ことでLampang市で加里肥料を買おうとすると不当に高いかも知れない。このような場合には単味の加里肥料に固執する必要はなく，計画地域でたばこ肥料として多量に使われている4-16-24-4（N-P_2O_5-K_2O-Mg）で代用すればよい。この肥料の成分の内，窒素は少量であるから，Starterとして役立ち，燐酸はもともと有意の効果を持っているもので，加里よりも増産効率が低いだけのことで全体として経済効率は落ちるが不当に高い加里肥料を買うよりずっと効果的である。また農家では薪を燃料として使っているが，薪木灰は多量の加里と少量の燐酸を含むので当地域の堆肥の肥料としては好適である。但し水にぬらさず，袋の中に保存すること。

また計画地域の農家は，豆類，にんにく等を播種したとき，初期生育保護のため，稲わらで播き床を厚く被覆する慣行があるが，これも施肥面から見ても推奨される。稲わらが1%以上の水溶性加里を含んでいるからである。

(5) 除草

熱帯で畑作物の肥沃地を灌漑すれば，雑草の繁茂は極めて旺盛である。豆科作物の灌漑栽培では雑草の繁茂を避けられない。除草に関する試験結果を見ると，手取りで一回除草しただけで，除草しないものの2倍の収量を挙げた成績さえある。除草は必ずすること。

5-14 にんにく

にんにくは冷涼気象を好むので，タイ国の条件下では北部7県と東北のスリン，シサケットが特産地となっている。栄養生長を続行するのは気温が12℃から18℃の間とされている。そして球根の肥大が始まるのが播種後45日から50日がよいとされているが，もし気温が20℃を超すと，播種後40日以内に球根の肥大が始まってしまう。この場合には栄養体は十分な発育を遂げていないで，その生成する球根も必然的に小さくなってしまう。このような温度に対するこの作物の反応が他の一切の条件を越えて重要であって，タイ国北部の環境下では，1月1日の播種するのが最適とされているが，この時期には前年水稲はまだ出穂したばかりであって不可能である。この問題に関しては雨期作水稲の項で述べた。ただこれに関して注意点の外に栽培上あると思うが，農民は水稲登熟後出来るだけ速かに植えている。今回行った実態調査の結果では農民は，にんにくを豆類より早く植えているが，ただこれよりは後になって植えている。計画地域では3月には平均気温は30℃近くなるから1月に植えたのでは遅すぎるわけで，東北産のものに比して質が劣るのはこのような理由によると思われる。にんにくは収益

(12月中に)
(1月に)

性の高い作物であるから適期に植えて，N，P_2O_5，K_2O を 50，25，25 kg の割で施用すれば可なりの増收を期待してよい。

5-15 たばこ　　専売局の指導に従う。

ANNEX 5-1
Table 5-1

Effect of various formulae of fertilizers on the yield of Nio Sanpatong rice

Soil series: Lampang
Number of trials: 10

Center: Chiang Mai
Sub-center: Lampang

Treatment kg/ha N	P_2O_5	K_2O	Yield (kg/ha) SE ±118	Increase over control	Value of yield increase (Baht)	Cost of treatment (Baht)	Gross profit (Baht)	Baht return per 100 Baht spent
0	0	0	3,183	—	—	—	—	—
25	25	25	3,892	709	638	417	221	153
25	25	50	3,563	380	342	495	Loss	69
25	50	25	3,654	471	424	577	Loss	73
25	50	50	3,772	589	530	655	Loss	81
50	25	25	3,627	444	400	597	Loss	67
50	25	50	3,943	760	684	675	9	101
50	50	25	3,805	622	560	756	Loss	74
50	50	50	3,889	706	635	834	Loss	76
25	25	0	3,634	451	406	339	67	120
50	50	0	3,674	491	442	678	Loss	65
25	0	25	3,533	350	315	258	57	122
50	0	50	3,953	770	693	515	178	135
0	25	25	3,449	266	239	238	1	100
0	50	50	3,210	27	24	475	Loss	45
Mean			3,652	503 = 16 %			+ At 0.9 Baht/kg	

LSD 5% 332 kg/ha 1% 438 kg/ha

Main effect (kg/ha)

	$N_{25}-0$	$N_{50}-N_{25}$	$P_{25}-0$	$P_{50}-P_{25}$	$K_{25}-0$	$K_{50}-K_{25}$
Response	502**	96	174	24	194	47
LSD 5%	234		234		234	

Effect of various formulae of fertilizers on the yield of RD2 rice.

~~RTES: SFF 8.67~~

Soil Series: Lampang Centre: Chiang Mai

Number of Trials: 11 Sub-centre: Lampang

Variety: RD2

Treatment Kg per hectare N	P_2O_5	K_2O	Kg per Hectare: Yield S.E.±120.0	Increase over Control	Baht per Hectare: Value of Yield Increase+	Cost of ~~Treatment~~ Treatment	Gross Profit	Baht returned per 100 Baht spent on Treatment
0	0	0	3193	-	-	-	-	-
0	38	0	3114	-79	-	239	Loss	-
0	75	0	3209	15	11	479	Loss	2
38	0	0	3817	623	436	269	167	162
38	38	0	3957	764	535	508	27	105
38	75	0	3844	651	456	748	Loss	61
75	0	0	4089	895	627	538	89	117
75	38	0	4458	1265	886	777	109	114
75	75	0	4266	1073	751	1017	Loss	74
38	75	25	3805	611	428	826	Loss	52
75	75	25	4419	1225	858	1095	Loss	78
75	75	50	4660	1467	1027	1173	Loss	88
Mean			3903	774 = 24 per cent				

+At 0.70 baht per Kg

C.V. 10.2 per cent S.E. of a difference ±169.7 Kg per hectare

L.S.D. 5 per cent: 336 Kg per hectare; 1 per cent: 445 Kg per hectare

MAIN EFFECTS - Kg per hectare

	$N_{38}-N_0$	$N_{75}-N_{38}$	$P_{38}-P_0$	$P_{75}-P_{38}$	$K_{25}-K_0$	$K_{50}-K_{25}$
Response	701**	398**	144	-70	57	242
S.E.	±98.0		±98.0		±120.0	±169.7
L.S.D. 5 per cent	194		194		-	336
1 per cent	257		-		-	-

ANNEX 5-1
Table 5-3

Analysis of paddy soil in Amphoe Muang Lampang.

