C.2.5. PERMEABILITY TEST

# PERMEABILITY TEST RESULT	Project : อ่างฯ คลองสียัด	
	Location จ.ฉะเชิงเทรา	MEMO 72/2533
		Date 2 เมย. 33
		Checked PS.

SAMPLE NO.	DEPTH m	METHOD OF COMPACTED	INITIAL TEST				FINAL WATER CONTENT %	SOIL GROUP	VALUES OF PERMEABILITY K cm/sec
			DRY DENSITY t/m³	WATER CONTENT %	VOID RATIO	SATURATION %			
(DAM-2) TPB-1	1.90-5.50	"	1.591	21.6	0.697	83.7	22.4	CL	1.158×10^{-8}
(DAM-2) TPB-2	0.00-4.00	"	1.737	18.0	0.554	87.7	19.0	GC	2.216×10^{-6}

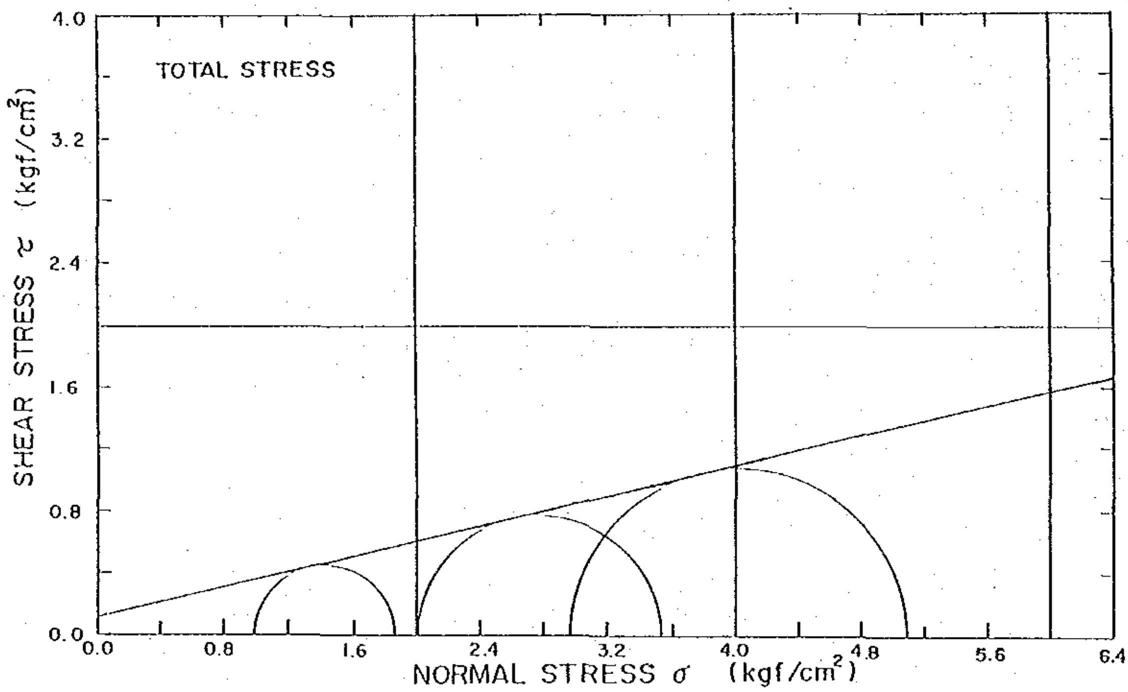
C.2.6. TRIAXIAL SHEAR TEST

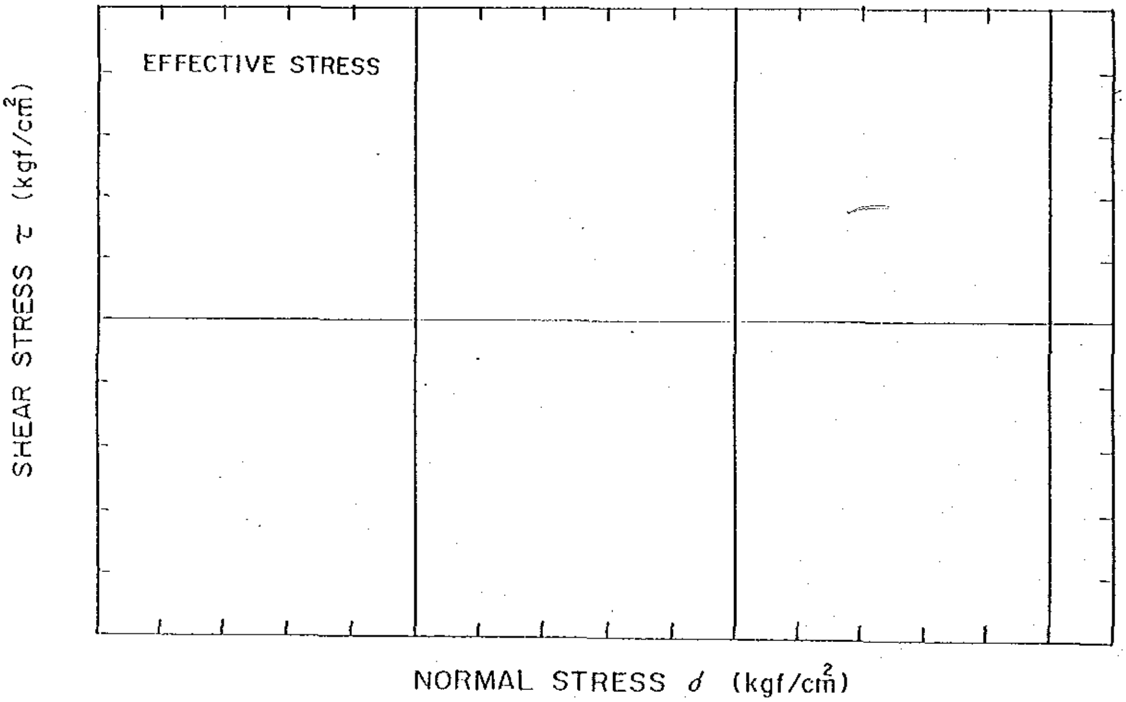
TRIAXIAL COMPRESSION TEST (UU-TEST)

SAMPLING SPOT & PLACE: KHLONG - SI - YAT DATE 4 - 4 - 1990

SAMPLE No. & DEPTH: No. TPB - 1 (1.90 - 5.50)

STRENGTH PARAMETER SCOPE OF STRESS	C kgf/cm	ϕ DEGREE	tan ϕ	C' kgf/cm	ϕ' DEGREE
NORMALLY CONSOLIDATED REGION	0.105	13.723	0.244		
OVER CONSOLIDATED REGION					

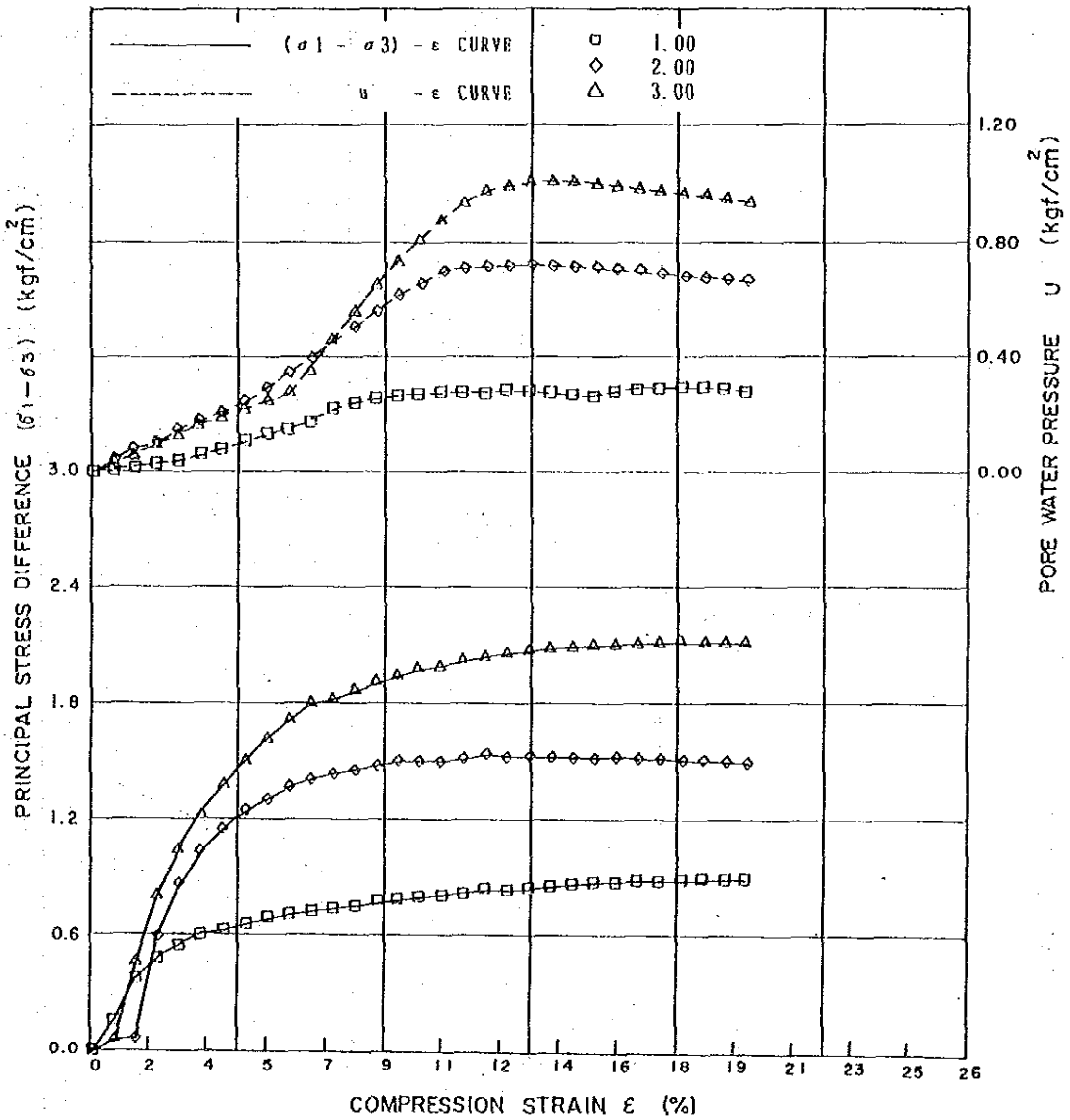




TRIAXIAL COMPRESSION TEST (UU-TEST)

SAMPLING SPOT & PLACE: TPB-1 (1.90-5.50)   DATE 4-4-1990

SPECIMEN No.		1 □	2 ◇	3 △	
MINOR PRINCIPAL STRESS σ_3 kgf/cm²		1.00	2.00	3.00	
PRINCIPAL STRESS DIFFERENCE AT PEAK	PRINCIPAL STRESS DIFFERENCE ($\sigma_1-\sigma_3$) kgf/cm²	0.877	1.537	2.121	
	COMPRESSION STRAIN εf %	15.072	11.842	17.880	
	PORE WATER PRESSURE Uf kgf/cm²				
	PORE PRESSURE COEFFIENT Af				

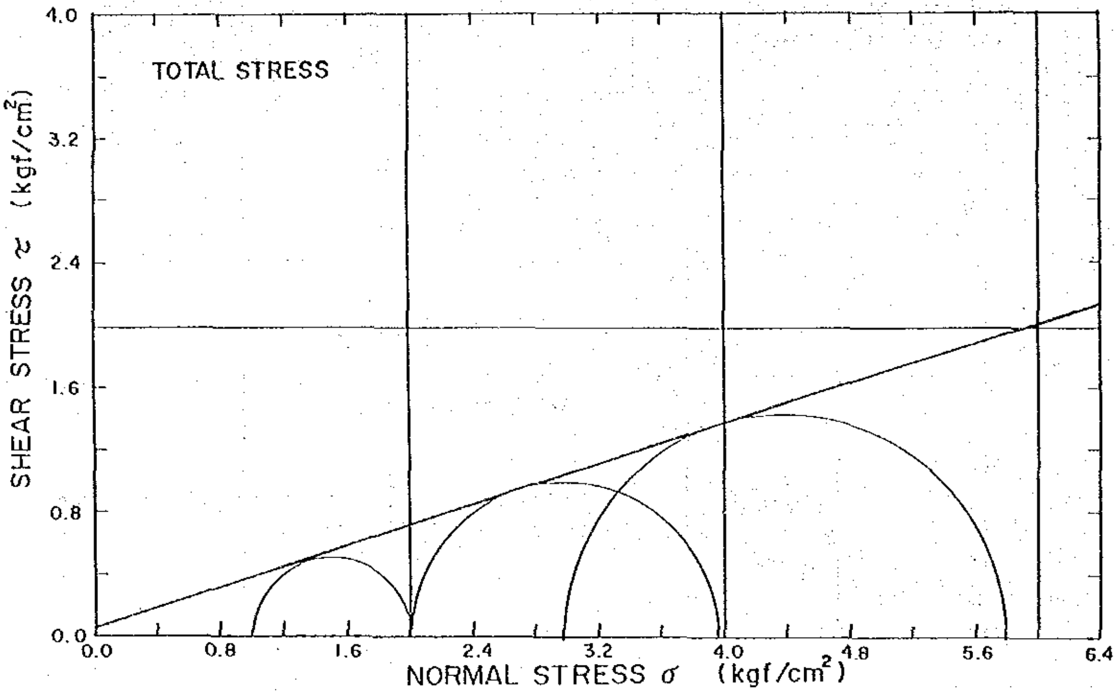


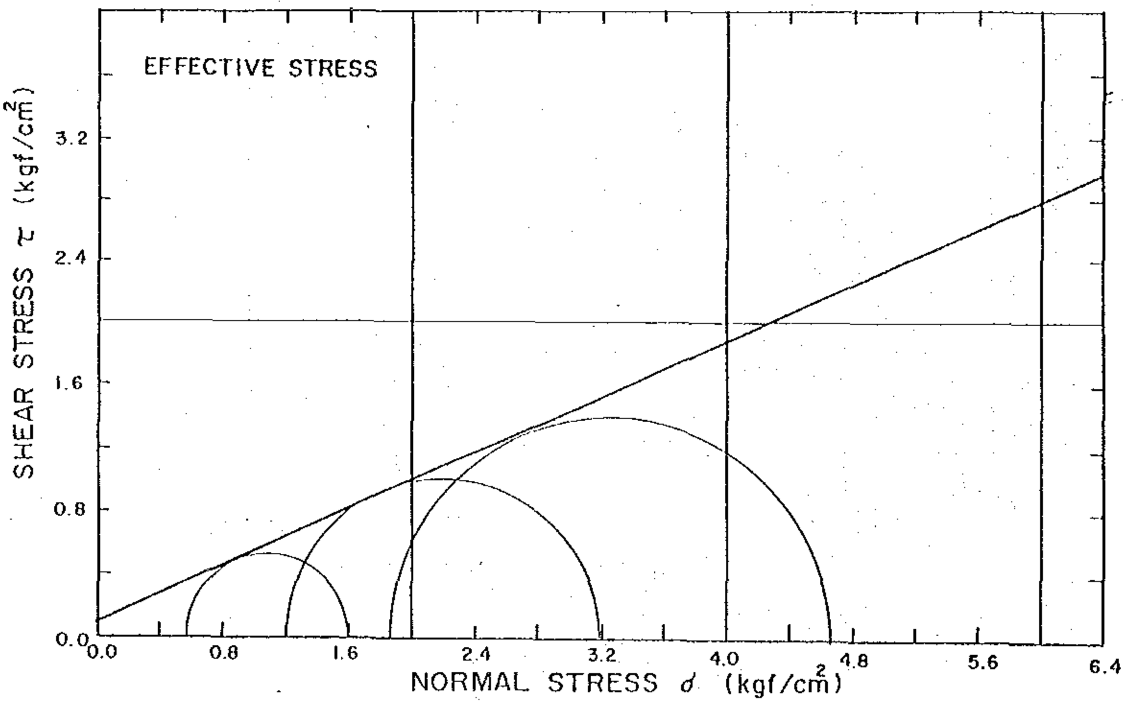
TRIAXIAL COMPRESSION TEST ($\overline{CU}$-TEST)

SAMPLING SPOT & PLACE: KHLONG - SI - YAT DATE 29-3-1990

SAMPLE No. & DEPTH: No. TPB - I (1.90 - 5.50)

STRENGTH PARAMETER						
SCOPE OF STRESS	C kgf/cm	Ø DEGREE	tan Ø	C' kgf/cm	Ø' DEGREE	
NORMALLY CONSOLIDATED REGION	0.049	18.051	0.326	0.084	24.194	
OVER CONSOLIDATED REGION						

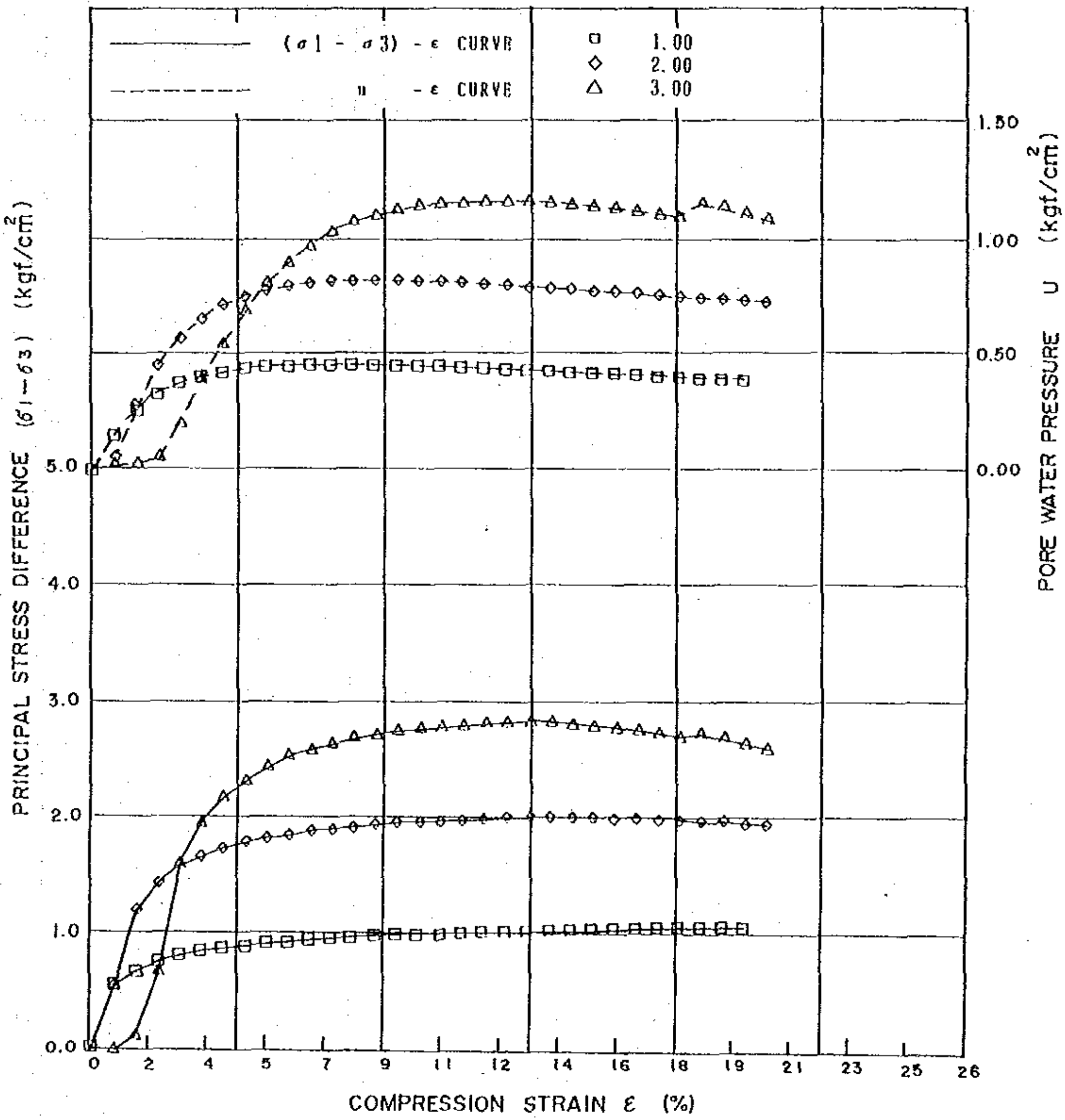




TRIAXIAL COMPRESSION TEST (CU-TEST)

SAMPLING SPOT
& PLACE: TPB-1 (1.90 - 5.50) DATE 29-3-1990

	SPECIMEN No.	1 □	2 ◇	3 △	
MINOR PRINCIPAL STRESS σ'_3 kgf/cm²		1.00	2.00	3.00	
PRINCIPAL STRESS DIFFERENCE AT PEAK	PRINCIPAL STRESS DIFFERENCE ($\sigma_1 - \sigma_3$) kgf/cm²	1.009	1.983	2.805	
	COMPRESSION STRAIN εf %	11.767	11.798	13.110	
	PORE WATER PRESSURE Uf kgf/cm²	0.441	0.797	1.148	
	PORE PRESSURE COEFFIENT Af	0.437	0.402	0.409	

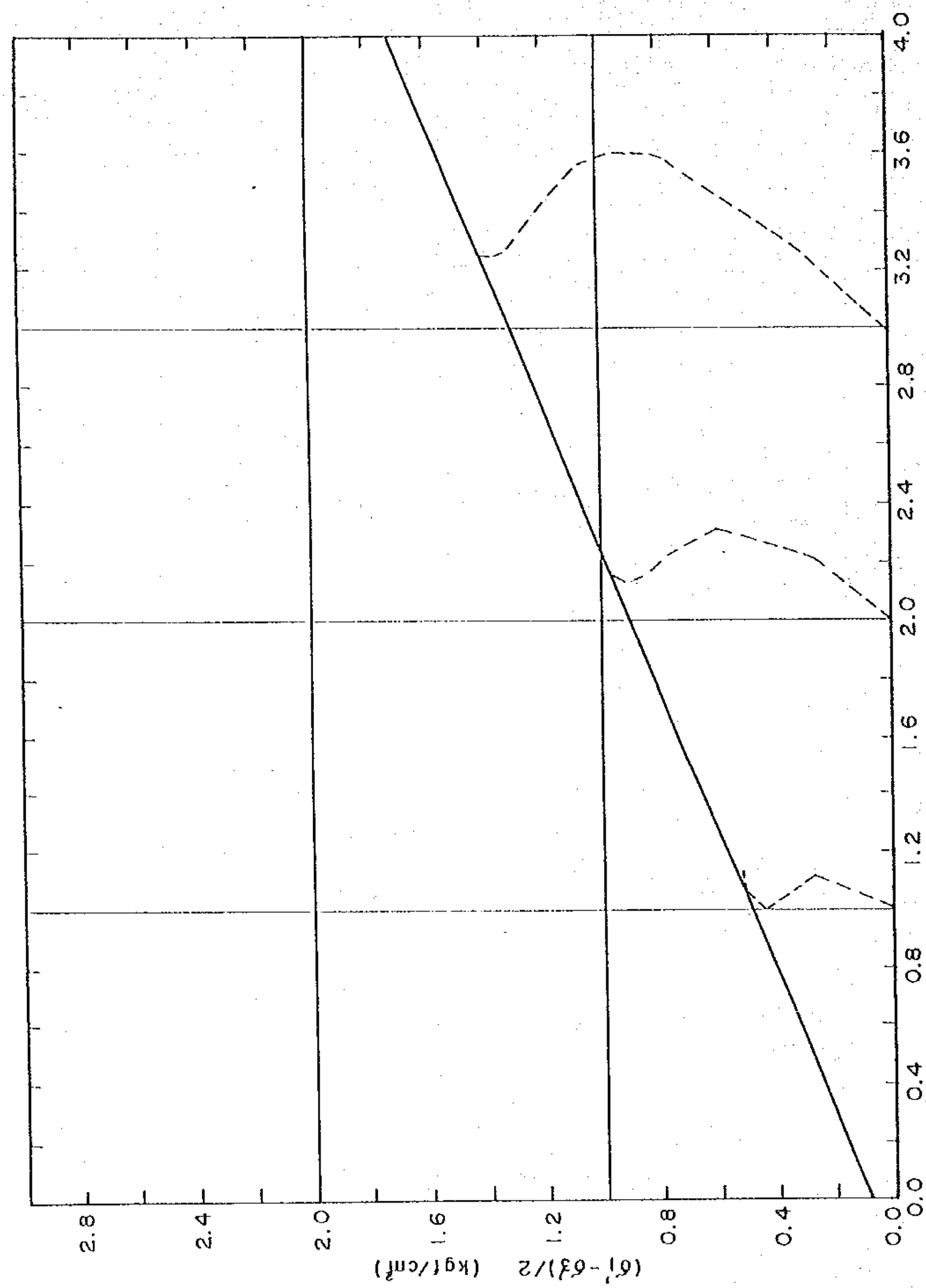


TRIAXIAL COMPRESSION TEST (CU-TEST) (STRESS PATH)

SAMPLING SPOT & PLACE: KHLONG-SI-YAT DATE 29-3-1990

SAMPLE No. & DEPTH: No. TPB-1 (1.90-5.50)

P = 0.08 (kgf/cm²) α = 24.21 DEGREE



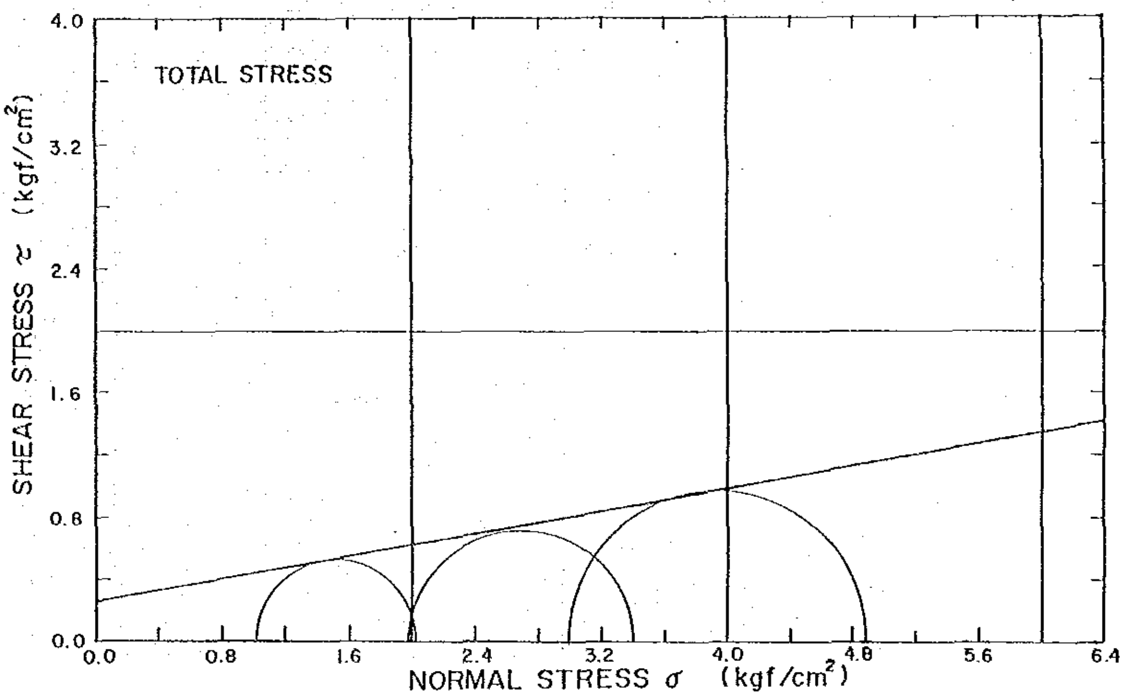
TRIAXIAL COMPRESSION TEST (UU-TEST)

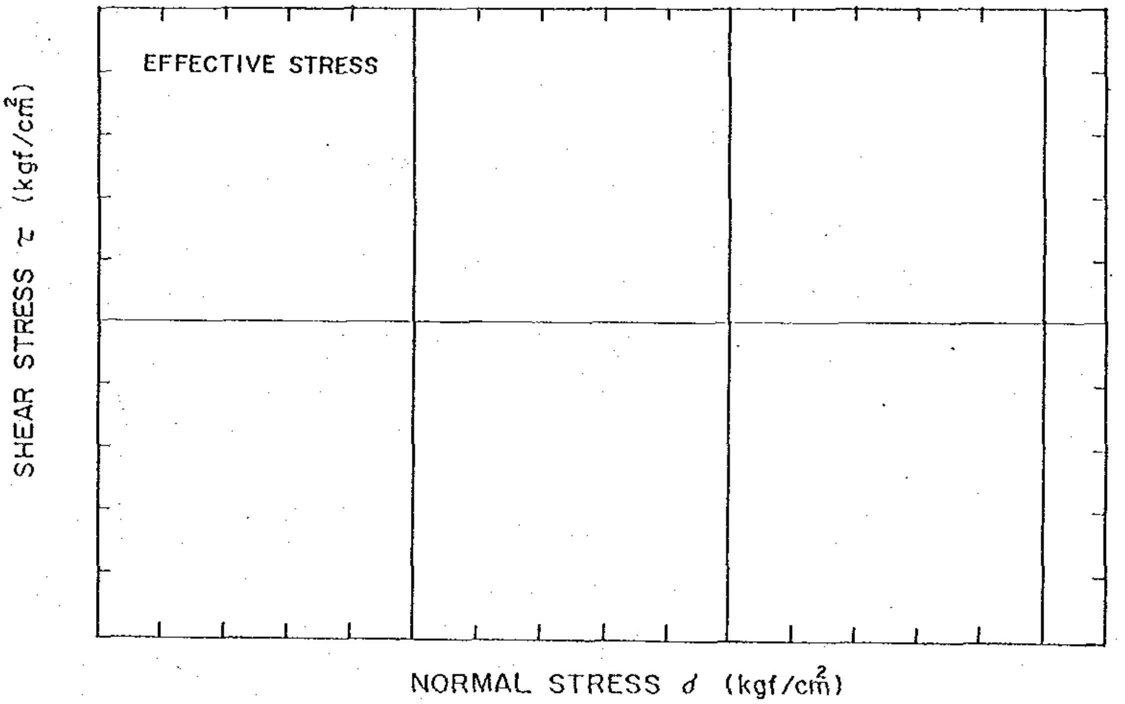
SAMPLING SPOT & PLACE: KHLONG - SI - YAT

DATE 6-4-1990

SAMPLE No. & DEPTH: No. TPB-2 (0.00 - 4.00)

STRENGTH PARAMETER	SCOPE OF STRESS	C kgf/cm	ϕ DEGREE	tan ϕ	C' kgf/cm	ϕ' DEGREE
	NORMALLY CONSOLIDATED REGION	0.244	10.242	0.181		
	OVER CONSOLIDATED REGION					

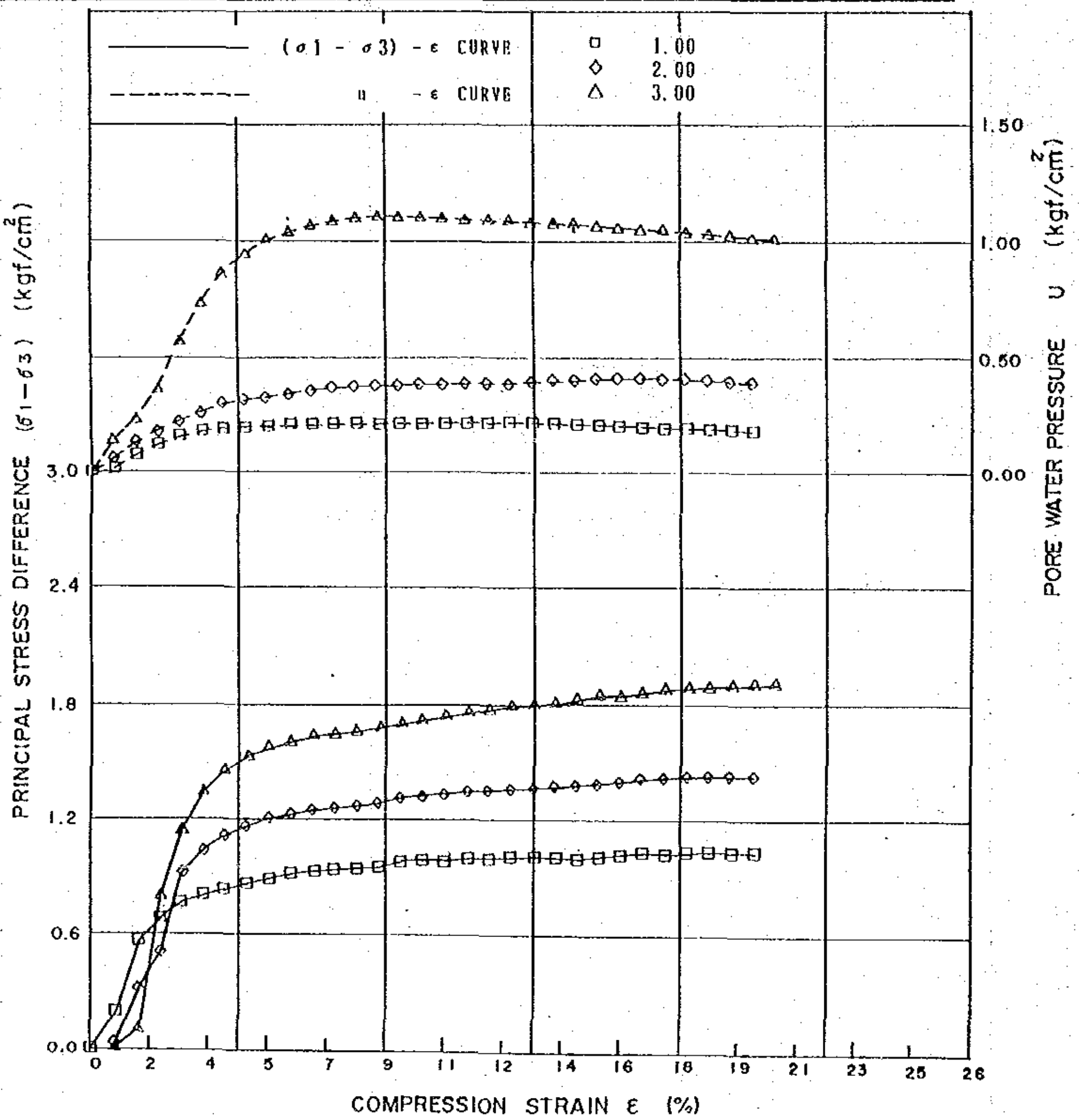




TRIAXIAL COMPRESSION TEST (UU-TEST)

SAMPLING SPOT
& PLACE: TPB-2 (0.00-4.00) DATE 6-4-1990

	SPECIMEN No.	1 □	2 ◇	3 △	
MINOR PRINCIPAL STRESS σ_3 kgf/cm²		1.00	2.00	3.00	
PRINCIPAL STRESS DIFFERENCE AT PEAK	PRINCIPAL STRESS DIFFERENCE ($\sigma_1-\sigma_3$) kgf/cm²	1.047	1.391	1.912	
	COMPRESSION STRAIN εf %	18.408	15.092	19.898	
	PORE WATER PRESSURE Uf kgf/cm²				
	PORE PRESSURE COEFFIENT Af				

