Tables

Table 2.1 LENGTH OF DRAINAGE CHANNELS FOR RUN-OFF ANALYSIS

Cenkareng West Area

unit km

Kamal drainage channel

Km			Ka			Kb			Kc			Kd			Ke			Kf			Kg			Kh		
Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L
Km-1																										
Km0	1.395	(1.395)	Ka0																							
Km1	3.467	3.467	Ka1	2.425	2.425	Kb0																				
Km2	0.425	3.892				Kb2	1.929	1.929	Kc0																	
Km3	0.456	4.348							Kc1	1.868	1.868	Kd0			Ke0			Kf0			Kg0					
Km4	0.553	4.901							Kc2	0.304	2.172	Kd2	1.832	1.832	Ke1	0.481	0.481	Kf1	0.806	0.806	Kg1	0.895	0.895			
Km5	0.780	5.681							Kc5	1.345	3.517			1.832	Ke1-2	1.172	1.653	Ke1	0.156	0.962						
Km6	1.176	6.857													Km6	1.184	2.837							Kh0		14.642
Km7	1.529	8.386																							Km7	1.792	1.792
Km8	0.478	8.864																								
Km9	0.304	9.168																								
Km10	1.316	10.484																								

Tanjungan drainage channel

Tm			Ta		
Code	Li	L	Code	Li	L
Tm0			Ta0		
Tm1	1.327	1.327	Ta1	1.356	1.356
Tm2	0.556	1.883	Ta2	0.686	2.042
Tm3	0.540	2.423	Tm3	1.205	3.247
Tm4	1.558	3.981			

Gede/Bor drainage channel

Gm			Ga		
Code	Li	L	Code	Li	L
Gm-1					
Gm0	0.784	0.784			
Gm1	1.939	2.723	Ga2		
Gm2	0.615	3.338	Gm2	0.348	0.348
Gm3	0.611	3.949			

Saluran Cengkareng drainage channel

Cm		
Code	Li	L
Cm0		
Cm0-2	0.767	0.767
Cm1	0.437	1.204
Cm1-2	1.030	2.234
Cm2	0.763	2.997
Cm3	1.226	4.223

Pedongkelan drainage channel (Constructed by PERUM PERUMNAS)

Pm			Pa			Pb			Pc		
Code	Li	L	Code	Li	L	Code	Li	L	Code	Li	L
						Pa1			Pm0		
Pm0			Pm0			Pb1	0.498	0.498	Pb1	0.844	0.844
Pm1	1.779	1.779	Pa1	1.175	1.175	Pm1	0.357	0.855			
Pm2	0.414	2.193	Pm2	0.984	2.159						
Pm3	0.590	2.783									

PIK Junction dainage channel

Nm		
Code	Li	L
Nm0		
Nm1	1.336	1.336
Nm2	0.846	2.182
Nm3	1.575	3.757

Meruya Area

Mm		
Code	Li	L
Mm0		
Mm1	1.197	1.197
Mm2	0.445	1.642
Mm3	0.408	2.050
Mm4	0.705	2.755
Mm5	0.134	2.889
Mm6	0.267	3.156

Note: Code : Locations of code are shown in Figs.2.1and 2.2
Li : Unit legth (km)
L : Accumulated distance (km)

Table 2.2 DRAINAGE AREA OF SUB-BASINS

Cenkareng West Area

Kamal drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Fish pond (km2)	Fish pond (%)
KM0	1.87	1.87	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM1	1.17	0.54	45.7	0.00	0.0	0.64	54.3	0.00	0.0
KA1	1.31	0.84	64.4	0.00	0.0	0.47	35.6	0.00	0.0
KM2	0.63	0.63	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KB1	1.18	1.18	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM3	0.39	0.39	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM4	0.39	0.39	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM5	0.54	0.54	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KD1	1.27	1.27	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KC1	1.23	1.23	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KC2	1.46	1.46	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM6	0.76	0.73	96.4	0.00	0.0	0.03	3.6	0.00	0.0
KG1	0.33	0.33	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KF1	0.38	0.38	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KE1-1	0.05	0.05	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KE1-2	0.35	0.35	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KE1	0.58	0.58	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KM7	0.98	0.46	47.2	0.37	37.8	0.15	15.0	0.00	0.0
KH0	0.61	0.61	100.0	0.00	0.0	0.00	0.0	0.00	0.0
KH1	2.41	1.42	58.8	0.00	0.0	1.00	41.2	0.00	0.0
KM8	0.55	0.24	44.2	0.31	55.8	0.00	0.0	0.00	0.0
KM9	0.73	0.24	33.2	0.48	66.8	0.00	0.0	0.00	0.0
KM10	1.74	0.00	0.0	0.00	0.0	0.00	0.0	1.74	100.0
Total	20.89	15.72	75.3	1.16	5.6	2.27	10.9	1.74	8.3

Tanjungan drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Fish pond (km2)	Fish pond (%)
TM1	0.96	0.96	100.0	0.00	0.0	0.00	0.0	0.00	0.0
TM2	0.53	0.09	16.2	0.45	83.8	0.00	0.0	0.00	0.0
TM3	0.31	0.00	0.0	0.31	100.0	0.00	0.0	0.00	0.0
TA1	0.49	0.49	100.0	0.00	0.0	0.00	0.0	0.00	0.0
TA2	0.71	0.00	0.0	0.71	100.0	0.00	0.0	0.00	0.0
TM4	1.24	0.00	0.0	0.00	0.0	0.00	0.0	1.24	100.0
Total	4.25	1.54	36.2	1.47	34.6	0.00	0.0	1.24	29.2

Gede/Bor drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Fish pond (km2)	Fish pond (%)
GM0	0.77	0.77	100.0	0.00	0.0	0.00	0.0	0.00	0.0
GM1	0.97	0.97	100.0	0.00	0.0	0.00	0.0	0.00	0.0
GM2	0.37	0.37	100.0	0.00	0.0	0.00	0.0	0.00	0.0
GM3	0.31	0.31	100.0	0.00	0.0	0.00	0.0	0.00	0.0
Total	2.41	2.41	100.0	0.00	0.0	0.00	0.0	0.00	0.0

Saluran Cengkareng drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Fish pond (km2)	Fish pond (%)
CM0-2	0.53	0.53	100.0	0.00	0.0	0.00	0.0	0.00	0.0
CM1	0.31	0.31	100.0	0.00	0.0	0.00	0.0	0.00	0.0
CM1-2	0.60	0.60	100.0	0.00	0.0	0.00	0.0	0.00	0.0
CM2	0.67	0.67	100.0	0.00	0.0	0.00	0.0	0.00	0.0
CM3	0.96	0.96	100.0	0.00	0.0	0.00	0.0	0.00	0.0
Total	3.08	3.08	100.0	0.00	0.0	0.00	0.0	0.00	0.0

Pedongkelan drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Fish pond (km2)	Fish pond (%)
PM1	1.09	1.09	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PB1	0.11	0.11	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PC1	0.29	0.29	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PB2	0.29	0.29	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PM2	0.23	0.23	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PA1	0.71	0.71	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PA2	0.35	0.35	100.0	0.00	0.0	0.00	0.0	0.00	0.0
PM3	0.32	0.32	100.0	0.00	0.0	0.00	0.0	0.00	0.0
Total	3.38	3.38	100.0	0.00	0.0	0.00	0.0	0.00	0.0

New drainage channel

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Others (km2)	Others (%)
NM1	0.66	0.66	100.0	0.00	0.0	0.00	0.0	0.00	0.0
NM2	2.05	1.20	58.3	0.85	41.7	0.00	0.0	0.00	0.0
Total	2.70	1.85	68.4	0.85	31.6	0.00	0.0	0.00	0.0

Meruya Area

Sub-Basin	Total (km2)	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Others (km2)	Others (%)
MM1	0.66	0.66	100.0	0.00	0.0	0.00	0.0	0.00	0.0
MM2	0.24	0.24	100.0	0.00	0.0	0.00	0.0	0.00	0.0
MM3	0.32	0.32	100.0	0.00	0.0	0.00	0.0	0.00	0.0
MM4	0.04	0.04	100.0	0.00	0.0	0.00	0.0	0.00	0.0
Total	1.27	1.27	100.0	0.00	0.0	0.00	0.0	0.00	0.0

Study Area Grand Total	Residential (km2)	Residential (%)	Industrial (km2)	Industrial (%)	Paddy field (km2)	Paddy field (%)	Others (km2)	Others (%)
37.98	29.24	77.0	3.49	9.2	2.27	6.0	2.98	7.8

Note: Based on land use in 2010
Locations of sub-basins are shown in Figs.2.1and 2.2

Table 2.3 RESULT OF RUN-OFF ANALYSIS

Cengkareng West Area

Code	C.A km2	L km	t min	rp10 mm/hr	B/L	f	C_o10 m3/s/km2	Q_o10 m3/s	C10 m3/s/km2	Q10 m3/s
Kamal drainage channel (main)										
Km10	20.89	11.88	451.9	19.1	0.15	0.45	2.17	45.34	2.30	48.06
Km9	19.15	10.56	408.0	20.8	0.17	0.48	2.54	48.58	2.50	47.89
Km8	18.43	10.26	397.9	21.3	0.18	0.47	2.54	46.83	2.55	46.99
Km7-down	17.88	9.78	381.9	22.0	0.19	0.47	2.63	47.04	2.60	46.49
Km7-up	14.86	9.78	381.9	22.0	0.16	0.48	2.72	40.35	2.80	41.60
Km6-down	13.88	8.25	331.0	24.7	0.20	0.48	3.06	42.39	2.95	40.93
Km6-up	12.19	8.25	331.0	24.7	0.18	0.47	3.01	36.68	3.15	38.41
Km5-down	11.44	7.08	291.8	27.3	0.23	0.47	3.33	38.12	3.30	37.75
Km5-up	7.48	7.08	291.8	27.3	0.15	0.46	3.33	24.90	4.05	30.30
Km4	6.94	6.30	265.8	29.3	0.18	0.45	3.49	24.19	4.10	28.45
Km3	6.54	5.74	247.3	30.9	0.20	0.45	3.71	24.30	4.20	27.48
Km2	6.15	5.29	232.1	32.4	0.22	0.45	3.89	23.95	4.40	27.08
Km1-down	4.35	4.86	218.0	34.0	0.18	0.42	3.80	16.55	5.15	22.40
Km0	1.87	1.40	102.4	59.7	0.96	0.50	8.12	15.21	8.40	15.72
Kamal drainage channel (branch)										
KH-Km7-ex	2.41	1.79	115.8	55.1	0.04	0.38	5.70	13.75	7.00	16.89
KE-Km6	1.68	3.83	142.8	47.7	0.11	0.50	6.53	10.98	8.10	13.62
Ke1-2	1.10	2.22							9.20	10.13
Ke1-down	0.75	1.05							10.80	8.11
KF-KG-Ke1	0.70	1.05	50.2	88.8	0.63	0.50	12.21	8.56	10.75	7.54
KC-Km5	3.96	3.52	144.6	47.3	0.32	0.50	6.36	25.16	7.00	27.70
Kc2	1.27	1.83	89.9	64.7	0.38	0.50	8.95	11.35	9.40	11.92
Kc1	1.23	1.87	89.6	64.8	0.35	0.50	8.92	10.94	9.30	11.41
KB-Km2	1.18	1.93	89.7	64.8	0.32	0.50	8.91	10.49	9.50	11.18
Ka-Km1	1.31	2.43	103.3	59.4	0.22	0.39	6.37	8.32	8.90	11.63
Tanjungan drainage channel										
Tm4	4.25	4.81	215.4	34.3	0.18	0.48	4.41	18.76	5.40	22.94
Tm3	3.01	3.25	150.4	46.0	0.29	0.60	7.48	22.50	6.30	18.96
Tm2	1.49	1.88	108.6	57.5	0.42	0.56	8.83	13.16	9.00	13.41
Tm1	0.96	1.33	85.4	66.8	0.54	0.50	9.21	8.83	10.00	9.59
Ta1	0.49	1.36	71.6	73.9	0.27	0.50	10.22	5.04	11.00	5.42
Gede/Bor drainage channel										
Gm3	2.41	3.95	172.3	41.6	0.15	0.50	5.67	13.66	7.0	16.9
Gm2	2.10	3.34	151.9	45.6	0.19	0.50	6.23	13.07	7.4	15.5
Gm1	1.73	2.72	131.4	50.6	0.23	0.50	6.91	11.95	8.0	13.8
Gm0	0.77	0.78	66.8	76.8	1.24	0.50	10.59	8.10	10.6	8.1
Saluran Cengkareng drainage channel										
Cm3	3.08	4.22	170.0	42.1	0.17	0.50	5.70	17.51	6.10	18.76
Cm2	2.11	3.00	129.1	51.2	0.24	0.50	6.99	14.77	7.40	15.63
Cm1-2	1.44	2.23							8.50	12.25
Cm1	0.84	1.20	69.3	75.2	0.58	0.50	10.38	8.76	10.38	8.76
Cm0-2	0.53	0.77							10.90	5.80
Pedongkelan drainege channel										
Pm3	3.38	2.78	118.3	54.3	0.44	0.50	7.36	24.91	7.35	24.87
Pm2	3.06	2.19	98.6	61.1	0.64	0.50	8.29	25.36	7.50	22.96
Pm1-down	1.77	1.78	84.8	67.0	0.56	0.50	9.24	16.39	8.80	15.61
Pm1-up	1.09	1.78	84.8	67.0	0.34	0.50	9.24	10.06	9.80	10.67
Pa1	0.71	1.18	64.2	78.4	0.51	0.50	10.83	7.65	10.70	7.55
PIK Junction drainage channel										
Nm3	2.70	3.75	145.7	47.0	0.19	0.56	7.13	19.26	6.70	18.1
Nm1	0.65	1.34	65.0	77.9	0.37	0.50	10.77	7.06	10.80	7.1

Meruya Area

Code	C.A km2	L km	t min	rp5 mm/hr	B/L	f	C_o5 m3/s/km2	Q_o5 m3/s	C5 m3/s/km2	Q5 m3/s
Mm4	1.22	2.76	108.6	50.5	0.16	0.50	6.94	8.48	7.70	9.41
Mm3	0.90	2.05	85.1	59.4	0.22	0.50	8.19	7.40	8.40	7.59
Mm2	0.66	1.64	71.5	66.1	0.24	0.50	9.13	6.03	9.00	5.94

Note: CA: Catchment area
L: Length of objective drainage channel
t: Concentration time(overland time + drain time)
rp: Point rainfall intensity (rp10 : for 10-year, rp5 : for 5-year)
B: Width of drainage area
f: Run-off coefficient
Co: Specific discharge calculated by rational formula
Qo: Flood peak discharge calculated by rational formula
C: Flood peak discharge calculated by C-A curve
Q: Specific discharge calculated by C-A curve
Location of "Code" are shown in Figs 2.1 and 2.2

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (1/7)

Name of Drainage : Kamal Drainage Channel (Main, KM)

Design channel gradient: 1/3200(0-2300m), 1/1800(2300- m)
W.L. at estuary(TTG.m): 0.2
Design riverbed .at estuary(TTG.m): -1.5

Case Name			Km10 Estuary	Km9 Highway	Km8	Km7 Conf.KH	Km7 before	Km6 Conf.KE	Km6 before	Km5	Private Sector
Design Flood Discharge(m3/s)			48.1	47.9			41.6		38.4		30.3
Side slope			1:2.0	1:0.5							
ddkm-a18	Bottom	W (m)	40.0	35.0	35.0	35.0	35.0	35.0	30.0	30.0	12.0
	Top	W (m)	46.8	36.6	36.6	36.6	36.6	36.4	31.4	31.4	13.8
	W.L	TTG.m	0.200	0.501	0.615	0.787	0.830	1.315	1.375	1.950	2.875
	Velocity	m/s	0.65	0.84	0.83	0.82	0.71	0.84	0.92	0.92	1.27
ddkm-e18	Bottom	W (m)	35.0	35.0	35.0	35.0	35.0	35.0	30.0	30.0	12.0
	Top	W (m)	41.8	36.7	36.7	36.7	36.7	36.4	31.4	31.4	13.8
	W.L	TTG.m	0.200	0.573	0.673	0.827	0.868	1.328	1.386	1.953	2.875
	Velocity	m/s	0.74	0.80	0.80	0.80	0.69	0.84	0.91	0.92	1.27
ddkm-k18	Bottom	W (m)	35.0	35.0	35.0	35.0	35.0	35.0	25.0	25.0	12.0
	Top	W (m)	41.8	36.7	36.7	36.7	36.7	36.4	26.4	26.5	13.9
	W.L	TTG.m	0.200	0.573	0.673	0.827	0.868	1.328	1.382	2.081	2.896
	Velocity	m/s	0.74	0.80	0.80	0.80	0.69	0.84	1.09	1.00	1.25
ddkm-h18	Bottom	W (m)	35.0	35.0	35.0	35.0	32.0	32.0	30.0	30.0	12.0
	Top	W (m)	41.8	36.7	36.7	36.7	33.7	33.5	31.4	31.4	13.9
	W.L	TTG.m	0.200	0.573	0.673	0.827	0.865	1.383	1.446	1.968	2.876
	Velocity	m/s	0.74	0.80	0.80	0.80	0.76	0.88	0.87	0.91	1.27
ddkm-g18	Bottom	W (m)	35.0	35.0	35.0	35.0	30.0	30.0	30.0	30.0	12.0
	Top	W (m)	41.8	36.7	36.7	36.7	31.7	31.5	31.5	31.4	13.9
	W.L	TTG.m	0.200	0.573	0.673	0.827	0.863	1.426	1.493	1.981	2.877
	Velocity	m/s	0.74	0.80	0.80	0.80	0.81	0.91	0.84	0.90	1.27
ddkm-i18	Bottom	W (m)	35.0	32.0	32.0	32.0	32.0	32.0	30.0	30.0	12.0
	Top	W (m)	41.8	33.7	33.7	33.7	33.7	33.5	31.4	31.4	13.9
	W.L	TTG.m	0.200	0.565	0.682	0.849	0.897	1.382	1.440	1.961	2.870
	Velocity	m/s	0.75	0.85	0.84	0.83	0.69	0.85	0.87	0.91	1.27
ddkm-j18	Bottom	W (m)	35.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0
	Top	W (m)	41.8	31.7	31.7	31.7	31.8	31.5	31.5	31.4	13.9
	W.L	TTG.m	0.200	0.562	0.699	0.895	0.944	1.451	1.514	1.988	2.878
	Velocity	m/s	0.74	0.94	0.92	0.89	0.77	0.89	0.83	0.89	1.27
ddkm-f18	Bottom	W (m)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0
	Top	W (m)	36.8	31.7	31.8	31.8	31.8	31.5	31.5	31.4	13.9
	W.L	TTG.m	0.200	0.659	0.774	0.947	0.992	1.468	1.529	1.993	2.878
	Velocity	m/s	0.85	0.89	0.88	0.87	0.75	0.88	0.82	0.89	1.27

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (2/7)

Name of Drainage : Kamal Drainage Channel (tributary, KE)

Design channel gradient: 1/1600

W.L. at conf. with KM(TTG.m): 1.4

Design riverbed at conf. with KM(TTG.m): 0.2

Case Name			Km6 Conf. KM	Ke1-2	Ke1	Ke0
Design Flood Discharge(m3/s)			13.0	10.1	0.9	0.9
Design Channel Gradient			1/1600			
dke-d	Bottom	W (m)	13.0	11.0	2.0	2.0
	Top	W (m)	14.2	12.2	3.1	2.9
	W.L	TTG.m	1.400	2.128	2.770	2.880
	Velocity	m/s	0.83	0.73	0.32	0.40
dke-f	Bottom	W (m)	13.0	11.0	4.0	4.0
	Top	W (m)	14.2	12.2	5.1	4.8
	W.L	TTG.m	1.400	2.128	2.763	2.793
	Velocity	m/s	0.83	0.73	0.18	0.25
dke-e	Bottom	W (m)	13.0	13.0	2.0	2.0
	Top	W (m)	14.2	14.2	3.0	2.9
	W.L	TTG.m	1.400	2.132	2.674	2.819
	Velocity	m/s	0.83	0.62	0.36	0.44
Design Channel Gradient			1/1700			
dke-d7	Bottom	W (m)	13.0	11.0	2.0	2.0
	Top	W (m)	14.2	12.2	3.1	2.9
	W.L	TTG.m	1.400	2.104	2.707	2.807
	Velocity	m/s	0.83	0.72	0.31	0.39
dke-g7	Bottom	W (m)	13.0	12.0	2.0	2.0
	Top	W (m)	14.2	13.2	3.1	2.9
	W.L	TTG.m	1.400	2.106	2.656	2.772
	Velocity	m/s	0.83	0.66	0.33	0.40
dke-e7	Bottom	W (m)	13.0	13.0	2.0	2.0
	Top	W (m)	14.2	14.2	3.0	2.9
	W.L	TTG.m	1.400	2.108	2.612	2.744
	Velocity	m/s	0.83	0.61	0.35	0.42
Design Channel Gradient			1/1800			
dke-c8	Bottom	W (m)	13.0	10.0	2.0	2.0
	Top	W (m)	14.2	11.2	3.2	3.0
	W.L	TTG.m	1.400	2.081	2.712	2.790
	Velocity	m/s	0.83	0.78	0.29	0.35
dke-d8	Bottom	W (m)	13.0	11.0	2.0	2.0
	Top	W (m)	14.2	12.2	3.1	3.0
	W.L	TTG.m	1.400	2.078	2.633	2.682
	Velocity	m/s	0.83	0.71	0.39	0.47
dke-g8	Bottom	W (m)	13.0	12.0	2.0	2.0
	Top	W (m)	14.2	13.2	3.1	2.9
	W.L	TTG.m	1.400	2.085	2.602	2.708
	Velocity	m/s	0.83	0.65	0.32	0.39
dke-e8	Bottom	W (m)	13.0	13.0	2.0	2.0
	Top	W (m)	14.2	14.2	3.1	2.9
	W.L	TTG.m	1.400	2.087	2.559	2.679
	Velocity	m/s	0.83	0.60	0.34	0.40
dke-h8	Bottom	W (m)	15.0	13.0	2.0	2.0
	Top	W (m)	16.2	14.1	3.0	2.9
	W.L	TTG.m	1.400	1.992	2.540	2.666
	Velocity	m/s	0.73	0.66	0.35	0.41

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (3/7)

Name of Drainage : Tanjungan Drainage Channel (TM)

Design channel gradient: 1/5000
W.L. at estuary(TTG.m): 0.2
Design riverbed at estuary(TTG.m): -1.3

Case Name			Tm4 Estuary	Tm3 Highway	Upstream of Tm3	Tm2 Bridge	Tm1
Design Flood Discharge(m3/s)			19.0	19.0	16.1	13.4	13.4
Side slope			1:2.0	1:0.5			
dtm-f	Bottom	W (m)	30.0	30.0	20.0	15.0	15.0
	Top	W (m)	36.0	31.4	21.4	16.4	16.4
	W.L	TTG.m	0.200	0.352	0.366	0.458	0.610
	Velocity	m/s	0.38	0.46	0.58	0.63	0.61
dtm-d	Bottom	W (m)	25.0	25.0	25.0	15.0	15.0
	Top	W (m)	31.0	26.4	26.4	16.4	16.4
	W.L	TTG.m	0.200	0.403	0.426	0.472	0.619
	Velocity	m/s	0.45	0.52	0.44	0.62	0.61
dtm-a	Bottom	W (m)	25.0	25.0	20.0	15.0	15.0
	Top	W (m)	31.0	26.4	21.4	16.4	16.4
	W.L	TTG.m	0.200	0.403	0.424	0.505	0.643
	Velocity	m/s	0.45	0.52	0.55	0.61	0.60
dtm-i	Bottom	W (m)	25.0	25.0	15.0	15.0	15.0
	Top	W (m)	31.0	26.4	16.4	16.5	16.5
	W.L	TTG.m	0.200	0.403	0.419	0.573	0.694
	Velocity	m/s	0.45	0.52	0.73	0.58	0.57
dtm-h	Bottom	W (m)	25.0	25.0	15.0	10.0	10.0
	Top	W (m)	31.0	26.4	16.4	11.5	11.6
	W.L	TTG.m	0.200	0.403	0.419	0.553	0.812
	Velocity	m/s	0.45	0.52	0.73	0.86	0.78
dtm-g	Bottom	W (m)	22.0	22.0	22.0	15.0	15.0
	Top	W (m)	28.0	23.5	23.5	16.4	16.5
	W.L	TTG.m	0.200	0.446	0.474	0.531	0.662
	Velocity	m/s	0.51	0.58	0.49	0.60	0.59
dtm-e	Bottom	W (m)	22.0	22.0	20.0	15.0	15.0
	Top	W (m)	28.0	23.5	21.5	16.4	16.5
	W.L	TTG.m	0.200	0.446	0.473	0.545	0.673
	Velocity	m/s	0.51	0.58	0.53	0.59	0.58
dtm-b	Bottom	W (m)	20.0	20.0	20.0	15.0	15.0
	Top	W (m)	26.0	21.5	21.5	16.5	16.5
	W.L	TTG.m	0.200	0.482	0.513	0.580	0.699
	Velocity	m/s	0.55	0.61	0.52	0.58	0.57
Side slope			1:3.0	1:0.5		1:0.0	
dtm-a'	Bottom	W (m)	25.0	25.0	20.0	15.0	15.0
	Top	W (m)	34.0	26.4	21.4	16.4	16.4
	W.L	TTG.m	0.200	0.390	0.409	0.479	0.633
	Velocity	m/s	0.43	0.46	0.49	0.65	0.62

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (4/7)

Name of Drainage : Gede/Bor Drainage Channel (GM)

Design channel gradient: 1/1600
W.L. at conf. with Mookervaat(TTG.m): 2.5
Design riverbed at conf.with Mookervaat(TTG.m): -1.3

Case Name			Gm3 Conf. with MKV	Gm2 Conf. with GA	Gm1 Private sector	Gm1 Private sector
Design Flood Discharge(m3/s)			16.9	15.5	(13.8)	
Side slop			1:0.5			
Design channel bed at conf.with Mookervaat(TTG.m) : 1.0						
dgm-d	Bottom	W (m)	12.0	11.0	7.0	7.0
	Top	W (m)	13.5	12.5	8.4	8.8
	W.L	TTG.m	2.500	2.837	3.216	4.725
	Velocity	m/s	0.88	0.91	1.25	1.00
dgm-c	Bottom	W (m)	11.0	11.0	7.0	7.0
	Top	W (m)	12.5	12.5	8.5	8.8
	W.L	TTG.m	2.500	2.888	3.237	4.726
	Velocity	m/s	0.96	0.88	1.23	1.00
dgm-b	Bottom	W (m)	11.0	10.0	7.0	7.0
	Top	W (m)	12.5	11.5	8.5	8.8
	W.L	TTG.m	2.500	2.884	3.292	4.728
	Velocity	m/s	0.96	0.96	1.18	0.99
dgm-a	Bottom	W (m)	10.0	10.0	7.0	7.0
	Top	W (m)	11.5	11.6	8.5	8.8
	W.L	TTG.m	2.500	2.946	3.317	4.729
	Velocity	m/s	1.05	0.92	1.16	0.99
Design channel bed at conf.with Mookervaat(TTG.m) : 0.9						
dgm-d09	Bottom	W (m)	12.0	11.0	7.0	7.0
	Top	W (m)	13.6	12.5	8.4	8.8
	W.L	TTG.m	2.500	2.786	3.136	4.626
	Velocity	m/s	0.83	0.88	1.23	1.00
dgm-c09	Bottom	W (m)	11.0	11.0	7.0	7.0
	Top	W (m)	12.6	12.6	8.5	8.8
	W.L	TTG.m	2.500	2.833	3.157	4.626
	Velocity	m/s	0.90	0.85	1.21	1.00
dgm-b09	Bottom	W (m)	11.0	10.0	7.0	7.0
	Top	W (m)	12.6	11.5	8.5	8.8
	W.L	TTG.m	2.500	2.832	3.210	4.629
	Velocity	m/s	0.90	0.93	1.17	0.99
dgm-a09	Bottom	W (m)	10.0	10.0	7.0	7.0
	Top	W (m)	11.6	11.6	8.5	8.8
	W.L	TTG.m	2.500	2.886	3.235	4.630
	Velocity	m/s	0.98	0.89	1.15	0.99
dgm-c09	Bottom	W (m)	10.0	9.0	7.0	7.0
	Top	W (m)	11.6	10.6	8.6	8.8
	W.L	TTG.m	2.500	2.881	3.298	4.633
	Velocity	m/s	0.98	0.99	1.10	0.99
Design channel bed at conf.with Mookervaat(TTG.m) : 0.8						
dgm-d08	Bottom	W (m)	12.0	11.0	7.0	7.0
	Top	W (m)	13.7	12.6	8.5	8.8
	W.L	TTG.m	2.500	2.742	3.061	4.527
	Velocity	m/s	0.77	0.84	1.21	1.00
dgm-b08	Bottom	W (m)	11.0	10.0	7.0	7.0
	Top	W (m)	12.7	11.6	8.5	8.8
	W.L	TTG.m	2.500	2.781	3.132	4.530
	Velocity	m/s	0.84	0.90	1.15	0.99
Design riverbed at conf.with Mookervaat(TTG.m) : 0.7						
dgm-d07	Bottom	W (m)	12.0	11.0	7.0	7.0
	Top	W (m)	13.8	12.6	8.5	8.8
	W.L	TTG.m	2.500	2.706	2.993	4.428
	Velocity	m/s	0.73	0.81	1.18	0.99

