TABLES

Table 3.1 Unit Cost of Materials

Item	Unit	Iloilo 93'	Iloilo 94' City	Increasing Rate	Ormoc 93'	Ormoc 94' City	Increasing Rate
Portland Cement	Bag	115	115	0%	105	110	5%
Sand	m3	180	200	10%	120	180	33%
Gravel 0.0 - 5.0 cm	m3	220	260	15%	130	180	28%
Boulders 20.0 - 25.0 cm	m3	250	250	0%	160	250	36%
Concrete Hollow Blocks	pc	7.0	7.5	7%	5.0	6.5	23%
Re-bar 10 mm	kg	15.0	15.0	0%	22.0	22.0	0%
R.C. Pile 24" * 1.0 m	l.m.	1,968	2,400	18%			
Gasoline	lit	10.17	10.17	0%	9.77	10.27	5%
Diesel	lit	7.41	7.41	0%	7.27	7.27	0%

Table 3.2 Unit Cost of Labor

Item	Unit	Iloilo 93'	Iloilo 94'	Increasing Rate	Ormoc 93'	Ormoc 94'	Increasing Rate
Labor							
Foreman	day	184.56	197.70	7%	125.00	147.81	18%
Capataz	day	170.70	183.84	8%	105.00	135.00	29%
Carpenter	day	145.14	157.99	9%	98.00	120.72	23%
Mason	day	145.14	157.99	9%	98.00	120.72	23%
Skilled Laborer	day	145.14	157.99	9%	98.00	120.72	23%
Heavy Equip. Operator	day	162.56	175.70	8%	116.00	132.00	14%
Electrician	day	145.14	157.99	9%	105.00	120.72	15%
Driver	day	141.06	153.92	9%	105.00	120.72	15%
Painter	day	145.14	157.99	9%	105.00	120.72	15%
Laborer	day	126.19	139.04	10%	90.90	113.62	25%

Table 3.3 Unit Cost of Equipment

Item	Unit	Cost 94'
Bulldozer	day	
a. D-8	day	10,496
b. D-6	day	5,739
Loader, 1.5 cu.m/2 yd.	day	2,703
Grader5,115 h.p.	day	2,749
2/3 Wheels Rd. Roller,9-11t	day	2,567
Sheefsfoot Roller,35 h.p.	day	1,543
Pneumatic Roller, 13 Wheels	day	2,223
Crane Crawler,21-25t	day	4,591
Crane, Trk. Mtd., 21-25t	day	5,415
Crane, Trk. Mtd., 2-5t	day	1,850
Pile Hammer, m-33	day	3,773
Drop Hammer 2t	day	95
Asphalt Distributor	day	3,823
Asphalt Paver, 88 hp	day	5,423
Conc. Mixer, 1.5-2 Bagger	day	637
Conc.Trans.Mixer, 4.79-5.73cu.m.	day	5,720
Dump Truck, 4.59-6.12cu.m.	day	4,847
Air Compressor, 251-351 cfm	day	2,615
Water Pump, 3 1/2-4 in	day	401
Welding Machine 300 amp	day	469
Water Truck, 500-1000 gals	day	4,530
Conc. Batch Plant, 40 tph	day	2,644
Asphalt Batch Plant, 60 tph	day	3,590
Aggregate Crusher	day	7,933

Table 3.4 Unit Cost of Compensation

Unit: Peso/sq.m

Land Classification	Iloilo 94'	Ormoc 94'	Cebu 94' (Estimated)	Tacloban 94' (Estimated)
Commercial Area	16,500	5,000	33,300	3,400
Residential Area				
Grade A	4,500	1,000	11,100	1,400
Grade B	3,050	280	8,000	1,100
Grade C	1,050		5,200	200
Agricultural Area	40	5	200	2
Fish-pond Area	50	2		2
Industrial Area	990	500	22,200	300
Ideal land	5	1	10	1
House	111,900	91,900	101,900	91,900

Grade A : Urban area
Grade B : Suburban Area
Grade C : Suburb Area

Table 3.5 Unit Cost of Construction Works

Item No.	Item of Work	Remark	Unit	TOTAL COST ILOILO	TOTAL COST ORMOC
1	excavation		m3	83.18	81.26
2	embankment	excavated materials	m3	79.17	77.51
3	embankment	borrow pit	m3	132.37	130.01
4	backfill		m3	72.93	71.47
5	dredging	spoil in land	m3	70.83	70.50
6	dredging	spoil in sea	m3	54.59	54.27
7	sodding		m2	19.03	15.94
8	concrete	210 kg, (steel 80.0kg/m)	m3	3,162.88	3,062.50
9	concrete	210 kg, (steel 30.0kg/m)	m3	3,055.09	2,914.89
10	concrete	180 kg, mass concrete	m3	2,362.46	2,241.73
11	concrete	180 kg,conc. dike	m3	2,658.43	2,541.09
12	wet mesonry		m2	184.76	161.98
13	backfill gravel		m2	433.31	383.11
14	steel sheet pile	l=8.0 m	m2	3,999.17	3,996.62
15	steel sheet pile	iloilo bredge protection	m2	5,129.96	5,194.03
16	concrete sheet pile		m2	3,145.26	3,066.67
17	boulder rip-rap		m3	453.55	447.80
18	gabion mattress		m3	554.40	535.53
19	boulder with anchor		no.	190.50	185.36
20	gravel pavement		m2	104.62	65.79
21	wooden pile	l = 3.0 m, D=0.15 m	m	154.75	133.26
22	concrete pipe	D= 1000 mm	m	3,705.40	3,635.12
23	concrete pipe	D= 800 mm	m	2,943.10	2,872.82
24	concrete pipe	D= 600 mm	m	2,356.54	2,292.73
25	flap gate	D = 600 mm	set	100,327.76	100,273.41
26	flap gate	D = 800 mm	set	116,057.76	116,003.41
27	flap gate	D = 1000 mm	set	138,535.60	139,476.62
28	slit gate	1.0 * 1.0 m	set	464,417.46	463,438.55
29	slit gate	1.2 * 1.2 m	set	493,445.36	493,864.00
30	slit gate	1.5 * 1.5 m	set	589,035.36	588,244.00
31	bridge		m2	22,989.10	23,403.14
32	RC. pile	0.5 * 0.5 *15 m	m	2,206.90	2,228.37
33	RC. pile	0.3 * 0.3 * 10 m	m	1,486.64	1,439.65

Table 3.6 Unit Cost of River/Drainage Structures

Unit : peso

Item No.	Item of Work	Remark	Unit	TOTAL COST Iloilo, Cebu	TOTAL COST Ormoc, Tacloban
1	Revetment	H=6.0 m	m	17,500	-
2		H=3.0 m, LWC	m	-	7,400
3		H=3.0 m, HWC	m	-	3,600
4	Retraining Wall	H=3.8 m	m3	7,900	7,200
5	Bridge		m2	22,989	23,403
6	Concrete Dike		m	20,000	-
7	Diversion	Conc. Weir H=4 m	m	118,000	-
8	Sluice	Type 1(1*1*1,L=12m)	no.	737,700	-
9		Type 2(D=1000,L=10 m)	no.	249,700	-
10		D=600,L=5m	no.	-	173,900
11	Jetty		m3	500	-
12	Invert Siphon	D=0.8 m	no.	898,100	-
13		D=1.0 m	no.	979,400	-
14	Silt Dam	Anilao1	no.	-	7,530,000
15	Box Culvert		no.	24,200	-
16	Drops	H=1.0 m	m	50,700	8,300
17		H=1.5 m	m	53,300	50,700
18		H=1.75 m	m	-	52,000
19	Bridge Protection		m2	5,130	-
20	MCF Protection		m2	148	-

Table 3.7 River Improvement Project Cost of Master Plan in Iloilo City

Work Items		Unit	Unit Cost (Pesos)	Jaro River		Iloilo River		Mandurriao River		Total	
				Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)
I. Main Construction Cost					900,521		268,786		147,888		1,317,196
1. Preparatory Works					74,423		22,214		12,222		108,859
2. Main Work					744,233		222,138		122,222		1,088,592
(1) Excavation		m3	83	3,069,000	254,727	0	0	75,000	6,225	3,144,000	260,952
(2) Embankment	Excavated Material	m3	79	463,000	36,577	0	0	0	0	463,000	36,577
	Barrow Pit	m3	132	0	0	63,000	8,316	72,000	9,504	135,000	17,820
(3) Backfill		m3	73	0	0	23,000	1,679	20,000	1,460	43,000	3,139
(4) Dredging	Spoil in Land	m3	71	0	0	563,000	39,973	250,000	17,750	813,000	57,723
	Spoil in Sea	m3	55	32,000	1,760	420,000	23,100	0	0	452,000	24,860
(5) Revetment	Type 1(H=3m)	m	11,900	0	0	0	0	1,100	13,090	1,100	13,090
	Type 1(H=6m)	m	17,500	10,900	190,750	0	0	0	0	10,900	190,750
	Type 1(H=7.2m)	m	19,400	1,000	19,400	0	0	0	0	1,000	19,400
	Type 2(H=2m)	m	27,800	1,600	44,480	0	0	1,800	50,040	3,400	94,520
	Type 2(H=3m)	m	29,400	0	0	300	8,820	0	0	300	8,820
(6) MFC Protection		m2	150	275,000	41,250	0	0	0	0	275,000	41,250
(7) Sodding		m2	19	252,000	4,788	20,000	380	2,900	55	274,900	5,223
(8) Gravel Pavement		m2	105	152,000	15,960	26,000	2,730	5,400	567	183,400	19,257
(9) Concrete Dike		m	20,000	0	0	4,780	95,600	0	0	4,780	95,600
(10) Diversion Works											
a. Lapaz Floodway	Conc. Weir H=0.7m (River	m	106,800	52	5,554	0	0	0	0	52	5,554
b. Jaro Floodway	Conc. Weir H=4m (River)	m	221,000	44	9,724	0	0	0	0	44	9,724
	Conc. Weir H=4m (FW)	m	221,000	68	15,028	0	0	0	0	68	15,028
c. Groundsill		m	27,100	80	2,168	0	0	0	0	80	2,168
(11) Sluice	Type A1	no.	772,900	2	1,546	0	0	0	0	2	1,546
	Type A2	no.	1,364,200	0	0	1	1,364	1	1,364	2	2,728
	Type A3	no.	2,085,500	0	0	1	2,086	1	2,086	2	4,171
	Type B0.6	no.	148,700	0	0	2	297	0	0	2	297
	Type B1.0x1	no.	192,500	6	1,155	1	193	0	0	7	1,348
	Type B1.0x2	no.	385,000	3	1,155	0	0	2	770	5	1,925
	Type B1.0x3	no.	577,500	1	578	0	0	0	0	1	578
(12) Jetty		m3	500	5,900	2,950	0	0	0	0	5,900	2,950
(13) Invert Siphon	D=0.7m	no.	829,900	1	830	0	0	0	0	1	830
	D=1.0m	no.	948,900	2	1,898	0	0	0	0	2	1,898
(14) Bridge		m2	22,989	4,000	91,956	1,100	25,288	840	19,311	5,940	136,555
(15) Bridge Protection		m2	5,130	0	0	2,400	12,312	0	0	2,400	12,312
3. Miscellaneous Works					81,866		24,435		13,444		119,745
II. Compensation Cost					457,553		51,909		68,197		577,659
(1) Land Acquisition	Residential A	m2	1,052	370,000	389,240	38,000	39,976	36,000	37,872	444,000	467,088
	Farm Land	m2	40	562,000	22,480	0	0	0	0	562,000	22,480
	Fish Pond	m2	50	94,000	4,700	82,000	4,100	0	0	176,000	8,800
	Other	m2	5	125,000	625	0	0	0	0	125,000	625
(2) House Compensation		no.	111,900	362	40,508	70	7,833	271	30,325	703	78,666
III. Administration Cost (5% of I+II)					67,904		16,035		10,804		94,743
IV. Physical Contingency (15% of I+II+III)					213,897		50,510		34,033		298,440
Total of I to IV					1,639,875		387,240		260,923		2,288,037
V. Engineering Services (16% of I. to IV)					144,083		43,006		23,662		210,751
Grand Total					1,783,958		430,245		284,585		2,498,788

Table 3.8 River Improvement Project Cost of Master Plan in Cebu City

Work Items		Unit	Unit Cost (Pesos)	Bulacao		Kinalumaan		Guadalupe		Labug		Subang Daku		Total	
				Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)
I. Main Construction Cost					89,617		166,504		169,813		217,487		245,115		888,536
1. Preparatory Works					7,406		13,761		14,034		17,974		20,257		73,433
2. Main Work					74,064		137,606		140,342		179,742		202,574		734,328
(1) Excavation		m3	83	297,000	24,651	143,000	11,869	330,000	27,390	149,600	12,417	374,000	31,042	1,293,600	107,369
(2) Embankment		m3	132	36,000	4,752	0	0	0	0	0	0	0	0	36,000	4,752
(3) Revetment		m	9,600	1,340	12,864	0	0	0	0	0	0	0	0	1,340	12,864
(4) Retaining Wall	H=2.8m	m	7,100	0	0	3,000	21,300	2,970	21,087	4,180	29,678	2,950	20,945	13,100	93,010
	H=3.1m	m	7,300	0	0	0	0	0	0	8,000	58,400	0	0	8,000	58,400
	H=3.6m	m	7,700	0	0	4,600	35,420	0	0	0	0	5,000	38,500	9,600	73,920
	H=3.8m	m	7,900	0	0	2,800	22,120	0	0	0	0	3,420	27,018	6,220	49,138
	H=4.3m	m	8,300	0	0	0	0	6,400	53,120	0	0	0	0	6,400	53,120
(5) Backfill Conc.		m3	2,658	0	0	2,520	6,698	600	1,595	2,400	6,379	5,040	13,396	10,560	28,068
(5) Sodding		m2	19	39,200	745	0	0	0	0	0	0	0	0	39,200	745
(6) Gravel Pavement		m2	105	15,900	1,670	0	0	0	0	0	0	0	0	15,900	1,670
(7) Drops	H=0.85m	m	49,900	0	0	12	599	0	0	0	0	12	599	24	1,198
	H=1.0m	m	50,700	244	12,371	0	0	0	0	0	0	232	11,762	476	24,133
	H=1.4m	m	52,700	0	0	0	0	0	0	11	580	0	0	11	580
	H=1.5m	m	53,300	0	0	96	5,117	36	1,919	55	2,932	0	0	187	9,967
	H=1.7m	m	54,300	0	0	0	0	18	977	0	0	0	0	18	977
(8) Bridge		m2	22,989	740	17,012	1,500	34,484	1,490	34,254	2,140	49,196	2,580	59,312	8,450	194,257
(9) Bridge for Labug River Mouth		no.	20,160,000	0	0	0	0	0	0	1	20,160	0	0	1	20,160
3. Miscellaneous Works					8,147		15,137		15,438		19,772		22,283		80,776
II. Compensation Cost					110,614		279,213		367,239		424,694		547,718		1,729,477
(1) Land Acquisition	Residential A	m2	5,150	18,000	92,700	52,000	267,800	5,300	27,295	19,870	102,331	102,000	525,300	197,170	1,015,426
	B	m2	8,000		0		0	5,000	40,000	38,130	305,040	0	0	43,130	345,040
	C	m2	11,100		0		0	25,700	285,270	0	0	0	0	25,700	285,270
	Farm Land	m2	170	82,000	13,940	0	0	0	0	0	0	0	0	82,000	13,940
(2) House Compensation		no.	101,900	39	3,974	112	11,413	144	14,674	170	17,323	220	22,418	685	69,802
III. Administration Cost (5% of I+II)					10,012		22,286		26,853		32,109		39,642		130,901
IV. Physical Contingency (15% of I+II+III)					31,536		70,200		84,586		101,143		124,871		412,337
Total of I to IV					241,780		538,203		648,490		775,433		957,345		3,161,251
V. Engineering Services (16% of I. to IV)					14,339		26,641		27,170		34,798		39,218		142,166
Grand Total					256,118		564,843		675,660		810,231		996,564		3,303,417

