TABLE E.3.3 PROPOSED FLOOD MITIGATION FACILITY : DHAKA EAST

Compartment	Facility		Main Feautres
1. Northern Compt. (DC-1)	1. Embankment	L=	14.00 km (E.33+200~E.69)
	2. Sub-Embankment (SA)	L=	6.40 km (SA.0~SA.16)
	3. Flood Wall (R)	L=	5.85 km (R.16+150~R.22)
	4. Sluice Gate	No=	4 Places (Main Emb.3, Sub-Emb.1)
2. Central Compt. (DC-2)	1. Embankment	L=	6.00 km (E.18+200~E.33+200)
	2. Sub-Embankment (SA)	L=	-
	3. Flood Wall (R)	L=	4.85 km (R.11+300~R.16+150)
	4. Sluice Gate	No=	1 Place
3. Southern Compt.-1 (DC-3)	1. Embankment	L=	2.97 km (E.11+150~E.18+200)
	2. Sub-Embankment	L=	4.71 km (SB.0~SB.12)
	3. Flood Wall (R)	L=	2.50 km (R.8+300~R.11+300)
	4. Sluice Gate	No=	1 Place
4. Southern Compt.-2 (DC-4)	1. Embankment	L=	4.55 km (E.0~E.11+150)
	2. Sub-Embankment (SA)	L=	6.31 km (SC.0~SC.13)
	3. Flood Wall (R)	L=	8.07 km (R.0~R.8+800)
	4. Sluice Gate	No=	1 Place
Total (DC 1-4)	1. Embankment	L=	27.52 km (E.0~E.69)
	2. Sub-Embankment (SA)	L=	17.42 km (3 Sub-Embankments)
	3. Flood Wall (R)	L=	21.27 km (R.0~R.22)
	4. Sluice Gate	No=	7 Place

TABLE E.3.4 LAND USE AND POPULATION OF GREATER DHAKA EAST

Year / Item / Area	Drainage Area (km2)	1990		2000		2010	
		Built-up Area (km2)	Population (million people)	Built-up Area (km2)	Population (million people)	Built-up Area (km2)	Population (million people)
Greater Dhaka East (F/S Area)	118.62	23.11	0.638	50.27	1.151	85.50	2.202
Part of Greater Dhaka West (Drainage Related Area)	47.74	43.60	1.512	45.38	1.806	46.90	2.268
Total (Study Area)	166.36	66.71	2.150	95.65	2.957	132.40	4.470

TABLE E.3.5 MAIN HYDRAULIC FEATURES OF EXISTING MAJOR KHALS : GREATER DHAKA EAST

Dhaka East Zone (DC)

Khal No.	Length	Max. Section						Min. Section					
		Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity	Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity
	(m)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)
K 1	820	2.50	21.60	3.30	0.050	30.9	12.3	0.80	5.80	1.10	0.050	1.3	1.6
K 2	1,640	5.95	6.80	1.00	0.025	0.9	0.2	2.00	2.00	0.40	0.025	0.1	0.0
K 3	4,100	3.77	82.20	3.60	0.017	81.4	21.6	2.50	35.60	1.50	0.017	8.2	3.3
K 4	440	11.49	13.80	1.40	0.017	2.8	0.2	10.00	9.60	0.80	0.017	0.8	0.1
K 5	3,040	18.34	38.60	2.80	0.025	30.3	1.7	1.76	20.40	0.90	0.025	2.4	1.4
K 6	1,940	1.00	13.60	1.20	0.017	2.1	2.1	7.30	2.40	0.20	0.017	0.0	0.0
K 7	640	18.00	12.00	1.30	0.017	2.1	0.1	20.00	5.80	1.00	0.017	0.7	0.0
K 8	3,540	26.00	11.60	3.30	0.017	9.1	0.3	24.50	9.80	0.90	0.017	1.0	0.0
K 9	1,760	0.50	15.40	1.10	0.017	2.1	4.2	3.00	14.20	0.90	0.017	1.4	0.5
K 10	1,600	30.80	14.20	1.80	0.017	4.3	0.1	30.00	7.40	1.00	0.017	0.8	0.0
K 11	1,620	6.30	19.20	1.30	0.017	3.5	0.6	5.70	5.60	0.80	0.017	0.4	0.1
K 12	740	38.40	18.60	2.00	0.017	6.8	0.2	38.00	10.60	1.60	0.017	2.6	0.1
K 13	1,700	4.00	12.40	1.80	0.017	3.8	0.9	3.00	9.40	1.30	0.017	1.7	0.6
K 14	740	1.50	10.40	1.60	0.017	2.6	1.7	0.50	7.40	1.20	0.017	1.1	2.3
K 15	2,600	47.90	39.60	2.60	0.017	22.7	0.5	39.00	10.60	1.40	0.017	2.1	0.1
K 16	2,200	3.50	43.20	2.90	0.017	29.7	8.5	1.00	8.20	1.30	0.017	1.4	1.4
K 17	800	1.00	13.20	1.70	0.017	3.7	3.7	1.50	7.60	0.50	0.017	0.3	0.2
K 18	1,920	1.50	13.60	1.50	0.017	3.1	2.1	0.50	5.00	0.50	0.017	0.2	0.4
K 19	3,220	1.00	26.60	1.10	0.017	3.6	3.6	1.50	12.80	0.60	0.017	0.6	0.4
K 20	1,640	33.50	25.40	2.00	0.025	11.4	0.3	32.00	10.40	1.70	0.025	3.5	0.1
K 21	2,600	40.90	42.60	3.20	0.017	34.5	0.8	34.00	22.00	2.30	0.017	10.2	0.3
K 22	5,320	14.00	17.00	3.50	0.025	18.5	1.3	13.50	8.60	0.60	0.025	0.5	0.0
K 23	4,820	8.20	34.20	2.50	0.017	18.4	2.2	6.50	7.60	1.30	0.017	1.3	0.2
K 24	3,420	5.50	18.00	3.10	0.017	13.4	2.4	2.00	7.60	1.10	0.017	1.0	0.5
K 25	2,420	1.00	41.40	1.80	0.017	12.9	12.9	8.00	13.20	2.00	0.017	4.8	0.6
K 26	1,800	4.10	29.00	2.70	0.017	17.6	4.3	3.00	19.20	1.70	0.017	5.4	1.8
K 27	2,400	45.00	57.00	5.30	0.017	106.6	2.4	44.00	56.80	2.70	0.017	34.8	0.8

Note : Roughness Coefficient (n) = 0.035

TABLE E.3.6(1) HYDRAULIC REQUIREMENTS OF PROPOSED PUMPING STATION : GREATER DHAKA EAST

Proposed Pumping Station	Drainage Zone		Discharge Capacity	Design Water Level (m, PWD)					Static Head (m)		Remarks
	No.	Area		Outer			Inner				
		(km^2)	(m^3/s)	H.H.W.L	H.W.L	L.W.L	H.W.L	L.W.L	Design	Max.	
P 5	DC-1	22.11	25.60	8.15	6.25	3.00	4.00	3.00	3.25	5.15	
P 6	DC-2	47.88	54.60	7.90	6.15	3.00	4.00	3.00	3.15	4.90	
P 7A	DC-3	46.58	53.10	7.60	6.05	3.00	4.00	3.00	3.05	4.60	
P 7B	DC-4	41.34	47.20	7.55	6.00	3.00	4.00	3.00	3.00	4.55	

Note : 1. H.H.W.L. and H.W.L. of outer design water level means that of 100-year and 2-year frequency flood respectively

TABLE E.3.6(2) HYDRAULIC REQUIREMENTS OF PROPOSED RETARDING POND : GREATER DHAKA EAST

Proposed Retarding Pond	Drainage Zone	Pond Area (ha)	Storage Capacity (x 10^6m^3)	Design Water Level (m, PWD)		Remarks
				H.W.L	L.W.L	
RP 5-1	DC-1	138	1.38	4.00	3.00	
RP 5-2	DC-1	127	1.27	4.00	3.00	
RP 6	DC-2	575	5.75	4.00	3.00	
RP 7A	DC-3	339	5.59	4.00	3.00	
RP 7B-1	DC-4	199	1.99	4.00	3.00	
RP 7B-2	DC-4	297	2.97	4.00	3.00	

TABLE E.3.7 LAND USE AND POPULATION BY DRAINAGE ZONE IN 1990 AND 2010

Item \ Area	DC 1	DC 2				DC 3			DC 4			Total
		2-A	2-B	2-C	Total	3-A	3-B	Total	4-A	4-B	Total	
Area (km2)	30.56	5.71	10.13	32.04	47.88	32.01	14.57	46.58	10.02	31.32	41.34	166.36
(I) Land Use (km2)												
(1) Residencial (high)	0	0	0	0	0	4.06	0	4.06	2.58	1.68	4.26	8.32
(2) Residencial (middle)	0.16	0	0.11	0.20	0.31	3.44	0.56	4.00	1.47	2.24	3.71	8.18
(3) Residencial (low)	4.90	3.60	3.21	3.15	9.96	13.95	0.85	14.80	1.27	5.41	6.68	36.34
(4) Commercial	0.08	0	0	0.01	0.01	1.42	0	1.42	1.57	0.31	1.88	3.39
(5) Industry	0	0	0	0	0	2.69	0	2.69	0.28	0.01	0.29	2.98
(6) Institution	0.02	0.44	0.01	0	0.45	4.68	0	4.68	2.15	0.20	2.35	7.50
Sub-Total (buil-up area)	5.16	4.04	3.33	3.36	10.73	30.24	1.41	31.65	9.32	9.85	19.17	66.71
(7) Agriculture	24.39	1.42	6.41	26.99	34.82	0.15	10.70	10.85	0.63	19.67	20.30	90.36
(8) Water Body	1.01	0.25	0.39	1.69	2.33	1.62	2.46	4.08	0.07	1.80	1.87	9.29
Sub-Total	25.40	1.67	6.80	28.68	37.15	1.77	13.16	14.93	0.70	21.47	22.17	99.65
(II) Population (x10 6)	0.08	0.05	0.04	0.06	0.15	0.93	0.02	0.95	0.54	0.43	0.97	2.15
(I) Land Use (km2)												
(1) Residencial (high)	4.46	0.05	2.49	2.57	5.11	9.60	2.87	12.47	3.79	7.92	11.71	33.75
(2) Residencial (middle)	8.44	0.05	3.51	6.65	10.21	6.58	2.70	9.28	0.93	8.66	9.59	37.52
(3) Residencial (low)	5.33	0.05	0.93	0.88	1.86	1.58	0.59	2.17	0.12	1.17	1.29	10.65
(4) Commercial	1.38	0.23	0.43	0.71	1.37	1.85	0.27	2.12	1.77	1.56	3.33	8.20
(5) Industry	0.22	0.00	0.03	0.00	0.03	2.18	0.00	2.18	0.21	0.15	0.36	2.79
(6) Institution	5.52	5.29	2.67	4.71	12.67	9.44	2.48	11.92	3.18	6.20	9.38	39.49
Sub-Total (buil-up area)	25.35	5.67	10.06	15.52	31.25	31.23	8.91	40.14	10.00	25.66	35.66	132.40
(7) Agriculture	2.40	0.00	0.00	10.70	10.70	0.00	0.00	0.00	0.00	0.00	0.00	13.10
(8) Water Body	2.81	0.04	0.07	5.82	5.93	0.78	5.66	6.44	0.02	5.66	5.68	20.86
Sub-Total	5.21	0.04	0.07	16.52	16.63	0.78	5.66	6.44	0.02	5.66	5.68	33.96
(II) Population (x10 6)	0.55	0.00	0.22	0.26	0.48	1.49	0.21	1.70	0.78	0.96	1.74	4.47

TABLE E.3.8 RUN-OFF COEFFICIENT : GREATER DHAKA EAST

Dhaka East Zone (DC)

(DC-1)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutional	Open Space /Agricultural	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
DC-1-1	2.53	0.39	12.03	24.05	24.05	5.70	1.11	17.50	14.25	1.31
DC-1-2	3.95	0.40	14.33	27.85	21.39	5.35	0.96	17.75	11.23	1.15
DC-1-3	5.01	0.44	21.88	40.30	12.64	4.19	0.45	18.57	1.35	0.62
DC-1-4	1.76	0.38	16.97	29.16	7.58	2.80	0.22	17.58	24.97	0.71
DC-1-5	5.09	0.33	10.07	19.70	11.79	2.81	0.49	11.78	42.42	0.96
DC-1-6	3.77	0.32	7.40	14.80	14.80	3.51	0.68	10.77	47.23	0.80
DC-1-7	3.38	0.39	12.03	24.05	24.05	5.70	1.11	17.50	14.25	1.31
DC-1-8	2.57	0.39	12.03	24.05	24.05	5.70	1.11	17.50	14.25	1.31
DC-1-9	2.50	0.42	26.63	25.87	8.09	4.82	0.15	33.09	1.17	0.19

(DC-2)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutional	Open Space /Agricultural	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
DC-2-1	5.71	0.38	18.18	13.92	3.57	4.08	0.00	59.43	0.00	0.82
DC-2-2	1.79	0.40	21.20	13.49	3.85	4.72	0.00	55.25	0.00	1.48
DC-2-3	4.08	0.44	24.03	38.41	10.38	4.19	0.31	22.23	0.00	0.45
DC-2-4	2.97	0.45	22.90	41.99	11.45	4.03	0.38	18.69	0.00	0.55
DC-2-5	1.29	0.42	21.89	26.78	7.40	4.40	0.18	38.20	0.00	1.05
DC-2-6	4.54	0.34	14.41	15.81	3.36	2.25	0.00	29.76	33.05	1.36
DC-2-7	3.52	0.40	19.31	21.27	4.51	4.24	0.00	41.18	8.09	1.40
DC-2-8	2.36	0.35	12.60	25.22	4.20	1.85	0.00	14.35	40.52	1.27
DC-2-9	3.33	0.40	16.76	33.57	5.59	3.64	0.00	20.40	18.77	1.29
DC-2-10	1.25	0.38	15.26	30.56	5.09	3.00	0.00	18.22	26.60	1.28
DC-2-11	4.98	0.38	15.26	30.56	5.09	3.00	0.00	18.22	26.60	1.28
DC-2-12	1.34	0.38	15.26	30.56	5.09	3.00	0.00	18.22	26.60	1.28
DC-2-13	1.23	0.35	12.03	24.10	4.01	2.36	0.00	14.37	42.11	1.01
DC-2-14	4.48	0.24	3.84	7.67	1.28	0.10	0.00	3.86	82.72	0.54
DC-2-15	5.01	0.25	3.94	7.88	1.31	0.10	0.00	3.96	82.24	0.56

(DC-3)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutional	Open Space /Agricultural	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
DC-3-1	8.81	0.47	40.87	9.45	0.32	10.51	6.63	30.02	0.00	2.20
DC-3-2	3.23	0.50	30.52	24.38	4.26	3.09	24.96	10.00	0.00	2.79
DC-3-3	5.54	0.42	24.81	21.06	7.71	3.47	0.00	35.98	4.67	2.30
DC-3-4	7.24	0.43	20.73	30.42	5.21	4.52	0.17	36.68	0.00	2.28
DC-3-5	6.29	0.43	23.28	20.27	4.06	4.81	7.16	38.88	0.00	1.55
DC-3-6	2.38	0.42	23.58	27.78	6.76	4.28	0.00	25.04	10.61	1.94
DC-3-7	3.42	0.38	14.89	29.84	4.96	3.24	0.00	18.13	27.79	1.14
DC-3-8	2.09	0.34	11.14	22.32	3.71	2.42	0.00	13.57	45.97	0.86
DC-3-9	1.86	0.30	8.55	16.16	2.28	2.42	0.10	9.98	59.98	0.52
DC-3-10	4.10	0.27	3.13	12.69	5.29	1.16	0.00	9.03	68.27	0.43
DC-3-11	0.69	0.40	8.69	35.22	14.70	3.21	0.00	25.08	11.92	1.19
DC-3-12	0.93	0.27	3.32	13.47	5.62	1.23	0.00	9.59	66.32	0.45

(DC-4)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutional	Open Space /Agricultural	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
DC-4-1	7.25	0.47	35.05	5.94	0.45	21.78	2.79	33.99	0.00	0.00
DC-4-2	2.11	0.48	61.10	16.61	2.41	5.68	0.61	12.84	0.00	0.74
DC-4-3	3.67	0.47	42.01	30.26	4.34	6.97	0.22	15.71	0.00	0.50
DC-4-4	1.03	0.43	34.67	24.97	3.58	5.75	0.18	12.97	17.48	0.41
DC-4-5	2.72	0.44	28.27	18.99	0.04	9.81	0.00	41.81	0.12	0.96
DC-4-6	0.61	0.44	28.27	18.99	0.04	9.81	0.00	41.81	0.12	0.96
DC-4-7	2.49	0.46	29.55	31.11	4.01	8.95	0.15	22.52	2.82	0.88
DC-4-8	0.70	0.29	4.27	18.28	5.48	1.55	0.13	9.77	60.00	0.52
DC-4-9	1.39	0.36	7.21	30.91	9.27	2.62	0.22	16.52	32.37	0.87
DC-4-10	5.30	0.37	28.38	12.54	1.38	2.73	0.79	19.16	34.15	0.87
DC-4-11	3.24	0.35	11.99	26.34	3.69	2.77	0.52	14.70	39.20	0.79
DC-4-12	2.91	0.44	27.04	29.90	3.97	4.79	1.13	31.90	0.00	1.28
DC-4-13	2.56	0.46	14.91	52.18	7.45	4.39	0.68	19.09	0.00	1.30
DC-4-14	0.30	0.29	3.91	16.76	5.03	1.42	0.12	8.96	63.33	0.47
DC-4-15	1.11	0.26	2.59	11.12	3.33	0.94	0.08	5.94	75.68	0.31
DC-4-16	1.10	0.43	11.23	44.16	10.47	3.73	0.42	20.62	8.18	1.19
DC-4-17	0.30	0.46	14.91	52.18	7.45	4.39	0.68	19.09	0.00	1.30
DC-4-18	1.96	0.44	27.04	29.90	3.97	4.79	1.13	31.90	0.00	1.28
DC-4-19	0.59	0.46	14.91	52.18	7.45	4.39	0.68	19.09	0.00	1.30

TABLE E.3.9 DESIGN DISCHARGE : GREATER DHAKA EAST

Dhaka East Zone (DC)

(DC-1)

Conditions: Inlet Time; 20min

Block No.	Drainage Area Individual a (km2)	Drainage Area Accumlated A (km2)	Run-off Coefficier Individual f	Run-off Coefficier Accumlated F	Length Individual l (km)	Length Accumlated L (km)	Velocity V (m/s)	Time of Concentration t (min)	Rainfal Intensity r (mm/hr)	Areal Reduction Factor (m3/s/km)	Design Discharge (m3/s)
DC-1-1	2.53	2.53	0.39	0.39	2.30	2.30	0.80	68	76.37	0.98	20.5
DC-1-2	3.95	6.48	0.40	0.40	1.70	4.00	0.80	103	58.73	0.96	40.3
DC-1-3	5.01	11.49	0.44	0.42	2.30	6.30	0.80	151	46.71	0.94	58.5
DC-1-4	1.76	1.76	0.38	0.38	2.00	2.00	0.80	62	80.64	0.99	14.9
DC-1-5	5.09	18.34	0.33	0.39	1.90	8.20	0.80	191	40.67	0.92	74.5
DC-1-6	3.77	22.11	0.32	0.38	0.50	8.70	0.80	201	39.33	0.91	83.2
DC-1-7	3.38	3.38	0.39	0.39	2.50	2.50	0.80	72	73.76	0.98	26.5
DC-1-8	2.57	5.95	0.39	0.39	1.30	3.80	0.80	99	60.37	0.96	37.3
DC-1-9	2.50	2.50	0.42	0.42	2.20	2.20	0.80	66	77.74	0.99	22.6

(DC-2)

Conditions: Inlet Time; 20min

Block No.	Drainage Area Individual a (km2)	Drainage Area Accumlated A (km2)	Run-off Coefficier Individual f	Run-off Coefficier Accumlated F	Length Individual l (km)	Length Accumlated L (km)	Velocity V (m/s)	Time of Concentration t (min)	Rainfal Intensity r (mm/hr)	Areal Reduction Factor (m3/s/km)	Design Discharge (m3/s)
DC-2-1	5.71	5.71	0.38	0.38	3.20	3.20	0.80	87	65.89	0.96	38.5
DC-2-2	1.79	7.50	0.40	0.39	1.40	4.60	0.80	116	54.30	0.95	41.6
DC-2-3	4.08	4.08	0.44	0.44	2.10	2.10	0.80	64	79.16	0.97	38.6
DC-2-4	2.97	7.05	0.45	0.45	2.00	4.10	0.80	105	57.94	0.96	48.5
DC-2-5	1.29	15.84	0.42	0.42	1.00	5.60	0.80	137	49.42	0.92	83.2
DC-2-6	4.54	20.38	0.34	0.40	2.20	7.80	0.80	183	41.81	0.91	86.2
DC-2-7	3.52	3.52	0.40	0.40	3.10	3.10	0.80	85	66.91	0.97	25.2
DC-2-8	2.36	26.26	0.35	0.40	2.00	9.80	0.80	224	36.67	0.88	93.0
DC-2-9	3.33	3.33	0.40	0.40	2.40	2.40	0.80	70	75.04	0.98	27.5
DC-2-10	1.25	30.84	0.38	0.40	1.40	11.20	0.80	253	33.77	0.86	98.5
DC-2-11	4.98	4.98	0.38	0.38	2.20	2.20	0.80	66	77.74	0.97	40.1
DC-2-12	1.34	6.32	0.38	0.38	1.60	3.80	0.80	99	60.37	0.96	39.1
DC-2-13	1.23	38.39	0.35	0.39	0.70	11.90	0.80	268	32.48	0.85	115.5
DC-2-14	4.48	4.48	0.24	0.24	2.80	2.80	0.80	78	70.17	0.97	20.7
DC-2-15	5.01	47.88	0.25	0.36	2.50	14.40	0.80	320	28.59	0.83	114.6

(DC-3)

Conditions: Inlet Time; 20min

Block No.	Drainage Area Individual a (km2)	Drainage Area Accumlated A (km2)	Run-off Coefficier Individual f	Run-off Coefficier Accumlated F	Length Individual l (km)	Length Accumlated L (km)	Velocity V (m/s)	Time of Concentration t (min)	Rainfal Intensity r (mm/hr)	Areal Reduction Factor (m3/s/km)	Design Discharge (m3/s)
DC-3-1	8.81	8.81	0.47	0.47	4.07	4.07	1.00	88	65.33	0.95	71.3
DC-3-2	3.23	12.04	0.50	0.48	2.40	6.47	1.00	128	51.22	0.94	77.0
DC-3-3	5.54	5.54	0.42	0.42	5.20	5.20	0.80	128	51.11	0.96	31.4
DC-3-4	7.24	7.24	0.43	0.43	4.60	4.60	0.80	116	54.30	0.96	45.5
DC-3-5	6.29	6.29	0.43	0.43	3.20	3.20	0.80	87	65.89	0.96	47.8
DC-3-6	2.38	33.49	0.42	0.45	2.30	8.77	0.80	203	39.15	0.86	139.6
DC-3-7	3.42	3.42	0.38	0.38	2.60	2.60	0.80	74	72.52	0.97	25.5
DC-3-8	2.09	5.51	0.34	0.36	1.80	4.40	0.80	112	55.70	0.96	29.8
DC-3-9	1.86	40.86	0.30	0.43	2.70	11.47	0.80	259	33.26	0.85	137.4
DC-3-10	4.10	44.96	0.27	0.41	2.20	13.67	0.80	305	29.63	0.83	127.1 (120.0)
DC-3-11	0.69	0.69	0.40	0.40	1.20	1.20	0.80	45	94.79	1.00	7.2
DC-3-12	0.93	1.62	0.27	0.33	1.20	2.40	0.80	70	75.04	0.99	10.9

(DC-4)

Conditions: Inlet Time; 20min

Block No.	Drainage Area Individual a (km2)	Drainage Area Accumlated A (km2)	Run-off Coefficier Individual f	Run-off Coefficier Accumlated F	Length Individual l (km)	Length Accumlated L (km)	Velocity V (m/s)	Time of Concentration t (min)	Rainfal Intensity r (mm/hr)	Areal Reduction Factor (m3/s/km)	Design Discharge (m3/s)
DC-4-1	7.25	7.25	0.47	0.47	4.00	4.00	1.00	87	65.89	0.95	58.6
DC-4-2	2.11	9.36	0.48	0.47	1.40	5.40	1.00	110	56.28	0.94	64.5
DC-4-3	3.67	3.67	0.47	0.47	3.30	3.30	0.80	89	64.90	0.97	30.4
DC-4-4	1.03	14.06	0.43	0.47	2.20	7.60	0.80	178	42.40	0.93	71.9
DC-4-5	2.72	2.72	0.44	0.44	1.90	1.90	0.80	60	82.17	0.98	26.5
DC-4-6	0.61	3.33	0.44	0.44	1.30	3.20	0.80	87	65.89	0.98	26.0
DC-4-7	2.49	5.82	0.46	0.44	1.10	4.30	0.80	110	56.43	0.96	38.9
DC-4-8	0.70	20.58	0.29	0.45	1.00	8.60	0.80	199	39.59	0.91	93.6
DC-4-9	1.39	1.39	0.36	0.36	1.90	1.90	0.80	60	82.17	0.99	11.3
DC-4-10	5.30	5.30	0.37	0.37	2.70	2.70	0.80	76	71.33	0.96	36.8
DC-4-11	3.24	8.21	0.35	0.39	2.20	4.90	0.80	122	52.46	0.95	44.6 (25.0)
DC-4-12	2.91	2.91	0.44	0.44	3.00	3.00	0.80	83	67.96	0.98	23.8
DC-4-13	2.56	5.47	0.46	0.45	2.20	5.20	0.80	128	51.11	0.96	33.6
DC-4-14	0.30	14.31	0.29	0.39	0.30	5.50	0.80	135	49.83	0.93	72.5 (35.0)
DC-4-15	1.11	37.39	0.26	0.42	1.90	10.50	0.80	239	35.16	0.85	131.0 (115.0)
DC-4-16	1.10	1.10	0.43	0.43	1.70	1.70	0.80	55	85.42	0.99	11.0
DC-4-17	0.30	38.79	0.46	0.42	0.50	11.00	0.80	249	34.15	0.85	132.1 (120.0)
DC-4-18	1.96	1.96	0.44	0.44	1.60	1.60	0.80	53	87.15	0.99	20.8
DC-4-19	0.59	2.55	0.46	0.45	1.20	2.80	0.80	78	70.17	0.98	21.8

Note: The figures in parenthesis indicate the design discharge estimated in hydraulic simulation by Mike 11 model, considering the storage effect of the retarding area.