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (5/7)

Name of Drainage : Saluran Cengkareng Drainage Channel

Design channel gradient: 1/3000

W.L at conf. with Cengkareng FW (TTG.m) : 1.3

Design reverbed at conf. with Cengkareng FW (TTG.m): 0.3

Case Name			Cm3 Estuary	Starting Masonry	Cm2	Cm1-2	Cm1 Outer Ring	Cm0-2	Cm0
Design Flood Discharge(m3/s)			18.8	12	10	12.6	8.8	5.8	5.8
dcm-e	Bottom	W (m)	9.0	9.0	9.0	9.0	8.0	8.0	8.0
	Top	W (m)	9.0	11.0	11.1	11.1	9.9	9.9	9.7
	W.L	TTG.m	1.300	1.378	1.683	1.914	2.129	2.205	2.271
	Velocity	m/s	1.00	0.87	0.75	0.60	0.51	0.35	0.40
dcm-f	Bottom	W (m)	10.0	9.0	7.0	7.0	7.0	7.0	7.0
	Top	W (m)	10.0	11.0	9.0	9.2	9.1	9.0	8.8
	W.L	TTG.m	1.300	1.354	1.657	2.026	2.318	2.392	2.455
	Velocity	m/s	0.90	0.88	0.95	0.70	0.52	0.35	0.40
dcm-g	Bottom	W (m)	10.0	9.0	8.0	8.0	7.0	7.0	7.0
	Top	W (m)	10.0	11.0	10.1	10.1	9.0	8.9	8.8
	W.L	TTG.m	1.300	1.354	1.664	1.955	2.207	2.294	2.368
	Velocity	m/s	0.90	0.88	0.84	0.65	0.55	0.38	0.42
dcm-i	Bottom	W (m)	10.0	10.0	8.0	8.0	6.0	6.0	6.0
	Top	W (m)	10.0	12.0	10.0	10.1	8.0	8.0	7.8
	W.L	TTG.m	1.300	1.361	1.611	1.923	2.184	2.306	2.403
	Velocity	m/s	0.90	0.80	0.87	0.66	0.64	0.43	0.47
dcm-h	Bottom	W (m)	10.0	10.0	8.0	8.0	7.0	7.0	7.0
	Top	W (m)	10.0	12.0	10.0	10.1	9.0	8.9	8.7
	W.L	TTG.m	1.300	1.361	1.611	1.923	2.186	2.276	2.352
	Velocity	m/s	0.90	0.80	0.87	0.66	0.56	0.38	0.42
dcm-d	Bottom	W (m)	10.0	10.0	10.0	9.0	8.0	8.0	8.0
	Top	W (m)	10.0	12.0	12.0	11.0	9.9	9.8	9.6
	W.L	TTG.m	1.300	1.361	1.620	1.826	2.070	2.153	2.225
	Velocity	m/s	0.90	0.80	0.71	0.63	0.53	0.36	0.41
dcm-b	Bottom	W (m)	11.0	10.0	10.0	9.0	8.0	8.0	8.0
	Top	W (m)	11.0	12.0	12.0	11.0	9.9	9.8	9.6
	W.L	TTG.m	1.300	1.343	1.608	1.817	2.064	2.148	2.220
	Velocity	m/s	0.81	0.81	0.71	0.63	0.53	0.36	0.41
dcm-a	Bottom	W (m)	11.0	11.0	10.0	9.0	8.0	8.0	8.0
	Top	W (m)	11.0	13.0	12.0	10.9	9.8	9.8	9.6
	W.L	TTG.m	1.300	1.348	1.567	1.789	2.046	2.132	2.207
	Velocity	m/s	0.81	0.74	0.73	0.64	0.54	0.37	0.41
dcm-c	Bottom	W (m)	12.0	11.0	10.0	9.0	8.0	8.0	8.0
	Top	W (m)	12.0	13.0	11.9	10.9	9.8	9.8	9.6
	W.L	TTG.m	1.300	1.335	1.558	1.783	2.042	2.129	2.204
	Velocity	m/s	0.75	0.74	0.73	0.64	0.54	0.37	0.41

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (6/7)

Name of Drainage : New Drainage Channel

Design channel gradient: 1/600

Design riverbed at Nm2 (TTG.m) -0.8

Case Name			Nm2	Nm1
Design Flood Discharge(m3/s)			7.1	
Design Channel Gradient			1/600	
dnm-a2	Bottom	W (m)	3.0	3.0
	Top	W (m)	3.0	3.0
	W.L	TTG.m	0.900	1.642
	Velocity	m/s	1.39	1.91
dnm-c2	Bottom	W (m)	2.5	2.5
	Top	W (m)	2.5	2.5
	W.L	TTG.m	0.900	1.872
	Velocity	m/s	1.67	1.93
dnm-d	Bottom	W (m)	2.2	2.2
	Top	W (m)	2.2	2.2
	W.L	TTG.m	0.865	2.141
	Velocity	m/s	1.94	1.94
dnm-b2	Bottom	W (m)	2.0	2.0
	Top	W (m)	2.0	2.0
	W.L	TTG.m	1.055	2.256
	Velocity	m/s	1.91	1.91

Note: [ ] selected case

Table 2.4 COMPARATIVE STUDY ON CHANNEL WIDTH (7/7)

Name of Drainage : Meruya Drainage Channel (main, MM)

Case Name			Mm6 along H.W	Mm5	Mm4 Culvert	Mm3	Mm2	Mm1
Design Flood Discharge(m3/s)			9.4			7.6	5.9	3.0
Design Channel Gradient			1/1000 (Sec. MM00-20 - M19)				1/700	
dddmm-4	Bottom	W (m)	3.0	3.0	3.0	2.5	2.0	2.0
	Top	W (m)	3.0	3.0	3.0	2.5	2.0	2.0
	W.L	TTG.m	5.136	5.443	5.577	6.248	7.945	8.565
	Velocity	m/s	1.73	1.73	1.73	1.67	2.04	1.04
	Water Depth	m	1.809	1.809	1.809	1.825	1.445	1.442
dddmm-3	Bottom	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	Top	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	W.L	TTG.m	5.136	5.443	5.577	6.248	7.945	8.670
	Velocity	m/s	1.73	1.73	1.73	1.67	2.04	1.29
	Water Depth	m	1.809	1.809	1.809	1.825	1.445	1.547
Design Channel Gradient			1/1000 (Sec. MM00-20 - M19)				1/700	
dddmm-2	Bottom	W (m)	3.0	3.0	3.0	2.5	2.0	2.0
	Top	W (m)	3.0	3.0	3.0	2.5	2.0	2.0
	W.L	TTG.m	5.136	5.443	5.577	6.248	7.906	8.492
	Velocity	m/s	1.73	1.73	1.73	1.67	1.98	1.03
	Water Depth	m	1.809	1.809	1.809	1.825	1.491	1.455
dddmm-1	Bottom	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	Top	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	W.L	TTG.m	5.136	5.443	5.577	6.248	7.906	8.595
	Velocity	m/s	1.73	1.73	1.73	1.67	1.98	1.28
	Water Depth	m	1.809	1.809	1.809	1.825	1.491	1.558
Design Channel Gradient			1/1000 (Sec. MM00-20 - M19)				1/300	
ddmm-f	Bottom	W (m)	3.5	3.5	3.5	3.0	2.0	1.5
	Top	W (m)	3.5	3.5	3.5	3.0	2.0	1.5
	W.L	TTG.m	4.876	5.183	5.317	5.991	6.338	7.816
	Velocity	m/s	1.73	1.73	1.73	1.62	2.97	1.97
	Water Depth	m	1.549	1.549	1.549	1.568	0.992	1.017
ddmm-d	Bottom	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	Top	W (m)	3.0	3.0	3.0	2.5	2.0	1.5
	W.L	TTG.m	5.136	5.443	5.577	6.248	6.688	7.817
	Velocity	m/s	1.73	1.73	1.73	1.67	2.20	1.97
	Water Depth	m	1.809	1.809	1.809	1.825	1.342	1.018
ddmm-a	Bottom	W (m)	2.5	2.5	2.5	2.5	2.0	1.5
	Top	W (m)	2.5	2.5	2.5	2.5	2.0	1.5
	W.L	TTG.m	5.537	5.844	5.978	6.670	6.924	7.827
	Velocity	m/s	1.70	1.70	1.70	1.35	1.87	1.95
	Water Depth	m	2.210	2.210	2.210	2.247	1.578	1.028
Design Channel Gradient			1/2000 (MM10)- M18)		1/260 (MM18- M25+90)		1/700(MM25+90-EP)	
dddm-f	Bottom	W (m)	5.0(+3.0)			2.5	2.2	1.2
	Top	W (m)	5.0(+3.0)			2.5	2.2	1.2
	W.L	TTG.m	5.932			7.323	7.686	8.633
	Velocity	m/s	1.31			1.45	2.26	1.17
	Water Depth	m	1.432			2.102	1.188	1.141

Note: [ ] selected case (for Step 2)

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (1/7)
(Kamal Drainage Channel, Main)

Bottom width at Km10	35 m	Design channel gradient(-KM29)	1/3200
Bottom width at Km9	32 m	Design channel gradient(KM29-)	1/1800
Bottom width at downstream of Km7	32 m	Water level at estuary (TTG m)	0.20
Bottom width at downstream of Km6	30 m	Design riverbed at KM00 (TTG.m)	-1.50

Section No.	Code		Distance L(m)	Channel Bed mean (TTG.m)	Channel Bed Design (TTG.m)	Bottom width (m)	Side slope Left	Side slope Right	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water Depth h(m)
			-1500.0							0.200		
			-1250.0							0.200		
			-1000.0							0.200		
			-750.0							0.200		
			-500.0							0.200		
			-250.0		-1.555					0.200		
BP			0.0		-1.519					0.200		
KM-00	km10	Present estuary	62.0	-1.14	-1.500	35.0	1:2.0	1:2.0		0.200		
KM-00'		New estuary	135.8		-1.477	35.0	1:2.0	1:2.0	48.1	0.200	0.748	1.677
KM-01			182.6	-1.66	-1.462	35.0	1:2.0	1:2.0	48.1	0.214	0.748	1.676
KM-02			269.1	-1.00	-1.435	35.0	1:2.0	1:2.0	48.1	0.239	0.749	1.674
KM-03			321.8	-1.93	-1.419	35.0	1:2.0	1:2.0	48.1	0.254	0.750	1.673
KM-05		Bridge	441.1	-0.90	-1.382	35.0	1:2.0	1:2.0	48.1	0.289	0.751	1.670
KM-06			543.8	-0.32	-1.349	35.0	1:2.0	1:2.0	48.1	0.319	0.752	1.668
KM-07			659.5	-1.18	-1.313	35.0	1:2.0	1:2.0	48.1	0.353	0.753	1.666
KM-08			805.6	-1.19	-1.268	35.0	1:2.0	1:2.0	48.1	0.396	0.754	1.664
KM-09			868.5	-0.90	-1.248	35.0	1:2.0	1:2.0	48.1	0.415	0.755	1.663
KM-10			978.1	-1.15	-1.214	35.0	1:2.0	1:2.0	48.1	0.448	0.756	1.661
KM-11			1064.3	-1.02	-1.187	35.0	1:2.0	1:2.0	48.1	0.473	0.756	1.660
KM-12			1179.4	-0.50	-1.151	35.0	1:2.0	1:2.0	48.1	0.508	0.757	1.659
KM-13			1266.9	-0.08	-1.123	35.0	1:2.0	1:2.0	48.1	0.534	0.757	1.658
KM-14		Bridge	1357.3	-1.02	-1.095	35.0	1:2.0	1:2.0	48.1	0.561	0.758	1.657
KM-15	Km9	Bridge(Highway)	1392.3	-0.95	-1.084	32.0	1:0.5	1:2.0	47.9	0.565	0.853	1.649
KM-16		Bridge(Highway)	1420.5	-1.22	-1.075	32.0	1:0.5	1:2.0	47.9	0.576	0.852	1.651
KM-17			1482.5	-0.80	-1.056	32.0	1:0.5	1:2.0	47.9	0.599	0.849	1.655
KM-18			1589.2	-0.85	-1.023	32.0	1:0.5	1:2.0	47.9	0.640	0.846	1.662
KM-20	Km8	Bridge	1702.5	-1.20	-0.987	32.0	1:0.5	1:2.0	47.9	0.682	0.842	1.669
KM-21			1733.2	0.06	-0.978	32.0	1:0.5	1:2.0	47.9	0.693	0.841	1.671
KM-22			1821.2	-0.85	-0.950	32.0	1:0.5	1:2.0	47.9	0.726	0.838	1.676
KM-23			1916.7	-1.00	-0.920	32.0	1:0.5	1:2.0	47.9	0.760	0.836	1.681
KM-24			1988.7	-0.70	-0.898	32.0	1:0.5	1:2.0	47.9	0.786	0.834	1.684
KM-25			2084.6	-1.00	-0.868	32.0	1:0.5	1:2.0	47.9	0.820	0.832	1.688
KM-26	Km7	Conf. with KII	2166.9	-1.05	-0.842	32.0	1:0.5	1:2.0	47.9	0.849	0.830	1.692
KM-27			2286.8	-0.95	-0.805	32.0	1:2.0	1:2.0	41.6	0.897	0.690	1.702
KM-28			2395.4	-0.94	-0.771	32.0	1:2.0	1:2.0	41.6	0.924	0.694	1.695
KM-29			2473.2	-0.94	-0.746	32.0	1:2.0	1:2.0	41.6	0.943	0.696	1.689
KM-31		Bridge	2540.7	-0.80	-0.709	32.0	1:2.0	1:2.0	41.6	0.960	0.706	1.669
KM-32			2614.2	-0.42	-0.668	32.0	1:2.0	1:2.0	41.6	0.978	0.716	1.647
KM-33			2713.9	-0.28	-0.613	32.0	1:0.5	1:2.0	41.6	1.004	0.756	1.617
KM-34			2769.5	-0.70	-0.582	32.0	1:0.5	1:2.0	41.6	1.021	0.763	1.603
KM-35			2822.7	-0.40	-0.552	32.0	1:0.5	1:2.0	41.6	1.037	0.770	1.590
KM-38			3001.1	-0.52	-0.453	32.0	1:0.5	1:0.5	41.6	1.096	0.820	1.549
KM-40		Bridge	3126.7	0.00	-0.383	32.0	1:0.5	1:0.5	41.6	1.143	0.832	1.526
KM-42		Bridge	3281.6	-0.25	-0.297	32.0	1:0.5	1:0.5	41.6	1.204	0.846	1.501
KM-43			3393.3	-0.25	-0.235	32.0	1:0.5	1:0.5	41.6	1.250	0.855	1.485
KM-45		Bridge	3454.0	-0.10	-0.202	32.0	1:2.0	1:0.5	41.6	1.278	0.831	1.480
KM-46			3527.4	0.10	-0.161	32.0	1:2.0	1:0.5	41.6	1.308	0.837	1.469
KM-47			3618.9	-0.05	-0.110	32.0	1:2.0	1:0.5	41.6	1.347	0.844	1.457
KM-48	Km6	Conf. with KE	3700.4	-0.10	-0.065	32.0	1:2.0	1:0.5	41.6	1.382	0.850	1.447
KM-50		Bridge	3831.3	0.40	0.008	30.0	1:0.5	1:0.5	38.4	1.440	0.873	1.432
KM-51			3926.0	0.56	0.061	30.0	1:0.5	1:0.5	38.4	1.485	0.878	1.424
KM-52			4022.9	0.08	0.114	30.0	1:0.5	1:0.5	38.4	1.531	0.883	1.417
KM-54		Bridge	4110.0	0.13	0.163	30.0	1:0.5	1:0.5	38.4	1.574	0.886	1.411
KM-55			4247.9	0.20	0.239	30.0	1:0.5	1:0.5	38.4	1.642	0.892	1.403
KM-56			4370.6	0.00	0.308	30.0	1:0.5	1:0.5	38.4	1.704	0.896	1.396
KM-57			4462.9	-0.19	0.359	30.0	1:0.5	1:0.5	38.4	1.751	0.899	1.392
KM-58			4572.9	0.35	0.420	30.0	1:0.5	1:0.5	38.4	1.808	0.901	1.388
KM-59			4678.9	0.40	0.479	30.0	1:0.5	1:0.5	38.4	1.863	0.904	1.385
KM-60			4770.9	0.35	0.530	30.0	1:0.5	1:0.5	38.4	1.912	0.905	1.382
KM-61	Km5		4862.9	0.80	0.581	30.0	1:0.5	1:0.5	38.4	1.961	0.907	1.379
KM-C-01		Culvert	5118.9	0.95	0.723	12.0	1:0.5	1:0.5	30.3	2.167	1.650	1.443
KM-C-02		Private sector	5153.9	1.24	0.743	12.0	1:0.5	1:0.5	30.3	2.241	1.586	1.498
KM-C-03		Private sector	5395.9	1.44	0.877	12.0	1:0.5	1:0.5	30.3	2.611	1.358	1.734
KM-C-04		Private sector	5652.9	1.25	1.020	12.0	1:0.5	1:0.5	30.3	2.870	1.267	1.850

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (2/7)
(Kamal Drainage Channel, Branch)

Bottom width at Km6 13.0 m
Bottom width at Ke1-2 11.0 m
Design channel gradient 1/1800
Water level at confluence with KM (TTG.m) 1.40

Section NO.	Code		Distance L(m)	Channel Bed mean (TTG.m)	Channel Bed Design (TTG.m)	Bottom width (m)	Side slope Left	Side slope Right	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water Depth h(m)
KE00	Km6		0.0	0.30	0.200	13.0	1:0.5	1:0.5	13.6	1.400	0.833	1.200
KE01		Bridge	36.6	0.49	0.220	13.0	1:0.5	1:0.5	13.6	1.422	0.832	1.201
KE02			134.0	0.60	0.274	13.0	1:0.5	1:0.5	13.6	1.479	0.830	1.205
KE03			272.3	0.60	0.351	13.0	1:0.5	1:0.5	13.6	1.560	0.827	1.209
KE04			372.7	0.70	0.407	13.0	1:0.5	1:0.5	13.6	1.618	0.825	1.211
KE07			486.8	0.60	0.470	13.0	1:0.5	1:0.5	13.6	1.684	0.824	1.213
KE08			568.3	0.90	0.516	13.0	1:0.5	1:0.5	13.6	1.730	0.823	1.215
KE10		Bridge(skew)	626.2	0.70	0.548	13.0	1:0.5	1:0.5	13.6	1.763	0.822	1.215
KE11			714.3	0.80	0.597	13.0	1:0.5	1:0.5	13.6	1.813	0.821	1.217
KE12		Bridge	785.9	0.90	0.637	13.0	1:0.5	1:0.5	13.6	1.854	0.821	1.217
KE13			894.7	0.25	0.697	13.0	1:0.5	1:0.5	13.6	1.916	0.820	1.218
KE14		Bridge	944.7	0.85	0.725	13.0	1:0.5	1:0.5	13.6	1.944	0.820	1.219
KE15		Bridge	1020.1	0.94	0.767	13.0	1:0.5	1:0.5	13.6	1.986	0.819	1.220
KE16		Bridge	1107.7	0.90	0.815	13.0	1:0.5	1:0.5	13.6	2.035	0.819	1.220
KE17	Ke1-2	Bridge	1174.1	0.85	0.852	11.0	1:0.5	1:0.5	10.1	2.078	0.710	1.226
KE18		Bridge	1265.4	1.10	0.903	11.0	1:0.5	1:0.5	10.1	2.117	0.717	1.214
KE19			1376.9	1.30	0.965	11.0	1:0.5	1:0.5	10.1	2.167	0.724	1.202
KE20		Bridge	1421.9	1.10	0.990	11.0	1:0.5	1:0.5	10.1	2.188	0.727	1.198
KE21			1497.0	1.18	1.032	11.0	1:0.5	1:0.5	10.1	2.223	0.731	1.191
KE23		Bridge	1536.7	1.04	1.054	11.0	1:0.5	1:0.5	10.1	2.242	0.733	1.188
KE24			1637.4	1.35	1.110	11.0	1:0.5	1:0.5	10.1	2.290	0.738	1.180
KE25			1718.5	0.90	1.155	11.0	1:0.5	1:0.5	10.1	2.330	0.742	1.175
KE26		Bridge	1870.3	1.24	1.239	11.0	1:0.5	1:0.5	10.1	2.405	0.748	1.166
KE27			1988.1	1.30	1.305	11.0	1:0.5	1:0.5	10.1	2.465	0.751	1.161
KE28		Bridge	2058.7	1.32	1.344	11.0	1:0.5	1:0.5	10.1	2.502	0.753	1.158
KE29			2132.0	1.58	1.384	11.0	1:0.5	1:0.5	10.1	2.540	0.755	1.155
KE30	Ke1	Bridge	2298.5	1.74	1.477	2.0	1:0.0	1:0.0	0.9	2.633	0.389	1.156
KE31			2474.4	2.04	1.575	2.0	1:0.0	1:0.0	0.9	2.649	0.419	1.074
KE32		Bridge	2580.3	2.04	1.634	2.0	1:0.0	1:0.0	0.9	2.660	0.438	1.027
KE33			2754.7	2.02	1.730	2.0	1:0.0	1:0.0	0.9	2.682	0.473	0.952

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (3/7)
Tanjungan Drainage Channel (TM)

Bottom width at Tm4 25.0 m Design Channel Gradient 1/5000
Bottom width at upstream of Tm3 20.0 m Water level at estuary (TTG.m) 0.20
Bottom width at Tm2 15.0 m(L-type wall)

Section NO.	Code		Distance L(m)	Channel Bed mean (TTG.m)	Channel Bed Design (TTG.m)	Width Bottom (m)	Side slope Left	Side slope Right	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water Depth h(m)
			-100		-1.333					0.200		
TM00	Tm4	Estuary	0.0	-0.97	-1.300	25.0	1:3.0	1:3.0	19.0	0.200	0.429	1.500
TM01			95.3	-0.94	-1.281	25.0	1:3.0	1:3.0	19.0	0.211	0.432	1.492
TM02			192.3	-0.84	-1.262	25.0	1:3.0	1:3.0	19.0	0.223	0.435	1.485
TM03			281.2	-0.75	-1.244	25.0	1:3.0	1:3.0	19.0	0.234	0.437	1.478
TM04			363.7	-0.79	-1.227	25.0	1:3.0	1:3.0	19.0	0.244	0.439	1.472
TM05			464.7	-0.80	-1.207	25.0	1:3.0	1:3.0	19.0	0.257	0.441	1.464
TM06			581.7	-0.74	-1.184	25.0	1:3.0	1:3.0	19.0	0.272	0.444	1.456
TM07			654.3	-0.83	-1.169	25.0	1:3.0	1:3.0	19.0	0.282	0.446	1.451
TM08			754.1	-1.00	-1.149	25.0	1:3.0	1:3.0	19.0	0.295	0.448	1.444
TM10		Bridge	858.2	-1.00	-1.128	25.0	1:3.0	1:3.0	19.0	0.309	0.451	1.438
TM11		Fish pond	949.5		-1.110	25.0	1:3.0	1:3.0	19.0	0.322	0.453	1.432
TM12		Fish pond	1039.6		-1.092	25.0	1:3.0	1:3.0	19.0	0.334	0.455	1.426
TM13		Fish pond	1082.6		-1.083	25.0	1:3.0	1:3.0	19.0	0.340	0.456	1.424
TM14		Fish pond	1198.3		-1.060	25.0	1:3.0	1:3.0	19.0	0.357	0.458	1.417
TM15		Fish pond	1281.2		-1.044	25.0	1:3.0	1:3.0	19.0	0.369	0.460	1.413
TM16		Fish pond	1357.3		-1.029	25.0	1:3.0	1:3.0	19.0	0.380	0.462	1.409
TM17	Tm3	Bridge(Highway)	1430.0	-1.40	-1.014	25.0	1:3.0	1:3.0	19.0	0.391	0.463	1.405
TM18		Bridge(Highway)	1455.3	-1.63	-1.009	25.0	1:2.0	1:3.0	19.0	0.394	0.475	1.403
TM19			1552.7	-1.15	-0.989	20.0	1:2.0	1:3.0	16.1	0.409	0.490	1.399
TM20			1652.8	-1.60	-0.969	20.0	1:2.0	1:3.0	16.1	0.426	0.491	1.396
TM21			1746.1	-0.84	-0.951	20.0	1:2.0	1:3.0	16.1	0.442	0.492	1.393
TM22			1840.4	-1.20	-0.932	20.0	1:0.5	1:2.0	16.1	0.457	0.533	1.389
TM23			1952.3	-1.00	-0.910	20.0	1:0.5	1:0.5	16.1	0.478	0.561	1.388
TM25	Tm2	Bridge	1977.7	-0.50	-0.904	15.0	1:0.0	1:0.0	13.4	0.479	0.646	1.384
TM26			2011.9	-0.55	-0.898	15.0	1:0.0	1:0.0	13.4	0.490	0.644	1.387
TM30			2043.8	-0.99	-0.891	15.0	1:0.0	1:0.0	13.4	0.499	0.642	1.391
TM33		Culvert	2181.2	-0.65	-0.864	15.0	1:0.0	1:0.0	13.4	0.540	0.636	1.404
TM34			2306.4	-1.27	-0.839	15.0	1:0.0	1:0.0	13.4	0.577	0.631	1.415
TM35			2415.0		-0.817	15.0	1:0.0	1:0.0	13.4	0.608	0.627	1.425
TM36	Tm1		2508.2		-0.798	15.0	1:0.0	1:0.0	13.4	0.633	0.624	1.432
EP			2535.8		-0.793	15.0	1:0.0	1:0.0	13.4	0.641	0.623	1.434

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (4/7)
(Gede/Bor Drainage channel)

Bottom width at Gm3	11 m	Design Channel Gradient	1/1600
Bottom width at Gm2	10 m	Water level at conf. with Mookervaat (TTG.m)	2.50
		Design riverbed at conf. with Mookervaat(TTG.	0.90

Section N0.	Code		Distance L(m)	Channel Bed mean (TTG.m)	Channel Bed Design (TTG.m)	Bottom width (m)	Side slope (L&R)	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water depth h(m)
B.P		Conf. with Mookrvaat	0.0								
GM-00	Gm3	Conf. with Mookrvaat	2.8	-0.40	0.900	11.0	1:0.5	16.9	2.500	0.895	1.600
GM-02			19.9	1.40	0.911	11.0	1:0.5	16.9	2.509	0.896	1.598
GM-03		Jl. Daan Mogot	49.5	1.46	0.929	11.0	1:0.5	16.9	2.524	0.898	1.594
GM-04			169.6	1.13	1.004	11.0	1:0.5	16.9	2.586	0.906	1.581
GM-05			258.6	1.09	1.060	11.0	1:0.5	16.9	2.633	0.912	1.573
GM-06		Bridge	374.1	1.50	1.132	11.0	1:0.5	16.9	2.695	0.918	1.563
GM-07			423.5	1.68	1.163	11.0	1:0.5	16.9	2.722	0.920	1.559
GM-08			536.3	1.71	1.233	11.0	1:0.5	16.9	2.785	0.925	1.551
GM-10	Gm2	Bridge, Conf with GA	619.8	1.85	1.286	10.0	1:0.5	15.5	2.832	0.930	1.547
GM-11		Bridge	697.1	1.65	1.334	10.0	1:0.5	15.5	2.878	0.932	1.544
GM-12			785.3	1.84	1.389	10.0	1:0.5	15.5	2.930	0.934	1.540
GM-13			886.6	1.55	1.452	10.0	1:0.5	15.5	2.990	0.936	1.537
GM-14	(Cm0)		974.7	1.38	1.507	10.0	1:0.5	15.5	3.042	0.938	1.535
GM-15			1072.2	1.80	1.568	10.0	1:0.5	15.5	3.101	0.940	1.532
GM-16			1150.1	2.10	1.617	10.0	1:0.5	15.5	3.148	0.941	1.531
EP	Gm1	Private Sector	1203.0	1.40	1.650	10.0	1:0.5	15.5	3.180	0.941	1.530

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (5/7)
(Saluran Cengkareng Drainage Channel)

