

TABLE F-2-7 CONSTRUCTION COST OF NONG YAI IRRIGATION PROJECT (2/3)

Description of Works	Unit	Total Cost		Foreign Currency		Local Currency	
		Quantity	unit rate	amount	unit rate	amount	unit rate
2.1.4 Block D	L.S			570		359	211
(1) Temporary Works							
(2) Pipe Line Works							
- Excavation Common Soil	cu.m	3000	17.0	51	12.0	36	5.0
- Backfill	cu.m	3000	32.0	96	23.0	69	9.0
- Sandbed	cu.m	200	240.0	48	72.0	14	168.0
- PVC (φ 200mm)	m	900	600.0	540	300.0	270	300.0
- PVC (φ 300mm)	m	650	1230.0	800	615.0	400	615.0
- Sluice Gate (φ 200mm)	gate	2	2800.0	6	1680.0	3	1120.0
- Sluice Gate (φ 300mm)	gate	1	3500.0	4	2100.0	2	1400.0
(3) Pump Station							
- Excavation Common Soil	cu.m	8000	17.0	136	12.0	96	5.0
- Backfill	cu.m	1000	32.0	32	23.0	23	9.0
- Reinforced Concrete	cu.m	300	3580.0	1074	1611.0	483	1969.0
- Pump (φ 250 X φ 200)	unit	1	2930000.0	2930	2344000.0	2344	586000.0
- Steel Pipe (φ 800mm)	m	18	8200.0	148	4920.0	89	3280.0
- Steel Pipe (φ 500mm)	m	900	5000.0	4500	3000.0	2700	2000.0
(4) Miscellaneous Works	L.S			1036		653	1800
Over-head (15%)	L.S			1795		1131	664
Sub-total	L.S			13765		8673	5092
2.1.5 Block E	L.S			499		312	186
(1) Temporary Works							
(2) Earth Works							
- Stripping	cu.m	6000	11.0	66	7.0	42	4.0
- Excavation Common Soil	cu.m	24000	17.0	408	12.0	288	5.0
- Embankment	cu.m	36000	38.0	1368	27.0	972	11.0
- Sodding	sq.m	24000	17.0	408	0.0	0	17.0
- Pavement (Laterite)	cu.m	2400	100.0	240	22.0	53	78.0
(3) Concrete Works							
- Lining Concrete	cu.m	350	1700.0	595	595.0	208	1105.0
- Reinforced Concrete	cu.m	50	3580.0	179	1611.0	81	1969.0
- Slide Gate (1,000X1,000)	gate	3	15400.0	46	9240.0	28	6160.0
(4) Pump Station							
- Excavation Common Soil	cu.m	2000	17.0	34	12.0	24	5.0
- Backfill	cu.m	1000	32.0	32	23.0	23	9.0
- Reinforced Concrete	cu.m	300	3580.0	1074	1611.0	483	1969.0
- Pump (φ 350 X φ 300)	unit	1	3540000.0	3540	2832000.0	2832	708000.0
- Steel Pipe (φ 800mm)	m	18	8200.0	148	4920.0	89	3280.0
- Steel Pipe (φ 600mm)	m	150	6200.0	930	3720.0	558	2480.0
(3) Miscellaneous Works	L.S			907		568	339
Over-head (15%)	L.S			1571		984	587
Sub-total	L.S			12044		7545	4500
2.1.6 Block F	L.S			569		352	217
(1) Temporary Works							
(2) Pipe Line Works							
- Excavation Common Soil	cu.m	3000	17.0	51	12.0	36	5.0
- Backfill	cu.m	3000	32.0	96	23.0	69	9.0
- Sandbed	cu.m	150	240.0	36	72.0	11	168.0
- PVC (φ 300mm)	m	1500	1230.0	1845	615.0	923	615.0
- Sluice Gate (φ 300mm)	gate	2	3500.0	7	2100.0	4	1400.0
(3) Pump Station							
- Excavation Common Soil	cu.m	2000	17.0	34	12.0	24	5.0
- Backfill	cu.m	1000	32.0	32	23.0	23	9.0
- Reinforced Concrete	cu.m	300	3580.0	1074	1611.0	483	1969.0
- Pump (φ 250 X φ 200)	unit	1	2680000.0	2680	2144000.0	2144	536000.0
- Steel Pipe (φ 800mm)	m	18	8200.0	148	4920.0	89	3280.0
- Steel Pipe (φ 600mm)	m	700	6200.0	4340	3700.0	2590	2500.0
(4) Miscellaneous Works	L.S			1034		640	395
Over-head	L.S			1792		1108	684
Sub-total	L.S			13738		8495	5243
2.1.7 Block G	L.S			934		481	453
(1) Temporary Works							
(2) Earth Works							
- Stripping	cu.m	20000	11.0	220	7.0	140	4.0
- Excavation Common Soil	cu.m	84000	17.0	1428	12.0	1008	5.0
- Embankment	cu.m	109000	38.0	4142	27.0	2943	11.0
- Sodding	sq.m	101000	17.0	1717	0.0	0	17.0
- Pavement (Laterite)	cu.m	10600	100.0	1060	22.0	233	78.0
(3) Concrete Works							
- Lining Concrete	cu.m	2000	1700.0	3400	595.0	1190	1105.0
- Reinforced Concrete	cu.m	650	3580.0	2327	1611.0	1047	1969.0
- Slide Gate (1,000X1,000)	gate	17	15400.0	262	9240.0	157	6160.0
- Steel Sheet Pile	sq.m	50	900.0	45	540.0	27	360.0
- Slide Gate (2,000X1,500)	gate	2	40000.0	80	24000.0	48	16000.0
- Portable Pump (22ps)	unit	5	460000.0	2300	391000.0	1955	69000.0
(4) Miscellaneous Works	L.S			1698		875	823
Over-head (15%)	L.S			2942		1516	1426
Sub-total	L.S			22555		11620	10935
Sub-total 2				98652		59147	39506

TABLE F - 2 - 7 CONSTRUCTION COST OF NONG YAI IRRIGATION PROJECT (3/3)

Description of Works	Unit	Total Cost		Foreign Currency		Local Currency		
		Quantity	unit rate	amount	unit rate	amount	unit rate	amount
2.2 Drainage Facilities								
2.2.1 Block B								
(1) Temporary Works	L.S			212		152		60
(2) Earth Works								
- Excavation Common Soil	cu.m	5000	21.0	105	15.0	75	6.0	30
- Embankment	cu.m	117000	32.0	3744	23.0	2691	9.0	1053
(3) Miscellaneous Works	L.S			385		277		108
Over-head (15%)	L.S			667		479		188
Sub-total	L.S			5112		3674		1438
2.2.2 Block E								
(1) Temporary Works	L.S			157		88		69
(2) Earth Works								
- Excavation Common Soil	cu.m	49000	21.0	1029	15.0	735	6.0	294
- Embankment	cu.m	12000	32.0	384	23.0	276	9.0	108
(3) Concrete Works								
- Reinforced Concrete	cu.m	300	3580.0	1074	1611.0	483	1969.0	591
- Stone Pitching	cu.m	550	680.0	374	204.0	112	476.0	262
(3) Miscellaneous Works	L.S			286		161		125
Over-head (15%)	L.S			496		278		217
Sub-total	L.S			3800		2134		1666
2.2.3 Block G								
(1) Temporary Works	L.S			156		111		45
(2) Earth Works								
- Excavation Common Soil	cu.m	135000	21.0	2835	15.0	2025	6.0	810
- Embankment	cu.m	0	32.0	0	23.0	0	9.0	0
(4) Miscellaneous Works	L.S			284		203		81
Over-head (15%)	L.S			491		351		140
Sub-total	L.S			3766		2690		1076
Sub-total 2				12678		8497		4181
Total				111330		67644		43586
3. AGRICULTURAL DEVELOPMENT FACILITIES								
3.1 Livestock Model Farm								
- Office	sq.m	50	6300.0	315	2520.0	126	3780.0	189
- Livestock House	sq.m	360	3200.0	1152	960.0	346	2240.0	806
- Pick up	unit	2	400000.0	800	320000.0	640	80000.0	160
3.2 Nahaang Market								
- Market House	sq.m	180	3200.0	576	960.0	173	2240.0	403
- Water Supply Pump	unit	1	200000.0	200	160000.0	160	40000.0	40
3.3 Inland Fishery Facilities								
- Office	sq.m	50	6300.0	315	2520.0	126	3780.0	189
- Fry Pond	sq.m	250	2100.0	525	840.0	210	1260.0	315
- Jetty	L.S	1	100000.0	100	30000.0	30	70000.0	70
3.4 Miscellaneous								
Over-head (15%)	L.S			797		362		435
Total	L.S			717		326		391
Grand Total				218548		116997		101551

TABLE F-2-8 OPERATION AND MAINTENANCE COST (1/4)

- (1) Improvement of Tha Taphao River System
 (1.1) Annual Operation and Maintenance Cost
 a) Salary and Wage

Position	Nos of Staff	Rate (Baht/year)	Amount ('000 B)
- Project Manager	1	180,000	180
- Administration Section			
.Chief	1	84,000	84
.Clerk	3	60,000	180
.Secretary	1	60,000	60
.Driver	5	48,000	240
.Typist	2	48,000	96
- Mechanical Section			
.Chief	1	84,000	84
.Engineer	1	72,000	72
.Technician	2	60,000	120
.Operator	5	60,000	300
.labour	10	36,000	360
- Tha Taphao River Section			
.Chief	1	84,000	84
.Engineer	2	72,000	144
.Technician	3	60,000	180
.Surveyor	5	48,000	240
- Canal Section			
.Chief	1	84,000	84
.Engineer	2	72,000	144
.Technician	3	60,000	180
.Surveyor	5	48,000	240
Sub-total			<u>3,072</u>

b) Administration and General Expenditure

- 3,072,000 × 10 % = 307 ('000 B)

c) Embankment Repair and Dredging

- Embankment Repair 138,911,000 B × 2 % = 2,778 ('000 B)

- Dredging 30,700 cum × 21 B/cum = 645

Sub-total 3,423 ('000 B)

TABLE F-2-8 OPERATION AND MAINTENANCE COST (2/4)

d) Equipment Repair & Maintenance			
Equipment	unit	(' 000 B)	(' 000 B)
. Motor-grader 3.7 m	1	2,400	2,400
. Dump Truck 8 ton	5	1,000	5,000
. Backhoe 0.7 cum	1	3,000	3,000
. Vehicle	5	323	1,615
. Motor Bicycle	10	45	450
. Bulldozer 11 ton	1	1,800	1,800
. Loader 1.2 cum	1	1,300	1,300
. Drainage Pump ϕ 4"	10	38	380
. Roller 3 ton	1	900	900
. Spare part and Office equipment	(10 %)	L.S	1,685
total			18,530

$$18,530 (' 000 B) \times 10 \% = \underline{1,853 (' 000 B)}$$

e) Fuel Cost	l/B	1/day	days/y	units	
- Heavy equipment	8.5	$\times 20$	$\times 200$	$\times 5$	= 170 (' 000 B)
- Dump	8.5	$\times 20$	$\times 200$	$\times 5$	= 170
- Vehicle	9.0	$\times 15$	$\times 300$	$\times 5$	= 203
- Others					149
Sub-total					<u>692 (' 000 B)</u>

f) Office Maintenance Cost

$$5,700,000 \times 4 \% = \underline{230 (' 000 B)}$$

$$\text{Total Cost} \quad \underline{\underline{9,577 (' 000 B)}}$$

TABLE F-2-8 OPERATION AND MAINTENANCE COST (3/4)

(2) Nong Yai Irrigation Project

(2.1) Replacement of Equipment

- Block A ϕ 350 \times 300 Pump	3,260 \times 0.9 =	2,934 ('000 B)
- B ϕ 450 \times 350 Pump	5,230 \times 0.9 =	4,707
- C ϕ 200 \times 150 Pump	1,700 \times 0.9 =	1,530
- D ϕ 250 \times 200 Pump	2,930 \times 0.9 =	2,637
- E ϕ 350 \times 300 Pump	3,540 \times 0.9 =	3,186
- F ϕ 250 \times 200 Pump	2,680 \times 0.9 =	2,412
- G Portable Pump	460 \times 5 \times 0.9 =	2,070
Total		<u>19,476</u>

(2.2) Annual Operation and Maintenance Cost

a) Salary and Wage

Position	Nos of Staff	Rate (Baht/year)	Amount ('000 B)
- Project Manager	1	180,000	180
- Administration Section			
.Chief	1	84,000	84
.Clerk	2	60,000	120
.Secretary	1	60,000	60
.Driver	5	48,000	240
.Typist	2	48,000	96
- Mechanical Section			
.Chief	1	84,000	84
.Engineer	1	72,000	72
.Technician	2	60,000	120
.Operator	2	60,000	120
.Labour	5	36,000	180
Sub-total	1,176 \times 0.5 =		588
- Nong Yai Section			
.Chief	1	84,000	84
.Zone Man	2	60,000	120
.Gate Tender	4	48,000	192
.Labour	5	36,000	180
Sub-total			576
Sub-total			<u>1,164</u>

b) Administration and General Expenditure

- 1,164,000 \times 10 % =	<u>116 ('000 B)</u>
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TABLE F-2-8 OPERATION AND MAINTENANCE COST (4/4)

c) Pump Operation Cost

- Block A	φ 350 × 300 P.	$30 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 193$
-	B φ 450 × 350 P.	$55 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 354$
-	C φ 200 × 150 P.	$11 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 71$
-	D φ 250 × 200 P.	$55 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 354$
-	E φ 350 × 300 P.	$45 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 289$
-	F φ 250 × 200 P.	$45 \times 2(10 \times 6 \times 30 \times 1.23 + 167 \times 6) = 289$
-	G Portable P.	$22 \times 0.23 \times 10 \times 6 \times 30 \times 8.5 \times 5 = 385$
	Sub-total	<u>1,935</u>

d) Equipment Repair & Maintenance

Equipment	unit	(' 000 B)	(' 000 B)
. Motor-grader 3.7 m	1	2,400	2,400
. Bulldozer 3 ton	1	1,200	1,200
. Truck 4 ton	3	630	1,890
. Vehicle	2	323	646
. Motor Bicycle	4	45	180
. Concrete Mixer	1	140	140
. Loader 1.2 cum	1	1,300	1,300
. Tamper	3	33	99
. Pump spare parts		L.S	3,481
. Spare part and Office equipment	(10 %)	L.S	786
total			12,122

$12,122 (' 000 B) \times 10 \% = \underline{1,212 (' 000 B)}$

e) Fuel Cost

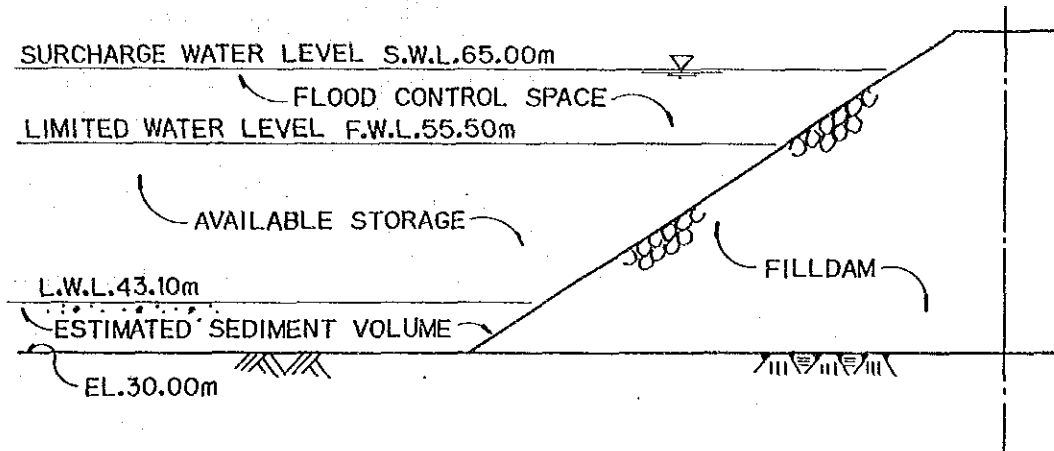
	l/B	l/day	days/y	units
- Heavy equipment	8.5	× 20	× 200	× 3 = 102 (' 000 B)
- Dump	8.5	× 20	× 200	× 3 = 102
- Vehicle	9.0	× 15	× 300	× 2 = 81
- Others				57
Sub-total				<u>342 (' 000 B)</u>

f) Office Maintenance Cost

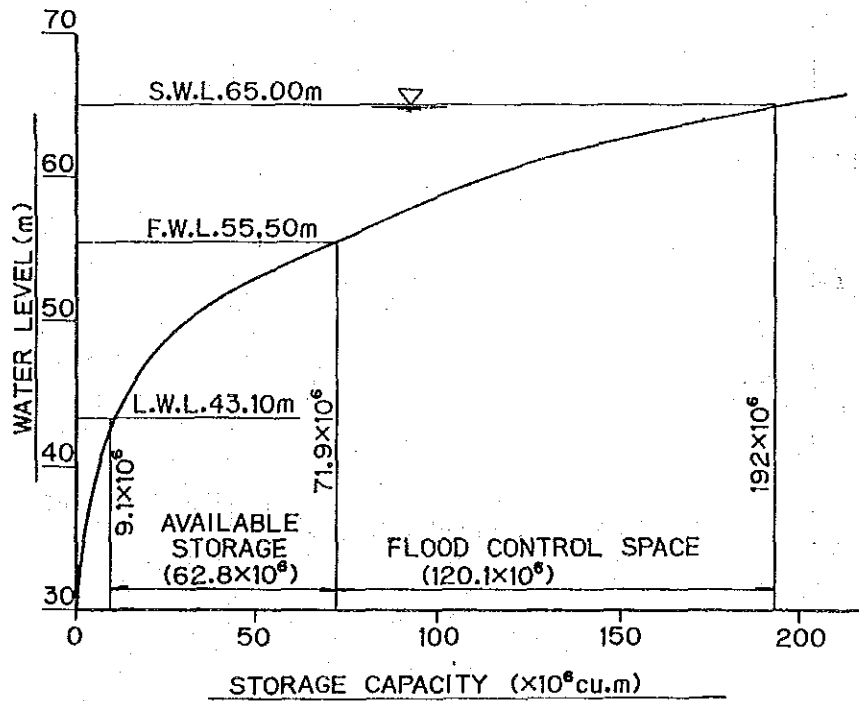
$1,900,000 \times 4 \% = \underline{76 (' 000 B)}$

Total Cost 4,845 (' 000 B)

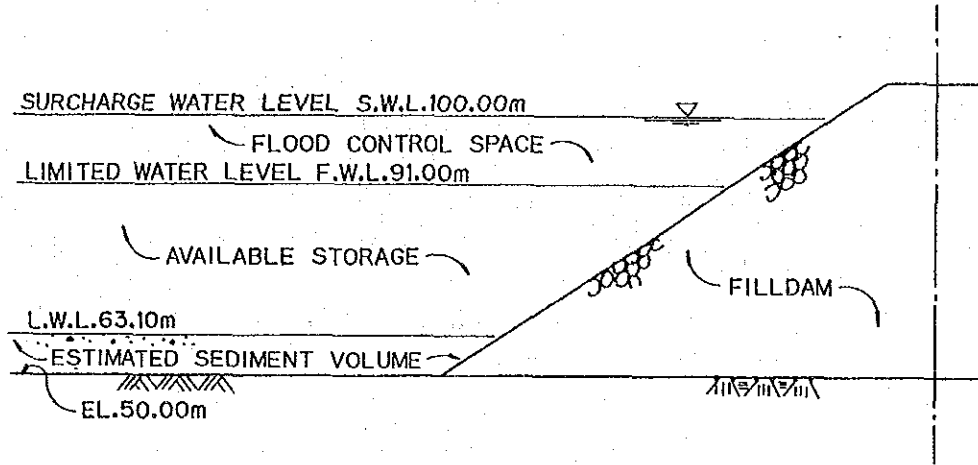
**FIGURE F-1-1 ALLOCATION OF RESERVOIR STORAGE
(RAP RO RESERVOIR)**



**FIGURE F-1-2 STORAGE WATER LEVEL~STORAGE CAPACITY CURVE
(RAP RO RESERVOIR)**



**FIGURE F - 1 - 3 ALLOCATION OF RESERVOIR STORAGE
(THA SAE RESERVOIR)**



**FIGURE F - 1 - 4 STORAGE WATER LEVEL~STORAGE CAPACITY CURVE
(THA SAE RESERVOIR)**

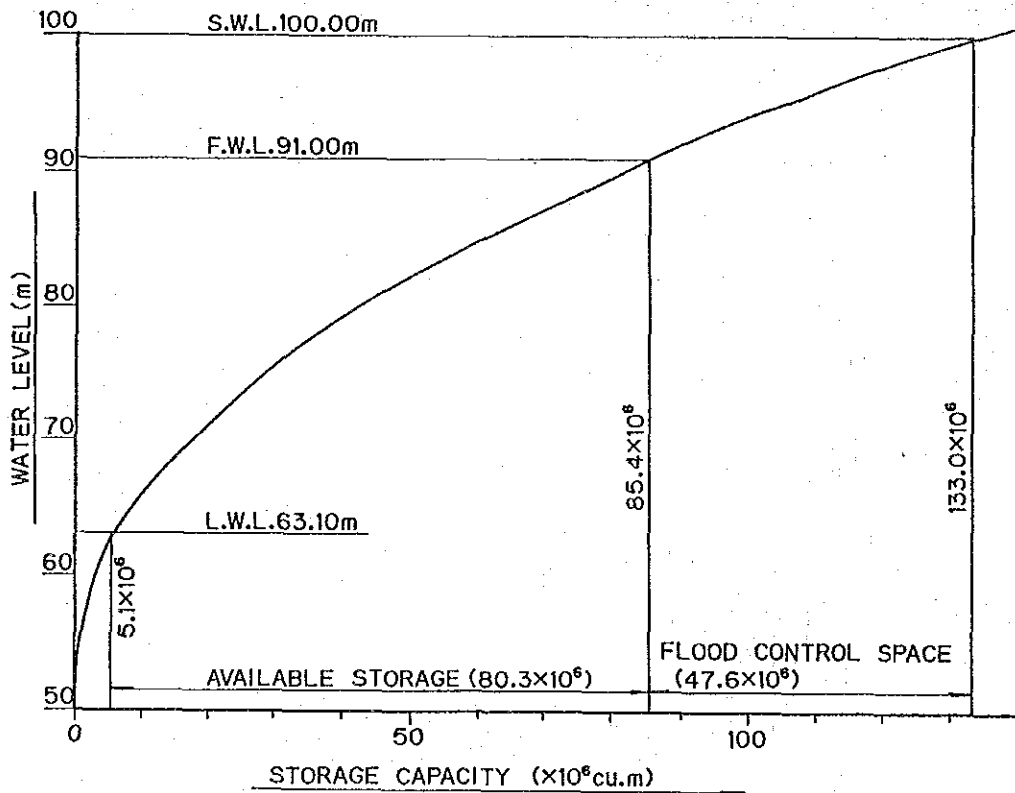
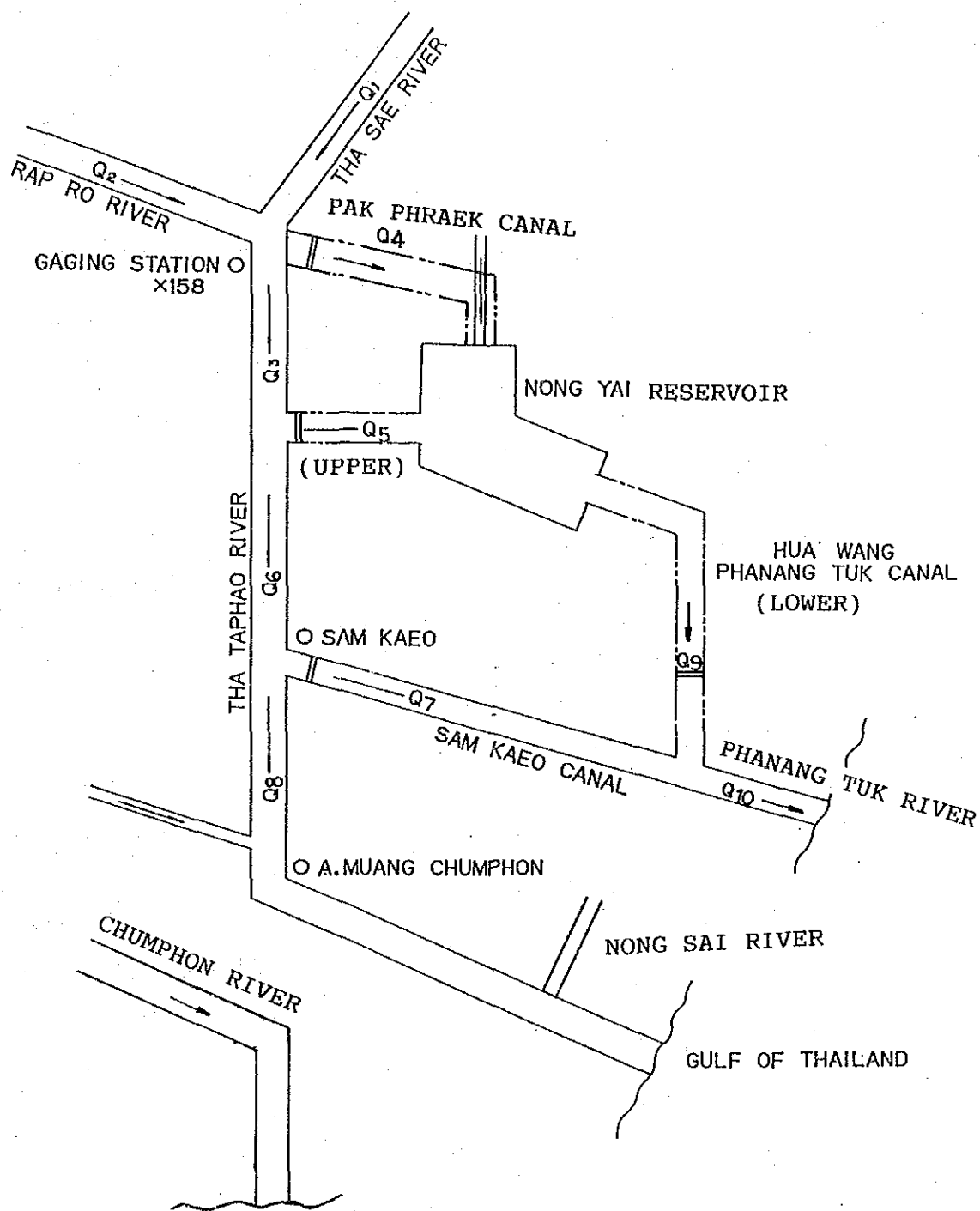
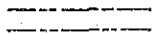


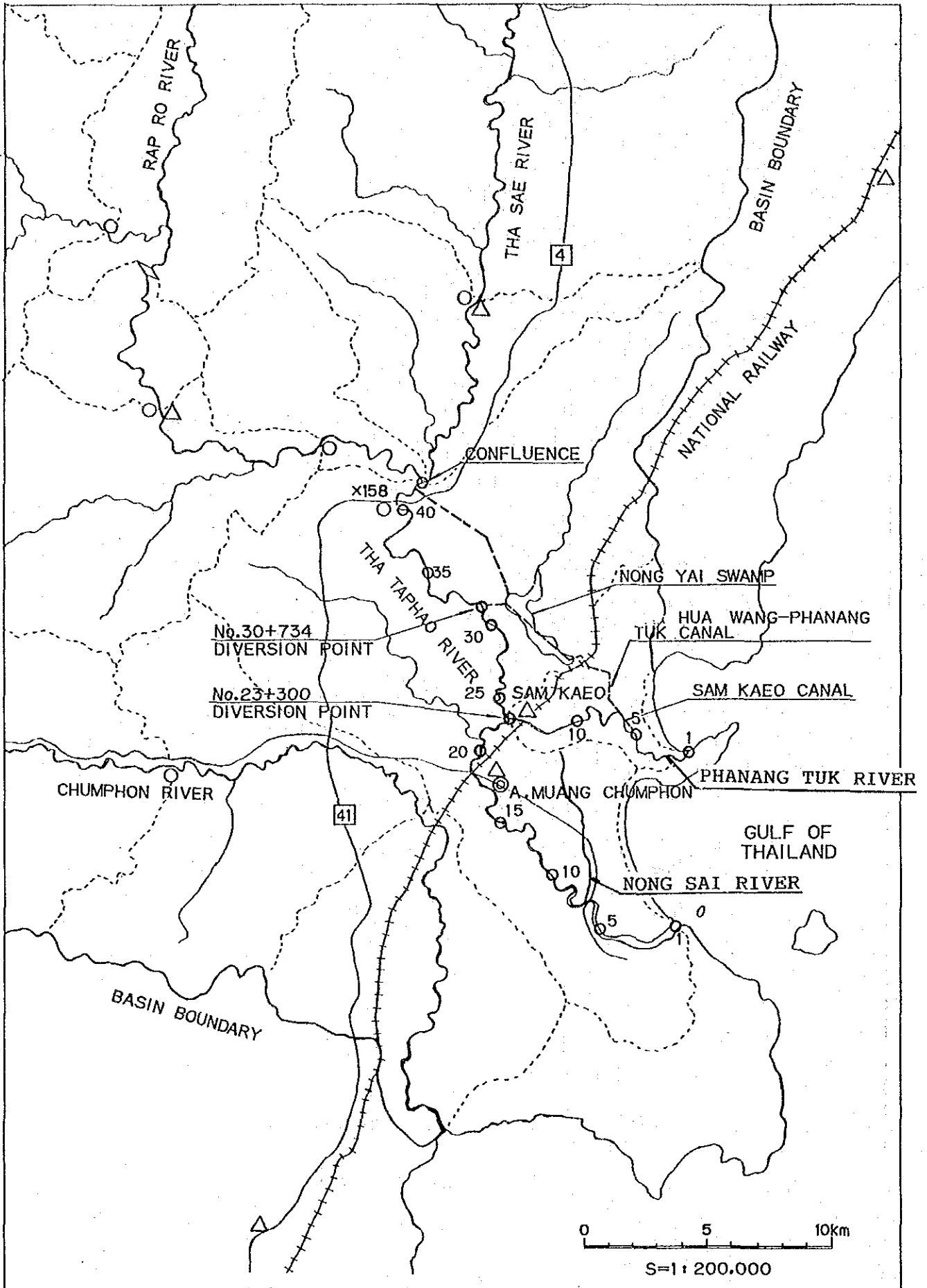
FIGURE F-1-5 DRAINAGE SYSTEM OF THA TAPHAO RIVER BASIN



