

BAB V KESIMPULAN

5.1 Kesimpulan

Dari hasil perhitungan yang telah dilakukan didapat kesimpulan sebagai berikut:

1. Analisis pembebanan yang terjadi pada Jembatan Samota menggunakan beton prategang tipe *I Girder dengan* sistem statis tak tentu sebagai berikut.
 - a. Perhitungan bangunan sekunder meliputi, pipa tiang sadaran dengan diameter 76,3 mm, tebal 2 mm serta berat 7,13 kg/m untuk tiang sandaran menggunakan tulangan lentur 2Ø12 dengan tulangan sengkang Ø10-100 mm, untuk kerb menggunakan tulangan Ø12 – 70 mm dengan tulangan sengkang 3Ø10, untuk trotoar menggunakan tulangan D16-250 mm dan tulangan bagi Ø12 – 250 mm.
 - b. Tegangan akibat kombinasi pembebanan tegangan pada desain struktur balok menerus ini mendapatkan hasil tegangan yang tidak melebihi tegangan ijin. Maka desain balok prategang aman terhadap tegangan.
 - c. Beban yang diterima balok *I-Girder* adalah 1805,52 kg/m, beban mati sendiri; 2992,20 kg/m, beban mati tambahan; 303,291 kg/m, beban truk; 31500 kg, beban lajur; 1456,875 kg/m dan 12691 kg, untuk gaya rem; 1125 kg, beban angin; 150,171 kg/m dan 859,47 kg/m untuk beban gempa.
 - d. Total kehilangan yang terjadi dengan akibat gesekan ankur, gesekan kabel, rangkai, susut, relaksasi dan perpendekan elastis beton adalah 30,852%.
2. Dimensi *PC I Girder* yang digunakan pada perencanaan Jembatan Samota sebagai berikut.
 - a. Dimensi PC I girder yang digunakan adalah PC I Berdasarkan *Bridge Product by WASKITA BETON* yaitu PC I H-210 dengan mutu beton K-800 untuk panjang bentang jembatan 80 m.

- b. Tendon yang digunakan adalah sebanyak 4 tendon yang. Disetiap tendonnya terdiri dari 12 *strands* dengan diameter 15,24 mm, jenis angkur yang digunakan berdasarkan spesifikasi *ASTM A 416-06 Grade 270*.

5.2 Saran

Berdasarkan pengerjaan tugas akhir ini terdapat beberapa saran antara lain:

1. Perlu dilakukan perencanaan dengan bentuk girder yang berbeda seperti U girder atau boks girder dengan statis tak tentu sebagai pembanding sehingga dapat diketahui girder yang paling efektif untuk digunakan.
2. Selanjutnya perlu dilakukan perhitungan anggaran biaya untuk mengetahui tingkat keekonomisan hasil perancangan



DAFTAR PUSTAKA

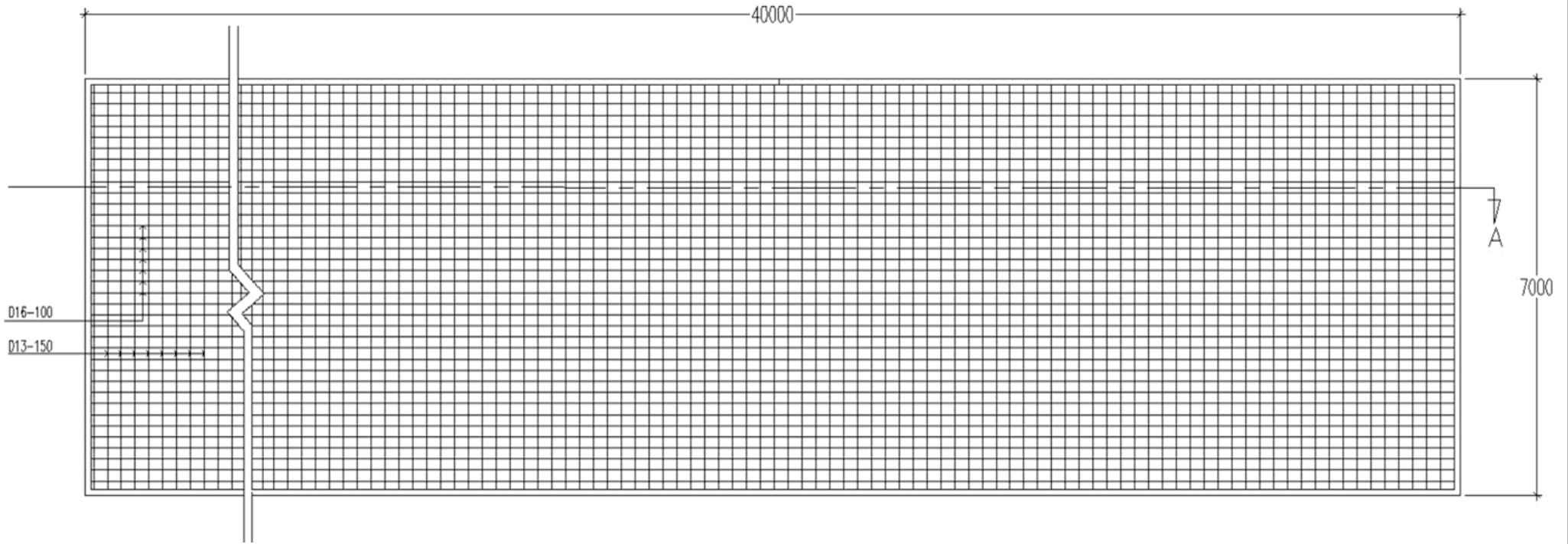
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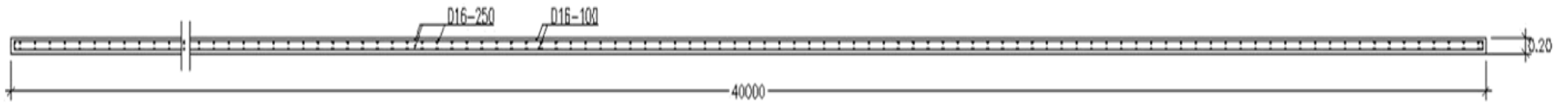


LAMPIRAN



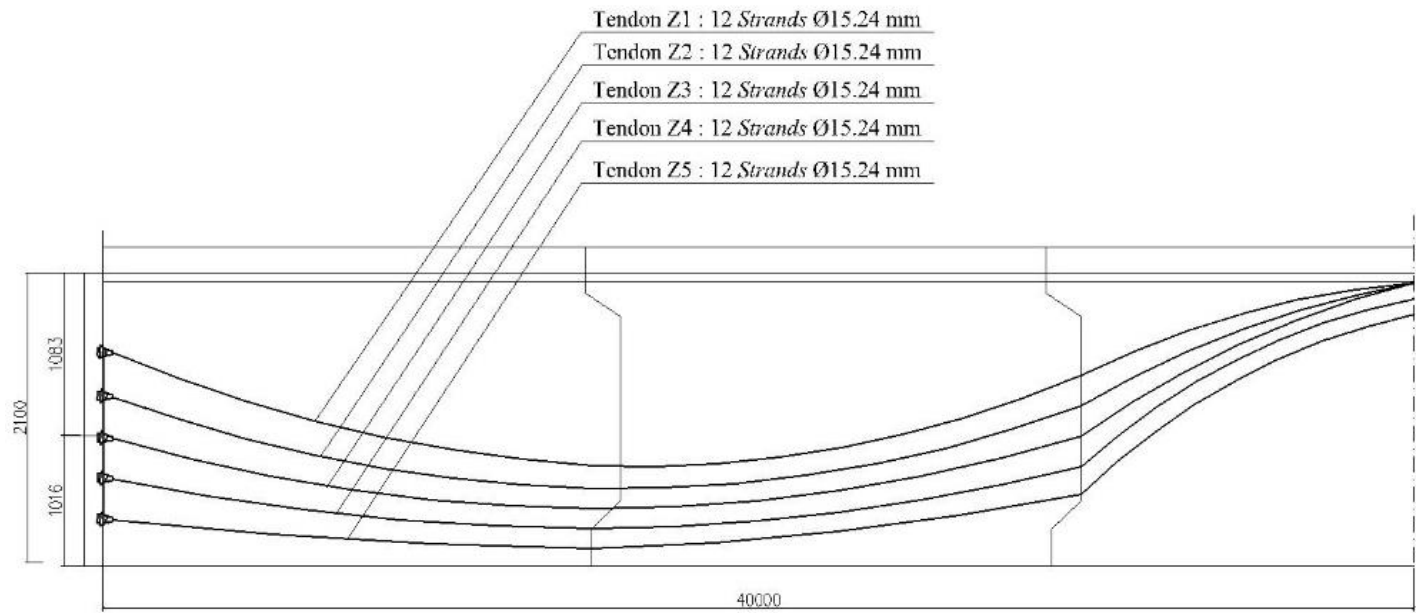
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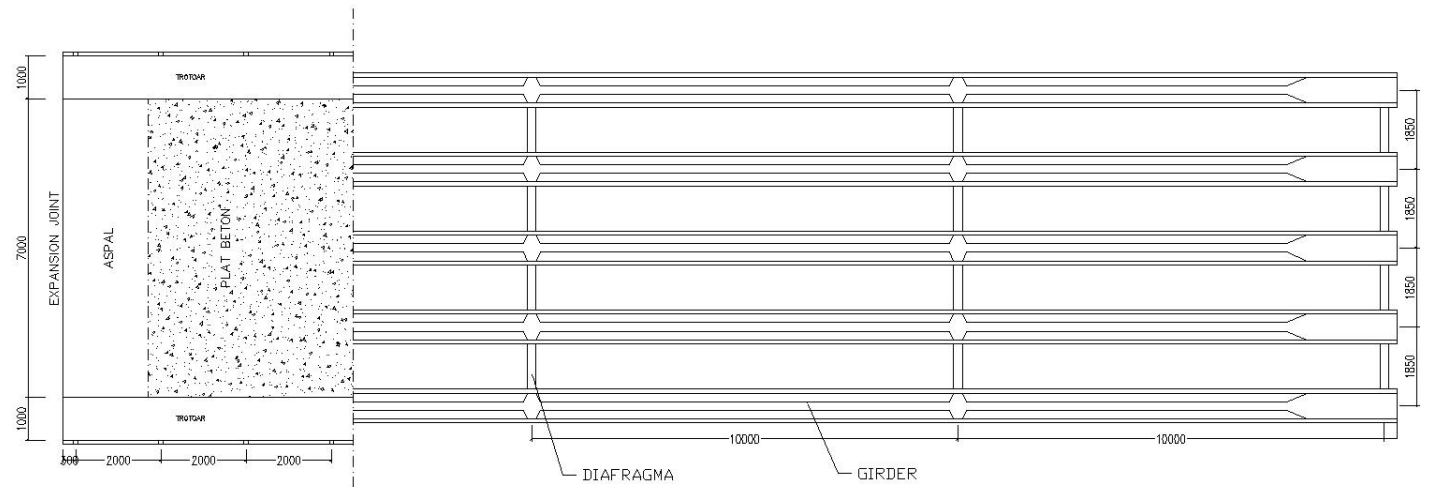
POTONGAN A PENULANGAN PLA LANTAI JEMBATAN

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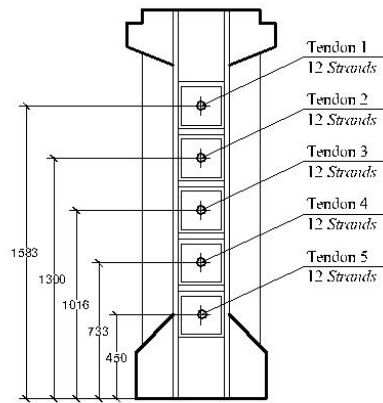
TRACE KABEL TENDON