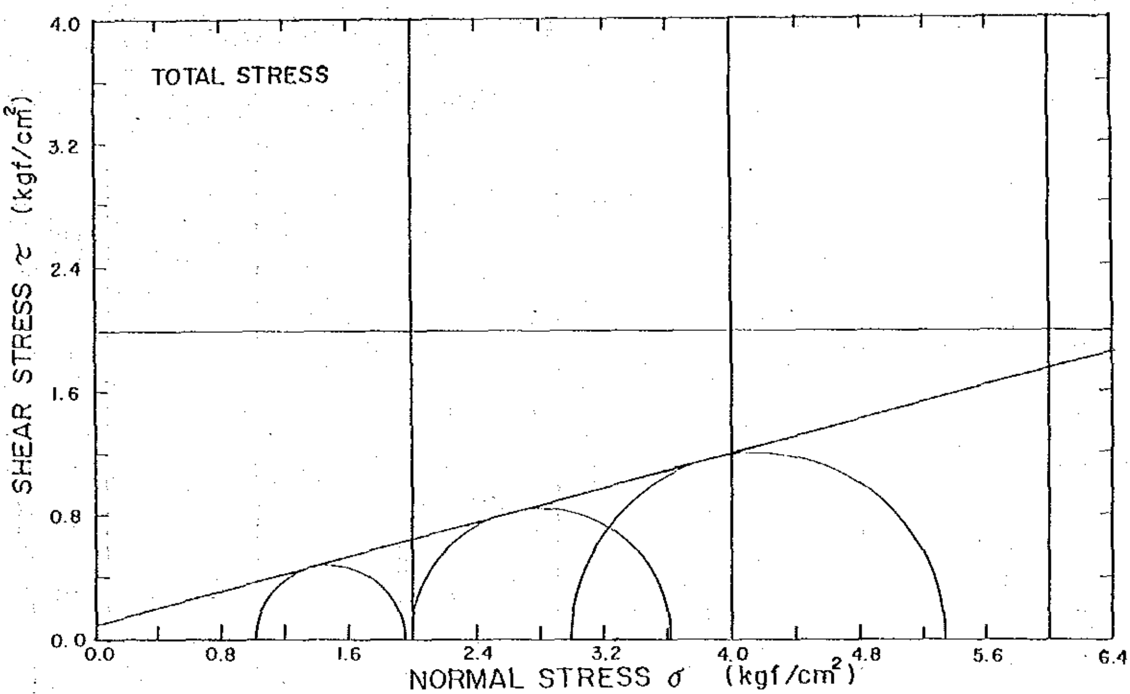


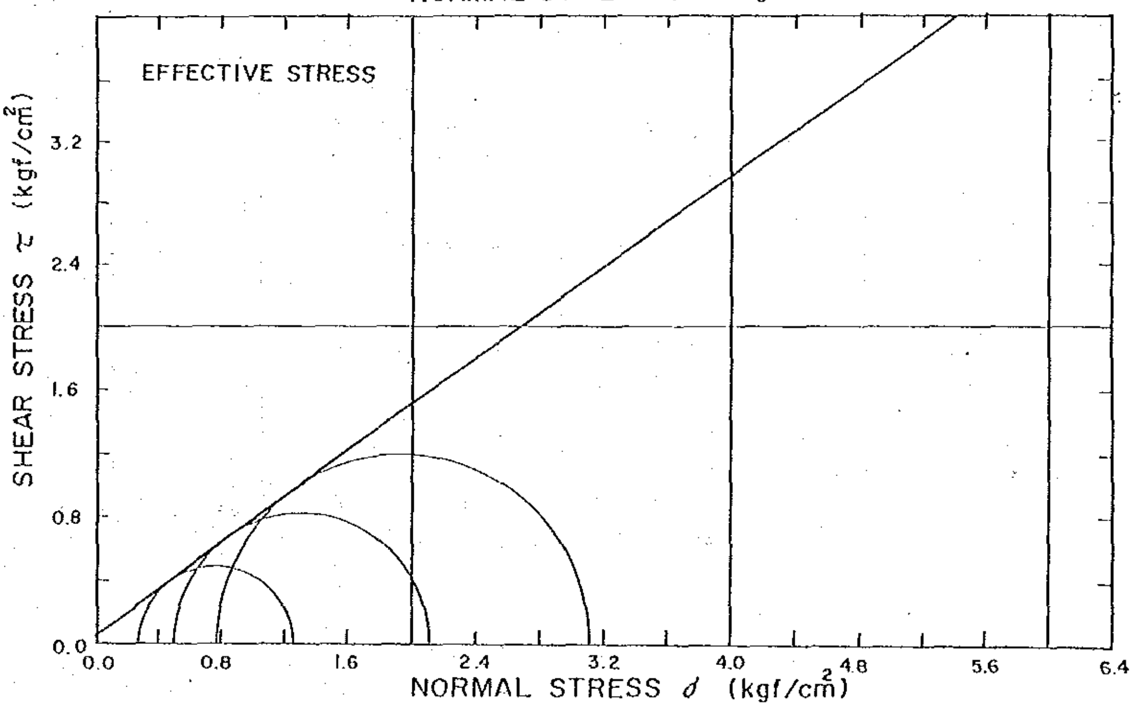
TRIAXIAL COMPRESSION TEST ($\overline{CU}$-TEST)

SAMPLING SPOT & PLACE: KHLONG - SI - YAT　　　DATE 8 - 3 - 1990

SAMPLE No. & DEPTH: No. TP8 - 2(0.00 - 4.00)

STRENGTH PARAMETER	SCOPE OF STRESS	C kgf/cm	ø DEGREE	tan ø	C' kgf/cm	ø' DEGREE
	NORMALLY CONSOLIDATED REGION	0.098	15.010	0.268	0.049	35.965
	OVER CONSOLIDATED REGION					



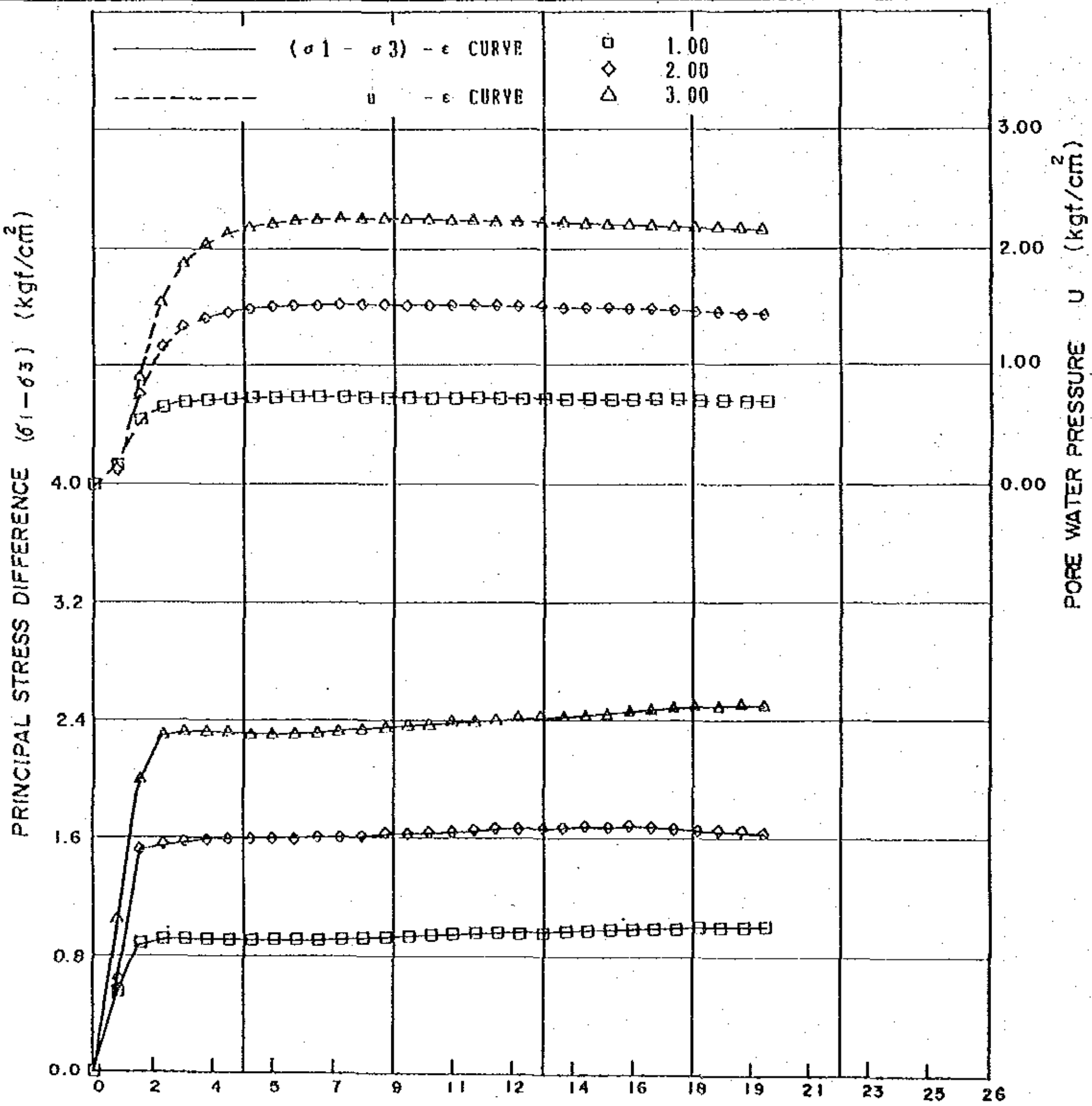


TRIAXIAL COMPRESSION TEST ($\overline{CU}$-TEST)

SAMPLING SPOT & PLACE: TPB-2 (0.00-4.00)

DATE 8-3-1990

	SPECIMEN No.	1 □	2 ◇	3 △	
MINOR PRINCIPAL STRESS σ'_3 kgf/cm²		1.00	2.00	3.00	
PRINCIPAL STRESS DIFFERENCE AT PEAK	PRINCIPAL STRESS DIFFERENCE $(\sigma_1-\sigma_3)$ kgf/cm²	0.985	1.830	2.363	
	COMPRESSION STRAIN εf %	11.186	8.530	9.174	
	PORE WATER PRESSURE Uf kgf/cm²	0.722	1.505	2.232	
	PORE PRESSURE COEFFIENT Af	0.748	0.923	0.945	



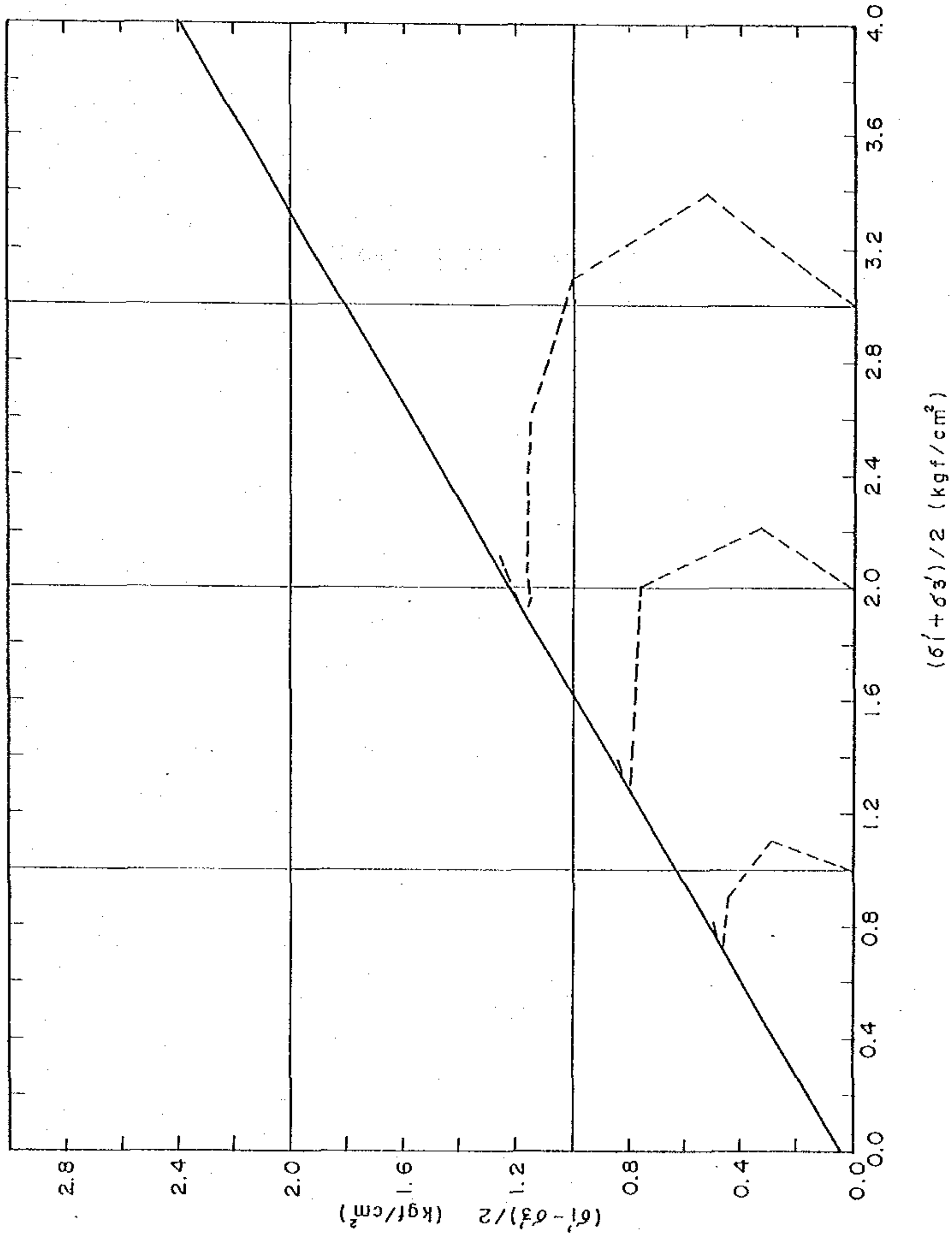
TRIAXIAL COMPRESSION TEST (CU-TEST) (STRESS PATH)

SAMPLING SPOT & PLACE: KHLONG - SI - YAT

DATE 8 - 3 - 1990

SAMPLE No. & DEPTH: No. TPB - 2 (0.00 - 4.40)

P = 0.04 (kgf/cm²) α = 35.98 DEGREE



C.2.7. ROCK TEST

กองวิจัยและทดลอง
กรมชลประทาน

ว.ท.2-03
(พ.ศ.2520)

คุณสมบัติของหินย่อยและกรวด

วันที่ 16 มกราคม 2533
ทดสอบโดย
ตรวจสอบโดย

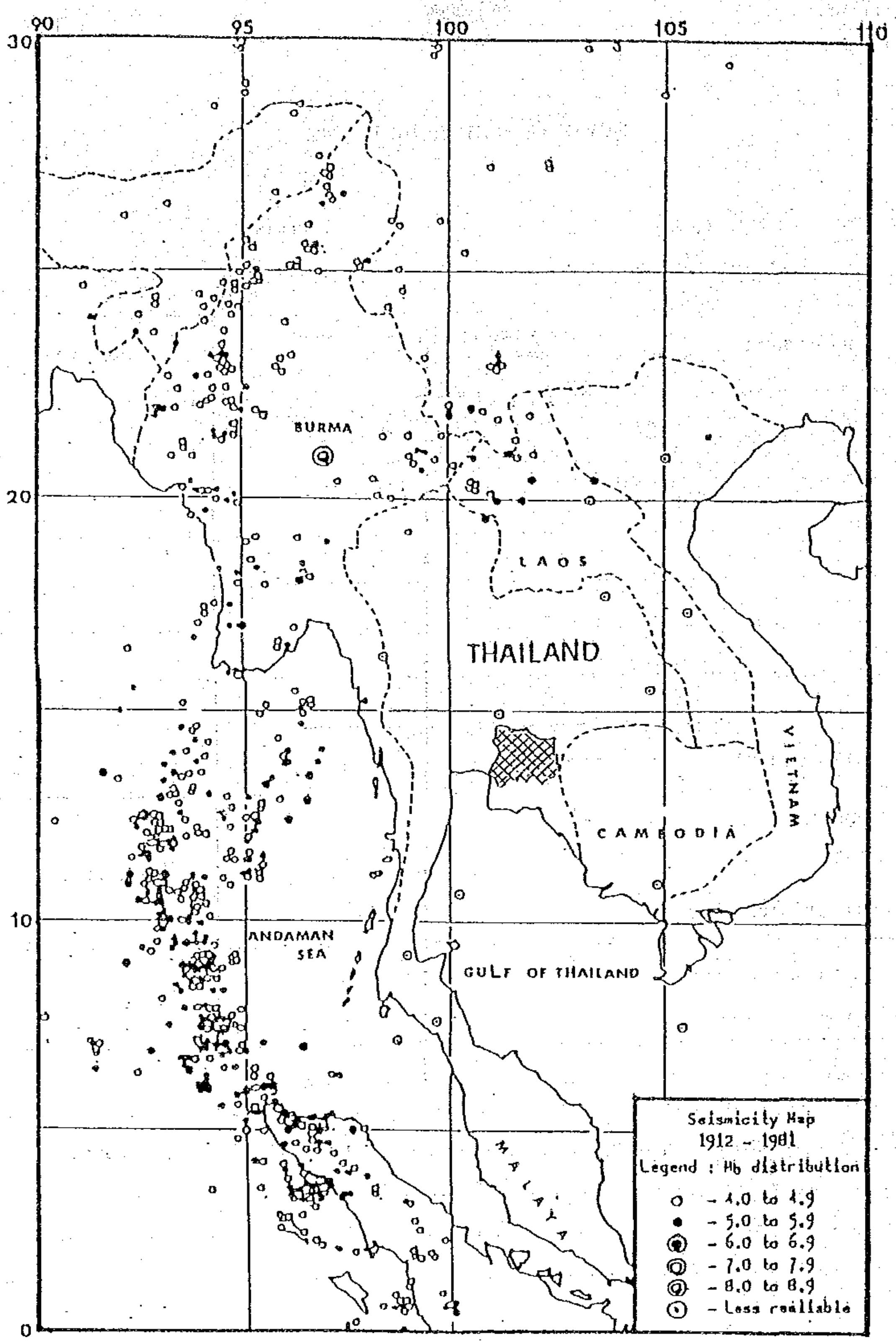
ลำดับงานที่ CM.113/2533
โครงการ ฝ่ายสำรวจธรณีวิทยา

ขนาดตะแกรง	ส่วนผ่านตะแกรงโดยน้ำหนัก - ร้อยละ		เกณฑ์กำหนด
	Q 1	Q 2	
	Khao Ba Ra Rum Quarry (3 km far from damsite)	Khao Yai Ma Noi Quarry (8 km far from damsite)	
ความถ่วงจำเพาะ	2.639	2.608	
ส่วนสูญหายเนื่องจากการขัดสี โดยเครื่องลอสแองจีลีส-ร้อยละ	-	-	ไม่มากกว่า 50
ส่วนสูญหายเมื่อทดลองด้วยโซเดียมซัลเฟต-ร้อยละ	-	-	ไม่มากกว่า 12
การดูดน้ำ-ร้อยละ	0.575	2.059	

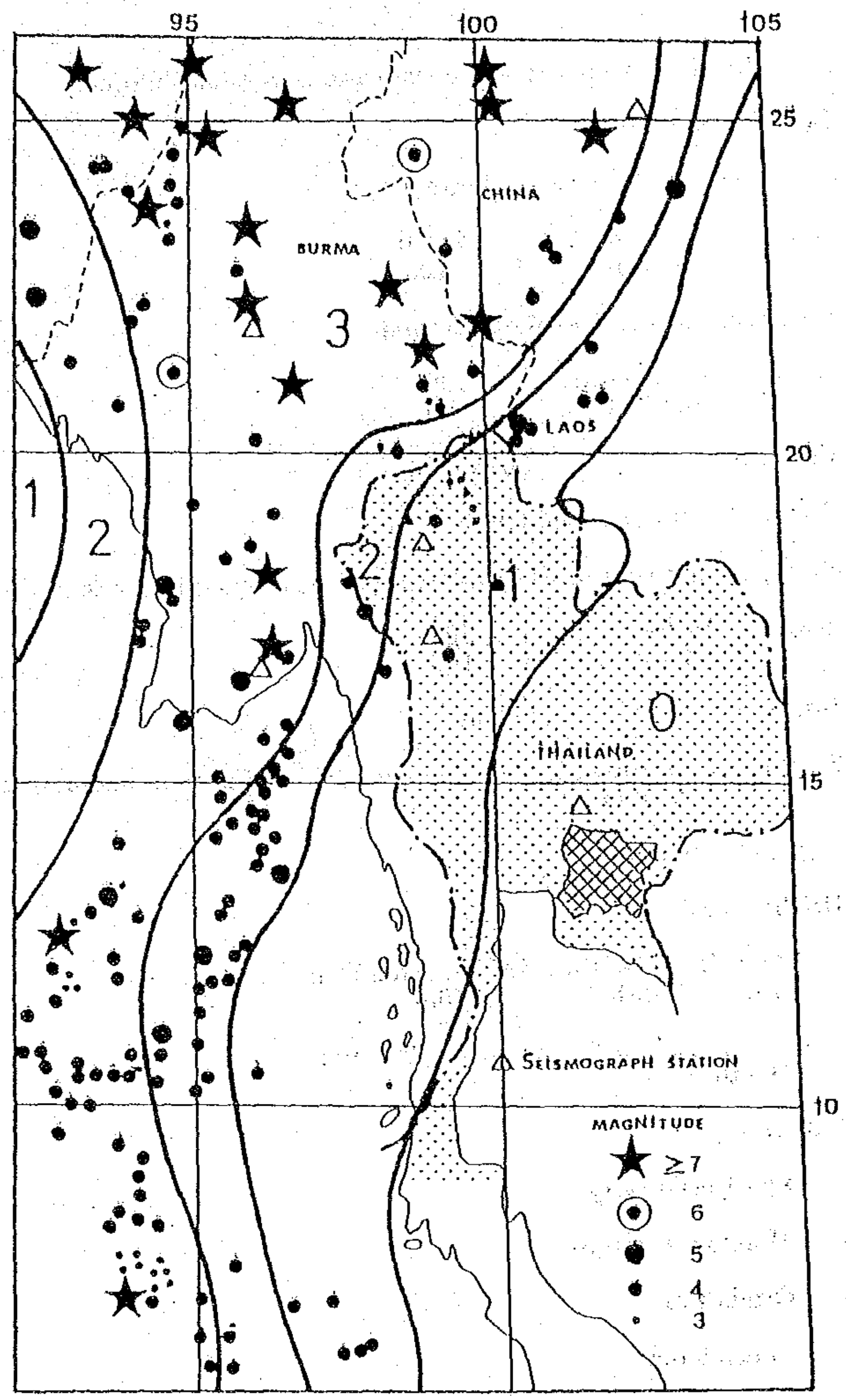
<u>หมายเหตุ</u> ในบริเวณ quarry ของโครงการท่าลาด (อ่างฯ คลองสียัด) อ.สนามชัยเขต จ.ฉะเชิงเทรา

พิมพ์ที่ ฝ่ายโรงพิมพ์ กรมชลประทาน (บ.315-ธ.ค.2529-15,000.)

C.3.1. SEISMICITY MAP



C.3.2. SEISMIC PROBABILITY MAP



LEGEND
ZONE 0 : No damage
ZONE 1 : Minor damage
ZONE 2 : Moderate damage
ZONE 3 : Major damage

C.4.1. Bang Pakong Diversion Dam

(1) Topographic Survey for Diversion Dam and Diversion Channel

Scale 1 : 2,000

(2) Profile Survey for Diversion Channel

Scale	Horizontal	1 : 2,000
	Vertical	1 : 100

(3) Sectional Survey for Diversion Channel

Scale	Horizontal	1 : 500
	Vertical	1 : 100
Interval		100 m

(4) Additional River Cross Section Survey

- to clarify the dike of the river upstream of the proposed Diversion Dam

Scale	Horizontal	1 : 500
	Vertical	1 : 100
Interval		200 m
Section	from the proposed diversion dam to the conjunction of the Tha Lat river	

(5) Geological Investigation

1) Drilling Test

- Additional Drilling for Diversion Dam
  2 hole, Depth : 50m
- At least 3 hole for Diversion Channel
  Depth : 20m

2) Laboratory Test

- Specific Gravity
- Moisture Content
- Gradation
- Consistency
- Standard Proctor Compaction
- Permeability

(6) Survey for navigation frequency

-to clarify the transportation on the river

Station : at the Chachoengsao bridge

at the proposed diversion dam site

at Bang Khla

(7) Transportation Survey

-to clarify the traffic on the Chachoengsao bridge and Route 304 and 315,

Station : at the Chachoengsao bridge

at the junction of route 304 and 315

C.4.2. CANAL NETWORKS

(1) Route Selection

- Detail route selection on the basis of Topo-map scaled 1 : 10,000 through field investigation

(2) Route Survey

- Topographic Survey	Width 100m Scale 1 : 500		
- Profile	Scale	Horizontal	1 : 500
		Vertical	1 : 100
- Section	Scale	1 : 100	

(3) Drilling Test

- At the point of structures Depth : at least 20m

C.4.3. Khlong Si Yat Dam

(1) Plan Map Survey

Location	Quantity
Quarry	40 ha
Spillway	60 ha
Total	100 ha

(2) Strip Topography Survey

Location	Quantity
Road	23 km
Others	2 km
Total	25 km

(3) Seismic Prospecting

Location	Quantity	
Quarry	2.0 km	
Main Dam : dam axis	3.2 km	
Main Dam : cross section	0.8 km	
Saddle Dam	1.0 km	(0.4 km × 2)
Outlet Works	1.0 km	
Spillway	1.0 km	
Total	9.0 km	

(4) Core Drilling

Location	Quantity	
Dam	20 m × 60 Nos.	1,200 m
Spillway & Others	20 m × 30 Nos.	600 m
Quarry	50 m × 4 Nos.	200 m
Total		2,000 m

(5) Test Pit & Auger Drilling

Location	Test Pit	Auger Drilling
Damsite	20 Nos.	300 m
Borrow Area	40 Nos.	600 m
Spillway	30 Nos.	500 m
Total	90 Nos.	1,400 m

(6) Laboratory Test

Location	Physical Test	Mechanical Test
Damsite	20 Nos.	10 Nos.
Borrow Area	40 Nos.	20 Nos.
Spillway	30 Nos.	20 Nos.
Quarry	10 Nos.	10 Nos.
Total	100 Nos.	60 Nos.

APPENDIX-D. IRRIGATION, DRAINAGE AND WATER BALANCE

APPENDIX-D IRRIGATION, DRAINAGE AND WATER BALANCE

LIST OF CONTENTS

D.1 IRRIGATION WATER REQUIREMENT

The following tables and figures present procedures employed in estimating irrigation water requirement:

Table D-1-1 Crop Water Requirement by Modified Penman (Prachinburi)

STATION: PRACHINBURI
Station Index: 48430
Latitude: 14° 03′ N
Longitude: 101° 22′ E
Elevation of Station above MSL : 5m
Height of Barometer above MSL : 6m
Height of Thermometer above Ground: 1.20m
Height of Wind Vane above Ground : 11.00m

	ITEM	(Unit)	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	Tmax	(℃)	32.4	34.1	35.7	36.0	34.4	33.0	32.2	31.8	31.6	31.8	31.8	31.6
2	Tmin	(℃)	19.4	22.1	23.9	24.9	25.1	24.9	24.6	24.6	24.5	24.3	22.4	19.9
3	Tmean	(℃)	25.9	28.1	29.8	30.5	29.8	29.0	28.4	28.2	28.1	28.1	27.1	25.8
4	ea	(mbar)	33.4	38.0	41.9	43.7	41.9	40.1	38.7	38.3	38.0	38.0	35.9	33.2
5	RHmax	(%)	83.1	86.2	87.9	89.4	91.4	92.7	93.5	93.9	94.1	90.0	84.5	81.9
6	RHmin	(%)	40.7	43.3	44.5	49.9	59.2	64.5	67.1	68.6	69.1	63.5	52.9	44.7
7	RHmean	(%)	61.9	64.8	66.2	69.7	75.3	78.6	80.3	81.3	81.6	76.8	68.7	63.3
8	ed=ea*RHmean/100	(mbar)	20.7	24.6	27.7	30.5	31.6	31.5	31.1	31.1	31.0	29.2	24.7	21.0
9	(ea-ed)	(mbar)	12.7	13.4	14.2	13.2	10.3	8.6	7.6	7.2	7.0	8.8	11.2	12.2
10	U (h=11.00m)	(knots)	3.6	3.3	2.9	2.4	2.4	2.1	2.1	2.3	2.2	3.0	4.1	4.3
11	U (h=2m)	(km/day)	112	103	90	75	75	65	65	72	68	93	128	134
12	f(u)=0.27(1+U/100)		0.57	0.55	0.51	0.47	0.47	0.45	0.45	0.46	0.45	0.52	0.62	0.63
13	1-W	(Elevation=5m)	0.25	0.23	0.22	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.25
14	(1-w)f(u)(ea-ed)	(mm/day)	1.81	1.70	1.59	1.30	1.07	0.85	0.79	0.76	0.72	1.05	1.67	1.92
15	Ra (14.03′N)	(mm/day)	12.4	13.6	14.9	15.7	15.8	15.7	15.7	15.7	15.1	14.1	12.8	12.0
16	Cloudiness	(0-10)	3.7	4.7	5.3	6.3	7.6	8.3	8.4	8.7	8.2	6.6	4.7	3.8
17	n/N		0.68	0.58	0.54	0.47	0.34	0.26	0.24	0.20	0.27	0.44	0.58	0.67
18	0.25+0.5n/N		0.59	0.54	0.52	0.49	0.42	0.38	0.37	0.35	0.39	0.47	0.54	0.59
19	Rs=15*18	(mm/day)	7.32	7.34	7.75	7.69	6.64	5.97	5.81	5.50	5.89	6.63	6.91	7.08
20	Rns=0.75Rs	(mm/day)	5.49	5.51	5.81	5.77	4.98	4.48	4.36	4.13	4.42	4.97	5.18	5.31
21	f(T)		15.9	16.3	16.7	16.8	16.7	16.5	16.4	16.3	16.3	16.3	16.1	15.9
22	f(ed)=0.34-0.044sqrt(ed)		0.14	0.12	0.11	0.10	0.09	0.09	0.09	0.09	0.10	0.10	0.12	0.14
23	f(n/N)=0.1+0.9n/N		0.71	0.62	0.59	0.52	0.41	0.33	0.32	0.28	0.34	0.50	0.62	0.70
24	Rnl=21*22*23	(mm/day)	1.58	1.21	1.08	0.87	0.62	0.49	0.47	0.41	0.55	0.82	1.20	1.56
25	Rn=Rns-Rnl	(mm/day)	3.91	4.30	4.73	4.90	4.36	3.99	3.89	3.72	3.87	4.15	3.98	3.75
26	W		0.75	0.77	0.78	0.79	0.78	0.78	0.77	0.77	0.77	0.77	0.76	0.75
27	W*Rn	(mm/day)	2.93	3.31	3.69	3.87	3.40	3.11	3.00	2.86	2.98	3.20	3.02	2.81
28	14+27	(mm/day)	4.74	5.01	5.28	5.17	4.47	3.96	3.79	3.62	3.70	4.25	4.69	4.73
29	c		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	ETO	(mm/day)	4.74	5.01	5.28	5.17	4.47	3.96	3.79	3.62	3.70	4.25	4.69	4.73

Table D-1-2 Crop Water Requirement by Modified Penman (Chonburi)

STATION: CHONBURI
Station Index: 48459
Latitude: 13° 22' N
Longitude: 100° 59' E
Elevation of Station above MSL : 1m
Height of Barometer above MSL : 2m
Height of Thermometer above Ground: 1.50m
Height of Wind Vane above Ground : 13.45m

	ITEM	(Unit)	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	Tmax	(℃)	31.7	32.4	33.5	34.3	33.6	32.7	32.2	31.9	31.6	31.7	31.6	31.7
2	Tmin	(℃)	20.1	22.5	24.3	25.4	25.5	25.5	25.1	24.9	24.3	23.6	22.1	20.4
3	Tmean	(℃)	25.9	27.5	28.9	29.9	29.6	29.1	28.7	28.4	28.0	27.7	26.9	26.1
4	ea	(mbar)	33.4	36.8	39.9	42.2	41.5	40.3	39.4	38.7	37.8	37.2	35.5	33.8
5	RHmax	(%)	84.4	87.4	86.8	87.0	88.0	87.2	88.3	89.2	92.2	92.3	88.0	83.3
6	RHmin	(%)	48.8	54.8	55.2	55.3	59.3	60.4	61.4	62.4	65.8	64.3	55.0	47.5
7	RHmean	(%)	66.6	71.1	71.0	71.2	73.7	73.8	74.9	75.8	79.0	78.3	71.5	65.4
8	ed=ea*RHmean/100	(mbar)	22.2	26.2	28.3	30.0	30.6	29.7	29.5	29.3	29.9	29.1	25.4	22.1
9	(ea-ed)	(mbar)	11.2	10.6	11.6	12.2	10.9	10.6	9.9	9.4	7.9	8.1	10.1	11.7
10	U (h=13.45m)	(knots)	4.7	5.2	5.3	4.8	4.2	4.9	4.6	4.6	3.5	3.5	4.9	5.1
11	U (h=2m)	(km/day)	146	162	165	149	131	152	143	143	109	109	152	159
12	f(u)=0.27(1+U/100)		0.66	0.71	0.72	0.67	0.62	0.68	0.66	0.66	0.56	0.56	0.68	0.70
13	1-W	(Elevation=1m)	0.25	0.23	0.23	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.25
14	(1-w)f(u)(ea-ed)	(mm/day)	1.85	1.73	1.92	1.80	1.49	1.59	1.50	1.43	1.02	1.04	1.65	2.05
15	Ra (13.22'N)	(mm/day)	12.5	13.7	15.0	15.7	15.8	15.6	15.6	15.7	15.1	14.2	13.0	12.2
16	Cloudiness	(0-10)	4.0	4.3	4.5	5.4	7.3	8.0	8.1	8.4	8.2	7.0	5.2	4.1
17	n/N		0.65	0.62	0.60	0.53	0.37	0.30	0.29	0.24	0.27	0.40	0.54	0.64
18	0.25+0.5n/N		0.58	0.56	0.55	0.52	0.44	0.40	0.40	0.37	0.39	0.45	0.52	0.57
19	Rs=15*18	(mm/day)	7.25	7.67	8.25	8.16	6.95	6.24	6.24	5.81	5.89	6.39	6.76	6.95
20	Rns=0.75Rs	(mm/day)	5.44	5.75	6.19	6.12	5.21	4.68	4.68	4.36	4.42	4.79	5.07	5.21
21	f(T)		15.9	16.2	16.5	16.7	16.6	16.5	16.4	16.4	16.3	16.2	16.1	15.9
22	f(ed)=0.34-0.044sqrt(ed)		0.13	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.13
23	f(n/N)=0.1+0.9n/N		0.69	0.66	0.64	0.58	0.43	0.37	0.36	0.32	0.34	0.46	0.59	0.68
24	Rnl=21*22*23	(mm/day)	1.43	1.18	1.16	0.97	0.71	0.61	0.59	0.52	0.55	0.75	1.14	1.41
25	Rn=Rns-Rnl	(mm/day)	4.01	4.57	5.03	5.15	4.50	4.07	4.09	3.84	3.87	4.04	3.93	3.80
26	W		0.75	0.77	0.77	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.76	0.75
27	W*Rn	(mm/day)	3.01	3.52	3.87	4.02	3.51	3.17	3.15	2.96	2.98	3.11	2.99	2.85
28	14+27	(mm/day)	4.86	5.25	5.79	5.82	5.00	4.76	4.65	4.39	4.00	4.15	4.64	4.90
29	c		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	ETO	(mm/day)	4.86	5.25	5.79	5.82	5.00	4.76	4.65	4.39	4.00	4.15	4.64	4.90

Figure D-1-1 Kc and Kp values by crop

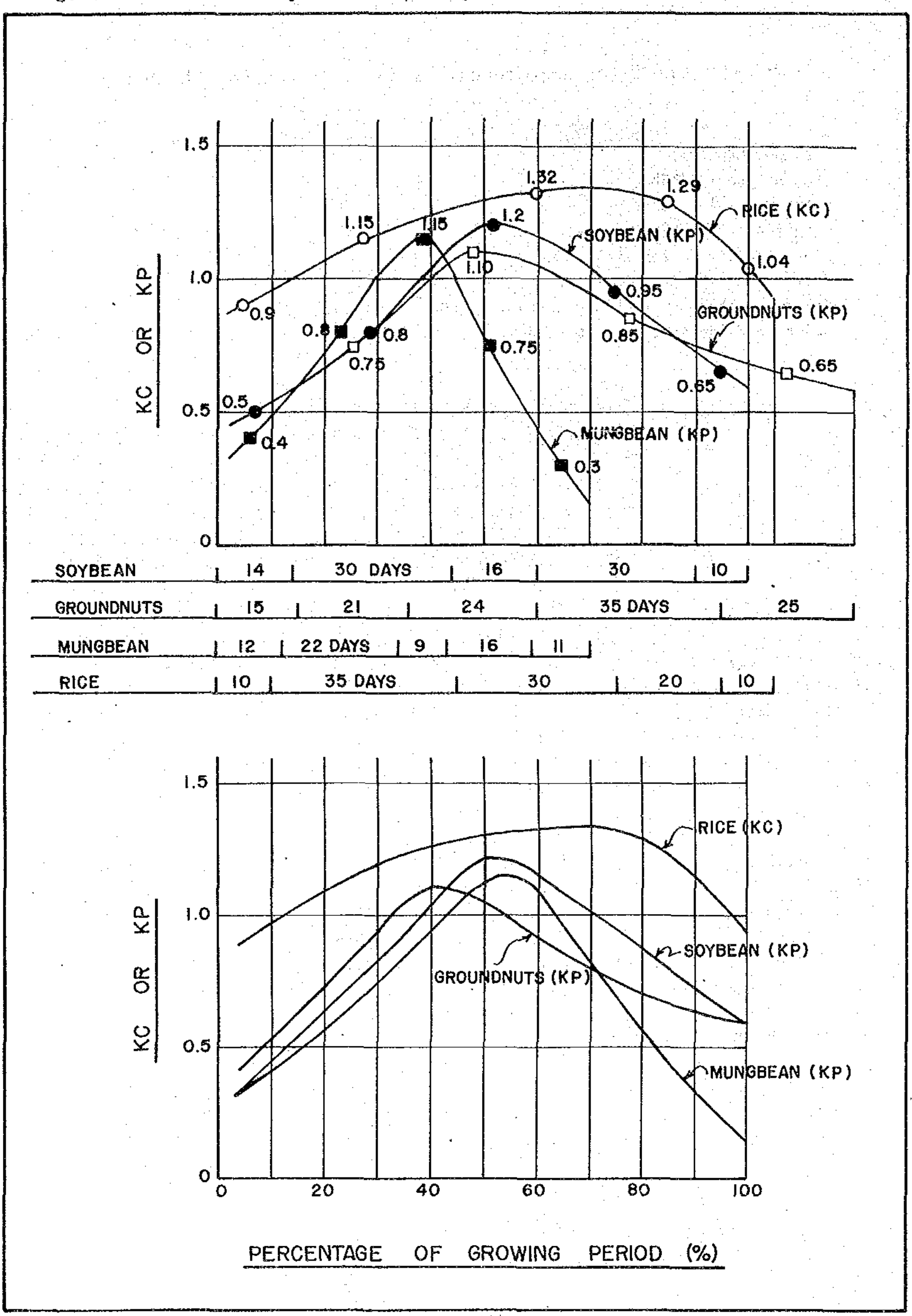


Figure D-1-2 Field Water Requirement (Wet Season Paddy:Broadcasted)

