

TABLES

Table 3-1 FEATURES OF REVETMENT FOR URGENT PROJECT

River	Stretch	Stretch Length (m)	Left/Right	Length of Revetment (m)	Area of Revetment (m ²)	
					Partial	Accum.
Deli R.	DE. 1 + 950 to DE. 2 + 320	370	L/R	740 *1	5,180	5,180
	DE. 3 + 260 to DE. 3 + 550	290	L/R	580 *1	4,060	9,240
	DE. 3 + 850 to DE. 4 + 190	340	L/R	680 *1	4,760	14,000
	DE. 4 + 600 to DE. 4 + 810	210	L/R	420 *1	2,940	16,940
	DE. 5 + 660 to DE. 6 + 360	700	L/R	1,400 *1	9,800	26,740
	DE. 6 + 540 to DE. 6 + 850	310	L/R	620 *1	4,340	31,080
	DE. 7 + 250 to DE. 7 + 750	500	L/R	1,000 *1	7,000	38,080
	DE. 8 + 390 to DE. 8 + 680	290	L/R	580 *1	4,060	42,140
	DE. 8 + 960 to DE. 9 + 160	200	L/R	400 *2	2,600	44,740
	DE. 9 + 470 to DE. 9 + 710	240	L/R	480 *2	3,120	47,860
	DE. 9 + 785 to DE.10 + 220	435	L/R	870 *2	5,655	53,515
	DE.10 + 540 to DE.10 + 770	230	L/R	460 *2	2,990	56,505
	DE.10 + 930 to DE.11 + 180	250	L/R	500 *2	3,250	59,755
DE.11 + 300 to DE.30 + 120	17,180	L/R	34,360 *3	223,340	283,095	
DE.30 + 620 to DE.31	380	L/R	760 *3	4,940	288,035	
Percut R.	PE.27 + 800 to PE.28	200	L/R	400 *1	2,800	2,800
	Bandar Sidoras Intake Weir			200	3,109	5,909
Padang R.	PA.24 + 400 to PA.24 + 700	300	L	300 *4	1,860	1,860
	PA.24 + 700 to PA.25	300	R	300 *4	1,860	3,720
	PA.25 + 400 to PA.26 + 100	700	R	700 *4	4,340	8,060
	PA.28 + 700 to PA.29 + 800	350	R	350 *4	2,170	10,230
	Paya Lombang Intake Weir			300	4,150	14,380
Medan Floodway	MF. 0 to MF. 3 + 840	3,840	L/R	7,680 *5	53,760	53,760
	Diversion Weir (Floodway)			200	3,576	57,336
	Diversion Weir (Deli River)			300	5,364	62,700
Grand Total				54,580		371,024

*1 : Gradient of Channel Slope = 1 : 2.0
Water Depth = 6.0 m

*2 : Gradient of Channel Slope = 1 : 2.0
Water Depth = 5.5 m

*3 : Gradient of Channel Slope = 1 : 1.5
Water Depth = 5.5 m

*4 : Gradient of Channel Slope = 1 : 2.0
Water Depth = 5.2 m

*5 : Gradient of Channel Slope = 1 : 1.5

Table 3-2 FEATURES OF GABION MATTRESS FOR URGENT PROJECT

River	Stretch	Stretch Length (m)	Left/Right	Length of Gabion mat. (m)	Area of Gabion mat.(m2)	
					Partial	Accum.
Deli R.	DE. 5 + 720 to DE. 5 + 890	170 *1	R	170	0	0
	DE. 6 + 20 to DE. 6 + 250	230 *1	L	230	0	0
	DE. 6 + 550 to DE. 6 + 660	110 *1	R	110	0	0
	DE. 6 + 600 to DE. 6 + 820	220 *1	L	220	0	0
	DE. 7 + 460 to DE. 7 + 570	110 *1	R	110	0	0
	DE. 7 + 550 to DE. 7 + 690	140 *1	L	140	0	0
	DE. 8 + 390 to DE. 8 + 470	80 *1	L	80	0	0
	DE. 8 + 550 to DE. 8 + 660	110 *1	L	110	0	0
	DE. 9 + 10 to DE. 9 + 130	120 *1	L	120	0	0
	DE. 9 + 850 to DE. 9 + 980	130 *1	R	130	0	0
	DE.10 + 30 to DE.10 + 170	140 *1	L	140	0	0
	DE.10 + 620 to DE.10 + 750	130 *1	R	130	0	0
	DE.10 + 950 to DE.11 + 180	230 *1	L	230	0	0
	DE.12 + 635 to DE.13 + 165	530 *1	L/R	1,060	0	0
	DE.13 + 770 to DE.15 + 800	2,030 *1	L/R	4,060	0	0
	DE.17 + 190 to DE.17 + 370	180 *1	R	180	0	0
	DE.17 + 400 to DE.17 + 620	220 *1	L	220	0	0
	DE.18 + 40 to DE.18 + 230	190 *1	L	190	0	0
	DE.18 + 680 to DE.18 + 850	170 *1	L	170	0	0
	DE.19 + 70 to DE.19 + 210	140 *1	R	140	0	0
	DE.21 + 60 to DE.21 + 320	260 *1	R	260	0	0
	DE.21 + 300 to DE.21 + 430	130 *1	R	130	0	0
	DE.21 + 460 to DE.21 + 640	180 *1	L	180	0	0
	DE.21 + 760 to DE.21 + 940	180 *1	L	180	0	0
	DE.21 + 970 to DE.22 + 90	120 *1	R	120	0	0
	DE.22 + 520 to DE.22 + 650	130 *1	L	130	0	0
	DE.22 + 680 to DE.22 + 840	160 *1	R	160	0	0
	DE.23 + 490 to DE.23 + 610	120 *1	R	120	0	0
	DE.23 + 660 to DE.23 + 770	110 *1	L	110	0	0
	DE.24 + 640 to DE.24 + 830	190 *1	L	190	0	0
	DE.25 + 550 to DE.25 + 680	130 *1	L	130	0	0
	DE.25 + 690 to DE.25 + 790	100 *1	L	100	0	0
	DE.25 + 900 to DE.26 + 60	160 *2	R	160	0	0
DE.26 + 290 to DE.26 + 450	160 *2	R	160	0	0	
DE.26 + 480 to DE.26 + 650	170 *2	L	170	0	0	
DE.26 + 990 to DE.27 + 170	180 *2	R	180	0	0	
DE.27 + 300 to DE.27 + 980	680 *2	L/R	1,360	0	0	
DE.28 + 460 to DE.28 + 620	160 *2	L	160	0	0	
DE.28 + 640 to DE.28 + 810	170 *2	R	170	0	0	
DE.29 to DE.29 + 780	780 *2	L/R	1,560	0	0	
DE.30 + 640 to DE.30 + 780	140 *2	L	140	0	0	
DE.30 + 820 to DE.30 + 990	170 *2	R	170	0	0	
Percut R.	Bandar Sidoras Intake Weir				8,900	8,900
Padang R.	PA.24 + 400 to PA.24 + 700	300 *1	L	300	0	0
	PA.24 + 700 to PA.25	300 *1	R	300	0	0
	PA.25 + 400 to PA.26 + 100	700 *1	R	700	0	0
	PA.28 + 700 to PA.29 + 800	350 *1	R	350	0	0
	Paya Lombang Intake Weir				19,200	19,200
Medan Floodway	Diversion Weir (Floodway)				1,890	1,890
	Diversion Weir (Deli River)				990	2,880
Grand Total						30,980

Note *1 : Breadth of Gabion mattress = 4.5 m

*2 : Breadth of Gabion mattress = 3.0 m

Table 3-3 (1/2) MAIN FEATURES OF EXISTING BRIDGES (DELI RIVER)

No.	Name of Bridge	Location	Administration Office	Type of Bridge	No. of Span	Narrowest Span (m)	Length (m)	Width (m)	Lowest EL. of Beam (EL.m)	Lowest EL. R. Bed (EL.m)	Remarks
1	Tollway Br.	DE. 0	JASA MARGA	Concrete girder	3	23.7	72.4	26.75	3.2	-3.23	
2	Railway Br.	DE. 0 +350	PJKA	Steel truss girder	1	62.4	63.0	5.00	2.8	-1.93	
3	National Rd Br.	DE. 0 +900	BINA MARGA	Concrete girder	5	9.9	51.4	9.30	2.4	-1.23	With a water pipe
4	Pedestrian Br.	DE. 2 +670	Medan Municipality	Suspension Br.	1	34.5	34.7	1.90	2.6	-2.58	
5	Pedestrian Br.	DE. 4 +375	- ditto -	- ditto -	1	33.2	33.2	1.20	3.5	-2.85	
6	Labuhan Deli Br.	DE. 5 +165	- ditto -	Concrete girder	1	33.3	34.0	9.70	4.4	-2.78	With a gas pipe
7	Pedestrian Br.	DE. 7 +250	- ditto -	Suspension Br.	1	32.0	32.0	5.00	5.3	0.33	
8	Pedestrian Br.	DE. 9 +200	- ditto -	Steel plate girder	4	5.5	53.2	5.00	7.3	0.46	
9	Titi Papan Br.	DE.11 +300	- ditto -	Steel truss girder	1	29.3	30.5	4.00	8.4	3.08	
10	Pedestrian Br.	DE.13 +365	- ditto -	Suspension Br.	3	60.0	34.5	1.60	10.2	4.25	
11	Gas Pipe	DE.13 +435	- ditto -	Steel truss girder	1	36.2	36.3	0.12x2	13.2	3.79	
12	Factory Br.	DE.14 +725	Private Company	Steel plate girder	3	7.8	32.2	6.00	11.9	5.84	
13	Pedestrian Br.	DE.15 +100	Medan Municipality	Suspension Br.	1	32.1	32.5	1.20	11.2	4.02	With a pedest. br. and a water pipe
14	Factory Br.	DE.16 +300	Private Company	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	
15	Gas Pipe	DE.17 +610	- ditto -	Steel truss girder	3	25.5	52.0	D=0.15	16.0	6.15	
16	Pertempuran Br.	DE.20 +205	Medan Municipality	Steel plate girder	2	19.3	40.0	9.70	17.0	8.96	
17	Water Pipe	DE.20 +540	- ditto -	Steel truss girder	1	32.0	34.0	D=0.30	17.0	10.14	
18	Pedestrian Br.	DE.21 +160	Medan Municipality	Suspension Br.	1	44.6	44.5	1.80	17.2	9.32	
19	Oil Pipe	DE.22 +340	- ditto -	Steel truss girder	1	31.0	30.9	D=0.15	18.2	11.29	
20	Glugur Bypass Br.	DE.23 +815	Medan Municipality	Concrete girder	3	10.3	42.4	11.00	18.8	12.89	
21	Railway Br.	DE.24 +465	PJKA	Steel truss girder	3	18.5	70.0	5.00	19.0	13.26	With a water pipe
22	Gurupatimpus Br.	DE.25 +335	Medan Municipality	Concrete girder	3	11.6	43.4	17.00	21.2	13.86	
23	Raden Saleh Br.	DE.26 +155	- ditto -	Concrete arch	1	30.4	49.0	14.90	23.0	14.64	With a water pipe
24	Mayjen Sutoyo Br.	DE.26 +575	- ditto -	Steel plate girder	4	9.6	40.4	5.80	22.2	14.34	- ditto -
25	Palang Merah Br.	DE.27 +240	- ditto -	Concrete arch	1	30.0	44.2	15.00	24.4	15.87	- ditto -
26	Letjen Suprpto Br.	DE.28 +250	- ditto -	Steel truss girder	1	30.9	31.4	12.50	23.0	16.74	- ditto -
27	Juanda Br.	DE.30 +120	- ditto -	Steel plate girder	2	25.2	51.2	20.50	25.4	18.34	Damaged road br.
28	Pedestrian Br.	DE.32 +355	- ditto -	Steel arch girder	1	30.9	30.9	4.00	26.5	17.25	Damaged railway br.
29	Pedestrian Br.	DE.33 +110	- ditto -	Suspension Br.	1	44.2	40.2	1.70	27.0	18.90	
30	Pedestrian Br.	DE.34 +120	PJKA	Steel truss girder	1	30.2	31.0	4.00	32.6	16.55	
31	Titi Kuning Br.	DE.34 +930	Medan Municipality	Steel plate girder	1	16.7	30.2	3.50	28.6	19.39	
32	Pedestrian Br.	DE.36 +950	- ditto -	Suspension Br.	1	33.7	46.2	1.20	33.5	25.68	
33	Buntu Br.	200 *1	- ditto -	Concrete girder	1	18.5	19.3	7.15	15.3	10.84	Sikambang R.
34	Utama Br.	1210 *1	- ditto -	- ditto -	1	16.8	17.0	5.00	16.0	12.13	- ditto -
35	Arifin Br.	125 *1	- ditto -	- ditto -	1	31.2	32.9	11.50	21.6	15.35	Babura R.
36	Subroto Br.	700 *1	- ditto -	Steel arch girder	2	17.2	35.5	7.50	22.5	16.28	- ditto -

Note *1 : Distance from confluence with Deli River (m)

Table 3-3 (2/2) MAIN FEATURES OF EXISTING BRIDGES (PERCUT AND PADANG RIVERS)

No.	Name of Brigde	Location	Administration Office	Type of Bridge	No. of Span	Narrowest Span (m)	Length (m)	Width (m)	Lowest EL. of Beam (EL.m)	Lowest R. Bed (EL.m)	Remarks
1	Percut Br.	PE. 5 + 995	Deli Serdang district	Steel plate girder	3	9.0	31.3	3.3	6.2	-1.41	
2	Pedestrian Br.	PE. 8 + 708	PTP IX	Suspension Br.	1	21.0	21.0	3.8	8.6	2.97	
3	Perkebunan Br.	PE.11 + 774	Deli Serdang district	- ditto -	1	17.5	17.5	1.8	11.2	4.91	
4	Titi Bobrok Br.	PE.13 + 244	PTP IX	Steel truss girder	1	37.8	37.8	4.0	13.8	6.45	
5	Paying Br.	PE.14 + 024	PTP IX	Steel plate girder	1	19.0	19.0	4.0	14.0	6.95	
6	Pedestrian Br.	PE.14 + 028	Deli Serdang district	Wooden girder	5	1.5	19.3	2.5	14.2	6.56	
7	- ditto -	PE.15 + 031	Deli Serdang district	- ditto -	3	5.5	23.5	1.4	15.2	8.67	
8	Medan Tembung Br.	PE.17 + 238	Medan municipality	Concrete girder	1	20.3	20.3	9.5	18.8	11.77	
9	Railway Br.	PE.17 + 980	PJKA	Steel truss girder	1	33.4	33.4	5.0	21.1	12.73	
10	Medan Denai Br.	PE.20 + 346	Medan municipality	Concrete girder	1	20.7	20.7	8.7	22.4	15.70	
11	Toilway Br.	PE.20 + 918	JASA MARGA	- ditto -	3	13.0	46.4	35.8	25.6	16.94	
12	Binjai Br.	PE.22 + 500	Medan municipality	- ditto -	2	4.0	29.9	11.4	25.0	19.57	
13	Pedestrian Br.	PE.22 + 794	Medan municipality	Suspension Br.	1	23.0	23.0	1.7	25.4	18.91	
14	Amplas Br.	PE.24 + 971	Medan municipality	Concrete girder	2	9.5	28.0	9.7	28.0	21.06	
15	National Rd. Br.	PE.27 + 435	DPUP	- ditto -	3	6.0	30.3	8.4	32.0	24.17	
1	Sarimah Br.	PA. 4 + 172	Deli Serdang district	Steel plate girder	5	3.0	46.7	4.8	3.7	-1.60	
2	National Road Br.	PA.24 + 78	DPUP	- ditto -	3	19.0	59.0	9.5	17.2	10.07	
3	Railway Br.	PA.24 + 966	PJKA	Steel truss girder	1	63.4	63.4	5.0	18.4	11.68	
4	National Road Br.	PA.26 + 85	DPUP	Concrete girder	3	9.6	60.5	11.7	18.1	10.90	
5	Pedestrian Br.	PA.28 + 719	Tebing Tinggi municipality	Suspension Br.	1	67.0	67.0	1.5	19.2	14.80	

Table 3-4 FEATURES OF BRIDGES FOR URGENT PROJECT

Name of River	Item No.	Name of Bridge	Location	Reasons for Reconstruction	Proposed Dimensions		Bridge Area (m ²)	
					Length(m)	Width(m)	Single	Accum.
Deli R.	1	Railway Br.	DE. 0 +350	BC,CS	110.0	5.0	550.0	550.0
	2	National Rd Br.	DE. 0 +900	BC,SP,CS	67.0	9.3	623.1	1173.1
	3	Pedestrian Br.	DE. 2 +670	BC,CS	67.0	1.9	124.0	1297.1
	4	Pedestrian Br.	DE. 4 +375	BC,CS	65.0	1.2	78.0	1375.1
	5	Labuhan Deli Br.	DE. 5 +165	BC,CS	63.0	9.7	611.1	1986.2
	6	Pedestrian Br.	DE. 7 +250	BC,CS	61.0	5.0	305.0	2291.2
	7	Pedestrian Br.	DE. 9 +200	BC,SP,CS	59.0	5.0	295.0	2586.2
	8	Titi Papan Br.	DE.11 +300	BC,CS	57.0	4.0	228.0	2814.2
	9	Pedestrian Br.	DE.13 +365	BC,CS	48.0	1.6	76.8	2891.0
	10	New Bridge No.1	DE.13+1200	NI	47.0	5.0	235.0	3126.0
	11	Factory Br.	DE.16 +300	BC,CS	47.0	5.0	235.0	3361.0
	12	Pertempuran Br.	DE.20 +205	CS	47.0	9.7	455.6	3816.5
	13	Pedestrian Br.	DE.21 +160	BC,CS	70.0	1.8	126.0	3942.5
	14	Glugur Bypass Br.	DE.23 +815	BC,CS	50.0	11.0	550.0	4492.5
	15	Gurupatinpus Br.	DE.25 +335	BC,CS	56.0	17.0	952.0	5444.5
	16	New Bridge No.2	DE.27 +500	NI	32.0	5.0	160.0	5604.5
	17	New Bridge No.3	DE.29 + 70	NI	32.0	5.0	160.0	5764.5
	18	Buntu Br.(Sikambang R.)	200	*1 BC	19.0	7.2	135.9	5900.4
	19	Utama Br.(Sikambang R.)	1210	*1 BC	17.0	5.0	85.0	5985.4
Percut R.	1	Percut Br.	PE. 5 + 995	SP,CS	80.0	3.1	248.0	248.0
	2	Pedestrian Br.	PE. 8 + 708	BC,CS	105.0	3.8	399.0	647.0
	3	Perkebunan Br.	PE.11 + 774	BC,CS	55.0	1.8	99.0	746.0
	4	Paying Br.	PE.14 + 024	BC,CS	38.0	4.0	152.0	898.0
	5	Pedestrian Br.	PE.14 + 028	BC,SP,CS	42.0	2.5	105.0	1003.0
	6	Pedestrian Br.	PE.15 + 031	BC,SP,CS	41.0	1.4	57.4	1060.4
	7	Medan Tembung Br.	PE.17 + 238	CS	47.0	9.5	446.5	1506.9
	8	Railway Br.	PE.17 + 980	CS	51.0	5.0	255.0	1761.9
	9	Medan Denai Br.	PE.20 + 346	BC,CS	42.0	8.7	365.4	2127.3
	10	Binjai Br.	PE.22 + 500	CS	47.0	11.4	535.8	2663.1
	11	Pedestrian Br.	PE.22 + 794	CS	40.0	1.5	60.0	2723.1
	12	Amplas Br.	PE.24 + 971	CS	47.0	9.7	455.9	3179.0
	13	National Rd. Br.	PE.27 + 435	CS	50.0	8.4	420.0	3599.0
Padang R.	1	Sarimah Br.	PA. 4 + 172	BC,SP,CS	260.0	4.8	1248.0	1248.0
	2	National Rd. Br.	PA.24 + 78	BC,CS	82.0	9.5	779.0	2027.0
	3	Railway Br.	PA.24 + 966	BC,CS	82.0	5.0	410.0	2437.0
	4	National Rd. Br.	PA.26 + 85	BC,CS	82.0	11.7	959.4	3396.4
	5	Pedestrian Br.	PA.28 + 719	BC,CS	82.0	1.5	123.0	3519.4
	6	Bahilang River Br.	120	*2 BC	20.0	5.0	100.0	3619.4
Medan Floodway	1	MF-1 Br.	MF. 0 + 990	NI	55.0	6.0	330.0	330.0
	2	MF-2 Br.	MF. 1 + 930	NI	53.0	6.0	318.0	648.0
	3	MF-3 Br.	MF. 2 + 600	NI	50.0	6.0	300.0	948.0
	4	MF-4 Br. (Railway)	MF. 3 + 80	NI	56.0	5.0	280.0	1228.0
	5	MF-5 Br. (National Road)	MF. 3 + 300	NI	70.0	8.0	560.0	1788.0
	6	MF-6 Br.	MF. 3 + 600	NI	75.0	6.0	450.0	2238.0
	7	Pedestrian Br.	DE.36 + 950	BC	100.0	1.2	120.0	2358.0

Note *1 : Distance from confluence with Deli River (m)

*2 : Distance from confluence with Padang River (m)

BC: Beam Clearance

SP: Insufficient Span

CP: Insufficient Cross Section Area for Design Discharge

NI: New Installation across Cut-off Channel or Floodway

Table 3-5 FEATURES OF DRAINAGE AND INTAKE FACILITIES FOR URGENT PROJECT

Name of River	Location	Purpose	Drainage/ Irrigation		Design Discharge (m ³ /s)	Facility			Remarks	
			Area (km ²)	Area (km ²)		Structure	Gate type	B x H x pcs. Length(m)		
Deli R.	DE.12 + 690 (R)*1	DR	-	-	-	Sluice way	Flap	Dia. 1.0 x 1	17.0	Type A-1
	DE.13 + 860 (R)*1	DR	-	-	-	Sluice way	Sluice	Dia. 1.3 x 3	23.0	Type C
	DE.13 + 2150 (R)*1	IF	-	-	-	Sluice way	Sluice	Dia. 1.3 x 3	23.0	Type C
	DE.27 + 380 (L)*1	DR	-	-	-	Sluice way	Flap	Dia. 1.0 x 1	17.0	Type A-1
	DE.29 + 50 (L)*1	DR	-	-	-	Sluice way	Flap	Dia. 1.0 x 1	17.0	Type A-1
97 sites *2	D	-	29.0	1.5/p.c.	Drain pipe	Flap	Dia. 1.0 x 97	15.0		

Percut R.	PE. 0 + 600 (R)	D,F	0.3	0.3	0.3	Sluice way	Stop-board	1.0 x 1.0 x 1	11.5	Type A-2
	PE. 0 + 850 (R)	D,F	9.0	9.0	9.0	Sluice way	Sluice	2.0 x 2.0 x 3	11.5	Type B-1
	PE. 1 + 350 (L)	D,F,N	5.6	5.6	5.6	Water gate	Roller	3.0 x 4.0 x 1	8.0	Type G
	PE. 8 + 800 (L)	D	3.8	1.9	1.9	Drain pipe	Flap	Dia. 1.0 x 2	11.5	Type A-3
	PE. 9 + 860 (L)	D	5.8	2.9	2.9	Drain pipe	Flap	Dia. 1.0 x 2	11.5	Type A-3
56 sites *2	D	-	28.0	1.5/p.c.	Drain pipe	Flap	Dia. 1.0 x 56	15.0		

Padang R.	PA. 0 + 450 (R)	D,F	0.7	0.7	0.7	Sluice way	Stop-board	1.0 x 1.0 x 1	16.5	Type A-2, to be reconstructed
	PA.13 + 300 (R)	I	-	-	-	Sluice way	Sluice	2.0 x 2.0 x 2	11.5	Type B-2
	PA.16 + 850 (L)	I (Langau)	11.5	1.2	1.2	Sluice way	Sluice	2.0 x 2.0 x 2	11.5	Type B-2, to be reconstructed
	PA.23 + 100 (L)	I (Paya Lombang)	15.6	1.7	1.7	Sluice way	Sluice	2.0 x 2.0 x 2	11.5	Type B-2, to be reconstructed
14 sites *2	D	-	4.0	1.5/p.c.	Drain pipe	Flap	Dia. 1.0 x 14	15.0		

Note : L : Left Bank
R : Right Bank
D : Drainage
N : Navigation
F : Intake for Fishpond
I : Irrigation
DR: Drainage for Old River Channel
IF: Intake for Factory
B : Breadth (m)
Dia.: Diameter (m)
*1: Short-cut Stretch
*2: In addition to sluice ways, drain pipes are proposed to be installed along urban areas.

Table 4-1 CONSTRUCTION COST OF ALTERNATIVE PLAN FOR DELI RIVER IMPROVEMENT

I t e m	Unit	Setting Back of Dike		Existing Channel Width	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
Stretch : Tollway to DE. 4, L = 4.0 km					
1. Construction Base Cost			6,234		26,215
1.1 Basic Construction Works			5,195		21,846
Excavation	1000 m3	168	979	47	296
Embankment	1000 m3	60	715	12	149
Revetment	1000 m2	25	1,295	26	1,324
Sheet Pile	m2	0	0	72,000	18,000
Concrete	m3	0	0	0	0
Gabion Mattress	m2	0	0	0	0
Sluice	m3	0	0	0	0
Drain	m3	0	0	0	0
Bridge	m2	1,297	2,205	1,222	2,077
1.2 Preparatory Works			1,039		4,369
2. Compensation Base Cost			0		0
2.1 Land Acquisition	ha	0	0	0	0
2.2 House Evacuation	p.c.	0	0	0	0
Total (1 + 2)			6,234		26,215

Table 4-2 (1/3) CONSTRUCTION COST OF ALTERNATIVE SHORT-CUT
PLAN FOR DELI RIVER

I t e m	Unit	Existing Channel		Cut-off Channel	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
Case DE-1		(L =1,490m)		(L =790m)	
1. Construction Base Cost			3,470		5,062
1.1 Basic Construction Works			2,892		4,218
Excavation	1000 m3	91	529	176	1,023
Embankment	1000 m3	40	475	10	122
Revetment	1000 m2	35	1,781	19	944
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	3,330	107	7,110	228
Sluice Type-A	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	1,000	1,700
1.2 Preparatory Works			578		844
2. Compensation Base Cost			2,827		2,864
2.1 Land Acquisition	ha	5.9	1,167	4.4	884
2.2 House Evacuation	p.c.	146	1,660	83	1,980
Total (1 + 2)			6,297		7,926
Case DE-2		(L =370m)		(L =215m)	
1. Construction Base Cost			1,126		1,424
1.1 Basic Construction Works			938		1,187
Excavation	1000 m3	26	150	42	244
Embankment	1000 m3	16	194	7	88
Revetment	1000 m2	11	561	5	257
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	1,035	33	1,935	62
Sluice Type-A	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	197	335
1.2 Preparatory Works			188		237
2. Compensation Base Cost			822		1,215
2.1 Land Acquisition	ha	2.5	502	1.0	195
2.2 House Evacuation	p.c.	30	320	20	1,020
Total (1 + 2)			1,948		2,639

Table 4-2 (2/3) CONSTRUCTION COST OF ALTERNATIVE SHORT-CUT
PLAN FOR DELI RIVER

I t e m	Unit	Existing Channel		Cut-off Channel	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
Case DE-3		(L = 470m)		(L = 210m)	
1. Construction Base Cost			816		1,406
1.1 Basic Construction Works			680		1,172
Excavation	1000 m3	9	53	40	230
Embankment	1000 m3	4	50	7	88
Revetment	1000 m2	11	561	5	250
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	510	16	1,260	40
Sluice	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	213	362
1.2 Preparatory Works			136		234
2. Compensation Base Cost			383		718
2.1 Land Acquisition	ha	0.7	138	0.9	188
2.2 House Evacuation	p.c.	25	245	15	530
Total (1 + 2)			1,199		2,124
Case DE-4		(L = 580m)		(L = 220m)	
1. Construction Base Cost			1,331		1,249
1.1 Basic Construction Works			1,109		1,041
Excavation	1000 m3	66	381	30	175
Embankment	1000 m3	1	17	7	88
Revetment	1000 m2	14	692	5	263
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	600	19	1,320	42
Sluice Type-A	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	160	272
1.2 Preparatory Works			222		208
2. Compensation Base Cost			806		625
2.1 Land Acquisition	ha	1.6	316	0.8	160
2.2 House Evacuation	p.c.	50	490	15	465
Total (1 + 2)			2,137		1,874

Table 4-2 (3/3) CONSTRUCTION COST OF ALTERNATIVE SHORT-CUT
PLAN FOR DELI RIVER

I t e m	Unit	Existing Channel		Cut-off Channel	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
Case DE-5		(L = 420m)		(L = 185m)	
1. Construction Base Cost			801		1,444
1.1 Basic Construction Works			667		1,204
Excavation	1000 m3	15	89	48	281
Embankment	1000 m3	4	53	7	88
Revetment	1000 m2	10	501	4	221
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	750	24	1,110	36
Sluice Type-A	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	222	377
1.2 Preparatory Works			133		241
2. Compensation Base Cost			415		526
2.1 Land Acquisition	ha	0.8	160	0.9	186
2.2 House Evacuation	p.c.	30	255	15	340
Total (1 + 2)			1,216		1,970
Case DE-6		(L = 730m)		(L = 140m)	
1. Construction Base Cost			1,596		1,180
1.1 Basic Construction Works			1,330		983
Excavation	1000 m3	40	234	18	105
Embankment	1000 m3	16	186	7	88
Revetment	1000 m2	17	871	3	167
Sheet Pile	m2	0	0	700	175
Concrete	m3	0	0	0	0
Gabion Mattress	m2	1,200	38	4,680	150
Sluice	m3	0	0	13	27
Drain	m3	0	0	0	0
Bridge	m2	0	0	160	272
1.2 Preparatory Works			266		197
2. Compensation Base Cost			1,066		281
2.1 Land Acquisition	ha	1.9	386	0.6	111
2.2 House Evacuation	p.c.	80	680	20	170
Total (1 + 2)			2,662		1,461

Table 4-3 CONSTRUCTION COST OF ALTERNATIVE PLAN FOR BANDAR SIDORAS INTAKE WEIR

I t e m	Unit	with Existing Weir		with New Movable Weir	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
PE. 7 to PE.14+200, L = 7,200 m					
1. Construction Base Cost			10,562		8,769
1.1 Basic Construction Works			9,602		7,971
Excavation	1000 m3	491	2,848	297	1,725
Embankment	1000 m3	199	2,383	138	1,656
Revetment	1000 m2	4	200	4	200
Rubber Dam	m2	0	0	120	1,680
Concrete	m3	0	381	0	877
Gabion Mattress	m2	12,000	384	7,700	246
Sluice Type-A	m3	69	207	1,140	285
Drain	m3	0	0	0	0
Bridge	m2	1,882	3,199	766	1,302
Sheet Pile	m2	0	0	1,140	285
1.2 Preparatory Works			960		797
2. Compensation Base Cost			1,766		218
2.1 Land Acquisition	ha	37.2	1,593	3.8	127
2.2 House Evacuation	p.c.	28	173	13	91
Total (1 + 2)			12,328		8,987

Table 4-4 CONSTRUCTION COST OF ALTERNATIVE SHORT-CUT
PLAN FOR PERCUT RIVER

Item	Unit	Existing Channel		Cut-off Channel	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
		(L = 840m)		(L = 470m)	
Case PE-1					
1. Construction Base Cost			1,027		3,046
1.1 Basic Construction Works			934		2,769
Excavation	1000 m3	15	84	80	464
Embankment	1000 m3	6	74	27	322
Revetment	1000 m2	0	0	15	750
Sheet Pile	m2	0	0	1,000	250
Concrete	m3	0	0	0	0
Gabion Mattress	m2	0	0	2,820	90
Sluice	m3	0	0	59	118
Drain	m3	0	0	0	0
Bridge	m2	456	775	456	775
1.2 Preparatory Works			93		277
2. Compensation Base Cost			189		465
2.1 Land Acquisition	ha	1.7	69	2.3	165
2.2 House Evacuation	p.c.	8	120	20	300
Total (1 + 2)			1,216		3,510

Table 4-5 CONSTRUCTION COST OF ALTERNATIVE PLAN FOR PAYA LOMBANG INTAKE WEIR

I t e m	Unit	with Existing Weir		with New Movable Weir	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
PA.23 to Sibarau R. , L = 6,500 m					
1. Construction Base Cost			26,807		21,942
1.1 Basic Construction Works			24,370		19,947
Excavation	1000 m3	1,439	8,346	1,086	6,296
Embankment	1000 m3	155	1,858	119	1,429
Revetment	1000 m2	23	1,144	27	1,351
Rubber Dam	m2	0	0	216	3,024
Concrete	m3	1,800	720	8,230	2,092
Gabion Mattress	m2	7,425	238	26,625	852
Sluice Type-B	m3	92	276	92	276
Drain	m3	165	165	165	165
Bridge	m2	6,838	11,624	2,371	4,031
Sheet Pile	m2	0	0	1,724	431
1.2 Preparatory Works			2,437		1,995
2. Compensation Base Cost			7,633		2,400
2.1 Land Acquisition	ha	91.9	3,874	26.9	1,133
2.2 House Evacuation	p.c.	225	3,759	121	1,267
Total (1 + 2)			34,440		24,342

Note : The proposed facilities have been designed on the scale of a 50-year return period.

Table 4-6 CONSTRUCTION COST OF ALTERNATIVE SHORT-CUT
PLAN FOR PADANG RIVER

I t e m	Unit	Existing Channel		with Cut-off Channel	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
National Road Br.(PA.23 + 78) to Sibarau R.		(L = 5,720 m)		(L = 4,970 m)	
1. Construction Base Cost			13,504		12,813
1.1 Basic Construction Works			12,276		11,648
Excavation	1000 m3	848	4,918	741	4,298
Embankment	1000 m3	92	1,099	107	1,278
Revetment	1000 m2	18	919	18	919
Sheet Pile	m2	0	0	0	0
Concrete	m3	1,800	720	1,800	720
Gabion Mattress	m2	5,850	187	7,425	238
Sluice	m3	0	0	0	0
Drain	m3	165	165	165	165
Bridge	m2	2,510	4,267	2,371	4,031
1.2 Preparatory Works			1,228		1,165
2. Compensation Base Cost			2,718		2,497
2.1 Land Acquisition	ha	22.8	1,553	20.8	1,417
2.2 House Evacuation	p.c.	109	1,165	99	1,080
Total (1 + 2)			16,222		15,310

Note : The proposed facilities have been designed on the scale of a 50-year return period.

Table 4-7 CONSTRUCTION COST OF ALTERNATIVE FLOODWAY ROUTES

Item	Unit	Case A		Case B-1		Case B-2		Case C-1		Case C-2	
		Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)	Quantity	Cost (mill.Rp.)
1. Construction Base Cost			21,644		21,714		59,328		32,183		35,240
1.1 Basic Construction Works			19,676		19,740		53,935		29,258		32,037
Excavation	1000 m3	974	5,654	1,196	6,941	1,020	5,919	2,376	19,768	31	180
Embankment	1000 m3	4	52	4	52	4	52	12	148	12	148
Revetment	1000 m3	102	5,104	106	5,293	75	3,728	57	2,836	9	447
Sheet Pile	m2	266	67	266	67	13,246	3,312	266	67	266	67
Concrete	1000 m3	11	2,769	11	2,769	101	39,009	11	2,769	11	2,769
Gabion Mattress	1000 m2	3	92	3	92	3	92	3	92	3	92
Tunneling	1000 m3	0	0	0	0	0	0	0	0	90	27,000
Bridge	p.c.	9	5,940	7	4,527	3	1,824	4	3,579	2	1,335
1.2 Preparatory Works			1,968		1,974		5,393		2,926		3,204
2. Compensation Base Cost			4,387		2,145		1,444		966		114
2.1 Land Acquisition	ha	18	630	20	582	15	454	21	711	2	99
2.2 House Evacuation	p.c.	196	3,757	97	1,563	66	990	17	255	1	15
Total (1 + 2)			26,031		23,860 *		60,772 *		33,149 *		35,354

Note * : Includes the reconstruction cost of the national road which crosses Percut River.