Table 3.9 River Improvement Project Cost of Master Plan in Ormoc City

Work Items		Unit	Unit Cost (Pesos)	Anilao river Quantity	Anilao river Amount (1000 P)	Malbasag River Quantity	Malbasag River Amount (1000 P)	Total Quantity	Total Amount (1000 P)
I. Main Construction Cost					154,474		104,221		258,695
1. Preparatory Works					12,766		8,613		21,380
2. Main Work					127,664		86,133		213,797
(1) Excavation		m3	81	166,000	13,446	225,000	18,225	391,000	31,671
(2) Embankment		m3	108	38,000	4,104	6,500	702	44,500	4,806
(3) Backfill		m3	71	60,000	4,260	45,000	3,195	105,000	7,455
(4) Revetment	(H=4m, LWC)	m	8,100	3,600	29,160	0	0	3,600	29,160
	(H=4m, HWC)	m	4,300	3,600	15,480	0	0	3,600	15,480
	(H=3m, LWC)	m	7,400	0	0	1,410	10,434	1,410	10,434
	(H=3m, HWC)	m	3,600	0	0	1,410	5,076	1,410	5,076
(5) Retaining Wall	H=3.8m	m	7,200	0	0	2,190	15,768	2,190	15,768
(6) MFC Protection		m2	148	21,000	3,108	10,225	1,513	31,225	4,621
(7) Sodding		m2	16	16,000	256	6,300	101	22,300	357
(8) Gravel Pavement		m2	66	11,000	726	10,800	713	21,800	1,439
(9) Drops	H=1.0m	m	48,300	0	0	35	1,691	35	1,691
	H=1.5m	m	50,700	40	2,028	64	3,245	104	5,273
	H=1.75m	m	52,000	80	4,160	0	0	80	4,160
(10) Sluice	Type A2	no.	1,352,600	2	2,705	0	0	2	2,705
	Type B0.6	no.	130,700	1	131	4	523	5	654
(11) Slit Dam	Anilao 1	no.	7,530,000	1	7,530	0	0	1	7,530
	Anilao 2	no.	5,670,000	1	5,670	0	0	1	5,670
	Malbasag	no.	9,070,000	0	0	1	9,070	1	9,070
(12) Maintenance Road for Slit Dams		m	1,500	800	1,200	600	900	1,400	2,100
(13) Bridge		m2	23,403	1,440	33,700	640	14,978	2,080	48,678
3. Miscellaneous Works					14,043		9,475		23,518
II. Compensation Cost					29,148		25,301		54,450
(1) Land Acquisition	Residential A	m2	0	0	0	0	0	0	0
	B	m2	280	34,800	9,744	39,700	11,116	74,500	20,860
	C	m2	1,000	0	0	0	0	0	0
	Farm Land	m2	5	0	0	0	0	0	0
	Forest, Wasteland	m2	1	13,400	13	32,700	33	46,100	46
(2) House Compensation		no.	91,900	211	19,391	154	14,153	365	33,544
III. Administration Cost (5% of I+II)					9,181		6,476		15,657
IV. Physical Contingency (15% of I+II+III)					28,920		20,400		49,320
Total of I to IV					221,724		156,398		378,122
V. Engineering Services (16% of I. to IV)					24,716		16,675		41,391
Grand Total					246,439		173,073		419,513

Table 3.10 Drainage Improvement Project Cost of Master Plan in Iloilo City

ILOILO CITY (1/5,1/3)

Work Items	Unit	Unit Cost (Peso)	Ingore Creek (5000 m)		Bo.Obrero Creek (4400 m)		Rizal Creek (620 m)		Total	
			Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)
I Main Construction										
1. Preparatory Works				4,263		3,631		675		8,569
2. Main Works										
(1) Excavation	m3	83	103,000	8,568	73,000	6,072	2,200	183	178,200	14,823
(2) Revetment	m2	1,400	10,200	14,280	10,400	14,560	700	980	21,300	29,820
(3) Concrete	m3	12,700	0	0	800	10,160	440	5,588	1,240	15,748
(4) Bridge	m2	23,000	860	19,780	240	5,520	0	0	1,100	25,300
Total Amount of Works				42,628		36,312		6,751		85,691
3. Miscellaneous Works (10% of 1+2)				4,689		3,994		743		9,426
Total of I				51,579		43,938		8,169		103,686
II Compensation				10,302		13,203		4,588		28,094
(1) Land	m2		46,000	8,400	8,500	6,825	0	0	54,500	15,225
(2) House	no.	111,900	17	1,902	57	6,378	41	4,588	115	12,869
III Administration (5% of I+II)				3,094		2,857		638		6,589
IV Physical Contingency (15% of I+II+III)				9,746		9,000		2,009		20,755
Total of I,II,III, and IV				74,722		68,998		15,404		159,123
V Engineering Services (16% of I)				8,253		7,030		1,307		16,590
Grand Total				82,975		76,028		16,711		175,713

Table 3.11 Drainage Improvement Project Cost of Master Plan in Cebu City (1/2)

CEBU CITY (1/5.1/3)

Work Items	Unit	Unit Cost (Peso)	Mabolo Creek (1930 m) Quantity	Mabolo Creek (1930 m) Amount (1000 P.)	Lahug Tributary (1680 m) Quantity	Lahug Tributary (1680 m) Amount (1000 P.)	Tinago Creek (1220 m) Quantity	Tinago Creek (1220 m) Amount (1000 P.)	Pahina Central M.D. (1100 m) Quantity	Pahina Central M.D. (1100 m) Amount (1000 P.)	Calamba Drainage Area M.D. (830 m) Quantity	Calamba Drainage Area M.D. (830 m) Amount (1000 P.)
I Main Construction												
1. Preparatory Works				1,711		1,385		2,813		3,886		2,191
2. Main Works												
(1) Excavation	m3	83	19,968	1,661	4,121	343	10,846	902	3,465	288	2,490	207
(2) Revetment	m2	1,400	10,375	14,525	8,910	12,474	10,699	14,979	0	0	0	0
(3) Concrete	m3	12,700	0	0	0	0	820	10,414	3,037	38,574	1,709	21,706
(4) Bridge	m2	23,000	40	920	45	1,035	80	1,840	0	0	0	0
Total Amount of Works				17,106		13,852		28,135		38,862		21,913
3. Miscellaneous Works (10% of 1+2)				1,882		1,524		3,095		4,275		2,410
Total of I				20,699		16,760		34,043		47,023		26,514
II Compensation												
(1) Land	m2		24,170	124,476	6,428	47,064	5,950	30,643	0	0	0	0
(2) House	no.	101,900	9	966	10	1,040	2	238	0	0	0	0
III Administration (5% of I+II)				7,307		3,243		3,246		2,351		1,326
IV Physical Contingency (15% of I+II+III)				23,017		10,216		10,225		7,406		4,176
Total of I,II,III, and IV				176,464		78,323		78,395		56,780		32,016
V Engineering Services (16% of I)				3,312		2,682		5,447		7,524		4,242
Grand Total				179,776		81,004		83,842		64,304		36,258

Table 3.11 Drainage Improvement Project Cost of Master Plan in Cebu City (2/2)

CEBU CITY (1/5.1/3)

Work Items	Unit	Unit Cost (Peso)	Sta. Teresita (530 m) Quantity	Sta. Teresita (530 m) Amount (1000 P.)	Basak-san Nicolas (860 m) Quantity	Basak-san Nicolas (860 m) Amount (1000 P.)	Sto. Niho Creek (1200 m) Quantity	Sto. Niho Creek (1200 m) Amount (1000 P.)	Barangsy Inayawan (1500 m) Quantity	Barangsy Inayawan (1500 m) Amount (1000 P.)	Total Quantity	Total Amount (1000 P.)
I Main Construction												
1. Preparatory Works				3,075		2,184		804		1,254		19,304
2. Main Works												
(1) Excavation	m3	83	2,625	218	4,485	373	23,441	1,950	13,221	1,100	84,662	7,042
(2) Revetment	m2	1,400	0	0	0	0	3,691	5,168	6,861	9,605	40,536	56,750
(3) Concrete	m3	12,700	2,404	30,532	1,690	21,468	0	0	0	0	9,661	122,693
(4) Bridge	m2	23,000	0	0	0	0	40	920	80	1,840	285	6,555
Total Amount of Works				30,750		21,841		8,037		12,544		193,041
3. Miscellaneous Works (10% of 1+2)				3,383		2,403		884		1,380		21,234
Total of I				37,208		26,428		9,725		15,179		233,579
II Compensation												371,542
(1) Land	m2		0	0	0	0	13,200	67,980	19,000	97,850	68,748	368,012
(2) House	no.	101,900	0	0	0	0	5	527	7	759	35	3,530
III Administration (5% of I+II)				1,860		1,321		3,912		5,689		30,256
IV Physical Contingency (15% of I+II+III)				5,860		4,162		12,322		17,922		95,307
Total of I,II,III, and IV				44,929		31,912		94,466		137,399		730,683
V Engineering Services (16% of I)				5,953		4,228		1,556		2,429		37,373
Grand Total				50,882		36,140		96,022		139,828		768,056

Table 3.12 Drainage Improvement Project Cost of Master Plan in Ormoc City

OROMOC CITY (1/5,1/3)

Work Items	Unit	Unit Cost (Peso)	Lotao Creek (1200 m) Quantity	Lotao Creek (1200 m) Amount (1000 P.)	City Proper Creek (630 m) Quantity	City Proper Creek (630 m) Amount (1000 P.)	Total Quantity	Total Amount (1000 P.)
I Main Construction								
1. Preparatory Works				589		665		1,254
2. Main Works								
(1) Excavation	m3	77	5,700	437	646	49	6,346	486
(2) Revetment	m2	1,400	2,300	3,220	2,043	2,860	4,343	6,080
(3) Concrete	m3	12,700	150	1,905	0	0	150	1,905
(4) Bridge	m2	23,400	14	328	160	3,744	174	4,072
Total Amount of Works				5,889		6,653		12,542
3. Miscellaneous Works (10% of 1+2)				648		732		1,380
Total of I				7,126		8,050		15,176
II Compensation								2,565
(1) Land	m2		4,000	4	2,583	723	6,583	727
(2) House	no.	91,900	13	1,195	7	643	20	1,838
III Administration (5% of I+II)				416		471		887
IV Physical Contingency (15% of I+II+III)				1,311		1,483		2,794
Total of I,II,III, and IV				10,052		11,371		21,423
V Engineering Services (16% of I)				1,140		1,288		2,428
Grand Total				11,192		12,659		23,851

Table3.13 Drainage Improvement Project Cost of Master Plan in Tacloban City (1/2)

TACLOBAN CITY (1/5,1/3)

Work Items	Unit	Unit Cost (Peso)	Abucay River (1700 m)		Naga-naga Creek (1000 m)		Mangonbangon River (4000 m)		Langhas Lirang Creek (3750 m)		Sagkahan Creek (380 m)	
			Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)	Quantity	Amount (1000 P.)
I Main Construction												
1. Preparatory Works				184		118		3,295		4,471		268
2. Main Works												
(1) Excavation	m3	77	5,712	438	3,240	248	40,670	3,116	74,450	5,704	474	36
(2) Revetment	m2	1,368	0	0	0	0	20,102	27,495	26,464	36,196	1,247	1,705
(3) Concrete	m3	12,700	0	0	0	0	0	0	0	0	0	0
(4) Bridge	m2	23,403	60	1,404	40	936	100	2,340	120	2,808	40	936
Total Amount of Works				1,842		1,184		32,951		44,709		2,678
3. Miscellaneous Works (10% of 1+2)				203		130		3,625		4,918		295
Total of I				2,229		1,433		39,871		54,097		3,240
II Compensation												
(1) Land	m2		19,720	1,919	1,800	192	40,570	31,782	52,000	16,201	1,330	1,397
(2) House	no.	91,900	4	400	0	40	66	6,095	35	3,252	3	266
III Administration (5% of I+II)				227		83		3,887		3,678		245
IV Physical Contingency (15% of I+II+III)				716		262		12,245		11,584		772
Total of I,II,III, and IV				5,491		2,010		93,881		88,813		5,919
V Engineering Services (16% of I)				357		229		6,379		8,656		518
Grand Total				5,848		2,239		100,260		97,468		6,438

Table3.13 Drainage Improvement Project Cost of Master Plan in Tacloban City (2/2)

TACLOBAN CITY (1/5,1/3)

Work Items	Unit	Unit Cost (Peso)	Pleasan Creek (1600 m) Quantity	Pleasan Creek (1600 m) Amount (1000 P.)	Burayan River (3500 m) Quantity	Burayan River (3500 m) Amount (1000 P.)	Total Quantity	Total Amount (1000 P.)
I Main Construction								
1. Preparatory Works				1,933		4,383		14,652
2. Main Works								
(1) Excavation	m3	77	11,268	863	47,300	3,624	183,114	14,029
(2) Revetment	m2	1,368	12,132	16,594	28,709	39,267	88,654	121,257
(3) Concrete	m3	12,700	0	0	0	0	0	0
(4) Bridge	m2	23,403	80	1,872	40	936	480	11,233
Total Amount of Works				19,329		43,827		146,519
3. Miscellaneous Works (10% of 1+2)				2,126		4,821		16,117
Total of I				23,388		53,030		177,288
II Compensation								85,441
(1) Land	m2		16,220	9,603	53,220	10,112	184,860	71,206
(2) House	no.	91,900	22	2,056	23	2,126	155	14,235
III Administration (5% of I+II)				1,752		3,263		13,136
IV Physical Contingency (15% of I+II+III)				5,520		10,280		41,380
Total of I,II,III, and IV				42,320		78,812		317,246
V Engineering Services (16% of I)				3,742		8,485		28,366
Grand Total				46,062		87,297		345,612