Horizon		Apg	B1g	B2g	BCg
Depth (cm)		0-13	13-24	24-39	39-65
Total nitrogen (%)		0.110	0.056	0.045	0.047
Total carbon (%)		1.410	0.637	0.427	0.428
C:N ratio		12.8	11.4	9.5	9.1
Humus (%)		2.43	1.10	0.74	0.74
Exchangeable bases me/100 g	Ca	5.46	-	-	-
	Mg	2.06	-	-	-
	Na	0.73	-	-	-
	K	0.17	-	-	-
CEC me/100 g		12.85	-	-	-
Base saturation degree (%)		65.5	-	-	-
Free iron oxide Fe_2O_3 (%)		0.61	0.69	0.61	0.74
Easily reducible MnO_2 ppm		456	456	399	741
Available NH_4-N	ppm	62.4	-	-	-
Total P_2O_5	(%)	0.048	0.038	0.045	0.066
available P_2O_5	ppm	22.7	26.9	28.5	33.3
Total K_2O	(%)	650	583	723	722
Available K_2O	ppm	80	-	-	-
Available SiO_2	ppm	59	-	-	-
Absorption coefficient mg/100g	NH_4-N	-	-	-	-
	P_2O_5	-	-	-	-
Productive Capability Classification					
Simplified code formula	For paddy rice	IIrfn			
	For upland crops	IIItIIpwfn			

Effect of Transplanting Time and Mode of Nitrogen Application on Yield of Paddy (kg/ha)

Location	Fertilizer Treatment	Transplanting Time			
		July	August	September	Mean
Sakon Nakhon	Nitrogen (basal only)	2,493	3,095	3,224	2,938
	Nitrogen (split)	3,550	3,404	3,138	3,364
	No Fertilizer	1,953	2,743	2,028	2,241
	Mean	2,665	3,081	2,797	2,848
Khon Kaen	Nitrogen (basal only)	2,760	2,894	3,227	2,961
	Nitrogen (split)	2,987	3,499	3,116	3,200
	No Fertilizer	1,645	2,430	2,107	2,061
	Mean	2,464	2,941	2,816	2,740
Chiang Mai	Nitrogen (basal only)	3,924	3,711	3,982	3,872
	Nitrogen (split)	3,563	3,976	3,798	3,779
	No Fertilizer	3,385	4,113	3,404	3,634
	Mean	3,624	3,934	3,728	3,762

Remark Transplanting was done on the first day of each month, Even September 1 is rather late for good yield Further delay greatly decrease the yield owing to shortening of vegetative grown, just as the too old seedlings in Table .

Response of RD 1 Rice to Nitrogen in the Wet and Dry Seasons (kg/ha)

Location	Fertilizer N kg/ha	Wet Season	Dry Season	Balance
Chainat	0	4,195	5,184	989
	37.5	4,653	5,513	860
	75.0	4,774	5,754	980
Suphan Buri	0	2,689	4,281	1592
	37.5	3,906	5,351	1445
	75.0	4,668	5,937	1269
Khlong Luang	0	2,585	2,555	-30
	37.5	3,390	3,405	15
	75.0	4,064	4,112	48

Source FAO/UNDP/SF Soil Fertility Research Project
Research Experiment on Rice By T. Takahashi

Remark Experiment was replicated four times and continued for three years

Effect of Seedling Age and Number of Seedlings per Hill on the Yield of RD 1 Rice
(Grain yield in kg/ha)

Number of Seedlings Per Hill	Age of Seedlings in Days				
	20	30	40	50	mean
1	5,654	6,013	5,722	4,712	5,525
3	5,422	6,260	5,732	4,985	5,600
5	5,614	5,962	5,821	4,962	5,590
7	5,472	5,955	5,987	5,250	5,666
Mean	5,541	6,047	5,816	4,977	5,595

	5%	1%
LSD for any two of 16 means	430	574
LSD for any two means of means	215	287
C.V. per cent	5.4	

Source FAO/UNDP/SF Soil Fertility Research Project
Research Experiment on Rice. By J. Takahashi

Effect of various formulae of fertilizers on the yield of peanut.

PEANUT (Dry Season: Irrigated) OBT 1.1

Soil Series: Hang Dong — Centre: Chiang Mai

Number of Trials: 16 — Sub-centre: Lampang

Treatment Kg per hectare N	P_2O_5	K_2O	Kg per Hectare Yield S.E. ±97.8	Increase over Control	Baht per Hectare Value of Yield Increase+	Cost of Treatment	Gross Profit	Baht returned per 100 Baht spent on Treatment
0	0	0	2261	-	-	-	-	-
0	38	0	2402	140	210	239	Loss	88
0	75	0	2532	271	406	479	Loss	85
0	0	38	2621	360	540	117	423	462
0	38	38	2928	667	1000	357	643	280
0	75	38	2954	693	1040	596	444	174
0	0	75	2907	646	969	235	734	412
0	38	75	2960	699	1048	474	574	221
0	75	75	3217	956	1434	713	721	201
6	75	38	3236	975	1462	641	821	228
6	75	75	3305	1044	1566	758	808	207
12	75	75	3378	1117	1676	805	873	209
Mean			2892	688 = 30 per cent			At 1.50 baht per Kg for unshelled peanut.	

C.V. 13.5 per cent — S.E. of a difference ±138.4 Kg per hectare

L.S.D. 5 per cent: 273 Kg per hectare; 1 per cent: 361 Kg per hectare

MAIN EFFECTS - Kg per hectare

	$P_{38}-P_0$	$P_{75}-P_{38}$	$K_{38}-K_0$	$K_{75}-K_{38}$	N_6-N_0	$N_{12}-N_6$
Response	167	138	436	193	185	73
S.E.	±70.9		±79.9		±97.8	±138.4
L.S.D. 5 per cent	158		158		193	-
1 per cent	208		208		-	-

