

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH Y (BA-TYPE 3)

Dimensi Balok Anak = (400x600)

b blk = 400 mm

b klm = 500 mm

fc' 22.5 MPa

h blk = 600 mm

h klm = 500 mm

fy 350 MPa

Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen

$$q=30.(1-4/3.((p-p')/pb)) = 10 \%$$

PORTAL ARAH Y (AS 12⁰)

FRAME	Mu awal KNm	Mu Distrb	Mu/φ KNm	pb	ρ max	ρ min	ρ pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	ρ ada pakal	ρ pakal	Aspru mm ²	Ø mm	A is mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Check
Btg A-B	T 251.35	226.2	282.8	0.029	0.022	0.004	0.011	18.3	3.463	452	500	T.Seb	2.83	0.009	0.009	1797	16	201.06	8.94	9	1809.56	82.79	290.46	Oke
Lt 1	L 120.46	145.6	182.0	0.029	0.022	0.004	0.011	18.3	3.463	362	500	T.Seb	1.82	0.006	0.006	1156	16	201.06	5.75	6	1206.37	55.19	199.46	Oke
Btg A-B	T 206.07	185.5	231.8	0.029	0.022	0.004	0.011	18.3	3.463	409	500	T.Seb	2.32	0.007	0.007	1473	16	201.06	7.33	8	1608.50	73.59	260.77	Oke
Lt 2	L 87.65	108.3	135.3	0.029	0.022	0.004	0.011	18.3	3.463	313	500	T.Seb	1.35	0.004	0.004	860	16	201.06	4.28	5	1005.31	45.99	167.84	Oke
Btg A-B	T 133.92	120.5	150.7	0.029	0.022	0.004	0.011	18.3	3.463	330	500	T.Seb	1.51	0.005	0.005	957	16	201.06	4.76	5	1005.31	45.99	167.84	Oke
Lt 3	L 66.00	79.4	99.2	0.029	0.022	0.004	0.011	18.3	3.463	268	500	T.Seb	0.99	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg A-B	T 39.00	35.1	43.9	0.029	0.022	0.004	0.011	18.3	3.463	178	500	T.Seb	0.44	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Lt 4	L 28.09	32.0	40.0	0.029	0.022	0.004	0.011	18.3	3.463	170	500	T.Seb	0.40	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH Y (BA-TYPE 3)

Dimensi Balok Anak = (400x600)

b blk = 400 mm

b klm = 500 mm

fc' 22.5 MPa

h blk = 600 mm

h klm = 500 mm

fy 350 MPa

Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen

$$q=30.(1-4/3.((p-p')/pb)) = 10 \%$$

PORTAL ARAH Y (AS 13⁰)

FRAME	Mu awal KNm	Mu Distrb	Mu/φ KNm	pb	ρ max	ρ min	ρ pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	ρ ada pakal	ρ pakal	Aspru mm ²	Ø mm	A is mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Check
Btg A-B	T 224.83	202.3	252.9	0.029	0.022	0.004	0.011	18.3	3.463	427	500	T.Seb	2.53	0.008	0.008	1607	16	201.06	7.99	8	1608.50	73.59	260.77	Oke
Lt 1	L 165.75	188.2	235.3	0.029	0.022	0.004	0.011	18.3	3.463	412	500	T.Seb	2.35	0.007	0.007	1495	16	201.06	7.44	8	1608.50	73.59	260.77	Oke
Btg A-B	T 177.62	159.9	199.8	0.029	0.022	0.004	0.011	18.3	3.463	380	500	T.Seb	2.00	0.006	0.006	1270	16	201.06	6.31	7	1407.44	64.39	230.44	Oke
Lt 2	L 120.04	137.8	172.3	0.029	0.022	0.004	0.011	18.3	3.463	353	500	T.Seb	1.72	0.005	0.005	1094	16	201.06	5.44	6	1206.37	55.19	199.46	Oke
Btg A-B	T 103.29	93.0	116.2	0.029	0.022	0.004	0.011	18.3	3.463	290	500	T.Seb	1.16	0.004	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Lt 3	L 52.44	62.8	78.5	0.029	0.022	0.004	0.011	18.3	3.463	238	500	T.Seb	0.78	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg A-B	T 37.22	33.5	41.9	0.029	0.022	0.004	0.011	18.3	3.463	174	500	T.Seb	0.42	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Lt 4	L 11.98	15.7	19.5	0.029	0.022	0.004	0.011	18.3	3.463	119	500	T.Seb	0.20	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN M nak - BALOK ANAK TANGGA

PORTAL ARAH Y (AS 2⁰)

TINJAUAN ARAH Y

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ^1 (desak)	$\rho 1$ ($\rho - \rho^1$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	8 D 16	2 D 16	8 D 16	1608.5	402.1	1608.5	0.008	0.0020	0.0060	0.0080	324.02	324.02	51.10	205.28	52.12	257.40	2.61	260.77
Btg A-B Lt 2	7 D 16	2 D 16	6 D 16	1407.4	402.1	1206.4	0.007	0.0020	0.0050	0.0060	508.83	350.00	45.99	167.84	56.30	224.13	1.99	199.46
Btg A-B Lt 3	4 D 16	2 D 16	4 D 16	804.2	402.1	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg A-B Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.1	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PORTAL ARAH Y (AS 3⁰)

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ^1 (desak)	$\rho 1$ ($\rho - \rho^1$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	9 D 16	2 D 16	6 D 16	1809.6	402.12	1206.4	0.009	0.0020	0.0070	0.0060	192.02	192.02	35.33	268.24	30.89	299.13	1.99	199.46
Btg A-B Lt 2	8 D 16	2 D 16	5 D 16	1608.5	402.12	1005.3	0.008	0.0020	0.0060	0.0050	324.02	324.02	51.10	205.28	52.12	257.40	1.68	167.84
Btg A-B Lt 3	5 D 16	2 D 16	4 D 16	1005.3	402.12	804.2	0.005	0.0020	0.0030	0.0040	1248.04	350.00	27.60	102.64	56.30	158.94	1.36	135.56
Btg A-B Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PORTAL ARAH Y (AS 5)

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ^1 (desak)	$\rho 1$ ($\rho - \rho^1$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	11 D 16	2 D 16	9 D 16	2211.7	402.12	1809.6	0.011	0.0020	0.0090	0.0090	16.01	16.01	3.79	382.37	2.58	384.95	2.90	290.46
Btg A-B Lt 2	10 D 16	2 D 16	8 D 16	2010.6	402.12	1608.5	0.010	0.0020	0.0080	0.0080	93.02	93.02	19.56	326.64	14.96	341.60	2.61	260.77
Btg A-B Lt 3	8 D 16	2 D 16	6 D 16	1608.5	402.12	1206.4	0.008	0.0020	0.0060	0.0060	324.02	324.02	51.10	205.28	52.12	257.40	1.99	199.46
Btg A-B Lt 4	5 D 16	2 D 16	4 D 16	1005.3	402.12	804.2	0.005	0.0020	0.0030	0.0040	1248.04	350.00	27.60	102.64	56.30	158.94	1.36	135.56

PORTAL ARAH Y (AS 11)

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ^1 (desak)	$\rho 1$ ($\rho - \rho^1$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	11 D 16	2 D 16	10 D 16	2211.7	402.12	2010.6	0.011	0.0020	0.0090	0.0101	16.01	16.01	3.79	382.37	2.58	384.95	3.19	319.49
Btg A-B Lt 2	10 D 16	2 D 16	8 D 16	2010.6	402.12	1608.5	0.010	0.0020	0.0080	0.0080	93.02	93.02	19.56	326.64	14.96	341.60	2.61	260.77
Btg A-B Lt 3	8 D 16	2 D 16	6 D 16	1608.5	402.12	1206.4	0.008	0.0020	0.0060	0.0060	324.02	324.02	51.10	205.28	52.12	257.40	1.99	199.46
Btg A-B Lt 4	5 D 16	2 D 16	4 D 16	1005.3	402.12	804.2	0.005	0.0020	0.0030	0.0040	1248.04	350.00	27.60	102.64	56.30	158.94	1.36	135.56

PORTAL ARAH Y (AS 12⁰)

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho - \rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm ²	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	9 D 16	2 D 16	6 D 16	1809.6	402.12	1206.4	0.009	0.0020	0.0070	0.0060	192.02	192.02	35.33	268.24	30.89	299.13	1.99	199.46
Btg A-B Lt 2	8 D 16	2 D 16	5 D 16	1608.5	402.12	1005.3	0.008	0.0020	0.0060	0.0050	324.02	324.02	51.10	205.28	52.12	257.40	1.68	167.84
Btg A-B Lt 3	5 D 16	2 D 16	4 D 16	1005.3	402.12	804.2	0.005	0.0020	0.0030	0.0040	1248.04	350.00	27.60	102.64	56.30	158.94	1.36	135.56
Btg A-B Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PORTAL ARAH Y (AS 13⁰)

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho - \rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakai Mpa	a mm ²	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg A-B Lt 1	8 D 16	2 D 16	8 D 16	1608.5	402.12	1608.5	0.008	0.0020	0.0060	0.0080	324.02	324.02	51.10	205.28	52.12	257.40	2.61	260.77
Btg A-B Lt 2	7 D 16	2 D 16	6 D 16	1407.4	402.12	1206.4	0.007	0.0020	0.0050	0.0060	508.83	350.00	45.99	167.84	56.30	224.13	1.99	199.46
Btg A-B Lt 3	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg A-B Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

**TABEL TULANGAN GESER BALOK ANAK PORTAL TANGGA
TINJAUAN ARAH Y**

PORTAL ARAH Y (AS 2⁰)

$f_c = 22.5 \text{ Mpa}$ $L = 4 \text{ m}$ $b \text{ klm} = 500 \text{ mm}$
 $f_y \text{ TP} = 300 \text{ Mpa}$ $\emptyset \text{ tul} = 10 \text{ mm}$ $h \text{ klm} = 500 \text{ mm}$
 $f_y \text{ TD} = 350 \text{ Mpa}$