Table 3.14 River Improvement Project Cost of Urgent Plan in Iloilo City

Work Items		Unit	Unit Cost (Pesos)	Jaro River		Iloilo River		Mandurriao River		Total	
				Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)	Quantity	Amount (1000 P)
I. Main Construction Cost					436,142		177,571		147,888		761,600
1. Preparatory Works					36,045		14,675		12,222		62,942
2. Main Work					360,448		146,753		122,222		629,422
(1) Excavation		m3	83	1,865,000	154,795	0	0	75,000	6,225	1,940,000	161,020
(2) Embankment	Excavated Material	m3	79	230,500	18,210	0	0	0	0	230,500	18,210
	Barrow Pit	m3	132	0	0	63,000	8,316	72,000	9,504	135,000	17,820
(3) Backfill		m3	73	0	0	23,000	1,679	20,000	1,460	43,000	3,139
(4) Dredging	Spoil in Land	m3	71	0	0	0	0	250,000	17,750	250,000	17,750
	Spoil in Sea	m3	55	22,000	1,210	0	0	0	0	22,000	1,210
(5) Revetment	Type 1(H=3m)	m	11,900	0	0	0	0	1,100	13,090	1,100	13,090
	Type 1(H=6m)	m	17,500	2,250	39,375	0	0	0	0	2,250	39,375
	Type 1(H=7.2m)	m	19,400	1,000	19,400	0	0	0	0	1,000	19,400
	Type 2(H=2m)	m	27,800	1,600	44,480	0	0	1,800	50,040	3,400	94,520
	Type 2(H=3m)	m	29,400	0	0	300	8,820	0	0	300	8,820
(6) MFC Protection		m2	150	0	0	0	0	0	0	0	0
(7) Sodding		m2	19	117,600	2,234	20,000	380	2,900	55	140,500	2,670
(8) Gravel Pavement		m2	105	72,200	7,581	26,000	2,730	5,400	567	103,600	10,878
(9) Concrete Dike		m	20,000	0	0	4,780	95,600	0	0	4,780	95,600
(10) Diversion Works											
a. Lapaz Floodway	Conc. Weir H=0.7m (River	m	106,800	0	0	0	0	0	0	0	0
b. Jaro Floodway	Conc. Weir H=4m (River)	m	221,000	12	2,652	0	0	0	0	12	2,652
	Conc. Weir H=4m (FW)	m	221,000	68	15,028	0	0	0	0	68	15,028
c. Groundsill		m	27,100	50	1,355	0	0	0	0	50	1,355
(11) Sluice	Type A1	no.	772,900	2	1,546	0	0	0	0	2	1,546
	Type A2	no.	1,364,200	0	0	1	1,364	1	1,364	2	2,728
	Type A3	no.	2,085,500	0	0	1	2,086	1	2,086	2	4,171
	Type B0.6	no.	148,700	0	0	2	297	0	0	2	297
	Type B1.0x1	no.	192,500	3	578	1	193	0	0	4	770
	Type B1.0x2	no.	385,000	2	770	0	0	2	770	4	1,540
	Type B1.0x3	no.	577,500	0	0	0	0	0	0	0	0
(12) Jetty		m3	500	0	0	0	0	0	0	0	0
(13) Invert Siphon	D=0.7m	no.	829,900	1	830	0	0	0	0	1	830
	D=1.0m	no.	948,900	2	1,898	0	0	0	0	2	1,898
(14) Bridge		m2	22,989	2,110	48,507	1,100	25,288	840	19,311	4,050	93,105
(15) Bridge Protection		m2	5,130	0	0	0	0	0	0	0	0
3. Miscellaneous Works					39,649		16,143		13,444		69,236
II. Compensation Cost					111,910		51,909		68,197		232,016
(1) Land Acquisition	Residential A	m2	1,052	78,000	82,056	38,000	39,976	36,000	37,872	152,000	159,904
	Farm Land	m2	40	460,000	18,400	0	0	0	0	460,000	18,400
	Fish Pond	m2	50	69,000	3,450	82,000	4,100	0	0	151,000	7,550
	Other	m2	5	79,000	395	0	0	0	0	79,000	395
(2) House Compensation		no.	111,900	68	7,609	70	7,833	271	30,325	409	45,767
III. Administration Cost (5% of I+II)					27,403		11,474		10,804		49,681
IV. Physical Contingency (15% of I+II+III)					86,318		36,143		34,033		156,495
Total of I to IV					661,773		277,097		260,923		1,199,792
V. Engineering Services (16% of I. to IV)					69,783		28,411		23,662		121,856
Grand Total					731,555		305,508		284,585		1,321,648

Table 3.15 River Improvement Project Cost of Urgent Plan in Ormoc City

Work Items		Unit	Unit Cost (Pesos)	Anilao river Quantity	Anilao river Amount (1000 P)	Malbasag River Quantity	Malbasag River Amount (1000 P)	Total Quantity	Total Amount (1000 P)
I. Main Construction Cost					130,234		93,219		223,453
1. Preparatory Works					10,763		7,704		18,467
2. Main Work					107,632		77,041		184,672
(1) Excavation		m3	81	123,200	9,979	200,800	16,265	324,000	26,244
(2) Embankment		m3	108	38,000	4,104	6,500	702	44,500	4,806
(3) Backfill		m3	71	60,000	4,260	45,000	3,195	105,000	7,455
(4) Revetment	(H=4m, LWC)	m	8,100	3,600	29,160	0	0	3,600	29,160
	(H=4m, HWC)	m	4,300	3,600	15,480	0	0	3,600	15,480
	(H=3m, LWC)	m	7,400	0	0	2,505	18,537	2,505	18,537
	(H=3m, HWC)	m	3,600	0	0	2,505	9,018	2,505	9,018
(5) Retaining Wall	H=3.8m	m	7,200	0	0	1,095	7,884	1,095	7,884
(6) MFC Protection		m2	148	21,000	3,108	10,225	1,513	31,225	4,621
(7) Sodding		m2	16	16,000	256	6,300	101	22,300	357
(8) Gravel Pavement		m2	66	11,000	726	10,800	713	21,800	1,439
(9) Drops	H=1.0m	m	48,300	0	0	27	1,280	27	1,280
	H=1.5m	m	50,700	26	1,318	46	2,332	72	3,650
	H=1.75m	m	52,000	52	2,704	0	0	52	2,704
(10) Sluice	Type A2	no.	1,352,600	2	2,705	0	0	2	2,705
	Type B0.6	no.	130,700	1	131	4	523	5	654
(11) Slit Dam	Anilao 1	no.	7,530,000	0	0	0	0	0	0
	Anilao 2	no.	5,670,000	0	0	0	0	0	0
	Malbasag	no.	9,070,000	0	0	0	0	0	0
(12) Maintenance Road for Slit Dams		m	1,500	0	0	0	0	0	0
(13) Bridge		m2	23,403	1,440	33,700	640	14,978	2,080	48,678
3. Miscellaneous Works					11,839		8,474		20,314
II. Compensation Cost					29,148		25,301		54,450
(1) Land Acquisition	Residential A	m2	0	0	0	0	0	0	0
	B	m2	280	34,800	9,744	39,700	11,116	74,500	20,860
	C	m2	1,000	0	0	0	0	0	0
	Farm Land	m2	5	0	0	0	0	0	0
	Forest, Wasteland	m2	1	13,400	13	32,700	33	46,100	46
(2) House Compensation		no.	91,900	211	19,391	154	14,153	365	33,544
III. Administration Cost (5% of I+II)					7,969		5,926		13,895
IV. Physical Contingency (15% of I+II+III)					25,103		18,667		43,770
Total of I to IV					192,454		143,113		335,568
V. Engineering Services (16% of I. to IV)					20,837		14,915		35,753
Grand Total					213,292		158,028		371,320

Table 3.16 Drainage Improvement Project Cost of Urgent Plan in Iloilo City

Work Items	Unit	Unit Cost (Peso)	Ingore Creek (5450 m) Quantity	Ingore Creek (5450 m) Amount (1000 P.)	Rizal (560 m) Quantity	Rizal (560 m) Amount (1000 P.)	Bo. Obrero Creek (4420 m) Quantity	Bo. Obrero Creek (4420 m) Amount (1000 P.)	Total Quantity	Total Amount (1000 P.)
I Main Construction										
1. Preparatory Works				4,576		571		3,196		8,343
2. Main Works										
(1) Excavation	m3	83	111,186	9,248	1,892	157	74,108	6,164	187,186	15,570
(2) Bridge	m2	22,989	856	19,679	0	0	236	5,425	1,092	25,104
(3) Revetment	m2	1,412	10,330	14,588	644	909	13,290	18,768	24,264	34,266
(4) Sodding	m2	19	34,354	654	847	16	14,081	268	49,282	938
(5) Gravel Pavement	m2	105	15,240	1,594	296	31	0	0	15,536	1,625
(6) Box Culvert	m	24,200	0	0	190	4,598	55	1,331	245	5,929
Total Amount of Works				45,763		5,712		31,957		83,432
3. Miscellaneous Works (10% of 1. +2.)				5,034		628		3,515		9,178
Total of I				55,374		6,911		38,668		100,953
II Compensation										
(1) Land	m2		49,335	9,362	0	0	8,555	6,673	57,890	16,035
(2) House	no.	111,900	14	1,549	18	2,048	28	3,147	60	6,744
Total of II				10,911		2,048				
III Administration (5% of I + II)				3,314		448		2,424		6,187
IV Physical Contingency (15% of I + II + III)				10,440		1,411		7,637		19,488
Total of I,II,III, and IV				80,039		10,819		58,549		149,406
V Engineering Services (16% of I)				8,860		1,106		6,187		16,152
Grand Total				88,898		11,924		64,736		165,559

Table 3.17 Drainage Improvement Project Cost of UrgentPlan in Ormoc City

Work Items	Unit	Unit Cost (Peso)	Lotao (1200 m) Quantity	Amount (1000 P.)
I Main Construction				
1. Preparatory Works				558
2. Main Works				
(1) Excavation	m3	81	5,730	466
(2) Bridge	m2	23,403	0	0
(3) Revetment	m2	1,368	2,270	3,105
(4) Sodding	m2	21	3,347	69
(5) Gravel Pavement	m2	66	1,845	121
(6) Box Culvert	m	24,200	75	1,815
Total Amount of Works				5,576
3. Miscellaneous Works (10% of 1. +2.)				613
Total of I				6,747
II Compensation				
(1) Land	m2		4,020	40
(2) House	no.	91,900	7	649
Total of II				689
III Administration (5% of I + II)				372
IV Physical Contingency (15% of I + II + III)				1,171
Total of I,II,III, and IV				8,979
V Engineering Services (16% of I,II,III and IV)				1,079
Grand Total				10,058

FIGURES

Implementation Schedule for Master Plan

	Quantity km	Construction Cost (million Pesos)
Iloilo City		1,964
Jaro	14.00	1,273
Floodway	5.90	
Iloilo	6.60	366
Mandurriao	4.72	181
Drainage	8.37	143
Cebu City		1,620
Bulacao	2.65	129
Kinalumsan	4.00	244
Guadalupe	4.50	253
Lahug	5.00	301
Subang Daku	5.54	352
Drainage	5.49	170
Drainage	5.36	171
Ormoc City		381
Anilao	2.00	215
Malbasag	2.20	145
Drainage	1.43	21
Tacloban City		
Drainage	15.93	247