Table 5-8 Physical Inputs per Hectare by Crop

		Unit	1. Paddy (Wet Season)	2. Paddy (Dry Season)	3. Peanut (Wet Season)	4. Peanut (Dry Season)	5. Tobacco	6. Soybean	7. Chilli	8. Garlic	9. Sugar cane	10. Orchard -Pineapple-	11. Vegetable -Cabbage-
							(unit: seedling)				(unit: pieces)	(unit: shoots)	(unit: seedling)
Present													
1. Seed		kg	76	76	128	158	3250	34	5	233	28500	26200	40000
2. Fertilizer	Ammonium phosphate	kg	6	95	—	—	—	20	—	35	67	—	170
	Ammonium sulphate	kg	—	—	—	—	—	—	375	—	—	160	—
	4-16-24-4(Mg)	kg	—	—	—	—	500	—	—	—	—	—	—
	—	kg											
3. Pesticide	Inspecticides	kg		34	—	—	487	34	418	203	—	—	678
4. Mechanical Percentage	Cultivation - animal -	%area	80	80	100	100	100	100	100	100	100	100	100
	" - Machine -	%area	20	20	—	—	—	—	—	—	—	—	—
Future Without Project													
1. Seed		kg	76	76	128	158	3250	34	5	233	28500	26200	40000
2. Fertilizer	Ammonium phosphate	kg	6	95	—	—	—	20	—	35	67	—	170
	Ammonium sulphate	kg	—	—	—	—	—	—	375	—	—	160	—
	4-16-24-4 (Mg)	kg	—	—	—	—	500	—	—	—	—	—	—
	—	kg											
3. Pesticide	Insecticides	kg	—	45	—	—	695	45	585	283	—	—	947
4. Mechanical Percentage	Cultivation - animal -	%area	80	80	100	100	100	100	100	100	100	100	100
	" - machine -	%area	20	20	—	—	—	—	—	—	—	—	—
Future With Project													
1. Seed		kg	50	50	120	120	3250	33	5	300	14000	24700	40000
2. Fertilizer	Ammonium sulphate	kg	250	375	—	—	—	—	250	250	190	190	375
	Super phosphate	kg	—	100	—	—	—	—	68	68	103	103	103
	Potash	kg	83	—	125	125	—	125	42	42	23	83	63
	4-16-24-4 (Mg)	kg	—	—	—	—	600	—	—	—	—	—	—
3. Pesticide	Inspecticides	kg	—	54	—	—	779	54	673	325	—	—	1092
4. Mechanical Percentage	Cultivation - animal -	%area	70	70	70	70	70	70	70	70	70	70	70
	" - machine -	%area	30	30	30	30	30	30	30	30	30	30	30

ANNEX 6 Construction Schedule and Project Costs

6-1. Construction Method and the Schedule

6-2. Project Costs Estimates

Table 6-1. Construction Schedule
" 6-2. Project Cost Estimates
" 6-3. Construction Cost of Main System Improvements Works
" 6-4. Construction Cost of Land Consolidation Works
" 6-5. Equipment. Vehicles for Construction
" 6-6. Equipment for Operation and Maintenance
" 6-7. Cost of Consulting Services and Trainings
" 6-8. Operation and Maintenance Cost
" 6-9. Annual Expenditures Schedule

6. 工事計画と事業費

6-1. 工事方法と工事計画

6-1-1. 工事数量と工事方法

事業計画で策定した基幹用排施設及び圃場開発の工事は次表に示すとおりである.

工種	工事数量
幹線用水路	100.12 km
支線用水路	79.65 〃
幹線排水路	61.00 〃
計	240.77 〃
圃場開発	
集約的開発	6.208 ha
粗放的開発	6.237 〃
計	12.445 〃

タイ国における建設工事は一般に乾期を中心に実施される. 計画地域は現在約30%の乾期作が栽培されているため, 工事期間中の通水中止期間を極力短縮し, 影響を最小限にする. 従って基幹施設の改修工事区間に関連する圃場開発工事は原則として同一年度に施工を完了する. 工事方法はRIDによる直営方式と一般入札による請負方式を採用し, 工事の円滑な実施を行う. 特にMae Wang左岸用水路の受益地の乾期作は率が高いこと及びランパン市への上水道源となっていることから単年度で工事を完了すべく請負方式を主体に実施する.

工事期間は過去の実績及び事業効果を勘案し5ヶ年とする. 直営方式

で実施する工事は調達する建設機械の償却経済性を考慮して決定された台数・規模の範囲とする。従って工事の最盛期においては一部不足する機械類をRIDが保有するトラクターセンターからの供給を受ける必要がある。上記以外の工事は地方建設業者の指導、育成と工期の短縮を計るため請負方式とする。この工事に必要な一般労働者は受益農民に求め雇用の拡大を計る。直営・請負の年度別計画を表6-1に示す。

6-1-2, 事業の実施計画

事業の実施は測量・設計等の準備期間と工事期間に区分される。ほ場開発計画に必要な地形図及び地籍図の作成は航空写真図にもとずいて実施される。既往の航空写真図は第一年目の乾期に撮影を開始し写真図の作成に約1ケ年が必要である。従って準備期間は設計・機械調達事務を含め2ケ年とする。事業全体工程を図6-3に示す。

(1) 測量及び図化.

この事業に必要な測量は上記・縮尺1/4,000（或いは1/2,000）の地形及び地籍測量のほか、水路施設の路線測量が含まれる。特にほ場開発計画に必要な地形図及び地籍図はこれを重ね合せた混成図(Combined map)が設計に有用である。

(2) 設計.

各種の設計は請負事務処理の期間を考慮し、工事実施前年度の乾期の終り、即ち7月~8月頃に完了する必要がある。基幹かんがい排水施設の

設計はRID，設計部の職員によって行われるであろう。ほ場開発の設計はRID，ほ場整備課の経験豊かな職員の指導のもとに現場事務所で実施する。農民の土地配分の協議が設計期間中に行われるため，必要に応じて，ほ場整備地事務所，内務省土地局の職員の協力が不可欠であると思われる。又これらに必要なRID職員の動員計画を事前に樹立する。

(3) 機械調達

円滑な工事の実施を行うために直営工事に必要な建設機械の調達は第1年度の後半から準備し，第2年度末には使用可能となる様に準備されなければならない。

(4) 工事計画

工事計画は表6-1に示すとおりとする。

6-2. 事業費の積算

6-2-1. 事業費

工事費の積算は1979年10月(FY1980年)の単価により積算し，換算レートはUS$1.00をB20.00とした。事業費の構成は工事費，維持管理施設，事務経費，機械調達費，コンサルタント経費，技術予備費及び物価上昇予備費からなる。総事業費は表6-2に示すごとく6億9760万バーツで内貨分3億9012万バーツ，外貨分3億748万バーツである。外貨分の構成要素は建設工事，O&Mサービスに必要な機械調達と鉄筋，セメント，油類の50%，その他建設機械の償却費が含まれる。