Month	July			August			September			October			November			December		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season	10	19	29	38	48	57	67	76	86	95	100							
Crop Coefficient (Kc)	0.96	1.07 0.96	1.17 1.07 0.96	1.25 1.17 1.07 0.96	1.29 1.25 1.17 1.07 0.96	1.32 1.29 1.25 1.17 1.07	1.33 1.32 1.29 1.25 1.17	1.32 1.33 1.32 1.29 1.25	1.20 1.32 1.33 1.32 1.29	1.05 1.20 1.32 1.33 1.32	0.93 1.05 1.20 1.32 1.33	0.93 1.05 1.20 1.32	0.93 1.05 1.20	0.93 1.05	0.93			
Kc Average	0.96	1.02	1.07	1.11	1.15	1.22	1.27	1.30	1.29	1.24	1.17	1.13	1.06	0.99	0.93			
ET0 by Penmen (mm/day)		4.22			4.01			3.85			4.20			4.67				
ETc (mm/day)	4.05	4.30	4.52	4.45	4.61	4.89	4.89	5.01	4.97	5.21	4.91	4.75	4.95	4.62	4.34			
Percolation (P, mm/day)		2.00			2.00			2.00			2.00			2.00				
ETc + P (mm/day)	6.05	6.30	6.52	6.45	6.61	6.89	6.89	7.01	6.97	7.21	6.91	6.75	6.95	6.62	6.34			
Initial Leaching (mm)		50																
Land Preparation (mm)		150																
2. EQUATION Initial Leaching	2/9	2/9	2/9	2/9	1/9													
Land Preparation	2/9	2/9	2/9	2/9	1/9													
Normal Irrigation	1/9	3/9	5/9	7/9	35/36	1/1	1/1	1/1	1/1	1/1	35/36	7/9	5/9	3/9	1/9			
3. WATER REQUIREMENT Initial Leaching (mm)	11.1	11.1	11.1	11.1	5.6													
Land Preparation (mm)	33.3	33.3	33.3	33.3	16.8													
Normal Irrigation (mm)	6.7	21.0	36.2	50.2	64.3	68.9	68.9	70.1	69.7	72.1	67.2	52.5	38.6	22.1	7.0			
Requirement (mm/month)		197.1			250.2			208.7			191.8			67.7				

Figure D-1-3 Field Water Requirement (Wet Season Paddy:Transplanted)

Month	July			August			September			October			November			December		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season	10	19	29	38	48	57	67	76	86	95	100							
Crop Coefficient (Kc)	0.96	1.07 0.96	1.17 1.07 0.96	1.25 1.17 1.07 0.96	1.29 1.25 1.17 1.07 0.96	1.32 1.29 1.25 1.17 1.07	1.33 1.32 1.29 1.25 1.17	1.32 1.33 1.32 1.29 1.25	1.20 1.32 1.33 1.32 1.29	1.05 1.20 1.32 1.33 1.32	0.93 1.05 1.20 1.32 1.33	0.93 1.05 1.20 1.32	0.93 1.05 1.20	0.93 1.05	0.93			
Kc Average	0.96	1.02	1.07	1.11	1.15	1.22	1.27	1.30	1.29	1.24	1.17	1.13	1.06	0.99	0.93			
ET0 by Penman (mm/day)		4.22			4.01			3.85			4.20			4.67				
ETc (mm/day)	4.05	4.30	4.52	4.45	4.61	4.89	4.89	5.01	4.97	5.21	4.91	4.75	4.95	4.62	4.34			
Percolation (P, mm/day)		2.00			2.00			2.00			2.00			2.00				
ETc + P (mm/day)	6.05	6.30	6.52	6.45	6.61	6.89	6.89	7.01	6.97	7.21	6.91	6.75	6.95	6.62	6.34			
Initial Leaching (mm)		50																
Land Preparation (mm)		150																
2. EQUATION Initial Leaching			2/9	2/9	2/9	2/9	1/9											
Land Preparation			1/9	2/9	2/9	2/9	7/36	1/36										
Normal Irrigation				1/9	3/9	5/9	7/9	35/36	1/1	1/1	35/36	7/9	5/9	3/9	1/9			
3. WATER REQUIREMENT Initial Leaching (mm)			11.1	11.1	11.1	11.1	5.6											
Land Preparation (mm)			16.7	33.3	33.3	33.3	29.2	4.2										
Normal Irrigation (mm)				7.2	22.0	38.3	53.6	68.2	69.7	72.1	67.2	52.5	38.6	22.1	7.0			
Requirement (mm/month)		27.8			200.7			230.5			191.8			67.7				

Figure D-1-4 Field Water Requirement (Dry Season Paddy:Broadcasted)

Month	December			January			February			March			April			May		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season	10	19	29	38	48	57	67	76	86	95	100							
Crop Coefficient (Kc)	0.96	1.07 0.96	1.17 1.07 0.96	1.25 1.17 1.07 0.96	1.29 1.25 1.17 1.07 0.96	1.32 1.29 1.25 1.17 1.07	1.33 1.32 1.29 1.25 1.17	1.32 1.33 1.32 1.29 1.25	1.20 1.32 1.33 1.32 1.29	1.05 1.20 1.32 1.33 1.32	0.93 1.05 1.20 1.32 1.33	0.93 1.05 1.20 1.32	0.93 1.05 1.20	0.93 1.05	0.93			
Kc Average	0.96	1.02	1.07	1.11	1.15	1.22	1.27	1.30	1.29	1.24	1.17	1.13	1.06	0.99	0.93			
ET0 by Penman (mm/day)		4.82			4.80			5.13			5.54			5.50			4.74	
ETc (mm/day)	4.63	4.92	5.16	5.33	5.52	5.86	6.52	6.67	6.62	6.87	6.48	6.26	5.83	5.45	5.12			
Percolation (P, mm/day)		2.00			2.00			2.00			2.00			2.00				
ETc + P (mm/day)	6.63	6.92	7.16	7.33	7.52	7.86	8.52	8.67	8.62	8.87	8.48	8.26	7.83	7.45	7.12			
Initial Leaching (mm)		50																
Land Preparation (mm)		150																
2. EQUATION Initial Leaching	2/9	2/9	2/9	2/9	1/9													
Land Preparation	2/9	2/9	2/9	2/9	1/9													
Normal Irrigation	1/9	3/9	5/9	7/9	35/36	1/1	1/1	1/1	1/1	1/1	35/36	7/9	5/9	3/9	1/9			
3. WATER REQUIREMENT Initial Leaching (mm)	11.1	11.1	11.1	11.1	5.6													
Land Preparation (mm)	33.3	33.3	33.3	33.3	16.8													
Normal Irrigation (mm)	7.4	23.1	39.8	57.0	73.1	78.6	85.2	86.7	86.2	88.7	82.4	64.2	43.5	24.8	7.9			
Requirement (mm/month)		203.5			275.5			258.1			235.3			76.2				

Figure D-1-5 Field Water Requirement (Dry Season Paddy:Transplanted)

Month	December			January			February			March			April			May		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season	10	19	29	38	48	57	67	76	86	95	100							
Crop Coefficient (Kc)	0.96	1.07 0.96	1.17 1.07 0.96	1.25 1.17 1.07 0.96	1.29 1.25 1.17 1.07 0.96	1.32 1.29 1.25 1.17 1.07	1.33 1.32 1.29 1.25 1.17	1.32 1.33 1.32 1.29 1.25	1.20 1.32 1.33 1.32 1.29	1.05 1.20 1.32 1.33 1.32	0.93 1.05 1.20 1.32 1.33	0.93 1.05 1.20 1.32	0.93 1.05 1.20	0.93 1.05	0.93			
Kc Average	0.96	1.02	1.07	1.11	1.15	1.22	1.27	1.30	1.29	1.24	1.17	1.13	1.06	0.99	0.93			
ET0 by Penman (mm/day)		4.82			4.80			5.13			5.54			5.50			4.74	
ETc (mm/day)	4.63	4.92	5.16	5.33	5.52	5.86	6.52	6.67	6.62	6.87	6.48	6.26	5.83	5.45	5.12			
Percolation (P, mm/day)		2.00			2.00			2.00			2.00			2.00				
ETc + P (mm/day)	6.63	6.92	7.16	7.33	7.52	7.86	8.52	8.67	8.62	8.87	8.48	8.26	7.83	7.45	7.12			
Initial Leaching (mm)		50																
Land Preparation (mm)		150																
2. EQUATION Initial Leaching			2/9	2/9	2/9	2/9	1/9											
Land Preparation			1/9	2/9	2/9	2/9	7/36	1/36										
Normal Irrigation				1/9	3/9	5/9	7/9	35/36	1/1	1/1	35/36	7/9	5/9	3/9	1/9			
3. WATER REQUIREMENT Initial Leaching (mm)			11.1	11.1	11.1	11.1	5.6											
Land Preparation (mm)			16.7	33.3	33.3	33.3	29.2	4.2										
Normal Irrigation (mm)				8.1	25.1	43.7	66.3	84.3	86.2	88.7	83.9	64.2	43.5	24.8	7.9			
Requirement (mm/month)		27.8			210.1			275.8			236.8			76.2				

Figure D-1-6 Field Water Requirement (Soybean:Dry Season)

Month	December			January			February			March			April			May		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season		5	15	25	35	45	55	65	75	85	95	100						
Crop Coefficient (Kp)		0.36	0.55 0.36	0.73 0.55 0.36	0.93 0.73 0.55 0.36	1.14 0.93 0.73 0.55	1.21 1.14 0.93 0.73	1.09 1.21 1.14 0.93	0.95 1.09 1.21 1.14	0.79 0.95 1.09 1.21	0.65 0.79 0.95 1.09	0.59 0.65 0.79 0.95	0.59 0.65 0.79	0.59 0.65	0.59			
Kp Average		0.36	0.46	0.55	0.64	0.84	1.00	1.09	1.10	1.01	0.87	0.75	0.68	0.67	0.59			
E (Pan E) (mm/day)	4.56			4.45			4.70			5.50			5.53			5.14		
ETc (mm/day)		1.64	2.10	2.45	2.85	3.74	4.70	5.12	5.17	5.56	4.79	4.13	3.76	3.71	3.26			
2. EQUATION Normal Irrigation		1/24	1/3	2/3	23/24	1/1	1/1	1/1	1/1	1/1	5/6	1/2	1/6					
3. WATER REQUIREMENT Normal Irrigation (mm)		0.7	7.0	16.3	27.3	37.4	47.0	51.2	51.7	55.6	39.9	20.7	6.3					
Requirement (mm/month)	7.7			81.0			149.9			116.2			6.3					

Figure D-1-7 Field Water Requirement (Groundnuts:Dry Season)

Month	December			January			February			March			April			May		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season		4	13	21	29	38	46	54	63	71	79	88	96	100				
Crop Coefficient (Kp)		0.42	0.58 0.42	0.75 0.58 0.42	0.91 0.75 0.58 0.42	1.09 0.91 0.75 0.58	1.08 1.09 0.91 0.75	1.00 1.08 1.09 0.91	0.88 1.00 1.08 1.09	0.78 0.88 1.00 1.08	0.70 0.78 0.88 1.00	0.65 0.70 0.78 0.88	0.61 0.65 0.70 0.78	0.58 0.61 0.65 0.70	0.58 0.61 0.65	0.58 0.61	0.58	
Kp Average		0.42	0.50	0.58	0.67	0.83	0.96	1.02	1.01	0.94	0.84	0.75	0.69	0.64	0.61	0.60	0.58	
E (Pan E) (mm/day)	4.56			4.45			4.70			5.50			5.53			5.14		
ETc (mm/day)		1.92	2.28	2.58	2.98	3.69	4.51	4.79	4.75	5.17	4.62	4.13	3.82	3.54	3.37	3.08	2.98	
2. EQUATION Normal Irrigation		1/24	1/3	2/3	23/24	1/1	1/1	1/1	1/1	1/1	1/1	1/1	5/6	1/2	1/6			
3. WATER REQUIREMENT Normal Irrigation (mm)		0.8	7.6	17.2	28.6	36.9	45.1	47.9	47.5	51.7	46.2	41.3	30.8	17.7	5.6			
Requirement (mm/month)	8.4			82.7			140.5			139.2			54.1					

Figure D-1-8 Field Water Requirement (Mungbean:Dry Season)

Month	March			April			May			June			July			August		
10-day	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Cropping Pattern																		
1. ELEMENT % of Growing Season				14	29	43	57	71	86	100								
Crop Coefficient (Kp)				0.48	0.73 0.48	1.00 0.73 0.48	1.14 1.00 0.73	0.80 1.14 1.00	0.42 0.80 1.14	0.15 0.42 0.80	0.15 0.42	0.15						
Kp Average				0.48	0.61	0.74	0.96	0.98	0.79	0.46	0.29	0.15						
E (Pan E) (mm/day)	5.50			5.53			5.14			4.50			4.81			4.30		
ETc (mm/day)				2.65	3.37	4.09	4.93	5.04	4.06	2.07	1.31	0.68						
2. EQUATION Normal Irrigation				1/6	1/2	5/6	1/1	1/1	1/1	5/6	1/2	1/6						
3. WATER REQUIREMENT Normal Irrigation (mm)				4.4	16.9	34.1	49.3	50.4	40.6	17.3	6.6	1.1						
Requirement (mm/month)				55.4			140.3			25.0								

Figure D-1-9 Rainfall - Effective Rainfall Relationship

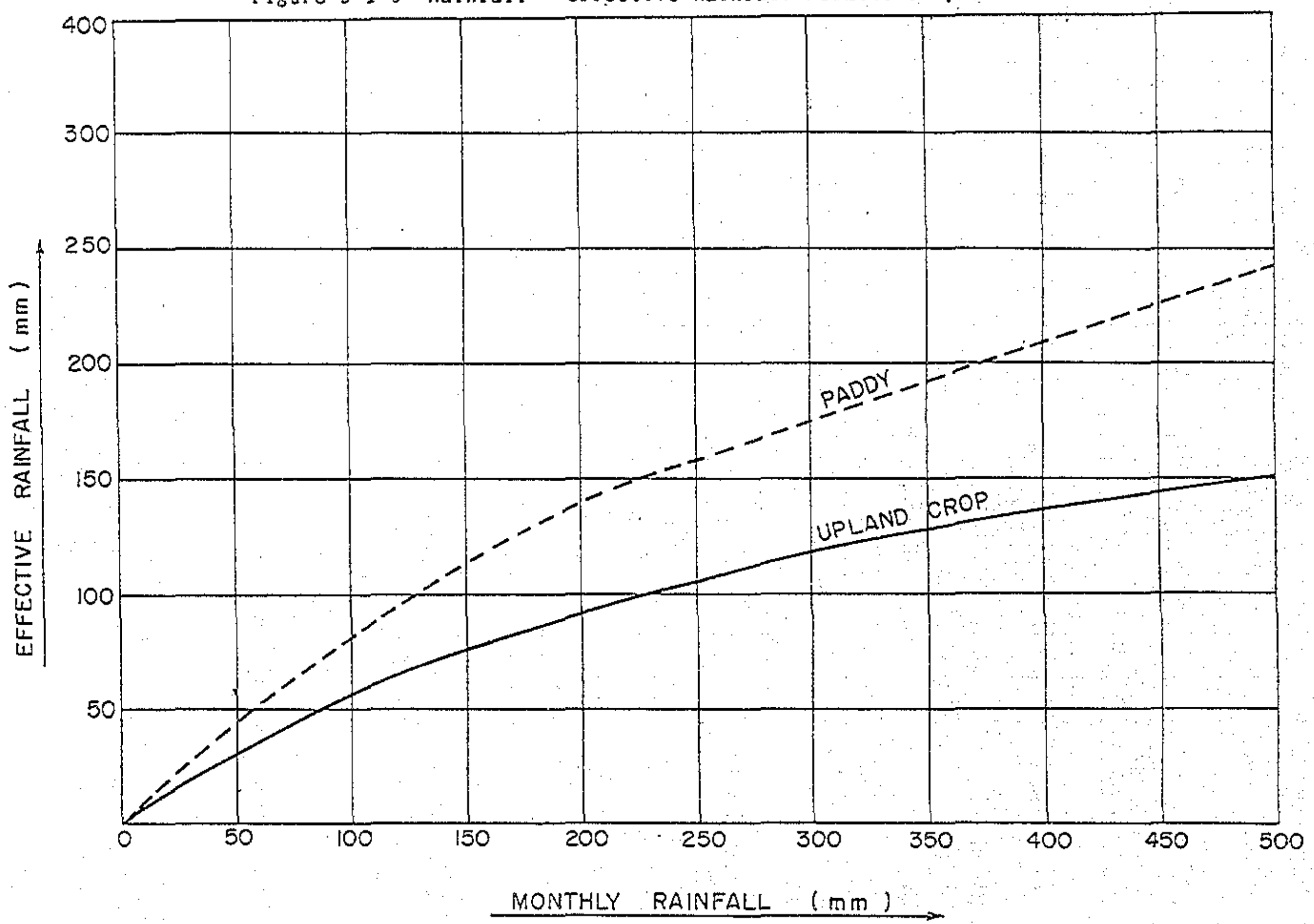
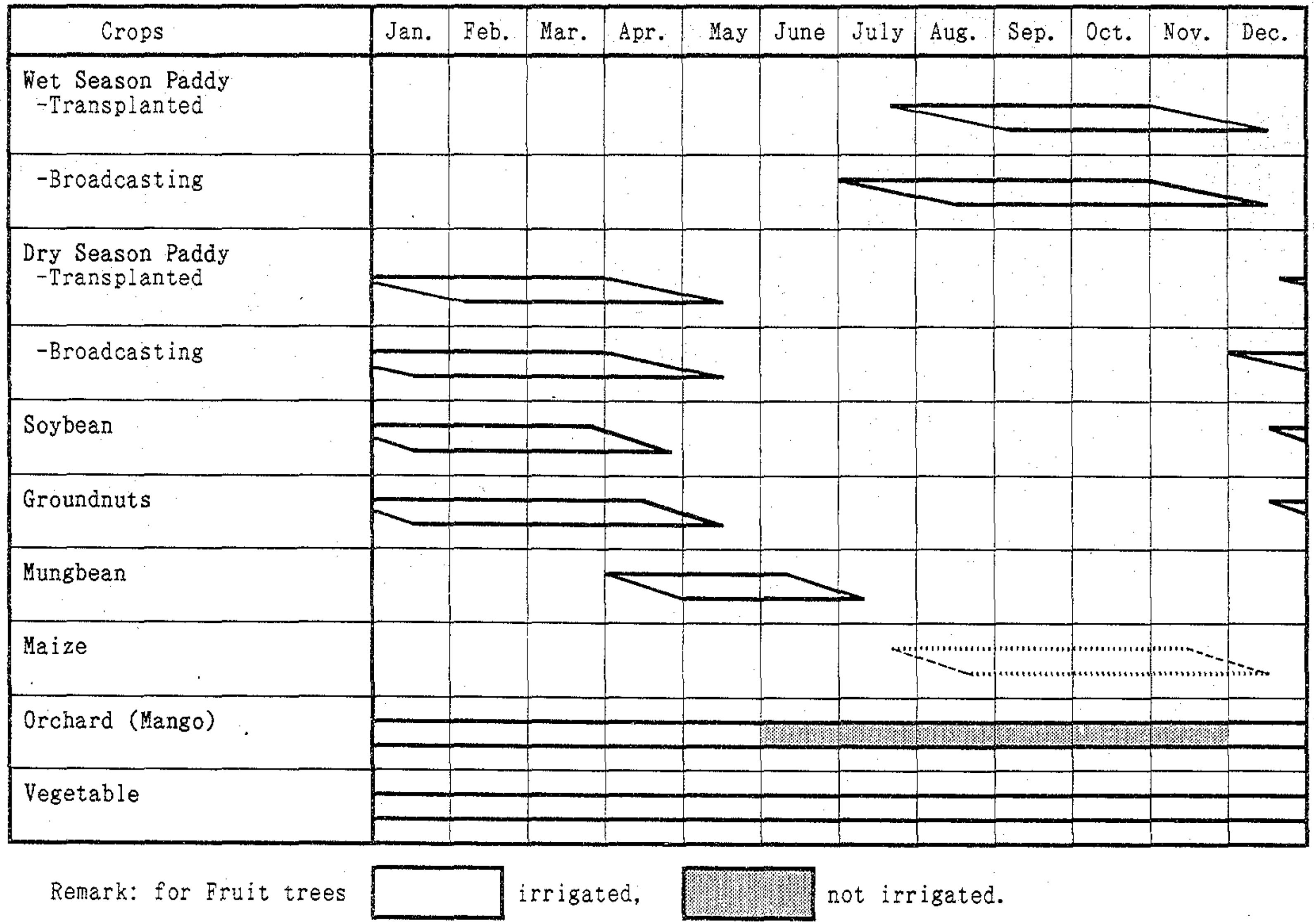


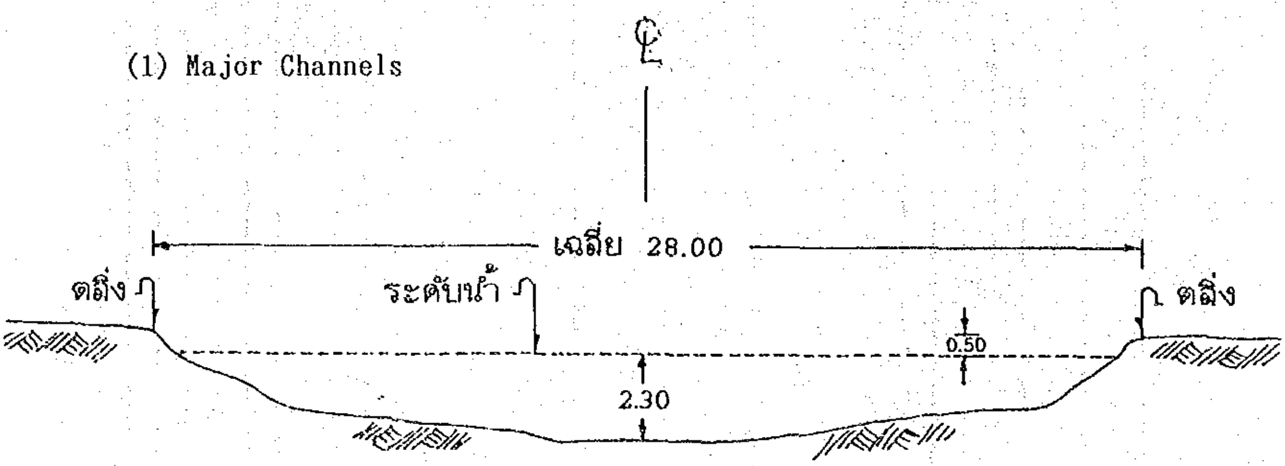
TABLE D-1-10 PROPOSED CROPPING CALENDAR



D.2 CHANNEL STORAGE VOLUME IN WATER CONSERVATION AREA (EXPERIENCE IN PRA-ONG CHAIYANUCHIT PROJECT AREA)

(PRA-ONG CHAIYANUCHIT AREA)

(1) Major Channels

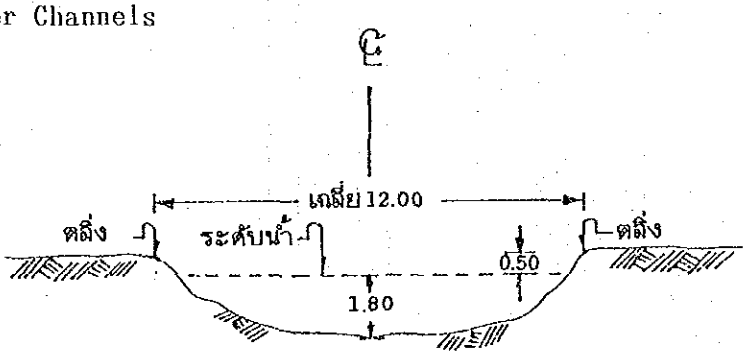


รูปตัดตามขวางคลองชลประทาน

มาตราส่วน 1:200

46.5 sq.m x 452.2 km = 21.027 MCM

(2) Other Channels



รูปตามขวางคลองธรรมชาติ

มาตราส่วน 1:200

14.8 sq.m x 470.75 km = 6.967 MCM

(3) Unit Area Storage Volume

(21.027 + 6.967)MCM/81,600ha = 3.43 x 10^{-4}MCM/ha

D.3 WATER BALANCE SIMULATION

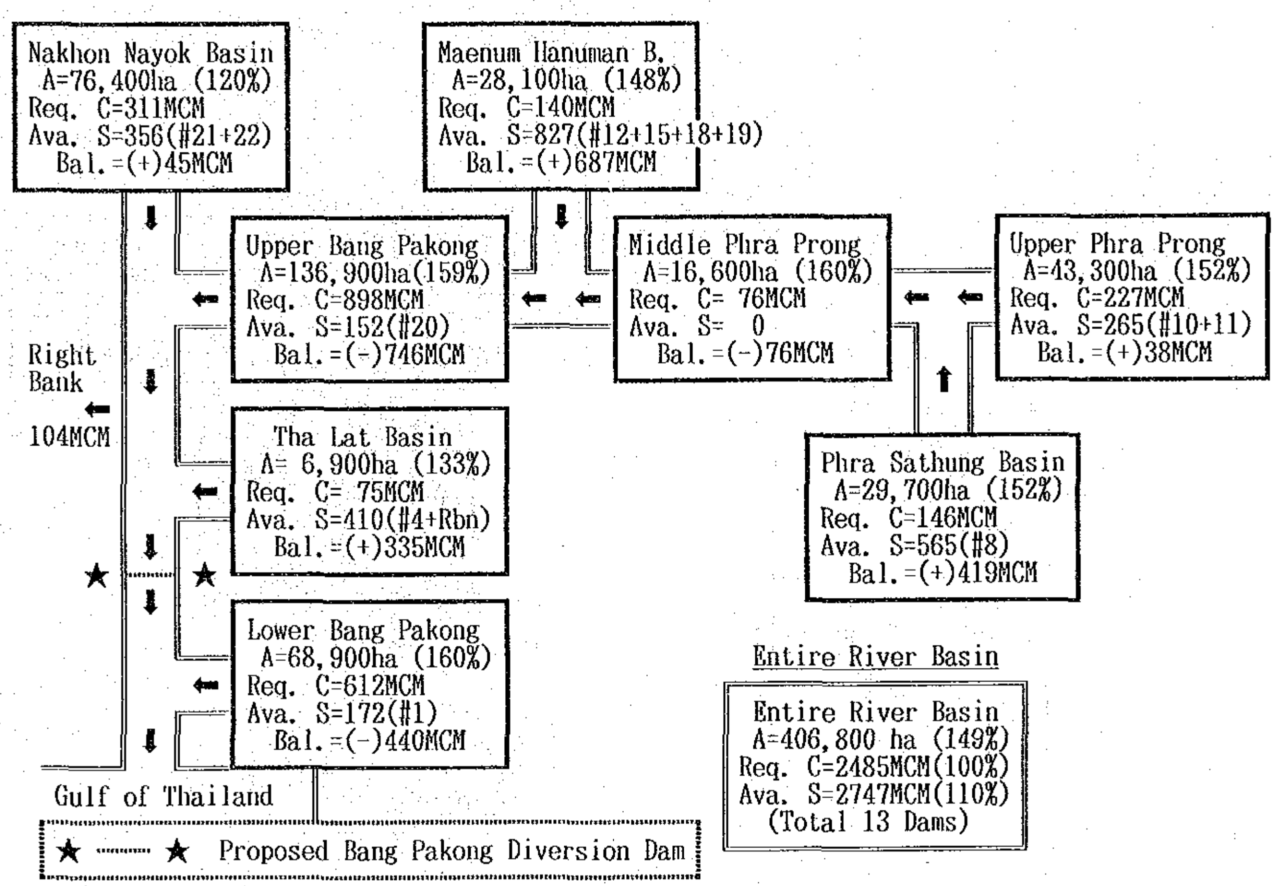
The following tables present the basic data and procedures employed in the water balance simulation study:

Table D-3-1 List of Data Given in Water Balance Computation

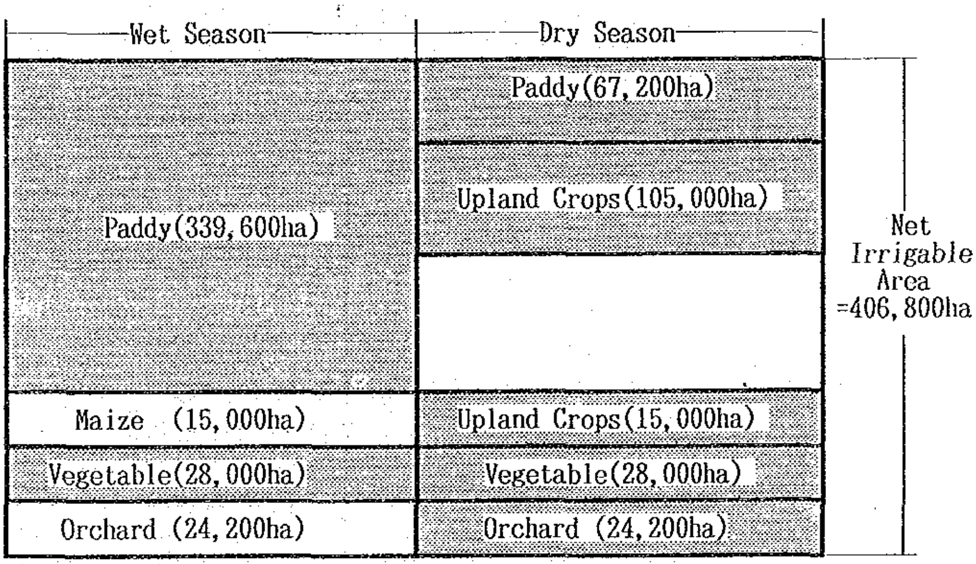
* LIST OF INPUT DATA *

BLOCK NO.	CATCH-MENT (HA)	FARM LAND (HA)	OTHER LAND (HA)	R.O. COEF	CHANNEL STOTAGE (MCM)	WATER SUPPLY (MCM)	INDUS-TRY (MCM)	FISH-ERY (HA)	<WET PADDY> T.P. (HA)	<WET PADDY> B.C. (HA)	<DRY PADDY> T.P. (HA)	<DRY PADDY> B.C. (HA)	<SOYBERN> DRY (HA)	<SOYBERN> WET (HA)	<GRNDNUT> DRY (HA)	<GRNDNUT> WET (HA)	<MNGBEAN> DRY (HA)	<MNGBEAN> WET (HA)	FRUIT CROP (HA)	VEGE-TABLE (HA)
UPP-3	26600	0	26600	0.24	0.241	1.249	0.250	0	0	0	0	0	0	0	0	0	0	0	0	0
UPP-2	77400	31840	45560	0.24	0.741	5.795	1.160	0	7670	230	0	0	3200	0	1000	0	1200	0	1000	1200
UPP-1	58800	52250	6550	0.24	0.915	3.200	0.640	0	18740	5960	0	0	9500	0	2900	0	2500	0	2500	1800
SUB-T	162800	84090	78710		1.897	10.244	2.050	0	26410	6190	0	0	12700	0	3900	0	3700	0	3500	3000
KPS-4	61400	25090	36310	0.21	0.855	0.859	0.252	0	0	0	0	0	0	0	0	0	0	0	0	0
KPS-3	83800	33040	50760	0.21	0.995	1.718	0.504	0	0	0	0	0	0	0	0	0	0	0	0	0
KPS-2	80100	19570	60530	0.21	1.311	1.718	0.504	0	360	1440	0	0	1000	0	600	0	700	0	500	1700
KPS-1	39000	32450	6550	0.21	0.555	2.400	0.480	0	15070	4830	0	0	7000	0	2600	0	2500	0	1600	700
SUB-T	264300	110150	154150		3.716	6.695	1.740	0	15430	6270	0	0	8000	0	3200	0	3200	0	2100	2400
MPP-1	97000	41340	55660	0.30	1.071	2.436	2.302	0	10320	5180	0	0	5500	0	1500	0	1500	0	0	500
SUB-T	97000	41340	55660		1.071	2.436	2.302	0	10320	5180	0	0	5500	0	1500	0	1500	0	0	500
MHM-5	6800	0	6800	0.27	0.036	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-6	9600	5650	3950	0.27	0.036	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-4	17400	4270	13130	0.27	0.126	0.000	0.000	0	3400	0	0	0	1100	0	300	0	300	0	500	0
MHM-8	6400	0	6400	0.28	0.048	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-9	14700	0	14700	0.30	0.105	0.800	0.160	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-7	23200	0	23200	0.35	0.288	0.800	0.160	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-3	27300	0	27300	0.40	0.198	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-2	15900	0	15900	0.45	0.165	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MHM-1	91700	54700	37000	0.36	1.137	3.495	6.101	0	18200	0	0	0	9600	0	1400	0	1400	0	2400	500
SUB-T	213000	64620	148380		2.139	5.095	6.421	0	21600	0	0	0	10700	0	1700	0	1700	0	2900	500
UBP-3	75000	72140	2860	0.28	1.646	4.420	6.746	0	11860	11840	0	3300	4800	0	1900	0	1900	0	2200	4500
UBP-5	10700	0	10700	0.70	0.096	0.207	0.491	0	0	0	0	0	0	0	0	0	0	0	0	0
UBP-4	39400	33390	6010	0.50	0.720	3.606	6.518	0	5400	5400	0	1700	2100	0	800	0	800	0	700	1800
UBP-2	44600	44000	600	0.40	5.879	5.245	8.147	0	1400	5700	0	1100	1400	0	500	0	500	0	2900	800
UBP-1	106000	105420	580	0.22	17.890	4.443	6.244	0	36730	36770	0	10300	15200	0	5600	0	5600	0	3000	5900
SUB-T	275700	254950	20750		26.231	17.921	28.146	0	55390	59710	0	16400	23500	0	8800	0	8800	0	8800	13000
MNN-6	15100	0	15100	0.70	0.087	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MNN-5	45600	11640	33960	0.65	0.630	1.566	2.505	0	6030	2470	0	1300	0	0	0	0	0	0	0	0
MNN-4	11400	0	11400	0.60	0.126	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
MNN-3	34500	22350	12150	0.55	0.381	1.958	3.480	0	7310	2990	0	1600	0	0	0	0	0	0	0	0
MNN-2	36900	30650	6250	0.30	5.247	1.864	3.970	0	0	27300	0	4100	0	0	0	0	0	0	0	0
MNN-1	49800	35080	14720	0.28	20.240	7.266	12.522	0	21510	8790	0	4500	0	0	0	0	0	0	0	0
SUB-T	193300	99720	93580		26.711	12.654	22.477	0	34850	41550	0	11500	0	0	0	0	0	0	0	0
KTL-9	58500	2580	55920	0.22	0.975	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
KTL-8	39100	4020	35080	0.22	0.543	0.000	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
KTL-7	39500	10120	29380	0.21	0.696	1.483	0.296	0	1100	600	0	300	1100	0	200	0	200	0	0	0
KTL-4	13700	10870	2830	0.16	0.240	2.966	0.592	0	710	390	0	300	400	0	200	0	300	0	2000	0
KTL-6	18100	8410	9690	0.22	0.273	0.742	0.148	0	0	0	0	0	0	0	0	0	0	0	0	0
KTL-5	61700	12880	48820	0.21	1.134	1.483	0.296	0	0	0	0	0	0	0	0	0	0	0	0	0
KTL-3	6900	6270	630	0.17	0.102	0.381	0.530	0	230	270	0	100	100	0	100	0	100	0	0	0
KTL-2	8600	7860	740	0.18	0.180	0.762	1.060	0	0	0	0	0	0	0	0	0	0	0	0	0
KTL-1	3200	2890	310	0.16	0.234	0.285	1.022	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB-T	249300	65900	183400		4.377	8.102	3.944	0	2040	1260	0	700	1600	0	500	0	600	0	2000	0
LBP-17	2000	1550	450	0.15	0.042	0.762	1.060	0	410	490	0	100	200	0	100	0	100	0	0	0
LBP-16	19900	18280	1620	0.15	0.345	1.504	1.208	0	710	590	0	100	400	0	100	0	100	0	0	0
LBP-15	6500	6030	470	0.15	0.078	1.380	5.676	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-14	20100	18380	1720	0.15	0.315	0.690	2.837	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-13	5600	4050	1550	0.15	0.030	1.963	6.704	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-12	34400	25140	9260	0.22	0.346	1.035	0.200	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-11	18400	14430	3970	0.20	0.150	6.621	0.120	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-10	8500	7920	580	0.16	0.108	0.000	0.000	0	1700	0	0	400	300	0	500	0	600	0	100	300
LBP-9	8800	8080	720	0.18	0.084	0.414	0.080	0	500	0	0	300	0	0	0	0	0	0	0	0
LBP-8	18200	17730	470	0.15	0.318	1.166	2.056	0	5600	0	0	700	300	0	1400	0	1400	0	500	1000
LBP-7	50100	45520	4580	0.20	0.450	1.615	3.005	0	300	0	0	100	0	0	0	0	0	0	0	0
LBP-6	8000	7260	740	0.15	0.129	2.915	5.140	0	1800	0	0	100	400	0	200	0	200	0	0	0
LBP-3	52600	52110	490	0.15	33.567	14.967	54.958	981	6460	25840	0	4800	6400	0	2400	0	2400	0	4300	4500
LBP-2	11900	6100	5800	0.15	1.577	5.958	24.168	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-5	27900	27700	200	0.15	0.099	7.319	11.147	0	0	0	0	0	0	0	0	0	0	0	0	0
LBP-4	14200	12550	1650	0.15	2.223	4.078	9.224	350	9000	0	0	3000	0	0	700	0	700	0	0	2800
LBP-1	3500	160	3340	0.15	0.073	6.460	20.495	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB-T	310600	272990	37610		39.934	52.847	148.078	1331	26480	26920	0	9600	8000	0	5400	0	5500	0	4900	8600
TOTAL	1766000	993760	772240		106.076	115.994	215.158	1331	192520	147080	0	38200	70000	0	25000	0	25000	0	24200	28000