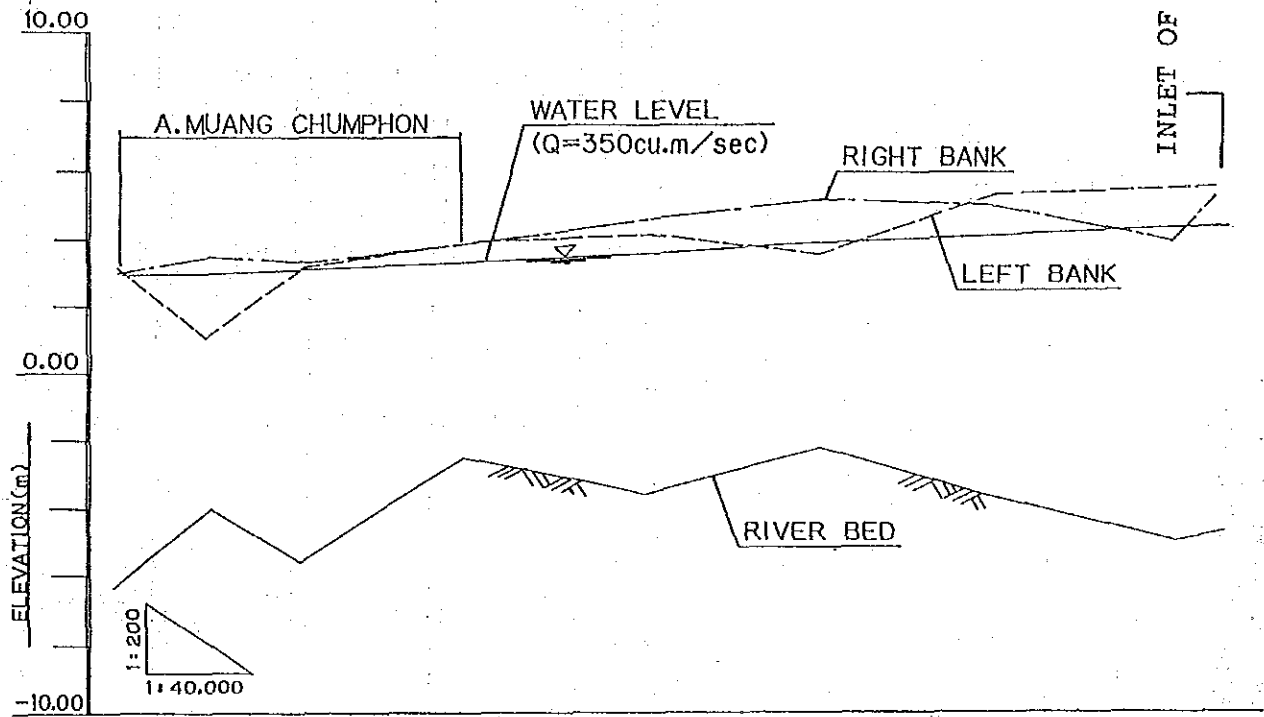
NOTE:  PROPOSED NEW CANAL

 WEIR OR GATE

FIGURE F-1-6 PLAN OF THA TAPHAO RIVER BASIN



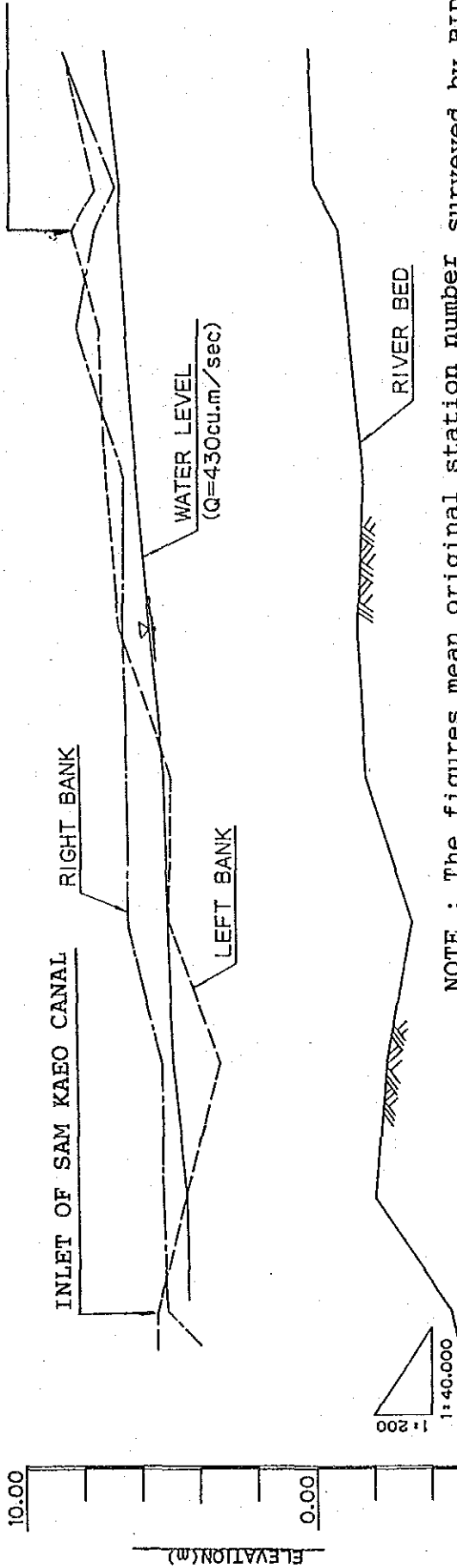
**FIGURE F-1-7 RIVER FLOW CAPACITY OF THA TAPHAO RIVER
(A. MUANG CHUMPHON - SAM KAEO)**



STATION	RIVERBED	LEFTBANK	RIGHTBANK
16+986	-6.23	3.05	2.97
17+546	-3.95	1.03	3.55
18+040	-5.52	3.14	3.33
18+956	-2.54	3.85	3.79
19+960	-3.60	4.14	4.46
20+992	-2.28	3.51	5.07
22+008	-3.69	5.23	4.85
23+054	-5.01	5.44	3.94
23+300	-4.75	5.46	5.05

NOTE : The figures mean original station number surveyed by RID

**FIGURE F - 1 - 8 RIVER FLOW CAPACITY OF THA TAPHAO RIVER
(SAM KAE0 - INLET OF HUA WANG PHANANG TUK)**



STATION	RIVERBED	LEFTBANK	RIGHTBANK
23+054	-5.01	5.44	3.94
23+300	-4.75	5.46	5.05
24+060	-2.15	4.41	5.21
24+996	-2.59	3.25	5.21
25+964	-3.46	4.89	6.29
26+952	-1.91	4.83	6.28
28+008	-1.74	6.51	6.44
29+018	-1.92	6.94	6.37
30+036	-1.42	7.27	7.97
30+734	-1.15	8.10	7.28
31+028	-0.32	7.28	6.63
31+952	-0.16	8.29	8.37

FIGURE F-1-9 STANDARD SECTIONAL PLAN OF DIKE

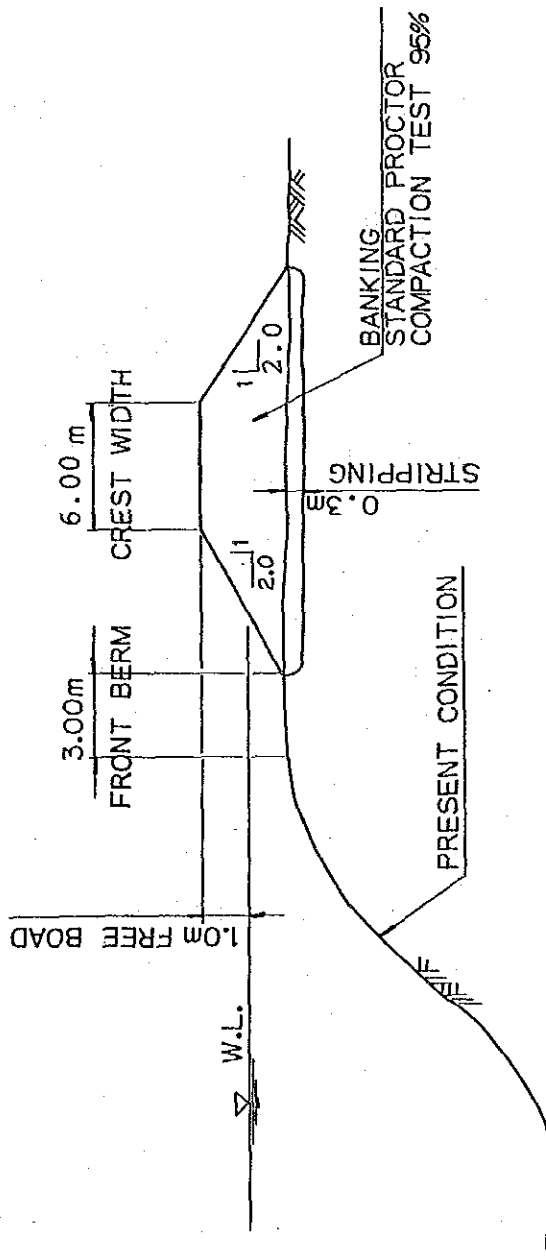
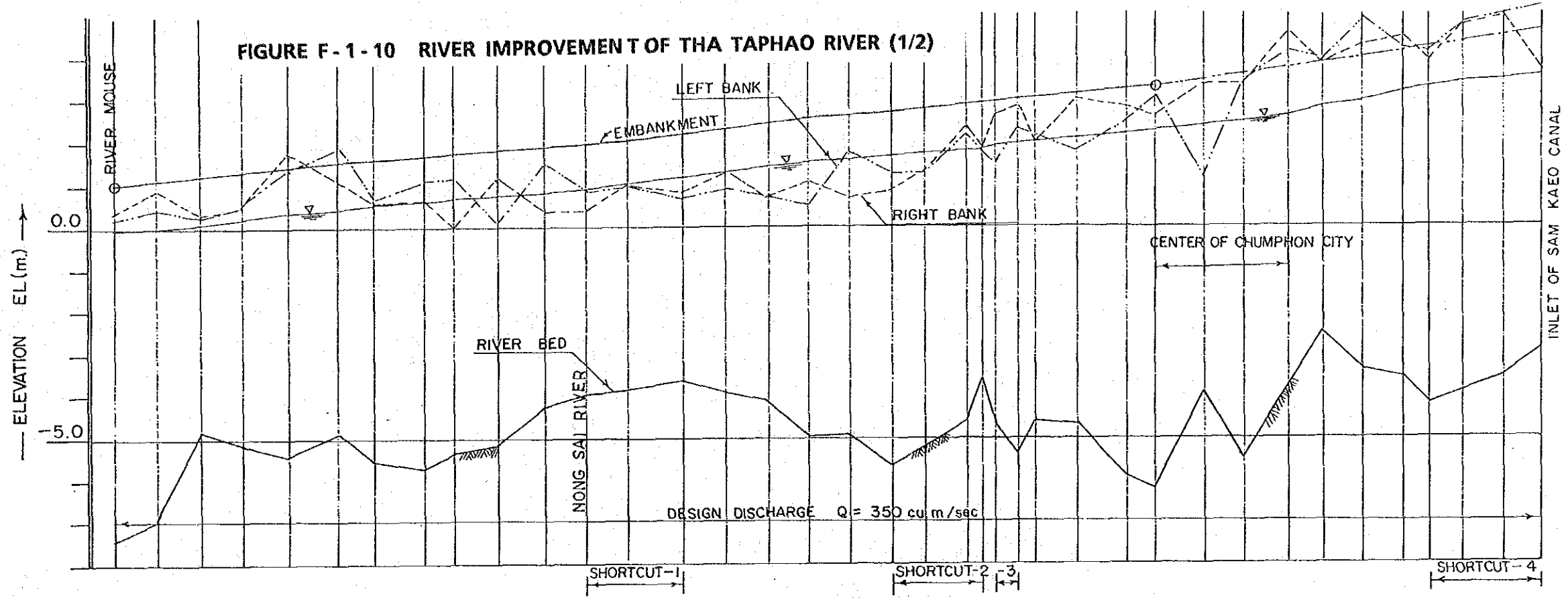


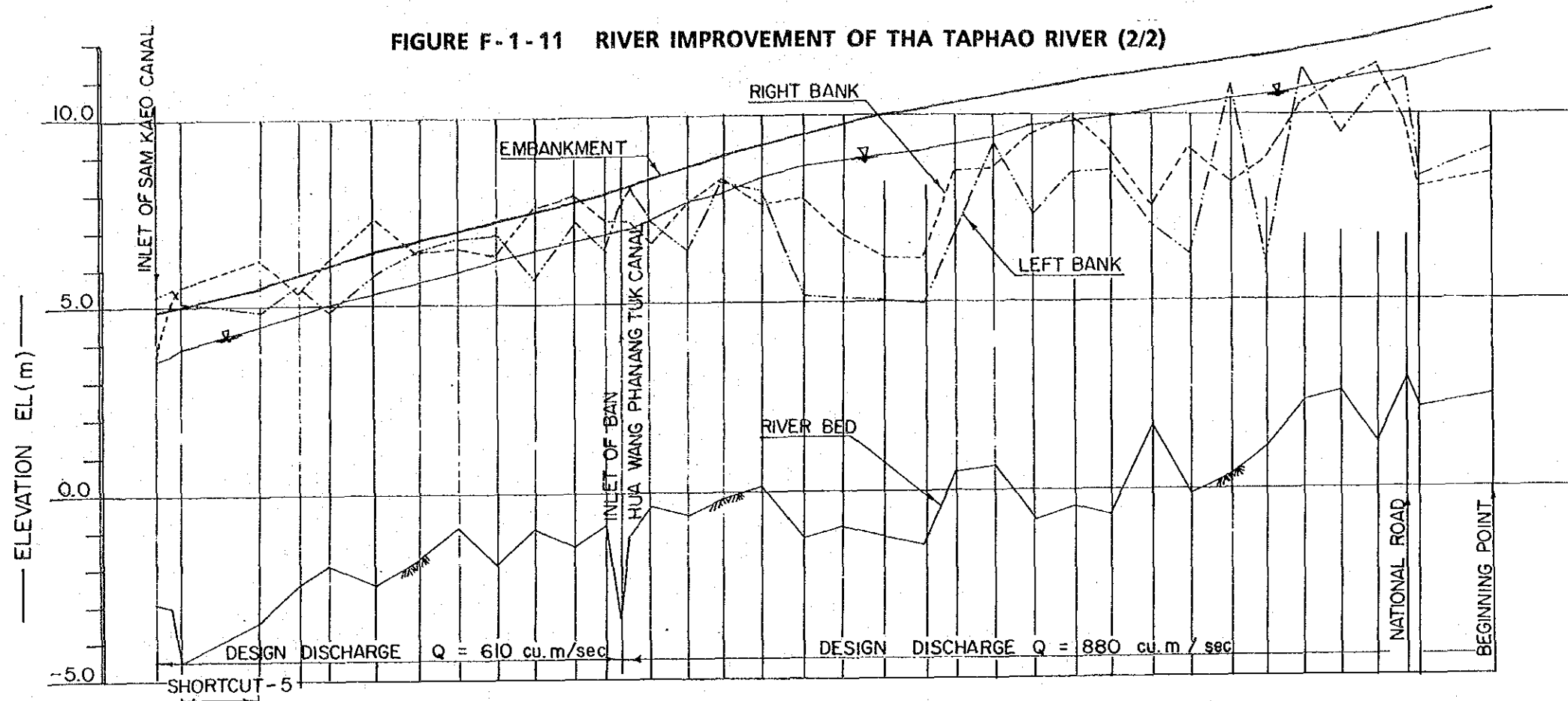
FIGURE F-1-10 RIVER IMPROVEMENT OF THA TAPHAO RIVER (1/2)



STATION No.	DISTANCE (m.)	LEFT BANK EL.(m)	RIGHT BANK EL.(m)	RIVER BED EL.(m)	WATER LEVEL MSL.(m)	EMBANKMENT EL.(m)
1+000	0	0.15	0.35	-7.45	-0.06	1.00
+500	500	0.36	0.85	-6.97	-0.03	1.08
2+020	520	0.17	0.17	-4.85	0.05	1.17
+536	516	0.47	0.42	-5.15	0.19	1.25
3+060	524	1.30	1.76	-5.45	0.32	1.34
+620	560	1.85	1.09	-4.90	0.40	1.43
4+044	424	0.62	0.57	-5.53	0.49	1.50
+660	616	1.08	0.59	-5.72	0.60	1.60
+986	326	1.10	-0.03	-5.41	0.65	1.66
5+504	518	0.03	1.07	-5.21	0.71	1.75
6+014	510	1.42	0.32	-4.29	0.78	1.83
+530	516	0.84	0.36	-4.02	0.89	1.92
7+000	470	0.95	0.95	-3.90	0.99	2.00
+646 (8+992)	646	0.67	0.75	-3.68	1.11	2.15
8+154 (9+500)	508	0.86	1.25	-3.98	1.27	2.27
+654 (10+000)	500	0.66	0.62	-4.13	1.37	2.38
9+172 (10+518)	518	0.46	0.98	-5.01	1.44	2.50
+654 (11+000)	482	1.71	0.62	-4.94	1.52	2.59
10+160 (11+506)	506	1.25	0.87	-5.71	1.66	2.69
+500	340	1.25	1.25	-5.28	1.70	2.75
11+000	500	2.18	2.29	-4.66	1.75	2.84
(14+154) (14+354)	146	1.76	1.78	-3.63	1.73	2.87
(14+362) (15+292)	264	1.41	2.59	-4.72	1.85	2.91
(15+292) (15+830)	212	2.27	2.78	-5.46	1.92	2.96
(15+504)		2.12	1.96	-4.66	1.94	3.00
12+356 (16+030)	526	1.75	2.94	-4.71	2.06	3.10
+932 (16+606)	576	2.46	2.79	-5.96	2.18	3.22
13+312 (16+986)	360	3.05	2.57	-6.23	2.26	(3.29)
+872 (17+546)	560	1.08	3.35	-3.95	2.33	(3.40)
14+366 (18+040)	494	3.44	3.33	-5.52	2.43	(3.50)
+882 (18+556)	516	4.08	4.52	-3.76	2.56	(3.68)
15+282 (18+956)	400	3.84	3.79	-2.54	2.74	(3.82)
+776 (19+450)	494	4.86	4.25	-3.41	2.91	(4.00)
16+286 (19+960)	510	4.14	4.46	-3.60	3.13	(4.15)
+586 (20+260)	300	4.05	3.88	-4.23	3.25	(4.23)
17+000	414	4.75	4.75	-3.94	3.39	(4.36)
+500	500	5.00	5.00	-3.60	3.45	4.50
+958 (23+474)	458	5.28	3.64	-2.96	3.52	4.81

NOTE : The figures in parentheses mean original station number surveyed by RID

FIGURE F-1-11 RIVER IMPROVEMENT OF THA TAPHAO RIVER (2/2)



STATION No	DISTANCE (m)	LEFT BANK EL(m)	RIGHT BANK EL(m)	RIVER BED EL(m)	WATER LEVEL M.S.L(m)	EMBANKMENT EL(m)
(23+474)	0	5.28	3.64	-2.96	3.52	4.81
17+958	190	5.50	5.19	-3.02	3.70	4.49
18+244	96	5.11	5.59	-4.51	3.86	5.00
(23+760)						
19+299	1,055	4.87	6.30	-3.46	4.46	5.50
(25+964)						
1801	502	5.56	5.37	-2.46	4.75	5.67
(26+466)						
20+287	486	4.83	6.28	-1.91	5.02	5.83
(26+952)						
1819	532	5.88	7.32	-2.44	5.34	6.50
(27+484)						
21+343	524	6.51	6.44	-1.74	5.64	6.76
(28+008)						
1845	502	6.81	6.58	-0.88	5.90	7.00
(28+510)						
22+353	508	6.94	6.37	-1.92	6.29	7.26
(29+018)						
1859	506	5.75	7.66	-0.97	6.52	7.53
(29+524)						
23+371	512	7.27	7.97	-1.42	6.79	7.79
(30+075)						
1873	402	6.47	7.29	-0.88	6.94	8.00
24+069	188	7.68	7.26	-3.36	7.05	8.12
(30+734)	108	8.10	7.28	-1.15	7.05	8.20
(30+734)	294	7.28	6.63	-0.32	7.28	8.39
(31+028)						
1859	496	6.48	7.76	-0.60	7.78	8.72
(31+524)						
25+287	428	8.29	8.37	-0.16	7.96	9.00
(31+932)						
1809	522	8.02	7.70	-0.17	8.40	9.25
(32+474)						
26+367	558	5.21	7.82	-1.23	8.69	9.51
(33+032)						
1867	500	5.15	6.87	-0.91	8.82	9.75
(33+532)						
27+387	520	5.03	6.24	-1.21	8.96	10.00
(34+032)						
1892	506	5.01	6.22	-1.47	9.09	10.17
(34+338)						
28+285	392	6.83	8.48	0.46	9.16	10.31
(34+950)						
1793	508	9.17	8.53	0.60	9.38	10.48
(35+458)						
29+319	526	7.31	9.36	-0.82	9.64	10.66
(35+984)						
1827	508	8.43	9.89	-0.48	9.76	10.83
(36+492)						
30+325	498	8.01	9.03	-0.71	9.89	11.00
(36+994)						
1839	514	7.04	7.52	1.64	10.01	11.13
(37+504)						
31+355	516	6.27	9.08	-0.15	10.19	11.25
(38+020)						
1881	526	10.73	8.16	0.30	10.31	11.38
(38+546)						
32+349	468	6.04	8.74	1.08	10.47	11.50
(39+014)						
1845	496	11.15	10.24	2.30	10.60	11.67
(39+510)						
33+309	464	9.45	10.82	2.59	10.82	11.83
(39+974)						
1873	474	10.61	11.28	1.13	11.00	12.00
(40+481)						
34+157	374	10.90	9.71	2.90	11.08	12.17
(40+958)	136	8.29	7.99	2.11	11.14	12.24
(41.958)						
35+293	1,000	9.09	8.39	2.47	11.62	12.70
(41.958)						

(30+626)

NOTE : The figures in parentheses mean original station number surveyed by RID

FIGURE F-1-12 RIVER IMPROVEMENT OF THA TAPHAO RIVER SHORT-CUT PLAN

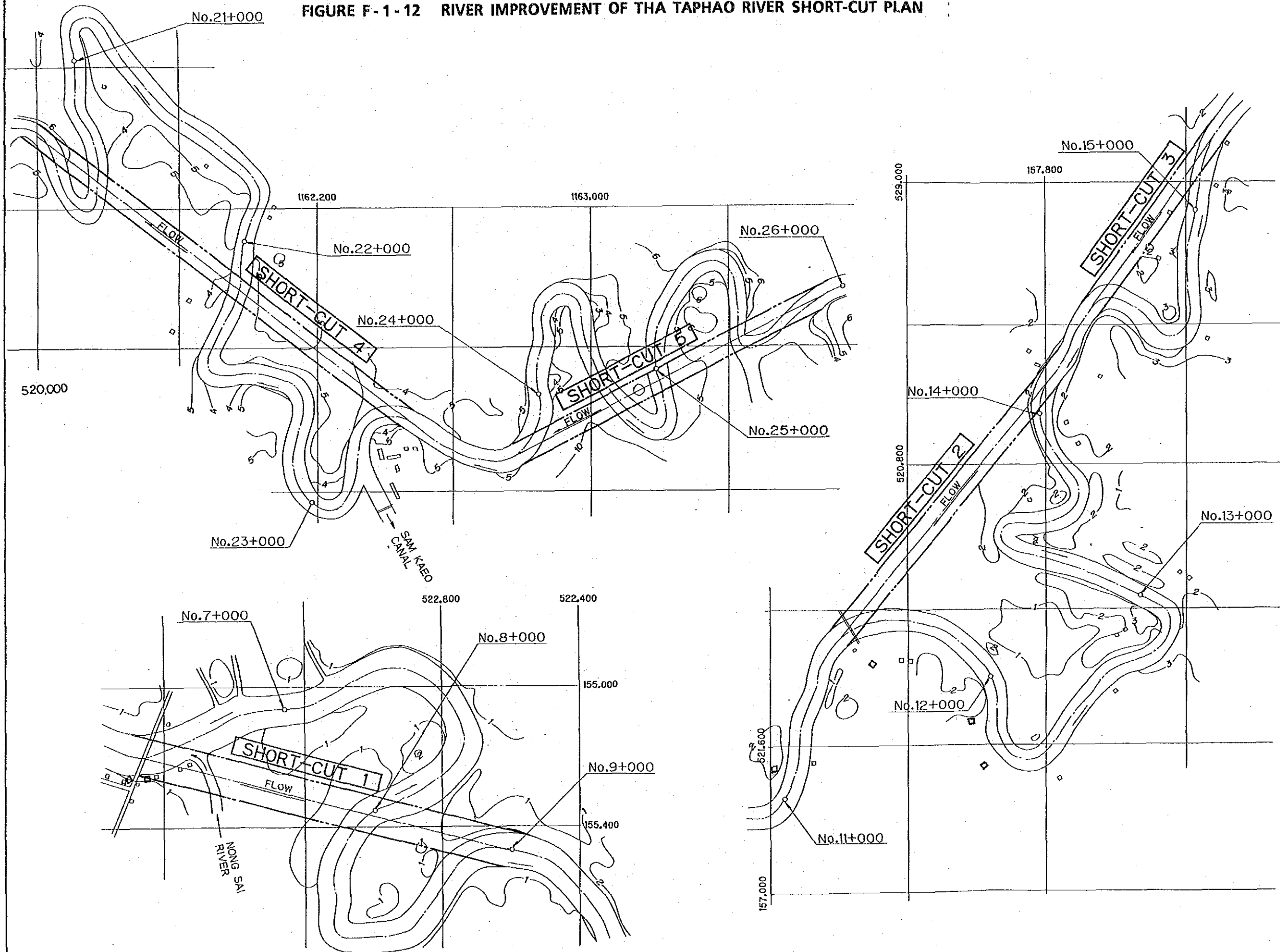
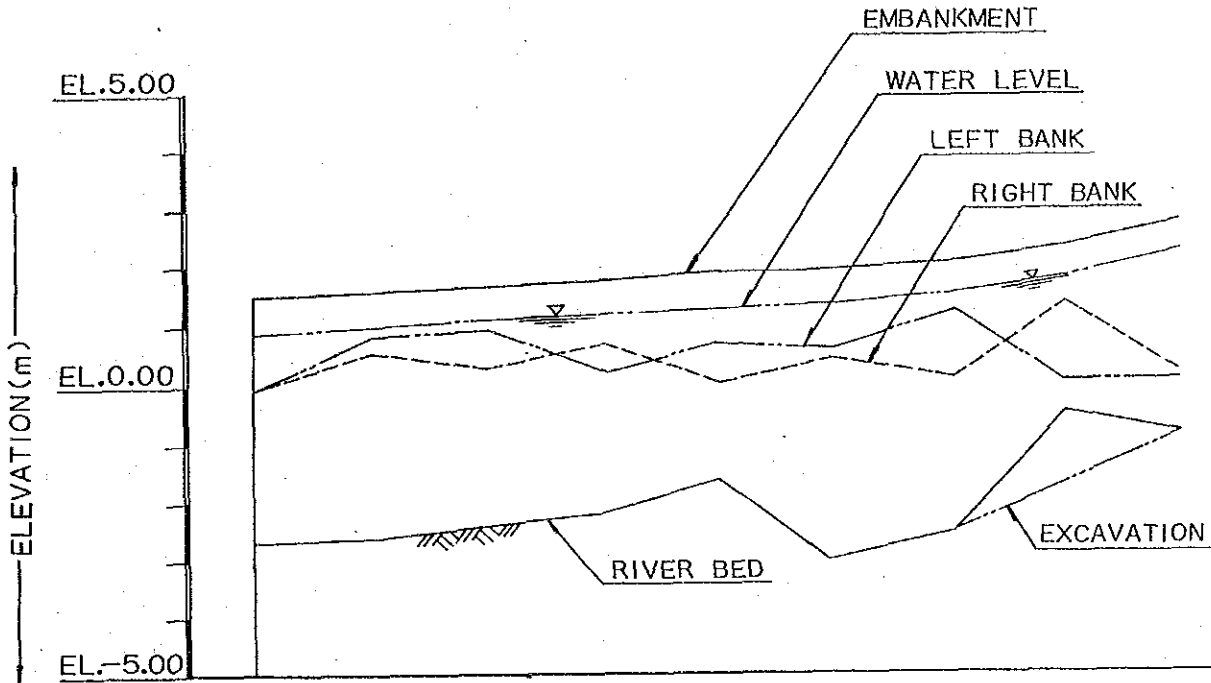
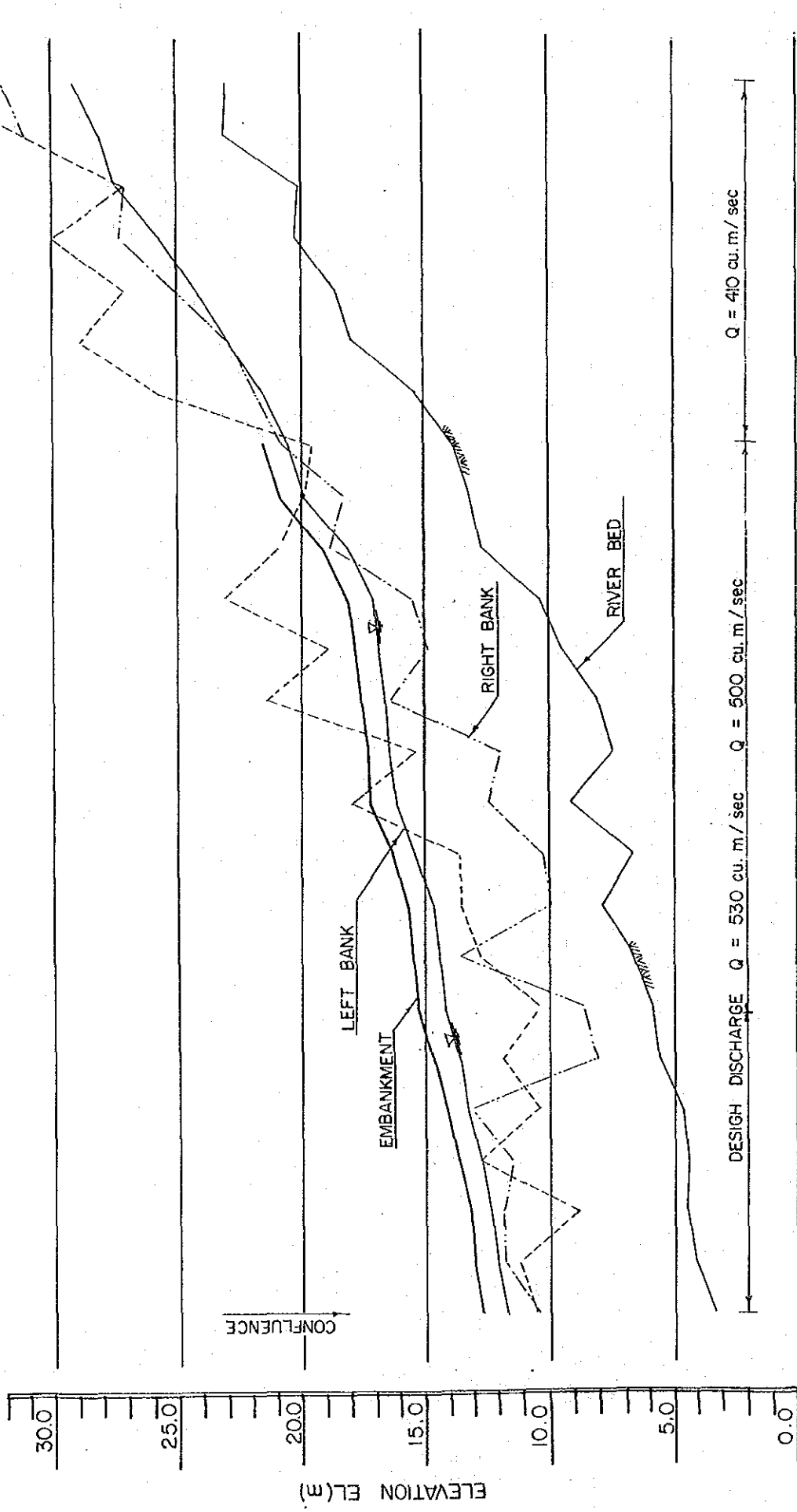