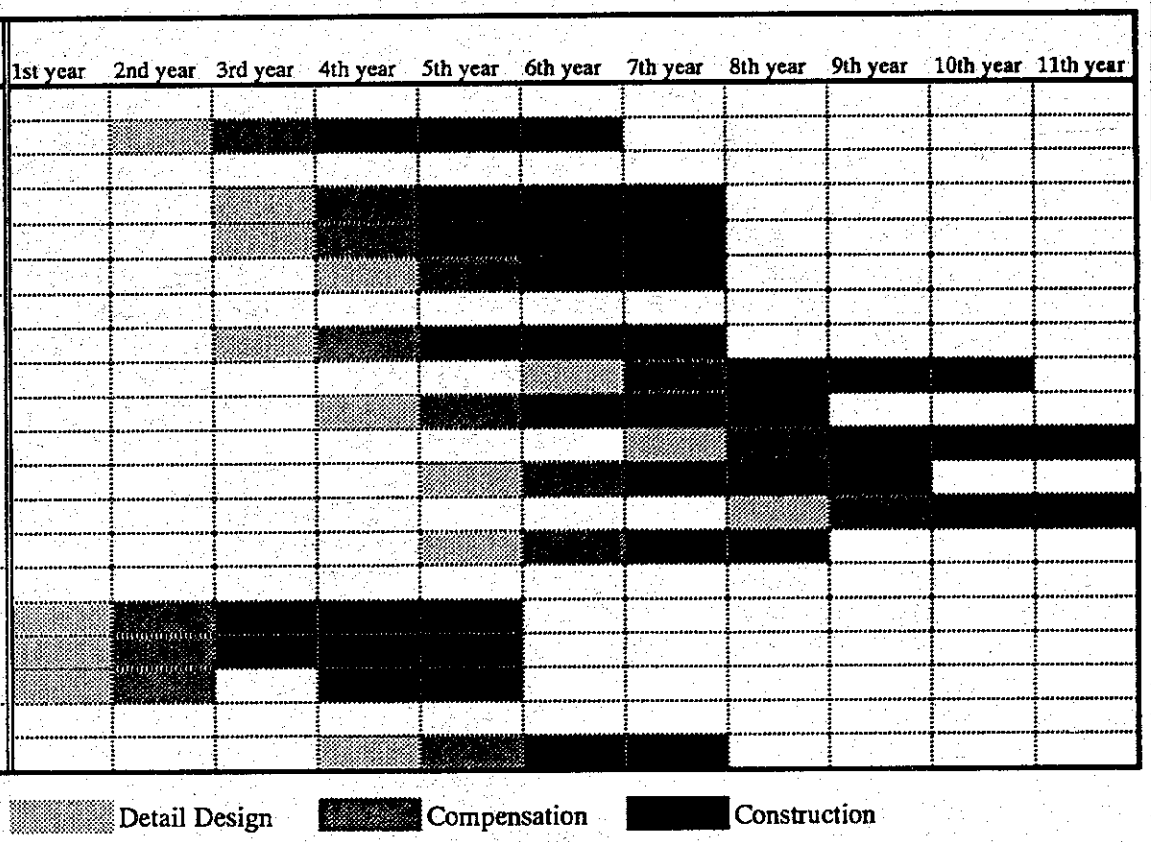
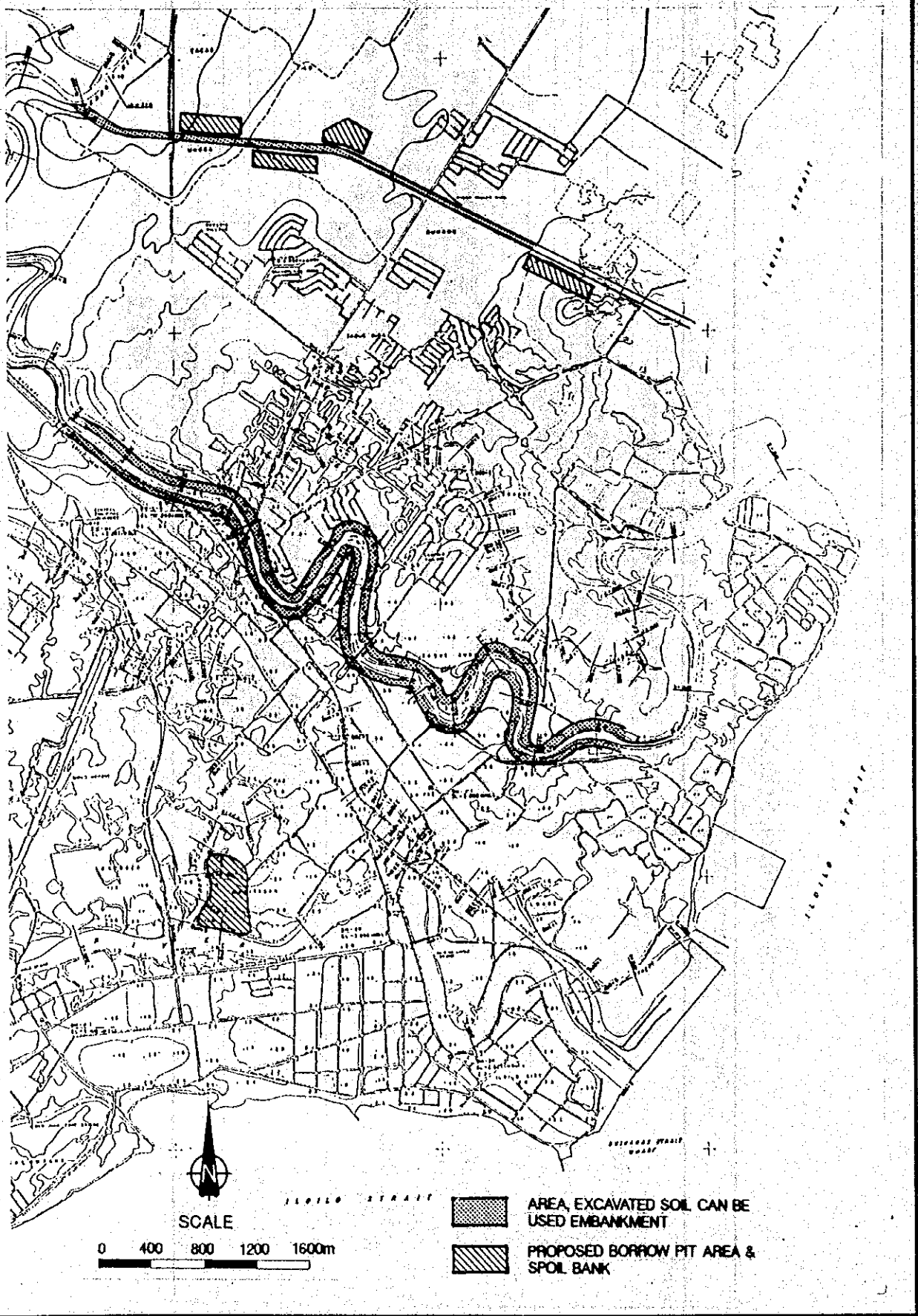


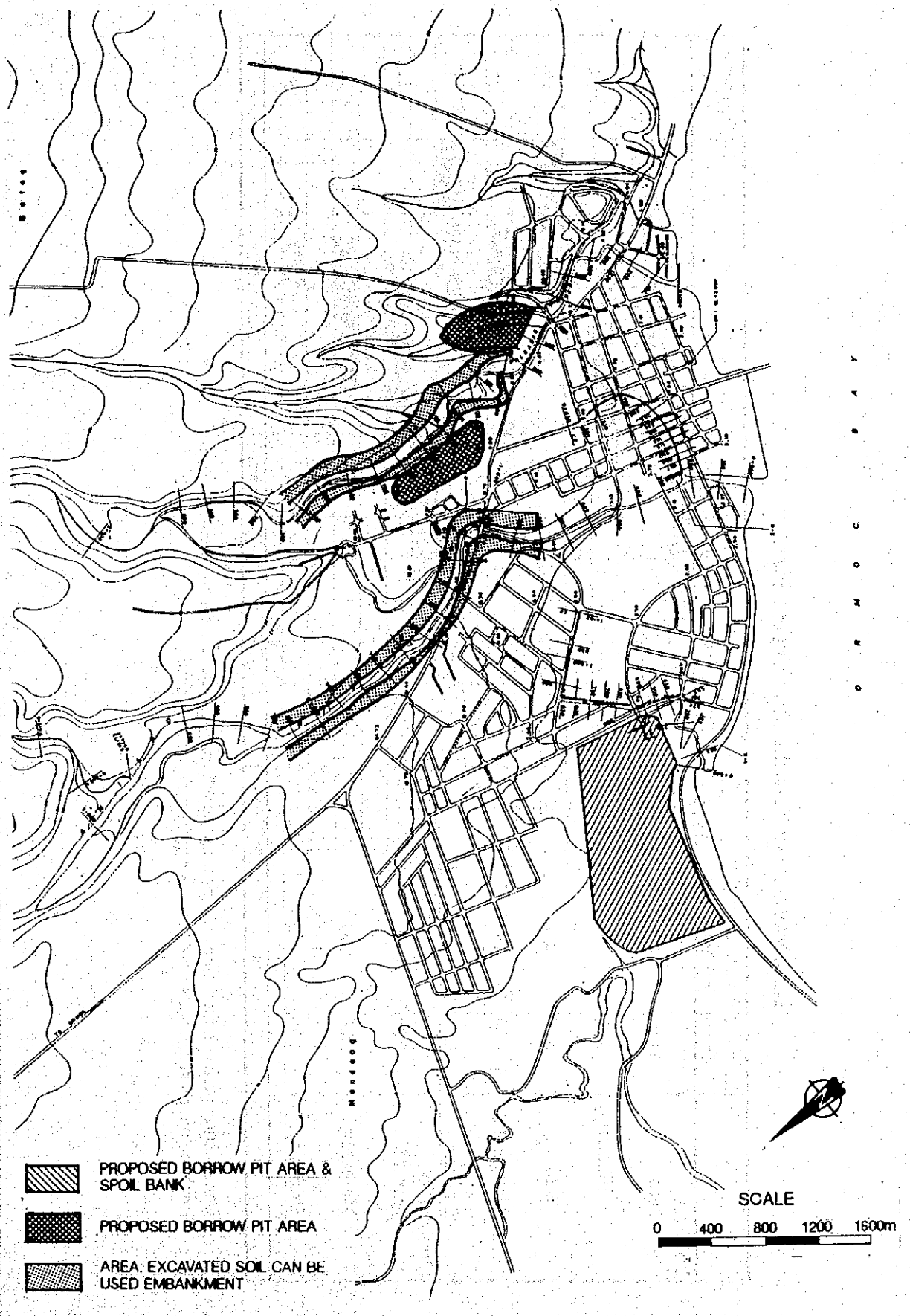
Fig. 2.1 Implementation Schedule of the Master Plan

THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS	Fig. 2.2
JAPAN INTERNATIONAL COOPERATION AGENCY	Proposed Spoil Bank and Borrow Pit in Iloilo City



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS	Fig. 2.3
JAPAN INTERNATIONAL COOPERATION AGENCY	Proposed Spoil Bank and Borrow Pit in Ormoc City

Implementation Schedule for Urgent Plan

	Quantity (km)	Construction Cost (million Pesos)	1994	1995	1996	1997	1998	1999	2000	2001	Construction Period
Iloilo City		1,175.6									
Jaro	14.00	614.1									2.00
Floodway	4.80										2.00
Iloilo	6.50	241.4									2.00
Mandurriao	4.20	180.7									1.75
Drainage	10.51	139.5									1.75
Ormoc City		321.3									
Anilao	2.00	182.2									1.75
Malbasag	2.20	129.8									1.50
Drainage	1.20	9.3									0.50
			F/S		D/D	Compensation		Construction			

1). Construction period is including mobilization, demobilization and other preparation works.
2). Implementation schedule is based on the loan agreement contracts.

THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 2.4 Implementation Schedule of the Urgent Plan

SUPPORTING REPORT

ON

SURVEY

SUPPORTING REPORT
ON
SURVEY

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1. INTRODUCTION

Topographic survey, river/channel survey and riverbed materials survey have been carried out for the Master Plan Study on flood control of rivers in the selected urban centers of, Iloilo, Cebu, Ormoc and Tacloban, and for the Feasibility Study on the Urgent Plan for Iloilo and Ormoc. The surveys carried out are as mentioned below.

(1) Master Plan Study

Spot elevation, drainage channel survey and river survey, together with traverse survey, were carried out for related rivers and urban drainage channels in the four (4) urban centers selected. Riverbed materials survey was also conducted.

(2) Feasibility Study

Additional river and drainage channel surveys were carried out for the rivers and urban drainage channels in Iloilo and Ormoc cities. Topographic survey was also conducted for the proposed structure sites and the riverine area of Anilao and Malbasag in Ormoc City.

Photographic surveying and mapping was undertaken for Iloilo City by the JICA Study Team from January to May 1994.

2. SCOPE OF WORK

2.1 River and Topographic Survey

Master Plan Study Stage

The survey work was conducted for the Master Plan Study in the four (4) urban centers selected; namely, Iloilo, Cebu, Ormoc and Tacloban.

(1) River Survey

The river survey was carried out for the twelve (12) rivers selected, and plane surveying was also conducted for the following river stretches:

City/River	Length (km)	Catchment Area (km^2)	Remarks
Iloilo			
(1) Jaro	66.0	412.0	Positioning river section is based on traverse survey
(2) Iloilo	25.0	106.0	
Cebu			
(1) Bulacao	13.5	10.7	Positioning river section is based on the topomap with a scale of 1/10,000
(2) Kinalumsan	8.4	17.8	
(3) Guadalupe	12.2	16.3	
(4) Lahug	9.5	6.3	
(5) Subang Daku	7.0	12.6	
Ormoc			
(1) Anilao	16.5	25.2	Positioning river section is based on traverse survey
(2) Malbasag	11.7	11.1	
Tacloban			
(1) Abucay	2.5	2.4	
(2) Mangonbangon	3.6	4.9	
(3) Burayan	3.0	6.5	
Total	178.9	631.8	

(a) Plane Survey

Traverse survey or Global Positioning System (GPS) survey was employed to fix the survey line of cross-sectioning. The total length is 75 km with 250 survey selections which are plotted in the map with a scale of 1/10,000.

(b) Longitudinal Profile and Cross-Section Survey

Longitudinal profile for a total length of 75 km and cross-section for a total of 250 sections were carried out. The interval of cross-sections is approx. 500 m from the river mouth 200 m long each from the riverside.

(2) Channel Survey

The channel survey was carried out for drainage channels in the four (4) urban centers selected by positioning the survey points in the map with a scale of 1/10,000.

The longitudinal profile and cross-section survey were carried out at intervals of approx. 200 m and a length of 20 m each from the channel side for a total of 150 lines.

(3) Leveling

To delineate the inundation area especially in urban areas, leveling was carried out for urban and surrounding areas. Total leveling distance is approx. 80 km with 360 points located by simple GPS. This leveling and GPS survey were used for the preparation of contourline in the map with a scale of 1/10,000.

Feasibility Study Stage

Additional surveys were conducted for the Feasibility Study. The survey works were conducted, based on the results of the photogrammetry and topo-mapping for Iloilo City (Scale: 1/5,000 and 1/10,000) undertaken between the Master Plan Study Stage and the Feasibility Study Stage.

(1) River Survey

Longitudinal profile 40 km in total length and cross-section survey for a total of 150 sections were carried out for the four (4) rivers selected for the Feasibility Study; namely, Jaro, Iloilo, Anilao and Malbasag. The interval of cross-section is approx. 250 m for rivers in Iloilo City and 100 m for rivers in Ormoc City, with a length of 50 m each from the riverside.

(2) Channel Survey

The channel survey was carried out for five (5) urban drainage channels, three in Iloilo City and two in Ormoc City. The positioning of cross-sections was made, based on the aerophotographic map with a scale of 1/5,000.

The longitudinal profile for 13 km and cross-section survey of 210 sections in total was carried out with an interval of approx. 20 m and a length of 20 m each from both sides of the channel.

(3) Topographic Survey

Topographic survey map with a scale of 1/500 for the riverine area of Anilao and Malbasag rivers and 1/200 for the sites of major facilities proposed are prepared.

2.2 Riverbed Material Survey

Survey was conducted on riverbed materials at three (3) points each for seven (7) rivers as tabulated below: The sampling sites are three each at the down, middle and upper streams of the respective river channels. In total, 21 samples were tested for sieving (JIS A1204) and specific gravity (JIS A1202) tests.

Item No.	Name of River	No. of Sampling Sites
1.	Jaro	3
2.	Iloilo	3
3.	Guadalupe	3
4.	Kinalumsan	3
5.	Anilao	3
6.	Malbasag	3
7.	Mangonbangon	3
Total		21

3. PROGRESS OF SURVEY

3.1 Ground Survey

Immediately after the field investigation and collection of data/information, some quantities of ground survey works were modified to the appropriate total quantity of the survey. The modifications were made to compensate and adjust the work quantities among the survey items without changing thecontract period and amount for the works.

(1) Progress of Work

The contents and covering areas of the ground survey were finally determined upon the completion of the first field investigation. Furthermore, small adjustments of work quantity were made to cope with the requirements of the Study, which were gradually detailed through the progress of the works. The work was subcontracted by the JICA Study Team to PACER (13th Floor, Strata 100 Bldg., Emerald Avenue, Pasig, Metro Manila) on April 2, 1993.

The survey works started with the spot elevation survey, and the river survey and drainage channel survey were consecutively carried out following the traverse survey. The field survey works in Ormoc and Tacloban cities were finished at the end of May 1993. That of Cebu City was finished at the beginning of June, and Iloilo was on June 25, 1993.