Bottom with at Cm3	10 m	Design channel gradient			1/3000
Bottom with at Cm1-2	8 m	Water level at conf. with Cengkareng FW (TTG.m)			1.40
Bottom with at Cm1	6 m	Design riverbed at conf. with Cengkareng FW (TTG.m)			-0.65

Section No.	Code	Remarks	Distance L(m)	Channel Bed Mean (TTG.m)	Channel Bed Design (TTG.m)	Bottom width W (m)	Side slope Left	Side slope Right	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water depth h(m)
B.P			0.0									
CM01			17.2	17.20	-0.800	10.0	1:0.0		18.8	1.300	0.90	2.100
CM02		Open Culvert	20.2	3.00	-0.799	10.0	1:0.0		18.8	1.301	0.90	2.100
CM03		Open Culvert	154.6	134.40	-0.754	10.0	1:0.0		17.7	1.334	0.85	2.089
CM04		Open Culvert	292.3	137.70	-0.708	10.0	1:0.0		17.7	1.362	0.86	2.070
CM05		Open Culvert	392.4	100.10	-0.675	10.0	1:0.0		17.7	1.382	0.86	2.057
CM06		Bridge	466.4	0.21	-0.650	10.0	1:0.5	1:0.5	17.7	1.398	0.78	2.048
CM07		Bridge	569.0	0.28	-0.616	10.0	1:0.5	1:0.5	17.7	1.430	0.79	2.045
CM08		Bridge	636.6	0.21	-0.593	10.0	1:0.5	1:0.5	17.7	1.451	0.79	2.044
CM09			808.2	-0.02	-0.536	10.0	1:0.5	1:0.5	17.7	1.504	0.79	2.040
CM10			884.9	-0.20	-0.510	10.0	1:0.5	1:0.5	17.7	1.528	0.79	2.038
CM12		Bridge	962.9	0.15	-0.484	10.0	1:0.5	1:0.5	17.7	1.552	0.79	2.037
CM13			1056.9	0.10	-0.453	10.0	1:0.5	1:0.5	17.7	1.582	0.79	2.035
CM14			1173.6	-0.12	-0.414	10.0	1:0.5	1:0.5	17.7	1.619	0.79	2.033
CM15	Cm2	Bridge	1237.0	0.08	-0.393	8.0	1:0.5	1:0.5	15.6	1.635	0.85	2.028
CM16			1312.8	-0.80	-0.368	8.0	1:2.0	1:0.0	15.6	1.671	0.76	2.039
CM17			1446.0	-0.30	-0.323	8.0	1:2.0	1:0.0	15.6	1.716	0.76	2.039
CM18			1544.5	-0.40	-0.291	8.0	1:2.0	1:2.0	15.6	1.753	0.63	2.044
CM19		Bridge	1613.6	-0.20	-0.268	8.0	1:2.0	1:2.0	15.6	1.768	0.64	2.036
CM20			1740.7	-0.47	-0.225	8.0	1:2.0	1:2.0	15.6	1.797	0.64	2.022
CM21			1832.5	-0.30	-0.195	8.0	1:2.0	1:2.0	15.6	1.818	0.65	2.012
CM22			1901.7	-0.50	-0.172	8.0	1:2.0	1:2.0	15.6	1.834	0.65	2.005
CM23	Cm1-2		2001.5	-0.12	-0.138	8.0	1:2.0	1:2.0	12.3	1.862	0.51	2.000
CM24			2102.9	-0.48	-0.104	8.0	1:2.0	1:0.0	12.3	1.874	0.62	1.978
CM25			2194.3	-0.22	-0.074	8.0	1:2.0	1:0.0	12.3	1.895	0.63	1.969
CM26			2304.8	-0.15	-0.037	8.0	1:2.0	1:0.0	12.3	1.920	0.63	1.958
CM27		Bridge	2448.0	0.16	0.011	8.0	1:0.0	1:0.0	12.3	1.953	0.79	1.942
CM29		Bridge	2599.3	-0.20	0.061	8.0	1:2.0	1:2.0	12.3	2.014	0.53	1.953
CM30			2698.3	-0.02	0.094	8.0	1:2.0	1:2.0	12.3	2.030	0.54	1.936
CM31			2803.5	-0.10	0.129	8.0	1:0.0	1:2.0	12.3	2.045	0.65	1.916
CM32			2933.5	-0.15	0.172	8.0	1:0.0	1:2.0	12.3	2.078	0.65	1.906
CM34	Cm1	Outer ring road	3047.4	0.23	0.210	6.0	1:2.0	1:2.0	8.8	2.113	0.47	1.902
CM36		Outer ring road	3095.6	-0.23	0.226	6.0	1:2.0	1:2.0	8.8	2.119	0.48	1.893
CM37			3219.0	0.34	0.268	6.0	1:2.0	1:2.0	8.8	2.137	0.48	1.870
CM38			3339.1	0.73	0.308	6.0	1:2.0	1:2.0	8.8	2.156	0.49	1.848
CM39			3425.5	0.80	0.336	6.0	1:2.0	1:0.5	8.8	2.167	0.58	1.831
CM40	Cm0-2	Bridge	3467.5	0.65	0.350	6.0	1:2.0	1:2.0	5.8	2.186	0.33	1.836
CM41			3556.9	0.90	0.380	6.0	1:2.0	1:2.0	5.8	2.192	0.33	1.812
CM42			3653.4	0.92	0.412	6.0	1:2.0	1:2.0	5.8	2.200	0.34	1.787
CM43			3777.2	1.02	0.454	6.0	1:0.5	1:0.5	5.8	2.208	0.48	1.754
CM45			3916.3	1.50	0.500	6.0	1:0.5	1:0.5	5.8	2.230	0.49	1.730
CM47			4022.2	1.20	0.535	6.0	1:0.5	1:0.5	5.8	2.248	0.49	1.713
CM48			4110.3	1.14	0.565	6.0	1:0.5	1:0.5	5.8	2.263	0.50	1.699
CM49		Bridge	4230.2	1.30	0.605	6.0	1:0.5	1:0.5	5.8	2.285	0.51	1.680
EP		Intake from GM	4231.2	1.30	0.605	6.0	1:0.5	1:0.5	5.8	2.285	0.51	1.680

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (6/7)
(PIK Junction Drainage Channel)

Bottom width at BP 2.2 m Design channel gradient 1/600
Bottom width at Nm1 2.2 m Water level at estuary (TTG.m) 0.865
(Manning)

Section NO.	Code		Distance L(m)	River Bed Lowest (TTG.m)	River Bed Design (TTG.m)	Bottom width (m)	Side slope Left	Side slope Right	Discharge Q(m3/s)	W.L (TTG.m)	Velocity (m/s)	Water depth h(m)
BP	NM2	Junction	0		-0.800	2.2	1:0.0(Concrete ditch)		7.1	0.865	1.939	1.665
NM26		Junction	55.8	-0.17	-0.707	2.2	1:0.0(Concrete ditch)		7.1	0.958	1.939	1.665
NM27		Junction	138.8	-0.05	-0.569	2.2	1:0.0(Concrete ditch)		7.1	1.096	1.939	1.665
NM28		Junction	223.2	-0.20	-0.428	2.2	1:0.0(Concrete ditch)		7.1	1.237	1.939	1.665
NM29		Junction	320.7	-0.10	-0.266	2.2	1:0.0(Concrete ditch)		7.1	1.399	1.939	1.665
NM30		Junction	411.6	0.31	-0.114	2.2	1:0.0(Concrete ditch)		7.1	1.550	1.939	1.664
NM32		Outer ring road	455.4	0.24	-0.041	2.2	1:0.0(Concrete ditch)		7.1	1.624	1.939	1.665
NM33		Outer ring road	550.7	0.95	0.118	2.2	1:0.0(Concrete ditch)		7.1	1.782	1.939	1.664
NM34		Outer ring road	665.1	0.72	0.308	2.2	1:0.0(Concrete ditch)		7.1	1.973	1.939	1.665
EP	NM1	Outer ring road	765.4		0.476	2.2	1:0.0(Concrete ditch)		7.1	2.141	1.939	1.665

Table 2.5 RESULT OF NON-UNIFORM FLOW ANALYSIS (7/7)
(Meruya Drainage Channel)

Section		Distance		Channel bed		Channel				Step2							Step1						
			Unit	Design	Slope	Width*1		Nos. of	Type*2	Discharge	W.L	Levee		Crest -	Water	Free-	Discharge	W.L	Levee		Crest -	Water	Free-
						Total	Lane	lanes				Crest	Slope	D.riverbed	Depth	board			Crest	Slope	D.riverbed	Depth	board
NO.		L(m)	(m)	(TTG.m)		(m)	(m)			(m3/s)	(TTG.m)	(TTG.m)			h(m)	(m)	(m3/s)	(TTG.m)	(TTG.m)			h(m)	(m)
MM101		0.0		4.500	1/2000	=5.0+3.0	=5.0+3.0	1	Ditch	9.4	5.932	6.280	Level	1.780	1.432	0.348	5.9	5.700					
MM102		98.9	98.9	4.549		=5.0+3.0	=5.0+3.0	1	Ditch	9.4	5.981	6.290		1.741	1.432	0.309	5.9	5.731					
MM103		201.3	102.4	4.601		=5.0+3.0	=5.0+3.0	1	Ditch	9.4	5.990	6.290		1.689	1.389	0.300	5.9	5.743					
MM104		294.2	92.9	4.647		=5.0+3.0	=5.0+3.0	1	Ditch	9.4	5.980	6.290	1/325	1.643	1.333	0.310	5.9	5.753					
MM104+65		359.2	65.0	4.680		=3.0*2	=3.0*2	1(2)	Box(2)	9.4	6.136	6.515	1/2000	1.835	1.456	0.379	5.9	5.850					
MM104+115		409.2	50.0	4.705		=3.0*2	=3.0*2	1(2)	Box(2)	9.4	6.240	6.695	1/2000	1.990	1.536	0.455	5.9	5.925					
MM00-20		465.9	56.7	4.733		=3.0*2	=3.0*2	1(2)	Box(2)	9.4	6.391	6.723		1.990	1.658	0.332	5.9	6.010					
MM302-10		504.3	38.4	4.752		=3.0*2	=3.0*2	1(2)	Box(2)	9.4	6.442	6.966	1/2000	2.214	1.690	0.524	5.9	6.049					
MM302		514.3	10.0	4.757		=3.0*2	=3.0*2	1(2)	Box(2)	9.4	6.460	6.971		2.214	1.703	0.511	5.9	6.062					
MM303a		590.6	76.3	4.795		3.0	3.0	1	Box	9.4	6.558	7.009		2.214	1.763	0.451	5.9	6.138					
MM303b		647.1	56.5	4.824		3.0	3.0	1	Box	9.4	6.625	7.037		2.214	1.801	0.412	5.9	6.190					
MM307		714.7	67.6	4.857		3.0	3.0	1	Box	9.4	6.698	7.071		2.214	1.841	0.373	5.9	6.249					
MM308		772.3	57.6	4.886		3.0	3.0	1	Box	9.4	6.758	7.100		2.214	1.871	0.342	5.9	6.297					
MM309		819.1	46.8	4.910		3.0	3.0	1	Box	9.4	6.803	7.123		2.214	1.894	0.320	5.9	6.334					
MM310		863.4	44.3	4.932		3.0	1.5	2	Box	9.4	6.845	7.146	1/1054	2.214	1.914	0.301	5.9	6.368	7.146	-1/10	2.213	1.437	0.777
MM310+4.7	Step*3	868.1	4.7	4.934		3.0	1.5	2	Ditch	9.4	6.850	7.150		2.216	1.916	0.300	5.9	6.372	6.671	1/1208	1.737	1.437	0.300
MM10	Step	883.3	15.2	4.942		3.0	1.5	2	Ditch	9.4	6.864	7.164		2.223	1.922	0.300	5.9	6.383	6.684		1.742	1.442	0.301
MM11	Step	952.7	69.4	4.976		3.0	1.5	2	Ditch	9.4	6.926	7.230		2.254	1.950	0.304	5.9	6.435	6.741		1.765	1.459	0.306
MM12	Step	1047.6	94.9	5.024		3.0	1.5	2	Ditch	9.4	7.008	7.320		2.297	1.984	0.312	5.9	6.503	6.820		1.796	1.479	0.317
MM13	Step	1129.6	82.0	5.065		3.0	1.5	2	Ditch	9.4	7.075	7.398		2.333	2.010	0.323	5.9	6.559	6.888		1.823	1.494	0.329
MM14	Step	1196.3	66.7	5.098		3.0	1.5	2	Ditch	9.4	7.128	7.461		2.363	2.029	0.333	5.9	6.603	6.943		1.845	1.505	0.340
MM15	Step	1318.6	122.3	5.159		3.0	1.5	2	Ditch	9.4	7.221	7.577		2.418	2.061	0.356	5.9	6.683	7.044		1.885	1.523	0.361
MM17	Step	1442.3	123.7	5.221		2.5	1.25	2	Ditch	7.6	7.323	7.695		2.474	2.102	0.372	5.9	6.742	7.147		1.926	1.521	0.405
MM18	Step	1505.6	63.3	5.253	1/260	2.5	1.25	2	Ditch	7.6	7.371	7.755		2.502	2.118	0.384	5.9	6.811	7.199		1.946	1.558	0.388
MM19	Step	1600.1	94.5	5.616		2.5	1.25	2	Ditch	7.6	7.412	7.845		2.228	1.796	0.433	5.9	6.866	7.277		1.661	1.249	0.411
MM20	Step	1665.6	65.5	5.868		2.5	2.5	1	Ditch	7.6	7.452	7.907		2.038	1.584	0.455	5.9	6.932	7.332		1.463	1.064	0.400
MM21	Step	1698.2	32.6	5.994		2.2	2.2	1	Ditch	5.9	7.537	7.938		1.944	1.544	0.401	5.9	6.925	7.359		1.365	0.931	0.434
MM21+20.0	Step	1718.2	20.0	6.070		2.2	2.2	1	Ditch	5.9	7.538	7.957		1.886	1.467	0.419	5.9	7.046	7.375	1/43	1.305	0.976	0.329
MM21+46.0		1744.2	26.0	6.170		2.2	2.2	1	Box	5.9	7.580	7.981	1/260	1.811	1.410	0.401	5.9	7.203	7.981	1/260	1.811	1.033	0.778
MM22		1775.2	31.0	6.290		2.2	2.2	1	Box	5.9	7.609	8.100		1.811	1.319	0.491	5.9	7.391					
MM22+42.2		1817.4	42.2	6.452		2.2	2.2	1	Box	5.9	7.669	8.074	1/260	1.622	1.217	0.405	5.9	7.506					
MM23		1829.4	12.0	6.498		2.2	2.2	1	Box	5.9	7.686	8.120		1.622	1.188	0.434	5.9	7.556					
MM24		1893.8	64.4	6.746		2.2	2.2	1	Box	5.9	7.831	8.368		1.622	1.085	0.537	5.9	7.794					
MM25		1942.6	48.8	6.934		2.2	2.2	1	Box	5.9	7.989	8.556		1.622	1.055	0.567	5.9	7.981					
MM25+89.6		2032.2	89.6	7.278	1/700	1.2	1.2	1	Ditch	1.6	8.499	8.900	1/4154	1.622	1.221	0.401	1.6	8.500					
MM26		2053.5	21.3	7.309		1.2	1.2	1	Ditch	1.6	8.521	8.905		1.597	1.212	0.384	1.6	8.521					
MM27		2161.3	107.8	7.463		1.2	1.2	1	Ditch	1.6	8.633	8.931		1.468	1.171	0.298	1.6	8.634					
MM28		2268.5	107.2	7.616		1.2	1.2	1	Ditch	1.6	8.756	8.957		1.341	1.140	0.201	1.6	8.756					
EP		2269.1	0.6	7.617		1.2	1.2	1	Ditch	1.6	8.756	8.957		1.340	1.140	0.201	1.6	8.757					

Note:
*1 Total: Total channel width
Lane: Channel width per lane
*2 Ditch: Concrete ditch
Box: Box culvert(single)
Box(2): 2-lane box culvert
*3 Stepwise construction

Table 3.1 SUMMARY OF DRAINAGE CHANNEL IMPROVEMENT (1/4)

Section	Type	Location *		Length (m)									Remarks
		B.P	E.P	L(E)	L(D)	L(P)	R(I)	R(II)	C(L)	C(D)	O/C	Others	
(1) Kamal Drainage Chennel (Main)													
Left (Total length = 4495.1 m)													
KM-LA		B.P	KM01+16.2									198.8	Excavation
KM-LB	L(E)	KM01+16.2	KM12+34.4	1057.0									
KM-LC		KM12+34.4	KM14+23.4									166.0	Gabion Protection
KM-LD		KM14+23.4	KM16+36.8									76.6	BINA MARGA's area
KM-LE	R(I)	KM16+36.8	KM18+12.8				144.7						
KM-LF	R(II)	KM18+12.8	KM26+28.8					593.7					
KM-LG	L(E)	KM26+28.8	KM32+60.9	485.7									
KM-LH	R(I)	KM32+60.9	KM35+140.6				288.2						
KM-LI	L(P)	KM35+140.6	KM45+2.2			492.9							
KM-LJ	L(E)	KM45+2.2	KM48+121.3	350.3									
KM-LK	R(I)	KM48+121.3	KM54				288.3						
KM-LL		KM54	KM57(E.P)									352.9	No works
Total				1893.0	0.0	492.9	721.2	593.7	0.0	0.0	0.0	794.3	
Right (Total length = 4547.9 m)													
KM-RA		B.P	KM00+73.4									135.4	Excavation
KM-RB	L(E)	KM00+73.4	KM13+77.9	1260.6									
KM-RC	R(I)	KM13+77.9	KM14+23.4				28.8						
KM-RD		KM14+23.4	KM16+22.8									62.6	BINA MARGA's area
KM-RE	R(I)	KM16+22.8	KM16+51.6				28.8						
KM-RF	L(E)	KM16+51.6	KM35+107.2	1509.3									
KM-RG	R(I)	KM35+107.2	KM38+90.4				161.6						
KM-RH	R(I)	KM38+90.4	KM45+2.2				364.7						
KM-RI	R(II)	KM45+2.2	KM47+70.9					233.6					
KM-RJ		KM47+70.9	KM48										Confluence with Branch channel
KM-RK	R(II)	KM48	KM57(E.P)					762.5					
Total				2769.9	0.0	0.0	583.9	996.1	0.0	0.0	0.0	198.0	

Levee/Revetment type

L(E) : Levee earth type
L(D) : Levee dump fill type
L(P) : Levee parapet wall type
R(I) : Revetment type I
R(II) : Revetment type II
C(L) : Concrete L-type wall
C(D) : Concrete ditch
O/C : Open culvert

Table 3.1 SUMMARY OF DRAINAGE CHANNEL IMPROVEMENT (2/4)

Section	Type	Location *		Length (m)									Remarks
		B.P	E.P	L(E)	L(D)	L(P)	R(I)	R(II)	C(L)	C(D)	O/C	Others	
(2) Kamal Drainage Chennel (Branch)													
Left (Total length = 2746.5 m)													
KE-LA		KE00(B.P)	KE00+8.2										Confluence with Branch channel
KE-LB	R(II)	KE00+8.2	KE02+50.0					175.8					
KE-LC		KE02+50.0	KE08+41.5									425.8	No works
KE-LD	R(II)	KE08+41.5	KE23					926.9					
KE-LE	R(I)	KE23	KE30+4.6				766.4						
KE-LF	C(D)	KE30+4.6	KE33(E.P)							451.6			
Total				0.0	0.0	0.0	766.4	1102.7	0.0	451.6	0.0	425.8	
Right (Total length = 2754.7 m)													
KE-RA	R(II)	KE00(B.P)	KE04+70.0					442.7					
KE-RB	R(I)	KE04+70.0	KE10+2.2				185.7						
KE-RC		KE10+2.2	KE12+47.6									205.1	No works
KE-RD		KE12+47.6	KE20+35.6									624.0	Heightening
KE-RE	R(II)	KE20+35.6	KE23+4.0					83.2					
KE-RF	R(I)	KE23+4.0	KE30+4.6				762.4						
KE-RG	C(D)	KE30+4.6	KE33(E.P)							451.6			
TotaL				0.0	0.0	0.0	948.1	525.9	0.0	451.6	0.0	829.1	
(3) Tanjungan Drainage Chennel													
Left (Total length = 2576.0 m)													
TM-LA	L(D)	TM00(B.P)	TM16+58.3		1453.8								
TM-LB		TM16+58.3	TM18+28.2									67.9	BINA MARGA's area
TM-LC	L(E)	TM18+28.2	TM21+18.8	283.4									
TM-LD	R(II)	TM21+18.8	TM23+16.2					203.6					
TM-LE	C(L)	TM23+16.2	E.P						567.3				
Total				283.4	1453.8	0.0	0.0	203.6	567.3	0.0	0.0	67.9	

Table 3.1 SUMMARY OF DRAINAGE CHANNEL IMPROVEMENT (3/4)

Section	Type	Location *		Length (m)									Remarks
		B.P	E.P	L(E)	L(D)	L(P)	R(I)	R(II)	C(L)	C(D)	O/C	Others	
Right (Total length = 2601.8 m)													
TM-RA	L(D)	TM00(B.P)	TM16+47.1		1442.1								
TM-RB		TM16+47.1	TM18+17.5									68.4	BINA MARGA's area
TM-RC		TM18+17.5	TM19									79.9	No works
TM-RD	L(D)	TM19	TM20+79.8		221.2								
TM-RE	L(E)	TM20+79.8	TM21+79.3	79.8									
TM-RF	R(II)	TM21+79.3	TM23+16.2					143.1					
TM-RG	C(L)	TM23+16.2	E.P						567.3				
Total				79.8	1663.3	0.0	0.0	143.1	567.3	0.0	0.0	148.3	
(4) Gede/Bor Drainage Chennel													
Left (Total length = 1203.0 m)													
GM-LA		B.P	GM02+0.1									20.0	Outlet structure
GM-LB	R(II)	GM02+0.1	GM10					599.8					
GM-LC	R(I)	GM10	GM12+99.3				264.8						
GM-LD	R(II)	GM12+99.3	E.P					318.4					
Total				0.0	0.0	0.0	264.8	918.2	0.0	0.0	0.0	20.0	
Right (Total length = 1203.0 m)													
GM-RA		B.P	GM02+0.1									20.0	Outlet structure
GM-RB	R(II)	GM02+0.1	E.P					1183.0					
Total				0.0	0.0	0.0	0.0	1183.0	0.0	0.0	0.0	20.0	
(5) Saluran Cengkareng Drainage Chennel													
Left (Total length = 4233.4 m)													
CM-LA		B.P	CM02+1.5									21.7	Outlet structure
CM-LB	O/C	CM02+1.5	CM05+20.0								390.7		
CM-LC	R(II)	CM05+20.0	CM15+25.8					850.4					
CM-LD	L(E)	CM15+25.8	CM26+82.8	1123.1									
CM-LE	L(P)	CM26+82.8	CM29+23.5			235.2							
CM-LF	L(E)	CM29+23.5	CM30+31.5	108.0									
CM-LG	L(P)	CM30+31.5	CM34+16.0			333.6							
CM-LH	L(E)	CM34+16.0	CM42+87.6	680.5									
CM-LI	R(I)	CM42+87.6	CM43+83.4				119.6						

Table 3.1 SUMMARY OF DRAINAGE CHANNEL IMPROVEMENT (4/4)

Section	Type	Location *		Length (m)									Remarks
		B.P	E.P	L(E)	L(D)	L(P)	R(I)	R(II)	C(L)	C(D)	O/C	Others	
CM-LJ	R(II)	CM43+83.4	CM45					55.7					
CM-LK	R(I)	CM45	E.P				314.9						
Total				1911.6	0.0	568.8	434.5	906.1	0.0	0.0	390.7	21.7	
Right (Total length = 4234.8 m)													
CM-RA		B.P	CM02+1.5									21.7	Outlet structure
CM-RB	O/C	CM02+1.5	CM05+20.0								390.7		
CM-RC	R(II)	CM05+20.0	CM15+6.0					830.6					
CM-RD	L(P)	CM15+6.0	CM17+84.5			287.5							
CM-RE	L(E)	CM17+84.5	CM23+53.0	529.9									
CM-RF	L(P)	CM23+53.0	CM29+18.8			563.6							
CM-RG	L(E)	CM29+18.8	CM38+35.0	758.9									
CM-RH	R(I)	CM38+35.0	CM40+20.5				113.9						
CM-RI	L(E)	CM40+20.5	CM42+87.6	247.8									
CM-RJ	R(I)	CM42+87.6	CM43+77.0				113.2						
CM-RK	R(II)	CM43+77.0	CM45					62.1					
CM-RL	R(I)	CM45	E.P				314.9						
Total				1536.6	0.0	851.1	542.0	892.7	0.0	0.0	390.7	21.7	
(6) PIK Junction Drainage Chennel (Total length = 765.4 m)													
NM-A	C(D)	B.P	E.P							765.4			
Total				0.0		0.0	0.0	0.0	0.0	765.4	0.0	0.0	
(7) Meruya Area Drainage Chennel													
(Total length = 2269.1 m)													
MM-A	C(D)	B.P	MM104+65.0								359.2		
MM-B		MM104+65.0	MM310									504.2	Box culvert
MM-C	C(D)	MM310	MM21+46.0							880.8			
MM-D		MM21+46.0	MM25+89.6										Box culvert
MM-E	C(D)	MM25+89.6	E.P							236.9		288.0	
Total				0.0	0.0	0.0	0.0	0.0	0.0	1117.7	359.2	792.2	

Note: * : Location is based on topographic cross section No.
the location of each section is shown in Fig.