Table 4-8 CONSTRUCTION COST OF ALTERNATIVE DIVERSION FACILITIES FOR FLOODWAY

Item	Unit	Type I		Type II		Type III	
		Quantity (mill.Rp.)	Cost (mill.Rp.)	Quantity (x 1000)	Cost (mill.Rp.)	Quantity (x 1000)	Cost (mill.Rp.)
1 Basic Construction Works			3,606		3,579		5,115
Excavation	1000 m3	30.8	180	30.6	179	40.9	241
Embankment	1000 m3	4.3	52	4.3	52	9.7	116
Revetment	1000 m3	8.9	447	8.9	447	8.9	447
Sheet Pile	m2	266.0	67	266.0	67	161.0	40
Concrete	1000 m3	10.6	2,769	10.5	2,745	13.5	4,230
Gabion Mattress	1000 m3	2.9	92	2.8	90	1.3	41
Intake	m3	0.0	0	0.0	0	0.0	0
Bridge	m3	0.0	0	0.0	0	0.0	0
2 Preparatory Works			361		358		512
Total (1 + 2)			3,967		3,937		5,627

Table 5-1 BASIC LABOUR WAGES

No.	Item	Wages (Rp.)
1	Foreman	12,000
2	Operator	10,000
3	Electrician	7,500
4	Mechanic	7,500
5	Welder	7,500
6	Driver	6,500
7	Mason	7,000
8	Carpenter	7,000
9	Rigger	7,000
10	Plumber	7,000
11	Concrete Worker	7,000
12	Steel Worker	7,000
13	Painter	7,000
14	Plasterer	7,000
15	Asphalt Worker	7,000
16	Skilled Labour	7,500
17	Semi Skilled Labour	5,000
18	Common Labour	4,000

Table 5-2 BASIC UNIT COSTS OF CONSTRUCTION MATERIALS

No.	Item	Unit	Unit Cost (Rp.)
CEMENT & STONE			
1	Portland cement, ordinary type	ton	145,000
2	Flyash cement (for mass concrete)	ton	151,000
3	Concrete admixture (205 ltr)	drum	440,000
4	Concrete aggregate, Coarse 80-5 mm	ton	13,000
5	Concrete aggregate, Fine	ton	4,200
6	Cobble Stone (15 to 50 cm)	m ³	18,500
7	Cobble Stone (10 to 15 cm)	m ³	15,500
WOODEN MATERIALS			
8	Formwork timber	m ³	323,300
9	Plywood for formwork	m ²	12,800
10	Log pile (Dia.=15 cm)	m	1,400
STEEL MATERIALS			
11	Reinforcement steel bar, deformed	ton	1,300,000
12	Steel shapes, H-beam	ton	1,800,000
13	Steel shapes, channel, angle	ton	1,500,000
14	Steel plate, t = 12 to 32 mm	ton	1,500,000
15	Steel sheet pile	ton	1,600,000
16	Steel pipe	ton	2,000,000
FUEL & LUBRICANTS			
17	Fuel, diesel oil (light oil)	ltr	250
18	Fuel, gasoline, regular	ltr	450
19	Oil, engine	ltr	2,500
20	Grease	kg	3,000
OTHERS			
21	Asphalt	kg	400
22	Drain pipe, PVC pipe, Dia.=50 mm	m	4,400

Table 5-3(1/3) BASIC UNIT COSTS OF CONSTRUCTION EQUIPMENT

No.	Kind of Equipment	Power (PS)	Total Weight of Equipment (ton)	Economic Life (year)	Yearly Working Hour (hr/year)	C.I.F. Median (1000 Rp.)	D Handling Cost C x 2.5% (1000 Rp.)	E Hourly Depreciation Cost (C + D)/A/B (Rp./hr)	F Rate of Yearly Repairing Cost (%)	G Hourly Repairing Cost (C+D) x F/B (Rp./hr)	H Hourly Interest and Insurance $(C-D) \times \frac{0.1}{B}$ (Rp./hr)	Total Hourly Cost E + G + H (Rp./hr)	Hourly Fuel Volume (ltr/hr)
1	Bulldozer; 33 ton; with ripper	320	33.50	5	2,000	655,000	16,375	67,138	15	50,353	33,569	151,059	45
2	Bulldozer; 24 ton; with ripper	220	23.60	5	2,000	391,600	9,790	40,139	15	30,104	20,070	90,313	26
3	Bulldozer; 15ton	160	15.90	5	2,000	191,300	4,783	19,608	15	14,706	9,804	44,119	18
4	Bulldozer; 11ton	110	11.90	5	2,000	171,400	4,285	17,569	15	13,176	8,784	39,529	13
5	Swamp bulldozer; 14ton	110	13.00	5	2,000	230,000	5,750	23,575	15	17,681	11,788	53,044	13
6	Backhoe; 1.0 m3	200	29.00	5	2,000	204,900	5,123	20,376	15	15,752	10,501	47,255	26
7	Backhoe; 0.60 m3	120	18.00	5	2,000	198,790	4,970	20,376	15	15,282	10,188	45,846	15
8	Backhoe; 0.35 m3	80	10.70	5	2,000	130,130	3,253	13,338	15	10,004	6,669	30,011	10
9	Dozer shovel; 1.5 m3	135	13.00	5	2,000	207,900	5,198	21,310	15	15,982	10,655	47,947	14
10	Dozer shovel; 0.4 m3	38	3.70	5	2,000	187,440	4,686	19,213	15	14,409	9,606	43,228	4
11	Crawler-type loader; 1.8 m3	206	21.10	5	2,000	316,260	7,907	32,417	15	24,312	16,208	72,937	23
12	Crawler-type loader; 1.6 m3	165	18.00	5	2,000	246,250	6,156	25,241	15	18,930	12,620	56,791	17
13	Crawler-type loader; 1.4 m3	110	13.00	5	2,000	171,800	4,295	17,610	15	13,207	8,805	39,621	11
14	Crawler-type loader; 0.8 m3	68	6.70	5	2,000	135,200	3,380	13,858	15	10,394	6,929	31,181	8
15	Crawler-type loader; 0.4 m3	39	3.81	4	2,000	75,200	1,880	9,635	15	5,781	3,854	19,270	4
16	Wheel-type loader; 4.6 m3	380	40.30	5	2,000	870,000	21,750	89,175	15	66,881	44,588	209,644	42
17	Wheel-type loader; 3.7 m3	274	26.50	5	2,000	360,410	9,010	36,942	15	27,707	18,471	83,120	27
18	Wheel-type loader; 2.8 m3	203	20.30	5	2,000	295,260	7,382	30,264	15	22,698	15,132	68,094	19
19	Wheel-type loader; 2.1 m3	157	15.40	5	2,000	164,460	4,112	16,857	15	12,643	8,429	37,929	15
20	Wheel-type loader; 1.4 m3	82	8.50	5	2,000	130,880	3,272	13,415	15	10,061	6,708	30,184	8
21	Wheel-type loader; 1.0 m3	74	6.30	4	2,000	112,000	2,800	14,350	15	8,610	5,740	28,700	7
22	Dump truck; 11 ton	275	9.20	5	2,000	127,800	3,195	13,100	15	9,825	6,550	29,474	12
23	Dump truck; 8 ton	220	7.20	5	2,000	88,180	2,205	9,088	15	6,779	4,519	20,337	10
24	Compactor; 0.1 ton	4	0.08	5	1,600	2,600	65	333	15	250	167	750	0.4
25	Crawler crane w/grab buc. 0.6m3; 35t	120	35.00	6	1,400	483,650	12,091	59,017	15	53,115	35,410	147,542	5.3
26	Crawler crane w/grab buc. 0.6m3; 27t	105	27.00	6	1,400	351,800	8,795	42,928	15	38,635	25,757	107,320	5.3
27	Crawler crane w/grab buc. 0.6m3; 16t	105	16.00	6	1,400	305,030	7,626	37,221	15	33,499	22,333	93,052	5.3
28	Truck crane; 35 ton	320	35.10	6	1,400	630,670	15,767	76,957	15	69,261	46,174	192,392	16
29	Truck crane; 16 ton	230	19.80	6	1,400	321,520	8,038	39,233	15	35,310	23,540	98,083	12
30	Truck crane; 4.9 ton	145	7.95	5	1,600	136,030	3,401	17,429	15	13,072	8,714	39,215	7

Table 5-3(2/3) BASIC UNIT COSTS OF CONSTRUCTION EQUIPMENT

No.	Kind of Equipment	Power (PS)	Total Weight of Equipment (ton)	Economic Life (year)	Yearly working Hour (hr/year)	C.I.F. Medan (1000 Rp.)	Handling Cost C x 2.5% (1000 Rp.)	Hourly Depreciation Cost (C + D)/A / B (Rp./hr)	Rate of Yearly Repairing Cost (%)	Hourly Repairing Cost (C+D) X F/B (Rp./hr)	Hourly Interest and Insurance (C+D) X 0.1/β (Rp./hr)	Total Hourly Cost E + G + H (Rp./hr)	Hourly Fuel Volume (ltr/hr)
31	Truck crane; 2.0 ton	80	4.00	5	1,600	43,970	1,099	5,634	15	4,225	2,817	12,676	4
32	Tractor and trailer; 30 ton	300	30.00	5	1,800	150,000	3,750	17,083	15	12,813	8,542	38,438	16
33	Portable engine compressor; 17 m ³ /min	216	4.50	5	1,200	74,380	1,860	12,707	15	9,530	6,353	28,590	22
34	Portable engine compressor; 10.5 m ³ /min	106	2.70	5	1,200	59,930	1,498	10,238	15	7,679	5,119	23,036	11
35	Portable engine compressor; 5.0 m ³ /min	50	0.90	4	1,200	47,810	1,195	10,209	15	5,126	4,084	20,419	5
36	Diesel engine generator; 200 kVA	254	4.70	7	1,600	151,000	3,775	13,819	15	14,510	9,673	38,003	25
37	Diesel engine generator; 150 kVA	185	2.82	7	1,600	86,500	2,163	7,916	15	8,312	5,541	21,770	19
38	Diesel engine generator; 75 kVA	95	2.20	7	1,600	48,100	1,203	4,402	15	4,622	3,081	12,106	10
39	Diesel engine generator; 50 kVA	47	1.09	7	1,600	35,700	893	3,267	15	3,431	2,287	8,985	5.7
40	Diesel engine generator; 10 kVA	17	0.35	7	1,600	15,100	378	1,382	15	1,451	957	3,800	1.7
41	Diesel engine generator; 5 kVA	10	0.33	7	1,600	11,000	275	1,007	15	1,057	705	2,768	1.0
42	Hand breaker; 1.6 m ³ /min		0.03	3	1,200	2,750	69	783	15	352	235	1,370	
43	Hand breaker; 1.2 m ³ /min		0.01	3	1,200	2,750	69	783	15	352	235	1,370	
44	Breaker; 600 kg	108	0.60	3	1,200	116,790	2,920	33,253	15	14,964	9,976	58,192	11
45	Leg hammer; 30 kg		0.03	3	1,200	8,600	215	2,449	15	1,102	735	4,285	3.5
46	Diesel pile hammer; 2.5 ton	102	5.20	4	1,400	140,150	3,504	25,652	15	15,391	10,261	51,305	10
47	Vibro hammer; 40 kw		3.90	5	1,400	100,300	2,508	14,687	15	11,015	7,343	33,045	
48	Vibro hammer; 30 kw		3.00	5	1,400	76,940	1,924	11,266	15	8,450	5,633	25,349	
49	Drop hammer; 0.5 ton	9	0.50	5	1,400	34,400	860	5,037	15	3,778	2,519	11,334	0.9
50	Vibratory roller; 4 ton	29	4.00	5	1,600	76,940	1,924	9,858	15	7,393	4,929	22,180	2.3
51	Vibratory roller; 2 ton	6	1.30	5	1,600	38,470	962	4,929	15	3,697	2,464	11,090	0.5
52	Vibratory roller; 1 ton	5	0.80	5	1,600	16,480	412	2,112	15	1,584	1,056	4,751	0.4
53	Motor grader; 4.01 m x 0.62 m	230	19.50	5	2,000	283,050	7,076	29,013	15	21,759	14,506	65,278	12
54	Aggregate production plant; 60 ton/hr P&F crusher-run; 90 kw		40.00	5	1,400	527,620	13,191	77,259	15	57,944	38,629	173,832	
55	Grizzly Plant; 120 m ³ /day; 11 kw		4.50	4	1,400	65,950	1,649	12,071	15	7,243	4,828	24,142	
56	Jaw Crusher; 540 x 760; 45 kw Double toggle		15.50	6	1,400	317,400	7,935	38,730	15	34,657	23,238	96,826	
57	Cone crusher; 900 mm; 55 kw		10.54	10	1,400	364,110	9,103	26,658	15	39,567	26,658	93,303	
58	Cone crusher; 600 mm; 30 kw		6.00	10	1,400	192,360	4,809	14,084	15	21,125	14,084	49,292	
59	Vibrating screen; 1,220x3,050; 3.7 kw		1.70	4	1,400	71,450	1,786	13,078	15	7,847	5,231	26,156	
60	Belt Conveyor; L= 10 m, B= 600mm; 5.5kw		0.50	6	1,200	20,610	515	2,934	15	2,641	1,760	7,355	

Table 5-3(3/3) BASIC UNIT COSTS OF CONSTRUCTION EQUIPMENT

No.	Kind of Equipment	Power (PS)	Total Weight of Equipment (ton)	Economic Life (year)	Yearly Working Hour (hr/year)	C.I.F. Median (1000 Rp.)	D Handling Cost C x 2.5% (1000 Rp.)	E Hourly Depreciation Cost (C + D)/A/B (Rp./hr)	F Rate of Yearly Repairing Cost (%)	G Hourly Repairing Cost (C+D) x F/B (Rp./hr)	H Hourly Interest and Insurance $(C+D) \times \frac{0.1}{B}$ (Rp./hr)	Total Hourly Cost E + G + H (Rp./hr)	Hourly Fuel Volume (ltr/hr)
61	Belt Conveyor; L= 10 m; 3.2 Kw		0.30	6	1,200	10,310	258	1,468	15	1,321	881	3,569	
62	Concrete plant; 25 m ³ /hr; 94 kw		38.00	5	1,400	1,329,360	33,234	194,655	15	145,992	97,328	437,977	
63	Portable concrete plant; 6 m ³ /hr; 36 kw		13.00	3	1,600	31,600	790	6,748	15	3,037	2,024	11,809	
64	Cement silo; 50 ton; 0.75 kw		6.20	5	1,200	43,970	1,099	7,512	15	5,634	3,756	16,901	
65	Asphalt plant; 30-40 ton/hr; 109 kw		27.00	5	1,400	1,211,860	30,297	177,454	15	133,090	88,727	399,271	
66	Truck mixer; 4.5 m ³	290	19.90	4	2,000	144,270	3,607	18,485	15	11,091	7,394	36,969	15
67	Truck mixer; 2.0 m ³	22	9.40	4	2,000	37,100	928	4,753	15	2,852	1,901	9,507	4.0
68	Concrete pump truck; 90 m ³ /hr	220	15.40	4	1,400	549,610	13,740	100,598	15	60,359	40,239	201,197	11
69	Asphalt finisher; 2.4 m	37.5	8.30	5	1,600	167,630	4,191	21,478	15	16,108	10,739	48,325	1.9
70	Asphalt sprayer; 30 ltr/hr	5	0.12	3	800	4,810	120	2,054	15	924	615	3,595	0.5
71	Water tanker; 6 m ³			6	2,000	80,000	2,000	5,833	15	6,150	4,100	17,083	11
72	Concrete bucket; 1.5 m ³		0.90	3	700	2,200	55	1,074	15	483	322	1,879	
73	Concrete bucket; 1.0 m ³		0.70	3	700	1,850	46	903	15	406	271	1,580	
74	Concrete vibrator; 60 mm; 1.0 kw		0.03	3	500	1,900	48	1,298	15	584	350	2,272	
75	Concrete vibrator; 30 mm; 0.75 kw		0.03	3	500	1,800	45	1,230	15	554	369	2,153	
76	Submergible pump; D 200 mm; 15 kw			6	1,200	5,050	126	719	15	647	431	1,797	
77	Submergible pump; D 150 mm; 11 kw			6	1,200	3,800	95	541	15	487	325	1,352	
78	Submergible pump; D 100 mm; 3.7 kw			6	1,200	3,050	76	434	15	391	261	1,086	
79	Submergible pump; D 80 mm; 2.2 kw			6	1,200	1,600	40	228	15	205	137	569	
80	Submergible pump; D 50 mm; 0.75 kw			6	1,200	1,400	35	199	15	179	120	498	
81	Cargo truck with crane; 2 ton	86	2.5	5	2,000	50,000	1,250	5,125	15	3,844	2,563	11,531	3.1
82	Cargo truck with crane; 6 ton	170	4.5	5	2,000	70,000	1,750	7,175	15	5,381	3,588	16,144	6.3
83	Cargo truck with crane; 8 ton	240	7	5	2,000	125,000	3,125	12,813	15	9,609	6,406	28,828	8.3

Table 5-4 UNIT COST OF MAIN CONSTRUCTION WORKS

Item No.	Item of Work	Unit	Labour			Material			Equipment			Overhead			Total	Grand Total					
			F.C.	L.C.	Total (%)	F.C.	L.C.	Total (%)	F.C.	L.C.	Total (%)	F.C.	L.C.	Total (%)							
Excavation																					
EX-A	Common	Rp./m3	0	420	9.6	220	220	440	10.0	2,840	710	3,550	80.4	750	330	1,080	3,810	69	1,690	31	5,500
EX-B	River bed	Rp./m3	0	610	10.9	260	260	520	9.2	3,570	890	4,460	79.9	970	450	1,420	4,800	69	2,200	31	7,000
EX-C	Rock	Rp./m3	0	1,130	8.8	500	2,300	2,800	21.8	7,130	1,780	8,910	69.4	1,880	1,280	3,160	9,500	59	6,500	41	16,000
Embankment																					
EM	Common	Rp./m3	0	1,000	10.4	470	840	1,310	13.6	5,830	1,460	7,290	76.0	1,580	830	2,410	7,880	66	4,120	34	12,000
Revetment																					
RE	wet stone masonry	Rp./m2	0	3,900	9.7	10,380	17,610	27,990	69.9	6,520	1,630	8,150	20.4	4,210	5,760	9,960	21,110	42	28,900	58	50,000
Concrete																					
CO-A	Mass Concrete	Rp./m3	0	12,910	10.1	23,550	49,210	72,760	56.7	34,180	8,540	42,720	33.3	14,210	17,400	31,610	71,940	45	88,060	55	160,000
CO-B	Reinforced Concrete	Rp./m3	0	16,610	5.2	205,430	54,680	260,110	81.4	34,180	8,540	42,720	13.4	60,420	20,130	80,550	300,030	75	99,970	25	400,000
Sheet Pile																					
SP	Common	Rp./m2	0	2,670	1.3	192,080	80	192,160	96.1	4,150	1,040	5,180	2.6	49,040	950	49,990	245,270	98	4,730	2	250,000
Gabion Mattress																					
GA	Thickness 50 cm	Rp./m2	0	1,530	6.0	120	21,370	21,490	84.0	2,040	510	2,550	10.0	540	5,890	6,440	2,700	8	29,300	92	32,000

Table 5-5 CONSTRUCTION COST OF MASTER PLAN

Name of River/ Work Item	Direct Cost		Indirect Cost		Physical Contingency	Total
	Construction Base Cost	Administration	Engineering Service	Compensation		
1. Belawan River						31,261
- River Improvement	20,960	1,467	3,144	2,848	2,842	31,261
2. Deli-Percut River						403,130
2.1 Deli River						182,162
- River Improvement	76,652	5,366	11,498	14,310	10,782	118,608
- Namobatang Dam	42,401	2,968	10,288	2,120	5,777	63,554
2.2 Medan Floodway	21,380	1,497	3,207	3,039	2,912	32,035
2.3 Percut River						188,933
- River Improvement	29,003	2,030	4,350	7,880	4,326	47,589
- Lausime Dam	102,234	7,156	16,861	2,244	12,849	141,344
Serdang River						153,850
- River Improvement	68,752	4,813	10,313	20,372	10,425	114,675
- Belumai Aqueduct	28,782	2,015	4,317	499	3,562	39,175
4. Ular River						16,076
- Karai Dam	8,977	628	4,309	700	1,462	16,076
5. Belutu River						56,401
- River Improvement	34,897	2,443	5,235	8,699	5,127	56,401
6. Padang River						100,544
- River Improvement	69,792	4,885	10,469	6,257	9,141	100,544
Total						761,262

Note :
 1) Administration cost is 7 % of direct construction cost.
 2) Physical Contingency is 10% of the total of direct and indirect costs

Table 5-6(1/9) RIVER IMPROVEMENT COST OF MASTER PLAN
(BELAWAN RIVER)

1. 50 Year Return Period --- For Master Plan --- (Item No BE-50)

I t e m	Unit	River Mouth to National Road (L = 21.7 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			14,573	6,386	20,960
1.1 Basic Construction Works			12,145	5,322	17,467
Excavation	1000 m3	1,665	6,652	2,989	9,641
Embankment	1000 m3	349	2,764	1,424	4,188
Bridge	site	6	2,729	910	3,638
1.2 Preparatory and Miscellaneous Works			2,429	1,064	3,493
2. Indirect Construction Cost			2,515	4,944	7,459
2.1 Administration(7 % of 1)			0	1,467	1,467
2.2 Engineering Service			2,515	629	3,144
2.3 Compensation	ha	33	0	2,848	2,848
3. Physical Contingency(10 % of 1+2)			1,709	1,133	2,842
Total (1 + 2 + 3)			18,797	12,463	31,261

2. 10 Year Return Period (Item No BE-10)

I t e m	Unit	River Mouth to National Road (L = 21.7 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			9,218	4,014	13,232
1.1 Basic Construction Works			7,682	3,345	11,027
Excavation	1000 m3	602	2,432	1,092	3,524
Embankment	1000 m3	349	2,764	1,424	4,188
Bridge	site	6	2,486	829	3,315
1.2 Preparatory and Miscellaneous Works			1,536	669	2,205
2. Indirect Construction Cost			1,588	2,267	3,855
2.1 Administration(7 % of 1)			0	926	926
2.2 Engineering Service			1,588	397	1,985
2.3 Compensation	ha	11	0	944	944
3. Physical Contingency(10 % of 1+2)			1,081	628	1,709
Total (1 + 2 + 3)			11,887	6,910	18,796

Table 5-6(2/9) RIVER IMPROVEMENT COST OF MASTER PLAN (DELI RIVER (1))

1. 100 Year Return Period (With Medan Floodway) ---- For Master Plan ---- (Item No. DE-11 to DE 13)

I t e m	Unit	River Mouth to Sikambang River (L = 22.9 km)			Sikambang River to Babura River (L = 5.3 km)			Babura River to Titi Kuning (L = 9.2 km)			T o t a l (L = 37.4 km)		
		Quantity	Cost (million Rp.) F.C. L.C. Total	Quantit	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total		
1. Construction Base Cost													
1.1 Basic Construction Works													
Excavation	1000 m3	1,887	7,555 3,406 10,961	272	1,088 490 1,579	174	690 311 1,001	4,974 4,761 9,735	2,333 9,334 4,207	43,000 33,652 76,652			
Embankment	1000 m3	251	1,988 1,024 3,012	151	1,196 616 1,812	91	721 371 1,092	4,145 3,967 8,112	493 3,905 2,011	35,833 28,043 63,876			
Revetment	1000 m2	360	7,560 10,440 18,000	125	2,625 3,625 6,250	91	1,911 2,639 4,550	1,911 2,639 4,550	576 12,096 16,704	28,800			
Concrete	1000 m3	0	0 0 0	8	2,340 780 3,120	1	420 560	420 560	9 2,760 920	3,680			
Gabion Mattress	1000 m2	36	92 1,060 1,152	8	20 227 246	13	33 383 416	33 383 416	57 145 1,689	1,814			
Bridge	site	12	4,867 1,622 6,489	5	2,357 786 3,143	2	370 123 493	370 123 493	19 7,594 2,531	10,125			
1.2 Preparatory and Miscellaneous Works			4,412 3,510 7,923		1,925 1,305 3,230		829 793 1,622			7,167 5,608 12,775			
2. Indirect Construction Cost			5,704 6,654 12,358		2,326 13,051 15,377		1,168 2,270 3,439			9,198 21,975 31,173			
2.1 Administration (7 % of 1)			0 3,328 3,328		0 1,357 1,357		0 681 681			0 5,366 5,366			
2.2 Engineering Service (15 % of 1)			5,704 1,426 7,130		2,326 581 2,907		1,168 292 1,460			9,198 2,300 11,498			
2.3 Compensation	ha	15	0 1,900 1,900	23	0 11,113 11,113	6	0 1,297 1,297			0 14,310 14,310			
3. Physical Contingency (10 % of 1+2)			3,218 2,772 5,989		1,388 2,088 3,476		614 703 1,317			5,220 5,562 10,782			
Total (1 + 2 + 3)			35,397 30,487 65,884		15,265 22,968 38,233		6,757 7,734 14,491			57,418 61,190 118,608			

Table 5-6(3/9) RIVER IMPROVEMENT COST OF MASTER PLAN (DELI RIVER (2))

2. 10 Year Return Period (Item No. DE-11, DE-12 and DE 14)

Item	Unit	River Mouth to Sikambang River (L = 22.9 km)			Sikambang River to Babura River (L = 5.3 km)			Babura River to Titi Kuning (L = 9.2 km)			Total (L = 37.4 km)		
		Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total		
1. Construction Base Cost													
1.1 Basic Construction Works													
Excavation	1000 m3	1,888	7,555 3,406 10,961	272	1,088 490 1,579	416	1,665 750 2,415	2,576	10,308 4,647 14,955				
Embankment	1000 m3	251	1,988 1,024 3,012	151	1,196 616 1,812	91	721 371 1,092	493	3,905 2,011 5,916				
Revetment	1000 m2	360	7,560 10,440 18,000	125	2,625 3,625 6,250	91	1,911 2,639 4,550	576	12,096 16,704 28,800				
Concrete	1000 m3	0	0 0 0	8	2,340 780 3,120	1	420 140 560	9	2,760 920 3,680				
Gabion Mattress	1000 m2	36	92 1,060 1,152	8	20 227 246	13	33 383 416	57	145 1,669 1,814				
Bridge	site	12	4,867 1,622 6,489	5	2,357 786 3,143	6	4,563 1,521 6,084	23	11,787 3,929 15,716				
1.2 Preparatory Works													
			4,412 3,510 7,923		1,925 1,305 3,230		1,863 1,161 3,023		8,200 5,976 14,176				
2. Indirect Construction Cost													
			5,704 6,654 12,358		2,326 13,051 15,377		2,177 3,731 5,908		10,207 23,436 33,643				
2.1 Administration (7 % of 1)			0 3,328 3,328		0 1,357 1,357		0 1,270 1,270		0 5,954 5,954				
2.2 Engineering Service (15 % of 1)			5,704 1,426 7,130		2,326 581 2,907		2,177 544 2,721		10,207 2,552 12,759				
2.3 Compensation	ha	15	0 1,900 1,900	23	0 11,113 11,113	11	0 1,917 1,917	48	0 14,930 14,930				
3. Physical Contingency (10 % of 1+2)			3,218 2,772 5,989		1,388 2,088 3,476		1,335 1,070 2,405		5,941 5,929 11,870				
Total (1 + 2 + 3)			35,397 30,487 65,884		15,265 22,968 38,233		14,688 11,766 26,454		65,349 55,221 130,570				

Table 5-6(4/9) RIVER IMPROVEMENT COST OF MASTER PLAN
(MEDAN FLOODWAY)

1. 100 Year Return Period --- For Master Plan --- (Item No. MF)

I t e m	Unit	Tembakau to Titi Kuning (L = 3.8 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			13,188	8,192	21,380
1.1 Basic Construction Works			10,990	6,827	17,817
Excavation	1000 m3	957	3,830	1,720	5,550
Embankment	1000 m3	8	65	34	99
Revetment	1000 m2	106	2,226	3,074	5,300
Concrete	1000 m3	11	1,796	996	2,792
Sheet Pile	1000 m2	7	66	1	67
Bridge	site		3,007	1,002	4,009
1.2 Preparatory and Miscellaneous Works			2,198	1,365	3,563
2. Indirect Construction Cost			2,566	5,177	7,743
2.1 Administration(7 % of 1)			0	1,497	1,497
2.2 Engineering Service			2,566	641	3,207
2.3 Compensation	ha	78	0	3,039	3,039
3. Physical Contingency(10 % of 1+2)			1,575	1,337	2,912
Total (1 + 2 + 3)			17,329	14,706	32,035

Table 5-6(5/9) RIVER IMPROVEMENT COST OF MASTER PLAN
(PERCUT RIVER)

1. 100 Year Return Period (With Lausimeme Dam) --- For Master Plan ---
(Item No. PE-50)

I t e m	Unit	River Mouth to Tembakau (L = 28.0 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			20,199	8,804	29,003
1.1 Basic Construction Works			16,832	7,337	24,169
Excavation	1000 m3	1,610	6,527	2,932	9,459
Embankment	1000 m3	440	3,485	1,795	5,280
Revetment	1000 m2	10	210	290	500
Concrete	1000 m3	4	516	364	880
Weir	m2	120	1,260	420	1,680
Sheet Pile	1000 m2	1	245	5	250
Bridge	site	13	4,590	1,530	6,120
1.2 Preparatory and Miscellaneous Works			3,367	1,467	4,834
2. Indirect Construction Cost			3,480	10,780	14,260
2.1 Administration(7 % of 1)			0	2,030	2,030
2.2 Engineering Service			3,480	870	4,350
2.3 Compensation	ha	133	0	7,880	7,880
3. Physical Contingency(10 % of 1+2)			2,368	1,958	4,326
Total (1 + 2 + 3)			26,047	21,542	47,589

2. 10 Year Return Period (Item No. PE-10)

I t e m	Unit	River Mouth to Tembakau (L = 28.0 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			14,438	6,226	20,664
1.1 Basic Construction Works			12,032	5,188	17,220
Excavation	1000 m3	812	3,293	1,479	4,772
Embankment	1000 m3	320	2,534	1,306	3,840
Revetment	1000 m2	10	210	290	500
Concrete	1000 m3	4	516	364	880
Weir	m2	88	924	308	1,232
Sheet Pile	1000 m2	1	245	5	250
Bridge	site	13	4,310	1,436	5,746
1.2 Preparatory and Miscellaneous Works			2,406	1,038	3,444
2. Indirect Construction Cost			2,480	7,932	10,412
2.1 Administration(7 % of 1)			0	1,446	1,446
2.2 Engineering Service			2,480	620	3,100
2.3 Compensation	ha	114	0	5,866	5,866
3. Physical Contingency(10 % of 1+2)			1,692	1,416	3,108
Total (1 + 2 + 3)			18,610	15,574	34,184

Table 5-6(6/9) RIVER IMPROVEMENT COST OF MASTER PLAN (SERDANG RIVER (1))

1. 50 Year Return Period --- For Master Plan --- (Item No. SE-51 to SE-53)

Item	Unit	Serdang River Improvement River Mouth to Baru (L = 9.3 km)			Belumai River Improvement Baru to Buntu (L = 7.2 km)			Batugginging River Improvement Baru to Gang Melaya (L = 8.9 km)			Total (L = 25.4 km)		
		Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total		
1. Construction Base Cost		27,874	11,940 39,814	7,260	3,093 10,353	12,846	5,740 18,586	47,980	20,772 68,752				
1.1 Basic Construction Works		23,228	9,950 33,178	6,050	2,578 8,627	10,705	4,783 15,488	39,983	17,311 57,294				
Excavation	1000 m3	3,688	14,758 6,652 21,410	786	3,146 1,418 4,565	2,030	8,124 3,662 11,786	6,504	26,028 11,733 37,761				
Embankment	1000 m3	329	2,506 1,342 3,948	30	238 122 360	181	1,434 738 2,172	540	4,277 2,203 6,480				
Revetment	1000 m2	0	0 0 0	2	32 44 75	0	0 0 0	2	32 44 75				
Concrete	1000 m3	0	0 0 0	4	636 404 1,040	0	0 0 0	4	636 404 1,040				
Weir	m2	0	0 0 0	132	1,386 462 1,848	0	0 0 0	132	1,386 462 1,848				
Sheet Pile	1000 m2	0	0 0 0	1	245 5 250	0	0 0 0	1	245 5 250				
Bridge	site	3	5,865 1,955 7,820	1	367 122 490	1	1,148 383 1,530	5	7,380 2,460 9,840				
1.2 Preparatory and Miscellaneous Works		4,646	1,590 6,636	1,210	516 1,725	2,141	957 3,098	7,997	3,462 11,459				
2. Indirect Construction Cost		4,778	14,749 19,527	1,242	3,596 4,839	2,230	8,902 11,132	8,250	27,248 35,498				
2.1 Administration (7 % of 1)		0	2,787 2,787	0	725 725	0	1,301 1,301	0	4,813 4,813				
2.2 Engineering Service		4,778	1,194 5,972	1,242	311 1,553	2,230	558 2,788	8,250	2,063 10,313				
2.3 Compensation	ha	149	0 10,768 10,768	22	0 2,561 2,561	116	0 7,043 7,043	287	0 20,372 20,372				
3. Physical Contingency (10 % of 1+2)		3,265	2,669 5,934	850	669 1,519	1,508	1,464 2,972	5,623	4,802 10,425				
Total (1 + 2 + 3)		35,917	29,358 65,275	9,352	7,358 16,711	16,584	16,105 32,689	61,853	52,822 114,675				

Table 5-6(7/9) RIVER IMPROVEMENT COST OF MASTER PLAN (SERDANG RIVER (2))

2. 10 Year Return Period (Item No. SE-11 to SE-13)