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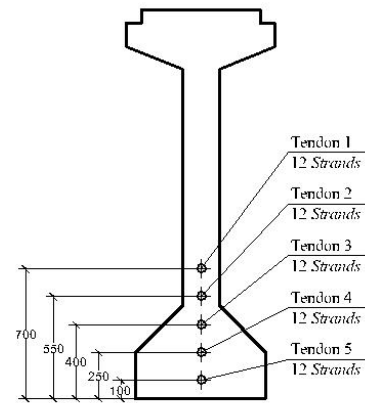
TAMPAK ATAS I GIRDER

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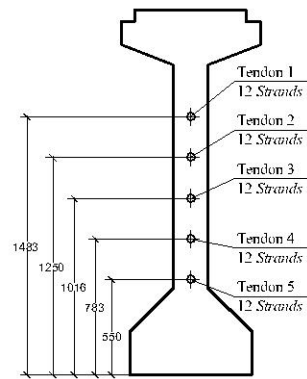
SEGMENT TUMPUAN TEPI

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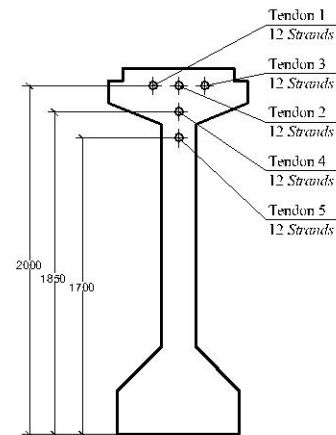
SEGMENT 3/8 DARI TEPI

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SEGMENT 3/4 DARI TEPI

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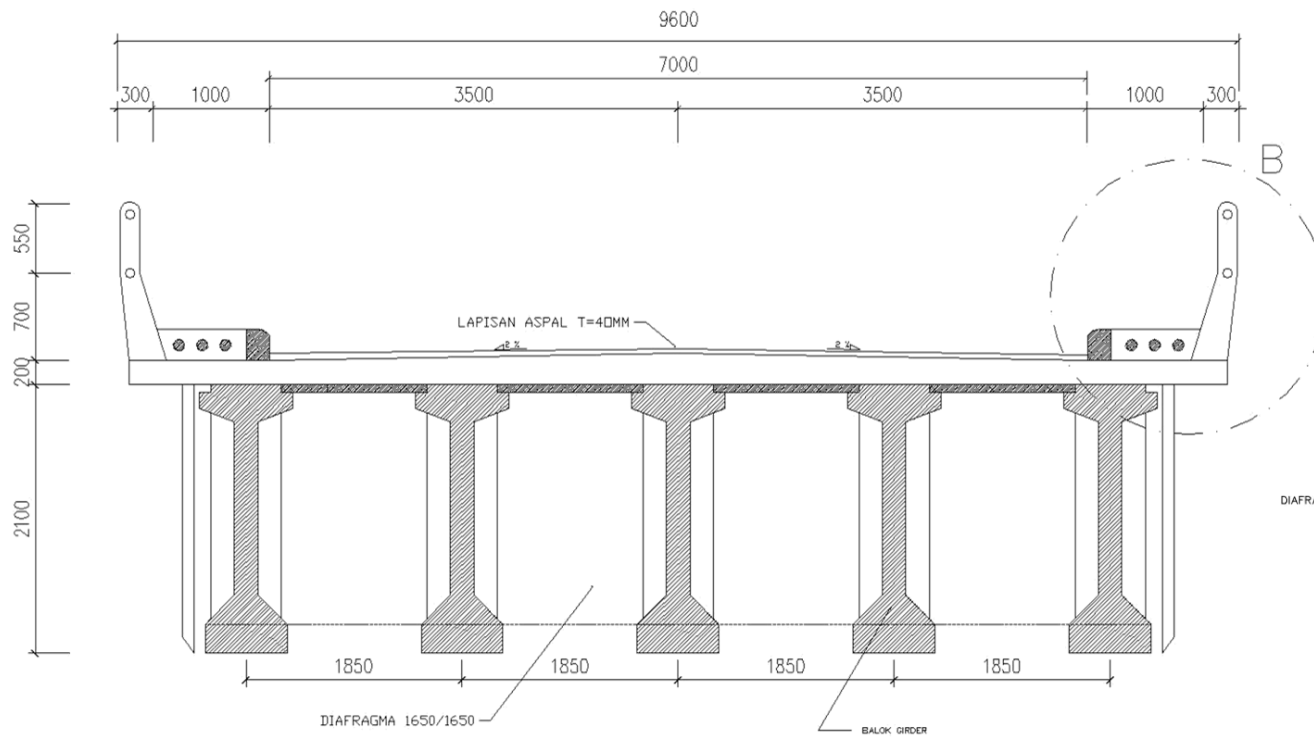


SEGMENT TENGAH BENTANG

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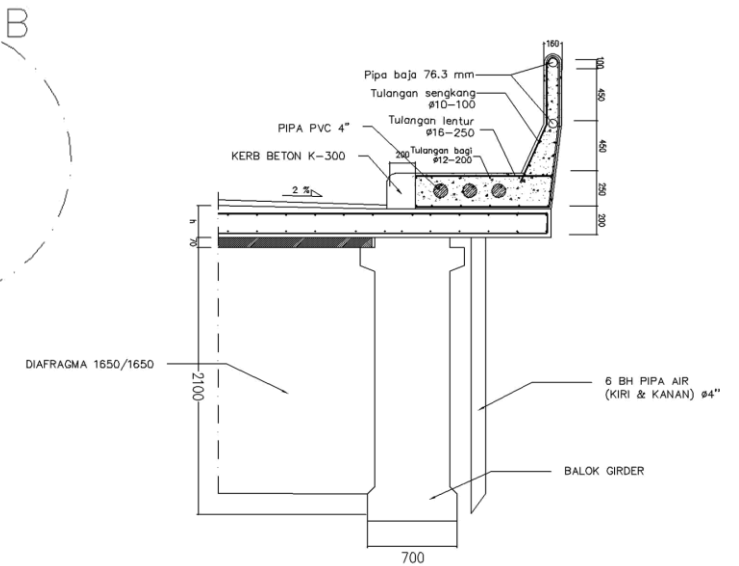
POSISI TENDON

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POTONGAN MELINTANG JEMBATAN

SKALA 1:50



POTONGAN B TIANG SANDARAN JEMBATAN

SKALA 1:50

Tabel 1 Rekapitulasi momen yang terjadi pada balok I-girder

Bentang	Berat sendiri	Beban mati sendiri	Beban mati tambahan	Lajur "D"	Beban Truk	Gaya Rem	Angin	Gempa
	BS	M _S	M _A	M _{TD}	M _{TT}	M _{TB}	M _{EWL}	M _{EQ}
	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	26180.040	43386.900	4397.722	20563.906	563.148	351.563	2177.486	12583.284
2	50554.560	83781.600	8492.153	39983.125	1126.296	703.125	4204.800	24298.755
3	73123.560	121184.100	12283.293	58257.656	1689.444	1054.688	6081.943	35146.413
4	93887.040	155594.400	15771.141	75387.500	2252.592	1406.250	7808.914	45126.259
5	112845.000	187012.500	18955.698	91372.656	2815.740	1757.813	9385.714	54238.292
6	129997.440	215438.400	21836.965	106213.125	3378.888	2109.375	10812.343	62482.513
7	145344.360	240872.100	24414.940	119908.906	3942.036	2460.938	12088.800	69858.920
8	158885.760	263313.600	26689.623	132460.000	4505.184	2812.500	13215.086	76367.515
9	170621.640	282762.900	28661.016	143866.406	5068.332	3164.063	14191.200	82008.298
10	180552.000	299220.000	30329.117	154128.125	5631.479	3515.625	15017.143	86781.268
11	188676.840	312684.900	31693.928	163245.156	6194.627	3867.188	15692.914	90686.425
12	194996.160	323157.600	32755.447	171217.500	6757.775	4218.750	16218.514	93723.769
13	199509.960	330638.100	33513.675	178045.156	7320.923	4570.313	16593.943	95893.301
14	202218.240	335126.400	33968.612	183728.125	7884.071	4921.875	16819.200	97195.020
15	203121.000	336622.500	34120.257	188266.406	8447.219	5273.438	16894.286	97628.926
16	202218.240	335126.400	33968.612	191660.000	9010.367	5625.000	16819.200	97195.020
17	199509.960	330638.100	33513.675	193908.906	9573.515	5976.563	16593.943	95893.301
18	194996.160	323157.600	32755.447	195013.125	10136.663	6328.125	16218.514	93723.769
19	188676.840	312684.900	31693.928	194972.656	10699.811	6679.688	15692.914	90686.425

Bentang	Berat sendiri	Beban mati sendiri	Beban mati tambahan	Lajur "D"	Beban Truk	Gaya Rem	Angin	Gempa
	BS	M _S	M _A	M _{TD}	M _{TT}	M _{TB}	M _{EWL}	M _{EQ}
	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)
20	180552.000	299220.000	30329.117	193787.500	11262.959	7031.250	15017.143	86781.268
21	170621.640	282762.900	28661.016	178766.656	11826.107	6257.813	14191.200	82008.298
22	158885.760	263313.600	26689.623	162601.125	12389.255	5484.375	13215.086	76367.515
23	145344.360	240872.100	24414.940	145290.906	12952.403	4710.938	12088.800	69858.920
24	129997.440	215438.400	21836.965	126836.000	13515.551	3937.500	10812.343	62482.513
25	112845.000	187012.500	18955.698	107236.406	14078.699	3164.063	9385.714	54238.292
26	93887.040	155594.400	15771.141	86492.125	14641.847	2390.625	7808.914	45126.259
27	73123.560	121184.100	12283.293	64603.156	15204.995	1617.188	6081.943	35146.413
28	50554.560	83781.600	8492.153	41569.500	12268.143	843.750	4204.800	24298.755
29	26180.040	43386.900	4397.722	17391.156	5831.291	70.313	2177.486	12583.284
30	0.000	0.000	0.000	-7931.875	-605.562	-703.125	0.000	0.000
31	-27985.560	-46379.100	-4701.013	-34399.594	-7042.414	-1476.563	-2327.657	-13451.096
32	-57776.640	-95750.400	-9705.318	-62012.000	-13479.266	-2250.000	-4805.486	-27770.006
33	-89373.240	-148113.900	-15012.913	-90769.094	-35666.118	-3023.438	-7433.486	-42956.727
34	-122775.360	-203469.600	-20623.800	-120670.875	-73602.970	-3796.875	-10211.657	-59011.262
35	-157983.000	-261817.500	-26537.978	-151717.344	-111539.822	-4570.313	-13140.000	-75933.609
36	-194996.160	-323157.600	-32755.447	-183908.500	-149476.674	-5343.750	-16218.514	-93723.769
37	-233814.840	-387489.900	-39276.207	-217244.344	-203163.526	-6117.188	-19447.200	-112381.742
38	-274439.040	-454814.400	-46100.258	-251724.875	-272600.378	-6890.625	-22826.057	-131907.527
39	-316868.760	-525131.100	-53227.601	-287350.094	-342037.230	-7664.063	-26355.086	-152301.125
40	-361104.000	-598440.000	-60658.235	-324120.000	-411474.082	-8437.500	-30034.286	-173562.535