TABLE E.3.10 HYDRAULIC DESIGN OF KHAL IMPROVEMENT : GREATER DHAKA EAST

Dhaka East Zone (DC)

Khal No.	Design Discharge (m3/s)	Section Bottom Wid. (m)	Section Upper Wid. (m)	Section Height (m)	Roughness Coefficient	Slope i (%)	Velosity (m/s)	Discharge Capacity (m3/s)
(DC-1)								
KD-1-1	83.2	20.00	34.80	3.70	0.035	0.022	0.84	85.2
KD-1-2	74.6	17.50	32.30	3.70	0.035	0.022	0.83	76.2
KD-1-3	58.5	13.00	27.80	3.70	0.035	0.022	0.80	60.1
KD-1-4	40.3	7.50	22.30	3.70	0.035	0.022	0.74	40.8
KD-1-5	20.5	2.00	16.80	3.70	0.035	0.022	0.65	22.5
KD-2	14.9	2.00	16.32	3.58	0.035	0.025	0.67	22.1
KD-3-1	37.3	5.00	21.00	4.00	0.035	0.022	0.74	38.3
KD-3-2	26.5	2.00	18.00	4.00	0.035	0.022	0.68	27.1
KD-4	22.6	2.50	10.50	4.00	0.025	0.022	0.91	23.6
(DC-2)								
KD-5-1	115.5	27.50	43.50	4.00	0.035	0.018	0.82	117.0
KD-5-2	115.5	27.50	43.50	4.00	0.035	0.018	0.82	117.0
KD-5-3	98.5	23.00	39.00	4.00	0.035	0.018	0.81	100.1
KD-5-4	93.1	21.50	37.50	4.00	0.035	0.018	0.80	94.5
KD-5-5	86.2	19.50	35.50	4.00	0.035	0.018	0.79	87.0
KD-5-6	83.2	16.00	31.68	3.92	0.035	0.025	0.89	83.6
KD-5-7	41.6	6.50	21.70	3.80	0.035	0.025	0.78	41.9
KD-5-8	38.6	6.00	21.00	3.75	0.035	0.025	0.77	39.0
KD-6	20.7	2.00	17.40	3.85	0.035	0.025	0.70	26.3
KD-7-1	40.1	7.00	23.00	4.00	0.035	0.018	0.69	41.6
KD-7-2	40.1	6.00	21.28	3.82	0.035	0.025	0.78	40.5
KD-8	27.5	2.50	17.90	3.85	0.035	0.025	0.72	28.1
KD-9	25.2	2.00	17.68	3.92	0.035	0.025	0.71	27.4
KD-10-1	48.6	9.00	24.00	3.75	0.035	0.025	0.81	50.1
KD-10-2	38.6	7.00	14.16	3.58	0.025	0.025	1.07	40.7
(DC-3)								
KD-11-1	120.0	24.50	41.70	4.30	0.035	0.018	0.85	120.4
KD-11-2	139.6	29.00	46.20	4.30	0.035	0.018	0.86	139.5
KD-11-3	139.6	26.50	42.98	4.12	0.035	0.025	0.98	140.0
KD-12-1	10.9	2.00	17.20	3.80	0.035	0.025	0.70	25.5
KD-12-2	7.2	2.00	15.04	3.26	0.035	0.025	0.64	17.7
KD-13-1	29.8	2.00	18.60	4.15	0.035	0.025	0.74	31.5
KD-13-2	25.5	2.00	18.20	4.05	0.035	0.025	0.73	29.7
(DC-4)								
KD-14-1	120.0	24.50	41.70	4.30	0.035	0.018	0.85	120.4
KD-14-2	115.0	23.50	40.70	4.30	0.035	0.018	0.84	116.2
KD-14-3	93.6	18.50	35.70	4.30	0.035	0.018	0.82	95.2
KD-14-4	71.9	11.50	20.10	4.30	0.025	0.018	1.09	74.0
KD-14-5	71.9	10.00	18.36	4.18	0.025	0.025	1.23	73.0
KD-15-1	21.8	2.00	18.80	4.20	0.035	0.025	0.74	32.4
KD-15-2	20.8	2.00	16.48	3.62	0.035	0.025	0.68	22.7
KD-16	11.0	2.00	16.40	3.60	0.035	0.025	0.68	22.4
KD-17-1	35.0	3.00	20.00	4.25	0.035	0.025	0.77	37.6
KD-17-2	25.0	2.00	18.28	4.07	0.035	0.025	0.73	30.0
KD-17-3	36.8	5.00	20.36	3.84	0.035	0.025	0.76	37.2
KD-18-1	33.6	3.00	19.28	4.07	0.035	0.025	0.75	34.0
KD-18-2	23.8	2.00	16.80	3.70	0.035	0.025	0.69	23.9
KD-19	11.3	2.00	16.04	3.51	0.035	0.025	0.67	21.1
KD-20-1	38.9	3.50	20.34	4.21	0.035	0.025	0.78	38.9
KD-20-2	26.5	3.00	11.20	4.10	0.025	0.025	1.00	29.2
KD-20-3	26.5	3.00	11.00	4.00	0.025	0.025	0.99	27.7

TABLE E.3.11 PROPOSED KHAL IMPROVEMENT WORKS : GREATER DHAKA EAST

Dhaka East Zone (DC)

Zone	Khal No.	Khal Length (km)	Required Hydraulic Section Wb x Wu x H (m x m x m)	Open Channel		Covered Channel		Bridge (Places)	Aqueduct (Places)	Dredging (1000m3)	Maintenance Road (km)	Land Acquisition (ha)
				Brick Protection (km)	Sodding (km)	Box Culvert (km)	Brick Pipe (km)					
DC-1	KD-1-1	0.50	20.0 34.8 3.7	-	0.50	-	-	-	-	25.10	0.50	1.88
	KD-1-2	1.90	17.5 32.3 3.7	-	1.90	-	-	-	-	36.90	1.90	2.35
	KD-1-3	2.30	13.0 27.8 3.7	-	2.30	-	-	-	-	65.95	2.30	7.47
	KD-1-4	1.70	7.5 22.3 3.7	-	1.70	-	-	-	-	32.30	1.70	6.72
	KD-1-5	1.00	2.0 16.8 3.7	-	1.00	-	-	-	-	22.90	1.00	2.93
	KD-2	1.40	2.0 16.3 3.6	-	1.40	-	-	-	-	1.86	1.40	1.66
	KD-3-1	1.30	5.0 21.0 4.0	-	1.30	-	-	-	-	0.00	1.30	3.88
	KD-3-2	1.40	2.0 18.0 4.0	-	1.40	-	-	-	-	0.00	1.40	3.85
	KD-4	1.20	2.5 10.5 4.0	1.20	-	-	-	-	-	3.86	1.20	1.63
	Sub-Total	12.70		1.20	11.50	0.00	0.00	0	0	188.87	12.70	32.37
DC-2	KD-5-1	2.50	27.5 43.5 4.0	-	2.50	-	-	-	-	148.44	2.50	8.01
	KD-5-2	0.70	27.5 43.5 4.0	-	0.70	-	-	-	-	49.47	0.70	3.18
	KD-5-3	1.40	23.0 39.0 4.0	-	1.40	-	-	-	-	79.81	1.40	5.55
	KD-5-4	2.00	21.5 37.5 4.0	-	2.00	-	-	-	-	81.70	2.00	6.80
	KD-5-5	2.20	19.5 35.5 4.0	-	2.20	-	-	-	-	61.03	2.20	8.67
	KD-5-6	1.00	16.0 31.7 3.9	-	1.00	-	-	-	-	32.40	1.00	4.40
	KD-5-7	1.40	6.5 21.7 3.8	-	1.40	-	-	-	-	18.80	1.40	5.18
	KD-6	1.80	2.0 17.4 3.9	-	1.80	-	-	-	-	13.62	1.80	3.08
	KD-7-1	1.60	7.0 23.0 4.0	-	1.60	-	-	-	-	27.68	1.60	3.53
	KD-7-2	2.20	6.0 21.3 3.8	-	2.20	-	-	-	-	23.40	2.20	4.54
	KD-8	1.80	2.5 17.9 3.9	-	1.80	-	-	-	-	6.91	1.80	2.85
	KD-9	1.00	2.0 17.7 3.9	-	1.00	-	-	-	-	1.59	1.00	1.59
	KD-10-1	2.00	9.0 24.0 3.8	-	2.00	-	-	3	-	39.34	2.00	7.06
	KD-10-2	2.10	7.0 14.2 3.6	2.10	-	-	-	5	-	154.25	2.10	7.29
	Sub-Total	23.70		2.10	21.60	0.00	0.00	8	0	738.44	23.70	71.73
DC-3	KD-11-1	2.20	24.5 41.7 4.3	-	2.20	-	-	-	-	135.81	2.20	2.38
	KD-11-2	2.70	29.0 46.2 4.3	-	2.70	-	-	-	-	155.96	2.70	5.49
	KD-11-3	1.70	26.5 43.0 4.1	-	1.70	-	-	-	-	110.73	1.70	6.66
	KD-12-1	1.20	2.0 17.2 3.8	-	1.20	-	-	-	-	37.82	1.20	2.97
	KD-12-2	1.30	2.0 15.0 3.3	-	1.30	-	-	-	-	35.89	1.30	4.44
	KD-13-1	1.80	2.0 18.6 4.2	-	1.80	-	-	-	-	14.81	1.80	2.73
	KD-13-2	1.20	2.0 18.2 4.1	-	1.20	-	-	-	-	4.01	1.20	1.23
	Sub-Total	12.10		0.00	12.10	0.00	0.00	0	0	495.03	12.10	25.90
DC-4	KD-14-1	0.50	24.5 41.7 4.3	-	0.50	-	-	-	-	159.04	0.50	5.60
	KD-14-2	1.90	23.5 40.7 4.3	-	1.90	-	-	1	-	153.30	1.90	8.62
	KD-14-3	1.00	18.5 35.7 4.3	-	1.00	-	-	-	-	117.04	1.00	6.41
	KD-14-4	0.70	11.5 20.1 4.3	0.70	-	-	-	-	-	45.15	0.70	1.27
	KD-14-5	1.50	10.0 18.4 4.2	1.50	-	-	-	1	-	111.59	1.50	4.32
	KD-15-1	1.20	2.0 18.8 4.2	-	1.20	-	-	-	-	61.56	1.20	2.96
	KD-15-2	1.40	2.0 16.5 3.6	-	1.40	-	-	-	-	86.64	1.40	5.05
	KD-16	1.70	2.0 16.4 3.6	-	1.70	-	-	-	-	78.98	1.70	5.14
	KD-17-1	0.60	3.0 20.0 4.3	-	0.60	-	-	-	-	6.40	0.60	0.36
	KD-17-2	2.20	2.0 18.3 4.1	-	2.20	-	-	1	-	81.88	2.20	3.46
	KD-17-3	2.70	5.0 20.4 3.8	-	2.70	-	-	-	-	117.99	2.70	4.47
	KD-18-1	2.20	3.0 19.3 4.1	-	2.20	-	-	-	-	56.14	2.20	4.23
	KD-18-2	0.90	2.0 16.8 3.7	-	0.90	-	-	-	-	19.80	0.90	1.87
	KD-19	1.90	2.0 16.0 3.5	-	1.90	-	-	-	-	14.16	1.90	1.65
	KD-20-1	1.10	3.5 20.3 4.2	-	1.10	-	-	1	-	47.40	1.10	3.45
	KD-20-2	1.30	3.0 11.2 4.1	1.30	-	-	-	-	-	34.40	1.30	3.14
	KD-20-3	1.30	3.0 11.0 4.0	1.30	-	-	-	-	-	46.24	1.30	4.53
	Sub-Total	24.10		4.80	19.30	0.00	0.00	4	0	1237.71	24.10	66.53
	Total	72.60		8.10	64.50	0.00	0.00	12	0	2660.05	72.60	196.53

TABLE E.4.1 PROPOSED FLOOD MITIGATION FACILITY : DND AREA

Route (Total Length)	Facility		Main Features
1. Chasara to Buriganga Bridge (DW) (L= 10.63 km)	1) Flood Wall Construction	:	-
	2) Rehabilitation Work	:	
	(1) Foot Protection	:	L = 3.63 km
	(2) Flood Wall Raising	:	L = -
	3) Stop Log Structure	:	14 places
2. Buriganga Bridge to Demra (DN) (L= 8.58 km)	1) Flood Wall Construction	:	L = 0.58 km
	2) Rehabilitation Work	:	
	(1) Foot Protection	:	L = 5.60 km
	(2) Flood Wall Raising	:	L = 4.40 km
	3) Stop Log Structure	:	17 places
3. Chasara to Hajiganj (DS) (L= 2.15 km)	1) Flood Wall Construction	:	L = 1.75 km
4. Hajganj to Demra (DE) (L= 10.16 km)	1) Flood Wall Construction	:	L = 1.05 km
	2) Rehabilitation Work	:	
	(1) Foot Protection	:	L = 8.40 km
	(2) Flood Wall Raising	:	L = 3.20 km
	3) Stop Log Structure	:	27 places
	4) Sluice Gate	:	1 place
Total	1) Flood Wall Construction	:	3.38 km
	2) Rehabilitation Work	:	
	(1) Foot Protection	:	17.63 km
	(2) Flood Wall Raising	:	7.60 km
	3) Stop Log Structure	:	58 places
	4) Sluice Gate	:	1 place

TABLE E.4.2 LAND USE AND POPULATION OF DND

Drainage Area (km^2)	1990		2000		2100	
	Buil-up Area (km^2)	Population (million people)	Buil-up Area (km^2)	Population (million people)	Buil-up Area (km^2)	Population (million people)
56.79	21.74	0.449	36.14	0.880	42.70	1.314

TABLE E.4.3 MAIN HYDRAULIC FEATURES OF EXISTING MAJOR KHALS : DND

DND Project Area (NA)

Khal No.	Length	Max. Section						Min. Section					
		Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity	Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity
	(m)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)
K 1	3,200	2.80	5.60	1.20	0.017	0.8	0.3	0.80	3.20	0.60	0.017	0.2	0.2
K 2	3,280	1.50	23.80	2.80	0.050	26.2	17.4	7.00	3.60	0.90	0.050	0.6	0.1
K 3	2,200	9.50	10.20	2.00	0.017	3.6	0.4	10.60	5.60	1.40	0.017	1.1	0.1
K 4	1,660	21.00	14.00	2.00	0.017	5.1	0.2	21.30	12.00	0.90	0.017	1.2	0.1
K 5	1,200	24.00	43.20	4.80	0.017	68.2	2.8	25.00	19.20	2.70	0.017	11.5	0.5
K 6	900	25.00	58.40	6.90	0.017	168.4	6.7	25.00	31.40	2.30	0.017	14.7	0.6
K 7	3,600	1.00	15.60	2.40	0.017	7.6	7.6	2.30	10.40	0.90	0.017	1.0	0.4
K 8	1,000	1.40	18.60	3.00	0.050	22.6	16.1	0.70	6.40	1.40	0.050	2.1	3.0
K 9	2,480	7.00	14.40	2.90	0.017	9.5	1.4	8.00	8.60	1.40	0.017	1.7	0.2
K 10	820	11.00	11.80	1.50	0.017	2.7	0.2	11.30	10.60	1.30	0.017	1.9	0.2
K 11	3,000	25.00	26.60	3.60	0.017	25.8	1.0	1.50	13.60	1.00	0.017	1.6	1.1
K 12	2,240	13.50	7.60	1.90	0.017	2.4	0.2	12.50	7.00	1.00	0.017	0.8	0.1
K 13	320	55.80	2.40	0.40	0.017	0.1	0.0	55.80	2.40	0.40	0.017	0.1	0.0
K 14	1,380	1.80	6.80	1.80	0.017	2.0	1.1	0.80	4.60	0.70	0.017	0.3	0.4
K 15	2,200	10.00	23.00	1.00	0.017	2.7	0.3	12.80	4.80	0.70	0.017	0.3	0.0
K 16	1,400	5.00	10.20	3.00	0.017	6.8	1.4	7.60	6.20	0.60	0.017	0.3	0.0
K 17	2,600	2.50	29.40	2.90	0.025	24.4	9.7	3.70	10.40	1.10	0.025	1.7	0.5
K 18	1,600	0.20	16.00	3.00	0.050	19.2	96.2	1.00	13.00	2.20	0.050	9.4	9.4

Note : Roughness Coefficient (n) = 0.035

TABLE E.4.4 YEARLY OPERATION RECORD OF DEMRA PUMPING STATION

Year	Total operation of Pump in hour						Water level (feet PWD)					
	A Gate	B Gate	C Gate	A+B Gate	B+C Gate	A+B+C Gate	River side		Country side		Main Canal	
							max.	min.	max.	min.	max.	min.
1970	2,166	327	3,995	2,493	4,322	6,488	18.70	2.00	8.80	2.30	15.60	13.50
1971	2,066	316	6,638	2,382	6,954	9,020	18.20	1.60	9.70	1.60	16.20	11.00
1972	3,654	528	2,160	4,182	2,688	6,342	16.00	1.20	7.60	1.60	15.40	10.50
1973	2,958	393	5,306	3,351	5,699	8,657	17.30	0.90	8.70	1.00	15.50	12.00
1974	2,944	481	6,370	3,425	6,851	9,795	19.70	1.70	8.20	1.40	15.60	13.20
1975	3,804	499	4,439	4,303	4,938	8,742	16.50	0.80	9.40	2.50	15.50	8.60
1976	3,623	712	4,588	4,335	5,300	8,923	16.30	1.00	8.80	1.60	15.80	9.00
1977	2,925	670	4,147	3,595	4,817	7,742	17.20	0.30	8.50	2.00	15.90	-
1978	3,824	604	4,873	4,428	5,477	9,301	16.10	0.05	8.40	2.70	15.90	11.40
1979	4,381	718	4,856	5,099	5,574	9,955	16.30	1.00	9.00	1.60	15.70	11.30
1980	3,597	653	4,530	4,250	5,183	8,780	18.30	1.00	7.50	0.00	15.80	11.50
1981	3,026	735	4,132	3,761	4,867	7,893	16.70	1.00	7.90	2.00	15.50	10.90
1982	3,404	528	2,703	3,932	3,231	6,635	15.90	0.00	7.90	1.40	15.90	11.50
1983	2,428	544	5,814	2,972	6,358	8,786	17.20	0.00	9.70	0.50	15.60	11.50
1984	3,168	332	7,921	3,500	8,253	11,421	18.10	0.00	9.40	0.00	15.70	11.00
1985	2,560	533	3,645	3,093	4,178	6,738	16.50	1.00	11.30	1.30	16.60	6.00
1986	3,483	237	5,216	3,720	5,453	8,936	15.40	0.20	10.00	0.80	16.00	9.00
1987	3,040	191	5,914	3,231	6,105	9,145	19.00	0.40	10.10	0.70	16.00	11.50
1988	2,272	191	6,712	2,463	6,903	9,175	20.90	0.80	9.80	1.00	15.25	12.80
1989	2,957	436	2,597	3,393	3,033	5,990	15.90	0.00	7.40	0.00	15.25	12.00
Average	3,114 (49)	481 (366)	4,828 (4,223)	3,595 (415)	5,309 (4,589)	8,423 (4,638)	17.31	0.75	8.91	1.30	15.74	10.41

Note : 1) Case A means irrigation supply by pump from the Lakhya River.

2) Case B means irrigation supply by pump from the drainage channel of country side.

3) Case C means pump drainage to the Lakhya River.

4) The figures in parenthesis show the value between June and October.

TABLE E.4.5(1) HYDRAULIC REQUIREMENTS OF PROPOSED PUMPING STATION : DND

Proposed Pumping Station	Drainage Zone		Discharge Capacity	Design Water Level (m, PWD)					Static Head (m)		Remarks
				Outer			Inner				
	No.	Area (km^2)	(m^3/s)	H.H.W.L	H.W.L	L.W.L	H.W.L	L.W.L	Design	Max.	
P 10	NA-1	25.10	14.50	---	5.75	3.00	1.80	1.00	4.75	---	Existing Pumping Station
P 11	NA-2	31.69	50.20	7.10	5.65	3.00	4.00	3.00	2.65	4.10	

Note : 1. H.H.W.L. and H.W.L. of outer design water level means that of 100-year and 2-year frequency flood respectively

TABLE E.4.5(2) HYDRAULIC REQUIREMENTS OF PROPOSED RETARDING POND : DND

Proposed Retarding Pond	Drainage Zone	Pond Area (ha)	Storage Capacity (x 10^6m^3)	Design Water Level (m, PWD)		Remarks
				H.W.L	L.W.L	
RP 10-1	NA-1	196	1.96	4.00	3.00	
RP 10-2	NA-1	45	0.45	4.00	3.00	
RP 10-3	NA-1	60	0.60	4.00	3.00	
RP 11-1	NA-2	90	0.90	4.00	3.00	
RP 11-2	NA-2	225	2.25	4.00	3.00	
RP 11-3	NA-2	66	0.66	4.00	3.00	

TABLE E.4.6 RUN-OFF COEFFICIENT : DND

DND Project Area (NA)

(NA-1)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutionl	Open Space /Agreculturat	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
NA-1-1	0.97	0.50	46.29	8.17	0.00	3.15	19.16	18.90	0.00	4.33
NA-1-2	1.17	0.50	50.88	8.98	0.00	3.87	15.42	16.21	0.00	4.63
NA-1-3	2.70	0.51	53.82	12.15	0.00	5.87	11.51	12.33	0.00	4.32
NA-1-4	2.15	0.40	23.40	14.46	2.79	2.76	7.85	20.21	25.60	2.92
NA-1-5	1.62	0.30	7.48	11.46	2.10	0.90	3.31	9.47	62.97	2.32
NA-1-6	0.71	0.29	10.68	5.76	1.03	1.10	4.08	8.64	67.35	1.36
NA-1-7	1.32	0.44	20.84	25.01	5.29	3.30	6.00	24.38	11.02	4.17
NA-1-8	1.15	0.48	36.01	17.80	2.43	4.77	10.76	21.88	2.45	3.90
NA-1-9	2.30	0.44	24.88	24.88	5.53	4.52	3.73	27.75	5.57	3.13
NA-1-10	3.43	0.44	24.88	24.88	5.53	4.52	3.73	27.75	5.57	3.13
NA-1-11	0.53	0.45	21.81	18.64	8.52	4.25	13.50	22.44	7.14	3.70
NA-1-12	1.62	0.44	24.88	24.88	5.53	4.52	3.73	27.75	5.57	3.13
NA-1-13	1.23	0.39	19.83	19.83	4.41	3.60	2.97	22.11	24.77	2.50
NA-1-14	0.69	0.40	17.11	13.90	7.01	3.41	11.41	17.30	27.01	2.86
NA-1-15	1.59	0.43	23.81	23.41	5.69	4.36	4.66	26.33	8.65	3.09
NA-1-16	0.94	0.45	21.38	16.63	9.50	4.33	16.32	21.21	6.90	3.75
NA-1-17	0.98	0.34	11.17	7.92	4.77	2.35	10.68	10.36	50.82	1.91

(NA-2)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutionl	Open Space /Agreculturat	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
NA-2-1	2.02	0.44	24.11	21.97	5.71	4.99	9.05	32.64	0.00	1.53
NA-2-2	1.67	0.45	23.97	23.36	5.26	4.40	8.66	32.29	0.00	2.06
NA-2-3	1.09	0.46	28.37	19.40	4.36	6.03	14.57	25.60	0.00	1.66
NA-2-4	2.77	0.38	14.91	14.18	2.61	1.98	10.54	15.38	36.90	3.50
NA-2-5	2.43	0.41	15.87	22.22	4.23	1.86	8.20	22.74	20.82	4.06
NA-2-6	1.57	0.35	10.85	13.56	2.71	1.32	6.16	12.00	49.13	4.26
NA-2-7	1.29	0.26	4.47	4.40	1.29	0.72	4.19	4.31	79.22	1.40
NA-2-8	1.36	0.45	23.66	20.22	3.29	1.87	12.02	21.66	12.06	5.23
NA-2-9	1.61	0.42	20.07	19.89	3.35	1.72	10.03	19.75	20.36	4.83
NA-2-10	1.19	0.43	16.43	25.82	4.69	1.89	7.62	20.99	17.23	5.32
NA-2-11	1.39	0.44	18.99	25.02	4.89	2.23	10.26	31.40	4.16	3.05
NA-2-12	0.71	0.43	16.76	25.72	4.72	1.94	7.96	22.32	15.57	5.03
NA-2-13	1.78	0.43	16.28	25.41	4.63	1.88	7.60	20.70	18.18	5.31
NA-2-14	2.63	0.40	14.94	20.43	3.93	1.77	7.89	19.24	27.07	4.73
NA-2-15	0.67	0.36	11.55	15.47	3.00	1.39	6.22	13.32	44.74	4.31
NA-2-16	1.25	0.34	10.52	15.62	3.19	1.31	5.22	13.11	47.79	3.24
NA-2-17	1.56	0.28	5.83	6.48	1.79	0.85	3.65	6.25	73.23	1.92
NA-2-18	0.90	0.41	18.29	14.22	8.13	3.70	13.96	18.14	20.35	3.20
NA-2-19	1.51	0.44	19.74	17.88	8.22	3.70	14.10	20.46	11.90	4.00
NA-2-20	1.76	0.41	16.59	9.74	6.58	3.74	21.63	13.48	25.50	2.72
NA-2-21	0.53	0.45	18.52	8.42	6.74	4.48	31.11	12.74	15.10	2.88

TABLE E.4.7 DESIGN DISCHARGE : DND

DND Project Area (NA)

(NA-1)

Conditions: Inlet Time; 20min

Block No.	Drainage Area		Run-off Coefficier		Length		Velocity	Time of Concentration	Rainfal Intensity	Areal Reduction Factor	Design Discharge
	Individual a (km2)	Accumlated A (km2)	Individual f	Accumlated F	Individual l (km)	Accumlated L (km)	V (m/s)	t (min)	r (mm/hr)	(m3/s/km)	(m3/s)
NA-1-1	0.97	0.97	0.50	0.50	1.00	1.00	0.80	41	99.14	1.00	13.3
NA-1-2	1.17	2.14	0.50	0.50	1.20	2.20	0.80	66	77.74	0.99	23.0
NA-1-3	2.70	2.70	0.51	0.51	2.80	2.80	0.80	78	70.17	0.98	26.4
NA-1-4	2.15	6.99	0.40	0.47	1.40	4.20	0.80	108	57.17	0.96	50.5
NA-1-5	1.62	1.62	0.30	0.30	2.50	2.50	0.80	72	73.76	0.99	9.9
NA-1-6	0.71	2.33	0.29	0.30	1.70	4.20	0.80	108	57.17	0.99	10.9
NA-1-7	1.32	10.64	0.44	0.43	1.80	6.00	0.80	145	47.83	0.94	57.3 (30.0)
NA-1-8	1.15	1.15	0.48	0.48	1.80	1.80	0.80	58	83.77	0.99	12.7
NA-1-9	2.30	3.45	0.44	0.45	1.50	3.30	0.80	89	64.90	0.97	27.3
NA-1-10	3.43	6.88	0.44	0.45	1.50	4.80	0.80	120	52.97	0.96	43.5
NA-1-11	0.53	18.05	0.45	0.44	0.60	6.60	0.80	158	45.64	0.92	92.2 (50.0)
NA-1-12	1.62	1.62	0.44	0.44	1.60	1.60	0.80	53	87.15	0.99	17.1
NA-1-13	1.23	2.85	0.39	0.42	1.60	3.20	0.80	87	65.89	0.98	21.4
NA-1-14	0.69	21.59	0.40	0.43	1.00	7.60	0.80	178	42.40	0.91	100.4 (60.0)
NA-1-15	1.59	1.59	0.43	0.43	1.80	1.80	0.80	58	83.77	0.99	15.7
NA-1-16	0.94	24.12	0.45	0.43	0.70	8.30	0.80	193	40.39	0.90	105.8 (65.0)
NA-1-17	0.98	-	0.34	-	1.10	-	0.80	-	-	-	33.8

(NA-2)

Conditions: Inlet Time; 20min

Block No.	Drainage Area		Run-off Coefficier		Length		Velocity	Time of Concentration	Rainfal Intensity	Areal Reduction Factor	Design Discharge
	Individual a (km2)	Accumlated A (km2)	Individual f	Accumlated F	Individual l (km)	Accumlated L (km)	V (m/s)	t (min)	r (mm/hr)	(m3/s/km)	(m3/s)
NA-2-1	2.02	2.02	0.44	0.44	2.20	2.20	0.80	66	77.74	0.99	19.1
NA-2-2	1.67	3.69	0.45	0.44	1.80	4.00	0.80	103	58.73	0.97	25.9
NA-2-3	1.09	1.09	0.46	0.46	1.60	1.60	0.80	53	87.15	0.99	12.1
NA-2-4	2.77	7.55	0.38	0.42	1.50	5.50	0.80	135	49.83	0.95	42.1
NA-2-5	2.43	2.43	0.41	0.41	2.30	2.30	0.80	68	76.37	0.98	20.7
NA-2-6	1.57	11.55	0.35	0.41	1.20	6.70	0.80	160	45.29	0.94	56.1
NA-2-7	1.29	12.84	0.26	0.40	1.30	8.00	0.80	187	41.23	0.93	54.1
NA-2-8	1.36	1.36	0.45	0.45	2.20	2.20	0.80	66	77.74	0.99	13.1
NA-2-9	1.61	1.61	0.42	0.42	1.80	1.80	0.80	58	83.77	0.99	15.6
NA-2-10	1.19	4.16	0.43	0.43	1.40	3.60	0.80	95	62.10	0.97	30.1
NA-2-11	1.39	1.39	0.44	0.44	1.80	1.80	0.80	58	83.77	0.99	14.1
NA-2-12	0.71	2.10	0.43	0.44	1.50	3.30	0.80	89	64.90	0.99	16.4
NA-2-13	1.78	8.04	0.43	0.43	1.20	4.80	0.80	120	52.97	0.95	48.7
NA-2-14	2.63	2.63	0.40	0.40	2.60	2.60	0.80	74	72.52	0.98	20.8
NA-2-15	0.67	11.34	0.36	0.42	0.80	5.60	0.80	137	49.42	0.94	61.6
NA-2-16	1.25	1.25	0.34	0.34	1.60	1.60	0.80	53	87.15	0.99	10.2
NA-2-17	1.56	14.15	0.28	0.40	2.40	8.00	0.80	187	41.23	0.93	60.0
NA-2-18	0.90	25.02	0.41	0.43	1.00	9.30	0.80	214	37.83	0.89	71.5 (40.0)
NA-2-19	1.51	1.51	0.44	0.44	2.20	2.20	0.80	66	77.74	0.99	14.2
NA-2-20	1.76	28.29	0.41	0.43	1.80	11.10	0.80	251	33.96	0.88	71.6
NA-2-21	0.53	55.81	0.45	0.42	0.60	11.70	0.80	264	32.84	0.82	143.5

Note: The figures in parenthesis indicate the design discharge estimated in hydraulic simulation by Mike 11 model, considering the storage effect of the retarding area.

