BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

Setelah melakukan analisis dan perancangan pada struktur Gedung Bank Modern Solo, dapat diambil beberapa kesimpulan seperti yang tercantum di bawah ini.

1. Pelat tangga digunakan tebal 120 mm dengan tulangan D13 pada tumpuan dan lapangan. Balok bordes (L=3 m) digunakan dimensi 250 mm x 400 mm dengan 3D16 untuk tulangan tarik dan 2D16 untuk tulangan tekan.
2. Pelat lantai dan atap digunakan tebal 100 mm. Pelat atap dua arah dengan tulangan P10-250 untuk arah X dan Y. Pelat lantai dua arah dengan tulangan P10-200 untuk arah X dan Y.
3. Dalam perencanaan balok, digunakan 2 macam dimensi yaitu sebesar 250 mm x 500 mm dan 250 mm x 400 mm. Balok-balok tersebut direncanakan dengan tulangan lentur dan geser yang berbeda-beda.
4. Dalam perencanaan kolom, dimensi yang digunakan untuk kolom lantai 1 – lantai 2 sebesar 800 mm x 800 mm, untuk kolom lantai 3 – lantai 4 sebesar 700 mm x 700 mm, untuk kolom lantai 5 – lantai 7 sebesar 600 mm x 600 mm, untuk kolom lantai 8 – lantai 9 sebesar 500 mm x 500 mm. Kolom-kolom tersebut direncanakan dengan jumlah tulangan longitudinal dan transversal yang berbeda-beda pula.

6.2 Saran

Saran-saran yang dapat diberikan penulis dari hasil Tugas Akhir yang disusun tercantum seperti di bawah ini.

1. Sebelum perencanaan struktur sebaiknya dilakukan estimasi awal pada ukuran elemen struktur, sehingga tidak terjadi penentuan elemen struktur berulang-ulang.
2. Untuk kemudahan dalam melaksanakan analisis struktur terutama dalam pembuatan model struktur gedung akan lebih mudah jika memakai program analisis struktur *ETABS* dan *SAP2000* beserta program-program bantu lainnya.