FIGURE F-1-13 PROFILE OF RIVER IMPROVEMENT OF NONG SAI RIVER



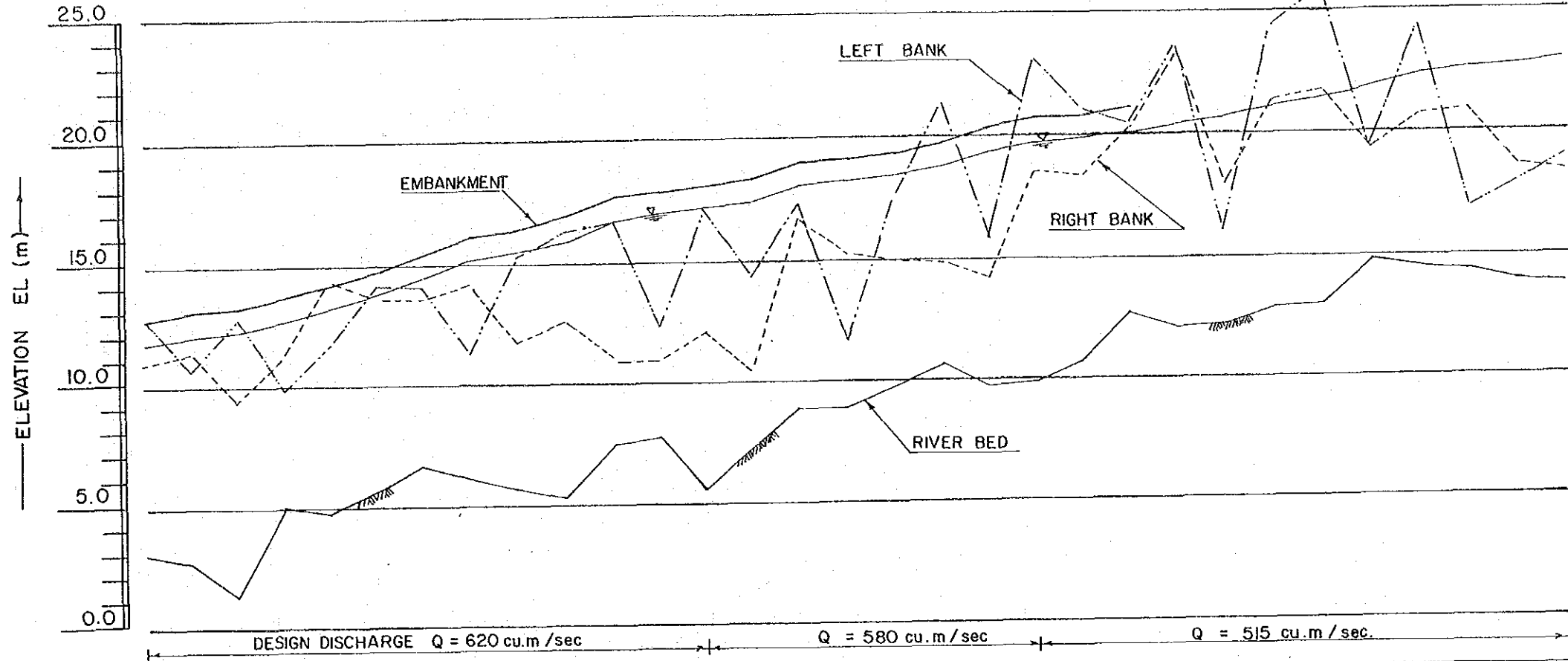
EMBANKMENT EL. (m)	1.49	1.62	1.72	1.82	1.94	2.02	2.16	2.38	2.84
WATER LEVEL EL. (m)	0.89	1.02	1.12	1.22	1.34	1.42	1.56	1.78	2.24
RIVER BED EL. (m)	-2.70	-2.62	-2.44	-2.20	-1.63	-3.02	-2.54	-1.70 (-0.47)	-0.81
RIGHT BANK EL. (m)	-0.07	0.58	0.29	0.70	0.07	0.47	0.13	1.32	0.24
LEFT BANK EL. (m)	0.05	0.87	0.95	0.22	0.76	0.65	1.27	0.07	0.09
DISTANCE (m)	0	944	1030	1006	942	1024	1024	964	1028
STATION (No.)	0+060	1+004	2+034	3+040	3+982	5+006	6+030	6+994	8+022

FIGURE F - 1 - 14 RIVER IMPROVEMENT OF RAP RO RIVER



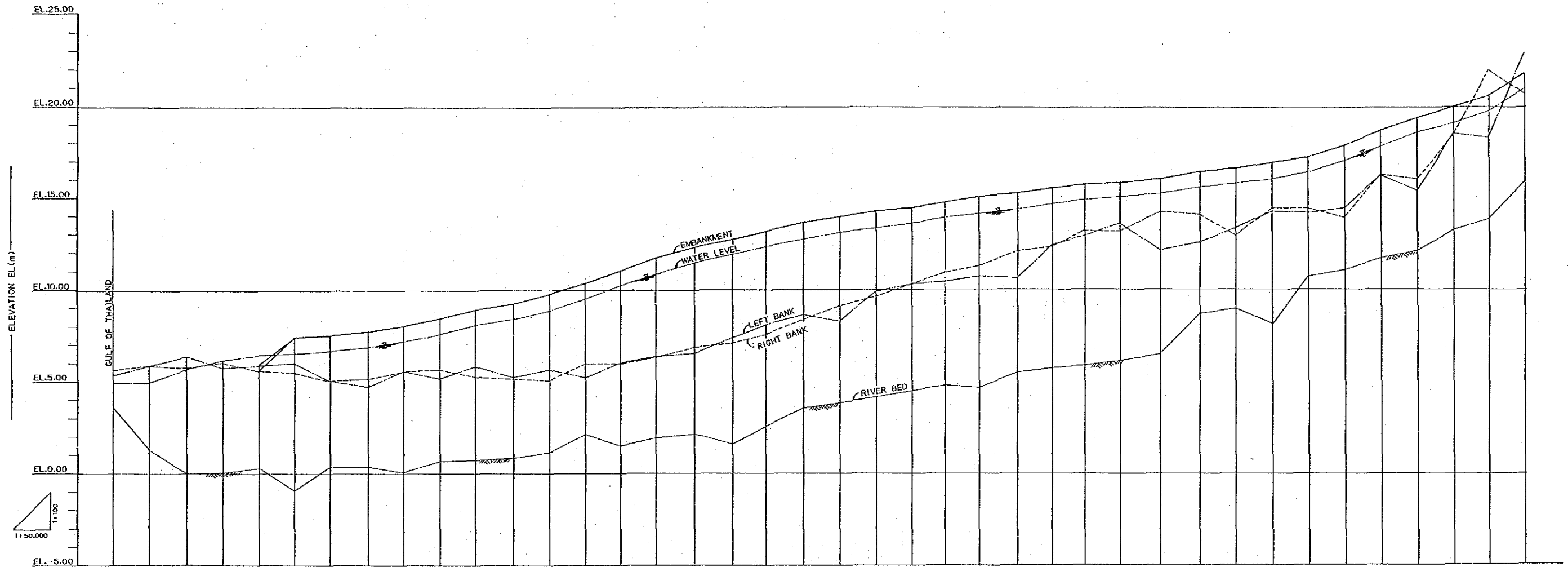
STATION No	DISTANCE (m)	LEFT BANK EL(m)	RIGHT BANK EL(m)	RIVER BED EL(m)	WATER LEVEL M.S.L(m)	EMBANKMENT EL(m)
0 + 000	0	10.48	10.39	3.28	11.76	13.00
1 + 000	1,000	11.16	11.76	4.07	11.96	13.00
2 + 000	1,000	8.77	11.83	4.37	12.30	13.20
3 + 000	1,000	12.77	11.45	4.38	12.66	13.70
4 + 000	1,000	10.39	13.02	4.62	13.20	14.20
5 + 000	1,000	11.94	8.14	5.55	13.63	14.65
6 + 000	1,000	10.38	8.56	5.78	14.22	15.25
7 + 000	1,000	12.71	13.64	6.67	14.38	15.50
8 + 000	1,000	13.54	9.96	7.88	14.65	15.65
9 + 000	1,000	13.64	10.18	6.74	15.33	16.35
10 + 000	1,000	18.04	12.36	9.11	16.23	17.25
11 + 000	1,000	15.38	11.87	7.54	16.40	17.40
12 + 000	1,000	21.42	16.42	8.08	16.63	17.65
13 + 000	1,000	18.90	14.93	9.47	16.86	17.90
14 + 000	1,000	23.09	15.48	10.32	17.13	18.15
15 + 000	1,000	20.91	18.80	12.73	18.16	19.20
16 + 000	1,000	19.92	18.31	13.20	19.94	20.95
17 + 000	1,000	19.60	20.78	13.80	20.56	21.60
18 + 000	1,000	25.68	21.91	15.39	21.58	—
19 + 000	1,000	28.92	22.87	17.89	23.00	—
20 + 000	1,000	27.15	25.08	18.56	24.28	—
21 + 000	1,000	29.99	27.41	20.20	25.68	—
22 + 000	1,000	27.23	27.23	20.08	27.46	—
23 + 000	1,000	31.24	31.14	23.16	28.08	—
24 + 000	1,000	35.34	32.04	22.95	29.24	—

FIGURE F-1-15 RIVER IMPROVEMENT OF THA SAE RIVER



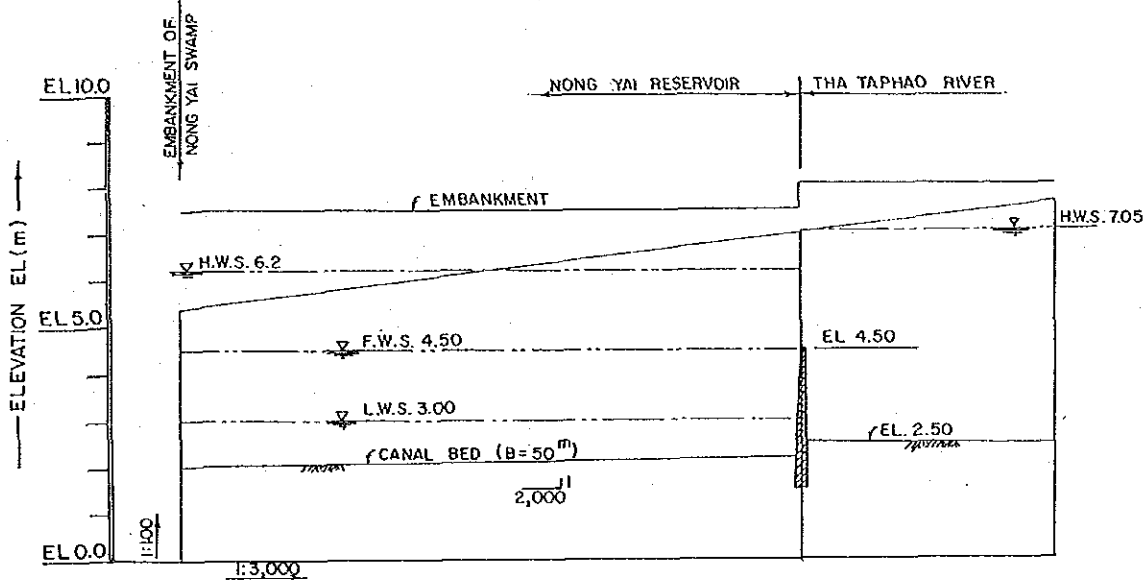
STATION No.	DISTANCE (m)	LEFT BANK EL (m)	RIGHT BANK EL (m)	RIVER BED EL (m)	WATER LEVEL M.S.L (m)	EMBANKMENT EL (m)
2+000	0	12.72	10.79	3.02	11.62	12.70
3+000	1,000	10.56	11.31	2.60	12.02	13.05
4+000	1,000	12.70	9.33	1.24	12.25	13.25
5+000	1,000	9.74	11.19	4.95	12.61	13.65
6+000	1,000	11.65	14.27	4.74	13.12	14.15
7+000	1,000	14.05	13.48	5.54	13.73	14.75
8+000	1,000	13.96	13.51	6.60	14.38	15.40
9+000	1,000	11.18	14.10	5.98	15.09	16.10
10+000	1,000	15.20	11.66	5.60	15.35	16.35
11+000	1,000	16.21	12.53	5.21	15.84	16.85
12+000	1,000	16.56	10.88	7.40	16.66	17.70
13+000	1,000	12.23	10.86	7.64	16.86	17.90
14+000	1,000	17.06	12.01	5.44	17.09	18.10
15+000	1,000	14.39	10.39	7.23	17.39	18.40
16+000	1,000	17.33	16.55	8.83	17.99	19.00
17+000	1,000	11.50	15.13	8.81	18.11	19.15
18+000	1,000	17.61	14.90	9.72	18.34	19.35
19+000	1,000	21.35	14.84	10.63	18.65	19.65
20+000	1,000	15.66	14.09	9.61	19.38	20.40
21+000	1,000	22.99	18.38	9.81	19.62	20.65
22+000	1,000	20.96	18.32	10.75	19.76	20.80
23+000	1,000	20.37	20.23	12.76	20.05	21.05
24+000	1,000	23.57	23.25	12.08	20.48	—
25+000	1,000	15.81	17.85	12.21	20.67	—
26+000	1,000	24.35	21.33	12.84	21.06	—
27+000	1,000	25.93	21.80	13.00	21.51	—
28+000	1,000	19.34	19.30	14.77	21.89	—
29+000	1,000	24.32	20.74	14.52	22.37	—
30+000	1,000	16.91	20.85	14.42	22.59	—
31+000	1,000	17.87	18.58	13.91	22.75	—
32+000	1,000	18.96	18.42	13.88	23.00	—

FIGURE F-1-16 PROFILE OF RIVER IMPROVEMENT OF CHUMPHON RIVER



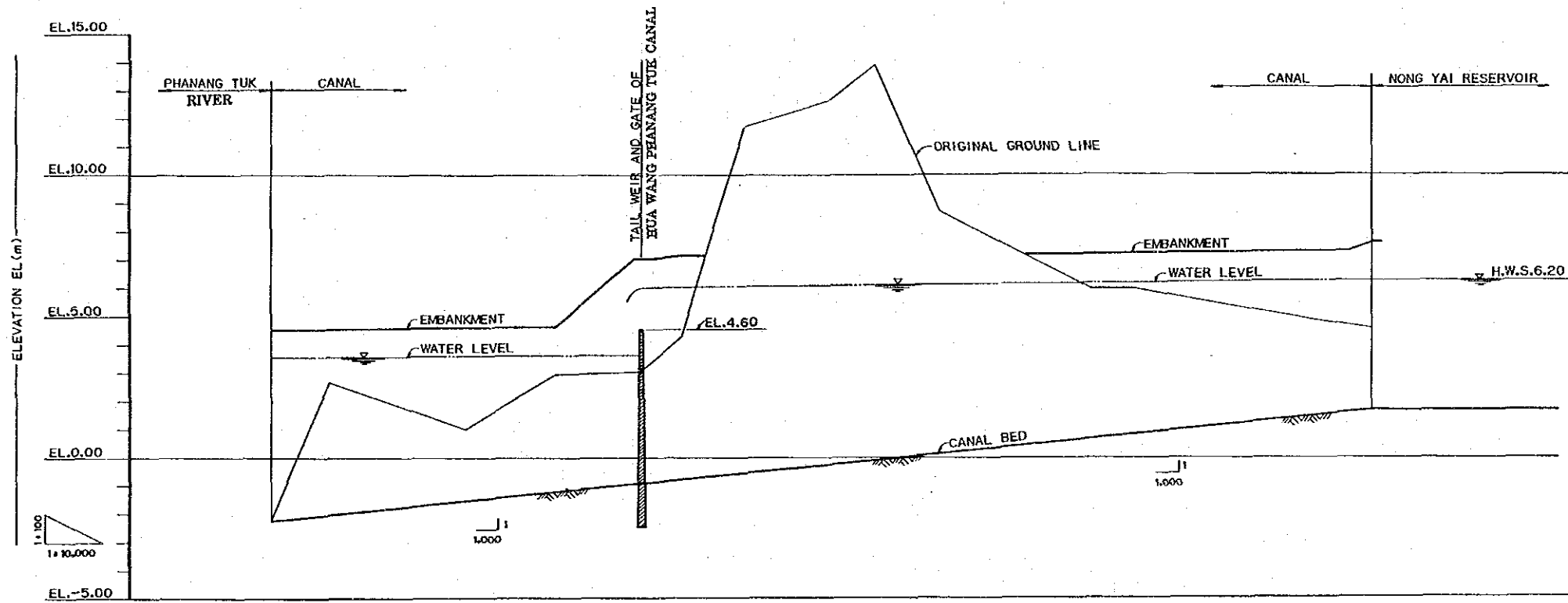
STATION No.	DISTANCE (m)	LEFT BANK EL. (m)	RIGHT BANK EL. (m)	RIVER BED EL. (m)	WATER LEVEL EL. (m)	EMBANKMENT EL. (m)
1+000	0	0.32	0.51	-1.46	-0.06	
2+000	1000	0.65	0.87	-3.71	-0.06	
3+000	1000	1.38	0.77	-3.00	0.67	
4+000	1000	0.76	1.03	-4.98	1.17	
5+000	1000	0.67	0.58	-4.71	1.44	
6+000	1000	1.48	0.49	-5.99	1.53	2.40
6+358	958	0.04	0.04	-4.69	1.64	2.50
8+006	1046	-0.30	0.10	-4.67	1.87	2.70
8+976	970	0.58	0.53	-4.92	2.16	3.00
10+017	1041	0.15	0.60	-4.38	2.57	3.40
11+015	998	0.79	0.23	-4.31	3.06	3.90
12+048	1033	0.22	0.09	-4.18	3.38	4.20
13+061	1013	0.63	0.02	-3.88	3.84	4.70
14+046	985	0.21	0.94	-2.92	4.46	5.30
15+051	1005	0.99	0.92	-3.52	5.19	6.00
16+069	1038	1.35	1.30	-3.09	5.82	6.70
17+084	985	1.53	1.82	-2.92	6.44	7.30
18+094	1010	2.37	2.07	-3.47	6.88	7.70
19+058	964	3.04	2.54	-2.52	7.30	8.10
20+098	1040	3.59	3.35	-1.50	7.71	8.60
21+124	1026	3.27	4.06	-1.19	8.08	8.90
22+064	960	4.83	4.57	-0.68	8.31	9.20
23+084	1000	5.29	5.30	-0.54	8.54	9.40
24+038	954	5.40	5.90	-0.24	8.87	9.70
25+008	970	5.72	6.26	-0.35	9.11	10.00
26+048	1040	5.58	7.06	0.43	9.36	10.20
26+992	944	7.39	7.32	0.69	9.64	10.50
27+910	916	7.87	8.15	0.84	9.86	10.70
28+904	994	6.58	8.18	1.17	10.00	10.80
29+882	978	7.13	9.21	1.44	10.19	11.00
31+100	1218	7.53	9.07	3.64	10.56	11.40
32+100	1000	8.33	7.93	3.94	10.77	11.60
33+100	1000	9.26	9.42	3.15	11.01	11.90
34+100	1000	9.13	9.38	5.68	11.38	12.20
35+100	1000	9.42	6.93	6.05	12.00	12.90
36+100	1000	11.14	11.21	6.71	12.74	13.60
37+100	1000	10.34	11.01	7.10	13.50	14.30
38+100	1000	13.45	13.36	8.19	14.02	14.90
39+100	1000	13.23	16.91	8.82	14.64	15.50
40+100	1000	17.82	15.63	10.65	15.87	16.70

**FIGURE F-1-17 PROFILE OF HUA WANG PHANANG TUK CANAL
(FROM THA TAPHAO RIVER TO RESERVOIR)**



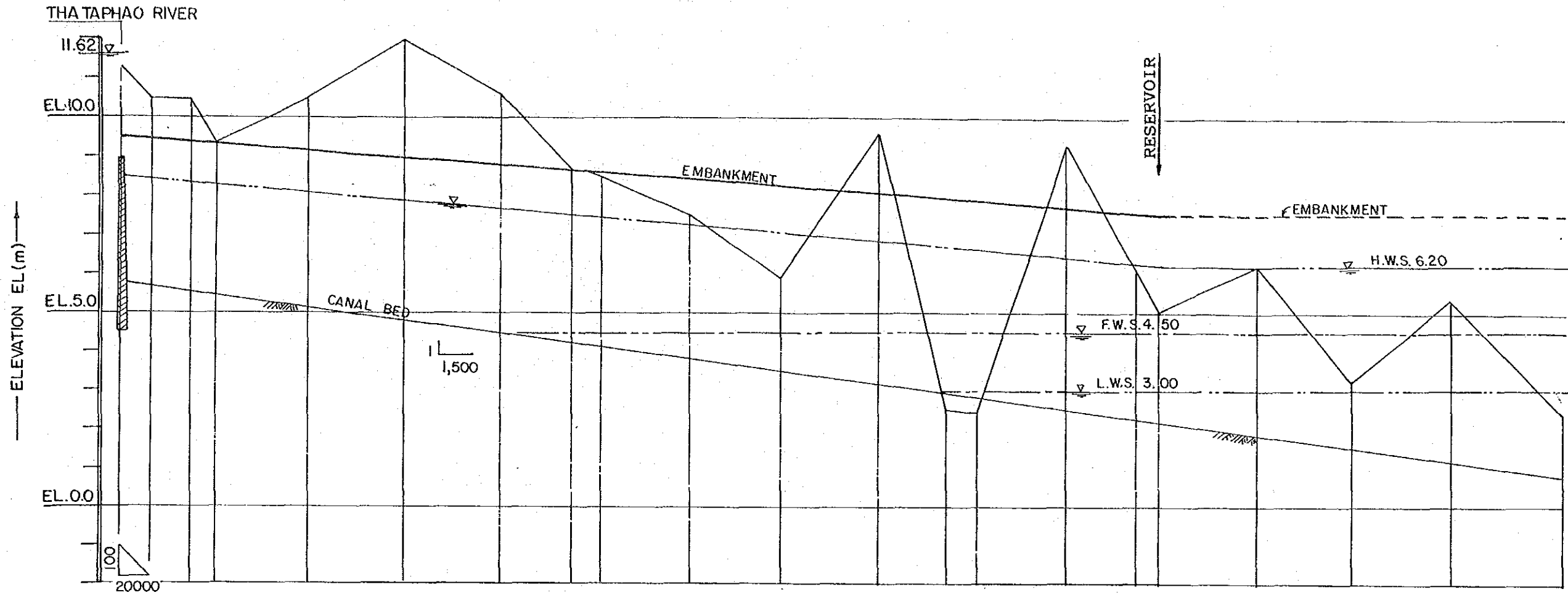
STATION No.	DISTANCE (m)	ELEVATION EL (m)	CANAL BED EL (m)	EMBANKMENT EL (m)	CURVE
0 + 000	0	5.4	2.00	7.50	
0 + 390	390	7.0	2.20 (2.50)	7.50 (8.05)	
0 + 550	550	7.7	2.50	8.05	