TABLE E.4.8 HYDRAULIC DESIGN OF KHAL IMPROVEMENT : DND

DND Project Area (NA)

Khal No.	Design Discharge (m3/s)	Section Bottom Wid. (m)	Section Upper Wid. (m)	Section Height (m)	Roughness Coefficient	Slope I (%)	Velosity (m/s)	Discharge Capacity (m3/s)
(NA-1)								
KN-1-1	33.8	5.50	13.50	4.00	0.025	0.017	0.89	33.8
KN-1-2	65.0	14.50	30.50	4.00	0.035	0.017	0.73	65.6
KN-1-3	60.0	13.00	29.00	4.00	0.035	0.017	0.72	60.4
KN-1-4	50.0	10.00	26.00	4.00	0.035	0.017	0.69	50.0
KN-1-5	30.0	10.00	26.00	4.00	0.035	0.017	0.69	50.0
KN-1-6	50.6	8.50	24.02	3.88	0.035	0.025	0.82	51.7
KN-1-7	23.0	3.50	17.02	3.38	0.035	0.025	0.68	23.7
KN-1-8	13.3	2.50	8.78	3.14	0.025	0.025	0.85	15.0
KN-2-1	21.4	2.00	17.48	3.87	0.035	0.025	0.71	26.6
KN-2-2	17.1	2.50	9.40	3.45	0.025	0.025	0.89	18.3
KN-3	10.9	2.00	17.44	3.86	0.035	0.025	0.70	26.4
KN-13	15.8	2.00	17.60	3.90	0.035	0.025	0.71	27.1
KN-14-1	43.5	6.50	22.02	3.88	0.035	0.025	0.79	43.8
KN-14-2	27.4	3.00	18.00	3.75	0.035	0.025	0.72	28.2
KN-14-3	12.7	2.00	8.16	3.08	0.025	0.025	0.81	12.7
KN-15	9.9	2.00	14.76	3.19	0.035	0.025	0.63	16.8
KN-16	26.4	4.00	11.40	3.70	0.025	0.025	0.99	28.3
(NA-2)								
KN-4-1	143.5	33.50	41.84	4.17	0.025	0.010	0.92	144.0
KN-4-2	56.1	10.50	27.18	4.17	0.035	0.017	0.72	56.7
KN-4-3	56.1	10.50	27.18	4.17	0.035	0.017	0.72	56.7
KN-4-4	42.1	5.50	21.66	4.04	0.035	0.025	0.79	43.5
KN-4-5	26.0	4.00	11.18	3.59	0.025	0.025	0.98	26.7
KN-4-6	19.1	3.50	10.04	3.27	0.025	0.025	0.91	20.2
KN-5-1	71.6	22.50	38.70	4.05	0.035	0.010	0.60	74.5
KN-5-2	40.0	9.50	17.50	4.00	0.025	0.010	0.76	40.8
KN-6	14.2	2.00	17.92	3.98	0.035	0.025	0.72	28.4
KN-7-1	61.6	12.00	28.68	4.17	0.035	0.017	0.73	62.3
KN-7-2	61.6	12.00	28.68	4.17	0.035	0.017	0.73	62.3
KN-7-3	48.7	7.00	15.14	4.07	0.025	0.025	1.14	51.6
KN-7-4	30.1	4.50	11.94	3.72	0.025	0.025	1.02	31.1
KN-7-5	13.1	2.00	8.82	3.41	0.025	0.025	0.86	15.9
KN-8	10.2	2.00	18.36	4.09	0.035	0.025	0.73	30.4
KN-9	20.8	2.00	18.28	4.07	0.035	0.025	0.73	30.0
KN-10	15.6	2.00	16.28	3.57	0.035	0.025	0.67	21.9
KN-11	20.7	2.00	18.20	4.05	0.035	0.025	0.73	29.7
KN-12	12.1	2.00	9.28	3.64	0.025	0.025	0.89	18.3
KN-17	16.4	2.00	15.80	3.45	0.035	0.025	0.66	20.2

TABLE E.9.9 PROPOSED KHAL IMPROVEMENT WORKS : DND

DND Project Area (NA)

Zone	Khal No.	Khal Length (km)	Required Hydraulic Section Wb x Wu x H (m x m x m)	Open Channel		Covered Channel		Bridge (Places)	Aqueduct (Places)	Dredging (1000m3)	Maintenance Road (km)	Land Acquisition (ha)
				Brick Protection (km)	Sodding (km)	Box Culvert (km)	Brick Pipe (km)					
NA-1	KN-1-1	2.10	5.5 13.5 4.0	2.10	-	-	-	-	-	22.27	2.10	0.61
	KN-1-2	0.70	14.5 30.5 4.0	-	0.70	-	-	1	-	34.44	0.70	1.72
	KN-1-3	1.00	13.0 29.0 4.0	-	1.00	-	-	1	-	43.02	1.00	2.54
	KN-1-4	0.60	10.0 26.0 4.0	-	0.60	-	-	-	-	11.90	0.60	0.82
	KN-1-5	1.80	10.0 26.0 4.0	-	1.80	-	-	1	-	76.88	1.80	4.83
	KN-1-6	1.40	8.5 24.0 3.9	-	1.40	-	-	1	-	49.86	1.40	3.98
	KN-1-7	1.20	3.5 17.0 3.4	-	1.20	-	-	-	-	29.51	1.20	2.67
	KN-1-8	0.60	2.5 8.8 3.1	0.60	-	-	-	-	-	5.91	0.60	0.22
	KN-2-1	1.60	2.0 17.5 3.9	-	1.60	-	-	3	1	34.36	1.60	3.70
	KN-2-2	1.60	2.5 9.4 3.5	1.60	-	-	-	2	-	21.32	1.60	2.37
	KN-3	1.70	2.0 17.4 3.9	-	1.70	-	-	1	-	16.78	1.70	2.92
	KN-13	1.20	2.0 17.6 3.9	-	1.20	-	-	1	-	39.35	1.20	3.49
	KN-14-1	1.50	6.5 22.0 3.9	-	1.50	-	-	-	-	48.18	1.50	4.92
	KN-14-2	1.50	3.0 18.0 3.8	-	1.50	-	-	-	-	36.30	1.50	4.45
	KN-14-3	1.60	2.0 8.2 3.1	1.60	-	-	-	1	-	27.68	1.60	3.18
	KN-15	1.60	2.0 14.8 3.2	-	1.60	-	-	1	-	11.69	1.60	4.32
	KN-16	2.20	4.0 11.4 3.7	2.20	-	-	-	-	-	43.04	2.20	4.68
	Sub-Total	23.90		8.10	15.80	0.00	0.00	13	1	552.49	23.90	51.42
NA-2	KN-4-1	1.80	33.5 41.8 4.2	1.80	-	-	-	3	-	229.56	1.80	4.37
	KN-4-2	1.30	10.5 27.2 4.2	-	1.30	-	-	-	-	118.68	1.30	4.93
	KN-4-3	1.20	10.5 27.2 4.2	-	1.20	-	-	2	-	61.65	1.20	2.61
	KN-4-4	1.50	5.5 21.7 4.0	-	1.50	-	-	2	-	73.93	1.50	4.16
	KN-4-5	1.80	4.0 11.2 3.6	1.80	-	-	-	4	-	24.91	1.80	1.27
	KN-4-6	0.80	3.5 10.0 3.3	0.80	-	-	-	1	-	20.80	0.80	0.67
	KN-5-1	1.80	22.5 38.7 4.1	-	1.80	-	-	-	-	256.96	1.80	6.03
	KN-5-2	1.00	9.5 17.5 4.0	1.00	-	-	-	-	-	67.23	1.00	2.40
	KN-6	0.90	2.0 17.9 4.0	-	0.90	-	-	-	-	18.44	0.90	1.36
	KN-7-1	2.40	12.0 28.7 4.2	-	2.40	-	-	1	1	196.23	2.40	7.92
	KN-7-2	0.80	12.0 28.7 4.2	-	0.80	-	-	-	-	42.41	0.80	2.52
	KN-7-3	1.20	7.0 15.1 4.1	1.20	-	-	-	-	-	24.62	1.20	1.36
	KN-7-4	1.40	4.5 11.9 3.7	1.40	-	-	-	6	-	34.30	1.40	1.18
	KN-7-5	0.80	2.0 8.8 3.4	0.80	-	-	-	1	-	8.70	0.80	0.58
	KN-8	1.00	2.0 18.4 4.1	-	1.00	-	-	-	-	20.54	1.00	1.65
	KN-9	1.30	2.0 18.3 4.1	-	1.30	-	-	1	-	31.32	1.30	2.20
	KN-10	1.80	2.0 16.3 3.6	-	1.80	-	-	2	-	20.00	1.80	2.43
	KN-11	1.40	2.0 18.2 4.1	-	1.40	-	-	-	-	30.19	1.40	3.14
	KN-12	1.60	2.0 9.3 3.6	1.60	-	-	-	1	-	8.96	1.60	0.76
	KN-17	1.50	2.0 15.8 3.5	-	1.50	-	-	1	-	47.32	1.50	4.18
	Sub-Total	27.30		10.40	16.90	0.00	0.00	25	1	1336.95	27.30	55.72
	Total	51.20		18.50	32.70	0.00	0.00	38	2	1889.44	51.20	107.14

TABLE E.5.1 PROPOSED FLOOD MITIGATION FACILITY : NARAYANGANJ WEST

Route (Total Length)		Facility		Main Features
1. Narayanganj to Panchabati (NW) (L = 5.64 km)	1)	Road-Cum-Embankment	: 4.10 km	(NW.8+100~ NW.29)
	2)	Embankment	: 1.54 km	(NW.0~NW.8 +100)
	3)	Sluice Gate	: 2 places	
2. Narayanganj to Demra (NE) (L = 21.83 km)	1)	Flood Wall	: 11.48 km	(NE.0~NE.48, NE.55~NE.62, NE.87~NE.88)
	2)	Embankment	: 10.35 km	(NE.48~NE.55, NE.62~NE.87)
	3)	Sluice Gate	: 12 places	
	4)	Stop Log Structure	: 17 places	
Total	1)	Road-Cum-Embankment	: 4.10 km	
	2)	Embankment	: 11.89 km	
	3)	Flood Wall	: 11.48 km	
	3)	Sluice Gate	: 14 places	
	4)	Stop Log Structure	: 17 places	

TABLE E.5.2 LAND USE AND POPULATION OF NARAYANGANJ WEST

Drainage Area (km^2)	1990		2000		2100	
	Buil-up Area (km^2)	Population (million people)	Buil-up Area (km^2)	Population (million people)	Buil-up Area (km^2)	Population (million people)
18.36	13.12	0.470	17.20	0.696	17.20	0.927

TABLE E.5.3

MAIN HYDRAULIC FEATURES OF EXISTING MAJOR KHAL : NARAYANGANJ WEST

Narayanganj West Zone (NB)

Khal No.	Length	Max. Section						Min. Section					
		Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity	Catchment Area	Width	Depth	Slope	Discharge Capacity	Specific Discharge Capacity
	(m)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)	(km2)	(m)	(m)	(%)	(m3/s)	(m3/s/km2)
K 1	420	0.50	11.20	1.70	0.050	5.3	10.6	1.70	5.00	0.90	0.050	0.8	0.5
K 2		1.20	3.00	3.50	0.050	2.6	2.2	1.20	3.00	3.50	0.050	2.6	2.2
K 3	1,220	55.80	44.00	6.60	0.050	199.9	3.6	55.80	13.20	0.40	0.050	0.6	0.0
K 4	520	0.30	11.20	5.60	0.050	31.6	105.3	0.70	5.20	3.60	0.050	6.2	8.8
K 5	600	0.70	25.60	5.20	0.050	76.4	109.2	0.20	20.40	4.50	0.050	47.5	237.3
K 6	360	0.50	15.40	3.10	0.050	19.4	38.9	0.50	15.40	3.10	0.050	19.4	38.9
K 7	1,240	2.40	14.40	3.00	0.017	10.0	4.2	2.00	7.60	0.90	0.017	0.7	0.4
K 8	1,400	4.60	16.40	5.20	0.025	32.6	7.1	1.30	12.20	2.40	0.025	7.1	5.5

Note : Roughness Coefficient (n) = 0.035

TABLE E.5.4(1) HYDRAULIC REQUIREMENTS OF PROPOSED PUMPING STATION : NARAYANGANJ WEST

Proposed Pumping Station	Drainage Zone		Discharge Capacity (m^3/s)	Design Water Level (m, PWD)					Static Head (m)		Remarks
	No.	Area (km^2)		Outer			Inner				
				H.H.W.L	H.W.L	L.W.L	H.W.L	L.W.L	Design	Max.	
P 12	NB-1	1.73	2.00	7.35	5.80	3.00	4.20	3.00	2.80	4.35	
P 13	NB-2	1.92	2.20	7.25	5.70	3.50	4.60	3.50	2.20	3.75	
P 14-A	NB-4	2.36	2.70	7.10	5.50	3.00	4.50	3.00	2.50	4.10	
P 14-B	NB-5	4.65	5.30	6.97	5.45	3.50	4.60	3.50	1.95	3.47	

Note : 1. H.H.W.L. and H.W.L. of outer design water level means that of 100-year and 2-year frequency flood respectively

TABLE E.5.4(2) HYDRAULIC REQUIREMENTS OF PROPOSED RETARDING POND : NARAYANGANJ WEST

Proposed Retarding Pond	Drainage Zone	Pond Area (ha)	Storage Capacity (x $10^6 m^3$)	Design Water Level (m, PWD)		Remarks
				H.W.L	L.W.L	
RP 12	NB-1	21	0.21	4.20	3.00	
RP 13	NB-2	23	0.23	4.60	3.50	
RP 14-1	NB-4	28	0.28	4.50	3.00	
RP 14-2	NB-5	26	0.26	4.60	3.50	
RP 14-3	NB-5	30	0.30	4.60	3.50	

TABLE E.5.5 RUN-OFF COEFFICIENT : NARAYANGANJ WEST

Narayanganj West Zone (NB)

Block No.	Area	Run-off Coefficient	Land Use (%)							
			Residential			Commercial	Industrial	Institutional	Open Space /Agreculturral	Waterbodies
			High Density	Midium Density	Low Density					
	km2	f	0.50	0.50	0.30	0.65	0.55	0.30	0.20	1.00
NB-1-1	0.57	0.45	23.44	19.60	5.95	5.21	7.83	31.29	2.60	4.07
NB-1-2	1.73	0.42	20.60	17.22	5.23	4.58	6.88	27.49	14.43	3.57
NB-2-1	1.19	0.43	19.90	7.11	3.29	4.85	25.76	17.61	19.37	2.09
NB-2-2	0.73	0.49	24.67	8.82	4.08	6.02	31.93	21.83	0.05	2.59
NB-2-3	2.07	0.49	24.67	8.82	4.08	6.02	31.93	21.83	0.05	2.59
NB-3-1	0.95	0.45	29.94	8.84	6.30	3.61	19.18	30.37	0.18	1.59
NB-3-2	0.91	0.45	29.94	8.84	6.30	3.61	19.18	30.37	0.18	1.59
NB-3-3	0.73	0.45	29.94	8.84	6.30	3.61	19.18	30.37	0.18	1.59
NB-3-4	0.70	0.48	39.92	4.65	1.18	7.44	19.65	25.46	0.00	1.70
NB-3-5	0.89	0.48	39.92	4.65	1.18	7.44	19.65	25.46	0.00	1.70
NB-3-6	0.40	0.53	35.09	5.04	0.00	33.90	6.04	17.02	0.00	2.91
NB-3-7	0.51	0.53	35.09	5.04	0.00	33.90	6.04	17.02	0.00	2.91
NB-3-8	0.24	0.53	35.09	5.04	0.00	33.90	6.04	17.02	0.00	2.91
NB-4-1	1.07	0.49	34.34	13.20	2.48	10.02	12.28	22.71	0.41	4.58
NB-4-2	0.54	0.45	29.25	11.25	2.11	8.54	10.46	19.34	15.16	3.89
NB-4-3	0.75	0.41	25.18	9.68	1.82	7.35	9.01	16.65	26.96	3.35
NB-5-1	1.01	0.50	42.91	17.94	3.72	11.96	3.38	15.13	0.41	4.54
NB-5-2	0.75	0.40	28.04	11.72	2.43	7.82	2.21	9.89	34.93	2.97
NB-5-3	1.33	0.46	37.43	15.64	3.25	10.44	2.95	13.20	13.14	3.96
NB-5-4	1.39	0.48	38.90	16.26	3.38	10.85	3.07	13.72	9.72	4.12
NB-5-5	0.17	0.50	42.91	17.94	3.72	11.96	3.38	15.13	0.41	4.54

TABLE E.5.6 DESIGN DISCHARGE : NARAYANGANJ WEST

Narayanganj West Zone (NB)

Conditions: Inlet Time; 20min

Block No.	Drainage Area		Run-off Coefficier		Length		Velocity	Time of Concentration	Rainfal Intensity	Areal Reduction Factor	Design Discharge
	Individual	Accumlated	Individual	Accumlated	Individual	Accumlated					
	a	A	f	F	l	L	V	t	r		
	(km2)	(km2)			(km)	(km)	(m/s)	(min)	(mm/hr)	(m3/s/km)	(m3/s)
NB-1-1	0.57	0.57	0.45	0.45	0.90	0.90	0.80	39	101.46	1.00	7.2
NB-1-2	1.73	1.73	0.42	0.42	1.80	1.80	0.80	58	83.77	0.99	16.7
NB-2-1	1.19	1.19	0.43	0.43	1.50	1.50	0.80	51	88.94	0.99	12.5
NB-2-2	0.73	0.73	0.49	0.49	1.80	1.80	0.80	58	83.77	1.00	8.3
NB-2-3	2.07	2.07	0.49	0.49	2.10	2.10	0.80	64	79.16	0.99	21.9
NB-3-1	0.95	0.95	0.45	0.45	1.50	1.50	0.80	51	88.94	1.00	10.5
NB-3-2	0.91	0.91	0.45	0.45	1.40	1.40	0.80	49	90.81	1.00	10.3
NB-3-3	0.73	0.73	0.45	0.45	1.10	1.10	0.80	43	96.91	1.00	8.8
NB-3-4	0.70	0.70	0.48	0.48	1.00	1.00	0.80	41	99.14	1.00	9.2
NB-3-5	0.89	0.89	0.48	0.48	1.50	1.50	0.80	51	88.94	1.00	10.5
NB-3-6	0.40	0.40	0.53	0.53	0.80	0.80	0.80	37	103.90	1.00	6.2
NB-3-7	0.51	0.51	0.53	0.53	1.20	1.20	0.80	45	94.79	1.00	7.2
NB-3-8	0.24	0.24	0.53	0.53	0.60	0.60	0.80	33	109.15	1.00	3.9
NB-4-1	1.07	1.07	0.49	0.49	1.70	1.70	0.80	55	85.42	0.99	12.4
NB-4-2	0.54	0.54	0.45	0.45	0.50	0.50	0.80	30	111.98	1.00	7.5
NB-4-3	0.75	2.36	0.41	0.46	0.90	1.40	0.80	49	90.81	0.99	27.0
NB-5-1	1.01	1.01	0.50	0.50	1.40	1.40	0.80	49	90.81	0.99	12.7
NB-5-2	0.75	1.76	0.40	0.46	0.80	2.20	0.80	66	77.74	1.00	17.4
NB-5-3	1.33	1.33	0.46	0.46	1.50	1.50	0.80	51	88.94	0.99	15.1
NB-5-4	1.39	1.39	0.48	0.48	2.00	2.00	0.80	62	80.64	0.99	14.6
NB-5-5	0.17	4.65	0.60	0.47	0.30	2.50	0.80	72	73.76	0.97	43.1

TABLE E.5.7 HYDRAULIC DESIGN OF KHAL AND TRUNK DRAIN IMPROVEMENT : NARAYANGANJ WEST

Narayanganj West Zone (NB)

Khal No.	Design Discharge (m3/s)	Section Bottom Wid. (m)	Section Upper Wid. (m)	Section Height (m)	Roughness Coefficient	Slope I (%)	Velosity (m/s)	Discharge Capacity (m3/s)
(NB-1)								
KN-18	7.2	2.00	7.00	2.50	0.025	0.033	0.84	9.5
KN-19	16.7	2.00	14.00	3.00	0.035	0.033	0.70	16.8
(NB-2)								
KN-20	12.5	3.00	13.00	2.50	0.035	0.033	0.66	13.1
KN-21	8.3	2.00	7.00	2.50	0.025	0.033	0.84	9.5
KN-22	21.9	4.50	10.50	3.00	0.025	0.033	1.05	23.7
(NB-3)								
KN-23	10.5	2.50	7.50	2.50	0.025	0.033	0.87	10.9
KN-24	10.3	2.50	7.50	2.50	0.025	0.033	0.87	10.9
KN-25	8.8	2.00	7.00	2.50	0.025	0.033	0.84	9.5
KN-26	9.2	2.00	7.00	2.50	0.025	0.033	0.84	9.5
KN-27	7.2	2.00	7.00	2.50	0.025	0.033	0.84	9.5
S-1	10.5	3.00	-	3.00	0.015	0.033	1.22	11.0
S-2	6.2	-	2.50	-	0.015	0.067	1.26	6.2
S-3	3.9	-	2.20	-	0.015	0.067	1.16	4.4
(NB-4)								
KN-28-1	27.0	6.00	18.00	3.00	0.035	0.033	0.79	28.3
KN-28-2	7.5	2.00	13.32	2.83	0.035	0.033	0.68	14.7
KN-29	12.4	2.00	8.00	3.00	0.025	0.033	0.93	13.9
(NB-5)								
KN-30-1	43.2	9.50	15.50	3.00	0.025	0.033	1.19	44.7
KN-30-2	15.1	2.50	8.50	3.00	0.025	0.033	0.96	15.8
KN-31-1	17.4	2.50	14.50	3.00	0.035	0.033	0.71	18.2
KN-31-2	12.7	2.00	8.00	3.00	0.025	0.033	0.93	13.9
KN-32	14.6	2.50	8.50	3.00	0.025	0.033	0.96	15.8

TABLE E.5.8

PROPOSED KHAL AND TRUNK DRAIN IMPROVEMENT WORKS : NARAYANGANJ WEST

Narayanganj West Zone (NB)

Zone	Khal No.	Khal Length (km)	Required Hydraulic Section Wb x Wu x H (m x m x m)	Open Channel		Covered Channel		Bridge (Places)	Aqueduct (Places)	Dredging (1000m3)	Maintenance Road (km)	Land Acquisition (ha)
				Brick Protection (km)	Sodding (km)	Box Culvert (km)	Brick Pipe (km)					
NB-1	KN-18	0.40	2.0 7.0 2.5	0.40	-	-	-	-	-	5.52	0.40	0.65
	KN-19	1.20	2.0 14.0 3.0	-	1.20	-	-	1	-	29.85	1.20	2.43
	Sub-Total	1.60		0.40	1.20	0.00	0.00	1	0	35.37	1.60	3.08
NB-2	KN-20	0.90	3.0 13.0 2.5	-	0.90	-	-	-	-	8.46	0.90	0.90
	KN-21	1.40	2.0 7.0 2.5	1.40	-	-	-	1	-	26.90	1.40	2.50
	KN-22	0.80	4.5 10.5 3.0	0.80	-	-	-	2	-	9.84	0.80	1.60
	Sub-Total	3.10		2.20	0.90	0.00	0.00	3	0	45.20	3.10	5.00
NB-3	KN-23	0.60	2.5 7.5 2.5	0.60	-	-	-	1	-	7.80	0.60	1.02
	KN-24	0.70	2.5 7.5 2.5	0.70	-	-	-	1	-	11.20	0.70	1.20
	KN-25	0.40	2.0 7.0 2.5	0.40	-	-	-	-	-	0.00	0.40	0.37
	KN-26	0.60	2.0 7.0 2.5	0.60	-	-	-	-	-	0.00	0.60	0.12
	KN-27	0.30	2.0 7.0 2.5	0.30	-	-	-	-	-	1.80	0.30	0.31
	S-1	0.90	3.0 - 3.0	-	-	0.90	-	-	-	21.69	0.90	1.50
	S-2	0.30	2.5	-	-	-	0.30	-	-	5.76	0.30	0.46
	S-3	0.20	2.2	-	-	-	0.20	-	-	2.44	0.20	0.29
	Sub-Total	4.00		2.60	0.00	0.90	0.50	2	0	50.69	4.00	5.27
NB-4	KN-28-1	0.90	6.0 18.0 3.0	-	0.90	-	-	-	-	10.25	0.90	1.65
	KN-28-2	0.50	2.0 13.3 2.8	-	0.50	-	-	-	-	4.33	0.50	1.04
	KN-29	1.40	2.0 8.0 3.0	1.40	-	-	-	2	-	35.40	1.40	2.70
	Sub-Total	2.80		1.40	1.40	0.00	0.00	2	0	49.98	2.80	5.39
NB-5	KN-30-1	0.30	9.5 15.5 3.0	0.30	-	-	-	1	-	13.52	0.30	0.41
	KN-30-2	1.50	2.5 8.5 3.0	1.50	-	-	-	-	-	13.67	1.50	1.26
	KN-31-1	0.80	2.5 14.5 3.0	-	0.80	-	-	1	-	22.80	0.80	1.53
	KN-31-2	1.30	2.0 8.0 3.0	1.30	-	-	-	2	-	33.30	1.30	3.01
	KN-32	1.80	2.5 8.5 3.0	1.80	-	-	-	2	-	37.60	1.80	3.45
	Sub-Total	5.70		4.90	0.80	0.00	0.00	6	0	120.89	5.70	9.66
	Total	17.20		11.50	4.30	0.90	0.50	14	0	302.13	17.20	28.40