Construction Schedule

Construction Item	FY1983		FY1984		FY1985		FY1986		FY1987		Total	
	F.B	C.B	F.B	C.B	F.B	C.B	F.B	C.B	F.B	C.B	F.B	C.B
1. Main irrigation system	(Km)											
Mae Wang Left	9.20	24.69	4.51	0	0	0	0	0	0	0	13.71	24.69
Mae Wang Right	0	0	5.20	8.43	11.70	9.96	0	0	0	0	12.03	18.39
Mae Pung main	0	0	0	5.61	0	0	0	0	0	0	0	5.61
Mae Pung Left	0	0	0	0	0	0	6.52	0	0	0	6.52	0
Mae Pung Right	0	0	0	0	0	0	0	12.30	0	0	0	12.30
Link canal	0	0	0	0	0	0	0	0	2.00	0	2.00	0
Lateral canal	5.00	2.20	22.30	1.40	11.70	9.90	13.75	13.20	0	0	52.75	26.70
Total	14.20	26.89	32.01	15.44	23.40	19.86	20.27	25.50	2.00	0.00	87.01	87.69
2. Main drainage system (Km)	0	10.5	0	0	0	31.2	0	0	0	19.3	0	61.0
3. On-farm development	(ha)											
Intensive I1	90	45	55	157	475	432	0	0	768	322	1.388	956
" I2	443	245	408	686	859	367	0	0	497	359	2207	1.657
Extensive E1	0	59	850	43	9	106	0	0	6	239	865	447
E2	0	0	0	0	0	0	2.451	0	0	0	2.451	0
E3	482	428	196	14	220	335	0	0	336	463	1,234	1,240
Total	1.015	777	1.509	900	1.563	1.240	2.451	0	1.607	1.383	8.145	4.300
Zone NO	1	2	3.4	8	7.10	9	12	-	6	5		
4. Right of way (ha)	28.2	0	34.9	0	89.9	0	36.3	0	53.7	0	243.0	0
	F.B. = Force Account Basis, C.B = Contract Basis											

Project Cost Estimates

Item	Quantity	Units	Costs (฿ 1,000) Foreign	Local	Total
A. Irrigation & Drainage Systems					
1. Irrigation systems					
a. Mae Wang Left Bank Canal	38.40	Km	14,917	38,528	53,445
b. Mae Wang Right Bank Canal	35.29	"	12,019	29,921	41,940
c. Mae Pung Main Canal	5.61	"	2,463	5,293	7,756
d. Mae Pung Left Bank Canal	6,52	"	1,660	3,739	5,399
e. Mae Pung Right Bank Canal	12.30	"	4,031	8,902	12,933
f. Link Canal	2.00	"	552	1,408	1,960
g. Lateral Canal Systems	79,65	"	15,775	34,397	50,172
Sub-total	129.27	"	51,417	122,188	173,605
2. Drainage Systems					
a. Main Drainage Canal (9 routes)	61,00	Km	7,213	11,481	18,694
Sub-total	61.00	"	7,213	11,481	18,694
3. Land Acquisitions					
a. Irrigation system	116.4	Ra	-	7,276	7,276
b. Drainage System	126.6	"	-	7,910	7,910
Sub-total	243.0	"	-	15,186	15,186
Total			58,630	148,855	207,485

- Continued -

Item	Quantity	Units	Costs (฿1,000) Foreign	Local	Total
B. On-farm Development					
1. Intensive Development Method					
I1	2,344	ha	19.591	30.275	49.866
I2	3,864	"	31.191	37.005	68.196
Sub-total	6,208	"	50.782	67.280	118.062
2. Extensive Development Method					
E1	1,312	ha	4.939	11.751	16.690
E2	2,451	"	6.549	10.346	16.895
E3	2,474	"	7.598	17.230	24.828
Sub-total	6,237	"	19.086	39.327	58.413
Total	12,445	ha	69.868	106.607	176.475
C. O&M Facilities					
1. Project Head Quarters	1,0	L.S	1,200	4,800	6,000
2. O&M Office Improvement	1,0	"	200	800	1,000
3. O&M Equipment			7,200	800	8,000
Total			8,600	6,400	15,000

- Continued -

Item	Quantity	Units	Costs Foreign	Costs Local	Costs Total
				(B'1,000)	
D. Physical Contingencies (10%)			13.702	25.148	38.850
E. Engineering Administration (10%)			-	42.780	42.780
F. Construction Equipment			93.300	4.660	97.960
G. Consultants Services, Training			23.280	4.770	28.050
Total (A-G)			267.380	339.220	606.600
H. Expected Price Escalation (15%)			40.100	50.900	91.000
Grand Total			307.480	390.120	697.600

Construction Cost of Main ~~Irrigation~~ System Improvement Works

Year	Item	Force Account Basis				Contract Basis				Total			
		L (Km)	F. C	L. C	Total	L (Km)	F. C.	L. C	Total	L (Km)	F. C.	L. C	Total
1983	Mae Wang Left	9.20	3,863	9,518	13,381	24.69	10,258	27,128	37,386	33.89	14,121	36,646	50,767
	Lateral	5.20	948	2,105	3,053	2.20	513	1,118	1,631	7.40	1,461	3,223	4,684
	Main drainage	0	0	0	0	10.50	984	1,436	2,420	10.50	984	1,436	2,420
	Total		4,811	11,623	16,434		11,755	29,682	41,437		16,566	41,305	57,871
1984	Mae Wang Left	4.51	796	1,882	2,678	0	0	0	0	4.51	796	1,882	2,678
	Mae Wang Right	5.20	1,835	4,682	6,517	8.43	3,039	8,132	11,171	13.63	4,874	12,814	17,688
	Mae Pung main	0	0	0	0	5.61	2,463	5,293	7,756	5.61	2,463	5,293	7,756
	Lateral	22.30	4,021	8,568	12,589	1.40	552	1,252	1,804	23.70	4,573	9,820	14,393
	Total		6,652	15,132	21,784		6,054	14,677	20,731		12,706	29,809	42,515
1985	Mae Wang Right	11.70	3,273	8,876	12,149	9.96	3,872	8,231	12,103	21.66	7,145	17,107	24,252
	Lateral	11.70	1,862	4,162	6,024	9.90	2,201	4,716	6,917	21.60	4,063	8,878	12,941
	Main drainage	0	0	0	0	31.20	3,612	5,370	8,982	31.20	3,612	5,370	8,982
	Total		5,135	13,038	18,173		9,685	18,317	28,002		14,820	31,355	46,175
1986	Mae Pung Left	6.52	1,660	3,739	5,399	0	0	0	0	6.52	1,660	3,739	5,399
	Mae Pung Right	0	0	0	0	12.30	4,031	8,902	12,933	12.30	4,031	8,902	12,933
	Lateral	13.75	2,462	5,739	8,201	13.20	3,216	6,737	9,953	26.95	5,678	12,476	18,154
	Total		4,122	9,478	13,600		7,247	15,639	22,886		11,369	25,117	36,486
1987	Link canal	2.00	552	1,408	1,960	0	0	0	0	2.00	552	1,408	1,960
	Main drainage	0	0	0	0	19.30	2,617	4,675	7,292	19.30	2,617	4,675	7,292
	Total		552	1,408	1,960		2,617	4,675	7,292		3,169	6,083	9,252
	Grand total		21,272	50,679	71,951		37,358	82,990	120,348		58,630 30.5%	133,669 69.5%	192,299 100%

