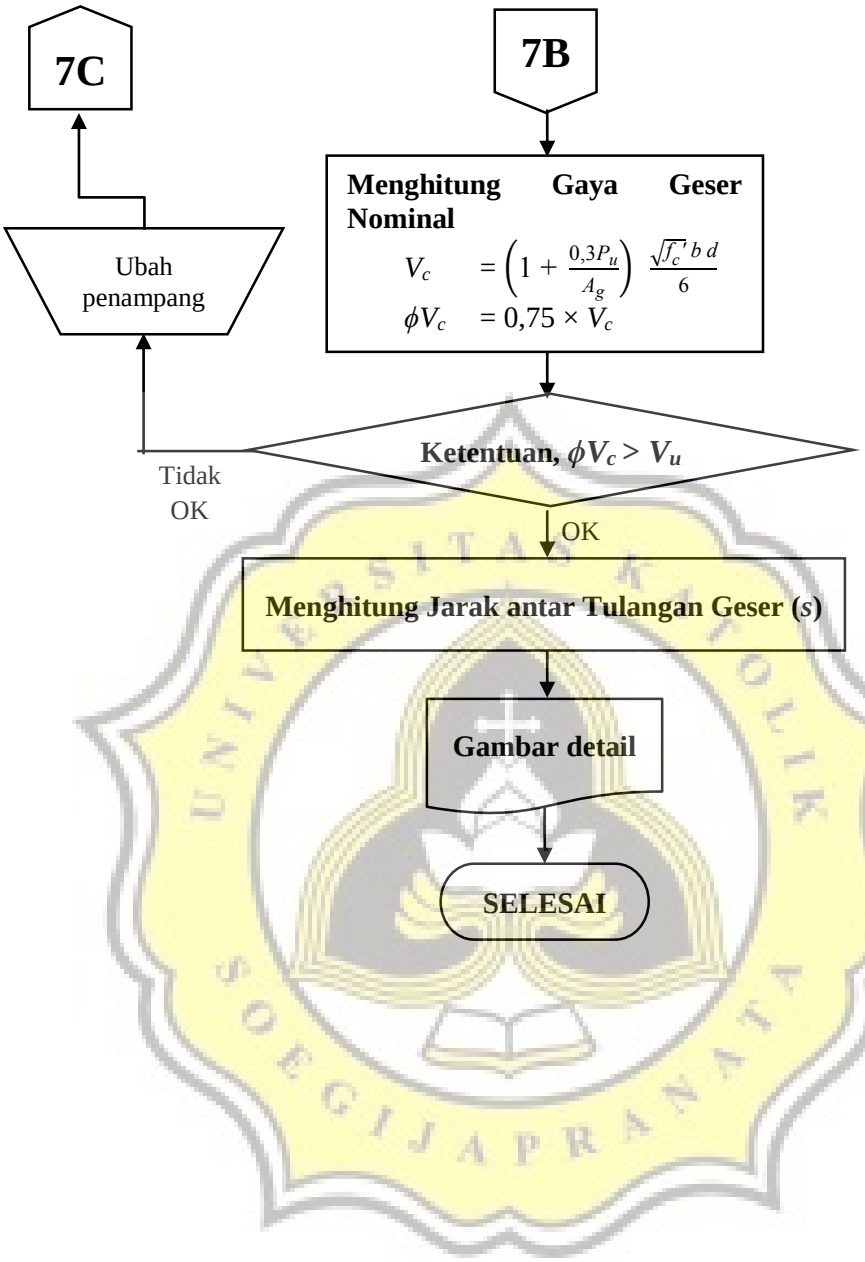

6A
6B
Kontrol Geser 2 Arah
B_1' = panjang penampang kritis
B_2' = lebar penampang kritis
V_u = gaya geser pada penampang kritis
ϕV_c = kuat geser beton, dengan ϕ = 0,75
Ketentuan, $\phi V_c > V_u$
Tidak OK
Perhitungan tulangan utama pile cap
Perhitungan Tulangan Utama Pile Cap
B' = lebar penampang kritis
q' = berat pile cap pada penampang kritis
M_u = momen terfaktor maksimum pada penampang kritis pile cap
Asumsikan Tulangan utama dan hitung Luas Tulangannya (A_s)
M_n = momen nominal pile cap
ϕM_n = 0,8 × M_n
Ketentuan, $\phi M_n > M_u$
Tidak OK (Coba tulangan lebih besar)
OK
Perhitungan Tulangan Bagi Pile Cap
Perhitungan Tulangan Utama Pile Cap
Kebutuhan tulangan tekan bagian atas diambil sebesar 20% dari A_s tulangan utama.
6D
6C



H.7 Bagan Alir Perhitungan *Tie Beam*




7C
7A
Asumsikan Tulangan dan hitung Luas Tulangannya
A_s = jumlah tulangan × (1/4 × π × $Ø^2$)
Coba tulangan lebih besar
Tidak OK
Ketentuan, $A_s > A_{s\,min}$
OK
Menghitung Daya Dukung penampang terhadap momen lentur
$M_n = A_s f_y \left(d - \frac{a}{2}\right)$
$\phi M_n = 0{,}8 \times M_n$
$\phi M_n > \Delta_M$
Menurut SNI 2847-2013 pasal 10 ayat 3 butir 6, nilai ϕP_n komponen struktur tekan tidak boleh lebih besar dari nilai $\phi P_{n\,max}$
$\phi P_{n\,max} = 0{,}80\,\phi \left[0{,}85 f_c' \left(A_g - A_{st}\right) + f_y A_{st}\right]$
$\phi P_n = 10\% \times P_{u\,max}$
$\phi P_n > \phi P_{n\,max}$
Perhitungan Tulangan Geser
Menghitung Beban Tie Beam (D)
Menghitung Gaya Geser Ultimit
$V_u = 1{,}4\,D$
7B
7C


7C
7B
Menghitung Gaya Geser Nominal
$V_c = \left(1 + \frac{0{,}3P_u}{A_g}\right) \frac{\sqrt{f_c'}\, b\, d}{6}$
$\phi V_c = 0{,}75 \times V_c$
Ubah penampang
Ketentuan, $\phi V_c > V_u$
Tidak OK
OK
Menghitung Jarak antar Tulangan Geser (s)
Gambar detail
SELESAI