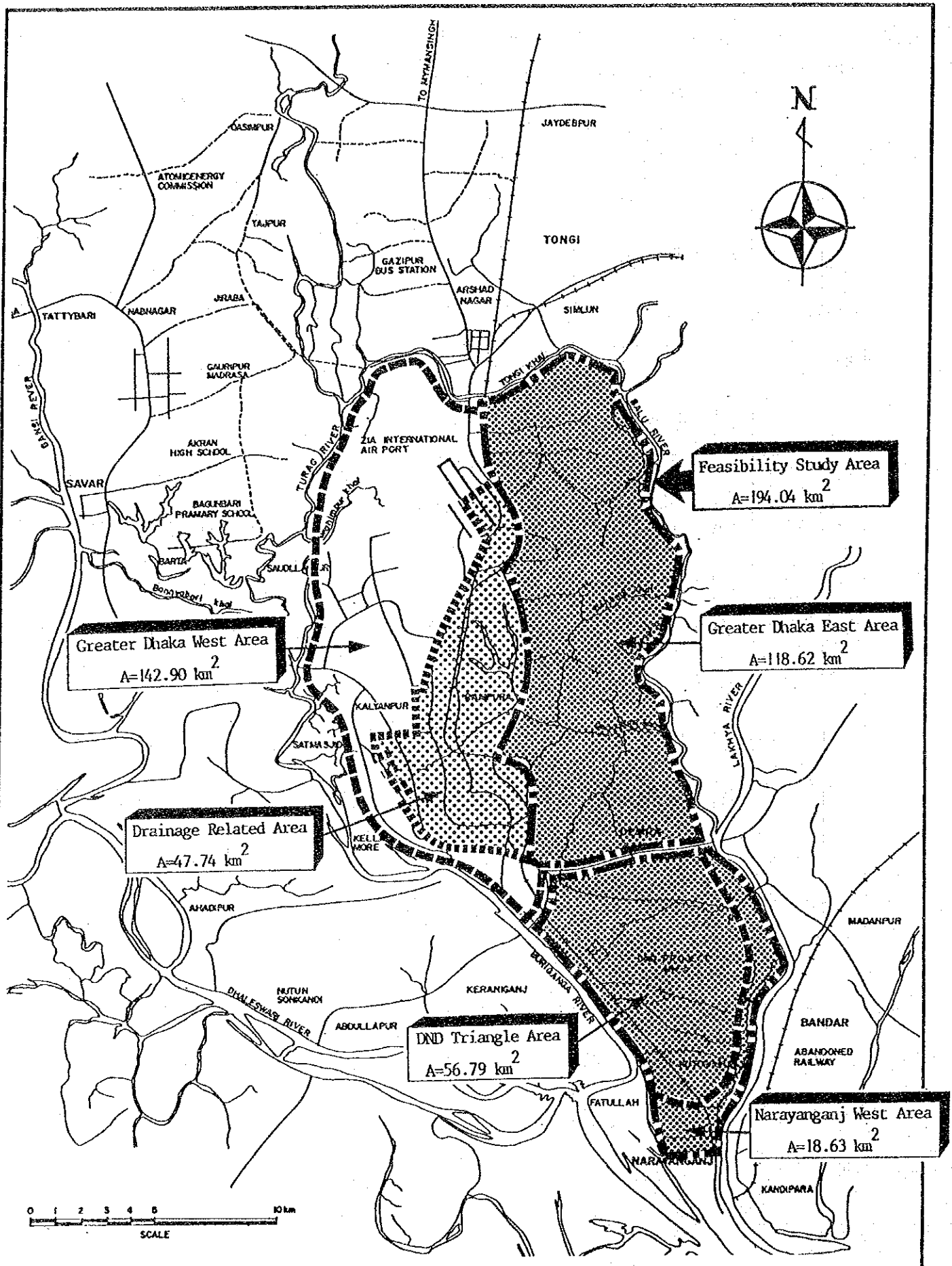


FIG. E.1.1 STUDY AREAS FOR FEASIBILITY STUDY

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

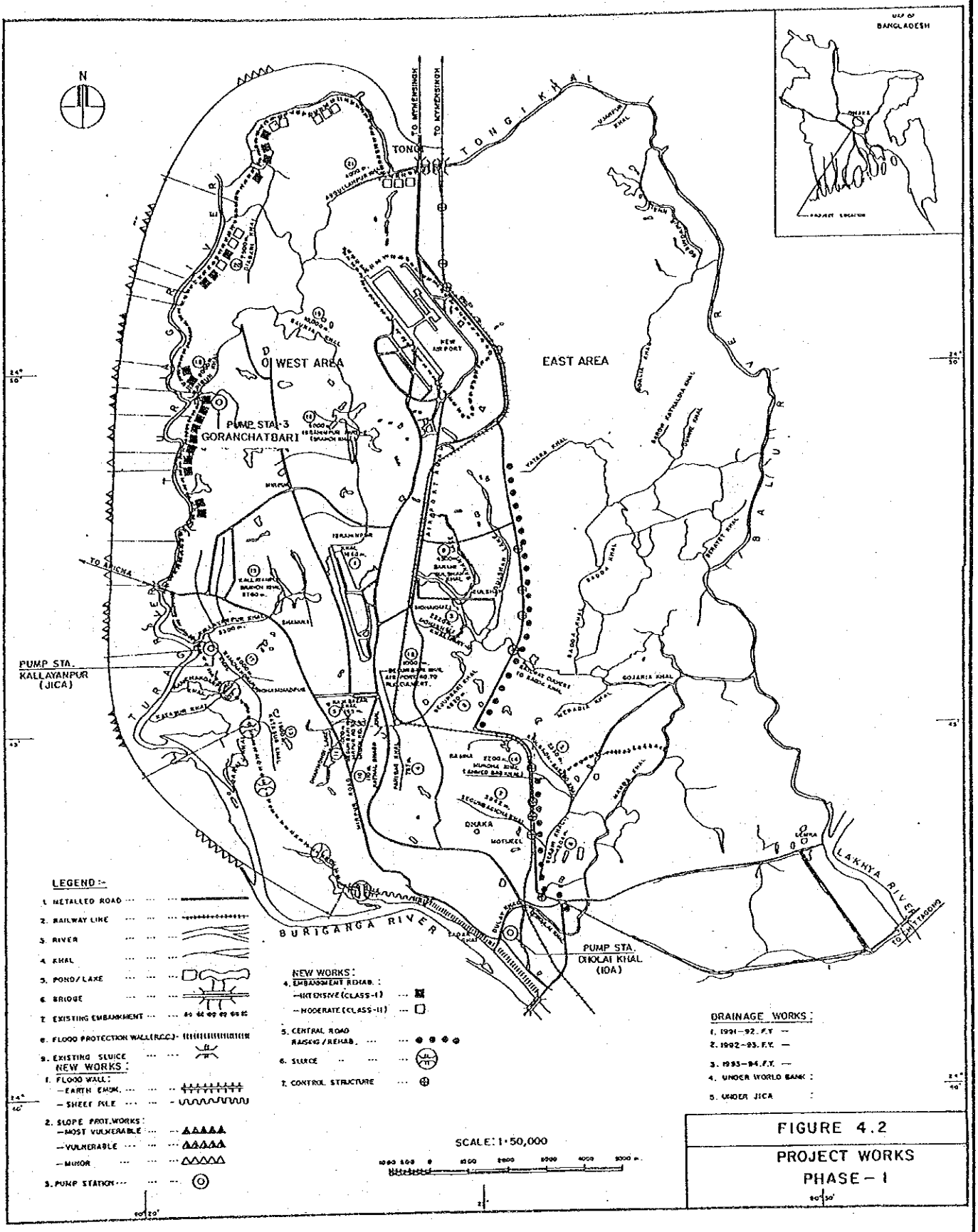


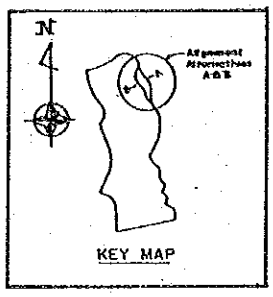
FIGURE 4.2

PROJECT WORKS
PHASE - I

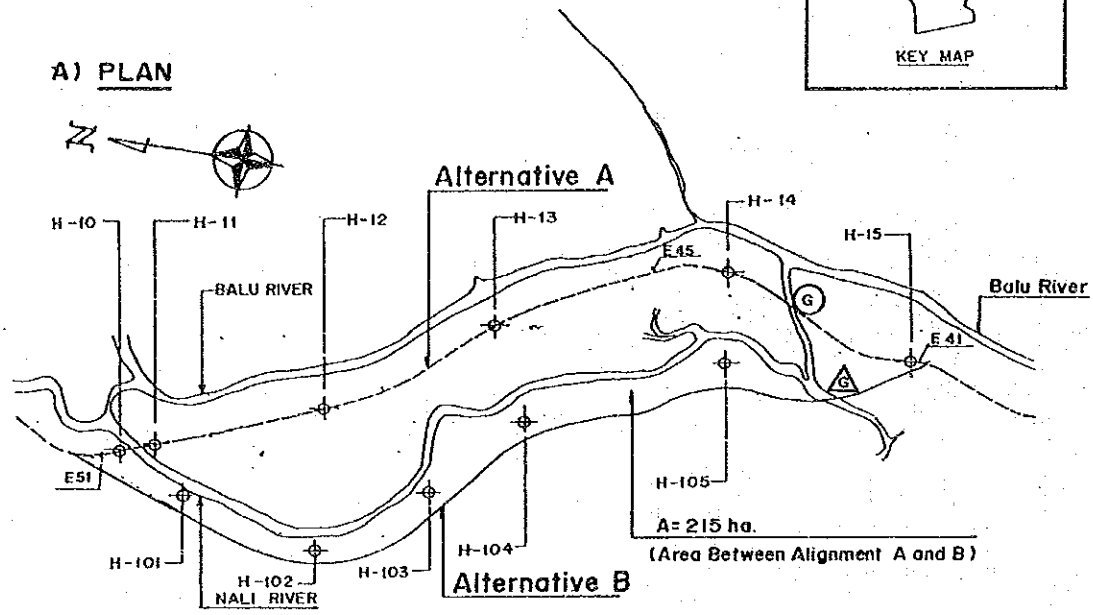
FIG. E.2.1 FLOOD CONTROL AND DRAINAGE WORKS PROPOSED BY FAP 8B

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

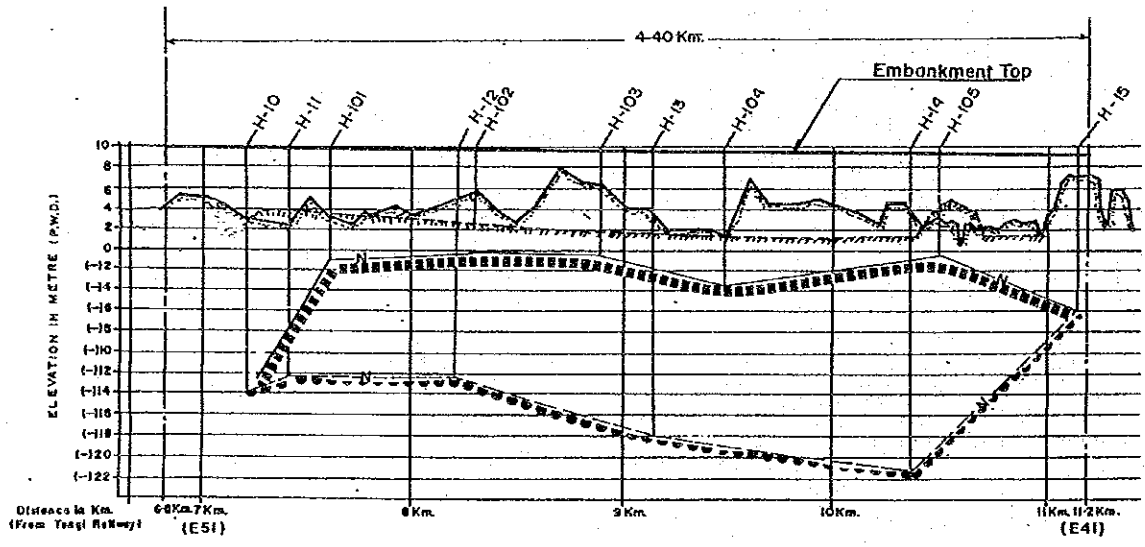
JICA



A) PLAN



B) LONGITUDINAL SECTIONS



LEGEND

Alignment Alternative-A :-

Alignment Alternative-B :-

Soil Bore Hole Point :- H-10, H-101

Level of SPT N-Value 4 & Above:-
-For Alignment Alternative-A :-
-For Alignment Alternative-B :-

FIG. E.3.1 EMBANKMENT ALIGNMENT OF NALI RIVER PORTION

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

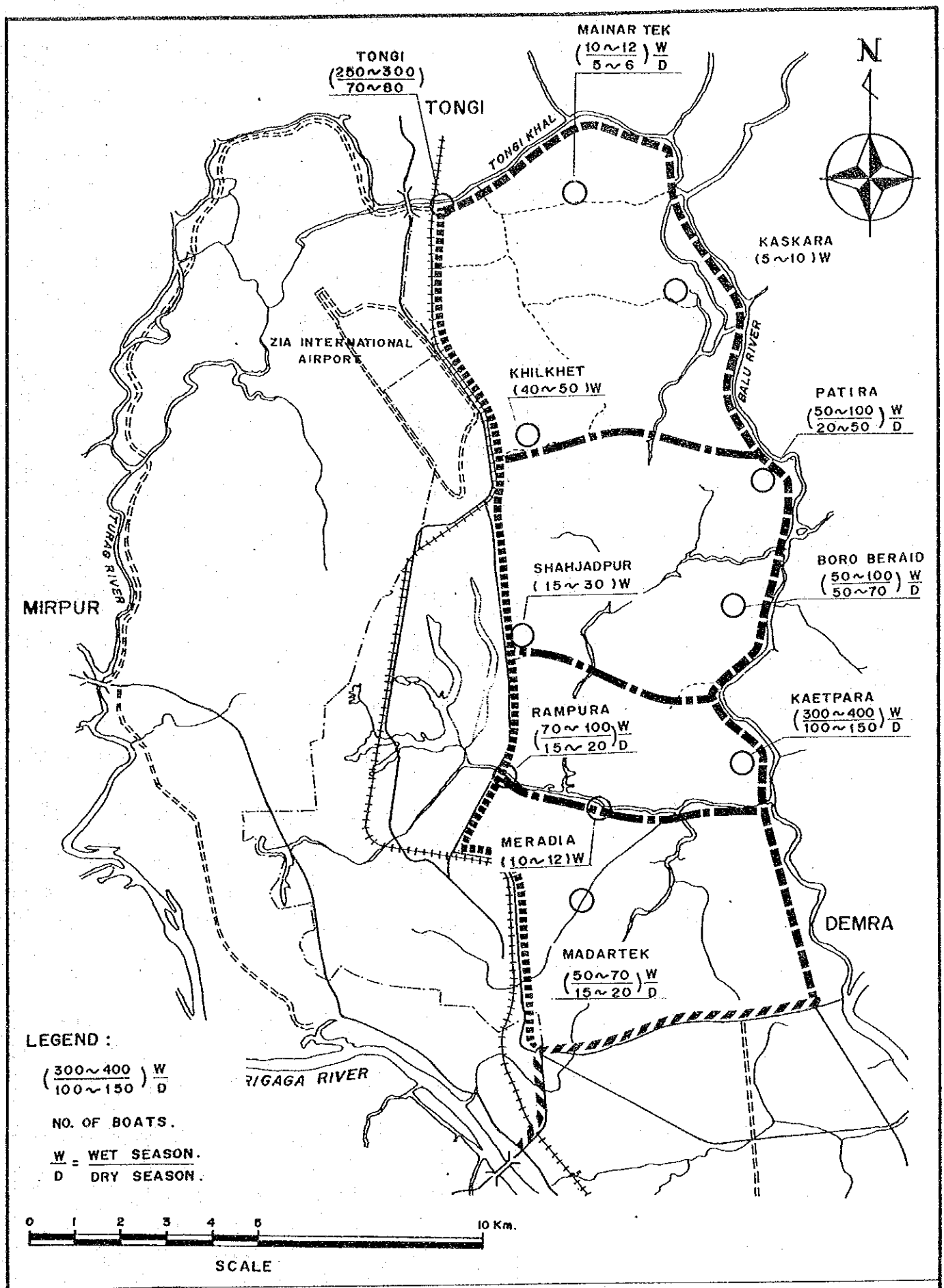
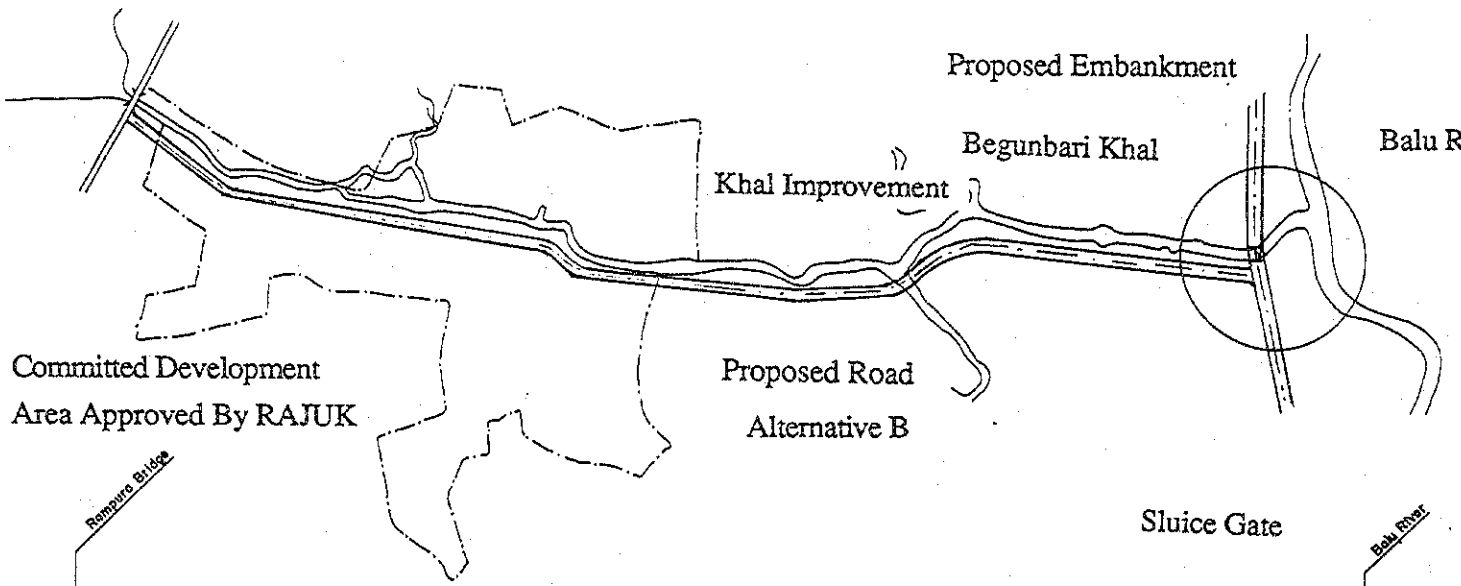
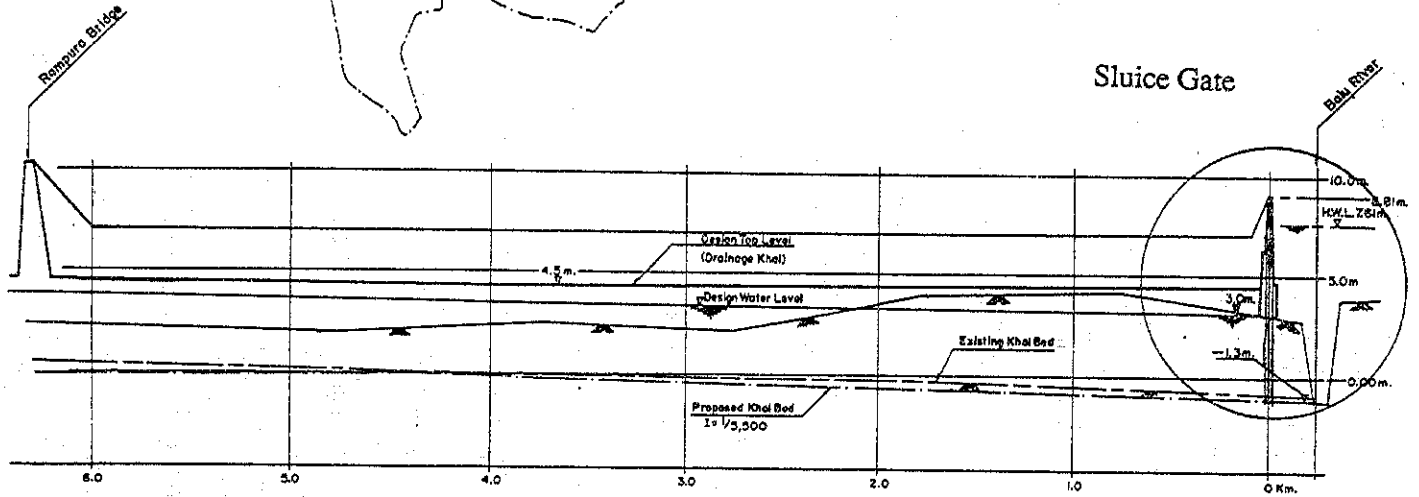


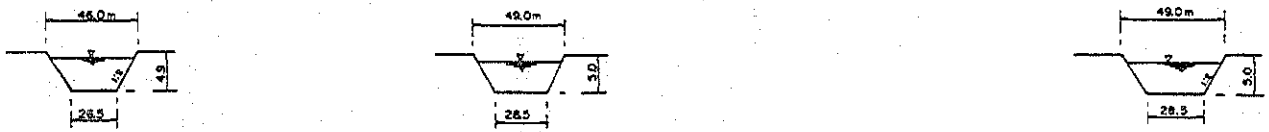
FIG. E.3.2 LOCATION OF NAVIGATION SURVEY POINTS & BOAT NUMBER

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA







Khal Section

Typical Section A-A

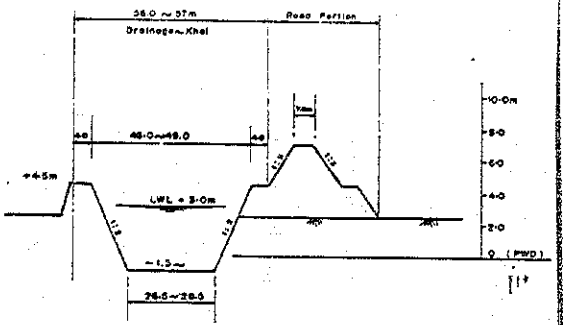
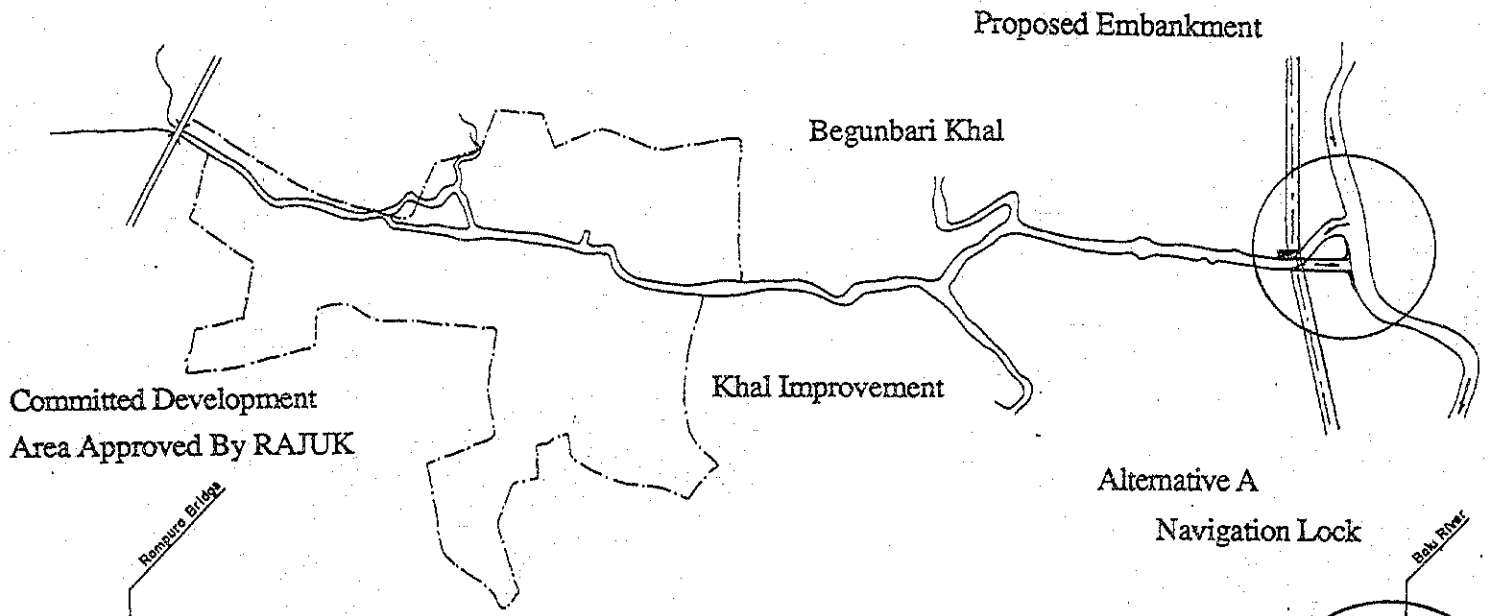


FIG. E.3.3(1) ALTERNATIVE A OF NAVIGATION SYSTEM OF BEGUNBARI KHAL

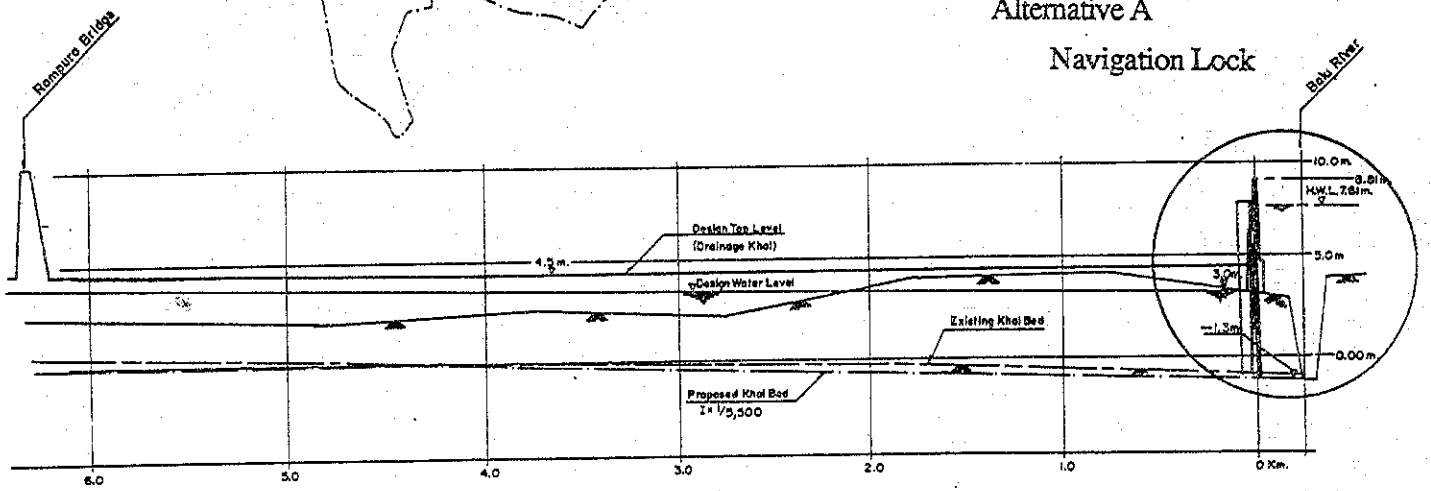
GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

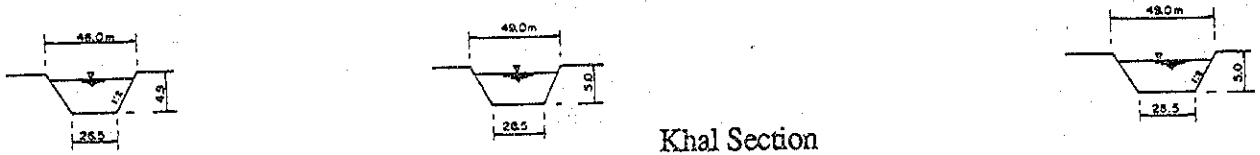
JICA



Alternative A

Navigation Lock





Khal Section

Typical Section A-A

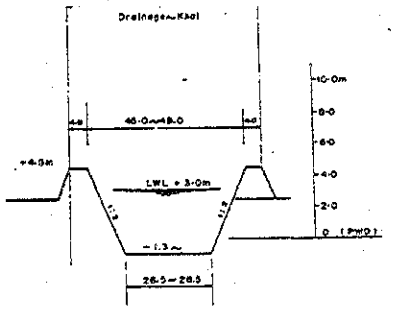
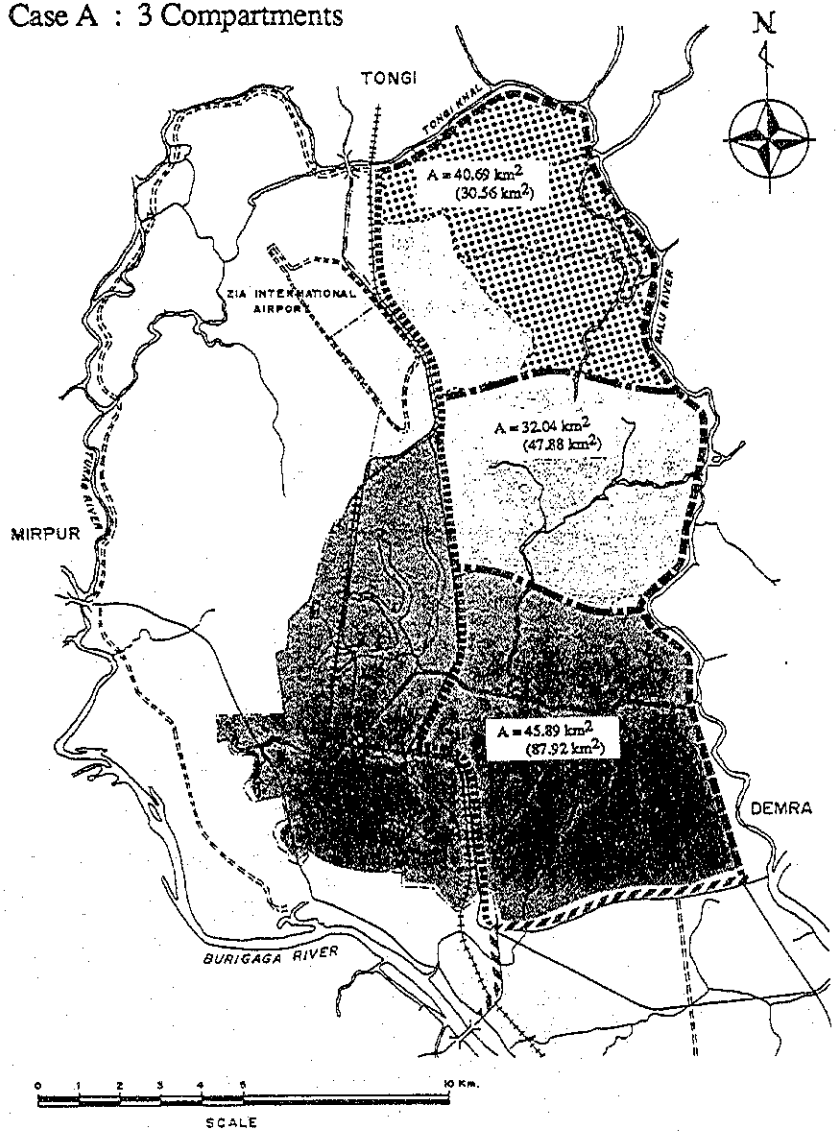