Tabel 2 Rekapitulas gaya geser pada balok I-girder

Bentang	Berat sendiri	Beban mati sendiri	Beban mati tambahan	Lajur "D"	Beban Truk	Gaya Rem	Angin	Gempa
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
0	-27082.80	-44883.00	-4549.368	-21136.250	-563.148	-351.563	-2252.571	-13017.190
1	-25277.28	-41890.80	-4246.076	-19991.563	-563.148	-351.563	-2102.400	-12149.377
2	-23471.76	-38898.60	-3942.785	-18846.875	-563.148	-351.563	-1952.229	-11281.565
3	-21666.24	-35906.40	-3639.494	-17702.188	-563.148	-351.563	-1802.057	-10413.752
4	-19860.72	-32914.20	-3336.203	-16557.500	-563.148	-351.563	-1651.886	-9545.939
5	-18055.20	-29922.00	-3032.912	-15412.813	-563.148	-351.563	-1501.714	-8678.127
6	-16249.68	-26929.80	-2729.621	-14268.125	-563.148	-351.563	-1351.543	-7810.314
7	-14444.16	-23937.60	-2426.329	-13123.438	-563.148	-351.563	-1201.371	-6942.501
8	-12638.64	-20945.40	-2123.038	-11978.750	-563.148	-351.563	-1051.200	-6074.689
9	-10833.12	-17953.20	-1819.747	-10834.063	-563.148	-351.563	-901.029	-5206.876
10	-9027.60	-14961.00	-1516.456	-9689.375	-563.148	-351.563	-750.857	-4339.063
11	-7222.08	-11968.80	-1213.165	-8544.688	-563.148	-351.563	-600.686	-3471.251
12	-5416.56	-8976.60	-909.874	-7400.000	-563.148	-351.563	-450.514	-2603.438
13	-3611.04	-5984.40	-606.582	-6255.313	-563.148	-351.563	-300.343	-1735.625
14	-1805.52	-2992.20	-303.291	-5110.625	-563.148	-351.563	-150.171	-867.813
15	0.00	0.00	0.000	-3965.938	-563.148	-351.563	0.000	0.000
16	1805.52	2992.20	303.291	-2821.250	-563.148	-351.563	150.171	867.813
17	3611.04	5984.40	606.582	-1676.563	-563.148	-351.563	300.343	1735.625
18	5416.56	8976.60	909.874	-531.875	-563.148	-351.563	450.514	2603.438
19	7222.08	11968.80	1213.165	612.813	-563.148	-351.563	600.686	3471.251
20	9027.60	14961.00	1516.456	1757.500	-563.148	-351.563	750.857	4339.063

Bentang	Berat sendiri	Beban mati sendiri	Beban mati tambahan	Lajur "D"	Beban Truk	Gaya Rem	Angin	Gempa
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
21	10833.12	17953.20	1819.747	15593.188	-563.148	773.438	901.029	5206.876
22	12638.64	20945.40	2123.038	16737.875	-563.148	773.438	1051.200	6074.689
23	14444.16	23937.60	2426.329	17882.563	-563.148	773.438	1201.371	6942.501
24	16249.68	26929.80	2729.621	19027.250	-563.148	773.438	1351.543	7810.314
25	18055.20	29922.00	3032.912	20171.938	-563.148	773.438	1501.714	8678.127
26	19860.72	32914.20	3336.203	21316.625	-563.148	773.438	1651.886	9545.939
27	21666.24	35906.40	3639.494	22461.313	-563.148	773.438	1802.057	10413.752
28	23471.76	38898.60	3942.785	23606.000	6436.852	773.438	1952.229	11281.565
29	25277.28	41890.80	4246.076	24750.688	6436.852	773.438	2102.400	12149.377
30	27082.80	44883.00	4549.368	25895.375	6436.852	773.438	2252.571	13017.190
31	28888.32	47875.20	4852.659	27040.063	6436.852	773.438	2402.743	13885.003
32	30693.84	50867.40	5155.950	28184.750	6436.852	773.438	2552.914	14752.815
33	32499.36	53859.60	5459.241	29329.438	37936.852	773.438	2703.086	15620.628
34	34304.88	56851.80	5762.532	30474.125	37936.852	773.438	2853.257	16488.441
35	36110.40	59844.00	6065.823	31618.813	37936.852	773.438	3003.429	17356.254
36	37915.92	62836.20	6369.115	32763.500	37936.852	773.438	3153.600	18224.066
37	39721.44	65828.40	6672.406	33908.188	69436.852	773.438	3303.771	19091.879
38	41526.96	68820.60	6975.697	35052.875	69436.852	773.438	3453.943	19959.692
39	43332.48	71812.80	7278.988	36197.563	69436.852	773.438	3604.114	20827.504
40	45138.00	74805.00	7582.279	37342.250	69436.852	773.438	3754.286	21695.317

Tabel 3 Kombinasi momen akibat beban

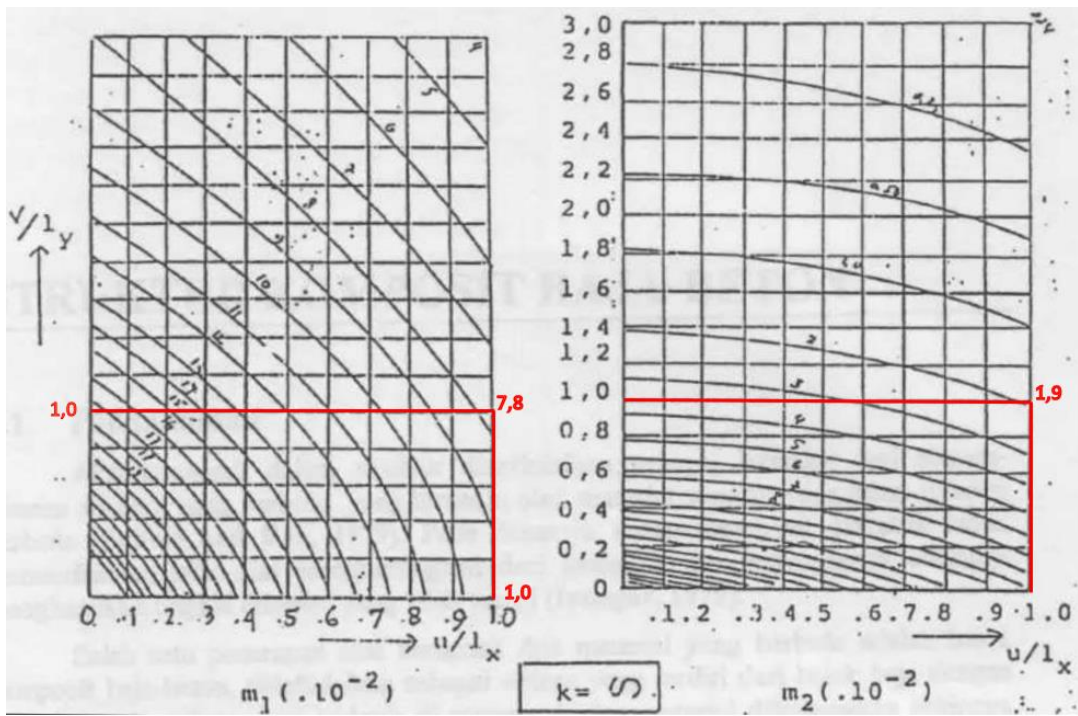
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	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	99521.23	90929.79	60859.72	60859.72	63037.21	79886.59	71599.03	71440.72	75706.82	64967.52	47784.62	15422.93
2	192784.81	176059.79	117522.23	117522.23	121727.03	154364.74	138428.50	138291.10	146630.06	125723.79	92273.75	29987.34
3	279790.72	255390.01	169987.51	169987.51	176069.45	223434.45	200488.40	200551.12	212769.72	182268.82	133467.39	43693.24
4	360538.98	328920.44	218255.56	218255.56	226064.48	287095.72	257778.73	258220.80	274125.79	234602.61	171365.54	56540.63
5	435029.57	396651.09	262326.40	262326.40	271712.11	345348.55	310299.50	311300.12	330698.27	282725.17	205968.20	68529.49
6	503262.51	458581.95	302200.01	302200.01	313012.35	398192.94	358050.70	359789.10	382487.17	326636.47	237275.36	79659.84
7	565237.78	514713.03	337876.40	337876.40	349965.20	445628.88	401032.34	403687.72	429492.48	366336.54	265287.04	89931.68
8	620955.40	565044.32	369355.57	369355.57	382570.65	487656.39	439244.41	442995.99	471714.21	401825.37	290003.22	99345.00
9	670415.35	609575.83	396637.51	396637.51	410828.71	524275.45	472686.91	477713.92	509152.36	433102.96	311423.92	107899.80
10	713617.65	648307.56	419722.23	419722.23	434739.38	555486.07	501359.85	507841.49	541806.92	460169.30	329549.12	115596.09
11	750562.28	681239.50	438609.74	438609.74	454302.65	581288.25	525263.22	533378.71	569677.89	483024.40	344378.83	122433.87
12	781249.26	708371.65	453300.01	453300.01	469518.53	601681.99	544397.03	554325.59	592765.28	501668.27	355913.05	128413.13
13	805678.58	729704.02	463793.07	463793.07	480387.01	616667.29	558761.27	570682.11	611069.08	516100.89	364151.77	133533.87
14	823850.23	745236.60	470088.90	470088.90	486908.10	626244.14	568355.94	582448.28	624589.30	526322.27	369095.01	137796.09
15	835764.23	754969.40	472187.51	472187.51	489081.80	630412.56	573181.05	589624.11	633325.94	532332.41	370742.76	141199.80
16	841420.56	758902.42	470088.90	470088.90	486908.10	629172.53	573236.59	592209.58	637278.99	534131.31	369095.01	143745.00
17	840819.24	757035.65	463793.07	463793.07	480387.01	622524.07	568522.56	590204.70	636448.45	531718.96	364151.77	145431.68
18	833960.26	749369.09	453300.01	453300.01	469518.53	610467.16	559038.97	583609.47	630834.33	525095.38	355913.05	146259.84
19	820843.61	735902.75	438609.74	438609.74	454302.65	593001.81	544785.81	572423.90	620436.63	514260.55	344378.83	146229.49
20	801469.31	716636.63	419722.23	419722.23	434739.38	570128.02	525763.09	556647.97	605255.34	499214.48	329549.12	145340.63
21	750968.55	672228.32	396637.51	396637.51	410828.71	537700.98	495062.80	522465.69	567329.66	468904.38	311423.92	134074.99
22	694210.13	622020.22	369355.57	369355.57	382570.65	499865.51	459592.94	483693.06	524620.40	434383.03	290003.22	121950.84

Bentang	Kuat I	Kuat II	Kuat III	Kuat IV	Kuat V	Ekstrem I	Ekstrem II	Daya layan I	Daya layan II	Daya layan III	Daya layan III	Fatik
	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)	(kg.m)
23	631194.04	566012.34	337876.40	337876.40	349965.20	456621.59	419353.52	440330.09	477127.56	395650.44	265287.04	108968.18
24	561920.30	504204.68	302200.01	302200.01	313012.35	407969.24	374344.53	392376.76	424851.13	352706.61	237275.36	95127.00
25	486388.90	436597.23	262326.40	262326.40	271712.11	353908.44	324565.98	339833.08	367791.12	305551.53	205968.20	80427.30
26	404599.84	363190.00	218255.56	218255.56	226064.48	294439.20	270017.86	282699.05	305947.52	254185.22	171365.54	64869.09
27	316553.11	283982.98	169987.51	169987.51	176069.45	229561.52	210700.17	220974.67	239320.33	198607.66	133467.39	48452.37
28	215948.73	194076.18	117522.23	117522.23	121727.03	158225.40	144862.92	151159.95	163359.56	136018.87	92273.75	31177.13
29	102786.69	93469.59	60859.72	60859.72	63037.21	80430.84	72506.10	73254.87	78065.21	66418.83	47784.62	13043.37
30	-16633.01	-12936.79	0.00	0.00	0.00	-2772.17	-4620.28	-9240.56	-12012.73	-7392.45	0.00	-5948.91
31	-142310.37	-125142.94	-65056.95	-65056.95	-67384.60	-91383.61	-86516.23	-96326.34	-106874.25	-85414.97	-51080.11	-25799.70
32	-274245.39	-243148.89	-134311.12	-134311.12	-139116.60	-185403.50	-173181.75	-188002.47	-206519.36	-167648.73	-105455.72	-46509.00
33	-440788.07	-389004.61	-207762.51	-207762.51	-215195.99	-289556.83	-272491.83	-300018.95	-331423.06	-266693.73	-163126.81	-68076.82
34	-641938.42	-562710.13	-285411.12	-285411.12	-295622.78	-403843.60	-384446.48	-432375.78	-481585.34	-382549.98	-224093.40	-90503.16
35	-849346.42	-742215.42	-367256.96	-367256.96	-380396.96	-523538.81	-501170.69	-569322.96	-636531.20	-502617.46	-288355.48	-113788.01
36	-1063012.08	-927520.51	-453300.01	-453300.01	-469518.53	-648642.46	-622664.48	-710860.48	-796260.65	-626896.19	-355913.05	-137931.38
37	-1311285.40	-1140675.37	-543540.29	-543540.29	-562987.49	-783879.55	-756802.82	-872738.36	-981248.68	-767986.15	-426766.11	-162933.26
38	-1594166.38	-1381680.03	-637977.80	-637977.80	-660803.85	-929250.09	-903585.74	-1054956.59	-1191495.30	-925887.36	-500914.66	-188793.66
39	-1883305.02	-1628484.46	-736612.52	-736612.52	-762967.61	-1080029.06	-1055138.22	-1241765.17	-1406525.50	-1087999.81	-578358.70	-215512.57
40	-2178701.32	-1881088.68	-839444.47	-839444.47	-869478.76	-1236216.48	-1211460.26	-1433164.10	-1626339.29	-1254323.50	-659098.23	-243090.00