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (1/6)

Drainage Channel : Cengkareng West Area
Wall No : PW1 Wall Height : 2.5 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 1 Input Data

Live load			q =		1 (t/m²)	
Unit weight of wall			W(conc.)=		2.5 (t/m³)	
Earth material						
Unit weight			We(dry) =		1.7 (t/m³)	
			We(sat.) =		1.7 (t/m³)	
Internal friction angle			ϕ =		8 (deg.)	
Friction angle against wall			δ =		2.67 (deg.)	
Cohesion			C =		4 (t/m²)	
Seismic coefficient (horizontal)			kh =		0	
Slope 1 : n	n =	0.05				
Width	B =	1.8 (m)	Height	H =	2.85 (m)	
	a1 =	0.9 (m)		h1 =	0.35 (m)	
	a2 =	0.3 (m)		h2 =	0.5 (m)	
	a3 =	0.6 (m)		h3 =	2 (m)	
	a4 =	0.7875 (m)		h4 =	0.2 (m)	
	a5 =	0.425 (m)		h5 =	0.5 (m)	
	a6 =	0.2 (m)		h6 =	0.2 (m)	
	a7 =	0.5875 (m)				
Water depth	d1 =	0.85 (m)	Cutoff	l =	3.3 (m)	
	d2 =	0.85 (m)				

1. Active earth pressure

Coefficient of active earth pressure Ka = 0.5000

Ph = 0.73 (t/m)
Pv = 0.03 (t/m)
x = 1.800 (m)
y = 0.283 (m)

2. Weight of wall

Wx = 4.10 (t/m)
x = 0.826 (m)
y = 0 (m)

3. Weight of earth material

Wx = 1.15 (t/m)
x = 0.942 (m)
y = 0.000 (m)

4. Weight of water

Wx = 0.00 (t/m)
x = 0.000 (m)
y = - (m)

5. Water pressure

Wy = 0.00 (t/m)
x = - (m)
y = 0.000 (m)

6. Uplift

Pu = -1.53 (t/m)
x = 0.900 (m)

7. Live load

Ll = 0.80 (t/m)
x = 1.400 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (1/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	0.03	0.73	1.800	0.283	0.06	0.21
2. Wall weight	4.10	0.00	0.826	0.000	3.39	0.00
3. Earth material	1.15	0.00	0.942	0.000	1.08	0.00
4. Water weight	0.00	0.00	0.000	0.000	0.00	0.00
5. Water pressure		0.00		0.000	0.00	0.00
6. Uplift	-1.53		0.900		-1.38	0.00
7. Live load	0.80		1.400		1.12	0.00
Total	4.55	0.73			4.27	0.21

8. Safety factor (Fs>=1.5)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{2.77}{0.73} = 3.79 \quad (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{4.27}{0.21} = 20.61$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{4.06}{4.55} = 0.89 \text{ (m)}$$

$$e = \frac{B}{2} - d = 0.01 \text{ (m)} ; \quad B/6 = 0.30 \text{ (m)}$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = 2.59 \ (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = 2.47 \ (t/m^2)$$

10.2 e > B/6

$$q1 = \frac{2V}{3d} = \text{---} \ (t/m^2)$$

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (2/6)

Drainage Channel : Cengkareng West Area
Wall No : PW1 Wall Height : 2.5 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 2 Input Data

Live load			q =		0 (t/m²)	
Unit weight of wall			W(conc.)=		2.5 (t/m³)	
Earth material						
Unit weight			We(dry) =		1.7 (t/m³)	
			We(sat.) =		1.7 (t/m³)	
Internal friction angle			ϕ =		8 (deg.)	
Friction angle against wall			δ =		-2.67 (deg.)	
Cohesion			C =		4 (t/m²)	
Seismic coefficient (horizontal)			kh =		0	
Slope 1 : n	n =	0.05				
Width	B =	1.8 (m)	Height	H =	2.85 (m)	
	a1 =	0.9 (m)		h1 =	0.35 (m)	
	a2 =	0.3 (m)		h2 =	0.5 (m)	
	a3 =	0.6 (m)		h3 =	2 (m)	
	a4 =	0.7875 (m)		h4 =	0.2 (m)	
	a5 =	0.425 (m)		h5 =	0.5 (m)	
	a6 =	0.2 (m)		h6 =	0.2 (m)	
	a7 =	0.5875 (m)				
Water depth	d1 =	0.85 (m)	Cutoff	l =	3.3 (m)	
	d2 =	2.55 (m)				

1. Active earth pressure

Coefficient of passive earth pressure Kp = 1.0000

Ph =	-7.41 (t/m)
Pv =	-0.34 (t/m)
x =	0.000 (m)
y =	0.283 (m)

2. Weight of wall

Wx =	4.10 (t/m)
x =	0.974 (m)
y =	- (m)

3. Weight of earth material

Wx =	1.15 (t/m)
x =	0.858 (m)
y =	- (m)

4. Weight of water

Wx =	1.02 (t/m)
x =	1.500 (m)
y =	- (m)

5. Water pressure

Wy =	2.89 (t/m)
x =	- (m)
y =	0.921 (m)

6. Uplift

Pu =	-2.93 (t/m)
x =	1.113 (m)

7. Live load

Ll =	0.00 (t/m)
x =	0.000 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (2/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	-0.13	-2.89	0.000	0.283	0.00	-0.82
2. Wall weight	4.10		0.974		4.00	0.00
3. Earth material	1.15		0.858		0.98	0.00
4. Water weight	1.02		1.500		1.53	0.00
5. Water pressure		2.89		0.921	0.00	2.66
6. Uplift	-2.93		1.113		-3.26	0.00
7. Live load	0.00		0.000		0.00	0.00
Total	3.21	0.00			3.25	1.84

8. Safety factor (Fs>=1.2)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{3.45}{0.00} = \quad \text{--- } (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{3.25}{1.84} = 1.76$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{1.41}{3.21} = 0.44 \text{ (m)}$$

$$e = \frac{B}{2} - d = 0.46 \text{ (m)} ; \quad B/6 = 0.30 \text{ (m)}$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = \text{--- } (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = \text{--- } (t/m^2)$$

10.2 e > B/6

$$q = \frac{2V}{3d} = 4.87 \ (t/m^2)$$

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (3/6)

Drainage Channel : Cengkareng West Area
Wall No : PW1 Wall Height : 2.5 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 3 Input Data

Live load			q =	0 (t/m²)		
Unit weight of wall			W(conc.)=	2.5 (t/m³)		
Earth material						
Unit weight			We(dry) =	1.7 (t/m³)		
			We(sat.) =	1.7 (t/m³)		
Internal friction angle			ϕ =	8 (deg.)		
Friction angle against wall			δ =	0 (deg.)		
Cohesion			C =	4 (t/m²)		
Seismic coefficient (horizontal)			kh =	0.075		
Slope 1 : n	n =	0.05				
Width	B =	1.8 (m)	Height	H =	2.85 (m)	
	a1 =	0.9 (m)		h1 =	0.35 (m)	
	a2 =	0.3 (m)		h2 =	0.5 (m)	
	a3 =	0.6 (m)		h3 =	2 (m)	
	a4 =	0.7875 (m)		h4 =	0.2 (m)	
	a5 =	0.425 (m)		h5 =	0.5 (m)	
	a6 =	0.2 (m)		h6 =	0.2 (m)	
	a7 =	0.5875 (m)				
Water depth	d1 =	0.85 (m)	Cutoff	l =	3.3 (m)	
	d2 =	0.85 (m)				

1. Active earth pressure

Coefficient of active earth pressure Ka = 0.5000
Ph = 0.31 (t/m)
Pv = 0.00 (t/m)
x = 1.800 (m)
y = 0.283 (m)

2. Weight of wall

Wx = 4.10 (t/m)
x = 0.826 (m)
y = 0.9108784 (m)

3. Weight of earth material

Wx = 1.15 (t/m)
x = 0.942 (m)
y = 0.600 (m)

4. Weight of water

Wx = 0.00 (t/m)
x = 0.000 (m)
y = - (m)

5. Water pressure

Wy = 0.00 (t/m)
x = - (m)
y = 0.000 (m)

6. Uplift

Pu = -1.53 (t/m)
x = 0.900 (m)

7. Live load

Ll = 0.00 (t/m)
x = 0.000 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (3/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	0.00	0.31	1.800	0.283	0.00	0.09
2. Wall weight	4.10	0.31	0.826	0.911	3.39	0.28
3. Earth material	1.15	0.05	0.942	0.600	1.08	0.03
4. Water weight	0.00	0.00	0.000	0.000	0.00	0.00
5. Water pressure		0.00		0.000	0.00	0.00
6. Uplift	-1.53		0.900		-1.38	0.00
7. Live load	0.00		0.000		0.00	0.00
Total	3.72	0.67			3.09	0.40

8. Safety factor (Fs>=1.2)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{2.70}{0.67} = 4.06 \quad (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{3.09}{0.40} = 7.77$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{2.69}{3.72} = 0.72 \text{ (m)}$$

$$e = \frac{B}{2} - d = 0.18 \text{ (m)};\ B/6 = 0.30 \text{ (m)}$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = 3.28 \ (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = 0.85 \ (t/m^2)$$

10.2 e > B/6

$$q1 = \frac{2V}{3d} = \text{---} \ (t/m^2)$$

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (4/6)

Drainage Channel : Cengkareng West Area
Wall No : PW2 Wall Height : 3.0 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 1 Input Data

Live load			q =		1 (t/m²)	
Unit weight of wall			W(conc.)=		2.5 (t/m³)	
Earth material						
Unit weight			We(dry) =		1.7 (t/m³)	
			We(sat.) =		1.7 (t/m³)	
Internal friction angle			ϕ =		8 (deg.)	
Friction angle against wall			δ =		8 (deg.)	
Cohesion			C =		4 (t/m²)	
Seismic coefficient (horizontal)			kh =		0	
Slope 1 : n	n =	0.05				
Width	B =	2.2 (m)	Height	H =	3.4 (m)	
	a1 =	1.3 (m)		h1 =	0.4 (m)	
	a2 =	0.3 (m)		h2 =	1 (m)	
	a3 =	0.6 (m)		h3 =	2 (m)	
	a4 =	1.1875 (m)		h4 =	0.25 (m)	
	a5 =	0.425 (m)		h5 =	1 (m)	
	a6 =	0.25 (m)		h6 =	0.25 (m)	
	a7 =	0.5875 (m)				
Water depth	d1 =	0.9 (m)	Cutoff	1 =	4.3 (m)	
	d2 =	0.9 (m)				

1. Active earth pressure

Coefficient of active earth pressure Ka = 0.5000

Ph = 1.52 (t/m)
Pv = 0.21 (t/m)
x = 2.200 (m)
y = 0.467 (m)

2. Weight of wall

Wx = 5.36 (t/m)
x = 0.914 (m)
y = 0 (m)

3. Weight of earth material

Wx = 2.96 (t/m)
x = 1.182 (m)
y = 0.000 (m)

4. Weight of water

Wx = 0.00 (t/m)
x = 0.000 (m)
y = - (m)

5. Water pressure

Wy = 0.00 (t/m)
x = - (m)
y = 0.000 (m)

6. Uplift

Pu = -1.98 (t/m)
x = 1.100 (m)

7. Live load

Ll = 1.20 (t/m)
x = 1.600 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (4/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	0.21	1.52	2.200	0.467	0.47	0.71
2. Wall weight	5.36	0.00	0.914	0.000	4.89	0.00
3. Earth material	2.96	0.00	1.182	0.000	3.50	0.00
4. Water weight	0.00	0.00	0.000	0.000	0.00	0.00
5. Water pressure		0.00		0.000	0.00	0.00
6. Uplift	-1.98		1.100		-2.18	0.00
7. Live load	1.20		1.600		1.92	0.00
Total	7.75	1.52			8.61	0.71

8. Safety factor (Fs>=1.5)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{3.07}{1.52} = 2.02 \quad (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{8.61}{0.71} = 12.15$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{7.90}{7.75} = 1.02 \ (m)$$

$$e = \frac{B}{2} - d = 0.08 \ (m)\ ;\ B/6 = 0.37 \ (m)$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = 4.30 \ (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = 2.75 \ (t/m^2)$$

10.2 e > B/6

$$q1 = \frac{2V}{3d} = \text{---} \ (t/m^2)$$

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (5/6)

Drainage Channel : Cengkareng West Area
Wall No : PW2 Wall Height : 3.0 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 2 Input Data

Live load			q =		0 (t/m²)	
Unit weight of wall			W(conc.)=		2.5 (t/m³)	
Earth material						
Unit weight			We(dry) =		1.7 (t/m³)	
			We(sat.) =		1.7 (t/m³)	
Internal friction angle			ϕ =		8 (deg.)	
Friction angle against wall			δ =		-8 (deg.)	
Cohesion			C =		4 (t/m²)	
Seismic coefficient (horizontal)			kh =		0	
Slope 1 : n	n =	0.05				
Width	B =	2.2 (m)	Height	H =		3.4 (m)
	a1 =	1.3 (m)		h1 =		0.4 (m)
	a2 =	0.3 (m)		h2 =		1 (m)
	a3 =	0.6 (m)		h3 =		2 (m)
	a4 =	1.1875 (m)		h4 =		0.25 (m)
	a5 =	0.425 (m)		h5 =		1 (m)
	a6 =	0.25 (m)		h6 =		0.25 (m)
	a7 =	0.5875 (m)				
Water depth	d1 =	0.9 (m)	Cutoff	l =		4.3 (m)
	d2 =	3.1 (m)				

1. Active earth pressure

Coefficient of passive earth pressure Kp = 1.0000

Ph = -12.74 (t/m)
Pv = -1.79 (t/m)
x = 0.000 (m)
y = 0.467 (m)

2. Weight of wall

Wx = 5.36 (t/m)
x = 1.286 (m)
y = - (m)

3. Weight of earth material

Wx = 2.96 (t/m)
x = 1.018 (m)
y = - (m)

4. Weight of water

Wx = 1.02 (t/m)
x = 1.900 (m)
y = - (m)

5. Water pressure

Wy = 4.40 (t/m)
x = - (m)
y = 1.101 (m)

6. Uplift

Pu = -3.88 (t/m)
x = 1.396 (m)

7. Live load

Ll = 0.00 (t/m)
x = 0.000 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (5/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	-0.62	-4.40	0.000	0.467	0.00	-2.05
2. Wall weight	5.36		1.286		6.89	0.00
3. Earth material	2.96		1.018		3.02	0.00
4. Water weight	1.02		1.900		1.94	0.00
5. Water pressure		4.40		1.101	0.00	4.84
6. Uplift	-3.88		1.396		-5.42	0.00
7. Live load	0.00		0.000		0.00	0.00
Total	4.84	0.00			6.43	2.79

8. Safety factor (Fs>=1.2)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{5.20}{0.00} = \cdots \ (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{6.43}{2.79} = 2.30$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{3.63}{4.84} = 0.75 \ (m)$$

$$e = \frac{B}{2} - d = 0.35 \ (m)\ ;\ B/6 = 0.37 \ (m)$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = 4.29 \ (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = 0.11 \ (t/m^2)$$

10.2 e > B/6

$$q = \frac{2V}{3d} = \cdots \ (t/m^2)$$

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (6/6)

Drainage Channel : Cengkareng West Area
Wall No : PW2 Wall Height : 3.0 (m)

Case 1 : Normal condition
Case 2 : Flood condition
Case 3 : Seismic condition

Case 3 Input Data

Live load			q =		0 (t/m²)	
Unit weight of wall			W(conc.)=		2.5 (t/m³)	
Earth material						
Unit weight			We(dry) =		1.7 (t/m³)	
			We(sat.) =		1.7 (t/m³)	
Internal friction angle			ϕ =		8 (deg.)	
Friction angle against wall			δ =		4 (deg.)	
Cohesion			C =		4 (t/m²)	
Seismic coefficient (horizontal)			kh =		0.075	
Slope 1 : n	n =	0.05				
Width	B =	2.2 (m)	Height	H =	3.4 (m)	
	a1 =	1.3 (m)		h1 =	0.4 (m)	
	a2 =	0.3 (m)		h2 =	1 (m)	
	a3 =	0.6 (m)		h3 =	2 (m)	
	a4 =	1.1875 (m)		h4 =	0.25 (m)	
	a5 =	0.425 (m)		h5 =	1 (m)	
	a6 =	0.25 (m)		h6 =	0.25 (m)	
	a7 =	0.5875 (m)				
Water depth	d1 =	0.9 (m)	Cutoff	1 =	4.3 (m)	
	d2 =	0.9 (m)				

1. Active earth pressure

Coefficient of active earth pressure Ka = 0.5000

Ph =	0.83 (t/m)
Pv =	0.06 (t/m)
x =	2.200 (m)
y =	0.467 (m)

2. Weight of wall

Wx =	5.36 (t/m)
x =	0.914 (m)
y =	1.0281554 (m)

3. Weight of earth material

Wx =	2.96 (t/m)
x =	1.182 (m)
y =	0.900 (m)

4. Weight of water

Wx =	0.00 (t/m)
x =	0.000 (m)
y =	- (m)

5. Water pressure

Wy =	0.00 (t/m)
x =	- (m)
y =	0.000 (m)

6. Uplift

Pu =	-1.98 (t/m)
x =	1.100 (m)

7. Live load

Ll =	0.00 (t/m)
x =	0.000 (m)

Table 3.2 STABILITY ANALYSIS OF PARAPET WALL (6/6)

Item	V (t)	H (t)	x (m)	y (m)	Mr (V · x) (tm)	Mo(H · y) (tm)
1. Earth pressure	0.06	0.83	2.200	0.467	0.13	0.39
2. Wall weight	5.36	0.40	0.914	1.028	4.89	0.41
3. Earth material	2.96	0.15	1.182	0.900	3.50	0.13
4. Water weight	0.00	0.00	0.000	0.000	0.00	0.00
5. Water pressure		0.00		0.000	0.00	0.00
6. Uplift	-1.98		1.100		-2.18	0.00
7. Live load	0.00		0.000		0.00	0.00
Total	6.40	1.38			6.35	0.94

8. Safety factor (Fs>=1.2)

8.1 Sliding

$$Fs = \frac{C \cdot B + V \cdot \tan \phi_B}{H} = \frac{2.95}{1.38} = 2.13 \quad (B=a4,\ \phi_B = 2\phi/3)$$

8.2 Overturning

$$Fs = \frac{Mr}{Mo} = \frac{6.35}{0.94} = 6.79$$

9. Eccentricity

$$d = \frac{Mr - Mo}{V} = \frac{5.41}{6.40} = 0.85 \ (m)$$

$$e = \frac{B}{2} - d = 0.25 \ (m);\ B/6 = 0.37 \ (m)$$

10. Reaction of foundation

10.1 e =< B/6

$$q1 = \frac{V}{B}\left(1 + \frac{6e}{B}\right) = 4.92 \ (t/m^2)$$

$$q2 = \frac{V}{B}\left(1 - \frac{6e}{B}\right) = 0.89 \ (t/m^2)$$

10.2 e > B/6

$$q1 = \frac{2V}{3d} = \cdots \ (t/m^2)$$

Table 3.3 DESIGN DISCHARGE AT SLUICEWAY/DRAIN-DITCH SITES

Left Bank					Right Bank				
No.	Location	Drainage Area (km2)	Specific Discharge (m3/s/km2	Discharge (m3/s)	No.	Location	Drainage Area (km2)	Specific Discharge (m3/s/km2	Discharge (m3/s)
Kamal Drainage Channel (main)									
DKM-1L	KM01+24m	0.012	12.5	0.15	SKM-1R	KM17-20m	0.479	11.0	5.27
SKM-1L	KM20+16m	0.252	11.6	2.92	SKM-2R	KM21+6m	0.316	11.2	3.54
SKM-2L	KM24+35m	0.234	11.7	2.74	SKM-3R	KM27+42m	0.367	11.1	4.07
SKM-3L[1]	KM26+2m	-	-	[2] 1.00	SKM-4R	KM40+32m	0.076	12.0	0.91
SKM-4L	KM29+19m	0.067	12.0	0.80	SKM-5R	KM45+6m	0.042	12.5	0.53
SKM-5L	KM31+56m	0.126	11.9	1.50	SKM-6R	KM50+31m	0.038	12.0	0.46
SKM-6L	KM38+3m	0.162	11.8	1.91	SKM-7R	KM54-26m	0.168	11.8	1.98
SKM-7L	KM42+7m	0.080	12.0	0.96					
SKM-8L	KM46+35m	0.109	12.0	1.30					
CKM-1L	KM52-2m	0.131	11.9	1.56					
Kamal Drainage Channel (branch)									
SKE-1L	KE01+5m	0.078	12.0	0.94	CKE-1R	KE01+5m	0.109	12.0	1.31
SKE-2L	KE12-32m	0.007	12.5	0.09	SKE-1R	KE21+5m	0.027	12.5	0.34
SKE-3L	KE13+0m	0.005	12.5	0.06	SKE-2R	KE25-5m	0.108	12.0	1.30
CKE-1L	KE15-8m	0.053	12.0	0.64	SKE-3R	KE31+0m	0.018	12.5	0.22
DKE-1L	KE18+54m	0.097	12.0	1.16					
DKE-2L	KE21-37m	0.024	12.5	0.30					
SKE-4L	KE25-5m	0.068	12.0	0.82					
CHKE-1L	KE30-10m	0.701	10.75	7.54					
SKE-5L	KE31-43m	0.018	12.5	0.22					
Tanjungan Drainage channel									
STM-1L	TM25-13m	0.063	12.0	0.76	STM-1R	TM25-13m	0.048	12.5	0.60
STM-2L	TM30-10m	0.255	11.6	2.96	STM-2R	TM30+3m	0.015	12.5	0.19
STM-3L	TM30+16m	0.077	12.0	0.92	STM-3R	TM35+0m	0.050	12.0	0.60
STM-4L	TM33+13m	0.131	11.9	1.56					
Gede /Bor Drainage Chennel									
DGM-1L	GM04-46m	0.040	12.5	0.50	DGM-1R	GM03+0m	0.018	12.5	0.23
DGM-2L	GM06-37m	0.047	12.5	0.59	SGM-1R	GM04+44m	0.074	12.0	0.89
DGM-3L	GM06-26m	0.085	12.0	1.02	DGM-2R	GM06+13m	0.0082	12.5	0.10
SGM-1L	GM12+0m	0.061	12.0	0.73	DGM-3R	GM08-41m	0.017	12.5	0.21
SGM-2L[3]	GM14-5m	-	-	-	SGM-2R	GM12+0m	0.051	12.0	0.61
SGM-3L	GM15+24m	0.090	12.0	1.08					
Saluran Cengkareng Drainage Channel									
SCM-1L	CM05-5m	0.181	11.8	2.14	DCM-1R	CM09-44m	0.121	11.9	1.44
SCM-2L	CM16+12m	0.421	11.0	4.63	SCM-1R	CM15-10m	0.173	11.8	2.04
SCM-3L	CM20+10m	0.148	11.9	1.76	SCM-2R	CM16-4m	0.171	11.8	2.02
SCM-4L	CM27-21m	0.163	11.8	1.92	SCM-3R	CM26+1m	0.126	11.9	1.50
SCM-5L	CM30+0m	0.147	11.9	1.75	SCM-4R	CM30+0m	0.138	11.9	1.64
SCM-6L	CM37+30m	0.173	11.8	2.04	SCM-5R	CM37+0m	0.142	11.9	1.69
SCM-7L	CM41+0m	0.164	11.8	1.94	SCM-6R	CM43-30m	0.187	11.8	2.21
SCM-8L	CM47+34m	0.147	11.9	1.75	SCM-7R	CM47+53m	0.04	12.5	0.50
PIK Junction Drainage Channel									
					SNM-1R	NM34+0m	0.148	11.9	1.76

Note: 1):Sluiceway for existing secondary channel
2):Flow capacity of existing secondary channel
3):Sluiceway for flushing Saluran Cengkareng Drainage Channel

Table 3.4 DESIGN OF SLUICEWAY AND DRAIN- DITCH

Left/ Right	No.	Facilities	Location	Levee /Revet. type	Q (m3/s)	EL				Sluiceway conduit/Ditch							Gate
						Channel bed(m)	HWL (m)	Levee crest(m)	Inland (m)	Nos. of lane	Inlet EL(m)	Outlet EL(m)	Length (m)	Slope 1 : n	Width (m)	Height (m)	Type
(1)Kamal drainage channel (Main channel)																	
Left	DKM-1L	Ditch	KM01+24m	G	0.15	-1.455	0.221	0.746	0.0	The existing ditch (0.7 m x 0.8 m) shall be used with no gate.							
	SKM-1L	Sluiceway	KM20+16m	R(II)	2.92	-0.982	0.688	1.230	0.5	1	-0.602	-0.682	9.671	120	1.2	1.2	Slide
	SKM-2L	Sluiceway	KM24+35m	R(II)	2.74	-0.887	0.798	1.327	0.9	1	-0.527	-0.587	6.564	110	1.1	1.1	Slide
	SKM-3L	Sluiceway	KM26+2m	R(II)	-	-0.841	0.850	1.374	0.7	1	-0.541	-0.541	0.300	Level	1.5	1.3	Slide
	SKM-4L	Sluiceway	KM29+19m	L(E)	0.80	-0.736	0.948	1.477	0.3	1	-0.357	-0.436	6.309	80	0.8	0.8	Slide
	SKM-5L	Sluiceway	KM31+56m	L(E)	1.50	-0.678	0.974	1.511	0.5	1	-0.315	-0.378	6.324	100	1.0	1.0	Slide
	SKM-6L	Sluiceway	KM38+3m	L(P)	1.91	-0.451	1.097	1.672	0.5	1	-0.094	-0.151	5.700	100	1.0	1.0	Slide
	SKM-7L	Sluiceway	KM42+7m	L(P)	0.96	-0.293	1.207	1.794	0.8	1	0.324	0.243	5.700	70	0.7	0.7	Slide
	SKM-8L	Sluiceway	KM46+35m	L(E)	1.30	-0.141	1.323	1.911	1.0	1	0.223	0.159	6.426	100	1.0	1.0	Slide
	CKM-1L	Culvert	KM52-2m	R(I)	1.56	0.113	1.530	2.107	1.2	The existing culvert (1.0 m x 1.0 m) shall be used with no gate.							
Right	SKM-1R	Sluiceway	KM17-20m	L(E)	5.27	-1.062	0.592	1.148	-0.1	2	-0.722	-0.762	4.362	110	1.1	1.1	Slide
	SKM-2R	Sluiceway	KM21+6m	L(E)	3.54	-0.976	0.695	1.236	0.0	1	-0.640	-0.676	4.331	120	1.2	1.2	Slide
	SKM-3R	Sluiceway	KM27+42m	L(E)	4.07	-0.792	0.907	1.425	0.1	1	-0.459	-0.492	4.284	130	1.3	1.3	Slide
	SKM-4R	Sluiceway	KM40+32m	R(I)	0.91	-0.365	1.156	1.739	0.9	1	-0.019	-0.065	3.692	80	0.8	0.8	Slide
	SKM-5R	Sluiceway	KM45+6m	R(II)	0.53	-0.199	1.280	1.868	1.2	1	0.171	0.101	5.544	80	0.8	0.8	Slide
	SKM-6R	Sluiceway	KM50+31m	R(II)	0.46	0.025	1.455	2.039	1.3	1	0.395	0.325	5.542	80	0.8	0.8	Slide
	SKM-7R	Sluiceway	KM54-26m	R(II)	1.98	0.148	1.561	2.134	1.6	1	0.514	0.448	6.536	100	1.0	1.0	Slide
(2)Kamal drainage channel (Branch channel)																	
Left	SKE-1L	Sluiceway	KE01+5m	R(II)	0.94	0.223	1.425	1.970	1.1	1	0.523	0.523	0.300	Level	0.8	0.8	Slide
	SKE-2L	Sluiceway	KE12-32m	R(II)	0.09	0.619	1.836	2.174	1.8	1	1.274	1.274	0.300	Level	0.4	0.4	Flap
	SKE-3L	Sluiceway	KE13+0m	R(II)	0.06	0.697	1.916	2.242	1.8	1	1.342	1.342	0.300	Level	0.4	0.4	Flap
	CKE-1L	Culvert	KE15-8m	R(II)	0.64	0.763	1.982	2.299	1.9	1	1.181	1.063	7.100	60	0.6	0.6	-
	DKE-1L	Ditch	KE18+54m	R(II)	1.16	0.933	2.141	2.449	2.1	1	1.687	1.649	3.000	80	0.8	0.8	-
	DKE-2L	Ditch	KE21-37m	R(II)	0.30	1.011	2.206	2.517	2.2	1	1.967	1.917	3.000	60	0.6	0.6	-
	SKE-4L	Sluiceway	KE25-5m	R(I)	0.82	1.152	2.328	2.641	1.9	1	1.497	1.452	3.557	80	0.8	0.8	Slide
	CHKE-1L	Channel	KE30-10m	R(I)	7.54	1.471	2.627	2.920	2.2	A tertiary channel shall be newly provided by Private Sctor.							
	SKE-5L	Sluiceway	KE31-43m	C(D)	0.22	1.551	2.645	2.925	2.5	1	2.025	2.025	0.300	Level	0.4	0.4	Flap
Right	CKE-1R	Culvert	KE01+5m	R(II)	1.31	0.223	1.425	1.970	1.4	1	0.612	0.523	7.100	80	0.8	0.8	-

Table 3.4 DESIGN OF SLUICEWAY AND DRAIN- DITCH

Left/ Right	No.	Facilities	Location	Levee /Revet. type	Q (m3/s)	EL				Sluiceway conduit/Ditch							Gate Type
						Channel bed(m)	HWL (m)	Levee crest(m)	Inland (m)	Nos. of lane	Inlet EL(m)	Outlet EL(m)	Length (m)	Slope 1 : n	Width (m)	Height (m)	
	SKE-1R	Sluiceway	KE21+5m	R(II)	0.34	1.035	2.225	2.538	1.8	1	1.335	1.335	0.300	Level	0.8	0.8	Slide
	SKE-2R	Sluiceway	KE25-5m	R(I)	1.30	1.152	2.328	2.641	1.9	1	1.525	1.452	6.557	90	0.9	0.9	Slide
	SKE-3R	Sluiceway	KE31+0m	C(D)	0.22	1.575	2.649	2.925	2.5	1	2.025	2.025	0.300	Level	0.4	0.4	Flap
(3)Tanjungan drainage channel																	
Left	STM-1L	Sluiceway	TM25-13m	R(II)	0.76	-0.907	0.478	0.903	0.40	1	-0.607	-0.607	0.300	Level	0.8	0.8	Slide
	STM-2L	Sluiceway	TM30-10m	C(L)	2.96	-0.893	0.496	0.922	-0.10	2	-0.593	-0.593	0.300	Level	1.0	1.0	Slide
	STM-3L	Sluiceway	TM30+16m	C(L)	0.92	-0.888	0.504	0.929	0.40	1	-0.588	-0.588	0.300	Level	0.8	0.8	Slide
	STM-4L	Sluiceway	TM33+13m	C(L)	1.56	-0.861	0.544	0.965	0.20	1	-0.561	-0.561	0.300	Level	1.0	1.0	Slide
Right	STM-1R	Sluiceway	TM25-13m	R(II)	0.60	-0.907	0.478	0.903	0.20	1	-0.607	-0.607	0.300	Level	0.8	0.8	Slide
	STM-2R	Sluiceway	TM30+3m	C(L)	0.19	-0.890	0.500	0.926	0.10	1	-0.139	-0.290	6.050	40	0.4	0.4	Flap
	STM-3R	Sluiceway	TM35+0m	C(L)	0.60	-0.817	0.608	1.024	-0.80	1	-0.446	-0.517	5.700	80	0.8	0.8	Slide
(4)PIK Junction drainage channel																	
Right	SNM-1R	Sluiceway	NM34+0m	C(D)	1.76	0.308	1.973	2.273	1.50	1	0.608	0.608	0.300	Level	1.1	1.1	Slide
(5)Saluran Cengkareng drainage channel																	
Left	SCM-1L	Sluiceway	CM05-5m	O/C	2.14	-0.677	1.381	1.726	1.3	1	-0.177	-0.177	0.300	Level	1.3	1.3	Slide
	SCM-2L	Sluiceway	CM16+12m	L(E)	4.63	-0.364	1.675	2.020	0.7	2	-0.014	-0.064	5.939	120	1.2	1.2	Slide
	SCM-3L	Sluiceway	CM20+10m	L(E)	1.76	-0.222	1.799	2.153	0.7	1	0.138	0.078	5.958	100	1.0	1.0	Slide
	SCM-4L	Sluiceway	CM27-21m	L(P)	1.92	0.004	1.948	2.343	0.9	1	0.304	0.304	0.300	Level	1.1	1.1	Slide
	SCM-5L	Sluiceway	CM30+0m	L(E)	1.75	0.094	2.030	2.414	1.5	1	0.634	0.594	4.018	100	1.0	1.0	Slide
	SCM-6L	Sluiceway	CM37+30m	L(E)	2.04	0.278	2.142	2.558	1.1	1	0.633	0.578	6.082	110	1.1	1.1	Slide
	SCM-7L	Sluiceway	CM41+0m	L(E)	1.94	0.380	2.192	2.626	1.7	1	0.736	0.680	6.118	110	1.1	1.1	Slide
	SCM-8L	Sluiceway	CM47+34m	R(I)	1.75	0.547	2.254	2.689	1.8	1	0.887	0.847	3.618	90	0.9	0.9	Slide
Right	DCM-1R	Ditch	CM09-44m	R(II)	1.44	-0.551	1.490	1.844	1.5	The existing ditch (1.0 m x 1.2 m) shall be used with no gate.							
	SCM-1R	Sluiceway	CM15-10m	R(II)	2.04	-0.396	1.632	1.989	1.3	1	0.204	0.204	0.300	Level	1.2	1.2	Slide
	SCM-2R	Sluiceway	CM16-4m	L(P)	2.02	-0.369	1.669	2.015	0.6	1	-0.069	-0.069	0.300	Level	1.2	1.2	Slide
	SCM-3R	Sluiceway	CM26+1m	L(P)	1.50	-0.037	1.920	2.311	0.7	1	0.263	0.263	0.300	Level	1.0	1.0	Slide
	SCM-4R	Sluiceway	CM30+0m	L(E)	1.64	0.094	2.030	2.414	1.1	1	0.454	0.394	6.018	100	1.0	1.0	Slide