Item	Unit	Serdang River Improvement		Belumai River Improvement		Batugginging River Improvement		Total						
		River Mouth to Baru (L = 9.3 km)		Baru to Buntu (L = 7.2 km)		Baru to Gang Melaya (L = 8.9 km)		(L = 25.4 km)						
		Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total	Quantity	Cost (million Rp.) F.C. L.C. Total					
1. Construction Base Cost														
1.1 Basic Construction Works		22,243	9,401	31,644	5,844	2,494	8,338	10,997	4,906	15,903	39,884	16,801	55,886	
Excavation	1000 m3	18,536	7,834	26,370	4,870	2,078	6,949	9,164	4,089	13,253	32,570	14,001	46,572	
Embankment	1000 m3	2,515	10,065	4,537	2,241	1,010	3,251	1,645	6,583	2,968	9,551	4,720	18,889	27,404
Revetment	1000 m2	329	2,606	1,342	238	122	360	181	1,434	738	2,172	540	4,277	6,480
Concrete	1000 m3	0	0	0	32	44	75	0	0	0	0	2	32	44
Weir	m2	0	0	0	636	404	1,040	0	0	0	0	4	636	404
Sheet Pile	1000 m2	0	0	0	111	1,166	389	1,554	0	0	0	111	1,166	389
Bridge	site	3	5,865	1,955	7,820	1	418	1	1,148	383	1,530	5	7,326	2,442
1.2 Preparatory and Miscellaneous Works		3,707	1,567	5,274	974	416	1,390	1,833	818	2,651	6,514	2,800	9,314	
2. Indirect Construction Cost		3,797	13,932	17,730	1,001	2,651	3,651	1,908	8,633	10,542	6,706	25,217	31,923	
2.1 Administration (7 % of 1)		0	2,215	2,215	0	584	584	0	1,113	1,113	0	3,912	3,912	
2.2 Engineering Service		3,797	949	4,747	1,001	250	1,251	1,908	477	2,386	6,706	1,677	8,383	
2.3 Compensation	ha	149	0	10,768	0	1,817	1,817	116	0	7,043	0	19,628	19,628	
3. Physical Contingency (10 % of 1+2)		2,604	2,333	4,937	685	514	1,199	1,291	1,354	2,645	4,579	4,202	8,781	
Total (1 + 2 + 3)		28,644	25,667	54,311	7,530	5,659	13,189	14,196	14,894	29,090	50,370	46,220	96,590	

Table 5-6(8/9) RIVER IMPROVEMENT COST OF MASTER PLAN
(BELUTU RIVER)

1. 50 Year Return Period ---- For Master Plan --- (Item No BT-50)

I t e m	Unit	Belutu River Improvement (L = 32.7 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			24,044	10,853	34,897
1.1 Basic Construction Works			20,036	9,045	29,081
Excavation	1000 m3	2,080	9,289	4,173	13,462
Embankment	1000 m3	895	7,088	3,652	10,740
Bridge	site	6	3,659	1,220	4,879
1.2 Preparatory and Miscellaneous Works			4,007	1,809	5,816
2. Indirect Construction Cost			4,188	12,189	16,376
2.1 Administration(7 % of 1)			0	2,443	2,443
2.2 Engineering Service			4,188	1,047	5,235
2.3 Compensation	ha	137	0	8,699	8,699
3. Physical Contingency(10 % of 1+2)			2,823	2,304	5,127
Total (1 + 2 + 3)			31,055	25,346	56,401

2. 10 Year Return Period (Item No BT-10)

I t e m	Unit	Belutu River Improvement (L = 32.7 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			20,099	9,081	29,180
1.1 Basic Construction Works			16,749	7,568	24,317
Excavation	1000 m3	1,348	6,002	2,696	8,698
Embankment	1000 m3	895	7,088	3,652	10,740
Bridge	site	6	3,659	1,220	4,879
1.2 Preparatory and Miscellaneous Works			3,350	1,514	4,863
2. Indirect Construction Cost			3,502	11,617	15,119
2.1 Administration(7 % of 1)			0	2,043	2,043
2.2 Engineering Service			3,502	875	4,377
2.3 Compensation	ha	137	0	8,699	8,699
3. Physical Contingency(10 % of 1+2)			2,360	2,070	4,430
Total (1 + 2 + 3)			25,961	22,768	48,729

Table 5-6(9/9) RIVER IMPROVEMENT COST OF MASTER PLAN
(PADANG RIVER)

1. 50 Year Return Period --- For Master Plan --- (Item No. PA-50)

I t e m	Unit	Padang River Improvement (L = 29.5 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			48,030	21,762	69,792
1.1 Basic Construction Works			40,025	18,135	58,160
Excavation	1000 m3	6,098	24,405	10,964	35,369
Embankment	1000 m3	820	6,494	3,346	9,840
Revetment	1000 m2	27	567	783	1,350
Concrete	1000 m3	8	1,260	740	2,000
Weir	m2	216	2,268	756	3,024
Sheet Pile	1000 m2	2	417	9	425
Bridge	site	6	4,614	1,538	6,152
1.2 Preparatory and Miscellaneous Works			8,005	3,627	11,632
2. Indirect Construction Cost			8,375	13,236	21,611
2.1 Administration(7 % of 1)			0	4,885	4,885
2.2 Engineering Service			8,375	2,094	10,469
2.3 Compensation	ha	128	0	6,257	6,257
3. Physical Contingency(10 % of 1+2)			5,641	3,500	9,141
Total (1 + 2 + 3)			62,045	38,499	100,544

2. 10 Year Return Period (Item No. PA-10)

I t e m	Unit	Padang River Improvement (L = 29.5 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			34,072	15,554	49,626
1.1 Basic Construction Works			28,394	12,962	41,355
Excavation	1000 m3	3,391	13,572	6,097	19,669
Embankment	1000 m3	820	6,494	3,346	9,840
Revetment	1000 m2	27	567	783	1,350
Concrete	1000 m3	6	1,008	592	1,600
Weir	m2	171	1,796	599	2,394
Sheet Pile	1000 m2	1	343	7	350
Bridge	site	6	4,614	1,538	6,152
1.2 Preparatory and Miscellaneous Works			5,679	2,592	8,271
2. Indirect Construction Cost			5,955	11,220	17,175
2.1 Administration(7 % of 1)			0	3,474	3,474
2.2 Engineering Service			5,955	1,489	7,444
2.3 Compensation	ha	128	0	6,257	6,257
3. Physical Contingency(10 % of 1+2)			4,003	2,677	6,680
Total (1 + 2 + 3)			44,030	29,451	73,481

Table 5-7 CONSTRUCTION COST OF URGENT PROJECT

Name of River	Direct Cost		Indirect Cost			Physical Contingency	Total
	Construction Base Cost	Administration	Engineering Service	Compensation			
1. Deli-Percut River							340,116
1.1 Deli River Improvement							119,156
- River Mouth to Sikambang River	47,543	3,328	7,131	1,889	5,989		65,880
- Sikambang River to Babura River	19,351	1,355	2,903	11,144	3,475		38,228
- Babura River to Titi Kuning	9,945	696	1,492	1,547	1,368		15,048
1.2 Medan Floodway	21,351	1,495	3,203	3,123	2,917		32,089
1.3 Percut River Improvement	29,077	2,035	4,362	7,732	4,321		47,527
1.4 Lausimeme Dam	102,234	7,156	16,861	2,244	12,849		141,344
2. Padang River Improvement	49,458	3,462	7,419	6,547	6,689		73,575
Total	278,959	19,527	43,371	34,226	37,608		413,691

Note :

- 1) Administration cost is 7 % of direct construction cost.
- 2) Physical Contingency is 10% of the total of direct and indirect costs

Table 5-8 (1/4) RIVER IMPROVEMENT COST OF URGENT PROJECT (DELI RIVER)

Item	Unit	DE-1 River Mouth to Sikambing River (L = 22.9 km)				DE-2 Sikambing River to Babura River (L = 5.3 km)				DE-3 Babura River to Titi Kurung (L = 9.2 km)				Total (L = 37.4 km)			
		Quantity		Cost (million Rp.)		Quantity		Cost (million Rp.)		Quantity		Cost (million Rp.)		Quantity		Cost (million Rp.)	
		F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.
1. Construction Base Cost		27,198	20,345	47,543	11,537	7,815	19,351	5,189	4,756	9,945	43,924	32,915	76,839				
1.1 Basic Construction Works		22,665	16,954	39,619	9,614	6,512	16,126	4,324	3,963	8,287	36,602	27,429	64,032				
Excavation	1000 m3	1,888	7,517	3,377	10,894	272	1,073	482	1,555	193	761	342	1,103	2,352	9,351	4,201	13,552
Embankment	1000 m3	251	1,985	1,023	3,007	151	1,198	617	1,815	91	718	370	1,087	492	3,901	2,009	5,910
Revetment	1000 m2	330	7,357	10,519	17,976	125	2,640	3,846	6,486	91	2,159	3,022	5,181	545	12,157	17,487	29,644
Parapet Wall	m	0	0	0	0	* 2400	2,160	720	2,880	** 100	60	20	80	2,500	2,220	740	2,960
Sluiceway	site	3	436	145	582	0	0	0	0	2	51	17	68	5	487	162	649
Drain	site	57	503	168	671	21	185	62	247	19	168	56	224	97	856	286	1,142
Bridge	site	12	4,867	1,622	6,489	5	2,357	786	3,143	2	408	136	544	19	7,632	2,544	10,176
1.2 Preparatory Works		4,533	3,391	7,924	1,923	1,302	3,225	865	793	1,657	7,320	5,486	12,806				
2. Compensation Base Cost		0	1,889	1,889	0	11,144	11,144	0	1,547	1,547	0	14,580	14,580				
2.1 Land Acquisition	ha	15	0	620	620	23	0	3,899	3,899	9	0	751	751	46	0	5,270	5,270
2.2 House Evacuation	house	64	0	1,269	1,269	556	0	7,245	7,245	142	0	796	796	762	0	9,310	9,310
Total (1 + 2) ***		27,198	22,234	49,432	11,537	18,959	30,495	5,189	6,303	11,482	43,924	47,496	91,420				

Note * : for Sikambing River, ** : for Babura River, *** : Excluding costs of Administration, Engineering Service and Physical Contingency.

Table 5-8 (2/4) RIVER IMPROVEMENT COST OF URGENT PROJECT (MEDAN FLOODWAY)

Item	Unit	FL-CH Floodway Channel (Tembakau to Titi Kuning : L = 3.8 km)			WE-FL , WE-DE Weir			FL-UP Compensation and Embankment Work for Upstream of Deli River : 3.2 km			Total						
		Quantity	Cost (million Rp.)	Total	Quantity	Cost (million Rp.)	Total	Quantity	Cost (million Rp.)	Total	Quantity	Cost (million Rp.)	Total				
		F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total				
1. Construction Base Cost																	
1.1 Basic Construction Works																	
Excavation	1000 m3	1,166	4,665	2,096	6,761	0	0	0	0	0	0	1,166	4,665	2,096	6,761		
Embankment	1000 m3	0	0	0	0	0	0	0	0	0	0	16	124	124	64	188	
Revetment	1000 m2	97	2,035	2,811	4,846	0	0	0	0	0	0	97	2,035	2,811	4,846		
Weir(Floodway Side)	site	0	0	0	0	1	1,061	701	1,762	0	0	1	1,061	701	1,762		
Weir(Deli River Side)	site	0	0	0	0	1	1,139	706	1,845	0	0	1	1,139	706	1,845		
Bridge	site	6	2,853	951	3,805	0	0	0	0	1	153	51	204	7	3,006	1,602	4,608
1.2 Preparatory Works																	
			955	586	1,541		220	141	361		28	11	39		1,203	738	1,941
2. Compensation Base Cost																	
			0	2,145	2,145		0	0	0		0	978	978		0	3,123	3,123
2.1 Land Acquisition	ha	20	0	582	582	0	0	0	0	58	0	889	889	78	0	1,471	1,471
2.2 House Evacuation	house	97	0	1,563	1,563	0	0	0	0	25	0	89	89	122	0	1,652	1,652
Total (1 + 2) *			10,509	8,588	19,098		2,420	1,548	3,968		305	1,104	1,409		13,234	11,241	24,475

Note * : Excluding costs of Administration, Engineering Service and Physical Contingency.

Table 5-8 (3/4) RIVER IMPROVEMENT COST OF URGENT PROJECT
(PERCUT RIVER)

Item	Unit	River Mouth to Tembakau (L = 28 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			20,348	8,729	29,077
1.1 Basic Construction Works			18,498	7,935	26,433
Excavation	1000 m3	1,433	5,734	2,576	8,310
Embankment	1000 m3	370	3,798	1,799	5,597
Revetment	1000 m2	6	131	182	313
Weir	site	1	2,136	1,145	3,281
Sluiceway and Water Gate	site	5	1,571	524	2,095
Drain	site	56	495	165	660
Bridge	site	13	4,633	1,544	6,177
1.2 Preparatory Works			1,850	794	2,644
2. Compensation Base Cost			0	7,732	7,732
2.1 Land Acquisition	ha	131	0	3,183	3,183
2.2 House Evacuation	house	409	0	4,549	4,549
Total (1 + 2) *			20,348	16,462	36,810

Note * : Excluding costs of Administration, Engineering Service and Physical Contingency.

Table 5-8 (4/4) RIVER IMPROVEMENT COST OF URGENT PROJECT
(PADANG RIVER)

Item	Unit	River Mouth to Sibarau River (L = 29.5 km)			
		Quantity	Cost (million Rp.)		
			F.C.	L.C.	Total
1. Construction Base Cost			33,503	15,955	49,458
1.1 Basic Construction Works			30,457	14,505	44,962
Excavation	1000 m3	3,422	13,695	6,153	19,848
Embankment	1000 m3	848	6,716	3,460	10,176
Revetment	1000 m2	23	499	882	1,381
Weir	site	1	3,616	2,033	5,649
Parapet Wall (Bahilang River)	m	600	540	180	720
Sluiceway	site	4	653	218	871
Drain	site	14	124	41	165
Bridge	site	6	4,614	1,538	6,152
1.2 Preparatory Works			3,046	1,450	4,496
2. Compensation Base Cost			0	6,547	6,547
2.1 Land Acquisition	ha	128	0	4,849	4,849
2.2 House Evacuation	house	252	0	1,698	1,698
Total (1 + 2) *			33,503	22,502	56,005

Note * : Excluding costs of Administration, Engineering Service and Physical Contingency

Table 5-9 ANNUAL DISBURSEMENT SCHEDULE OF MASTER PLAN

(Unit : Million Rp)

Project	Quantity	Unit	Total	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1. Belawan River Improvement (50-Yr)	21.7	km	31,261										
2. Deli-Perkut River System (100-Yr)			403,130			11,852	26,963	80,538	65,428	73,031	61,015	17,571	12,300
(a) Deli River Improvement	37.4	km	118,608			3,794	11,565	22,701	14,831	22,434	22,434	14,176	6,573
(b) Medan Floodway	3.8	km	32,035			1,058	2,730	8,315	6,644	6,644	6,644	3,395	5,727
(c) Namobatang Multipurpose Dam	1	site	63,554										
(d) Percut River Improvement	28.0	km	47,589			1,436	5,770	16,351	12,016	12,016			
(e) Lausimeme Multipurpose Dam	1	site	141,344			5,564	6,798	33,171	31,937	31,937			
3. Serdang River (50-Yr)			153,850										
(a) Serdang River Improvement	25.4	km	114,675										
(b) Belumai Aqueduct	5.5	km	39,175										
4. Ular River (50-Yr)/Karai Flood Control Dam	1	site	16,076										
5. Belutu River Improvement (50-Yr)	32.7	km	56,401										
6. Padang River Improvement (50-Yr)	29.5	km	100,544										
Total			761,262			11,852	30,418	90,876	77,821	83,369	73,408	29,964	24,693
Project				2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1. Belawan River Improvement (50-Yr)				13,608	13,608	13,608	13,608						
2. Deli-Perkut River System (100-Yr)									1,038	4,171	8,684	8,684	8,684
(a) Deli River Improvement													
(b) Medan Floodway													
(c) Namobatang Multipurpose Dam													
(d) Percut River Improvement													
(e) Lausimeme Multipurpose Dam													
3. Serdang River (50-Yr)				4,828	16,583	35,451	24,247	24,247	24,247	24,247			
(a) Serdang River Improvement				3,403	14,508	28,296	17,092	17,092	17,092	17,092			
(b) Belumai Aqueduct				1,425	1,975	7,155	7,155	7,155	7,155	7,155			
4. Ular River (50-Yr)/Karai Flood Control Dam													
5. Belutu River Improvement (50-Yr)							1,727	11,299	8,675	8,675	8,675	8,675	8,675
6. Padang River Improvement (50-Yr)				12,393	12,393								
Total				30,829	42,584	49,059	39,582	35,546	35,382	39,285	21,513	21,513	21,513

Note : Price escalation excluded in project cost.

Table 5-10 ANNUAL DISBURSEMENT SCHEDULE OF URGENT PROJEC

(Unit : Million Rp)

Description	Total		1993		1994		1995		1995		1997		1998		1999		2000		
	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	
1. CONSTRUCTION BASE COST	351,161	178,254	172,907	0	0	0	21,712	33,702	24,107	40,403	30,461	44,248	36,800	37,466	35,038	13,141	14,281	9,295	10,508
1.1 De11 River Improvement	76,839	43,924	32,915	0	0	0	0	6,800	5,086	5,800	5,086	10,645	7,691	10,545	7,691	6,440	4,983	2,595	2,378
1.2 Medan Floodway	21,351	13,233	8,118	0	0	0	0	3,308	2,030	3,308	2,030	3,308	2,030	3,308	2,030	0	0	0	0
1.3 Percut River Improvement	29,077	20,348	8,729	0	0	0	0	6,783	2,910	6,783	2,910	6,783	2,910	6,783	2,910	0	0	0	0
1.4 Lausime Dam	102,234	67,246	34,988	0	0	0	0	16,812	8,747	16,812	8,747	16,812	8,747	16,812	8,747	0	0	0	0
1.5 Padang River Improvement	49,458	33,503	15,955	0	0	0	0	0	0	6,701	3,191	6,701	3,191	6,701	3,191	6,701	3,191	6,701	3,191
1.6 Price Escalation; F.C. 0% & L.C. 8%	72,202	0	72,202	0	0	0	21,712	0	5,335	0	8,498	0	12,232	0	13,379	0	6,107	0	4,939
2. ENGINEERING SERVICES COST	45,503	36,965	8,537	9,309	1,625	11,090	2,284	3,849	993	2,544	620	2,544	669	2,544	723	2,544	781	2,544	843
2.1 Detailed Design	26,022	22,180	3,842	9,309	1,476	11,090	1,921	1,781	445	0	0	0	0	0	0	0	0	0	0
2.2 Construction Supervision	17,348	14,786	2,562	0	0	0	0	2,069	328	2,544	447	2,544	447	2,544	447	2,544	447	2,544	447
2.3 Price Escalation; F.C. 0% & L.C. 8%	2,133	0	2,133	0	149	0	363	0	220	0	173	0	222	0	276	0	334	0	396
3. COMPENSATION COST	42,636	0	42,636	0	0	0	16,456	0	26,181	0	0	0	0	0	0	0	0	0	0
3.1 House Evacuation & Land Acquisition	34,226	0	34,226	0	0	0	13,840	0	20,387	0	0	0	0	0	0	0	0	0	0
3.2 Price Escalation; F.C. 0% & L.C. 8%	8,410	0	8,410	0	0	0	2,616	0	5,794	0	0	0	0	0	0	0	0	0	0
4. ADMINISTRATION COST	29,252	0	29,252	0	0	0	0	0	4,717	0	6,055	0	7,215	0	6,695	0	2,607	0	1,963
4.1 Administration	19,827	0	19,827	0	0	0	0	0	3,673	0	4,366	0	4,817	0	4,139	0	1,492	0	1,040
4.2 Price Escalation; F.C. 0% & L.C. 8%	9,725	0	9,725	0	0	0	0	0	1,044	0	1,689	0	2,398	0	2,556	0	1,115	0	923
5. TOTAL (1+2+3+4)	468,552	215,220	253,332	9,309	1,625	11,090	40,452	37,551	55,998	42,946	37,136	46,792	44,684	40,009	42,455	15,634	17,668	11,839	13,314
6. PHYSICAL CONTINGENCY	46,854	21,521	25,333	931	163	1,109	4,045	3,755	5,600	4,294	3,713	4,679	4,469	4,001	4,245	1,568	1,767	1,184	1,331
6.1 Physical Contingency: 10% of 1.	35,117	17,825	17,291	0	0	0	2,171	3,370	2,411	4,040	3,046	4,425	3,680	3,747	3,504	1,314	1,428	930	1,051
6.2 Physical Contingency: 10% of 2.	4,548	3,695	853	931	163	1,109	228	385	89	254	62	254	67	254	72	254	78	254	84
6.3 Physical Contingency: 10% of 3.	4,284	0	4,284	0	0	0	1,646	0	2,618	0	0	0	0	0	0	0	0	0	0
6.4 Physical Contingency: 10% of 4.	2,925	0	2,925	0	0	0	0	0	472	0	605	0	722	0	669	0	261	0	196
7. TOTAL (5+6)	515,406	236,741	278,665	10,240	1,788	12,199	44,497	41,306	61,598	47,240	40,849	51,471	49,153	44,010	46,700	17,252	19,435	13,023	14,645
8. VAT: 10% of 7.	51,541	0	51,541	0	1,203	0	5,670	0	10,290	0	8,809	0	10,062	0	9,071	0	3,699	0	2,767
9. GRAND TOTAL (7+8)	566,947	236,741	330,206	10,240	2,991	12,199	50,167	41,306	71,888	47,240	49,658	51,471	59,215	44,010	55,771	17,252	23,104	13,023	17,412

Price Level : September 1991
Conversion Rate : US\$1.00 = Rp.1,950 = Yen136

Table 5-11(1/4) ANNUAL O.M.R. COST OF URGENT PROJECT (DELI RIVER)

1. River Mouth to Sikambang River

Item	Quantity	Unit	Unit Price		Amount		Total (Mill.Rp)
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	
1) Civil Works					178	153	331
Excavation	18,880	m3			76	33	109
Common	15,482	m3	3.8	1.7	59	26	85
Riverbed	2,832	m3	4.8	2.2	14	6	20
Dredging	566	m3	4.8	2.2	3	1	4
Embankment	2,566	m3	7.9	4.1	20	10	30
Revetment	3,297	m2	21.0	29.0	69	96	165
Gabion Mattress	357	m2	2.6	29.4	1	11	12
Sheet Pile	14	m2	245.0	5.0	3	0	3
Sluice A	1 place	m3	1,875.0	625.0	0	0	0
Sluice C	2 place	m3	2,250.0	750.0	4	1	5
Drain	57 place	m3	750.0	250.0	5	2	7
2) Administration (10 % of 1)					0	33	33
Total (1 + 2)					178	186	364

2. Sikambang River to Babura River

Item	Quantity	Unit	Unit Price		Amount		Total (Mill.Rp)
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	
1) Civil Works					73	57	130
Excavation	2,716	m3			11	5	16
Common	2,308	m3	3.8	1.7	9	4	13
Riverbed	407	m3	4.8	2.2	2	1	3
Dredging	0	m3	4.8	2.2	0	0	0
Embankment	1,512	m3	7.9	4.1	12	6	18
Concrete	72	m3			22	7	29
R.C.	72	m3	300.0	100.0	22	7	29
Revetment	1,248	m2	21.0	29.0	26	36	62
Gabion Mattress	77	m2	2.6	29.4	0	2	2
Drain	21 place	m3	750.0	250.0	2	1	3
2) Administration (10 % of 1)					0	13	13
Total (1 + 2)					73	70	143

3. Babura River to Titij Kuning

Item	Quantity	Unit	Unit Price		Amount		Total (Mill.Rp)
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	
1) Civil Works					39	39	78
Excavation	1,927	m3			7	4	11
Common	1,638	m3	3.8	1.7	6	3	9
Riverbed	289	m3	4.8	2.2	1	1	2
Dredging	0	m3	4.8	2.2	0	0	0
Embankment	906	m3	7.9	4.1	7	4	11
Concrete	2	m3			1	0	1
R.C.	2	m3	300.0	100.0	1	0	1
Revetment	907	m2	21.0	29.0	19	26	45
Gabion Mattress	131	m2	2.6	29.4	0	4	4
Sheet Pile	9	m2	245.0	5.0	2	0	2
Sluice A	2 place	m3	1,875.0	625.0	1	0	1
Drain	19 place	m3	750.0	250.0	2	1	3
2) Administration (10 % of 1)					0	8	8
Total (1 + 2)					39	47	86

Table 5-11(2/4) ANNUAL O.M.R. COST OF URGENT PROJECT (MEDAN FLOODWAY)

Item	Quantity	Unit	Unit Price		Amount		Total
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	L.C. (Mill.Rp)
1) Civil Works					90	64	154
Excavation	11,965	m3			48	22	70
Common	9,560	m3	3.8	1.7	36	16	52
Riverbed	2,405	m3	4.8	2.2	12	6	18
Embankment	200	m3	7.9	4.1	2	1	3
Revetment	1,059	m2	21.0	29.0	22	31	53
Gabion Mattress	29	m2	2.6	29.4	0	1	1
Concrete	106	m3			17	9	26
Mass	62	m3	72.0	88.0	4	5	9
R.C.	45	m3	300.0	100.0	13	4	17
Sheet Pile	3	m2	245.0	5.0	1	0	1
2) Administration (10 % of 1)					0	15	15
Total (1 + 2)					90	79	169

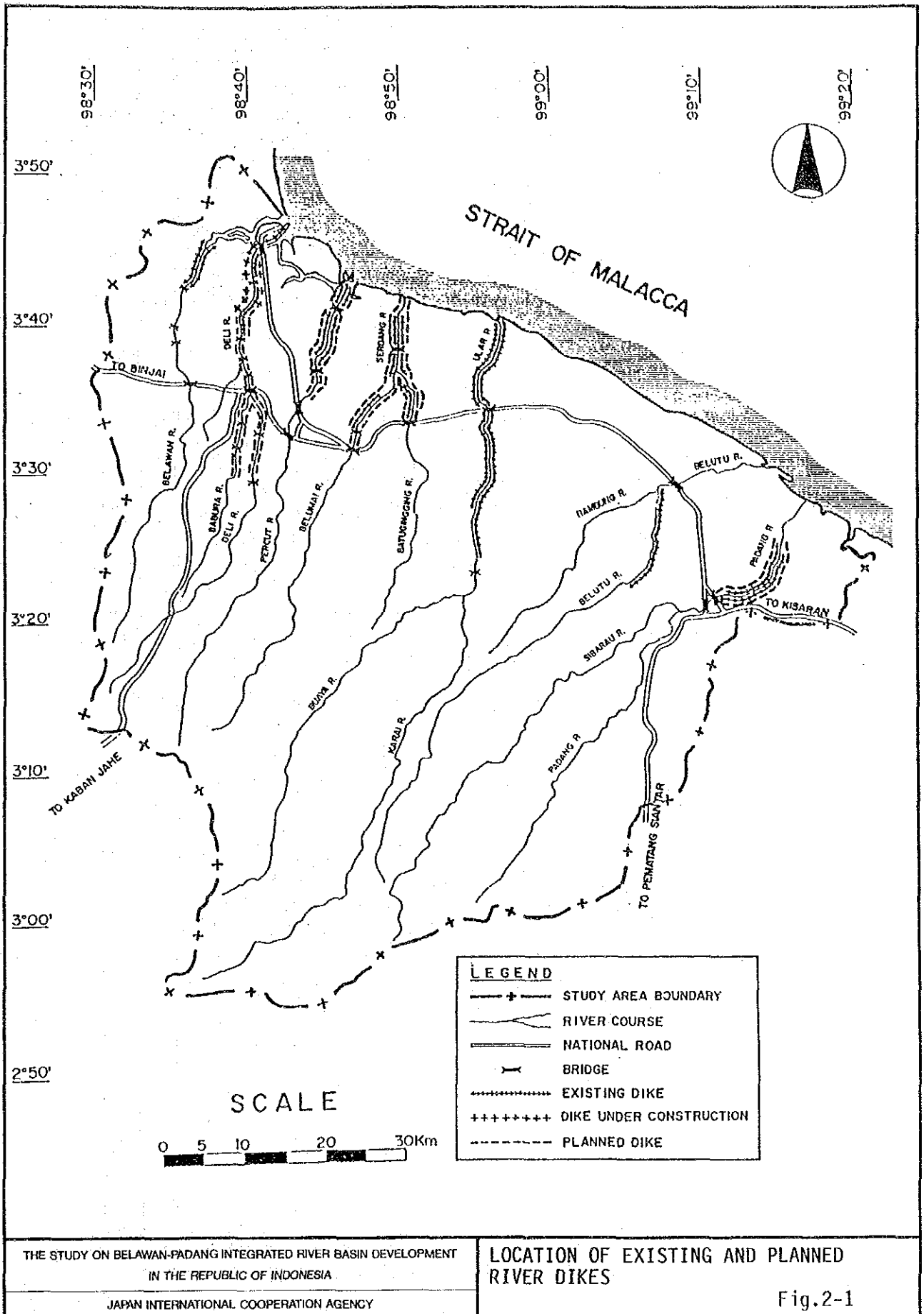
Table 5-11(3/4) ANNUAL O.M.R. COST OF URGENT PROJECT (PERCUT RIVER)

Item	Quantity	Unit	Unit Price		Amount		Total
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	(Mill.Rp)
1) Civil Works					130	61	191
Excavation	14,328	m3			57	25	82
Common	11,462	m3	3.8	1.7	43	19	62
Riverbed	2,436	m3	4.8	2.2	12	5	17
Dredging	430	m3	4.8	2.2	2	1	3
Embankment	3,704	m3	7.9	4.1	29	15	44
Revetment	94	m2	21.0	29.0	2	3	5
Gabion Mattress	89	m2	2.6	29.4	0	3	3
Inflatable Weir	1	m2	10,500.0	3,500.0	13	4	17
Concrete	41	m3			5	4	9
Mass	31	m3	72.0	88.0	2	3	5
R.C.	10	m3	300.0	100.0	3	1	4
Sheet Pile	11	m2	245.0	5.0	3	0	3
Sluice A	3 place	0.5	1,875.0	625.0	1	0	1
Sluice B	1 place	1.4	2,250.0	750.0	3	1	4
Drain	50 place	6.6	750.0	250.0	5	2	7
Gate	1 place	0.1	97,500.0	32,500.0	12	4	16
2) Administration (10 % of 1)					0	19	19
Total (1 + 2)					130	80	210

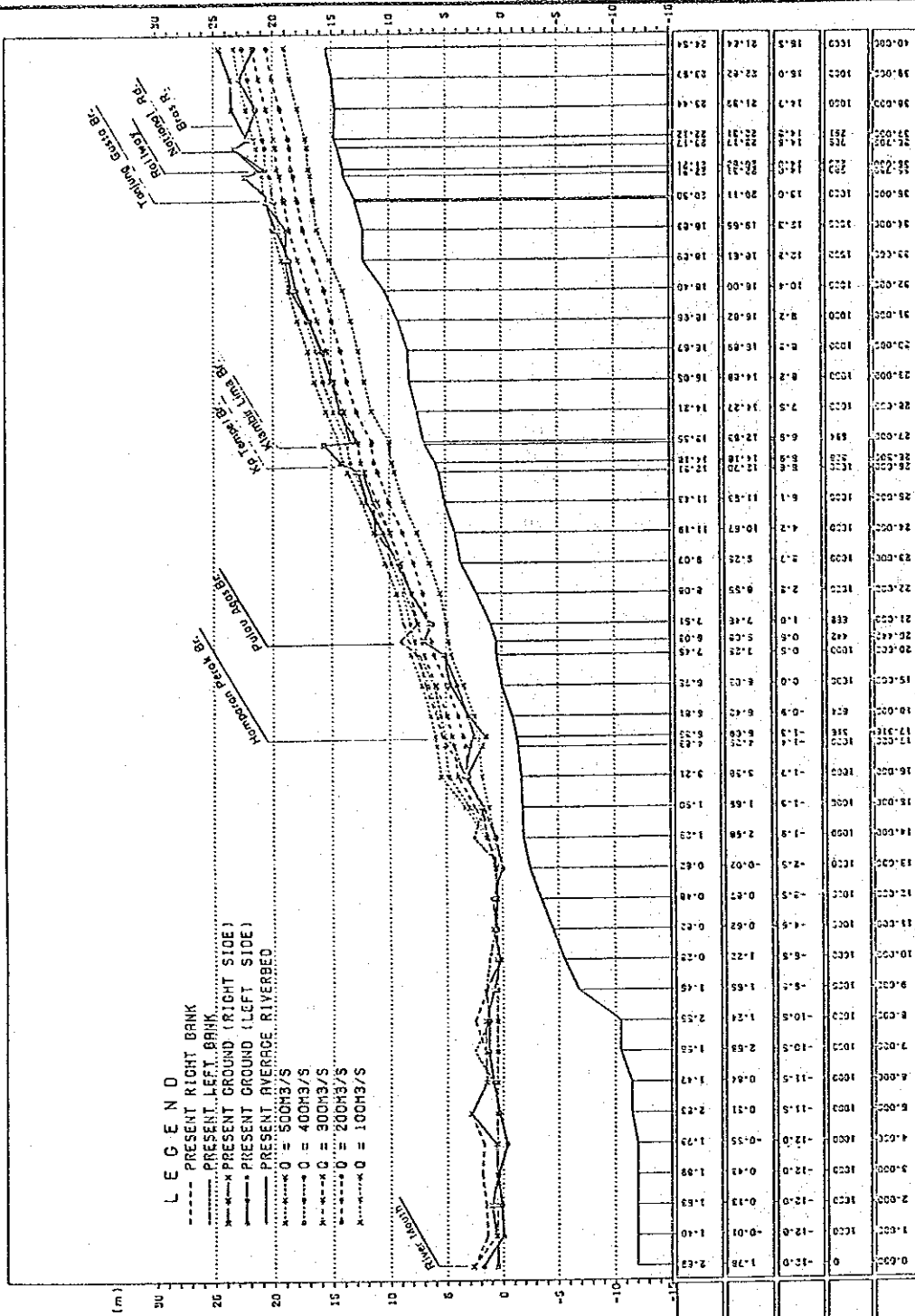
Table 5-11(4/4) ANNUAL O.M.R. COST OF URGENT PROJECT (PADANG RIVER)

Item	Quantity	Unit	Unit Price		Amount		Total
			F.C. (1000Rp)	L.C. (1000Rp)	F.C. (Mill.Rp)	L.C. (Mill.Rp)	(Mill.Rp)
1. Civil Works					259	130	389
Excavation	34,220	m3			137	62	199
Common	27,376	m3	3.8	1.7	104	47	151
Riverbed	5,817	m3	4.8	2.2	28	13	41
Dredging	1,027	m3	4.8	2.2	5	2	7
Embankment	8,480	m3	7.9	4.1	67	35	102
Revetment	270	m2	21.0	29.0	6	8	14
Gabion Mattress	266	m2	2.6	29.4	1	8	9
Inflatable Weir	2	m2	10,500.0	3,500.0	23	8	31
Concrete	82	m3			14	7	21
Mass	50	m3	72.0	88.0	4	4	8
R.C.	32	m3	300.0	100.0	10	3	13
Sheet Pile	17	m2	245.0	5.0	4	0	4
Sluice A	1 place	0.2	1,875.0	625.0	0	0	0
Sluice B	3 place	2.8	2,250.0	750.0	6	2	8
Drain	14 place	1.7	750.0	250.0	1	0	1
2. Administration (10 % of 1)					0	39	39
Total (1 + 2)					259	168	427