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	51.59	6.93	400	600	500	257.40	260.77	58.52	190.99	153.98	10	256.63	91.81	P10- 90	102.16	158.11	12.15	250.00	P10- 200
Btg A-B Lt 2	3.5	55.79	7.71	400	600	500	224.13	199.46	63.5	172.57	142.32	10	237.20	99.34	P10- 90	99.96	158.11	8.48	250.00	P10- 200
Btg A-B Lt 3	3.5	52.23	5.62	400	600	500	125.37	135.56	57.85	125.98	107.34	10	178.90	125.00	P10- 120	81.24	158.11	22.71	250.00	P10- 200
Btg A-B Lt 4	3.5	38.36	6.08	400	600	500	125.37	135.56	44.44	111.90	93.26	10	155.43	125.00	P10- 120	67.16	158.11	46.17	250.00	P10- 200

PORTAL ARAH Y (AS 3⁰)

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	118.88	6.79	400	600	500	299.13	199.46	125.67	256.60	220.99	10	368.31	63.97	P10- 60	171.13	158.11	127.10	185.38	P10- 180
Btg A-B Lt 2	3.5	121.52	7.32	400	600	500	257.40	167.84	128.84	241.59	211.22	10	352.03	66.93	P10- 60	168.69	158.11	123.04	191.49	P10- 190
Btg A-B Lt 3	3.5	117.57	5.15	400	600	500	158.94	135.56	122.72	202.48	181.45	10	302.41	77.91	P10- 70	152.00	158.11	95.21	247.47	P10- 200
Btg A-B Lt 4	3.5	53.83	6.49	400	600	500	125.37	135.56	60.32	128.57	109.93	10	183.22	125.00	P10- 120	83.84	158.11	18.38	250.00	P10- 200

PORTAL ARAH Y (AS 5)

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	123.19	5.78	400	600	500	384.95	290.46	128.97	304.27	256.03	10	426.71	55.22	P10- 50	188.49	158.11	156.03	151.01	P10- 150
Btg A-B Lt 2	3.5	141.57	6.79	400	600	500	341.60	260.77	148.36	306.37	263.34	10	438.91	53.68	P10- 50	203.11	158.11	180.40	130.61	P10- 130
Btg A-B Lt 3	3.5	144.58	6.69	400	600	500	257.40	199.46	151.27	273.05	240.42	10	400.69	58.80	P10- 50	194.73	158.11	166.44	141.57	P10- 140
Btg A-B Lt 4	3.5	128.73	5.52	400	600	500	158.94	135.56	134.25	214.59	193.55	10	322.59	73.04	P10- 70	164.10	158.11	115.39	204.19	P10- 200

PORTAL ARAH Y (AS 11)

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	122.08	5.31	400	600	500	384.95	310.49	127.39	309.87	259.55	10	432.59	54.47	P10- 50	189.11	158.11	157.07	150.01	P10- 150
Btg A-B Lt 2	3.5	141.72	6.76	400	600	500	341.60	260.77	148.48	306.50	263.47	10	439.12	53.66	P10- 50	203.23	158.11	180.61	130.46	P10- 130
Btg A-B Lt 3	3.5	144.69	6.7	400	600	500	257.40	199.45	151.39	273.18	240.54	10	400.90	58.77	P10- 50	194.86	158.11	166.65	141.39	P10- 140
Btg A-B Lt 4	3.5	129.56	5.59	400	600	500	158.94	135.56	135.15	215.53	194.50	10	324.16	72.69	P10- 70	165.05	158.11	116.96	201.44	P10- 200

PORTAL ARAH Y (AS 12⁰)

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	119.07	6.75	400	600	500	299.13	199.46	125.818	256.76	221.14	10	368.57	63.93	P10- 60	171.28	158.11	127.36	185.00	P10- 180
Btg A-B Lt 2	3.5	121.56	7.32	400	600	500	257.40	167.84	128.88	241.63	211.26	10	352.10	66.92	P10- 60	168.74	158.11	123.11	191.39	P10- 190
Btg A-B Lt 3	3.5	117.7	5.14	400	600	500	158.94	135.56	122.84	202.61	181.57	10	302.62	77.86	P10- 70	152.12	158.11	95.42	246.92	P10- 200
Btg A-B Lt 4	3.5	53.64	6.5	400	600	500	125.37	135.56	60.14	128.38	109.74	10	182.91	125.00	P10- 120	83.65	158.11	18.70	250.00	P10- 200

PORTAL ARAH Y (AS 13⁰)

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Btg A-B Lt 1	3.5	51.66	6.84	400	600	500	257.40	260.77	58.5	190.97	153.96	10	256.59	91.83	P10- 90	102.14	158.11	12.12	250.00	P10- 200
Btg A-B Lt 2	3.5	55.87	7.71	400	600	500	224.13	199.46	63.58	172.66	142.40	10	237.34	99.28	P10- 90	100.04	158.11	8.62	250.00	P10- 200
Btg A-B Lt 3	3.5	52.28	5.62	400	600	500	125.37	135.56	57.9	126.03	107.39	10	178.99	125.00	P10- 120	81.30	158.11	22.62	250.00	P10- 200
Btg A-B Lt 4	3.5	38.42	6.1	400	600	500	125.37	135.56	44.52	111.98	93.34	10	155.57	125.00	P10- 120	67.25	158.11	46.03	250.00	P10- 200

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH X

Dimensi Balok Anak = (400x600) b blk = 400 mm b klm = 500 mm
 fc' 22.5 MPa h blk = 600 mm h klm = 500 mm
 fy 350 MPa Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen $q=30.(1-4/3.((p-p')/pb)) = 10 \%$

PORTAL ARAH X (AS A) PANJANG BATANG 4 M

FRAME		Mu awal KNm	Mu Distrb	Mu/φ KNm	pb	p max	p min	p pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	p ada	p pakal	Asprtu mm ²	Ø mm	A 1Ø mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Check
Btg 2 ⁰ -3 ⁰ Lt 1	T	83.19	74.9	93.6	0.029	0.022	0.004	0.011	18.3	3.463	260	500	T.Seb	0.94	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	46.39	54.7	68.4	0.029	0.022	0.004	0.011	18.3	3.463	222	500	T.Seb	0.68	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 2	T	53.34	48.0	60.0	0.029	0.022	0.004	0.011	18.3	3.463	208	500	T.Seb	0.60	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	23.23	28.6	35.7	0.029	0.022	0.004	0.011	18.3	3.463	161	500	T.Seb	0.36	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 3	T	24.95	22.5	28.1	0.029	0.022	0.004	0.011	18.3	3.463	142	500	T.Seb	0.28	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	14.23	16.7	20.9	0.029	0.022	0.004	0.011	18.3	3.463	123	500	T.Seb	0.21	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 4	T	19.11	17.2	21.5	0.029	0.022	0.004	0.011	18.3	3.463	125	500	T.Seb	0.21	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	14.01	15.9	19.9	0.029	0.022	0.004	0.011	18.3	3.463	120	500	T.Seb	0.20	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH X

Dimensi Balok Anak = (400x600) b blk = 400 mm b klm = 500 mm
 fc' 22.5 MPa h blk = 600 mm h klm = 500 mm
 fy 350 MPa Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen $q=30.(1-4/3.((p-p')/pb)) = 10 \%$

PORTAL ARAH X (AS A) PANJANG BATANG 5,5 M

FRAME		Mu awal KNm	Mu Distrb	Mu/φ KNm	pb	p max	p min	p pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	p ada	p pakal	Asprtu mm ²	Ø mm	A 1Ø mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Check
Btg 3 ⁰ -5 Lt 1	T	101.34	91.2	114.0	0.029	0.022	0.004	0.011	18.3	3.463	287	500	T.Seb	1.14	0.004	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	51.54	61.7	77.1	0.029	0.022	0.004	0.011	18.3	3.463	236	500	T.Seb	0.77	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 2	T	86.43	77.8	97.2	0.029	0.022	0.004	0.011	18.3	3.463	265	500	T.Seb	0.97	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	42.38	51.0	63.8	0.029	0.022	0.004	0.011	18.3	3.463	215	500	T.Seb	0.64	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 3	T	65.22	58.7	73.4	0.029	0.022	0.004	0.011	18.3	3.463	230	500	T.Seb	0.73	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	30.00	36.5	45.7	0.029	0.022	0.004	0.011	18.3	3.463	182	500	T.Seb	0.46	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 4	T	46.76	42.1	52.6	0.029	0.022	0.004	0.011	18.3	3.463	195	500	T.Seb	0.53	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	24.10	28.8	36.0	0.029	0.022	0.004	0.011	18.3	3.463	161	500	T.Seb	0.36	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH X

Dimensi Balok Anak = (400x600) b blk = 400 mm b klm = 500 mm
 fc' 22.5 MPa h blk = 600 mm h klm = 500 mm
 fy 350 MPa Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen $q=30.(1-4/3.((p-p')/pb)) = 10 \%$

PORTAL ARAH X (AS B) PANJANG BATANG 4 M

FRAME		Mu awal KNm	Mu Distrib	Mu/φ KNm	pb	p max	p min	p pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	p ada	p pakal	Asprtu mm ²	Ø mm	A t Ø mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Chec
Btg 2 ⁰ -3 ⁰ Lt 1	T	93.16	83.8	104.8	0.029	0.022	0.004	0.011	18.3	3.463	275	500	T.Seb	1.05	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	45.92	55.2	69.0	0.029	0.022	0.004	0.011	18.3	3.463	223	500	T.Seb	0.69	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 2	T	65.76	59.2	74.0	0.029	0.022	0.004	0.011	18.3	3.463	231	500	T.Seb	0.74	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	20.58	27.2	33.9	0.029	0.022	0.004	0.011	18.3	3.463	157	500	T.Seb	0.34	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 3	T	48.41	43.6	54.5	0.029	0.022	0.004	0.011	18.3	3.463	198	500	T.Seb	0.54	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	21.93	26.8	33.5	0.029	0.022	0.004	0.011	18.3	3.463	155	500	T.Seb	0.33	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 2 ⁰ -3 ⁰ Lt 4	T	21.08	19.0	23.7	0.029	0.022	0.004	0.011	18.3	3.463	131	500	T.Seb	0.24	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	15.14	17.2	21.6	0.029	0.022	0.004	0.011	18.3	3.463	125	500	T.Seb	0.22	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN TULANGAN BALOK ANAK TANGGA ARAH X

Dimensi Balok Anak = (400x600) b blk = 400 mm b klm = 500 mm
 fc' 22.5 MPa h blk = 600 mm h klm = 500 mm
 fy 350 MPa Øtul = 16 mm

Prosentase untuk menambah atau mengurangi pada distribusi momen $q=30.(1-4/3.((p-p')/pb)) = 10 \%$