Table 3.4 DESIGN OF SLUICEWAY AND DRAIN- DITCH

Left/ Right	No.	Facilities	Location	Levee /Revet. type	Q (m3/s)	EL				Sluiceway conduit/Ditch							Gate
						Channel bed(m)	HWL (m)	Levee crest(m)	Inland (m)	Nos. of lane	Inlet EL(m)	Outlet EL(m)	Length (m)	Slope 1 : n	Width (m)	Height (m)	Type
	SCM-5R	Sluiceway	CM37+0m	L(E)	1.69	0.268	2.137	2.550	1.1	1	0.609	0.568	4.076	100	1.0	1.0	Slide
	SCM-6R	Sluiceway	CM43-30m	L(E)	2.21	0.444	2.206	2.650	1.3	1	0.781	0.744	4.138	110	1.1	1.1	Slide
	SCM-7R	Sluiceway	CM47+53m	R(I)	0.50	0.553	2.257	2.692	1.8	1	0.936	0.853	6.617	80	0.8	0.8	Slide
(6)Gede/Bor drainage channel																	
Left	DGM-1L	Ditch	GM04-46m	R(II)	0.50	0.975	2.562	2.968	2.70	The existing ditch (1.0 m x 1.2 m) shall be used with no gate.							
	DGM-2L	Ditch	GM06-37m	R(II)	0.59	1.109	2.675	3.089	2.70	The existing ditch (0.7 m x 0.7 m) shall be used with no gate.							
	DGM-3L	Ditch	GM06-26m	R(II)	1.02	1.116	2.681	3.095	2.70	The existing ditch (1.0 m x 1.2m) shall be used with no gate.							
	SGM-1L	Sluiceway	GM12+0m	R(I)	0.73	1.389	2.930	3.343	2.30	1	1.772	1.689	6.607	80	0.8	0.8	Slide
	SGM-2L	Sluiceway	GM14-5m	R(II)	-	1.504	3.039	3.447	-	2	1.204	1.137	6.704	100	1.0	1.0	Slide
	SGM-3L	Sluiceway	GM15+24m	R(II)	1.08	1.583	3.115	3.519	2.50	1	1.996	1.883	9.000	80	0.8	0.8	Slide
Right	DGM-1R	Ditch	GM03+0m	R(II)	0.23	0.929	2.524	2.926	3.70	The existing ditch (0.7 m x 2.5 m) shall be used with no gate.							
	SGM-1R	Sluiceway	GM04+44m	R(II)	0.89	1.032	2.609	3.019	2.40	1	1.532	1.532	0.300	Level	0.8	0.8	Slide
	DGM-2R	Ditch	GM06+13m	R(II)	0.10	1.140	2.702	3.117	2.60	1	2.367	2.317	3.000	60	0.6	0.8	-
	DGM-3R	Ditch	GM08-41m	R(II)	0.21	1.208	2.762	3.179	2.80	The existing ditch (0.3 m x 0.4 m) shall be used with no gate.							
	SGM-2R	Sluiceway	GM12+0m	R(II)	0.61	1.389	2.930	3.343	2.60	1	1.689	1.689	0.300	Level	0.8	0.8	Slide

Table 3.5 DESIGN LOAD FOR STRESS ANALYSIS ON TRANSVERSE SECTION OF SLUICEWAY CONDUIT

Conduit category	H0 (m)	B0 (m)	t1 (m)	t2 (m)	t3 (m)	t4 (m)	H1 (m)	B1 (m)	B2 (m)	Dt (t/m)	Ds (t/m)	Dp (t/m)	Db (t/m)	Depth h1 (m)	Depth h1' (m)	Depth h2 (m)	Pv1 Pve (t/m2)	Pv1 Pv1 (t/m2)	PvL (t/m)	PvL' (t/m2)	W (m)	X (m)	X' (m)	Ph1 & Ph2 Ph1 (t/m2)	Ph1 & Ph2 Ph2 (t/m2)	Pv21 (t/m2)	Pv22 (t/m2)	P1 (t/m)	P2 (t/m)
I. 1 lane sluiceway																													
1-1 Category 1 (conduit size : 1.0 x 1.0 to 0.7 x 0.7)																													
Case-1	1.00	1.00	0.25	0.25	0.30	-	1.28	1.25	1.50	0.94	1.25	-	1.13	0.925	0.800	2.200	1.44	2.19	7.56	-		0.625	-	1.33	2.48	9.24	9.24	0.63	-
Case-2	1.00	1.00	0.25	0.25	0.30	-	1.28	1.25	1.50	0.94	1.25	-	1.13	0.925	0.800	2.200	1.44	2.19	7.56	-		0.938	-	1.33	2.48	0.17	18.31	0.63	-
Case-3	1.00	1.00	0.25	0.25	0.30	-	1.28	1.25	1.50	0.94	1.25	-	1.13	0.925	0.800	2.200	1.44	2.19	7.56	-		1.250	-	1.33	2.48	0.00	35.67	0.63	-
1-2 Category 2 (conduit size : 1.3 x 1.3 to 1.1 x 1.1)																													
Case-1	1.30	1.30	0.25	0.25	0.30	-	1.58	1.55	1.80	1.13	1.63	-	1.35	0.725	0.600	2.300	1.08	1.81	7.56	-		0.775	-	1.15	2.57	7.73	7.73	0.81	-
Case-2	1.30	1.30	0.25	0.25	0.30	-	1.58	1.55	1.80	1.13	1.63	-	1.35	0.725	0.600	2.300	1.08	1.81	7.56	-		1.163	-	1.15	2.57	0.42	15.05	0.81	-
Case-3	1.30	1.30	0.25	0.25	0.30	-	1.58	1.55	1.80	1.13	1.63	-	1.35	0.725	0.600	2.300	1.08	1.81	7.56	-		1.550	-	1.15	2.57	0.00	27.93	0.81	-
II. 2 lane sluiceway																													
2-1 Category 3 (conduit size : 1.2 x 1.2 to 1.0 x 1.0)																													
Case-1	1.20	1.20	0.30	0.30	0.35	0.30	1.53	1.50	3.30	2.48	1.80	0.90	2.89	0.950	0.800	2.475	1.44	2.27	7.56	-		1.500	-	1.36	2.73	5.69	5.69	0.90	0.90
Case-2	1.20	1.20	0.30	0.30	0.35	0.30	1.53	1.50	3.30	2.48	1.80	0.90	2.89	0.950	0.800	2.475	1.44	2.27	7.56	-		2.250	-	1.36	2.73	1.91	9.47	0.90	0.90
Case-3	1.20	1.20	0.30	0.30	0.35	0.30	1.53	1.50	3.30	2.48	1.80	0.90	2.89	0.950	0.800	2.475	1.44	2.27	7.56	-		3.000	-	1.36	2.73	0.00	13.62	0.90	0.90
III. 3 Outlet sluiceway of Saluran Cengkareng drainage channel																													
3-1 2 lane sluiceway (conduit size : 2.7 x 2.3)																													
Case-1	2.30	2.70	0.40	0.50	0.55	0.40	2.83	3.10	6.60	8.25	4.60	2.30	9.08	3.250	3.000	6.075	5.40	6.73	-	1.22	6.20	-	3.10	3.43	5.97	9.06	9.06	2.30	2.30
3-2 3 lane sluiceway (conduit size : 2.7 x 2.3)																													
Case-1	2.30	2.70	0.40	0.50	0.55	0.40	2.83	3.10	9.70	12.13	4.60	4.60	13.34	3.250	3.000	6.075	5.40	6.70	-	1.22	6.20	-	4.65	3.43	5.97	8.51	8.51	2.30	2.30
Case-4	2.30	2.70	0.40	0.50	0.55	0.40	2.83	3.10	9.70	12.13	4.60	4.60	13.34	3.250	3.000	6.075	5.40	6.70	-	1.22	6.20	-	6.20	3.43	5.97	7.69	9.32	2.30	2.30

Notes:
- Dt = total weight of top slab per longitudinal length
- Ds = total weight of side walls per longitudinal length
- Dp = total weight of partition walls per longitudinal length
- Db = total weight of bottom slab per longitudinal length
- Case-1 : X = 0.5 Σ B1; Case-2 : X = 0.75 Σ B1; Case-3 : X = 1.0 Σ B1
- Case-4 : X = 0.67 Σ B1
- h1' = earth thickness on top slab
- Pve = vertical earth pressure at rest
- PvL = vertical live load(concentrated)
- PvL' = vertical live load(distributed)
- X = loading point of PvL
- X = center of PvL'
- W = width of PvL'
- Refer to Figs. 3.7 and 3.8 for others.

Table 3.6 STRESS ANALYSIS ON TRANSVERSE SECTION OF SLUICEWAY CONDUIT

Conduit category	Force	Conduit member			
		Top slab	Bottom slab	Side wall	Partition wall
I. 1 lane sluiceway					
1-1 Category 1 (conduit size : 1.0 x 1.0)					
	M (t · m/m)	1.87	1.29	0.92	-
	Sjoint (t/m)	8.95	9.60	1.63	-
	S2d (t/m)	4.27	2.55	0.79	
	N (t/m)	1.41	1.03	5.15	-
1-2 Category2 (conduit size : 1.3 x 1.3)					
	M (t · m/m)	2.30	1.61	1.17	-
	Sjoint (t/m)	9.00	9.82	1.57	
	S2d (t/m)	4.28	2.62	0.87	-
	N (t/m)	1.57	1.37	5.18	-
II. 2 lane sluiceway					
2-1 Category3 (conduit size : 1.2 x 1.2)					
	M (t · m/m)	2.12	1.88	1.71	0.59
	Sjoint (t/m)	9.15	9.13	3.07	0.49
	S2d (t/m)	4.83	3.22	1.84	0.49
	N (t/m)	1.56	1.41	9.15	8.21
III. 3 Outlet sluiceway of Saluran Cengkareng drainage channel					
3-1 2 lane sluiceway (conduit size : 2.7 x 2.3)					
	M (t · m/m)	8.15	7.54	4.57	0.00
	Sjoint (t/m)	13.85	15.00	7.66	0.00
	S2d (t/m)	5.97	6.01	3.67	-
	N (t/m)	5.64	7.66	13.08	-
3-2 3 lane sluiceway (conduit size : 2.7 x 2.3)					
	M (t · m/m)	7.42	7.28	4.60	0.45
	Sjoint (t/m)	13.55	14.72	7.71	0.13
	S2d (t/m)	4.94	5.93	2.60	0.19
	N (t/m)	5.66	7.83	11.01	26.01

Note :
(1) M = bending moment ,Sjoint = shearing stress at joint, S2d = shearing stress at 2d from joint
N = axial force, d = effective slab thickness
(2) This table compiless the maximum value in each member.

Table 3.7 THICKNESS OF SLUICEWAY CONDUIT

Conduit category	Member	Design Thickness Td (cm)	Effective Thickness d (cm)	Concrete cover d' (cm)	Bending Moment M (t · m)	Axial force N (t)	e = M/N (m)	c = Td/2-d' (m)	Ms (t · m)	Required Eff. thick. (cm)	Required thick. Te(cm)	Check Td > Te
I. 1 lane sluiceway												
1-1 Category 1 (conduit size : 1.0 x 1.0)												
	Top slab	25	20	5	1.87	1.41	1.33	0.08	1.98	13.91	18.91	OK
	Bottom slab	30	20	10	1.29	1.03	1.25	0.05	1.34	11.46	21.46	OK
	Side wall	25	20	5	0.92	5.15	0.18	0.08	1.31	11.31	16.31	OK
1-2 Category2 (conduit size : 1.3 x 1.3)												
	Top slab	25	20	5	2.30	1.57	1.46	0.08	2.42	15.39	20.39	OK
	Bottom slab	30	20	10	1.61	1.37	1.18	0.05	1.68	12.82	22.82	OK
	Side wall	25	20	5	1.17	5.18	0.23	0.08	1.56	12.36	17.36	OK
II. 2 lane sluiceway												
2-1 Category3 (conduit size : 1.2 x 1.2)												
	Top slab	30	25	5	2.12	1.56	1.36	0.10	2.28	14.93	19.93	OK
	Bottom slab	35	25	10	1.88	1.41	1.33	0.08	1.99	13.95	23.95	OK
	Side wall	30	25	5	1.71	9.15	0.19	0.10	2.63	16.04	21.04	OK
	Partition wall	30	25	5	0.59	8.21	0.07	0.10	1.41	11.76	16.76	OK
III. 3 Outlet sluiceway of Saluran Cengkareng drainage channel												
3-1 2 lane sluiceway (conduit size : 2.7 x 2.3)												
	Top slab	50	40	10	8.15	5.64	1.45	0.15	9.00	29.69	39.69	OK
	Bottom slab	55	45	10	7.54	7.66	0.98	0.18	8.88	29.50	39.50	OK
	Side wall	40	30	10	4.57	13.08	0.35	0.10	5.88	24.00	34.00	OK
3-2 3 lane sluiceway (conduit size : 2.7 x 2.3)												
	Top slab	50	40	10	7.42	5.66	1.31	0.15	8.27	28.46	38.46	OK
	Bottom slab	55	45	10	7.28	7.83	0.93	0.18	8.65	29.11	39.11	OK
	Side wall	40	30	10	4.60	11.01	0.42	0.10	5.70	23.63	33.63	OK
	Partition wall	40	30	10	0.45	26.01	0.02	0.10	3.05	17.29	27.29	OK

Table 3.8 SHEARING STRESS FOR TRANSVERSE SECTION OF SLUICEWAY CONDUIT

Conduit category	Member	Design Thickness Td (cm)	Effective Thickness d (cm)	Concrete cover : d' (cm)	Shearing stress Joint Sjoint (t)	Shearing stress 2d S2d (t)	Average shearing stress Tjoint (kg/cm2)	Check Tnode > 8	Average shearing stress T2d (kg/cm2)	Check T2d > 4
I. 1 lane sluiceway										
1-1 Category 1 (conduit size : 1.0 x 1.0)										
	Top slab	25	20	5	8.95	4.27	4.48	OK	2.14	OK
	Bottom slab	30	20	10	9.6	2.55	4.80	OK	1.28	OK
	Side wall	25	20	5	1.63	0.79	0.82	OK	0.40	OK
1-2 Category2 (conduit size : 1.3 x 1.3)										
	Top slab	25	20	5	9	4.28	4.50	OK	2.14	OK
	Bottom slab	30	20	10	9.82	2.62	4.91	OK	1.31	OK
	Side wall	25	20	5	1.57	0.87	0.79	OK	0.44	OK
II. 2 lane sluiceway										
2-1 Category3 (conduit size : 1.2 x 1.2)										
	Top slab	30	25	5	9.15	4.83	3.66	OK	1.93	OK
	Bottom slab	35	25	10	9.13	3.22	3.65	OK	1.29	OK
	Side wall	30	25	5	3.07	1.84	1.23	OK	0.74	OK
	Partition wall	30	25	5	0.49	0.49	0.20	OK	0.20	OK
III. 3 Outlet sluiceway of Saluran Cengkareng drainage channel										
3-1 2 lane sluiceway (conduit size : 2.7 x 2.3)										
	Top slab	50	40	10	13.85	5.97	3.46	OK	1.49	OK
	Bottom slab	55	45	10	15	6.01	3.33	OK	1.34	OK
	Side wall	40	30	10	7.66	3.67	2.55	OK	1.22	OK
3-2 3 lane sluiceway (conduit size : 2.7 x 2.3)										
	Top slab	50	40	10	13.55	4.94	3.39	OK	1.24	OK
	Bottom slab	55	45	10	14.72	5.93	3.27	OK	1.32	OK
	Side wall	40	30	10	7.71	2.6	2.57	OK	0.87	OK
	Partition wall	40	30	10	0.13	0.19	0.04	OK	0.06	OK

Table 3.9 REINFORCING BAR FOR TRANSVERSE SECTION OF SLUICEWAY CONDUIT

Conduit category	Member	Design Thickness Td (cm)	Effective Thickness d (cm)	Concrete cover d' (cm)	Bending Moment M (t · m)	Axial force N (t)	e = M/N (m)	c = Td/2-d' (m)	Ms (t · m)	Required rein. bar (cm2/m)	Arranged rein. bar Dia@pitch	Arranged rein. bar As (cm2/m)
I. 1 lane sluiceway												
1-1 Category 1 (conduit size : 1.0 x 1.0)												
	Top slab	25	20	5	1.87	1.41	1.33	0.08	1.98	7.09	D16@200	9.93
	Bottom slab	30	20	10	1.29	1.03	1.25	0.05	1.34	4.76	D16@200	9.93
	Side wall	25	20	5	0.92	5.15	0.18	0.08	1.31	1.68	D16@200	9.93
1-2 Category2 (conduit size : 1.3 x 1.3)												
	Top slab	25	20	5	2.30	1.57	1.46	0.08	2.42	8.79	D16@200	9.93
	Bottom slab	30	20	10	1.61	1.37	1.18	0.05	1.68	5.90	D16@200	9.93
	Side wall	25	20	5	1.17	5.18	0.23	0.08	1.56	2.69	D16@200	9.93
II. 2 lane sluiceway												
2-1 Category3 (conduit size : 1.2 x 1.2)												
	Top slab	30	25	5	2.12	1.56	1.36	0.10	2.28	6.35	D16@200	9.93
	Bottom slab	35	25	10	1.88	1.41	1.33	0.08	1.99	5.51	D16@200	9.93
	Side wall	30	25	5	1.71	9.15	0.19	0.10	2.63	2.07	D16@200	9.93
	Partition wall	30	25	5	0.59	8.21	0.07	0.10	1.41	-	D16@200	9.93
III. 3 Outlet sluiceway of Saluran Cengkareng drainage channel												
3-1 2 lane sluiceway (conduit size : 2.7 x 2.3)												
	Top slab	50	40	10	8.15	5.64	1.45	0.15	9.00	14.41	D22@200	19.4
	Bottom slab	55	45	10	7.54	7.66	0.98	0.18	8.88	10.71	D22@200	19.4
	Side wall	40	30	10	4.57	13.08	0.35	0.10	5.88	6.72	D22@200	19.4
	Partition wall	40	30	10	0.00	30.00	0.00	0.10	3.00	-	D19@200	14.3
3-2 3 lane sluiceway (conduit size : 2.7 x 2.3)												
	Top slab	50	40	10	7.42	5.66	1.31	0.15	8.27	12.91	D22@200	19.4
	Bottom slab	55	45	10	7.28	7.83	0.93	0.18	8.65	10.17	D22@200	19.4
	Side wall	40	30	10	4.60	11.01	0.42	0.10	5.70	7.72	D22@200	19.4
	Partition wall	40	30	10	0.45	26.01	0.02	0.10	3.05	-	D19@200	14.3

Table 3.10 REINFORCING BAR OF SLUICEWAY WING WALL

Sluiceway site	Wing wall			Load			at bottom		at half height	
	Height (m)	Length (m)	Thick. (m)	Pat (t/m2)	Pab (t/m2)	ava Pa (t/m2)	Mb (t m)	Bar arrange. Dia@pitch	avaM (t m)	Bar arrange. Dia@pitch
(1) Levee earth type site										
	2.4	2.0	0.30	0.50	2.66	1.58	5.32	D16@100	3.16	D16@200
(2) Levee parapet w3all type site										
case - 1	2.4	1.8	0.30	0.50	2.66	1.58	4.31	D16@100	2.56	D16@200
case - 2	1.0	1.7	0.30	0.50	1.40	0.95	2.02	D16@200	1.37	D16@200
(3) Revetment Type I site										
	2.4	1.5	0.30	0.50	2.66	1.58	2.99	D16@100	1.78	D16@200
(4) Revetment Type II site										
case - 1	2.2	2.0	0.30	0.50	2.48	1.49	4.96	D16@100	2.98	D16@200
case - 2	2.1	2.0	0.30	0.50	2.39	1.45	4.78	D16@100	2.89	D16@200
case - 3	2.0	2.0	0.30	0.50	2.30	1.40	4.60	D16@100	2.80	D16@200
case - 4	1.6	2.2	0.30	0.50	1.94	1.22	4.69	D16@100	2.95	D16@200
case - 5	2.4	2.5	0.30	0.50	2.66	1.58	8.31	D19@100	4.94	D19@200
(5) Open culvert/concrete ditch site										
case - 1	1.8	1.8	0.25	0.50	2.12	1.31	3.43	D16@100	2.12	D16@200
case - 2	0.9	0.9	0.25	0.50	1.31	0.91	0.53	D16@200	0.37	D16@200
(6) Concrete L-type wall site										
case - 1	1.4	1.4	0.25	0.50	1.76	1.13	1.72	D16@200	1.11	D16@200
case - 2	0.9	0.6	0.25	0.50	1.31	0.91	0.24	D16@200	0.16	D16@200

Note:
Pat = load at wall crest; Pab = load at wall bottom; avaPa = load at half height

Table 3.11 CALCULATION OF GROUND REACTION AT SLUICEWAYS (1/2)

Left/ Right	No.	Location	Nos. of lane	Gate Type	Coundit size Width (m)	Coundit size Height (m)	Foundation length L (m)	Total load t (t)	x (m)	e (m)	Qmax (t/m2)	Qmin (t/m2)
Type-A												
(1)Kamal drainage channel (Main channel)												
Left	SKM-4L	KM29+19m	1	Slide	0.8	0.8	7.809	55.356	4.39	0.49	8.13	3.68
	SKM-5L	KM31+56m	1	Slide	1.0	1.0	7.824	63.599	4.33	0.42	7.16	3.67
	SKM-8L	KM46+35m	1	Slide	1.0	1.0	7.926	59.572	4.37	0.41	6.57	3.46
Right	SKM-2R	KM21+6m	1	Slide	1.2	1.2	5.831	54.661	3.27	0.35	7.50	3.53
	SKM-3R	KM27+42m	1	Slide	1.3	1.3	5.784	56.278	3.23	0.34	7.31	3.50
(5)Saluran Cengkareng drainage channel												
Left	SCM-3L	CM20+10m	1	Slide	1.0	1.0	7.458	68.563	4.18	0.45	8.35	3.91
	SCM-5L	CM30+0m	1	Slide	1.0	1.0	5.518	48.968	3.23	0.47	8.94	2.89
	SCM-6L	CM37+30m	1	Slide	1.1	1.1	7.582	68.045	4.22	0.43	7.52	3.70
	SCM-7L	CM41+0m	1	Slide	1.1	1.1	7.618	66.924	4.24	0.43	7.35	3.63
Right	SCM-4R	CM30+0m	1	Slide	1.0	1.0	7.518	66.799	4.21	0.45	8.05	3.80
	SCM-5R	CM37+0m	1	Slide	1.0	1.0	5.576	52.079	3.19	0.40	8.91	3.55
	SCM-6R	CM43-30m	1	Slide	1.1	1.1	5.638	51.919	3.21	0.39	8.14	3.37
(1)Kamal drainage channel (Main channel)												
Left	SKM-6L	KM38+3m	1	Slide	1.0	1.0	7.200	56.460	4.03	0.43	7.10	3.35
	SKM-7L	KM42+7m	1	Slide	0.7	0.7	7.200	42.274	4.40	0.80	8.90	1.78
Type-B												
(1)Kamal drainage channel (Main channel)												
Right	SKM-4R	KM40+32m	1	Slide	0.8	0.8	6.352	38.425	3.16	-0.02	5.14	4.95
(2)Kamal drainage channel (Branch channel)												
Left	SKE-4L	KE25-5m	1	Slide	0.8	0.8	6.044	30.931	3.03	0.01	4.31	4.22
Right	SKE-2R	KE25-5m	1	Slide	0.9	0.9	9.044	50.712	4.52	0.00	4.01	4.01
(5)Saluran Cengkareng drainage channel												
Left	SCM-8L	CM47+34m	1	Slide	0.9	0.9	6.372	43.105	3.05	-0.14	5.47	4.20
Right	SCM-7R	CM47+53m	1	Slide	0.8	0.8	9.369	50.159	4.79	0.11	4.78	4.15
(6)Gede/Bor drainage channel												
Left	SGM-1L	GM12+0m	1	Slide	0.8	0.8	9.278	47.607	4.79	0.15	4.69	3.86
(1)Kamal drainage channel (Main channel)												
Left	SKM-1L	KM20+16m	1	Slide	1.2	1.2	13.656	98.048	6.81	-0.02	4.26	4.19
	SKM-2L	KM24+35m	1	Slide	1.1	1.1	9.407	69.303	4.56	-0.14	5.02	4.19
Right	SKM-5R	KM45+6m	1	Slide	0.8	0.8	9.268	51.110	4.83	0.20	5.19	4.00
	SKM-6R	KM50+31m	1	Slide	0.8	0.8	9.386	50.262	4.94	0.25	5.18	3.75
	SKM-7R	KM54-26m	1	Slide	1.0	1.0	8.961	59.942	4.46	-0.02	4.52	4.40
(6)Gede/Bor drainage channel												
Left	SGM-3L	GM15+24m	1	Slide	0.8	0.8	11.336	56.173	6.00	0.33	4.85	3.41
Type-C												
(3)Tanjungan drainage channel												
Right	STM-3R	TM35+0m	1	Slide	0.8	0.8	7.840	36.861	4.50	0.58	6.79	2.61
(3)Tanjungan drainage channel												
Right	STM-2R	TM30+3m	1	Flap	0.4	0.4	7.030	17.207	4.46	0.95	6.33	0.66
Type-D												
(1)Kamal drainage channel (Main channel)												
Right	SKM-1R	KM17-20m	2	Slide	1.1	1.1	5.862	94.839	3.19	0.26	6.94	4.02
(5)Saluran Cengkareng drainage channel												
Left	SCM-2L	CM16+12m	2	Slide	1.2	1.2	7.439	133.146	4.03	0.31	7.10	4.26
Type-E												
(6)Gede/Bor drainage channel												
Left	SGM-2L	GM14-5m	2	Slide	1.0	1.0	10.772	152.005	5.43	0.04	5.25	5.02
Type-F												
(5)Saluran Cengkareng drainage channel												
Left	SCM-4L	CM27-21m	1	Slide	1.1	1.1	2.000	28.170	1.16	0.16	9.48	3.33
Right	SCM-2R	CM16-4m	1	Slide	1.2	1.2	2.000	29.626	1.15	0.15	9.34	3.54
	SCM-3R	CM26+1m	1	Slide	1.0	1.0	2.000	26.738	1.17	0.17	9.61	3.12

Table 3.11 CALCULATION OF GROUND REACTION AT SLUICEWAYS (2/2)