In parallel with the field works, the calculations and drafting work were carried out based on the field survey results. Final drawings were prepared after the check and inspection by the Study Team and completed on July 25, 1993. The original schedule and actual progress of the Ground Survey is presented in Fig. 3.1.

(2) Modification of Work Quantity

(a) Spot Elevation Survey

The total number of spot elevation surveys was increased from 350 to 432 points after examining the collected data and topographic maps. The detailed number of spot elevation survey is summarized as follows.

City	Original	Actual
Iloilo	100	217
Cebu	150	90
Ormoc	50	53
Tacloban	50	72
Total	350	432

(b) Drainage Channel Survey

Based on the result of field survey and the information/data collected by the Study Team, the quantity of drainage channel survey was also modified to cope with the requirements of the Study. The object areas of the survey was concentrated in the poor drainage area and newly developed urban area. Furthermore, the survey for closed channels and pipes were not carried out due to the difficulty to open maintenance holes. The actual work quantity is shown below.

City	Profile		Cross Section	
	Plan	Actual	Plan	Actual
Iloilo	7.0	14.5	50	97
Cebu	7.0	6.3	50	57
Ormoc	4.0	1.7	30	25
Tacloban	2.0	12.5	20	56
Total	20.0	35.0	150	235

(c) River Survey

The number of objective river for river survey is increased from 8 to 13 rivers. The increased quantities in the river survey was adjusted by increasing the interval of cross-sections and decreasing the width of cross-sectioning. The changes in river survey are summarized as follows:

City/River	Profile (km)		Cross Section	
	Plan	Actual	Plan	Actual
Iloilo City	43.0	49.5	120	98
Jaro	23.0	26.5	60	56
Aganan	10.0	11.0	30	25
Iloilo	10	12.0	30	18
Cebu City	17.5	23.6	70	87
Bulacao	-.-	2.6	-	8
Kinalumsan	6.0	4.0	35	15
Guadalupe	6.5	6.0	35	21
Lahug	5.0	5.5	20	24
Subang Daku	-.-	5.5	-	19
Ormoc City	14.5	14.0	40	36
Anilao	9.5	9.0	25	23
Malbasag	5.0	5.0	15	13
Tacloban City	-.-	9.2	-	31
Mangonbangon	-.-	4.0	-	20
Abucay	-.-	1.7	-	7
Burayan	-.-	3.5	-	4
Total	75.0	96.3	250	252

(d) Traverse Survey

By the collected topographical maps and aerial photos, the quantity of traverse survey was reduced, while the reduced quantity was adjusted by increasing the number of spot elevations. The actual quantity of traverse survey is shown as follows:

City	Plan	Actual
Iloilo	43.0	20.0
Cebu	17.5	0.0
Ormoc	14.5	14.0
Tacloban	-.-	7.2
Total	75.0	41.2

(2) Collection of Topographic Maps and Aerial Photos

The JICA Study Team had collected the following additional topographic maps and aerial photos through the field investigation:

(a) Iloilo City

Semi-rectified photo-mosaics: scale of 1/2,500 on the basis of aerial photos in scale of 1/15,000 taken in 1980. (City Planning and Development Office)

(b) Cebu City

Topographical maps (colored): scale of 1/5,000 on the basis of aerial photos taken in 1988. (NAMRIA with the German Agency for Technical Cooperation)

Topographic maps: scale of 1/2,500 digitized on the basis of topographic maps of 1/2,000 taken in 1981. (Water Resources Center, University of San Carlos)

(c) Ormoc City

Aerial photos: scale of 1/12,500 taken in 1972. (NAMRIA)

(d) Tacloban City

Topographic maps: scale of 1/2,500 and 1/5,000 on the basis of aerial photos taken in 1981. (City Planning and Development Office, Tacloban City)

3.2 Additional Ground Survey

The area of survey works is delineated on the basis of the Master Plan completed in 1993. The work was subcontracted by the JICA Study Team to PACER (13th floor Strata 100 Bldg., Emerald Avene, Pasig, Metro Manila) made on May 19, 1994.

(1) Progress of Work

The survey work started with the river survey followed by the topographic survey at the diversion points of the two (2) proposed floodways, then proceeded to the drainage channel survey.

Upon the completion of field work in Iloilo City, on June 16, 1994, the survey team proceeded to Ormoc City for river, topographic and drainage channel surveys in sequence. Calculations and drafting work were carried out in parallel with the field work. Final drawings were prepared after the check and inspection by the Study Team and completed on July 31, 1994. All results of the survey, together with the drawings, were submitted to the Study Team on August 2, 1994.

On the other hand, the topographic map of Iloilo City (scale: 1/5,000) and the upper stream of Jaro River (scale: 1/10,000), which was prepared based on another contract with JICA, were received by the Study Team in the beginning of July 1994. The Study Team gave instructions to the survey team to incorporate the results of the survey into the topographic maps.

(2) Modification of Work Quantity

After field investigation and collection of data/information conducted by the Study Team, some quantities in the ground survey works were modified. The modification was made to compensate and adjust the original work quantity among the survey items without changing the contract period and amount of the works.

The modifications are summarized as follows, with details given in Table 3.1.

Survey Item	Location	Original	Actual
River Survey			
Longitudinal	Iloilo	35.0 km	35.2 km
	Ormoc	5.0 km	5.0 km
Cross-section	Iloilo	100 sections	19 sections
	Ormoc	50 sections	41 sections
Drainage Survey			
Longitudinal	Iloilo	11.0 km	10.0 km
	Ormoc	2.0 km	1.1 km
Cross-section	Iloilo	180 sections	150 sections
	Ormoc	30 sections	14 sections
Topographic Survey			
Scale of 1/500	Iloilo	8.0 ha	10.9 ha
	Ormoc	80.0 ha	99.0 ha
Scale of 1/200	Ormoc	6.0 ha	5.2 ha
Total			
Longitudinal		53.0 km	51.5 km
Cross-section		360 sections	401 sections
Topographic		94.0 ha	115.1 ha

3.3 Riverbed Materials Survey

The riverbed materials survey was subcontracted by the JICA Study Team to a local consultant; Ground Test & Const. Corporation (26 Denver St., Cubao, Quezon City). The work was completed on June 8, 1993.

(1) Sampling Sites

Out of the eleven (11) related rivers of the four (4) cities selected, samples were collected for seven (7) rivers. The location of sampling sites are shown in Fig. 3.2 for Iloilo City, Fig. 3.3 for Cebu City, Fig. 3.4 for Tacloban City and Fig. 3.5 for Ormoc City.

Three (3) sampling spots for each river were selected by considering the distribution of riverbed materials and arranged as samples collected at upper stream, midstream and downstream, respectively.

(2) Laboratory Test

The following two items of laboratory tests were conducted.

(a) Grain Size Analysis

° Method Used : sieve test for 76.2 mm to 0.074 mm
hydrometer for less than 0.074 mm

° Amount Used	:	less than 20 mm:	1,000 g
		20 to 30 mm:	2,000 g
		30 to 40mm:	3,000 g
		40 to 50 mm:	4,000 g
		more than 50mm:	all the amount taken from site

(3) Result of Laboratory Test

The results of grain size analysis are shown in Fig. 3.6 to 3.12 as particle size distribution curve, and the results of the specific gravity tests are compiled into the summary of the laboratory test result as shown in the Table 3.2.

TABLES

Table 3.1 Final Result of Ground Survey Works

City Name		Location	Work Content	Quantity of Contract	Carry-Out Quantity	# of Original Sheets	Notes
Iloilo	Aero-photo	Study Area	Plan			10	S=1:5000
	River	Jaro	Cross-Section	50 sections	68 sections	35	H=1:500,V=1:100
			Longitudinal Profile	17.0km	17.8km	6	H=1:5000,V=1:100
		Iloilo	Cross-Section	25 sections	30 sections	18	H=1:500,V=1:100
			Longitudinal Profile	7.5km	7.6km	3	H=1:5000,V=1:100
		Manduriao	Cross-Section	50 sections	68 sections	29	H=1:200,V=1:100
			Longitudinal Profile	5.5km	4.8km	2	H=1:5000,V=1:100
		Floodway Jaro	Cross-Section	30 sections	26 sections	7	H=1:500,V=1:100
			Longitudinal Profile	6.5km	4.8km	1	H=1:2000,V=1:100
			Topographic	4.0ha	5.8ha	1	S=1:500
		Floodway Lapaz	Cross-Section	4 sections	4 sections	1	H=1:500,V=1:100
			Longitudinal Profile	0.6km	0.4km	1	H=1:2000,V=1:100
			Topographic	4.0ha	5.1ha	1	S=1:500
	Drainage	R-4 Ingore	Cross-Section	120 sections	85 sections	41	H=1:100,V=1:100
			Longitudinal Profile	6.0km	5.5km	4	h=1:2000,V=1:50
		R-3 Obrero	Cross-Section	80 sections	59 sections	28	H=1:100,V=1:100
			Longitudinal Profile	4.5km	4.2km	3	H=1:2000,V=1:50
		R-2 Rezal	Cross-Section	10 sections	6 sections	4	H=1:100,V=1:100
			Longitudinal Profile	0.5km	0.3km	1	H=1:2000,V=1:50
Ormoc	Study Area		Revised Plan			2	S=1:5000
	River	Anilao	Cross-Section	25 sections	22 sections	10	H=1:500,V=1:100
			Longitudinal Profile	2.0km	2.5km	1	H=1:5000,V=1:100
			Topographic	40.0ha	57.2ha	9	S=1:500
		Malbasag	Cross-Section	25 sections	19 sections	21	H=1:500,V=1:100
			Longitudinal Profile	2.0km	2.5km	1	H=1:5000,V=1:100
			Topographic	40.0ha	41.8ha	6	S=1:500
	Drainage	R-1 Lotao	Cross-Section	20 sections	14 sections	7	H=1:100,V=1:100
			Longitudinal Profile	1.1km	1.1km	1	H=1:2000,V=1:50
		R-2	Cross-Section	10 sections	N/A	N/A	
			Longitudinal Profile	0.9km	N/A	N/A	
	Dam Site	A-1	Cross-Section	1 section	1 section	1	h=1:200,V=1:100
			Topographic	2.0ha	1.4ha	1	S=1:200
		A-2	Cross-Section	1 section	1 section	1	H=1:200,V=1:100
			Topographic	2.0ha	1.3ha	1	S=1:200
		M-1	Cross-Section	1 section	1 section	1	H=1:200,V=1:100
			Topographic	2.0ha	2.5ha	1	S=1:200

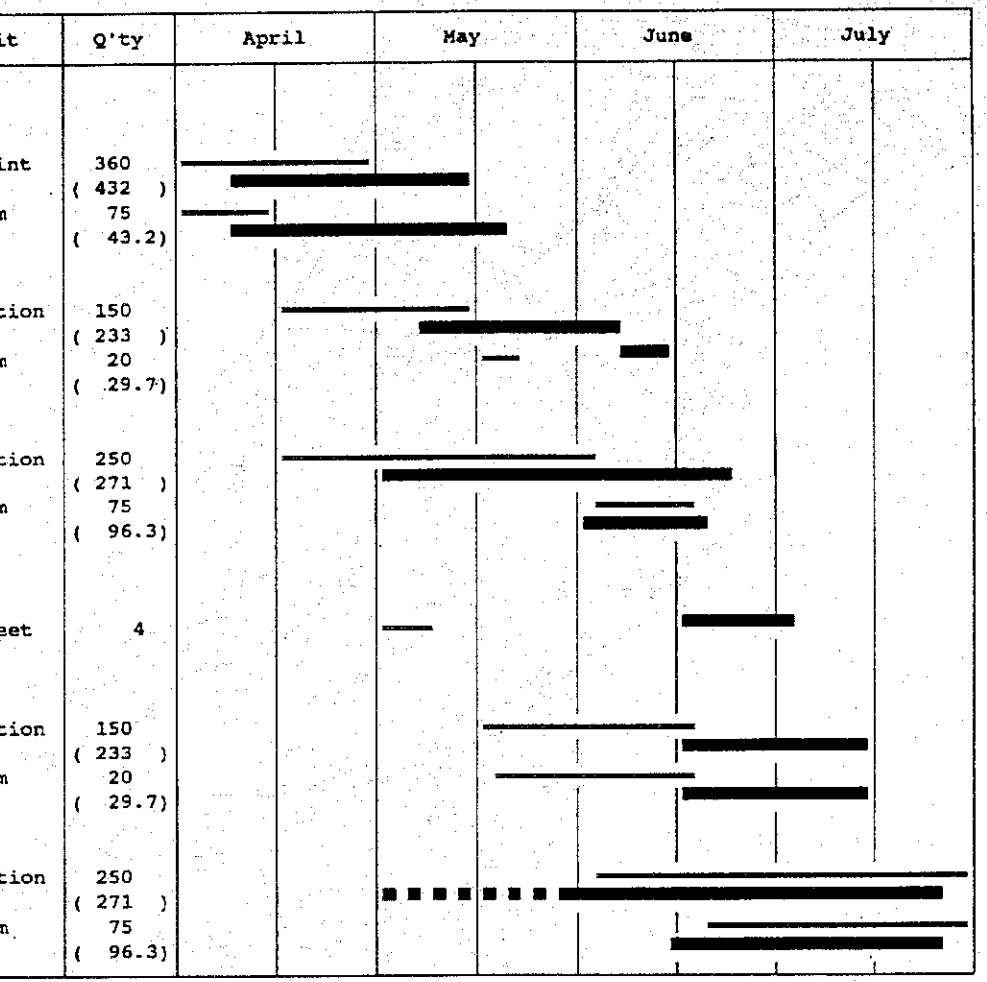
Table 3.2 Summary of Laboratory Test Results

Name of River	Sample No.	Specific Gravity			Grain Size Distribution		
					Gravel	Sand	Silt/Clay
		>9.52mm	.074 - 9.52mm	<.074mm	>20mm	20 - .074mm	<.074mm
Iloilo	I-1	-	2.47	2.68	3	19	78
	I-2	-	2.38	2.63	9	70	21
	I-3	-	2.50	2.62	5	86	9
Jaro	J-1	-	2.90	2.65	1	98	1
	J-2	2.17	2.64	2.50	59	34	7
	J-3	2.09	2.75	2.65	52	48	0
Kinalumsan	K-1	1.99	2.27	-	56	44	0
	K-2	2.04	2.46	-	75	25	0
	K-3	-	2.59	-	89	11	0
Guadalupe	G-1	2.44	2.32	2.62	50	46	4
	G-2	1.75	2.40	-	60	40	0
	G-3	1.97	2.42	2.62	79	17	4
Anilao	AN-1	1.93	2.39	-	52	48	0
	AN-2	2.07	2.18	2.67	46	51	3
	AN-3	1.89	2.42	2.65	60	37	3
Malbasag	ML-1	1.78	2.57	-	57	43	0
	ML-2	2.39	2.18	-	58	42	0
	ML-3	2.01	2.42	-	55	45	0
Mangonbangon	M-1	-	2.29	2.63	8	82	10
	M-2	-	2.19	2.62	4	80	16
	M-3	-	2.49	-	44	56	0