FIGURES



BELAWAN RIVER

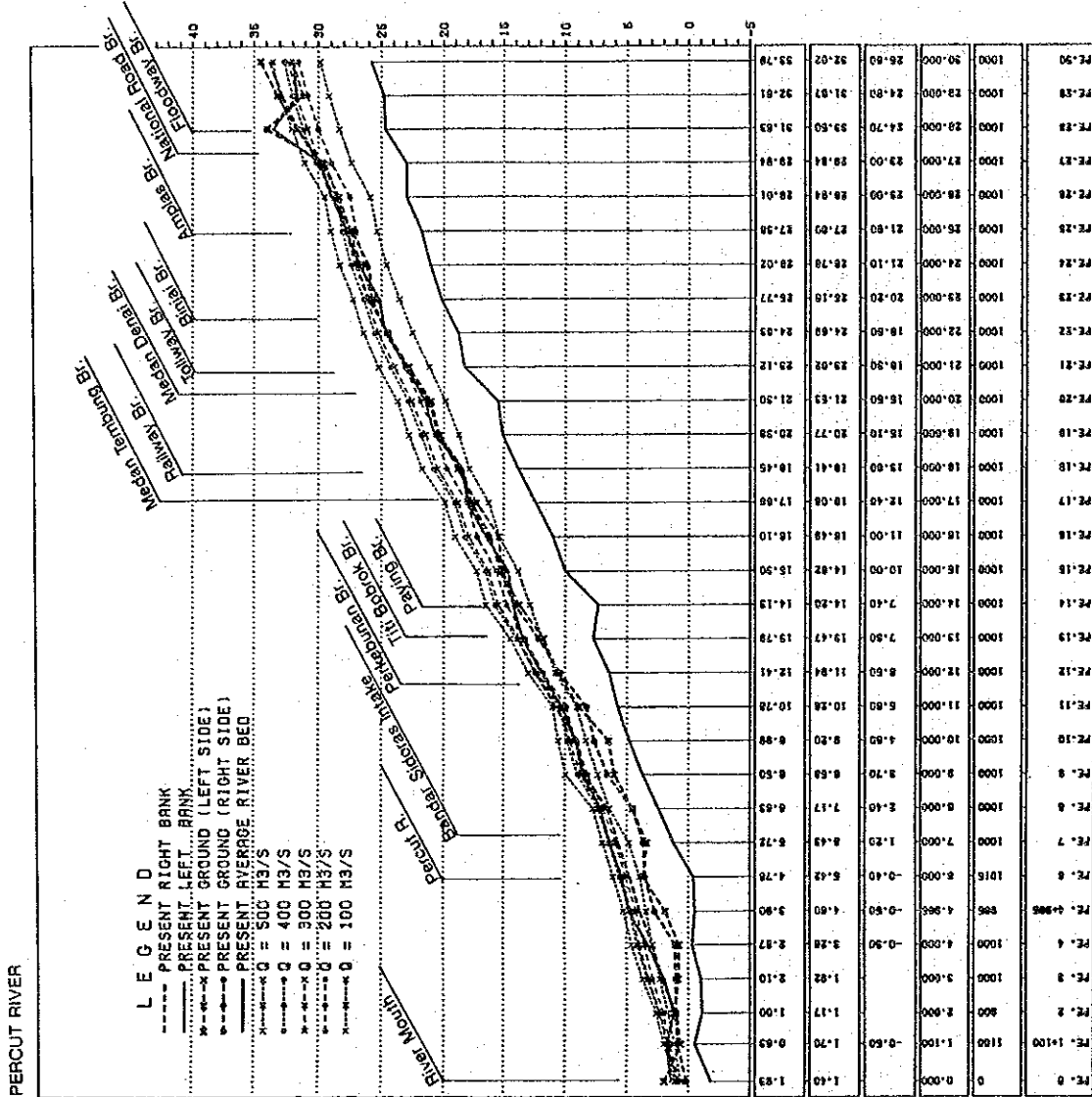


- LEGEND**
- PRESENT RIGHT BANK
 - PRESENT LEFT BANK
 - PRESENT GROUND (RIGHT SIDE)
 - PRESENT GROUND (LEFT SIDE)
 - PRESENT AVERAGE RIVERBED
 - PRESENT Q = 500M³/S
 - PRESENT Q = 400M³/S
 - PRESENT Q = 300M³/S
 - PRESENT Q = 200M³/S
 - PRESENT Q = 100M³/S

Present Elevation (m)	Right Bank		Left Bank		Average Riverbed	
	Distance (m)	Station No. BE.	Distance (m)	Station No. BE.	Distance (m)	Station No. BE.
24.53	24.53	1000	1.78	1.78	0	0
23.87	23.87	1000	1.10	1.10	-12.0	1000
23.44	23.44	1000	1.63	1.63	-12.0	1000
22.72	22.72	1000	1.98	1.98	-12.0	1000
22.17	22.17	1000	2.23	2.23	-11.5	1000
21.93	21.93	1000	2.47	2.47	-11.5	1000
21.81	21.81	1000	2.55	2.55	-10.5	1000
21.22	21.22	1000	2.83	2.83	-10.5	1000
20.90	20.90	1000	3.17	3.17	-9.5	1000
20.11	20.11	1000	3.48	3.48	-8.5	1000
19.65	19.65	1000	3.72	3.72	-7.5	1000
19.40	19.40	1000	3.97	3.97	-6.5	1000
18.00	18.00	1000	4.21	4.21	-5.5	1000
16.02	16.02	1000	4.45	4.45	-4.5	1000
15.02	15.02	1000	4.69	4.69	-3.5	1000
14.00	14.00	1000	4.93	4.93	-2.5	1000
13.00	13.00	1000	5.17	5.17	-1.5	1000
12.00	12.00	1000	5.41	5.41	-0.5	1000
11.00	11.00	1000	5.65	5.65	0.5	1000
10.00	10.00	1000	5.89	5.89	1.5	1000
9.00	9.00	1000	6.13	6.13	2.5	1000
8.00	8.00	1000	6.37	6.37	3.5	1000
7.00	7.00	1000	6.61	6.61	4.5	1000
6.00	6.00	1000	6.85	6.85	5.5	1000
5.00	5.00	1000	7.09	7.09	6.5	1000
4.00	4.00	1000	7.33	7.33	7.5	1000
3.00	3.00	1000	7.57	7.57	8.5	1000
2.00	2.00	1000	7.81	7.81	9.5	1000
1.00	1.00	1000	8.05	8.05	10.5	1000
0.00	0.00	1000	8.29	8.29	11.5	1000
-1.00	-1.00	1000	8.53	8.53	12.0	1000
-2.00	-2.00	1000	8.77	8.77	12.0	1000
-3.00	-3.00	1000	9.01	9.01	12.0	1000
-4.00	-4.00	1000	9.25	9.25	12.0	1000
-5.00	-5.00	1000	9.49	9.49	12.0	1000
-6.00	-6.00	1000	9.73	9.73	12.0	1000
-7.00	-7.00	1000	9.97	9.97	12.0	1000
-8.00	-8.00	1000	10.21	10.21	12.0	1000
-9.00	-9.00	1000	10.45	10.45	12.0	1000
-10.00	-10.00	1000	10.69	10.69	12.0	1000
-11.00	-11.00	1000	10.93	10.93	12.0	1000
-12.00	-12.00	1000	11.17	11.17	12.0	1000
-13.00	-13.00	1000	11.41	11.41	12.0	1000
-14.00	-14.00	1000	11.65	11.65	12.0	1000
-15.00	-15.00	1000	11.89	11.89	12.0	1000
-16.00	-16.00	1000	12.13	12.13	12.0	1000
-17.00	-17.00	1000	12.37	12.37	12.0	1000
-18.00	-18.00	1000	12.61	12.61	12.0	1000
-19.00	-19.00	1000	12.85	12.85	12.0	1000
-20.00	-20.00	1000	13.09	13.09	12.0	1000
-21.00	-21.00	1000	13.33	13.33	12.0	1000
-22.00	-22.00	1000	13.57	13.57	12.0	1000
-23.00	-23.00	1000	13.81	13.81	12.0	1000
-24.00	-24.00	1000	14.05	14.05	12.0	1000
-25.00	-25.00	1000	14.29	14.29	12.0	1000
-26.00	-26.00	1000	14.53	14.53	12.0	1000
-27.00	-27.00	1000	14.77	14.77	12.0	1000
-28.00	-28.00	1000	15.01	15.01	12.0	1000
-29.00	-29.00	1000	15.25	15.25	12.0	1000
-30.00	-30.00	1000	15.49	15.49	12.0	1000
-31.00	-31.00	1000	15.73	15.73	12.0	1000
-32.00	-32.00	1000	15.97	15.97	12.0	1000
-33.00	-33.00	1000	16.21	16.21	12.0	1000
-34.00	-34.00	1000	16.45	16.45	12.0	1000
-35.00	-35.00	1000	16.69	16.69	12.0	1000
-36.00	-36.00	1000	16.93	16.93	12.0	1000
-37.00	-37.00	1000	17.17	17.17	12.0	1000
-38.00	-38.00	1000	17.41	17.41	12.0	1000
-39.00	-39.00	1000	17.65	17.65	12.0	1000
-40.00	-40.00	1000	17.89	17.89	12.0	1000
-41.00	-41.00	1000	18.13	18.13	12.0	1000
-42.00	-42.00	1000	18.37	18.37	12.0	1000
-43.00	-43.00	1000	18.61	18.61	12.0	1000
-44.00	-44.00	1000	18.85	18.85	12.0	1000
-45.00	-45.00	1000	19.09	19.09	12.0	1000
-46.00	-46.00	1000	19.33	19.33	12.0	1000
-47.00	-47.00	1000	19.57	19.57	12.0	1000
-48.00	-48.00	1000	19.81	19.81	12.0	1000
-49.00	-49.00	1000	20.05	20.05	12.0	1000
-50.00	-50.00	1000	20.29	20.29	12.0	1000
-51.00	-51.00	1000	20.53	20.53	12.0	1000
-52.00	-52.00	1000	20.77	20.77	12.0	1000
-53.00	-53.00	1000	21.01	21.01	12.0	1000
-54.00	-54.00	1000	21.25	21.25	12.0	1000
-55.00	-55.00	1000	21.49	21.49	12.0	1000
-56.00	-56.00	1000	21.73	21.73	12.0	1000
-57.00	-57.00	1000	21.97	21.97	12.0	1000
-58.00	-58.00	1000	22.21	22.21	12.0	1000
-59.00	-59.00	1000	22.45	22.45	12.0	1000
-60.00	-60.00	1000	22.69	22.69	12.0	1000
-61.00	-61.00	1000	22.93	22.93	12.0	1000
-62.00	-62.00	1000	23.17	23.17	12.0	1000
-63.00	-63.00	1000	23.41	23.41	12.0	1000
-64.00	-64.00	1000	23.65	23.65	12.0	1000
-65.00	-65.00	1000	23.89	23.89	12.0	1000
-66.00	-66.00	1000	24.13	24.13	12.0	1000
-67.00	-67.00	1000	24.37	24.37	12.0	1000
-68.00	-68.00	1000	24.61	24.61	12.0	1000
-69.00	-69.00	1000	24.85	24.85	12.0	1000
-70.00	-70.00	1000	25.09	25.09	12.0	1000

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF EXISTING RIVER AND FLOOD WATER LEVEL (BELAWAN RIVER)
 Fig.2-2(1/7)



PERCUT RIVER

LEGEND

- PRESENT RIGHT BANK
- PRESENT LEFT BANK
- PRESENT GROUND (LEFT SIDE)
- PRESENT GROUND (RIGHT SIDE)
- PRESENT AVERAGE RIVER BED
- Q = 500 M³/S
- Q = 400 M³/S
- Q = 300 M³/S
- Q = 200 M³/S
- Q = 100 M³/S

Station No.	Present Elevation (m)	Right Bank	Left Bank	Average Riverbed	accu. (km)	Partial (m)
FE-0	0	0.000	1.40	1.40	0.00	0.00
FE-1	100	1.00	1.17	1.00	0.00	0.00
FE-2	800	2.000	1.82	1.00	0.00	0.00
FE-3	1000	3.000	1.82	1.00	0.00	0.00
FE-4	1000	4.000	2.87	2.10	0.00	0.00
FE-5	985	4.985	3.90	3.90	0.00	0.00
FE-6	1015	6.000	4.76	4.76	0.00	0.00
FE-7	1000	7.000	5.43	5.43	0.00	0.00
FE-8	1000	8.000	7.17	6.83	0.00	0.00
FE-9	1000	9.000	8.50	8.50	0.00	0.00
FE-10	1000	10.000	8.20	8.88	0.00	0.00
FE-11	1000	11.000	10.28	10.78	0.00	0.00
FE-12	1000	12.000	11.84	12.41	0.00	0.00
FE-13	1000	13.000	19.47	19.78	0.00	0.00
FE-14	1000	14.000	14.13	14.13	0.00	0.00
FE-15	1000	15.000	15.90	15.90	0.00	0.00
FE-16	1000	16.000	14.82	14.82	0.00	0.00
FE-17	1000	17.000	18.48	18.48	0.00	0.00
FE-18	1000	18.000	18.41	18.41	0.00	0.00
FE-19	1000	18.600	20.77	20.58	0.00	0.00
FE-20	1000	20.000	21.50	21.50	0.00	0.00
FE-21	1000	21.000	23.02	23.12	0.00	0.00
FE-22	1000	22.000	24.69	24.69	0.00	0.00
FE-23	1000	23.000	25.18	25.77	0.00	0.00
FE-24	1000	24.000	28.78	28.02	0.00	0.00
FE-25	1000	25.000	27.09	27.58	0.00	0.00
FE-26	1000	26.000	29.09	28.84	0.00	0.00
FE-27	1000	27.000	29.84	29.84	0.00	0.00
FE-28	1000	28.000	29.50	29.84	0.00	0.00
FE-29	1000	29.000	31.97	32.81	0.00	0.00
FE-30	1000	30.000	32.02	32.02	0.00	0.00

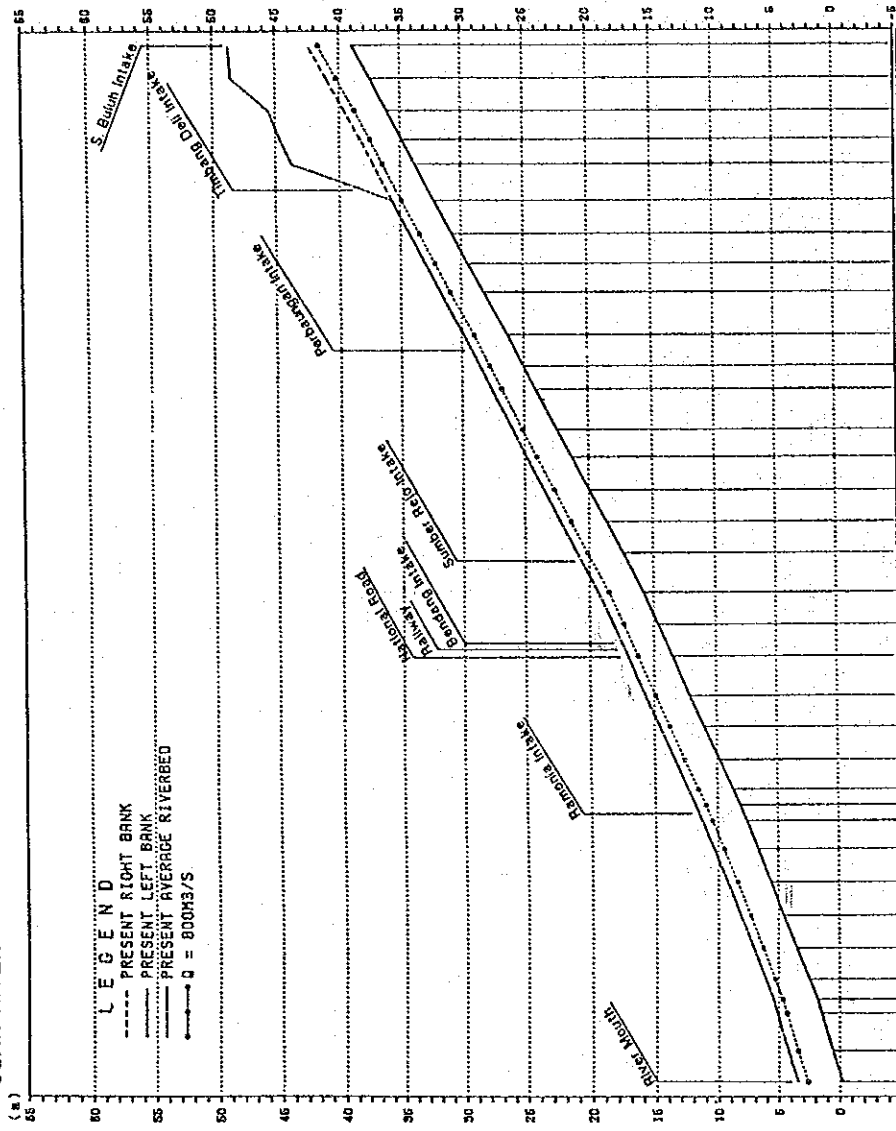
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF EXISTING RIVER AND FLOOD
WATER LEVEL (PERCUT RIVER)

Fig.2-2(3/7)

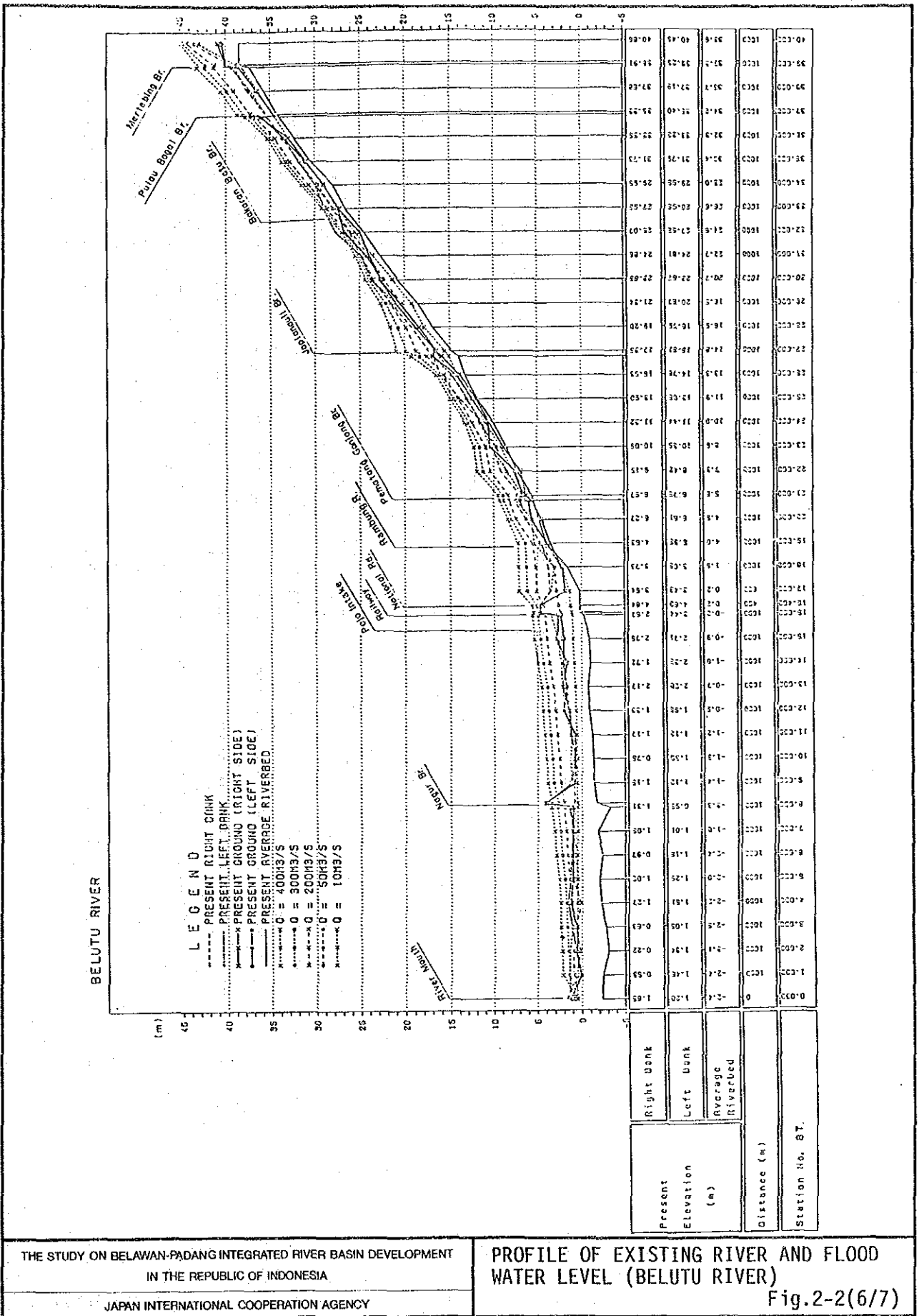
ULAR RIVER



Present Elevation (m)	Right Bank	Left Bank	Average Riverbed	Distance (m)	Station No. UL
0.00	0.00	0.00	0.00	0	0000
0.50	0.50	0.50	0.50	50	0050
1.00	1.00	1.00	1.00	100	0100
1.50	1.50	1.50	1.50	150	0150
2.00	2.00	2.00	2.00	200	0200
2.50	2.50	2.50	2.50	250	0250
3.00	3.00	3.00	3.00	300	0300
3.50	3.50	3.50	3.50	350	0350
4.00	4.00	4.00	4.00	400	0400
4.50	4.50	4.50	4.50	450	0450
5.00	5.00	5.00	5.00	500	0500
5.50	5.50	5.50	5.50	550	0550
6.00	6.00	6.00	6.00	600	0600
6.50	6.50	6.50	6.50	650	0650
7.00	7.00	7.00	7.00	700	0700
7.50	7.50	7.50	7.50	750	0750
8.00	8.00	8.00	8.00	800	0800
8.50	8.50	8.50	8.50	850	0850
9.00	9.00	9.00	9.00	900	0900
9.50	9.50	9.50	9.50	950	0950
10.00	10.00	10.00	10.00	1000	1000
10.50	10.50	10.50	10.50	1050	1050
11.00	11.00	11.00	11.00	1100	1100
11.50	11.50	11.50	11.50	1150	1150
12.00	12.00	12.00	12.00	1200	1200
12.50	12.50	12.50	12.50	1250	1250
13.00	13.00	13.00	13.00	1300	1300
13.50	13.50	13.50	13.50	1350	1350
14.00	14.00	14.00	14.00	1400	1400
14.50	14.50	14.50	14.50	1450	1450
15.00	15.00	15.00	15.00	1500	1500
15.50	15.50	15.50	15.50	1550	1550
16.00	16.00	16.00	16.00	1600	1600
16.50	16.50	16.50	16.50	1650	1650
17.00	17.00	17.00	17.00	1700	1700
17.50	17.50	17.50	17.50	1750	1750
18.00	18.00	18.00	18.00	1800	1800
18.50	18.50	18.50	18.50	1850	1850
19.00	19.00	19.00	19.00	1900	1900
19.50	19.50	19.50	19.50	1950	1950
20.00	20.00	20.00	20.00	2000	2000
20.50	20.50	20.50	20.50	2050	2050
21.00	21.00	21.00	21.00	2100	2100
21.50	21.50	21.50	21.50	2150	2150
22.00	22.00	22.00	22.00	2200	2200
22.50	22.50	22.50	22.50	2250	2250
23.00	23.00	23.00	23.00	2300	2300
23.50	23.50	23.50	23.50	2350	2350
24.00	24.00	24.00	24.00	2400	2400
24.50	24.50	24.50	24.50	2450	2450
25.00	25.00	25.00	25.00	2500	2500
25.50	25.50	25.50	25.50	2550	2550
26.00	26.00	26.00	26.00	2600	2600
26.50	26.50	26.50	26.50	2650	2650
27.00	27.00	27.00	27.00	2700	2700
27.50	27.50	27.50	27.50	2750	2750
28.00	28.00	28.00	28.00	2800	2800
28.50	28.50	28.50	28.50	2850	2850
29.00	29.00	29.00	29.00	2900	2900
29.50	29.50	29.50	29.50	2950	2950
30.00	30.00	30.00	30.00	3000	3000
30.50	30.50	30.50	30.50	3050	3050
31.00	31.00	31.00	31.00	3100	3100
31.50	31.50	31.50	31.50	3150	3150
32.00	32.00	32.00	32.00	3200	3200
32.50	32.50	32.50	32.50	3250	3250
33.00	33.00	33.00	33.00	3300	3300
33.50	33.50	33.50	33.50	3350	3350
34.00	34.00	34.00	34.00	3400	3400
34.50	34.50	34.50	34.50	3450	3450
35.00	35.00	35.00	35.00	3500	3500
35.50	35.50	35.50	35.50	3550	3550
36.00	36.00	36.00	36.00	3600	3600
36.50	36.50	36.50	36.50	3650	3650
37.00	37.00	37.00	37.00	3700	3700
37.50	37.50	37.50	37.50	3750	3750
38.00	38.00	38.00	38.00	3800	3800
38.50	38.50	38.50	38.50	3850	3850
39.00	39.00	39.00	39.00	3900	3900
39.50	39.50	39.50	39.50	3950	3950
40.00	40.00	40.00	40.00	4000	4000
40.50	40.50	40.50	40.50	4050	4050
41.00	41.00	41.00	41.00	4100	4100
41.50	41.50	41.50	41.50	4150	4150
42.00	42.00	42.00	42.00	4200	4200
42.50	42.50	42.50	42.50	4250	4250
43.00	43.00	43.00	43.00	4300	4300
43.50	43.50	43.50	43.50	4350	4350
44.00	44.00	44.00	44.00	4400	4400
44.50	44.50	44.50	44.50	4450	4450
45.00	45.00	45.00	45.00	4500	4500
45.50	45.50	45.50	45.50	4550	4550
46.00	46.00	46.00	46.00	4600	4600
46.50	46.50	46.50	46.50	4650	4650
47.00	47.00	47.00	47.00	4700	4700
47.50	47.50	47.50	47.50	4750	4750
48.00	48.00	48.00	48.00	4800	4800
48.50	48.50	48.50	48.50	4850	4850
49.00	49.00	49.00	49.00	4900	4900
49.50	49.50	49.50	49.50	4950	4950
50.00	50.00	50.00	50.00	5000	5000
50.50	50.50	50.50	50.50	5050	5050
51.00	51.00	51.00	51.00	5100	5100
51.50	51.50	51.50	51.50	5150	5150
52.00	52.00	52.00	52.00	5200	5200
52.50	52.50	52.50	52.50	5250	5250
53.00	53.00	53.00	53.00	5300	5300
53.50	53.50	53.50	53.50	5350	5350
54.00	54.00	54.00	54.00	5400	5400
54.50	54.50	54.50	54.50	5450	5450
55.00	55.00	55.00	55.00	5500	5500

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF EXISTING RIVER AND FLOOD WATER LEVEL (ULAR RIVER)
 Fig.2-2(5/7)



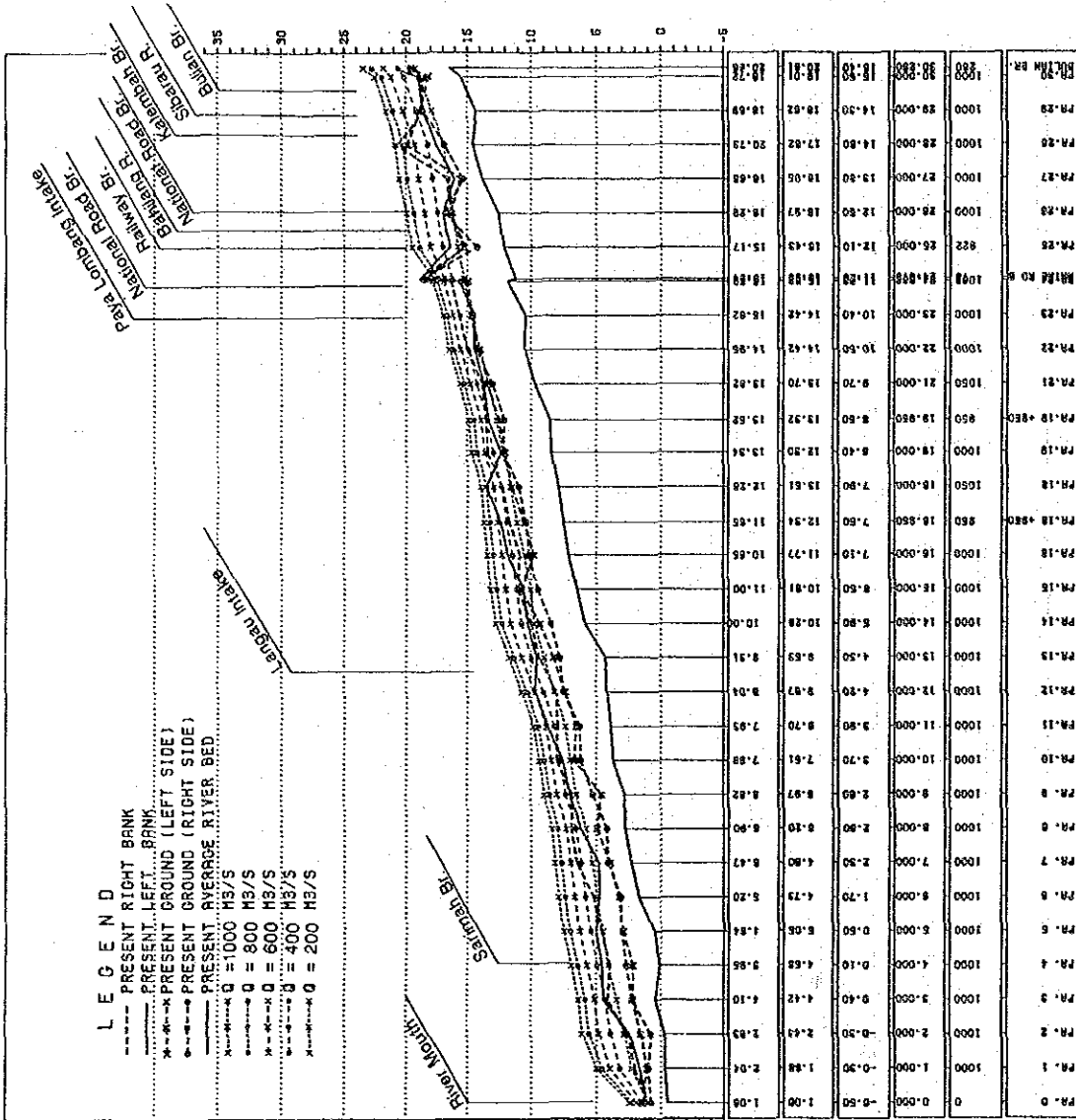
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF EXISTING RIVER AND FLOOD
WATER LEVEL (BELUTU RIVER)

Fig.2-2(6/7)

PADANG RIVER



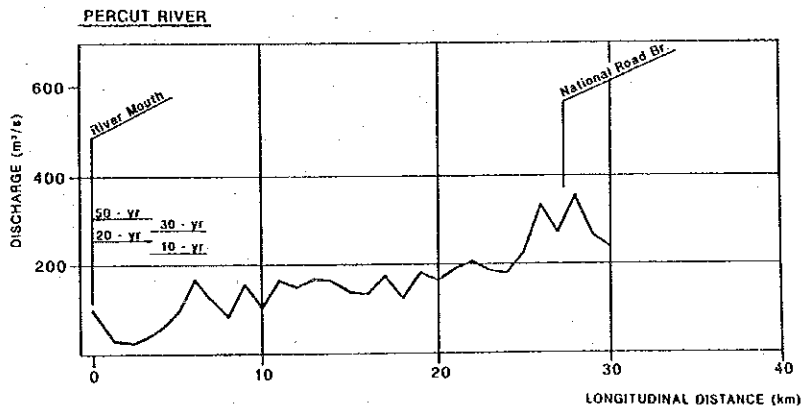
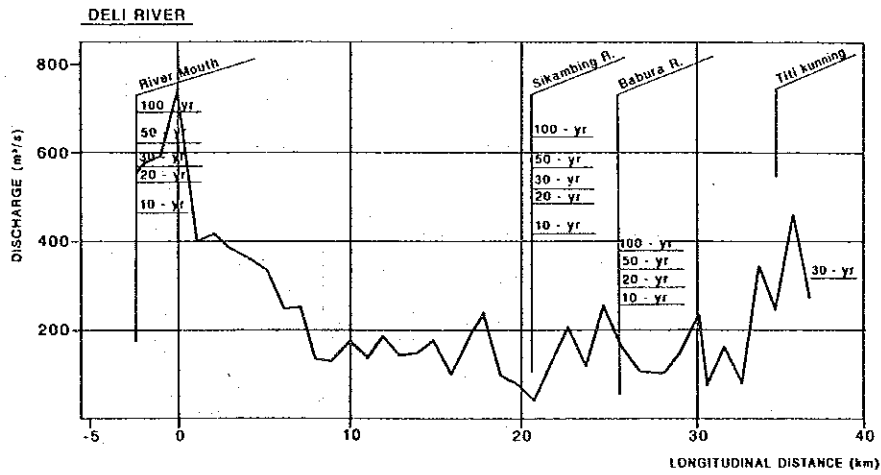
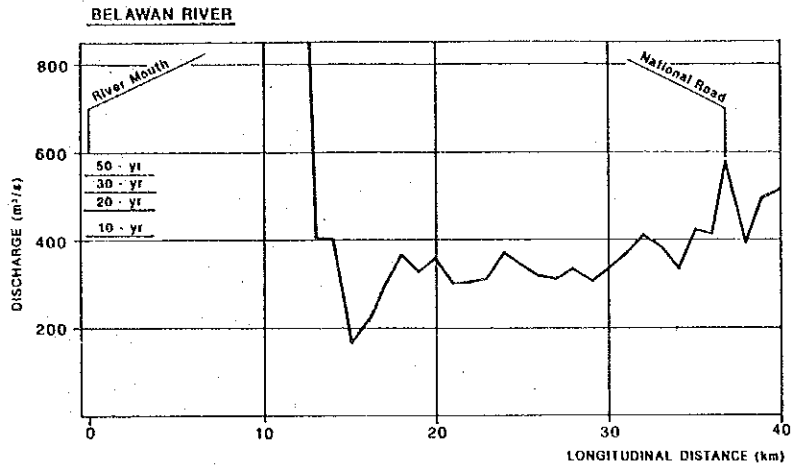
Station No.	Distance	Present Elevation (m)	Right Bank		Left Bank		Average Riverbed	secur. (km)	partial (m)
			Present	Elevation (m)	Present	Elevation (m)			
PA.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PA.1	1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PA.2	1000	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
PA.3	1000	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
PA.4	1000	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
PA.5	1000	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
PA.6	1000	6.00	6.00	6.00	6.00	6.00	6.00	6.00	
PA.7	1000	7.00	7.00	7.00	7.00	7.00	7.00	7.00	
PA.8	1000	8.00	8.00	8.00	8.00	8.00	8.00	8.00	
PA.9	1000	9.00	9.00	9.00	9.00	9.00	9.00	9.00	
PA.10	1000	10.00	10.00	10.00	10.00	10.00	10.00	10.00	
PA.11	1000	11.00	11.00	11.00	11.00	11.00	11.00	11.00	
PA.12	1000	12.00	12.00	12.00	12.00	12.00	12.00	12.00	
PA.13	1000	13.00	13.00	13.00	13.00	13.00	13.00	13.00	
PA.14	1000	14.00	14.00	14.00	14.00	14.00	14.00	14.00	
PA.15	1000	15.00	15.00	15.00	15.00	15.00	15.00	15.00	
PA.16	1000	16.00	16.00	16.00	16.00	16.00	16.00	16.00	
PA.17	1000	17.00	17.00	17.00	17.00	17.00	17.00	17.00	
PA.18	1000	18.00	18.00	18.00	18.00	18.00	18.00	18.00	
PA.19	1000	19.00	19.00	19.00	19.00	19.00	19.00	19.00	
PA.20	1000	20.00	20.00	20.00	20.00	20.00	20.00	20.00	
PA.21	1000	21.00	21.00	21.00	21.00	21.00	21.00	21.00	
PA.22	1000	22.00	22.00	22.00	22.00	22.00	22.00	22.00	
PA.23	1000	23.00	23.00	23.00	23.00	23.00	23.00	23.00	
PA.24	1000	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
PA.25	1000	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
PA.26	1000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	
PA.27	1000	27.00	27.00	27.00	27.00	27.00	27.00	27.00	
PA.28	1000	28.00	28.00	28.00	28.00	28.00	28.00	28.00	
PA.29	1000	29.00	29.00	29.00	29.00	29.00	29.00	29.00	
PA.30	1000	30.00	30.00	30.00	30.00	30.00	30.00	30.00	
PA.31	1000	31.00	31.00	31.00	31.00	31.00	31.00	31.00	
PA.32	1000	32.00	32.00	32.00	32.00	32.00	32.00	32.00	
PA.33	1000	33.00	33.00	33.00	33.00	33.00	33.00	33.00	
PA.34	1000	34.00	34.00	34.00	34.00	34.00	34.00	34.00	
PA.35	1000	35.00	35.00	35.00	35.00	35.00	35.00	35.00	