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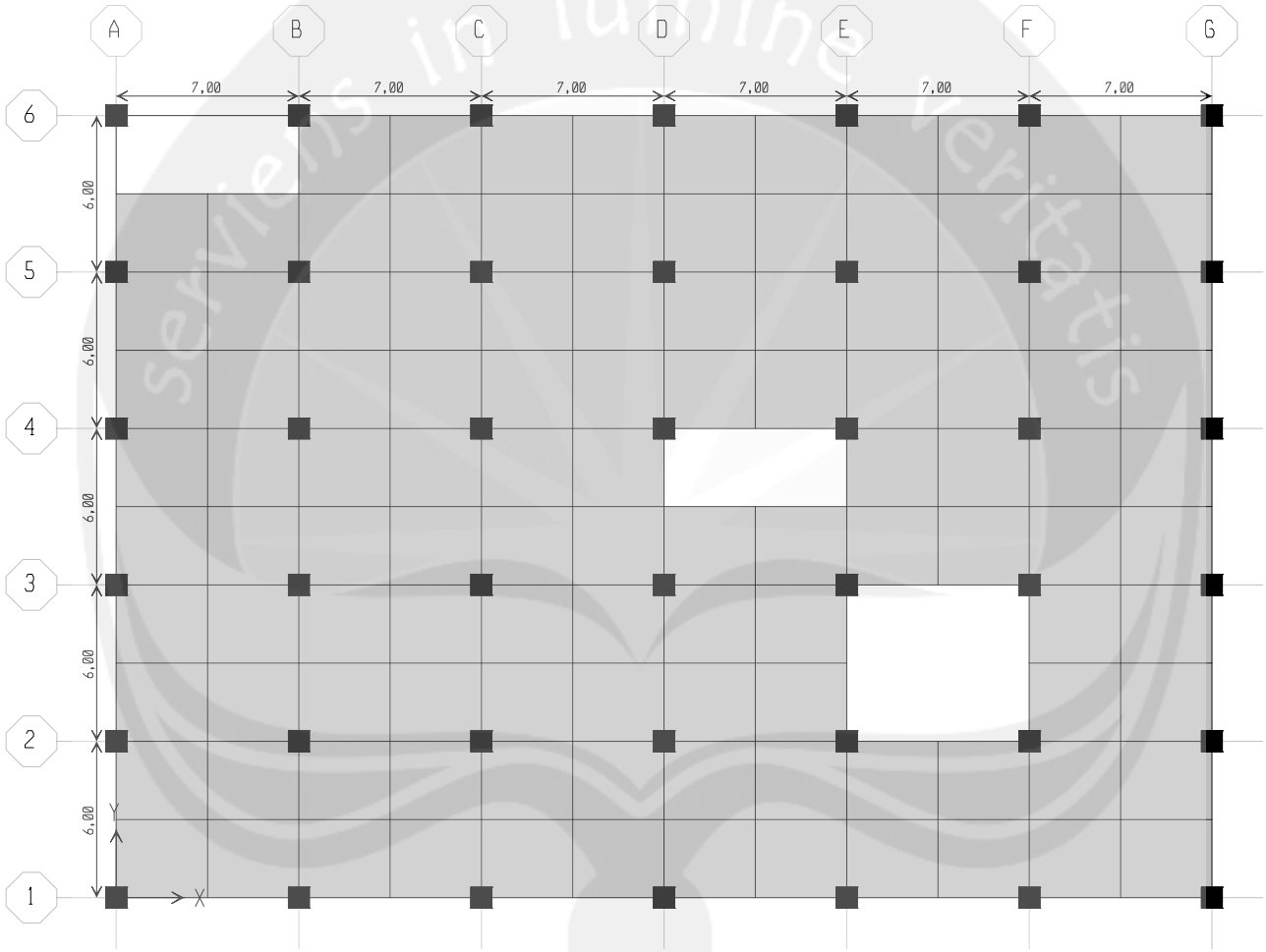
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B
C
D
E
F
G
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7,00
7,00
7,00
7,00
7,00
6
5
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6,00
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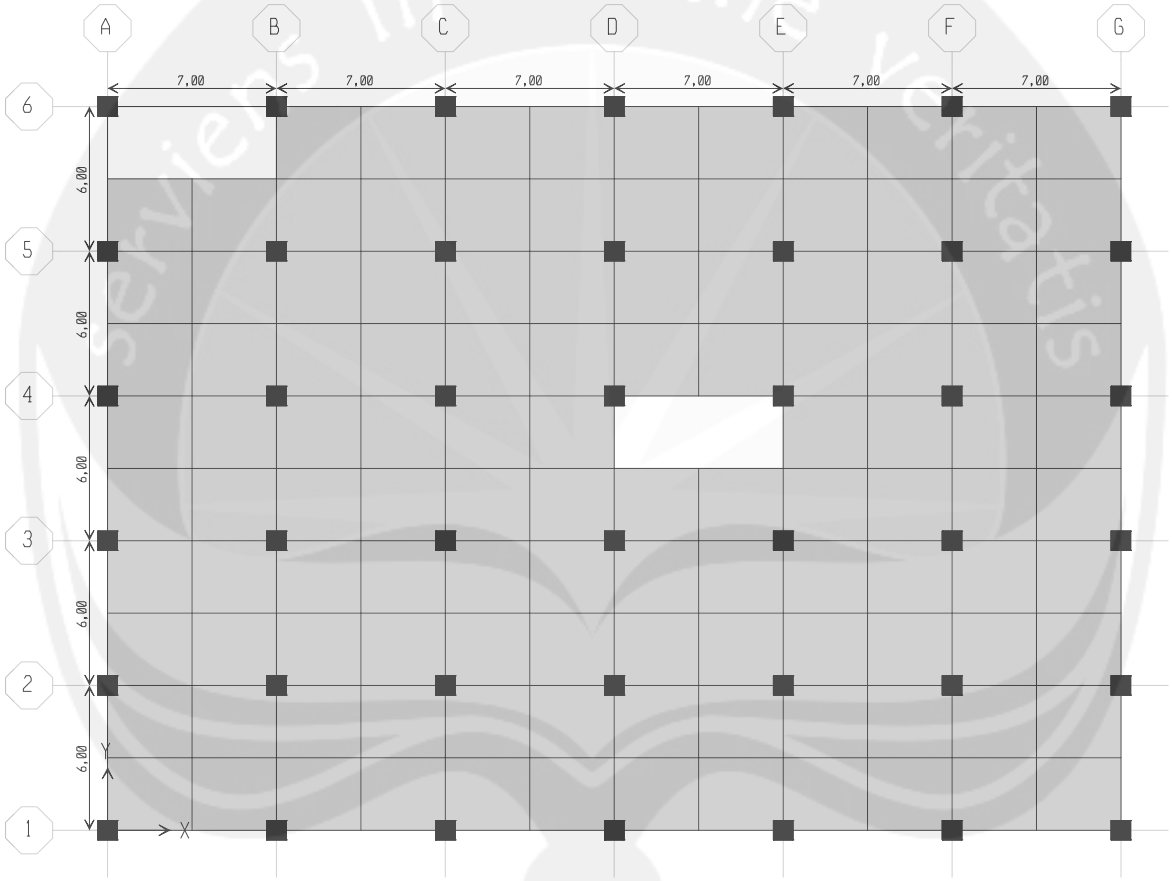
6,00
6,00
6,00
Y
X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C
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F
G
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7,00
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6,00
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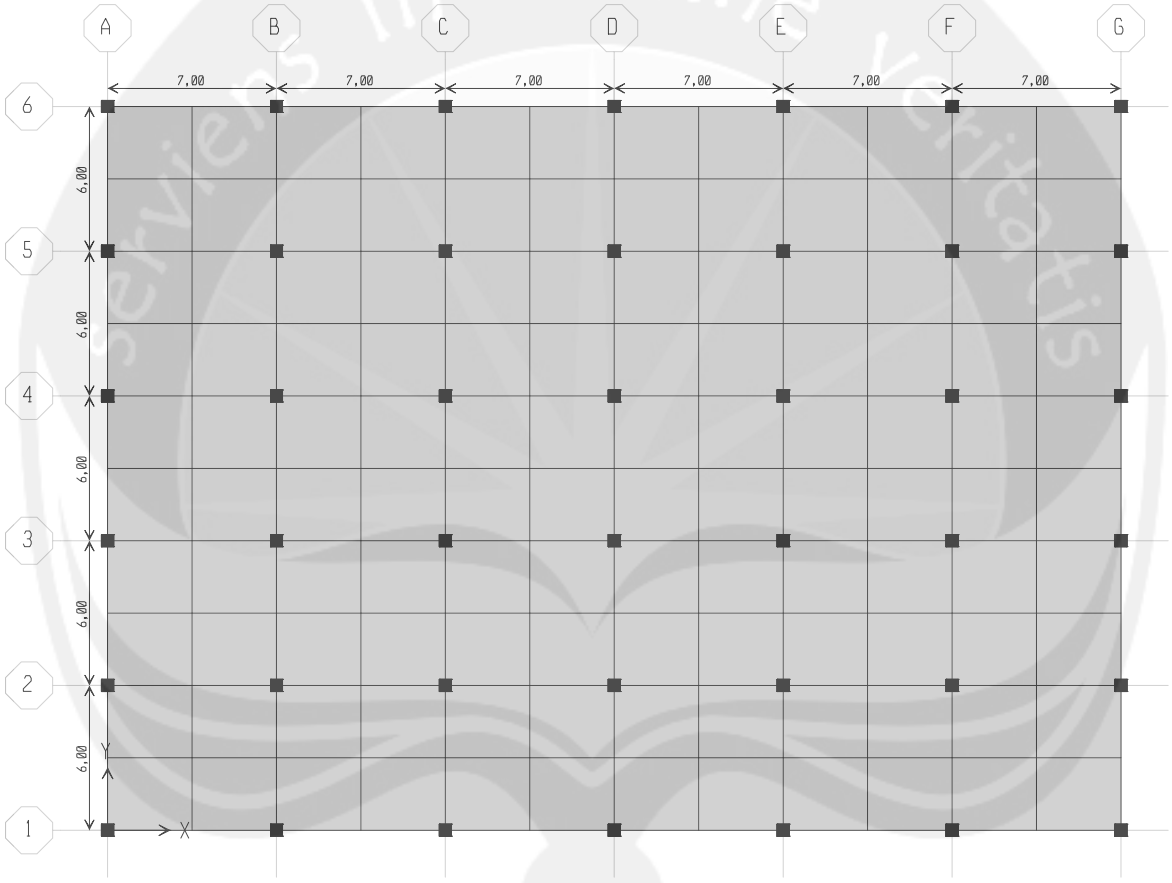
6,00
6,00
Y
X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B
C
D
E
F
G
7,00
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7,00
7,00
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7,00
6
5
4
3
2
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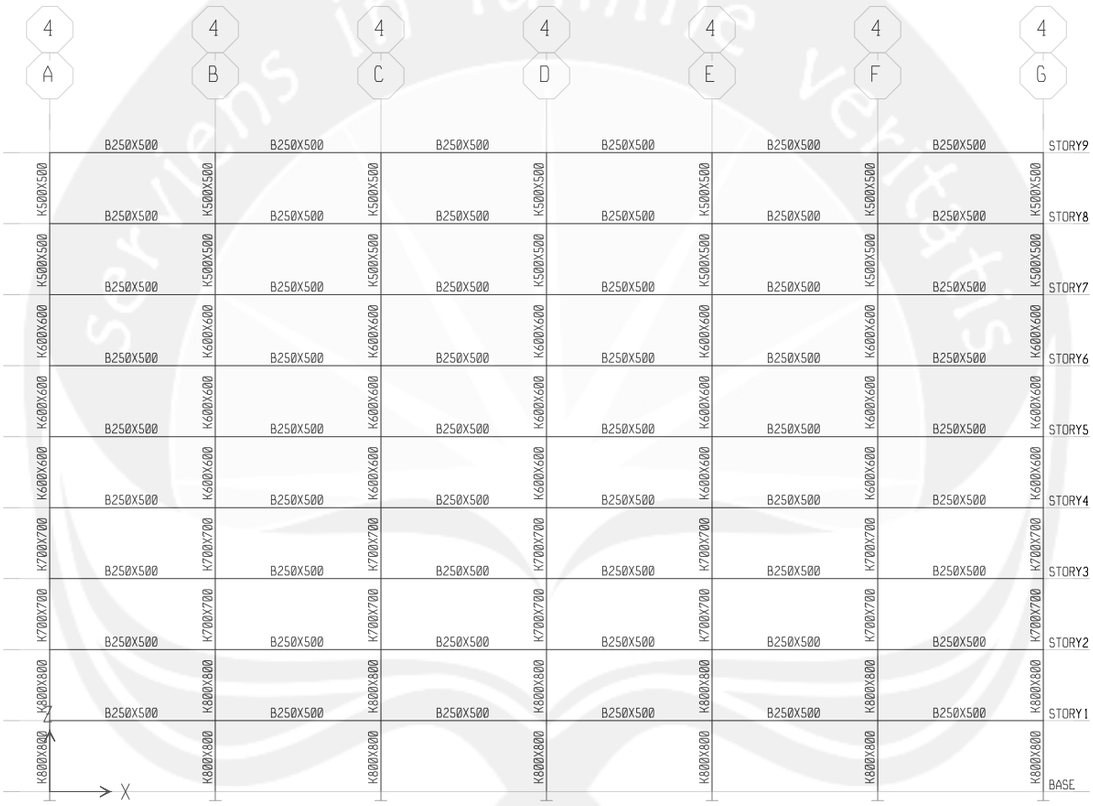
6,00
6,00
6,00
6,00
6,00
Y
X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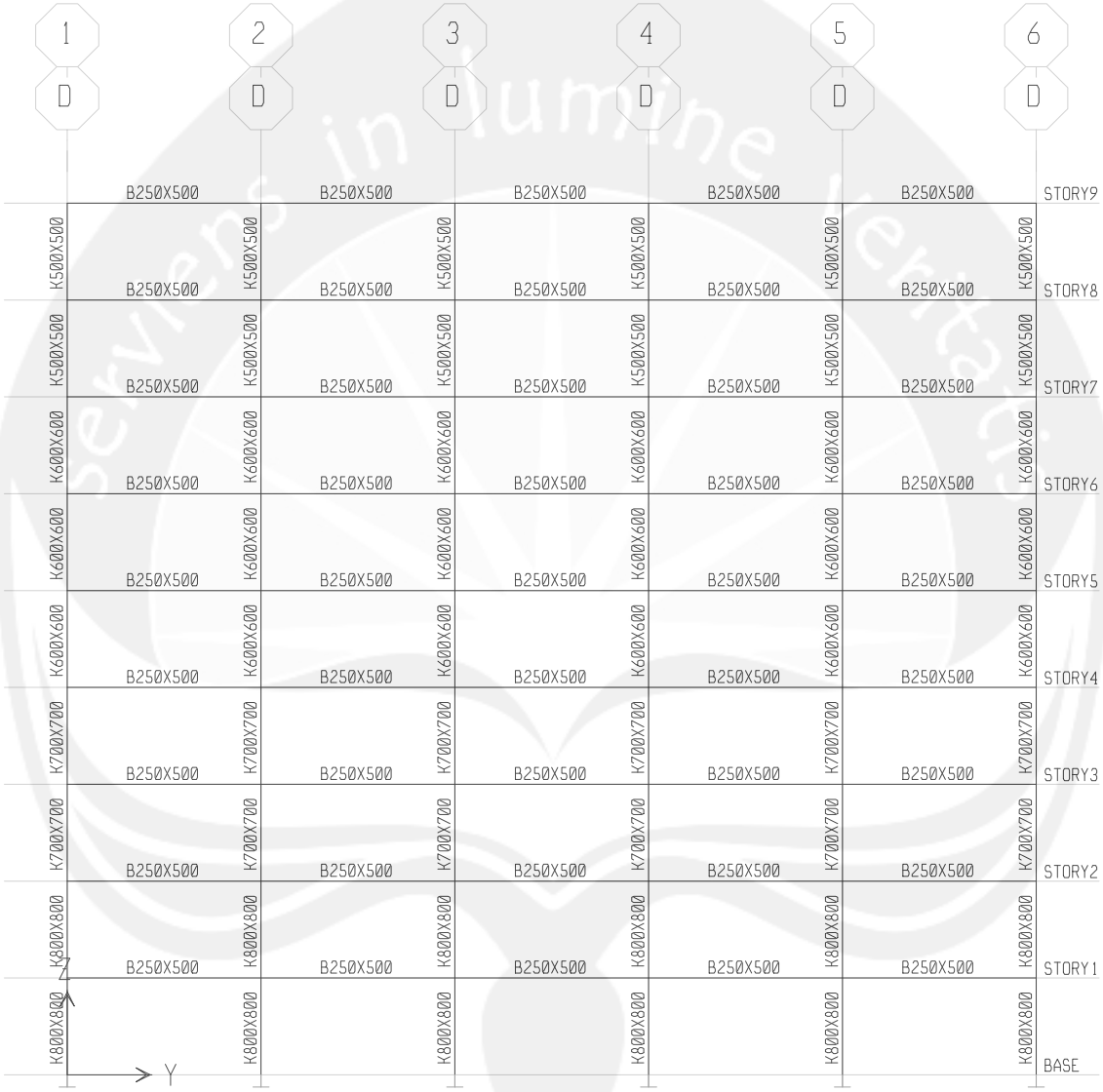
A
4
B
4
C
4
D
4
E
4
F
4
G
B250X500
K500X500
K600X600
K700X700
K800X800
STORY9
STORY8
STORY7
STORY6
STORY5
STORY4
STORY3
STORY2
STORY1
BASE
Z
X