FIGURE D-3-1 OVERALL BASIN DEVELOPMENT PLAN (ALTERNATIVE PLAN-1)

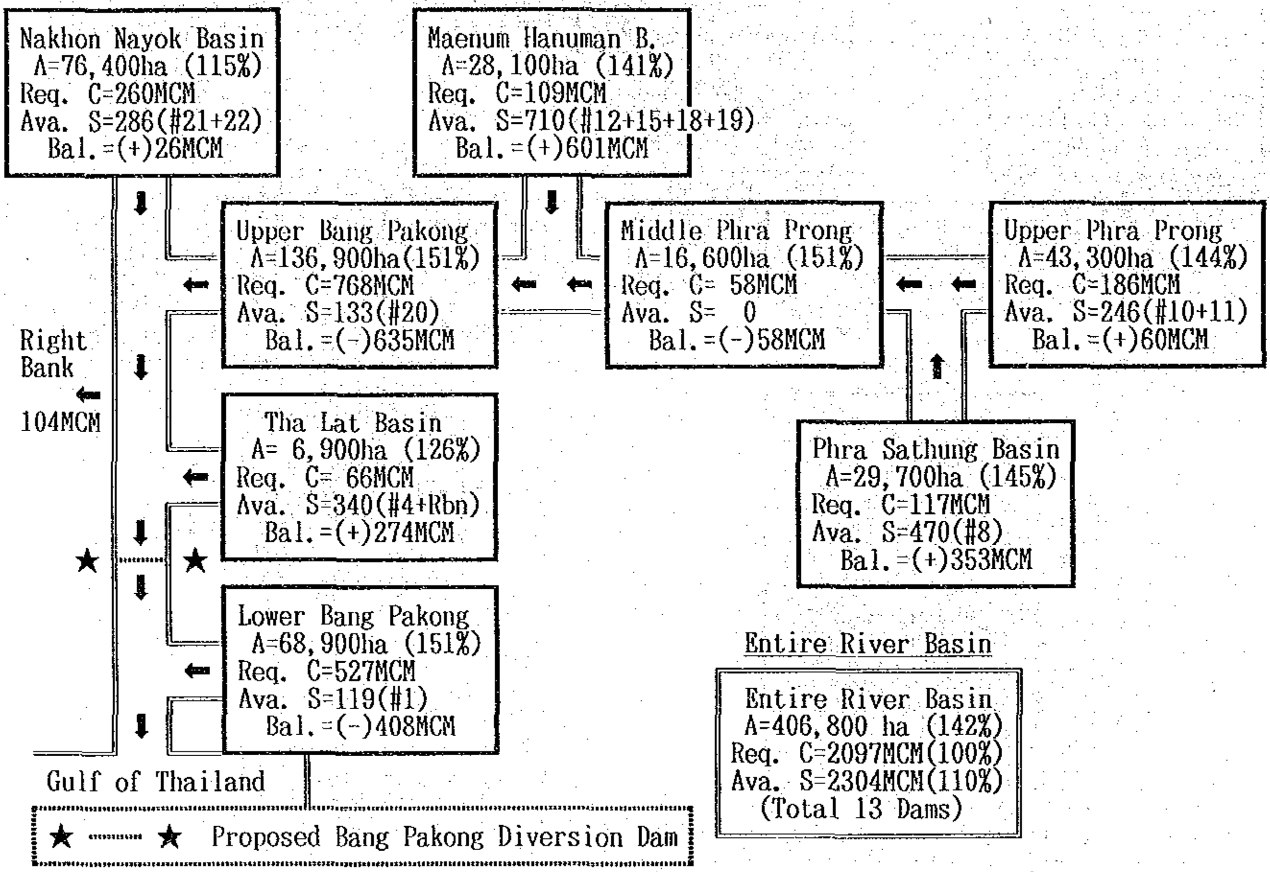


CROPPING AND IRRIGATION PLAN (ALTERNATIVE PLAN-1)

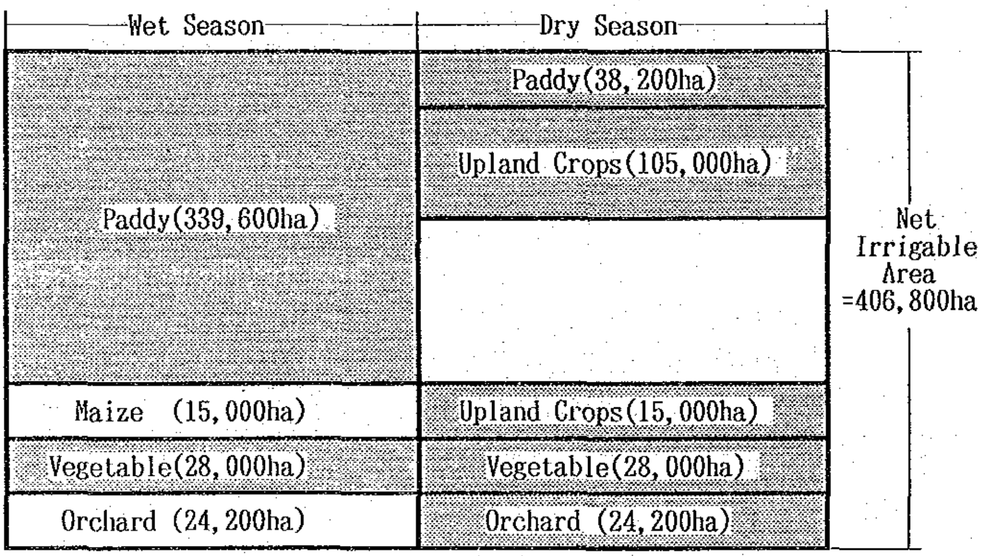


Notes : 1) Req.C stands for water shortage analyzed in terms of the required live storage of reservoirs.
2) Ava.S stands for available storage capacity at the proposed damsites.
3) Effective live storage of freshwater at the proposed Bang Pakong diversion dam is estimated at 30 MCM and is treated as the available channel storage in the water balance simulation study.

FIGURE D-3-2 OVERALL BASIN DEVELOPMENT PLAN (ALTERNATIVE PLAN-2)

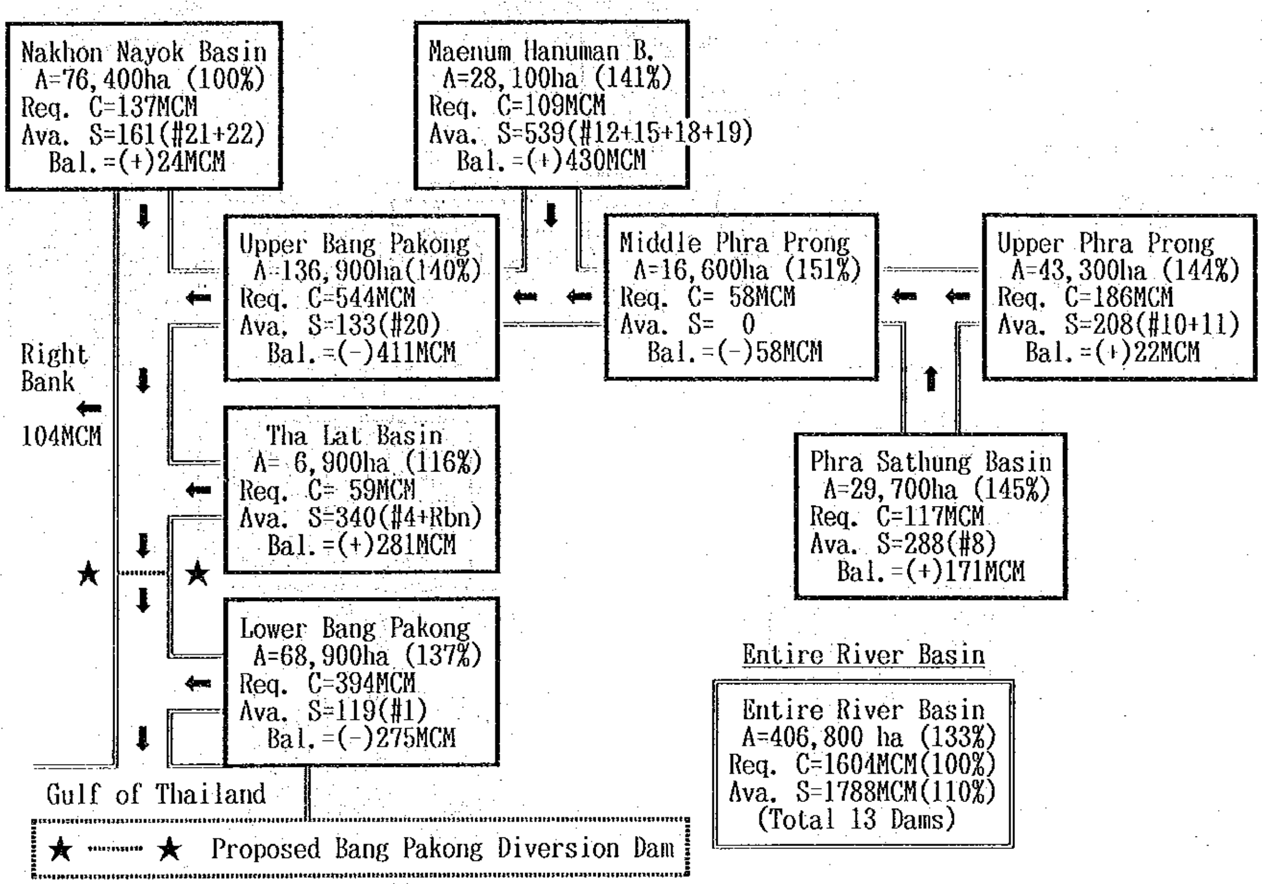


CROPPING AND IRRIGATION PLAN (ALTERNATIVE PLAN-2)

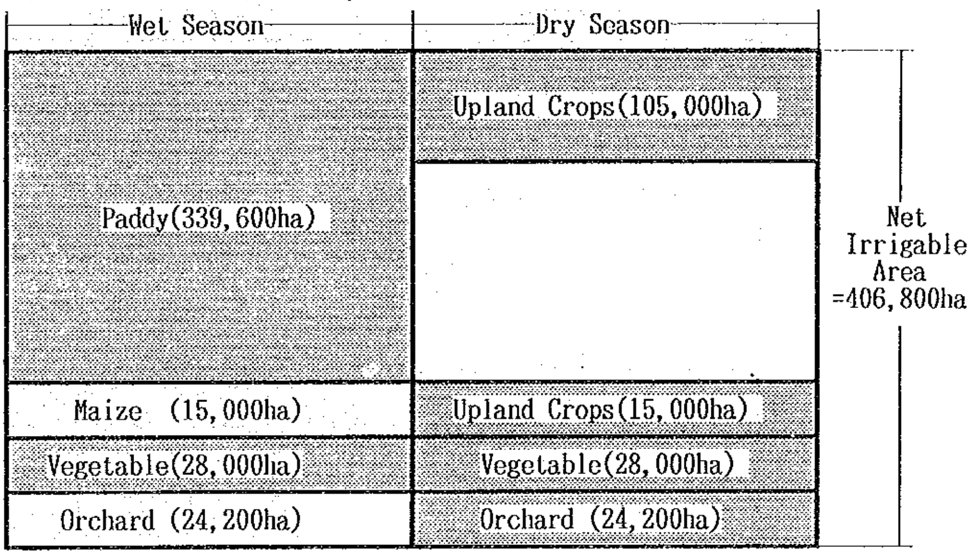


Notes : 1) Req.C stands for water shortage analyzed in terms of the required live storage of reservoirs.
2) Ava.S stands for available storage capacity at the proposed damsites.
3) Effective live storage of freshwater at the proposed Bang Pakong diversion dam is estimated at 30 MCM and is treated as the available channel storage in the water balance simulation study.

FIGURE D-3-3 OVERALL BASIN DEVELOPMENT PLAN (ALTERNATIVE PLAN-3)

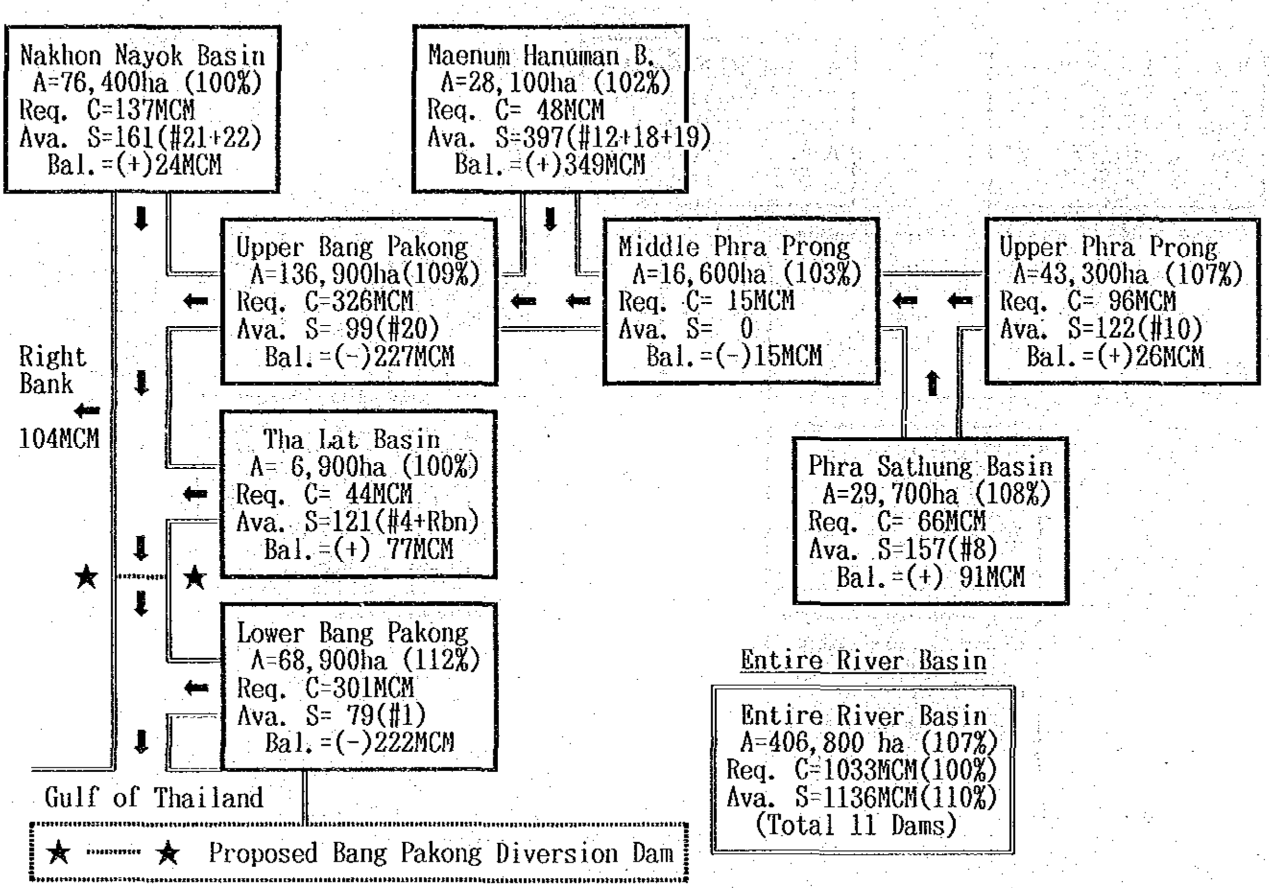


CROPPING AND IRRIGATION PLAN (ALTERNATIVE PLAN-3)

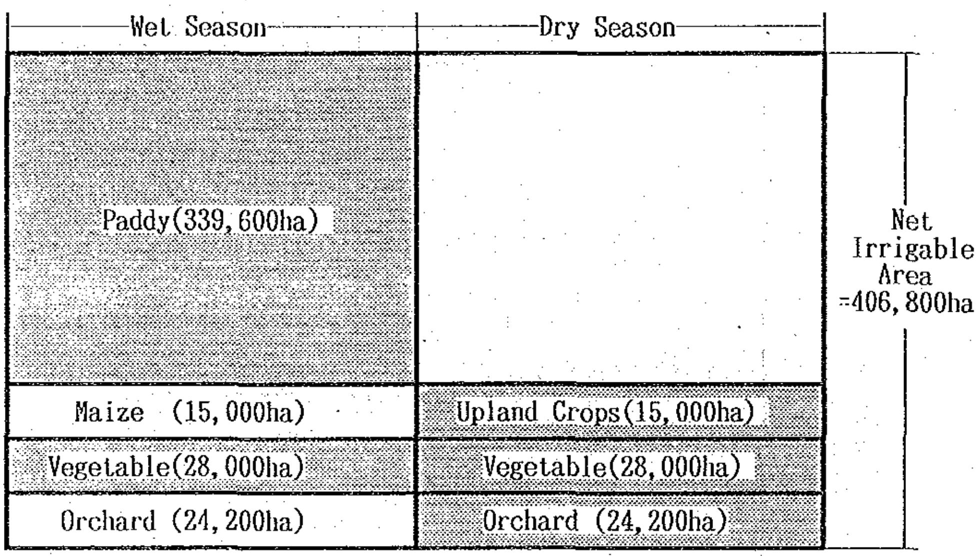


Notes : 1) Req.C stands for water shortage analyzed in terms of the required live storage of reservoirs.
2) Ava.S stands for available storage capacity at the proposed damsites.
3) Effective live storage of freshwater at the proposed Bang Pakong diversion dam is estimated at 30 MCM and is treated as the available channel storage in the water balance simulation study.

FIGURE D-3-4 OVERALL BASIN DEVELOPMENT PLAN (ALTERNATIVE PLAN-4)



CROPPING AND IRRIGATION PLAN (ALTERNATIVE PLAN-4)



Notes : 1) Req.C stands for water shortage analyzed in terms of the required live storage of reservoirs.
2) Ava.S stands for available storage capacity at the proposed damsites.
3) Effective live storage of freshwater at the proposed Bang Pakong diversion dam is estimated at 30 MCM and is treated as the available channel storage in the water balance simulation study.

Table D-3-2 Simulated Results by Sub-Basin (1)

UPPER PHRA PRONG

BLOCK NO.= 1 + 2 + 3 +
TCA= 162800.(HA) QMA= 1.628(CUM) TCV= 1.897(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	361.774	429.070	114.365	406.541	160.877	4.693	225.123	190.606
1969	334.579	530.624	147.555	535.810	173.217	2.869	192.211	182.628
1970	325.667	540.371	126.105	500.384	185.139	5.196	159.577	145.693
1971	335.813	449.605	116.293	398.589	189.814	4.709	169.246	157.082
1972	295.467	524.215	147.591	532.849	158.242	4.768	157.425	144.572
1973	336.728	471.771	132.832	430.285	195.107	5.383	162.410	143.273
1974	304.014	475.689	118.584	421.552	193.284	4.908	130.157	113.537
1975	327.570	448.878	120.017	399.491	196.415	5.161	158.389	136.894
1976	319.199	601.733	170.911	647.004	153.629	2.944	192.658	189.621
1977	302.404	483.903	151.513	494.774	165.069	3.957	162.436	153.933
1978	332.409	477.403	147.776	471.288	185.235	3.727	177.945	162.948
1979	375.294	531.631	165.111	522.165	201.102	5.589	200.782	153.108
1980	305.678	593.643	170.664	609.139	177.592	5.383	150.511	133.182
1981	273.643	543.419	148.638	558.543	154.387	5.335	141.045	111.988
1982	317.974	552.729	156.616	567.226	165.455	4.482	174.739	162.202
1983	299.968	636.844	190.905	699.298	157.419	3.176	173.377	152.452
1984	313.371	538.626	153.385	569.188	146.946	3.469	190.550	185.669
1985	292.909	567.887	149.131	564.971	173.942	4.648	140.729	129.540
1986	315.470	555.262	153.409	531.721	200.258	2.395	137.741	136.587
1987	379.729	444.165	115.846	404.791	178.496	6.124	223.770	161.100
TOTAL	6449.645	10397.453	2897.244	10265.586	3511.622	88.916	3420.817	3046.612
MEAN	322.482	519.873	144.862	513.279	175.581	4.446	171.041	152.331

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 152.1 1/5= 174.0 1/7= 179.9 1/10= 185.6

KHLONG PHRA SATHUNG

BLOCK NO.= 4 + 5 + 6 + 7 +
TCA= 264300.(HA) QMA= 2.643(CUM) TCV= 3.716(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	254.917	706.989	71.961	653.384	178.942	7.215	131.204	118.709
1969	230.267	793.577	89.489	765.921	167.301	6.520	114.991	101.946
1970	221.162	836.396	80.852	801.178	152.157	5.603	103.265	94.378
1971	233.720	698.005	73.245	634.941	173.884	8.235	98.689	95.500
1972	210.280	857.720	90.045	842.248	144.876	4.298	105.320	101.379
1973	234.149	774.857	82.840	709.773	187.569	4.960	86.227	78.950
1974	216.040	769.738	73.290	696.588	181.765	4.430	68.451	67.279
1975	227.738	773.405	74.469	722.107	173.909	4.827	102.572	93.028
1976	218.379	845.741	100.987	866.826	139.073	4.168	136.717	128.999
1977	206.436	684.720	88.466	655.293	155.949	5.496	90.309	86.604
1978	235.354	605.848	86.006	587.090	169.129	4.035	128.837	116.229
1979	262.072	737.715	96.662	704.546	189.200	4.844	134.001	112.136
1980	210.727	809.387	98.506	798.927	154.890	4.835	101.201	86.963
1981	195.532	902.009	90.266	887.185	143.998	7.563	88.721	80.715
1982	222.948	771.226	92.471	749.628	158.129	6.848	108.317	97.206
1983	206.955	947.354	112.257	962.468	144.301	5.790	113.220	97.237
1984	220.586	731.521	90.042	718.463	145.756	5.703	117.423	110.490
1985	208.374	824.228	88.904	807.937	154.450	4.412	100.525	93.470
1986	219.977	846.174	91.707	804.171	171.594	5.421	88.670	83.957
1987	268.032	724.405	72.112	622.278	212.824	6.483	92.153	81.397
TOTAL	4503.641	15640.988	1744.575	14990.922	3299.694	111.684	2110.812	1926.571
MEAN	225.182	782.049	87.229	749.546	164.985	5.584	105.541	96.329

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 95.3 1/5= 108.9 1/7= 112.8 1/10= 116.6

MIDDLE PHRA PRONG

BLOCK NO.= 8 +
TCA= 97000.(HA) QMA= 0.970(CUM) TCV= 1.071(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	145.905	354.283	56.424	1379.176	137.507	2.142	54.449	37.072
1969	134.818	429.241	67.306	1723.136	120.470	1.318	60.746	60.278
1970	127.947	458.783	61.625	1747.009	116.565	2.142	51.913	49.364
1971	125.083	416.768	59.214	1428.711	118.625	1.071	45.354	45.354
1972	118.136	429.801	69.146	1799.805	106.623	1.071	43.897	43.897
1973	130.998	395.176	61.894	1500.926	128.067	2.142	34.795	30.996
1974	122.203	424.830	60.956	1514.899	115.700	1.581	33.175	33.175
1975	124.393	413.648	59.656	1501.780	121.476	2.069	31.269	31.269
1976	117.259	572.639	88.231	2118.118	99.667	1.071	59.605	59.605
1977	108.690	488.483	74.393	1641.912	101.295	2.142	37.658	36.795
1978	128.329	513.346	75.093	1561.082	120.761	1.741	42.593	42.593
1979	148.895	519.910	76.148	1715.676	141.604	2.045	41.800	41.536
1980	109.610	606.151	87.532	2031.387	100.439	1.071	40.319	40.319
1981	108.068	539.508	75.421	1986.838	103.120	2.142	34.251	22.707
1982	121.449	516.830	73.803	1847.269	101.840	1.990	60.159	60.159
1983	110.089	607.864	96.915	2295.905	105.776	1.071	40.520	65.447
1984	123.068	501.276	68.980	1785.404	114.005	2.142	50.564	48.913
1985	117.930	502.113	66.727	1863.045	108.645	1.071	39.227	39.227
1986	119.070	509.273	72.681	1839.998	111.914	1.071	40.149	40.149
1987	132.082	396.129	56.118	1381.583	126.766	2.142	34.349	29.207
TOTAL	2474.021	9596.027	1408.259	34663.633	2300.862	33.236	876.791	858.061
MEAN	123.701	479.801	70.413	1733.182	115.043	1.662	43.840	42.903

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 41.9 1/5= 52.2 1/7= 55.3 1/10= 58.3

Table D-3-3 Simulated Results by Sub-Basin (2)

MAENUM HANUMAN SUB-BASIN

BLOCK NO.= 9 + 10 + 11 + 12 + 13 + 14 + 15 + 16 + 17 +
TCA= 213000.(HA) QMA= 2.130(CUM) TCV= 2.139(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	<------WATER SUPPLY FROM-----> RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	220.930	993.190	91.365	933.115	169.248	3.459	71.631	46.118
1969	193.363	1359.310	127.290	1410.913	104.091	2.648	117.677	111.208
1970	203.509	1164.884	93.025	1135.753	141.755	2.342	80.198	78.067
1971	213.963	1115.632	98.325	1091.393	146.650	2.675	92.555	86.656
1972	191.970	1260.967	125.322	1303.609	104.660	2.617	109.165	101.553
1973	210.029	1081.619	117.177	1059.106	157.717	3.833	70.340	59.798
1974	204.166	1257.609	111.362	1236.313	150.533	2.818	71.636	68.606
1975	169.502	1466.837	152.495	1523.851	117.676	2.604	73.860	69.266
1976	185.185	1353.187	123.179	1390.707	112.223	2.368	98.398	92.164
1977	197.013	1172.852	112.761	1180.701	126.794	3.080	93.169	86.818
1978	204.199	1412.236	132.895	1451.991	119.716	2.690	109.651	106.178
1979	261.455	1406.468	128.194	1363.923	196.337	4.756	91.163	80.363
1980	162.286	1489.140	137.104	1549.784	100.216	2.337	86.816	80.187
1981	192.247	1460.575	121.350	1476.081	123.747	3.644	86.602	79.628
1982	200.321	1202.721	107.202	1238.013	100.497	2.649	126.273	119.922
1983	208.963	1360.917	131.666	1377.397	145.474	2.654	95.918	75.803
1984	207.466	1369.610	122.438	1398.102	121.069	2.767	113.324	106.809
1985	209.052	1245.842	100.272	1228.473	139.478	2.635	91.610	81.186
1986	221.714	1139.028	95.023	1103.780	155.186	3.689	91.318	84.779
1987	206.405	1107.474	99.343	1082.798	142.939	4.550	81.148	54.778
TOTAL	4063.737	25420.066	2327.785	25535.773	2676.002	60.817	1852.451	1669.886
MEAN	203.187	1271.003	116.389	1276.789	133.800	3.041	92.623	83.494

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 82.9 1/5= 99.7 1/7= 104.3 1/10= 108.8

UPPER BANG PAKONG SUB-BASIN

BLOCK NO.= 18 + 19 + 20 + 21 + 22 +
TCA= 275700.(HA) QMA= 2.757(CUM) TCV= 26.231(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	<------WATER SUPPLY FROM-----> RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	1477.558	919.948	503.269	2991.430	911.790	57.447	733.585	665.862
1969	1323.624	1031.289	524.214	3964.426	896.594	27.029	624.646	622.543
1970	1320.959	1155.714	557.152	3867.957	892.653	51.250	567.163	509.896
1971	1363.887	996.761	495.484	3339.593	852.307	62.109	695.206	651.714
1972	1247.638	1011.558	512.230	3896.590	861.862	47.431	520.492	517.220
1973	1480.174	783.270	446.026	3020.708	925.802	57.677	725.619	629.628
1974	1369.339	920.723	512.266	3463.072	917.737	46.604	626.645	590.684
1975	1389.501	849.638	483.920	3611.993	921.949	51.618	646.263	593.558
1976	1308.806	933.217	553.740	4377.367	832.187	29.047	687.186	679.785
1977	1378.124	890.751	479.464	3381.842	972.032	48.162	567.427	545.305
1978	1502.359	900.816	486.445	3662.463	934.362	46.351	764.226	729.743
1979	1718.399	817.646	459.598	3623.588	951.813	51.945	984.435	906.709
1980	1343.315	1078.714	561.998	4461.387	935.472	42.404	590.375	588.061
1981	1409.996	1180.879	566.793	4382.648	976.698	47.207	576.194	544.469
1982	1443.929	920.152	491.350	3721.757	929.102	61.278	667.172	641.757
1983	1211.509	1130.852	631.439	4756.406	855.513	39.708	557.869	500.867
1984	1356.048	900.768	498.944	3945.563	830.564	40.096	715.663	696.317
1985	1425.993	938.101	518.521	3839.861	912.652	45.513	695.052	657.618
1986	1396.982	982.130	541.057	3863.335	830.573	26.997	793.362	788.312
1987	1454.466	881.066	471.079	3004.456	939.656	76.895	644.745	458.231
TOTAL	27922.574	19223.957	10294.969	75176.375	18081.285	956.766	13383.297	12518.258
MEAN	1396.129	961.198	514.748	3758.819	904.064	47.838	669.165	625.913

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 612.3 1/5= 707.7 1/7= 737.3 1/10= 767.2

MAENUM NAKHON NAYOK SUB-BASIN

BLOCK NO.= 23 + 24 + 25 + 26 + 27 + 28 +
TCA= 193300.(HA) QMA= 1.933(CUM) TCV= 26.711(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	<------WATER SUPPLY FROM-----> RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	677.444	1011.944	313.230	864.848	390.292	58.980	243.831	223.042
1969	586.315	1318.528	379.088	1307.969	353.962	62.381	186.835	162.623
1970	540.482	1489.544	382.115	1477.600	360.372	53.969	136.916	114.544
1971	595.114	1209.438	358.766	1176.410	326.082	71.785	215.299	185.562
1972	481.163	1350.879	394.902	1378.324	357.405	32.332	105.397	99.385
1973	689.673	1017.213	294.831	895.854	380.856	52.125	273.485	250.516
1974	554.380	1119.865	329.871	993.857	435.820	42.689	91.314	84.162
1975	585.941	1323.782	381.014	1280.621	359.454	83.247	158.362	118.737
1976	526.394	1305.378	445.251	1404.110	337.650	28.593	180.283	178.545
1977	614.681	970.908	311.425	816.581	403.783	66.210	160.460	144.540
1978	679.570	1061.064	340.250	1074.433	317.556	44.068	340.405	332.585
1979	758.058	980.445	304.345	858.059	386.446	54.893	336.001	300.436
1980	539.220	1297.450	394.260	1316.116	362.696	35.291	159.712	153.199
1981	575.223	1315.833	364.795	1277.376	347.533	67.632	177.601	128.913
1982	602.049	1320.244	372.122	1291.140	369.242	55.544	194.358	118.929
1983	506.298	1540.531	485.899	1653.078	308.969	73.308	147.839	109.419
1984	615.767	1155.201	342.821	1114.289	339.898	48.919	243.850	240.858
1985	649.826	1227.306	394.834	1187.323	404.267	77.599	188.301	160.055
1986	607.808	1301.444	397.958	1302.401	361.397	46.639	217.280	213.387
1987	818.458	874.758	264.589	624.600	440.974	95.482	298.085	164.841
TOTAL	12203.836	24191.727	7252.352	23294.953	7344.641	1151.682	4055.614	3484.275
MEAN	610.192	1209.586	362.617	1164.748	367.232	57.584	202.781	174.214

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 160.3 1/5= 222.4 1/7= 243.6 1/10= 265.9

Table D-3-4 Simulated Results by Sub-Basin (3)

KHLONG THA LAT SUB-BASIN

BLOCK NO.= 29 + 30 + 31 + 32 + 33 + 34 + 35 + 36 + 37 +
TCA= 249300.(HA) QMA= 2.493(CUM) TCV= 4.377(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	83.631	586.191	11.839	581.327	65.966	4.614	66.930	49.421
1969	69.462	638.222	11.927	618.978	57.854	5.577	42.671	51.206
1970	70.750	995.801	13.618	979.139	58.327	6.488	38.025	34.200
1971	78.432	647.510	12.329	638.879	62.230	5.509	59.685	43.844
1972	82.541	554.388	11.927	535.528	66.587	6.204	51.996	39.595
1973	79.737	524.992	10.889	503.773	66.863	6.612	47.391	36.736
1974	79.405	487.495	12.195	480.194	63.880	4.489	55.969	43.515
1975	75.394	672.195	12.622	644.315	66.013	5.442	39.077	36.617
1976	74.188	680.627	12.888	667.520	59.516	6.807	46.530	36.211
1977	71.504	719.477	12.236	675.451	65.398	6.949	16.911	23.578
1978	75.449	744.328	12.710	724.736	63.056	6.245	42.911	38.581
1979	84.514	724.634	12.634	718.799	66.789	7.122	63.775	45.434
1980	76.711	785.773	12.496	761.175	64.729	5.072	42.132	38.350
1981	76.342	1089.290	15.390	1083.560	60.252	4.405	50.927	40.956
1982	82.054	586.383	11.155	568.846	64.902	4.654	53.286	41.661
1983	70.567	877.295	14.573	856.236	60.450	7.041	39.052	27.441
1984	73.424	590.213	11.458	554.771	66.982	5.438	26.299	13.871
1985	78.820	604.058	12.070	595.543	62.100	4.776	54.456	44.599
1986	74.000	689.100	13.341	691.849	56.240	4.377	63.307	45.908
1987	75.513	559.185	11.129	519.241	67.024	6.289	27.665	5.668
TOTAL	1532.437	13757.133	249.424	13399.832	1265.155	114.113	928.993	737.389
MEAN	76.622	687.856	12.471	669.991	63.258	5.706	46.450	36.869

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 33.8 1/5= 52.1 1/7= 58.5 1/10= 65.3