Left/ Right	No.	Location	Nos. of lane	Gate Type	Coundit size Width (m)	Coundit size Height (m)	Foundatio length L (m)	Total load t (t)	x (m)	e (m)	Qmax (t/m2)	Qmin (t/m2)
Type-G												
(2)Kamal drainage channel (Branch channel)												
Left	SKE-1L	KE01+5m	1	Slide	0.8	0.8	3.602	23.888	1.34	-0.46	6.16	0.82
Right	SKE-1R	KE21+5m	1	Slide	0.8	0.8	3.591	21.251	1.37	-0.43	5.35	0.88
(3)Tanjungan drainage channel												
Left	STM-1L	TM25-13m	1	Slide	0.8	0.8	3.786	25.990	1.30	-0.59	6.99	0.23
Right	STM-1R	TM25-13m	1	Slide	0.8	0.8	3.786	25.329	1.33	-0.56	6.65	0.40
(5)Saluran Cengkareng drainage channel												
Right	SCM-1R	CM15-10m	1	Slide	1.2	1.2	4.429	33.180	1.45	-0.76	6.61	-0.10
(6)Gede/Bor drainage channel												
Right	SGM-1R	GM04+44m	1	Slide	0.8	0.8	3.978	26.121	1.37	-0.62	6.69	0.22
	SGM-2R	GM12+0m	1	Slide	0.8	0.8	3.941	27.119	1.34	-0.63	7.10	0.15
(1)Kamal drainage channel (Main channel)												
Left	SKM-3L	KM26+2m	1	Slide	1.5	1.3	4.091	36.782	1.34	-0.71	7.06	-0.14
(2)Kamal drainage channel (Branch channel)												
Left	SKE-2L	KE12-32m	1	Flap	0.4	0.4	2.658	20.809	0.86	-0.47	12.41	-0.37
	SKE-3L	KE13+0m	1	Flap	0.4	0.4	2.660	20.269	0.88	-0.45	11.81	-0.09
Type-II												
(2)Kamal drainage channel (Branch channel)												
Left	SKE-5L	KE31-43m	1	Flap	0.4	0.4	1.700	7.883	0.75	-0.10	4.18	2.00
Right	SKE-3R	KE31+0m	1	Flap	0.4	0.4	1.700	7.883	0.75	-0.10	4.18	2.00
(4)PIK Junction drainage channel												
Right	SNM-1R	NM34+0m	1	Slide	1.1	1.1	2.200	23.652	1.10	0.00	5.38	5.38
(5)Saluran Cengkareng drainage channel												
Left	SCM-1L	CM05-5m	1	Slide	1.3	1.3	2.200	31.662	1.09	-0.01	6.72	6.36
(3)Tanjungan drainage channel												
Left	STM-3L	TM30+16m	1	Slide	0.8	0.8	2.200	17.307	0.94	-0.16	5.95	4.14
	STM-4L	TM33+13m	1	Slide	1.0	1.0	2.200	17.468	0.98	-0.12	5.02	3.78
Type-I												
(3)Tanjungan drainage channel												
Left	STM-2L	TM30-10m	2	Slide	1.0	1.0	2.200	28.589	1.05	-0.05	3.79	2.88

Note : Levee/Revetment type

L(E)	Levee earth type
L(P)	Levee parapet wall type
R(I)	Revetment type I
R(II)	Revetment type II
C(L)	Concrete L-type wall
C(D)	Concrete ditch
O/C	Open culvert

x :	Gravity center from inlet
e :	Eccentric distance; =x-L/2
Qmax :	Maximum ground reaction
Qmin :	Minimum ground reaction

Table 3.12 DESIGN OF PILE ARRANGEMENT AT SLUICEWAYS (1/5)

(a) LEVEE EARTH TYPE SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Main channel)																								
Left	SKM-4L	KM29+19m	KSC-4	0	1	5	5	3	17	1	24	250 x 250	6.0	9.5	42.0	6	3.90	33.41	55.40	0.49	4.62	0.41	6.07	3.16
	SKM-5L	KM31+56m	KSC-4	0	1	5	5	3	17	1	24	250 x 250	6.0	9.5	42.0	6	3.91	33.56	63.60	0.42	5.30	0.40	6.73	3.87
	SKM-8L	KM46+35m	KSC-3	0	4	4	8	3	13	2	35	250 x 250	6.0	13.5	58.0	6	3.96	34.56	59.60	0.41	4.97	0.35	6.25	3.68
Right	SKM-2R	KM21+6m	KSC-6	1	5	5	3	3	27	0	32	250 x 250	7.0	10.6	47.0	4	2.92	13.51	54.70	0.35	6.84	0.71	8.68	5.00
	SKM-3R	KM27+42m	KSC-5	1	5	6	3.5	2	12	0	32	250 x 250	8.0	8.2	38.0	7	2.89	18.55	56.30	0.34	4.02	0.52	5.35	2.69
(2)Saluran Cengkareng drainage channel																								
Left	SCM-3L	CM20+10m	CSC-6	4	0	4	10	1	19	0	25	250 x 250	8.0	8.7	40.0	9	3.73	40.32	68.60	0.45	3.81	0.38	5.12	2.51
	SCM-5L	CM30+0m	CSC-4	1	0	3	5	5	16	0	26	250 x 250	6.0	10.8	47.0	4	2.76	11.85	49.00	0.47	6.13	0.97	8.50	3.75
	SCM-6L	CM37+30m	CSC-3	0	0	5	6	1	22	3	36	250 x 250	6.0	12.0	52.0	6	3.79	31.25	68.00	0.43	5.67	0.47	7.29	4.04
	SCM-7L	CM41+0m	CSC-2	1	0	3	7	2	24	3	28	250 x 250	6.0	16.3	69.0	6	3.81	31.59	66.90	0.43	5.58	0.46	7.16	3.99
Right	SCM-4R	CM30+0m	CSC-4	1	0	3	5	5	16	0	26	250 x 250	6.0	10.8	47.0	6	3.76	30.66	66.80	0.45	5.57	0.49	7.25	3.88
	SCM-5R	CM37+0m	CSC-3	0	0	5	6	1	22	3	36	250 x 250	6.0	12.0	52.0	4	2.79	12.15	52.10	0.40	6.51	0.86	8.63	4.40
	SCM-6R	CM43-30m	CSC-2	1	0	3	7	2	24	3	28	250 x 250	6.0	16.3	69.0	4	2.82	12.47	51.90	0.39	6.49	0.81	8.52	4.46

(b) LEVEE PARAPET WALL TYPE SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Main channel)																								
Left	SKM-6L	KM38+3m	KSC-3	0	4	4	8	3	13	2	35	250 x 250	6.0	13.5	58.0	6	3.60	27.78	56.50	0.43	4.71	0.44	6.14	3.27
	SKM-7L	KM42+7m	KSC-3	0	4	4	8	3	13	2	35	250 x 250	6.0	13.5	58.0	6	3.60	27.78	42.30	0.80	3.53	0.61	5.52	1.53

Table 3.12 DESIGN OF PILE ARRANGEMENT AT SLUICEWAYS (2/5)

(a) REVETMENT TYPE I SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Main channel)																								
Right	SKM-4R	KM40+32m	KSC-3	0	4	4	8	3	13	2	35	250 x 250	6.0	13.5	58.0	5	3.18	19.27	38.40	-0.02	3.84	-0.02	3.78	3.90
(2)Kamal drainage channel (Branch channel)																								
Left	SKE-4L	KE25-5m	KSC-15	1	7	6	6	2	18	0	25	250 x 250	7.0	9.6	43.0	5	3.02	17.19	30.90	0.01	3.09	0.01	3.11	3.07
Right	SKE-2R	KE25-5m	KSC-15	1	7	6	6	2	18	0	25	250 x 250	7.0	9.6	43.0	8	4.52	58.26	50.70	0.00	3.17	0.00	3.17	3.17
(3)Saluran Cengkareng drainage channel																								
Left	SCM-8L	CM47+34m	CSC-1	1	4	5	8	2	20	1	25	250 x 250	6.0	10.0	44.0	5	3.19	19.40	43.10	-0.14	4.31	-0.16	3.86	4.76
Right	SCM-7R	CM47+53m	CSC-1	1	4	5	8	2	20	1	25	250 x 250	6.0	10.0	44.0	8	4.68	62.94	50.20	0.11	3.14	0.04	3.33	2.95
(4)Gede/Bor drainage channel																								
Left	SGM-1L	GM12+0m	KGSC-2	4	14	3	18	2	25	0	25	250 x 250	6.0	22.0	92.0	8	4.64	61.60	47.60	0.15	2.98	0.06	3.23	2.72

(b) REVETMENT TYPE II SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Main channel)																								
Left	SKM-1L	KM20+16m	KSC-6	1	5	5	3	3	27	0	32	250 x 250	7.0	10.6	47.0	9	6.83	154.95	98.00	-0.02	5.44	-0.01	5.40	5.49
	SKM-2L	KM24+35m	KSC-5	1	5	6	3.5	2	12	0	32	250 x 250	8.0	8.2	38.0	6	4.70	51.86	69.30	-0.14	5.78	-0.09	5.36	6.19
Right	SKM-5R	KM45+6m	KSC-3	0	4	4	8	3	13	2	35	250 x 250	6.0	13.5	58.0	8	4.63	61.47	51.10	0.20	3.19	0.08	3.55	2.84
	SKM-6R	KM50+31m	KSC-2	3	8	1	6	3	16	2	26	250 x 250	6.0	14.5	62.0	8	4.69	63.19	50.30	0.25	3.14	0.10	3.58	2.71
	SKM-7R	KM54-26m	KSC-2	3	8	1	6	3	16	2	26	250 x 250	6.0	14.5	62.0	7	4.48	51.80	59.90	-0.02	4.28	-0.01	4.23	4.33
(2)Gede/Bor drainage channel																								
Left	SGM-3L	GM15+24m	KGSC-5	4	5	5	25	0	25	0	25	250 x 250	6.0	16.5	70.0	10	5.67	113.07	56.20	0.33	2.81	0.08	3.25	2.37

Table 3.12 DESIGN OF PILE ARRANGEMENT AT SLUICEWAYS (3/5)

(a) CONCRETE L-TYPE WALL SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru (t)	n:Pile nos/line	XG (m)	IG (m2)	W (t)	e (m)	W/n (t)	We/IG (t)	VO (t)	VI (t)
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)										
(1)Tanjungan drainage channel																								
Right	STM-3R	TM35+0m	TSC-3	6	4	3	3	0	22	0	26	250x250	9.0	6.8	33.0	8	3.82	33.38	36.90	0.58	2.31	0.32	3.43	1.18

(b) CONCRETE L-TYPE WALL SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru (t)	n:Pile nos/line	XG (m)	IG (m2)	W (t)	e (m)	W/n (t)	We/IG (t)	VO (t)	VI (t)
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)										
(1)Tanjungan drainage channel																								
Right	STM-2R	TM30+3m	TSC-2	1	6	2	4	5	3	1	18	250x250	8.0	6.0	29.0	7	3.42	22.93	17.20	0.95	2.46	0.71	4.66	0.25

LEVEE EARTH TYPE SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru (t)	n:Pile nos/line	XG (m)	IG (m2)	W (t)	e (m)	W/n (t)	We/IG (t)	VO (t)	VI (t)
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)										
(1)Kamal drainage channel (Main channel)																								
Right	SKM-1R	KM17-20m	KSC-7	8	3	1	22	0	27	0	27	250x250	9.0	10.1	46.0	5	2.93	15.39	94.80	0.26	6.32	0.53	7.71	4.93
(2)Saluran Cengkareng drainage channel																								
Left	SCM-2L	CM16+12m	CSC-7	3	3	3	9	3	23.5	0	25	250x250	7.0	13.8	59.5	5	3.72	26.73	133.1	0.31	8.87	0.51	10.62	7.12

REVETMENT TYPE II SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru (t)	n:Pile nos/line	XG (m)	IG (m2)	W (t)	e (m)	W/n (t)	We/IG (t)	VO (t)	VI (t)
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)										
(1)Gede/Bor drainage channel																								
Left	SGM-2L	GM14-5m	KGSC-5	4	5	5	25	0	25	0	25	250 x 250	6.0	16.5	70.0	9.000	5.39	91.36	152.00	0.04	5.63	0.02	5.74	5.52
(2)Saluran Cengkareng drainage channel																								
	Outlet	CM01	CSC-9	3	7	3	8	1	25	0	25	300 x 300	7.0	33.9	106.5	8.000	8.13	184	845.00	-0.10	26.41	-0.11	25.57	27.25

LEVEE PARAPET WALL TYPE SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru (t)	n:Pile nos/line	XG (m)	IG (m2)	W (t)	e (m)	W/n (t)	We/IG (t)	VO (t)	VI (t)
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)										
(1)Saluran Cengkareng drainage channel																								
Left	SCM-4L	CM27-21m	CSC-4	1	0	3	5	5	16	0	26	250 x 250	7.0	14.6	63.0	2	1.00	0.61	28.20	0.16	7.05	3.73	9.59	4.51
Right	SCM-2R	CM16-4m	CSC-7	3	3	3	9	3	23.5	0	25	250x250	7.0	13.8	59.5	2	1.00	0.61	29.60	0.15	7.40	3.67	9.90	4.90
	SCM-3R	CM26+1m	CSC-4	1	0	3	5	5	16	0	26	250 x 250	7.0	14.6	63.0	2	1.00	0.61	26.70	0.17	6.68	3.75	9.23	4.12

Table 3.12 DESIGN OF PILE ARRANGEMENT AT SLUICEWAYS (4/5)

(a) REVETMENT TYPE II SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Branch channel)																								
Left	SKE-1L	KE01+5m	KSC-12	1	6	3	5	2	17	3	25	250 x 250	6.0	12.8	55.0	4	1.80	4.87	23.90	-0.46	2.99	-1.13	1.32	4.66
Right	SKE-1R	KE21+5m	KSC-15	1	7	6	6	2	18	0	25	250 x 250	7.0	9.6	43.0	4	1.80	4.84	21.30	-0.43	2.66	-0.95	1.27	4.06
(2)Tanjungan drainage channel																								
Left	STM-1L	TM25-13m	TSC-2	1	6	2	4	5	3	1	18	250x250	9.0	10.3	47.0	4	1.89	5.50	26.00	-0.59	3.25	-1.40	1.06	5.44
Right	STM-1R	TM25-13m	TSC-2	1	6	2	4	5	3	1	18	250x250	9.0	10.3	47.0	4	1.89	5.50	25.30	-0.56	3.16	-1.29	1.14	5.19
(3)Saluran Cengkareng drainage channel																								
Right	SCM-1R	CM15-10m	CSC-7	3	3	3	9	3	23.5	0	25	250x250	7.0	13.8	59.5	4	2.21	7.97	33.20	-0.76	4.15	-1.58	1.15	7.15
(4)Gede/Bor drainage channel																								
Right	SGM-1R	GM04+44m	KGSC-1	3	3	5	18	1	26	0	26	250x250	6.0	14.8	63.0	4	1.99	6.19	26.10	-0.62	3.26	-1.31	1.08	5.44
	SGM-2R	GM12+0m	KGSC-2	4	14	3	18	2	25	0	25	250 x 250	6.0	22.0	92.0	4	1.97	6.05	27.10	-0.63	3.39	-1.41	1.06	5.71

(b) REVETMENT TYPE II SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Main channel)																								
Left	SKM-3L	KM26+2m	KSC-5	1	5	6	3.5	2	12	0	32	250 x 250	9.0	11.1	50.0	4	2.05	6.62	36.80	-0.71	4.60	-1.97	1.19	8.01

(c) REVETMENT TYPE II SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(2)Kamal drainage channel (Branch channel)																								
Left	SKE-2L	KE12-32m	KSC-13	3	8	3	3	2	15	1	25	250 x 250	7.0	10.9	48.0	3	1.33	2.04	20.80	-0.47	3.47	-2.40	1.04	5.89
	SKE-3L	KE13+0m	KSC-13	3	8	3	3	2	15	1	25	250 x 250	7.0	10.9	48.0	3	1.33	2.04	20.30	-0.45	3.38	-2.24	1.12	5.65

Table 3.12 DESIGN OF PILE ARRANGEMENT AT SLUICEWAYS (5/5)

(a) OPEN CULVERT/CONCRETE DITCH SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Kamal drainage channel (Branch channel)																								
Left	SKE-5L	KE31-43m	KSC-17	4	9	1	6	4	14	0	25	250x250	5.0	9.7	42.0	2	0.75	0.37	7.90	-0.10	1.98	-1.07	1.52	2.43
Right	SKE-3R	KE31+0m	KSC-17	4	9	1	6	4	14	0	25	250x250	5.0	9.7	42.0	2	0.75	0.37	7.90	-0.10	1.98	-1.07	1.52	2.43

(b) OPEN CULVERT/CONCRETE DITCH SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)PIK Junction drainage channel																								
Right	SNM-1R	NM34+0m	NSC-4	1	3	2	6	5	3	1	19	250x250	8.0	6.2	30.0	3	1.00	0.92	23.70	0.00	3.95	0.00	3.95	3.95
(2)Saluran Cengkareng drainage channel																								
Left	SCM-1L	CM05-5m	CSC-8	3	4	1	7	4	22	1	25	250x250	6.0	14.8	63.0	2	1.00	0.92	31.70	-0.01	7.93	-0.17	7.81	8.04

(c) CONCRETE L-TYPE WALL SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Tanjungan drainage channel																								
Left	STM-3L	TM30+16m	TSC-2	1	6	2	4	5	3	1	18	250x250	8.0	6.0	29.0	3	1.00	0.92	17.30	-0.16	2.88	-1.50	1.87	3.90
	STM-4L	TM33+13m	TSC-2	1	6	2	4	5	3	1	18	250x250	8.0	6.0	29.0	3	1.00	0.92	17.50	-0.12	2.92	-1.14	2.14	3.69

CONCRETE L-TYPE WALL SITE

Left/ Right	No.	Location	Sounding Point	Layer 1		Layer 2		Layer 3		Layer 4		RC Precast Pile			Ru	n:Pile	XG	IG	W	e	W/n	We/IG	VO	VI
				t(m)	N	t(m)	N	t(m)	N	t(m)	N	Size	L(m)	Ra(t/Pile)	(t)	nos/line	(m)	(m2)	(t)	(m)	(t)	(t)	(t)	(t)
(1)Tanjungan drainage channel																								
Left	STM-2L	TM30-10m	TSC-2	1	6	2	4	5	3	1	18	250x250	8.0	6.0	29.0	3	1.00	0.92	28.60	-0.05	3.18	-0.52	2.83	3.53

Table 4.1 TYPICAL SECTION OF PC GIRDER BRIDGE

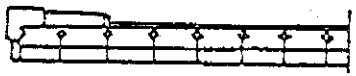
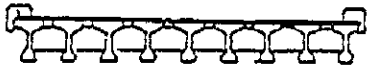
Bridge Type	Ginder Type	Shape of Girder	Section of Bridge	Applicable Length(m)	Remarks
Solid Slab Bridge (Pre-Tension)	Pre-Tension Solid Beam			5 - 11	Most applicable for the project
Hollow Slab Bridge (Pre-Tension)	Pre-Tension Hollow Beam			12 - 24	Most applicable for the project
T Girder Bridge (Pre-Tension)	Pre-Tension T Beam			18 - 24	Second best
T Girder Bridge (Post-Tension)	Post-Tension T Beam			20 - 40	Not applicable
Composite Girder Bridge (Post-Tension)	Post-Tension I Beam			20 - 40	Not applicable

Table 4.2 PROVISIONAL CHANNEL WIDTH AND BRIDGE SPAN (1/3)

	Structure No	(1) W.O.B	(2) Depth	(3) W.A.H	(4) M.V.C	(5) W.O.C	(6) B.L b1	b2	Total	(7) T.G.L	(8) Span	(9) G.L	Remarks
KKMAL	KM 2~9-2	35.0	1.70	36.70	0.50	37.70	1.18	0.25	1.45	40.56	0.25+13.00+0.53+ 13.00+0.53+13.00+0.25	13.50	
	KM 9-2 ~21-2	32.0	1.70	33.70	0.50	34.20	(0.90) 1.20	0.25	(1.15) 1.45	(36.50) 37.10	0.25+11.85(11.65)+0.53+ 11.85(11.65)+0.53+11.85 (11.65)+0.25	(12.15) 12.35	
	KM 21-2 ~23-2	30.0	1.70	31.70	0.50	32.20	(0.93) 1.53	0.25	(1.18) 1.58	(34.56) 35.76	0.25+11.40(11.00)+0.53+ 11.40(11.00)+0.53+11.40 (11.00)+0.25	(11.50) 11.90	
KAMAL (BRANCH)	KE 1-1 ~10-1	13.0	1.20	14.20	0.50	14.60	0.91	0.20	1.10	16.82	0.20+8.00+0.43+8.00+ 0.20	8.40	
	KE 10-1 ~21	11.0	1.10	12.10	0.30	12.40	0.97	0.15	1.12	14.64	0.15+7.00+0.33+7.00+ 0.15	7.30	
	KE 21 ~24-1	1.8	0.20	2.60	0.30	2.90	0.50	0.15	0.45	3.80	0.15+3.50+0.15	-	
TANJUNGAN	TM 1~2	22.0	1.50	23.50	0.40	23.90	1.32	0.25	1.57	27.04	0.25+13.00+0.53+13.00+ 0.25	13.50	
	TM 2~3-4	19.0	1.50	20.50	0.40	20.90	1.22	0.25	1.47	23.84	0.25+13.00+0.53+11.40+ 0.25	11.90	
	TM 3-4~6	15.0	1.50	16.50	0.40	16.90	0.92	0.25	1.15	19.24	0.25+9.10+0.53+9.10+ 0.25	9.60	
NEW DRAINAGE	NM 11	4.0	1.70	5.70	0.30	6.00	1.00	0.20	1.20	8.40	0.20+8.00+0.20	8.40	
SALURAN CENGKARENG	CM 22 ~19-1	6.0	1.90	7.90	0.30	8.20	0.90	0.25	1.15	10.50	0.20+10.00+0.25	10.50	

Table 4.2 PROVISIONAL CHANNEL WIDTH AND BRIDGE SPAN (2/3)

	Structure No	(1) W.O.B	(2) Depth	(3) W.A.H	(4) M.V.C	(5) W.O.C	(6) B.L b1	(6) B.L b2	(6) B.L Total	(7) T.G.L	(8) Span	(9) G.L	Remarks
SALURAN CENGKARENG	CM 19-1~9	8.0	2.0	10.00	0.30	10.30	(0.90) 1.35	0.25	(1.15) 1.60	(12.60) 13.50	0.25+13.00(12.10)+0.25	(12.60) 13.50	Bridge
	CM 9~6	10.0	2.0	12.00	0.30	12.30	(0.90) 1.50	0.25	(1.15) 1.75	(14.60) 15.80	0.25+15.30(14.10)+0.25	(14.60) 15.80	Bridge
	CM 6~1	10.0	2.0	12.00	0.30	12.30	1.50	0.25	1.75	15.80	0.25+15.30+0.25	15.80	Bridge
GEDE/BOR	GM 15-1 ~11-2	10.5	1.50	12.00	0.40	12.40	1.45	0.25	1.70	15.80	0.25+15.30+0.25	15.80	Bridge
	GM 11-2 ~1-2	11.0	1.50	12.50	0.40	12.90	(0.90) 1.20	0.25	(1.15) 1.45	(15.20) 15.80	0.25+15.30(14.70)+0.25	15.80	Bridge
GEDE/BOR (BRANCH)	-	-	-	-	-	-	-	-	-	-	-	-	No crossing structure under the road
MERUYA	MM 1-1 ~2-3	3.0	2.0	3.0							3.0		(Slab) Bridge
	MM 4-3	3.0	2.0	5.0			0.90	0.15	1.15	7.10	0.15+7.30+0.15	7.10	Bridge
	MM 6	3.0	2.0	3.0							3.0		(Slab) Bridge
	MM 10~12	2.6	2.0	2.6							2.6		Culvert
	MM 14-1 ~16	1.7	2.0	1.7							1.7		Culvert

Table 4.2 PROVISIONAL CHANNEL WIDTH AND BRIDGE SPAN (3/3)

Remarks:

(1)	W.O.B	:	indicate the Width Of Bottom of the channel
(2)	Depth	:	water Depth of channel
(3)	W.A.H	:	Width at H.W.L
(4)	M.V.C	:	Minimum Vertical Clearance
(5)	W.O.C	:	Width Of Channel
(6)	B.L	:	Back Length of girder out of the edge of levee b1 - Distance between edge of levee and bearing center b2 - Surplus girder length out of bearing center
(7)	T.G.L	:	Total Girder Length
(8)	Span	:	Span length
(9)	G.L	:	Girder Length of each span
( )		:	In case of single squad of the piles

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (1/8)

CHANNEL : KAMAL

No of :		Existing Structure			Replacement Structure											Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	G.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BKM 1	KM 2	B	2.63	11.75	4.60	IV -1	37.7	0.25 +13.00+0.53+13.00 +0.53+13+0.25 =40.56	13.50	0.316	0.5+0.84 = 1.34	0.63	2.286	1.700	0.586	
BKM 2	KM 9 - 2	B	4 lanes	10.80	-		-	-	-	-	0.5+0.84 = 1.34	-	-	-	-	Jasa Marga
BKM 3	KM 11 - 1	B	(5.50) 7.40	13.70	(7.0) 9.60	II/III -2	34.2	0.25+11.85+0.53+11.85 +0.53+11.85+0.25 =37.11	12.350	0.706	0.5+0.84 = 1.34	0.67	2.716	2.040	0.676	
BKM 4	KM 15	P	2.69	5.93	2.50		34.2	0.25+11.65+0.53+11.65 +0.53+11.65+0.25 =36.51	12.150	0.961	0.5+0.84 = 1.34	0.42	2.721	1.480	1.241	
BKM 5	KM 17 - 2	(Skew) B	(5.50) 7.95	13.90	(7.0) 9.60	II/III -2	34.2	0.25+11.85+0.53+11.85 +0.53+11.85+0.25 =37.11	12.350	1.195	0.5+0.84 = 1.34	0.67	3.205	2.620	0.585	
BKM 6	KM 19	P	1.96	10.35	2.50		34.2	0.25+11.65+0.53+11.65 +0.53+11.65+0.25 =36.51	12.150	1.289	0.5+0.84 = 1.34	0.42	3.049	1.890	1.159	
BKM 7	KM 20	P	1.94	7.07	2.50		34.2	0.25+11.65+0.53+11.65 +0.53+11.65+0.25 =36.51	12.150	1.375	0.5+0.84 = 1.34	0.42	3.135	1.450	1.685	
BKM 8	KM 21 - 2	B	3.15	5.70	4.60	IV -1	32.2	0.25+11.40+0.53+11.40 +0.53+11.40+0.25 =35.76	11.90	1.468	0.5+0.84 = 1.34	0.63	3.438	2.330	1.108	
BKM 9	KM 22 - 3	P	2.31	16.60	2.50		32.2	0.25+11.00+0.53+11.00 +0.53+11.00+0.25 =34.56	11.50	1.483	0.5+0.84 = 1.34	0.58	3.403	2.790	0.613	
BKM 10	KM 22 - 4	B	(6.50) 8.93	16.70	(7.0) 9.60	II/III -2	32.2	0.25+11.40+0.53+11.40 +0.53+11.40+0.25 =35.76	11.90	1.483	0.5+0.84 = 1.34	0.67	3.493	2.910	0.583	
BKM 11	KM 23 - 2	B	(6.07) 8.98	13.70	(7.0) 9.60	II/III -2	32.2	0.25+11.40+0.53+11.40 +0.53+11.40+0.25 =35.76	11.90	1.64	0.5+0.84 = 1.34	0.67	3.65	2.960	0.690	

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (2/8)

CHANNEL : KAMAL (BRANCH)

No of :		Existing Structure			Replacement Structure										Remarks
		1	2	3	4	5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)	C. Width	Span	G.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BKE 1	KE 1-1	B	2.63	11.75	3.00 IV -S	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	1.690	0.4+0.84 = 1.24	0.53	3.460	1.810	1.650	
BKE 2	KE 2	B	3.80	6.80	4.60 IV -1	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	1.900	0.4+0.84 = 1.24	0.53	3.670	2.090	1.580	
BKE 3	KE 3 -2	(Skew) B	5.70	5.60	6.60 III/IV -3	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	1.950	0.4+0.84 = 1.24	0.56	3.750	2.690	1.060	
BKE 4	KE 4	B	5.10	5.10	6.60 III/IV -3	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.100	0.4+0.84 = 1.24	0.56	3.900	2.640	1.260	
BKE 5	KE 5	B	5.05	4.80	6.60 III/IV -3	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.050	0.4+0.84 = 1.24	0.56	3.850	2.520	1.330	
BKE 6	KE 6	B	3.20	4.30	4.60 IV -1	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.140	0.4+0.84 = 1.24	0.53	3.910	2.430	1.480	
BKE 7	KE 7	B	5.00	3.10	6.60 III/IV -3	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.100	0.4+0.84 = 1.24	0.53	3.870	2.540	1.330	
BKE 8	KE 9	P	1.27	3.50	2.50	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.050	0.4+0.84 = 1.24	0.30	3.590	2.310	1.280	
BKE 9	KE 10 - 1	B	4.45	3.05	4.60 IV -1	14.60	0.20+8.00+0.43+8.00 +0.20 =16.83	8.40	2.300	0.4+0.84 = 1.24	0.53	4.070	2.450	1.620	
BKE 10	KE 12	B	5.50	3.00	6.60 III/IV -3	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.3	2.200	0.3+0.84 =1.14	0.56	3.900	2.680	1.220	
BKE 11	KE 14	B	3.00	2.40	4.60 IV -1	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.3	2.280	0.3+0.84 =1.14	0.53	3.950	2.670	1.280	