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF EXISTING RIVER AND FLOOD
WATER LEVEL (PADANG RIVER)

Fig.2-2(7/7)



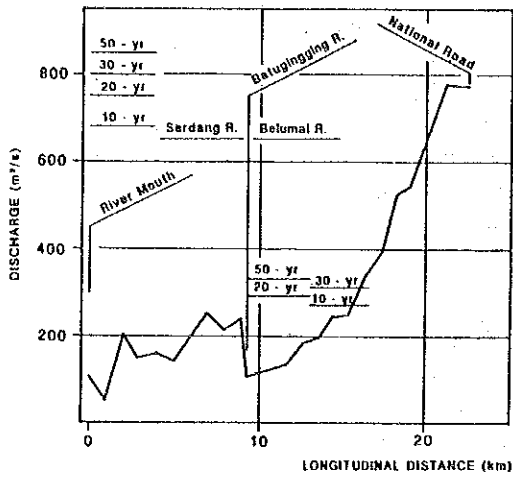
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

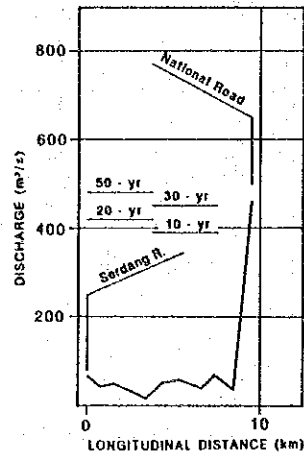
FLOW CAPACITY OF EXISTING RIVER
CHANNEL

Fig.2-3(1/2)

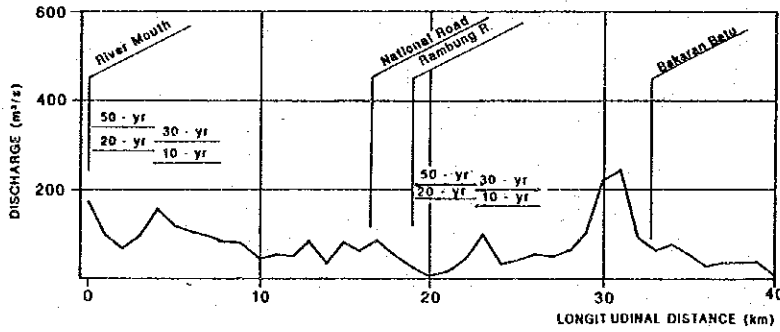
SERDANG RIVER



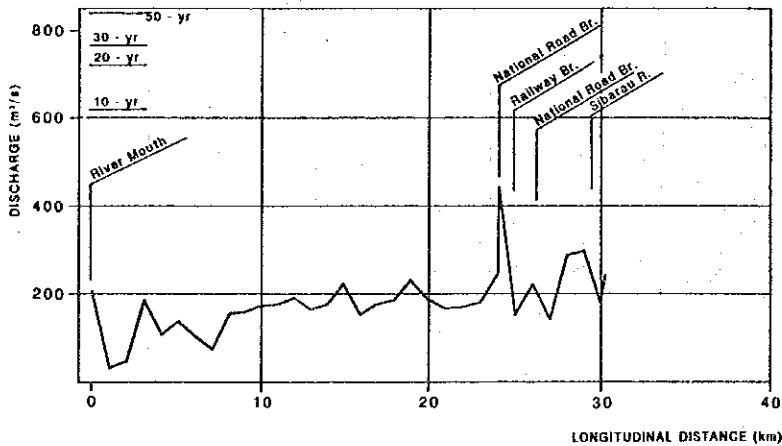
BATUGINGGING RIVER



BELUTU RIVER



PADANG RIVER



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

FLOW CAPACITY OF EXISTING RIVER
CHANNEL

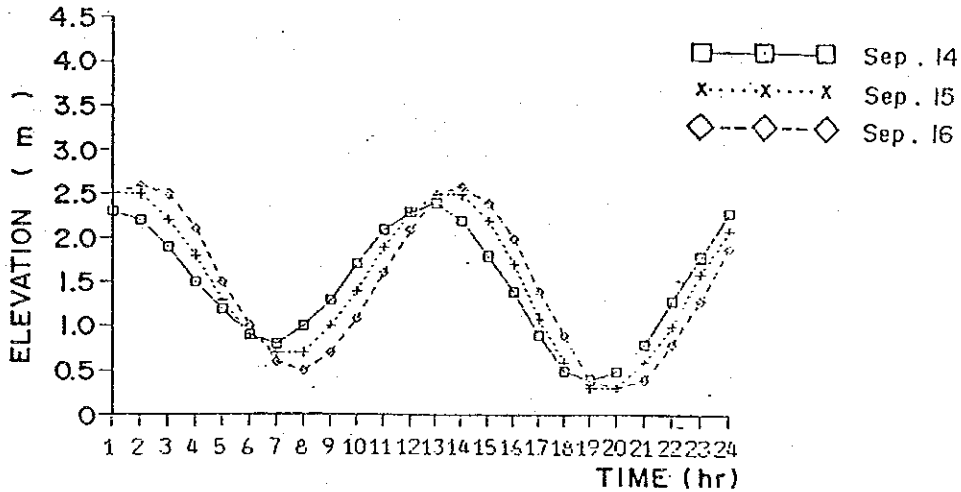
Fig.2-3(2/2)

TIDE AT BELAWAN PORT

▽ 3.30	HHWS (Highest High Water Spring)	
▽ 2.80	MHWS (Mean High Water Spring)	
▽ 1.90	MSL (Mean Sea Level)	National Bench Mark ∇ 0.0 (Padang MSL) Belawan Port Bench Mark ∇ 0.0 0.405m
▽ 0.90	MLWS (Mean Lower Water Spring)	
▽ 0.00	LWS (Lower Water Spring)	
▽ -0.40	LLWS (Lowest Lower Water Spring)	

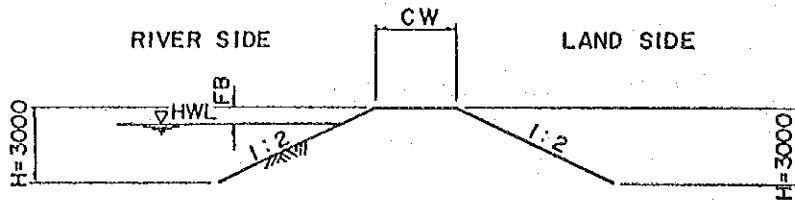
SOURCE: PETUNJUK BATAS PEHANDUAN, (PILOTAGE BOUNDARY DIRECTOR.)
DEPARTMENT OF SEA COMMUNICATION, 1980.

BELAWAN PORT TIDE IN SEPTEMBER 1989

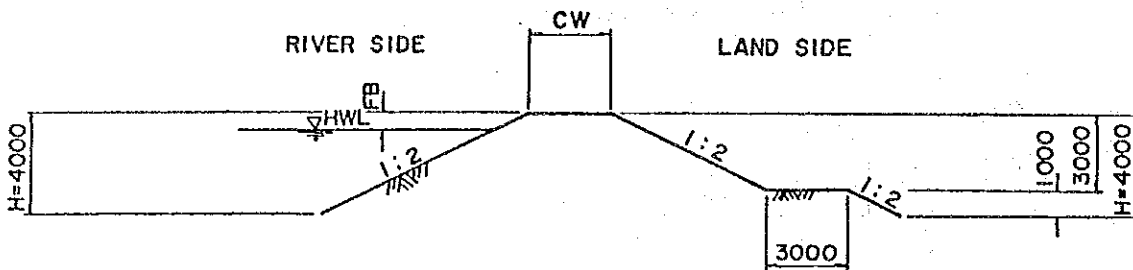


SOURCE: DAFTAR PASANG SURUT (TIDE TABLES)
DEPARTMENT OF SEA COMMUNICATION, 1989.

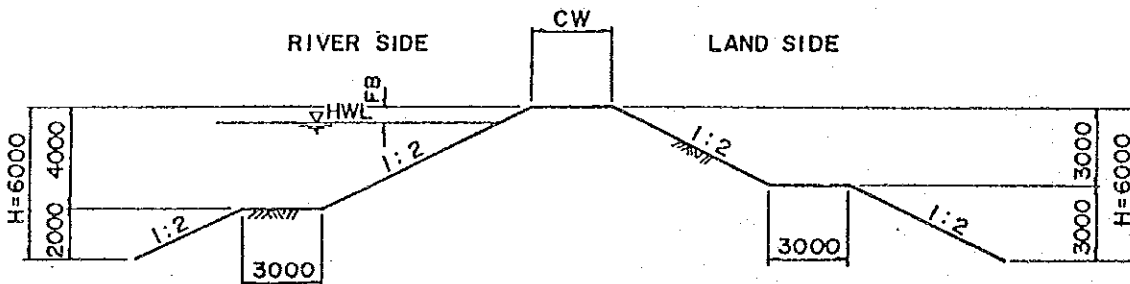
CASE - 1 $H \leq 3.0\text{ m}$



CASE - 2 $3.0\text{ m} < H \leq 4.0\text{ m}$

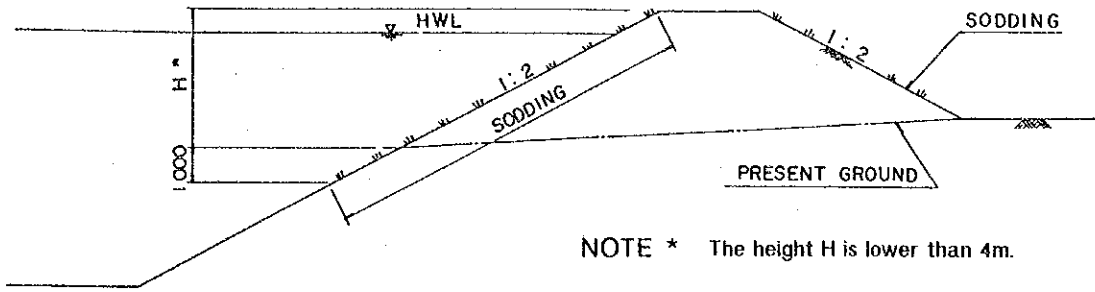


CASE - 3 $4.0\text{ m} < H \leq 6.0\text{ m}$



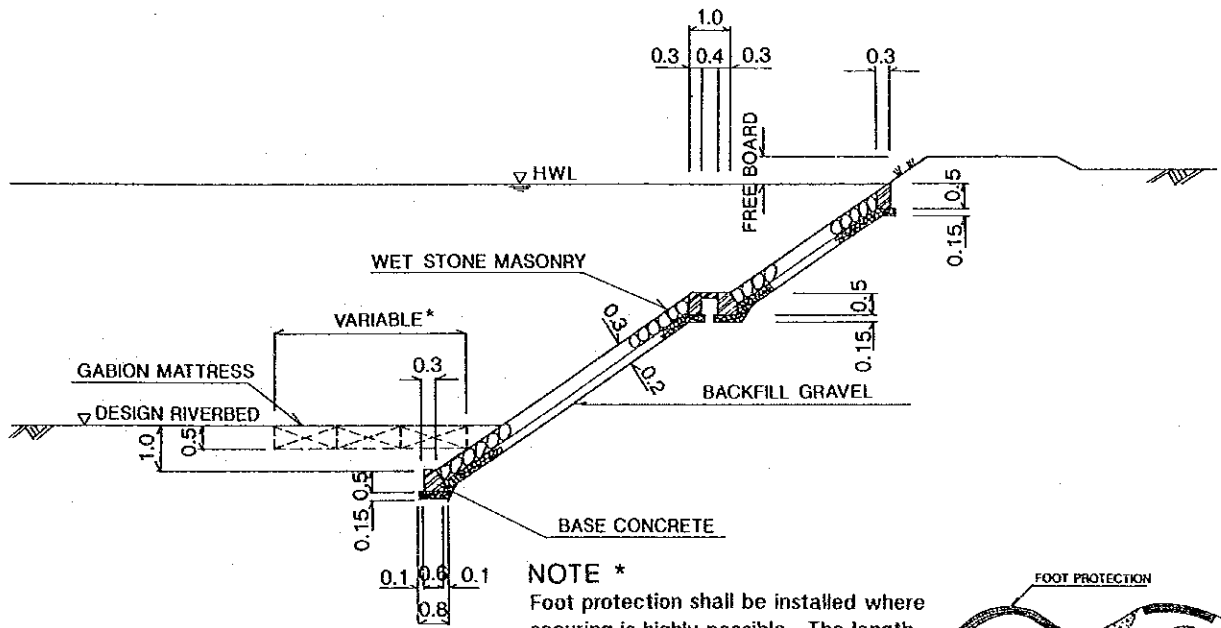
DESIGN DISCHARGE $Q(\text{m}^3/\text{s})$	FREEBOARD FB(m)	CROWN WIDTH CW(m)
< 500	0.6	3
500 to 1000	0.8	4

TYPE A

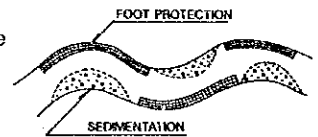


NOTE * The height H is lower than 4m.

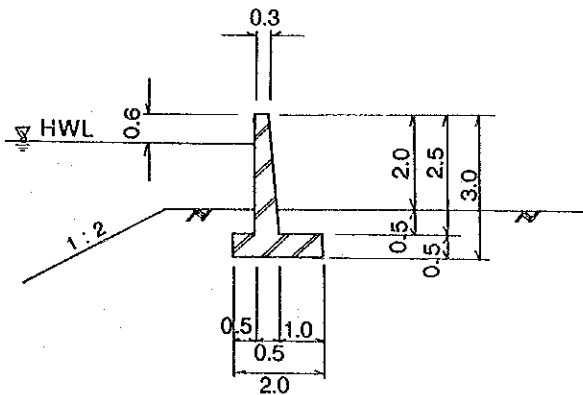
TYPE B

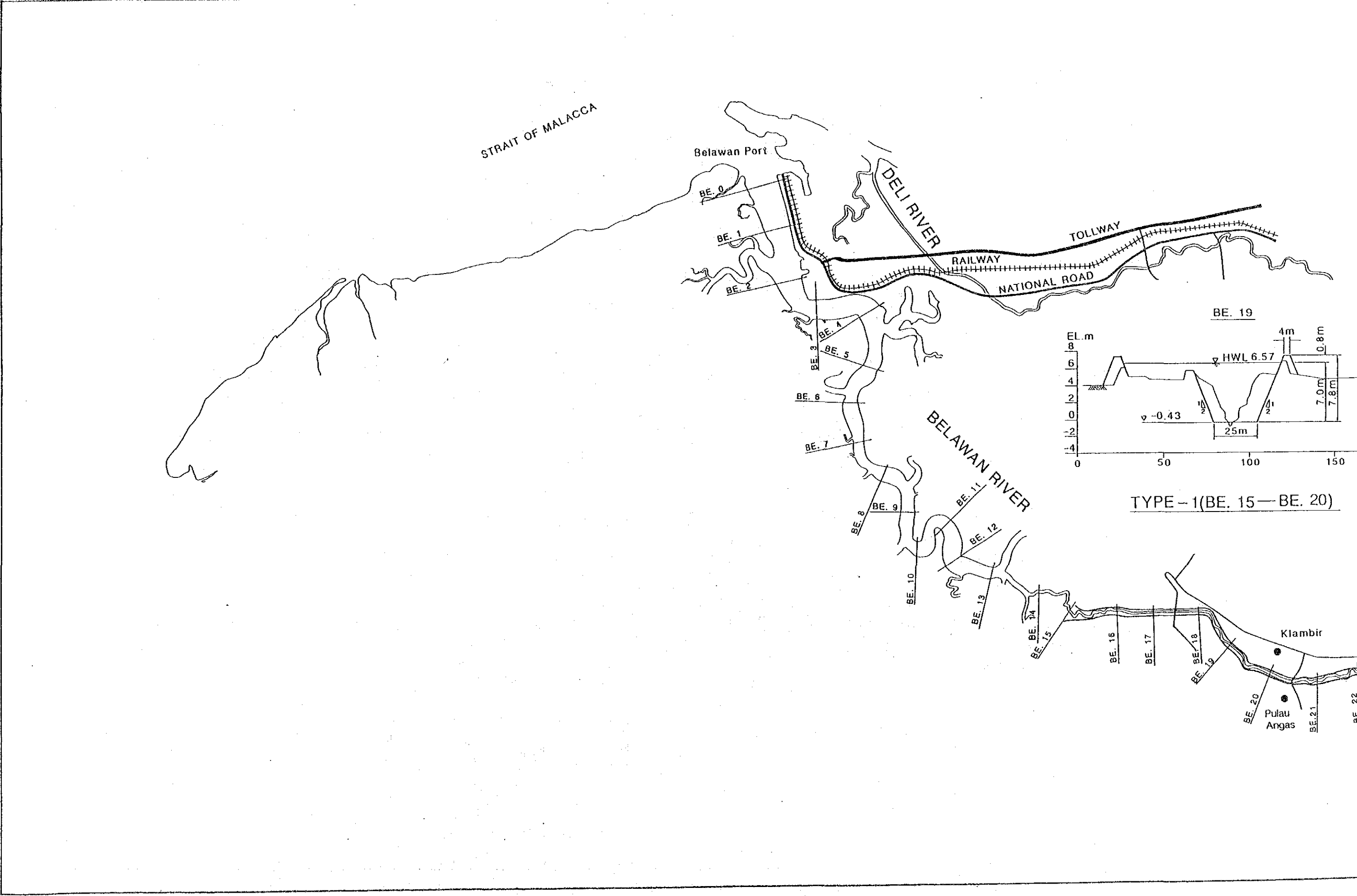


NOTE * Foot protection shall be installed where scouring is highly possible. The length of foot protection depends on the riverbed condition and river width.



TYPE C





STRAIT OF MALACCA

Belawan Port

DELI RIVER

TOLLWAY

RAILWAY

NATIONAL ROAD

BE. 0

BE. 1

BE. 2

BE. 4

BE. 5

BE. 6

BE. 7

BELAWAN RIVER

BE. 8

BE. 9

BE. 11

BE. 12

BE. 10

BE. 13

BE. 14

BE. 15

BE. 16

BE. 17

BE. 18

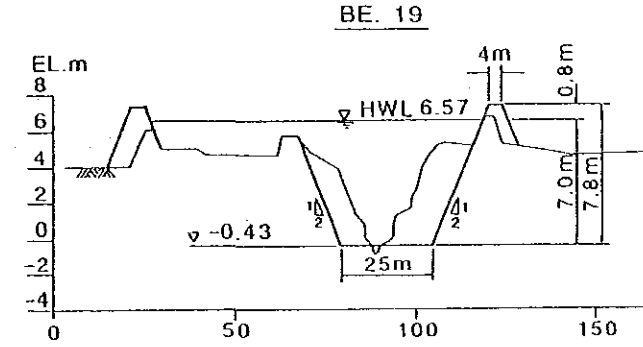
BE. 19

Klambir

Pulau Angas

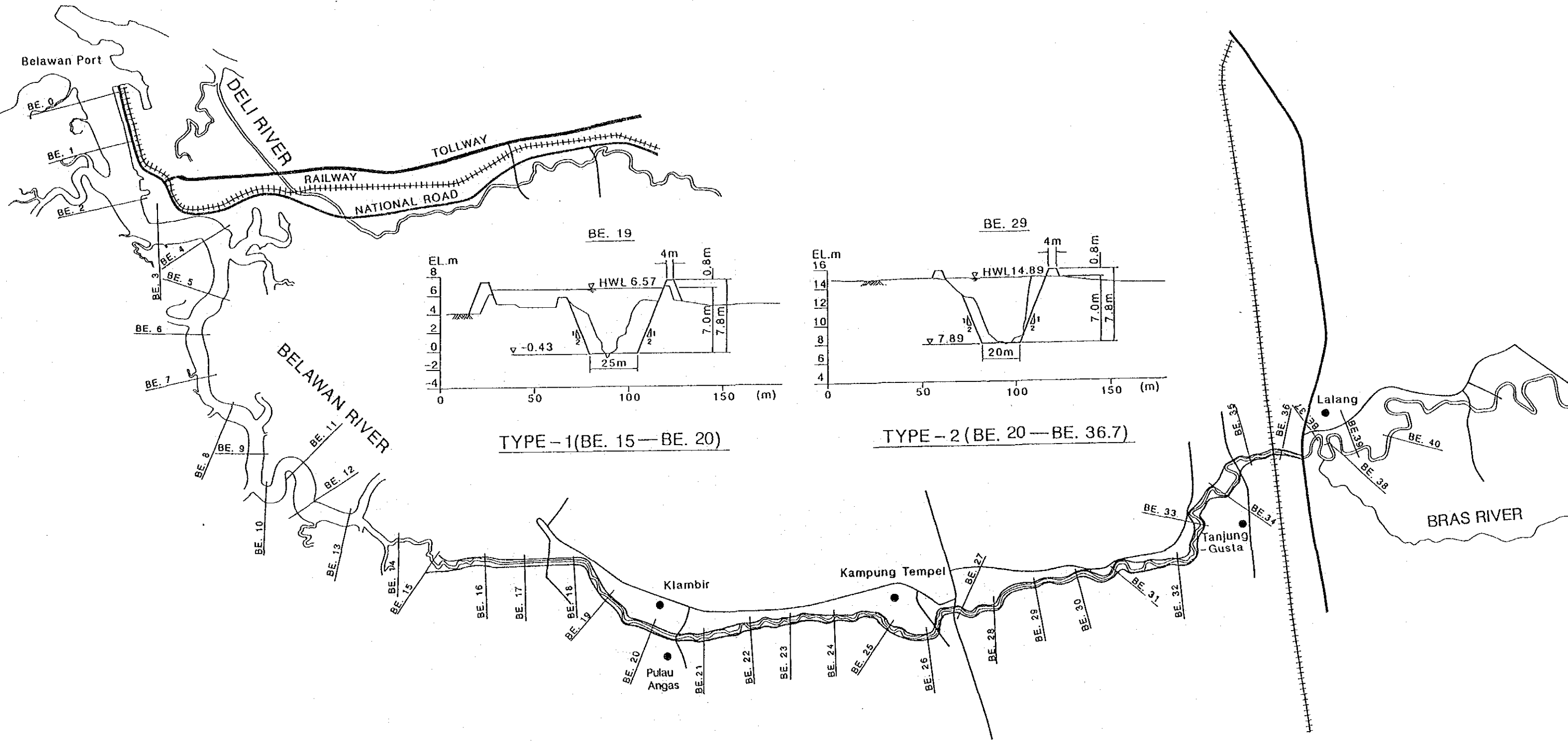
BE. 21

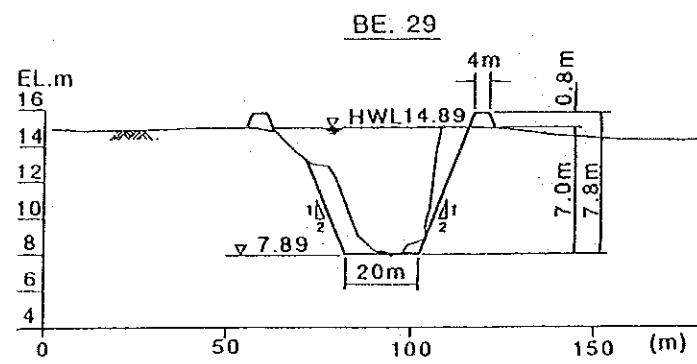
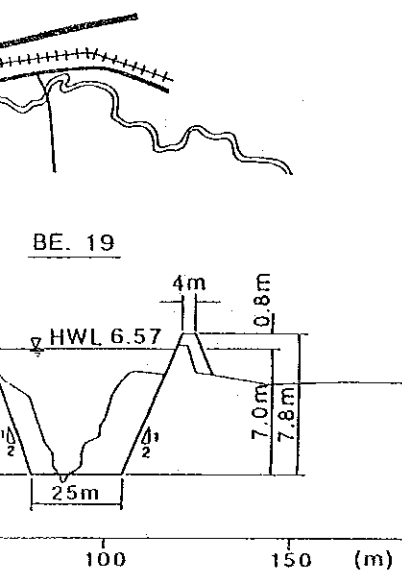
BE. 22



TYPE - 1 (BE. 15 - BE. 20)

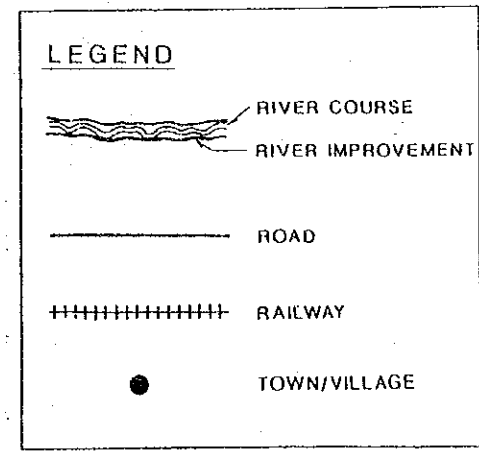
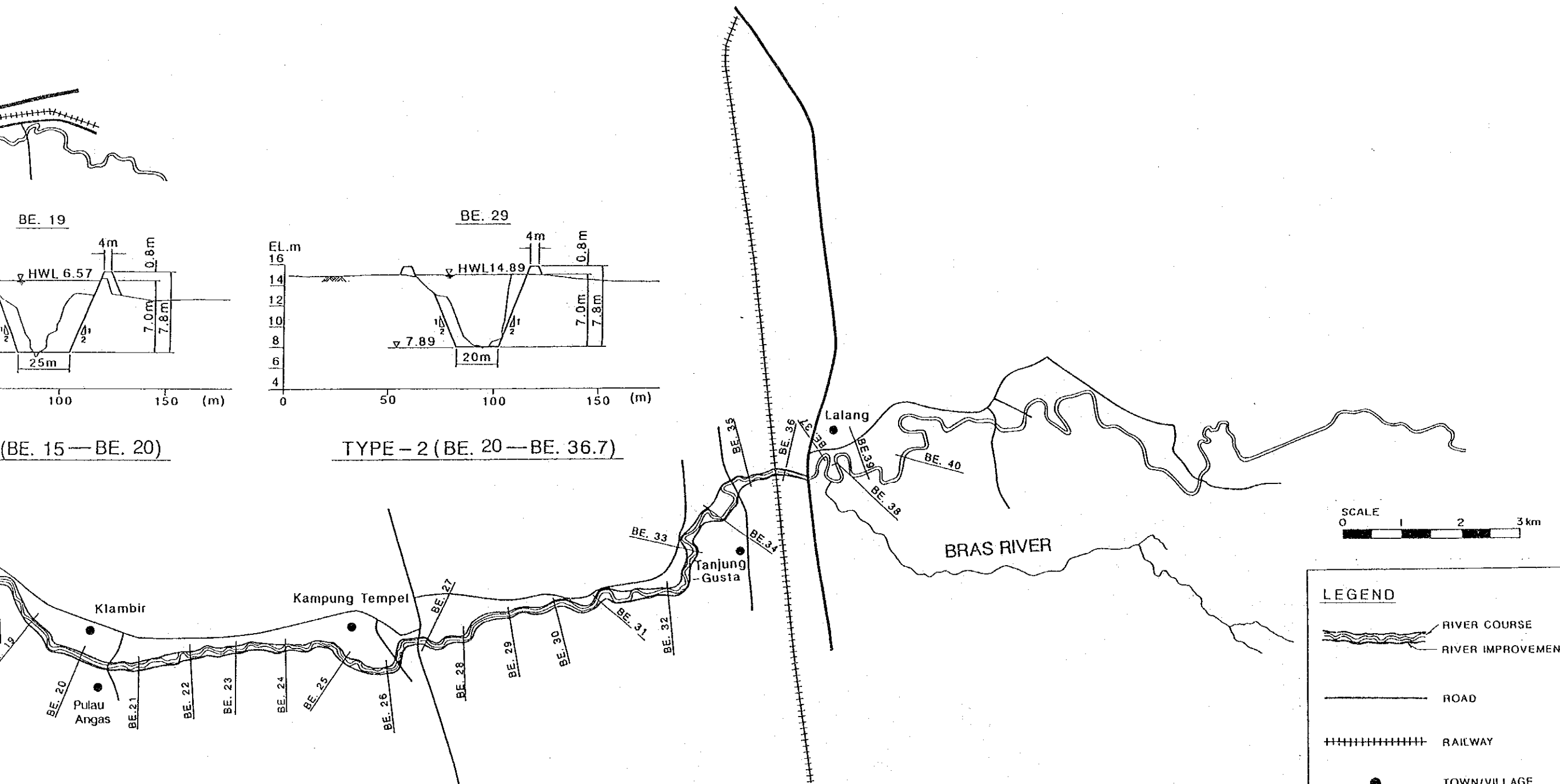
ACCA





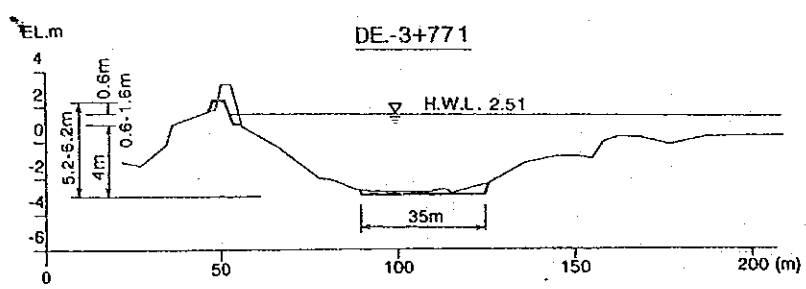
(BE. 15 — BE. 20)

TYPE - 2 (BE. 20 — BE. 36.7)

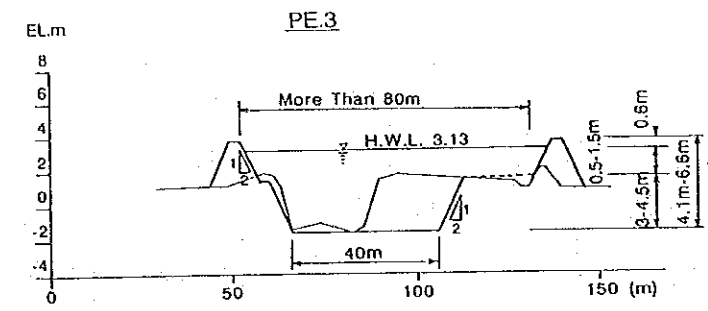


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	PLAN AND CROSS SECTION OF PROPOSED RIVER IMPROVEMENT WORKS FOR MASTER PLAN: (BELAWAN RIVER) Fig.3-4(1/6)
JAPAN INTERNATIONAL COOPERATION AGENCY	

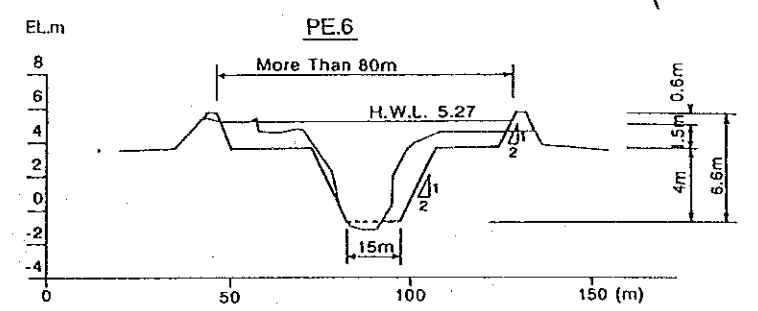
STRAIT OF MALACCA



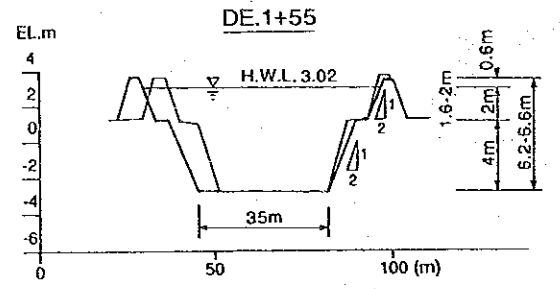
TYPE-1(DE-3+500-DE.0)



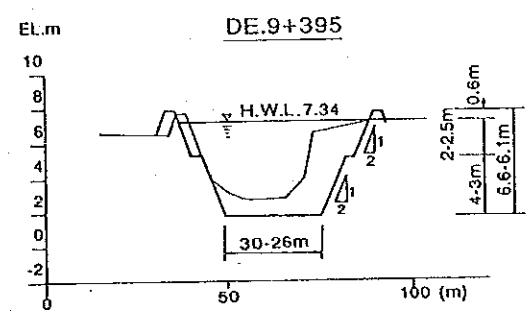
TYPE-1(PE.0-PE.5)



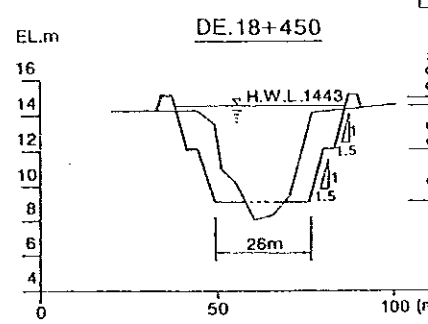
TYPE-2(PE.5-PE.6+800)