FIG. E.3.3(2)	ALTERNATIVE B OF NAVIGATION SYSTEM OF BEGUNBARI KHAL

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

Case A : 3 Compartments



Case B : 4 Compartments

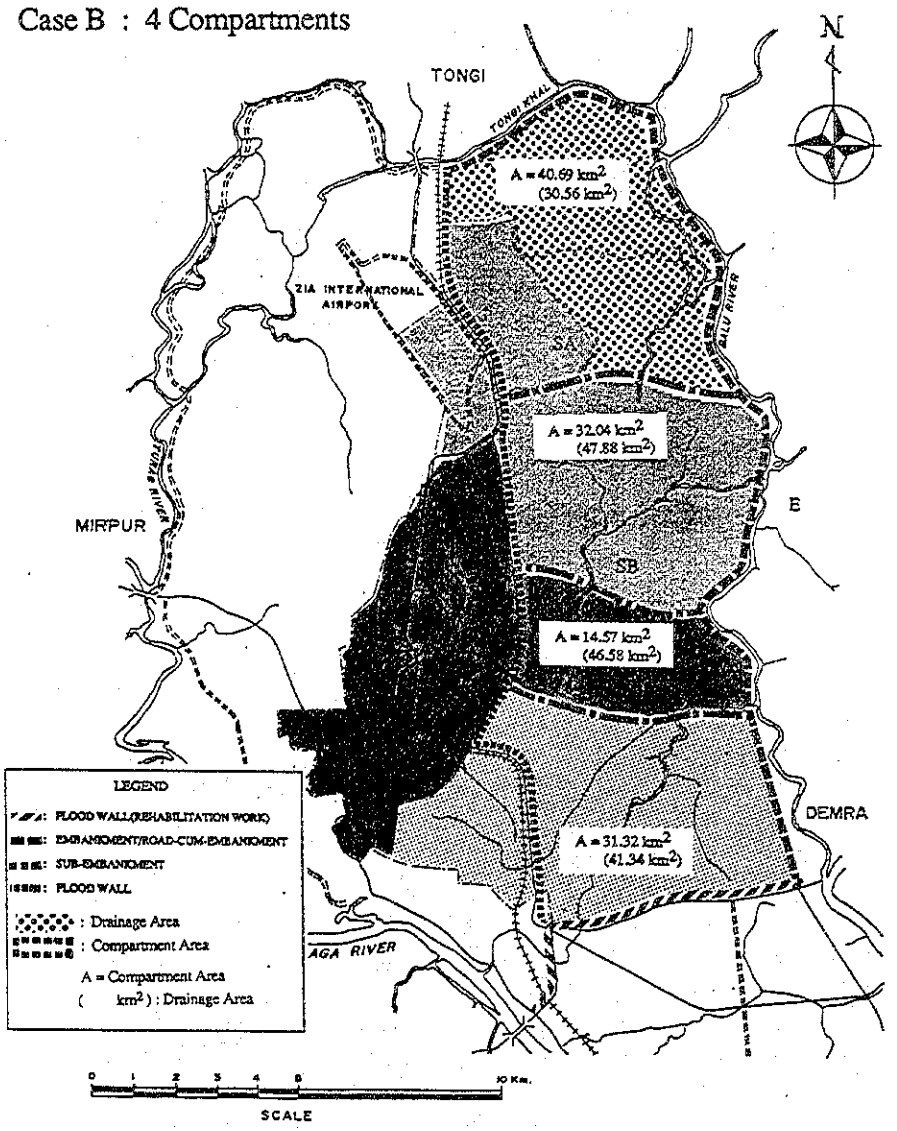


FIG. E.3.4 ALTERNATIVE OF COMPARTMENTALIZATION

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

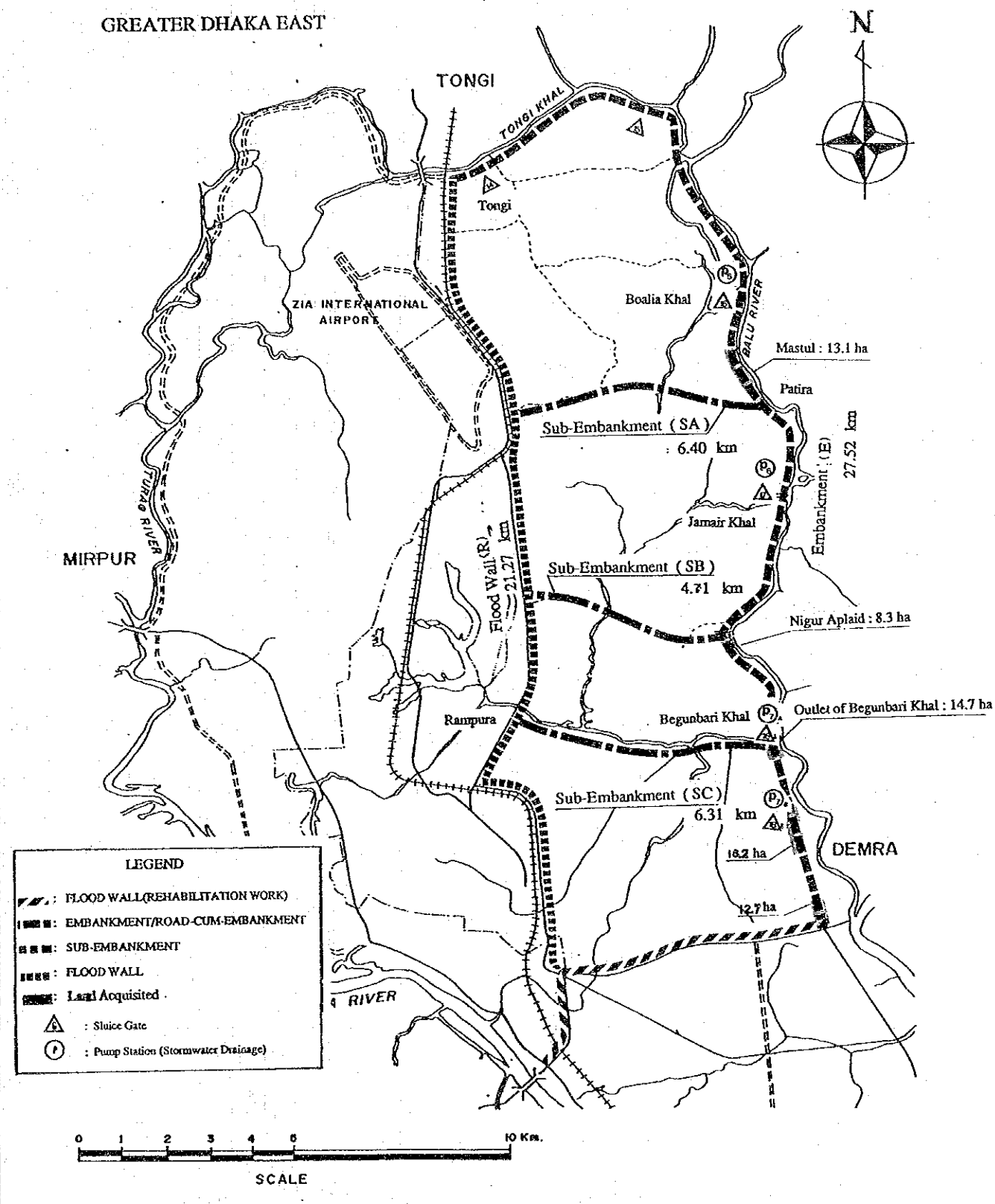


FIG. E.3.5 PROPOSED FLOOD MITIGATION FACILITIES

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

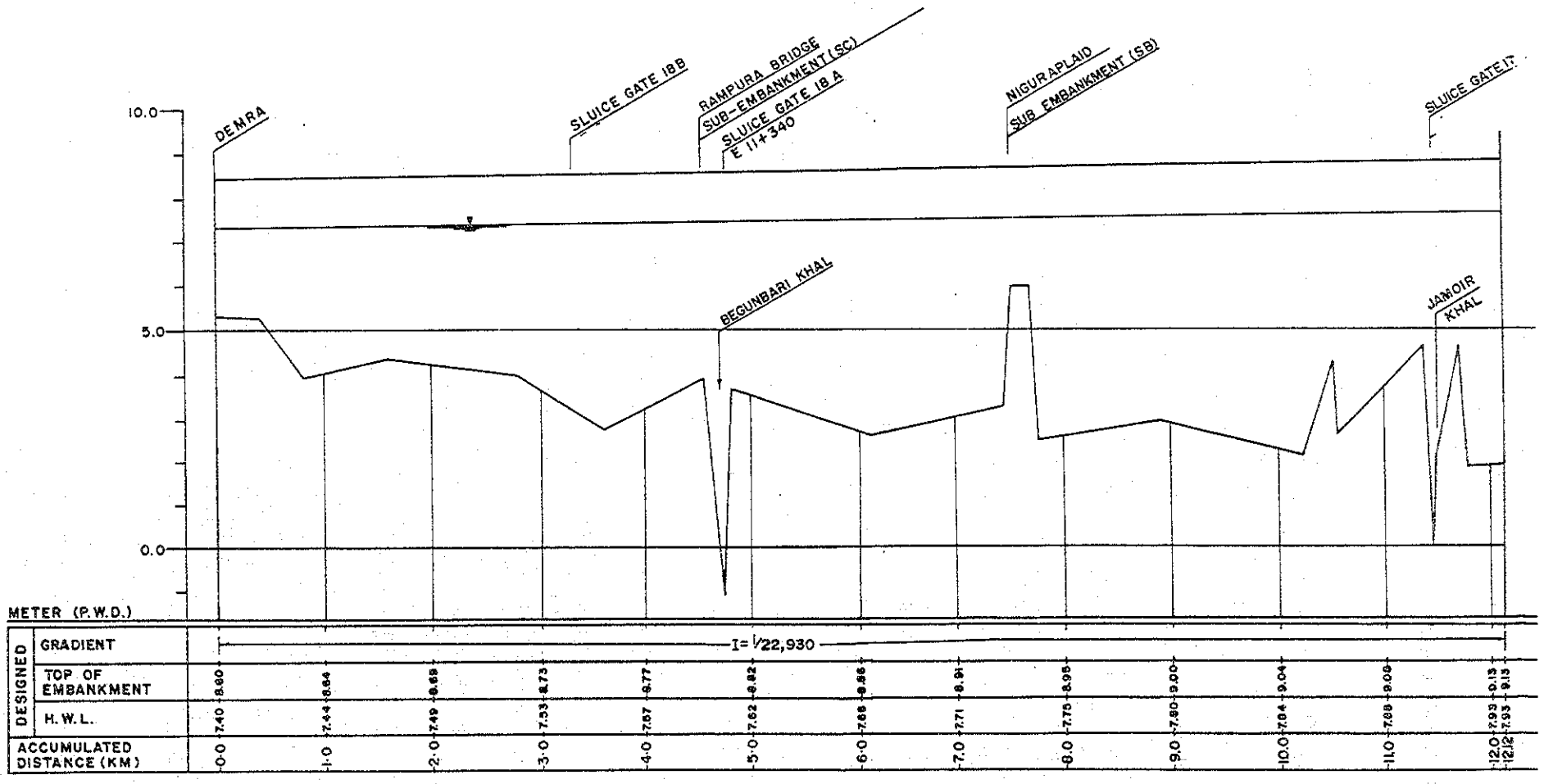


FIG. E.3.6(1) LONGITUDINAL SECTION OF EMBANKMENT : DHAKA EAST (E_1)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

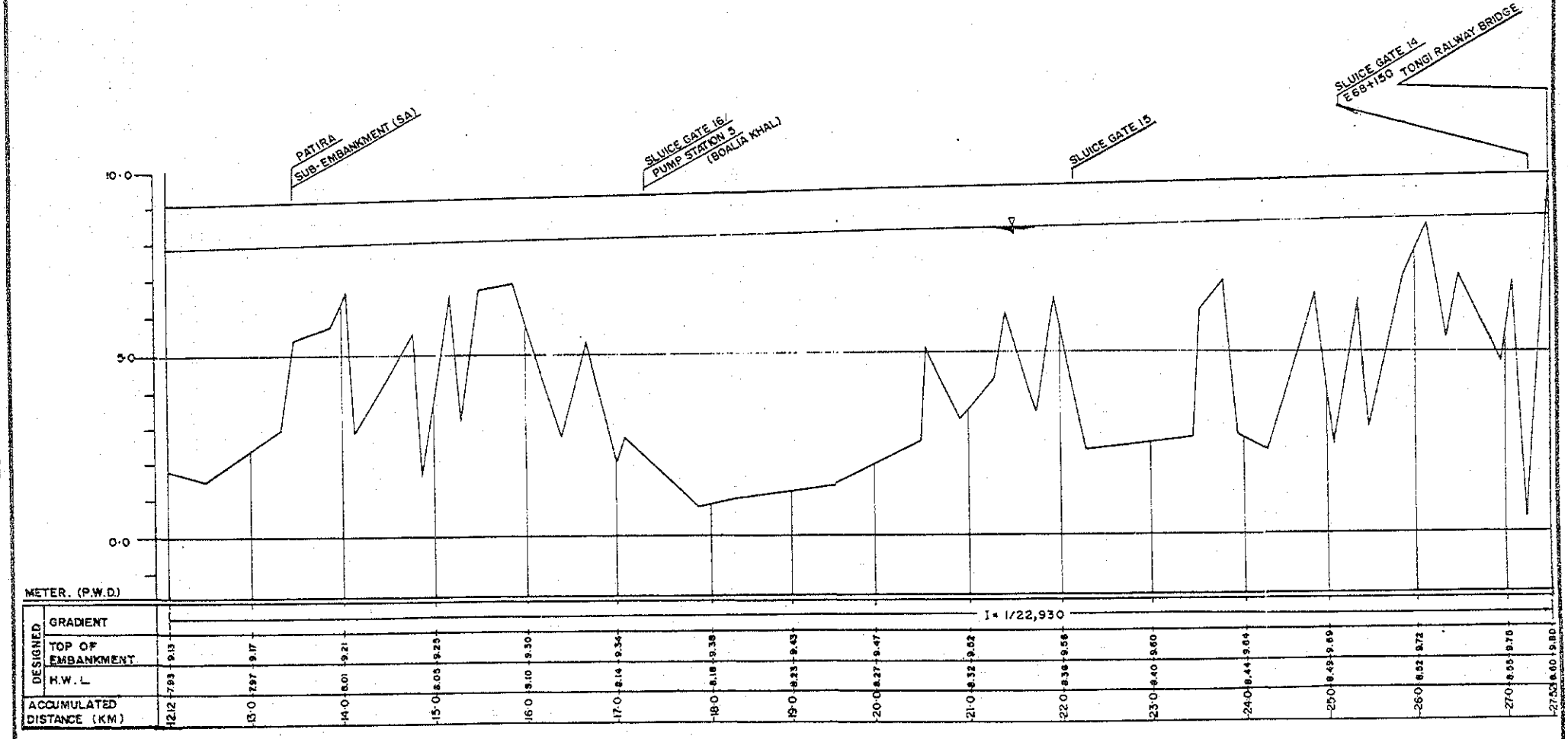


FIG. E.3.6(2) LONGITUDINAL SECTION OF EMBANKMENT : DHAKA EAST (E_2)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

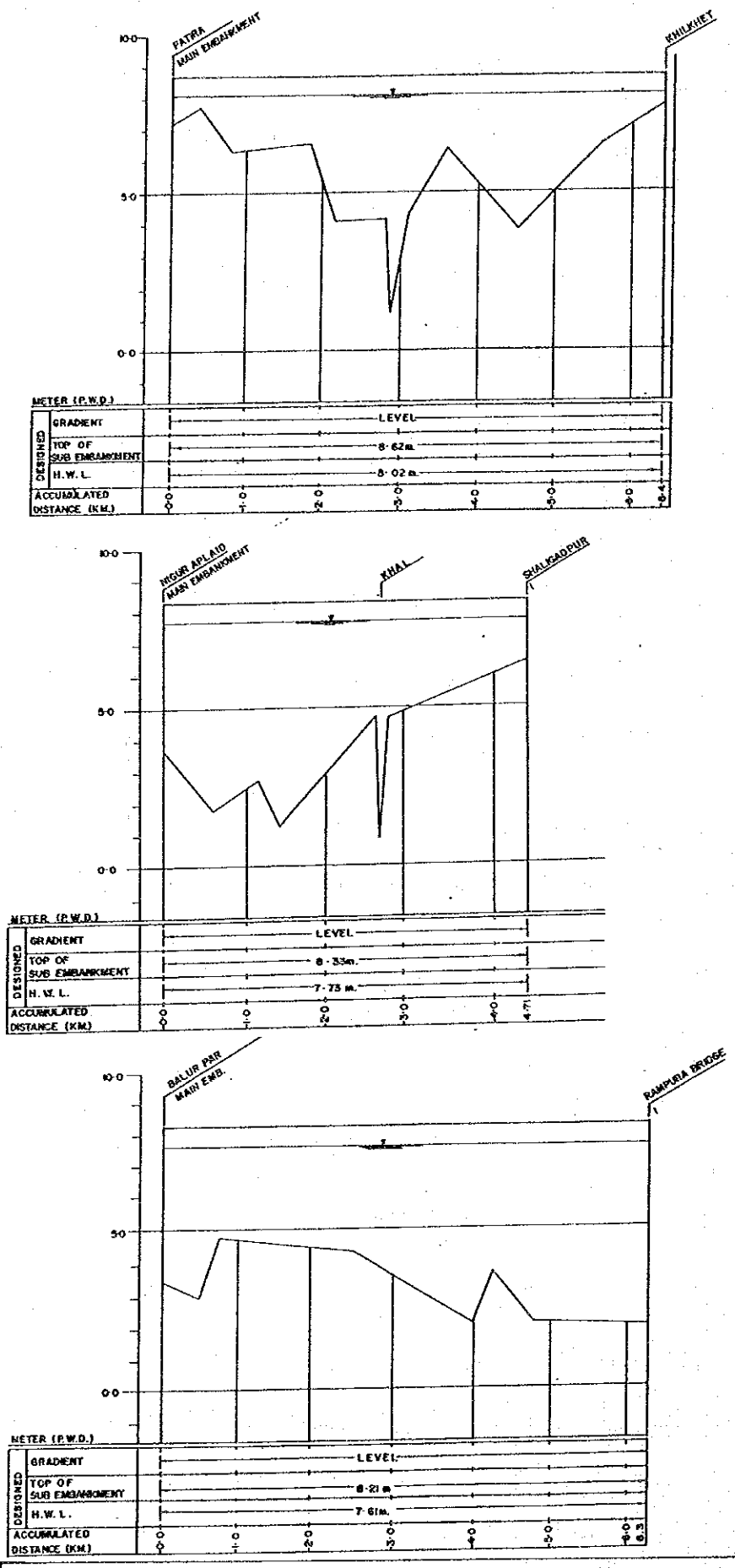


FIG. E.3.6(3) LONGITUDINAL SECTION OF EMBANKMENT : DHAKA EAST (SA, SB AND SC)

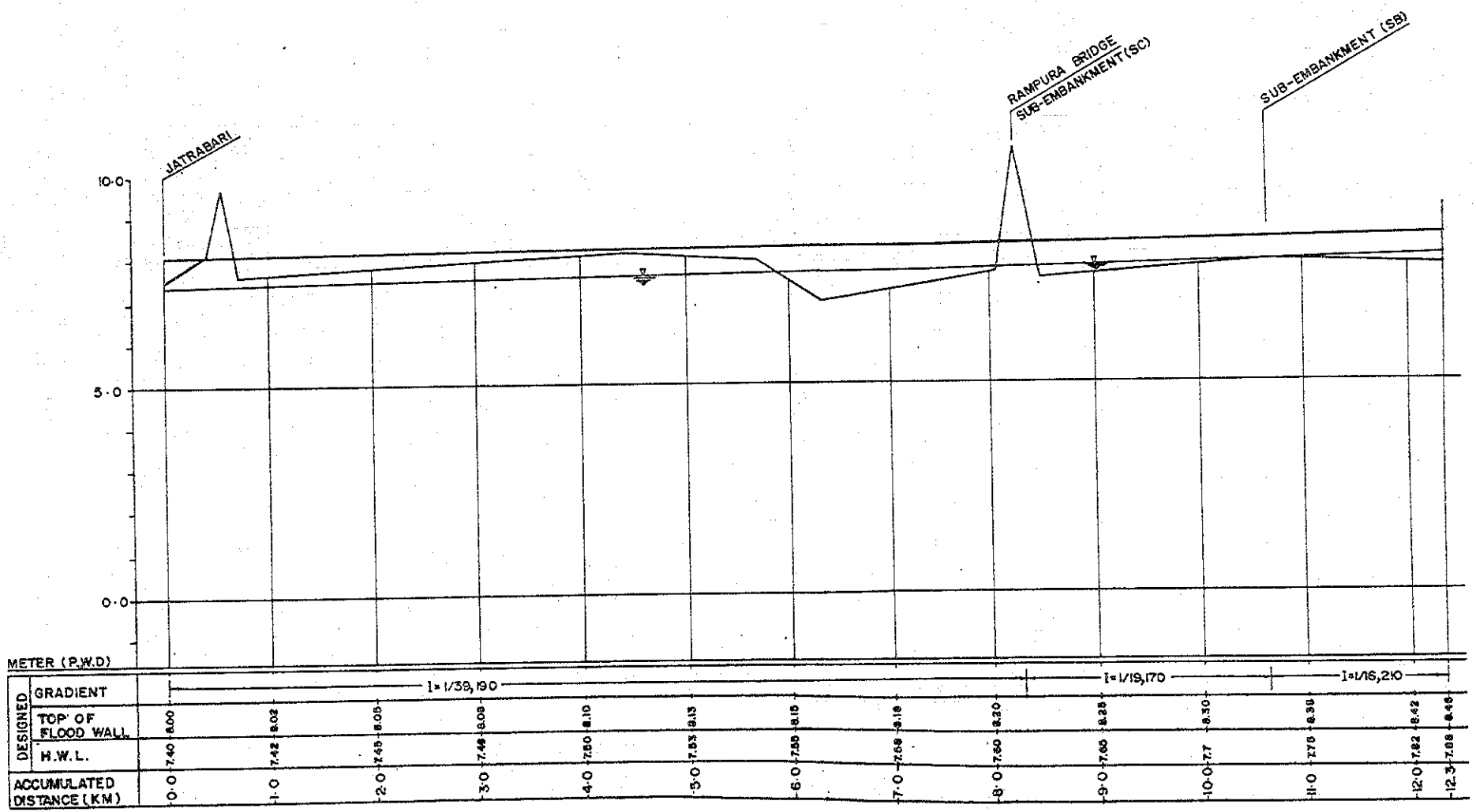


FIG. E.3.6(4) LONGITUDINAL SECTION OF FLOOD WALL : DHAKA EAST (R_1)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

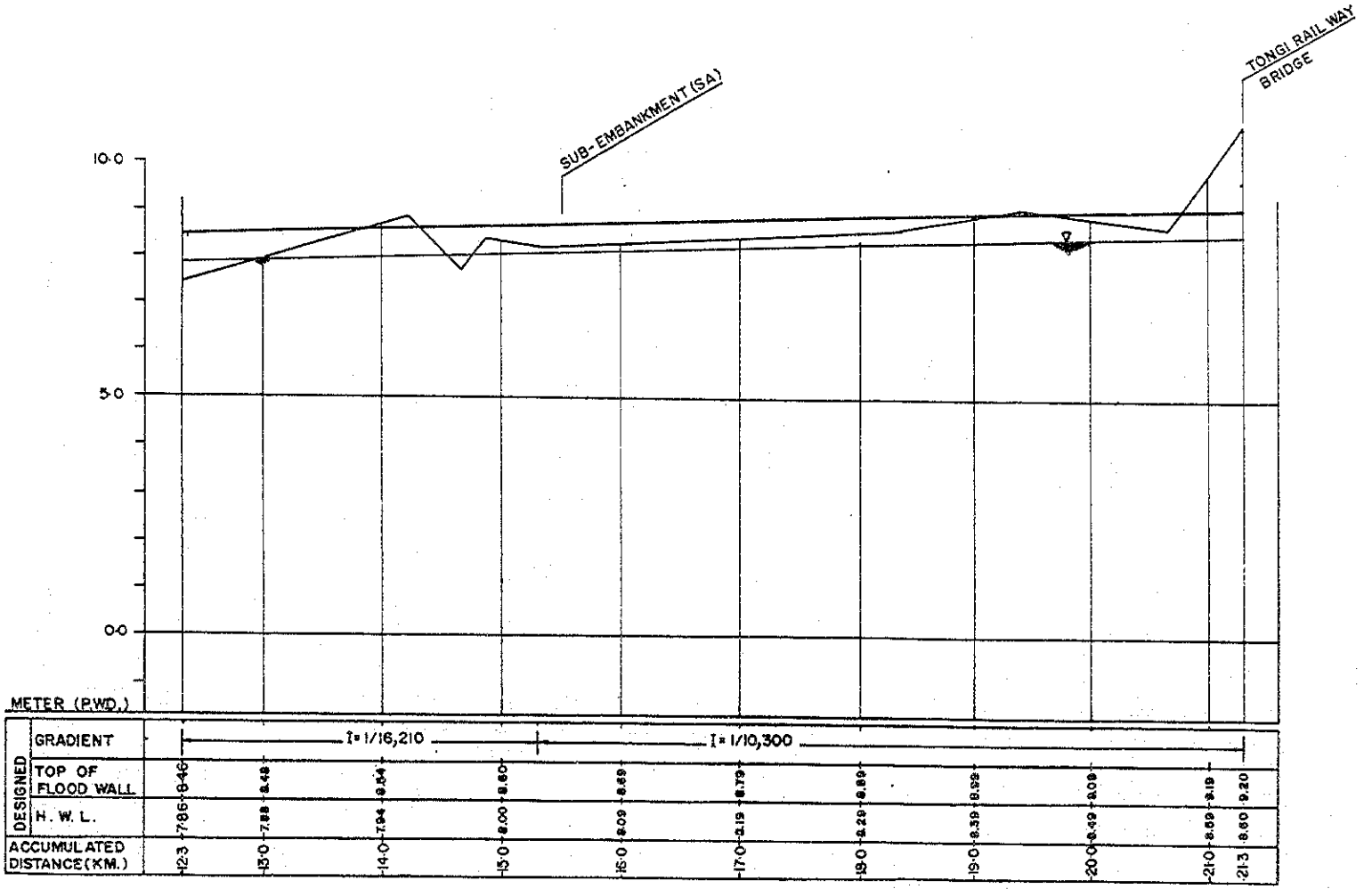


FIG. E.3.6(5) LONGITUDINAL SECTION OF FLOOD WALL : DHAKA EAST (R_2)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

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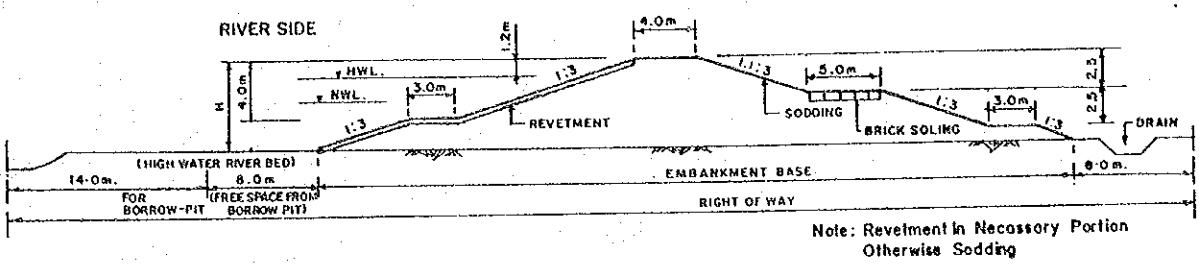
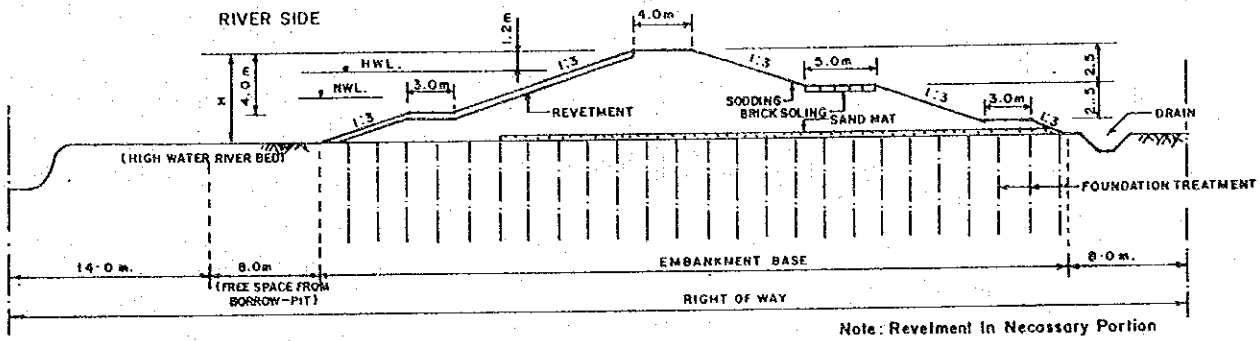
TYPICAL SECTION OF EMBANKMENT



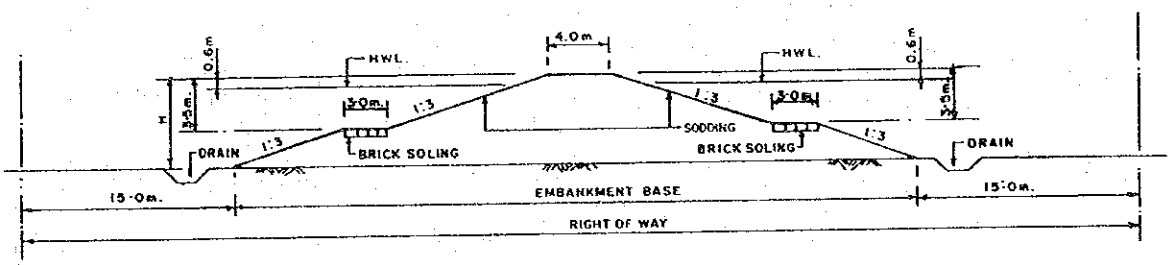
Note: Revetment in Necessary Portion
Otherwise Sodding

TYPICAL SECTION OF EMBANKMENT WITH FOUNDATION TREATMENT



Note: Revetment in Necessary Portion
Otherwise Sodding.