Construction Cost of Land Consolidation Works

Year	Type	Force Account Basis				Contract Basis				Total				Remarks
		Acinge	F.C.	L.C	Total	Acreage	F.C	L.C	Total	Acreage	F.C	L.C	Total	
1983	I1	90	728	866	1,594	45	559	631	1.190	135	1,287	1.497	2,784	
	I2	443	3.399	2,829	6,228	245	2.999	2,497	5,496	688	6398	5,326	11.724	
	E1	0	-	-	-	59	315	575	890	59	315	575	890	
	E3	482	1,591	2.530	4,121	428	1.885	3.044	4.929	910	3.476	5,574	9.050	
	Total	1.015	5,718	6.225	11.943	777	5,758	6.747	12,505	1.792	11.476	12.972	24.448	
1984	I1	55	445	529	974	157	1.949	2,203	4,152	212	2.394	2,732	5.126	
	I2	408	3,130	2,605	5,735	686	8.397	6,992	15,389	1,094	11.527	9,597	21.124	
	E1	850	3.562	6.213	9.775	43	230	419	649	893	3.792	6.632	10.424	
	E3	196	647	1,029	1.676	14	62	99	161	210	709	1.128	1.837	
	Total	1.509	7.784	10.376	18.160	900	10.638	9.713	20.351	2.409	18.422	20.089	38.511	
1985	I1	475	3.843	4.570	8.413	432	5,362	6.063	11.425	907	9.205	10,633	19.838	
	I2	859	6,590	5,485	12,075	367	4,492	3,741	8,233	1,226	11.082	9.226	20.308	
	E1	9	38	66	104	106	566	1.032	1,598	115	604	1,098	1.702	
	E3	220	726	1,155	1,881	335	1,475	2.382	3,857	555	2,201	3,537	5,738	
	Total	1.563	11.197	11.276	22.473	1.240	11.895	13.218	25. 113	2, 803	23.092	24,494	47.586	
1986	E2	2.457	7.951	8.944	16.895	0	0	0	0	2.451	7.951	8.944	16,895	
1987	I1	768	6,213	7.389	13.602	322	3.997	4,519	8.516	1,090	10.210	11.908	22,118	
	I2	497	3.813	3,173	6.986	359	4,395	3,659	8.054	856	8.208	6,832	15.040	
	E1	6	25	44	69	239	1,277	2,328	3.605	245	1,302	2,372	3,674	
	E3	336	1,109	1.764	2,873	463	2,039	3,292	5,331	799	3,148	5,056	8.204	
	Total	1.607	11.160	12,370	23,530	1,383	11.708	13.798	25,506	2,990	22,868	26.168	49.036	
Grand total		8.145	43.810	49.191	93.001	4,300	39.999	43,476	83.475	12.445	83,809	92,667	176.476	
%			47.1	52.9			47.9	52.1			47.5	52.5		

ANNEX 6
Table 6-5

Equipment, Vehicles for Construction

Item	Quantity	Unit Cost	Total Cost
		(B'1,000)	
1. Foreign currency portion			
Tractor, crawler, 140HP	6	1,170	7,020
Tractor, swampy, 140HP	2	1,290	2,580
Scrap-dozer, crawler 6.4 m³	2	2,190	4,380
Motor scraper, 11 cu. yd.	5	4,280	21,400
Dragline, crawler, 1.20m³	2	4,310	8,620
Backhoe, crawler, 3/4 cu. yd	12	1,380	16,560
Truck, dump, 6 ton	27	340	9,180
Motor grader, 110 HP	4	870	3,480
Roller, tire, 15 ton	5	640	3,200
Truck, water tank	2	300	600
Truck, fuel	1	580	580
Truck, field greasing	1	1,500	1,500
Truck, pick-up, 3/4 ton, 4x4	10	80	800
Station wagon, 4x4	4	250	1,000
Concrete mixer 140L	10	25	250
Sub-total			81,150
Spare parts (15%)			12,150
Total			93,300 (US$4,665,000)
2. Local currency portion			
Transportation:	L.S		1,400
Delivery charge	L.S		1,860
Others	L.S		1,400
Total			4,660
Grand total			97,960

Equipment for Operation and Maintenance

Item	Quantity	Unit Cost (B 1,000)	Total Cost
1. Foreign currency portion			
Backhoe 0.35m³	1	920	920
Tractor, crawler 140HP	1	1,170	1,170
Grader 110HP	1	870	870
Loader 1.60m³	1	1,060	1,060
Jeep 1,500 cc	4	200	800
Dump truck 6 ton	2	340	680
Pickup truck 0.75 ton	4	100	400
Concrete mixer 140L	2	25	50
Pump 100 mm	5	22	110
Motor cycle 75cc	30	14	420
Spare parts	L.S.		720
Total			7,200
2. Local currency portion			(US$ 360,000)
Transportation	L.S		250
Delivery charge	L.S		300
Others	L.S		250
Total			800
Grand total			8,000