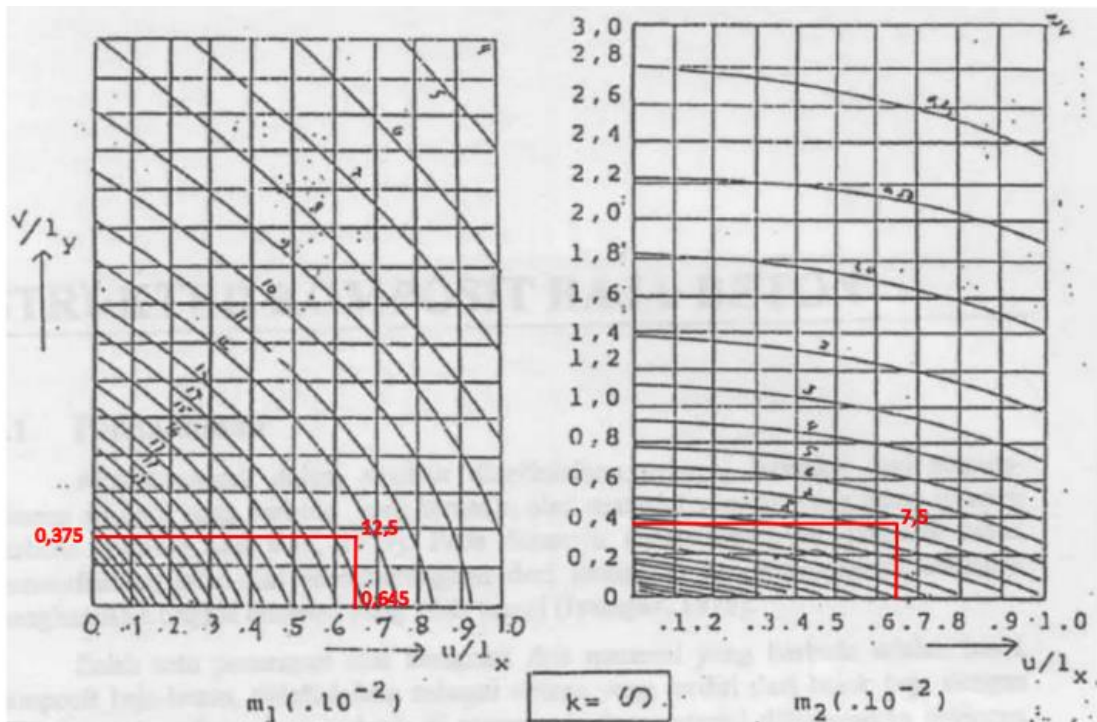
Tabel 4 Kombinasi gaya gesr akibat beban

Bentang	Kuat I	Kuat II	Kuat III	Kuat IV	Kuat V	Ekstrem I	Ekstrem II	Daya layan I	Daya layan II	Daya layan III	Daya layan III	Fatik
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
0	-102650.064	-93829.680	-62958.335	-62958.335	-65210.907	-82590.813	-73983.815	-73735.899	-78098.616	-67073.136	-49432.368	-15852.188
1	-96392.404	-88029.895	-58761.113	-58761.113	-60863.513	-77182.372	-69214.249	-69145.549	-73315.031	-62861.895	-46136.876	-14993.672
2	-90134.744	-82230.110	-54563.891	-54563.891	-56516.119	-71773.931	-64444.683	-64555.199	-68531.446	-58650.654	-42841.385	-14135.156
3	-83877.084	-76430.325	-50366.668	-50366.668	-52168.725	-66365.490	-59675.117	-59964.849	-63747.861	-54439.412	-39545.894	-13276.641
4	-77619.425	-70630.540	-46169.446	-46169.446	-47821.332	-60957.048	-54905.551	-55374.499	-58964.277	-50228.171	-36250.403	-12418.125
5	-71361.765	-64830.756	-41972.223	-41972.223	-43473.938	-55548.607	-50135.985	-50784.149	-54180.692	-46016.930	-32954.912	-11559.609
6	-65104.105	-59030.971	-37775.001	-37775.001	-39126.544	-50140.166	-45366.419	-46193.799	-49397.107	-41805.689	-29659.421	-10701.094
7	-58846.445	-53231.186	-33577.779	-33577.779	-34779.150	-44731.725	-40596.853	-41603.449	-44613.522	-37594.448	-26363.929	-9842.578
8	-52588.785	-47431.401	-29380.556	-29380.556	-30431.756	-39323.283	-35827.287	-37013.099	-39829.937	-33383.207	-23068.438	-8984.063
9	-46331.125	-41631.616	-25183.334	-25183.334	-26084.363	-33914.842	-31057.721	-32422.749	-35046.352	-29171.965	-19772.947	-8125.547
10	-40073.466	-35831.831	-20986.112	-20986.112	-21736.969	-28506.401	-26288.154	-27832.398	-30262.767	-24960.724	-16477.456	-7267.031
11	-33815.806	-30032.047	-16788.889	-16788.889	-17389.575	-23097.959	-21518.588	-23242.048	-25479.182	-20749.483	-13181.965	-6408.516
12	-27558.146	-24232.262	-12591.667	-12591.667	-13042.181	-17689.518	-16749.022	-18651.698	-20695.597	-16538.242	-9886.474	-5550.000
13	-21300.486	-18432.477	-8394.445	-8394.445	-8694.788	-12281.077	-11979.456	-14061.348	-15912.012	-12327.001	-6590.982	-4691.484
14	-15042.826	-12632.692	-4197.222	-4197.222	-4347.394	-6872.636	-7209.890	-9470.998	-11128.427	-8115.760	-3295.491	-3832.969
15	-8785.166	-6832.907	0.000	0.000	0.000	-1464.194	-2440.324	-4880.648	-6344.842	-3904.518	0.000	-2974.453
16	-2527.506	-1033.122	4197.222	4197.222	4347.394	3944.247	2329.242	-290.298	-1561.257	306.723	3295.491	-2115.938
17	3730.153	4766.663	8394.445	8394.445	8694.788	9352.688	7098.808	4300.052	3222.328	4517.964	6590.982	-1257.422
18	9987.813	10566.447	12591.667	12591.667	13042.181	14761.129	11868.374	8890.402	8005.912	8729.205	9886.474	-398.906
19	16245.473	16366.232	16788.889	16788.889	17389.575	20169.571	16637.940	13480.752	12789.497	12940.446	13181.965	459.609
20	22503.133	22166.017	20986.112	20986.112	21736.969	25578.012	21407.507	18071.103	17573.082	17151.688	16477.456	1318.125
21	53629.593	47308.202	25183.334	25183.334	26084.363	35131.253	33085.073	36477.453	40317.467	32415.729	19772.947	11694.891
22	59887.253	53107.987	29380.556	29380.556	30431.756	40539.695	37854.639	41067.803	45101.052	36626.970	23068.438	12553.406

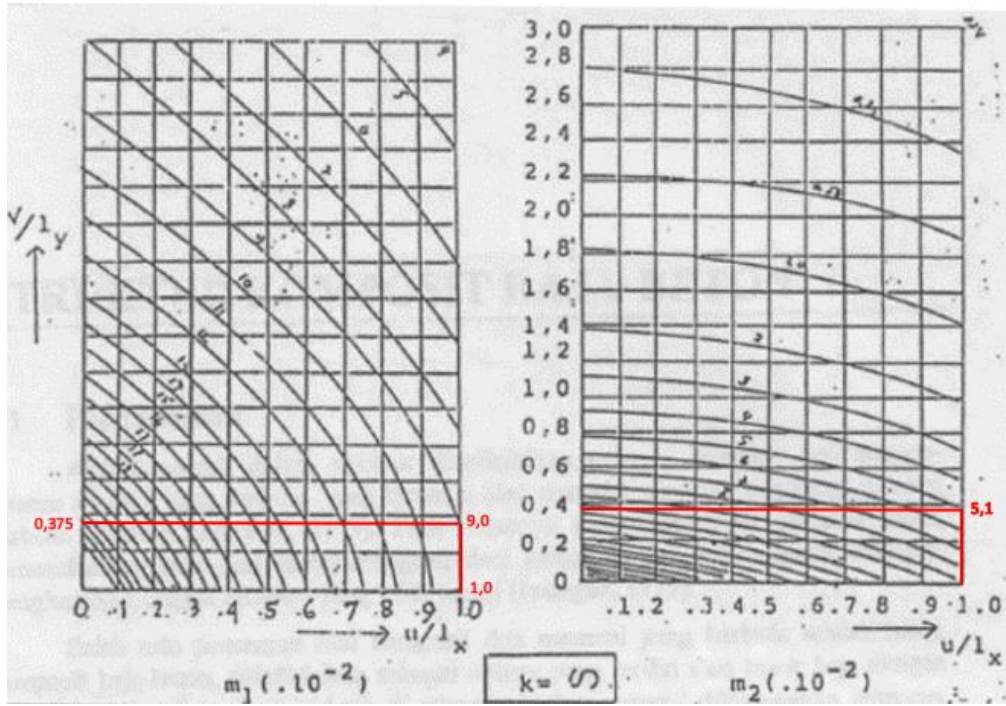
Bentang	Kuat I	Kuat II	Kuat III	Kuat IV	Kuat V	Ekstrem I	Ekstrem II	Daya layan I	Daya layan II	Daya layan III	Daya layan III	Fatik
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
23	66144.912	58907.772	33577.779	33577.779	34779.150	45948.136	42624.205	45658.153	49884.637	40838.211	26363.929	13411.922
24	72402.572	64707.557	37775.001	37775.001	39126.544	51356.577	47393.771	50248.503	54668.222	45049.452	29659.421	14270.438
25	78660.232	70507.341	41972.223	41972.223	43473.938	56765.018	52163.337	54838.853	59451.807	49260.693	32954.912	15128.953
26	84917.892	76307.126	46169.446	46169.446	47821.332	62173.460	56932.903	59429.203	64235.392	53471.935	36250.403	15987.469
27	91175.552	82106.911	50366.668	50366.668	52168.725	67581.901	61702.469	64019.553	69018.977	57683.176	39545.894	16845.984
28	110033.212	97706.696	54563.891	54563.891	56516.119	75090.342	69972.035	75609.903	82902.562	67494.417	42841.385	17704.500
29	116290.872	103506.481	58761.113	58761.113	60863.513	80498.783	74741.601	80200.253	87686.147	71705.658	46136.876	18563.016
30	122548.531	109306.266	62958.335	62958.335	65210.907	85907.225	79511.168	84790.604	92469.732	75916.899	49432.368	19421.531
31	128806.191	115106.050	67155.558	67155.558	69558.300	91315.666	84280.734	89380.954	97253.316	80128.140	52727.859	20280.047
32	135063.851	120905.835	71352.780	71352.780	73905.694	96724.107	89050.300	93971.304	102036.901	84339.382	56023.350	21138.563
33	198021.511	170805.620	75550.002	75550.002	78253.088	111582.549	109569.866	130061.654	147770.486	113750.623	59318.841	21997.078
34	204279.171	176605.405	79747.225	79747.225	82600.482	116990.990	114339.432	134652.004	152554.071	117961.864	62614.332	22855.594
35	210536.831	182405.190	83944.447	83944.447	86947.876	122399.431	119108.998	139242.354	157337.656	122173.105	65909.823	23714.109
36	216794.491	188204.975	88141.669	88141.669	91295.269	127807.872	123878.564	143832.704	162121.241	126384.346	69205.315	24572.625
37	279752.150	238104.760	92338.892	92338.892	95642.663	142666.314	144398.130	179923.054	207854.826	155795.587	72500.806	25431.141
38	286009.810	243904.544	96536.114	96536.114	99990.057	148074.755	149167.696	184513.404	212638.411	160006.829	75796.297	26289.656
39	292267.470	249704.329	100733.336	100733.336	104337.451	153483.196	153937.262	189103.755	217421.996	164218.070	79091.788	27148.172
40	298525.130	255504.114	104930.559	104930.559	108684.844	158891.637	158706.828	193694.105	222205.581	168429.311	82387.279	28006.688