FIGURE F - 1 - 18 PROFILE OF HUA WANG PHANANG TUK CANAL
 (FROM NONG YAI RESERVOIR TO PHANANG TUK RIVER) Q = 540 m³/sec



CURVE	P1 IA=55°00'00" R=500.000 TL=260.284 CL=479.956 SL=63.691		P2 IA=27°35'33" R=400.000 TL=98.222 CL=92.433 SL=11.883		P3 IA=26°27'47" R=400.000 TL=24.052 CL=84.742 SL=11.883		P4 IA=75°26'16" R=400.000 TL=309.367 CL=526.698 SL=109.675		P5 IA=50°12'51" R=400.000 TL=187.434 CL=350.561 SL=41.737		P6 IA=22°04'31" R=400.000 TL=78.025 CL=154.115 SL=7.535					
EMBANKMENT EL. (m)	4.500	4.520	4.570	4.600	7.000	7.100	(7.100)	(7.100)	(7.100)	7.100	7.100	7.200	7.200	7.200	7.500	
WATER LEVEL M.S.L.(m)	3.531	3.539	3.564	3.585	3.609	6.005	6.014	6.026	6.035	6.046	6.081	6.039	6.125	6.153	6.174	6.185
CANAL BED EL. (m)	-2.250	-2.050	-1.570	-1.250	-0.950	-0.810	-0.590	-0.290	-0.110	0.100	0.620	0.760	1.110	1.370	1.520	1.600
ELEVATION EL. (m)	-2.25	2.70	1.00	2.90	3.00	4.20	11.60	12.60	13.80	8.70	5.90	5.90	5.30	4.80	4.60	4.50
DISTANCE (m)	0	202	480	318	300	171	193	292	185	204	527	139	351	253	154	81
STATION No.	0+000	0+202	0+682	1+000	1+300	1+471	1+664	1+956	2+141	2+345	2+872	3+011	3+362	3+615	3+769	3+850

FIGURE F-1-19 PROFILE OF PAK PHRAEK CANAL

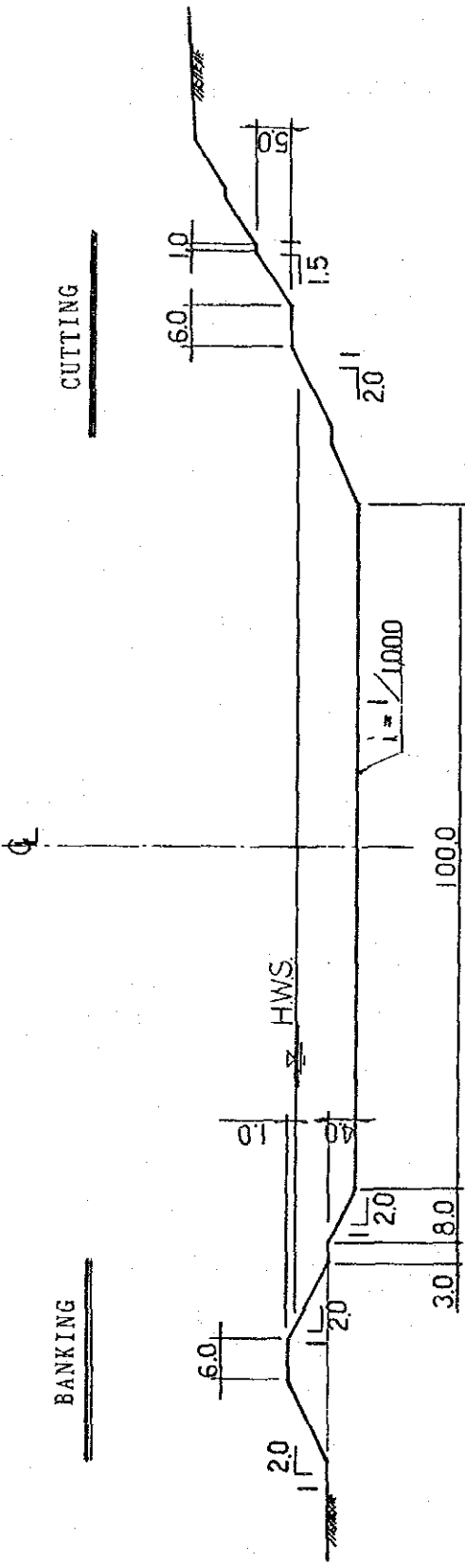


STATION No.	DISTANCE (m)	ELEVATION EL (m)	CANAL BED EL (m)	EMBANKMENT EL (m)	CURVE
0 + 000	0	11.3	5.80	9.50	IA=40°-00'-00" R=300.0 TL=109.191 CL=209.440 SL=19.253 IP.1
0 + 158	158.0	10.5	5.69	9.44	
0 + 367	209.4	10.5	5.56	9.37	
0 + 500	133.0	9.4	5.47	9.32	
1 + 000	500.0	10.5	5.13	9.14	IP.2 IA=30°-00'-00" R=300.0 TL=80.385 CL=157.080 SL=10.583
1 + 500	500.0	12.0	4.80	8.95	
2 + 000	500.0	10.6	4.47	8.77	
2 + 377	377.0	8.7	4.22	8.64	
2 + 534	157.0	8.5	4.11	8.58	IP.3 IA=30°-00'-00" R=300.0 TL=80.385 CL=157.080 SL=10.583 IP.4 IA=70°-00'-00" R=3000 TL=210.062 CL=366.519 SL=66.232
3 + 000	466.0	7.5	3.80	8.41	
3 + 500	500.0	5.9	3.47	8.23	
4 + 000	500.0	9.6	3.13	8.05	
4 + 368	368.0	2.5	2.89	7.91	IP.4 IA=70°-00'-00" R=3000 TL=210.062 CL=366.519 SL=66.232
4 + 525	157.0	2.4	2.78	7.85	
5 + 009	484.0	9.3	2.46	7.68	
5 + 376	367.0	6.2	2.22	7.55	
5 + 500	133.0	5.0	2.13	(7.50)	IP.4 IA=70°-00'-00" R=3000 TL=210.062 CL=366.519 SL=66.232
6 + 000	500.0	6.2	1.80	(7.50)	
6 + 500	500.0	3.2	1.47	(7.50)	
7 + 000	500.0	5.3	1.13	(7.50)	
7 + 575	575.0	2.4	0.75	(7.50)	

FIGURE F - 1 - 20 TYPICAL CROSS SECTION OF CANAL (1/2)

HUA WANG PHANANG TUK CANAL (LOWER) (NO.0+000 - NO.1+300)

Q = 540.0 cu.m/sec



HUA WANG PHANANG TUK CANAL (LOWER) (NO.1+300 ~ NO.3+850)

Q = 540.0 cu.m/sec

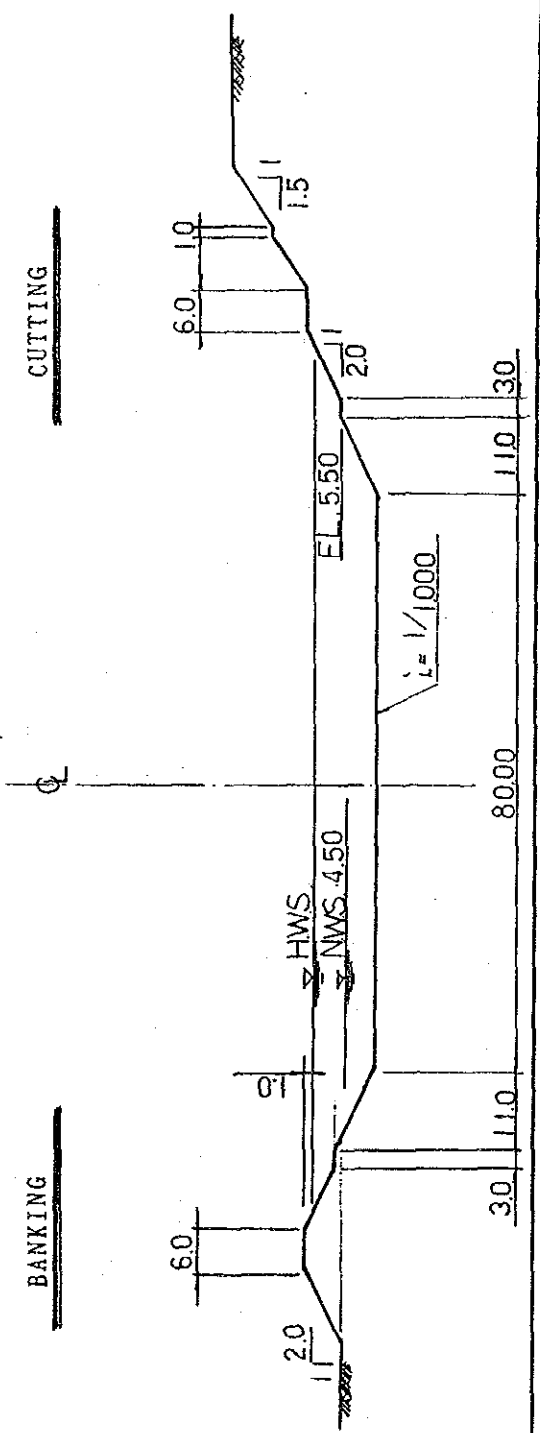
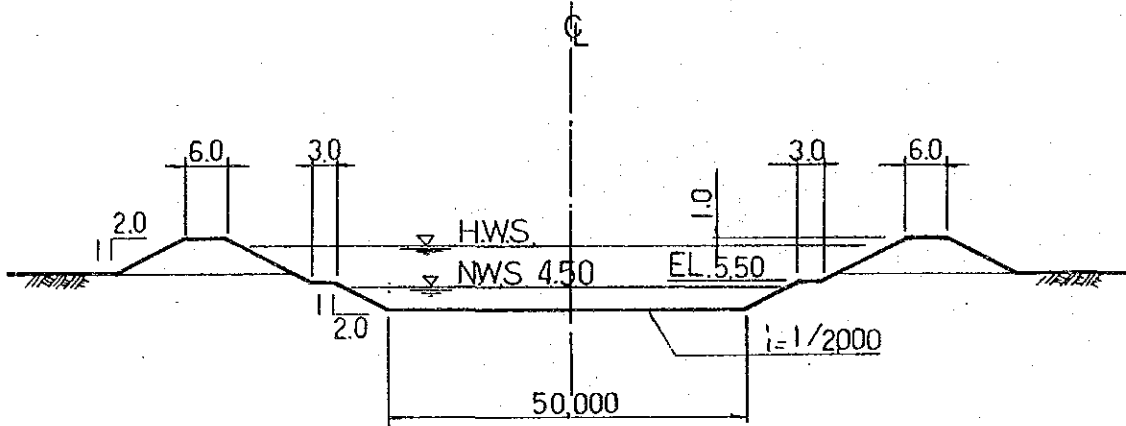


FIGURE F-1-21 TYPICAL CROSS SECTION OF CANAL (2/2)

HUA WANG PHANANG TUK CANAL (UPPER)

$Q = 270.0 \text{ cu.m/sec}$



PAK PHRAEK CANAL

$Q = 270.0 \text{ cu.m/sec}$

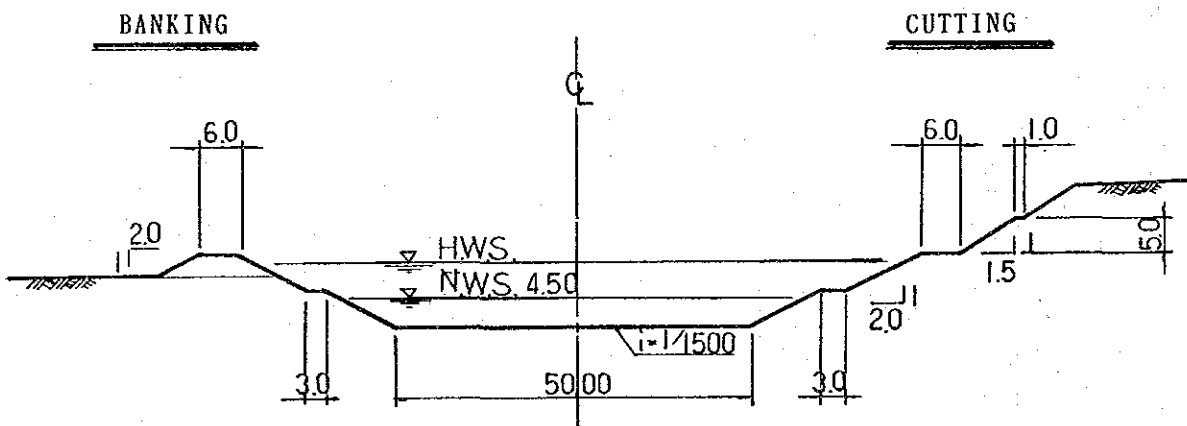
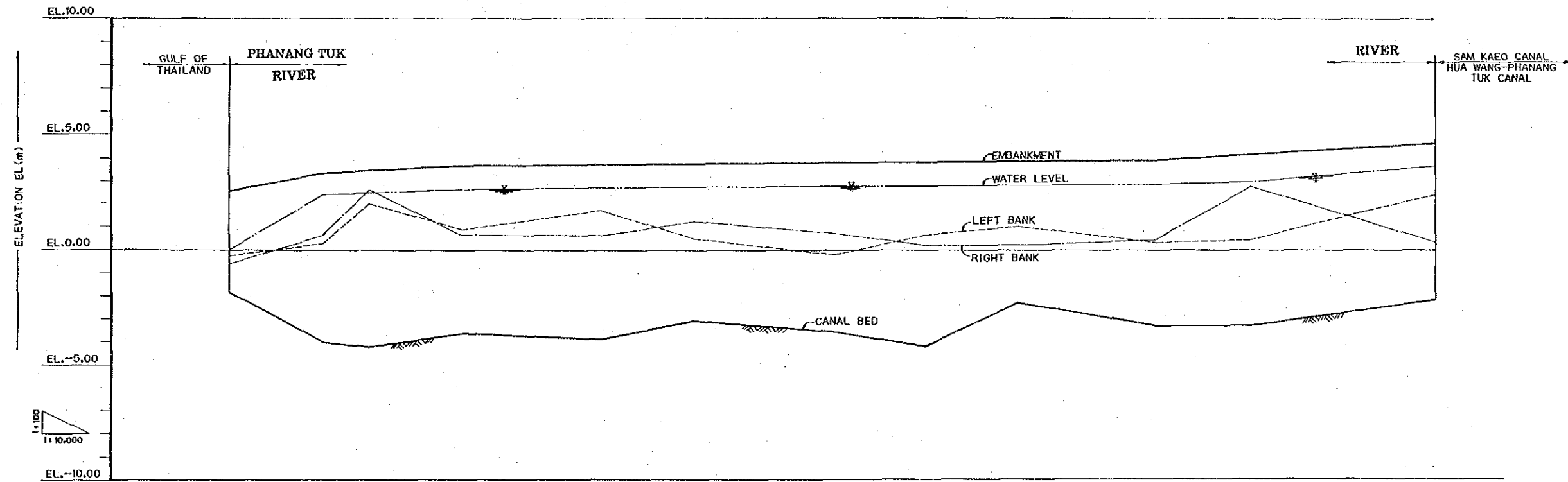


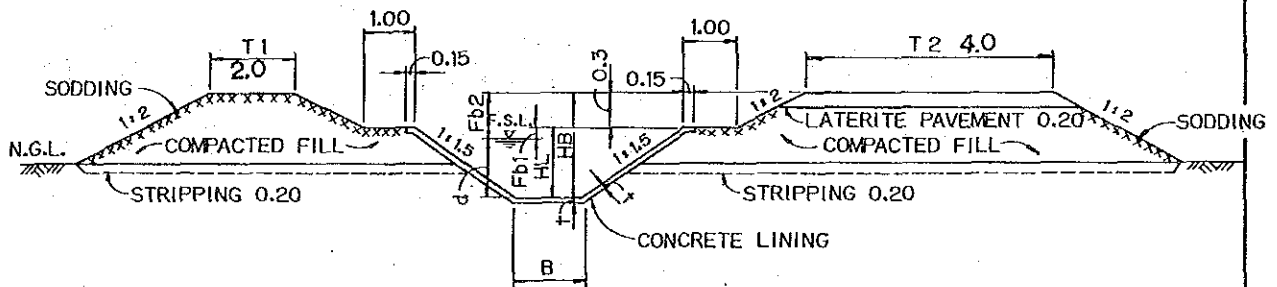
FIGURE F - 1 - 22 PROFILE OF PHANANG TUK RIVER Q = 800 m³/sec



EMBANKMENT EL. (m)		2.50	3.30	3.40	3.60	3.66	3.70	3.70	3.70	3.74	3.80	4.03	4.50
WATER LEVEL EL. (m)		-0.06	2.33	2.40	2.59	2.64	2.67	2.68	2.69	2.70	2.76	2.83	3.53
CANAL BED EL. (m)		-1.83	-4.01	-4.22	-3.67	-3.90	-3.12	-3.61	-4.22	-2.38	-3.37	-3.33	-2.25
RIGHT BANK EL. (m)		-0.80	0.59	2.53	0.60	0.58	1.16	0.68	0.13	0.13	0.39	2.63	0.27
LEFT BANK EL. (m)		-0.24	0.23	1.92	0.82	1.63	0.41	-0.27	0.57	0.91	0.25	0.35	2.28
DISTANCE (m)		0	400	200	400	600	400	600	400	400	600	400	800
STATION No.		1+000	1+400	1+600	2+000	2+600	3+000	3+600	4+000	4+400	5+000	5+400	6+200

FIGURE F - 1 - 23 MAJOR FEATURES OF IRRIGATION CANAL

BLOCK	CANAL NAME	DISTANCE (m)	Q (cu m/s)	1/I	B (m)	d (m)	V (m/s)	Fb1 (m)	Fb2 (m)	HL (m)	HB (m)
A	1	230	0.403	1000	0.70	0.39	0.81	0.21	0.51	0.60	0.90
	2	1580	0.240	1000	0.70	0.32	0.73	0.18	0.48	0.50	0.80
B	1	490	0.612	1000	0.90	0.44	0.89	0.16	0.46	0.60	0.90
	2-1	170	0.513	1000	0.80	0.42	0.56	0.18	0.48	0.60	0.90
	2-2	560	0.222	1000	0.60	0.30	0.69	0.20	0.50	0.50	0.80
	3	2250	0.154	5000	0.50	0.30	0.55	0.20	0.50	0.50	0.80
E	4	630	0.292	600	0.50	0.31	0.90	0.19	0.49	0.50	0.80
	1	470	0.431	3000	0.90	0.49	0.54	0.21	0.51	0.70	1.00
	2	1190	0.357	600	0.60	0.34	0.95	0.16	0.46	0.50	0.80
G	3	930	0.160	4000	0.60	0.28	0.55	0.22	0.42	0.50	0.80
	1	560	1.340	5500	1.60	0.82	0.57	0.18	0.48	1.00	1.30
	2-1	350	1.281	5500	1.60	0.80	0.57	0.20	0.50	1.00	1.30
	2-2	940	0.312	3000	0.80	0.43	0.50	0.17	0.47	0.60	0.90
	3	2110	0.173	2000	0.60	0.32	0.50	0.18	0.48	0.50	0.80
	5	430	0.969	5500	1.40	0.73	0.53	0.17	0.47	0.90	1.20
	6-1	840	0.956	5500	1.40	0.73	0.53	0.17	0.47	0.90	1.20
	6-2	460	0.920	5500	1.40	0.73	0.53	0.17	0.47	0.90	1.20
	7	600	0.190	2000	0.60	0.33	0.52	0.17	0.47	0.50	0.80
	8	520	0.430	3500	1.00	0.49	0.51	0.21	0.51	0.70	1.00
	10	1010	0.114	1500	0.50	0.26	0.51	0.14	0.44	0.40	0.70
	11	500	0.301	2500	0.80	0.40	0.53	0.20	0.50	0.60	0.90
	13-1	275	0.142	1500	0.60	0.27	0.53	0.23	0.53	0.50	0.80
	13-2	760	0.069	1500	0.60	0.27	0.53	0.23	0.53	0.50	0.80
14	835	0.073	1000	0.50	0.18	0.52	0.22	0.52	0.40	0.70	
15-17	1400	0.213	2000	0.70	0.34	0.53	0.16	0.46	0.50	0.80	



TYPICAL CROSS SECTION OF LINED CANAL
(NO SCALE)

FIGURE F-1-24 BORING INVESTIGATION FOR PILE DESIGN AT SITE-9

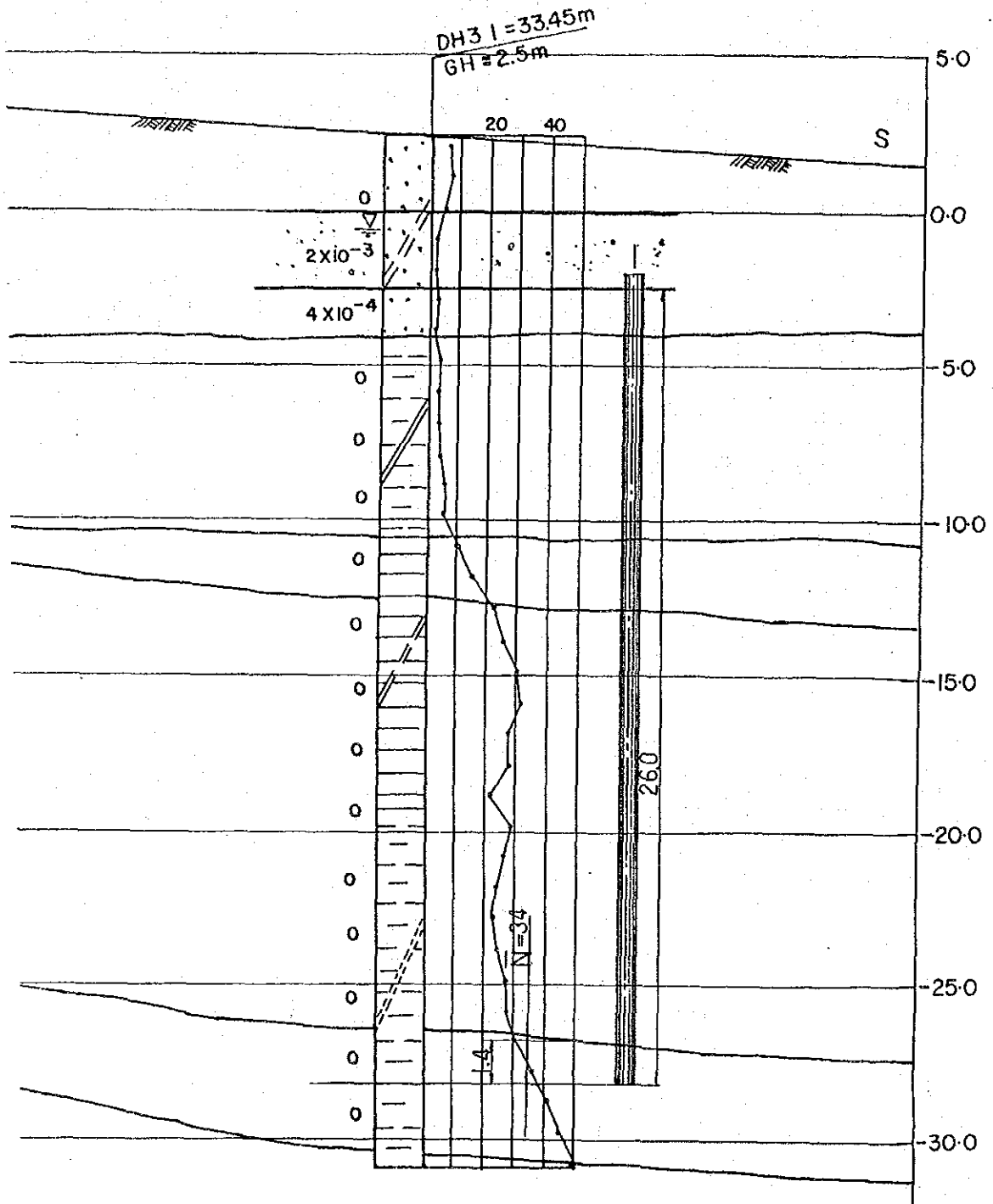
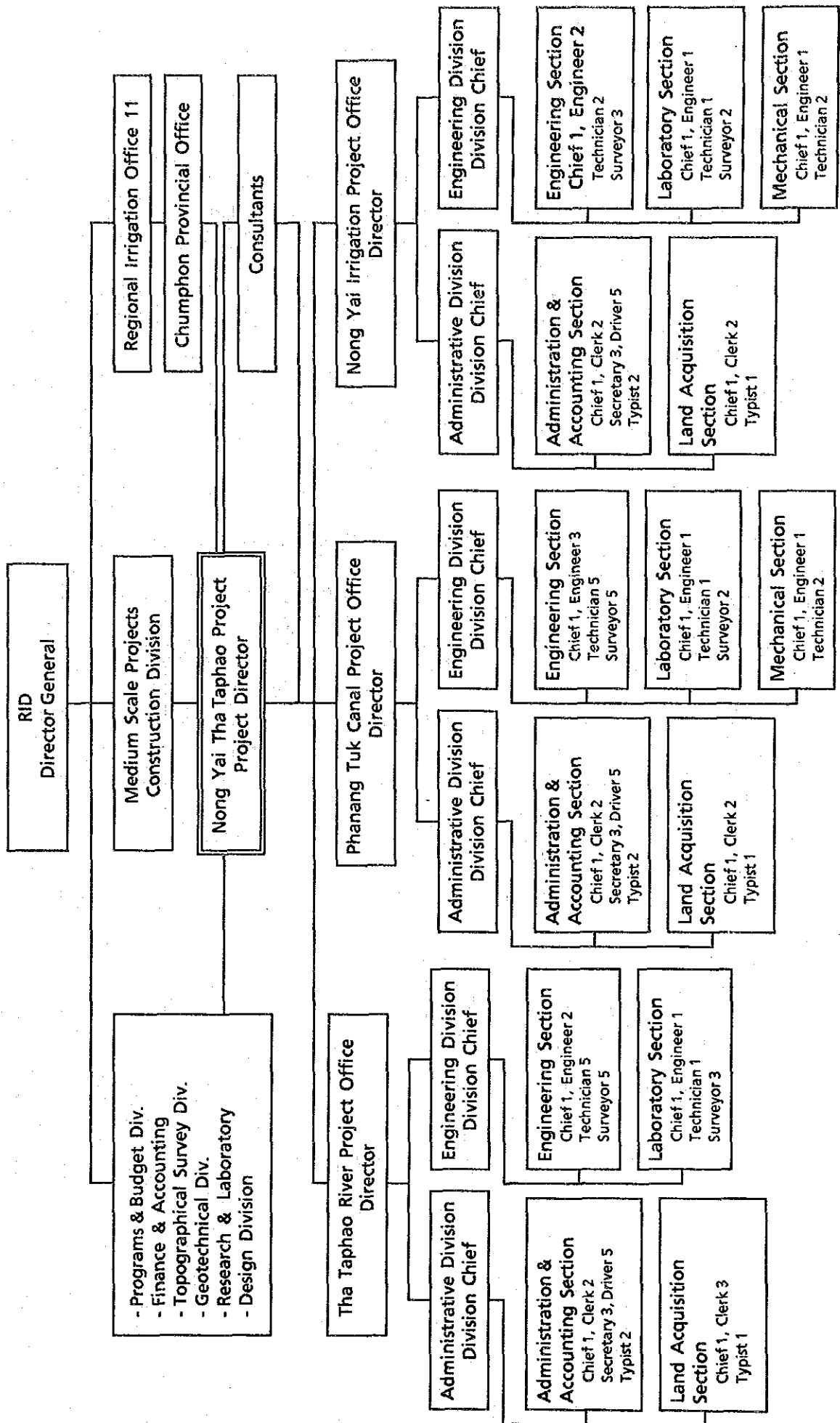


FIGURE F - 2 - 1 PROJECT ORGANIZATION CHART FOR IMPLEMENTATION



**FIGURE F - 2 - 2 IMPLEMENTATION SCHEDULE OF NONG YAI -
THA TAPHAO DEVELOPMENT PROJECT**

Description	Quantities	1992 Y	1993 Y	1994 Y	1995 Y	1996 Y
[I] THA TAPHAO RIVER SYSTEM IMPROVEMENT PROJECT						
1. RIVER IMPROVEMENT PROJECT		F/S	D/D		Construction	
1.1 Tha Taphao river	34.3 km					
1.2 Nong Sai river	8.0 km					
1.3 Phanang Tuk river	6.2 km					
2. CANAL PROJECT						
2.1 Sam Kaeo canal (rehabilitation)	4.8 km		Construction			
2.2 Hua Wang Phanang Tuk canal	4.5 km	F/S	D/D	Construction		
2.3 Pak Phraek canal	5.5 km					
[II] NONG YAI IRRIGATION PROJECT						
1. Nong Yai reservoir (Dike and Road)	13.9 km	F/S	D/D	Construction		
2. Irrigation and Drainage system	1,200 ha					
3. Agricultural Development Facilities	L.S					

APPENDIX G. AGRICULTURE

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G - 1 LAND USE OF CHUMPHON PROVINCE

The total land area of Chumphon province is about 601 thousand ha, or equivalent to 8.5 percent of the Southern Thailand, being classified into 3 categories ; forest land (142 thousand ha), farm holding land (241 thousand ha) and unclassified land (218 thousand ha).