PORTAL ARAH X (AS B) PANJANG BATANG 5,5 M

FRAME		Mu awal KNm	Mu Distrib	Mu/φ KNm	pb	p max	p min	p pakal	m mm	Rn perlu	d perlu	d ada mm	Tul Pakal	Rn baru	p ada	p pakal	Asprtu mm ²	Ø mm	A t Ø mm ²	n	Tul Pakal	Asada mm ²	a mm	Mn KNm	Chec
Btg 3 ⁰ -5 Lt 1	T	121.37	133.5	166.9	0.029	0.022	0.004	0.011	18.3	3.463	347	500	T.Seb	1.87	0.005	0.005	1060	16	201.06	5.27	6	1206.37	55.19	199.46	Oke
	L	100.00	87.9	109.8	0.029	0.022	0.004	0.011	18.3	3.463	282	500	T.Seb	1.10	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 2	T	86.41	77.8	97.2	0.029	0.022	0.004	0.011	18.3	3.463	265	500	T.Seb	0.97	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	63.83	72.5	90.6	0.029	0.022	0.004	0.011	18.3	3.463	256	500	T.Seb	0.91	0.003	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 3	T	50.41	45.4	56.7	0.029	0.022	0.004	0.011	18.3	3.463	202	500	T.Seb	0.57	0.002	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	26.98	32.0	40.0	0.029	0.022	0.004	0.011	18.3	3.463	170	500	T.Seb	0.40	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
Btg 3 ⁰ -5 Lt 4	T	16.04	14.4	18.0	0.029	0.022	0.004	0.011	18.3	3.463	114	500	T.Seb	0.18	0.001	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke
	L	10.20	11.8	14.8	0.029	0.022	0.004	0.011	18.3	3.463	103	500	T.Seb	0.15	0.000	0.004	800	16	201.06	3.98	4	804.25	36.80	135.56	Oke

PERHITUNGAN M nak - BALOK ANAK TANGGA

PORTAL ARAH X (AS A) PANJANG BATANG 4 M

TINJAUAN ARAH X

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho-\rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakal Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg 2 ^o -3 ^o Lt 1	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.0080	0.0040	0.0040	0.0080	786.03	350.00	36.80	67.78	56.30	124.08	2.61	130.39
Btg 2 ^o -3 ^o Lt 2	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.0040	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 2 ^o -3 ^o Lt 3	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.0040	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 2 ^o -3 ^o Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.0040	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PERHITUNGAN M nak - BALOK ANAK TANGGA

PORTAL ARAH X (AS A) PANJANG BATANG 5,5 M

TINJAUAN ARAH X

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho-\rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakal Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg 3 ^o -5 Lt 1	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.008	0.0040	0.0040	0.0080	786.03	350.00	36.80	67.78	56.30	124.08	2.61	130.39
Btg 3 ^o -5 Lt 2	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 3 ^o -5 Lt 3	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 3 ^o -5 Lt 4	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PERHITUNGAN M nak - BALOK ANAK TANGGA

PORTAL ARAH X (AS B) PANJANG BATANG 4 M

TINJAUAN ARAH X

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho-\rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakal Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg 2 ^o -3 ^o Lt 1	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 2 ^o -3 ^o Lt 2	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 2 ^o -3 ^o Lt 3	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 2 ^o -3 ^o Lt 4	4 D 16	2 D 16	4 D 16	804.2	402.12	804.2	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

PERHITUNGAN M nak - BALOK ANAK TANGGA

PORTAL ARAH X (AS B) PANJANG BATANG 5,5 M

TINJAUAN ARAH X

Balok Anak Tangga	Tul tump (T)		Tul Lap bawah	As Tul Tump		As Tul lap	ρ (tarik)	ρ' (desak)	ρ_1 ($\rho-\rho'$)	ρ aktual Tul. Lap	fs' Mpa	fs'pakal Mpa	a mm2	Mn1 KNm	Mn2 KNm	Mnak- KNm	Rn Mpa	Mnak+ KNm
	atas	bawah		As	As'													
Btg 3 ^o -5 Lt 1	6 D 16	2 D 16	4 D 16	1206.37	402.12	804.25	0.006	0.0020	0.0040	0.0040	786.03	350.00	36.80	135.56	56.30	191.86	1.36	135.56
Btg 3 ^o -5 Lt 2	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 3 ^o -5 Lt 3	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56
Btg 3 ^o -5 Lt 4	4 D 16	2 D 16	4 D 16	804.25	402.12	804.25	0.004	0.0020	0.0020	0.0040	2172.07	350.00	18.40	69.08	56.30	125.37	1.36	135.56

**TABEL TULANGAN GESER BALOK ANAK PORTAL TANGGA
TINJAUAN ARAH X**

PORTAL ARAH X (AS A) PJNG BATANG 4 M

$f_c = 22.5 \text{ Mpa}$ $L = 4 \text{ m}$ $b_{klm} = 500 \text{ mm}$
 $f_y \text{ TP} = 300 \text{ Mpa}$ $\phi_{tul} = 10 \text{ mm}$ $h_{klm} = 500 \text{ mm}$
 $f_y \text{ TD} = 350 \text{ Mpa}$

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Blg 2 ^o -3 ^o Lt 1	3.5	27.54	5.09	400	600	500	124.08	130.39	32.63	97.88	79.70	10	132.84	125.00	P10- 120	54.26	158.11	67.69	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 2	3.5	29.18	5.1	400	600	500	125.37	135.56	34.28	101.23	82.59	10	137.65	125.00	P10- 120	56.50	158.11	63.95	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 3	3.5	29.47	5.18	400	600	500	125.37	135.56	34.65	101.62	82.98	10	138.30	125.00	P10- 120	56.88	158.11	63.31	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 4	3.5	27.3	5.18	400	600	500	125.37	135.56	32.48	99.34	80.70	10	134.50	125.00	P10- 120	54.61	158.11	67.10	250.00	P10- 200

**TABEL TULANGAN GESER BALOK ANAK PORTAL TANGGA
TINJAUAN ARAH X**

PORTAL ARAH X (AS A) PJNG BATANG 5,5 M

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Blg 3 ^o -5 Lt 1	3.5	35.7	0.18	400	600	500	124.08	130.39	35.88	101.29	83.11	10	138.52	125.00	P10- 120	57.67	158.11	62.00	250.00	P10- 200
Blg 3 ^o -5 Lt 2	3.5	35.24	0.31	400	600	500	125.37	135.56	35.55	102.58	83.92	10	139.67	125.00	P10- 120	57.83	158.11	61.73	250.00	P10- 200
Blg 3 ^o -5 Lt 3	3.5	35.09	0.42	400	600	500	125.37	135.56	35.51	102.52	83.88	10	139.80	125.00	P10- 120	57.79	158.11	61.80	250.00	P10- 200
Blg 3 ^o -5 Lt 4	3.5	34.54	0.52	400	600	500	125.37	135.56	35.06	102.05	83.41	10	139.02	125.00	P10- 120	57.32	158.11	62.59	250.00	P10- 200

**TABEL TULANGAN GESER BALOK ANAK PORTAL TANGGA
TINJAUAN ARAH X**

PORTAL ARAH X (AS B) PJNG BATANG 4 M

$f_c = 22.5 \text{ Mpa}$ $L = 4 \text{ m}$ $b_{klm} = 500 \text{ mm}$
 $f_y \text{ TP} = 300 \text{ Mpa}$ $\phi_{tul} = 10 \text{ mm}$ $h_{klm} = 500 \text{ mm}$
 $f_y \text{ TD} = 350 \text{ Mpa}$

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Blg 2 ^o -3 ^o Lt 1	3.5	51.29	10.79	400	600	500	125.37	135.58	62.08	130.42	111.76	10	186.30	125.00	P10- 120	85.69	158.11	15.30	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 2	3.5	58.24	13.7	400	600	500	125.37	135.58	71.94	140.77	122.13	10	203.56	115.75	P10- 110	96.04	158.11	1.95	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 3	3.5	52.08	10.88	400	600	500	125.37	135.58	62.96	131.34	112.70	10	187.84	125.00	P10- 120	86.61	158.11	13.76	250.00	P10- 200
Blg 2 ^o -3 ^o Lt 4	3.5	28.9	5.61	400	600	500	125.37	135.58	32.51	99.37	80.73	10	134.55	125.00	P10- 120	54.64	158.11	67.65	250.00	P10- 200

**TABEL TULANGAN GESER BALOK ANAK PORTAL TANGGA
TINJAUAN ARAH X**

PORTAL ARAH X (AS B) PJNG BATANG 5,5 M

Balok Induk	Ln (m)	VD (KN)	VL (KN)	b (mm)	h (mm)	d (mm)	Mnak,b (KNm)	Mnak,b' (KNm)	Vg (KN)	Vu,b (KN)	Vu,b pakai (KN)	ØTul (mm)	Di daerah sendi plastis			Di luar sendi plastis				
													Vs (KN)	s (mm)	Tul.Geser	Vu,b(KN)	Vc (KN)	Vs (KN)	s (mm)	Tul. Geser
Blg 3 ^o -5 Lt 1	3.5	18.78	0.08	400	600	500	191.86	135.58	18.84	99.54	78.15	10	126.92	125.00	P10- 120	43.41	158.11	65.77	250.00	P10- 200
Blg 3 ^o -5 Lt 2	3.5	17.81	0.19	400	600	500	125.37	135.58	17.8	83.92	65.29	10	108.81	125.00	P10- 120	39.19	158.11	92.79	250.00	P10- 200
Blg 3 ^o -5 Lt 3	3.5	18.15	0.29	400	600	500	125.37	135.58	18.44	84.50	65.96	10	109.93	125.00	P10- 120	39.86	158.11	91.67	250.00	P10- 200
Blg 3 ^o -5 Lt 4	3.5	18.13	0.54	400	600	500	125.37	135.58	18.67	84.84	66.20	10	110.33	125.00	P10- 120	40.11	158.11	91.27	250.00	P10- 200

PERENCANAAN PELAT LANTAI TYPE PL-1

data Untuk Penulangan Pelat Lantai

Wan Mati	(KN/m ²)	4.510
ban Hidup (R. Kuliah)	(KN/m ²)	2.500
(beban ultimit)	(KN/m ²)	9.412
	(Mpa)	22.5
	(Mpa)	300
	(mm)	20
o plat	(mm)	120
i ₁		0.85
D		0.6
D _w	(mm)	1000