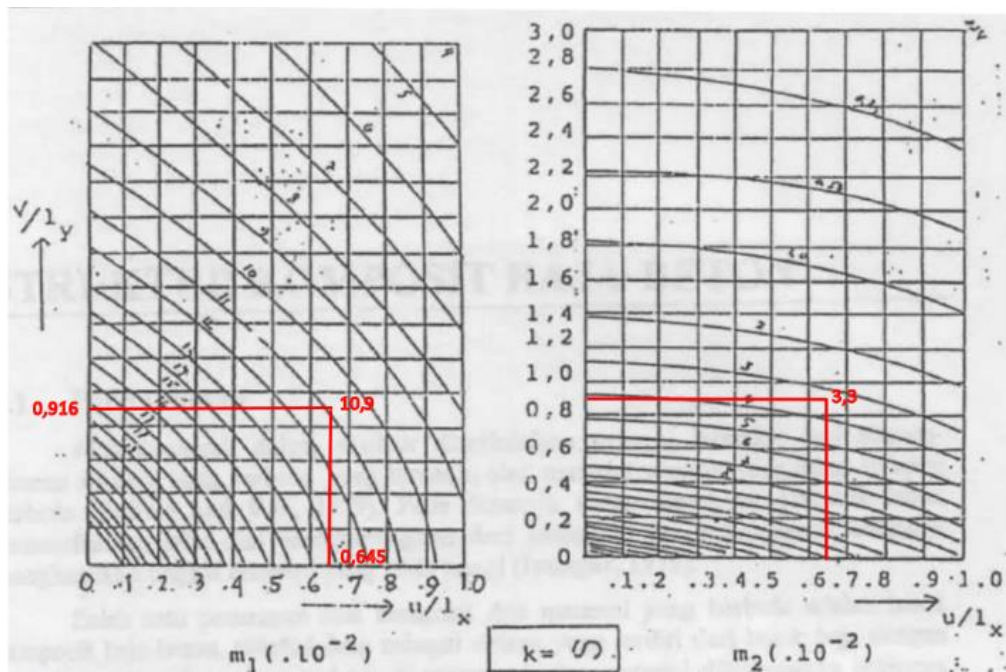
Gambar 1 Grafik M.Pigeaud akibat beban mati



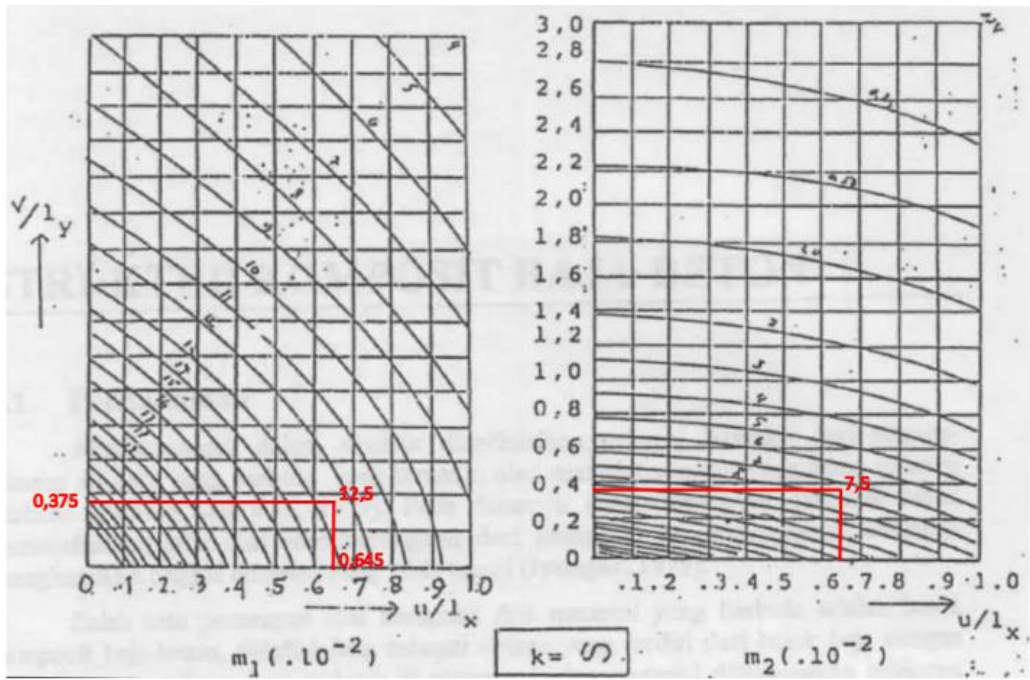
Gambar 2 Grafik M.Pigeaud akibat beban hidup pada kondisi pembebanan 1



Gambar 3 Grafik M.Pigeaud akibat beban hidup pada kondisi pembebanan 2



Gambar 4 Grafik M.Pigeaud akibat beban hidup pada kondisi pembebanan 3 formasi 1



Gambar 5 Grafik M.Pigeaud akibat beban hidup pada kondisi pembebanan 3 formasi 3

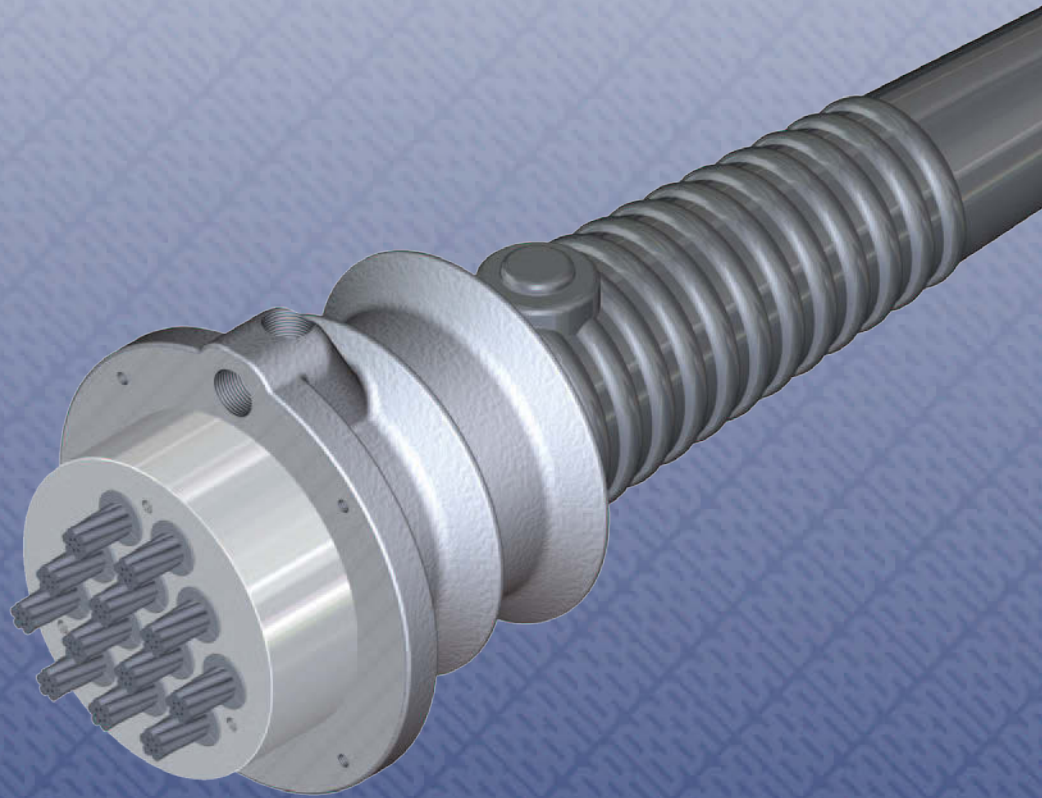
BBR VT CONA CMI

Bonded Post-tensioning System with 04 to 31 Strands



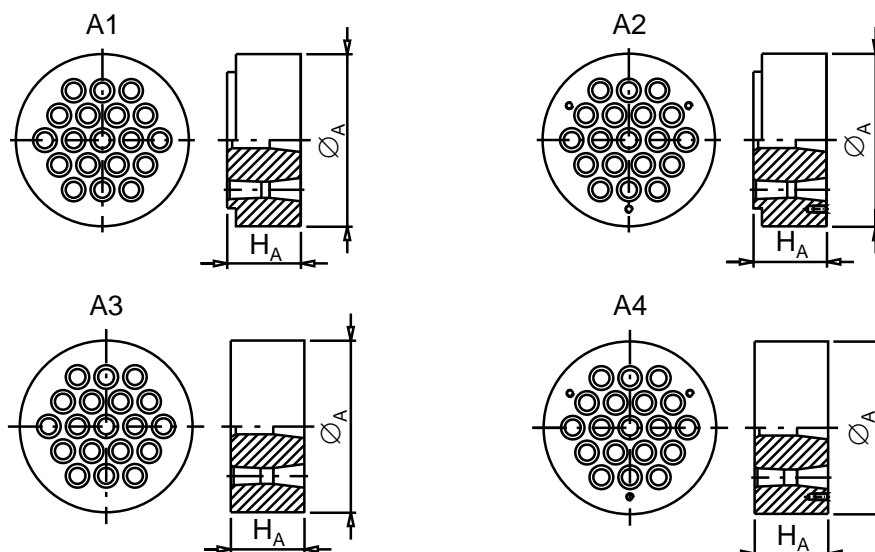
European Technical Assessment
ETA – 06/ 0147

CE

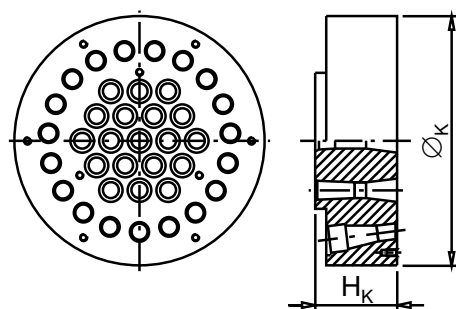


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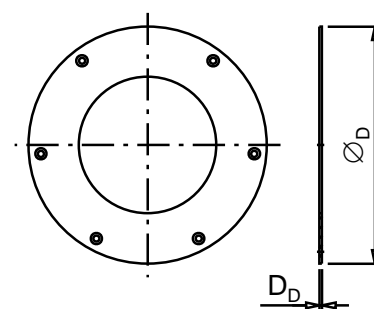
Anchor head A1–A4