ANNEX 6
Table 6-7

Cost of: Consulting Services and Trainings

A. Consulting Services		
1. Foreign Currency Portion		
1.1. Remuneration (Foreign consultants)	US$	1,050,000
1.2. Out-of-pocket expenses	US$	55,000
a. International travel expenses		(20,000)
b. Reimbursable cost item & others		(35,000)
1.3. Contingencies	US$	115,000
Sub-total	US$	1,220,000
		(฿24,400,000)
2. Local Currency Portion		
2.1 Remuneration (Local consultants)	฿	2,000,000
2.2. Living allowance and quarter	฿	1,500,000
2.3. Local communication, transportation	฿	500,000
2.4. Printing of reports	฿	300,000
2.5. Contingencies	฿	430,000
Sub-total	฿	4,730,000
Total	฿	29,130,000
B. Trainings		
1. Foreign currency portion		
1.1. International travel expenses	US$	8,000
1.2. Per-diem (US$50 x 8 person x 60 days)	US$	24,000
1.3. Other cost	US$	8,000
1.4. Contingencies	US$	4,000
Sub-total	US$	44,000
		(฿880,000)
2. Local currency portion		
2.1. Preparation expenses	฿	40,000
Sub-total	฿	40,000
Total	฿	920,000
Grand total	฿	30,050,000

ANNEX 6
Table 6-8

Operation and Maintenance Cost :

1. Operation Cost

1.1. Salaries and wages	Cost (₱1,000)
Staffs – 10	1,200
Parmanent Employee (A) – 23	552
Ditto (B) – 98	1,176
Labors, operator – 75	900
Sub-Total	3,828
Foreman, Common Irrigator – 480	1,728.
Sub-total	1,728.
Total	5,556

1.2. Materials and supplies	
Fuel and oil	200
Office supplies	100
Total	300

2. Maintenance Cost.

Main System Improvement	950
On-farm level	1,540
Total	2,490

Grand Total	8,346
O.M cost per ha	₱542/ha

Annual Expenditures Schedule

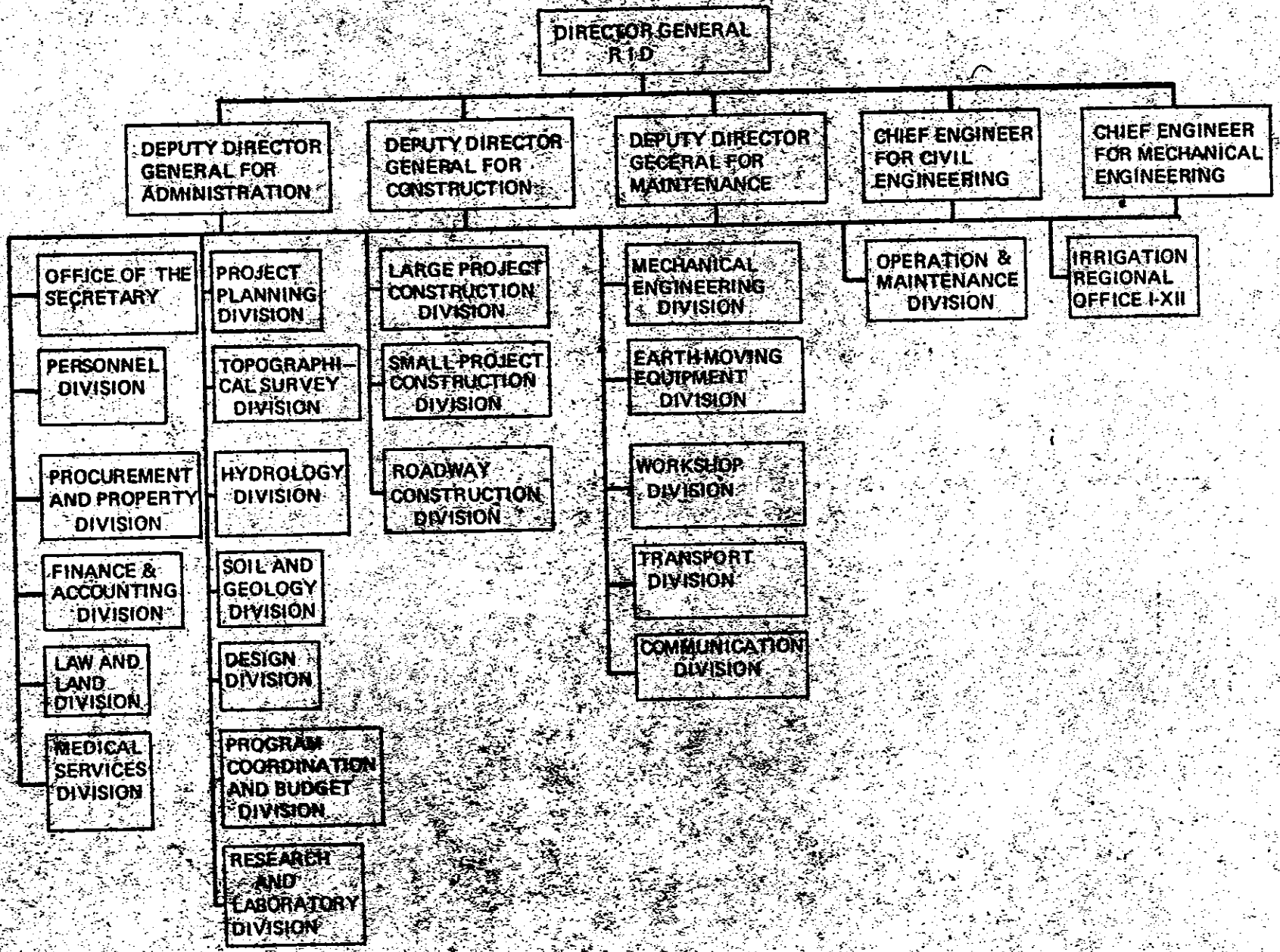
Unit : Million Baht

Item	Total	1st	2nd	3rd	4th	5th	6th	7th
1. Irrigation system	173.61	–	–	55.45	42.52	37.19	36.49	1.96
2. Drainage system	18.69	–	–	2.42	–	8.98	–	7.29
3. On-farm Development	176.49	–	–	24.45	38.51	47.53	16.89	49.04
4. Land acquisitions	15.19	–	–	1.76	2.18	5.62	2.27	3.36
Sub-total	383.96	–	–	84.08	83.21	99.30	55.65	61.65
5. O&M facilities	15.00	4.00	2.00	–	1.00	–	8.00	
6. Physical contingencies	38.85	0.60	2.00	8.41	8.42	7.94	5.57	5.91
7. Engineering Administration	42.78	8.78	4.00	6.00	6.00	6.00	6.00	6.00
8. Construction equipment	97.96	20.00	77.96	–	–	–	–	–
9. Consultants services	28.05	4.05	4.00	4.00	4.00	4.00	4.00	4.00
Sub-total	222.64	37.43	89.96	18.41	19.42	17.94	23.57	15.91
Total	606.60	37.43	89.96	102.49	102.63	117.31	79.22	77.56