1
2
3
4
5
6
D
B250X500
K500X500
K600X600
K700X700
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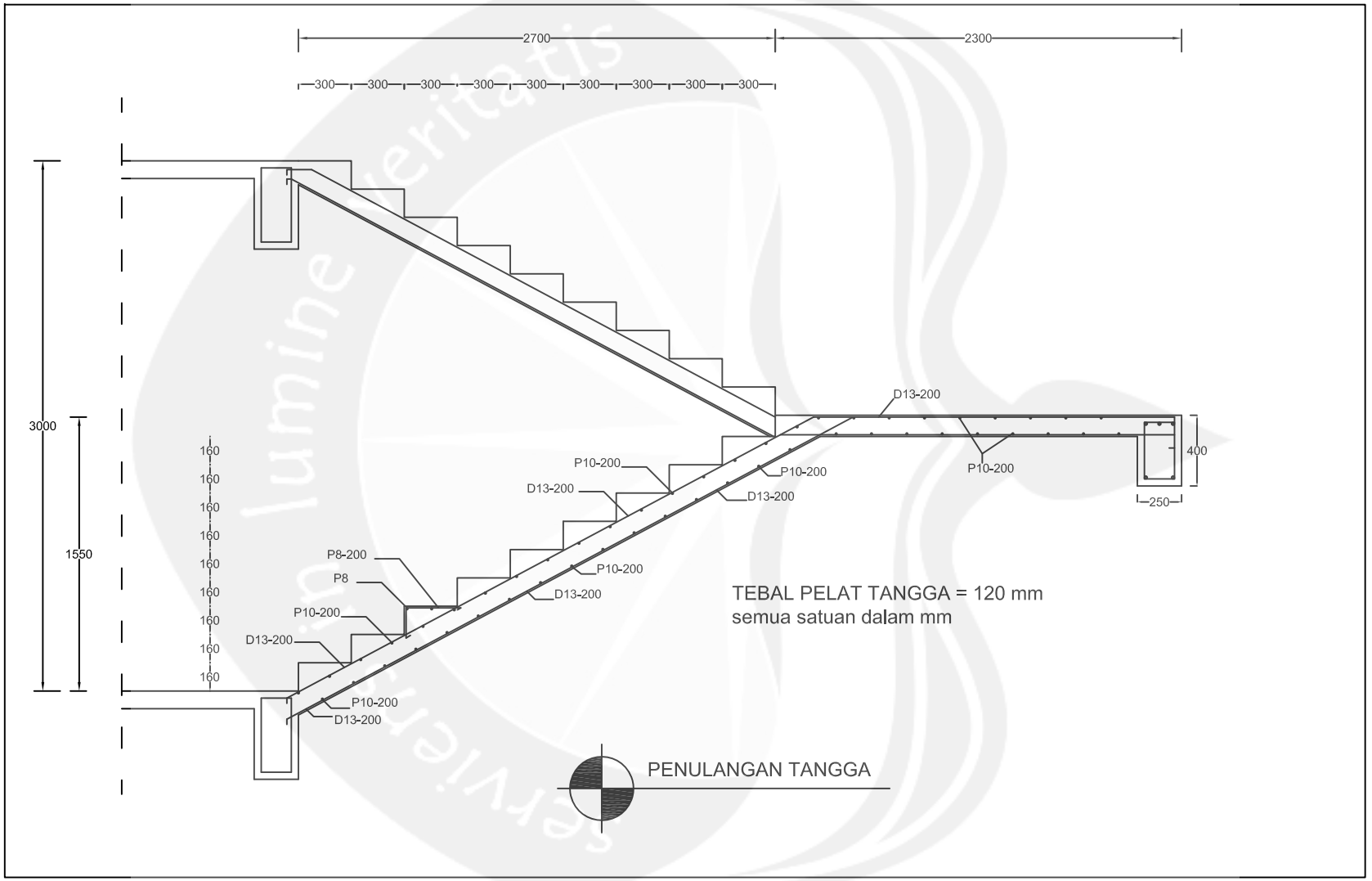
STORY8
STORY7
STORY6
STORY5
STORY4
STORY3
STORY2
STORY1
BASE
Z
Y