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (3/8)

CHANNEL : KAMAL (BRANCH)

No of :		Existing Structure			Replacement Structure											Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	G.L.	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BKE 12	KE 15 - 1	B	7.50	2.70	8.20	III/IV -1	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.440	0.3+0.84 =1.14	0.57	4.150	3.040	1.110	
BKE 13	KE 15 - 2	B	7.40	2.70	8.20	III/IV -1	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.140	0.3+0.84 =1.14	0.57	3.850	3.180	0.670	
BKE 14	KE 16	B	2.60	1.90	3.00	IV -S	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.150	0.3+0.84 =1.14	0.53	3.820	2.340	1.480	
BKE 15	KE 17 - 1	B	2.90	1.70	3.00	IV -S	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.340	0.3+0.84 =1.14	0.53	4.010	2.420	1.590	
BKE 16	KE 18	P	1.45	1.40	2.50		12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.400	0.3+0.84 =1.14	0.27	3.810	2.160	1.650	
BKE 17	KE 19	P	1.65	1.25	2.50		12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.420	0.3+0.84 =1.14	0.27	3.830	2.480	1.350	
BKE 18	KE 20 - 1	B	4.50	1.08	4.60	IV -1	12.40	0.15+7.00+0.33+7.00 +0.15 = 14.63	7.30	2.680	0.3+0.84 =1.14	0.53	4.340	2.740	1.600	
BKE 19	KE 22	B	4.60	1.90	4.60	IV -1	3.80	0.15+3.50+0.15 =3.80	3.80	2.540	0.3+0.84 =1.14	0.31	3.990	2.520	1.470	
BKE 20	KE 24 - 1	B	3.74	1.69	4.60	IV -1	3.80	0.15+3.50+0.15 =3.80	3.80	2.840	0.3+0.84 =1.14	0.31	4.290	2.950	1.340	

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (4/8)

CHANNEL : TANJUNGAN

No of :		Existing Structure			Replacement Structure										Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	G.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BTM 1	TM 1	B	5.63	4.88	6.60	III/IV -3	23.90	0.25+13.00+0.53+13.00 +0.25 =27.03	13.50	0.200	0.4+0.84 =1.24	0.66	2.100	0.490	1.610	
BTM 2	TM 2 - 1	C	24.40	3.35	-			-			-					Jasa Marga
BTM 3	TM 3 - 4	B	8.50	9.90	(8.00) 10.60	I -2	23.90	0.25+11.40+0.53+11.40 +0.35 =23.83	11.90	0.570	0.4+0.84 =1.24	0.68	2.490	1.180	1.310	
BTM 4	TM 5	B	12.70	2.00	12.20	II -3	16.90	0.25+9.10+0.53+9.10 +0.25 =19.23	9.60	0.590	0.4+0.84 =1.24	0.66	2.490	1.040	1.450	
BTM 5	TM 6	(Skew) B	11.80	3.00	12.20	II -3	16.90	0.25+9.10+0.53+9.10 +0.25 =19.23	9.60	0.620	0.4+0.84 =1.24	0.66	2.520	1.000	1.520	

CHANNEL : PIK JUNCTION DRAINAGE

No of :		Existing Structure			Replacement Structure										Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	G.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BNM 1	NM 5 - 1	C	8.10	0.60	8.20	II/III -1	6.0	0.20+8.00+0.20 =8.40	8.40		0.3+0.84 =1.14	0.57		2.660		
BNM 2	NM 8	C	3.10	0.60	4.60	IV -1	6.0	0.20+8.00+0.20 =8.40	8.40		0.3+0.84 =1.14	0.53		2.570		
BNM 3	NM 11	B	4.00	1.70	4.60	IV -1	6.0	0.20+8.00+0.20 =8.40	8.40		0.3+0.84 =1.14	0.53		2.760		
		Road	2 lanes		12.20	I -1	6.0	0.20+8.00+0.20 =8.40	8.40		0.3+0.84 =1.14	0.61				

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (5/8)

CHANNEL : SALURAN CENGKARENG

No of :		Existing Structure			Replacement Structure										Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	G.L.	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BCM 1	CM 1 - 4	C	2 lanes	5.60	9.60	II/III -2	12.30	0.25+15.30+0.25 =15.80	15.80		0.3+0.84 = 1.14	0.77				
BCM 2	CM 3	B	8.70	3.55	(7.00) 9.60	II/III -3	12.30	0.25+15.30+0.25 =15.80	15.80	1.327	0.3+0.84 = 1.14	0.77	3.237	2.620	0.617	
BCM 3	CM 6	B	4.15	9.60	4.60	IV -1	12.30	0.25+15.30+0.25 =15.80	15.80	1.386	0.3+0.84 = 1.14	0.73	3.256	3.190	0.066	
BCM 4	CM 7	P	1.00	9.80	2.50		12.30	0.25+14.10+0.25 =14.60	14.60	1.408	0.3+0.84 = 1.14	0.62	3.168	2.230	0.938	
BCM 5	CM 9	B	6.20	11.30	6.60	III/IV -3	12.30	0.25+15.30+0.25 =15.80	15.80	1.515	0.3+0.84 = 1.14	0.71	3.365	2.460	0.905	
BCM 6	CM 11	B	6.25	11.20	6.60	III/IV -3	10.30	0.25+13.00+0.25 =13.50	13.50	1.609	0.3+0.84 = 1.14	0.66	3.409	2.650	0.579	
BCM 7	CM 13	P	2.20	8.50	2.50		10.30	0.25+12.10+0.25 =12.60	12.60	1.734	0.3+0.84 = 1.14	0.42	3.294	1.360	1.934	
BCM 8	CM 15	P	1.50	8.40	2.50		10.30	0.25+12.10+0.25 =12.60	12.60	1.897	0.3+0.84 = 1.14	0.42	3.457	1.460	1.997	
BCM 9	CM 16	P	1.50	8.35	2.50		10.30	0.25+12.10+0.25 =12.60	12.60	2.012	0.3+0.84 = 1.14	0.42	3.572	2.710	0.862	
BCM 10	CM 17 - 1	B	6.40	5.60	6.60	III/IV -3	10.30	0.25+13.00+0.25 =13.50	13.50	2.061	0.3+0.84 = 1.14	0.66	3.861	2.660	1.201	
BCM 11	CM 18 - 4	B	14.50	5.58	12.20	I -3	10.30	0.25+13.00+0.25 =13.50	13.50	2.106	0.3+0.84 = 1.14	0.71	3.956	3.710	0.246	
BCM 12	CM 19 - 1	B	17.00	9.70	12.20	I -3	10.30	0.25+13.00+0.25 =13.50	13.50	2.109	0.3+0.84 = 1.14	0.71	3.959	3.980	0.021	
BCM 13	CM 20	B	7.10	8.90	8.20	II/III -1	8.20	0.25+10.00+0.25 =10.50	10.50	2.252	0.3+0.84 = 1.14	0.62	4.012	3.810	0.202	
BCM 14	CM 22	B	9.10	9.40	(7.00) 9.60	II/III -3	8.20	0.25+10.00+0.25 =10.50	10.50	2.398	0.3+0.84 = 1.14	0.62	4.158	3.820	0.338	

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (6/8)

CHANNEL : GEDE/BOR

No of :		Existing Structure			Replacement Structure											Remarks
		1	2	3	4		5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)		C. Width	Span	O.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	E.B.E.L (m)	D (m)	
BGM 1	GM 1 - 2	B	2 lanes	2.90	(7.00) 9.60	II/III -2	12.90	0.25+15.30+0.25 = 15.80	15.80	2.510	0.4+1.12 =1.52	0.77	4.800	3.640	1.160	
BGM 2	GM 1 - 4	B	2 lanes	2.90	(7.00) 9.60	II/III -2	12.90	0.25+15.30+0.25 = 15.80	15.80	2.530	0.4+1.12 =1.52	0.77	4.820	3.690	1.130	
BGM 3	GM 5	P	1.35	4.25	2.50		12.90	0.25+15.30+0.25 = 15.80	15.80	2.600	0.4+1.12 =1.52	0.52	4.640	3.710	0.930	changed from P to B
BGM 4	GM 6	B	5.10	2.20	6.60	III/IV -3	12.90	0.25+15.30+0.25 = 15.80	15.80	2.650	0.4+1.12 =1.52	0.67	4.840	4.020	0.820	
BGM 5	GM 7	B	3.95	4.00	4.60	IV -1	12.90	0.25+15.30+0.25 = 15.80	15.80	2.650	0.4+1.12 =1.52	0.73	4.900	4.080	0.820	
BGM 6	GM 8 - 1	B	3.10	3.90	4.60	IV -1	12.90	0.25+15.30+0.25 = 15.80	15.80	2.720	0.4+1.12 =1.52	0.73	4.970	3.980	0.990	
BGM 7	GM 9	B	4.90	2.70	4.60	IV -1	12.90	0.25+15.30+0.25 = 15.80	15.80	2.720	0.4+1.12 =1.52	0.73	4.970	3.980	0.990	
BGM 8	GM 10 - 2	B	6.40	4.60	6.60	III/IV -3	12.90	0.25+15.30+0.25 = 15.80	15.80	2.750	0.4+1.12 =1.52	0.76	5.030	4.310	0.720	
BGM 9	GM 11 - 2	B	6.24	4.60	6.60	III/IV -3	12.90	0.25+15.30+0.25 = 15.80	15.80	2.860	0.4+1.12 =1.52	0.76	5.140	4.650	0.490	
BGM 10	GM 13 - 1	B	3.45	3.10	3.50	IV -S	12.40	0.25+15.30+0.25 = 15.80	15.80	2.910	0.4+1.12 =1.52	0.73	5.160	5.070	0.090	
BGM 11	GM 14 - 1	B	4.90	7.70	4.60	IV -1	12.40	0.25+15.30+0.25 = 15.80	15.80	3.070	0.4+1.12 =1.52	0.73	5.320	5.060	0.260	
BGM 12	GM 15 - 1	B	8.10	1.90	8.20	II/III -1	12.40	0.25+15.30+0.25 = 15.80	15.80	3.130	0.4+1.12 =1.52	0.77	5.420	5.320	0.100	

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (7/8)

CHANNEL : MERUYA

No of :		Existing Structure			Replacement Structure										Remarks
		1	2	3	4	5	6	7	8	9	10	11	12	13	
Bridge	Structure	Facility	Width (m)	Length (m)	Width (m)	C. Width	Span	G.L	H.W.L (m)	V.C (m)	G.H (m)	B.E.L (m)	F.B.E.L (m)	D (m)	
BMM 1	MM 1 - 1	B	4 lanes	-	-	-									On going at the time
BMM 2	MM 2 - 3	B	7.5	2.06	7.5 C/B	3.0									Same as above
BMM 3	MM 4 - 3	B	7.1	2.30	7.5 C/B	3.0									Same as above
BMM 4	MM 6	B	6.7	2.60	7.5 C/B	3.0									Same as above
BMM 5	MM 10	B	6.5	0.75	7.5 C/B	3.0									Same as above
BMM 6	MM 12	B	7.0	1.30	7.5 C/B	3.0									Same as above
BMM 7	MM 14 - 1	B	7.2	0.75	7.5 C/B	3.0									Same as above
BMM 8	MM 14 - 2	B	7.0	7.00	7.5 C/B	3.0									Same as above
BMM 9	MM 16	C	7.1	0.56	7.5 C/B	3.0									Same as above

Table 4.3 PRINCIPAL DIMENSIONS OF BRIDGE AND CULVERT (PRIMITIVE PLAN) (8/8)

Remarks:

Column 1 (Facility)	:	indicates sorts of the existing facilities, i.e. B - Road Bridge, P - Pedestrian Bridge and C - Culvert
Column 2 (Width)	:	is the total Width of the existing bridges
Column 3 (Length)	:	is the total Length of the existing bridges
Column 4 (Width)	:	is the total width of new bridges with the road class applied according to Fig. 5.5.5. IV-S indicates a special width which has been newly set up to be approximate size equal to the existing width and C indicates culvert
Column 5 (C.W)	:	indicate the Channel Width
Column 6 (Span Length)	:	indicate the total length of Span Length
Column 7 (G.L)	:	indicates representative Girder Length
Column 8 (H.W.L)	:	indicates High Water Level
Column 9 (V.C)	:	indicates Vertical Clearance
Column 10 (G.H)	:	indicates Girder Height including pavement and crossfall
Column 11 (B.E.L)	:	indicates Bridge Elevation
Column 12 (E.B.E.L)	:	indicates Existing Bridge Elevation
Column 13 (D)	:	indicates Difference between B.E.L and E.B.E.L (B.L.E - E.B.E.L)

Table 4.4 COMPARISON OF LIVE LOAD (`T' LOAD) BETWEEN INDONESIAN STANDARD AND JAPAN

Standard	Computation	Comparison	Remarks
A.Loading Specification of Indonesia	1.BM100 Momnt: M=P($\beta + \gamma$)x(1+I) Where, P:`T' load =10.0t β :load factor at center=10.0/4=2.5 γ :load factor at 4m apart from span center= 2.5/5=0.5 I:impact ratio=20/50+10=0.333 M=10.0x(2.5+0.5)x(1+0.333)=40.0tm Shear Force S=P($\delta + \varepsilon$)x(1+I) δ , ε :load factor for M,S S=10.0x(1.0+0.167)x(1+0.333)=15.6t 2.BM70 M=40.0X0.7=28.0tm S=15.6x0.7=10.9t	Comparison of Moment: BM100/"B" load Φ=40.0/39.6=1.01 Shear Force: Ψ=15.6/15.8=0.99t BM70/"A" Load Φ=28.0/33.3=0.84 Ψ=10.9/13.3=0.82	10m span is typically applied. According to the standerd design of Slab bridge by BINA MARGA, BM80 is applied for lower Class Road instead of BM70.
B. Japan Bridge Standard	1."A" Load M=PX β X(1+I)=10.0X2.5x(1+0.333)=33.3tm S=Px δ x(1+I)=10.0x1.0x(1+0.333)=13.3t β , δ :load factor for M,S 2."B" Load Incremental ratio=L/33+7/8=10.0/33+7/8=1.188 Consequently M=33.3x1.188=39.6tm S=13.3x1.188=15.8t	MOMENT "A" /"B" =33.3/39.6=0.84 SHEAR FORCE "A" /"B" =13.3/15.8=0.84	Conclusion and recomendation 1)For BM100 spesific load can be applied. 2)For BM70 to be designed to cover BM80.

Table 4.5 CLASSIFICATION OF SPAN LENGTH IN RESPECT OF WIDTH

RORD CLASS	KAMAL (m)	KA.(BRANCH) (m)	TANJUGAN (m)	NEW DRAIN (m)	SARURAN (m)	CEDE/BOR (m)	MERUYA (m)	TOTAL of No	TOTAL OF DIFFERENCE
Ⅲ-1(8. 2m)		7. 3(2)		8. 4(1)	10. 5(1)	15. 8(1)		4(5)	4
Ⅳ−1(4. 6m)	11. 9(1) 13. 5(1).	7. 3(2) 8. 4(3)		8. 4(2)	15. 8(1)	15. 8(4)		7(14)	5
Ⅰ−2(10. 6m)			11. 9(1)						1
Ⅲ−2(9. 6m)	11. 9(2) 12. 35(2)				10. 5(1) 15. 8(2)	15. 8(2)		5(9)	4
Ⅰ−3(12. 2m)				8. 4(1)	13. 5(2)			2(3)	2
Ⅱ−3(12. 2m)			9. 6(2)					1(2)	1
Ⅲ−3(6. 6m)		7. 3(1) 8. 4(4)	13. 5(1)		13. 5(2) 15. 8(1)	15. 8(3)		6(12)	4
P. B(2. 5m)	11. 5(1) 12. 15(3)	8. 4(1) 7. 3(2)			12. 6(3) 14. 6(1)	15. 8(1)		7(12)	7
Ⅳ−S(3. 0m)		7. 3(2) 8. 4(1)						2(3)	2
Ⅳ−S(3. 5m)						15. 8(1)		1(1)	1
SMALL (4. 6m)	3.8(2)								
BRIDGE (7.5m)							2.6(2),3.0(2),5(1)	5(10)	4
CULVERT(7.5)							1.7(3)		
GIRDER No	6(10)	9(18)	3(4)	3(4)	9(14)	6(12)	—	36(62)	31
SMALL BRIDGE NO	1(2)						3(5)	4(7)	4
CULVERT NO							1(3)	1(3)	1
STRUCTURE NO	7(12)	9(18)	3(4)	3(4)	9(14)	6(12)	4(8)	41(72)	36

Note:1 Total number of structures−72(bridge−62,slab bridge−7,culvert−3)
2 Total ,number of different kind−36(bridge−31,slab bridge−4,culvert−1)
3 Number in ( ) indicates one of structures as an aunit.

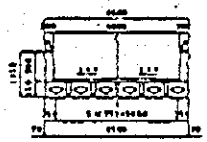
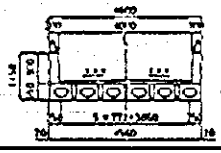
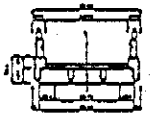
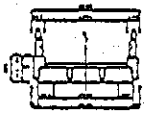
Table 4.6 TYPICAL GIRDER LENGTH USED FOR DESIGN

BRIDGE LENTH(M)	7	8	9	10	11	12		13	14	15	16	Bridge No
		[1]	[2]		[3]						[4]	
Ⅲ-1(8. 2m)		7.3(2)	8.4(1)		10.5(1)						15.8(1)	4(5)
Ⅳ—1(4. 6m)		[5] 7.3(2)	[6] 8.4(5)			[7] 11.9(1)			[8] 13.5(1)		[9] 15.8(5)	5(14)
Ⅰ—2(10. 6m)						[10] 11.9(1)						1(1)
Ⅲ—2(9. 6m)					[11] 10.5(1)	[12] 11.9(2)		[13] 12.35(2)			[14] 15.8(4)	4(9)
Ⅰ—3(12. 2m)			[15] 8.4(1)						[16] 13.5(2)			2(3)
Ⅱ—3(12. 2m)				[17] 9.6(2)								1(2)
Ⅲ—3(6. 6m)		[18] 7.3(1)	[19] 8.4(4)						[20] 13.5(3)		[21] 15.8(4)	4(12)
P. B(2. 5m)		[22] 7.3(2)	[23] 8.4(1)			[24] 11.5(1)	[25] 12.15(3)	[26] 12.6(3)		[27] 14.6(1)	[28] 15.8(1)	7(12)
Ⅳ—S(3. 0m)		[29] 7.3(2)	[30] 8.4(1)									2(3)
Ⅳ—S(3. 5m)											[31] 15.8(1)	1(1)
BridgeNo		5(9)	6(13)	1(2)	2(2)	4(5)	1(3)	2(5)	3(6)	1(1)	6(16)	31(62)

NOTE:1 [ ] INDICATS THE NUMBERING OF GIRDER DESIGN,BEEING 31 BRIDGES IN TOTAL.
2 ( )INDICATS THE NUMBER OF BRIDES WITH SAME GIRDER LENGTH.
3 COLOURED LINES MEAN THE BRIDGES DESIGNED WITH BM100.

Table 4.7 STRESS SUMMARY OF GIRDER (1/8)

KAMAL

MARK	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) MU	ML	S-F	NOTES
BKX-8		4.600	11.400	11.900	0.450	R.L 70T	1	81.4			1	-78.4			1	39.3	78.5	90.00	56.50	1.59	BX70-05 [7] I+i=1.326
							2	55.9			2	-56.6			2	0.0	0.0				
							3	137.2			3	-135.0			3	20.0	20.0				
							4	31.5	> -18.0	O	4	144.9	< 200.0	O	4	59.3	98.5				
							5	125.9	< 160.0	O	5	12.6	> -18.0	O							
BKX-1		4.600	13.000	13.500	0.550	R.L 70T	1	79.6			1	-76.4			1	48.0	96.0	132.80	69.80	1.90	BX70-07 [8] I+i=1.317
							2	43.3			2	-44.0			2	0.0	0.0				
							3	122.9			3	-120.4			3	20.0	20.0				
							4	28.8	> -18.0	O	4	153.7	< 200.0	O	4	68.0	116.0				
							5	109.1	< 160.0	O	5	32.6	> -18.0	O							
BKX-10 BKX-11		9.600	11.400	11.900	0.450	R.L 70T	1	83.9			1	-81.0			1	80.3	160.6	90.00	61.80	1.46	BX70-05 [12] I+i=1.326
							2	63.6			2	-64.4			2	3.9	7.9				
							3	147.5			3	-145.4			3	40.0	40.0				
							4	31.5	> -18.0	O	4	144.9	< 200.0	O	4	124.2	208.5				
							5	136.1	< 160.0	O	5	2.4	> -18.0	O							
BKX-3 BKX-5		9.600	11.850	12.350	0.500	R.L 70T	1	78.7			1	-76.0			1	87.7	175.4	104.30	66.30	1.57	BX70-06 [13] I+i=1.323
							2	54.1			2	-55.0			2	4.1	3.2				
							3	132.7			3	-131.0			3	40.0	40.0				
							4	29.2	> -18.0	O	4	139.1	< 200.0	O	4	131.8	223.6				
							5	121.3	< 160.0	O	5	11.3	> -18.0	O							
BKX-9		2.500	11.000	11.500	0.400	P	1	86.6			1	-83.7			1	17.2	34.5	53.500	28.600	1.87	PB-03 [24] PERSON LOAD 0.35t/m2 I+i=1.000
							2	17.5			2	-17.7			2	3.8	7.6				
							3	104.1			3	-101.4			3	.0	.0				
							4	39.5	> -18.0	O	4	69.2	< 200.0	O	4	21.1	42.1				
							5	89.6	< 160.0	O	5	3.1	> -18.0	O							
BKX-4 BKX-6 BKX-7		2.500	11.650	12.150	0.450	P	1	85.3			1	-83.0			1	20.1	40.2	69.900	34.400	2.03	PB-04 [25] PERSON LOAD 0.35t/m2 I+i=1.000
							2	15.6			2	-15.9			2	4.0	8.1				
							3	100.9			3	-98.8			3	.0	.0				
							4	66.3	> -18.0	O	4	63.0	< 200.0	O	4	24.1	48.2				
							5	109.1	< 160.0	O	5	-0.3	> -18.0	O							

NOTES

LOAD TYPE R.L 100T:WHEEL LOAD 10.0tf
R.L 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

JU:JUDGEMENT

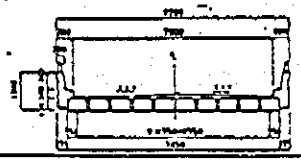
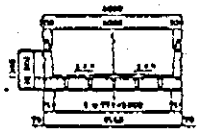
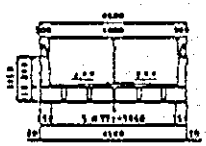
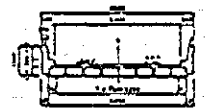
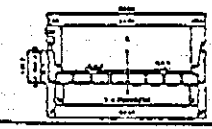
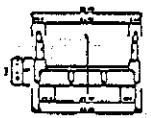
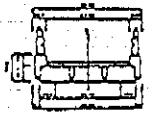
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

ML:ULTIMATE MOMENT
MU:RESISTANT MOMENT

I+i=FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (2/8)

KAMAL (BRANCH)

NAME	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) MU	ML	S-F	NOTES
BKE-12 BKE-13		8.200	7.000	7.300	0.400	B.L. 70T	1	41.9			1	-40.4	-		1	42.2	84.3	61.10	39.50	1.55	BK70-01 [13] 1+i=1.351
							2	65.2			2	-64.2			2	0.0	0.0				
							3	107.1			3	-104.6			3	40.0	40.0				
							4	32.1	> -18.0	O	4	109.2	< 200.0	O	4	82.2	124.3				
							5	114.6	< 160.0	O	5	2.5	> -18.0	O							
BKE-18		4.600	7.000	7.300	0.400	B.L. 70T	1	38.6			1	-37.3			1	24.7	49.4	61.10	32.50	1.88	BK70-01 [6] 1+i=1.351
							2	51.6			2	-50.8			2	0.0	0.0				
							3	90.3			3	-88.0			3	20.0	20.0				
							4	32.1	> -18.0	O	4	109.2	< 200.0	O	4	44.7	69.4				
							5	97.7	< 160.0	O	5	18.9	> -18.0	O							
BKE-2 BKE-6 BKE-9 BKE-11		4.600	8.000	8.400	0.450	B.L. 70T	1	43.0			1	-41.6			1	30.8	61.6	69.90	38.40	1.82	BK70-02 [6] 1+i=1.345
							2	44.8			2	-44.3			2	0.0	0.0				
							3	87.8			3	-85.9			3	20.0	20.0				
							4	36.4	> -18.0	O	4	91.1	< 200.0	O	4	50.8	81.6				
							5	95.9	< 160.0	O	5	11.1	> -18.0	O							
BKE-10		6.600	7.000	7.300	0.400	B.L. 70T	1	36.8			1	-35.4			1	30.9	61.9	61.10	39.40	1.55	BK70-01 [18] 1+i=1.351
							2	67.8			2	-66.7			2	0.0	0.0				
							3	104.5			3	-102.1			3	40.0	40.0				
							4	32.1	> -18.0	O	4	109.2	< 200.0	O	4	70.9	101.9				
							5	112.0	< 160.0	O	5	4.4	> -18.0	O							
BKE-3 BKE-4 BKE-5 BKE-		6.600	8.000	8.400	0.450	B.L. 70T	1	41.1			1	-39.8			1	39.0	78.0	69.90	46.90	1.49	BK70-02 [19] 1+i=1.345
							2	60.5			2	-59.8			2	0.0	0.0				
							3	101.7			3	-99.6			3	40.0	40.0				
							4	36.4	> -18.0	O	4	91.1	< 200.0	O	4	79.0	118.0				
							5	109.7	< 160.0	O	5	-3.2	> -18.0	O							
BKE-8		2.500	8.000	8.400	0.350	P	1	53.6			1	-52.3			1	11.3	22.6	24.800	14.000	1.77	PB-02 [23] PERSON LOAD 0.35t/m2 1+i=1.000
							2	12.1			2	-12.4			2	2.8	5.6				
							3	65.7			3	-64.7			3	.0	.0				
							4	39.2	> -18.0	O	4	35.3	< 200.0	O	4	14.1	28.2				
							5	70.0	< 160.0	O	5	-5.1	> -18.0	O							
BKE-16 BKE-17		2.500	7.000	7.300	0.350	P	1	41.0			1	-40.2			1	9.8	19.6	22.800	10.700	2.13	PB-01 [22] PERSON LOAD 0.35t/m2 1+i=1.000
							2	9.3			2	-9.5			2	2.4	4.9				
							3	50.3			3	-49.6			3	.0	.0				
							4	41.2	> -18.0	O	4	33.4	< 200.0	O	4	12.3	24.5				
							5	63.3	< 160.0	O	5	1.5	> -18.0	O							

NOTES

LOAD TYPE B.L. 100T:WHEEL LOAD 10.0tf
B.L. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

JU:JUDGEMENT

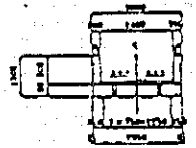
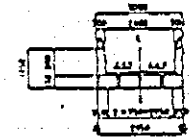
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

ML:ULTIMATE MOMENT
MU:RESISTANT MOMENT

i+i=FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (3/6)

KAMAL (BRANCH)