Unclassified land is the balance of land area taken from total land estimated by the Royal Thai Survey Department minus forest land estimated by the Royal Forest Department ; they area swamp land, sanitary district area, municipal area, railroads, highways, real estate, public area and etc. Land use of Chumphon province is given below;

Category	Southern Thailand	Chumphon Province	
		Area	%
Forest Land	9,143,517	890,469	9.7
Farm Holding Land			
- Housing area	444,662	28,913	6.5
- Paddy field	4,292,162	148,238	3.5
- Upland crop field	225,832	20,933	9.3
- Fruit and tree crops	11,846,389	1,125,770	9.5
- Vegetable	69,622	9,696	13.9
- Pasture	149,435	11,103	7.4
- Idle land	1,700,092	154,430	9.1
- Others	261,304	6,362	2.4
Sub-total	18,989,498	1,505,445	7.9
Unclassified Land	16,063,977	1,359,716	8.5
Total	44,196,992	3,755,630	8.5

Source : Agricultural Statistics of Thailand, Crop Year 1989/90 MOAC

The total forest land of Chumphon province was registered to be 344 thousand ha (2,151, 832 rai) in 1970 (Table G-1). Since then forest land has been officially developed for use of the Agricultural Land Reform Office (ALRO) of the Ministry of Agricultural and Cooperatives (MOAC), Cooperatives, private companies and so on, totaling 125 thousand ha (782,249 rai) as given in Table G-2. The total land area of 27 national reserve forest is 312 thousand ha, or 1,947,427 rai according to the data prepared in 1989 by the Royal Forest Department. In 1961, the forest area was 414.4 thousand ha, corresponding to 69.0 percent of the total land area of Chumphon province (600.9 thousand ha).

According to data prepared by the Royal Forest Department in 1979, 1982, 1985 and 1989 by means of analysis of LANDSAT information, forest land has been decreased year by year. In 1989, the forest land shares only 23.7 percent of the total land area of the province.

CHANGE IN FOREST LAND IN CHUMPHON PROVINCE

Unit : thousand ha

	1961	1978	1982	1985	1989
Forest	414.4	168.1	151.6	146.2	142.5
(%)	69.0	28.0	25.2	24.3	23.7

Source : Royal Forest Department

Of 240.9 thousand ha of farm holding land in 1989, 210.5 thousand ha of land area used for cultivation of paddy, upland crops, fruits and tree crops, vegetable and pasture, being increased from 139.9 thousand ha in 1986 (Table G-3). Among 5 kinds of farm land, farm land for fruits and tree crops occupies 85.6 percent of the total farm land, whereas paddy fields occupies 11.3 percent.

G - 2 CROPS AND YIELD

(Tree Crops)

The land use of Chumphon province is characterized by the high rate of farm land for tree crops of about 70,450 ha, or 60 percent of the total farm land in the province. The harvest area of coffee in 1990 of the province was about 25,500 ha corresponding to 52.2 percent of the national total. The harvested area of coffee in the province increased from 15,200 ha in 1987 to 25,500 ha in 1990. The same holds good of the Study Area; the harvested area of coffee amounted to 11,904 ha in 1990. Average yields of coffee in the Study Area area are 500 kg/ha (80 kg/rai) for Amphoe Bang Sapan Noi, 590 kg/ha (95 kg/rai) for Amphoe of Tha Sae and Pathiu and 1,030 kg/ha (165 kg/rai) for Amphoe Muang Chumphon, while the national average yield in 1990 is 1,220 kg/ha (195 kg/rai).

For coconut, most soils used for coconut plantation area are sand or sandy loam spreading along the east coast of the Study Area. Most farmers in these areas grow coconut. Since 1985 the planted area of coconut has a

tendency to decrease. The planted area of coconut of the Study Area was 16,164 ha in 1990. Detail information on yields of coconut is not available so far except for Amphoe Muang Chumphon that has an average yield of 450 fruit/rai in 1990, lower than the provincial average yield of 637 fruit/rai.

The planted area of oil palm in Chumphon province increased from 12,800 ha in 1987 to 19,200 ha in 1990, the harvested area from 9,300 ha to 12,800 ha for the same period. The production of oil palm in 1990 of Chumphon province (144,600 ton) shared about 13 percent of the national total production. The expansion of oil palm plantation in Chumphon province is mainly due to soils suitable for oil palm growing. The oil palm planted area in the Study Area was 7,678 ha, of which 6,645 ha was in Amphoe Tha Sae. Most of oil palm cultivation is practiced in settlement areas. There are 2 settlement projects operated by settlement cooperatives in Amphoe Tha Sae and Amphoe Pathiu. Besides, there are large scale oil palm plantations that have their own processing factories. Average yields of oil palm in 1990 are 6,900 kg/ha (1,100 kg/rai) for Amphoe of Pathiu and Tha Sae, 7,500 kg/ha (1,200 kg/rai) for Amphoe Bang Sapan Noi and 9,100 kg/ha (1,450 kg/rai) for Amphoe Muang Chumphon, whereas the national average yield of oil palm in 1990 is 12,300kg/ha.

The rubber planted area in the Study Area is 12,448 ha. Rubber plantations within the Study Area are mainly concentrated in undulating to moderately steep area in Amphoe Tha Sae and Amphoe Muang Chumphon. Many of rubber producers are of small scale holding, and farmers are in need of seeking the off-farm employment. Most of the farmers tap daily and suspend the period of rainfall. Detail information on yields of rubber is not available except for Amphoe Muang Chumphon with an average yield of 100 kg/rai in 1990, same to the national average yield in 1990, whereas the provincial average yield is reported to be 247 kg/rai.

(Fruit)

According to the statistics obtained from the provincial office of agriculture, the area under fruit trees is 18,796 ha : 6,623 ha in Amphoe Muang Chumphon, 12,063 ha in Amphoe Tha Sae. Papaya and durian are important fruits in the Study Area followed by mangosteen, rambutan and banana. Average yields of durian, rambutan, mangosteen, banana and papaya are 12.2 ton/ha, 3.4 ton/ha, 11.0 ton/ha, 6,100 fruits/ha and 28.1 ton/ha respectively.

(Vegetables)

The total acreage under vegetables in the Study Area fluctuates every year and occupies only a relatively small part of the total cultivated land. Most vegetables area grown as mixed farm with fruit trees. Main vegetables harvested in 1990 were pepper, cucumber, ginger, white gourd and so on (Table G-7).

(Paddy)

In 1990, 7,593 ha of rainy season paddy was planted in the Study Area ; 4,448 ha in Amphoe Muang Chumphon, 2,993 ha in Amphoe Tha Sae and 152 ha in Amphoe Pathiu. Most paddy cropping is practiced on low-lying land along main rivers. The average yield of rainy season paddy of Chumphon province fluctuate as 2.1 ton/ha, 1.5 ton/ha, 1.8 ton/ha and 2.2 ton/ha in 1987, 1988, 1989 and 1989 respectively.

Average yields of rainy season paddy of the Study Area in 1990 range from 2.0 ton/ha in Amphoe Muang Chumphon to 2.3 ton/ha in Amphoe Tha Sae. In 1990, rainy season paddy was planted to 7,593 ha ; however, harvested area was 6,758 ha with an average yield of 2.1 ton/ha. Dry season paddy was planted to 1,207 ha in 1990 ; 719 ha in Amphoe Tha Sae, and 488 ha in Amphoe Muang Chumphon. Average yields were 3.1 ton/ha (500 kg/rai) for amphoe Tha Sae and 4.0 ton/ha (640 kg/rai) for Amphoe Muang Chumphon.

According to data of NRD-2, 1990 by NESDB, of 12,926 paddy farm households. 5,304 households (or 41 percent) have a farm size of 0.16 to 0.8 ha, and 4,826 households (or 37 percent) have a farm size of 0.8 ha to 1.6 ha (Table G-9). 1,321 paddy farm households (or, 10 percent) cultivated their paddy fields twice a year in 1990; 16 percent in Amphoe Tha Sae, 15 percent in Amphoe Pathiu, and no double cropping in Amphoe Bang Sapan Noi (Table G-10).

About 52 percent of paddy farm households used the recommended high yielding varieties (HYV); highest in Amphoe Pathiu as 94 percent, and lowest in Amphoe Pathiu as 22 percent. 80 percent and 74 percent of paddy farm households applies fertilizer and chemicals respectively (Table G-10).

Present Cropping calendars are given in Figure G-1.

G-3 LIVESTOCK AND SHRIMP CULTURE

Livestock raising in the Study Area has expanded during the last decade as the secondary sources of income for smallholders. About 18,400 heads of cattle were raised in 1990 in the Study Area by about 2,200 farm households with about 3,100 ha pasture; 11,600 heads in Amphoe Tha Sae, 2,900 heads in Amphoe Muang Chumphon, 3,200 heads in Amphoe Phathiu, and 700 heads in Amphoe Bang Sapan Noi respectively (refer to Table G-11).

Shrimp culture of Thailand has been remarkably developed ; total shrimp production has increased from 15,800 ton in 1986 to 55,600 ton in 1990, of which 40,800 ton of production is shared by jumbo tiger shrimp. In the Study Area, there are 1,509 ponds for jumbo tiger shrimp culture in 1990 with a total pond area of 2,700 ha (16,893 rai) being managed by 1,059 operators. Of 2,700 ha of pond area, 1,970 ha is operated by 8 private enterprises.

G-4 ACTUAL USE OF FARM LAND

The data of NRD-2C, 1990 by NESDB reveal the situation of actual use of farm land the village basis of 277 village in the Study Area, only 40 villages, or 14 percent of the total village, used their all farm land as summarized below (for detail, refer to Table G-13).

Amphoe	Nos. of Villages	ACTUAL USE OF FARM LAND			
		Nos. of Villages by Land Use Rate			
		All	3/4	1/2	< 1/2
Muang Chumphon	140	20	91	16	13
Tha Sae	82	13	55	12	2
Pathiu	43	7	34	2	-
Bang Sapan Noi	12	-	11	1	-
Total	277	40	191	31	15

46 village, or 17 percent of villages used their farm land with a land use intensity of not more than 50 percent. The data also show the reasons why they could not fully used their farm land ; the greatest reason is water shortage for crop cultivation (Table G-14), as summarized as follows :

REASONS FOR LOW LAND USE INTENSITY

Unit : Nos. of Villages

	Poor Soils	Labor Shortage	Low Yield	Lack of Knowledge	Water Shortage	Flood	Others
Muang Chumphon	16	5	16	5	54	8	18
Tha Sae	1	4	7	3	54	-	13
Pathiu	-	1	9	1	16	-	13
Bang Sapan Noi	1	1	2	-	8	-	-
Total	18	11	34	9	132	8	44

G - 5 LAND TENURE

Most farmers in the Study Area are owner farmers (88 percent of the total farm households), according to the data of NRD-2C, 1990, NESDB. The numbers of tenant farmers are 1,397, or only 3 percent of the total farm households in the Study Area (Table G-15), as summarized below;

LAND TENURE

Amphoe	Nos. of Farm Households	Owner	Part Owner	Tenant
Muang Chumphon	18,259	15,560	1,721	978
Tha Sae	14,653	13,393	970	290
Rap Ro	6,820	6,318	430	72
Pathiu	2,611	2,157	397	57
Total	42,343	37,428	3,518	1,397

Table G-16 gives the situation of farm land tenancy of the Study Area on the village basis. Most farmers rent farm land from villagers living at the same village, being followed by parent and / or their relatives and people living outside their village, as summarized below;

FARM LAND TENANCY

Unit : Nos. of Villages

Amphoe	Parent, Relatives	Villagers	People outside Village
Muang Chumphon	26	60	14
Tha Sae	7	34	7
Rap Ro	3	12	2
Pathiu	-	7	2
Total	36	113	25

G - 6 FARMER'S GROUP AND AGRICULTURAL CREDIT

In the Study Area, about 3,000 farmers and 7,900 farmers are members of agricultural cooperatives and farmer's groups mainly for the purpose of borrowing institutional agricultural credit. There are several kinds of agricultural credit for farmers, including the Bank for Agriculture and Agricultural Cooperatives (BAAC), agricultural cooperatives, commercial banks, merchants and others. Among these sources, BAAC plays an important role in agricultural credit in the Study Area. 244 villages, or 38 percent of the total villages that borrowed agricultural credit, had the loan from BAAC ; however, 65 villages, or 10 percent of villages, still borrowed funds for farming from merchants (Table G-17).

Agricultural credit supplied by BAAC Chumphon branch during the period from April, 1990 to March, 1991 amounted to about Baht 457 million for 7,654 client farmers (Table G-18). Of total credit amounts, Baht 135 million (or, 30 percent) are for fisheries production purposes, Baht 99 million (or 22 percent) are for para rubber production purposes, and Baht 81 million (or 18 percent) are oil palm production purposes (Table G-19).

BAAC provides the short-term production loans with the repayment period of half to 1 year, the medium-term loans mainly for procurement of farm machinery and equipment, draught animals and land with the repayment period of 3 to 5 years, and the long-term loans for investment in agriculture with the repayment period up to 15 years or 20 years. During the period from April, 1991 to October, 1991, BAAC Chumphon branch offered to 3 Amphoe in the province related to the Study Area agricultural credit amounting to Baht 923 million, of which Baht 286 million, Baht 102 million and Baht 535 million area the short-term loans, the medium, term loans and the long-term loan respectively.

TABLE G - 1 FOREST OF CHUMPHON PROVINCE

- Unit: rai -

Amphoe	National Reserve	Wildlife Reserve	National Park	Others	Total
Muang Chumphon	127,224	-	-	1,750	128,974
Tha Sae	580,090	283,750	6,875	-	870,715
Pathiu	289,603	-	-	2,500	292,103
Lang Suan	53,336	-	-	5,000	58,336
Sawi	277,762	-	-	-	277,762
Lamae	80,019	-	-	-	80,019
King Patoe	347,588	-	-	25,000	372,588
King Tung Tako	71,335	-	-	-	71,335
Total	1,826,957	283,750	6,875	34,250	2,151,832

Source: Royal Forest, Department, 1990

TABLE G - 2 FOREST LAND DEVELOPMENT FOR AGRICULTURE IN CHUMPHON PROVINCE

Amphoe	ALRO	So To Ko	Cooperatives	Private and Official	Total
Muang Chumphon	-	18,907	-	221	19,128
Tha Sae	307,761	24,358	73,240	40,537	445,896
Pathiu	85,215	15,048	46,900	38,135	185,298
Lang Suan	-	-	55,000	836	55,836
Sawi	-	33,932	-	120	34,052
Lamae	-	15,091	5,000	63	20,154
King Patoe	-	12,833	-	-	12,833
King Tung Tako	-	8,800	-	252	9,052
Total	392,976	128,969	180,140	80,164	782,249

Source: Royal Forest, Department

TABLE G - 3 CHANGE IN FARM HOLDING LAND OF CHUMPHON PROVINCE

- Unit: rai -

Category	1986		1989	
	Area	%	Area	%
Housing Area	24,963		28,913	
Farm Land				
- Paddy field	185,495	21.2	148,238	11.3
- Upland crop field	23,756	2.7	20,933	1.6
- Fruit and tree crop	659,596	75.4	1,125,770	85.6
- Vegetable	3,057	0.4	9,696	0.7
- Pasture	2,767	0.3	11,103	0.8
Sub-total	874,671	100.0	1,315,740	100.0
Idle Land	85,505		154,430	
Others	42,075		6,362	
Total	1,022,214		1,505,445	

Source: Office of Agricultural Economy, MOAL

TABLE G-4 CROPPED AREA AND YIELD OF SELECTED CROPS IN THREE AMPHOE OF CHUMPHON PROVINCE IN 1990

Crops	Pathiu			Tha Sae			Muang			Average Yield of Chumphon (kg/raisi)
	Planted Area (raisi)	Yielded Area (raisi)	Yield (kg/raisi)	Planted Area (raisi)	Yielded Area (raisi)	Yield (kg/raisi)	Planted Area (raisi)	Yielded Area (raisi)	Yield (kg/raisi)	
<u>Rice</u>										
<u>Wet Season</u>										
Lowland	10,748	10,748 *	374	10,578	9,559 *	380	34,441	30,971 *	316	336
Upland	5,920	1,920 *	300	21,354	18,479 *	363	1,010	1,010 *	347	341
<u>Dry Season</u>										
Para Rubber	1,200	1,200 *	500	7,672	17,422 *	500	3,053	2,715 *	644	537
Palm Oil	88,565	-	-	33,037	-	-	10,016	1,180	100	247
Coconut	7,345	5,682	1,100	41,534	12,421	1,100	3,240	2,528	1,450	1,610
Coffee	27,444	-	-	26,780	-	-	58,667	36,537	450 **	637 **
Durian	9,555	9,092	95	48,070	5,621	95	22,089	15,937	165	145
Rambutan	1,949	-	-	14,272	-	-	14,267	13,018	1,786	1,447
Mangosteen	392	-	-	4,539	-	-	3,837	556	550	2,080
maize	2,750	-	-	6,446	-	-	7,515	130	150	1,767
Banana	57,000	41,000 *	601	88,934	66,227 *	563	600	485 *	427	576
Papaya	2,500	-	-	18,500	1,400	1,028 **	5,811	3,208	982 **	1,157 ***
	3,500	-	-	28,000	22,000	4,472	5,201	4,215	4,500	4,526

Note: * Harvested area, ** fruit/rai, *** hands/rai.

Source: Provincial Office of Agriculture, Changwat Chumphon

TABLE G - 5 CROPPED AREA AND YIELD OF SELECTED CROPS IN AMPHOE BANG SAPAN NOI IN 1990

Crops \ Tambon	Chan Rag (Rais)	Chai Rach (Rais)	Bang Sphan Noi Total	
			Area (Rais)	Yield (kg/rai)
Rice				
Wet Season	20	-	3,080	350
Para Rubber	3,970	1,308	8,923	140
Palm Oil	740	380	11,580	1,200
Coconut	17,228	1,175	77,397	300*
Coffee	39	1,675	2,169	80
Durian	93	63	469	100
Maize	2,050	1,508	10,074	350
Ginger	2,500	3,030	6,680	3,000
Vegetable	872	1,530	2,442	-

Note : * fruits/rai

Source : Amphoe Office of Agriculture, Bang Sphan Noi, Prachuap Khiri Khan Province

TABLE G - 6 CROPPED AREA OF FRUIT TREES IN THREE AMPHOE OF CHUMPHON PROVINCE IN 1990

Fruit Trees	Pathiu	Tha Sae	Muang	Total of Chumphon
Durian	1,949	14,272	14,257	56,717
Rambutan	392	4,539	3,837	54,116
Mangosteen	2,750	6,446	7,515	40,190
Pomelo	0	2,827	3,043	6,265
Banana				
Homtong	0	1,500	2,700	5,534
Namwa	2,500	17,000	1,847	29,893
Lady Finger	0	0	1,264	3,852
Jack Fruit	114	200	15	1,545
Langsat	0	0	20	5,832
Java Apple	0	0	32	178
Papaya	3,500	28,000	5,201	40,525
Others	21	612	1,666	3,744
Total	11,226	75,397	41,397	248,391

Source: Provincial Office of Agriculture, Chumphon Province

TABLE G - 7 CROPPED AREA OF VEGETABLES IN THREE AMPHOE OF CHUMPHON PROVINCE IN 1990

- Unit: rai -

Vegetable	Pathiu	Tha Sae	Muang	Total of Chumphon
Bird Pepper	2,317	5,183	91	8,569
Cucumber (small)	199	486	93	1,114
Cucumber (large)	405	1,299	816	3,239
Yard Long Bean	341	533	238	1,628
Luffa	97	375	116	855
Ginger	476	11,363	240	12,156
Water Convolvulus	303	859	464	2,017
Chinese Kale	69	993	80	1,305
Cantonese	70	10	83	268
White Gourd	2,170	1,308	10	3,634
Others	679	2,379	275	4,410
Total	7,126	24,788	2,506	39,195

Source: Provincial Office of Agriculture, Chumphon Province

TABLE G - 8 CROPPED AREA OF UPLAND CROPS IN THREE AMPHOE OF CHUMPHON PROVINCE IN 1990

- Unit: rai -

Fruit Trees	Pathiu	Tha Sae	Muang	Total of Chumphon
Maize	57,000	88,934	600	146,709
Sweet Corn	568	3,449	501	5,437
Peanut	8,740	12,587	700	22,519
Pineapple	8,150	6,489	135	15,445
Water Melon	3,352	486	21	7,739
Pumpkin	7,883	2,399	239	11,130
Soy Bean	657	9,307	130	10,094
Others	1,018	2,025	8	3,579
Total	87,368	125,676	2,334	222,652

Source: Provincial Office of Agriculture, Chumphon Province

TABLE G - 9 SIZE OF PADDY FARM

- Unit : Nos. of Paddy Farm Households -

Tambon	Paddy Farm Households	Nos. of Paddy Farm Households by Size (rai)					
		< 1	1~5	6~10	11~20	21~50	> 50
Mung							
Khun Krating	139	-	49	52	31	7	-
Tak Dad	406	-	65	162	160	19	-
Tayang	424	2	136	153	85	48	-
Tungka	363	-	87	153	94	29	-
Na Tung	164	-	97	53	14	-	-
Bang Luak	1,012	-	562	309	123	14	4
Bang Mark	1,203	2	358	321	413	96	13
Ban Na	185	-	87	47	51	-	-
Paknam	109	-	42	67	-	-	-
Wangphai	483	-	127	148	146	53	9
Visai Nua	312	-	181	118	12	1	-
Hadpankrai	612	72	289	201	38	7	5
Na Cha Ung	371	-	160	140	54	15	2
Wang Mai	43	-	10	23	10	-	-
Had Sai Lee	105	-	9	42	39	15	-
Tumsing	18	-	15	3	-	-	-
Sub-total	5,949	76	2,274	1,992	1,270	304	33
Tha Sae							
Tha Sae	687	-	171	432	69	15	-
Ku Ring	541	-	184	292	65	-	-
Takhom	783	40	277	346	104	16	-
Nakra Tam	886	1	245	336	209	86	9
Rap Ro	2,022	27	1,186	628	96	52	33
Salui	166	-	113	50	3	-	-
Hong Charoem	143	-	97	46	-	-	-
Sub-total	5,228	68	2,273	2,130	546	169	42
Pathiu							
Bangson	173	-	121	52	-	-	-
Chum Ko	348	-	62	260	26	-	-
Don Yang	444	-	137	106	176	25	-
Tale Thup	122	-	101	18	3	-	-
Sa Plee	612	-	319	246	42	5	-
Sub-total	1,699	-	740	682	247	30	-
Bang Sapan Noi							
Chang Rag	43	2	14	21	6	-	-
Chai Rach	7	-	3	1	3	-	-
Sub-total	50	2	17	22	9	-	-
Total	12,926	146	5,304	4,826	2,072	503	75

Source : NRD-2, 1990, NESDB

TABLE G - 10 FARM INPUT FOR PADDY AND PADDY CROP INTENSITY

- Unit : Nos. of Paddy Farm Households -

Tambon	Paddy Farm Households	Nos. of Households using			Paddy Crop Intensity	
		HYV	Fertizer	Chemicals	One Crop	Two Crops
Mung						
Khun Krating	139	82	139	139	139	-
Tak Dad	406	175	343	406	386	33
Tayang	424	11	154	286	424	-
Tungka	363	50	347	324	352	11
Na Tung	164	91	101	139	164	-
Bang Luak	1,012	142	914	709	917	65
Bang Mark	1,203	512	1,203	1,072	1,113	-
Ban Na	185	162	183	185	185	-
Paknam	109	18	109	99	109	-
Wangphai	483	279	477	483	407	70
Visai Nua	312	107	312	304	312	-
Hadpankrai	612	271	453	442	549	45
Na Cha Ung	371	245	304	312	357	-
Wang Mai	43	33	43	43	43	-
Had Sai Lee	105	43	105	29	105	-
Tumsing	18	-	18	18	18	-
Sub-total	5,949	2,221	5,205	4,990	5,580	224
Tha Sae						
Tha Sae	687	548	599	594	630	49
Ku Ring	541	541	541	541	160	381
Takham	783	664	762	733	685	95
Nakra Tam	886	282	620	480	687	217
Rap Ro	2,022	665	697	525	543	53
Salui	166	109	121	166	121	20
Hong Charoem	143	86	143	143	123	30
Sub-total	5,228	2,895	3,483	3,182	3,249	845
Pathiu						
Bangson	173	173	173	173	143	24
Chum Ko	348	328	348	348	264	89
Don Yang	444	444	434	414	168	102
Tale Thup	122	99	122	122	100	37
Sa Plee	612	545	595	293	612	-
Sub-total	1,699	1,589	1,672	1,350	1,287	252
Bang Sapan Noi						
Chang Rag	43	11	19	8	43	-
Chai Rach	7	-	10	16	7	-
Sub-total	50	11	29	18	50	-
Total	12,926	6,716	10,389	9,540	10,166	1,321

Source : NRD-2, 1990, NESDB

TABLE G - 11 LIVESTOCK RAISING IN 1990

Tambon	Pasture (rai)	Cattle		Buffealoes		Pigs		Poultry	
		H,H	Nos	H,H	Nos.	H,H	Nos	H.H	Nos.
Mung									
Khun Krating	-	22	59	4	17	47	164	57	570
Tak Dad	-	169	388	15	85	388	1,195	47	4,050
Tayang	-	-	-	1	57	53	476	7	1,800
Tungka	-	82	345	26	227	274	902	150	1,000
Na Tung	-	27	169	1	16	45	430	3	70
Bang Luak	525	75	231	126	825	462	1,050	206	1,981
Bang Mark	1,465	146	392	129	324	628	2,159	136	121,511
Ban Na	-	31	123	18	62	179	419	1	30
Paknam	-	3	9	7	163	28	934	7	6,440
Wangphai	3,500	71	287	82	249	373	1,618	315	7,314
Visai Nua	3,200	10	54	1	3	193	675	12	825
Hadpankrai	1,700	16	71	90	317	276	799	20	200
Na Cha Ung	-	89	206	45	133	152	744	101	12,920
Wang Mai	-	28	439	2	20	27	716	1	10,033
Had Sai Lee	-	18	44	6	33	158	363	58	911
Tumsing	-	22	40	12	22	20	50	-	-
Sub-total	10,390	809	2,857	565	2,553	3,303	12,694	1,121	169,655
Tha Sae									
Tha Sae	-	82	232	44	443	525	1,045	486	5,646
Ku Ring	-	47	447	10	96	40	1,122	1	220
Takham	-	-	-	50	530	339	1,463	-	-
Nakra Tam	-	-	-	-	-	372	670	387	1,900
Rap Ro	97	547	9,264	81	6,146	2,255	56,990	1,043	62,215
Salui	1,875	145	1,043	80	259	945	1,988	805	9,368
Hong Charoem	-	166	595	28	176	460	735	10	50
Sub-total	1,972	987	11,581	293	7,650	4,936	64,013	2,732	79,399
Pathiu									
Bangson	1,020	125	384	23	75	262	795	595	4,500
Chum Ko	2,632	104	1,889	30	697	117	2,629	8	6,800
Don Yang	-	-	-	-	-	-	-	1	1,200
Tale Thup	180	50	435	16	22	96	351	20	1,420
Sa Plee	-	112	520	57	279	412	1,123	457	10,344
Sub-total	3,832	391	3,228	126	1,073	887	4,898	1,081	24,264
Bang Sapan Noi									
Chang Rag	-	-	-	-	-	1	50	-	-
Chai Rach	3,068	38	690	25	268	154	270	100	6,168
Sub-total	3,068	38	690	25	268	155	320	100	6,168
Total	19,262	2,225	18,356	1,009	11,544	9,281	81,925	5,034	279,486

TABLE G - 12 SHRIMP CULTURE PONDS IN 1990

Tambon	Village No.	Nos. of Operators	Nos. of Ponds	Area (rai)
Muang				
Tayang	1	10	40	245
	2	11	18	148
	3	1	1	2
	9	35	177	1,221
	10	10	72	441
	10	Private enterprise	12	59
Tungka	2	3	24	201
	2	Private enterprise	120	4,000
	2	Private enterprise	150	6,000
	2	Private enterprise	50	1,000
	4	Private enterprise	100	800
Na Tung	3	12	14	60
Paknam	2	2	13	210
	5	11	34	341
	7	1	6	92
	8	3	7	72
Na Cha Ung	3	1	1	3
	4	8	11	67
	5	5	5	6
Had Sai Lee	2	12	50	458
	4	Private enterprise	15	120
	4	Private enterprise	50	220
	4	Private enterprise	15	120
	5	15	74	1,013
Total		148	1,059	16,893