LOWER BANG PAKONG SUB-BASIN

BLOCK NO.= 38 + 39 + 40 + 41 + 42 + 43 + 44 + 45 + 46 + 47 + 48 + 49 + 50 + 51 + 52 + 53 + 54 +
TCA= 310600.(HA) QMA= 3.106(CUM) TCV= 39.934(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	1124.968	597.754	166.907	4573.270	818.693	52.137	498.042	436.371
1969	1073.045	536.618	176.116	6007.594	745.824	46.075	512.181	444.232
1970	1101.788	632.798	173.279	6483.055	813.712	67.275	418.206	371.661
1971	1064.335	607.613	187.397	5440.117	717.125	67.439	554.673	461.364
1972	1126.173	525.039	175.974	5853.113	795.050	47.801	468.292	395.333
1973	1095.015	539.252	172.184	4530.695	772.637	86.685	496.530	407.490
1974	1035.604	650.847	197.119	5211.707	752.617	50.708	457.796	397.206
1975	1109.873	533.885	168.162	5626.141	824.174	46.271	498.786	408.629
1976	1063.538	563.216	178.791	6660.801	715.715	69.600	531.723	449.260
1977	1119.612	473.669	165.548	4830.645	842.018	47.857	442.563	397.479
1978	1125.317	521.425	179.275	5634.465	752.193	50.784	592.892	512.140
1979	1229.848	383.351	158.450	5187.242	807.293	44.955	675.812	588.144
1980	1084.232	495.527	173.956	6645.410	769.590	52.399	520.145	434.932
1981	1101.396	568.823	180.833	6860.527	784.346	48.671	469.692	405.387
1982	1094.307	506.231	175.167	5679.469	739.327	73.102	509.079	450.076
1983	979.778	695.531	210.318	7650.164	704.022	49.197	479.144	338.458
1984	1152.975	469.223	167.383	5692.418	806.457	45.941	574.492	514.416
1985	1111.525	416.291	172.937	5643.148	750.895	50.648	541.825	472.735
1986	1117.381	550.172	188.391	6054.488	752.206	46.303	576.838	502.833
1987	1108.732	568.275	174.175	4161.891	856.894	75.693	379.421	282.201
TOTAL	22019.410	10835.520	3542.360	114426.062	15520.758	1119.541	10198.117	8670.328
MEAN	1100.970	541.776	177.118	5721.301	776.038	55.977	509.906	433.516

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2= 428.4 1/5= 490.5 1/7= 508.6 1/10= 526.4

ENTIRE BANG PAKONG RIVER BASIN

BLOCK NO.= 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 20 +
21 + 22 + 23 + 24 + 25 + 26 + 27 + 28 + 29 + 30 + 31 + 32 + 33 + 34 + 35 + 36 + 37 + 38 + 39 + 40 +
41 + 42 + 43 + 44 + 45 + 46 + 47 + 48 + 49 + 50 + 51 + 52 + 53 + 54 +
TCA= 1766000.(HA) QMA= 17.660(CUM) TCV=106.076(MCM)

YEAR	WATER DEMAND	BASIN RUNOFF	E.RAIN RETURN	TAIL-END OUTFLOW	WATER SUPPLY FROM RIVER	CHANNEL	DAM	REQUIRED CAPACITY
	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1968	4347.113	5599.316	1329.358	4573.270	2833.312	190.687	2024.789	1767.199
1969	3945.469	6637.352	1522.983	6007.594	2619.309	154.417	1851.952	1736.662
1970	3912.260	7274.230	1487.769	6483.055	2720.677	194.264	1555.260	1397.800
1971	4010.345	6141.273	1401.050	5440.117	2586.713	223.532	1930.703	1727.075
1972	3753.365	6514.508	1527.135	5853.113	2595.300	146.523	1561.982	1442.931
1973	4256.496	5588.082	1318.671	4530.695	2814.614	219.417	1896.793	1637.385
1974	3885.148	6106.734	1415.642	5211.707	2811.333	158.226	1535.138	1398.162
1975	4009.908	6482.199	1452.352	5626.141	2781.062	201.239	1708.573	1487.996
1976	3812.944	6855.668	1673.975	6660.801	2449.655	144.598	1933.095	1814.187
1977	3998.460	5884.707	1395.802	4830.645	2832.334	183.852	1570.928	1475.049
1978	4282.977	6236.402	1460.447	5634.465	2662.003	159.641	2199.455	2040.994
1979	4838.523	6101.750	1401.140	5187.242	2940.581	176.150	2527.765	2227.863
1980	3831.776	7155.723	1636.513	6645.410	2665.620	148.792	1691.206	1555.191
1981	3932.445	7600.270	1563.484	6860.527	2694.079	186.599	1625.029	1414.762
1982	4085.028	6376.453	1479.884	5679.469	2628.490	210.547	1893.378	1691.911
1983	3594.122	7797.113	1873.969	7650.164	2481.919	181.944	1646.935	1367.121
1984	4062.702	6256.371	1455.448	5692.418	2571.675	154.476	2032.161	1917.341
1985	4094.425	6325.762	1503.394	5643.148	2706.426	191.302	1851.723	1678.427
1986	4072.399	6572.508	1553.565	6054.488	2639.366	136.891	2008.661	1895.910
1987	4443.402	5555.398	1264.388	4161.891	2965.569	273.658	1781.331	1237.421
TOTAL	81169.125	129061.562	29716.926	114426.062	53999.992	3636.753	36826.828	32911.359
MEAN	4058.456	6453.078	1485.846	5721.301	2700.000	181.838	1841.341	1645.568

---------- PROBABILITY OF REQUIRED CAPACITY (MCM) ----------
1/2=1613.6 1/5=1844.6 1/7=1916.2 1/10=1988.2

Table D-3-5 Summary of Water Demand Computation
(average in 20 years 1968 - 1987)

** SUMMARY OF WATER DEMAND COMPUTATION (AVERAGE IN 20 YEARS, 1968 - 1987) **

BLOCK AND BASIN	IRRIGATION: CROP CONSUMPTION	IRRIGATION: EFFECTIVE RAINFALL	IRRIGATION: ON-FARM REQUIREMENT	IRRIGATION: DIVERSION REQUIREMENT	OTHER WATER SUPPLY: DOMESTIC WATER SUPPLY	OTHER WATER SUPPLY: INDUSTRIAL WATER SUPPLY	OTHER WATER SUPPLY: FRESH WATER TO FISHERY	TOTAL WATER DEMAND
(1) UPPER PHRA PRONG								
UPP-3	0.000	0.000	0.000	0.000	1.250	0.250	0.000	1.500
UPP-2	96.818	50.036	46.782	87.927	5.800	1.161	0.000	94.888
UPP-1	281.012	161.896	119.116	222.252	3.203	0.640	0.000	226.095
SUB-TOTAL	377.830	211.933	165.897	310.179	10.252	2.051	0.000	322.482
(2) KHLONG PHRA SATHUNG								
KPS-4	0.000	0.000	0.000	0.000	0.860	0.252	0.000	1.112
KPS-3	0.000	0.000	0.000	0.000	1.719	0.504	0.000	2.224
KPS-2	46.932	21.822	25.110	48.938	1.719	0.504	0.000	51.162
KPS-1	215.019	124.255	90.764	167.803	2.402	0.480	0.000	170.685
SUB-TOTAL	261.950	146.077	115.873	216.740	6.700	1.741	0.000	225.182
(3) MIDDLE PHRA PRONG								
MPP-1	159.574	94.342	65.232	118.959	2.438	2.304	0.000	123.701
SUB-TOTAL	159.574	94.342	65.232	118.959	2.438	2.304	0.000	123.701
(4) MAENUM HANUMAN SUB-BASIN								
MHM-5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-4	33.695	16.914	16.781	30.721	0.000	0.000	0.000	30.721
MHM-8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-9	0.000	0.000	0.000	0.000	0.801	0.160	0.000	0.961
MHM-7	0.000	0.000	0.000	0.000	0.801	0.160	0.000	0.961
MHM-3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-1	196.709	111.278	85.431	160.942	3.498	6.105	0.000	170.545
SUB-TOTAL	230.404	128.192	102.212	191.662	5.099	6.425	0.000	203.187
(5) UPPER BANG PAKONG SUB-BASIN								
UBP-3	328.448	163.317	165.131	299.979	4.424	6.751	0.000	311.153
UBP-5	0.000	0.000	0.000	0.000	0.207	0.491	0.000	0.699
UBP-4	146.289	70.605	75.684	136.548	3.609	6.522	0.000	146.679
UBP-2	109.821	53.096	56.725	104.168	5.249	8.153	0.000	117.570
UBP-1	900.838	445.845	454.993	809.334	4.447	6.248	0.000	820.029
SUB-TOTAL	1485.396	732.863	752.533	1350.028	17.936	28.165	0.000	1396.128
(6) MAENUM NAKHON NAYOK SUB-BASIN								
MNN-6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MNN-5	81.052	46.007	35.045	58.899	1.567	2.507	0.000	62.973
MNN-4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MNN-3	98.471	55.305	43.166	72.548	1.960	3.482	0.000	77.990
MNN-2	299.108	161.151	137.957	231.861	1.866	3.973	0.000	237.699
MNN-1	287.478	161.500	125.978	211.729	7.272	12.531	0.000	231.531
SUB-TOTAL	766.108	423.962	342.146	575.036	12.664	22.492	0.000	610.192
(7) KHLONG THA LAT SUB-BASIN								
KTL-9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
KTL-8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
KTL-7	22.101	8.690	13.411	24.110	1.484	0.296	0.000	25.891
KTL-4	26.541	8.668	17.873	34.055	2.968	0.592	0.000	37.616
KTL-6	0.000	0.000	0.000	0.000	0.743	0.148	0.000	0.891
KTL-5	0.000	0.000	0.000	0.000	1.484	0.296	0.000	1.780
KTL-3	6.280	2.636	3.644	6.401	0.381	0.530	0.000	7.313
KTL-2	0.000	0.000	0.000	0.000	0.763	1.061	0.000	1.823
KTL-1	0.000	0.000	0.000	0.000	0.285	1.023	0.000	1.308
SUB-TOTAL	54.923	19.995	34.928	64.567	8.109	3.947	0.000	76.622
(8) LOWER BANG PAKONG SUB-BASIN								
LBP-17	10.019	4.517	5.502	9.637	0.763	1.061	0.000	11.460
LBP-16	13.872	6.498	7.375	12.997	1.505	1.209	0.000	15.711
LBP-15	0.000	0.000	0.000	0.000	1.381	5.680	0.000	7.061
LBP-14	0.000	0.000	0.000	0.000	0.691	2.839	0.000	3.529
LBP-13	0.000	0.000	0.000	0.000	1.965	6.709	0.000	8.673
LBP-12	0.000	0.000	0.000	0.000	1.036	0.200	0.000	1.236
LBP-11	0.000	0.000	0.000	0.000	0.622	0.120	0.000	0.742
LBP-10	25.375	10.401	14.974	27.161	0.000	0.000	0.000	27.161
LBP-9	6.833	2.402	4.431	7.447	0.414	0.080	0.000	7.942
LBP-8	73.363	32.296	41.068	74.745	1.167	2.057	0.000	77.970
LBP-7	3.254	1.378	1.877	3.154	1.616	3.007	0.000	7.777
LBP-6	16.979	7.966	9.012	15.892	2.917	5.144	0.000	23.953
LBP-3	457.040	186.602	270.439	484.594	14.979	54.995	10.682	565.251
LBP-2	0.000	0.000	0.000	0.000	5.963	24.184	0.000	30.147
LBP-5	0.000	0.000	0.000	0.000	7.325	11.155	0.000	18.480
LBP-4	135.450	54.695	80.755	144.075	4.081	9.230	3.811	161.198
LBP-1	0.000	0.000	0.000	0.000	6.465	20.509	0.000	26.974
SUB-TOTAL	742.186	306.755	435.431	779.703	52.890	148.179	14.494	995.266
(9) ENTIRE BANG PAKONG RIVER BASIN								
SUB-TOTAL	4078.369	2064.116	2014.252	3606.873	116.089	215.304	14.494	3952.757

Table D-3-6 Summary of Water Balance Computation (average in 20 years 1968 - 1987)

** SUMMARY OF WATER BALANCE COMPUTATIOM (AVERAGE IN 20 YEARS, 1968 - 1987) **

BLOCK AND BASIN	DIVERSION REQUIREMENT			DIVERSION FROM RIVERS			DIVERSION FROM CHANNEL STORAGE					DIVERSION FROM DAMS		
	WET S.	DRY S.	TOTAL	WET S.	DRY S.	TOTAL	CAPA.	WET S.	DRY S.	TOTAL	NOS.	WET S.	DRY S.	TOTAL
	(1)	(2)	(1)+(2)	(3)	(4)	(3)+(4)	(5)	(6)	(7)	(8)	(8)/(5)	(9)	(10)	(11)
(1) UPPER PHRA PRONG														
UPP-3	0.741	0.759	1.500	0.741	0.669	1.410	0.241	0.008	0.324	0.333	1.380	0.000	1.026	1.026
UPP-2	42.457	52.429	94.887	40.735	22.578	63.313	0.741	0.563	0.696	1.258	1.698	1.586	38.711	40.297
UPP-1	104.314	121.780	226.094	78.128	32.728	110.857	0.915	2.104	0.750	2.855	3.120	24.096	105.621	129.717
SUB-TOTAL	147.512	174.968	322.480	119.604	55.975	175.579	1.897	2.676	1.770	4.446	2.344	25.683	145.357	171.040
(2) KHLONG PHRA SATHUNG														
KPS-4	0.550	0.562	1.112	0.550	0.535	1.085	0.855	0.009	1.028	1.037	1.213	0.000	1.813	1.813
KPS-3	1.100	1.124	2.224	1.100	1.124	2.224	0.995	0.051	1.288	1.338	1.345	0.000	2.957	2.957
KPS-2	17.397	33.764	51.161	17.361	26.520	43.881	1.311	0.584	1.635	2.219	1.692	0.203	22.209	22.412
KPS-1	84.786	85.898	170.684	78.687	39.107	117.794	0.555	0.561	0.430	0.990	1.784	6.836	71.522	78.358
SUB-TOTAL	103.832	121.348	225.180	97.698	67.285	164.983	3.716	1.204	4.380	5.584	1.503	7.039	98.501	105.540
(3) MIDDLE PHRA PRONG														
MPP-1	69.871	53.829	123.700	69.525	45.517	115.042	1.071	0.804	0.857	1.662	1.552	2.712	41.128	43.839
SUB-TOTAL	69.871	53.829	123.700	69.525	45.517	115.042	1.071	0.804	0.857	1.662	1.552	2.712	41.128	43.839
(4) MAENUM HANUMAN SUB-BASIN														
MHM-5	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.024	0.047	0.070	1.955	0.022	0.456	0.478
MHM-6	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.034	0.054	0.088	2.441	0.065	0.705	0.769
MHM-4	16.462	14.259	30.720	12.637	5.003	17.639	0.126	0.275	0.140	0.416	3.298	3.715	12.389	16.104
MHM-8	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.006	0.064	0.070	1.463	0.000	0.255	0.255
MHM-9	0.475	0.486	0.961	0.475	0.413	0.887	0.105	0.005	0.138	0.142	1.357	0.000	0.645	0.645
MHM-7	0.475	0.486	0.961	0.475	0.486	0.961	0.288	0.000	0.327	0.327	1.137	0.000	0.724	0.724
MHM-3	0.000	0.000	0.000	0.000	0.000	0.000	0.198	0.000	0.189	0.189	0.957	0.000	0.594	0.594
MHM-2	0.000	0.000	0.000	0.000	0.000	0.000	0.165	0.000	0.158	0.158	0.958	0.000	0.306	0.306
MHM-1	68.667	101.876	170.544	67.096	47.216	114.311	1.137	0.551	1.028	1.579	1.389	1.426	71.321	72.747
SUB-TOTAL	86.078	117.107	203.185	80.682	53.117	133.799	2.139	0.895	2.146	3.041	1.422	5.228	87.394	92.622
(5) UPPER BANG PAKONG SUB-BASIN														
UBP-3	139.980	171.173	311.152	132.070	107.456	239.526	1.646	1.564	1.353	2.917	1.772	13.524	130.882	144.407
UBP-5	0.348	0.350	0.699	0.348	0.279	0.627	0.096	0.012	0.117	0.129	1.342	0.003	0.501	0.504
UBP-4	67.592	79.086	146.678	48.012	18.735	66.746	0.720	1.405	0.587	1.992	2.766	18.177	61.187	79.364
UBP-2	45.813	71.756	117.569	45.813	71.756	117.569	5.879	3.095	5.621	8.716	1.483	0.030	49.417	49.447
UBP-1	417.885	402.135	820.019	334.506	145.085	479.591	17.890	28.575	5.510	34.085	1.905	62.391	333.049	395.440
SUB-TOTAL	671.618	724.499	1396.116	560.749	343.310	904.058	26.231	34.651	13.187	47.838	1.824	94.126	575.036	669.162
(6) MAENUM NAKHON NAYOK SUB-BASIN														
MNN-6	0.000	0.000	0.000	0.000	0.000	0.000	0.087	0.006	0.106	0.112	1.286	0.000	0.638	0.638
MNN-5	40.276	22.697	62.973	38.095	11.251	49.347	0.630	0.449	0.585	1.034	1.641	1.765	13.035	14.800
MNN-4	0.000	0.000	0.000	0.000	0.000	0.000	0.126	0.055	0.167	0.222	1.763	0.009	0.486	0.494
MNN-3	49.853	28.135	77.989	37.414	9.015	46.428	0.381	0.728	0.298	1.026	2.693	11.712	19.587	31.299
MNN-2	168.879	68.818	237.698	126.949	24.159	151.108	5.247	10.789	3.403	14.192	2.705	31.142	45.585	76.727
MNN-1	149.961	81.569	231.530	92.641	27.706	120.347	20.240	32.597	8.401	40.998	2.026	24.723	54.099	78.822
SUB-TOTAL	408.970	201.219	610.189	295.098	72.131	367.230	26.711	44.624	12.960	57.584	2.156	69.350	133.430	202.780
(7) KHLONG THA LAT SUB-BASIN														
KTL-9	0.000	0.000	0.000	0.000	0.000	0.000	0.975	0.095	1.152	1.247	1.279	0.000	2.619	2.619
KTL-8	0.000	0.000	0.000	0.000	0.000	0.000	0.543	0.019	0.622	0.641	1.180	0.000	1.675	1.675
KTL-7	11.336	14.555	25.891	11.308	11.428	22.736	0.696	0.201	0.909	1.110	1.596	0.124	11.409	11.533
KTL-4	8.294	29.321	37.615	8.294	19.210	27.504	0.240	0.137	0.294	0.432	1.798	0.178	23.389	23.567
KTL-6	0.440	0.451	0.891	0.440	0.353	0.793	0.273	0.036	0.323	0.359	1.315	0.000	0.956	0.956
KTL-5	0.880	0.901	1.780	0.880	0.901	1.780	1.134	0.042	1.240	1.281	1.130	0.000	2.757	2.757
KTL-3	3.692	3.621	7.313	3.692	3.621	7.313	0.102	0.024	0.129	0.153	1.501	0.040	2.473	2.512
KTL-2	0.907	0.916	1.823	0.907	0.916	1.823	0.180	0.025	0.233	0.259	1.438	0.001	0.683	0.683
KTL-1	0.653	0.655	1.308	0.653	0.655	1.308	0.234	0.001	0.222	0.224	0.956	0.000	0.146	0.146
SUB-TOTAL	26.202	50.419	76.621	26.174	37.083	63.257	4.377	0.581	5.125	5.706	1.304	0.343	46.107	46.449
(8) LOWER BANG PAKONG SUB-BASIN														
LBP-17	6.742	4.718	11.460	1.483	0.501	1.985	0.042	0.141	0.032	0.173	4.131	5.123	4.238	9.361
LBP-16	9.353	6.358	15.711	8.420	2.398	10.817	0.345	0.437	0.213	0.650	1.883	0.626	5.439	6.065
LBP-15	3.526	3.535	7.061	3.314	1.661	4.976	0.078	0.116	0.051	0.167	2.143	0.267	2.592	2.859
LBP-14	1.763	1.767	3.529	1.753	1.320	3.073	0.315	0.096	0.323	0.420	1.333	0.016	1.450	1.466
LBP-13	4.329	4.344	8.673	4.297	3.821	8.118	0.030	0.028	0.028	0.057	1.892	0.294	2.768	3.062
LBP-12	0.611	0.625	1.236	0.606	0.469	1.075	0.346	0.196	0.472	0.668	1.930	0.087	1.741	1.827
LBP-11	0.366	0.375	0.742	0.366	0.375	0.742	0.150	0.068	0.194	0.262	1.748	0.039	0.943	0.982
LBP-10	11.149	16.013	27.161	10.354	9.516	19.871	0.108	0.165	0.154	0.319	2.954	1.432	10.896	12.329
LBP-9	3.111	4.830	7.942	2.760	1.274	4.033	0.084	0.113	0.064	0.177	2.112	0.301	3.677	3.978
LBP-8	37.412	40.557	77.969	26.759	15.577	42.336	0.318	0.883	0.355	1.238	3.892	10.829	32.235	43.064
LBP-7	3.932	3.845	7.777	3.883	2.588	6.471	0.450	0.234	0.595	0.828	1.840	0.122	3.621	3.743
LBP-6	14.132	9.820	23.953	13.337	7.886	21.223	0.129	0.166	0.154	0.321	2.486	1.220	5.918	7.138
LBP-3	291.342	379.607	670.948	287.169	261.347	548.516	33.567	19.412	21.288	40.700	1.213	3.726	260.868	264.594
LBP-2	15.055	15.092	30.147	15.055	15.092	30.147	1.577	1.272	0.670	1.942	1.232	0.372	10.510	10.883
LBP-5	9.198	9.281	18.480	8.860	4.964	13.823	0.099	0.170	0.138	0.308	3.108	0.702	6.984	7.686
LBP-4	66.769	94.428	161.197	22.344	9.507	31.851	2.223	6.637	1.022	7.659	3.445	38.411	84.856	123.267
LBP-1	13.461	13.513	26.974	13.461	13.513	26.974	0.073	0.069	0.018	0.088	1.200	0.774	6.825	7.599
SUB-TOTAL	492.251	608.709	1100.960	424.222	351.808	776.031	39.934	30.204	25.773	55.977	1.402	64.340	445.562	509.902
(9) ENTIRE BANG PAKONG RIVER BASIN														
SUB-TOTAL	2006.331	2052.094	4058.430	1673.750	1026.223	2699.977	106.076	115.639	66.198	181.837	1.714	268.820	1572.510	1841.330

Table D-3-7 Summary of Water Balance Computation (specific year of 1979)

** SUMMARY OF WATER BALANCE COMPUTATIOM (SPECIFIC YEAR OF 1979 **

BLOCK AND BASIN	DIVERSION REQUIREMENT			DIVERSION FROM RIVERS			DIVERSION FROM CHANNEL STORAGE					DIVERSION FROM DAMS		
	WET S.	DRY S.	TOTAL	WET S.	DRY S.	TOTAL	CAPA.	WET S.	DRY S.	TOTAL	NOS.	WET S.	DRY S.	TOTAL
	(1)	(2)	(1)+(2)	(3)	(4)	(3)+(4)	(5)	(6)	(7)	(8)	(8)/(5)	(9)	(10)	(11)
(1) UPPER PHRA PRONG														
UPP-3	0.756	0.743	1.499	0.756	0.591	1.347	0.241	0.000	0.241	0.241	1.000	0.000	1.387	1.387
UPP-2	53.936	59.578	113.514	53.936	27.197	81.134	0.741	0.000	0.773	0.773	1.044	0.000	42.964	42.964
UPP-1	129.744	135.990	265.734	86.546	40.513	127.059	0.915	2.745	2.745	5.490	6.000	40.453	111.181	151.634
SUB-TOTAL	184.436	196.311	380.748	141.238	68.301	209.539	1.897	2.745	3.759	6.504	3.429	40.453	155.532	195.985
(2) KHLONG PHRA SATHUNG														
KPS-4	0.560	0.551	1.111	0.560	0.471	1.031	0.855	0.000	0.855	0.855	1.000	0.000	3.767	3.767
KPS-3	1.120	1.102	2.222	1.120	1.102	2.222	0.995	0.000	1.013	1.013	1.018	0.000	4.414	4.414
KPS-2	18.299	37.934	56.232	18.299	30.022	48.320	1.311	0.000	1.311	1.311	1.000	0.000	29.563	29.563
KPS-1	108.184	97.306	205.490	96.567	44.627	141.194	0.555	0.555	1.110	1.665	3.000	11.062	81.418	92.480
SUB-TOTAL	128.163	136.892	265.056	116.546	76.221	192.768	3.716	0.555	4.289	4.844	1.304	11.062	119.162	130.224
(3) MIDDLE PHRA PRONG														
MPP-1	85.640	66.322	151.962	85.640	59.032	144.672	1.071	0.323	1.722	2.045	1.909	0.000	41.536	41.536
SUB-TOTAL	85.640	66.322	151.962	85.640	59.032	144.672	1.071	0.323	1.722	2.045	1.909	0.000	41.536	41.536
(4) MAENUM HANUMAN SUB-BASIN														
MHM-5	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.015	0.036	0.051	1.410	0.000	0.656	0.656
MHM-6	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.036	0.036	0.072	2.000	0.035	0.983	1.018
MHM-4	19.834	18.014	37.848	12.717	5.409	18.126	0.126	0.252	0.000	0.252	2.000	6.865	16.439	23.304
MHM-8	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.000	0.073	0.073	1.526	0.000	0.283	0.283
MHM-9	0.484	0.476	0.960	0.484	0.387	0.871	0.105	0.000	0.105	0.105	1.000	0.000	0.718	0.718
MHM-7	0.484	0.476	0.960	0.484	0.476	0.960	0.288	0.000	0.288	0.288	1.000	0.000	0.688	0.688
MHM-3	0.000	0.000	0.000	0.000	0.000	0.000	0.198	0.000	0.198	0.198	1.000	0.000	1.041	1.041
MHM-2	0.000	0.000	0.000	0.000	0.000	0.000	0.165	0.000	0.165	0.165	1.000	0.000	0.552	0.552
MHM-1	104.746	119.376	224.122	102.097	77.830	179.927	1.137	1.137	2.274	3.411	3.000	1.511	58.070	59.581
SUB-TOTAL	125.548	138.343	263.890	115.782	84.102	199.884	2.139	1.440	3.175	4.615	2.158	8.411	79.430	87.841
(5) UPPER BANG PAKONG SUB-BASIN														
UBP-3	178.672	214.914	393.586	160.119	133.669	293.788	1.646	1.646	4.938	6.584	4.000	20.138	166.707	186.845
UBP-5	0.352	0.346	0.698	0.352	0.226	0.578	0.096	0.000	0.106	0.106	1.106	0.000	0.750	0.750
UBP-4	91.896	98.418	190.314	51.809	8.926	60.734	0.720	1.440	0.720	2.160	3.000	38.648	90.176	128.823
UBP-2	55.321	83.670	138.992	55.321	83.670	138.992	5.879	3.252	6.428	9.681	1.647	0.000	65.329	65.329
UBP-1	521.765	499.849	1021.615	333.388	148.615	482.004	17.890	35.780	9.685	45.465	2.541	152.597	449.996	602.594
SUB-TOTAL	848.007	897.197	1745.204	600.990	375.107	976.096	26.231	42.118	21.877	63.996	2.440	211.382	772.958	984.340
(6) MAENUM NAKHON NAYOK SUB-BASIN														
MNN-6	0.000	0.000	0.000	0.000	0.000	0.000	0.087	0.000	0.087	0.087	1.000	0.000	1.202	1.202
MNN-5	44.960	32.784	77.744	40.623	14.282	54.904	0.630	0.630	0.630	1.260	2.000	3.708	20.560	24.267
MNN-4	0.000	0.000	0.000	0.000	0.000	0.000	0.126	0.000	0.179	0.179	1.425	0.000	0.682	0.682
MNN-3	62.195	40.713	102.909	37.855	8.422	46.276	0.381	0.762	0.000	0.762	2.000	23.579	33.001	56.580
MNN-2	194.128	102.038	296.166	141.344	28.164	169.507	5.247	10.494	1.631	12.125	2.311	42.291	76.779	119.069
MNN-1	165.980	117.663	283.642	89.361	28.799	118.161	20.240	40.480	0.000	40.480	2.000	36.139	98.062	134.201
SUB-TOTAL	467.263	293.197	760.461	309.182	79.666	388.848	26.711	52.366	2.527	54.893	2.055	105.716	230.286	336.001
(7) KHLONG THA LAT SUB-BASIN														
KTL-9	0.000	0.000	0.000	0.000	0.000	0.000	0.975	0.240	1.663	1.903	1.952	0.000	3.716	3.716
KTL-8	0.000	0.000	0.000	0.000	0.000	0.000	0.543	0.000	0.831	0.831	1.530	0.000	2.486	2.486
KTL-7	12.632	16.499	29.131	12.078	12.238	24.316	0.696	0.696	0.696	1.392	2.000	0.862	15.897	16.759
KTL-4	10.225	31.928	42.153	10.225	19.100	29.325	0.240	0.240	0.240	0.480	2.000	0.944	29.546	30.490
KTL-6	0.449	0.441	0.890	0.449	0.309	0.758	0.273	0.023	0.467	0.489	1.792	0.000	1.347	1.347
KTL-5	0.897	0.882	1.779	0.897	0.882	1.779	1.134	0.000	1.738	1.738	1.532	0.000	4.117	4.117
KTL-3	4.554	4.224	8.778	4.554	4.224	8.778	0.102	0.102	0.102	0.204	2.000	0.377	3.665	4.042
KTL-2	0.919	0.904	1.822	0.919	0.904	1.822	0.180	0.082	0.298	0.380	2.113	0.000	1.017	1.017
KTL-1	0.659	0.648	1.307	0.659	0.648	1.307	0.234	0.000	0.245	0.245	1.047	0.000	0.426	0.426
SUB-TOTAL	30.334	55.526	85.860	29.780	38.304	68.085	4.377	1.383	6.279	7.662	1.750	2.183	62.216	64.399
(8) LOWER BANG PAKONG SUB-BASIN														
LBP-17	8.200	5.808	14.007	1.268	0.189	1.457	0.042	0.096	0.007	0.103	2.445	6.847	5.634	12.482
LBP-16	11.005	7.873	18.878	8.714	1.717	10.432	0.345	0.371	0.000	0.371	1.075	1.919	8.287	10.206
LBP-15	3.557	3.499	7.056	3.301	0.878	4.180	0.078	0.109	0.000	0.109	1.391	0.296	3.615	3.911
LBP-14	1.778	1.749	3.527	1.778	0.828	2.606	0.315	0.000	0.392	0.392	1.244	0.000	2.543	2.543
LBP-13	4.369	4.298	8.667	4.358	3.588	7.946	0.030	0.030	0.000	0.030	1.000	0.226	3.563	3.788
LBP-12	0.623	0.612	1.235	0.623	0.347	0.969	0.346	0.346	0.125	0.471	1.361	0.093	3.349	3.442
LBP-11	0.374	0.367	0.741	0.374	0.367	0.741	0.150	0.094	0.073	0.167	1.113	0.000	1.839	1.839
LBP-10	14.198	17.231	31.429	10.998	9.264	20.262	0.108	0.216	0.000	0.216	2.000	3.771	13.572	17.343
LBP-9	3.570	5.349	8.919	2.663	0.986	3.648	0.084	0.168	0.000	0.168	2.000	0.739	4.656	5.395
LBP-8	46.570	44.987	91.557	26.442	15.628	42.070	0.318	0.636	0.636	1.272	4.000	19.492	37.704	57.197
LBP-7	4.194	4.128	8.322	4.194	2.097	6.291	0.450	0.243	0.207	0.450	1.000	0.000	5.960	5.960
LBP-6	16.463	11.154	27.617	12.216	7.999	20.215	0.129	0.258	0.129	0.387	3.000	4.640	8.398	13.038
LBP-3	364.214	390.778	754.992	327.586	268.760	596.345	33.567	33.567	1.218	34.785	1.036	23.225	329.049	352.274
LBP-2	15.188	14.939	30.127	15.188	14.939	30.127	1.577	1.577	0.000	1.577	1.000	0.219	13.968	14.187
LBP-5	9.310	9.157	18.467	9.167	4.223	13.390	0.099	0.396	0.099	0.495	5.000	0.503	7.725	8.227
LBP-4	73.351	103.484	176.835	21.758	8.230	29.988	2.223	2.675	2.223	4.898	2.203	51.024	93.410	144.434
LBP-1	13.589	13.367	26.956	13.589	13.367	26.956	0.073	0.000	0.073	0.073	1.000	0.000	9.422	9.422
SUB-TOTAL	590.551	638.780	1229.332	464.217	353.406	817.624	39.934	40.781	5.181	45.962	1.151	112.994	552.694	665.688
(9) ENTIRE BANG PAKONG RIVER BASIN														
SUB-TOTAL	2459.939	2422.565	4882.500	1863.370	1134.137	2997.511	106.076	141.712	48.809	190.521	1.796	492.200	2013.808	2506.010

Table D-3-7 Summary of Water Balance Computation (specific year of 1983)