2700
2300
300
300
300
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300
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300
3000
1550
160
160
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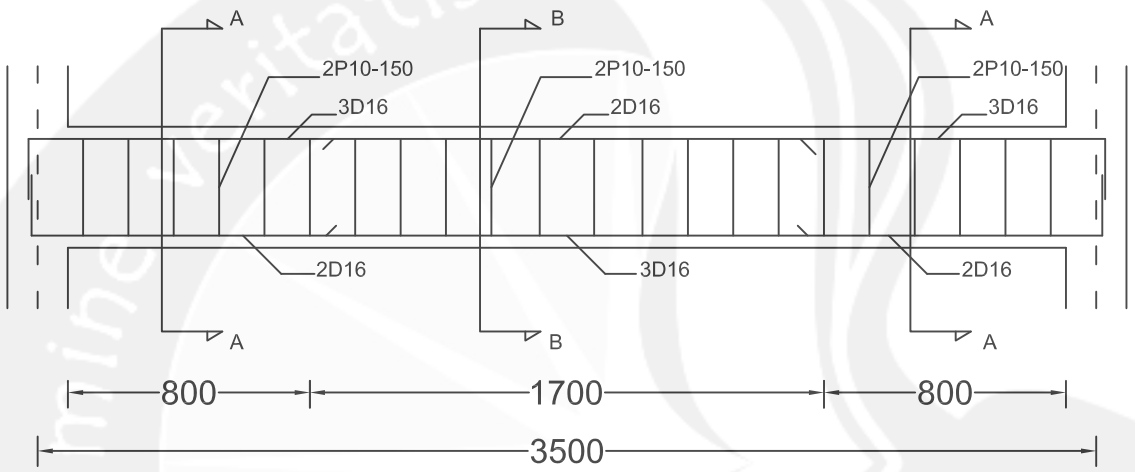
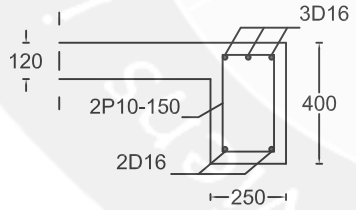
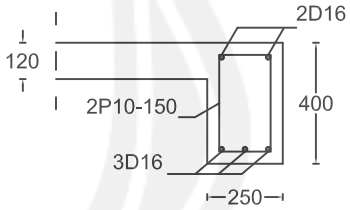
160
160
P10-200
D13-200
P10-200
D13-200
D13-200
P10-200
P10-200
D13-200
P8-200
P8
P10-200
D13-200
P10-200
D13-200
D13-200
P10-200
400
250
TEBAL PELAT TANGGA = 120 mm
semua satuan dalam mm
PENULANGAN TANGGA



GAMBAR PENULANGAN BALOK BORDES



POTONGAN A-A



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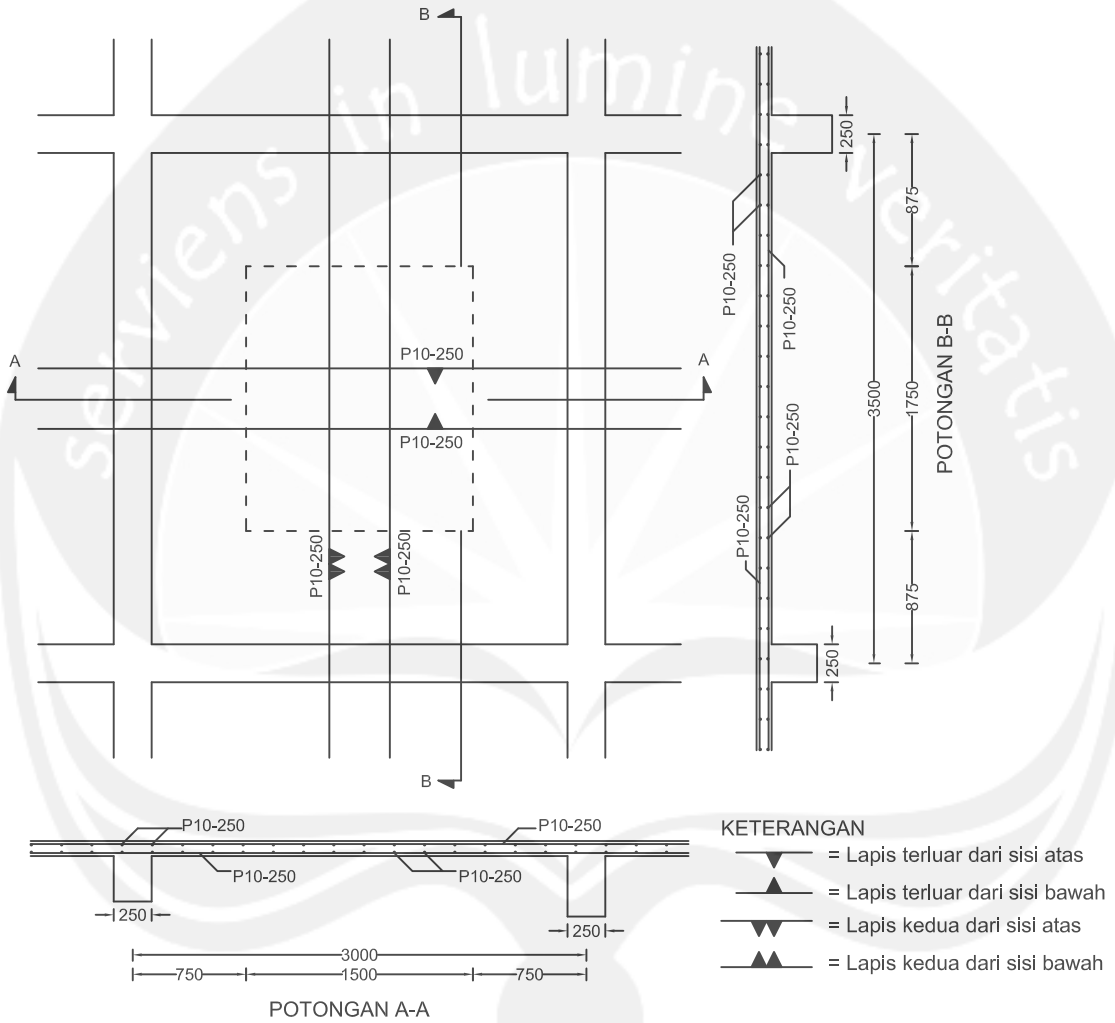