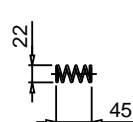
Coupler head K



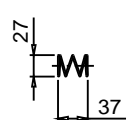
Cover plate



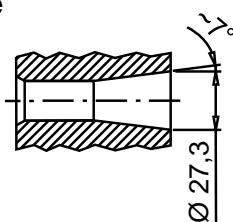
Spring A



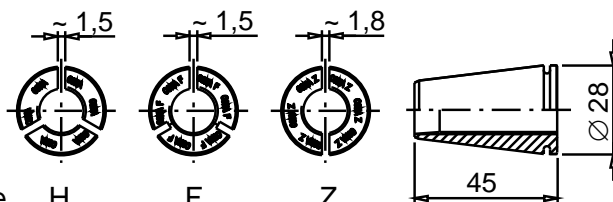
Spring K



Cone



Wedge



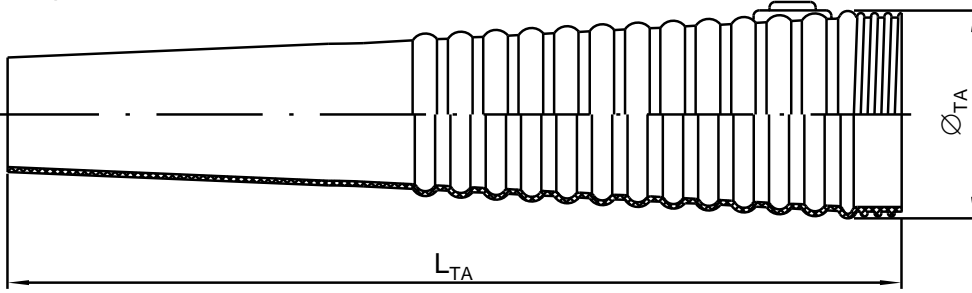
Number of strands		04	07	09	12	15	19	22	24	27	31
Anchor head A1–A4											
Diameter	Ø _A mm	100	130	160	160	200	200	225	240	255	255
Height	H _A mm	50	55	60	65	75	85	95	100	105	110
Coupler anchor head K											
Diameter	Ø _K mm	195	210	250	250	290	290	310	340	390	390
Height	H _K mm	85	85	90	90	90	95	105	120	125	130
Cover plate											
Diameter	Ø _D mm	192	207	246	246	286	286	306	336	386	386
Thickness	D _D mm	3	3	3	3	3	3	5	5	5	5



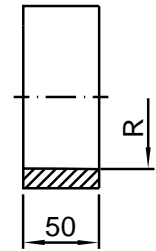
Bonded Post-tensioning System
Components – Anchorage and coupler

Annex 3
of European Technical Assessment
ETA-06/0147 of 30.10.2017

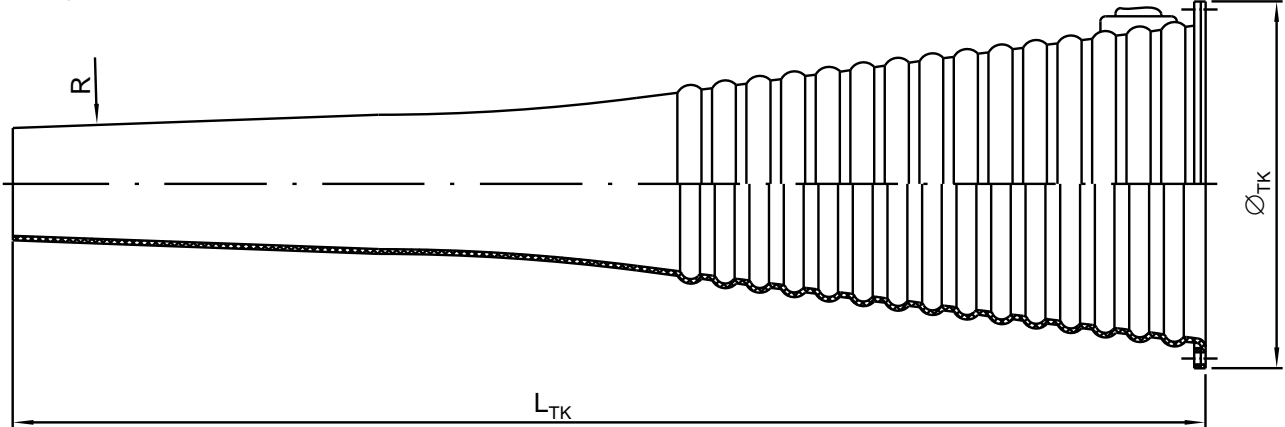
Trumpet A



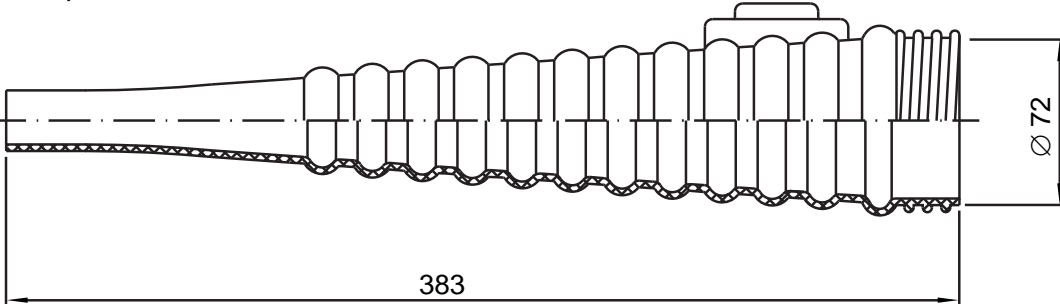
Tension ring



Trumpet K



Trumpet F



Dimensions in mm

Number of strands		04	07	09	12	15	19	22	24	27	31
Trumpet A											
Diameter	Ø _{TA} mm	72	88	127	127	153	153	170	191	191	191
Length	L _{TA} mm	200	328	623	508	694	579	715	866	866	751
Trumpet K											
Diameter	Ø _{TK} mm	185	203	240	240	275	275	305	330	375	375
Length	L _{TK} mm	470	640	845	730	890	775	840	1 090	1 265	1 150

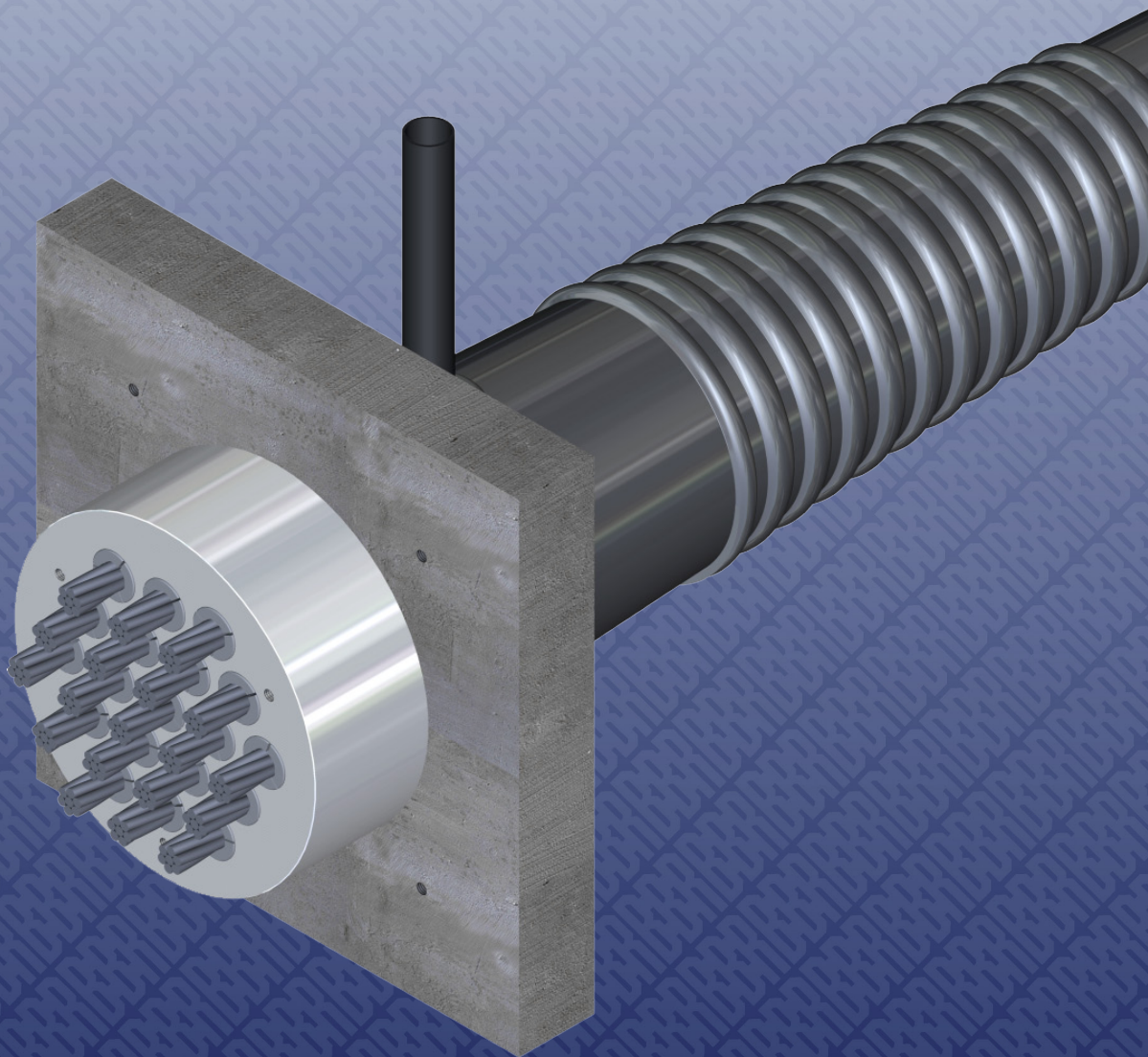


Bonded Post-tensioning System
 Components – Accessory

Annex 5
 of European Technical Assessment
ETA-06/0147 of 30.10.2017

BBR VT CONA CMI SP

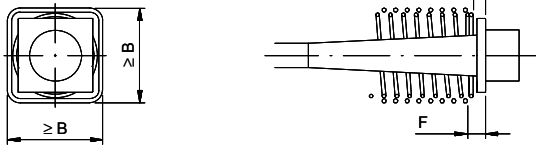
Internal Post-tensioning System with 01 to 61 Strands



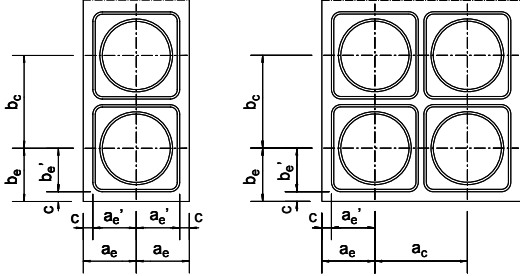
European Technical Approval
ETA – 09/ 0287

CE

Stressing and fixed anchorage / coupler



Centre spacing and edge distance



$$a_e = a_e' + c$$

$$b_e = b_e' + c$$

BBR VT CONA CMI SP	0806	0906	1206
Strand arrangement			

7-wire prestressing steel strand
 Nominal diameter 15.7 mm ... Nominal cross-sectional area 150 mm² ... Maximum characteristic tensile strength 1860 MPa¹⁾

Tendon			
Cross-sectional area	A _p mm ²	1200	1350
Char. value of maximum force	F _{pk} kN	2232	2511
Char. value of 0.1 % proof force	F _{p0.1} kN	1968	2214
Maximum prestressing force	0.90 · F _{p0.1} kN	1771	1993
Maximum overstressing force	0.95 · F _{p0.1} kN	1870	2103

Minimum concrete strength / Helix / Additional reinforcement / Centre spacing and edge distance / Square plate dimensions																			
Minimum concrete strength																			
Cube	f _{cm, 0, cube, 150} MPa	26	28	34	38	43	46	26	28	34	38	43	46	26	28	34	38	43	46
Cylinder	f _{cm, 0, cylinder, Ø 150} MPa	21	23	28	31	35	38	21	23	28	31	35	38	21	23	28	31	35	38
Helix, ribbed reinforcing steel, R_s ≥ 500 MPa																			
Outer diameter	mm	280	270	230	215	205	200	295	280	240	225	215	215	325	320	290	280	270	260
Bar diameter ³⁾	mm	10	10	12	12	12	12	10	10	10	10	12	12	12	12	12	14	14	14
Length approximately	mm	280	258	237	237	237	212	280	280	260	260	262	327	327	312	289	289	239	239
Pitch	mm	45	45	50	50	50	50	45	45	50	50	50	50	45	45	50	50	50	50
Number of pitches	—	7	6.5	5.5	5.5	5.5	5	7	7	6	6	6	5	8	8	7	6.5	6.5	5.5
Distance	E mm	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Additional reinforcement, ribbed reinforcing steel, R_s ≥ 500 MPa																			
Number of stirrups	mm	5	4	3	3	3	3	5	4	4	4	3	4	7	6	7	6	6	6
Bar diameter ³⁾	mm	12	12	16	16	16	16	12	12	16	16	16	16	14	14	16	16	16	16
Spacing	mm	70	90	120	110	105	100	75	75	90	85	110	75	55	55	55	60	60	55
Distance from anchor plate	F mm	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
Minimum outer dimensions	B × B mm	315	300	280	265	250	240	330	320	295	280	265	255	385	375	345	325	310	300
Centre spacing and edge distance																			
Minimum centre spacing	a _c , b _c mm	335	320	300	285	270	260	355	340	315	300	285	275	410	395	365	345	330	320
Minimum edge distance	a _e ', b _e ' mm	160	150	140	135	125	120	170	160	150	140	135	130	195	190	175	165	155	150
Square plate dimensions²⁾																			
Side length	S _{SP} mm	225	225	225	220	215	215	255	255	250	245	240	240	265	265	265	260	255	250
Thickness	T _{SP} mm	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

c..... Concrete cover
 1)..... Prestressing steel strand with nominal diameter of 15.3 mm, cross-sectional area of 140 mm² or with characteristic tensile strength below 1860 MPa may also be used.
 2)..... The square plate dimensions are minimum values, therefore larger or thicker plates may be used.
 3)..... Bar diameter of 14 mm can be replaced by 16 mm.