DISTRIBUSI MOMEN

Dari SK SNI T-15-1991-03

Ly	10	$\mu = \text{coef. } qU \cdot Ln^2$	
Lx	4	Mu 1/16	7.41
Ly/Lx	2.5	Mu 1/14	8.47
Ly/Lx ≥ 2	Satu arah	Mu 1/11	10.78
Lbalok	0.45	Mu 1/10	11.86
Ln	3.55		
Pelat Satu Tepi Menerus		129.761905	
Dua Tepi Menerus		111.22449	

Lx = 4

Plat Lantai
PL-1

Ly = 10 m

PERHITUNGAN PENULANGAN PLAT LANTAI TYPE PL-1

Penulangan	Mu 1/16	Mu 1/14	Mu 1/11	Mu 1/10
Mu (KN.m)	7.4134	8.4725	10.7832	11.8615
Mn = Mu / 0,8 (KN.m)	9.2668	10.5906	13.4789	14.8268
Diameter (mm)	10	10	10	10
d (mm)	95	95	85	95
Rn = (Mu/Φ)/(b.d ²) (Mpa)	1.027	1.173	1.866	1.643
m = fy/(0,85.f _c)	15.686	15.686	15.686	15.686
p perlu = (1/m) · (1 - (1 - 2m · Rn/fy) ^{0,5})	0.00352	0.00404	0.00656	0.00573
pb = (0,85 · f _c · β _f /fy) · (600/(600 + fy))	0.036	0.036	0.036	0.036
p maks = 0,75 pb	0.0271	0.0271	0.0271	0.0271
p min = 1,4/fy	0.0047	0.0047	0.0047	0.0047
1,33 p perlu	0.0047	0.0054	0.0087	0.0076
p terpakai	0.0047	0.0047	0.0047	0.0047
As perlu = p terpakai · b · h	560.00	560.00	560.00	560.00
As perlu ≥ 0,002 · b · h	240	240	240	240
As pakai	560	560	560	560
Tul Ø polos (mm)	10	10	10	10
A _{1Ø} (mm ²)	78.54	78.54	78.54	78.54
Jrk Tul (S) = A _{1Ø} · b / As pakai	140.25	140.25	140.25	140.25
Syarat S ≤ 2 · h ≤ 250	140.25	140.25	140.25	140.25
S dipakai	140	120	100	100
As ada = A _{1Ø} · b / S pakai	561.00	654.50	785.40	785.40
Kontrol Kapasitas Momen (Mn)				
a = As ada · fy / (0,85 f _c · b)	8.80	10.27	12.32	12.32
Mn = As ada · fy · (d - (0,5a)) (kNm)	15.248	17.645	18.576	20.932
Mu = 1,33 · Mu/Φ (kNm)	12.325	14.085	17.927	19.720
Dipakai Tul	P10-140	P10-120	P10-100	P10-100
Safety	AMAN	AMAN	AMAN	AMAN

Perhitungan Tulangan Bagi

Tul Polos Bagi (mm)	8	8	8	8
As bagi = 0,002 · b · h	240	240	240	240
S bagi = A _{1Ø} · b / As bagi	320	320	320	320
As ada (mm ²)	245.44	245.44	245.44	245.44
Dipakai tul	P8-200	P8-200	P8-200	P8-200
Safety	AMAN	AMAN	AMAN	AMAN

PORTAL ARAH - Y (AS 5)

Portal Y	Kolom	Lt	Lc (m)	MD (KNm)	ML (KNm)	E (Mpa)	Ic (mm ⁴)	βd	Eic (Nmm ²)	Bagian Atas								Bagian Bawah								k	kl/r	Analisis
										Balok kiri				Balok kanan				Balok kiri				Balok kanan						
										Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr			
										(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)			
As 5	K5-A	Dasar	3.65	42.25	3.32	2.2E+04	5.21E+09	0.91	2.4E+13	5	400	600	3.6E+09	-	-	-	-	5	300	500	1.6E+09	-	-	-	-	1.09	26.5	K.lgsg
		1	3.6	49.74	4.34	2.2E+04	5.21E+09	0.90	2.4E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		2	3.6	48.52	1.02	2.2E+04	5.21E+09	0.97	2.4E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		3	3.6	18.53	2.01	2.2E+04	5.21E+09	0.87	2.5E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		4	3.7	8.32	1.84	2.2E+04	5.21E+09	0.77	2.6E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.9	K.lgsg
	K5-B	Dasar	3.65	16.91	4.09	2.2E+04	5.21E+09	0.76	2.6E+13	5	400	600	3.6E+09	-	-	-	-	5	300	500	1.6E+09	-	-	-	-	1.09	26.5	K.lgsg
		1	3.6	19.23	7.32	2.2E+04	5.21E+09	0.66	2.8E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		2	3.6	14.45	11.45	2.2E+04	5.21E+09	0.49	3.1E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		3	3.6	13.30	3.63	2.2E+04	5.21E+09	0.73	2.7E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.2	K.lgsg
		4	3.7	2.14	0.34	2.2E+04	5.21E+09	0.83	2.5E+13	5	400	600	3.6E+09	-	-	-	-	5	400	600	3.6E+09	-	-	-	-	1.09	26.9	K.lgsg

Penentuan Kriteria Kolom (arah - X)

PORTAL ARAH - X (AS A)

Portal Y	Kolom	Lt	Lc (m)	MD (KNm)	ML (KNm)	E (Mpa)	Ic (mm ⁴)	Pd	E/c (N/mm ²)	Bagian Atas								Bagian Bawah								k	kl/r	Analisis
										Balok kiri				Balok kanan				Balok kiri				Balok kanan						
										Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr			
										(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)			
As A	KA-2 ^o	Dasar	3.65	17.62	2.47	2.2E+04	5.21E+09	0.84	2.5E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	-	-	-	-	1.09	26.5	Klgag
		1	3.6	28.90	4.34	2.2E+04	5.21E+09	0.82	2.5E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
		2	3.6	32.49	5.92	2.2E+04	5.21E+09	0.80	2.6E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
		3	3.6	19.75	0.47	2.2E+04	5.21E+09	0.97	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
	4	3.7	3.74	0.16	2.2E+04	5.21E+09	0.95	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.9	Klgag	
	KA-3 ^o	Dasar	3.65	31.53	2.65	2.2E+04	5.21E+09	0.90	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	-	-	-	-	1.09	26.5	Klgag
		1	3.6	40.74	3.98	2.2E+04	5.21E+09	0.88	2.5E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
		2	3.6	46.61	5.71	2.2E+04	5.21E+09	0.86	2.5E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
		3	3.6	20.78	1.09	2.2E+04	5.21E+09	0.93	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
	4	3.7	2.23	0.16	2.2E+04	5.21E+09	0.91	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.9	Klgag	
	KA-3 ^o	Dasar	3.65	42.25	3.32	2.2E+04	5.21E+09	0.91	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	-	-	-	-	1.09	26.5	Klgag
		1	3.6	49.74	4.34	2.2E+04	5.21E+09	0.90	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag
2		3.6	48.52	1.02	2.2E+04	5.21E+09	0.97	2.4E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag	
3		3.6	18.53	2.01	2.2E+04	5.21E+09	0.87	2.5E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.2	Klgag	
4	3.7	8.32	1.84	2.2E+04	5.21E+09	0.77	2.6E+13	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	1.09	26.9	Klgag		

PORTAL ARAH - X (AS B)

Portal Y	Kolom	Lt	Lc (m)	MD (KNm)	ML (KNm)	E (Mpa)	Ic (mm ⁴)	Pd	E/c (N/mm ²)	Bagian Atas								Bagian Bawah								k	kl/r	Analisis
										Balok kiri				Balok kanan				Balok kiri				Balok kanan						
										Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr	Lg	b	h	Icr			
										(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)	(m)	(mm)	(mm)	(mm ⁴)			
As B	KB-2 ^o	Dasar	3.65	3.19	0.50	2.2E+04	5.21E+09	0.83	2.5E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	1.09	26.5	Klgag
		1	3.6	3.50	1.60	2.2E+04	5.21E+09	0.62	2.9E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
		2	3.6	8.59	3.21	2.2E+04	5.21E+09	0.67	2.8E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
		3	3.6	3.18	3.64	2.2E+04	5.21E+09	0.40	3.3E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
	4	3.7	4.53	0.67	2.2E+04	5.21E+09	0.84	2.5E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.9	Klgag	
	KB-3 ^o	Dasar	3.65	12.13	0.89	2.2E+04	5.21E+09	0.91	2.4E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	1.09	26.5	Klgag
		1	3.6	14.60	1.71	2.2E+04	5.21E+09	0.86	2.5E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
		2	3.6	12.13	3.32	2.2E+04	5.21E+09	0.73	2.7E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
		3	3.6	15.10	4.00	2.2E+04	5.21E+09	0.74	2.7E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
	4	3.7	3.69	0.70	2.2E+04	5.21E+09	0.80	2.6E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.9	Klgag	
	KB-3 ^o	Dasar	3.65	16.91	4.09	2.2E+04	5.21E+09	0.76	2.6E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	300	500	1.6E+09	1.09	26.5	Klgag
		1	3.6	19.23	7.32	2.2E+04	5.21E+09	0.66	2.8E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag
2		3.6	14.45	11.45	2.2E+04	5.21E+09	0.49	3.1E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag	
3		3.6	13.30	3.63	2.2E+04	5.21E+09	0.73	2.7E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.2	Klgag	
4	3.7	2.14	0.34	2.2E+04	5.21E+09	0.83	2.5E+13	-	-	-	-	3.5	400	600	3.6E+09	-	-	-	-	3.5	400	600	3.6E+09	1.09	26.9	Klgag		

Analisis Gaya Aksial dan Momen Kolom (Arah Y) Akibat M kap Balok

PORTAL ARAH - Y (AS 2⁰)