** SUMMARY OF WATER BALANCE COMPUTATION (SPECIFIC YEAR OF 1983 **

BLOCK AND BASIN	DIVERSION REQUIREMENT			DIVERSION FROM RIVERS			DIVERSION FROM CHANNEL STORAGE					DIVERSION FROM DAMS		
	WET S.	DRY S.	TOTAL	WET S.	DRY S.	TOTAL	CAPA.	WET S.	DRY S.	TOTAL	NOS.	WET S.	DRY S.	TOTAL
	(1)	(2)	(1)+(2)	(3)	(4)	(3)+(4)	(5)	(6)	(7)	(8)	(8)/(5)	(9)	(10)	(11)
(1) UPPER PHRA PRONG														
UPP-3	0.756	0.743	1.499	0.756	0.743	1.499	0.241	0.000	0.566	0.566	2.350	0.000	0.450	0.450
UPP-2	27.689	53.136	80.824	27.689	21.520	49.208	0.741	0.000	0.741	0.741	1.000	0.000	40.759	40.759
UPP-1	75.875	132.720	208.595	75.456	35.595	111.051	0.915	0.915	0.915	1.830	2.000	0.911	111.693	112.604
SUB-TOTAL	104.320	186.599	290.918	103.900	57.858	161.758	1.897	0.915	2.222	3.137	1.654	0.911	152.902	153.813
(2) KHLONG PHRA SATHUNG														
KPS-4	0.560	0.551	1.111	0.560	0.551	1.111	0.855	0.000	1.196	1.196	1.399	0.000	0.433	0.433
KPS-3	1.120	1.102	2.222	1.120	1.102	2.222	0.995	0.000	1.786	1.786	1.795	0.000	0.896	0.896
KPS-2	14.463	32.852	47.315	14.463	26.022	40.486	1.311	0.000	1.943	1.943	1.482	0.000	21.724	21.724
KPS-1	58.940	92.095	151.035	58.940	41.612	100.552	0.555	0.000	0.555	0.555	1.000	0.000	74.102	74.102
SUB-TOTAL	75.084	126.599	201.684	75.084	69.286	144.371	3.716	0.000	5.481	5.481	1.475	0.000	97.156	97.156
(3) MIDDLE PHRA PRONG														
MPP-1	48.302	59.249	107.551	48.302	54.935	103.238	1.071	0.000	1.071	1.071	1.000	0.000	35.232	35.232
SUB-TOTAL	48.302	59.249	107.551	48.302	54.935	103.238	1.071	0.000	1.071	1.071	1.000	0.000	35.232	35.232
(4) MAENUM HANUMAN SUB-BASIN														
MHM-5	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.000	0.072	0.072	2.000	0.000	0.437	0.437
MHM-6	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.000	0.072	0.072	2.000	0.000	0.772	0.772
MHM-4	11.034	15.197	26.231	9.873	4.841	14.714	0.126	0.378	0.252	0.630	5.000	1.029	13.095	14.123
MHM-8	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.000	0.092	0.092	1.923	0.000	0.158	0.158
MHM-9	0.484	0.476	0.960	0.484	0.476	0.960	0.105	0.000	0.196	0.196	1.865	0.000	0.346	0.346
MHM-7	0.484	0.476	0.960	0.484	0.476	0.960	0.288	0.000	0.418	0.418	1.453	0.000	0.028	0.028
MHM-3	0.000	0.000	0.000	0.000	0.000	0.000	0.198	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MHM-2	0.000	0.000	0.000	0.000	0.000	0.000	0.165	0.000	0.036	0.036	0.220	0.000	0.000	0.000
MHM-1	62.771	112.526	175.297	62.771	67.619	130.390	1.137	0.000	1.137	1.137	1.000	0.000	64.611	64.611
SUB-TOTAL	74.773	128.675	203.448	73.612	73.413	147.024	2.139	0.378	2.276	2.654	1.241	1.029	79.448	80.477
(5) UPPER BANG PAKONG SUB-BASIN														
UBP-3	91.842	172.996	264.839	91.842	123.742	215.584	1.646	0.000	3.292	3.292	2.000	0.000	112.365	112.365
UBP-5	0.352	0.346	0.698	0.352	0.346	0.698	0.096	0.000	0.175	0.175	1.818	0.000	0.026	0.026
UBP-4	45.629	79.733	125.362	40.525	41.400	81.925	0.720	0.720	2.376	3.096	4.300	4.384	36.996	41.380
UBP-2	32.963	69.474	102.436	32.963	69.474	102.436	5.879	0.000	15.471	15.471	2.632	0.000	23.409	23.409
UBP-1	271.945	404.449	676.394	271.945	172.943	444.888	17.890	0.000	17.890	17.890	1.000	0.000	291.492	291.492
SUB-TOTAL	442.731	726.998	1169.729	437.627	407.904	845.531	26.231	0.720	39.204	39.924	1.522	4.384	464.288	468.671
(6) MAENUM NAKHON NAYOK SUB-BASIN														
MNN-6	0.000	0.000	0.000	0.000	0.000	0.000	0.087	0.000	0.153	0.153	1.764	0.000	0.036	0.036
MNN-5	26.383	27.321	53.704	26.383	21.216	47.599	0.630	0.000	1.260	1.260	2.000	0.000	5.869	5.869
MNN-4	0.000	0.000	0.000	0.000	0.000	0.000	0.126	0.000	0.342	0.342	2.718	0.000	0.224	0.224
MNN-3	29.445	33.029	62.474	28.222	15.630	43.852	0.381	0.381	0.762	1.143	3.000	0.842	17.252	18.095
MNN-2	103.012	83.526	186.538	79.906	37.549	117.455	5.247	10.494	8.938	19.432	3.704	12.612	40.807	53.419
MNN-1	95.300	97.525	192.825	64.218	35.270	99.488	20.240	23.458	27.514	50.972	2.518	7.624	42.511	50.135
SUB-TOTAL	254.140	241.401	495.541	198.729	109.665	308.394	26.711	34.333	38.970	73.304	2.744	21.078	106.700	127.777
(7) KHLONG THA LAT SUB-BASIN														
KTL-9	0.000	0.000	0.000	0.000	0.000	0.000	0.975	0.000	1.498	1.498	1.536	0.000	0.962	0.962
KTL-8	0.000	0.000	0.000	0.000	0.000	0.000	0.543	0.000	0.766	0.766	1.410	0.000	0.543	0.543
KTL-7	9.018	14.181	23.199	9.018	12.750	21.768	0.696	0.000	1.652	1.652	2.373	0.000	6.143	6.143
KTL-4	7.521	27.287	34.808	7.521	19.002	26.523	0.240	0.000	0.480	0.480	2.000	0.000	20.458	20.458
KTL-6	0.449	0.441	0.890	0.449	0.434	0.883	0.273	0.000	0.393	0.393	1.440	0.000	0.279	0.279
KTL-5	0.897	0.882	1.779	0.897	0.882	1.779	1.134	0.000	1.540	1.540	1.358	0.000	0.817	0.817
KTL-3	2.347	3.451	5.798	2.347	3.451	5.798	0.102	0.000	0.204	0.204	2.000	0.000	1.377	1.377
KTL-2	0.919	0.904	1.822	0.919	0.904	1.822	0.180	0.000	0.360	0.360	2.000	0.000	0.360	0.360
KTL-1	0.659	0.648	1.307	0.659	0.648	1.307	0.234	0.000	0.149	0.149	0.637	0.000	0.000	0.000
SUB-TOTAL	21.810	47.794	69.604	21.810	38.071	59.881	4.377	0.000	7.041	7.041	1.609	0.000	30.939	30.939
(8) LOWER BANG PAKONG SUB-BASIN														
LBP-17	4.205	4.681	8.886	1.673	0.611	2.284	0.042	0.168	0.058	0.226	5.378	2.399	4.035	6.434
LBP-16	5.894	6.356	12.250	5.894	3.612	9.505	0.345	0.000	0.690	0.690	2.000	0.000	3.555	3.555
LBP-15	3.557	3.499	7.056	3.557	2.017	5.574	0.078	0.027	0.204	0.231	2.962	0.013	1.938	1.951
LBP-14	1.778	1.749	3.527	1.778	1.537	3.315	0.315	0.000	0.554	0.554	1.759	0.000	0.727	0.727
LBP-13	4.369	4.298	8.667	4.369	3.929	8.299	0.030	0.000	0.060	0.060	2.000	0.000	2.429	2.429
LBP-12	0.623	0.612	1.235	0.623	0.549	1.172	0.346	0.000	0.828	0.828	2.393	0.000	1.033	1.033
LBP-11	0.374	0.367	0.741	0.374	0.367	0.741	0.150	0.000	0.293	0.293	1.955	0.000	0.567	0.567
LBP-10	6.508	15.359	21.868	6.508	9.152	15.659	0.108	0.000	0.324	0.324	3.000	0.000	10.747	10.747
LBP-9	1.642	4.938	6.580	1.642	1.837	3.479	0.084	0.000	0.168	0.168	2.000	0.000	3.198	3.198
LBP-8	23.328	40.103	63.431	22.946	15.138	38.084	0.318	0.318	0.636	0.954	3.000	0.064	31.911	31.975
LBP-7	3.165	3.894	7.059	3.165	3.204	6.369	0.450	0.000	1.392	1.392	3.094	0.000	2.156	2.156
LBP-6	9.863	10.080	19.943	9.863	8.496	18.358	0.129	0.000	0.258	0.258	2.000	0.000	5.775	5.775
LBP-3	223.962	360.809	584.771	223.962	268.099	492.061	33.567	0.000	33.567	33.567	1.000	0.000	216.108	216.108
LBP-2	15.188	14.939	30.127	15.188	14.939	30.127	1.577	0.000	1.577	1.577	1.000	0.000	9.308	9.308
LBP-5	9.310	9.157	18.467	9.310	5.369	14.679	0.099	0.000	0.099	0.099	1.000	0.000	6.543	6.543
LBP-4	49.646	94.505	144.151	24.676	9.697	34.374	2.223	5.935	2.223	8.158	3.670	20.232	82.915	103.147
LBP-1	13.589	13.367	26.956	13.589	13.367	26.956	0.073	0.000	0.073	0.073	1.000	0.000	6.524	6.524
SUB-TOTAL	377.001	588.714	965.715	349.117	361.919	711.036	39.934	6.448	43.005	49.453	1.238	22.708	389.469	412.177
(9) ENTIRE BANG PAKONG RIVER BASIN														
SUB-TOTAL	1398.157	2106.026	3504.187	1308.179	1173.048	2481.230	106.076	42.794	139.269	182.064	1.716	50.109	1356.130	1406.238

D.4 OPTIMUM SCALE OF WATER RESOURCES DEVELOPMENT

Tha following tables summarize the procedures employed to determine the optimum scale of water resources development:

Table D-4-1 Irrigable Area by Alternative Plan
Table D-4-2 Required Dam Storage by Alternative Development Plan
Table D-4-3 Net Production Value by Alternative Development Plan
Table D-4-4 Amount of Water Resources to be Allocated to Sectors
Table D-4-5 Construction Cost (Agricultural Sector) by Alternative Plan
Table D-4-6 B/C Ratio by Alternative Development Plan

TABLE D-4-1 IRRIGABLE AREA BY ALTERNATIVE PLAN

(Unit = ha)

	Wet Season		Dry Season				Net Irrigation Area
	Paddy	Veget.	Paddy	Upland C	Veget.	Orchrd	
Alt. Plan-1	339,600	28,000	67,200	120,000	28,000	24,200	406,800
Alt. Plan-2	339,600	28,000	38,200	120,000	28,000	24,200	406,800
Alt. Plan-3	339,600	28,000	0	120,000	28,000	24,200	406,800
Alt. Plan-4	339,600	28,000	0	15,000	28,000	24,200	406,800

Note: Net irrigation area = 339,600 + 28,000 + 15,000 + 24,200 = 406,800 ha

TABLE D-4-3 NET PRODUCTION VALUE BY ALTERNATIVE DEVELOPMENT PLAN

(Unit = million baht)

Sub-Basin	Alt. Plan-1	Alt. Plan-2	Alt. Plan-3	Alt. Plan-4
Lower Bang Pakong	648	624	547	501
Tha Lat	103	100	95	92
Upper Bang Pakong	1,365	1,300	1,194	382
Nakhon Nayok	160	137	62	62
Middle Phra Prong	96	85	85	59
Maenum Hanuman	254	240	240	198
Phra Sathung	254	239	239	205
Upper Phra Prong	412	390	390	338
Total	3,292	3,115	2,852	1,837

TABLE D-4-4 AMOUNT OF WATER RESOURCES TO BE ALLOCATED TO SECTORS

(Unit = MCM & %)

Sector	Alt. Plan-1	Alt. Plan-2	Alt. Plan-3	Alt. Plan-4
Irrigation	4,066(92%)	3,607(92%)	2,997(91%)	2,412(87%)
Industrial Suupply	215(5%)	215(5%)	215(6%)	215(8%)
Water Supply	116(3%)	116(3%)	116(3%)	116(4%)
Fishery	14(0%)	14(0%)	14(0%)	14(1%)
Total	4,412	3,953	3,343	2,758

Note: Irrigation and fishery are counted as agricultural sector.

TABLE D-4-5 CONSTRUCTION COST (AGRICULTURAL SECTOR) BY ALTERNATIVE PLAN

(Unit = million baht)

Item	Dam No.	Alt. Plan-1	Alt. Plan-2	Alt. Plan-3	Alt. Plan-4
Dam	1	814	685	685	615
	4	961	820	820	-
	5	-	-	-	170
	Rabom	97	97	97	97
	8	1,185	1,056	896	786
	10	738	738	696	696
	11	247	223	223	-
	12	885	754	754	577
	15	174	150	139	-
	18+19	1,943	1,939	1,951	1,419
	20	1,820	1,548	1,548	1,222
	21	169	152	111	111
	22	1,048	837	616	616
	Total	9,957	8,902	7,839	6,212
	Agri.	92%= 9,160	92%= 8,190	91%= 7,133	88%= 5,466
Diversion Dam		595	595	595	595
Main Facilities		12,302	12,302	12,302	12,302
On-farm Facilities		4,037	4,037	4,037	4,037
Total		26,094	25,124	24,067	22,400

Note : (1) The Rabom dam is at present under construction.
(2) The proposed Khlong Luang dam is assigned as the No.1 dam.
(3) About 1,500 million bahts of construction cost of the Bang Pakong diversion dam is allocated fiftyfifty between agriculture and other sectors. The cost for agricultural sector is then allocated between both banks of the Bang Pakong river, as;
1,500 x 50% x 384.6MCM/484.6MCM = 595 million bahts (Left bank) and 1,500 x 50% - 595 = 155 (Right bank).

TABLE D-4-6 B/C RATIO BY ALTERNATIVE DEVELOPMENT PLAN

Item	Alt. Plan-1	Alt. Plan-2	Alt. Plan-3	Alt. Plan-4
Benefit				
- Benefit (1)	3,292	3,115	2,852	1,837
- O/M Cost (2)	302	301	300	299
- ((1)-(2))/0.12	24,917	23,450	21,267	12,817
Cost				
- Financial Cost	26,094	25,124	24,067	22,400
- Economic(0.9)	23,484	22,611	21,660	20,160
B/C Ratio	1.06	1.04	0.98	0.64

Note: Discount rate was taken at 12% and project life was considered to be 60 years as an average.

TABLE D-4-2 REQUIRED DAM STORAGE BY ALTERNATIVE DEVELOPMENT PLAN

(Unit = MCM)

Dam No.	Alt. Plan-1	Alt. Plan-2	Alt. Plan-3	Alt. Plan-4
1	172	119	119	79
4	370	300	300	-
5	-	-	-	81
Rabom	(40)	(40)	(40)	(40)
8	565	470	288	157
10	160	160	122	122
11	105	86	86	-
12	350	290	290	193
15	150	98	45	-
18 + 19	327	322	204	204
20	152	133	133	99
21	230	188	90	90
22	126	98	71	71
Total	2,747	2,304*	1,788	1,136

Note: (1) Rabom dam is under construction.
(2) 2,304 MCM(*) includes losses due to evaporation and seepage, that correspond to 10% of the required capacity.

D.5 SELECTION OF PRIORITY PROJECT

The following tables summarized the procedures employed to select the priority sub-project:

Table D-5-1 Evaluation from National Economic Point of View

Table D-5-2 Evaluation from Technical Point of View

Table D-5-3 Evaluation from Social Point of View

Table D-5-4 Evaluation from Farm Economic Point of View

TABLE D-5-1 EVALUATION FROM NATIONAL ECONOMIC POINT OF VIEW (B/C RATIO)

Sub-Basin	Incremental Benefit			Feasible Investment		Cost		B/C Ratio	
				Discount Rate				Discount Rate	
	Incre. Beneft	O/M Cost	Bene -fit	10 %	12 %	Finan-cial	Econo-mic	10 %	12 %
Lower Bang Pakong	624	52.7	571.3	5,713	4,761	5,168	4,651	1.23	1.02
Tha Lat	100	6.9	93.1	931	776	707	636	1.46	1.22
Upper Bang Pakong	1,300	97.7	1202.3	12,023	10,019	8,118	7,306	1.65	1.37
Nakhon Nayok	137	54.4	82.6	826	688	3,379	3,041	0.27	0.23
Middle Phra Prong	85	13.5	71.5	715	596	822	740	0.97	0.80
Maenum Hanuman	240	21.4	218.6	2,186	1,822	3,060	2,754	0.79	0.66
Phra Sathung	239	22.4	216.6	2,166	1,805	1,957	1,761	1.23	1.02
Upper Phra Prong	390	32.0	358.0	3,580	2,983	1,808	1,627	2.20	1.83
Total	3,115	301	2,814	28,140	23,450	25,019	22,516	1.25	1.04

Note: Benefit, feasible investment and cost are given in million bahts.

TABLE D-5-2 EVALUATION FROM TECHNICAL POINT OF VIEW (DAM CONSTRUCTION AND COMPENSATION)

Sub-Basin	Dam No.	Height (m)	Dam Volume 1000m^3	Compensation (ha)	Reliability of Dam Foundation (Max=5)	Quality of Embankment Materia (3)	Workability (Max=2)	Total	EVALUATION	Compensation, N/P	Houses, G/L	EVALUATION
Lower Bang Pakong	1	23.5	3,340	5,500	3	3	2	8	B	P	G	C
Tha Lat	4	33.5	3,740	7,370	3	3	2	8	C	P	G	C
Phra Sathung	8	30.3	4,270	9,710	3	2	2	7	C	P	G	C
Upper Phra prong	10	23.5	2,750	8,580	1	3	2	6	E	P	G	C
	11	28.3	1,060	1,720	4	3	2	9	A	N	0	A
Maenum Hanuman	12	35.2	3,450	2,600	3	2	1.	6.	D	P	L	B
	15	24.2	260	3,010	5	1	2	8	B	P	G	C
	18	85.6	10,800	1,130	4	1	1	6	E	N	0	A
	19	23.0	480	430	4	2	1	7	C	N	0	A
Upper Bang Pakong	20	86.6	11,150	450	5	2	1.	8.	B	N	0	B
Nakhon Nayok	21	47.7	920	2,480	1	3	1.	5.	E	N	0	A
	22	43.2	6,600	700	4	2	1	7	C	P	L	B

Note: (1) No proposed damsite in the Middle Phra prong sub-basin.
(2) Decimal point denotes 0.5 point (ex. 1.=1.5). Three(3) point is given for the grade "A"(excellent or no problem), 2 point is given for "B", while 1 point for "C" and "D", and 0 point for "E"(difficult).
(3) For compensation of the reservoir area, 3 point is given for "A" where no or less impact is evaluated, 2 point for "B"(moderate) and 1 point for "C" where a considerable impact is presumed.

TABLE D-5-3 EVALUATION FROM SOCIAL POINT OF VIEW (URGENCY AND INHABITANT'S NEEDS)

Sub-Basin	Inhabitant's Needs					Supply Urgency	
	Irrigat.	Domestic	Road	Elec	Evaluat.	Industry	Domes.
Lower Bang Pakong	2	1	(3)	(1)	3	3	3
Tha Lat	3	1	(2)	(1)	4	3	3
Upper Bang Pakong	3	1	(2)	(1)	4	2	2
Nakhon Nayok	2	1	(3)	(1)	3	2	2
Middle Phra Prong	2	1	(3)	(1)	3	1	1
Maenum Hanuman	2	1	(3)	(1)	3	1	1
Phra Sathung	1	1	(3)	(2)	2	1	1
Upper Phra prong	1	1	(3)	(1)	2	1	1

Note: Needs for road and electricity were excluded from overall evaluation.
Inhabitants's needs: 3=eager, 2=moderate and 3=modest.
Urgency: 3=very urgent, 2=moderate and 1=not urgent.

TABLE D-5-4 EVALUATION FROM FARM ECONOMIC POINT OF VIEW (PER HA BENEFIT)

Sub-Basin	Annual Benefit (Million B)	Benefic-ial Area (ha)	Unit Area Benefit (1000baht/ha)	Evalua -tion
Lower Bang Pakong	624	68,900	9.1	2
Tha Lat	100	6,900	11.8	3
Upper Bang Pakong	1,300	136,900	9.4	2
Nakhon Nayok	137	76,400	1.8	1
Middle Phra Prong	85	16,600	5.1	1
Maenum Hanuman	240	28,100	8.2	2
Phra Sathung	239	29,700	8.0	2
Upper Phra Prong	390	43,300	9.2	2
Total	3,115	406,800	7.7	

Notes: Evaluation; 3 points for benefit>10.0, 2points for 10.0≦benefit≦7.5 and 1 point for benefit<7.5.

D.6 FLOOD RUNOFF ANALYSIS

D.6.1 Flood Rainfall

Probable 3 Day Consecutive Rainfall

As is seen in Figure D-6-1, probable 3 day consecutive rainfall has a close relation with the average annual rainfall at selected rain stations, where storm rainfall data are available. The following equation was developed to estimate probable consecutive rainfall in each irrigation block (see Tables D-6-1 and D-6-2).

$X = 0.0865 \times Y + 65.1$

where, X : 3 day consecutive rainfall which would occur once in 10 years, in mm

Y : Average annual rainfall (mm)

Hourly Distribution of Storm Rainfall

Hourly distribution of storm rainfall was determined in proportion to the actual pattern of the storm rainfall measured at stations in September 1972 (cf. Appendix A-2-10).

Runoff Coefficient during Flood

Amount of flood runoff was plotted against the amount of flood rainfall at stations. An envelope curve was drawn mainly from the data obtained at the station kgt.12, as shown in Figure D-6-1. This envelope curve was then converted into an equation showing relation between the accumulated storm rainfall and rainfall loss as under:

$SL = 0.5 \times SR$, when $SR < 100$ mm

$SL = 0.375 \times SR + 12.5$, when $SR > 100$ mm

where, SL : Cumulative loss of rainfall (mm)

SR : Cumulative rainfall (mm)

Effective Rainfall

Effective rainfall is, then, calculated as follows:

$SRE_t = SR_t - SL_t$

$RE_t = SRE_t - SRE_{t-1}$

where, SRE : Cumulative effective rainfall (mm)

t, t-1: time

D.6.2 Flood Runoff Model

The mechanism of surface runoff may fall generally into two parts; namely (1) the behaviour of rain water which flows down a sloping surface and pours directly into river channel and (2) the behaviour of lateral inflow which pours into such a stream. As a simplified stream condition, the behaviour of unsteady flow in an open channel with distributed lateral inflow along a channel is studied hydraulically to establish the basic relationship between the rate of inflow and runoff in a stream or on a sloping surface. Hydrographs under this simplified condition are easily computed for both laminar and turbulent flows, and the hydraulic character of hydrographs resulting from simulated inflow at a given rate are investigated. The method of characteristics was employed to express this phenomenon. Breif explanation is as below:

If the law of resistance of Manning's type is used, unsteady flow in an open channel with a given rate of lateral inflow would be expressed for the practical purposes by the equations;

$$A = n \times I^{-1/2} \times R^{2/3} \times Q = kQ^{p} \quad \text{and}$$

$$\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial X} = q$$

The method of characteristics is applied in order to solve the above equations and the characteristic curves are given as follows:

$$\frac{dX}{1} = \frac{dt}{dA/dQ} = \frac{dt}{pkQ^{p-1}} = \frac{dQ}{q}$$

where, A : cross-sectional area of flow (sq.m)

n : Manning's roughness coefficient

I : water surface slope of flow

R : hydraulic radius (m)

Q : discharge (cu.m/sec)

k, p : constants

t : time

X : distance along channel (m)

q : lateral inflow per unit length of channel (cu.m/sec/m)

This means that to solve the former equations is to solve the *following two equations on a characteristic curve, which is expressed as* $dX/dt = Q^{1-p}/pk$. Thus;

$qdt = pkQ^{p-1}$ or $qt = kQ^{p}$ + constant, and

$qdX = dQ$ or $qX = Q$ + constant

Taking that constant = 0, the flow condition is expressed for a given magnitude of lateral inflow q, as;

$t = kQ^{p}/q$ and

$t = kXQ^{p-1}$

When q=0, it is expressed on a characteristic curve given above that A = constant and Q = constant $= (A/k)^{1/p}$. The flow condition is so given as follows:

$X = (Q^{1-p}/pk)t.$

Some Consideration on Effect of Storage on a Paddy Plot

The time lag of concentration of runoff is generally recognized to be remarkable for drainage area mainly composed of low flat paddy because of storage capacity on a paddy plot. A paddy plot surrounded by levees with certain depth of flooding water can be regarded as a small reservoir and, therefore, the conception of simplified reservoir operation could be introduced to take into account the effect of rain water deposit on a paddy plot.

A storage function is introduced to calculate the specific runoff capacity from a paddy plot by the following equation:

$$\frac{dV}{dt} = I - O$$

where V denotes storage on a paddy plot, I and O, inflow into and outflow from a paddy plot respectively, and t time. The above equation can be divided by the water surface area on a plot, A, and then transformed:

$$\frac{dH}{dt} = i - o$$

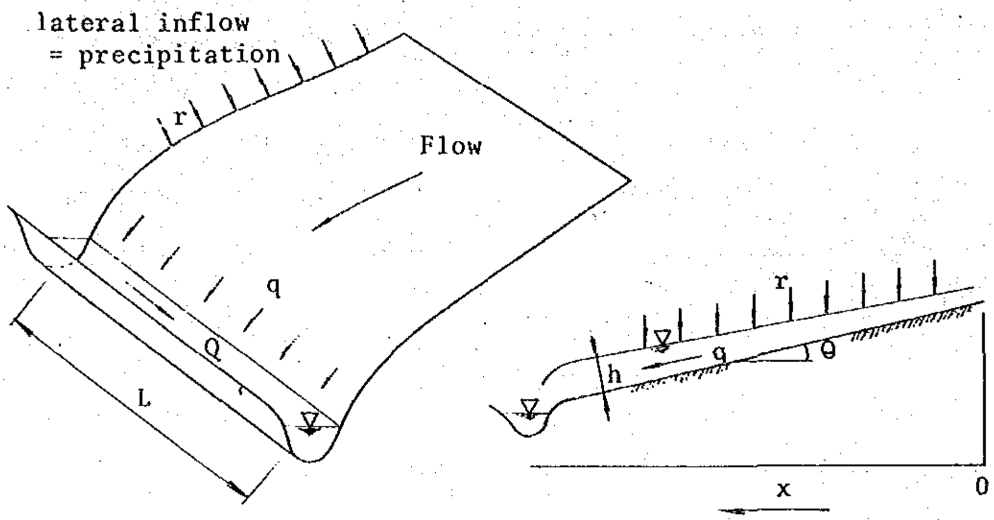
where H shows ponding depth on a plot, i specific inflow corresponding to effective rainfall on a plot, and o specific outflow corresponding to the specific runoff capacity from a paddy plot. A differencial equation is constructed to solve the above equation by a computer as;

$$H_{t+1} = H_t + (RE_{t,\,t+1} - \frac{o_t - o_{t+1}}{2})\Delta t$$

where $RE_{t,\,t+1}$ represents effective rainfall between time t and t+1 and Δt is a time interval given for computation. The specific runoff capacity from paddy fields is thus computed at corresponding time t, and then this is considered as a lateral inflow of drainade canal or stream.

Application of the Characteristic Method to a Real Problem

(1) For a Slope



- In the case when $r \neq 0$

  $t = kq^{p} / \delta r$

  $t = kXq^{p-1}$

- When $r = 0$

  $t = pkX/q^{1-p} = 0.6q^{-0.4}(N/I^{1/2})^{0.6}X$

  where, δ : conversion rate from mm/hr to m³/sec = 0.2778×10^{-6}

  r : effective rainfall (mm/hr)

  q : discharge per unit width of slope (m³/sec/m)

  N : equivalent roughness coefficient of slope

  I : slope = $\sin\theta$

  X : flow distance

(2) For River or Channel : As stated previously with theoretical conception.

(3) For Paddy Field

- for ditch

$$A_m = kQ_m^p$$

$$\frac{\partial A_m}{\partial t} + \frac{\partial Q_m}{\partial X} = (2b0)\alpha, \text{ and}$$

- for lateral drainage canal

$$A_b = kQ_b^p$$

$$\frac{\partial A_b}{\partial t} + \frac{\partial Q_b}{\partial X} = \frac{Q_m}{2b}$$

where, A_m, Q_m : flow area and discharge in a ditch

A_b, Q_b : flow area and discharge in a laretal canal

k, p : constants

α : $= 0.2778 \times 10^{-6}$

b : see Figure

0 : runoff capacity per unit area (mm/hr)

Table D-6-3 presents basin characteristics given for flood runoff analysis, and Figure D-6-2 shows the concept of runoff capacity from the paddy field.

TABLE D-6-1 DAILY RAINFALL IN OCTOBER, 1983

Daily Rainfall in (1983 October) (1)

Day	0304	0308	0321	0322	0606	0901	0916	0917	2204	2207
6	-	-	-	6.2	7.4	-	-	2.6	-	0.9
7	-	13.0	-	-	8.1	-	-	-	-	-
8	-	12.4	-	9.1	17.6	3.2	7.4	-	14.5	-
9	-	24.0	-	1.0	16.0	13.0	4.5	63.1	22.5	43.2
10	35.1	38.6	30.4	44.1	12.7	13.2	18.7	21.8	62.5	70.5
11	16.2	45.6	40.4	49.3	6.4	15.6	7.8	25.6	26.6	92.3
12	8.2	5.7	-	2.8	48.8	18.8	-	0.3	35.8	9.5
13	0.0	18.7	40.0	36.7	2.3	40.1	-	10.0	22.6	56.2
14	14.5	10.0	15.5	21.0	14.7	-	36.8	0.7	10.2	-
15	0.0	8.4	-	-	7.4	10.3	7.6	-	16.2	27.5
16	40.1	-	6.5	2.7	-	-	-	-	12.1	-
17	0.0	11.5	-	-	48.4	6.0	17.6	26.1	5.2	28.2
18	25.6	40.0	45.5	41.1	39.4	50.1	132.0	37.6	22.3	73.9
19	56.6	3.3	40.4	44.9	28.7	25.8	6.9	1.5	8.6	-
20	0.0	-	8.5	-	25.1	0.1	2.6	7.8	29.5	4.2
21	-	-	0.5	-	-	14.5	0.9	-	6.2	-
22	-	-	-	-	-	0.9	9.6	11.0	15.8	-
23	-	-	-	3.3	-	4.2	27.9	51.5	8.5	-
24	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	51.2	-
Total	196.3	231.2	277.7	262.2	283.0	215.8	280.3	259.6	324.3	406.4

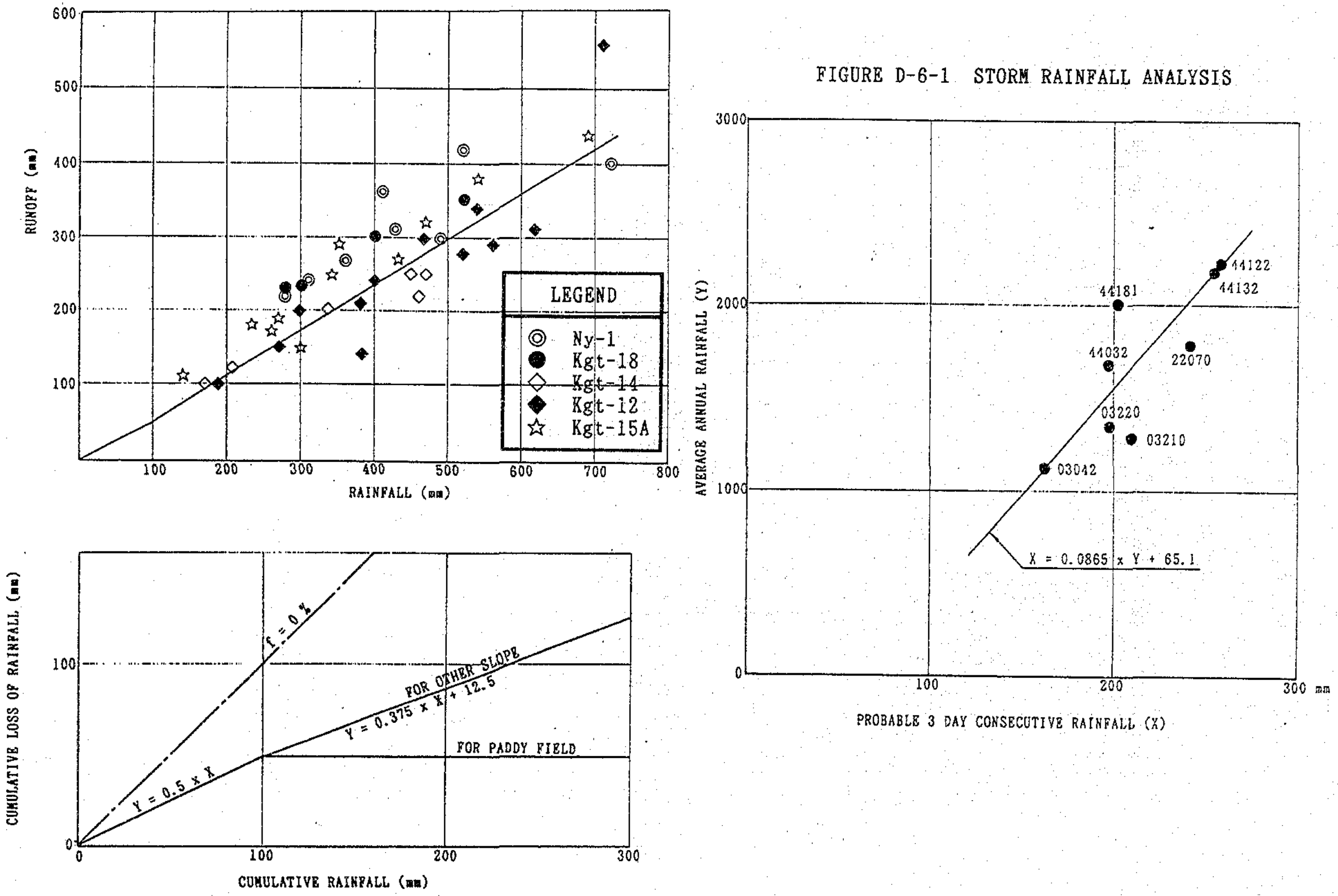
Daily Rainfall in October, 1983 (2)

Day	2215	2517	2553	4402	4404	4406	4408	4412	4413	2515
6	-	-	0.8	-	-	-	-	-	-	1.0
7	5.7	-	-	10.0	-	-	-	-	-	-
8	2.4	7.9	4.8	-	6.0	5.8	6.7	26.0	25.3	6.0
9	22.8	3.9	2.3	35.5	2.9	11.2	13.1	31.8	4.0	2.9
10	83.2	111.0	55.1	40.0	51.3	60.2	49.5	97.5	88.0	69.4
11	16.7	59.0	2.4	60.0	1.0	-	2.8	4.9	-	3.0
12	5.6	110.0	41.0	15.0	8.2	-	48.5	1.8	51.0	51.7
13	22.4	136.7	5.7	20.5	5.2	-	33.3	43.9	26.3	7.2
14	22.6	8.3	0.4	-	2.9	15.0	-	-	52.6	0.5
15	107.4	33.5	21.3	15.0	21.8	16.5	-	24.5	3.7	26.8
16	-	-	-	-	2.6	-	8.0	-	3.0	-
17	35.5	-	27.7	30.5	55.3	-	65.9	85.3	37.6	34.9
18	31.4	49.6	21.7	-	34.1	23.0	5.0	18.8	9.0	27.3
19	42.3	-	-	-	0.7	30.5	-	-	1.3	-
20	-	-	5.7	-	6.7	25.0	6.8	25.6	7.2	7.2
21	-	1.3	-	-	-	-	-	-	7.1	-
22	-	3.2	7.0	-	0.8	-	-	66.0	0.4	8.8
23	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	8.3	-	-
25	-	-	-	-	-	-	-	-	-	
Total	398.0	524.4	195.9	226.5	199.5	187.2	239.6	434.4	316.5	246.7