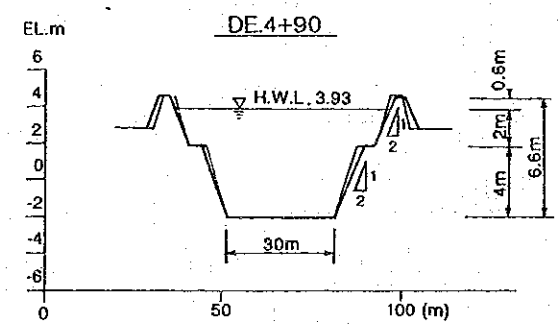
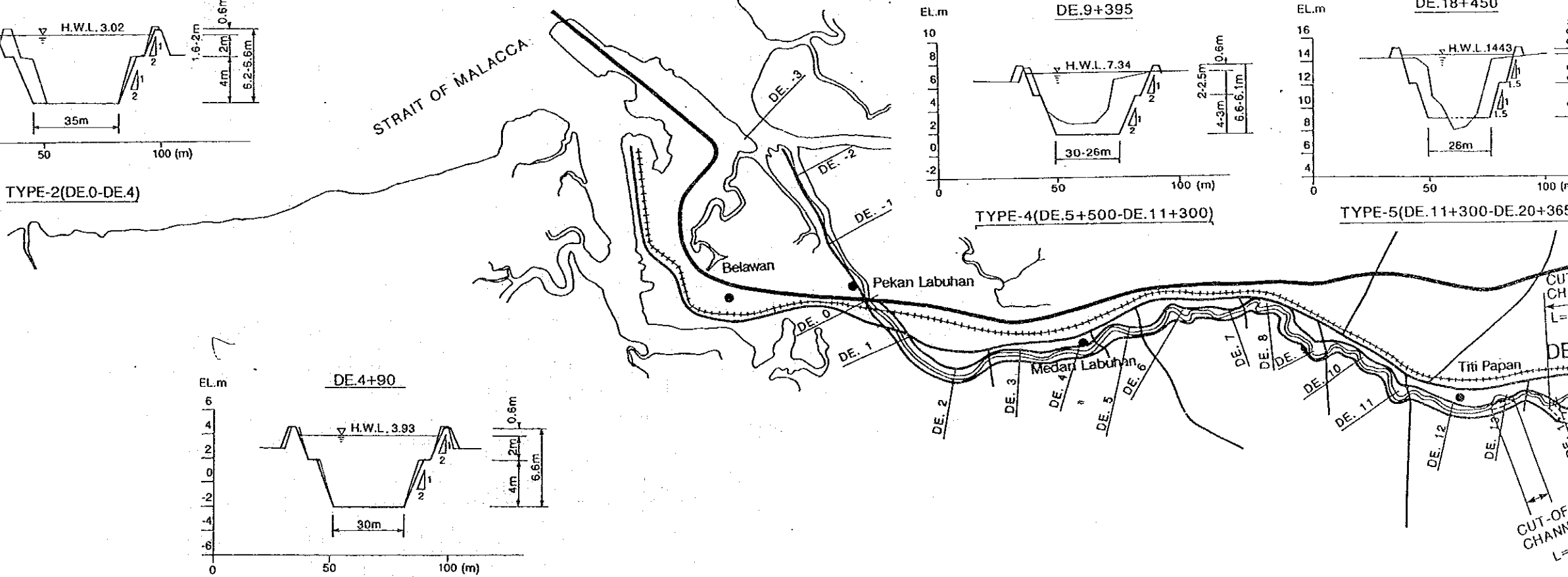
TYPE-2(DE.0-DE.4)



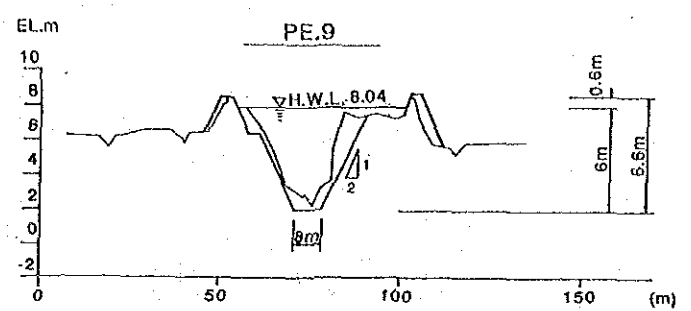
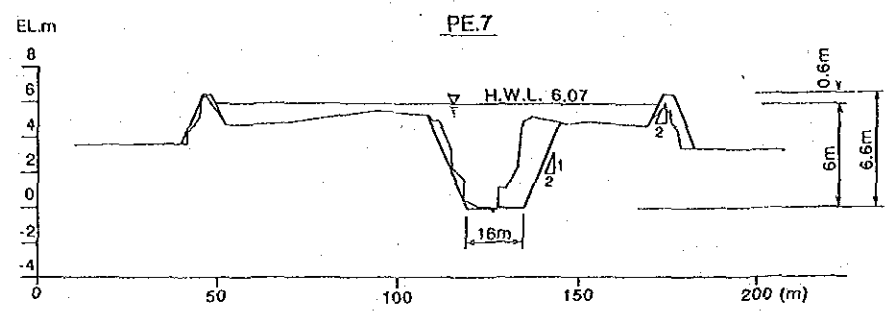
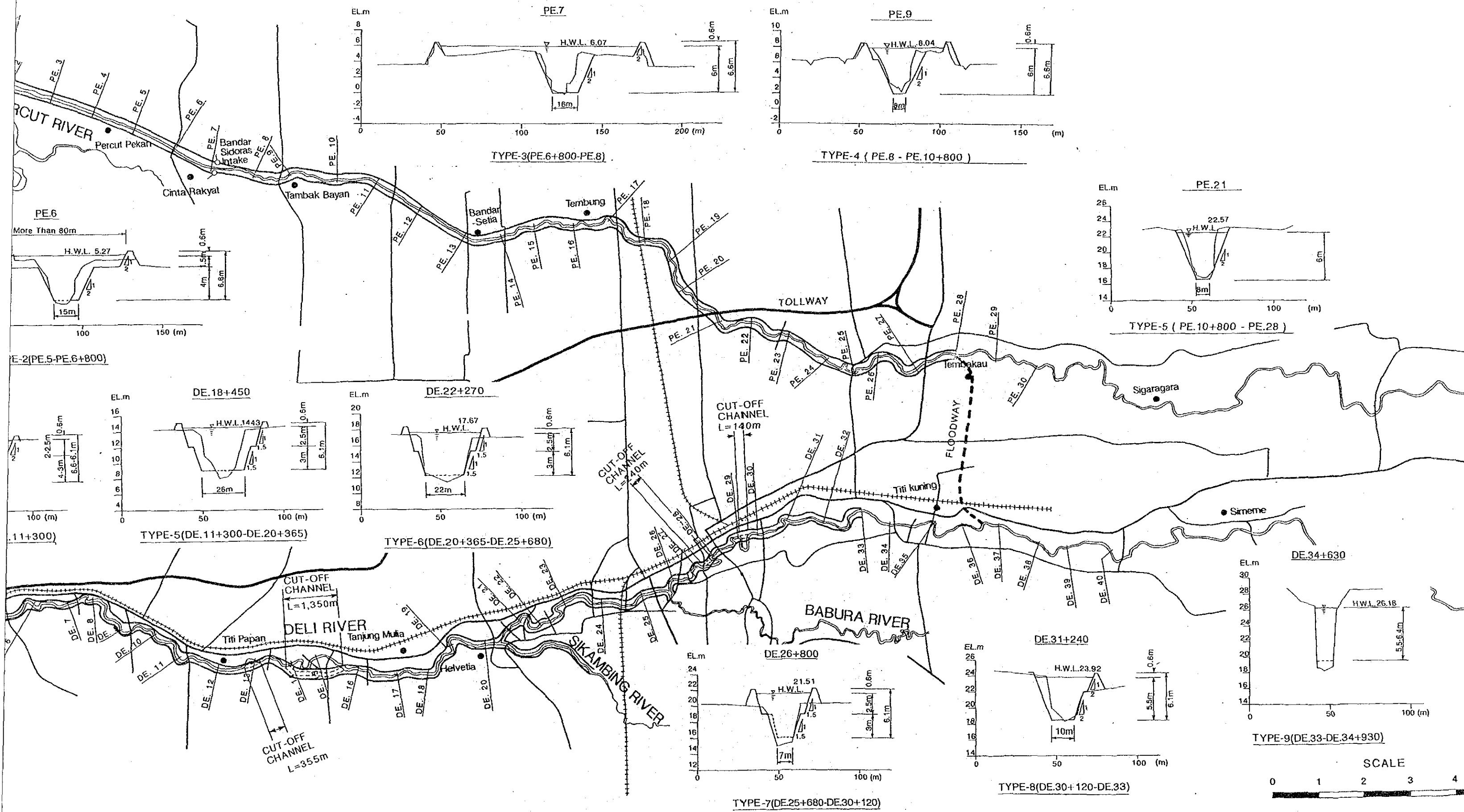
TYPE-4(DE.5+500-DE.11+300)



TYPE-5(DE.11+300-DE.20+365)

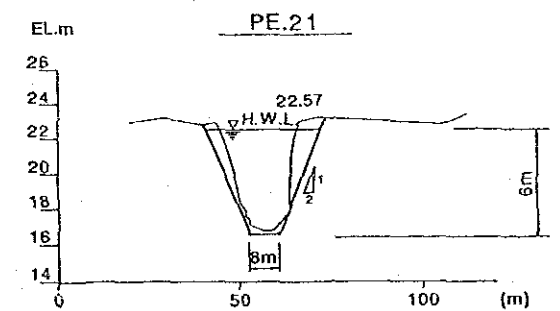


TYPE-3(DE.4-DE.5+500)

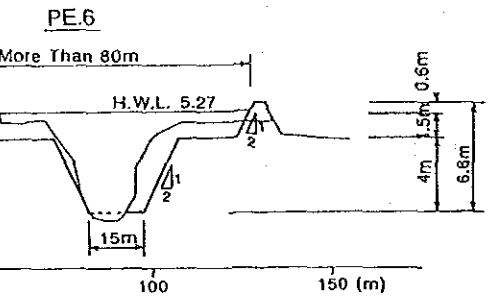


TYPE-3(PE.6+800-PE.8)

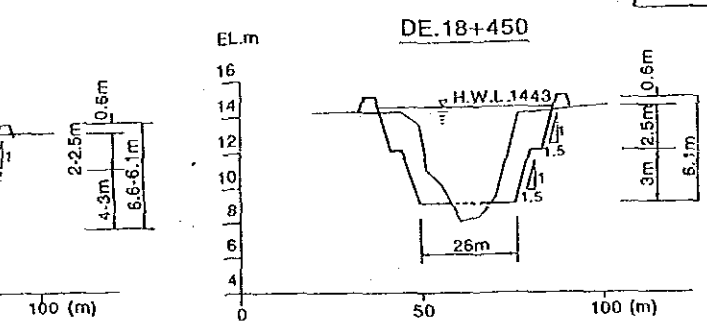
TYPE-4 (PE.8 - PE.10+800)



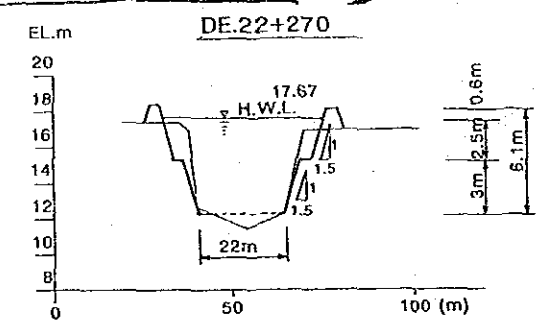
TYPE-5 (PE.10+800 - PE.28)



TYPE-2(PE.5-PE.6+800)



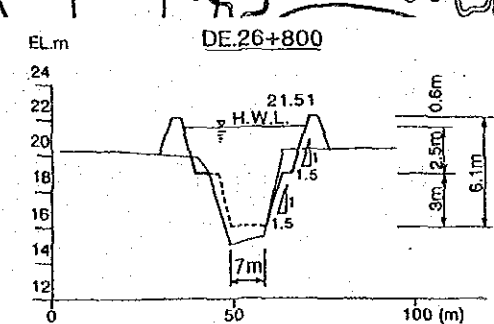
TYPE-5(DE.11+300-DE.20+365)



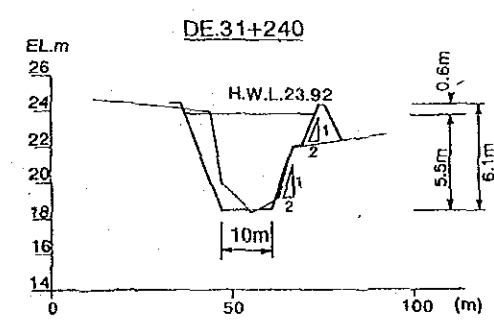
TYPE-6(DE.20+365-DE.25+680)

CUT-OFF CHANNEL
L=240m

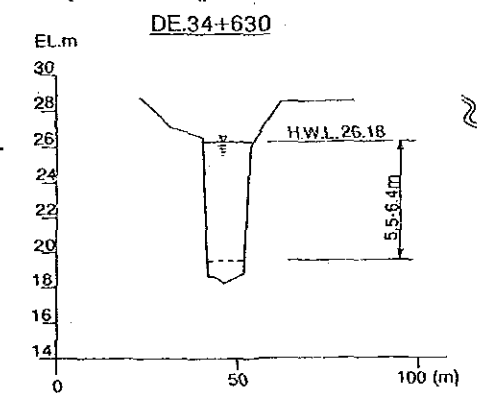
CUT-OFF CHANNEL
L=140m



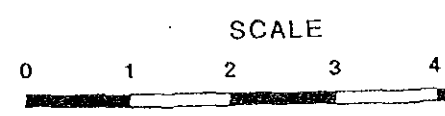
TYPE-7(DE.25+680-DE.30+120)

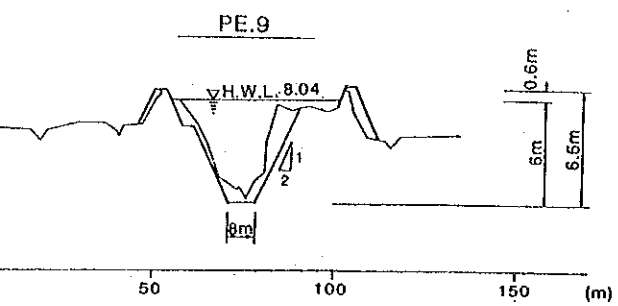


TYPE-8(DE.30+120-DE.33)

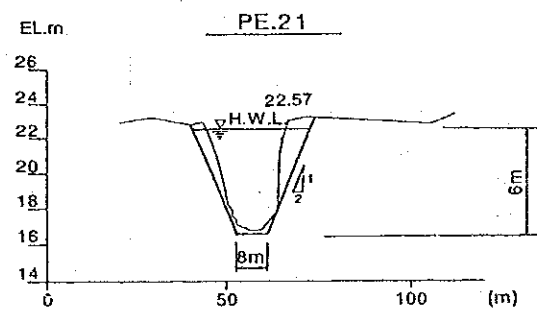


TYPE-9(DE.33-DE.34+930)

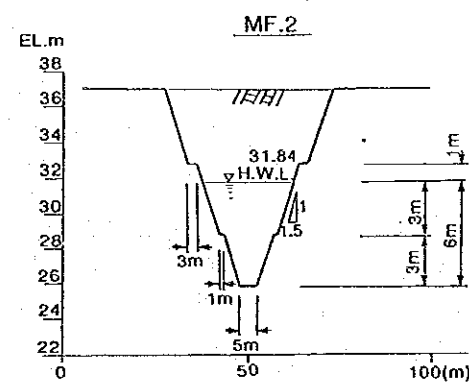




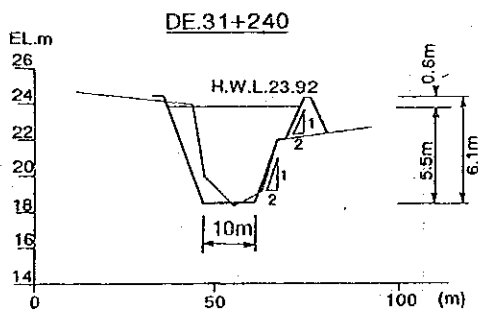
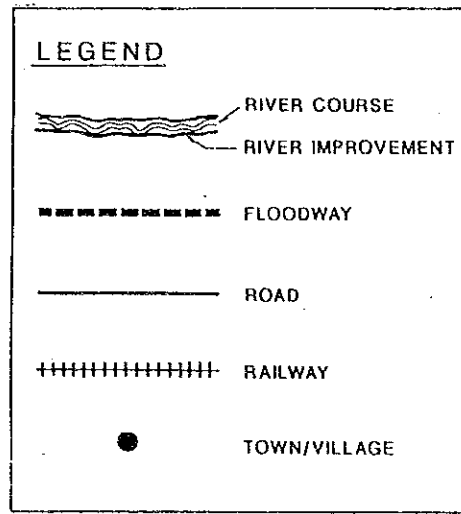
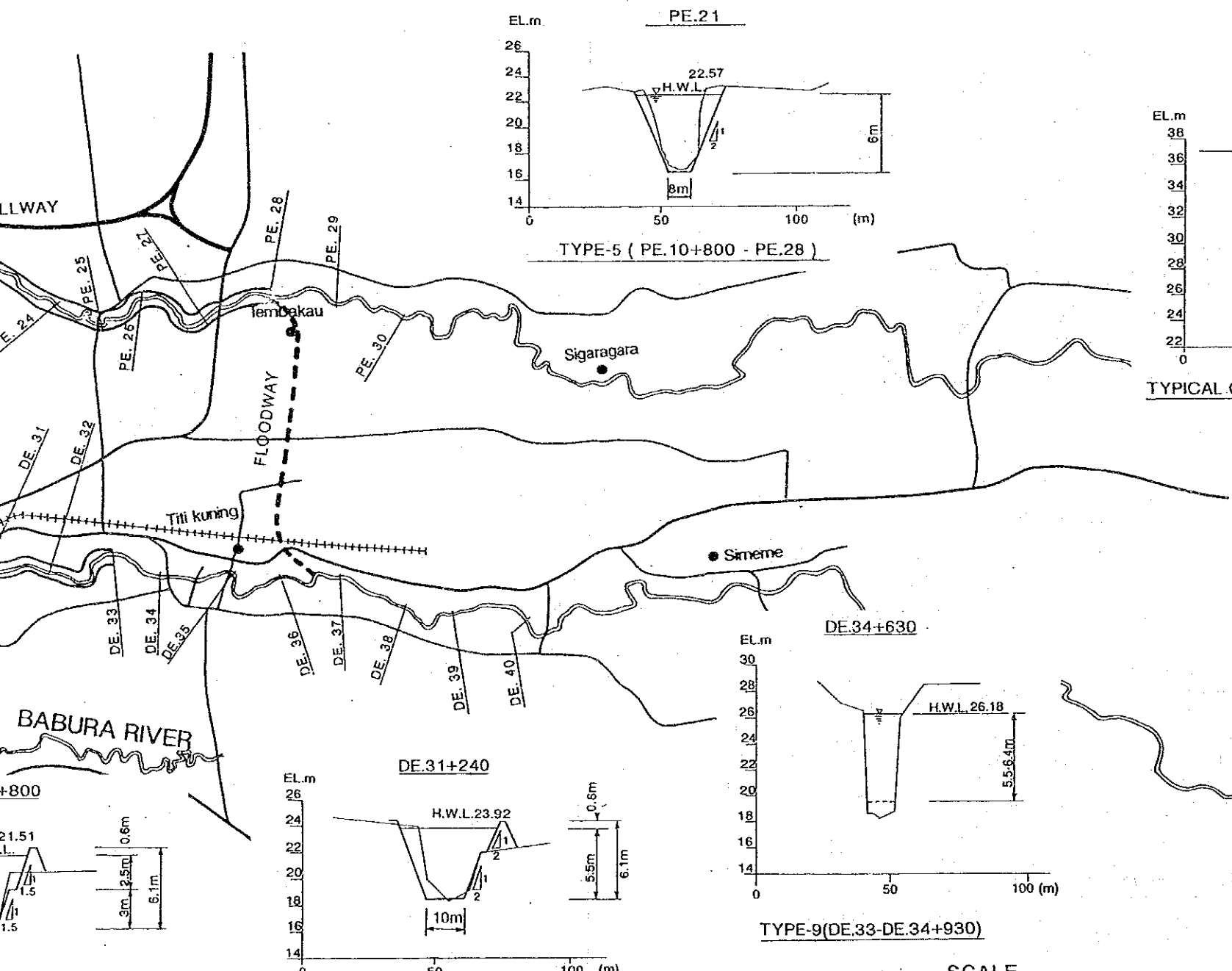
TYPE-4 (PE.8 - PE.10+800)



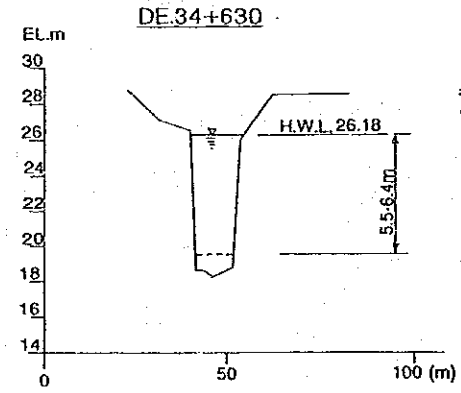
TYPE-5 (PE.10+800 - PE.28)



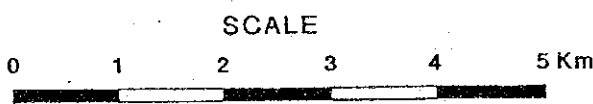
TYPICAL CROSS SECTION OF FLOODWAY



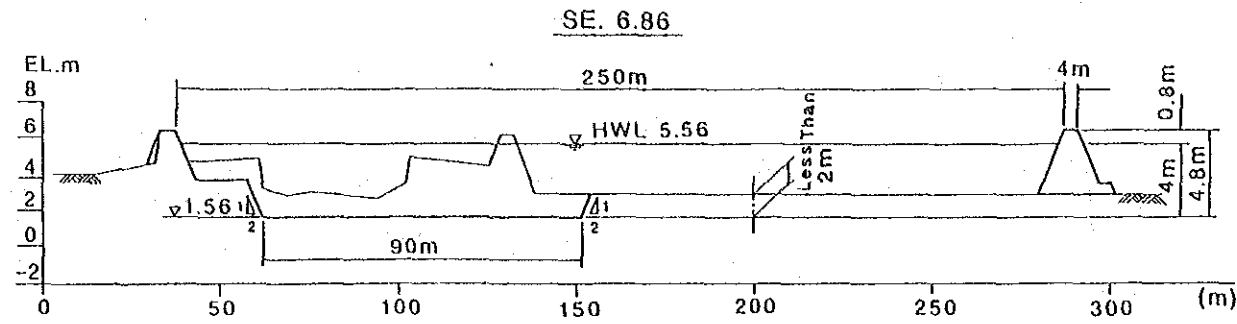
TYPE-8(DE.30+120-DE.33)



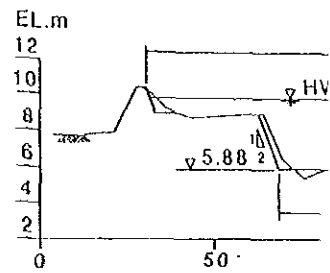
TYPE-9(DE.33-DE.34+930)



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	PLAN AND CROSS SECTION OF PROPOSED RIVER IMPROVEMENT WORKS FOR MASTER PLAN (DELI-PERCUT RIVER) Fig.3-4(2/6)
JAPAN INTERNATIONAL COOPERATION AGENCY	

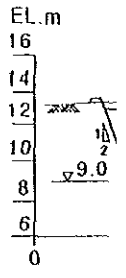
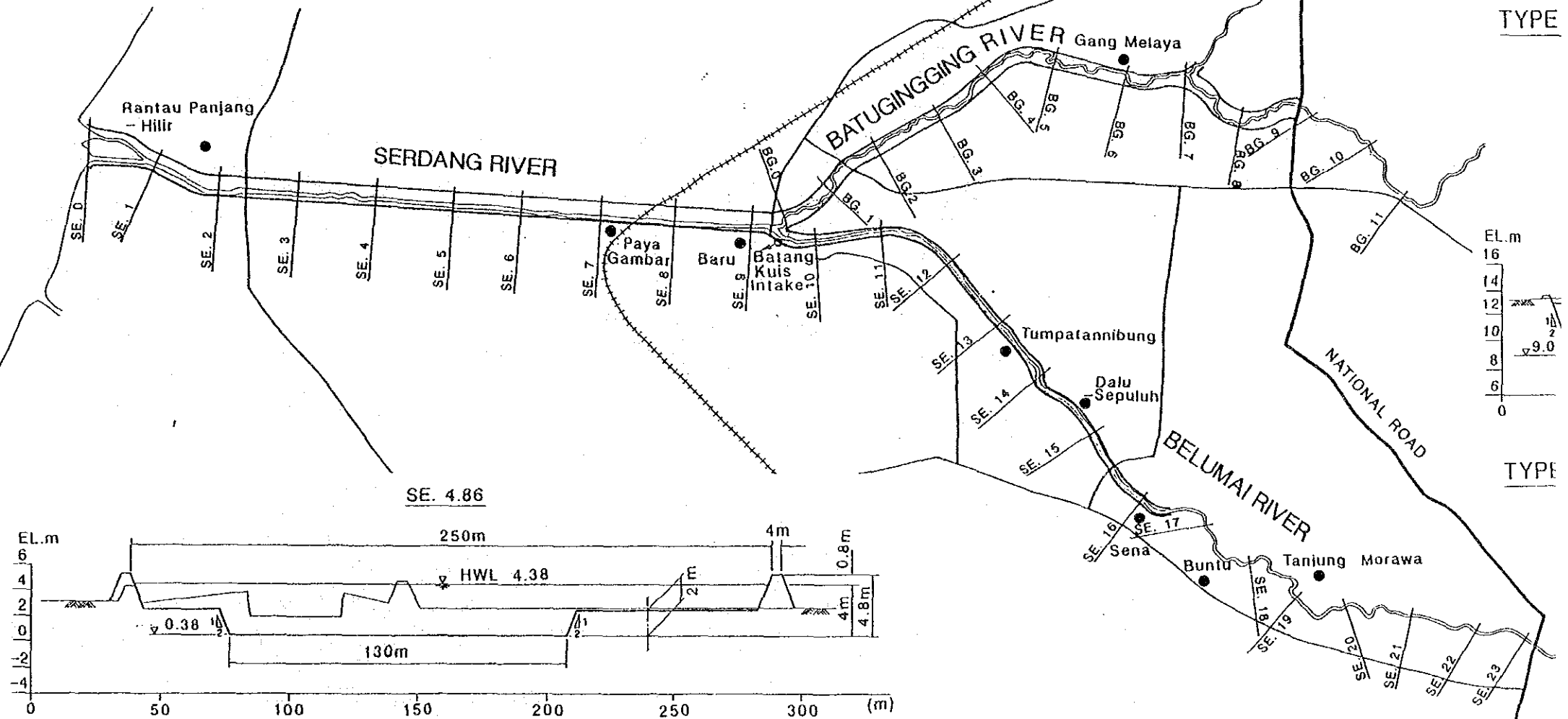


TYPE - 2 (SE. 4.86 - SE. 9.3)

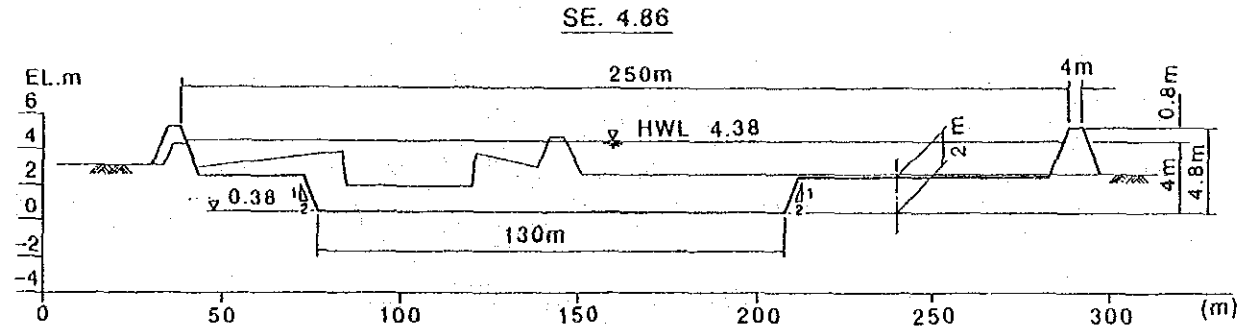


TYPE

STRAIT OF MALACCA

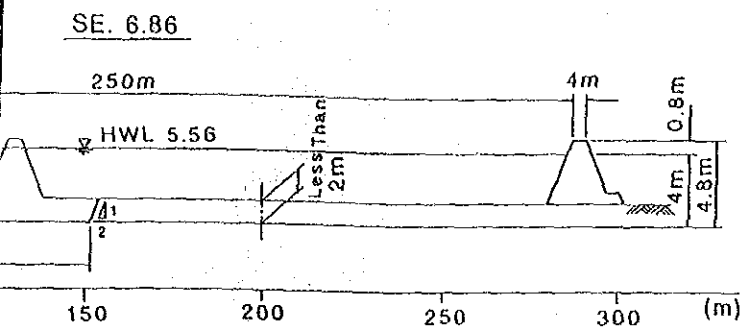


TYPE

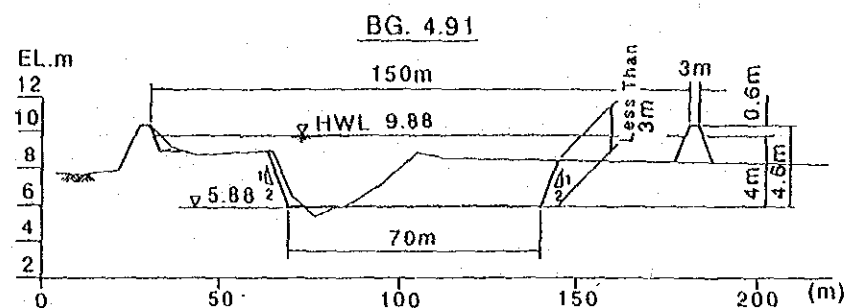


TYPE - 1 (SE. 0 - SE. 4.86)

THE

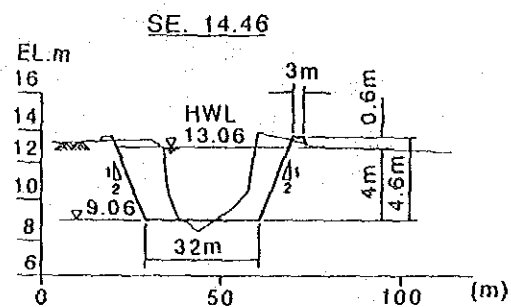
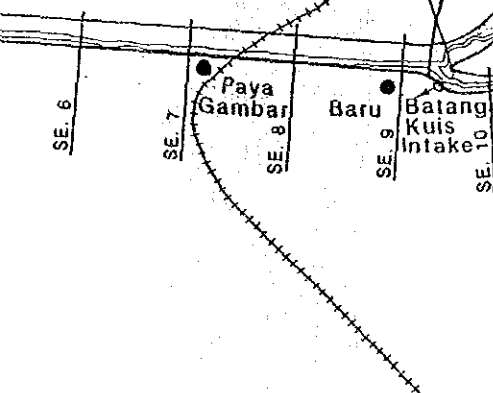


SE. 4.86 - SE. 9.3

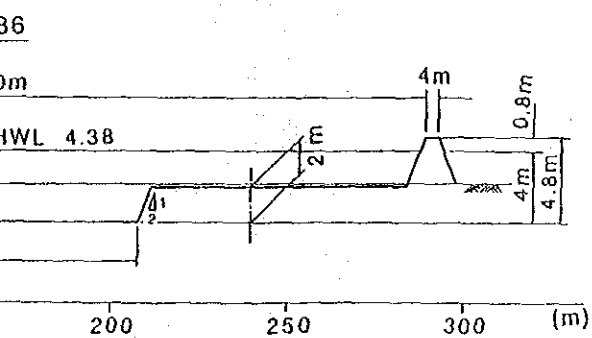


TYPE - 1 (BG. 0 - BG. 8.95)

BATURING RIVER



TYPE - 3 (SE. 9.3 - SE. 16.45)



SE. 4.86

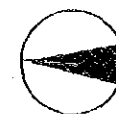
BATURING RIVER
Gang Melaya

BELUMAI RIVER

Sena Buntu Tanjung Morawa

RAILWAY

NATIONAL ROAD

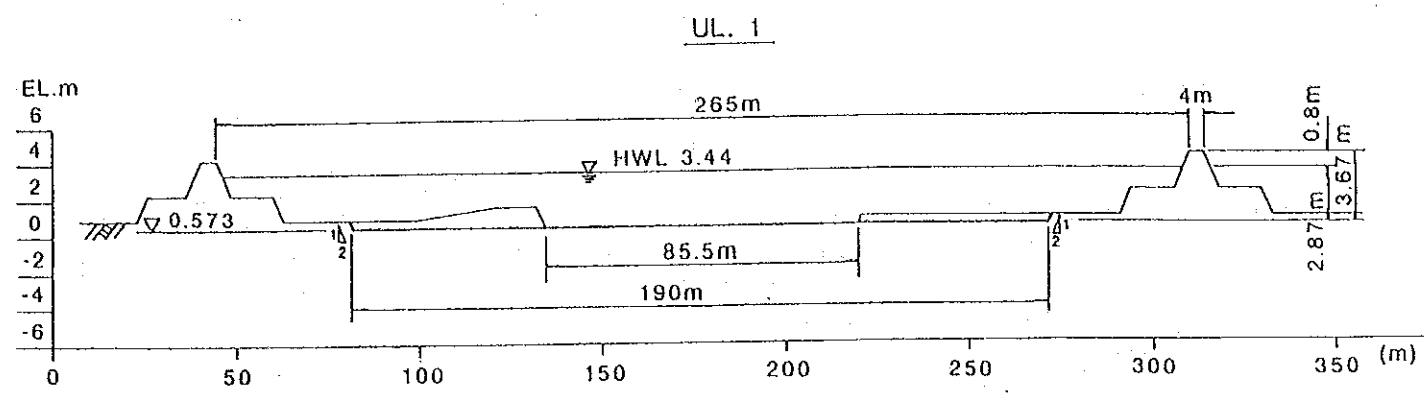


LEGEND

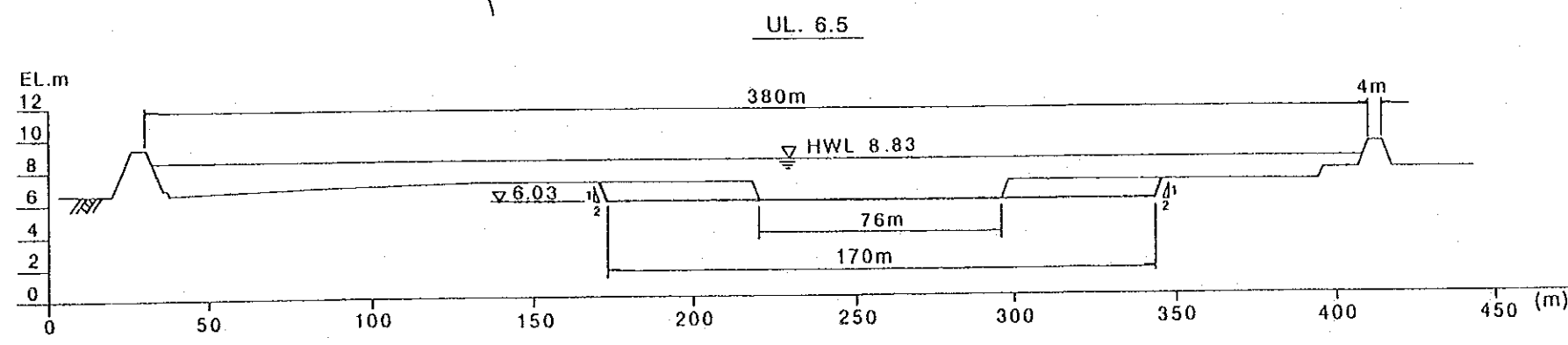
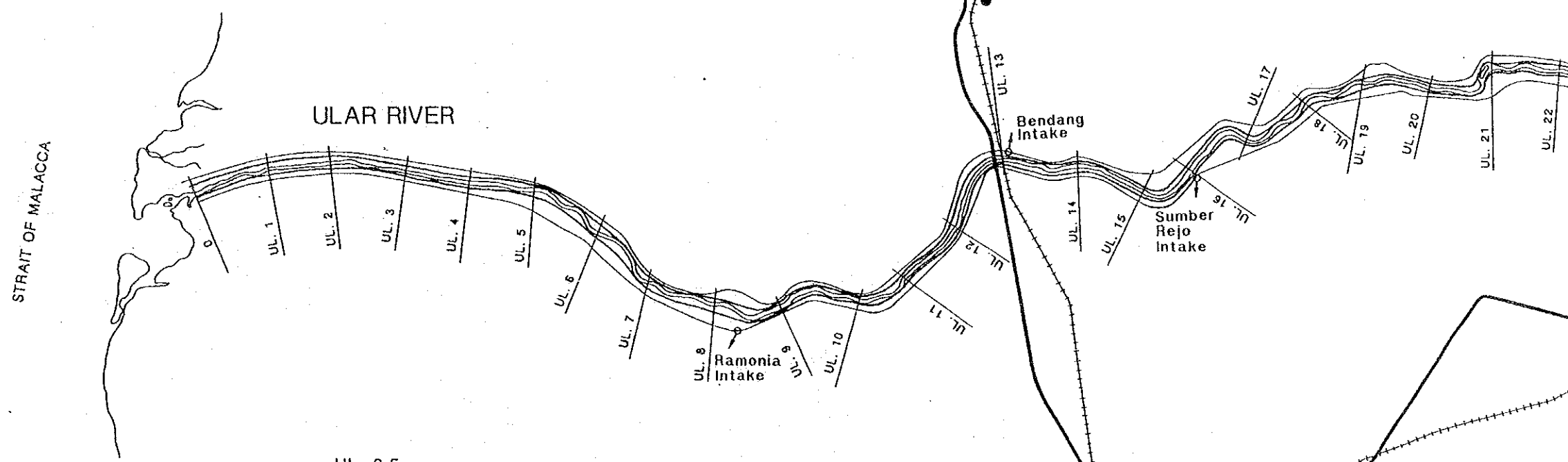
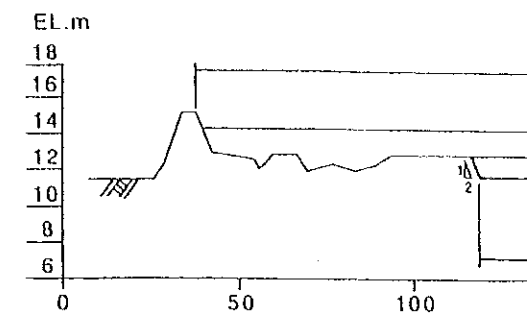
- RIVER COURSE
- RIVER IMPROVEMENT
- ROAD
- RAILWAY
- TOWN/VILLAGE