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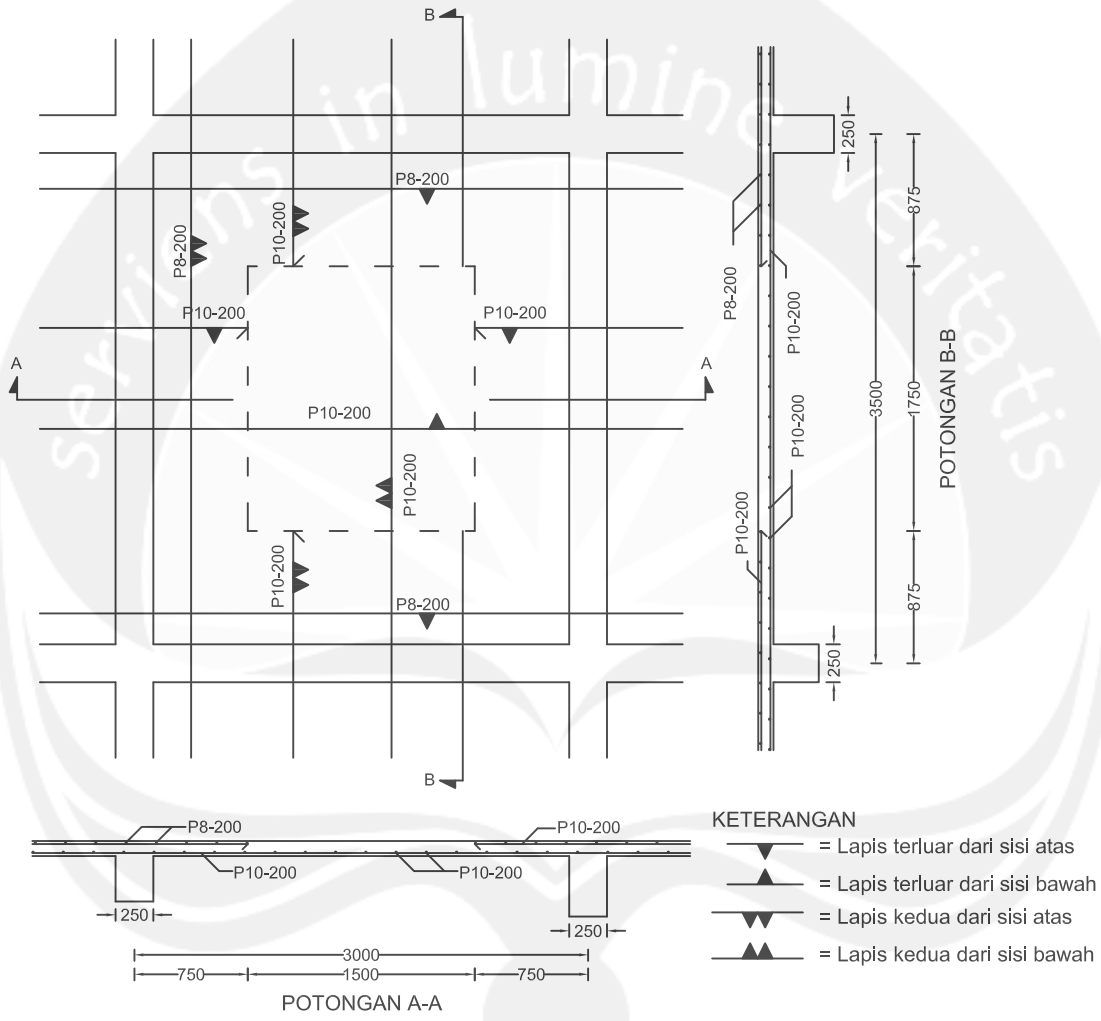
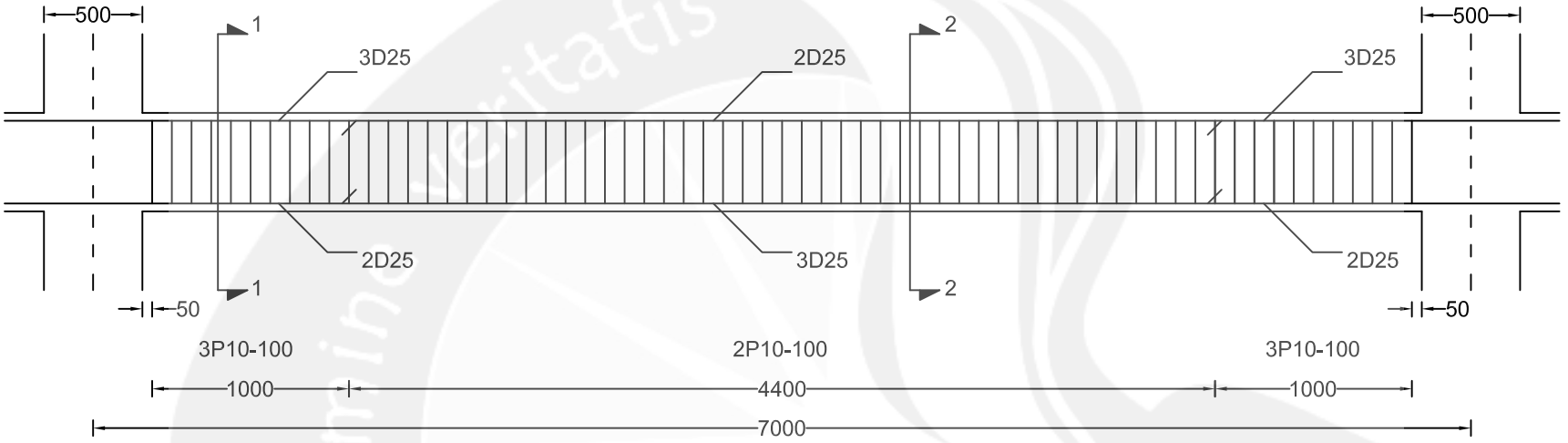
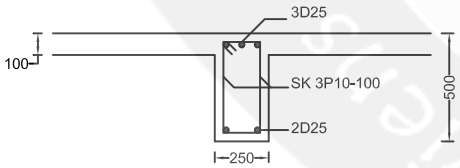