TABLE D-6-2 AREAL DISTRIBUTION OF DAILY RAINFALL IN OCTOBER, 1983

	OCTOBER 1983																		
NO.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
LBP 1	0.0	0.0	3.2	13.0	13.2	15.6	18.8	40.1	0.0	10.3	0.0	6.0	50.1	25.8	0.1	14.5	0.9	4.2	215.8
2	0.0	1.3	1.3	2.8	34.8	19.1	8.3	3.1	13.6	1.1	34.9	1.3	27.8	49.8	0.0	0.4	0.0	0.1	199.9
3	0.0	0.0	0.0	0.0	49.6	23.9	5.6	12.8	14.8	0.0	29.3	0.0	32.0	51.0	2.7	0.2	0.0	0.0	221.9
4	0.0	0.0	2.0	8.2	21.3	15.8	14.9	25.3	5.4	6.5	14.8	3.8	41.0	37.0	0.1	9.1	0.6	2.6	208.4
5	0.4	0.0	2.9	20.1	14.8	16.7	15.1	33.6	1.9	8.6	0.0	9.6	52.3	21.2	1.4	11.6	2.8	12.5	225.6
6	1.5	0.0	0.0	35.3	27.7	21.5	3.8	5.6	6.8	0.0	17.6	14.6	32.3	25.5	4.4	0.0	6.2	28.8	231.5
7	1.8	0.0	2.1	46.1	20.9	20.4	0.2	7.1	11.2	2.2	0.0	23.6	65.0	3.1	6.3	0.3	10.6	44.7	265.6
8	1.7	0.0	0.0	40.4	26.6	22.2	3.1	6.4	5.7	0.0	14.4	16.7	33.3	21.1	5.0	0.0	7.0	33.0	236.6
9	2.6	0.0	0.0	63.1	21.8	25.6	0.3	10.0	0.7	0.0	0.0	26.1	37.6	1.5	7.3	0.0	11.0	51.5	259.6
10	2.6	0.0	0.0	63.1	21.8	25.6	0.3	10.0	0.7	0.0	0.0	26.1	37.6	1.5	7.8	0.0	11.0	51.5	259.6
11	2.8	0.0	0.5	60.0	22.9	26.8	0.4	11.3	1.7	0.0	0.1	24.8	37.8	3.7	7.4	0.0	10.4	49.1	259.7
12	3.1	0.0	1.2	55.0	24.7	28.7	0.6	13.5	3.3	0.0	0.4	22.7	38.1	7.1	6.8	0.0	9.6	45.2	259.9
13	0.0	0.0	0.0	0.0	43.3	20.6	6.7	7.2	14.7	0.0	34.1	0.0	29.2	53.2	1.5	0.1	0.0	0.0	210.5
14	2.5	0.0	0.0	59.9	24.7	26.3	0.3	11.5	1.4	0.0	0.3	24.8	38.0	3.4	7.8	0.0	10.4	48.9	260.5
15	0.3	0.0	0.0	6.9	74.0	38.8	0.0	36.7	13.9	0.0	5.8	2.9	44.6	36.1	8.4	0.4	1.2	5.7	275.7
16	1.0	0.0	0.9	9.6	68.0	39.1	0.3	35.2	13.8	0.0	5.1	3.9	43.9	35.0	7.5	0.4	1.6	8.1	273.4
17	0.0	0.0	0.0	0.0	80.4	40.4	0.0	40.0	15.5	0.0	6.5	0.0	45.5	40.4	8.5	0.5	0.0	0.0	277.7
KTL 1	0.0	0.0	0.0	0.0	80.4	40.4	0.0	40.4	15.5	0.0	6.5	0.0	45.5	40.4	8.5	0.5	0.0	0.0	277.7
2	0.0	0.0	0.0	0.0	80.4	40.4	0.0	40.4	15.5	0.0	6.5	0.0	45.5	40.4	8.5	0.5	0.0	0.0	277.7
3	0.0	0.0	0.0	0.0	80.4	40.4	0.0	40.4	15.5	0.0	6.5	0.0	45.5	40.4	8.5	0.5	0.0	0.0	277.7
4	3.6	0.0	5.3	0.6	59.3	45.6	1.6	38.1	18.7	0.0	4.3	0.0	42.9	43.0	3.6	0.2	0.0	1.9	268.7
5	5.4	0.0	7.9	1.2	44.9	48.7	2.5	35.5	19.8	0.1	4.0	0.1	42.2	44.0	0.7	0.4	0.0	2.9	260.3
6	4.5	0.0	6.6	2.4	32.6	49.9	2.3	28.7	16.6	0.8	8.0	0.7	45.1	41.9	0.2	1.9	0.0	2.6	244.6
7	5.8	0.0	8.0	8.5	41.4	46.5	2.5	33.5	18.6	0.0	2.4	3.1	40.7	39.7	0.9	0.0	1.3	9.1	261.9
8	6.2	0.0	9.1	1.0	44.1	49.3	2.8	36.7	21.0	0.0	2.7	0.0	41.1	44.9	0.0	0.0	0.0	3.3	262.2
9	6.2	0.0	9.1	1.0	44.1	49.3	2.8	36.7	21.0	0.0	2.7	0.0	41.1	44.9	0.0	0.0	0.0	3.3	262.2
UBP 1	0.0	4.2	2.8	13.9	61.2	38.6	4.4	25.1	10.9	7.7	2.9	8.9	29.8	23.7	8.2	0.2	0.0	0.0	242.6
2	0.2	3.4	3.4	25.9	56.1	40.3	6.4	19.9	7.3	18.2	0.0	15.2	30.7	13.7	12.0	0.0	0.0	0.0	252.7
3	0.0	0.0	2.4	6.9	28.5	34.4	2.1	9.3	10.3	6.5	13.8	2.7	44.0	32.7	8.4	4.3	0.0	0.5	206.6
4	0.0	0.0	6.8	10.8	61.6	0.0	2.5	1.3	16.9	15.9	0.1	1.9	22.3	29.0	24.1	0.4	0.0	0.0	193.7
5	0.0	0.0	9.3	9.9	65.2	0.0	9.2	4.7	21.8	14.2	0.5	6.8	20.5	25.2	21.8	1.3	0.1	0.0	210.5
MNN 1	0.5	4.2	1.4	31.9	57.3	60.5	20.4	31.2	0.3	21.9	0.2	30.0	33.0	0.2	3.5	0.1	2.0	0.2	298.8
2	0.6	1.0	6.6	14.8	62.1	23.2	37.9	16.8	2.7	22.1	2.9	25.3	26.9	2.1	11.2	1.5	8.4	2.0	268.2
3	0.3	0.0	9.6	29.5	65.2	48.9	26.9	34.0	6.7	20.0	8.0	13.0	39.8	5.7	20.9	4.1	10.4	5.6	348.8
4	0.0	0.0	11.9	15.2	81.4	39.2	64.7	67.1	9.5	22.9	7.4	3.2	32.9	5.2	18.0	4.3	10.9	5.2	399.1
5	0.7	0.0	2.3	33.7	79.1	82.3	32.7	72.6	2.2	28.4	0.5	21.1	66.5	0.3	4.3	0.5	1.3	0.3	428.9
6	0.3	0.0	3.7	22.9	65.0	35.3	5.7	23.5	9.3	20.9	0.0	10.4	42.4	18.6	16.8	0.0	0.1	0.0	275.0
MPP 1	0.4	0.0	13.4	18.3	52.1	28.4	1.5	27.7	3.8	13.3	9.8	42.9	36.4	18.1	12.9	2.9	32.3	0.6	314.9
MHM 1	0.0	0.2	22.7	8.6	82.4	5.3	38.7	27.2	40.5	9.7	4.0	41.4	14.7	5.0	9.0	5.9	9.5	0.1	324.9
2	0.0	0.0	21.0	5.6	81.9	0.0	39.8	20.5	44.3	6.5	2.3	29.3	12.1	7.7	11.1	5.5	0.3	0.0	288.1
3	0.0	2.4	7.0	13.5	85.6	21.8	35.5	46.5	20.7	57.5	0.3	19.0	31.6	24.6	6.3	1.1	0.8	0.0	374.3
4	0.0	4.7	6.3	19.6	84.0	13.9	13.3	23.1	27.7	89.8	0.5	35.9	27.6	35.3	1.2	1.2	0.1	0.0	384.1
5	0.0	5.7	2.4	22.8	83.2	16.7	5.6	22.4	22.6	107.4	0.0	35.5	31.4	42.3	0.0	0.0	0.0	0.0	398.0
6	0.0	5.7	2.4	22.8	83.2	16.7	5.6	22.4	22.6	107.4	0.0	35.5	31.4	42.3	0.0	0.0	0.0	0.0	398.0
7	0.0	0.0	26.0	31.8	97.5	4.9	1.8	43.9	0.0	24.5	0.0	85.3	18.8	0.0	25.6	0.0	66.0	0.0	426.1
8	0.0	3.1	13.2	24.7	89.0	10.9	7.8	30.9	16.4	67.6	0.2	54.6	24.8	22.9	10.3	0.6	25.1	0.0	402.1
9	0.3	0.0	19.0	22.1	83.5	4.1	14.7	31.3	0.1	23.4	0.0	66.3	19.8	0.0	19.0	0.0	46.5	0.0	350.1
KPS 1	0.0	0.0	19.0	25.6	81.7	4.2	17.2	40.4	0.0	16.4	2.6	78.9	14.2	0.0	19.4	0.0	44.2	0.0	370.1
2	1.8	0.0	8.9	11.1	51.8	16.5	31.5	35.1	6.1	2.0	5.8	48.3	16.6	13.0	6.3	0.0	5.3	1.0	364.5
3	3.3	2.8	10.8	12.8	36.0	9.2	43.6	22.8	7.5	2.6	4.6	52.5	21.0	15.0	12.5	0.0	0.0	0.4	257.3
4	5.7	4.7	13.6	12.0	26.9	15.6	38.2	16.1	13.4	4.3	2.1	40.6	33.3	27.0	15.8	0.0	0.0	0.8	270.0
UPP 1	0.0	0.0	23.9	29.7	92.2	4.7	6.9	42.7	0.0	21.8	0.9	83.2	17.3	0.0	23.5	0.0	58.7	0.0	405.6
2	0.0	0.0	11.1	17.4	60.5	3.3	37.8	35.7	0.0	5.6	6.2	70.4	8.2	0.0	11.1	0.0	15.2	0.0	282.5
3	0.4	0.0	7.9	10.2	57.4	2.8	39.9	21.8	0.2	12.5	3.4	50.5	14.2	0.0	8.4	0.0	10.5	0.0	240.0
MEAN	1.2	0.8	6.5	18.9	55.7	26.3	12.7	26.9	11.3	14.8	5.3	22.6	34.0	22.3	8.4	1.4	8.0	7.9	285.2

FIGURE D-6-1 STORM RAINFALL ANALYSIS



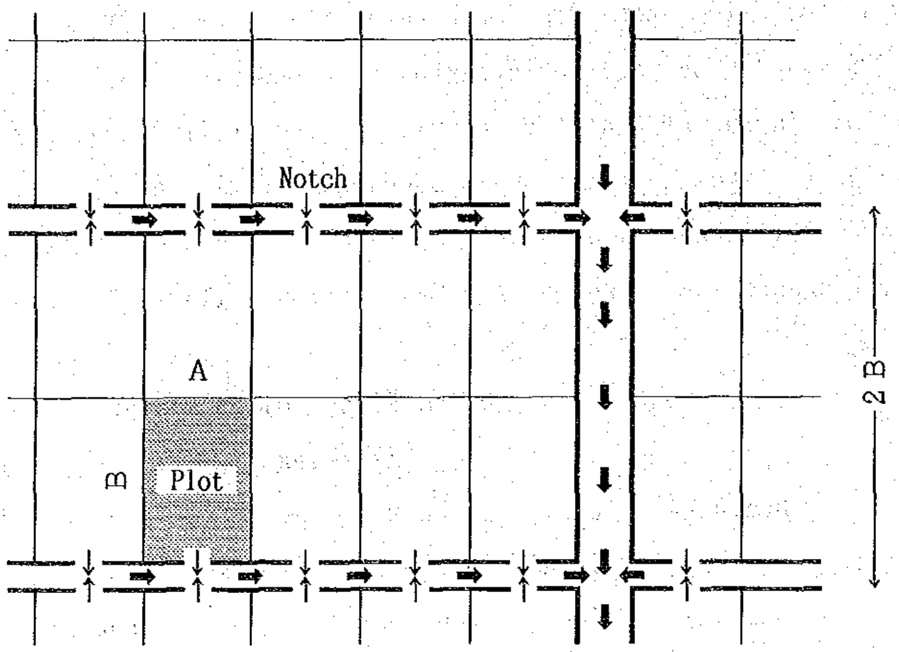
D.6.3 Flood Discharge

The following peak discharge and total amount of the design flood were obtained for (1) existing basin condition and (2) anticipated condition in future, as the result of the preliminary study of flood analysis. For the computation, topographic condition of irrigation block including drainage area and surface slope by land use and length and slope of river channel was read on 1/50,000 topo-maps (Table D-6-3).

Peak Discharge and Flood Volume Analyzed

			Existing		Anticipated	
Station	Drainage Area	Basin Rainfall	Peak Discharge	Specific Volume	Peak Discharge	Specific Volume
	(sq. km)	(mm)	(cum/sec)	(mm)	(cum/sec)	(mm)
801	1,628	247.6	1500.6	115.2	2056.0	131.8
701	2,643	227.9	1203.3	82.8	1408.6	88.6
601	5,241	223.3	3079.0	91.4	3941.0	102.3
501	2,130	247.6	1492.2	118.5	1700.6	125.1
401	10,128	171.2	5750.9	85.8	7063.8	102.8
301	1,933	199.0	1085.4	97.0	2129.1	118.4
201	2,493	153.9	1042.7	68.8	1060.0	70.2
101	17,660	145.8	8,361.8	72.3	10181.3	89.8

FIGURE D-6-2 RUNOFF CAPACITY FROM PADDY FIELD



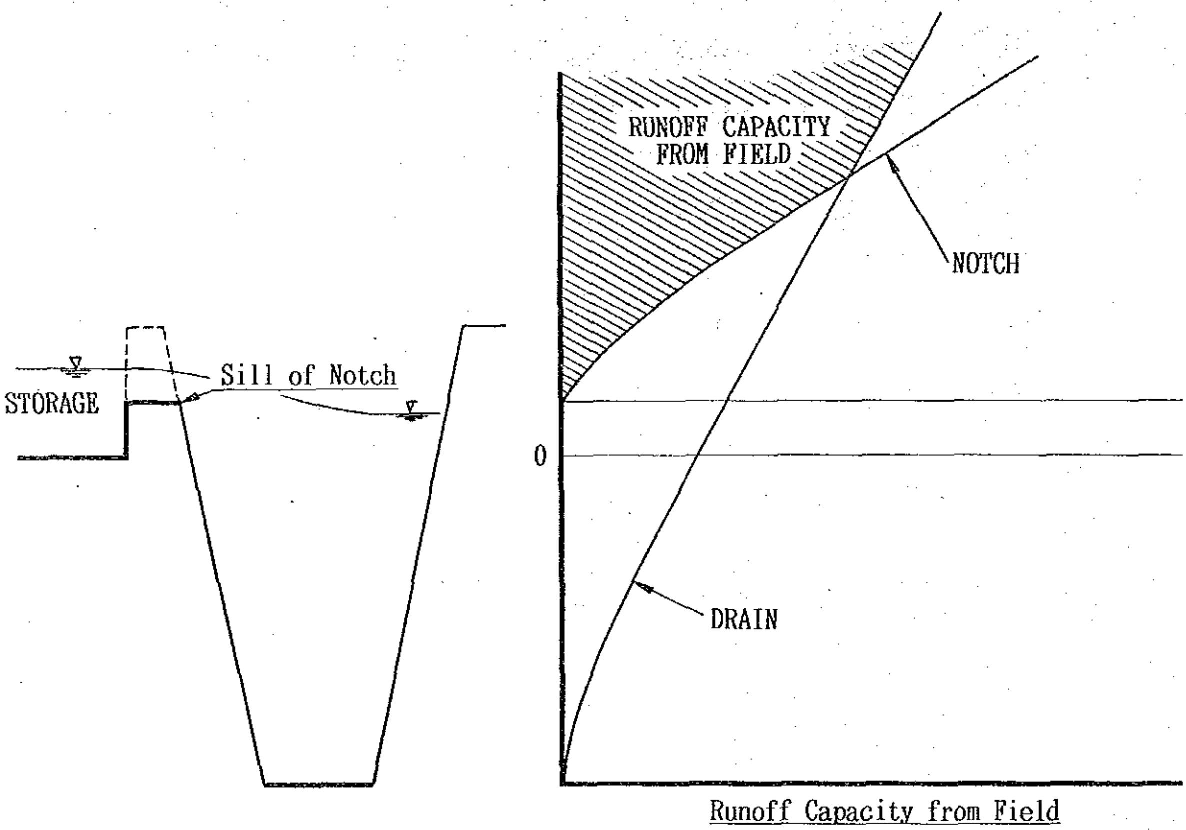


TABLE D-6-3 BASIN CHARACTERISTICS GIVEN FOR FLOOD RUNOFF ANALYSIS

Sub Basin	Site No	Watershed Area (sq. km)				Slope Gradient			River Chan.	
		Paddy	Upland	Others	Total	Pad.	Upld	Othr	Lngt	Slope
UPP-3	803	0.0	0.0	266.0	266.0	300	200	30	30	90
-2	802	215.2	103.0	455.6	774.0	200	170	10	58	1450
-1	801	250.4	272.1	65.5	588.0	200	160	10	58	2900
KPS-4	704	19.7	231.2	363.1	614.0	200	150	40	48	170
-3	703	26.2	304.2	507.6	838.0	200	120	80	45	1100
-2	702	92.4	103.3	605.3	801.0	200	150	120	38	1900
-1	701	161.3	163.2	65.5	390.0	300	200	100	50	5000
MPP-1	601	195.2	218.2	556.6	970.0	500	450	200	63	6300
MHM-5	505	0.0	0.0	68.0	68.0	400	300	25	8	90
-6	506	0.0	56.5	39.5	96.0	500	400	15	7	35
-4	504	38.8	3.9	131.3	174.0	800	500	60	18	450
-8	508	0.0	0.0	64.0	64.0	200	100	60	10	250
-9	509	0.0	0.0	147.0	147.0	1000	500	50	20	80
-7	507	0.0	0.0	232.0	232.0	1000	800	100	28	350
-3	503	0.0	0.0	273.0	273.0	200	150	110	37	300
-2	502	0.0	0.0	159.0	159.0	500	300	170	28	40
-1	501	206.4	340.6	370.0	917.0	2000	800	80	53	1300
UBP-3	403	346.9	374.5	28.6	750.0	1000	400	300	40	8000
-5	405	0.0	0.0	107.0	107.0	300	200	130	15	35
-4	404	230.3	103.6	60.1	394.0	500	250	110	35	1200
-2	402	177.2	262.8	6.0	446.0	1000	250	60	38	8000
-1	401	919.4	134.8	5.8	1060.0	5000	3000	400	43	8000
MNN-6	306	0.0	0.0	151.0	151.0	200	100	10	18	450
-5	305	34.3	82.1	339.6	456.0	3000	500	300	40	110
-4	304	0.0	0.0	114.0	114.0	200	100	10	8	60
-3	303	179.4	44.1	121.5	345.0	1000	300	60	25	1700
-2	302	260.3	46.2	62.5	369.0	5000	5000	400	15	1900
-1	301	342.8	8.0	147.2	498.0	5000	5000	400	35	3500
KTL-9	209	1.3	24.5	559.2	585.0	200	100	70	38	420
-8	208	3.8	36.4	350.8	391.0	200	100	20	38	380
-7	207	2.5	98.7	293.8	395.0	200	140	70	33	1700
-4	204	7.9	100.8	28.3	137.0	200	100	100	25	2500
-6	206	1.8	82.3	96.9	181.0	200	180	100	18	1800
-5	205	7.6	121.2	488.2	617.0	200	200	100	43	1100
-3	203	0.0	62.7	6.3	69.0	5000	3000	200	18	1000
-2	202	1.3	77.3	7.4	86.0	5000	3000	200	15	7500
-1	201	13.7	15.2	3.1	32.0	5000	3000	400	22	9000
LBP-17	117	11.9	3.6	4.5	20.0	5000	500	400	7	3500
-16	116	22.0	160.8	16.2	199.0	5000	400	400	30	1250
-15	115	18.5	41.8	4.7	65.0	5000	300	300	12	500
-14	114	12.5	171.3	17.2	201.0	5000	250	300	25	830
-13	113	27.8	12.7	15.5	56.0	5000	400	400	8	800
-12	112	1.4	250.0	92.6	344.0	2000	100	70	15	500
-11	111	6.4	137.9	39.7	184.0	2000	200	70	15	1000
-10	110	25.3	53.9	5.8	85.0	2000	200	300	13	1300
-9	109	26.2	54.6	7.2	88.0	2000	200	70	15	300
-8	108	99.5	77.8	4.7	182.0	5000	500	300	28	2800
-7	107	39.7	415.5	45.8	501.0	2000	100	70	25	190
-6	106	59.6	13.0	7.4	80.0	2000	200	200	25	1050
-3	103	438.9	82.2	4.9	526.0	5000	3000	400	45	15000
-2	102	48.4	12.6	58.0	119.0	5000	3000	400	8	15000
-5	105	104.8	172.2	2.0	279.0	2000	100	70	20	670
-4	104	83.9	41.6	16.5	142.0	5000	800	400	15	5000
-1	101	0.0	1.6	33.4	35.0	5000	500	400	10	1700

D.7 INTAKE-RATE TEST

Intake-rate tests were conducted at the selected five (5) sites in the proposed Tha Lat Expansion irrigation area. Figure D-7-1 shows the selected sites, and the measurements are summarized in Table D-7-1. They were further analyzed in order to obtain the basic intake-rates and others as given in Figure D-7-2.

FIGURE D-7-1 LOCATION OF INTAKE-RATE TEST SITES

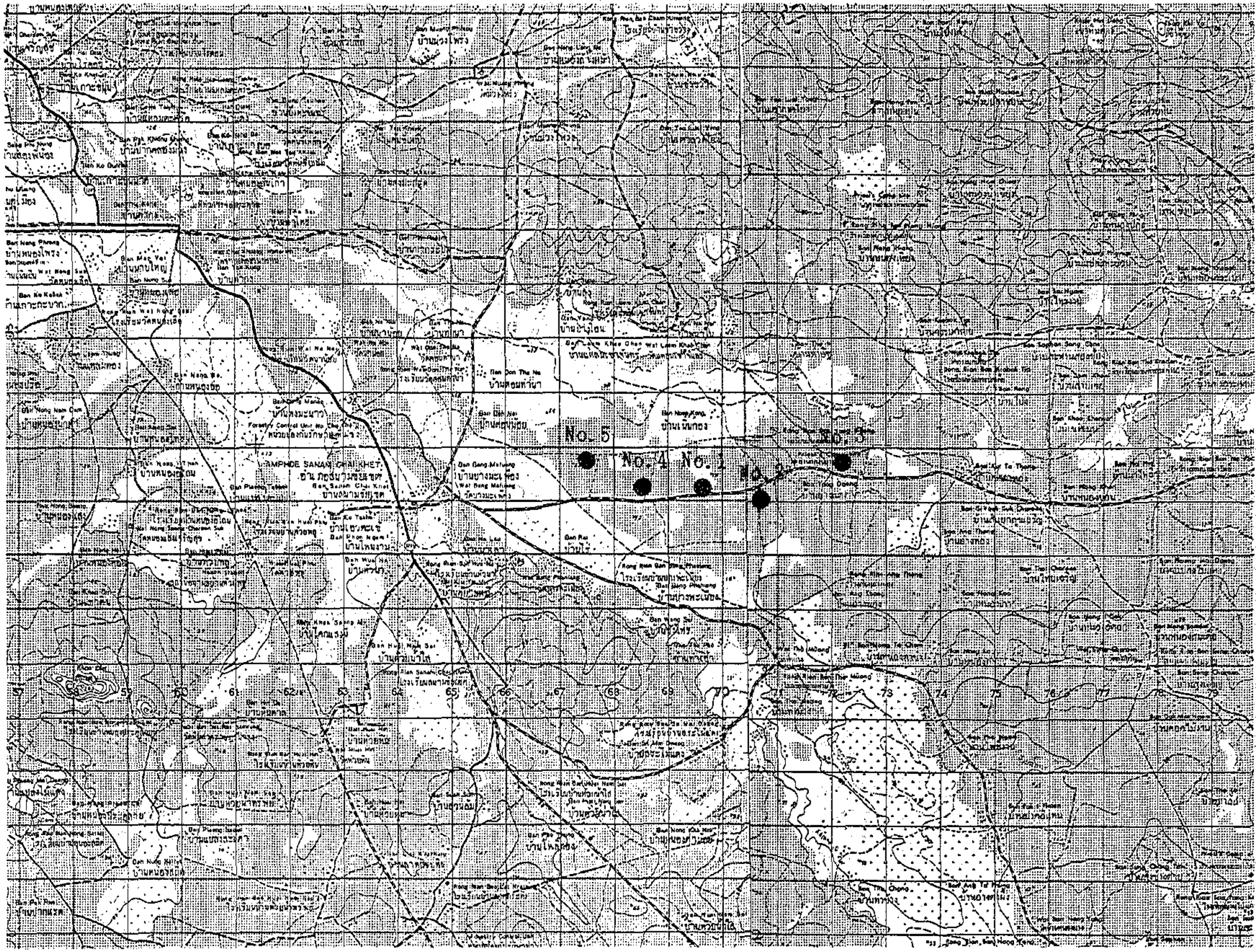
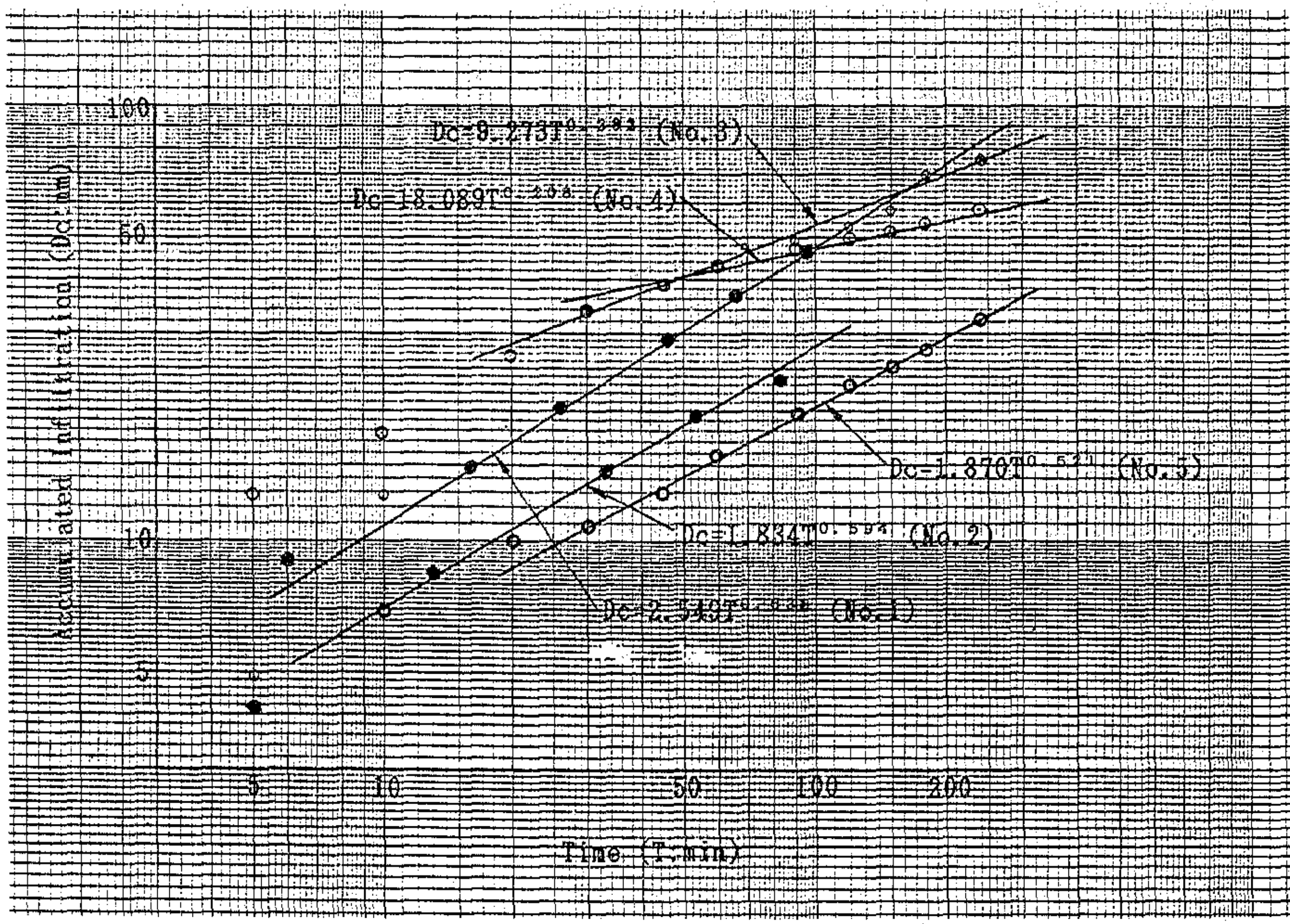


TABLE D-7-1 Data Sheet for Intake Rate Test

Reading Time (Hr)	Time between Readings (min.)	Water Level (cm.)	Difference (mm)	Accumulation (mm)
(1) No.1 site				
11:24	0	24.33	0.0	0.0
30	6	23.42	9.1	9.1
40	16	22.83	5.9	15.0
50	26	22.30	5.3	20.3
12:10	46	21.40	9.0	29.3
30	66	20.67	7.3	36.6
13:00	96	19.72	9.5	46.1
(2) No.2 site				
11:32	0	19.50	0.0	0.0
37	5	19.08	4.2	4.2
45	13	18.65	4.3	8.5
12:05	33	18.03	6.2	14.7
25	53	17.57	4.6	19.3
55	83	17.14	4.3	23.6
(3) No.3 site				
13:30	0	20.0	0.0	0.0
35	5	19.5	5.0	5.0
40	10	18.7	8.0	13.0
50	20	17.3	14.0	27.0
14:00	30	16.6	7.0	34.0
15	45	16.1	5.0	39.0
30	60	15.7	4.0	43.0
15:00	90	15.1	6.0	49.0
30	120	14.6	5.0	54.0
16:00	150	14.2	4.0	58.0
30	180	14.0	2.0	60.0
17:30	240	13.5	5.0	65.0
(4) No.4 site				
10:45	0	20.0	0.0	0.0
50	5	18.7	13.0	13.0
55	10	18.2	5.0	18.0
11:05	20	17.3	9.0	27.0
15	30	16.6	7.0	34.0
30	45	16.0	6.0	40.0
45	60	15.7	3.0	43.0
12:15	90	15.3	4.0	47.0
45	120	15.0	3.0	50.0
13:15	150	14.8	2.0	52.0
45	180	14.6	2.0	54.0
14:45	240	14.2	4.0	58.0
(5) No.5 site				
9:50	0	20.0	0.0	0.0
55	5	19.5	5.0	5.0
10:00	10	19.3	2.0	7.0
10	20	19.0	3.0	10.0
20	30	18.9	1.0	11.0
35	45	18.7	2.0	13.0
50	60	18.4	3.0	16.0
11:20	90	18.0	4.0	20.0
50	120	17.7	3.0	23.0
12:20	150	17.5	2.0	25.0
50	180	17.2	3.0	28.0
13:50	240	16.8	4.0	32.0

FIGURE D-7-2 INTAKE-RATES AT VARIOUS TEST SITES



D.8 PEAK IRRIGATION REQUIREMENT

Peak Irrigation Requirements

(Unit: liter/sec/ha)

Year	Existing Tha Lat First	Existing Tha Lat Second	Existing & Proposed Bang Pakong First	Existing & Proposed Bang Pakong Second	Proposed Tha Lat First	Proposed Tha Lat Second
1968	1.188	0.961	1.360	1.162	1.072	1.051
69	0.970	0.754	1.049	0.759	0.866	0.818
1970	1.042	0.909	1.277	1.209	0.903	0.884
71	1.035	0.958	1.101	1.036	1.105	1.016
72	1.060	1.031	1.137	1.040	1.206	1.087
73	1.188	0.997	1.231	1.112	1.208	1.031
74	1.056	0.952	1.081	1.035	1.146	1.132
1975	1.084	0.878	1.068	0.968	1.176	0.961
76	1.050	0.909	1.149	0.934	0.971	0.933
77	0.988	0.978	1.126	1.122	0.970	0.962
78	1.192	0.801	1.302	0.877	1.155	0.859
79	1.199	1.188	1.273	1.231	1.208	1.208
1980	1.209	0.797	1.284	0.831	1.246	0.838
81	1.197	0.944	1.296	1.100	1.189	0.962
82	1.109	0.901	1.143	0.907	1.171	1.053
83	0.976	0.896	1.022	0.973	1.188	0.912
84	1.188	0.801	1.231	1.057	1.208	0.785
1985	1.101	0.877	1.189	0.834	1.125	1.088
86	1.170	0.787	1.324	0.904	1.118	0.915
87	0.946	0.882	1.037	1.015	1.054	0.743
Probable(*)	1.2	1.0	1.3	1.2	1.2	1.1

Note(*): Probable value during 5-year drought period.

D.9 RESULTS OF WATER BALANCE SIMULATION

The following tables summarize the simulated results of water balance for the subject feasibility study area:

Tables	Case of Computation	Remarks
D-9-1	1	Water demand computation
D-9-2	1	Runoff and water diversion
D-9-3	1	Water balance at the water sources
D-9-4	2	Water demand computation
D-9-5	2	Runoff and water diversion
D-9-6	2	Water balance at the water sources

TABLE D-9-1 WATER DEMAND COMPUTATION (COMPUTATION CASE-1)

1) WATER DEMAND COMPUTATION

YEAR		BANG PAKONG IRRIG.	BANG PAKONG FISH.	BANG PAKONG OTHER	BANG PAKONG TOTAL	EXISTING THA LAT IRRIG.	EXISTING THA LAT FISH.	EXISTING THA LAT OTHER	EXISTING THA LAT TOTAL	THA LAT EXPANSION IRRIG.	THA LAT EXPANSION FISH.	THA LAT EXPANSION OTHER	THA LAT EXPANSION TOTAL	ENTIRE PROJECT AREA IRRIG.	ENTIRE PROJECT AREA FISH.	ENTIRE PROJECT AREA OTHER	ENTIRE PROJECT AREA TOTAL
1968	WET	61.7	1.8	83.1	146.7	134.0	3.1	27.2	164.2	22.5	0.0	4.6	27.1	218.2	4.9	115.0	338.0
	DRY	196.8	11.2	83.4	291.4	115.6	3.5	27.3	146.3	58.9	0.0	4.6	63.5	371.3	14.7	115.3	501.2
	TTL	258.6	13.0	166.5	438.0	249.5	6.6	54.5	310.6	81.4	0.0	9.2	90.6	589.4	19.5	230.2	839.2
1969	WET	47.9	1.8	83.1	132.8	95.7	3.0	27.2	125.9	13.0	0.0	4.6	17.6	156.6	4.8	115.0	276.4
	DRY	183.2	11.0	82.9	277.2	100.1	3.4	27.1	130.6	47.0	0.0	4.6	51.6	330.3	14.4	114.6	459.3
	TTL	231.2	12.8	166.1	410.0	195.7	6.4	54.3	256.5	59.9	0.0	9.2	69.2	486.9	19.2	229.6	735.7
1970	WET	58.0	1.7	83.1	142.8	113.0	2.9	27.2	143.1	15.2	0.0	4.6	19.9	186.2	4.6	115.0	305.7
	DRY	187.9	11.0	82.9	281.8	106.9	3.4	27.1	137.4	50.5	0.0	4.6	55.1	345.2	14.4	114.6	474.3
	TTL	245.8	12.7	166.1	424.6	219.8	6.3	54.3	280.4	65.7	0.0	9.2	75.0	531.4	19.0	229.6	780.0
1971	WET	51.4	1.7	83.1	136.2	117.3	2.8	27.2	147.3	21.5	0.0	4.6	26.1	190.1	4.5	115.0	309.6
	DRY	191.6	11.1	82.9	285.6	108.4	3.7	27.1	139.2	53.2	0.0	4.6	57.8	353.2	14.8	114.6	482.6
	TTL	243.0	12.8	166.1	421.8	225.7	6.5	54.3	286.5	74.7	0.0	9.2	83.9	543.3	19.3	229.6	792.2
1972	WET	56.6	1.8	83.1	141.5	114.8	3.0	27.2	145.0	18.3	0.0	4.6	22.9	189.7	4.8	115.0	309.5
	DRY	183.6	11.1	83.4	278.2	106.7	3.5	27.3	137.4	56.6	0.0	4.6	61.2	346.8	14.6	115.3	476.7
	TTL	240.3	12.9	166.5	419.7	221.5	6.5	54.5	282.4	74.8	0.0	9.2	84.0	536.5	19.4	230.2	786.2
1973	WET	57.4	1.9	83.1	142.4	128.3	3.1	27.2	158.7	21.4	0.0	4.6	26.0	207.2	5.0	115.0	327.2
	DRY	178.2	11.0	82.9	272.1	97.1	3.4	27.1	127.6	47.0	0.0	4.6	51.6	322.2	14.4	114.6	451.3
	TTL	235.6	12.9	166.1	414.6	225.4	6.5	54.3	286.3	68.4	0.0	9.2	77.6	529.4	19.4	229.6	778.4
1974	WET	53.7	1.8	83.1	138.6	113.3	3.0	27.2	143.5	19.6	0.0	4.6	24.2	186.5	4.7	115.0	306.3
	DRY	191.0	11.1	82.9	285.0	108.4	3.5	27.1	139.0	53.0	0.0	4.6	57.6	352.4	14.5	114.6	481.5
	TTL	244.7	12.8	166.1	423.6	221.6	6.4	54.3	282.4	72.6	0.0	9.2	81.8	538.9	19.3	229.6	787.8
1975	WET	64.4	1.9	83.1	149.4	128.6	3.1	27.2	158.9	19.6	0.0	4.6	24.2	212.5	4.9	115.0	332.4
	DRY	179.2	11.0	82.9	273.2	97.0	3.4	27.1	127.5	47.1	0.0	4.6	51.7	323.3	14.5	114.6	452.4
	TTL	243.6	12.9	166.1	422.6	225.5	6.5	54.3	286.3	66.7	0.0	9.2	75.9	535.8	19.4	229.6	784.8
1976	WET	49.2	1.8	83.1	134.2	96.4	2.9	27.2	126.5	13.4	0.0	4.6	18.0	159.0	4.7	115.0	278.7
	DRY	192.0	11.2	83.4	286.6	112.8	3.5	27.3	143.5	55.6	0.0	4.6	60.2	360.4	14.6	115.3	490.3
	TTL	241.3	12.9	166.5	420.7	209.2	6.4	54.5	270.1	69.0	0.0	9.2	78.2	519.4	19.3	230.2	769.0
1977	WET	64.1	1.8	83.1	149.1	143.4	3.0	27.2	173.6	22.6	0.0	4.6	27.2	230.0	4.8	115.0	349.8
	DRY	183.8	11.0	82.9	277.7	102.1	3.4	27.1	132.6	49.1	0.0	4.6	53.7	335.0	14.4	114.6	464.1
	TTL	247.9	12.8	166.1	426.8	245.5	6.4	54.3	306.2	71.7	0.0	9.2	80.9	565.1	19.2	229.6	813.9
1978	WET	57.0	1.8	83.1	141.9	120.0	3.0	27.2	150.2	17.3	0.0	4.6	21.9	194.3	4.8	115.0	314.0
	DRY	191.0	11.1	82.9	285.0	110.3	3.5	27.1	140.8	52.2	0.0	4.6	56.8	353.5	14.5	114.6	482.6
	TTL	248.0	12.9	166.1	426.9	230.3	6.5	54.3	291.1	69.5	0.0	9.2	78.7	547.7	19.3	229.6	796.6
1979	WET	81.5	2.0	83.1	166.6	175.2	3.2	27.2	205.7	27.2	0.0	4.6	31.8	283.9	5.2	115.0	404.0
	DRY	192.6	11.1	82.9	286.7	112.2	3.6	27.1	142.9	57.0	0.0	4.6	61.6	361.7	14.8	114.6	491.1
	TTL	274.1	13.1	166.1	453.3	287.4	6.9	54.3	348.6	84.1	0.0	9.2	93.4	645.6	20.0	229.6	895.1
1980	WET	46.5	1.7	83.1	131.3	107.0	2.9	27.2	137.1	18.2	0.0	4.6	22.8	171.7	4.6	115.0	291.2
	DRY	188.2	11.1	83.4	282.7	107.8	3.4	27.3	138.5	52.4	0.0	4.6	57.0	348.4	14.6	115.3	478.2
	TTL	234.7	12.8	166.5	414.0	214.8	6.3	54.5	275.6	70.6	0.0	9.2	79.8	520.1	19.1	230.2	769.4
1981	WET	62.2	1.8	83.1	147.1	124.7	3.0	27.2	154.9	17.4	0.0	4.6	22.0	204.3	4.7	115.0	324.0
	DRY	190.2	11.1	82.9	284.2	110.3	3.6	27.1	140.9	55.5	0.0	4.6	60.1	355.9	14.6	114.6	485.2
	TTL	252.4	12.8	166.1	431.3	234.9	6.5	54.3	295.8	72.9	0.0	9.2	82.1	560.2	19.4	229.6	809.2
1982	WET	54.7	1.7	83.1	139.6	120.0	3.0	27.2	150.2	21.0	0.0	4.6	25.7	195.7	4.7	115.0	315.4
	DRY	194.5	11.1	82.9	288.5	114.3	3.5	27.1	144.9	55.6	0.0	4.6	60.2	364.3	14.6	114.6	493.5
	TTL	249.2	12.8	166.1	428.1	234.3	6.5	54.3	295.1	76.6	0.0	9.2	85.8	560.1	19.3	229.6	808.9
1983	WET	39.4	1.6	83.1	124.1	80.0	2.6	27.2	109.9	12.8	0.0	4.6	17.4	132.2	4.2	115.0	251.4
	DRY	184.8	11.0	82.9	278.8	100.2	3.4	27.1	130.8	48.2	0.0	4.6	52.8	333.3	14.5	114.6	462.3
	TTL	224.2	12.6	166.1	402.9	180.3	6.0	54.3	240.6	61.0	0.0	9.2	70.2	465.5	18.7	229.6	713.7
1984	WET	61.6	1.8	83.1	146.5	111.1	2.9	27.2	141.3	15.5	0.0	4.6	20.1	188.2	4.7	115.0	307.9
	DRY	189.2	11.2	83.4	283.8	105.5	3.5	27.3	136.2	46.6	0.0	4.6	51.2	341.4	14.6	115.3	471.2
	TTL	250.8	12.9	166.5	430.3	216.6	6.4	54.5	277.5	62.1	0.0	9.2	71.4	529.6	19.3	230.2	779.1
1985	WET	52.9	1.9	83.1	138.0	118.6	3.2	27.2	149.0	21.9	0.0	4.6	26.5	193.4	5.0	115.0	313.4
	DRY	191.0	11.0	82.9	284.9	110.7	3.4	27.1	141.3	54.4	0.0	4.6	59.0	356.1	14.5	114.6	485.2
	TTL	243.9	12.9	166.1	422.9	229.3	6.6	54.3	290.2	76.3	0.0	9.2	85.5	549.5	19.5	229.6	798.6
1986	WET	59.0	1.7	83.1	143.9	114.2	2.9	27.2	144.4	17.1	0.0	4.6	21.7	190.3	4.7	115.0	310.0
	DRY	195.3	11.1	82.9	289.3	114.4	3.6	27.1	145.1	54.8	0.0	4.6	59.4	364.6	14.7	114.6	493.9
	TTL	254.3	12.8	166.1	433.2	228.7	6.5	54.3	289.5	71.9	0.0	9.2	81.1	554.9	19.4	229.6	803.8
1987	WET	65.5	1.8	83.1	150.4	131.3	3.1	27.2	161.6	19.1	0.0	4.6	23.7	215.9	4.9	115.0	335.7
	DRY	141.2	8.6	55.1	204.9	94.4	1.8	18.0	114.2	45.3	0.0	3.1	48.4	280.9	10.5	76.1	367.4
	TTL	206.7	10.4	138.2	355.3	225.6	4.9	45.2	275.8	64.4	0.0	7.7	72.1	496.7	15.3	191.1	703.2
ANNUM		4870.	255.	3296.	8421.	4522.	128.	1078.	5728.	1414.	0.	183.	1597.	10806.	382.	4557.	15745.