TYPICAL SECTION OF SUB-EMBANKMENT



TYPICAL SECTION OF SUB-EMBANKMENT WITH FOUNDATION TREATMENT

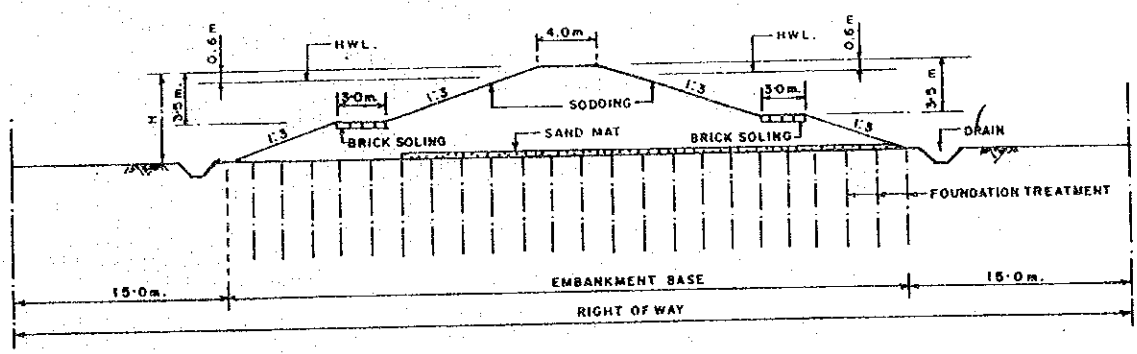


FIG. E.3.7 STANDARD CROSS-SECTION OF EMBANKMENT/SUB-EMBANKMENT : DHAKA EAST

Khal Length

No.	Length(m)
K 1	820
K 2	1,640
K 3	4,100
K 4	440
K 5	3,040
K 6	1,940
K 7	640
K 8	3,540
K 9	1,760
K 10	1,600
K 11	1,400
K 12	740
K 13	1,700
K 14	740
K 15	2,600
K 16	2,200
K 17	800
K 18	1,920
K 19	3,220
K 20	1,640
K 21	2,700
K 22	5,320
K 23	4,820
K 24	3,420
K 25	2,420
K 26	1,800
K 27	2,200
Total	59,160

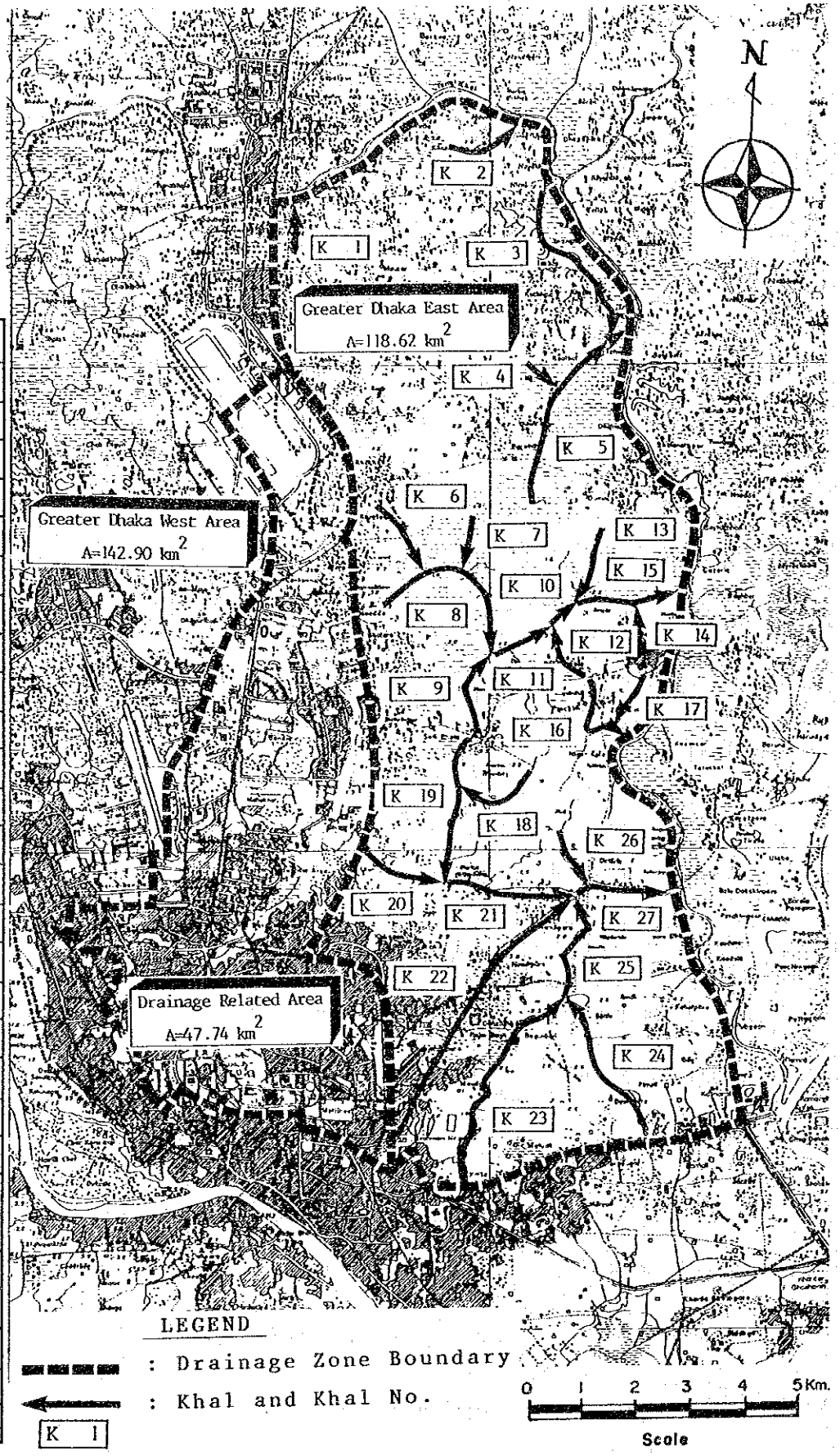
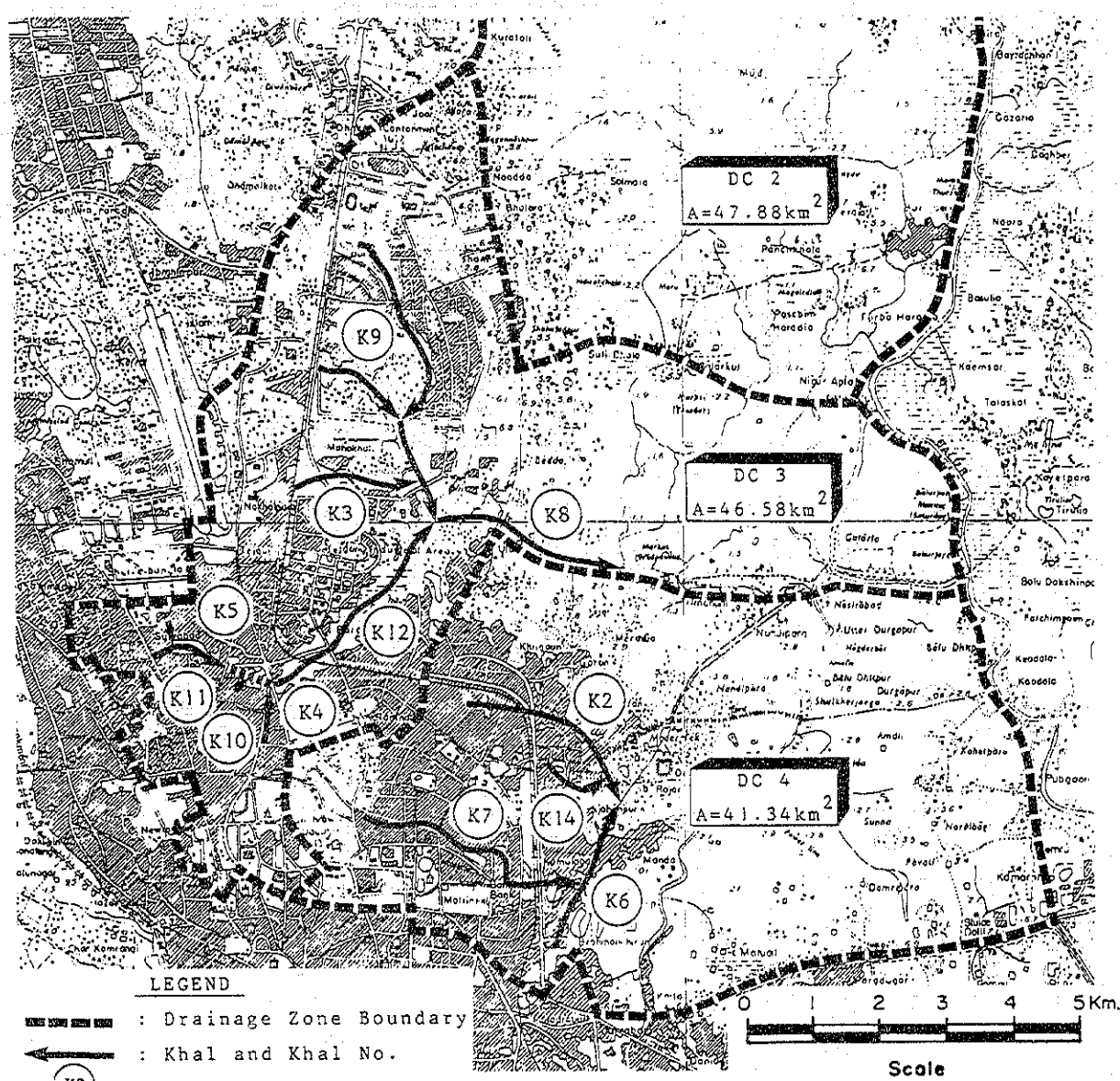


FIG. E.3.8 EXISTING MAJOR KHALS : GREATER DHAKA EAST

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA



Phased Khal Improvement Work

Khal No.	Name of Khal	Improved Length(m)
Phase I Work (1991 - 1992)		
K 3	Mohakhali Khal	2,220
K11	BegunbariKhal	1,000
K 7	Segunbagicha Khal	2,366
K 5	Rajabazar Khal	195
K10	Kathalbagan Khal	110
Sub-total		5,891
Phase II Work (1992 - 1993)		
K 2	Khilgaon-Basabo Khal	3,035
K 6	Gerani Khal	1,204
K 7	Segunbagicha Khal	1,576
K12	Begunbari Khal	1,000
K 9	Banani-Gulshan Khal	4,500
K 4	Paribagh Khal	767
Sub-total		12,082
Phase III Work (1993 - 1994)		
K14	Mugda Khal	2,200
K 8	Begunbari Khal	4,820
Sub-total		7,020
Total		24,993

Sourse : ADB,Dhaka Integrated Flood Protection,FAP-8B,Sep.1991

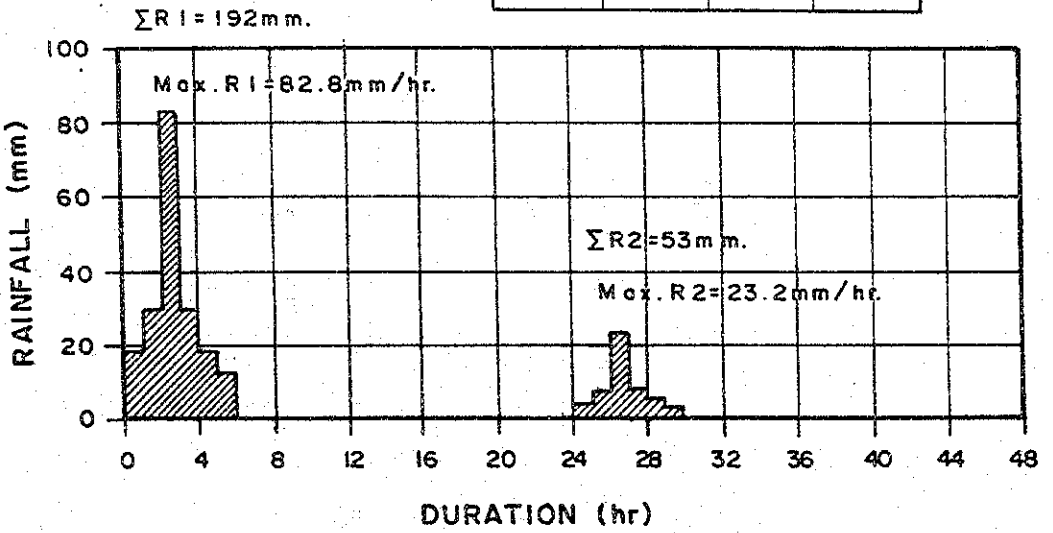
FIG. E.3.9 KHAL IMPROVEMENT WORKS PROPOSED IN DIFPP FINANCED BY ADB

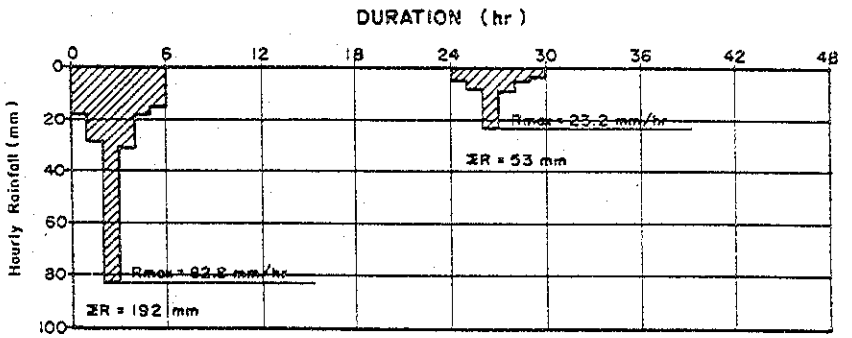
GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

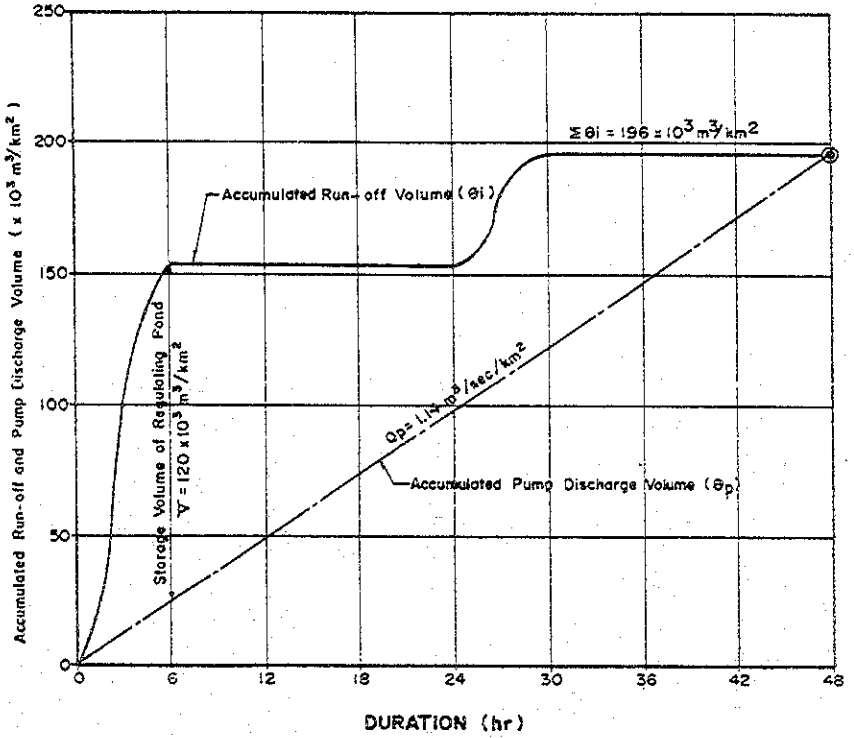
JICA

HOURLY DISTRIBUTION

hr	%	R1	R2
1	9	17.4	4.8
2	15	28.3	8.0
3	44	82.8	23.2
4	16	30.6	8.5
5	9	18.0	5.0
6	7	14.9	3.5
TOTAL	100	192.0	53.0



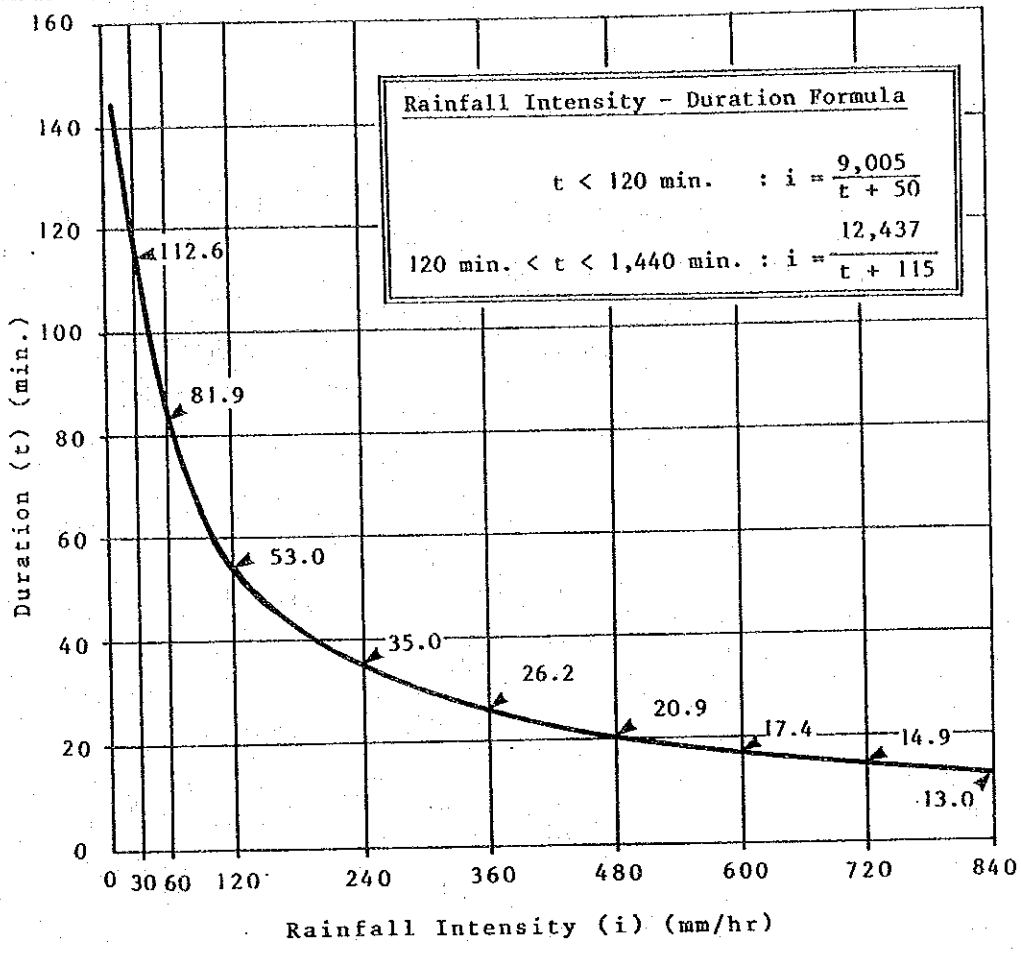




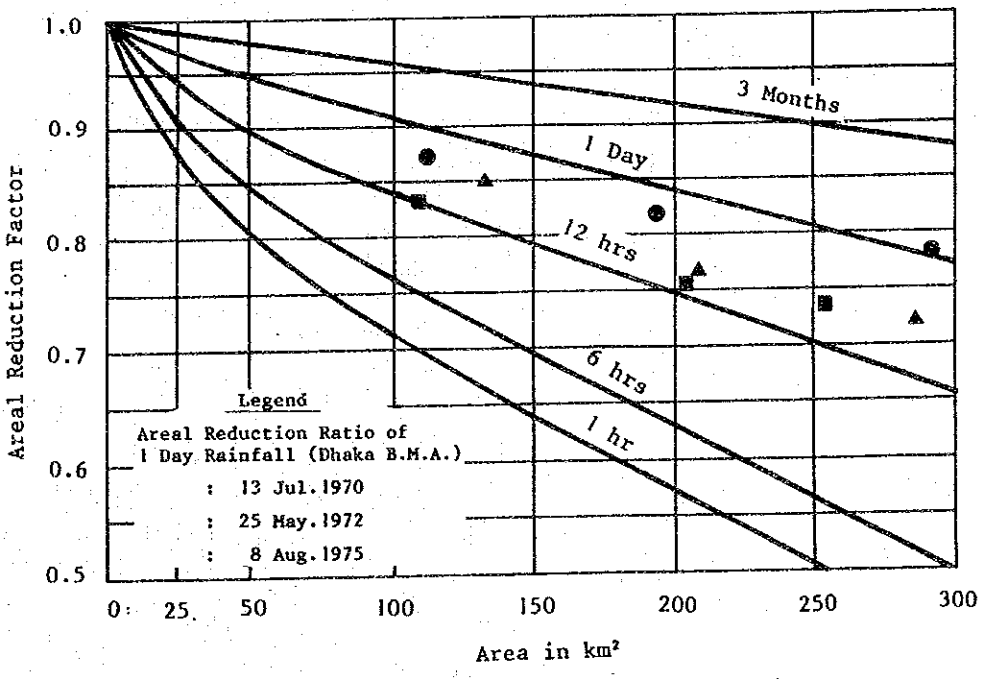
E - 104

FIG. E.3.10 DESIGN RAINFALL FOR PUMP DRAINAGE PLAN AND DESIGN SPECIFIC REQUIREMENTS OF PUMP AND RETARDING POND

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH



Souece : JICA,Study on Storm Water Drainage System Improvement Project in Dhaka City,1987



Source : NEDECO,Master Plan for Drainage and Flood Control of Jakarta,1973

FIG. E.3.11 DESIGN RAINFALL AND AREAL REDUCTION CURVE FOR KHAL IMPROVEMENT PLAN

Drainage Zone Area

Greater Dhaka East Area

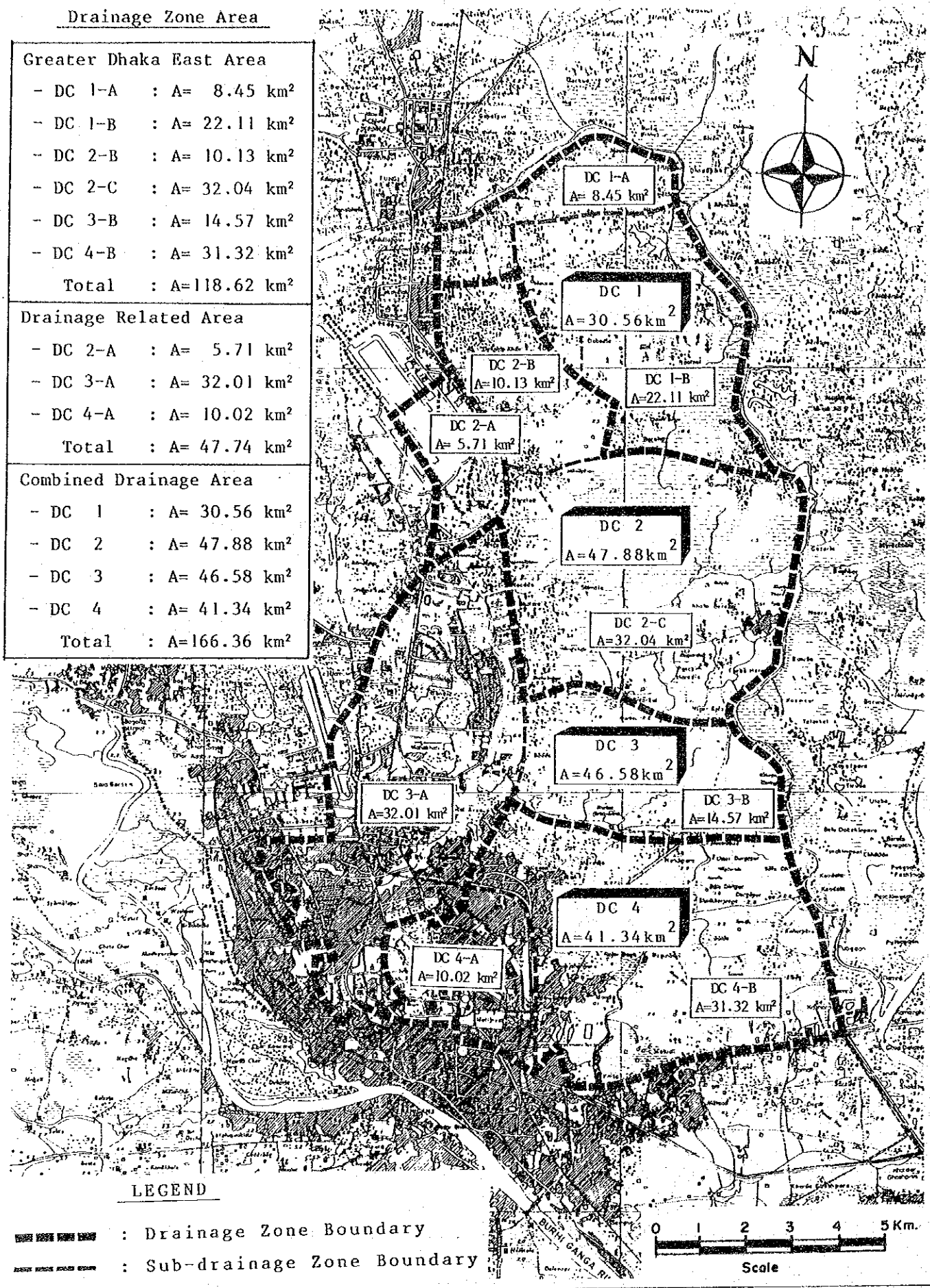
- DC 1-A	: A=	8.45 km²
- DC 1-B	: A=	22.11 km²
- DC 2-B	: A=	10.13 km²
- DC 2-C	: A=	32.04 km²
- DC 3-B	: A=	14.57 km²
- DC 4-B	: A=	31.32 km²
Total	: A=	118.62 km²

Drainage Related Area

- DC 2-A	: A=	5.71 km²
- DC 3-A	: A=	32.01 km²
- DC 4-A	: A=	10.02 km²
Total	: A=	47.74 km²

Combined Drainage Area

- DC 1	: A=	30.56 km²
- DC 2	: A=	47.88 km²
- DC 3	: A=	46.58 km²
- DC 4	: A=	41.34 km²
Total	: A=	166.36 km²



LEGEND

: Drainage Zone Boundary

: Sub-drainage Zone Boundary

FIG. E.3.12 DRAINAGE ZONE : GREATER DHAKA EAST

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

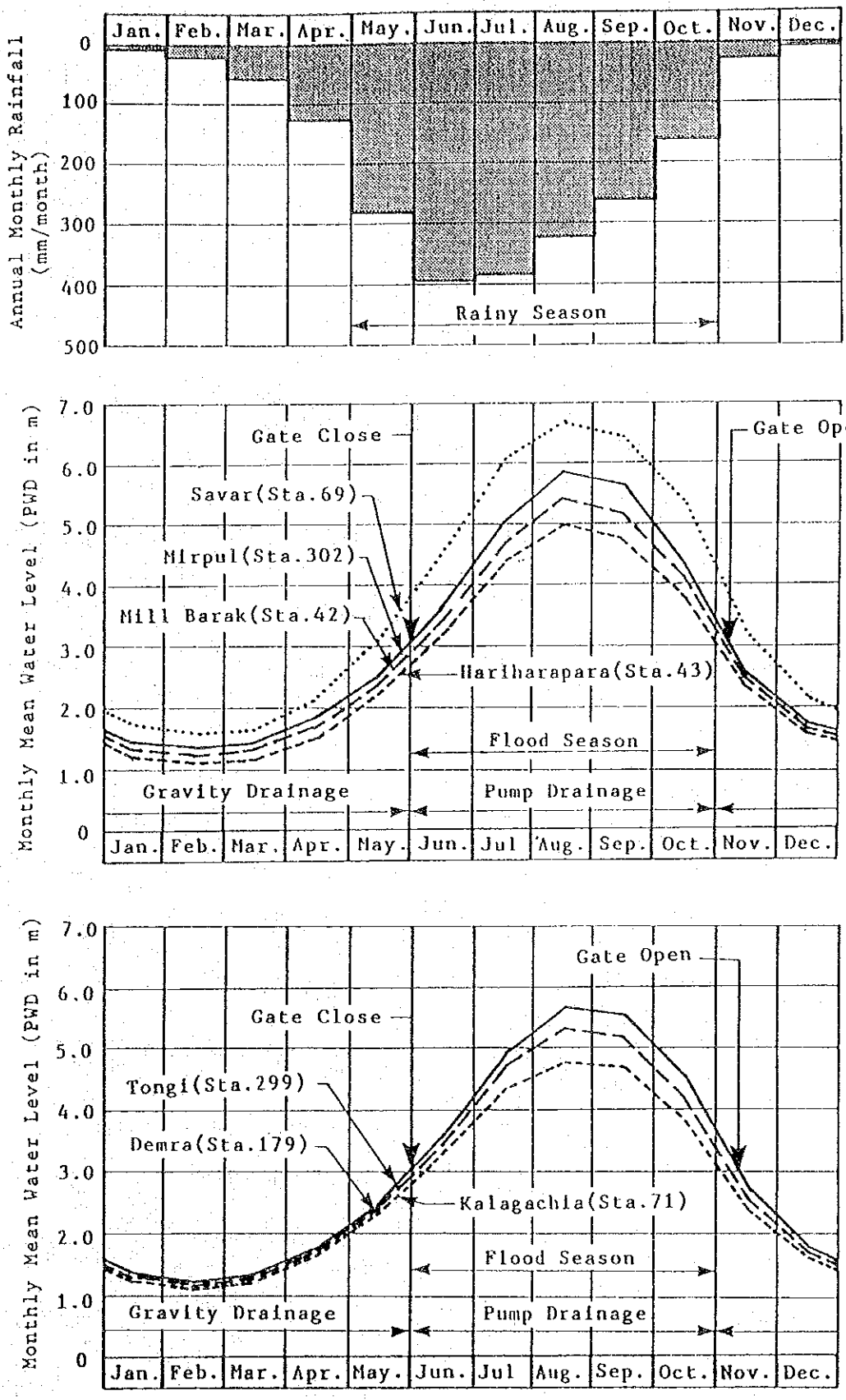
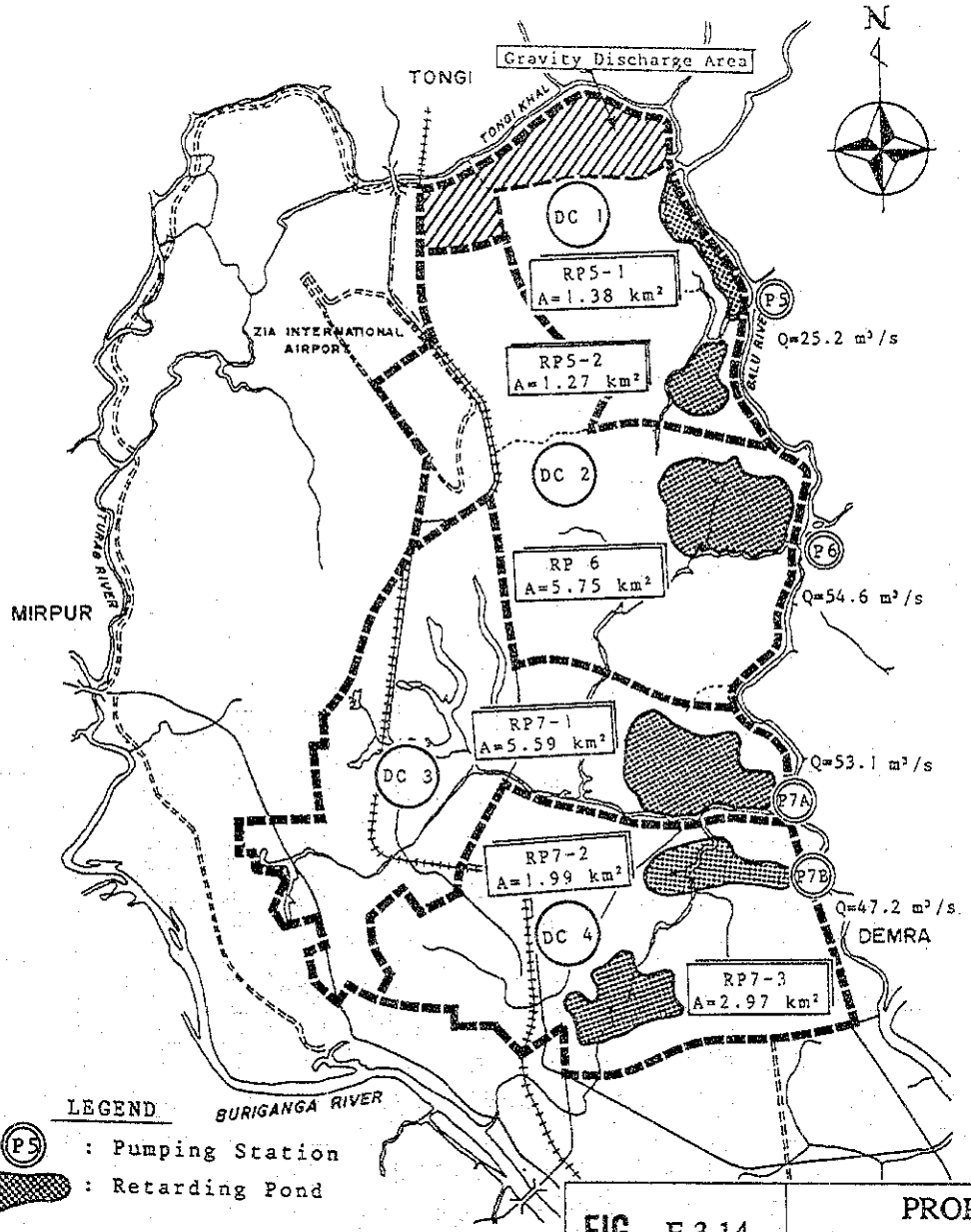
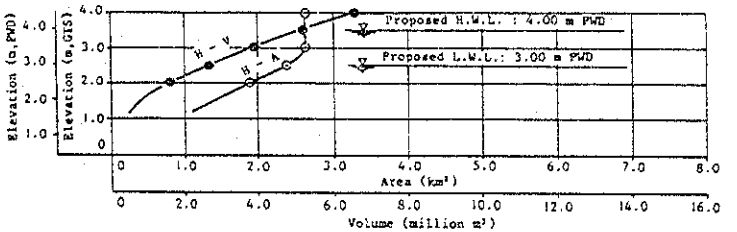
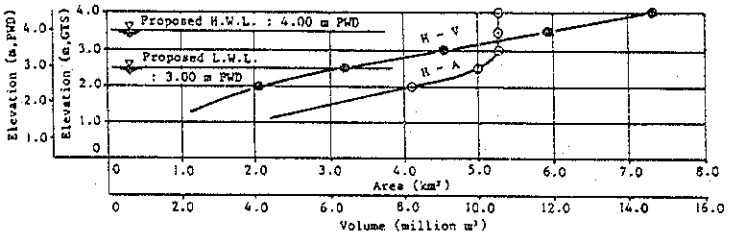