Source: Provincial Office of Fisheries, Chumphon, 1990

TABLE G - 13 ACTUAL USE OF FARM LAND

Tambon	Nos. of Villages	Nos. of Villages by Land Use Rate			
		All	3/4	1/2	< 1/2
Muang					
Khun Krating	7	2	5	-	-
Tak Dad	10	4	5	-	1
Tayang	11	4	7	-	-
Tungka	9	-	6	2	1
Na Tung	9	-	8	1	-
Bang Luak	12	-	11	1	-
Bang Mark	12	-	11	-	1
Ban Na	10	4	6	-	-
Paknam	5	-	3	1	1
Wangphai	10	2	6	2	-
Visai Nua	12	2	8	1	1
Hadpankrai	9	1	4	2	2
Na Cha Ung	7	-	3	2	2
Wang Mai	7	-	4	2	1
Had Sai Lee	5	-	-	2	3
Tumsing	5	1	4	-	-
<u>Sub-total</u>	<u>140</u>	<u>20</u>	<u>91</u>	<u>16</u>	<u>13</u>
Tha Sae					
Tha Sae	14	4	10	-	-
Ku Ring	12	-	12	-	-
Takhm	14	1	10	2	1
Nakra Tam	11	2	8	1	-
Rap Ro	14	2	7	5	-
Salui	9	-	4	4	1
Hong Charoen	8	4	4	-	-
<u>Sub-total</u>	<u>82</u>	<u>13</u>	<u>55</u>	<u>12</u>	<u>2</u>
Pathiu					
Bangson	7	3	4	-	-
Chum Ko	8	-	8	-	-
Don Yang	12	-	10	2	-
Tale Thup	6	3	3	-	-
Sa Plee	10	1	9	-	-
<u>Sub-total</u>	<u>43</u>	<u>7</u>	<u>34</u>	<u>2</u>	<u>-</u>
Bang Sapan Noi					
Chang Rag	8	-	8	-	-
Chia Rach	4	-	3	1	-
<u>Sub-total</u>	<u>12</u>	<u>-</u>	<u>11</u>	<u>1</u>	<u>-</u>
Total	277	40	191	31	15

Source: NRD-2C, 1990, NESDB

TABLE G - 14 REASONS FOR LOW LAND USE INTENSITY

- Uunit: Nos. of Villages -

Tambon	Poor Soil	Labor Shortage	Low Yield	Lack of Knowledge	Water Shortage	Flood	Others
Muang							
Khun Krating	-	2	1	-	3	-	-
Tak Dad	-	-	-	-	4	-	1
Tayang	1	-	-	1	3	-	2
Tungka	2	-	3	-	2	-	2
Na Tung	1	-	4	-	2	-	2
Bang Luak	1	-	5	-	1	3	2
Bang Mark	1	2	-	1	7	-	1
Ban Na	1	-	-	-	3	1	3
Paknam	2	-	-	-	-	1	2
Wangphai	-	-	1	1	4	1	-
Visai Nua	3	-	-	-	5	1	1
Hadpankrai	1	-	2	2	4	-	-
Na Cha Ung	-	-	-	-	7	-	-
Wang Mai	-	1	-	-	5	-	1
Had Sai Lee	3	-	-	-	-	1	1
Tumsing	-	-	-	-	4	-	-
<u>Sub-total</u>	<u>16</u>	<u>5</u>	<u>16</u>	<u>5</u>	<u>54</u>	<u>8</u>	<u>18</u>
Tha Sae							
Tha Sae	-	-	3	-	9	-	2
Ku Ring	-	-	2	-	10	-	-
Takham	-	1	-	-	8	-	5
Nakra Tam	1	-	1	-	6	-	3
Rap Ro	-	-	-	1	12	-	1
Salui	-	-	1	-	6	-	2
Hong Charoen	-	3	-	2	3	-	-
<u>Sub-total</u>	<u>1</u>	<u>4</u>	<u>7</u>	<u>3</u>	<u>54</u>	<u>-</u>	<u>13</u>
Pathiu							
Bangson							
Bangson	-	-	-	-	1	-	6
Chum Ko	-	-	1	-	5	-	2
Don Yang	-	1	6	1	1	-	3
Tale Thup	-	-	1	-	2	-	1
Sa Plee	-	-	1	-	7	-	1
<u>Sub-total</u>	<u>-</u>	<u>1</u>	<u>9</u>	<u>1</u>	<u>16</u>	<u>-</u>	<u>13</u>
Bang Sapan Noi							
Chang Rag	1	-	2	-	5	-	-
Chia Rach	-	1	-	-	3	-	-
<u>Sub-total</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>-</u>	<u>8</u>	<u>-</u>	<u>-</u>
Total	18	11	34	9	132	8	44

Source: NRD-2C, 1990, NESDB

TABLE G - 15 LAND TENURE (1)

Tambon	Nos. of Farm Household	Nos. of Household by land Tenure		
		Owner	Part Owner	Tenant
Muang				
Khun Krating	443	352	69	22
Tak Dad	1,133	938	143	52
Tayang	1,851	1,141	348	362
Tungka	1,168	1,015	87	66
Na Tung	1,210	1,023	128	59
Bang Luak	1,325	1,187	113	25
Bang Mark	2,150	1,774	294	82
Ban Na	1,372	1,333	37	2
Paknam	529	506	17	6
Wangphai	1,671	1,222	259	190
Visai Nua	1,065	918	106	41
Hadpankrai	881	802	51	28
Na Cha Ung	886	825	41	20
Wang Mai	1,522	1,493	28	1
Had Sai Lee	499	477	-	22
Tumsing	554	554	-	-
<u>Sub-total</u>	<u>18,259</u>	<u>15,560</u>	<u>1,721</u>	<u>978</u>
Tha Sae				
Tha Sae	1,732	1,450	188	94
Ku Ring	1,623	1,471	144	8
Takham	1,492	1,391	100	1
Nakra Tam	1,240	944	272	24
Rap Ro	3,112	2,859	188	65
Salui	3,368	3,192	78	98
Hong Charoen	2,086	2,086	-	-
<u>Sub-total</u>	<u>14,653</u>	<u>13,393</u>	<u>970</u>	<u>290</u>
Pathiu				
Bangson	592	570	22	-
Chum Ko	1,758	1,617	134	7
Don Yang	2,176	2,031	96	49
Tale Thup	832	786	33	13
Sa Plee	1,462	1,314	145	3
<u>Sub-total</u>	<u>6,820</u>	<u>6,318</u>	<u>430</u>	<u>72</u>
Bang Sapan Noi				
Chang Rag	1,514	1,475	39	-
Chia Rach	1,086	682	358	57
<u>Sub-total</u>	<u>2,611</u>	<u>2,157</u>	<u>397</u>	<u>57</u>
Total	42,343	37,428	3,518	1,397

Source: NRD-2C, 1990, NESDB

TABLE G - 16 LAND TENURE (2)

Tambon	Nos. of Village	Nos. of Villages that Rent Farm Land Mainly from:		
		Parent, Relatives	Villagers	People Outside Village
Muang				
Khun Krating	7	2	3	1
Tak Dad	10	2	5	1
Tayang	11	-	8	3
Tungka	9	2	3	-
Na Tung	9	1	3	5
Bang Luak	12	5	5	1
Bang Mark	12	3	7	-
Ban Na	10	3	3	-
Paknam	5	2	-	1
Wangphai	10	5	4	-
Visai Nua	12	1	7	1
Hadpankrai	9	-	5	-
Na Cha Ung	7	-	3	-
Wang Mai	7	-	3	-
Had Sai Lee	5	-	1	1
Tumsing	5	-	-	-
<u>Sub-total</u>	<u>140</u>	<u>26</u>	<u>60</u>	<u>14</u>
Tha Sae				
Tha Sae	14	1	7	1
Ku Ring	12	-	3	3
Takham	14	-	7	1
Nakra Tam	11	2	9	-
Rap Ro	14	2	4	2
Salui	9	2	4	-
Hong Charoen	8	-	-	-
<u>Sub-total</u>	<u>82</u>	<u>7</u>	<u>34</u>	<u>7</u>
Pathiu				
Bangson	7	-	1	-
Chum Ko	8	-	6	-
Don Yang	12	1	1	-
Tale Thup	6	1	-	-
Sa Plee	10	1	4	2
<u>Sub-total</u>	<u>43</u>	<u>3</u>	<u>12</u>	<u>2</u>
Bang Sapan Noi				
Chang Rag	8	-	2	2
Chia Rach	4	-	5	-
<u>Sub-total</u>	<u>12</u>	<u>-</u>	<u>7</u>	<u>2</u>
Total	277	36	113	25

Source: NRD-2C, 1990, NESDB

TABLE G - 17 FARMER'S GROUP AND AGRICULTURAL CREDIT SOURCE

Tambon	Member of:		Nos. of Villages by Credit Sources					Total
	Agri. Corp.	Farmer's Group	BAAC	Bank	Coorp.	Merchant	Others	
Muang								
Khun Krating	-	194	5	4	2	-	1	12
Tak Dad	-	262	8	2	2	1	4	17
Tayang	6	43	5	2	1	-	-	8
Tungka	5	156	9	7	3	5	4	28
Na Tung	-	190	9	8	1	-	3	21
Bang Luak	20	141	10	2	4	3	3	22
Bang Mark	16	468	12	12	1	12	15	52
Ban Na	15	239	10	4	6	1	9	30
Paknam	25	64	3	3	-	2	-	8
Wangphai	39	293	8	1	2	3	5	19
Visai Nua	4	254	10	6	3	3	6	28
Hadpankrai	26	115	2	-	3	1	-	6
Na Cha Ung	-	46	3	2	1	1	3	10
Wang Mai	129	53	7	4	6	-	-	17
Had Sai Lee	-	40	4	4	3	2	-	13
Tumsing	138	236	4	3	1	3	2	13
<u>Sub-total</u>	<u>423</u>	<u>2,794</u>	<u>109</u>	<u>64</u>	<u>39</u>	<u>37</u>	<u>55</u>	<u>304</u>
Tha Sae								
Tha Sae	296	598	13	8	11	5	2	39
Ku Ring	198	413	11	5	7	1	-	24
Takham	321	543	14	4	11	-	4	33
Nakra Tam	80	220	11	9	6	2	8	36
Rap Ro	42	881	13	-	6	-	1	20
Salui	91	159	9	-	3	-	1	13
Hong Charoen	329	406	8	3	5	2	-	18
<u>Sub-total</u>	<u>1,357</u>	<u>3,220</u>	<u>79</u>	<u>29</u>	<u>49</u>	<u>10</u>	<u>16</u>	<u>183</u>
Pathiu								
Bangson	-	-	7	2	4	1	2	16
Chum Ko	465	926	8	8	8	-	-	24
Don Yang	51	195	12	8	6	3	3	32
Tale Thup	45	333	6	3	4	1	3	17
Sa Plee	27	142	10	4	7	2	3	26
<u>Sub-total</u>	<u>588</u>	<u>1,596</u>	<u>43</u>	<u>25</u>	<u>29</u>	<u>7</u>	<u>11</u>	<u>115</u>
Bang Sapan Noi								
Chang Rag	555	133	8	3	7	7	8	33
Chia Rach	73	108	5	-	4	4	2	15
<u>Sub-total</u>	<u>628</u>	<u>241</u>	<u>13</u>	<u>3</u>	<u>11</u>	<u>11</u>	<u>10</u>	<u>48</u>
Total	2,996	7,851	244	121	128	65	92	650

Source: NRD-2C, 1990, NESDB

TABLE G - 18 AGRICULTURAL CREDIT SUPPLIED BY BAAC CHUMPHON BRANCH
IN 1990 (APRIL 1, 1990 - MARCH 31, 1991)

Tambon	Households	Client Farmers (%)	Baht 1,000 (%)
Muang			
Khun Krating	500	121 (24.2)	7,619 (3.6)
Tak Dad	1,593	145 (9.1)	9,812 (4.6)
Tayang	1,851	75 (4.1)	17,896 (8.5)
Tungka	1,170	530 (45.3)	41,355 (19.6)
Na Tung	1,601	151 (9.4)	12,358 (5.8)
Bang Luak	1,335	74 (5.5)	2,718 (1.3)
Bang Mark	2,232	118 (5.3)	8,483 (4.0)
Ban Na	1,372	401 (29.2)	21,505 (10.2)
Paknam	1,046	92 (8.8)	37,693 (17.8)
Wangphai	1,741	90 (5.2)	6,975 (3.3)
Visai Nua	1,090	381 (35.0)	23,073 (10.9)
Hadpankrai	881	51 (5.8)	2,570 (1.2)
Na Cha Ung	961	83 (8.6)	5,772 (2.7)
Wang Mai	1,531	151 (9.9)	10,396 (4.9)
Had Sai Lee	499	13 (2.6)	3,285 (1.6)
Tumsing	554	(-)	(-)
<u>Sub-total</u>	<u>19,957</u>	<u>2,476 (12.4)</u>	<u>211,510 (100.0)</u>
Tha Sae			
Tha Sae	1,799	472 (26.2)	23,603 (18.0)
Ku Ring	1,623	321 (19.8)	14,424 (11.0)
Takhom	1,492	417 (27.9)	12,064 (9.2)
Nakra Tam	1,240	98 (7.9)	4,589 (3.5)
Rap Ro	3,131	453 (14.5)	15,735 (12.0)
Salui	3,526	1,270 (36.0)	32,783 (25.0)
Hong Charoen	2,096	922 (44.0)	27,934 (21.3)
<u>Sub-total</u>	<u>14,907</u>	<u>3,953 (26.5)</u>	<u>131,132 (100.0)</u>
Pathiu			
Bangson	592	112 (18.9)	7,855 (6.9)
Chum Ko	1,758	162 (9.2)	8,145 (7.1)
Don Yang	2,582	549 (21.3)	71,708 (62.7)
Tale Thup	838	257 (30.7)	18,636 (15.8)
Sa Plee	1,462	145 (9.9)	8,581 (7.5)
<u>Sub-total</u>	<u>7,232</u>	<u>1,225 (16.0)</u>	<u>114,325 (100.0)</u>
Total	42,096	7,654	456,967

Source: BAAC Chumphon Branch

TABLE G - 19 AGRICULTURAL CREDIT BY PRODUCTION PURPOSE BY BAAC CHUMPHON BRANCH
IN 1990 (April, 1990 - March, 1991)

- Unit: Baht thousand -

Production	A.Muang		Tha Sae		Pathiu		Total	
	Amount	(%)	Amount	(%)	Amount	(%)	Amount	(%)
Paddy	2,115	1.0	918	0.7	457	0.4	3,490	0.8
Para Rubber	15,863	7.5	24,915	19.0	58,535	51.2	99,313	21.7
Oil Palm	5,499	2.6	62,943	48.0	12,576	11.0	81,018	17.7
Upland Crops	-	-	10,491	8.0	10,175	8.9	20,666	4.5
Livestock	8,037	3.8	17,703	13.5	14,862	13.0	40,602	8.9
Fisheries	128,388	60.7	-	-	7,088	6.2	135,476	29.6
Fruits and Tree Crops	51,608	24.2	14,162	10.8	10,632	9.3	76,401	16.7
Total	211,510	100.0	131,132	100.0	114,325	100.0	456,967	100.0

TABLE G-20 FARMING HOUSEHOLDS OF PADDY, COCONUT, ORCHARD
AND VEGETABLE CULTIVATION (NONG YAI PROJECT)

Tambon Village No.	Name	Total HH	Paddy (HH)			Coconut		Orchard		Vegetable	
			1-5 rai	6-10 rai	11-20 rai	21-50 rai	HH	Size	HH	Size	HH
Na Thung*											
		1,601	97	53	14	0	154	12	8	0	0
01	Ban Don Ta Bow	65	27	6	3	0	23	0	0	0	0
04	Ban Thab Thanot	117	23	31	8	0	42	0	0	0	0
05	Ban Tha Taphoa Nue	257	3	0	0	0	18	0	0	0	0
06	Ban Wang Yang	218	0	0	0	0	6	0	0	0	0
08	Ban Thung Jig	132	8	2	0	0	48	12	8	0	0
09	Ban Nong Phak	285	0	0	0	0	19	0	0	0	0
Bang Luk*											
		1,335	562	309	123	18	454	146	3.5	94	3.5
03	Ban Fai Tha	96	21	12	2	0	18	43	5	20	5
08	Ban Sala Loi	75	38	21	0	0	0	1	4	15	4
09	Ban Na Pru	103	40	24	25	14	0	0	0	7	2
12	Ban Khoa Rad	68	42	13	0	0	28***	5	0	4	2
Na Cha-Ang*											
		961	160	140	54	17	638	100	1	38	1
01	Ban Khun Saen	182	32	20	8	0	30	100	1	0	0
02	Ban Na Cha-Ang	139	23	26	26	27	74	0	0	0	0
03	Ban Hu Ro	172	43	40	10	0	165	0	0	5	1
06	Ban Sai Thong	84	30	14	0	0	93	0	0	30	1
07	Ban Nern Kheeree	56	7	0	0	0	34	0	0	0	0
Total **		2,049	337	209	82	31	570	156	2.6	81	2.7

Note : * Tambon total

** Priority Project total

*** Cashew nut

Source : NRD-2C, 1990

TABLE G-21 YIELD OF SOME SELECTED CROPS, 1990 (NONG YAI PROJECT)

Unit : Kg/rai

Tambon/ Village No.	Name	Paddy	Coconut**	Mangosteen	Durian	Rambutan	Coffee
Na Thung*		116	23	350	1,600	220	120
01	Ban Don Ta Bow	115	22	na	na	na	na
04	Ban Thab Tanot	117	23	na	na	na	na
05	Ban Tha Taphoa Nue	-	22	na	na	na	na
06	Ban Wang Yang	-	20	na	na	na	na
08	Ban Thung Jig	113	22	na	na	na	na
09	Ban Nong Phak	-	21	na	na	na	na
Bang Luk*		350	42	-	-	-	125
03	Ban Fai Tha	na	na	-	-	-	-
08	Ban Sala Loi	na	na	-	-	-	-
09	Ban Na Pru	na	na	-	-	-	-
12	Ban Khoa Rad	na	na	-	-	-	-
Na Cha-Ang*		310	43	300	1,000	1,500	-
01	Ban Khun Saen	280	41	na	na	na	-
02	Ban Na Cha-Ang	350	38	na	na	na	-
03	Ban Hu Ro	370	45	na	na	na	-
06	Ban Sai Thong	290	39	na	na	na	-
07	Ban Nern Kheeree	280	36	na	na	na	-

Note : * Tambon average

** Fruits/tree/year

Source : Guideline for Agricultural Development, Tambon Na Thung, Tambon Na Cha-Ang, and Tambon Bang Luk.

TABLE G-22 LIVESTOCK RAISING IN NONG YAI PROJECT AREA, 1990

Tambon/ Village No.	Name	Cattle		Buffaloes		Pigs		Poultry	
		H.H	Nos.	H.H	Nos.	H.H	Nos.	H.H	Nos.
Na Thung*									
		27	169	1	16	45	430	3	70
01	Ban Don Ta Bow	5	20	0	0	3	12	0	0
04	Ban Thab Tanot	10	42	0	0	7	50	0	0
05	Ban Tha Taphoa Nue	5	57	0	0	20	250	0	0
06	Ban Wang Yang	0	0	0	0	8	80	0	0
08	Ban Thung Jig	3	24	1	16	4	26	3	70
09	Ban Nong Phak	0	0	0	0	0	0	0	0
Bang Luk*									
		75	231	126	825	462	1,050	206	1,981
03	Ban Fai Tha	7	16	5	48	5	20	0	0
08	Ban Sala Loi	0	0	1	50	50	112	0	0
09	Ban Na Pru	8	30	16	60	25	50	0	0
12	Ban Khoa Rad	3	13	8	36	4	7	0	0
Na Cha-Ang*									
		89	206	45	133	152	744	101	12,920
01	Ban Khun Saen	32	42	12	20	7	123	0	0
02	Ban Na Cha-Ang	14	43	33	113	29	125	75	1,960
03	Ban Hu Ro	0	0	0	0	5	200	1	5,000
06	Ban Sai Thong	0	0	0	0	30	38	0	0
07	Ban Nern Kheeree	9	20	0	0	2	7	20	60
Total**		96	307	76	343	199	1,028	99	7,090

Notes : * Tambon total

** Priority Project total

Source : NRD-2C, 1990

TABLE G-23 INLAND FISHERY IN NONG YAI PROJECT AREA, 1990

Tambon/ Village No.	Name	Number of farmer	Number of pond	Area of pond (m ²)
Na Thung*		na	na	na
01	Ban Don Ta Bow	2	2	880
04	Ban Thab Tanot	6	6	1,118
05	Ban Tha Taphoa Nue	1	1	1,500
06	Ban Wang Yang	1	1	400
08	Ban Thung Jig	-	-	-
09	Ban Nong Phak	-	-	-
Bang Luk*		na	na	na
03	Ban Fai Tha	11	18	5,850
08	Ban Sala Loi	9	9	1,100
09	Ban Na Pru	-	-	-
12	Ban Khoa Rad	-	-	-
Na Cha-Ang*		na	na	na
01	Ban Khun Saen	1	1	200
02	Ban Na Cha-ang	7	7	1,707
03	Ban Hu Ro	-	-	-
06	Ban Sai Thong	-	-	-
07	Ban Nern Kheeree	-	-	-
Total**		38	45	12,845

Note : * Tambon total

** Priority Project total

Source : Changwat Fishery Office, Chumphon

**TABLE G-24 PLANTED AREA OF TREE CROPS AND FRUIT TREE CROPS
SUBSIDIED BY CHANGWAT OFFICE OF AGRICULTURE UNDER
TYPHOON GAY PROJECT IN NONG YAI PROJECT AREA, 1990-
1991**

Unit : rai

Items	Na Cha-Ang	Bang Luk	Total
(1) Mangosteen	100	1,179	1,279
(2) Durian	1,001	876	1,877
(3) Rambutan	300	582	882
(4) Coffee	131	-	131
(5) Paddy	155	67	222
(6) Para rubber	1,002	1,162	2,164
(7) Coconut	1,523	660	2,183
(8) Young Coconut	1,080	450	1,530
(9) Betel nut	-	-	-
(10) Longang	500	75	575
(11) Pomelo	105	1,174	1,279
(12) Oil Palm	600	100	700
(13) Cocia	310	220	530
(14) Cashew nut	100	100	200
Total	6,907	6,915	13,822

Source : Agricultural Extention Services in damaged area
caused by Typhoon Gay, 1990-1992, MOAC.

TABLE G-25 PRESENT AND PROPOSED CROP YIELDS OF SOME SELECTED CROPS IN THE NONG YAI PROJECT AREA

<u>Crops</u>	<u>Unit</u>	<u>Present</u>	<u>Proposed</u>
(1) <u>Paddy</u>			
Wet Season	kg/rai	260	500
Dry Season	kg/rai	-	650
(2) <u>Coconut</u>	fruit/rai	576	1,200
Coconut	fruit/rai	-	2,140
Young Coconut			
(3) <u>Durian</u>	kg/rai	700	1,200
(4) <u>Mangosteen</u>	kg/rai	350	950~1,250
(5) <u>Pomelo</u>	fruit/rai	800	1,500
(6) <u>Cashew nut</u>	kg/rai	180	280
(7) <u>Pineapple</u>	kg/rai	-	6,500

TABLE G-26 FARM SIZE OF PADDY CROPPING (NONG YAI PROJECT)

Village / Muban	Total Household	Nos. of Paddy Farm Household				Total
		1-5 rai	5-10 rai	10-20 rai	20-50 rai	
Na Thung						
- Ban Don Ta Bow	65	27	6	3	-	36
- Ban Thab Thanot	117	23	31	8	-	62
- Ban Tha Taphao Nue	257	3	-	-	-	3
- Ban Wang Yang	218	-	-	-	-	-
- Ban Thung Jig	132	8	2	-	-	10
- Ban Nong Phak	285	-	-	-	-	-
Sub - Total	1,074	61	39	11	-	111
Bang Luk						
- Ban Fai Tha	96	21	12	2	-	35
- Ban Sala Loi	75	38	21	-	-	59
- Ban Na Pru	103	40	24	25	14	103
- Ban Khoa Rad	68	42	13	-	-	55
Sub - Total	342	141	70	27	14	252
Na Cha Ang						
- Ban Khun Saen	182	32	20	8	-	60
- Ban Na Cha Ang	139	23	26	26	27	102
- Ban Hu Ro	172	43	40	10	-	93
- Ban Sai Thong	84	30	14	-	-	44
- Ban Nern Khuree	56	7	-	-	-	7
Sub - Total	633	135	100	44	27	306
Total	2,049	337	209	82	41	669

Source : NRD - 2C, 1990

**TABLE G-27 FARM SIZE OF COCONUT, ORCHARD AND VEGETABLE CROPPING
(NONG YAI PROJECT)**

Village / Muban	Coconut		Orchard		Vegetables	
	Nos. of Farms	Farm Size (rai)	Nos. of Farms	Farm Size (rai)	Nos. of Farms	Farm Size (rai)
Na Thung						
- Ban Don Ta Bow	23	8	-	-	-	-
- Ban Thab Thanot	42	10	-	-	-	-
- Ban Tha Taphao Nue	18	5	-	-	-	-
- Ban Wang Yang	6	5	-	-	-	-
- Ban Thung Jig	48	6	12	8	-	-
- Ban Nong Phak	19	10	-	-	-	-
Sub - Total	156		12		-	-
Bang Luk						
- Ban Fai Tha	18	5	43	5	20	5
- Ban Sala Loi	-	-	1	4	15	4
- Ban Na Pru	-	-	-	-	7	2
- Ban Khoa Rad	-	-	28	5	4	2
Sub - Total	18		72		46	
Na Cha Ang						
- Ban Khun Saen	30	3	100	1	-	-
- Ban Na Cha Ang	74	6	-	-	-	-
- Ban Hu Ro	165	8	-	-	5	1
- Ban Sai Thong	93	5	-	-	30	1
- Ban Nern Khuree	34	5	-	-	-	-
Sub - Total	396		100		35	
Total	570		184		81	

Source : NRD - 2C, 1990

TABLE G-28 LAND TENURE (NONG YAI PROJECT)

Unit : %

Village / Muban	Owner	Part-Owner	Tenant	Landless
Na Thung				
- Ban Don Ta Bow	90.8	-	3.1	6.1
- Ban Thab Thanot	51.3	-	12.8	35.9
- Ban Tha Taphao Nue	63.4	-	-	36.6
- Ban Wang Yang	100.0	-	-	-
- Ban Thung Jig	60.6	3.0	1.5	34.9
- Ban Nong Phak	28.1	-	-	71.9
Sub - Total	61.5	0.4	1.8	36.3
Bang Luk				
- Ban Fai Tha	97.9	2.1	-	-
- Ban Sala Loi	86.7	13.3	-	-
- Ban Na Pru	86.4	10.7	2.9	-
- Ban Khoa Rad	100.0	-	-	-
Sub - Total	92.4	6.7	0.9	-
Na Cha Ang				
- Ban Khun Saen	100.0	-	-	-
- Ban Na Cha Ang	77.0	4.3	1.4	17.3
- Ban Hu Ro	70.4	20.3	9.3	-
- Ban Sai Thong	100.0	-	-	-
- Ban Nern Khuree	100.0	-	-	-
Sub - Total	86.9	6.5	2.8	3.8
Total	74.5	3.3	2.0	20.2

Source : NRD - 2C

TABLE G-29 LIVESTOCK (NONG YAI PROJECT)

Village / Muban	Cattle		Buffaloes		Swine		Poultry	
	Farms	Nos.	Farms	Nos.	Farms	Nos.	Farms	Nos.
Na Thung								
- Ban Don Ta Bow	5	20	-	-	3	12	-	-
- Ban Thab Thanot	10	42	-	-	7	50	-	-
- Ban Tha Taphao Nue	5	57	-	-	20	250	-	-
- Ban Wang Yang	-	-	-	-	8	80	-	-
- Ban Thung Jig	3	24	1	16	4	26	3	70
- Ban Nong Phak	-	-	-	-	-	-	-	-
Sub - Total	23	143	1	16	42	418	3	70
Bang Luk								
- Ban Fai Tha	7	16	5	48	5	20	-	-
- Ban Sala Loi	-	-	1	50	50	112	-	-
- Ban Na Pru	8	30	16	60	25	50	-	-
- Ban Khoa Rad	3	13	8	36	4	7	-	-
Sub - Total	18	59	30	194	84	189	-	-
Na Cha Ang								
- Ban Khun Saen	32	42	12	20	7	123	-	-
- Ban Na Cha Ang	14	43	33	113	29	125	75	1,960
- Ban Hu Ro	-	-	-	-	5	200	1	5,000
- Ban Sai Thong	-	-	-	-	30	38	-	-
- Ban Nern Khuree	9	20	-	-	2	7	20	60
Sub - Total	55	105	45	133	73	493	96	7,020
Total	96	307	76	343	199	1,100	99	7,090