Portal	Kolom	Lt	h (m)	hn (m)	Rv	ωd	k	Mnak bik (kNm)		L balok (m)		Ln balok (m)		Mkap bik (kNm)		PD kN	PL kN	PE kN	Ng (N) Pd+Pl	Pu,k Y (kN)	Menghitung α		Menghitung Mu,k y	
								kiri	kanan	kiri	kanan	kiri	kanan	kiri	kanan						α k.atas	α k.bwh	atas	bawah
As 2 ⁰	K2 ⁰ -A	Dasar	4.2	3.65	1	1	1	-	105.69	-	4.0	-	3.5	-	132.11	464.48	43.59	99.36	508.07	556.59	0.540	0.460	49.58	42.29
		1	4.2	3.60	1	1.3	1	-	260.77	-	4.0	-	3.5	-	325.96	357.59	31.75	53.99	369.34	465.85	0.548	0.452	159.09	131.48
		2	4.2	3.60	1	1.3	1	-	199.46	-	4.0	-	3.5	-	249.33	244.85	19.14	23.27	263.99	320.82	0.440	0.560	97.70	124.56
		3	4.2	3.60	1	1.3	1	-	135.56	-	4.0	-	3.5	-	169.46	135.38	8.70	7.08	144.08	180.94	0.552	0.448	83.43	67.63
	4	3.0	2.50	1	1	1	-	135.56	-	4.0	-	3.5	-	169.46	40.22	0.03	0.93	40.25	46.17	0.738	0.262	83.42	29.55	
	K2 ⁰ -B	Dasar	4.2	3.65	1	1	1	-	105.69	-	4.0	-	3.5	-	132.11	619.21	75.06	56.66	694.27	752.10	0.483	0.517	44.33	47.52
		1	4.2	3.60	1	1.3	1	-	135.56	-	4.0	-	3.5	-	169.46	468.97	59.07	26.48	528.04	584.10	0.568	0.432	85.87	65.19
		2	4.2	3.60	1	1.3	1	-	135.56	-	4.0	-	3.5	-	169.46	311.14	33.46	7.62	344.60	391.48	0.573	0.427	86.59	64.47
3		4.2	3.60	1	1.3	1	-	135.56	-	4.0	-	3.5	-	169.46	165.63	12.98	1.02	178.61	191.82	0.566	0.434	85.52	65.54	
4	3.0	2.50	1	1	1	-	135.56	-	4.0	-	3.5	-	169.46	56.60	0.41	0.02	57.01	59.94	0.795	0.205	89.82	23.15		

Analisis Gaya Aksial dan Momen Kolom (Arah Y) Akibat M kap Balok

PORTAL ARAH - Y (AS 3⁰)

Portal	Kolom	Lt	h (m)	hn (m)	Rv	ωd	k	Mnak bik (kNm)		L balok (m)		Ln balok (m)		Mkap bik (kNm)		PD kN	PL kN	PE kN	Ng (N) Pd+Pl	Pu,k Y (kN)	Menghitung α		Menghitung Mu,k y	
								kiri	kanan	kiri	kanan	kiri	kanan	kiri	kanan						α k.atas	α k.bwh	atas	bawah
As 3 ⁰	K3 ⁰ -A	Dasar	4.2	3.65	1	1	1	105.69	105.69	4.0	5.5	3.5	5.0	132.11	132.11	738.18	41.17	2.14	779.35	827.31	0.368	0.632	66.33	113.92
		1	4.2	3.60	1	1.3	1	260.77	130.39	4.0	5.5	3.5	5.0	325.96	162.98	42.72	29.45	5.63	72.17	99.42	0.283	0.717	121.60	308.81
		2	4.2	3.60	1	1.3	1	199.46	135.56	4.0	5.5	3.5	5.0	249.33	169.46	346.72	17.35	7.90	364.07	415.45	0.281	0.719	103.30	264.35
		3	4.2	3.60	1	1.3	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	155.11	7.44	5.53	162.55	193.90	0.274	0.726	81.37	215.08
	4	3.0	2.50	1	1	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	47.65	0.73	2.23	48.38	60.17	0.531	0.469	117.76	103.94	
	K3 ⁰ -B	Dasar	4.2	3.65	1	1	1	105.69	105.69	4.0	5.5	3.5	5.0	132.11	132.11	740.70	72.16	51.47	812.86	893.44	0.433	0.567	78.07	102.18
		1	4.2	3.60	1	1.3	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	556.89	53.69	24.40	610.58	692.33	0.348	0.652	103.06	193.39
		2	4.2	3.60	1	1.3	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	374.15	30.68	6.71	404.83	453.25	0.287	0.713	85.05	211.40
3		4.2	3.60	1	1.3	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	208.76	12.49	2.39	221.25	242.35	0.300	0.700	88.82	207.64	
4	3.0	2.50	1	1	1	135.56	135.56	4.0	5.5	3.5	5.0	169.46	169.46	77.85	0.13	2.35	77.98	91.75	0.565	0.435	125.26	96.44		

Analisis Gaya Aksial dan Momen Kolom (Arah Y) Akibat M kap Balok

PORTAL ARAH - Y (AS 5)

Portal	Kolom	L _t	h (m)	h _n (m)	R _v	ω _d	k	M _{nak} b _{ik} (kNm)		L _{balok} (m)		L _n balok (m)		M _{kap} b _{ik} (kNm)		PD	PL	PE	Ng (N)	P _{u,k} Y	Menghitung α		Menghitung Mu,k y	
								kir	kanan	kir	kanan	kir	kanan	kir	kanan	kN	kN	kN	P _o +P _u	(kN)	α k.atas	α k.bwh	atas	bawah
As 5	K5-A	Dasar	4.2	3.65	1	1	1	105.69	-	5.5	-	5.0	-	132.11	-	825.21	22.03	81.29	848.24	907.47	0.454	0.546	40.13	48.27
		1	4.2	3.60	1	1.3	1	130.39	-	5.5	-	5.0	-	162.98	-	642.31	16.06	50.85	658.37	712.03	0.358	0.644	49.74	90.10
		2	4.2	3.60	1	1.3	1	135.56	-	5.5	-	5.0	-	169.46	-	439.17	8.95	26.88	448.12	492.09	0.438	0.562	63.65	81.74
		3	4.2	3.60	1	1.3	1	135.56	-	5.5	-	5.0	-	169.46	-	232.87	1.84	11.79	234.71	268.01	0.645	0.355	93.81	51.58
		4	3.0	2.50	1	1	1	135.56	-	5.5	-	5.0	-	169.46	-	41.84	0.21	3.47	42.05	58.73	0.892	0.108	96.95	11.78
	K5-B	Dasar	4.2	3.65	1	1	1	105.69	-	5.5	-	5.0	-	132.11	-	887.27	54.78	104.9	942.05	1005.97	0.410	0.590	36.29	52.12
		1	4.2	3.60	1	1.3	1	135.56	-	5.5	-	5.0	-	169.46	-	681.83	40.91	46.23	722.74	780.44	0.382	0.618	55.58	89.81
		2	4.2	3.60	1	1.3	1	135.56	-	5.5	-	5.0	-	169.46	-	462.06	18.67	11.15	480.73	526.33	0.563	0.437	81.87	63.52
		3	4.2	3.60	1	1.3	1	135.56	-	5.5	-	5.0	-	169.46	-	274.06	8.78	3.34	282.84	311.01	0.445	0.555	64.73	80.66
		4	3.0	2.50	1	1	1	135.56	-	5.5	-	5.0	-	169.46	-	63.69	0.69	2.63	64.38	78.65	0.629	0.371	68.44	40.29

Analisis Gaya Aksial dan Momen Kolom (Arah X) Akibat M kap Balok

PORTAL ARAH - X (AS A)

Portal	Kolom	Lt	h (m)	hn (m)	Rv	ωd	k	Mnak blk (kNm)		L balok (m)		Ln balok (m)		Mkap blk (kNm)		PD kN	PL kN	PE kN	Ng (N) Po+Pl	Pu,k Y (kN)	Menghitung α		Menghitung Mu,k y	
								kiri	kanan	kiri	kanan	kiri	kanan	kiri	kanan						α k.atas	α k.bwh	atas	bawah
As A	KA-2°	Dasar	4.2	3.65	1	1	1	105.69	-	4	-	3.5	-	132.11	-	464.48	43.59	158.30	508.07	556.59	0.540	0.460	49.63866	42.21091
		1	4.2	3.60	1	1.3	1	260.77	-	4	-	3.5	-	325.96	-	357.59	31.75	80.74	389.34	465.85	0.549	0.451	159.3894	131.1848
		2	4.2	3.60	1	1.3	1	199.46	-	4	-	3.5	-	249.33	-	244.85	19.14	28.60	263.99	320.82	0.589	0.411	130.8494	91.40924
		3	4.2	3.60	1	1.3	1	135.56	-	4	-	3.5	-	169.46	-	135.38	8.70	4.68	144.08	170.86	0.613	0.387	92.53683	58.52087
	4	3.0	2.50	1	1	1	135.56	-	4	-	3.5	-	169.46	-	40.22	0.03	0.57	40.25	44.66	0.297	0.703	33.51278	79.45772	
	KA-3°	Dasar	4.2	3.65	1	1	1	105.69	-	4	-	3.5	-	132.11	-	738.18	41.17	161.29	779.35	841.44	0.540	0.460	49.57899	42.27259
		1	4.2	3.60	1	1.3	1	199.46	-	4	-	3.5	-	249.33	-	42.72	29.45	85.04	72.17	119.41	0.543	0.457	120.7965	101.4621
		2	4.2	3.60	1	1.3	1	167.84	-	4	-	3.5	-	209.80	-	346.72	17.35	33.25	364.07	418.99	0.576	0.424	107.7369	79.28187
		3	4.2	3.60	1	1.3	1	135.56	-	4	-	3.5	-	169.46	-	155.11	7.44	8.16	162.55	200.33	0.832	0.168	125.6727	25.38498
	4	3.0	2.50	1	1	1	135.56	-	4	-	3.5	-	169.46	-	47.65	0.73	1.94	48.38	58.95	0.795	0.205	89.78442	23.18609	
	KA-5	Dasar	4.2	3.65	1	1	1	105.69	-	4	-	3.5	-	132.11	-	826.21	22.03	255.35	848.24	913.77	0.416	0.584	38.18828	53.66129
		1	4.2	3.60	1	1.3	1	290.46	-	4	-	3.5	-	363.07	-	642.31	16.06	147.84	658.37	754.83	0.377	0.623	122.0675	201.5825
2		4.2	3.60	1	1.3	1	260.77	-	4	-	3.5	-	325.96	-	439.17	8.95	66.53	448.12	527.57	0.255	0.745	74.16249	216.4117	
3		4.2	3.60	1	1.3	1	199.46	-	4	-	3.5	-	249.33	-	232.87	1.84	15.35	234.71	290.08	0.077	0.923	17.03554	205.2231	
4	3.0	2.50	1	1	1	135.56	-	4	-	3.5	-	169.46	-	41.84	0.21	1.19	42.05	49.15	0.619	0.381	69.94886	43.02165		