GAMBAR PENULANGAN PELAT LANTAI

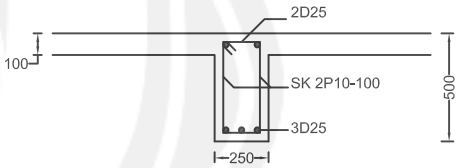
SKALA 1 : 50



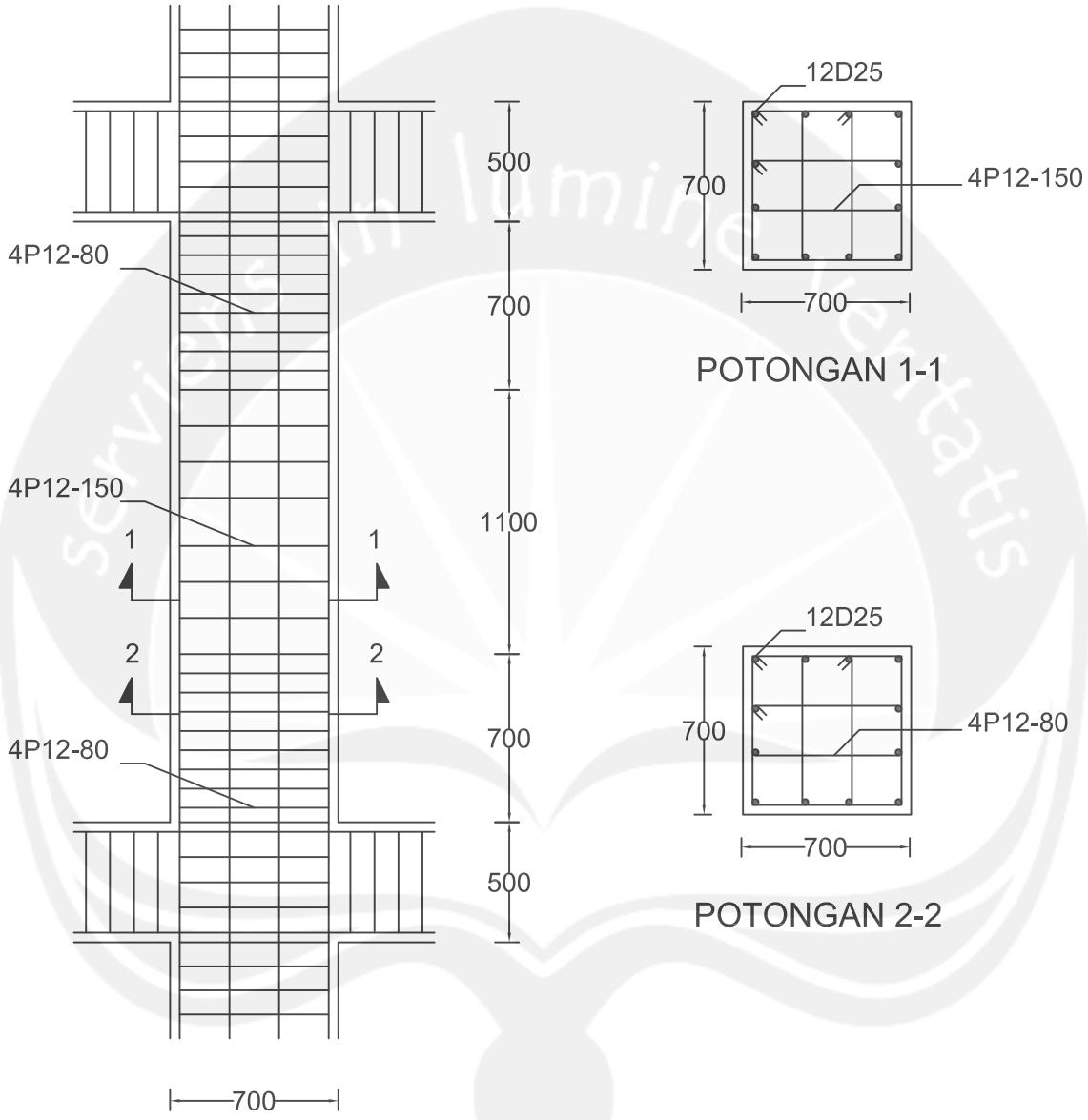
GAMBAR PENULANGAN BALOK INDUK



POTONGAN 1-1



POTONGAN 2-2



GAMBAR PENULANGAN KOLOM

S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
STORY9	None	3,000	27,000
STORY8	STORY9	3,000	24,000
STORY7	STORY9	3,000	21,000
STORY6	STORY9	3,000	18,000
STORY5	STORY9	3,000	15,000
STORY4	STORY9	3,000	12,000
STORY3	STORY9	3,000	9,000
STORY2	STORY9	3,000	6,000
STORY1	STORY9	3,000	3,000
BASE	None		0,000

M A S S S O U R C E D A T A

MASS FROM	LATERAL MASS ONLY	LUMP MASS AT STORIES
Loads	Yes	Yes

M A S S S O U R C E L O A D S

LOAD	MULTIPLIER
DEAD	1,0000
LIVE	0,3000
RAIN	0,3000

D I A P H R A G M M A S S D A T A

STORY	DIAPHRAGM	MASS-X	MASS-Y	MMI	X-M	Y-M
STORY9	D9	806,9801	806,9801	190424,6051	21,000	15,000
STORY8	D8	1002,6853	1002,6853	260166,6355	21,151	14,838
STORY7	D7	1019,3342	1019,3342	265178,7840	21,149	14,841
STORY6	D6	1035,9832	1035,9832	270190,9067	21,146	14,843
STORY5	D5	1035,9832	1035,9832	270190,9067	21,146	14,843
STORY4	D4	1055,6593	1055,6593	276114,2928	21,144	14,846
STORY3	D3	1075,3354	1075,3354	282037,6465	21,141	14,849
STORY2	D2	1098,0386	1098,0386	288872,2473	21,138	14,852
STORY1	D1	1097,4157	1097,4157	292093,0334	20,915	14,980

M A T E R I A L P R O P E R T Y D A T A

MATERIAL NAME	MATERIAL TYPE	DESIGN TYPE	MATERIAL DIR/PLANE	MODULUS OF ELASTICITY	POISSON'S RATIO	THERMAL COEFF	SHEAR MODULUS
STEEL	Iso	Steel	All	199947979	0,3000	1,1700E-05	76903069
CONC	Iso	Concrete	All	25742960	0,2000	9,9000E-06	10726233
OTHER	Iso	None	All	199947979	0,3000	1,1700E-05	76903069

M A T E R I A L P R O P E R T Y M A S S A N D W E I G H T

MATERIAL NAME	MASS PER UNIT VOL	WEIGHT PER UNIT VOL
STEEL	7,8271E+00	7,6820E+01
CONC	2,4010E+00	2,3560E+01
OTHER	7,8271E+00	7,6820E+01

M A T E R I A L D E S I G N D A T A F O R C O N C R E T E M A T E R I A L S

MATERIAL NAME	LIGHTWEIGHT CONCRETE	CONCRETE FC	REBAR FY	REBAR FYS	LIGHTWT REDUC FACT
CONC	No	30000,000	400000,000	240000,000	N/A

S H E L L S E C T I O N P R O P E R T Y D A T A

SHELL SECTION	MATERIAL NAME	SHELL TYPE	MEMBRANE THICK	BENDING THICK	TOTAL WEIGHT	TOTAL MASS
WALL1	CONC	Shell-Thin	0,2500	0,2500	0,0000	0,0000
SLAB1	CONC	Shell-Thin	0,2500	0,2500	0,0000	0,0000
DECK1	CONC	Membrane	0,0889	0,0889	0,0000	0,0000
LANTAI	CONC	Membrane	0,1200	0,1200	27429,4944	2795,3402
ATAP	CONC	Membrane	0,1200	0,1200	3562,2720	363,0312