FIGURES

SCHEDULE AND PROGRESS OF GROUND SURVEY WORKS

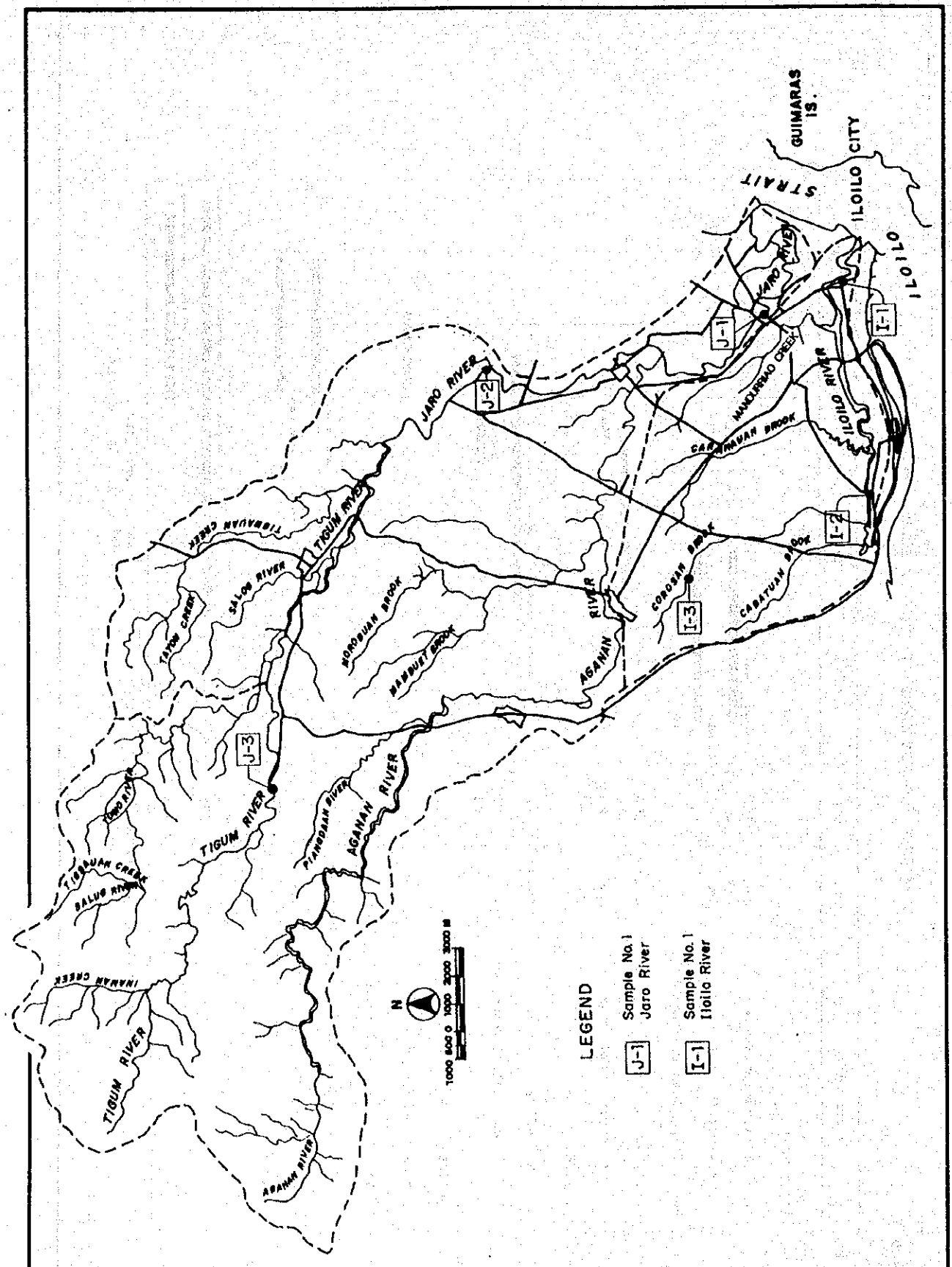
Description	Unit	Q'ty
FIELD WORKS		
1. Spot Elevation Survey	point	360 (432)
2. Traverse Survey	km	75 (43.2)
3. Drainage Channel Survey		
(a) Cross-Section	section	150 (233)
(b) Longitudinal Profile	km	20 (29.7)
4. River Survey		
(a) Cross-Section	section	250 (271)
(b) Longitudinal Profile	km	75 (96.3)
OFFICE WORKS - Drafting		
1. Spot Elevation Survey	sheet	4
2. Drainage Channel Survey		
(a) Cross-Section	section	150 (233)
(b) Longitudinal Profile	km	20 (29.7)
3. River Survey		
(a) Cross-Section	section	250 (271)
(b) Longitudinal Profile	km	75 (96.3)



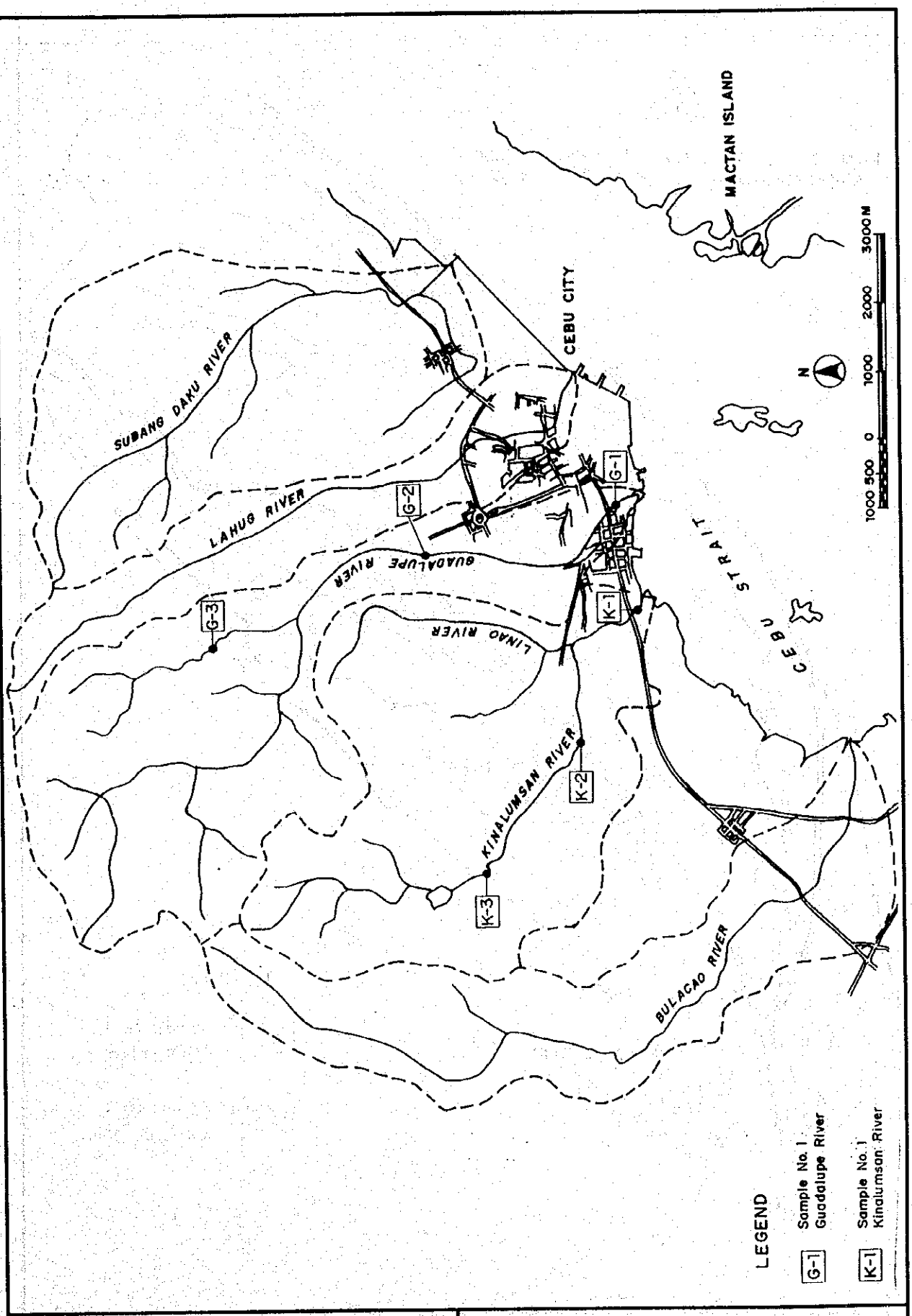
(Note) Figures in parentheses are the actual work quantity.

: Scheduled
: Actual Progress

Fig. 3.1 Schedule and Progress of Ground Survey Works



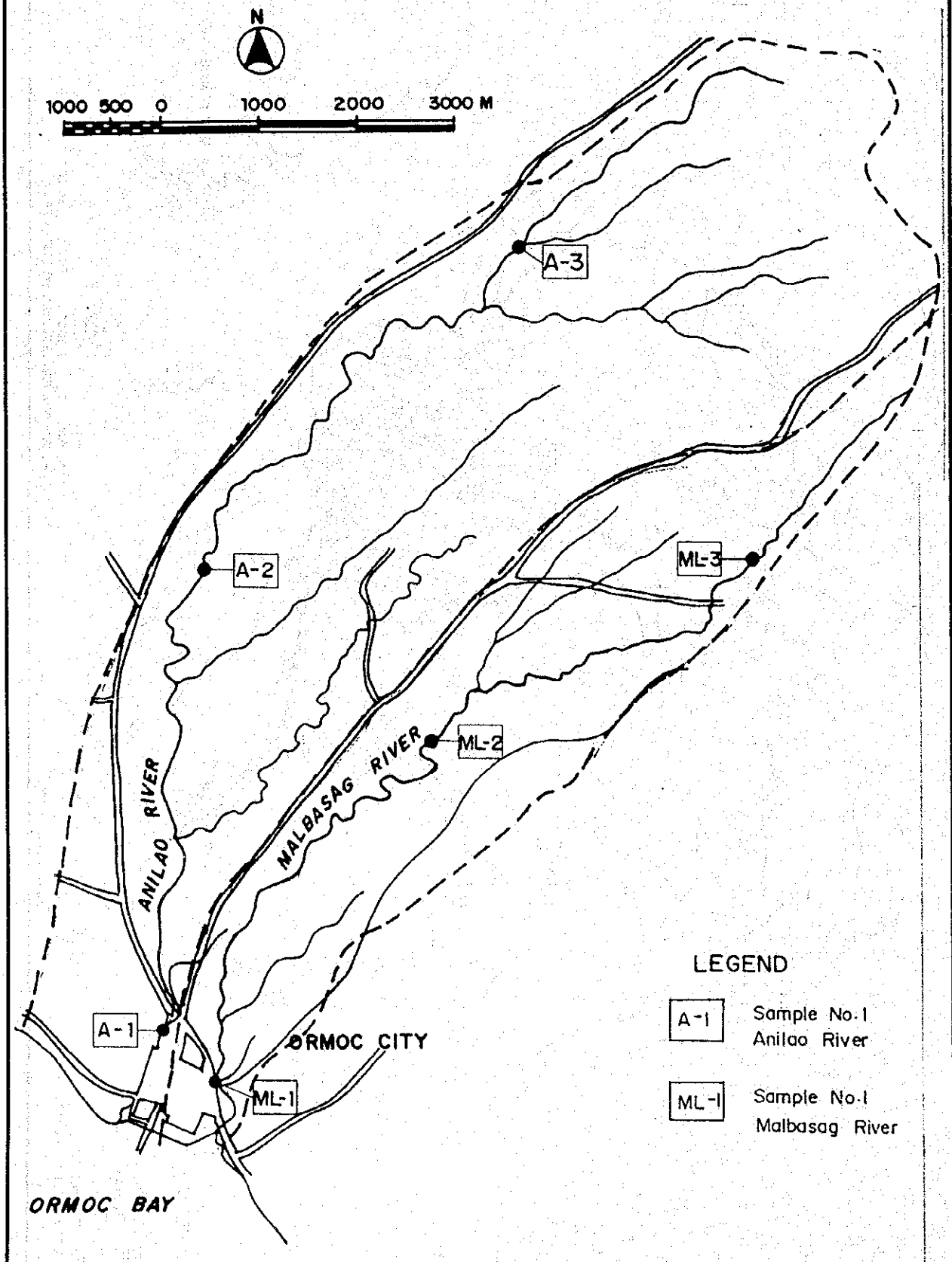
THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS	Fig. 3.2
JAPAN INTERNATIONAL COOPERATION AGENCY	Location of Sampling Sites for Iloilo City