PORTAL ARAH - X (AS B)

Portal	Kolom	Lt	h (m)	hn (m)	Rv	ωd	k	Mnak blk (kNm)		L balok (m)		Ln balok (m)		Mkap blk (kNm)		PD kN	PL kN	PE kN	Ng (N) Po+Pl	Pu,k Y (kN)	Menghitung α		Menghitung Mu,k y	
								kiri	kanan	kiri	kanan	kiri	kanan	kiri	kanan						α k.atas	α k.bwh	atas	bawah
As B	KB-2°	Dasar	4.2	3.65	1	1	1	-	105.69	-	4	-	3.5	-	132.11	619.21	75.06	71.38	694.27	752.10	0.517	0.483	47.49	44.36
		1	4.2	3.60	1	1.3	1	-	260.77	-	4	-	3.5	-	325.96	468.97	59.07	36.18	528.04	611.49	0.538	0.462	156.38	134.20
		2	4.2	3.60	1	1.3	1	-	199.46	-	4	-	3.5	-	249.33	311.14	33.46	6.43	344.60	388.84	0.564	0.436	125.44	96.82
		3	4.2	3.60	1	1.3	1	-	135.56	-	4	-	3.5	-	169.46	165.63	12.98	0.24	178.61	188.55	0.666	0.334	100.59	50.46
	4	3.0	2.50	1	1	1	-	135.56	-	4	-	3.5	-	169.46	56.60	0.41	1.65	57.01	66.79	0.261	0.739	29.51	83.46	
	KB-3°	Dasar	4.2	3.65	1	1	1	-	105.69	-	4	-	3.5	-	132.11	740.70	72.16	54.54	812.86	876.62	0.519	0.481	47.64	44.21
		1	4.2	3.60	1	1.3	1	-	199.46	-	4	-	3.5	-	249.33	556.89	53.69	32.11	610.58	684.74	0.531	0.469	118.11	104.15
		2	4.2	3.60	1	1.3	1	-	167.84	-	4	-	3.5	-	209.80	374.15	30.68	8.72	404.83	461.70	0.551	0.449	103.03	83.98
		3	4.2	3.60	1	1.3	1	-	135.56	-	4	-	3.5	-	169.46	208.76	12.49	5.23	221.25	254.28	0.683	0.317	103.10	47.96
	4	3.0	2.50	1	1	1	-	135.56	-	4	-	3.5	-	169.46	77.85	0.13	0.25	77.98	82.93	0.841	0.159	94.98	18.00	
	KB-5	Dasar	4.2	3.65	1	1	1	-	105.69	-	4	-	3.5	-	132.11	887.27	54.78	153.03	942.05	1012.27	0.505	0.495	46.36	45.49
		1	4.2	3.60	1	1.3	1	-	290.46	-	4	-	3.5	-	363.07	681.83	40.91	36.77	722.74	822.41	0.541	0.459	175.20	148.45
2		4.2	3.60	1	1.3	1	-	260.77	-	4	-	3.5	-	325.96	462.06	18.67	30.62	480.73	561.81	0.585	0.415	170.11	120.47	
3		4.2	3.60	1	1.3	1	-	199.46	-	4	-	3.5	-	249.33	274.06	8.78	21.66	282.84	340.61	0.581	0.419	129.22	93.04	
4	3.0	2.50	1	1	1	-	135.56	-	4	-	3.5	-	169.46	63.69	0.69	2.30	64.38	77.26	0.134	0.866	15.19	97.78		

PERENCANAAN TULANGAN LENTUR KOLOM TANGGA ARAH - Y

PORTAL ARAH - Y (AS 2⁰)

Portal	Kolom	Lt	Hasil Analisis		pg (%)	Ast mm ²	As=As' mm ²	Øtul mm	n ada batang	n pakai	Asada As'ada	Check Eksentrisitas Balance (es)													
			Pu,k y/Ø	Mu,k y/Ø								y _b	ab	fs'pakai	Ccb (N)	Csb (N)	Tsb (N)	Pnb (kN)	Mnb	eb	e	Jns Patah	Pn	Mn	Kontrol
As 2 ⁰	K2 ⁰ -A	Dasar	856.30	76.25248	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.09	Pth Desak	3732.82	828.07	OK !!!
		1	716.69	244.7614	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.34	Pth Tarik	1850.67	410.55	OK !!!
		2	493.57	191.6346	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.39	Pth Tarik	1692.78	375.52	OK !!!
		3	278.37	128.3529	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.46	Pth Tarik	1494.19	331.46	OK !!!
		4	71.03	128.3452	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.81	Pth Tarik	471.82	104.67	OK !!!
	K2 ⁰ -B	Dasar	1157.08	73.10284	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.06	Pth Desak	4168.03	924.62	OK !!!
		1	898.61	132.1111	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.15	Pth Desak	3025.59	671.19	OK !!!
		2	602.28	133.2087	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.22	Pth Desak	2435.76	540.34	OK !!!
		3	295.11	131.5655	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.45	Pth Tarik	1531.89	339.83	OK !!!
		4	92.22	138.1859	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.50	Pth Tarik	559.59	124.14	OK !!!

PORTAL ARAH - Y (AS 3⁰)

Portal	Kolom	Lt	Hasil Analisis		pg (%)	Ast mm ²	As=As' mm ²	Øtul mm	n ada batang	n pakai	Asada As'ada	Check Eksentrisitas Balance (es)													
			Pu,k y/Ø	Mu,k y/Ø								y _b	ab	fs'pakai	Ccb (N)	Csb (N)	Tsb (N)	Pnb (kN)	Mnb	eb	e	Jns Patah	Pn	Mn	Kontrol
As 3 ⁰	K3 ⁰ -A	Dasar	1272.78	175.2677	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.14	Pth Desak	3120.53	692.25	OK !!!
		1	152.96	475.0913	1.4	3500	1750	22	4.60	5	1900.7	277.9	236.2	350	2.26E+06	6.29E+05	6.7E+05	2222.41	543.80	0.24	3.11	Pth Tarik	299.51	73.29	OK !!!
		2	639.16	406.6921	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.64	Pth Tarik	1165.37	258.52	OK !!!
		3	298.31	330.8973	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.11	Pth Tarik	731.15	162.19	OK !!!
		4	92.56	181.1743	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.96	Pth Tarik	438.31	97.23	OK !!!
	K3 ⁰ -B	Dasar	1374.52	157.2041	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.11	Pth Desak	3386.90	751.34	OK !!!
		1	1065.12	297.5246	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.28	Pth Tarik	2112.88	468.71	OK !!!
		2	697.31	325.236	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.47	Pth Tarik	1481.49	328.65	OK !!!
		3	372.85	319.4393	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.86	Pth Tarik	912.68	202.47	OK !!!
		4	141.15	192.708	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.37	Pth Tarik	608.43	134.97	OK !!!

PERENCANAAN TULANGAN LENTUR KOLOM TANGGA ARAH - Y

PORTAL ARAH - Y (AS 5)

Urut	Kolom	L	Hasil Analisis		ρg (%)	Ast (mm ²)	As=As' (mm ²)	Øtul (mm)	n ada batang	n pakai	Asada (mm ²)	Check Eksentrisitas Balance (eb)													
			Pu,k.y/Ø	Mu,k.y/Ø								As'ada	y _b	z _b	f _a 'pakai	Ccb (N)	Csb (N)	Tsb (N)	Pnb (kN)	Mnb	eb	ε	Jns Patah	Pn	Mn
s 5	K5-A	Dasar	1396.10	74.26873	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.05	Pth Desak	4364.47	968.20	OK !!!
		1	1095.43	138.619	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.13	Pth Desak	3242.51	719.30	OK !!!
		2	757.07	125.7513	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.17	Pth Desak	2848.03	631.80	OK !!!
		3	412.33	144.3267	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.35	Pth Tarik	1819.75	403.69	OK !!!
		4	90.35	149.1609	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	1.65	Pth Tarik	512.46	113.68	OK !!!
	K5-B	Dasar	1547.64	80.18251	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.05	Pth Desak	4393.26	974.58	OK !!!
		1	1200.68	138.1716	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.12	Pth Desak	3378.16	749.40	OK !!!
		2	809.74	125.9546	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.16	Pth Desak	2943.56	652.99	OK !!!
		3	478.48	124.0991	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.26	Pth Tarik	2213.62	491.06	OK !!!
		4	120.99	105.2988	1	2500	1250	22	3.29	4	1520.5	277.9	236.2	350	2.26E+06	5.03E+05	5.3E+05	2229.68	494.62	0.22	0.87	Pth Tarik	900.69	199.81	OK !!!

PERENCANAAN TULANGAN LENTUR KOLOM TANGGA ARAH - X

ORTAL ARAH - X (AS A)

ortal	Kolom	Lt	Hasil Analisis		pg (%)	Ast mm ²	As=As' mm ²	Øtul mm	n ada batang	n pakai	Asada As'ada	Check Eksentrisitas Balance (eb)													
			Pu,k y/Ø	Mu,k y/Ø								yb	ab	fs'pakai	Ccb (N)	Csb (N)	Tsb (N)	Pnb (kN)	Mnb	eb	e	Jns Patah	Pn	Mn	Kontrol
s A	KA-2 ^o	Dasar	856.30	76.3672	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.09	Pth Desak	3730.80	827.65	OK !!!
		1	716.89	245.214	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.34	Pth Tarik	1848.34	410.03	OK !!!
		2	493.57	201.307	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.41	Pth Tarik	1634.33	362.55	OK !!!
		3	262.86	142.364	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.54	Pth Tarik	1322.67	293.42	OK !!!
	4	68.70	122.243	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.78	Pth Tarik	478.54	106.16	OK !!!	
	KA-3 ^o	Dasar	1294.52	76.2723	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.06	Pth Desak	4249.64	942.72	OK !!!
		1	183.71	185.841	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.01	Pth Tarik	792.06	175.71	OK !!!
		2	644.60	165.749	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.26	Pth Tarik	2225.46	493.69	OK !!!
		3	308.20	193.343	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.63	Pth Tarik	1178.65	261.47	OK !!!
	4	90.69	138.13	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.52	Pth Tarik	551.37	122.31	OK !!!	
	KA-5	Dasar	1405.80	82.5558	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.06	Pth Desak	4253.44	943.57	OK !!!
		1	1161.27	310.127	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.27	Pth Tarik	2173.68	482.20	OK !!!
2		811.65	332.941	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.41	Pth Tarik	1627.59	361.06	OK !!!	
3		446.27	315.728	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.71	Pth Tarik	1069.74	237.31	OK !!!	
4	75.62	107.614	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.42	Pth Tarik	586.18	130.04	OK !!!		