S T A T I C L O A D C A S E S

STATIC CASE	TYPE	AUTO LAT LOAD	SELF WT MULTIPLIER
DEAD	DEAD	N/A	1,0000
LIVE	LIVE	N/A	0,0000
RAIN	LIVE	N/A	0,0000
EX	QUAKE	USER	0,0000
EY	QUAKE	USER	0,0000

CASE	TYPE	LOAD	MULTIPLIER				
STORY	DIAPHRAGM		FX	FY	MZ	X	Y	Z
COMB1	ADD	DEAD	Static	1,4000				
COMB2	ADD	DEAD	Static	1,2000				
		LIVE	Static	1,6000				
		RAIN	Static	0,5000				
COMB3	ADD	DEAD	Static	1,2000				
		LIVE	Static	1,0000				
		EX	Static	1,0000				
		EY	Static	0,3000				
COMB4	ADD	DEAD	Static	1,2000				
		LIVE	Static	1,0000				
		EX	Static	-1,0000				
		EY	Static	0,3000				
COMB5	ADD	DEAD	Static	1,2000				
		LIVE	Static	1,0000				

	EX	Static	1,0000	
	EY	Static	-0,3000	
COMB6	ADD	DEAD	Static	1,2000
	LIVE	Static	1,0000	
	EX	Static	-1,0000	
	EY	Static	-0,3000	
COMB7	ADD	DEAD	Static	1,2000
	LIVE	Static	1,0000	
	EX	Static	0,3000	
	EY	Static	1,0000	
COMB8	ADD	DEAD	Static	1,2000
	LIVE	Static	1,0000	
	EX	Static	-0,3000	
	EY	Static	1,0000	
COMB9	ADD	DEAD	Static	1,2000
	LIVE	Static	1,0000	
	EX	Static	0,3000	
	EY	Static	-1,0000	
COMB10	ADD	DEAD	Static	1,2000
	LIVE	Static	1,0000	
	EX	Static	-0,3000	
	EY	Static	-1,0000	
COMB11	ADD	DEAD	Static	0,9000
	EX	Static	1,0000	
COMB12	ADD	DEAD	Static	0,9000
	EX	Static	-1,0000	
COMB13	ADD	DEAD	Static	0,9000
	EX	Static	1,0000	
COMB14	ADD	DEAD	Static	0,9000
	EX	Static	-1,0000	
COMB15	ADD	DEAD	Static	0,9000
	EX	Static	0,3000	
COMB16	ADD	DEAD	Static	0,9000
	EX	Static	-0,3000	
COMB17	ADD	DEAD	Static	0,9000
	EX	Static	0,3000	
COMB18	ADD	DEAD	Static	0,9000
	EX	Static	-0,3000	
ENVE	ENVE	COMB1	Combo	1,0000
	COMB2	Combo	1,0000	
	COMB3	Combo	1,0000	
	COMB4	Combo	1,0000	
	COMB5	Combo	1,0000	
	COMB6	Combo	1,0000	
	COMB7	Combo	1,0000	
	COMB8	Combo	1,0000	
	COMB9	Combo	1,0000	
	COMB10	Combo	1,0000	
	COMB11	Combo	1,0000	
	COMB12	Combo	1,0000	
	COMB13	Combo	1,0000	
	COMB14	Combo	1,0000	
	COMB15	Combo	1,0000	
	COMB16	Combo	1,0000	
	COMB17	Combo	1,0000	

COMB18 Combo 1,0000

A U T O S E I S M I C U S E R
Case: EX

AUTO SEISMIC INPUT DATA

Direction: X
Typical Eccentricity = 5%
Eccentricity Overrides: No

Period Calculation: Program Calculated
Ct = 0,035 (in feet units)

Top Story: STORY9
Bottom Story: BASE

C = 0,06278586
K = 1

AUTO SEISMIC CALCULATION FORMULAS

V = C W

AUTO SEISMIC CALCULATION RESULTS

W Used = 90490,03

V Used = 0,0628W = 5681,49

AUTO SEISMIC STORY FORCES AND RESULTANT LOCATION

STORY	FX	FY	X	Y	Z
STORY9	926,08	0,00	21,000	15,000	27,000
STORY8	1022,81	0,00	21,151	14,838	24,000
STORY7	909,82	0,00	21,149	14,841	21,000
STORY6	792,58	0,00	21,146	14,843	18,000
STORY5	660,49	0,00	21,146	14,843	15,000
STORY4	538,42	0,00	21,144	14,846	12,000
STORY3	411,34	0,00	21,141	14,849	9,000
STORY2	280,02	0,00	21,138	14,852	6,000
STORY1	139,93	0,00	20,915	14,980	3,000

AUTO SEISMIC DIAPHRAGM FORCES AND DIAPHRAGM CENTER OF MASS/LOAD

STORY	DIAPHRAGM	FX	FY	MZ	X	Y	Z
STORY9	D9	926,08	0,00	0,000	21,000	15,000	27,000
STORY8	D8	1022,81	0,00	0,000	21,151	14,838	24,000
STORY7	D7	909,82	0,00	0,000	21,149	14,841	21,000
STORY6	D6	792,58	0,00	0,000	21,146	14,843	18,000
STORY5	D5	660,49	0,00	0,000	21,146	14,843	15,000
STORY4	D4	538,42	0,00	0,000	21,144	14,846	12,000
STORY3	D3	411,34	0,00	0,000	21,141	14,849	9,000
STORY2	D2	280,02	0,00	0,000	21,138	14,852	6,000
STORY1	D1	139,93	0,00	0,000	20,915	14,980	3,000

A U T O S E I S M I C U S E R
Case: EY

AUTO SEISMIC INPUT DATA

Direction: Y
Typical Eccentricity = 5%
Eccentricity Overrides: No

Period Calculation: Program Calculated
Ct = 0,035 (in feet units)

Top Story: STORY9
Bottom Story: BASE

C = 0,06278586
K = 1

AUTO SEISMIC CALCULATION FORMULAS

V = C W

AUTO SEISMIC CALCULATION RESULTS

W Used = 90490,03

V Used = 0,0628W = 5681,49

AUTO SEISMIC STORY FORCES AND RESULTANT LOCATION

STORY	FX	FY	X	Y	Z
STORY9	0,00	926,08	21,000	15,000	27,000
STORY8	0,00	1022,81	21,151	14,838	24,000
STORY7	0,00	909,82	21,149	14,841	21,000
STORY6	0,00	792,58	21,146	14,843	18,000
STORY5	0,00	660,49	21,146	14,843	15,000
STORY4	0,00	538,42	21,144	14,846	12,000
STORY3	0,00	411,34	21,141	14,849	9,000
STORY2	0,00	280,02	21,138	14,852	6,000
STORY1	0,00	139,93	20,915	14,980	3,000