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

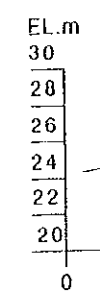
PLAN AND CROSS SECTION OF PROPOSED
RIVER IMPROVEMENT WORKS FOR MASTER
PLAN (SERDANG RIVER) Fig.3-4(3/6)

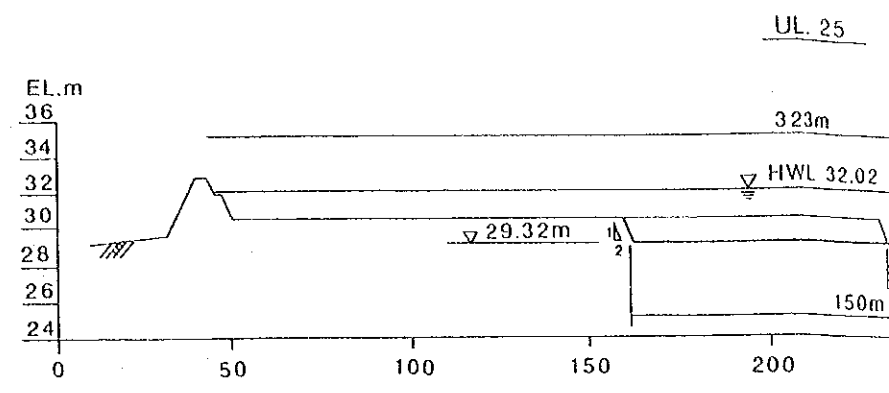
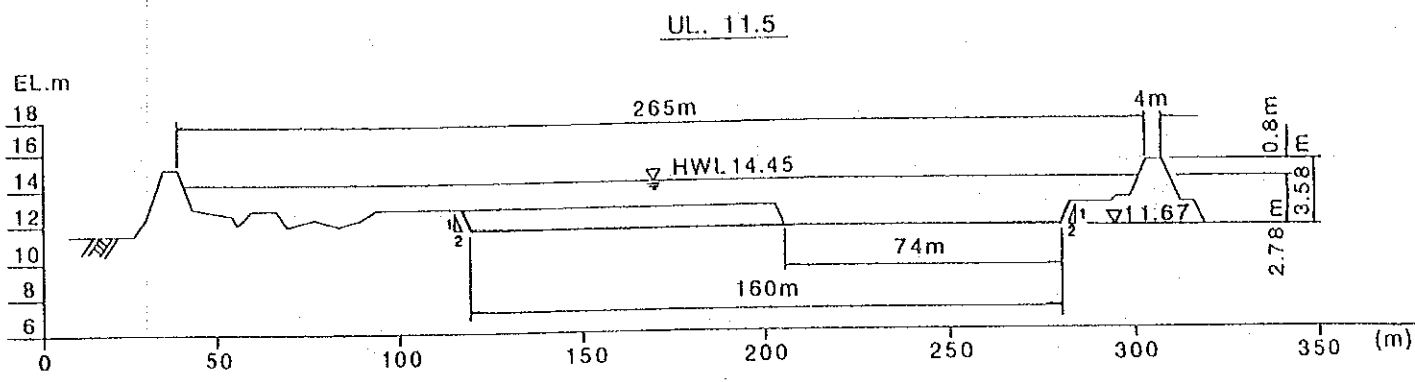
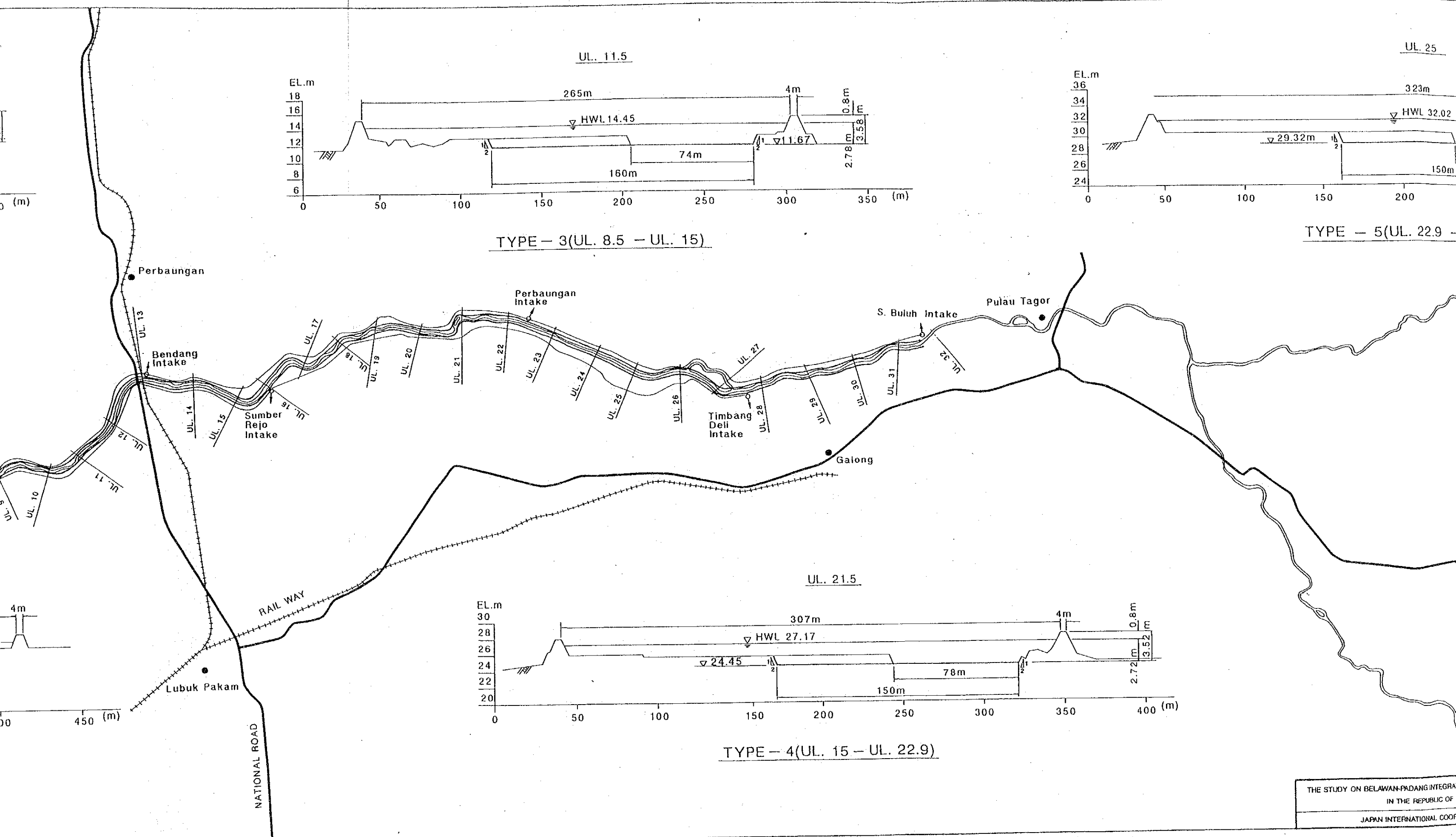


TYPE - 1 (UL. 0 - UL. 2.5)



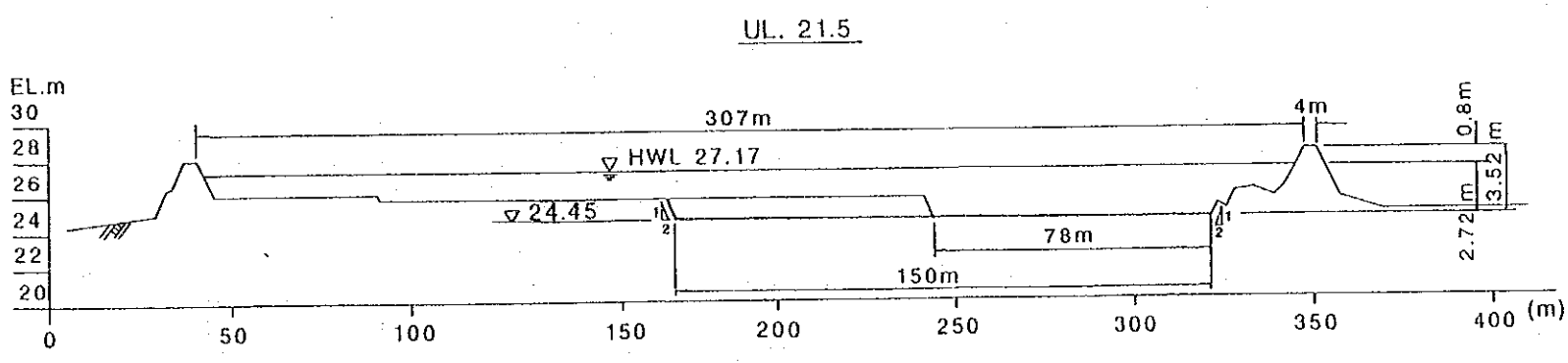
TYPE - 2 (UL. 2.5 - UL. 8.5)



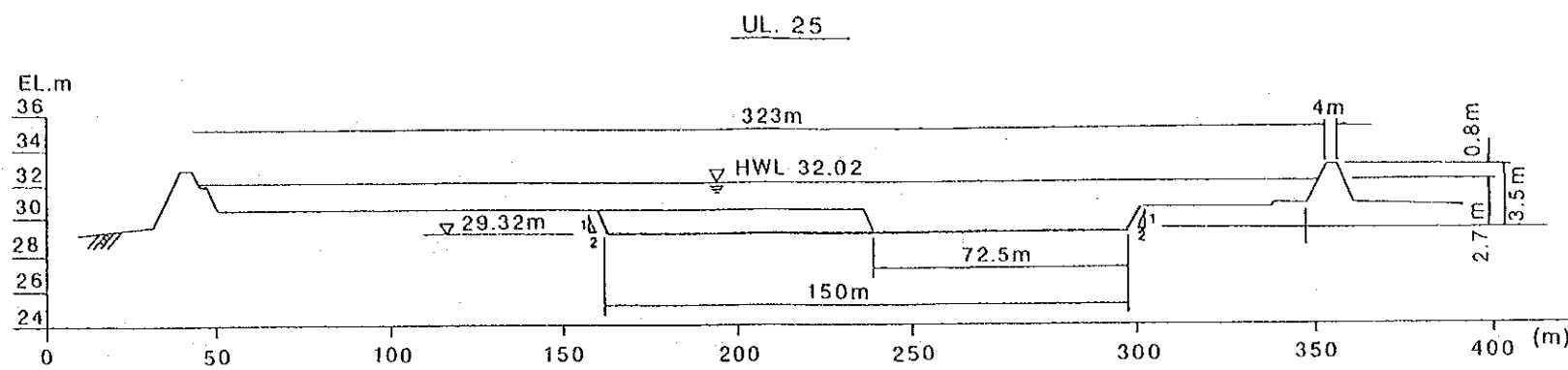
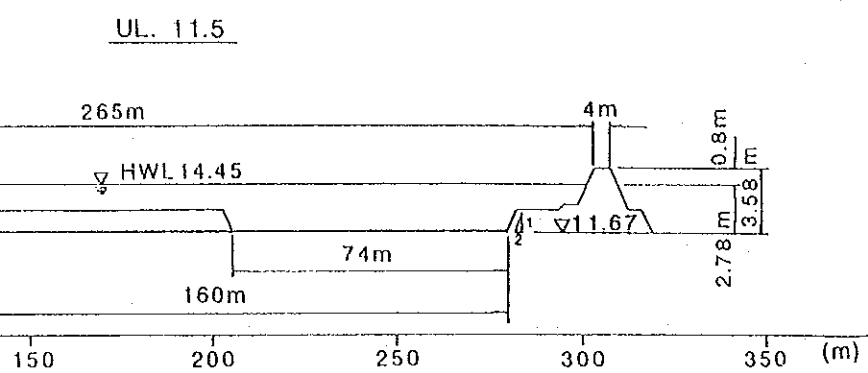


TYPE - 3(UL. 8.5 - UL. 15)

TYPE - 5(UL. 22.9 - UL. 25)

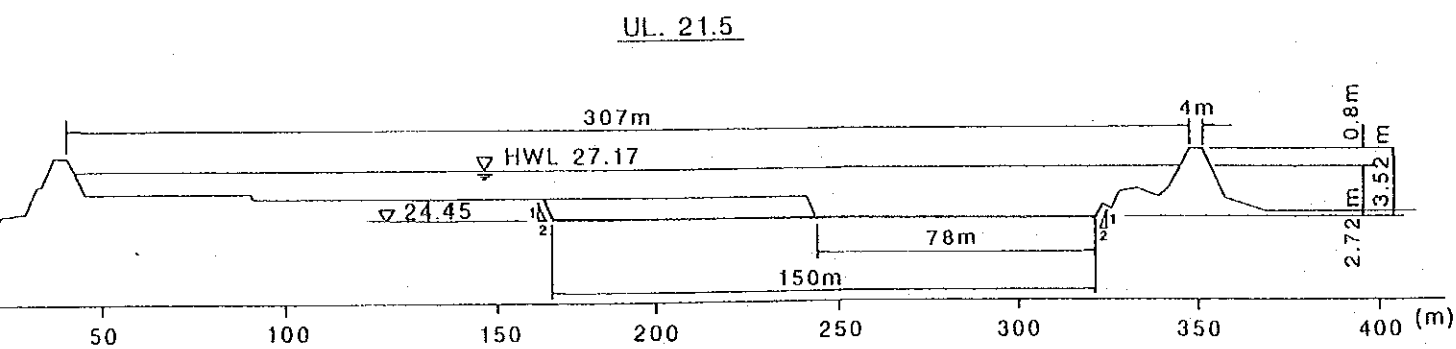
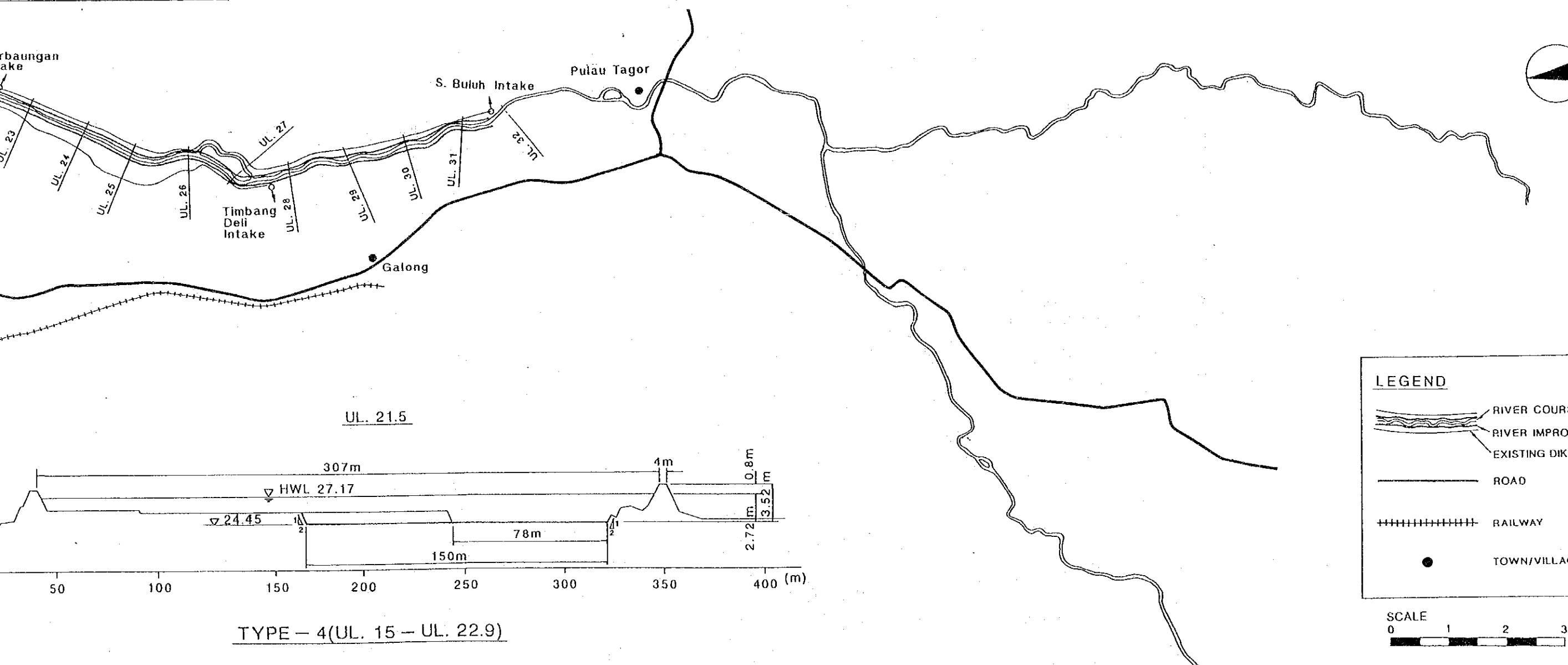


TYPE - 4(UL. 15 - UL. 22.9)

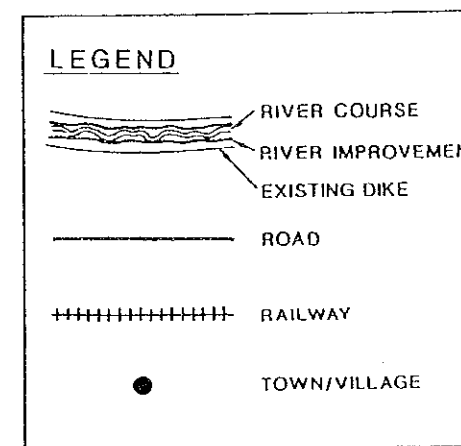


E - 3(UL. 8.5 - UL. 15)

TYPE - 5(UL. 22.9 - UL.31.758)

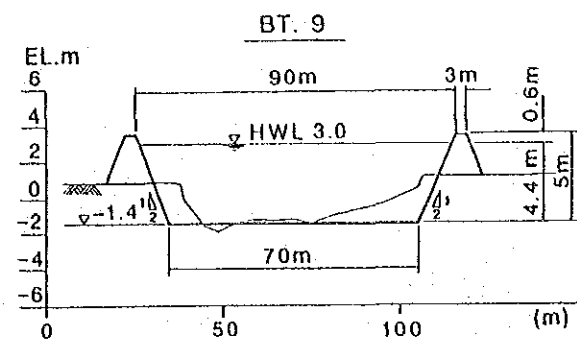


TYPE - 4(UL. 15 - UL. 22.9)

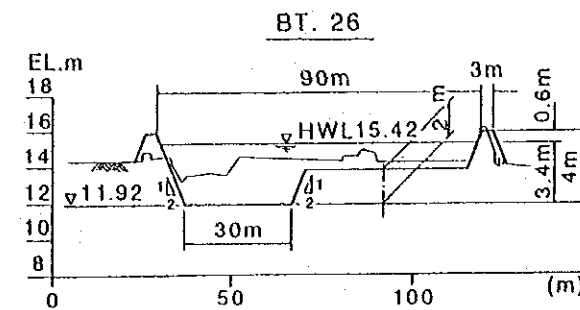


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

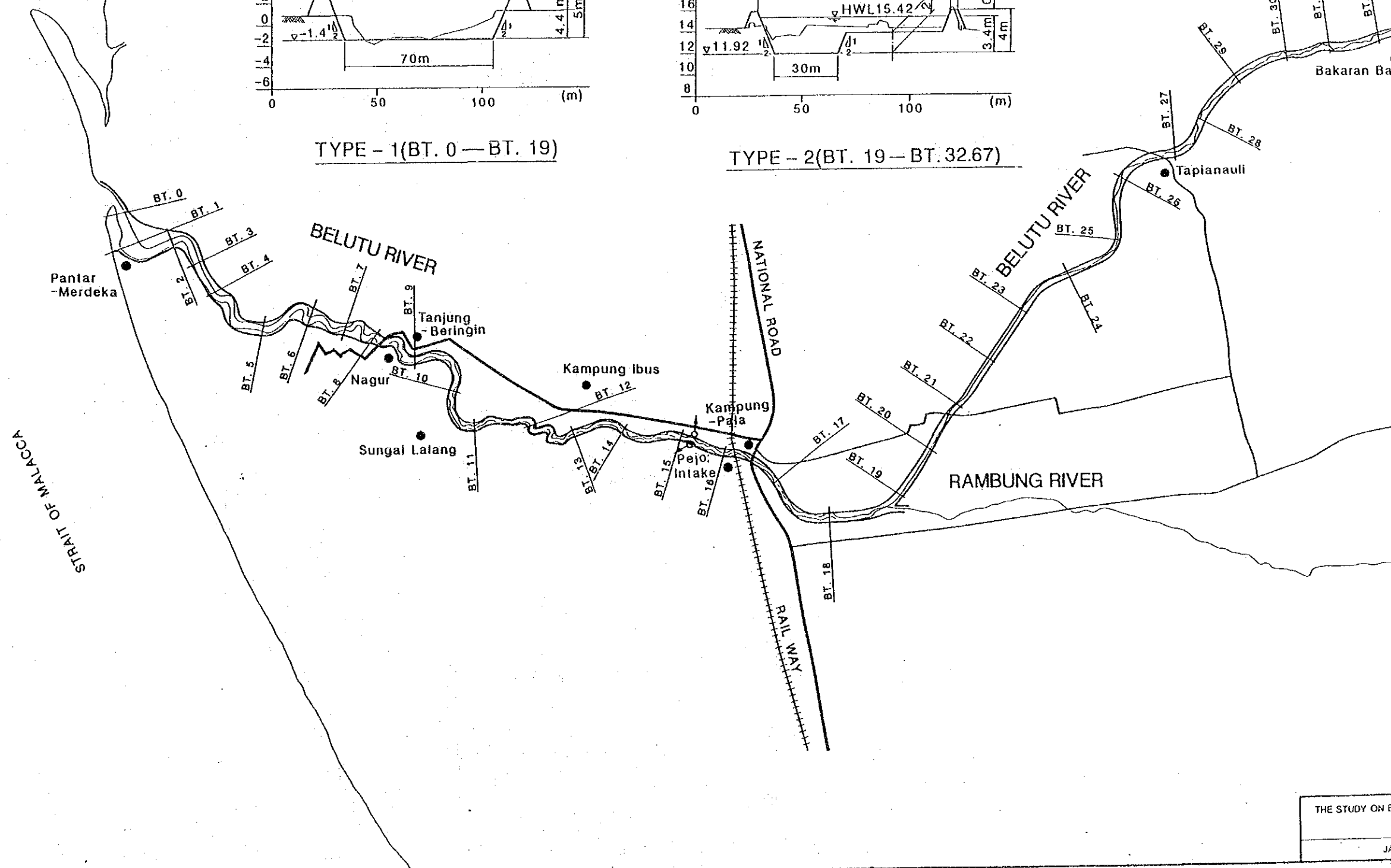
PLAN AND CROSS SECTION OF PROPOSED
 RIVER IMPROVEMENT WORKS FOR MASTER
 PLAN (ULAR RIVER) Fig.3-4(4/6)

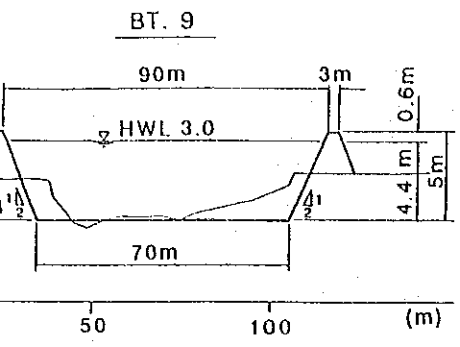


TYPE - 1 (BT. 0 — BT. 19)

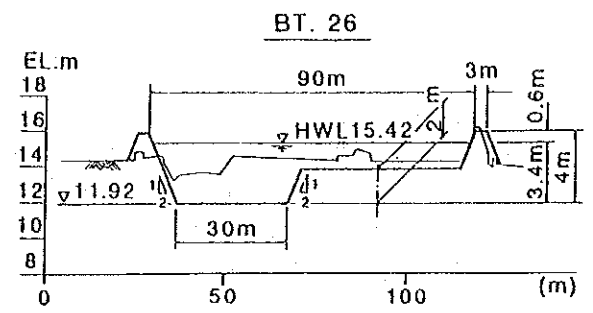


TYPE - 2 (BT. 19 — BT. 32.67)

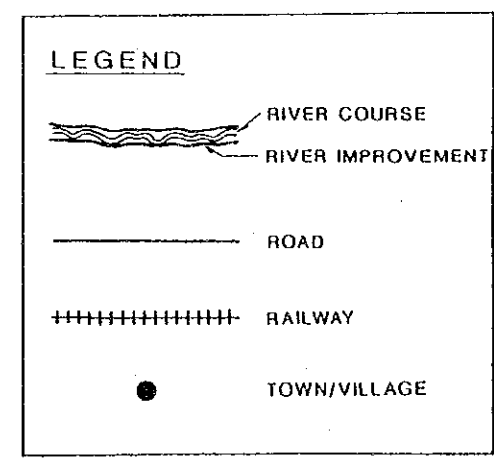
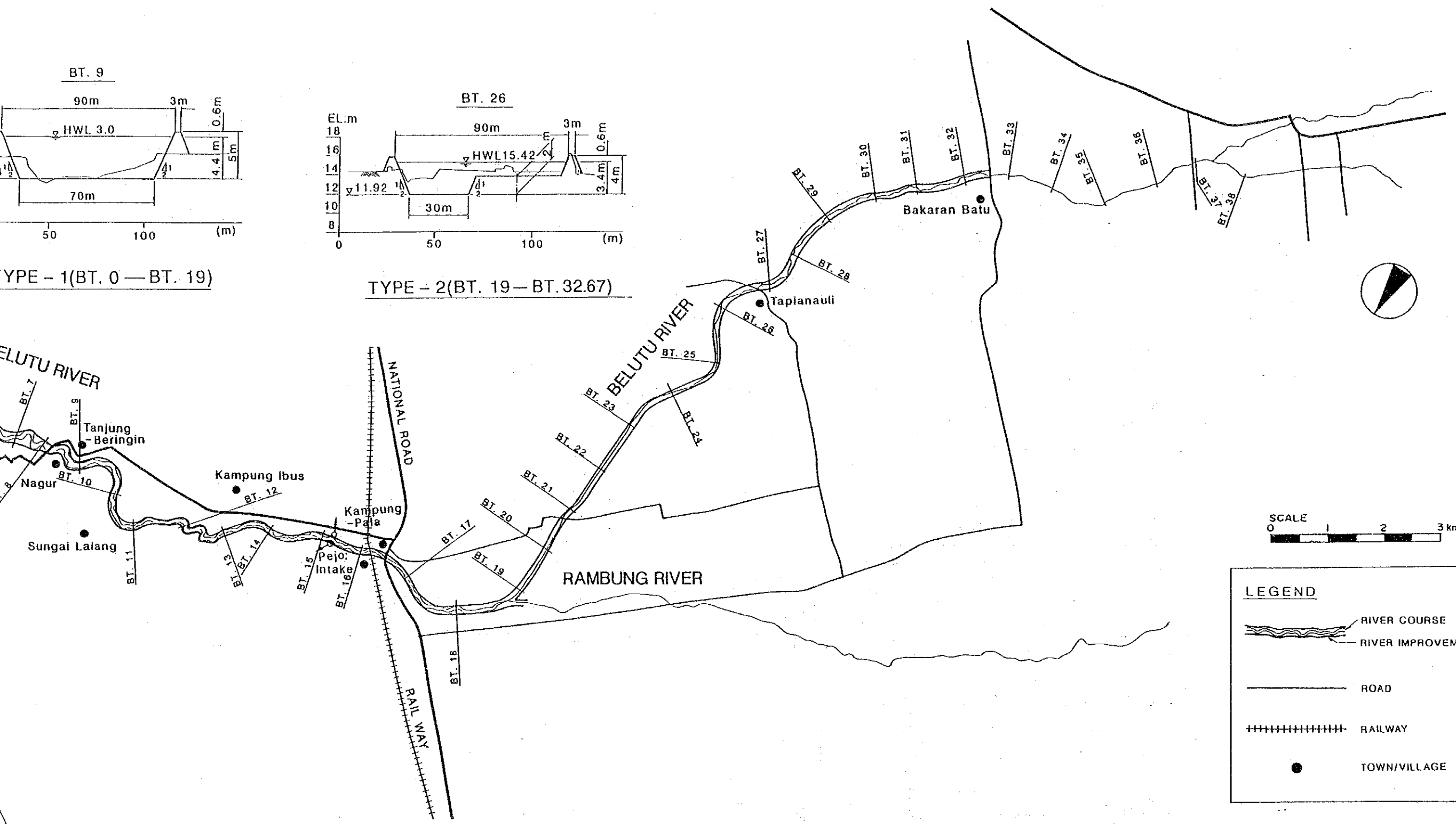




TYPE - 1 (BT. 0 — BT. 19)