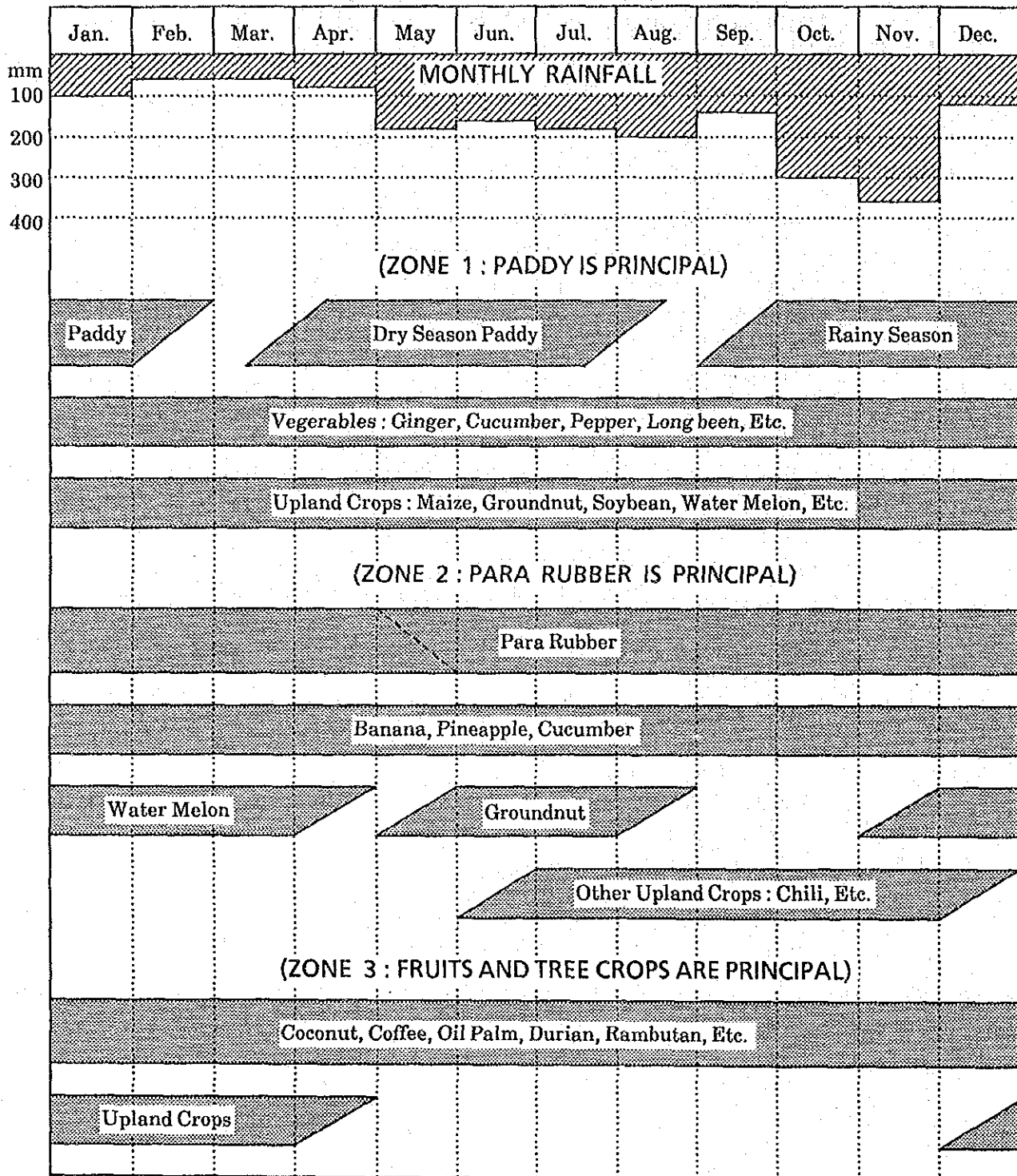
Source : NRD - 2C, 1990

TABLE G-30 INLAND FISHERIES (NONG YAI PROJECT)

Village/Muban	Nos. of Farms	Nos. of Ponds	Area (ha)
Na Thung			
- Ban Don Ta Bow	2	2	0.09
- Ban Thab Thanot	6	6	0.11
- Ban Tha Taphao Nue	1	1	0.15
- Ban Wang Yang	1	1	0.04
- Ban Thung Jig	-	-	-
- Ban Nong Phak	-	-	-
Sub - Total	10	10	0.39
Bang Luk			
- Ban Fai Tha	11	18	0.59
- Ban Sala Loi	9	9	0.11
- Ban Na Pru	-	-	-
- Ban Khoa Rad	-	-	-
Sub - Total	20	27	0.70
Na Cha Ang			
- Ban Khun Saen	1	1	0.02
- Ban Na Cha Ang	7	7	0.17
- Ban Hu Ro	-	-	-
- Ban Sai Thong	-	-	-
- Ban Nern Khuree	-	-	-
Sub - Total	8	8	0.19
Total	38	45	1.28

Source : Provincial Office of Fisheries, 1991

FIGURE G-1 PRESENT CROPPING CALENDAR



Source : Provincial Office of Agriculture, Chumphon

FIGURE G-2 PROPOSED CROPPING PATTERN

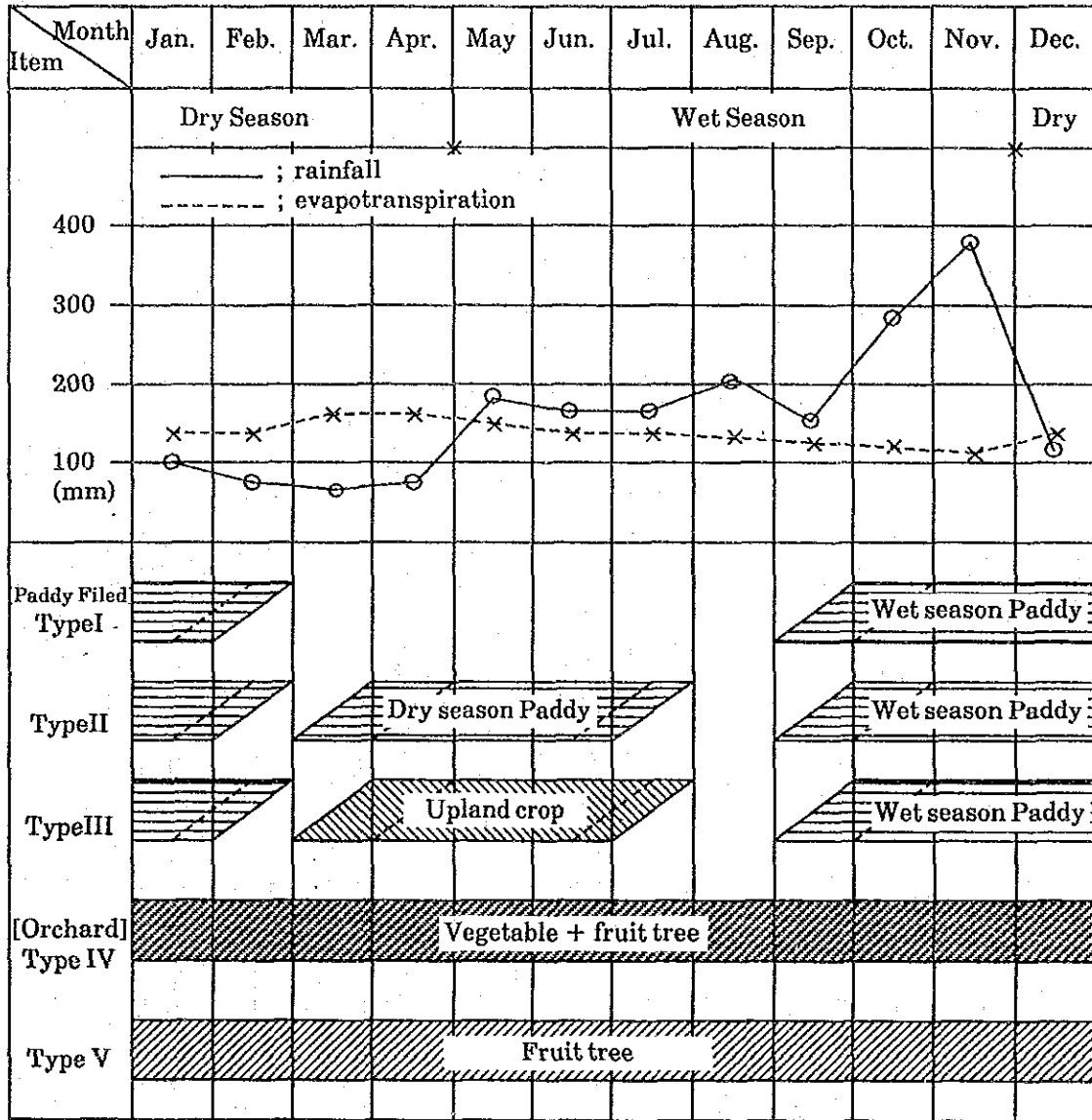


FIGURE G-3 PROPOSED CROPPING PATTERNS IN THE NONG YAI PROJECT AREA

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Item												
	<p style="text-align: center;">← Dry season → ← Wet season →</p>											
Type I Paddy	Wet											
Type II Paddy-Paddy	Wet			Dry Season Paddy						Wet Season Paddy		
Type III Mixed Orchard	<p>(1) Under Coconut tree</p> <p>(a) Mangosteen, Durian, Pomelo</p> <p>(b) Pine apple, Young Coconut</p> <p>(c) Pine apple, Cashew nut</p> <p>(2) New Orchard (Mixed)</p> <p>Mangosteen, Durian, Pomelo</p>											
Type IV Vegetable	<p>Bird pepper, Cucumber, Yard long bean</p>											

APPENDIX H : SOCIO-AGROECONOMY

AND

PROJECT EVALUATION

CONTENTS

APPENDIX H : SOCIO-AGROECONOMY AND PROJECT EVALUATION

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H - 1 SOCIO-AGROECONOMY

H-1-1 General

The South or Peninsular Thailand which forms a tail-shape linking to the main region of Thailand covers an area of approximately 14 percent of the Kingdom (44,196.992 rai or approximately 7 Mha); meanwhile its population is about 12.5 percent of the whole country (approximately 7.5 million persons).

It consists of 14 provinces, namely from north to south: Chumphon, Ranong, Phangga, Surat Thani, Krabi, Nakhon Si Thammarat, Trang, Phu Khet, Phatthalung, Satun, Songkhla, Pattani, Yala and Narathivat.

The region is topographically characterized by large mountain-chains running north to south forming undulated rolling hills toward narrow coastal plains, making a specific nature of scenic landscapes.

The most common soils in this region are Entisols, Inceptisols and Ultisols, offering limited lands suitable for agriculture as follows:

7.2 million rai for Paddy, etc.	(16%)
14.7 million rai for Perennial Crops	(33%)
21.9 million rai for Agriculture	(49%)
<hr/>	
approx. 44.2 million rai for Total Area of the South	(100%)

Prior to the recent development of tourism-industry by profiting potential landscapes of beaches and lagoons, the South is well-known for tin-production and mining apart from its large para-rubber plantations which are now grown at about 10 million rai. Fruit crops and coconut have been largely grown also, building its specific southern agricultural system. Recently oil palm plantations have been planted by a few large estates and small holders.

The Study Area which covers largely the northernmost part of province Chumphon is basically a typical agricultural area of this type. Its land-area of 2,625 km² in which more than 2,300 km² are in province Chumphon, the northernmost province of the South connected to province Prachuap Khiri Khan, the southernmost province of Central Region which covers approximately 300 km² of the Study Area in the north, and in the south, to another tourism-oriented province, Surat Thani.

The Nong Yai area, which gross land area of approximately 2,200 ha(14,125 rai) is located nearby the municipality of Chumphon, is an agrarian area laying beside Tha Tapao river, the main watershed subjected to flood-control in Chumphon basin.

Historically, Chumphon was a community since long time ago, around B.E. 2228 at the time of King Phet Raja. From its strategic position, Chumphon was a place suffering from casual wars, times to times.

Topo-geologically, province Chumphon is located at the shrinking portion linking the Peninsular to the remain of the Kingdom. This place possesses both northeast and southwest monsoons, occasionally causing cyclonic precipitation patterns of heavy rains and storms.

In the past, this location had experienced many typhoons, recently in 1970, 1988 and 1989 (Gay) in which the latter had caused innumerable damages to this province. Almost tree crops had been destroyed by this typhoon which recent replantations have no yields as yet.

H-1-2 Social Setting

(1) Administrative Unit

The Study Area is administratively composed of four Amphoe in two provinces: three Amphoe of Muang, Tha Sae and Phathiu in Chumphon province and one Amphoe of Bang Saphan Noi in Prachuap Khiri Khan province. Only Amphoe of Tha Sae is fully covered by the Study Area, and three Amphoe of Muang Chumphon, Phathiu and Bang Saphan Noi are partly covered. There are 31 Tambon and 282 villages in the Study Area as summarized below:

<u>Province</u>	<u>Amphoe</u>	<u>Nos. of Tambon</u>	<u>Nos. of Villages</u>
Chumphon	1. Muang	16	140
	2. Tha Sae	7	82
	3. Phathiu	6	48
Prachuap Khiri Khan	4. Bang Saphan Noi	5	15
<u>Total</u>		<u>4</u>	<u>285</u>

Amphoe Muang Chumphon largely covered in the Study Area is the main administrative unit of this province where located the municipality and headquarters of Chumphon with a population density of more than 180 persons per sq.km. This Amphoe is located in the narrow lowland plain of the Chumphon basin, subjected to annual flushing floods resulted from heavy rains on nearby mountainous/upland areas.

For the priority project-area, the Nong Yai area is shared by 3 Tambon in the northeast of Amphoe Muang Chumphon; they are Tambon Na Cha Ang on the eastern side of Nong Yai swamp, Tambon Bang Luk on the western side and Tambon Na Thung below the Sam Kaeo canal. Its consists of 15 villages adjacent to the municipality of Chumphon.

(2) Population

The population of four Amphoe related to the Study Area was 241,531 in 1989 with the average population density of 67.1 persons per sq.km, ranging between 32.4 persons per sq.km in Amphoe Tha Sae and 184.5 persons per sq.km in Amphoe Muang Chumphon.

<u>Amphoe</u>	<u>Population</u>	<u>Area (sq.km)</u>	<u>Population Density (persons/sq.km)</u>
1. Muang Chumphon	124,553	675.1	184.5
2. Tha Sae	49,600	1,531.2	32.4
3. Phathiu	37,249	672.4	55.4
4. Bang Saphan Noi	30,129	720.0	41.8
Total	241,531	3,598.7	67.1

Besides, the total population of 15 villages(Muban) related to Nong Yai area is 10,803 in 1991 with an average population density of approximately 320 persons per sq.km, about 2 times of the average population density of Amphoe Muang Chumphon. The population distribution in is as follows:

<u>Tambon</u>	<u>population</u>	<u>House hold</u>		<u>Nos. of Villages</u>
		<u>Total</u>	<u>Farming</u>	
Na Cha Ang	3,495	649	387*	5
Bang Luk	1,728	357	353*	4
Na Thung	5,580	1,088	477	6
Total	10,803	2,094	1,217	15

Note: (*) : estimated

The Nong Yai area, therefore, is basically an agrarian area with some specific parts, especially in Tambon Na Thung, developing towards residential area linking to the municipality of Chumphon. Most households in the area have engaged in agricultural products, except for some villages in Tambon Na Thung where about 60 percents of households work for official and private jobs.

Concerning the population growth in Chumphon, its population in 1986 was 366,242 persons and in 1991 it was more than 400,000 persons. The amount of people migrated in was higher than the amount migrated out. In addition, the population growth rate has been increased due to its birth rate was far higher than its death rate. Its average growth rate of about 2.38 percent, higher than the average growth rate of 1.65 in Thailand. This tendency seems to be continued in coming decades due to the population pressure from the Central Region and socio-economic conditions in the surroundings

(3) Education

The educational structures in Chumphon province are relatively in good conditions. There are 331 elementary and secondary schools with the enrollment of 73,846 students in 1990, and three vocational schools. The Study Area has schooling problems in remote areas, especially in Amphoe Tha Sae.

Regarding the education in 15 villages related to the Nong Yai area, only 5 villages have primary schools (Tambon Na Cha Ang : 3, Tambon Bang Luk : 1, Tambon Na Tung : 1).

Students in villages without schools should go to schools of nearby villages.

(4) Public Health

In Chumphon province, there are one provincial hospital, six community hospitals and 77 health stations; however, on an average, one physician shall cover 11,547 persons, one nurse for 1,683 persons and one public health officer for 28,122 persons respectively. These figures may indicate that public health services in Chumphon province need improving. The similarity is observed in the Study Area.

These figures indicate that public health personnel is still quite less, compared to the total population of the province. Especially, there is still a lack of dentists and physicians.

Regarding health service in Nong Yai area, each Tambon has a healthcenter for caring about minor cases in health problem. For serious cases, patients will be sent to proper hospitals in the municipality of Chumphon for treatment. There are no serious health problems at now, except for the security of drinking water.

(5) Rural Electrification

The electrification in the Study Area is quite good. The rate of electrification in three Amphoe of Chumphon province reaches 92 percent on the village basis as summarized as follows:

Amphoe	Nos. of Village Electrified	Percent
1. Muang Chumphon	136	97
2. Tha Sae	70	85
3. Phathiu	42	88
Total	248	92

The electrification is applied for almost households in the Nong Yai area except for the remote village Don Ta Bow(Mo. 1) of Tambon Na Thung. The electric charge per house for lighting is approximately 150 baht per month which is not a large amount in family expenditure.

(6) Water Supply

In the Study-Area only Amphoe Muang Chumphon is supplied by running water treated by a plant in the municipality with watersource intake from Tha Taphao River.

The situation of city-water in province Chumphon is as follows:

Statistics of Water Works in Chumphon, 1990

Location	No. of Consumers	Sold to Consumers (m ³ /year)	Revenue (1,000 baht)
Muang	6,804	3,550,573	26,381
Lang Suan	2,066	1,039,279	4,585
Total	8,870	4,589,852	30,966

(Source: Provincial Water Works Authority)

In Nong Yai area, except for Tambon Na Thung linking to the municipality of Chumphon where city water is supplied to some parts, other 2 Tambon of Bang Luk and Na Cha Ang, especially for the latter, have been suffered from lack of domestic water. Local inhabitants collect rain water in jars for drinking and water from shallow wells of ARD, homemade etc. for domestic use but the quality of well-water in many areas of Tambon Bang Luk and Tambon Na Cha Ang is reportedly very hard, even for domestic use.

(7) Marketing Facilities

In Amphoe Muang Chumphon, there are 2 central markets which structures are in unproper conditions for this municipality distribution system; especially for the distribution of products from fruit trees and tree crops mainly produced in this peovince.

In other 3 Amphoe the markets are almost in similar conditions, except for the market of Amphoe Pathiu recently rebuilt after typhoon Gay.

In Nong Yai area, there is only a small market near the railway station of Na Cha Ang for distribution purpose of agricultural products and some daily goods. Local inhabitants have inquired a proper marketing and distribution system for supporting their agricultural production.

(8) Recreational Facilities and Sports Grounds

On the aspect of public services, there is a lack of proper recreational facilities and sports grounds in 4 Amphoes in the Study-Area.

(9) Religion

Most people in province Chumphon are Buddhists but few of them in Amphoe Muang are Christians and Islam.

Religious institutions in province Chumphon are as follows:

- Buddhist temples	156
- Buddhist shrines	31
- Idle Buddhism temples	35
- Buddha's instruction schools	49
- Buddhist language schools	3
- Sunday schools for Buddhists	10
- Buddhist schools for young children before primary school level	4

- Christ church	4
- Mosque	5
- Buddhist monks	2,005
- Buddhist elementary monks	718

(Source: Education Office of Chumphon)

(10) Traditional Activities

Southern dialect is spoken in province Chumphon, especially from Amphoe Lang Suan toward the south. In Amphoe Muang Chumphon and upper Amphoe, Tha Sae and Pathiu, covered in the Study-Area the spoken language is considered mixing between the language of Central Region and the southern dialect, but mostly for the Central Region. This would be resulted from a large population migrated from the Central Region.

For cultural activities, local Buddhist festivals and native farmer songs are considered as the most impressive items in province Chumphon.

H-1-3 Agro-Economy

(1) Agro-Economic Zone

Initially, the whole country of Thailand is divided into 19 agro-economic zones in which province Chumphon is belonged to Zone No. 17 along with provinces Surat Thani, Nakhon Si Thammarat, Phatthalung and Songkhla. Main products envisaged for this agro-economic zone are rice, para-rubber, coconut, cattle-buffalo, coffee and marine fisheries.

Zone No.	Province	Total Land (km ²)	Population	Available Land	
				Paddy Land (km ²)	Up Land (km ²)
17	Chumphon	6,009.0	341,658	300.7	38.0
	Nakhon Si Thammarat	9,942.5	1,310,672	2,507.4	29.9
	Phatthalung	3,424.5	417,176	1,036.5	13.6
	Songkhla	7,393.9	930,123	1,214.4	13.4
	Surat Thani	12,891.5	641,098	606.1	37.2
	Total	39,661.4	3,640,727	5,665.1	124.1
	Whole Kingdom	513,114.6	49,515,074	117,637.3	43,815.9

(Source: Agricultural Statistics of Thailand, 82-83)

Recently, due to substantial changes in socio-economic environments for further appropriateness in agro-economic development, agro-economic zones are reallocated into 24 zones in which province Chumphon is belonged to Zone No. 21 along with provinces Ranong and Surat Thani.

Main products of this Zone are fruit crops, rice, para-rubber, coconut, coffee, cattle and marine products.

Zone No.	Province	Total Land (km ²)	Population	Available Land	
				Paddy Land (km ²)	Up Land (km ²)
21	Chumphon	6,009.0	401,421	237.3	33.5
	Ranong	424.8	91,462*	36.0	8.0
	Surat Thani	12,891.5	641,098*	761.8	109.2
Total		19,325.3	1,133,981	1,035.1	150.7

(Source: Agricultural Statistics of Thailand, 90-91

* Thailand Agro - Economic Zone 82-83)

New Definition on Agro-Economic Zone

The regional planning of agriculture development is to be based on the concept of Agro-Economic Zones or characteristics of each area. This is important for planning the development of agriculture in long term. The whole area of the country with differences in geographic characteristics are the basis for establishing these Agro-Economic Zones. Within an Agro-Economic Zone, factors for agriculture and economic development, therefore, are similar. This will support the planning of agricultural development.

An Agro-Economic Zone will have similar factors of kind of soil, rain, temperature, economic plant and efficiency in farming and other main-incomes in agriculture.

(2) Regional Economy

Despite of its agro-economy, since the last decade the GDP of agricultural sector in Chumphon province has become gradually less than the non-agricultural sector due to a remarkable expansion of business and service works. In 1989 the GDP of this province was counted at 9,286,302 Baht. This shows a growth in GPP from 4,250 million Baht in 1981 with an average annual rate of 10.1 percent. Of this value, 5,030,951 Baht was for non-agricultural sector and only 4,247,351 Baht for agricultural sector.

The GDP of agricultural sector in this province which production is mainly in fruit trees and tree crops has been considered stagnant, caused by lack of a proper distribution system and an unfavorable pricing system. In addition, there has been reportedly of a serious lack of young labour force for works in large plantations such as palm oil and para-rubber considered as a move of farm labour to the non-agricultural sector.

It was found that the GDP of agricultural sector in the period of 1981-89 tended to be fluctuated every year. This trend has been continued up to now. In 1989, 46 percent of the GPP was shared by agricultural products(4,247 million Baht), of which major products were crops(3,021 million Baht), fishlivestock(241 million Baht) and simple agricultural processing productions(230 million Baht), and the average annual growth rate since 1981 were 10.5 percent, 9.5 percent, 10.8 percent and 15.3 percent respectively.

The GDP of non-agricultural sector has been increased every year with an average increasing rate of approximately 10.4 percent per annum in this period which is considered rather high due to a remarkable expansion of all kinds of business in this province. In 1982 it marked a highest increasing rate of 12.35 percent.

With a total population of approximately 400,000 in Chumphon province, the per capita income in 1989 of 22,630 Baht, therefore, is considered higher than the average value of 21,955 Baht for the South in the same year. (Refer to TABLES H - 1 and H - 2) This GPP, however, is less than 31,608 Baht of the national average in the same year.

TABLE H-1 GROSS PROVINCIAL PRODUCT AT CURRENT MARKET PRICES

CHUMPHON

UNIT : 1,000 BAHT

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture	1,970,812	1,977,883	2,301,125	2,629,090	2,773,370	3,380,077	3,755,459	4,371,501	4,247,351
Crops	1,356,123	1,357,618	1,598,864	1,881,637	1,996,462	2,371,389	2,589,121	2,986,266	3,020,893
Livestock	105,839	101,434	159,325	150,928	123,431	177,109	211,561	217,471	240,757
Fisheries	342,916	329,382	423,038	317,698	363,087	495,897	585,575	734,254	709,377
Forestry	74,996	70,078	492	135,595	137,431	197,074	214,577	224,116	28,034
Agricultural services	17,434	19,161	13,942	15,075	19,351	14,863	12,671	17,193	18,298
Simple agn. processing products	73,502	100,210	105,457	128,155	133,508	123,745	151,954	192,201	229,992
Mining and quarrying	129,152	129,817	141,240	153,111	262,159	139,932	113,201	183,155	234,058
Manufacturing	174,696	197,203	233,863	283,831	238,649	236,959	274,928	325,966	370,841
Constructing	116,134	137,867	167,151	156,408	211,403	509,625	280,754	280,155	283,598
Electricity and water supply	28,303	52,284	61,597	70,298	87,298	104,021	130,996	137,083	158,477
Transportation and communication	148,853	179,645	148,170	193,342	229,112	284,830	288,287	281,397	300,588
Wholesale and retail trade	769,092	816,080	757,443	869,319	877,916	1,102,084	1,154,135	1,391,908	547,769
Banking, insurance and real estate	81,514	94,665	115,334	115,305	125,557	143,397	182,581	230,602	306,339
Ownership of dwellings	160,274	181,633	202,945	220,910	239,081	260,451	276,641	293,319	322,409
Public administration and defence	223,442	255,030	295,138	293,504	315,053	323,430	349,913	393,875	450,535
Services	445,543	551,778	559,805	640,680	687,869	890,574	810,582	894,272	1,062,385
GPP	4,249,815	4,583,885	5,013,811	5,625,798	6,047,267	7,375,360	7,827,477	8,783,233	9,286,350
Percapita GPP. (BAHT)	12,426	13,097	14,163	15,671	15,433	19,553	19,558	22,068	22,630
Population (1,000 persons)	342	350	354	359	368	377	388	396	410

CHUMPHON

UNIT : 1,000 BAHT

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture	874,059	979,973	997,121	1,100,325	1,283,938	1,386,859	1,502,608	1,605,329	1,759,575
Crops	639,492	726,736	748,927	832,143	1,013,074	1,053,339	1,144,708	1,204,552	1,385,640
Livestock	54,577	53,501	65,114	66,294	68,877	79,520	97,972	106,763	130,068
Fisheries	120,358	125,983	135,122	108,155	110,586	130,452	137,193	48,643	148,839
Forestry	18,577	19,534	164	35,854	31,733	50,703	49,226	4,373	5,884
Agricultural services	5,510	5,530	3,584	4,964	5,777	4,235	3,406	77,358	4,615
Simple agn. processing products	35,545	43,689	44,210	52,915	55,891	63,610	70,104	74,876	56,721
Mining and quarrying	41,401	41,093	44,916	48,825	80,847	56,381	45,436	107,535	83,934
Manufacturing	85,208	93,640	102,607	123,133	82,740	94,225	99,547	76,009	111,817
Constructing	44,193	47,280	54,908	48,862	61,784	145,443	77,920	107,695	67,558
Electricity and water supply	16,632	29,576	32,670	37,036	41,266	49,125	57,720	509,238	67,981
Transportation and communication	73,700	79,535	70,350	84,885	93,201	106,750	107,471	69,606	115,090
Wholesale and retail trade	308,194	309,119	295,990	348,388	367,850	435,653	450,334	121,923	573,059
Banking, insurance and real estate	30,075	33,191	38,973	38,632	41,005	46,062	57,217	167,488	88,325
Ownership of dwellings	59,423	93,279	95,563	100,506	104,429	109,899	114,552	328,445	130,141
Public administration and defence	112,940	118,972	133,084	255,439	198,612	142,158	152,359	393,875	165,930
Services	197,595	225,115	237,714	640,680	269,113	352,531	307,137	894,272	246,637
GPP	1,875,331	2,050,773	2,104,896	2,318,148	2,564,786	2,925,086	2,972,401	3,228,937	3,510,042