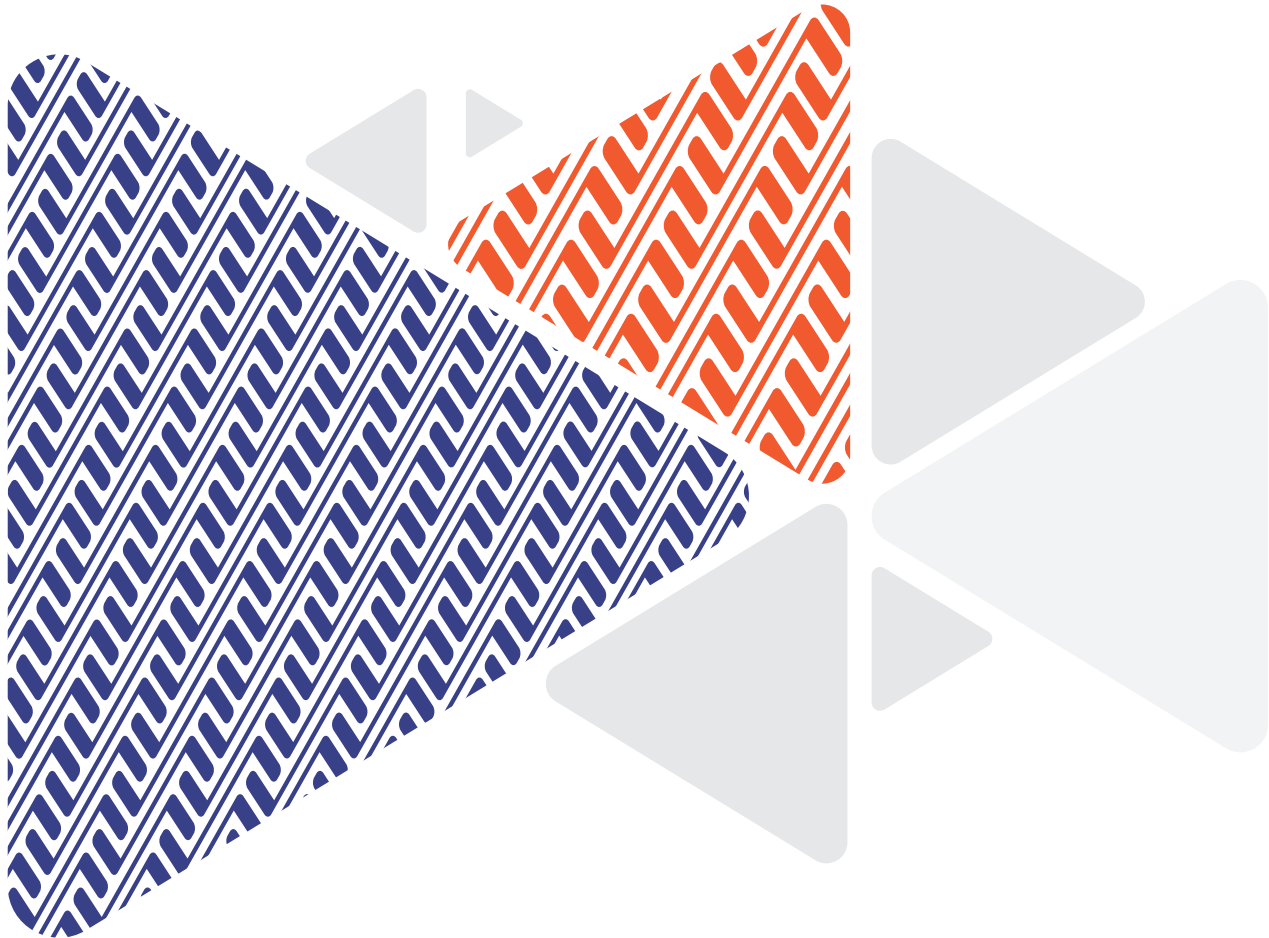
Internal Post-tensioning System
 Minimum concrete strength
 Helix – Additional reinforcement
 Centre and edge distance – Square plate dimensions

Annex 24
 of European technical approval
 ETA-09/0287



Dedication for Movement

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Jakarta Timur 13340
T. (021) 22892999 / 29838020
F. (021) 29838025
waskitaprecast.co.id



Kantor Area Pemasaran

AREA 1

**Di Aceh, Sumatera Utara, Riau,
Kepulauan Riau, dan Sumatera Barat**

Jalan Patriot No.10 Kp. Lalang
Medan, Sumatera Utara
Email : info@waskitaprecast.co.id

AREA 4

Jawa Tengah, DIY, Kalimantan

Jl Ring Road Utara, Ruko Panda Kav. O
(depan polda DIY) Condong Catur
Depok, Sleman
Email : info@waskitaprecast.co.id

AREA 2

**Sumatera Selatan, Bangka Belitung, Jambi,
Bengkulu dan Lampung**

Jl Gubernur H. Ahmad Bastari,
Kec. Seberang Ulu I, Kota Palembang
Sumatera Selatan 30967
Email : info@waskitaprecast.co.id

AREA 5

**Jawa Timur, Bali, Nusa Tenggara Barat, dan
Nusa Tenggara Timur**

Jl. Raya Prambon Km 36
Ds. Kedungwonokerto,
Prambon, Sidoarjo, Jawa Timur
Email : info@waskitaprecast.co.id

AREA 3

DKI Jakarta, Banten dan Jawa Barat

Tamansari Hive Office Tower
Jl D.I Panjaitan, Kav.2, Cawang
Jakarta Timur 13350
Email : info@waskitaprecast.co.id

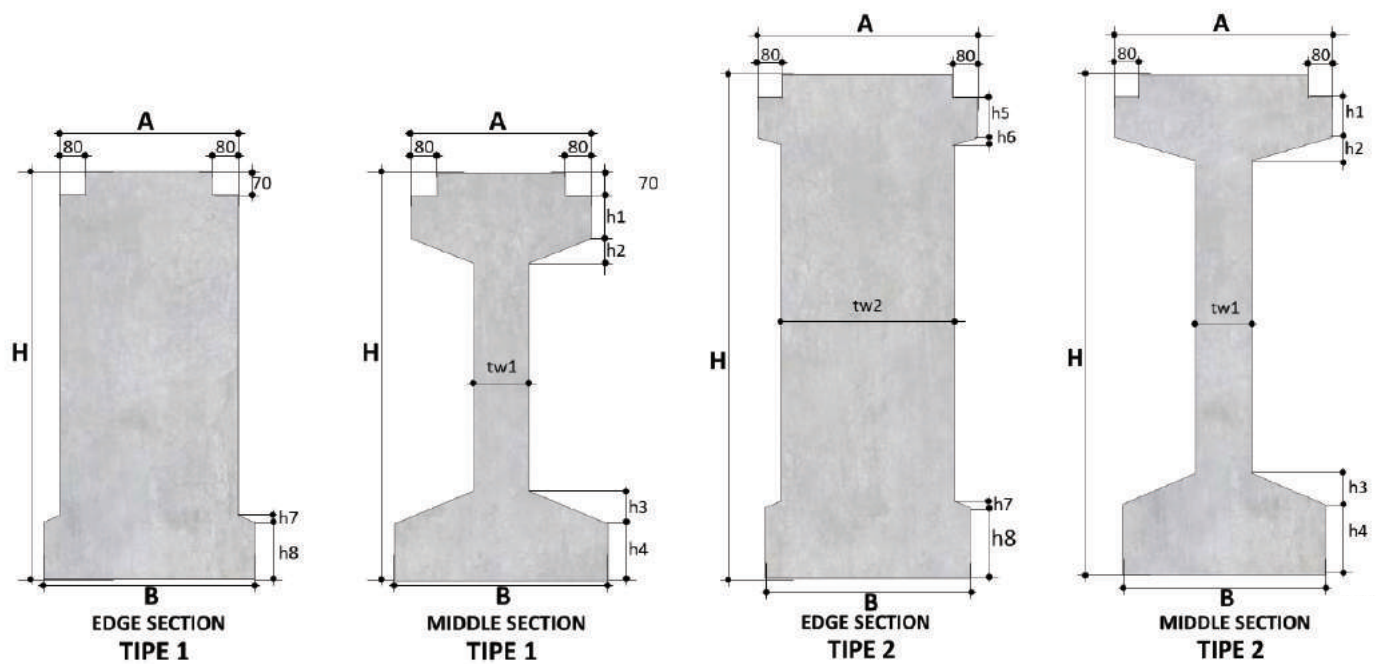
AREA 6

Sulawesi, Kepulauan Maluku dan Papua

Jalan Mapala 22-3, Tidung
Kec. Rappocini
Kota Makassar
Sulawesi Selatan 90222
Email: info@waskitaprecast.co.id

Item	Specification	Reference	
	SWPR7BL	JIS G 3536 : 2014	(Uncoated Stress-Relieved Steel Wires and Strands for Prestressed Concrete)
Post Tension System	VLM System DSI System		
Post Tension Grout	Compressive Strength : at 7 Day : 27 MPa at 28 Day : 30 MPa	BS EN 447 : 2007	(Grout for Prestressing Tendon. Basic Requirement)
Pin Connector	S45C C45	JIS G 4051:2009 DIN EN 10083-2:2006-10	(Carbon Steel for Machine Structural) (Steel for Quenching and Tempering)

PRODUCT DIMENSION



All units in mm

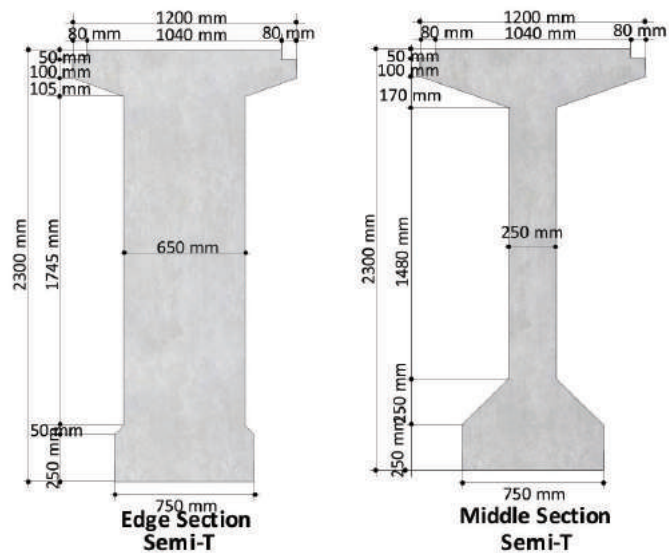
PC-I GIRDER



Notation	Unit (mm)	H (cm) Type 1	Type 2							
			90	125	140	160	170	185	210	230
A	mm	550	550	700	700	800	800	800	850	1200
B	mm	650	650	650	650	700	700	700	750	750
Tw1	mm	170	170	180	180	200	200	200	250	250
Tw2	mm	-	-	550	550	600	600	600	600	650
h1	mm	130	130	130	130	130	130	130	130	100
h2	mm	75	75	75	75	120	120	120	120	170
h3	mm	100	100	100	100	250	250	250	250	250
h4	mm	125	125	225	225	250	250	250	250	250
h5	mm	-	-	130	130	130	130	130	130	100
h6	mm	-	-	22	22	40	40	40	40	105
h7	mm	21	22	21	22	50	50	50	50	50
h8	mm	125	175	225	225	250	250	250	250	250