ORTAL ARAH - X (AS B)

ortal	Kolom	Lt	Hasil Analisis		pg (%)	Ast mm ²	As=As' mm ²	Øtul mm	n ada batang	n pakai	Asada As'ada	Check Eksentrisitas Balance (eb)													
			Pu,k y/Ø	Mu,k y/Ø								yb	ab	fs'pakai	Ccb (N)	Csb (N)	Tsb (N)	Pnb (kN)	Mnb	eb	e	Jns Patah	Pn	Mn	Kontrol
s B	KB-2 ^o	Dasar	1157.08	73.0626	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.06	Pth Desak	4168.68	924.77	OK !!!
		1	940.75	240.581	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.26	Pth Tarik	2232.97	495.35	OK !!!
		2	598.21	192.98	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.32	Pth Tarik	1923.28	426.65	OK !!!
		3	290.07	154.759	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.53	Pth Tarik	1338.11	296.84	OK !!!
	4	102.75	128.393	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.25	Pth Tarik	658.39	146.05	OK !!!	
	KB-3 ^o	Dasar	1348.65	73.2957	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.05	Pth Desak	4340.89	962.97	OK !!!
		1	1053.45	181.711	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.17	Pth Desak	2793.18	619.63	OK !!!
		2	710.30	158.515	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.22	Pth Tarik	2423.07	537.52	OK !!!
		3	391.20	158.614	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.41	Pth Tarik	1641.27	364.09	OK !!!
	4	127.58	146.116	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.15	Pth Tarik	710.97	157.72	OK !!!	
	KB-5	Dasar	1557.34	71.3215	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.05	Pth Desak	4522.54	1003.26	OK !!!
		1	1265.25	269.531	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.21	Pth Desak	2489.06	552.16	OK !!!
2		864.32	261.7	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.30	Pth Tarik	2005.71	444.94	OK !!!	
3		524.02	198.803	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	0.38	Pth Tarik	1720.67	381.71	OK !!!	
4	118.86	150.437	1.0	2500	1250	22	3.29	4	1520.5	277.9	236.21	350	2.259E+06	5.03E+05	5.32E+05	2229.68	494.62	0.22	1.27	Pth Tarik	650.93	144.40	OK !!!		

TULANGAN GESER KOLOM TANGGA TINJAUAN ARAH Y

PORTAL ARAH - Y (AS 2°)

Portal	Kolom	Lt	Menghitung Mu,k y		VD,k (kN)	VL,k (kN)	VEx,k (kN)	VEy,k (kN)	h (m)	hn (m)	Vu,k kN	Vs,k kN	Daerah sejauh lo				Di Luar Daerah lo				
			atas	bawah									Øtul	Av (mm ²)	s (mm)	Tul. Pakai	Vc (kN)	Vs	Av (mm ²)	s (mm)	Tul. Pakai
As 2°	K2°-A	Dasar	49.56	42.29	7.11	0.94	4.42	44.84	4.2	3.65	25.16	41.94	10	157.08	160.00	P10-160	201.58	159.64	157.08	129.88	P10-120
		1	159.09	131.48	13.29	2.14	2.83	31.72	4.2	3.60	80.72	134.5	10	157.08	154.13	P10-160	197.07	62.55	157.08	160.00	P10-160
		2	97.70	124.56	14.73	2.51	1.38	20.27	4.2	3.60	61.74	102.9	10	157.08	160.00	P10-160	189.87	86.97	157.08	160.00	P10-160
		3	83.43	67.63	8.5	0.37	1.14	1.45	4.2	3.60	15.4	25.67	10	157.08	160.00	P10-160	182.92	157.24	157.08	131.86	P10-130
		4	83.42	29.55	3.47	0.44	0.43	0.28	4.2	3.70	5.282	8.803	10	157.08	160.00	P10-160	176.22	167.42	157.08	123.85	P10-120
	K2°-B	Dasar	44.33	47.52	1.92	0.41	5.36	58.21	4.2	3.65	25.16	41.94	10	157.08	160.00	P10-160	211.30	169.36	157.08	122.43	P10-120
		1	85.87	65.19	1.62	0.73	2.42	37.34	4.2	3.60	41.96	69.93	10	157.08	160.00	P10-160	202.95	133.02	157.08	155.88	P10-150
		2	86.59	64.47	3.68	1.28	1.16	23.82	4.2	3.60	41.96	69.93	10	157.08	160.00	P10-160	193.38	123.45	157.08	160.00	P10-160
		3	85.52	65.54	2.73	1.93	1.03	2.14	4.2	3.60	13.88	23.14	10	157.08	160.00	P10-160	183.46	160.32	157.08	129.33	P10-120
		4	89.82	23.15	1.32	0.59	0.41	0.36	4.2	3.70	3.518	5.863	10	157.08	160.00	P10-160	176.90	171.04	157.08	121.22	P10-120

PORTAL ARAH - Y (AS 3°)

Portal	Kolom	Lt	Menghitung Mu,k y		VD,k (kN)	VL,k (kN)	VEx,k (kN)	VEy,k (kN)	h (m)	hn (m)	Vu,k kN	Vs,k kN	Daerah sejauh lo				Di Luar Daerah lo				
			atas	bawah									Øtul	Av (mm ²)	s (mm)	Tul. Pakai	Vc (kN)	Vs	Av (mm ²)	s (mm)	Tul. Pakai
As 3°	K3°-A	Dasar	66.33	113.92	13.99	1.09	2.42	44.93	4.2	3.65	49.38	82.31	10	157.08	160.00	P10-160	215.04	132.73	157.08	156.22	P10-150
		1	121.60	308.81	21.25	2.11	2.87	32.73	4.2	3.60	119.6	199.3	10	157.08	104.05	P10-100	178.87	20.40	157.08	160.00	P10-160
		2	103.30	264.35	22.52	2.58	2.99	21.94	4.2	3.60	102.1	170.2	10	157.08	121.82	P10-120	194.57	24.36	157.08	160.00	P10-160
		3	81.37	215.08	12.71	0.8	2.72	3.96	4.2	3.70	50.82	51.36	10	157.08	160.00	P10-160	183.56	132.20	157.08	156.84	P10-150
		4	117.76	103.94	2.47	0.46	1.34	1.53	4.2	3.65	9.503	15.84	10	157.08	160.00	P10-160	176.92	161.08	157.08	128.72	P10-120
	K3°-B	Dasar	78.07	102.18	3.39	0.61	3.28	55.86	4.2	3.65	49.38	82.31	10	157.08	160.00	P10-160	218.32	136.01	157.08	152.44	P10-150
		1	103.06	193.39	7.81	0.8	3.02	38.65	4.2	3.60	82.35	137.2	10	157.08	151.08	P10-150	208.33	71.08	157.08	160.00	P10-160
		2	85.05	211.40	6.57	1.34	3.32	25.26	4.2	3.60	82.35	137.2	10	157.08	151.08	P10-150	196.45	59.20	157.08	160.00	P10-160
		3	88.82	207.64	10.45	2.13	3.27	5.01	4.2	3.60	34.25	57.09	10	157.08	160.00	P10-160	185.97	128.88	157.08	160.00	P10-160
		4	125.26	96.44	2.06	0.47	1.26	1.51	4.2	3.70	8.999	15	10	157.08	160.00	P10-160	178.48	163.49	157.08	126.83	P10-120

TULANGAN GESER KOLOM TANGGA TINJAUAN ARAH Y

PORTAL ARAH - Y (AS 5)

Portal	Kolom	Lr	Menghitung Mu,k y		VD,k (kN)	VL,k (kN)	VEx,k (kN)	VEy,k (kN)	b (m)	hn (m)	Vu,k kN	Vs,k kN	Daerah sejauh lo				Di Luar Daerah lo				
			atas	bawah									Øtul	Av (mm ²)	s (mm)	Tul. Pakai	Vc (kN)	Vs	Av (mm ²)	s (mm)	Tul. Pakai
As 5	K5-A	Dasar	40.13	48.27	24.83	2.24	3.37	89.77	4.2	3.65	24.22	40.37	10	157.08	160.00	P10-160	219.02	178.65	157.08	116.06	P10-110
		1	49.74	90.10	23.6	2.3	1.7	40.32	4.2	3.60	38.84	64.74	10	157.08	160.00	P10-160	209.31	144.57	157.08	143.42	P10-140
		2	63.65	81.74	24.63	2.3	1.3	29.03	4.2	3.60	40.39	67.31	10	157.08	160.00	P10-160	198.38	131.07	157.08	158.20	P10-150
		3	93.81	51.58	24.63	0.76	1.2	13.47	4.2	3.70	39.3	65.49	10	157.08	160.00	P10-160	187.24	121.75	157.08	160.00	P10-160
		4	96.95	11.78	5.27	0.76	1.2	0.58	4.2	3.65	8.768	14.61	10	157.08	160.00	P10-160	176.84	162.23	157.08	127.81	P10-120
	K5-B	Dasar	36.29	52.12	7.52	2.57	3.96	152	4.2	3.65	24.22	40.37	10	157.08	160.00	P10-160	223.91	183.55	157.08	112.97	P10-110
		1	55.58	89.81	7.61	4.84	3.32	104.56	4.2	3.60	40.39	67.31	10	157.08	160.00	P10-160	212.71	145.40	157.08	142.61	P10-140
		2	81.87	63.52	2.77	7.12	3.5	71.02	4.2	3.60	40.39	67.31	10	157.08	160.00	P10-160	200.08	132.77	157.08	156.17	P10-150
		3	64.73	80.66	24.15	4.17	3.02	13.47	4.2	3.60	40.39	67.31	10	157.08	160.00	P10-160	189.38	122.07	157.08	160.00	P10-160
		4	68.44	40.29	7.83	0.92	2.24	2.98	4.2	3.70	21.7	36.17	10	157.08	160.00	P10-160	177.83	141.66	157.08	146.37	P10-140