NAME	CROSS SECTION	PIOTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	ST	UPPER STRESS (kgf/cm2) STRESS	ALLOWABL	JU	ST	LOWER STRESS (kgf/cm2) STRESS	ALLOWABL	JU	ST	REACTION (tf) ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) MU	ML	S-F	NOTES
BXE-14 BXE-15		3.000	7.000	7.300	0.400	B.M. 70T	1	41.4	—		1	-39.9			1	17.8	35.5	61.10	39.50	1.55	BX70-01 [29] 1+i=1.351
							2	65.6			2	-64.5			2	0.0	0.0				
							3	106.9			3	-104.4			3	20.0	20.0				
							4	32.1	> -18.0	○	4	109.2	< 200.0	○	4	37.8	55.5				
							5	114.4	< 160.0	○	5	2.6	> -18.0	○							
BXE-1		3.000	8.000	8.400	0.450	B.M. 70T	1	45.9			1	-44.5			1	22.0	44.0	69.90	47.30	1.48	BX70-02 [30] 1+i=1.345
							2	58.8			2	-58.1			2	0.0	0.0				
							3	104.7			3	-102.6			3	20.0	20.0				
							4	36.4	> -18.0	○	4	91.1	< 200.0	○	4	42.0	64.0				
							5	112.9	< 160.0	○	5	45.6	> -18.0	○							

NOTES

LOAD TYPE B.M. 100T:WHEEL LOAD 10.0tf
B.M. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

JU:JUDGEMENT

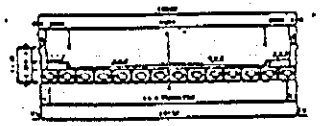
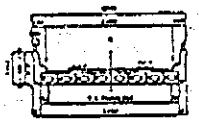
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

ML:ULTIMATE MOMENT
MU:RESISTANT MOMENT

i+1:FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (4/8)

TANJUGAN

NAME	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) XU	XL	S-F	NOTES
BTK-3		10.600	11.400	11.900	0.500	B.T. 100T	1	62.9			1	-66.0			1	93.0	185.9	115.90	70.80	1.64	BX100-02 [10] i+i=1.326
							2	65.1			2	-65.9			2	4.2	8.3				
							3	134.0			3	-131.9			3	61.6	61.6				
							4	23.2	> -18.0	O	4	166.5	< 200.0	O	4	158.7	255.8				
							5	121.0	< 160.0	O	5	24.0	> -18.0	O							
BTK-4 BTK-5		12.200	9.100	9.600	0.450	B.T. 70T	1	50.5			1	-48.6			1	84.4	168.9	81.40	50.30	1.62	BX70-03 [17] i+i=1.338
							2	61.6			2	-60.7			2	0.0	0.0				
							3	112.2			3	-109.3			3	60.0	60.0				
							4	40.4	> -18.0	O	4	108.8	< 200.0	O	4	144.4	228.9				
							5	117.0	< 160.0	O	5	5.6	> -18.0	O							
BTK-1		6.600	13.000	13.500	0.550	B.T. 70T	1	84.1			1	-80.9			1	68.0	136.1	132.80	89.00	1.33	BX70-07 [20] i+i=1.317
							2	63.5			2	-64.5			2	0.0	0.0				
							3	147.6			3	-145.4			3	40.0	40.0				
							4	28.8	> -18.0	O	4	153.7	< 200.0	O	4	108.0	176.1				
							5	133.7	< 160.0	O	5	7.8	> -18.0	O							

NOTES

LOAD TYPE B.T. 100T:WHEEL LOAD 10.0tf
B.T. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD JU:JUDGEMENT
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

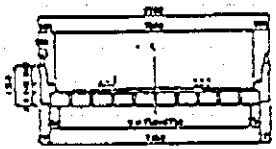
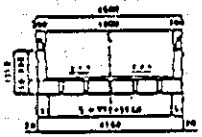
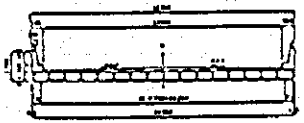
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

XL:ULTIMATE MOMENT
XU:RESISTANT MOMENT

i+i=FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (5/8)

PIK JUNCTION

MARK	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) MU	XL	S-F	NOTES
BNX-1		8.200	8.000	8.400	0.450	B.L. 70T	1	45.0			1	-44.5			1	52.8	105.6	69.90	46.20	1.51	BX70-02 [2] 1+i=1.345
							2	56.9			2	-56.2			2	0.0	0.0				
							3	102.8			3	-100.7			3	40.0	40.0				
							4	36.4	> -18.0	O	4	91.1	< 200.0	O	4	92.8	145.6				
							5	110.9	< 160.0	O	5	-3.7	> -18.0	O							
BNX-2 BNX-3		4.600	8.000	8.400	0.450	B.L. 70T	1	43.0			1	-41.6			1	30.8	61.6	69.90	38.40	1.82	BX70-02 [6] 1+i=1.345
							2	44.8			2	-44.3			2	0.0	0.0				
							3	87.8			3	-85.9			3	20.0	20.0				
							4	36.4	> -18.0	O	4	91.1	< 200.0	O	4	50.8	81.6				
							5	95.9	< 160.0	O	5	11.1	> -18.0	O							
BNX-4		12.200	8.000	8.400	0.450	B.L. 100T	1	39.4			1	-37.7			1	73.9	147.8	88.60	47.50	1.87	BX100-01 [16] 1+i=1.345
							2	62.4			2	-61.2			2	0.0	0.0				
							3	101.8			3	-99.0			3	67.5	67.5				
							4	28.2	> -18.0	O	4	133.8	< 200.0	O	4	141.4	215.3				
							5	103.0	< 160.0	O	5	27.2	> -18.0	O							

NOTES

LOAD TYPE B.L. 100T:WHEEL LOAD 10.0tf
B.L. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD JU:JUDGEMENT
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

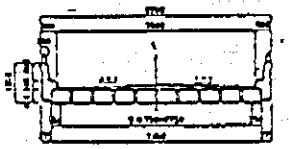
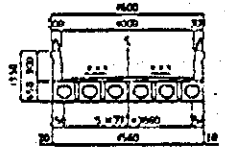
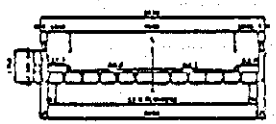
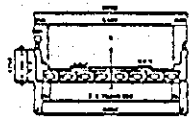
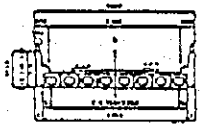
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

XL:ULTIMATE MOMENT
MU:RESISTANT MOMENT

i+i=FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (6/8)

SALURAN

NAME	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	ST	UPPER STRESS (kgf/cm2) STRESS	ALLOWABL	JU	ST	LOWER STRESS (kgf/cm2) STRESS	ALLOWABL	JU	ST	REACTION (tf) ABUTMENT	PIER	ULTIMATE MOMENT(tf-m) YU	YL	S-F	NOTES
BCX-13		8.200	10.000	10.500	0.450	B.M. 70T	1	70.1			1	-67.4				66.0	132.0				BM70-04 [3]
							2	67.2			2	-66.0				0.0	0.0				1+i=1.333
							3	137.3			3	-133.3				40.0	40.0				
							4	43.2	> -18.0	O	4	120.1	< 200.0	O		106.0	172.0	88.70	59.30	1.50	α=1.000
							5	138.6	< 160.0	O	5	-4.3	> -18.0	O							
BCX-3		4.600	15.300	15.800	0.650	B.M. 70T	1	91.1			1	-87.4			1	62.0	124.0				BM70-08 [9]
							2	37.6			2	-38.5			2	0.0	0.0				
							3	128.7			3	-126.0			3	20.0	20.0				1+i=1.306
							4	34.6	> -18.0	O	4	144.3	< 200.0	O	4	82.0	144.0	174.10	95.10	1.83	α=1.000
							5	114.1	< 160.0	O	5	26.4	> -18.0	O							
BCX-14		9.600	10.000	10.500	0.450	B.M. 70T	1	70.5			1	-67.8			1	78.6	157.2				BM70-04 [11]
							2	58.4			2	-57.3			2	3.5	6.9				
							3	128.9			3	-125.0			3	40.0	40.0				1+i=1.333
							4	43.2	> -18.0	O	4	120.1	< 200.0	O	4	122.1	204.2	88.70	54.30	1.63	α=1.000
							5	130.1	< 160.0	O	5	4.0	> -18.0	O							
BCX-1 BCX-2		9.600	15.300	15.800	0.650	B.M. 70T	1	93.9			1	-90.3			1	127.7	255.3				BM70-08 [14]
							2	42.9			2	-43.9			2	5.2	10.5				
							3	136.9			3	-134.3			3	40.0	40.0				1+i=1.306
							4	35.1	> -18.0	O	4	143.9	< 200.0	O	4	172.9	305.8	174.10	101.40	1.72	α=1.000
							5	122.2	< 160.0	O	5	18.4	> -18.0	O							
BCX-11 BCX-12		12.200	13.000	13.500	0.550	B.M. 100T	1	73.0			1	-69.6			1	116.7	233.4				BM100-03 [16]
							2	69.1			2	-70.3			2	0.0	0.0				
							3	142.1			3	-139.9			3	76.9	76.9				1+i=1.317
							4	28.8	> -18.0	O	4	153.7	< 200.0	O	4	193.6	310.3	132.70	89.00	1.49	α=1.281
							5	128.4	< 160.0	O	5	12.3	> -18.0	O							
BCX-6 BCX-10		6.600	13.000	13.500	0.550	B.M. 70T	1	84.1			1	-80.9			1	68.0	136.1				BM70-07 [20]
							2	63.5			2	-64.5			2	0.0	0.0				
							3	147.6			3	-145.4			3	40.0	40.0				1+i=1.317
							4	28.8	> -18.0	O	4	153.7	< 200.0	O	4	108.0	176.1	132.80	89.00	1.33	α=1.000
							5	133.7	< 160.0	O	5	7.8	> -18.0	O							
BCX-5		6.600	15.300	15.800	0.650	B.M. 70T	1	95.0			1	-91.5			1	86.8	173.5				BM70-08 [28]
							2	55.0			2	-56.3			2	0.0	0.0				
							3	150.0			3	-147.8			3	40.0	40.0				1+i=1.308
							4	34.6	> -18.0	O	4	144.3	< 200.0	O	4	126.8	213.5	174.10	115.80	1.50	α=1.000
							5	135.4	< 160.0	O	5	4.7	> -18.0	O							

NOTES

LOAD TYPE B.M. 100T:WHEEL LOAD 10.0tf
B.M. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

JU:JUDGEMENT

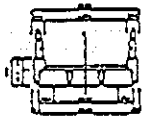
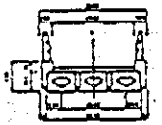
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

YL:ULTIMATE MOMENT
YU:RESISTANT MOMENT

i=i-FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (7/8)

SALURAN

NAME	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL.	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL.	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf·m) MU	ML	S-F	NOTES
BCX-7 BCX-8 BCX-9		2.500	12.100	12.600	0.450	P	1	92.0			1	-89.1			1	20.8	41.7	81.400	42.200	1.93	PB-05 [20] PERSON LOAD 0.35t/m2 1+i=1.000
							2	16.8			2	-17.0			2	4.2	8.4				
							3	108.8			3	-106.1			3	0.0	0.0				
							4	66.9	> -18.0	O	4	84.2	< 200.0	O	4	25.0	50.0				
							5	113.7	< 160.0	O	5	11.3	> -18.0	O							
BCX-6		2.500	14.100	14.600	0.450	P	1	113.3			1	-108.6			1	21.3	42.6	84.400	46.200	1.82	PB-06 [27] PERSON LOAD 0.35t/m2 1+i=1.000
							2	22.3			2	-23.6			2	4.9	9.7				
							3	136.5			3	-132.2			3	.0	.0				
							4	56.4	> -18.0	O	4	111.3	< 200.0	O	4	26.2	52.3				
							5	125.6	< 160.0	O	5	10.0	> -18.0	O							

NOTES

LOAD TYPE B.M. 100T:WHEEL LOAD 10.0tf
B.M. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

JU:JUDGEMENT

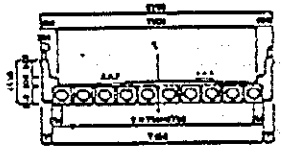
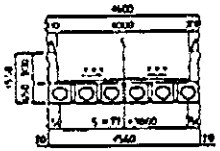
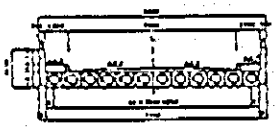
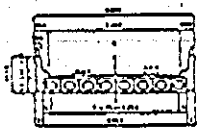
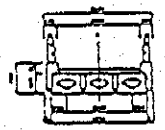
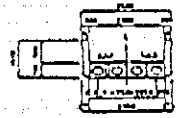
1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

MU:ULTIMATE MOMENT
MU:RESISTANT MOMENT

i+1=FACTER OF IMPACT

Table 4.7 STRESS SUMMARY OF GIRDER (8/8)

CEDE/BOR

NAME	CROSS SECTION	WIDTH	SPAN	GIRDER LENGTH	GIRDER HEIGHT	LOAD TYPE	UPPER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	LOWER STRESS (kgf/cm2) ST	STRESS	ALLOWABL	JU	REACTION (tf) ST	ABUTMENT	PIER	ULTIMATE MOMENT(tf·m) MU	ML	S-F	NOTES
BCX-12		8.200	15.300	15.800	0.650	B.X. 70T	1	94.5			1	-91.0			1	108.1	216.2	174.10	105.90	1.64	BX70-08 [4] I+i=1.306
							2	46.7			2	-47.7			2	0.0	0.0				
							3	141.2			3	-138.8			3	40.0	40.0				
							4	34.6	> -18.0	O	4	144.3	< 200.0	O	4	148.1	256.2				
							5	126.5	< 160.0	O	5	13.9	> -18.0	O							
BCX-5 BCX-6 BCX-7 BCX-11		4.600	15.300	15.800	0.650	B.X. 70T	1	91.1			1	-87.4			1	62.0	124.0	174.10	95.10	1.83	BX70-08 [9] I+i=1.306
							2	37.6			2	-38.5			2	0.0	0.0				
							3	128.7			3	-126.0			3	20.0	20.0				
							4	34.6	> -18.0	O	4	144.3	< 200.0	O	4	82.0	144.0				
							5	114.1	< 160.0	O	5	26.4	> -18.0	O							
BCX-1 BCX-2		9.600	15.300	15.800	0.650	B.X. 70T	1	93.9			1	-90.3			1	127.7	255.3	174.10	101.40	1.72	BX70-08 [14] I+i=1.306
							2	42.9			2	-43.9			2	5.2	10.5				
							3	136.9			3	-134.3			3	40.0	40.0				
							4	35.1	> -18.0	O	4	143.9	< 200.0	O	4	172.9	305.8				
							5	122.2	< 160.0	O	5	18.4	> -18.0	O							
BCX-4 BCX-8 BCX-9		6.600	15.300	15.800	0.650	B.X. 70T	1	95.0			1	-91.5			1	86.8	173.5	174.10	115.80	1.50	BX70-08 [21] I+i=1.308
							2	55.0			2	-56.3			2	0.0	0.0				
							3	150.0			3	-147.8			3	40.0	40.0				
							4	34.6	> -18.0	O	4	144.3	< 200.0	O	4	126.8	213.5				
							5	135.4	< 160.0	O	5	4.7	> -18.0	O							
BCX-3		2.500	15.300	15.800	0.500	P	1	116.9			1	-112.2			1	24.5	48.9	97.500	56.700	1.72	PS-07 [28] PERSON LOAD 0.35t/m2 I+i=1.000
							2	22.6			2	-23.0			2	5.3	10.5				
							3	139.4			3	-135.2			3	.0	-0				
							4	58.4	> -18.0		4	102.1	< 200.0		4	29.7	59.4				
							5	128.4	< 160.0		5	2.8	> -18.0								
BCX-10		3.500	15.300	15.800	0.700	B.X. 70T	1	100.6			1	-97.8			1	52.2	104.5	191.80	126.80	1.51	BX70-09 [31] I+i=1.306
							2	48.2			2	-49.5			2	0.0	0.0				
							3	148.8			3	-147.4			3	20.0	20.0				
							4	29.7	> -18.0	O	4	142.2	< 200.0	O	4	72.2	124.5				
							5	133.3	< 160.0	O	5	2.3	> -18.0	O							

NOTES

LOAD TYPE B.X. 100T:WHEEL LOAD 10.0tf
B.X. 70T:WHEEL LOAD 7.0tf
P:HUMAN/ANIMALS LOAD 0.35tf/m2

ST:STATE 1. STRESS OF DEAD LOAD JU:JUDGEMENT
2. STRESS OF LIVE LOAD
3. SUMMATION (1+2)
4. AT IMMEDIATELY AFTER PRESTRESSING
5. STRESS OF SERVICE STATE

1. DEAD LOAD
2. PERSON
3. LIVE LOAD
4. SUMMATION (1+2+3)

ML:ULTIMATE MOMENT
MU:RESISTANT MOMENT

I+i:FACTER OF IMPACT

Table 4.8 TYPICAL SECTION OF GIRDER (1/5)

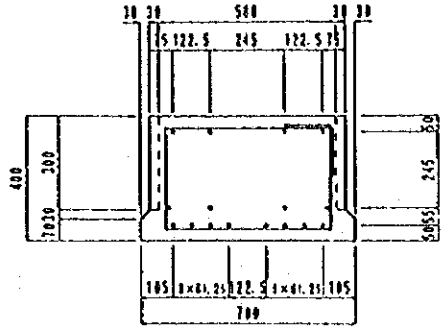
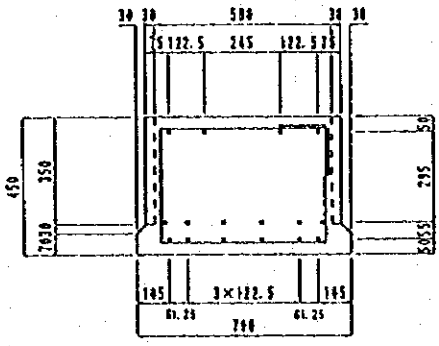
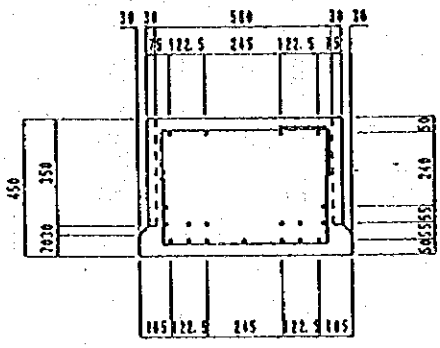
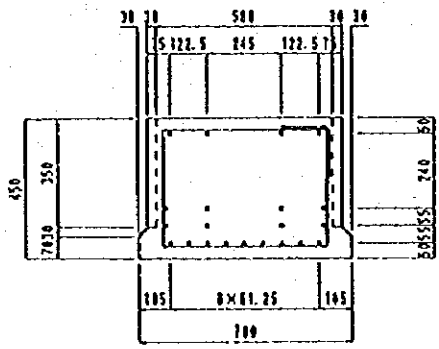
GIRDER NAME	SPAN	G.L.	BRIDGE NAME	CROSS SECTION
BM70-01 [1],[5],[18],[29]	7.00	7.30	BKE-10 BKE-12 BKE-13 BKE-14 BKE-15 BKE-18	
BM70-02 [2],[6],[19],[30]	8.00	8.40	BNM-1 BKE-4 BNM-2 BKE-5 BNM-3 BKE-6 BKE-1 BKE-9 BKE-2 BKE-11 BKE-3 BKE-7	
BM70-03 [17]	9.10	9.60	BTM-4 BTM-5	
BM70-04 [3],[11]	10.00	10.50	BCM-13 BCM-14	

Table 4.8 TYPICAL SECTION OF GIRDER (2/5)

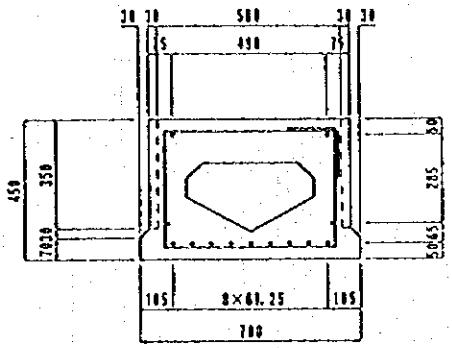
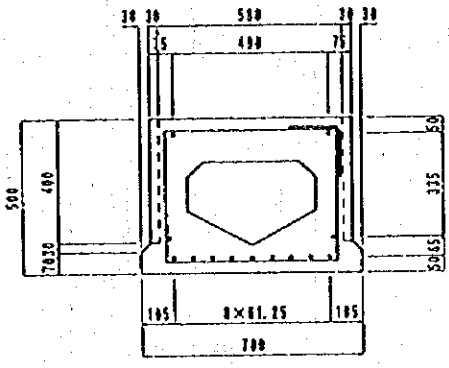
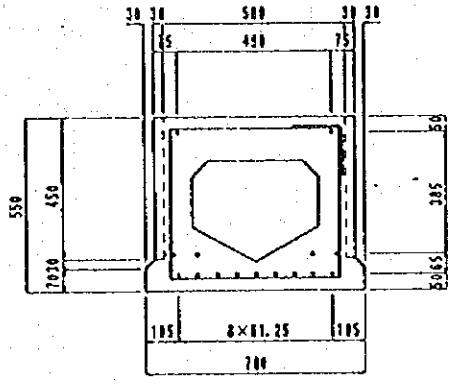
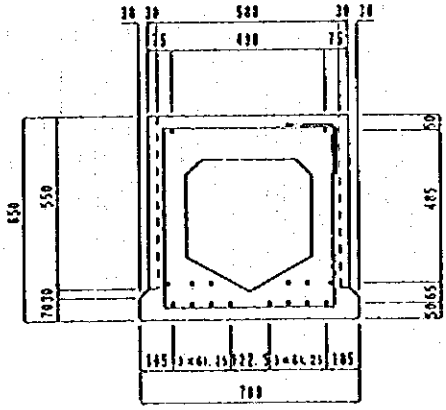
GIRDER NAME	SPAN	G.L.	BRIDGE NAME	CROSS SECTION
BM70-05 {7},{12}	11.40	11.90	BKM-8 BKM-10 BKM-11	
BM70-06 {13},{25},{26}	11.85	12.35	BKM-3 BKM-5	
BM70-07 {8},{20}	13.00	13.50	BKM-1 BTM-1 BCM-6 BCM-10	
BM70-08 {4},{9},{14},{21}	15.30	15.80	BGM-1 BGM-9 BGM-2 BGM-11 BGM-4 BGM-12 BGM-5 BCM-1 BGM-6 BCM-2 BGM-7 BCM-3 BGM-8 BCM-4	

Table 4.8 TYPICAL SECTION OF GIRDER (3/5)

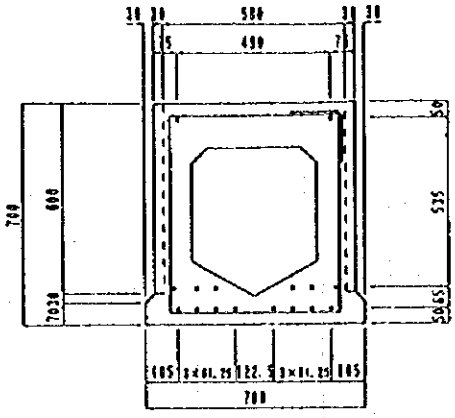
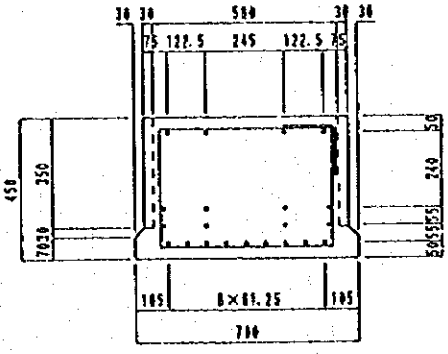
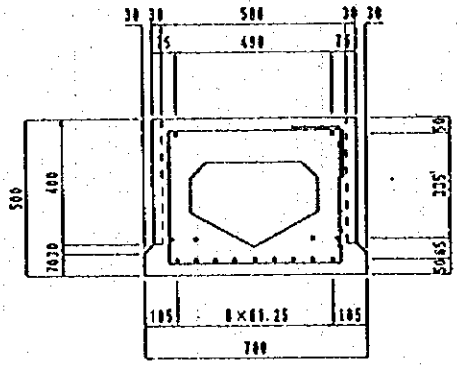
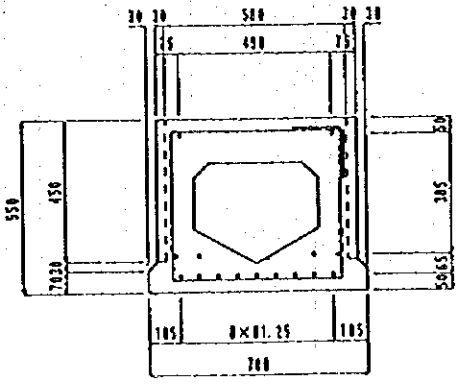
GIRDER NAME	SPAN	G. L.	BRIDGE NAME	CROSS SECTION
BM70-09 [31]	15.30	15.80	BGM-10	
BM100-01 [15]	8.00	8.40	BNM-4	
BM100-02 [10]	11.40	11.90	BTM-3	
BM100-03 [16]	13.00	13.50	BCM-11 BCM-12	

Table 4.8 TYPICAL SECTION OF GIRDER (4/5)

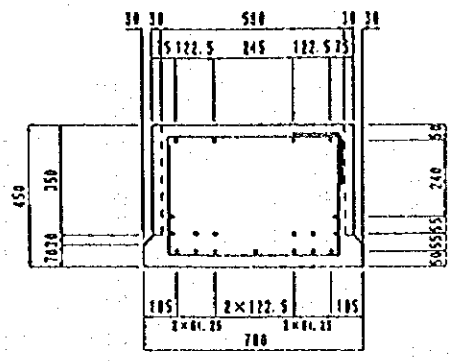
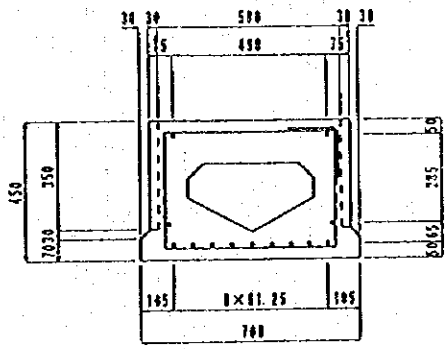
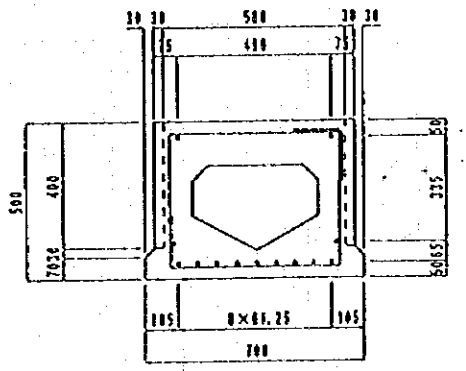
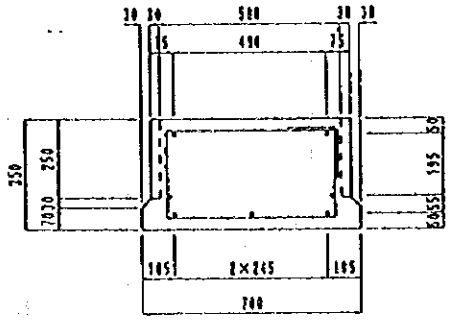
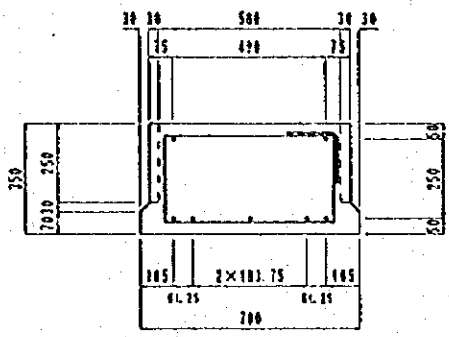
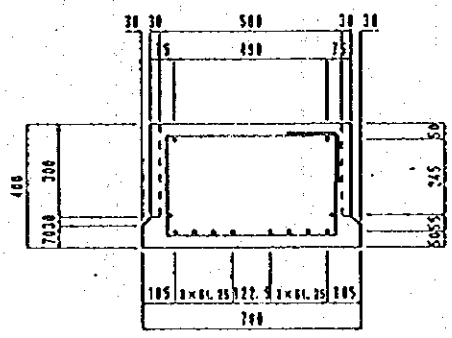
GIRDER NAME	SPAN	G.L.	BRIDGE NAME	CROSS SECTION
PB-05 [20]	12.10	12.60	BCM-7 BCM-8 BCM-9	
PB-06 [27]	14.10	14.60	BCM-4	
PB-07 [28]	15.30	15.80	BCM-3	

Table 4.8 TYPICAL SECTION OF GIRDER (5/5)

GIRDER NAME	SPAN	G.L.	BRIDGE NAME	CROSS SECTION
PB-01 [22]	7.00	7.30	BKE-16 BKE-17	
PB-02 [23]	8.00	8.40	BKE-8	
PB-03 [24]	11.00	11.50	BKM-9	
PB-04 [25]	11.65	12.15	BKM-4 BKM-6 BKM-7