FIG. E.3.13 SEASONAL VARIATION OF RAINFALL AND FLOOD WATER LEVEL IN DHAKA METROPOLITAN AREA

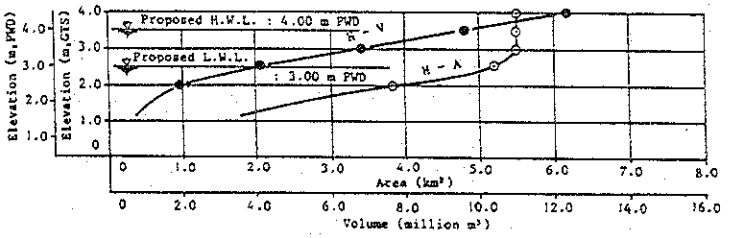




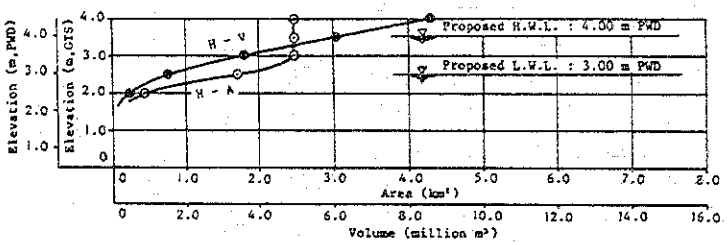
Retarding Pond : 5-1 and 5-2



Retarding Pond : 6



Retarding Pond : 7-1

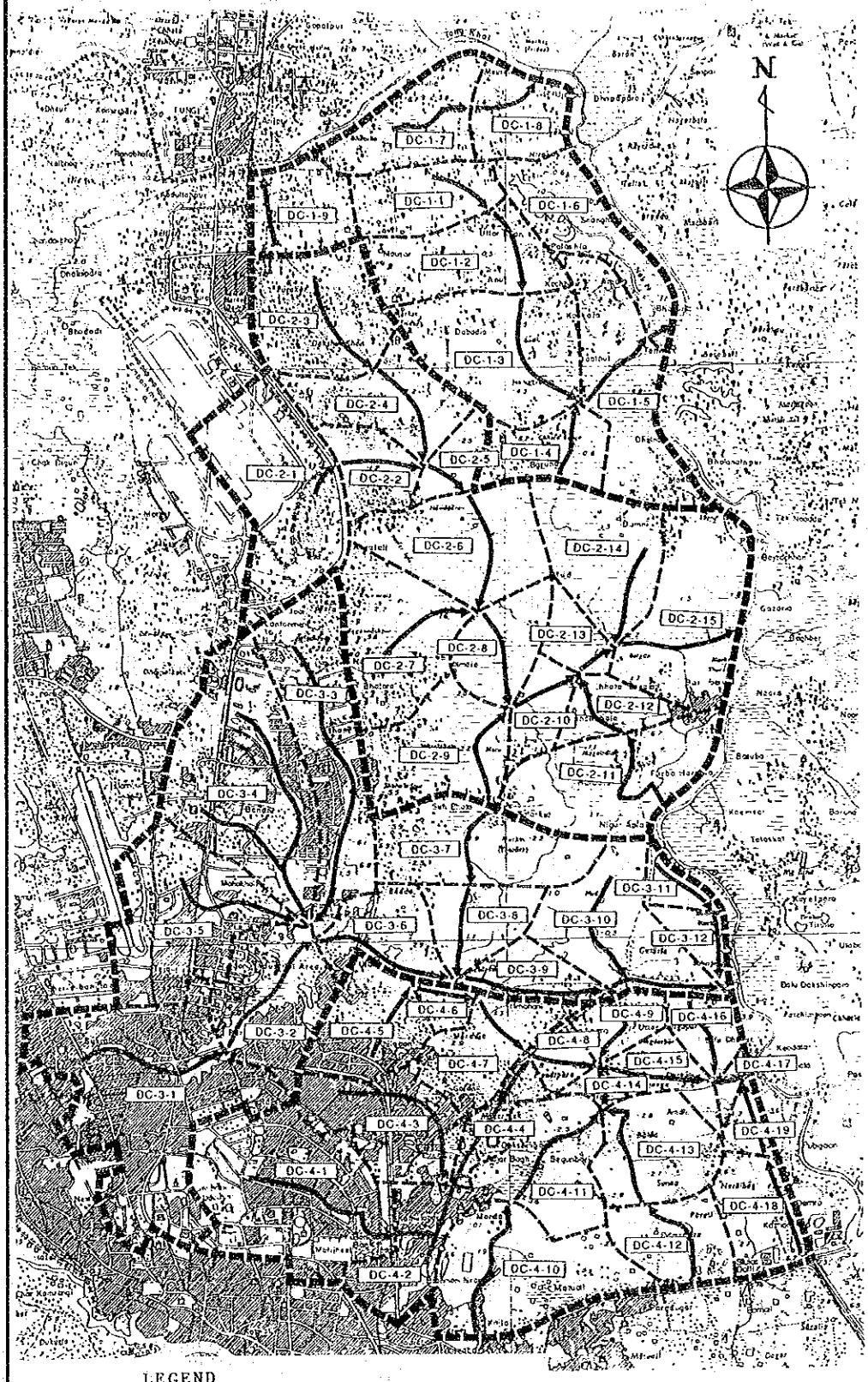


Retarding Pond : 7-2 and 7-3

FIG. E.3.14 PROPOSED REQUIREMENTS OF PUMP AND RETARDING POND : GREATER DHAKA EAST

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA



Block No.	Drainage Area (km2)	Run-off Coefficient f
	(DC-1)	
DC-1-1	2.53	0.39
DC-1-2	3.95	0.40
DC-1-3	5.01	0.44
DC-1-4	1.76	0.38
DC-1-5	5.09	0.33
DC-1-6	3.77	0.32
DC-1-7	3.38	0.39
DC-1-8	2.57	0.39
DC-1-9	2.50	0.42
	(DC-2)	
DC-2-1	5.71	0.38
DC-2-2	1.79	0.40
DC-2-3	4.08	0.44
DC-2-4	2.97	0.45
DC-2-5	1.29	0.42
DC-2-6	4.54	0.34
DC-2-7	3.52	0.40
DC-2-8	2.36	0.35
DC-2-9	3.33	0.40
DC-2-10	1.25	0.38
DC-2-11	4.98	0.38
DC-2-12	1.34	0.38
DC-2-13	1.23	0.35
DC-2-14	4.48	0.24
DC-2-15	5.01	0.25
	(DC-3)	
DC-3-1	8.81	0.47
DC-3-2	3.23	0.50
DC-3-3	5.54	0.42
DC-3-4	7.24	0.43
DC-3-5	6.29	0.43
DC-3-6	2.38	0.42
DC-3-7	3.42	0.38
DC-3-8	2.09	0.34
DC-3-9	1.86	0.30
DC-3-10	4.10	0.27
DC-3-11	0.69	0.40
DC-3-12	0.93	0.27
	(DC-4)	
DC-4-1	7.25	0.47
DC-4-2	2.11	0.48
DC-4-3	3.67	0.47
DC-4-4	1.03	0.43
DC-4-5	2.72	0.44
DC-4-6	0.61	0.44
DC-4-7	2.49	0.46
DC-4-8	0.70	0.29
DC-4-9	1.39	0.36
DC-4-10	5.30	0.37
DC-4-11	3.24	0.35
DC-4-12	2.91	0.44
DC-4-13	2.56	0.46
DC-4-14	0.30	0.29
DC-4-15	1.11	0.26
DC-4-16	1.10	0.43
DC-4-17	0.30	0.46
DC-4-18	1.96	0.44
DC-4-19	0.59	0.46

LEGEND

: Drainage Zone Boundary

: Sub-drainage Zone Boundary

DC-2-14 : Block No. of Sub-drainage Zone

: Khal

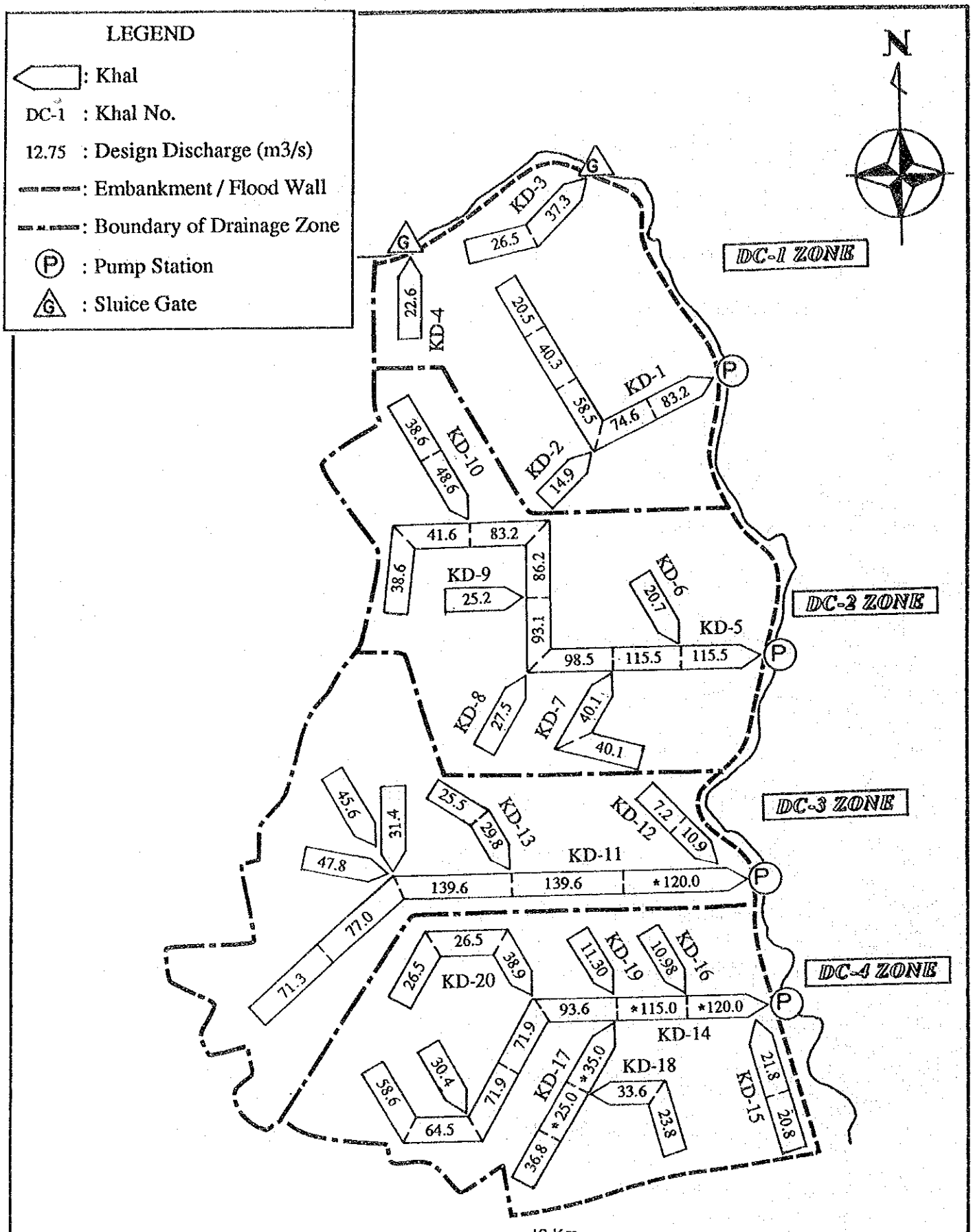
0 1 2 3 4 5Km.

Scale

FIG. E.3.15 SUB-DRAINAGE ZONE AND THEIR RUN-OFF COEFFICIENT : GREATER DHAKA EAST

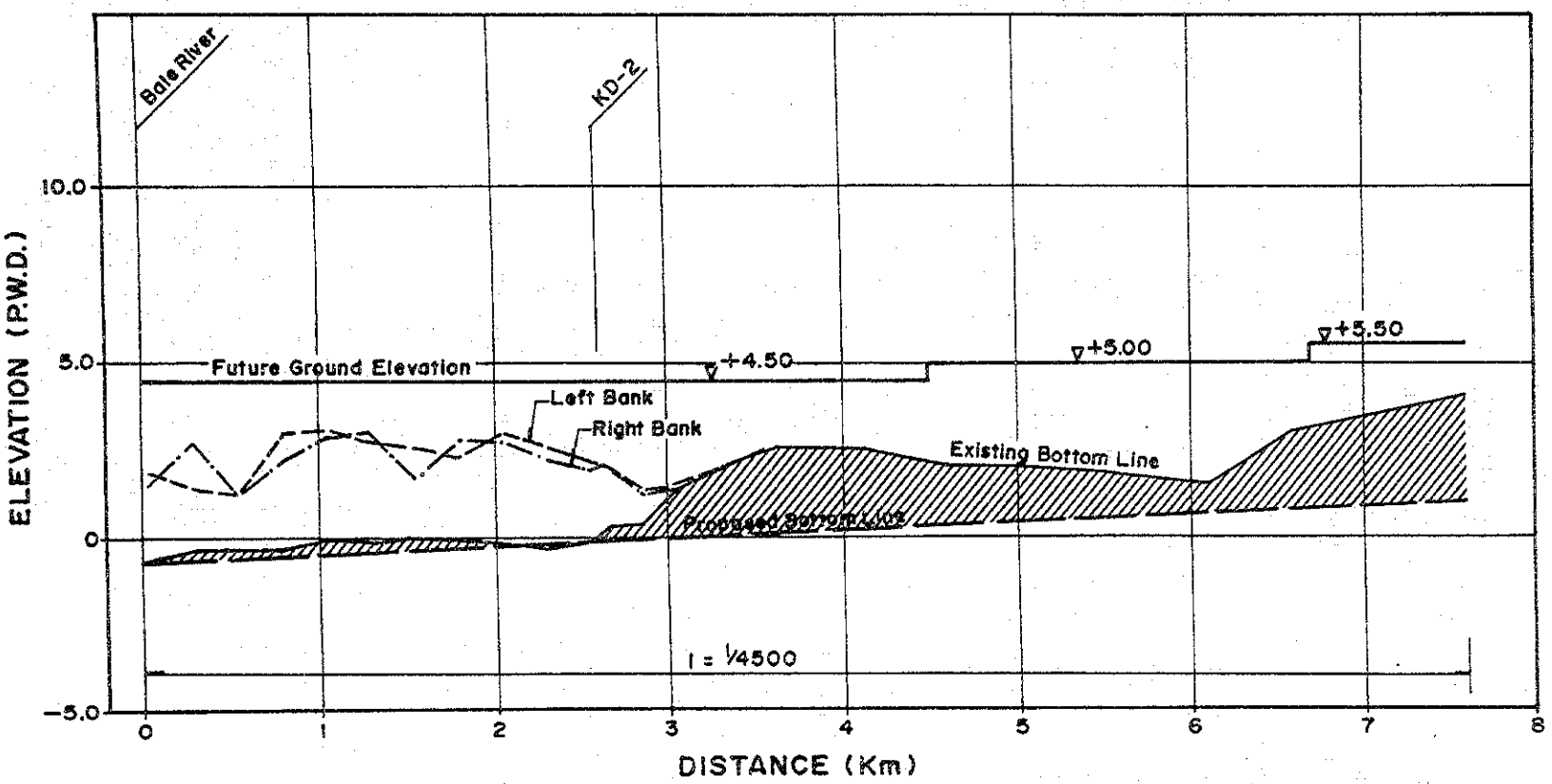
GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

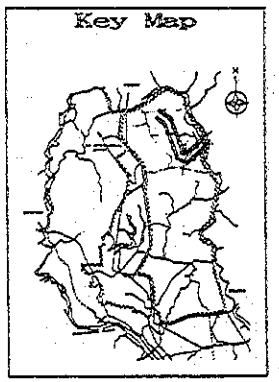
JICA



Note: The figures with (*) indicate the design discharge estimated in hydraulic simulation by Mike 11 model.

FIG. E.3.16 DESIGN DISCHARGE FOR KHAL IMPROVEMENTS : GREATER DHAKA EAST





Section No.	KD-1-1	KD-1-2	KD-1-3	KD-1-4	KD-1-5

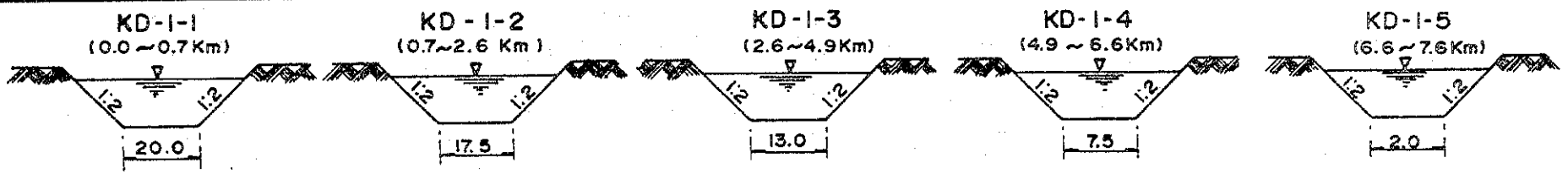
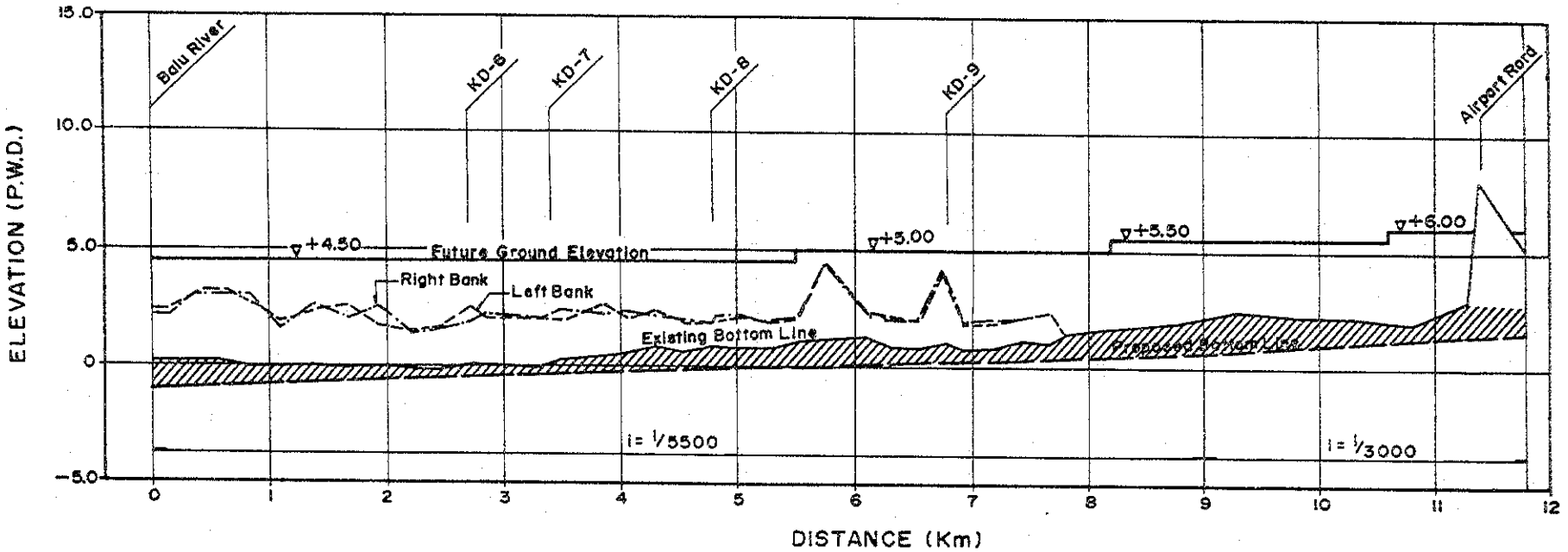


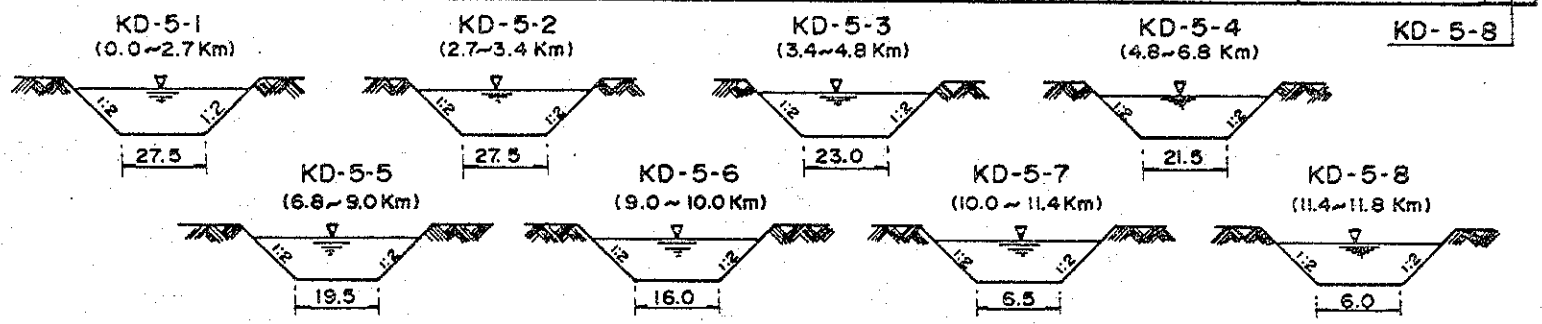
FIG. E.3.17(1) PROPOSED LONGITUDINAL AND CROSS SECTIONS (KD-1)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA



Section No.	KD-5-1	KD-5-2	KD-5-3	KD-5-4	KD-5-5	KD-5-6	KD-5-7	



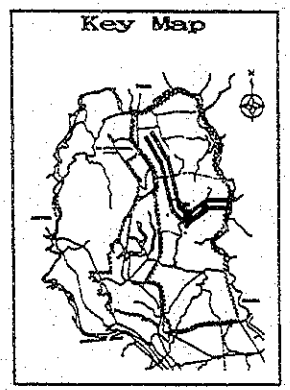
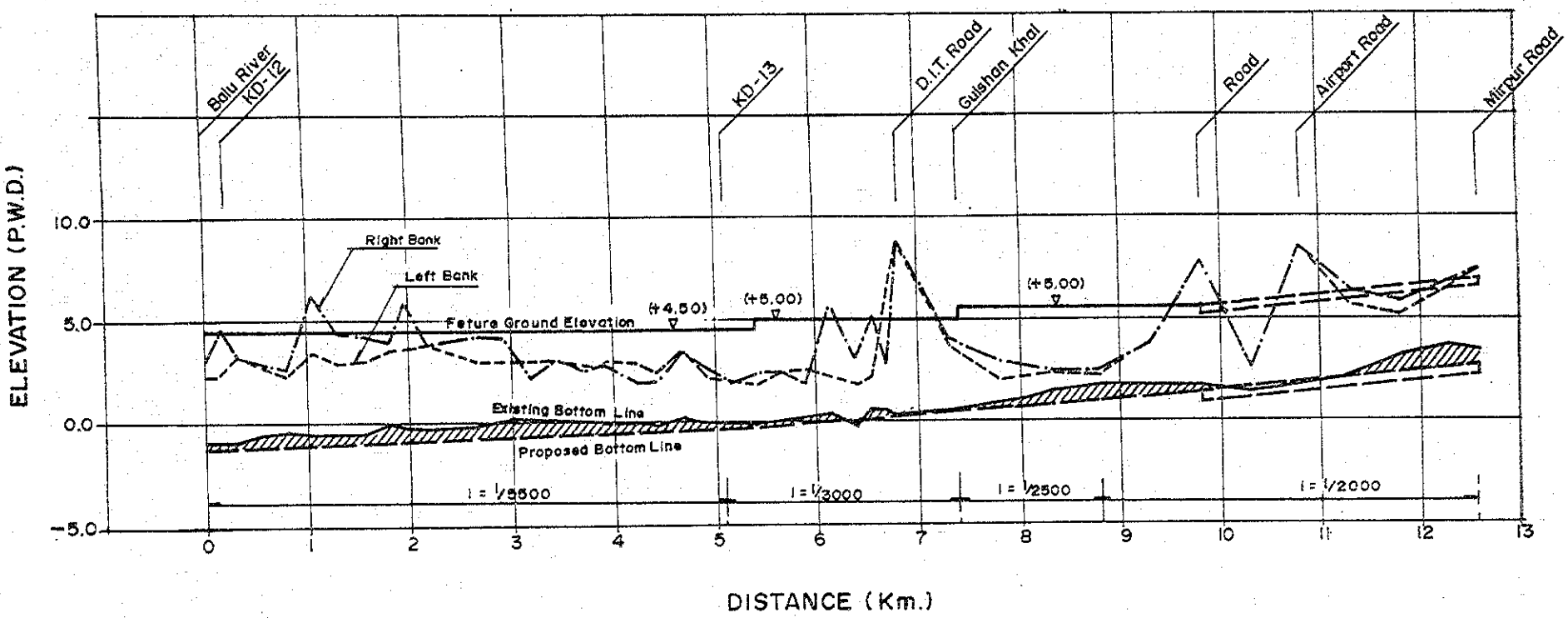
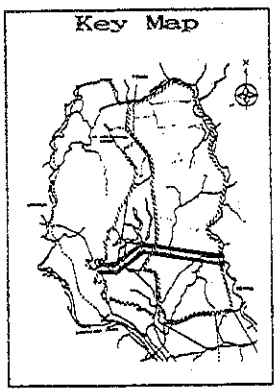