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY

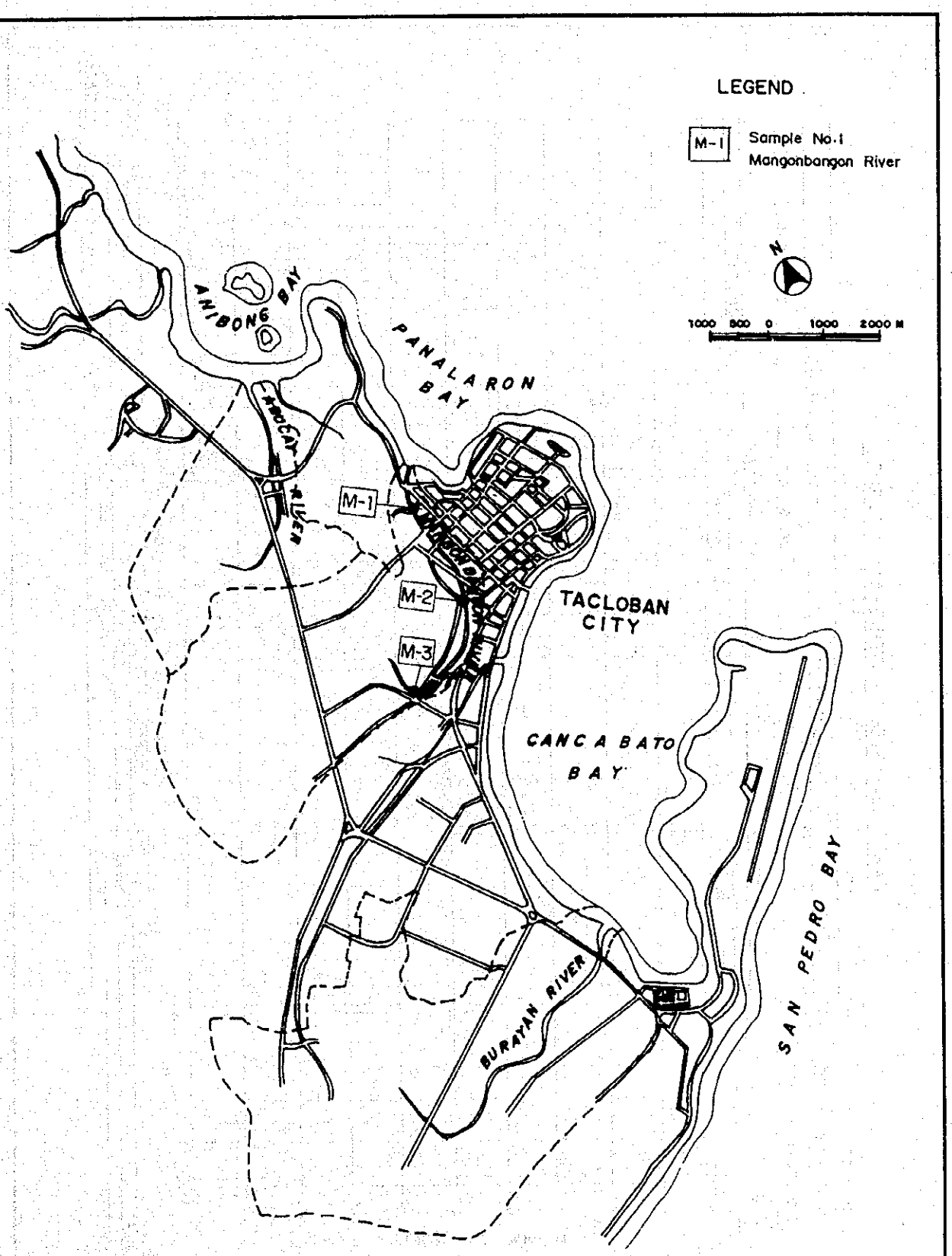
Fig. 3.3
Location of Sampling Sites for Cebu City



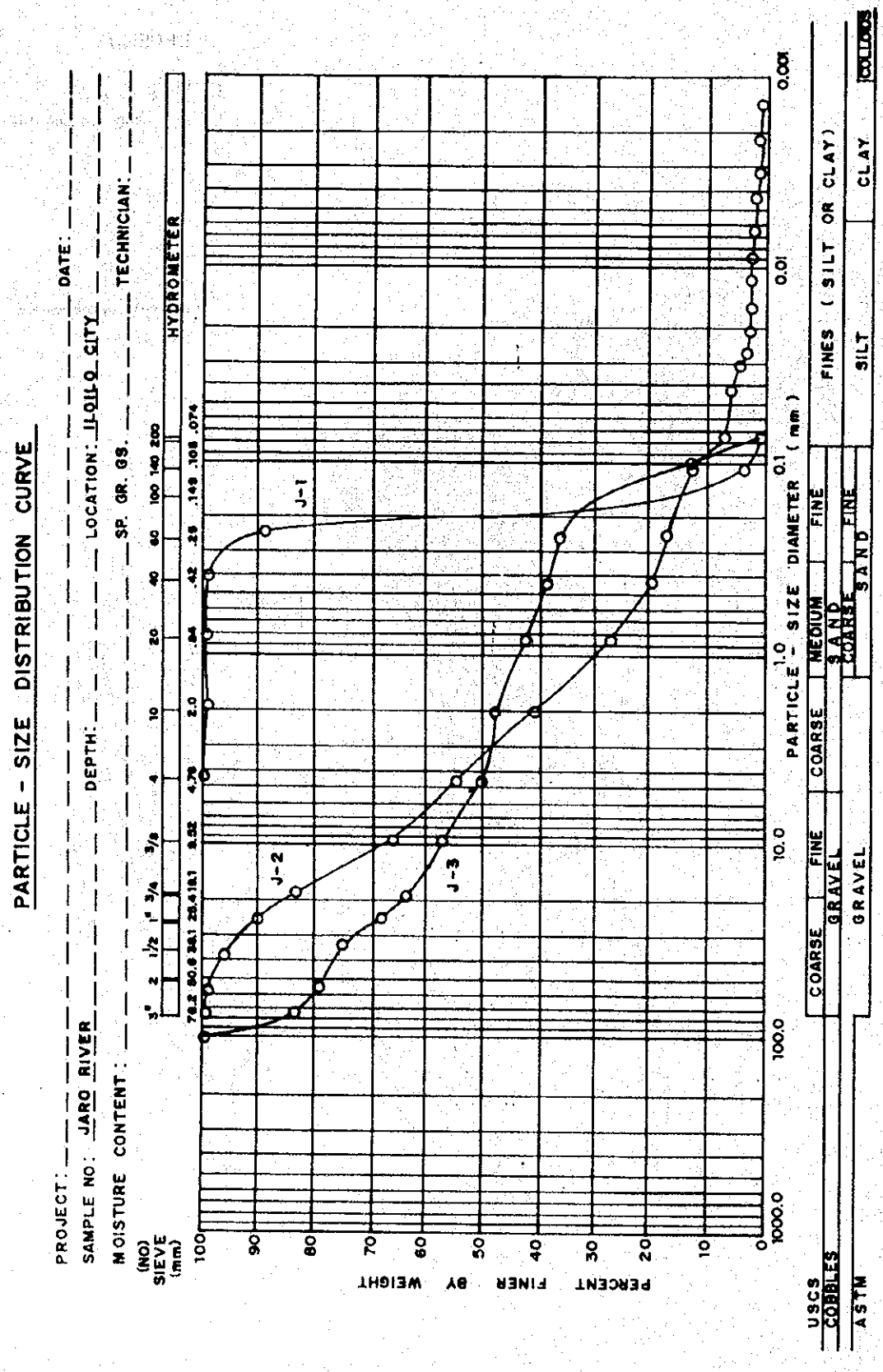
THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 3.4
Location of Sampling Sites for Tacloban City



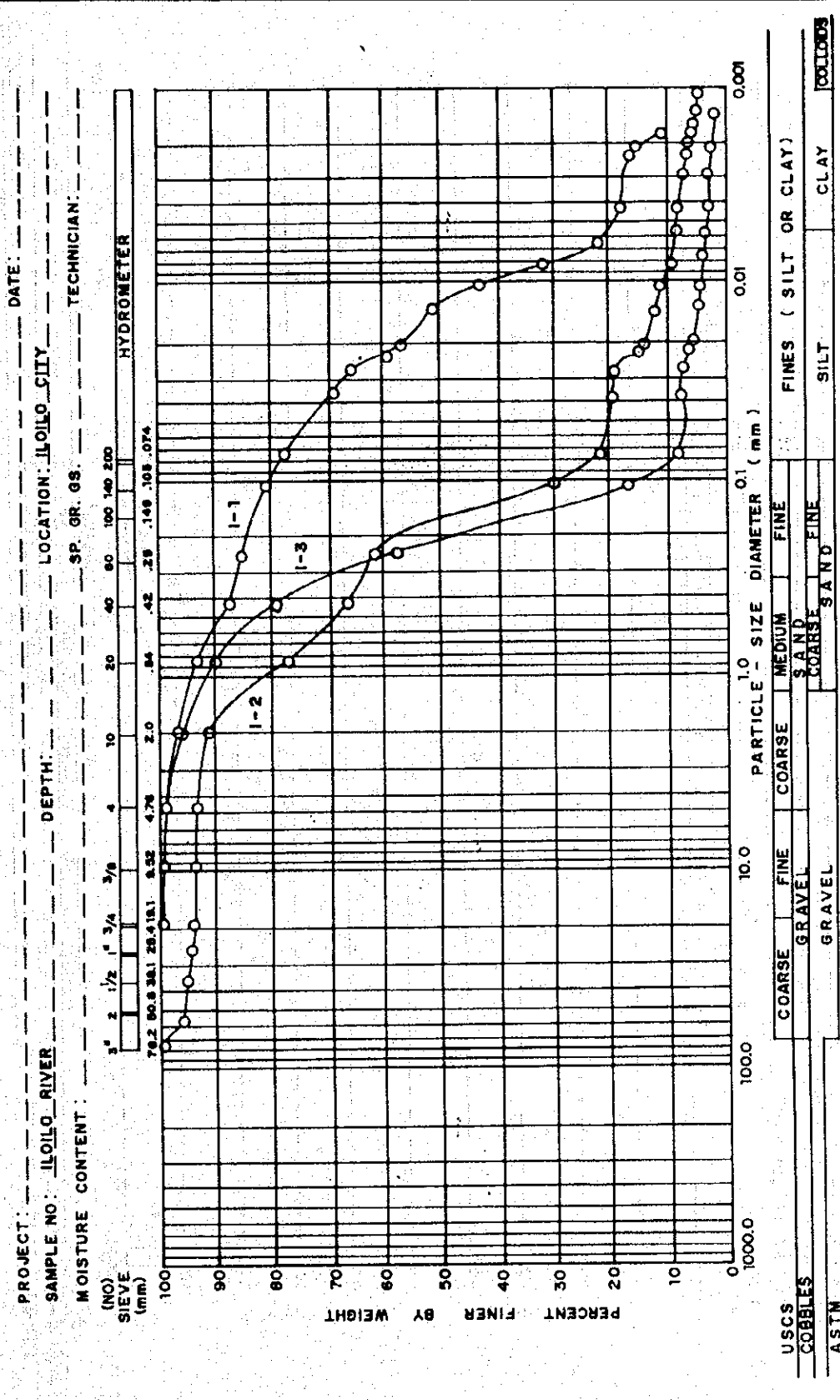
THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS	Fig. 3.5
JAPAN INTERNATIONAL COOPERATION AGENCY	Location of Sampling Sites for Ormoc City



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY

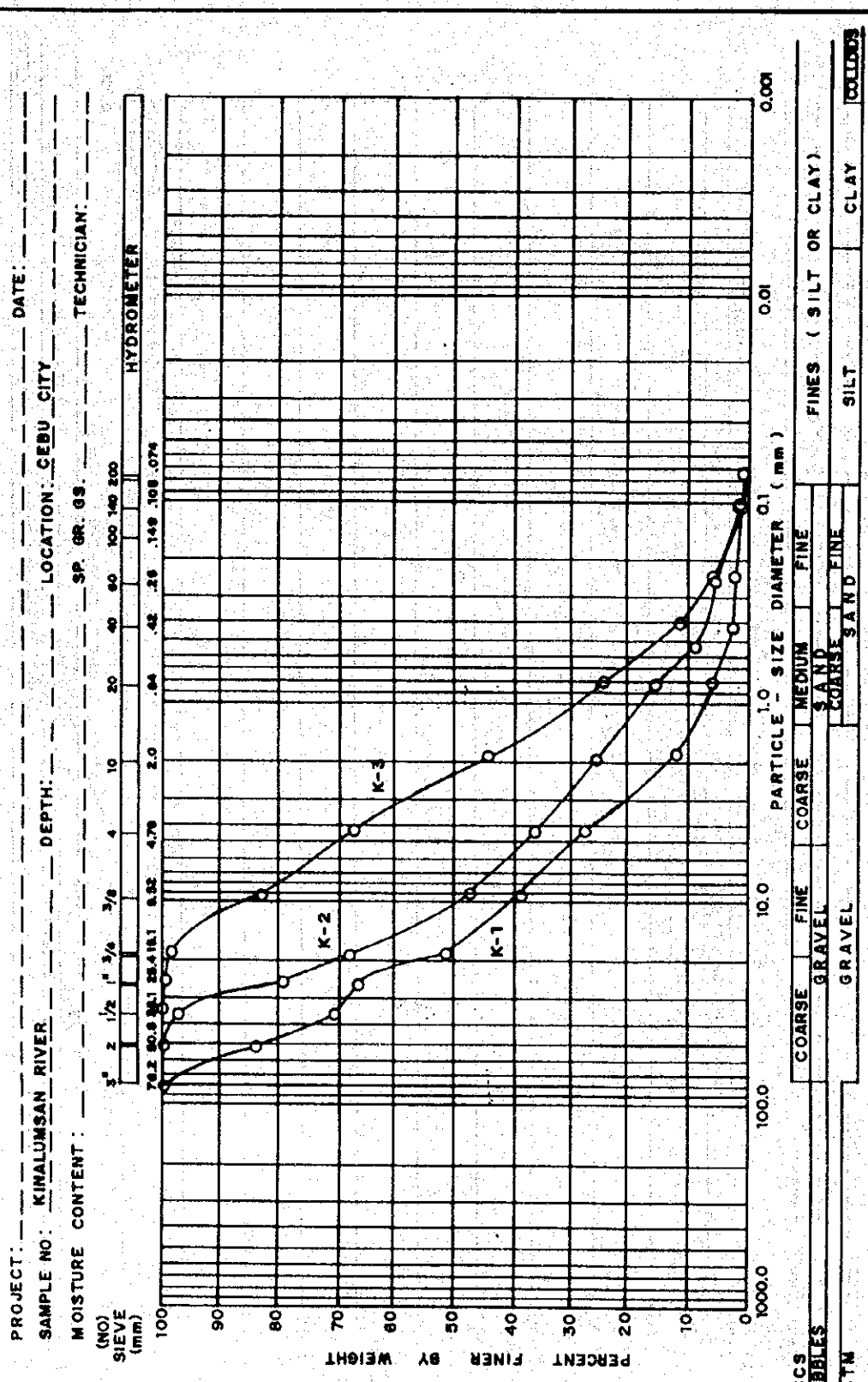
Fig. 3.6
Particle-Size Distribution Curve (Jaro River)



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 3.7
Particle-Size Distribution Curve (Iloilo River)



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. 3.8 Particle-Size Distribution Curve (Kinalumsan River)