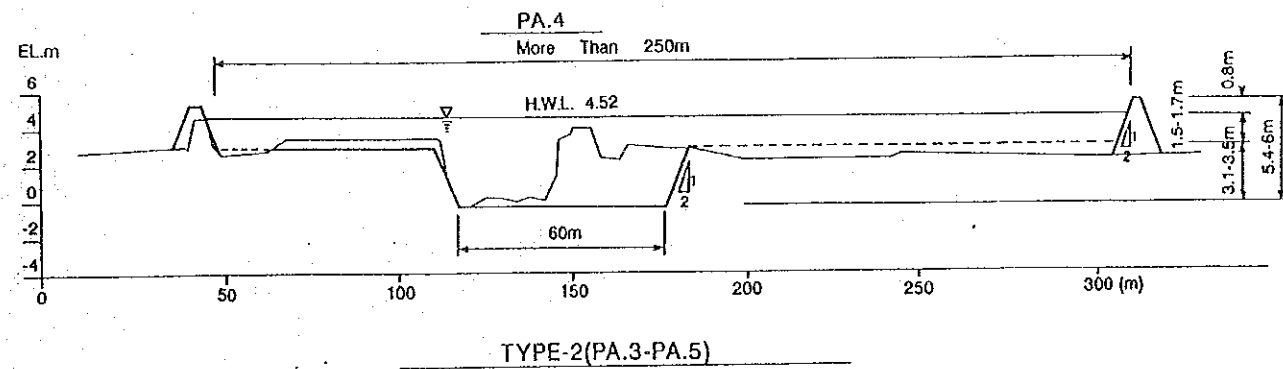
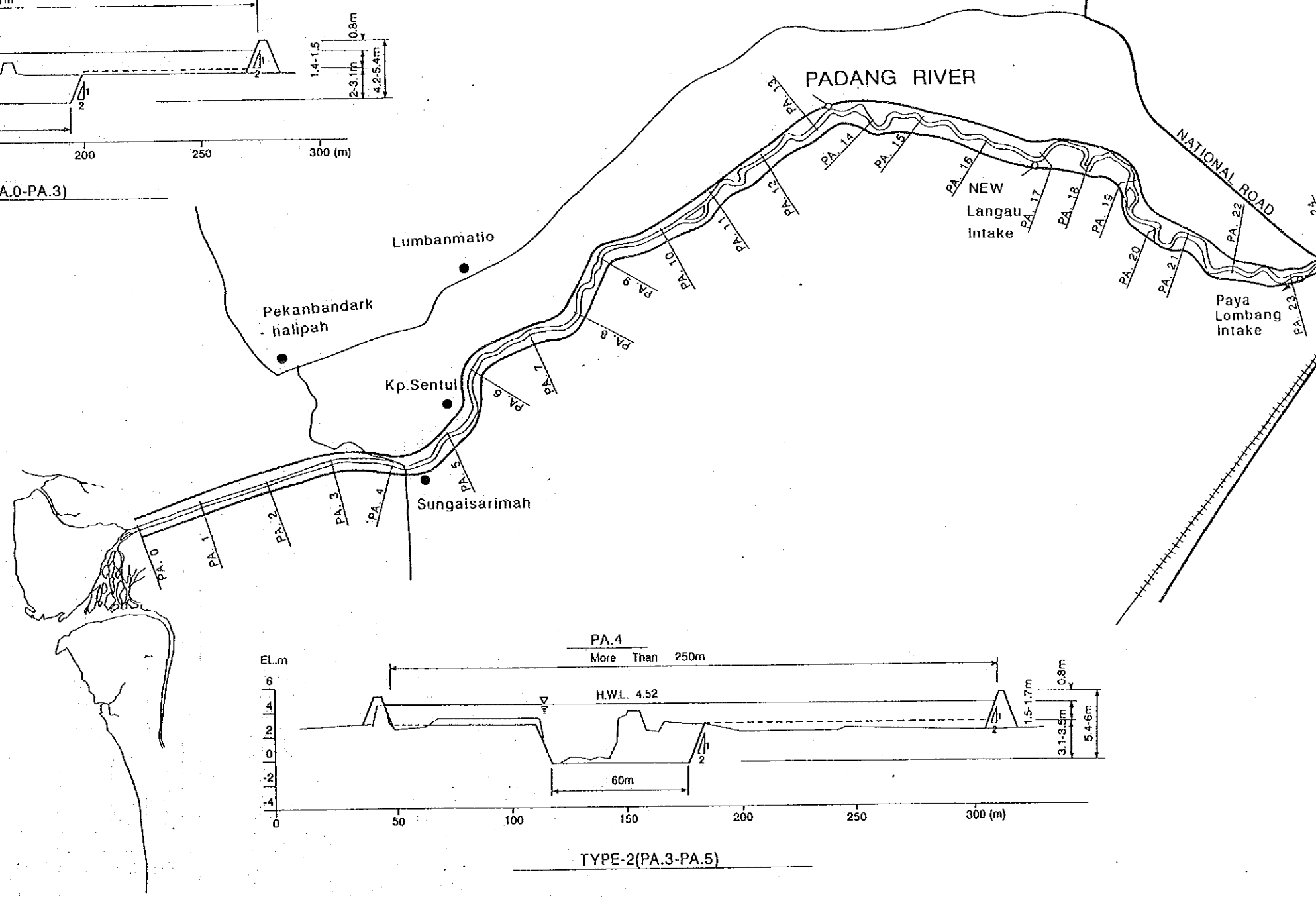
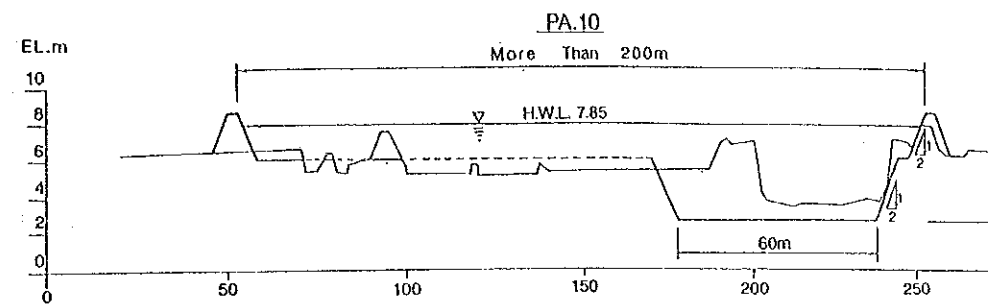
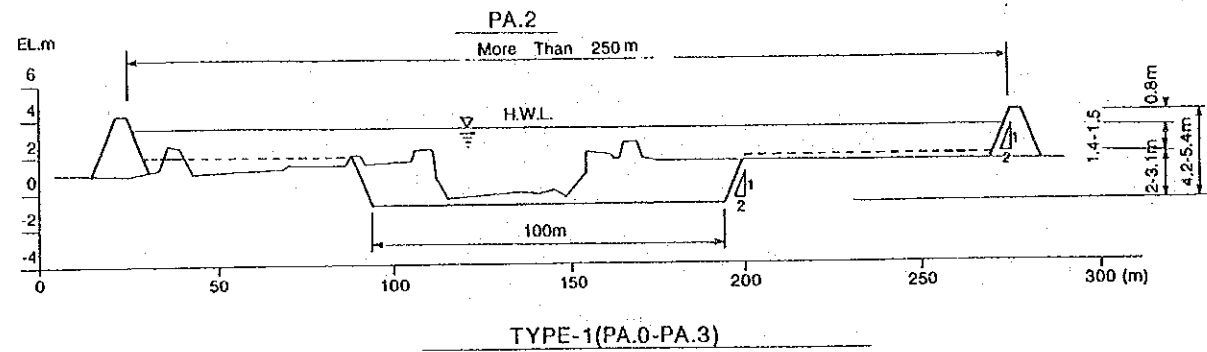


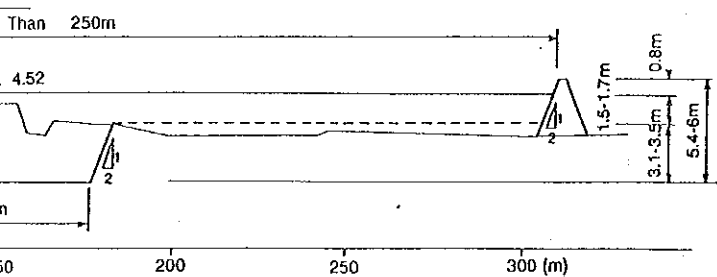
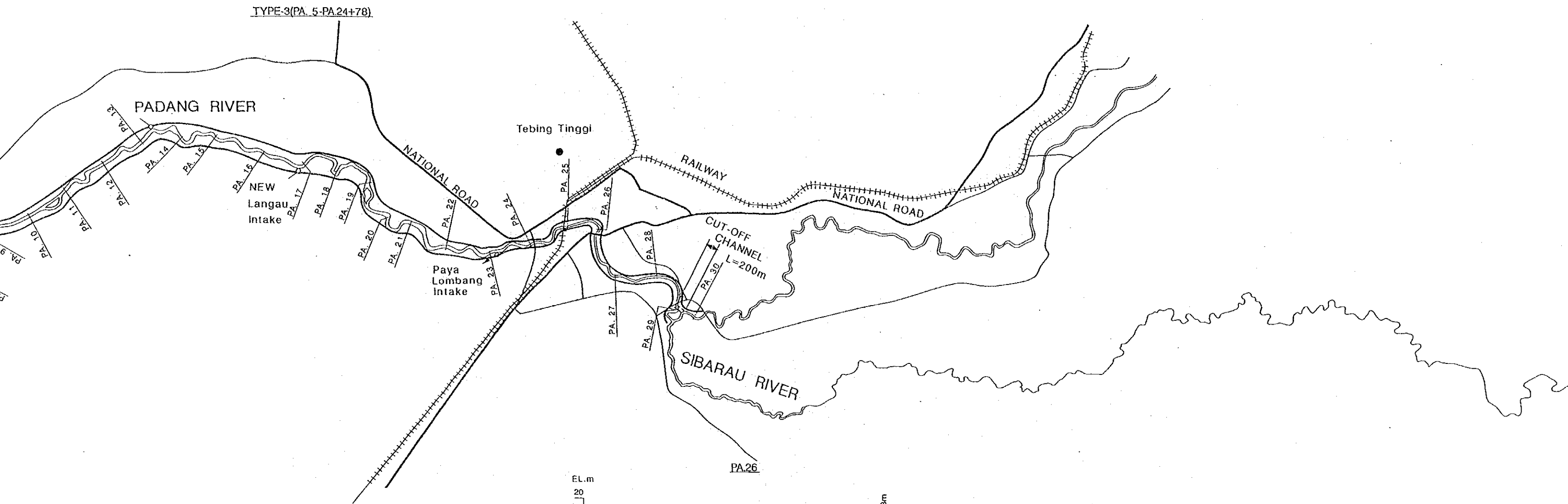
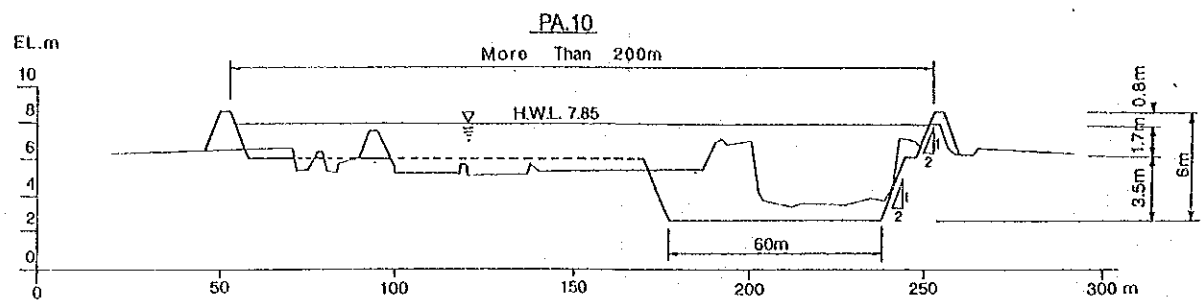
TYPE - 2 (BT. 19 — BT. 32.67)



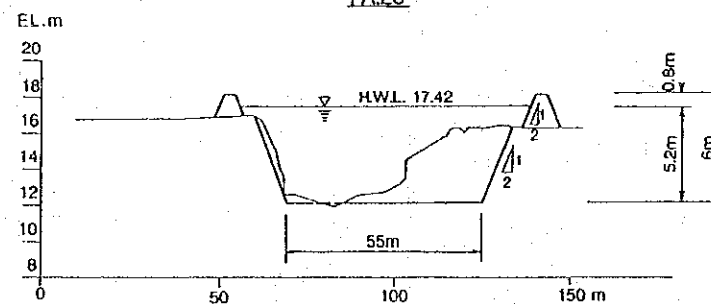
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

PLAN AND CROSS SECTION OF PROPOSED
RIVER IMPROVEMENT WORKS FOR MASTER
PLAN (BELUTU RIVER) Fig.3-4(5/6)

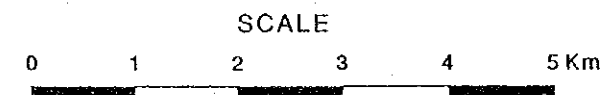




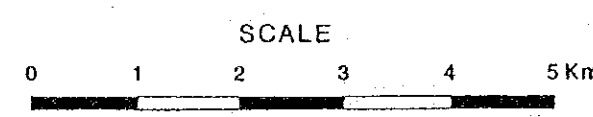
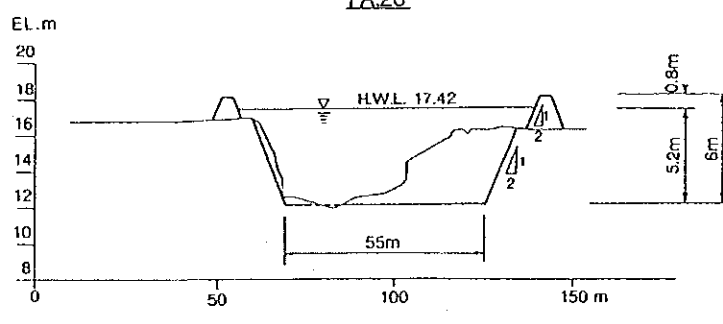
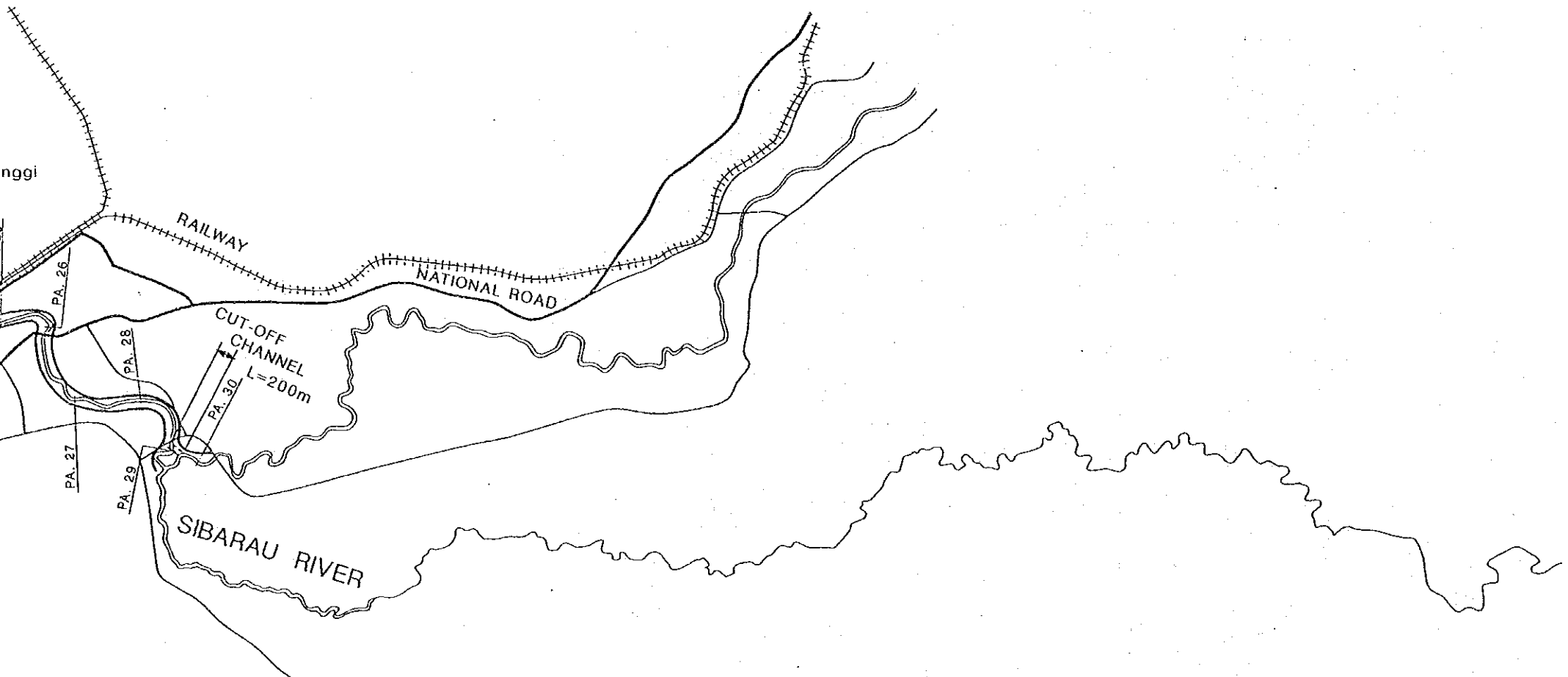
2(PA.3-PA.5)



TYPE-4(PA.24+78-PA.29+800)



3.5m
1.7m
0.8m
5m

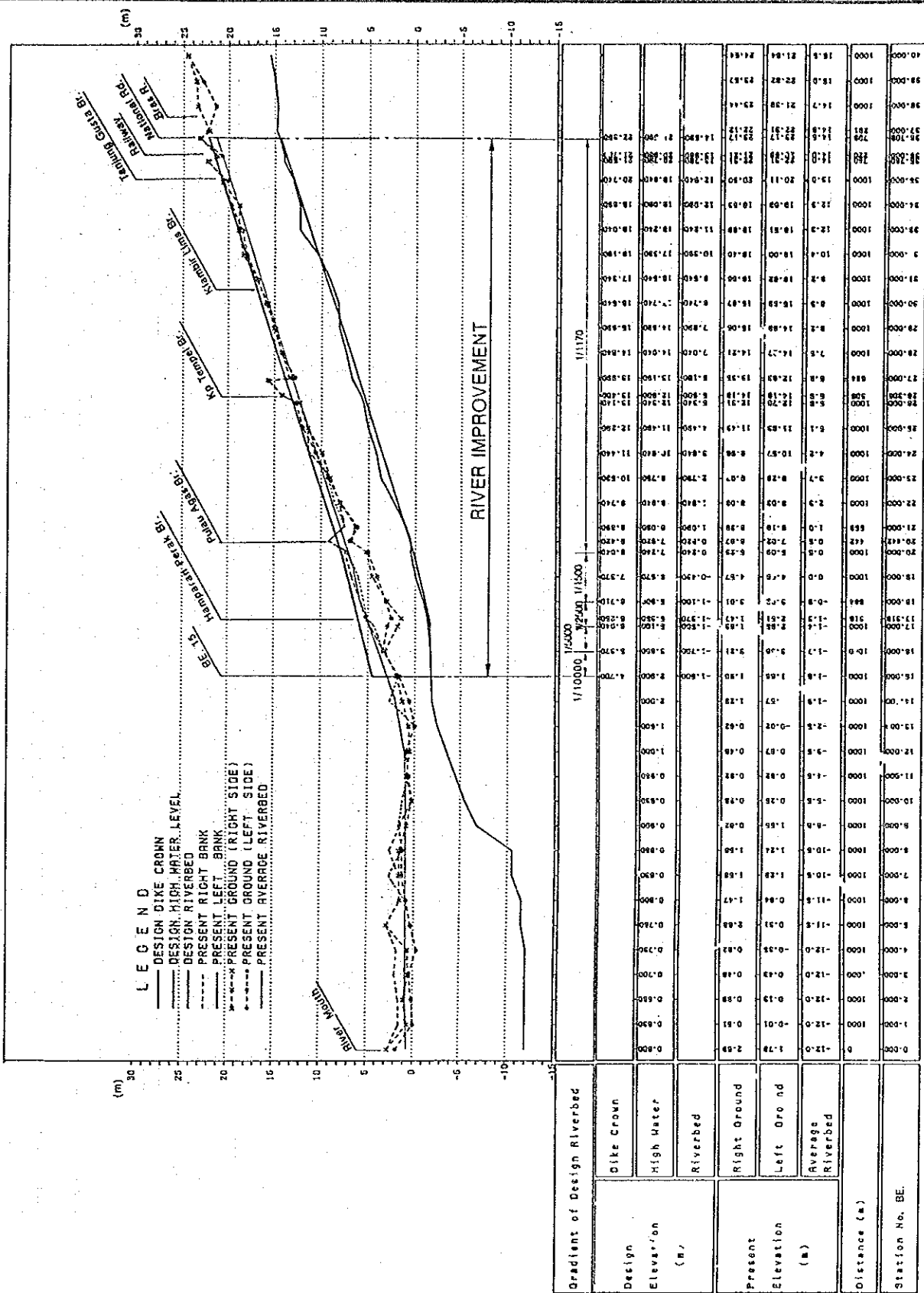


LEGEND	
	RIVER COURSE
	RIVER IMPROVEMENT
	FLOODWAY
	ROAD
	RAILWAY
	TOWN/VILLAGE

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

PLAN AND CROSS SECTION OF PROPOSED
RIVER IMPROVEMENT WORKS FOR MASTER
PLAN (PADANG RIVER) Fig.3-4(6/6)

BELAWAN RIVER

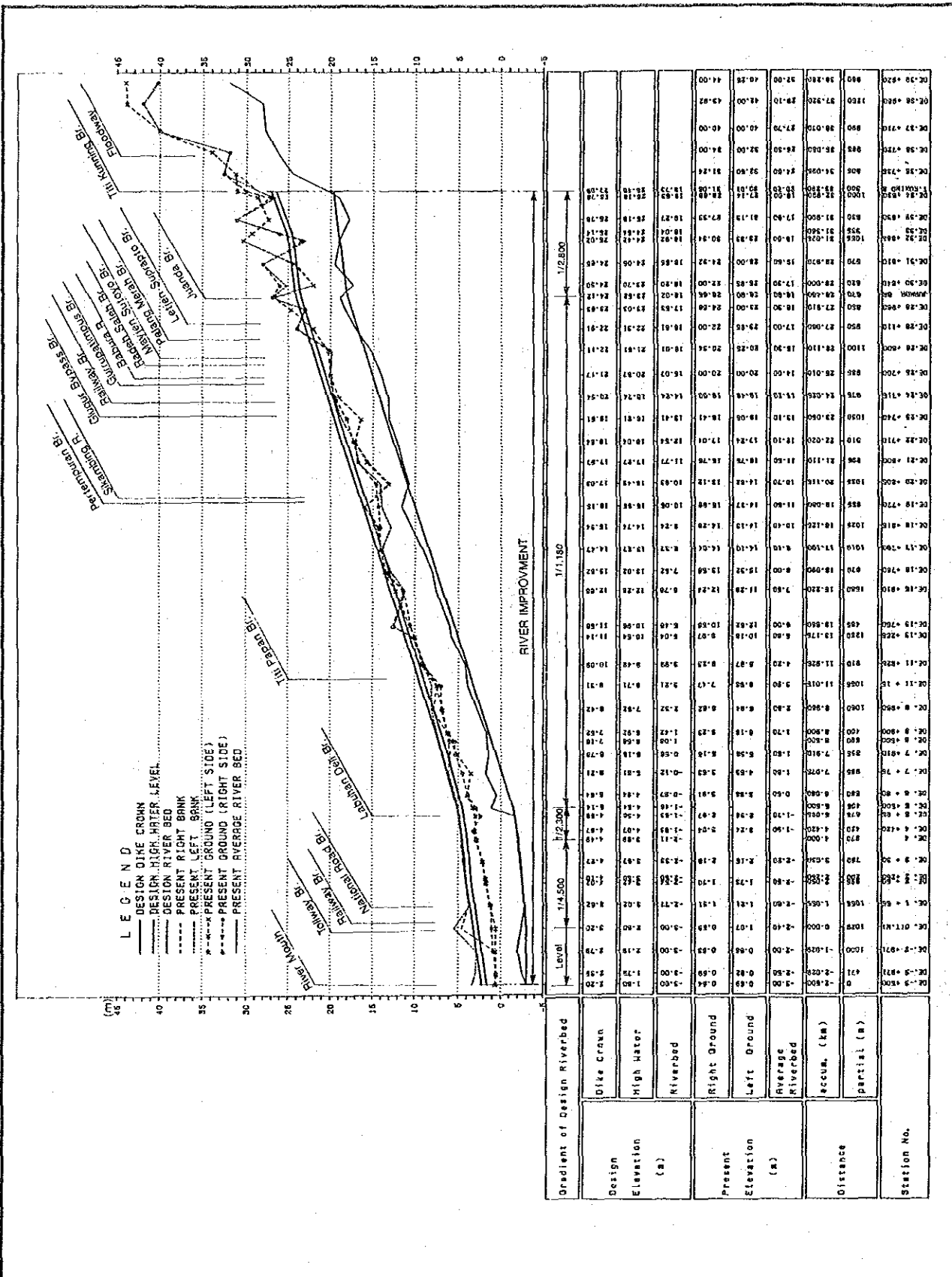


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF PROPOSED RIVER IMPROVEMENT
WORKS FOR MASTER PLAN
(BELAWAN RIVER)

Fig.3-5(1/8)



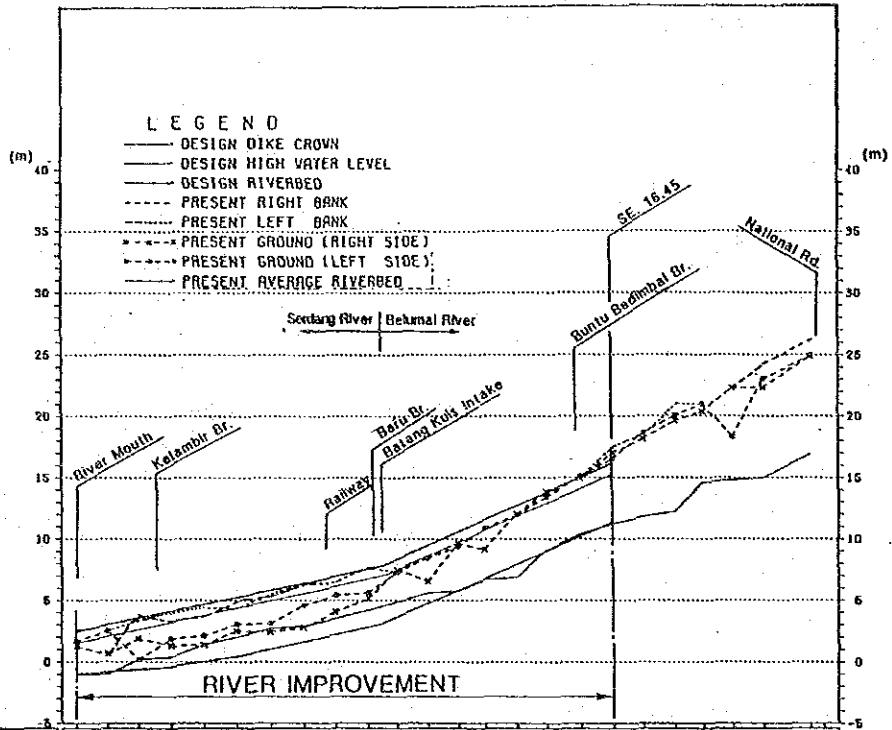
LEGEND
 ——— DESIGN DIKE CROWN
 - - - - - DESIGN HIGH WATER LEVEL
 - - - - - DESIGN RIVER BED
 - - - - - PRESENT RIGHT BANK
 - - - - - PRESENT LEFT BANK
 - - - - - PRESENT GROUND (LEFT SIDE)
 - - - - - PRESENT GROUND (RIGHT SIDE)
 - - - - - PRESENT AVERAGE RIVER BED

Station No.	Gradient of Design Riverbed		Dike Crown	High Water	Riverbed	Right Ground	Left Ground	Average Riverbed	Accum. (km)	Partial (m)
	Design	Elevation (m)								
02-3-1000	0.84	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-950	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-900	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-850	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-800	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-750	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-700	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-650	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-600	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-550	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-500	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-450	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-400	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-350	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-300	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-250	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-200	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-150	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-100	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-50	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0
02-3-00	0.85	1.80	1.80	2.55	1.80	1.80	1.80	2.55	0	0

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF PROPOSED RIVER IMPROVEMENT
 WORKS FOR MASTER PLAN
 (DELI RIVER)
 Fig.3-5(2/8)

SERDANG RIVER



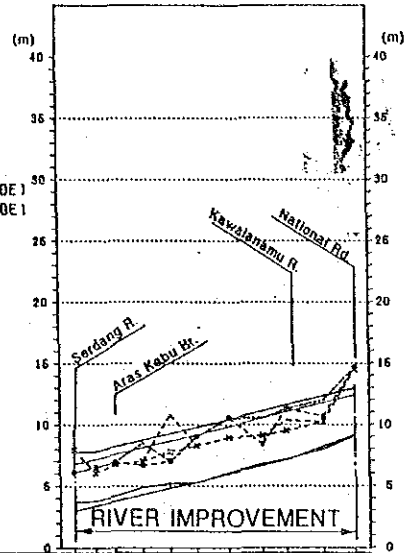
Gradient of Design Riverbed		1/5000	1/2500	1/1700	1/850
Design Elevation (m)	Dike Crown	2.480	2.490	2.510	2.530
	High Water	1.420	1.410	1.430	1.450
	Riverbed	-1.000	-0.810	-0.820	-0.840
Present Elevation (m)	Right Ground	1.21	0.91	0.87	0.89
	Left Ground	1.38	2.81	0.80	1.35
	Average Riverbed	-1.0	-1.0	0.2	0.4
Distance (m)		0	100	200	300
Station No. SE		0.000	0.960	1.820	2.670

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF PROPOSED RIVER IMPROVEMENT
WORKS FOR MASTER PLAN
(SERDANG RIVER)
Fig.3-5(4/8)

BATUGINGGING RIVER

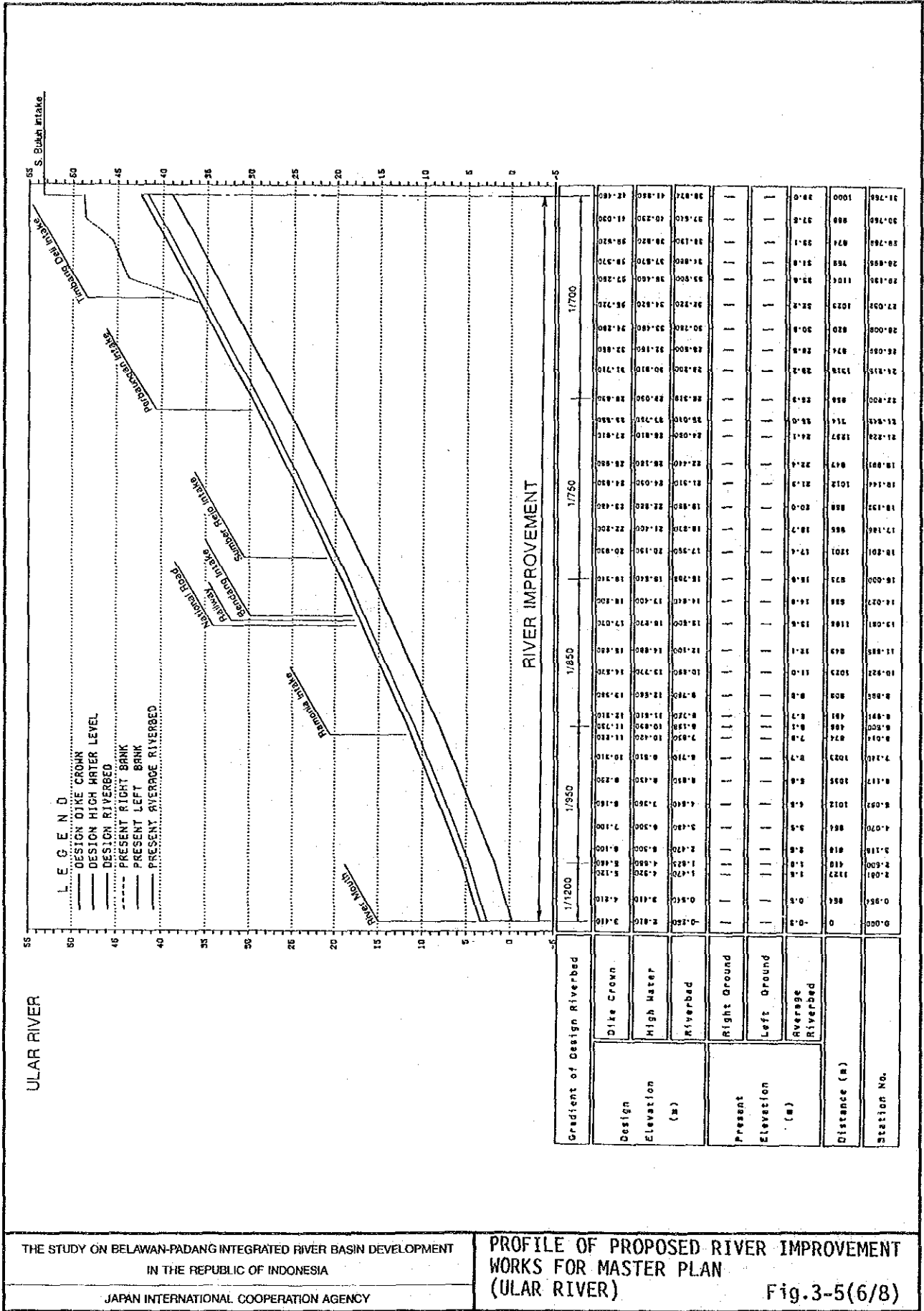
- LEGEND**
- DESIGN DIKE CROWN
 - DESIGN HIGH WATER LEVEL
 - DESIGN RIVERBED
 - - - PRESENT RIGHT BANK
 - - - PRESENT LEFT BANK
 - * - * - * PRESENT GROUND (RIGHT SIDE)
 - o - o - o PRESENT GROUND (LEFT SIDE)
 - PRESENT AVERAGE RIVERBED

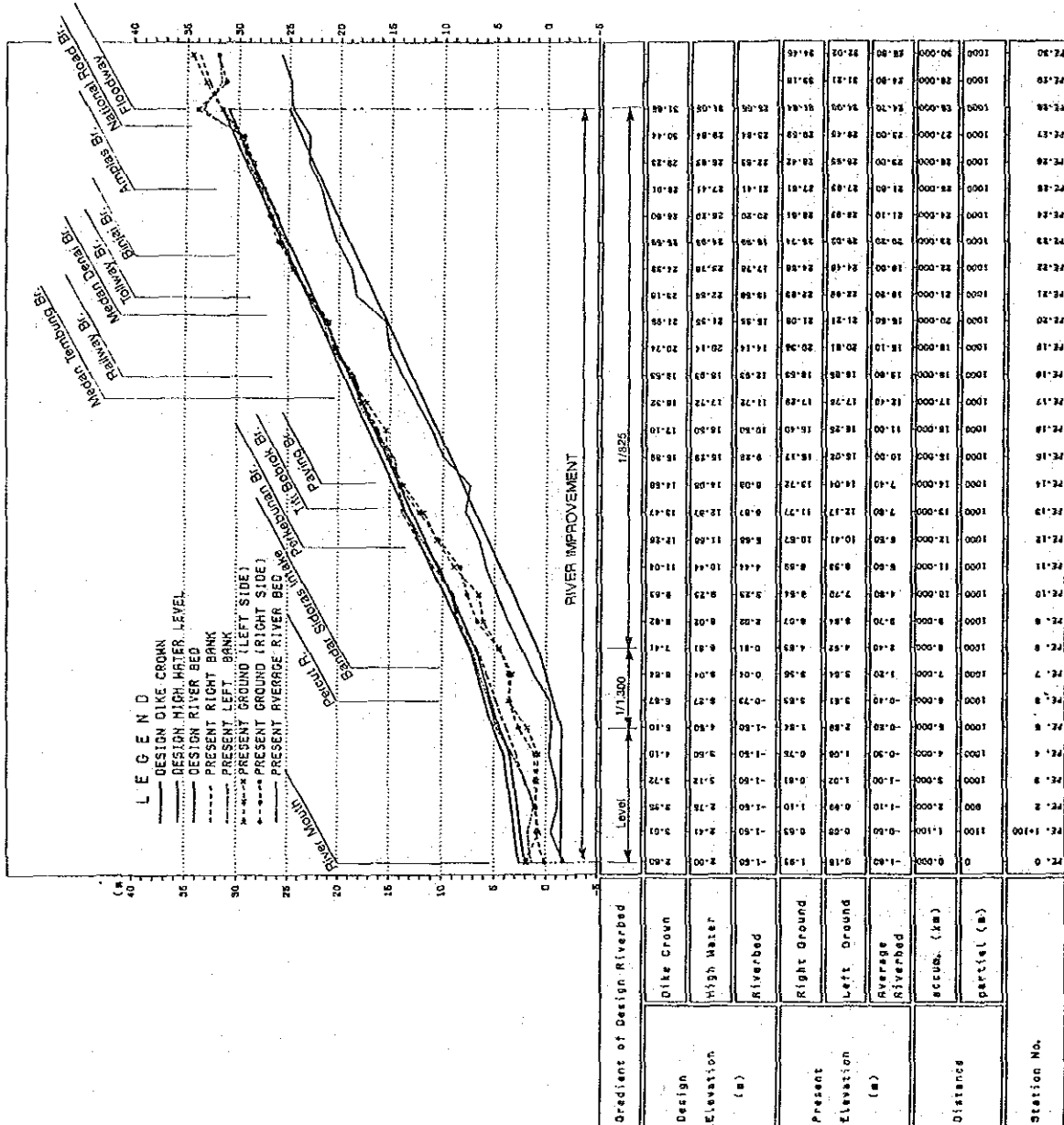


Gradient of Design Riverbed		1/1700	1/1010
Design Elevation (m)	Dike Crown	7.784	7.900
	High Water	8.900	9.016
	Riverbed	2.884	2.900
Present Elevation (m)	Right Ground	7.08	7.78
	Left Ground	6.18	6.88
	Average Riverbed	3.7	4.2
Distance (m)		0	1000
Station No. BG.		0.877	1.900

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF PROPOSED RIVER IMPROVEMENT
WORKS FOR MASTER PLAN
(BATUGINGGING RIVER) Fig.3-5(5/8)





THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROFILE OF PROPOSED RIVER IMPROVEMENT
 WORKS FOR MASTER PLAN
 (PADANG RIVER) Fig.3-5(8/8)