FIG. E.3.17(2) PROPOSED LONGITUDINAL AND CROSS SECTIONS (KD-5)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH



Section No.	KD-II-1	KD-II-2	KD-II-3	(A.D.B. Project Area)



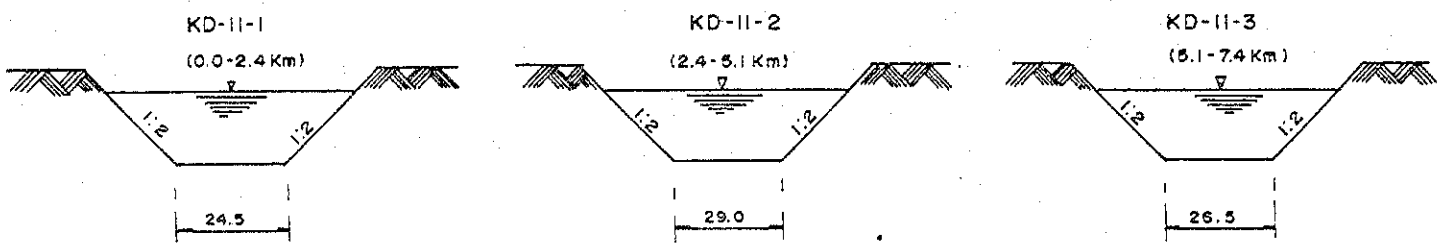
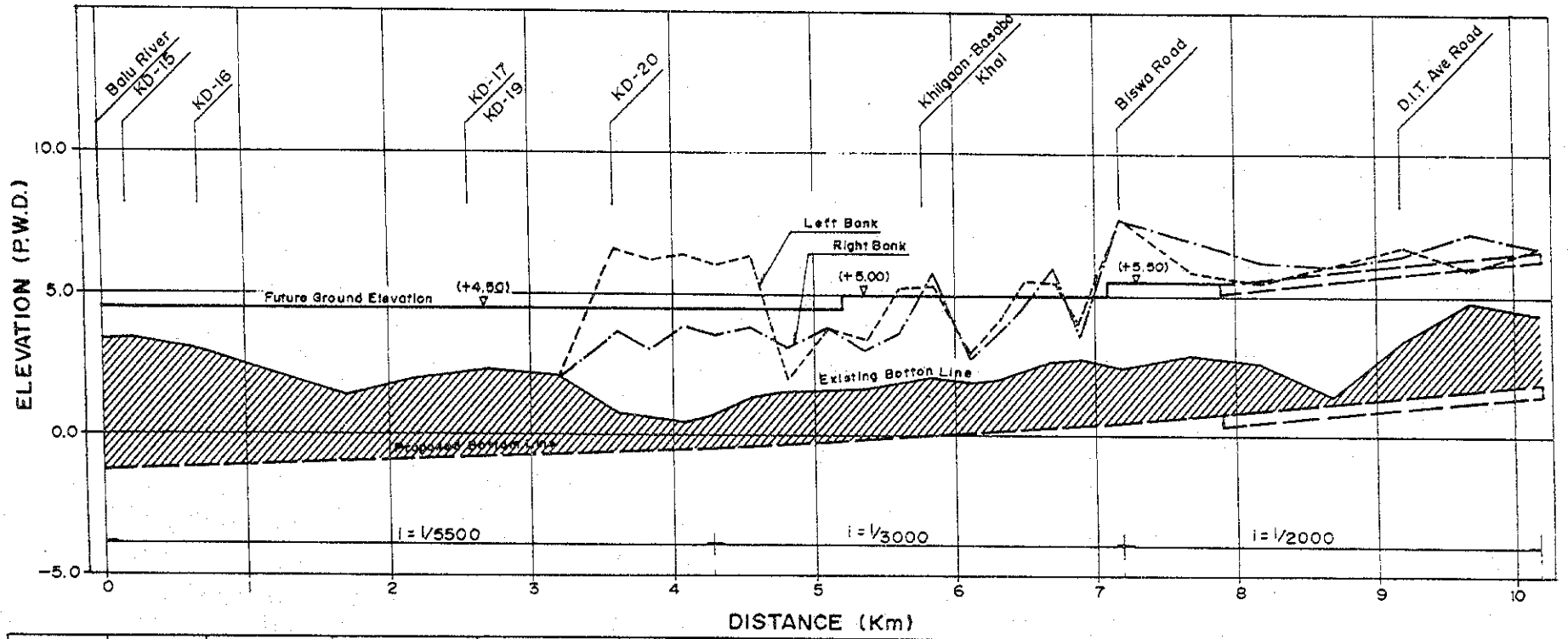


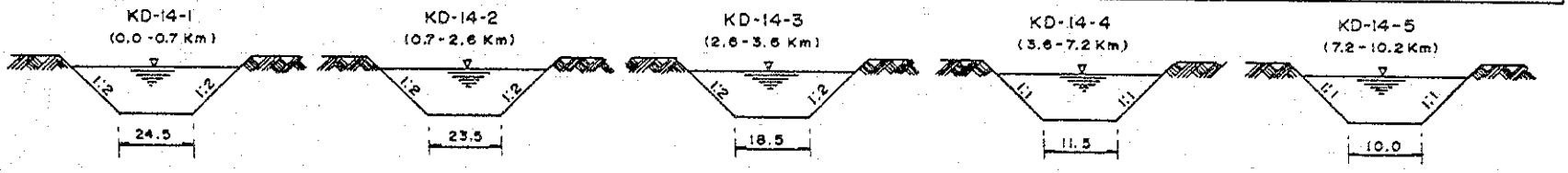
FIG. E.3.17(3) PROPOSED LONGITUDINAL AND CROSS SECTIONS (KD-11)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA



Section No.	KD-14-1	KD-14-2	KD-14-3	KD-14-4	KD-14-5	A.D.B. Project Area



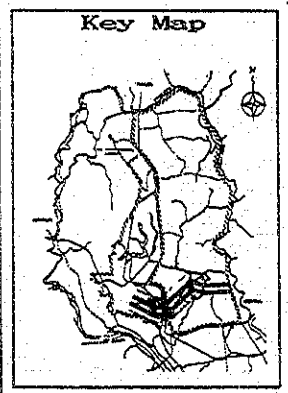


FIG. E.3.17(4) PROPOSED LONGITUDINAL AND CROSS SECTIONS (KD-14)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

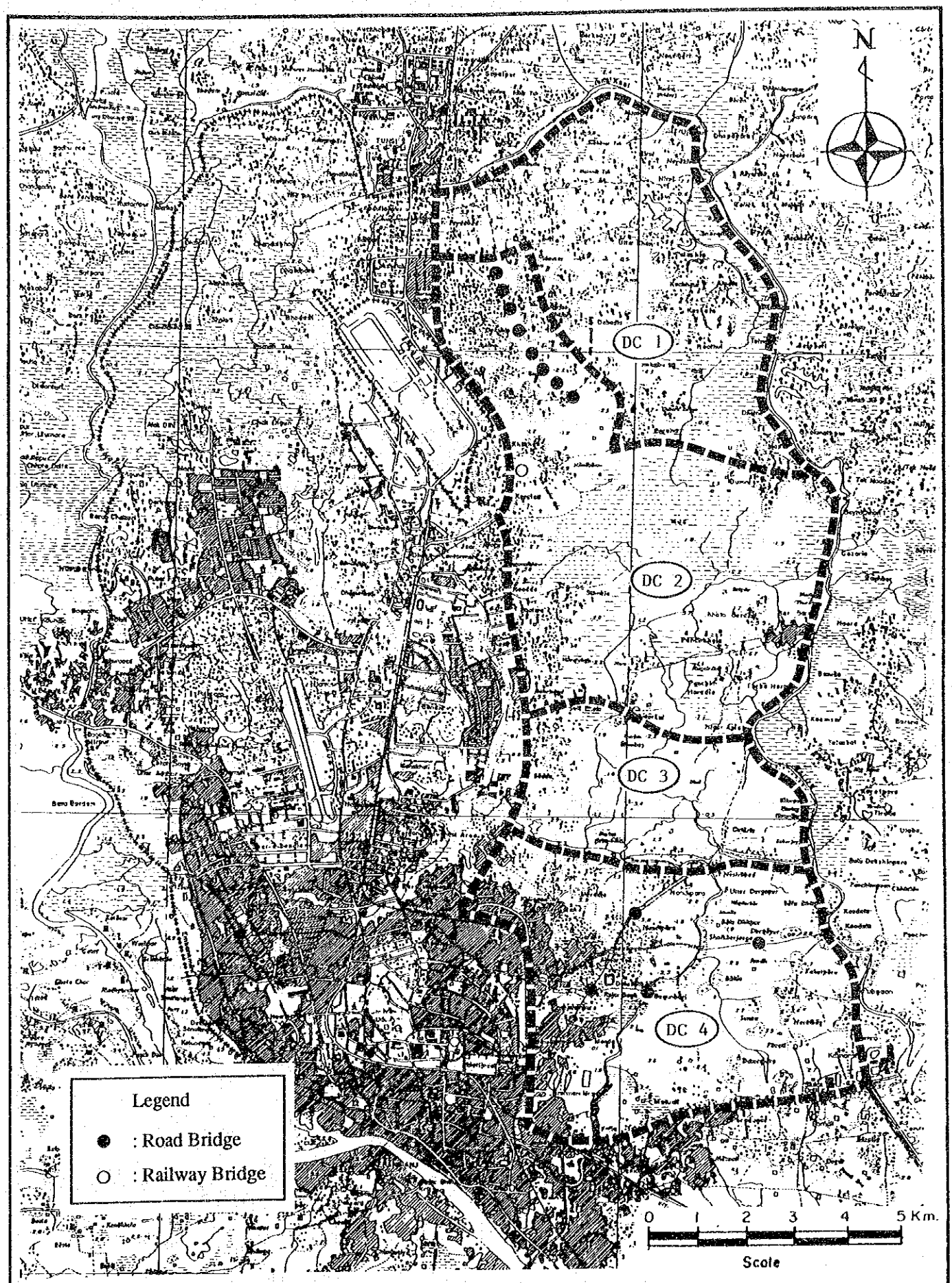


FIG. E.3.18 LOCATION OF PROPOSED BRIDGES : GREATER DHAKA EAST

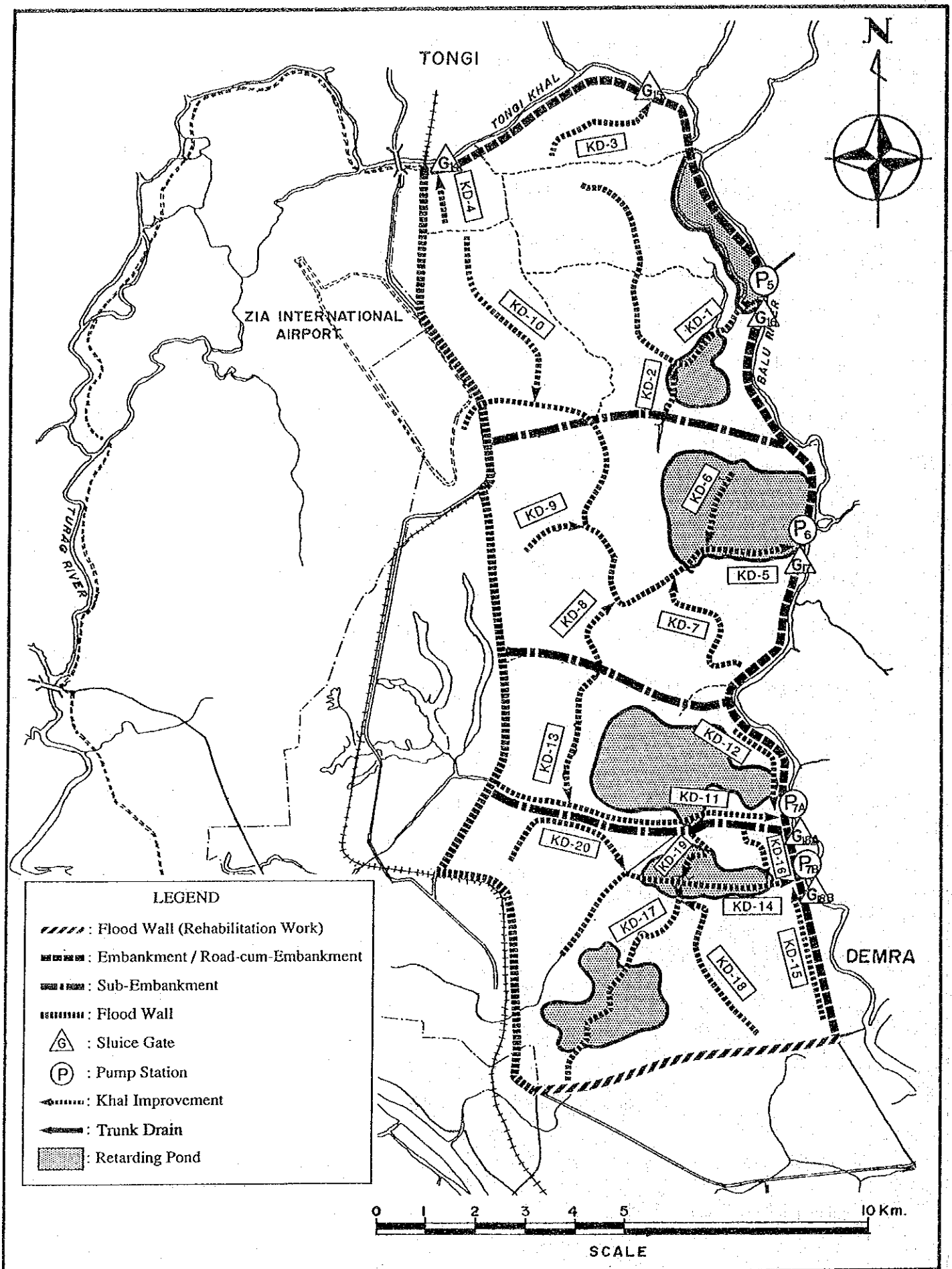


FIG. E.3.19 PROPOSED FACILITIES : GREATER DHAKA EAST

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

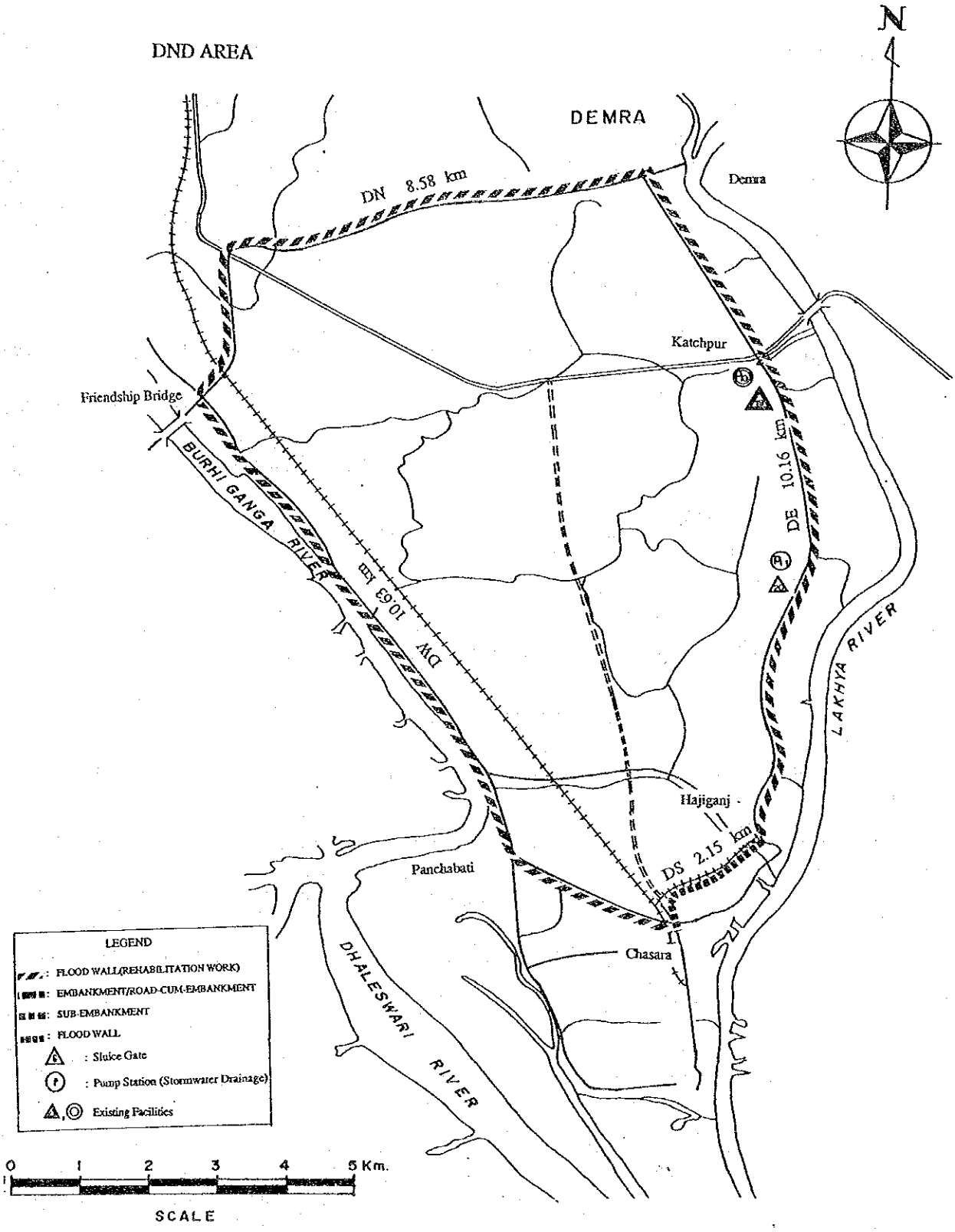


FIG. E.4.1 ALIGNMENT OF FLOOD WALL : DND AREA

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

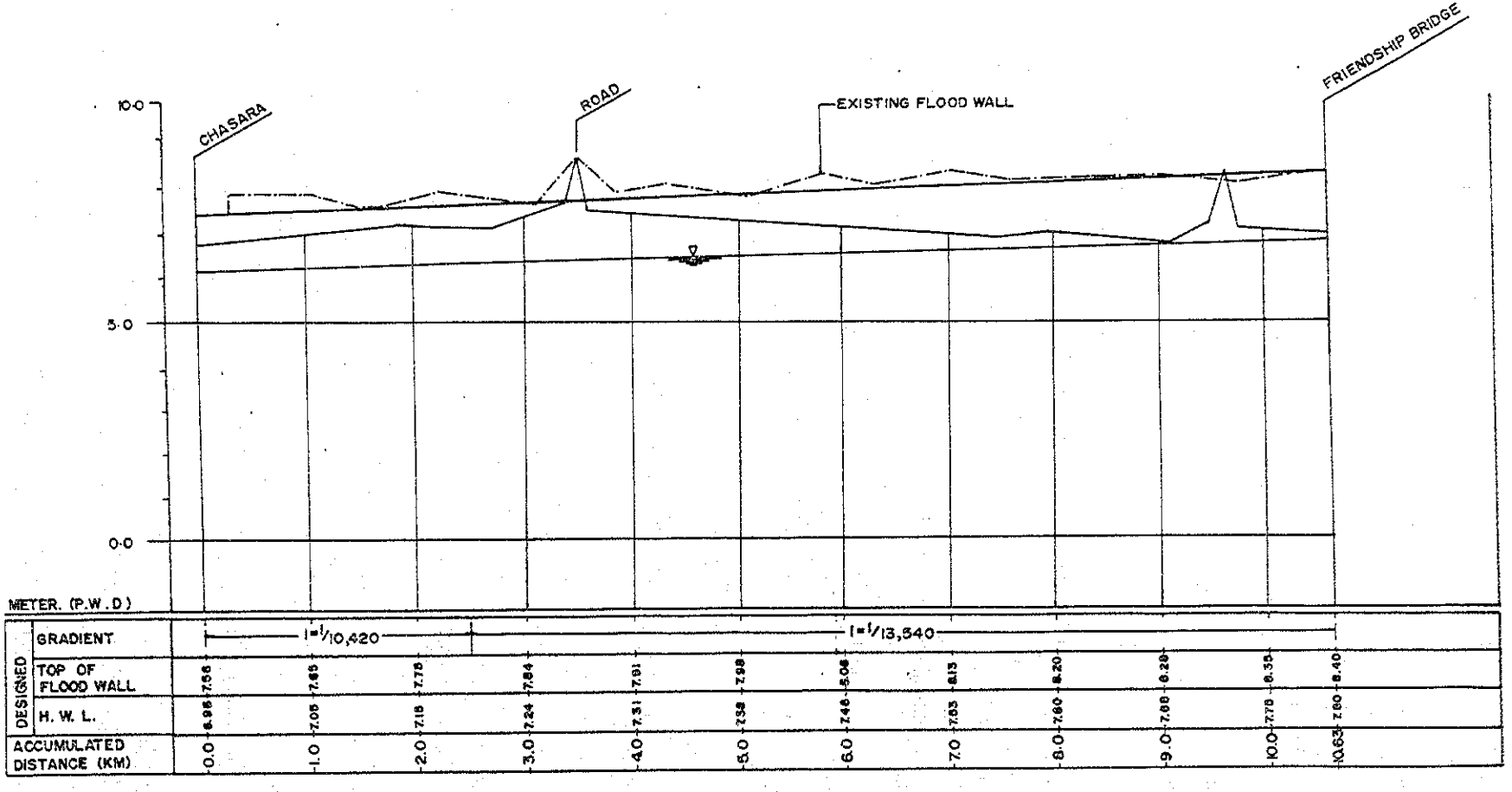


FIG. E.4.2(1) LONGITUDINAL SECTION OF FLOOD WALL : DND (DW)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA

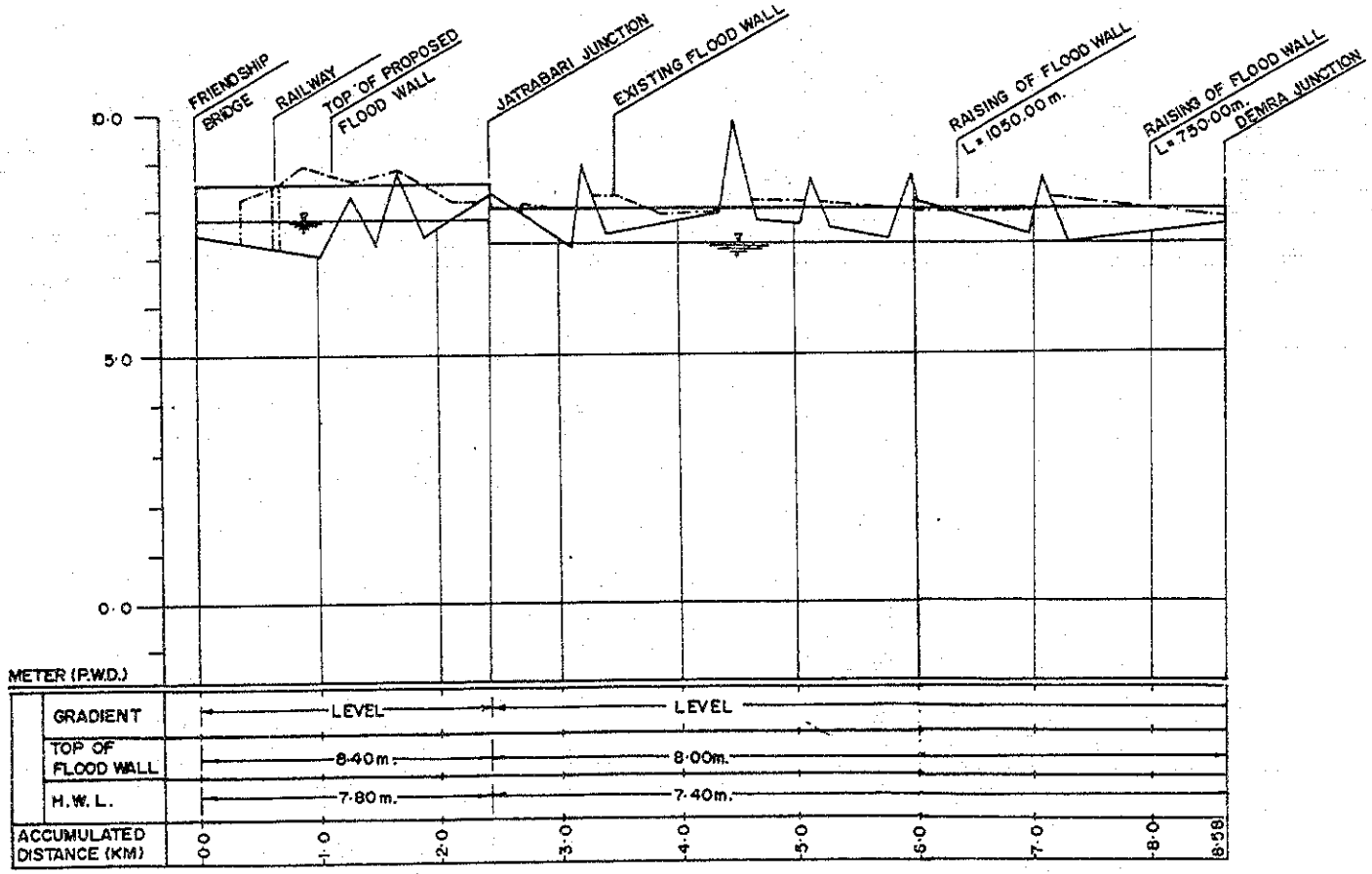


FIG. E.4.2(2)	LONGITUDINAL SECTION OF FLOOD WALL : DND (DN)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

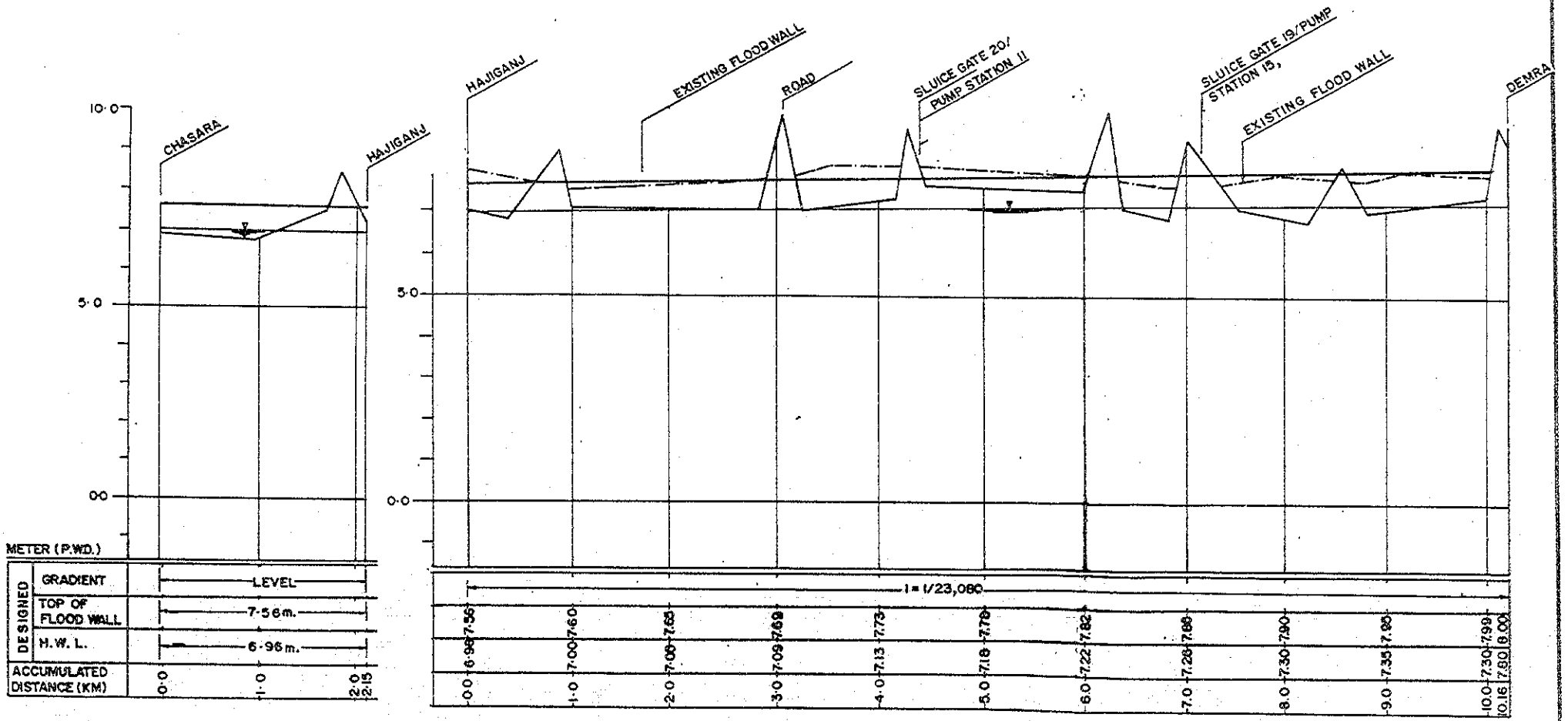


FIG. E.4.2(3) LONGITUDINAL SECTION OF FLOOD WALL : DND (DS AND DE)

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF BANGLADESH FLOOD ACTION PLAN NO.8A IN THE PEOPLE'S REPUBLIC OF BANGLADESH

JICA