ANNEX 7. Implementation of the Project

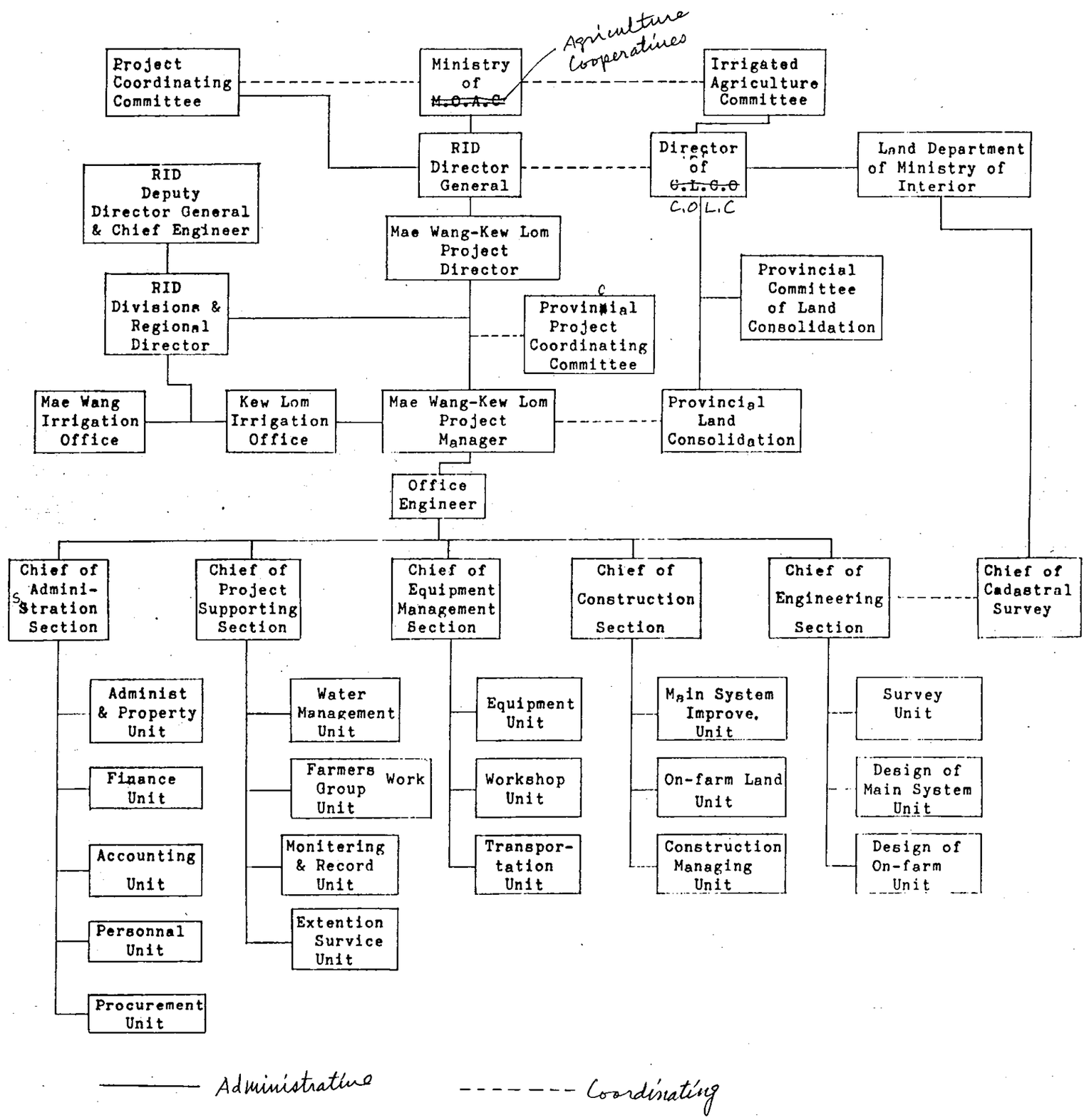
Figure 7-1 RID Organization
" 7-2 Proposed Organization of Project Implementation
" 7-3 Project Implementation Schedule
" 7-4 Proposed Organization on Operation and Maintenance
" 7-5 Proposed Farmers' Organization on Operation and Maintenance