AUTO SEISMIC DIAPHRAGM FORCES AND DIAPHRAGM CENTER OF MASS/LOAD

STORY	DIAPHRAGM	FX	FY	MZ	X	Y	Z
STORY9	D9	0,00	926,08	0,000	21,000	15,000	27,000
STORY8	D8	0,00	1022,81	0,000	21,151	14,838	24,000
STORY7	D7	0,00	909,82	0,000	21,149	14,841	21,000
STORY6	D6	0,00	792,58	0,000	21,146	14,843	18,000
STORY5	D5	0,00	660,49	0,000	21,146	14,843	15,000
STORY4	D4	0,00	538,42	0,000	21,144	14,846	12,000
STORY3	D3	0,00	411,34	0,000	21,141	14,849	9,000
STORY2	D2	0,00	280,02	0,000	21,138	14,852	6,000
STORY1	D1	0,00	139,93	0,000	20,915	14,980	3,000

SAP2000 v7.40 File: TANGGA KN-m Units

S T A T I C L O A D C A S E S

STATIC CASE	CASE TYPE	SELF WT FACTOR
LOAD1	DEAD	0,0000

SAP2000 v7.40 File: TANGGA KN-m Units

J O I N T D A T A

JOINT	GLOBAL-X	GLOBAL-Y	GLOBAL-Z	RESTRAINTS	ANGLE-A	ANGLE-B	ANGLE-C
1	0,00000	0,00000	0,00000	1 1 1 0 0 0	0,000	0,000	0,000
2	2,70000	0,00000	1,50000	0 0 0 0 0 0	0,000	0,000	0,000
3	5,00000	0,00000	1,50000	1 1 1 0 0 0	0,000	0,000	0,000

SAP2000 v7.40 File: TANGGA KN-m Units

F R A M E E L E M E N T D A T A

FRAME	JNT-1	JNT-2	SECTION	ANGLE	RELEASES	SEGMENTS	R1	R2	FACTOR LENGTH
1	1	2	FSEC1	0,000	000000	2	0,000	0,000	1,000 3,089
2	2	3	FSEC1	0,000	000000	4	0,000	0,000	1,000 2,300

SAP2000 v7.40 File: TANGGA KN-m Units

F R A M E S P A N D I S T R I B U T E D L O A D S Load Case LOAD1

FRAME	TYPE	DIRECTION	DISTANCE-A	VALUE-A	DISTANCE-B	VALUE-B
1	FORCE	GLOBAL-Z	0,0000	-12,4426	1,0000	-12,4426
2	FORCE	GLOBAL-Z	0,0000	-10,2480	1,0000	-10,2480

SAP2000 v7.40 File: TANGGA KN-m Units

J O I N T D I S P L A C E M E N T S

JOINT	LOAD	U1	U2	U3	R1	R2	R3
1	LOAD1	0,0000	0,0000	0,0000	0,0000	1,267E-03	0,0000
2	LOAD1	4,315E-05	0,0000	-2,112E-04	0,0000	-4,150E-04	0,0000
3	LOAD1	0,0000	0,0000	0,0000	0,0000	-3,072E-04	0,0000

SAP2000 v7.40 File: TANGGA KN-m Units

F R A M E E L E M E N T F O R C E S

FRAME	LOAD	LOC	P	V2	V3	T	M2	M3
1	LOAD1	0,00	-87,49	-13,66	0,00	0,00	0,00	0,00
		1,54	-78,16	3,14	0,00	0,00	0,00	8,13
		3,09	-68,82	19,93	0,00	0,00	0,00	-9,69
2	LOAD1	0,00	-69,84	-16,00	0,00	0,00	0,00	-9,69
		5,8E-01	-69,84	-10,11	0,00	0,00	0,00	-2,18
		1,15	-69,84	-4,21	0,00	0,00	0,00	1,93
		1,73	-69,84	1,68	0,00	0,00	0,00	2,66
		2,30	-69,84	7,57	0,00	0,00	0,00	0,00

ETABS v7.10 File: SKRIPSI GEMPA STATIS TABEL KN-m Units

COMB1	ADD	DEAD	Static	1.4000
COMB2	ADD	DEAD	Static	1.2000
		LIVE	Static	1.6000
		RAIN	Static	0.5000
COMB3	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	1.0000
		EY	Static	0.3000
COMB4	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	-1.0000
		EY	Static	0.3000
COMB5	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	1.0000
		EY	Static	-0.3000
COMB6	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	-1.0000
		EY	Static	-0.3000
COMB7	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	0.3000
		EY	Static	1.0000
COMB8	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	-0.3000

		EY	Static	1.0000
COMB9	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	0.3000
		EY	Static	-1.0000
COMB10	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		EX	Static	-0.3000
		EY	Static	-1.0000
COMB11	ADD	DEAD	Static	0.9000
		EX	Static	1.0000
COMB12	ADD	DEAD	Static	0.9000
		EX	Static	-1.0000
COMB13	ADD	DEAD	Static	0.9000
		EX	Static	1.0000
COMB14	ADD	DEAD	Static	0.9000
		EX	Static	-1.0000
COMB15	ADD	DEAD	Static	0.9000
		EX	Static	0.3000
COMB16	ADD	DEAD	Static	0.9000
		EX	Static	-0.3000
COMB17	ADD	DEAD	Static	0.9000
		EX	Static	0.3000
COMB18	ADD	DEAD	Static	0.9000
		EX	Static	-0.3000

ETABS v7.10 File: SKRIPSI GEMPA STATIS TABEL KN-m Units

C O L U M N F O R C E E N V E L O P E S

STORY	COLUMN	ITEM	P	V2	V3	T	M2	M3
STORY9	C25	Min Value	-376.51	-22.04	-35.09	-0.012	-49.244	-52.556
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB8	COMB3
		Max Value	-208.42	39.57	23.45	0.021	51.469	49.978
		Max Case	COMB13	COMB3	COMB8	COMB3	COMB9	COMB14
STORY8	C25	Min Value	-772.13	-41.31	-64.53	-0.058	-68.978	-109.039
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB8	COMB3
		Max Value	-403.78	75.14	43.55	0.048	93.444	78.805
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB9	COMB3
STORY7	C25	Min Value	-1178.01	-67.45	-95.81	-0.188	-107.782	-150.418
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB8	COMB3
		Max Value	-600.48	107.27	70.81	0.154	134.754	117.762
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB9	COMB3
STORY6	C25	Min Value	-1583.82	-88.51	-114.71	-0.248	-139.885	-159.309
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB3
		Max Value	-802.91	124.94	92.02	0.207	146.886	153.050
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB9	COMB3
STORY5	C25	Min Value	-1988.66	-105.69	-129.18	-0.297	-169.711	-163.784
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB3
		Max Value	-1004.86	138.03	109.15	0.250	153.244	181.282
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB9	COMB3
STORY4	C25	Min Value	-2403.91	-120.31	-150.70	-0.565	-228.579	-188.638
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB14
		Max Value	-1207.86	161.80	125.05	0.470	191.953	248.159
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB8	COMB3

STORY3	C25	Min Value	-2818.37	-128.03	-151.26	-0.535	-291.983	-269.403
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB14
		Max Value	-1417.42	159.76	131.72	0.443	264.922	314.124
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB8	COMB3
STORY2	C25	Min Value	-3244.54	-130.75	-161.56	-0.704	-440.629	-413.735
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB14
		Max Value	-1628.21	173.80	134.90	0.578	402.039	477.872
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB8	COMB3
STORY1	C25	Min Value	-3669.31	-132.75	-147.70	-0.315	-643.402	-656.353
		Min Case	COMB2	COMB14	COMB9	COMB6	COMB9	COMB14
		Max Value	-1846.42	153.88	134.50	0.263	634.234	675.392
		Max Case	COMB14	COMB3	COMB8	COMB3	COMB8	COMB5