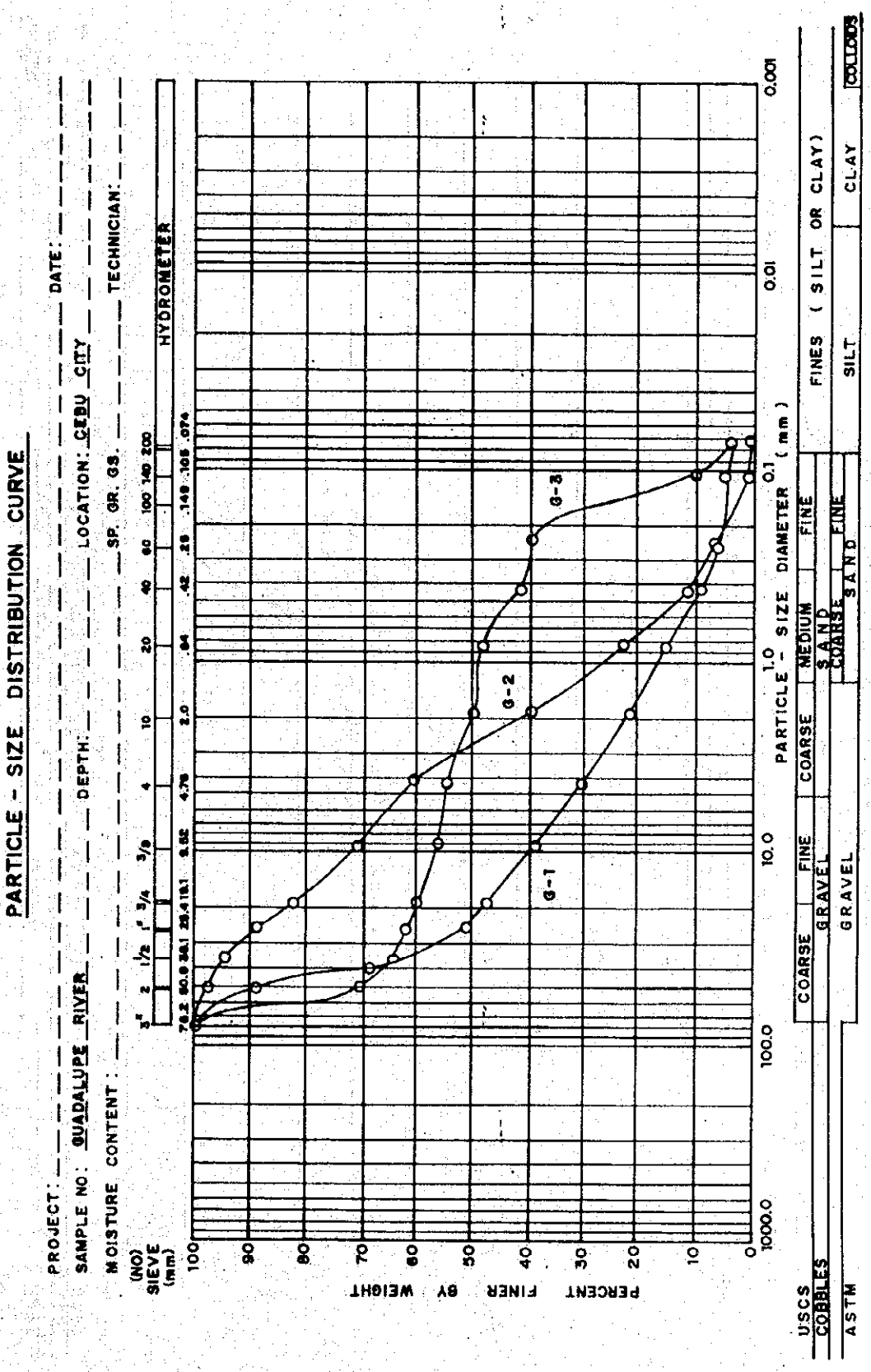


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Fig. 3.9
Particle-Size Distribution Curve (Guadalupe River)

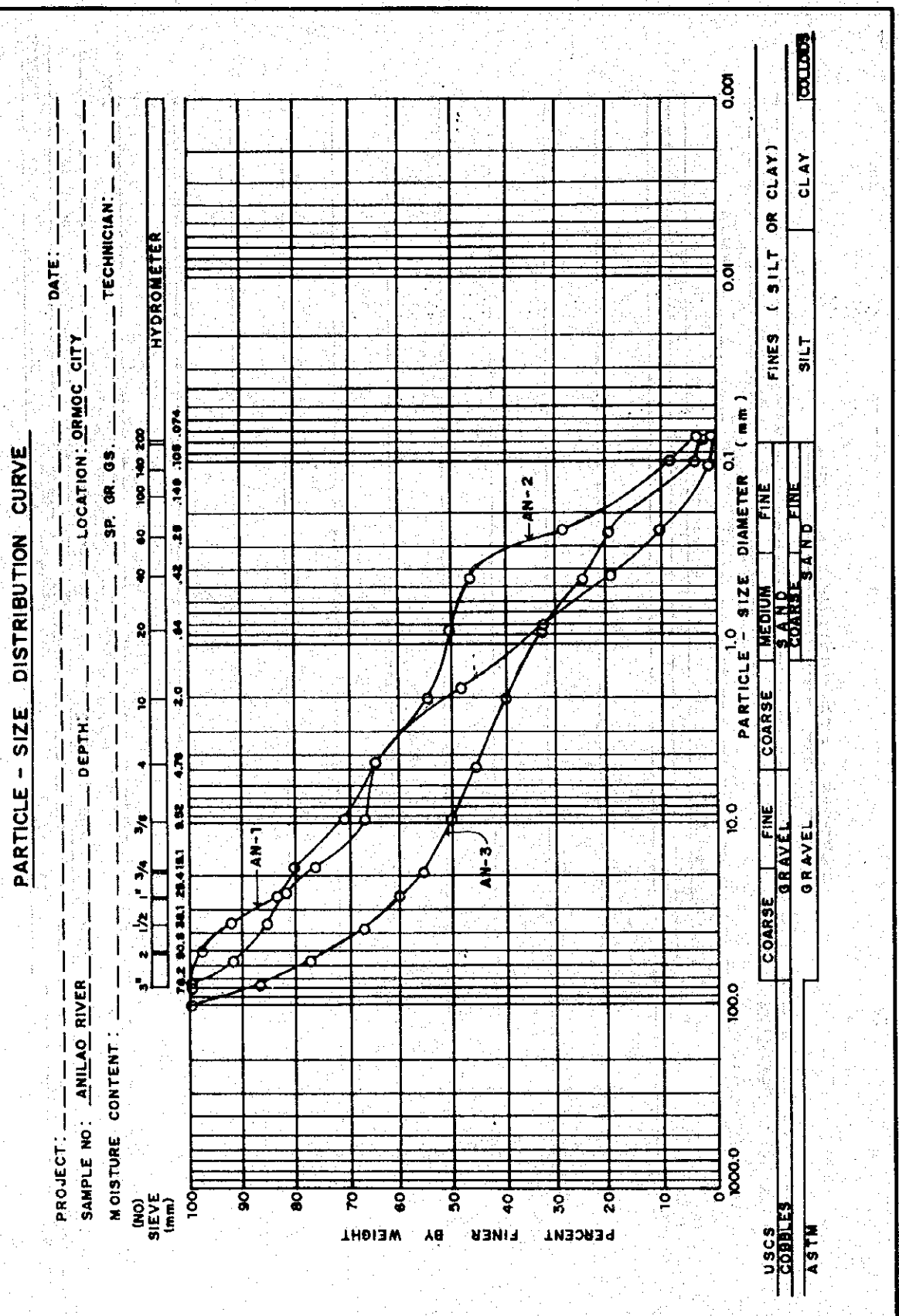

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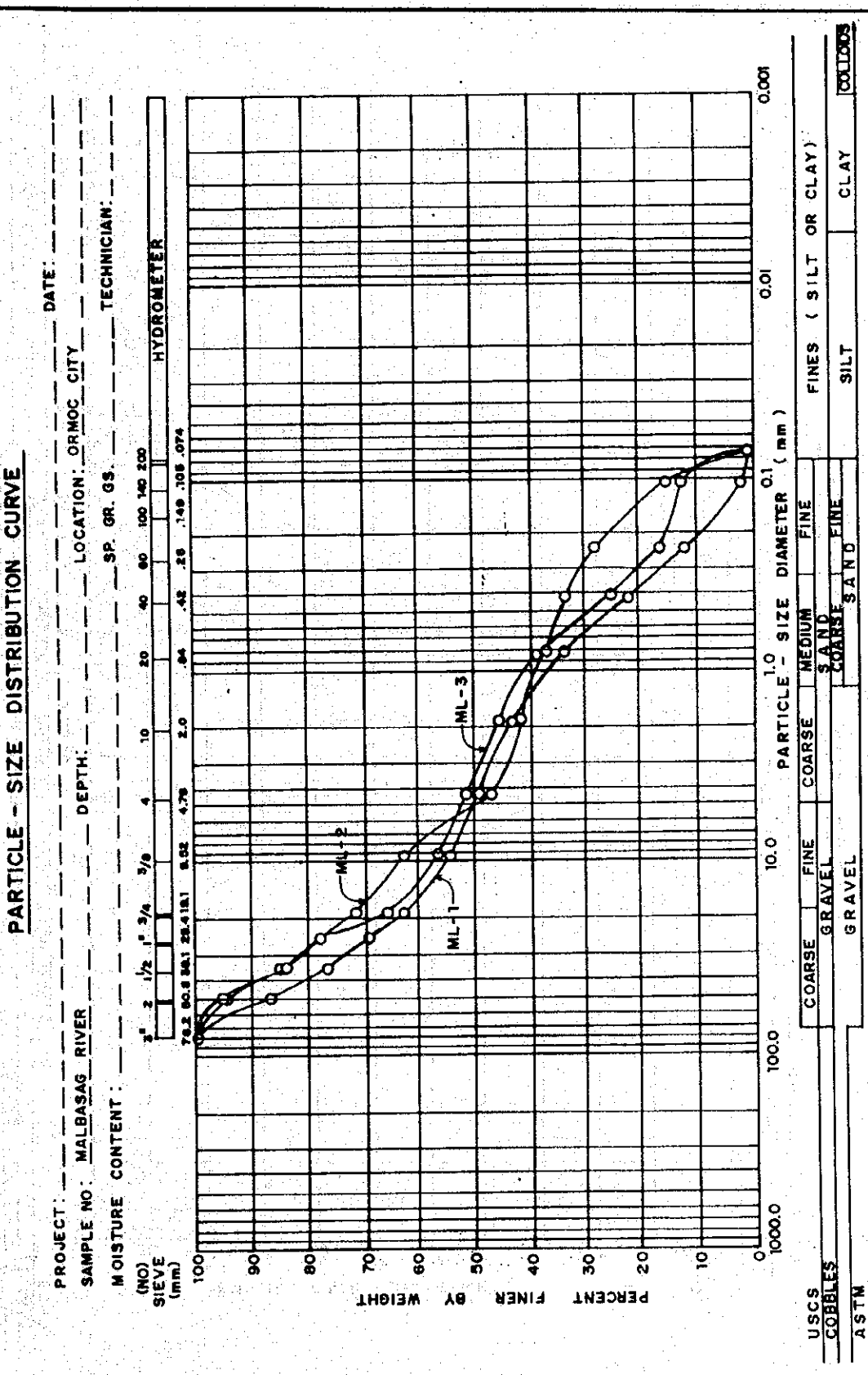
Fig. 3.10
Particle-Size Distribution Curve (Anilao River)



THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS	Fig. 3.11 Particle-Size Distribution Curve (Malbasag River)
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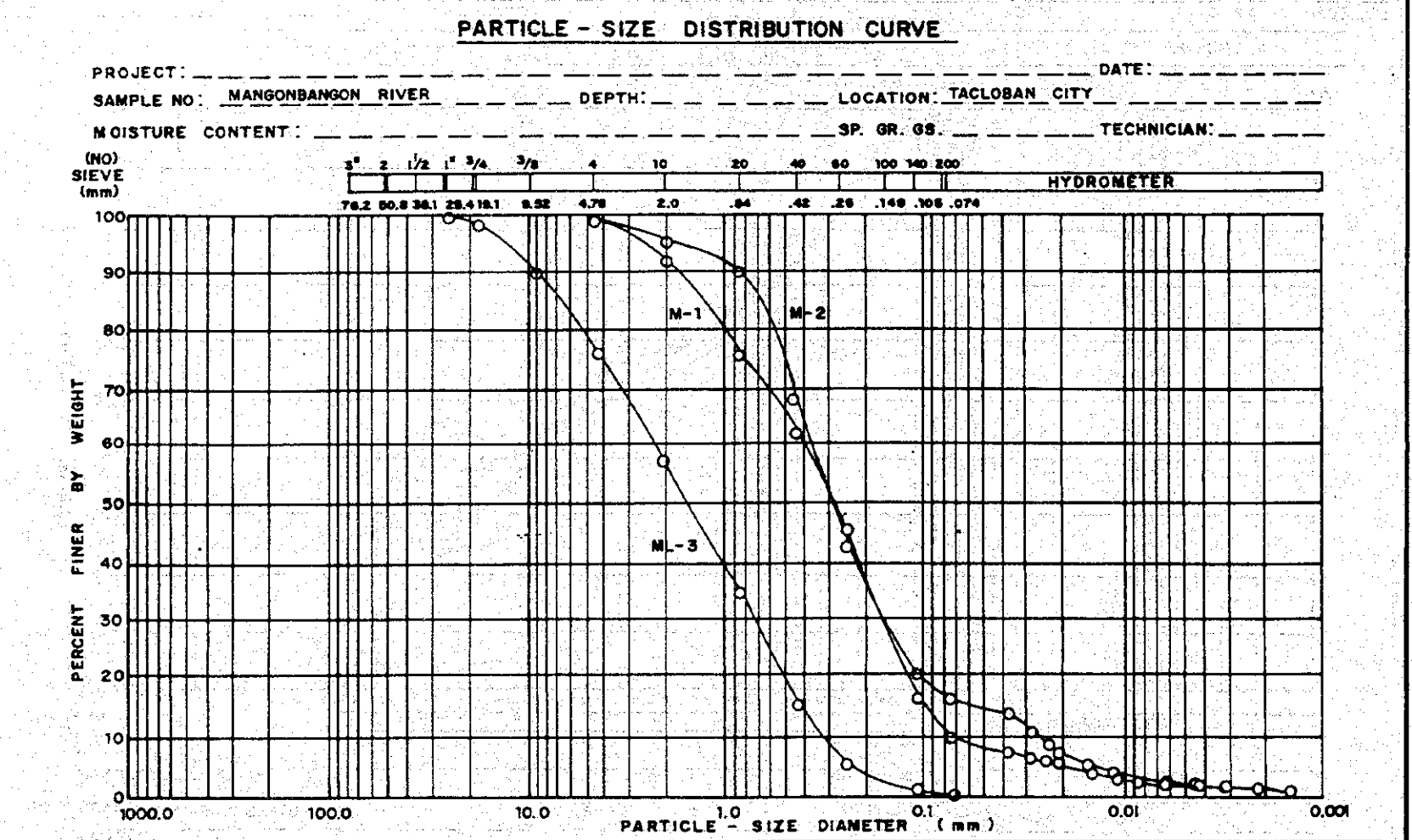

Fig. 3.12 Particle-Size Distribution Curve (Mangonbangon River)

THE STUDY ON THE FLOOD CONTROL FOR RIVERS IN THE SELECTED URBAN CENTERS

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