Analisis Pertemuan Balok Kolom Arah Y (As 2°)

Posisi	Jenis	L1	h (m)	b1	bb	h0	b0	Bj pakai	Mnak btk (kNm)				L balok (m)				Ln balok (m)				V _{tot}	Tampang btk			C _u kN	C _{se} kN	V _h kN	Kontrol	V _h (kN)	V _v (kN)	Geser Horizontal				Geser Vertikal									
									Idri		kanan		Idri		kanan		Idri		kanan			Z _u	Z _s	C _u kN							C _{se} kN	V _h kN	V _v kN	A _h (kN)	Tul	Av Rangkap 4 bh	Jml Lapis	V _{ov} (kN)	V _{or} (kN)	V _{ow} (kN)	A _v (kN)	Tul	Av Rangkap 4 bh	Jml Lapis
									Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan																										
As 2°	JA-2°	Dasar	4.2	500	300	500	550	500	-	132.11	-	4	-	3.5	50.33	0	0.50	0.00	184.98	134.83	Ok	274.88	140.24	487.45	10	314	2.00	275.00	188.29	108.71	355.71	10	314	2.00										
		1	4.2	600	400	500	650	600	-	325.98	-	4	-	3.5	124.18	0	0.60	0.00	380.29	258.12	Ok	324.87	68.75	229.17	10	314	2.00	325.00	320.14	4.86	18.19	10	314	2.00										
		2	4.2	600	400	500	650	600	-	249.33	-	4	-	3.5	94.98	0	0.60	0.00	290.88	195.90	Ok	324.91	129.01	430.02	10	314	2.00	325.00	244.88	80.12	287.08	10	314	2.00										
		3	4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.85	191.80	639.35	10	314	2.00	323.00	186.43	158.57	528.57	10	314	2.00										
	4	4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.99	191.84	639.48	10	314	2.00	325.00	186.43	158.57	528.57	10	314	2.00											
	JB-2°	Dasar	4.2	500	300	500	550	500	-	132.11	-	4	-	3.5	50.33	0	0.50	0.00	184.98	134.83	Ok	274.82	140.19	487.29	10	314	2.00	275.00	188.29	108.71	355.71	10	314	2.00										
		1	4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.83	191.89	638.98	10	314	2.00	325.00	186.43	158.57	528.57	10	314	2.00										
		2	4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.89	191.74	639.14	10	314	2.00	325.00	186.43	158.57	528.57	10	314	2.00										
3		4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.94	191.80	639.34	10	314	2.00	325.00	186.43	158.57	528.57	10	314	2.00											
4	4.2	600	400	500	650	600	-	189.48	-	4	-	3.5	64.55	0	0.60	0.00	197.70	133.14	Ok	324.98	191.84	639.48	10	314	2.00	325.00	186.43	158.57	528.57	10	314	2.00												

Analisis Pertemuan Balok Kolom Arsh Y (As 3°)

Posisi	Jenis	L1	h (m)	b1	bb	h0	b0	Bj pakai	Mnak btk (kNm)				L balok (m)				Ln balok (m)				V _{tot}	Tampang btk			C _u kN	C _{se} kN	V _h kN	Kontrol	V _h (kN)	V _v (kN)	Geser Horizontal				Geser Vertikal									
									Idri		kanan		Idri		kanan		Idri		kanan			Z _u	Z _s	C _u kN							C _{se} kN	V _h kN	V _v kN	A _h (kN)	Tul	Av Rangkap 4 bh	Jml Lapis	V _{ov} (kN)	V _{or} (kN)	V _{ow} (kN)	A _v (kN)	Tul	Av Rangkap 4 bh	Jml Lapis
									Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan																										
As 3°	JA-3°	Dasar	4.2	500	300	500	550	500	132.11	132.11	4.00	5.5	3.50	5	48.44	0.50	0.50	184.98	184.98	321.47	Ok	274.80	48.88	155.59	10	314	2.00	275.00	401.84	128.84	422.81	10	314	2.00										
		1	4.2	600	400	500	650	600	325.98	182.98	4.00	5.5	3.50	5	59.78	0.50	0.50	458.35	228.18	624.77	Ok	324.97	299.79	999.31	10	314	2.00	325.00	780.98	455.98	1519.88	10	314	2.00										
		2	4.2	600	400	500	650	600	249.33	169.48	4.00	5.5	3.50	5	62.13	0.50	0.50	349.06	237.24	524.16	Ok	324.88	199.28	664.28	10	314	2.00	325.00	655.21	330.21	1100.68	10	314	2.00										
		3	4.2	600	400	500	650	600	189.48	183.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.94	87.40	291.33	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00										
	4	4.2	600	400	500	650	600	189.48	189.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.98	87.38	291.20	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00											
	JB-3°	Dasar	4.2	500	300	500	550	500	132.11	132.11	4.00	5.5	3.50	5	48.44	0.50	0.50	184.98	184.98	321.47	Ok	274.78	48.69	155.64	10	314	2.00	275.00	401.84	128.84	422.81	10	314	2.00										
		1	4.2	600	400	500	650	600	189.48	189.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.80	87.54	291.81	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00										
		2	4.2	600	400	500	650	600	189.48	189.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.87	87.47	291.58	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00										
3		4.2	600	400	500	650	600	189.48	189.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.93	87.41	291.37	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00											
4	4.2	600	400	500	650	600	189.48	189.48	4.00	5.5	3.50	5	62.13	0.50	0.50	237.24	237.24	412.34	Ok	324.97	87.37	291.23	10	314	2.00	325.00	515.43	190.43	834.78	10	314	2.00												

Analisis Pertemuan Balok Kolom Arah Y (As 5)

Posisi	Jenis	L1	h (m)	b1	bb	h0	b0	Bj pakai	Mnak btk (kNm)				L balok (m)				Ln balok (m)				V _{tot}	Tampang btk			C _u kN	C _{se} kN	V _h kN	Kontrol	V _h (kN)	V _v (kN)	Geser Horizontal				Geser Vertikal									
									Idri		kanan		Idri		kanan		Idri		kanan			Z _u	Z _s	C _u kN							C _{se} kN	V _h kN	V _v kN	A _h (kN)	Tul	Av Rangkap 4 bh	Jml Lapis	V _{ov} (kN)	V _{or} (kN)	V _{ow} (kN)	A _v (kN)	Tul	Av Rangkap 4 bh	Jml Lapis
									Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan	Idri	kanan																										
As 5	JA-5	Dasar	4.2	500	300	500	550	500	132.11	-	5.50	0	5.00	0	48.44	0	0.50	184.98	0.00	138.52	Ok	274.78	138.28	480.87	10	314	2.00	275.00	170.65	104.35	347.85	10	314	2.00										
		1	4.2	600	400	500	650	600	182.98	-	5.50	0	5.00	0	59.78	0	0.60	190.15	0.00	130.39	Ok	324.79	194.41	648.03	10	314	2.00	325.00	182.98	182.02	540.08	10	314	2.00										
		2	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.86	189.29	630.98	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00										
		3	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.92	189.38	631.19	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00										
	4	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.98	189.42	631.39	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00											
	JB-5	Dasar	4.2	500	300	500	550	500	132.11	-	5.50	0	5.00	0	48.44	0	0.50	184.98	0.00	138.52	Ok	274.75	138.24	480.79	10	314	2.00	275.00	170.65	104.35	347.85	10	314	2.00										
		1	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.77	189.21	630.70	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00										
		2	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.85	189.28	630.94	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00										
3		4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13	0	0.60	197.70	0.00	135.56	Ok	324.91	189.35	631.15	10	314	2.00	325.00	189.48	155.54	518.48	10	314	2.00											
4	4.2	600	400	500	650	600	189.48	-	5.50	0	5.00	0	62.13																															

PENENTUAN PERTEMUAN BALOK KOLOM C dan D

1. Joint tangga (As 2° dan As 13°)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Rangkap	Tul Geser	
					Horisontal	Vertikal
J 2°	Dasar	K1-D	600/600	4	2P10	2P10
	1	K1-1	600/600	4	2P10	2P10
	2	K1-2	600/600	4	2P10	2P10
	3	K1-3	600/600	4	2P10	2P10

2. Joint Type2 (As 6 & 7)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Rangkap	Tul Geser	
					Horisontal	Vertikal
J 3°	Dasar	K2-D	600/600	4	2P10	2P10
	1	K2-1	600/600	4	2P10	2P10
	2	K2-2	600/800	4	2P10	2P10
	3	K2-3	600/800	4	2P10	2P10

3. Joint Type 3 (As 2 - 5 dan As 8 - 14)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Rangkap	Tul Geser	
					Horisontal	Vertikal
J 5	Dasar	K3-D	600/600	4	2P10	2P10
	1	K3-1	600/600	4	2P10	2P10
	2	K3-2	600/600	4	2P10	2P10
	3	K3-3	600/600	4	2P10	2P10

PENENTUAN KOLOM PADA TEPI DAN TENGAH

1. Kolom tangga (As 2° dan As 13°)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Tul Lentur	Tul Geser	
					Daerah <i>lo</i>	Di luar <i>lo</i>
K 2°	Dasar	K1-D	500/500	4D22	P10-100	P10-120
	1	K1-1	500/500	4D22	P10-100	P10-120
	2	K1-2	500/500	4D22	P10-120	P10-160
	3	K1-3	500/500	4D22	P10-120	P10-160

2. Kolom Tangga (As 3° dan As 12°)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Tul Lentur	Tul Geser	
					Daerah <i>lo</i>	Di luar <i>lo</i>
K 3°	Dasar	K2-D	500/500	4D22	P10-100	P10-120
	1	K2-1	500/500	4D22	P10-100	P10-120
	2	K2-2	500/500	4D22	P10-120	P10-160
	3	K2-3	500/500	4D22	P10-120	P10-160

3. Kolom Tangga (As 2 dan As 13)

Kolom	Lantai	Brdasarkan lantai	Dimensi	Tul Lentur	Tul Geser	
					Daerah <i>lo</i>	Di luar <i>lo</i>
K 5	Dasar	K3-D	500/500	4D22	P10-100	P10-120
	1	K3-1	500/500	4D22	P10-100	P10-120
	2	K3-2	500/500	4D22	P10-120	P10-160
	3	K3-3	500/500	4D22	P10-120	P10-160