TABLE D-9-2 RUNOFF AND WATER DIVERSION (COMPUTATION CASE-1)

2) RUNOFF & WATER DIVERSION

YEAR		BANG PAKONG					EXISTING THA LAT					THA LAT EXPANSION					ENTIRE PROJECT AREA				
		DRCT	RESID	RIVER	CHAN	DAM	DRCT	RESID	RIVER	CHAN	DAM	DRCT	RESID	RIVER	CHAN	DAM	DRCT	RESID	RIVER	CHAN	DAM
1968	WET	13.6	296.1	86.9	4.5	51.8	44.4	307.4	90.5	7.4	58.1	29.8	221.5	22.1	0.4	0.0	87.7	824.9	199.5	12.3	109.9
	DRY	3.9	28.1	32.0	0.0	256.6	9.6	44.8	35.7	0.0	102.9	4.9	17.4	14.6	0.1	46.2	18.5	90.3	82.3	0.1	405.7
	TTL	17.5	324.2	118.9	4.5	308.4	54.0	352.2	126.2	7.4	161.0	34.7	238.9	36.8	0.5	46.2	106.2	915.2	281.8	12.4	515.7
1969	WET	18.1	301.8	92.5	6.0	30.9	58.6	290.0	79.2	9.8	28.7	41.7	250.8	13.0	0.1	0.0	118.4	842.7	184.6	15.9	59.6
	DRY	8.2	31.3	39.5	0.0	235.0	20.6	41.4	39.4	0.0	82.9	14.8	16.4	15.9	0.5	31.8	43.7	89.0	94.8	0.5	349.7
	TTL	26.3	333.1	131.9	6.0	265.9	79.3	331.4	118.6	9.8	111.6	56.5	267.2	28.9	0.5	31.8	162.1	931.7	279.4	16.3	409.3
1970	WET	18.5	309.0	96.9	4.5	37.9	64.2	309.5	97.6	7.4	29.9	52.1	404.1	15.2	0.0	0.0	134.8	1022.5	209.7	11.9	67.8
	DRY	8.4	26.1	34.5	0.0	244.7	20.4	37.0	40.2	1.9	87.2	13.2	16.4	17.3	0.5	34.1	42.0	79.5	92.0	2.4	366.0
	TTL	26.9	335.1	131.4	4.5	282.6	84.6	346.5	137.8	9.2	117.1	65.3	420.5	32.5	0.5	34.1	176.8	1102.0	301.7	14.3	433.8
1971	WET	23.4	364.6	100.9	4.8	27.0	75.7	360.5	108.8	4.9	25.3	49.9	251.4	21.5	0.1	0.0	148.9	976.6	231.2	9.8	52.3
	DRY	3.6	25.0	28.6	0.0	254.4	12.8	35.9	33.7	2.5	96.2	10.6	16.4	16.5	0.7	37.6	27.0	77.3	78.8	3.1	388.2
	TTL	27.0	389.6	129.4	4.8	281.4	88.4	396.4	142.5	7.4	121.5	60.5	267.8	38.0	0.7	37.6	175.9	1053.8	309.9	12.9	440.5
1972	WET	15.7	298.9	85.3	4.5	48.2	56.5	290.5	80.5	5.4	50.8	42.4	206.7	16.0	0.6	1.6	114.7	796.1	181.8	10.6	100.7
	DRY	8.0	28.7	36.7	0.0	238.7	18.8	39.7	38.9	1.9	88.6	8.8	16.5	17.9	0.5	39.9	35.6	84.9	93.5	2.5	367.2
	TTL	23.8	327.6	122.0	4.5	287.0	75.3	330.3	119.4	7.4	139.4	51.2	223.2	33.9	1.2	41.5	150.3	881.0	275.3	13.0	467.9
1973	WET	12.6	286.1	82.5	5.0	51.7	42.7	286.9	78.4	7.4	64.7	30.6	201.8	21.4	0.0	0.0	85.9	774.8	182.3	12.4	116.3
	DRY	9.6	60.8	67.3	0.0	201.8	26.7	62.1	36.7	0.0	82.6	17.9	22.3	15.5	0.5	32.4	54.2	145.1	119.5	0.5	316.8
	TTL	22.1	346.8	149.7	5.0	253.4	69.4	349.0	115.1	7.4	147.3	48.5	224.1	36.9	0.5	32.4	140.1	919.9	301.7	12.9	433.1
1974	WET	19.7	338.6	84.8	5.5	45.0	62.1	337.2	92.9	9.8	32.4	38.5	171.6	18.9	0.5	0.1	120.3	847.4	196.7	15.8	77.6
	DRY	4.6	19.4	24.1	0.0	258.2	14.2	33.4	38.1	0.0	93.9	10.3	16.4	19.2	0.5	35.2	29.2	69.2	81.4	0.5	387.3
	TTL	24.4	358.1	108.9	5.5	303.2	76.3	370.5	131.0	9.8	126.3	48.8	188.0	38.1	1.0	35.4	149.5	916.6	278.0	16.3	464.9
1975	WET	12.4	287.0	86.4	4.5	55.0	51.2	287.4	88.8	4.9	56.8	44.6	262.1	19.4	0.2	0.0	108.2	836.6	194.7	9.6	111.8
	DRY	8.0	32.1	40.1	0.0	230.4	23.8	40.2	38.7	2.1	78.6	16.7	16.4	17.7	0.7	30.2	48.5	88.6	96.4	2.9	339.3
	TTL	20.5	319.1	126.5	4.5	285.4	75.0	327.6	127.5	7.0	135.5	61.2	278.5	37.1	0.9	30.2	156.7	925.2	291.1	12.5	451.1
1976	WET	17.2	329.1	85.5	7.5	37.9	62.3	307.9	73.4	9.8	35.0	50.0	267.2	13.4	0.0	0.0	129.5	904.2	172.3	17.3	72.9
	DRY	6.1	27.4	33.5	0.0	250.4	15.6	38.4	34.2	1.4	99.8	9.7	16.7	15.7	1.0	40.4	31.5	82.5	83.4	2.5	390.6
	TTL	23.3	356.5	119.0	7.5	288.2	78.0	346.3	107.6	11.2	134.9	59.7	283.9	29.1	1.0	40.4	160.9	986.7	255.7	19.8	463.5
1977	WET	15.0	175.6	74.0	4.5	67.0	49.9	187.3	96.5	7.4	61.5	38.9	281.1	22.3	0.4	0.0	103.8	644.0	192.8	12.3	128.5
	DRY	7.6	38.6	40.5	1.5	232.9	19.6	48.6	38.5	0.0	86.1	12.2	17.2	20.7	0.5	29.7	39.5	104.4	99.6	1.9	348.7
	TTL	22.6	214.2	114.5	6.0	299.9	69.6	235.9	135.0	7.4	147.5	51.2	298.3	43.0	0.9	29.7	143.3	748.4	292.4	14.2	477.2
1978	WET	17.1	266.6	75.6	3.0	59.9	57.3	253.5	76.5	9.8	55.6	45.1	299.3	17.1	0.2	0.0	119.5	819.3	169.2	13.0	115.5
	DRY	6.0	25.9	31.9	0.0	250.4	16.6	33.7	33.5	0.0	99.5	13.7	16.4	15.9	0.3	37.6	36.3	76.1	81.3	0.3	387.4
	TTL	23.1	292.5	107.5	3.0	310.3	73.9	287.2	110.0	9.8	155.1	58.8	315.7	33.0	0.5	37.6	155.8	895.4	250.5	13.3	502.9
1979	WET	9.8	152.9	81.0	3.0	79.1	37.2	178.4	100.0	4.9	92.4	34.2	284.2	26.5	0.6	0.2	81.2	615.5	207.5	8.5	171.8
	DRY	3.6	13.3	16.9	0.0	267.1	9.7	32.7	39.1	2.5	94.5	5.3	16.4	16.5	0.5	41.8	18.7	62.4	72.5	3.0	403.3
	TTL	13.4	166.2	97.9	3.0	346.2	46.9	211.1	139.1	7.4	186.9	39.5	300.6	43.0	1.1	42.0	99.8	677.9	280.0	11.5	575.1
1980	WET	18.2	235.6	81.4	7.5	39.0	62.4	227.2	84.0	9.8	35.0	48.9	313.2	18.2	0.0	0.0	129.5	776.0	183.5	17.3	74.0
	DRY	7.3	63.8	47.7	1.5	230.4	18.7	70.7	34.7	0.0	96.0	15.0	51.1	16.6	0.5	37.1	41.0	185.6	99.0	2.0	363.4
	TTL	25.5	299.4	129.1	9.0	269.4	81.1	297.9	118.6	9.8	130.9	63.9	364.2	34.8	0.5	37.1	170.5	961.6	282.5	19.3	437.4
1981	WET	17.5	252.6	92.2	4.5	47.0	56.6	260.7	99.5	4.9	42.2	45.8	393.2	16.1	0.5	0.8	119.8	906.6	207.7	9.9	90.0
	DRY	7.7	28.1	35.8	1.5	244.1	17.8	45.6	44.2	2.6	86.2	9.6	22.7	20.8	0.8	35.4	35.1	96.4	100.8	4.9	365.8
	TTL	25.2	280.7	128.0	6.0	291.1	74.4	306.3	143.7	7.5	128.4	55.4	415.9	36.9	1.3	36.3	154.9	1003.0	308.5	14.8	455.8
1982	WET	17.4	185.2	98.8	6.1	31.2	50.7	193.4	91.3	9.8	40.7	32.6	215.1	21.0	0.0	0.0	100.7	593.7	211.2	15.9	71.9
	DRY	3.6	17.4	21.0	0.0	264.8	10.8	36.2	36.4	2.5	98.5	8.1	19.0	17.0	0.5	39.7	22.5	72.5	74.4	3.0	403.0
	TTL	21.0	202.6	119.8	6.1	295.9	61.5	229.6	127.7	12.3	139.2	40.7	234.1	38.0	0.5	39.7	123.2	666.3	285.5	18.9	474.9
1983	WET	31.1	466.3	90.7	4.5	25.4	103.3	410.7	82.0	7.9	11.8	73.1	347.3	12.8	0.0	0.0	207.5	1224.3	185.5	12.3	37.2
	DRY	6.3	20.4	26.8	0.0	249.4	19.5	35.2	43.3	0.2	79.6	15.0	17.4	18.2	1.4	30.0	40.8	72.9	88.2	1.6	358.9
	TTL	37.4	486.8	117.5	4.5	274.8	122.8	445.8	125.3	8.0	91.4	88.1	364.6	31.0	1.4	30.0	248.3	1297.2	273.7	13.9	396.1
1984	WET	16.7	224.6	81.1	7.5	54.4	59.8	209.5	77.9	9.1	46.1	46.4	223.5	15.5	0.0	0.0	122.9	657.5	174.5	16.6	100.4
	DRY	5.4	39.1	44.4	0.0	236.6	18.3	46.4	34.6	0.0	93.5	17.2	21.1	17.2	0.5	30.4	40.9	106.6	96.2	0.5	360.6
	TTL	22.1	263.7	125.5	7.5	291.0	78.2	255.9	112.4	9.1	139.6	63.5	244.5	32.7	0.5	30.4	163.8	764.1	270.7	17.1	461.0
1985	WET	15.7	154.8	88.5	6.0	40.3	48.1	168.2	96.9	6.7	37.1	32.8	222.5	21.9	0.0	0.0	96.6	545.5	207.3	12.7	77.4
	DRY	8.5	62.9	53.8	1.5	226.6	24.6	64.0	34.5	0.0	98.7	18.7	34.7	16.2	0.5	39.0	51.8	161.5	104.5	2.0	364.3
	TTL	24.2	217.7	142.3	7.5	266.9	72.7	232.2	131.4	6.7	135.7	51.4	257.2	38.1	0.5	39.0	148.3	707.1	311.8	14.7	441.7
1986	WET	20.8	283.9	83.0	6.0	51.4	65.6	268.2	84.7	7.4	44.0	45.2	251.3	17.0	0.1	0.0	131.7	803.4	184.7	13.5	95.4
	DRY	3.2	22.4	25.6	0.0	261.1	10.3	36.9	33.9	0.0	103.4	7.7	16.4	16.3	0.4	39.7	21.2	75.7	75.7	0.4	404.2
	TTL	24.0	306.2	108.5	6.0	312.5	75.9	305.1	118.6	7.4	147.4	52.9	267.8	33.3	0.5	39.7	152.8	879.0	260.4	13.9	499.7
1987	WET	14.7	264.6	107.3	3.7	35.9	48.1	296.8	117.6	4.9	30.8	33.8	211.2	19.1	0.0	0.0	96.5	772.6	244.0	8.6	66.7
	DRY	2.1	10.0	12.1	0.0	190.5	7.5	29.6	35.0	2.5	71.2	5.6	12.2	16.3	1.0	29.3	15.3	51.8	63.4	3.5	291.0
	TTL	16.8	274.6	119.4	3.7	226.4	55.6	326.4	152.6	7.4	102.0	39.4	223.4	35.4	1.0	29.3	111.8	824.4	307.5	12.1	357.7
ANNUM		467.	6095.	2448.	109.	5740.	1493.	6284.	2540.	169.	2699.	1091.	5678.	710.	16.	720.	3051.	18057.	5698.	294.	9159.

TABLE D-9-3 WATER BALANCE AT WATER SOURCES (COMPUTATION CASE-1)

3) WATER SOURCES

YEAR		BANG PAKONG				EXISTING THA LAT				THA LAT EXPANSION				ENTIRE PROJECT AREA			
		INFLOW	UPSTRM	LOSSES	OUTFLW	INFLOW	UPSTRM	LOSSES	OUTFLW	INFLOW	UPSTRM	LOSSES	OUTFLW	INFLOW	UPSTRM	LOSSES	OUTFLW
1968	WET	3420.2	292.9	0.0	3661.3	235.6	115.4	0.0	292.9	278.4	0.0	4.0	115.4	3934.2	408.4	4.0	4069.7
	DRY	384.4	114.3	0.0	242.1	11.0	206.2	0.0	114.3	8.6	0.0	16.6	206.2	404.1	320.5	16.6	562.6
	TTL	3804.6	407.2	0.0	3903.4	246.6	321.6	0.0	407.2	287.0	0.0	20.6	321.6	4338.3	728.9	20.6	4632.3
1969	WET	4972.5	301.9	0.0	5243.5	285.9	44.6	0.0	301.9	309.1	0.0	3.3	44.6	5567.6	346.5	3.3	5590.0
	DRY	611.6	109.3	0.0	485.9	17.8	174.4	0.0	109.3	1.5	0.0	13.1	174.4	630.9	283.7	13.1	769.6
	TTL	5584.1	411.2	0.0	5729.4	303.8	219.0	0.0	411.2	310.7	0.0	16.3	219.0	6198.5	630.2	16.3	6359.5
1970	WET	4904.2	706.5	0.0	5572.8	447.3	289.0	0.0	706.5	506.3	0.0	3.1	289.0	5857.8	995.5	3.1	6568.2
	DRY	549.7	119.0	0.0	424.0	15.1	191.1	0.0	119.0	2.7	0.0	13.8	191.1	567.4	310.1	13.8	734.1
	TTL	5453.9	825.5	0.0	5996.8	462.4	480.1	0.0	825.5	508.9	0.0	16.9	480.1	6425.2	1305.6	16.9	7302.4
1971	WET	4419.8	329.5	0.0	4722.4	286.3	68.6	0.0	329.5	312.6	0.0	3.9	68.6	5018.7	398.1	3.9	5120.4
	DRY	362.9	142.4	0.0	251.0	13.4	225.2	0.0	142.4	3.4	0.0	15.1	225.2	379.7	367.7	15.1	618.7
	TTL	4782.8	472.0	0.0	4973.4	299.7	293.8	0.0	472.0	316.0	0.0	19.0	293.8	5398.4	765.7	19.0	5739.1
1972	WET	4931.1	243.6	0.0	5126.4	238.7	55.7	0.0	243.6	261.4	0.0	5.7	55.7	5431.1	299.3	5.7	5425.7
	DRY	570.3	121.7	0.0	341.1	10.5	201.2	0.0	121.7	3.1	0.0	14.5	201.2	583.9	322.9	14.5	664.0
	TTL	5501.3	365.3	0.0	5467.5	249.2	256.9	0.0	365.3	264.5	0.0	20.2	256.9	6015.0	622.2	20.2	6089.7
1973	WET	3673.6	197.7	0.0	3519.6	217.4	46.8	0.0	197.7	258.9	0.0	4.6	46.8	4149.9	244.4	4.6	3764.1
	DRY	687.1	112.1	0.0	477.3	27.3	169.1	0.0	112.1	13.3	0.0	13.0	169.1	727.7	281.2	13.0	758.5
	TTL	4360.6	309.8	0.0	3996.9	244.7	215.9	0.0	309.8	272.3	0.0	17.7	215.9	4877.6	525.7	17.7	4522.6
1974	WET	3990.3	194.4	0.0	4139.7	197.1	29.8	0.0	194.4	210.7	0.0	3.0	29.8	4398.1	224.2	3.0	4364.0
	DRY	393.1	78.6	0.0	182.2	10.8	148.4	0.0	78.6	4.2	0.0	12.0	148.4	408.1	227.0	12.0	409.2
	TTL	4383.5	273.1	0.0	4322.0	207.8	178.1	0.0	273.1	214.9	0.0	15.0	178.1	4806.2	451.2	15.0	4773.2
1975	WET	4815.2	274.8	0.0	5035.0	293.7	37.9	0.0	274.8	328.4	0.0	3.7	37.9	5437.4	312.6	3.7	5347.6
	DRY	448.3	100.9	0.0	318.8	17.8	161.8	0.0	100.9	2.7	0.0	12.6	161.8	468.7	262.7	12.6	581.5
	TTL	5263.5	375.7	0.0	5353.8	311.5	199.7	0.0	375.7	331.1	0.0	16.3	199.7	5906.1	575.4	16.3	5929.1
1976	WET	5427.6	347.8	0.0	5737.5	310.2	72.6	0.0	347.8	327.6	0.0	2.3	72.6	6065.4	420.4	2.3	6157.8
	DRY	437.3	121.6	0.0	308.5	13.1	208.3	0.0	121.6	5.7	0.0	15.7	208.3	456.1	329.9	15.7	638.4
	TTL	5864.9	469.3	0.0	6046.0	323.3	280.9	0.0	469.3	333.3	0.0	18.0	280.9	6521.5	750.2	18.0	6796.2
1977	WET	3947.8	364.3	0.0	4245.1	304.1	121.6	0.0	364.3	360.4	0.0	4.9	121.6	4612.3	485.9	4.9	4731.0
	DRY	533.0	81.1	0.0	381.2	11.6	155.7	0.0	81.1	8.0	0.0	13.3	155.7	552.5	236.8	13.3	618.0
	TTL	4480.8	445.4	0.0	4626.3	315.7	277.3	0.0	445.4	368.4	0.0	18.1	277.3	5164.8	722.7	18.1	5349.0
1978	WET	4272.2	440.5	0.0	4652.7	333.7	162.4	0.0	440.5	370.2	0.0	4.1	162.4	4976.1	602.8	4.1	5255.5
	DRY	529.5	182.7	0.0	461.8	17.1	265.2	0.0	182.7	1.0	0.0	15.4	265.2	547.5	447.9	15.4	909.7
	TTL	4801.6	623.2	0.0	5114.6	350.8	427.5	0.0	623.2	371.2	0.0	19.4	427.5	5523.6	1050.7	19.4	6165.3
1979	WET	3881.7	282.8	0.0	4085.3	298.3	76.9	0.0	282.8	373.4	0.0	6.8	76.9	4553.4	359.7	6.8	4445.0
	DRY	273.3	154.4	0.0	100.7	7.8	242.0	0.0	154.4	0.5	0.0	15.2	242.0	281.6	396.3	15.2	497.0
	TTL	4155.0	437.1	0.0	4186.0	306.1	318.9	0.0	437.1	373.9	0.0	22.1	318.9	4835.0	756.0	22.1	4942.0
1980	WET	5634.1	378.8	0.0	5974.0	350.3	63.6	0.0	378.8	398.2	0.0	2.8	63.6	6382.6	442.4	2.8	6416.3
	DRY	694.4	130.0	0.0	594.1	52.6	173.4	0.0	130.0	50.9	0.0	15.0	173.4	797.9	303.5	15.0	897.5
	TTL	6328.5	508.9	0.0	6568.0	402.8	237.0	0.0	508.9	449.1	0.0	17.8	237.0	7180.5	745.9	17.8	7313.9
1981	WET	5135.2	704.7	0.0	5793.0	428.8	318.1	0.0	704.7	506.3	0.0	4.7	318.1	6070.3	1022.8	4.7	6815.8
	DRY	490.9	114.6	0.0	361.4	14.0	186.8	0.0	114.6	18.1	0.0	13.9	186.8	523.0	301.4	13.9	662.8
	TTL	5626.1	819.3	0.0	6154.3	442.8	504.9	0.0	819.3	524.3	0.0	18.5	504.9	6593.3	1324.3	18.5	7478.6
1982	WET	4512.1	258.5	0.0	4739.5	233.1	66.2	0.0	258.5	285.3	0.0	2.3	66.2	5030.4	324.7	2.3	5064.1
	DRY	367.7	185.5	0.0	288.4	13.0	271.0	0.0	185.5	7.3	0.0	15.5	271.0	388.0	456.5	15.5	744.9
	TTL	4879.8	444.0	0.0	5027.9	246.1	337.2	0.0	444.0	292.6	0.0	17.8	337.2	5418.4	781.2	17.8	5809.0
1983	WET	6291.2	503.4	0.0	6769.2	414.0	101.2	0.0	503.4	421.0	0.0	2.2	101.2	7126.2	604.6	2.2	7373.7
	DRY	555.8	64.2	0.0	370.6	15.9	127.9	0.0	64.2	6.4	0.0	12.4	127.9	578.1	192.0	12.4	562.7
	TTL	6847.0	567.6	0.0	7139.8	429.9	229.0	0.0	567.6	427.4	0.0	14.6	229.0	7704.3	796.6	14.6	7936.4
1984	WET	4757.0	340.3	0.0	5042.9	260.7	125.7	0.0	340.3	280.0	0.0	3.4	125.7	5297.6	466.0	3.4	5508.9
	DRY	640.6	138.4	0.0	542.4	23.9	208.0	0.0	138.4	12.0	0.0	14.1	208.0	676.5	346.4	14.1	888.7
	TTL	5397.6	478.7	0.0	5585.3	284.6	333.7	0.0	478.7	292.0	0.0	17.5	333.7	5974.1	812.4	17.5	6397.6
1985	WET	4308.9	243.6	0.0	4512.1	239.8	40.8	0.0	243.6	288.8	0.0	4.1	40.8	4837.5	284.4	4.1	4796.5
	DRY	841.2	165.0	0.0	779.6	39.7	223.9	0.0	165.0	30.2	0.0	15.5	223.9	911.1	388.9	15.5	1168.5
	TTL	5150.1	408.6	0.0	5291.7	279.6	264.7	0.0	408.6	318.9	0.0	19.5	264.7	5748.6	673.3	19.5	5965.0
1986	WET	4404.0	298.7	0.0	4651.3	286.0	56.7	0.0	298.7	310.1	0.0	3.0	56.7	5000.1	355.4	3.0	5006.7
	DRY	424.3	140.8	0.0	304.0	10.7	233.6	0.0	140.8	4.8	0.0	16.0	233.6	439.7	374.4	16.0	678.4
	TTL	4828.3	439.5	0.0	4955.3	296.7	290.3	0.0	439.5	314.9	0.0	19.0	290.3	5439.9	729.8	19.0	5685.1
1987	WET	3274.2	232.3	0.0	3470.6	232.2	30.8	0.0	232.3	265.3	0.0	3.1	30.8	3771.7	263.1	3.1	3733.6
	DRY	419.6	41.9	0.0	271.0	4.0	109.1	0.0	41.9	6.9	0.0	11.2	109.1	430.5	151.0	11.2	422.0
	TTL	3693.8	274.1	0.0	3741.6	236.2	139.9	0.0	274.1	272.2	0.0	14.2	139.9	4202.2	414.0	14.2	4155.6
	ANNUM	101188.	9355.	0.	104180.	6240.	5807.	0.	9355.	6843.	0.	359.	5807.	114271.	15162.	359.	119341.

TABLE D-9-4 WATER DEMAND COMPUTATION (COMPUTATION CASE-2)

1) WATER DEMAND COMPUTATION

YEAR		BANG PAKONG IRRIG.	BANG PAKONG FISH.	BANG PAKONG OTHER	BANG PAKONG TOTAL	EXISTING THA LAT IRRIG.	EXISTING THA LAT FISH.	EXISTING THA LAT OTHER	EXISTING THA LAT TOTAL	THA LAT EXPANSION IRRIG.	THA LAT EXPANSION FISH.	THA LAT EXPANSION OTHER	THA LAT EXPANSION TOTAL	ENTIRE PROJECT AREA IRRIG.	ENTIRE PROJECT AREA FISH.	ENTIRE PROJECT AREA OTHER	ENTIRE PROJECT AREA TOTAL
1968	WET	61.7	1.8	83.1	146.7	130.9	0.0	8.3	139.2	22.1	0.0	4.6	26.7	214.7	1.8	96.0	312.6
	DRY	82.2	11.2	83.4	176.7	0.0	0.0	8.3	8.3	0.0	0.0	4.6	4.6	82.2	11.2	96.3	189.6
	TTL	143.9	13.0	166.5	323.4	130.9	0.0	16.6	147.5	22.1	0.0	9.2	31.3	296.9	13.0	192.3	502.2
1969	WET	47.9	1.8	83.1	132.8	93.8	0.0	8.3	102.1	12.8	0.0	4.6	17.4	154.5	1.8	96.0	252.3
	DRY	70.0	11.0	82.9	164.0	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	70.0	11.0	95.8	176.8
	TTL	117.9	12.8	166.1	296.8	93.8	0.0	16.5	110.3	12.8	0.0	9.2	22.0	224.5	12.8	191.8	429.1
1970	WET	58.0	1.7	83.1	142.8	110.3	0.0	8.3	118.6	15.0	0.0	4.6	19.6	183.3	1.7	96.0	281.0
	DRY	74.3	11.0	82.9	168.3	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	74.3	11.0	95.8	181.1
	TTL	132.3	12.7	166.1	311.1	110.3	0.0	16.5	126.8	15.0	0.0	9.2	24.2	257.6	12.7	191.8	462.1
1971	WET	51.4	1.7	83.1	136.2	114.6	0.0	8.3	122.9	21.1	0.0	4.6	25.7	187.0	1.7	96.0	284.7
	DRY	78.3	11.1	82.9	172.4	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	78.3	11.1	95.8	185.2
	TTL	129.7	12.8	166.1	308.6	114.6	0.0	16.5	131.1	21.1	0.0	9.2	30.3	265.3	12.8	191.8	469.9
1972	WET	56.6	1.8	83.1	141.5	112.6	0.0	8.3	120.9	18.0	0.0	4.6	22.6	187.3	1.8	96.0	285.1
	DRY	69.9	11.1	83.4	164.4	0.0	0.0	8.3	8.3	0.0	0.0	4.6	4.6	69.9	11.1	96.3	177.3
	TTL	126.5	12.9	166.5	306.0	112.6	0.0	16.6	129.2	18.0	0.0	9.2	27.2	257.1	12.9	192.3	462.4
1973	WET	57.4	1.9	83.1	142.4	124.7	0.0	8.3	133.0	21.0	0.0	4.6	25.6	203.2	1.9	96.0	301.1
	DRY	65.3	11.0	82.9	159.2	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	65.3	11.0	95.8	172.1
	TTL	122.7	12.9	166.1	301.7	124.7	0.0	16.5	141.3	21.0	0.0	9.2	30.2	268.4	12.9	191.8	473.1
1974	WET	53.7	1.8	83.1	138.6	110.9	0.0	8.3	119.2	19.2	0.0	4.6	23.8	183.8	1.8	96.0	281.6
	DRY	77.4	11.1	82.9	171.4	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	77.4	11.1	95.8	184.2
	TTL	131.1	12.8	166.1	310.0	110.9	0.0	16.5	127.4	19.2	0.0	9.2	28.4	261.2	12.8	191.8	465.9
1975	WET	64.4	1.9	83.1	149.4	125.7	0.0	8.3	134.0	19.2	0.0	4.6	23.8	209.3	1.9	96.0	307.3
	DRY	66.4	11.0	82.9	160.4	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	66.4	11.0	95.8	173.2
	TTL	130.8	12.9	166.1	309.8	125.7	0.0	16.5	142.3	19.2	0.0	9.2	28.4	275.8	12.9	191.8	480.5
1976	WET	49.2	1.8	83.1	134.2	94.2	0.0	8.3	102.5	13.2	0.0	4.6	17.8	156.7	1.8	96.0	254.5
	DRY	77.6	11.2	83.4	172.2	0.0	0.0	8.3	8.3	0.0	0.0	4.6	4.6	77.6	11.2	96.3	185.1
	TTL	126.9	12.9	166.5	306.3	94.2	0.0	16.6	110.8	13.2	0.0	9.2	22.5	234.3	12.9	192.3	439.6
1977	WET	64.1	1.8	83.1	149.1	140.1	0.0	8.3	148.4	22.2	0.0	4.6	26.8	226.4	1.8	96.0	324.2
	DRY	70.5	11.0	82.9	164.5	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	70.5	11.0	95.8	177.3
	TTL	134.7	12.8	166.1	313.5	140.1	0.0	16.5	156.6	22.2	0.0	9.2	31.4	297.0	12.8	191.8	501.6
1978	WET	57.0	1.8	83.1	141.9	117.1	0.0	8.3	125.3	17.0	0.0	4.6	21.6	191.0	1.8	96.0	288.9
	DRY	77.3	11.1	82.9	171.2	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	77.3	11.1	95.8	184.1
	TTL	134.3	12.9	166.1	313.2	117.1	0.0	16.5	133.6	17.0	0.0	9.2	26.2	268.3	12.9	191.8	472.9
1979	WET	81.5	2.0	83.1	166.6	169.4	0.0	8.3	177.7	26.5	0.0	4.6	31.1	277.4	2.0	96.0	375.4
	DRY	79.1	11.1	82.9	173.2	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	79.1	11.1	95.8	186.0
	TTL	160.6	13.1	166.1	339.8	169.4	0.0	16.5	185.9	26.5	0.0	9.2	35.7	356.6	13.1	191.8	561.4
1980	WET	46.5	1.7	83.1	131.3	104.8	0.0	8.3	113.1	17.9	0.0	4.6	22.5	169.2	1.7	96.0	267.0
	DRY	74.0	11.1	83.4	168.5	0.0	0.0	8.3	8.3	0.0	0.0	4.6	4.6	74.0	11.1	96.3	181.4
	TTL	120.5	12.8	166.5	299.9	104.8	0.0	16.6	121.4	17.9	0.0	9.2	27.2	243.3	12.8	192.3	448.4
1981	WET	62.2	1.8	83.1	147.1	121.6	0.0	8.3	129.9	17.1	0.0	4.6	21.7	200.9	1.8	96.0	298.7
	DRY	76.6	11.1	82.9	170.6	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	76.6	11.1	95.8	183.5
	TTL	138.9	12.8	166.1	317.8	121.6	0.0	16.5	138.1	17.1	0.0	9.2	26.3	277.6	12.8	191.8	482.2
1982	WET	54.7	1.7	83.1	139.6	117.6	0.0	8.3	125.9	20.7	0.0	4.6	25.3	193.0	1.7	96.0	290.7
	DRY	80.8	11.1	82.9	174.8	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	80.8	11.1	95.8	187.6
	TTL	135.5	12.8	166.1	314.3	117.6	0.0	16.5	134.1	20.7	0.0	9.2	29.9	273.7	12.8	191.8	478.3
1983	WET	39.4	1.6	83.1	124.1	78.1	0.0	8.3	86.4	12.6	0.0	4.6	17.2	130.1	1.6	96.0	227.7
	DRY	71.6	11.0	82.9	165.6	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	71.6	11.0	95.8	178.4
	TTL	111.0	12.6	166.1	289.7	78.1	0.0	16.5	94.7	12.6	0.0	9.2	21.8	201.7	12.6	191.8	406.1
1984	WET	61.6	1.8	83.1	146.5	108.5	0.0	8.3	116.8	15.3	0.0	4.6	19.9	185.3	1.8	96.0	283.1
	DRY	75.0	11.2	83.4	169.6	0.0	0.0	8.3	8.3	0.0	0.0	4.6	4.6	75.0	11.2	96.3	182.5
	TTL	136.6	12.9	166.5	316.0	108.5	0.0	16.6	125.1	15.3	0.0	9.2	24.5	260.4	12.9	192.3	465.6
1985	WET	52.9	1.9	83.1	138.0	115.1	0.0	8.3	123.4	21.4	0.0	4.6	26.1	189.5	1.9	96.0	287.4
	DRY	77.3	11.0	82.9	171.3	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	77.3	11.0	95.8	184.1
	TTL	130.3	12.9	166.1	309.3	115.1	0.0	16.5	131.7	21.4	0.0	9.2	30.7	266.8	12.9	191.8	471.6
1986	WET	59.0	1.7	83.1	143.9	111.3	0.0	8.3	119.6	16.7	0.0	4.6	21.4	187.0	1.7	96.0	284.8
	DRY	81.4	11.1	82.9	175.5	0.0	0.0	8.2	8.2	0.0	0.0	4.6	4.6	81.4	11.1	95.8	188.3
	TTL	140.4	12.8	166.1	319.3	111.3	0.0	16.5	127.8	16.7	0.0	9.2	25.9	268.5	12.8	191.8	473.1
1987	WET	65.5	1.8	83.1	150.4	128.1	0.0	8.3	136.4	18.8	0.0	4.6	23.5	212.4	1.8	96.0	310.3
	DRY	63.5	8.6	55.1	127.2	0.0	0.0	5.5	5.5	0.0	0.0	3.1	3.1	63.5	8.6	63.6	135.7
	TTL	129.0	10.4	138.2	277.6	128.1	0.0	13.8	141.8	18.8	0.0	7.7	26.5	275.9	10.4	159.6	446.0
ANNUM		2634.	255.	3296.	6184.	2329.	0.	328.	2657.	368.	0.	183.	551.	5331.	255.	3807.	9392.