TABLE H-2 GROSS REGIONAL PRODUCT AT CURRENT MARKET PRICES

SOUTHERN	UNIT:1,000 BAHT									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	
Agriculture	27,655,641	27,025,239	33,260,863	32,991,433	33,911,922	36,749,843	45,453,236	55,019,661	63,033,299	
Crops	14,129,896	13,623,714	16,626,410	16,583,868	17,931,418	19,377,335	24,708,802	31,558,136	30,497,454	
Livestock	1,638,122	1,689,615	2,641,898	2,356,077	1,973,819	2,813,783	3,112,574	3,176,024	3,180,480	
Fisheries	4,132,743	4,366,615	6,309,033	4,721,410	5,504,479	6,684,225	8,372,976	10,822,572	9,796,995	
Forestry	5,023,136	4,524,702	5,606,867	6,000,491	4,722,202	4,594,706	5,258,171	5,054,707	4,146,308	
Agricultural services	449,893	453,825	400,212	343,498	452,155	360,840	413,373	400,954	345,558	
Simple agril.processing products	2,182,081	2,356,968	2,776,483	2,986,069	3,327,768	2,948,944	3,589,941	4,306,268	5,097,492	
Mining and quarrying	6,263,234	5,527,928	4,506,617	5,212,477	4,924,758	2,817,630	2,914,010	4,190,704	8,407,182	
Manufacturing	8,634,066	5,436,269	6,269,610	6,309,904	6,906,176	6,796,907	6,174,524	7,870,808	8,768,544	
Construction	3,540,906	3,887,833	4,236,776	5,539,217	6,970,276	8,994,427	6,593,458	9,994,230	9,381,481	
Electricity and water supply	849,350	1,781,997	1,330,948	1,607,444	1,773,916	2,061,063	2,414,031	2,694,026	3,161,892	
Transportation and communication	3,806,147	4,531,560	4,641,772	5,407,221	5,309,521	8,039,595	8,218,918	8,093,429	9,880,546	
Wholesale and retail trade	14,757,572	15,319,968	14,881,948	17,024,310	16,608,143	19,604,763	22,021,469	27,064,938	30,075,434	
Banking,insurance and real estate	1,362,597	1,629,968	2,035,948	2,023,108	2,227,833	2,468,393	3,189,453	4,066,099	5,500,546	
Ownership of dwellings	2,682,358	3,007,174	3,422,336	3,725,300	4,100,882	4,609,758	4,870,440	5,074,720	5,568,379	
Public administration and defence	3,685,875	4,746,525	5,272,995	5,215,973	5,644,118	5,901,510	6,126,406	6,706,486	7,573,573	
Services	7,480,180	9,028,078	10,176,480	10,975,880	11,857,944	12,962,722	14,328,134	16,248,090	19,823,272	
G R P.	77,627,926	81,321,223	89,025,391	94,924,267	98,234,489	107,421,611	122,564,078	145,823,301	161,284,211	
Per capita GRP.(BAHT)	12,885	13,178	14,073	14,638	14,779	15,749	17,519	20,329	21,945	
Population(1,000 persons)	6,020	6,171	6,326	6,485	6,647	6,821	6,996	7,173	7,346	

GROSS REGIONAL PRODUCT AT CONSTANT 1972 PRICES

SOUTHERN	UNIT:1,000 BAHT									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	
Agriculture	10,163,632	10,791,753	11,314,590	11,695,735	12,539,290	13,227,379	14,356,824	16,477,060	18,465,246	
Crops	5,619,258	5,006,369	6,122,278	6,295,306	7,252,961	7,578,176	8,321,968	8,909,297	10,147,977	
Livestock	821,360	890,491	1,053,931	1,120,458	1,104,758	1,270,206	1,306,558	1,413,084	1,546,441	
Fisheries	1,457,797	1,632,266	1,698,496	1,614,865	1,688,249	1,771,916	1,982,564	2,367,908	2,036,184	
Forestry	1,221,829	1,180,036	1,321,581	1,422,573	1,088,834	1,098,009	1,137,341	1,097,206	901,809	
Agricultural services	142,722	131,426	103,143	112,676	146,081	106,960	117,081	113,261	97,574	
Simple agril.processing products	890,696	971,165	1,016,189	1,129,849	1,259,407	1,404,212	1,522,292	1,586,294	1,855,291	
Mining and quarrying	1,951,117	1,771,411	1,515,157	1,728,410	1,545,129	1,557,129	1,642,185	2,124,326	2,992,401	
Manufacturing	1,958,551	1,838,906	1,882,826	1,864,799	2,004,396	2,060,566	2,166,650	2,317,223	2,494,000	
Construction	1,324,606	1,330,924	1,391,162	1,732,415	1,742,661	1,819,054	1,925,790	2,353,623	2,242,345	
Electricity and water supply	517,843	641,998	591,104	757,336	807,553	931,691	1,022,483	1,129,728	1,311,340	
Transportation and communication	1,764,912	1,835,179	1,919,280	2,168,318	2,033,212	2,773,274	2,860,883	2,733,020	3,111,340	
Wholesale and retail trade	5,917,727	5,802,977	5,815,493	6,822,648	6,958,869	7,749,747	8,592,598	9,903,821	11,135,325	
Banking,insurance and real estate	502,750	571,491	687,960	677,822	729,747	799,325	890,128	1,227,356	1,575,612	
Ownership of dwellings	1,485,436	1,544,353	1,628,303	1,694,068	1,791,242	1,945,113	2,018,514	2,109,402	2,247,692	
Public administration and defence	1,863,040	2,130,718	2,377,709	2,312,810	2,483,203	2,593,907	2,567,555	2,851,809	2,825,142	
Services	3,377,264	3,726,450	4,157,244	4,439,237	4,719,276	5,135,122	5,516,673	5,962,785	6,399,218	
G R P.	30,825,877	32,096,159	33,380,916	35,894,390	37,355,353	40,592,297	43,690,283	48,210,143	52,803,550	

TABLE H-3 POPULATION, LAND AREAS AND HOUSEHOLDS IN PROVINCE CHUMPHON IN 1990

Amphoe	Population (persons)	Land Area (km ²)	No. of Households	No. of Houses	Average of Population (Persons/km ²)	Average Number of Persons per Household	Average Number of Persons per House
1. Muang	124,553	751.9	25,495	27,049	165.65	4.88	4.60
- In Municipal	13,993	—	4,063	4,798	—	—	—
- Out Municipal	110,560	—	21,432	22,251	—	—	—
2. Langsuan	66,427	936.5	11,792	12,173	70.93	5.63	5.46
- In Municipal	4,898	—	1,134	1,478	—	—	—
- Out Municipal	61,529	—	10,658	10,695	—	—	—
3. Sawi	58,452	898	10,487	11,820	65.09	5.57	4.94
4. Thasae	49,640	1,485	9,655	10,453	33.43	5.14	4.75
5. Pathiu	37,249	596	6,404	7,178	62.50	5.81	5.19
6. Lane	21,613	259	3,545	4,621	83.44	6.10	4.68
7. Thung Takho	18,933	928	3,469	3,906	20.40	5.46	4.85
8. Patho	14,004	335	2,479	3,323	40.80	5.65	4.21
Total	390,831	6,189.4	73,326	80,523	63.14	5.33	4.85

(Source: Administration Office of Province Chumphon)

TABLE H-4 AVERAGE CASH INCOME AND EXPENSES PER FARM BY REGION

Unit: Baht

Items		Northeast	North	Central	South	Whole Kingdom
Income	Crops	8,135	15,059	28,640	15,146	14,197
	Livestocks	2,761	2,729	7,078	4,739	3,709
	Others	122	238	343	664	259
	Total					
	Agricultural	11,020	18,027	36,062	20,550	18,165
Off Farm Jobs		11,246	9,944	17,605	21,687	13,296
	Total	22,266	27,971	53,667	42,237	31,461
Expenses	Agricultural	4,355	9,375	22,670	8,281	9,155
	Living	14,129	17,218	30,627	25,060	19,043
	Total	18,484	26,593	53,297	33,341	28,198
Net Income	Agricultural	6,655	8,652	13,392	12,269	9,010
	Total	3,782	1,378	370	8,896	3,263

TABLE H-5 GENERAL SURVEY DATA OF TAMBON NA CHA ANG, BANG LUK, AND NA THUNG

	Tambon : NA CHA ANG	Tambon : BANG LUK	Tambon : NA THUNG
1. Population :	Total : 5,040 persons Male : 2,448 " Female : 2,592 "	Total : 5,759 persons Male : 2,869 " Female : 2,840 "	Total : 8,549 persons Male : 4,460 " Female: 4,089 "
2. Occupation :	(1) Rice Planting (2) Fruits Tree Crops (3) Labour, Fishery	(1) Tree Crops & Fruits (2) Paddy Cultivation	(1) Officials & Labours (2) Fruit Trees (3) Rice Cultivation (4) Fishery
3. Agricultural Land :	(1) Paddy Field : 30,500 rai (2) Tree Crops : 8,230 " (3) Fruit Trees : 233 " (4) Others : na "	(1) Paddy field : 2,500 rai (2) Tree Crops : 2,300 " (3) Fruit Trees : 3,500 "	10,896 rai (for all kinds)
4. Fisheries :	184 households	23 households	290. Households
5. Industries :	na	na	na
6. Tambon-problems :	(1) Low Living standard & lack of basic needs (2) Lack of agricultural water (3) Annual flood in some lowland areas	(1) Flood (2) Low price of Agricultural Products & low income (3) No land for Agriculture	(1) Human Basic Need Assistance (2) No land for cultivation (3) Flood
7. Planning Projects :	(1) Cottage works for females in house (2) Chirdren project (3) Flower-making	(1) Marketing (2) Repair of village Facilities (3) Vocational Training for juniors and females	(1) Youth Center (2) Data Center (3) Improvement works for main roads & irrigation

TABLE H-6 POPULATION HOUSEHOLDS AND AREAS IN NONG YAI AREA

	Population	Households	Farming Houses (%)	Area (rai)	Agricultural Land (rai)	(%)	Population Density
1. Tambon NaThung							
(1) Mu.01 Ban Don Ta Bow	577	56	(100)	876	866	(99)	412/Km ²
(2) " 04 Ban Theb Tanot	625	116	(69)	1,381	1,371	(99)	164
(3) " 05 Ban Tha Tapao Nua	1,259	239	(76)	515	294	(57)	1,535
(4) " 06 Ban Wang Yang	940	206	(19)	990	930	(94)	630
(5) " 08 Ban Thung Jig	1,560	341	(22)	320	320	(100)	3,045.5
(6) " 09 Ban Nong Phak	619	130	(35)	863	67	(8)	448
	(5,580)	(1,088)	(44)	(8,701)	(3,848)	(44)	(401)
2. Tambon Bang Luk							
(1) Mu.03 Ban Fai Tha	446	81	(99)	1,511	975	(64.5)	187.5
(2) " 08 Ban Sala Loi	640	125	(100)	1,466	192	(13)	273
(3) " 09 Ban Na Pru	396	98	(88)	2,500	25	(1)	99
(4) " 12 Ban Khoa Rad	246	53	(100)	-	-	-	-
	(1,728)	(357)	(96)	(5,477)	(1,192)	(22)	(197)
3. Tambon Na Cha Ang							
(1) Mu.01 Ban Khun Saen	1,207	176	(60)	865	696	(80.5)	875
(2) " 02 Ban Na Cha Ang	805	135	(78)	1,475	1,297	(87)	344
(3) " 03 Ban Hu Ro	744	192	(84)	2,816	2,786	(98)	163
(4) " 06 Ban Sai Thong	361	92	(67)	1,260	1,170	(93)	181
(5) " 07 Ban Nern Kheeree	378	54	(83)	503	499	(99)	469
	(3,495)	(649)	(72.5)	(6,919)	(6,448)	(93)	(315)
Total 3 Tambon (15 Villages)	10,803	2,094	(62)	21,097	11,488	(55)	319
Source : Provincial Materials on Socio-Economic Situation, 1991							

TABLE H-7 SOCIO-ECONOMIC CONDITIONS OF 15 VILLAGES IN NONG YAI PROJECT AREA

(NESDB - 1990)

	Basic Structures										Production						Public Health						Water Supply		Knowledge																									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	10	1	2	1	2	3	4	5	6													
1. Tambon Na Thung																																																		
(1) Mu. 01 Ban Don Ta Bow	2	1	3	3	3	3	1	3	3	3	1	1	1	1	2	1	1	3	2	1	1	3	1	3	2	3	3	2	1	3	3	1	3	2	1	1	2	1	1	1	3	2	1	1	2	1	1	2	1	1
(2) Mu. 04 Ban Thab Tanot	2	3	3	3	3	3	3	1	3	3	1	2	3	3	3	1	1	3	2	3	1	3	2	2	2	3	2	2	3	3	2	1	3	3	1	2	2	3	2	2	3	3	3	1	2	2	2	2	2	2
(3) Mu. 05 Ban Tha Tapao Hua	2	3	3	3	3	3	3	3	3	3	1	1	1	1	3	2	1	3	1	2	1	3	3	2	2	1	3	2	3	2	3	3	3	3	1	2	3	2	3	2	3	3	3	1	1	3	3	1	3	2
(4) Mu. 06 Ban Wang Yang	2	3	3	3	3	3	3	3	3	3	1	1	1	1	2	2	2	3	2	3	1	3	2	1	2	2	3	2	3	3	3	3	3	3	1	2	3	1	1	1	3	3	3	1	1	1	1	1	1	1
(5) Mu. 08 Ban Thung Jig	2	3	3	3	3	3	1	3	3	3	1	1	1	1	2	2	2	3	2	3	1	3	3	2	2	3	3	3	3	3	3	3	3	3	1	2	3	1	1	1	3	3	3	1	1	1	1	1	1	1
(6) Mu. 09 Ban Nong Phak	2	3	3	3	3	3	1	3	3	3	1	1	1	1	2	2	2	3	2	3	1	3	2	2	2	3	3	3	3	3	3	3	3	3	1	2	3	1	1	1	3	3	3	1	1	1	1	1	1	1
2. Tambon Bang Luk																																																		
(1) Mu. 03 Ban Fai Tha	2	3	2	3	3	3	3	3	3	3	1	1	1	1	3	3	3	3	3	3	3	3	2	2	2	1	3	3	3	3	1	3	2	1	3	3	3	3	3	3	2	1	2	1	1	1	1	1	1	1
(2) Mu. 08 Ban Sala Loi	2	3	3	3	3	3	3	3	3	3	1	1	1	1	2	2	2	2	1	3	3	3	2	2	2	1	3	3	3	3	2	1	2	2	1	3	3	3	3	3	2	1	2	2	1	2	2	1	1	1
(3) Mu. 09 Ban Na Pru	2	3	2	3	3	3	3	1	3	3	2	2	1	1	2	2	3	2	3	3	3	3	2	2	2	3	3	3	3	3	2	3	2	2	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1
(4) Mu. 12 Ban Khoa Rad	1	2	2	3	1	3	3	3	3	3	1	1	1	1	1	1	1	3	1	2	1	3	1	2	2	1	3	3	2	1	3	3	1	2	1	3	3	1	1	1	3	3	1	1	1	1	1	1	1	1
3. Tambon Na Cha Ang																																																		
(1) Mu. 01 Ban Khun Saen	3	3	3	2	3	3	3	2	3	3	1	1	1	1	3	1	1	3	3	3	3	3	2	2	2	3	3	3	3	3	1	1	3	2	2	3	3	3	3	3	3	3	2	2	3	2	3	1	1	1
(2) Mu. 02 Ban Na Cha Ang	3	3	3	3	3	3	2	3	3	3	1	1	1	1	3	1	1	3	3	3	3	3	2	2	2	1	3	3	3	3	1	1	3	1	1	3	3	3	3	3	2	3	1	2	3	2	3	2	3	2
(3) Mu. 03 Ban Hu Ro	2	3	2	3	3	3	3	3	3	3	1	1	1	1	3	1	1	3	2	3	1	3	2	2	2	3	2	3	3	3	1	1	3	2	2	3	2	3	2	2	2	2	1	2	2	2	2	2	2	2
(4) Mu. 06 Ban Sai Thong	1	3	1	2	3	3	3	3	3	3	1	1	1	1	1	3	1	3	1	3	1	3	1	2	2	3	3	3	3	3	1	1	3	2	2	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1
(5) Mu. 07 Ban Nern Kheeree	3	3	3	3	3	3	2	3	3	3	3	1	1	1	1	1	1	3	3	3	1	3	3	2	2	3	3	3	3	3	1	1	3	2	2	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1

Note: 1. Below the average level
 2. At the average level
 3. Above the average level

THE MEANING OF LEVEL INDEX DEVELOPMENT OF VILLAGE BY NRD-2C

FORMULA

Basic Structures

1. Ownership Document
2. Electricity
3. Communication
4. Rice-mill or Shop
5. Housing
6. Wood source and fuel
7. Profession and Job
8. Animals for work
9. Salary rate
10. Land ownership

Production

1. Production by Growing Rice
2. Production by doing farming
3. Others professions
4. Migration for works
5. Groups of Agriculturists
6. Agricultural Credit Source
7. Agricultural in the dry season

Meaning or Marks:

- | | |
|-------------------|------------------------------|
| 1. means not good | (low than average standard) |
| 2. means moderate | (in average standard) |
| 3. means good | (more than average standard) |

Public Health

1. Public health service in village
2. Public health service in Tambon
3. Sanitation in family
4. Health and Healthful State
5. Treatment
6. Weight of new-born baby
7. New-born baby to five years
8. Vaccine injection
9. Family planning

Water Supply

1. Drinking and Domestic Use
2. Agricultural Use

Knowledge

1. Education Level of Population
2. Knowledge From government
3. Knowledge on Life Quality
4. Knowledge Place in Village
5. Data and News Service Place
6. Sports, Culture, Activity Religion

(3) Farm Economy

The characteristics of farm-economy in the Study Area as well as the whole province of Chumphon, as implied by its agro-economic zone are based on its specific natural resource potentials and human traditional economic activities. In general it is a typical agricultural area of the southern type where fruit trees and tree crops, especially para-rubber on its northern side and coconut in the southern part are largely planted. Paddy cultivation is mainly practiced in specific lowland plains of Amphoe Muang at the estuary of 3 main rivers, Tha Sae, Rap Ro and Tha Taphao. Recently, shrimp-culture has been expanded in coastal plains, especially in mangrove areas.

Off-farm activities, however, are found relatively scarce in this province.

The situation of agricultural land utilization in 1986 and 1990 in province Chumphon are as follows:

	1986 rai (%)		1990 rai (%)	
Homestead	24.963	(2.44%)	28.93	(1.9%)
Paddy	185.495	(18.15%)	148.288	(9.85%)
Upland Crop	23.756	(2.32%)	20.933	(1.4%)
Fruit Trees & Tree Crops	695.596	(64.53%)	1,125.770	(74.8%)
Vegetable & Flowers	3.057	(0.29%)	9.696	(0.65%)
Livestock Farm	2.777	(0.27%)	11.103	(0.74%)
Idle Land	80.505	(7.88%)	154.430	(10.25%)
Others	42.075	(4.12%)	6.362	(0.4%)
	1,022.214	(100%)	1,505.445	(100%)

This implies a significant increase of approximately 50 percents of agricultural land, especially for fruit trees & tree crops, vegetable & flowers and livestock farms. Meanwhile this shows a decrease of areas for paddy fields and upland crops. Particularly, since the last decade areas for rice fields in province Chumphon tended to be decreased gradually year by year. This would be caused by factors such as irrigation-shortage, expansion of resident areas in lowland plains, higher inputs but yields of each year were not much different.

In general, due to their low market prices and small-scale plantations for marketing distribution, the cultivation of upland crops have been decreased also, offering areas for fruit trees and tree crops which have shown a remarkable expansion in this area due to proper natural conditions of climate and soil.

The situation of cropping in 4 Amphoe related to the Study Area in the crop-year 1990-91 is shown in Table H-8.

On another hand, the Nong Yai area is an agrarian area with 2 fundamental characteristics : its location of adjacency to the municipality of Chumphon, and the southern style of agriculture based on its apecific natural potentials and located traditional socio-economic activities. The first characteristic is observed in the land use of 3 Tambon related to the Nong Yai area as follows :

Category of Land Use	Tambon					
	Na Cha Ang		Bang Luk		Na Thung	
	Rai	%	Rai	%	Rai	%
Communities Lands	1,590	6.16	1,062	3.96	na	*
Agricultural Land	11,839	45.84	13,326	46.31	8,701	87.85
Industrial Land	8	0.03	6	0.02	na	*
Public Area	5,493	21.27	400	1.39	na	*
National Forest Area	3,000	11.62	3,822	13.28	na	*
Idle Land	2,495	9.66	360	1.25	na	*
Other Area	1,400	5.42	9,803	34.06	na	*
Total	15,825	100.00	28,779	100.00	9,904	100.00

(Source : Department of Town & Country Planning, Ministry of Interior 1991)

Tambon Na Thung is affiliated to the municipality of Chumphon. Therefore, related figures are not available.

TABLE H - 8 : FARMING SITUATION IN 4 AMPHOE OF THE STUDY AREA
(CROP YEAR 1990 - 91)

Item	Amphoe Muang Chumphon	Thasae	Pathiu	Ban Saphan Noi	Total
Total Land Area (%)	594,937.5 rai (100 %)	928,125 rai (100 %)	372,500 rai (100 %)	450,000 rai (100 %)	2,345,562.5 rai (100 %)
Farm Holding Land (%)	258,672 (43.5 %)	496,802 (53.5 %)	281,038 (75.5 %)	271,880 (60.5 %)	1,308,392 (55.8 %)
Farm Households (Population)	13,827 (124,553)	6,232 (49,640)	4,782 (37,249)	5,244 (30,129)	30,085 (241,571)
Farm-Size (rai)	18.71	79.72	58.77	51.85	44.5
Cultivated Areas	137,031	355,686	255,570	150,963	899,985
(1) Paddy Land :	38,504	31,932	16,668	3,080	90,184
(Wet Season)	(35,451)	(10,578)	(10,748)	(3,080)	(59,857)
(Dry Season)	(3,053)	(21,354)	(5,920)		(30,327)
(2) Fruit Tree :	3,694	25,257	5,091	469	34,511
Durian	(3,018)	(14,272)	(1,949)	(469)	(19,708)
Mangosteen	(130)	(6,446)	2,750		(9,326)
Rambutan	(556)	(4,539)	(392)		(5,487)

Amphoe	Muang	Thasae	Pathiu	Ban	Total
Item	Chumphon			Saphan Noi	
(3) <u>Tree Crops :</u>	<u>81,478</u>	<u>149,421</u>	<u>140,443</u>	<u>100,069</u>	<u>471,411</u>
Para Rubber	(10,016)	(33,037)	(83,565)	(8,923)	(135,541)
Palm Oil	(3,240)	(41,534)	(7,345)	(11,580)	(63,699)
Coffee	(9,555)	(48,070)	(22,089)	(2,169)	(81,883)
Coconut	(58,667)	(26,780)	(27,444)	(77,397)	(190,288)
(4) <u>Upland Crop :</u>	<u>2,334</u>	<u>125,676</u>	<u>87,368</u>	<u>10,074</u>	<u>225,452</u>
(Maize)	(600)	(88,934)	(57,000)		
(5) <u>Vegetables & Orchard :</u>	<u>11,021</u>	<u>23,400</u>	<u>6,000</u>	<u>9,122</u>	<u>49,543</u>
(Banana)	(15,811)	(1,400)	(2,500)	Ginger &	
(Papaya)	(5,201)	(22,000)	(3,500)	Vegetable	

From this farming situation, the ratio of farm holding land is highest in Amphoe Pathiu (75.5 %) but lowest in Amphoe Muang Chumphon (43.5 %). The average ratio for 4 Amphoe is 55.8 %, considered higher than the ratio for Amphoe Thasae (53.5 %) with a large area subjected to forest reserves.

Regarding the aspect of farm-size, only Amphoe Muang Chumphon has a farm size lower than the average figure of national level (28 rai). Other 3 Amphoe, in average, have very large farm sizes, especially for Thasae with 79.72 rai as the average farm size.

The ratio of cultivated area in farm holding land of Amphoe Muang Chumphon, however, is considered lowest due to a large area for residence and facilities in this Amphoe.

Regarding cropping areas, in all 4 Amphoes of the Study Area, tree crops have the highest areas, followed by upland crops for 3 Amphoe Thasae Pathiu and Bansaphan Noi. In Amphoe Muang Chumphon have the second largest cultivated area.

Regarding tree crops which cover the largest planted area in the Study Area, main crops show following features.

For coconut, most soils in the area planted of coconut are sand or sandy loam. These areas are on the east coast of sea flooding plain from Amphoe Pathiu with the length of 200 kilometers. Most farmers in these areas grow coconut. In Chumphon province, the largest area planted of coconut was in Amphoe Muang. The next large planted area of coconut in the Study Area was in Amphoe Bansaphan Noi of province Prachmap Khiri Kan Ccoconut's major problem was low income earned from coconut. production. Since 1985 it was found that area planted of coconut decreased because farmers changed to grow other higher income crops. Recently the yield of coconut however became higher due to well caring. Presently, its average yield was more than 700 fruits per rai.)

For rubber, rubber plantations in the Study Area are just replanted after its total destruction by the typhoon Gay (1989). In 1986, total area planted of rubber in Chumphon province was 163,021 rai with average yield of 230 kg per rai. It could be observed that the area planted in 1986 decreased from 1985 which was 168,068 rai with average yield of 176 kg per rai and production value of 211,353,000 Baht. This production value was less than the

value of 285,572,000 Baht in 1985. Area planted in 1986 was less than in 1985 but area harvested in 1986 was higher and its averaged yield and price were also higher. This resulted in higher value of total production. The largest area planted of rubber was in Amphoe Pathiu.

Regarding coffee, the production of coffee is an important product for economic development in this province because it enabled to increase farmer's income considerably. Farmer sold coffee at a good price. Presently the amounts of coffee growers and planted areas in Chumphon are highest figures in Thailand. Coffee production of Chumphon was more than 40 percents of total production of Thailand. The value of production in Chumphon was more than 500 million Baht per year. Land and soil in Chumphon are considered suitable for coffee cultivation. Especially, price of coffee was high in previous years but recently there is a sharp decrease in world market price affecting the local price and production.

For oil palm, the extension of growing this crop which is subject to substitute imported products is performed in Chumphon. At present, products of oil palm in Thailand are almost enough for domestic demand. Because soil potential in Chumphon is suitable for oil palm, the extension of oil palm is then performed here. Plan of this extension project is rather clear. Most oil palm plantations are in settlement areas. There are 3 settlement areas for oil palm cultivation in Amphoe Tha Sae, Amphoe Pathiu and Amphoe Lang Suan. Besides, they are big companies which have their own process factories such as Witchaphan Co. Presently, area planted of oil palm in 4 Amphoes of the Study Area is 63,699 rai in which 41,534 rai are in Amphoe Tha Sae. Total production of the province was approximately 90,000 tons with average yield of 1,700 kg per rai.

For upland crops, maize is the main item proper to the situation of rolling land configuration in this area. Regarding the economic aspect, maize shows a low benefit but easy to plant and use as the second staple food crop after rice.

Only paddy is largely cultivated in Amphoe Muang Chumphon due to the availability of low-lands and few rolling hills in this Amphoe. In 2 Amphoe Pathiu and Bansaphau Noi, the lack of water has limited paddy cultivation.

The similar problem of agricultural water is considered for the limitation on cultivation of vegetables and orchards in 4 Amphoe of the Study Area

For Nong Yai area, the average farm size, in general, is smaller, especially for Tambon Na Thung with the average farm size of only 2.1 rai (0.34 ha). This situation basically effects to the agricultural economy of this area. Besides, 2 Tambon of Na Cha Ang and Bang Luk have approximately 46 percents of the Tambon area for agricultural use. About 88 percents of land are used for agriculture in Tambon Na Thung despite of its adjacency to the town of Chumphon.

The second characteristic is observed in the present utilization of agricultural lands in these 3 Tambon as follows :

Agricultural Land Use of 3 Tambon

Crops	Na Cha Ang		Bang Luk		Na Thung		Total	
	Rai	%	Rai	%	Rai	%	Rai	%
Coconut Fields	7,649	63.5	4,971	30.9	4,156	47.8	16,776	45.6
Tree Crops & Fruits	200	1.7	1,356	8.4	996	11.4	2,552	6.9
Paddy Fields	3,095	25.6	6,890	42.8	2,553	29.4	12,538	34.0
Others	1,105	9.2	2,890	17.9	996	11.4	4,991	13.5
Total	12,049	100.0	16,107	100.00	8,701	100.0	36,857	100.0

(Source : Department of Town & Country Planning, Ministry of Interior 1991)

As coconut trees have been grown for almost 50 percents of its agricultural land, the income from crops, therefore, will be considerably low and basically limited due to its low revenue from 2-3 Baht per fruit (farm gate price). Coconut trees, however, can produce fruits all year round without intensive farming care and be grown on podzolic soils largely expanding in the upland parts of Nong Yai area. Coconut, therefore, is considered as a low but steady income-source in the agriculture of the South.

Paddy fields, on the other hand, are limited in lowlands with an average coverage of approximately 34 percents of total agricultural land. Other tree crops, fruit trees and vegetables are covered in an average figure of 20.5 percents of the agricultural land. These crops excluding coconut, therefore, have made up the main part of cropping income in this southern style of agriculture.

(4) Marketing of Farm Products

The major problem for economic crops in Chumphon is low and fluctuated market prices. Farmers often sell their farm products at prices much lower than actual prices. Farmers have no bargain power because most traders come to buy farm products at farms due to lack of a proper marketing system.

For rice, farmers keep the product for their own family consumption or sell to traders came to buy at farms in case of needs to sell. For coconut, farmers sold about 90 percents of their production at home, and consumed the rest of 10 percents. Coffee farmers sold about 75 percents of their production at home, and 25 percents werw sold at nearby cooperatives or local market. Oil palm farmers sell all their production at cooperative only. Therefore oil palm farmers did not have problem of unfair low price. Price of coffee, however, is very depended on market demand and supply. Farmers of other fruit trees as rambutan, durian and mangosteen sell most of their fruits at home, they sell only a few at markets.

The institutional marketing flow charts of major agricultural products in province Chumphon are notified in FIGURES H - 1, H - 2, H - 3, and H - 4.