Typical of girder according to length :

1. Span 16 m, H 90
2. Span 20 m, H 125
3. Span 25 m, H 160
4. Span 30 m, H 170
5. Span 40 m, H 210
6. Span 45 m, H 210, Semi-T
7. Span 50 m, Semi-T



Another Available length

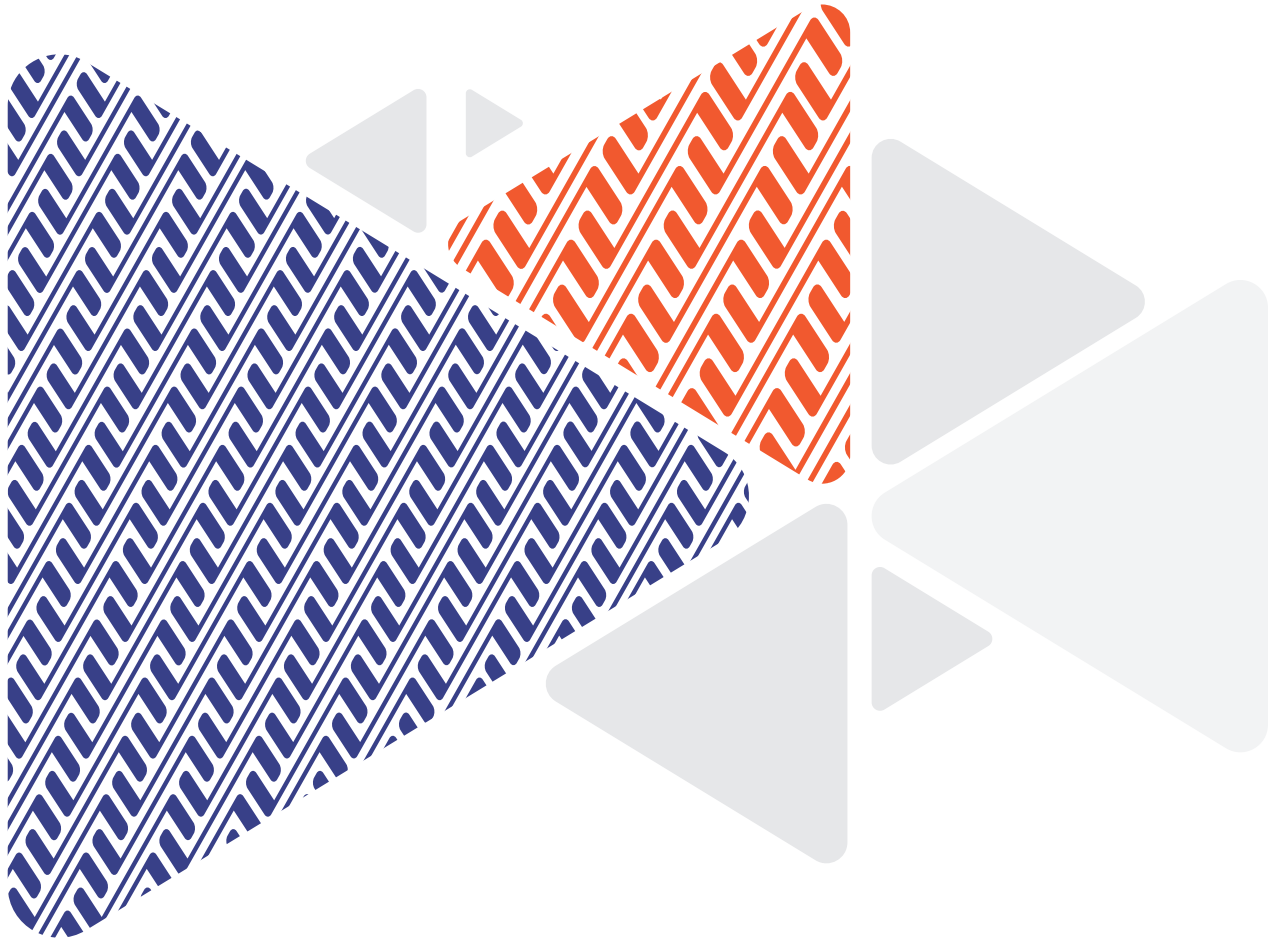
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		90	125	140	160	170	185	210	230	Semi-T
span (K-800)	m	16 to 19	16 to 28	16 to 35	24 to 43	35 to 44	37 to 48	38 to 52	45 to 52	Max 50 m
span (K-500)	m	16 to 18	16 to 24	16 to 28	20 to 33	27 to 40	29 to 42	32 to 45	37 to 48	

Recommended CTC (Center to Center) Spacing : 1,4 m ; 1,85 m ; 2,1 m ; 2,4 m
But another CTC Spacing can be Designed



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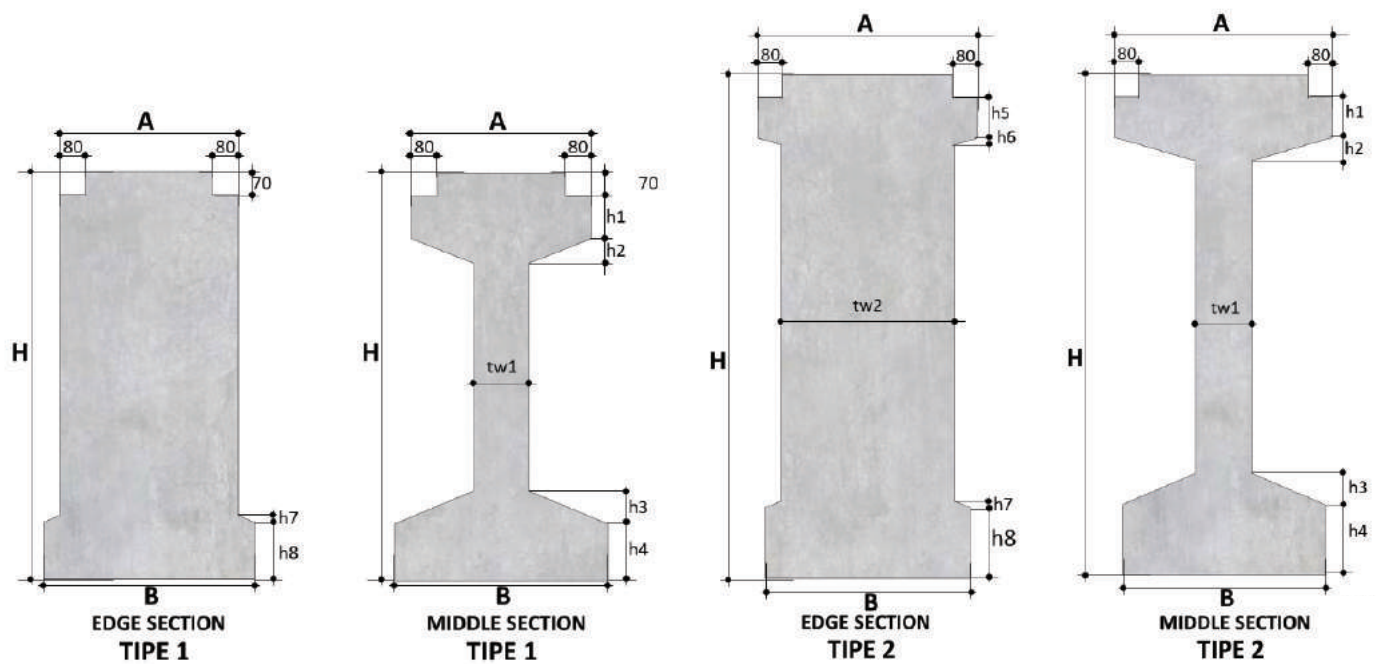
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PRODUCT DIMENSION



All units in mm

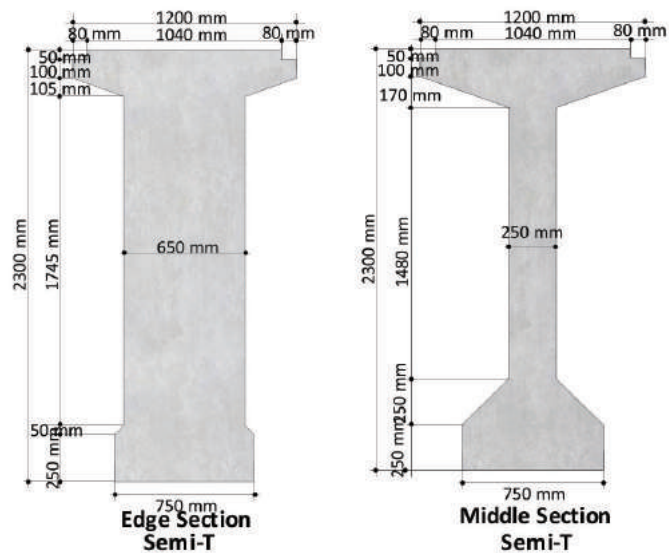
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h2	mm	75	75	75	75	120	120	120	120	170
h3	mm	100	100	100	100	250	250	250	250	250
h4	mm	125	125	225	225	250	250	250	250	250
h5	mm	-	-	130	130	130	130	130	130	100
h6	mm	-	-	22	22	40	40	40	40	105
h7	mm	21	22	21	22	50	50	50	50	50
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LEMBAR ASISTENSI
SKRIPSI/TUGAS AKHIR

NAMA : NIDA ULYANI
NIM : 2019D1B005

TANGGAL	URAIAN TUGAS	PARAF
25/9-2023	- Perbaiki penulisan sesuai pedoman.	
29/9-2023	- Perbaiki BAB I, II, III yang sudah saya koreksi & foto Tambahkan kekurangannya.	
2/10-2023	- Perbaiki BAB I, II, III yang sudah saya koreksi dalam laporannya berupa Catatan dan foto.	
3/10-2023	- Cek lagi Perda Aparatur - yakin menggunakan SAP ?	

4/10-2023

Lanjut ke Pembimbing ke-T

Dosen Pembimbing II

Ahmad Zarkasi, ST., M.T

NIDN: 0819068903



KEMENTERIAN RISET TEKNOLOGI DAN PENDIDIKAN TINGGI
UNIVERSITAS MUHAMMADIYAH MATARAM
FAKULTAS TEKNIK
PROGRAM STUDI TEKNIK SIPIL
Jl. K.H Ahmad Dahlan No.1 Telp. 640728 Pagesangan Mataram

LEMBAR ASISTENSI
SKRIPSI/TUGAS AKHIR

NAMA : NIDA ULYANI
NIM : 2019D1B005

TANGGAL	URAIAN TUGAS	PARAF
09/10/2023	- perhitungan awal struktur tug, beban OK - layout dan perhitungan balok prategang dan dsb	
13/10/2023	- perhitungan pembeban balok di zona lagi - dimensi balok prategang dan penempatan tendon di hitung! - Perhitungan statik dan defleksi	
17/10/2023	- Perhitungan jumlah tendon di seluruh stasiun statis tak tentu dikontrol kepastiannya - diagram hasil perhitungan	
20/10/2023	- Gambar detail - hasil dimensi dan uraian	

Haryadi

Dosen Pembimbing I

Dr. Eng. Haryadi, ST., M.Sc. (Eng)
NIDN: 0026115301