Figure 7-1 RID ORGANIZATION CHART



ANNEX 7
Figure 7-1

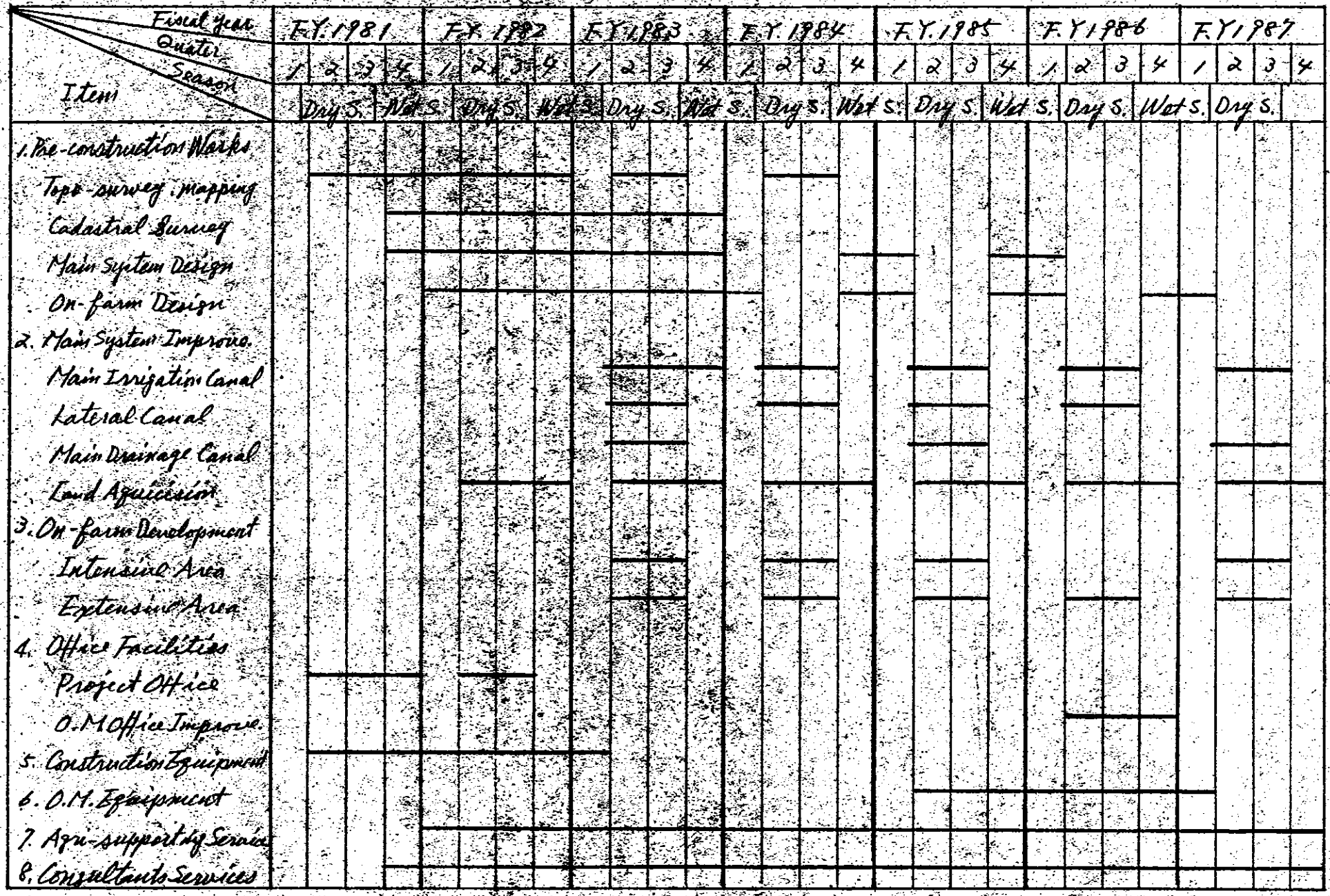
Figure 7-2. Proposed Organization ~~Chart~~ ~~For~~ of Project Implementation



7-2

ANNEX 7
Figure 7-2

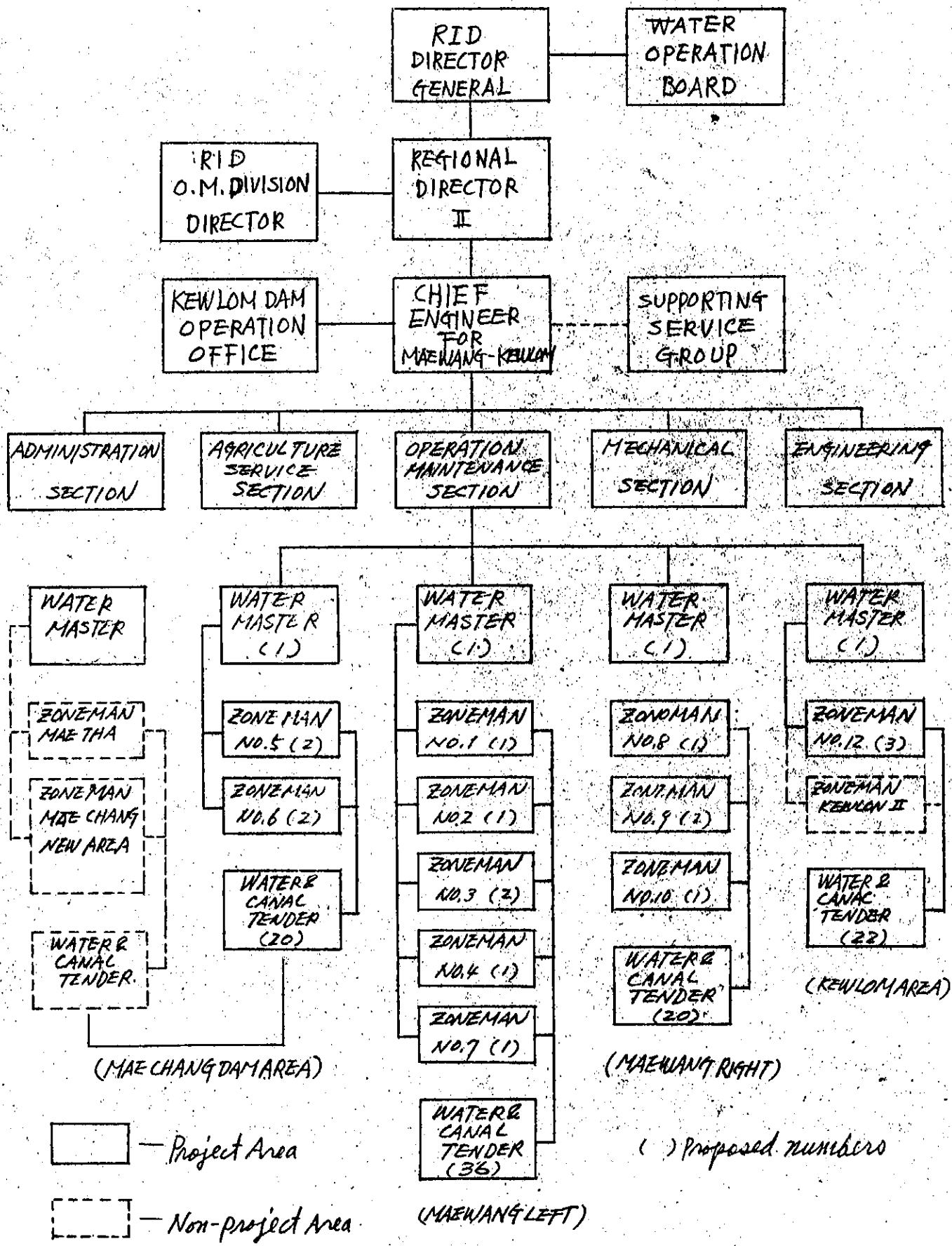
事業工程表 (Mae Wang - Kew Lom Project)



ANNEX 7
Figure 7-3

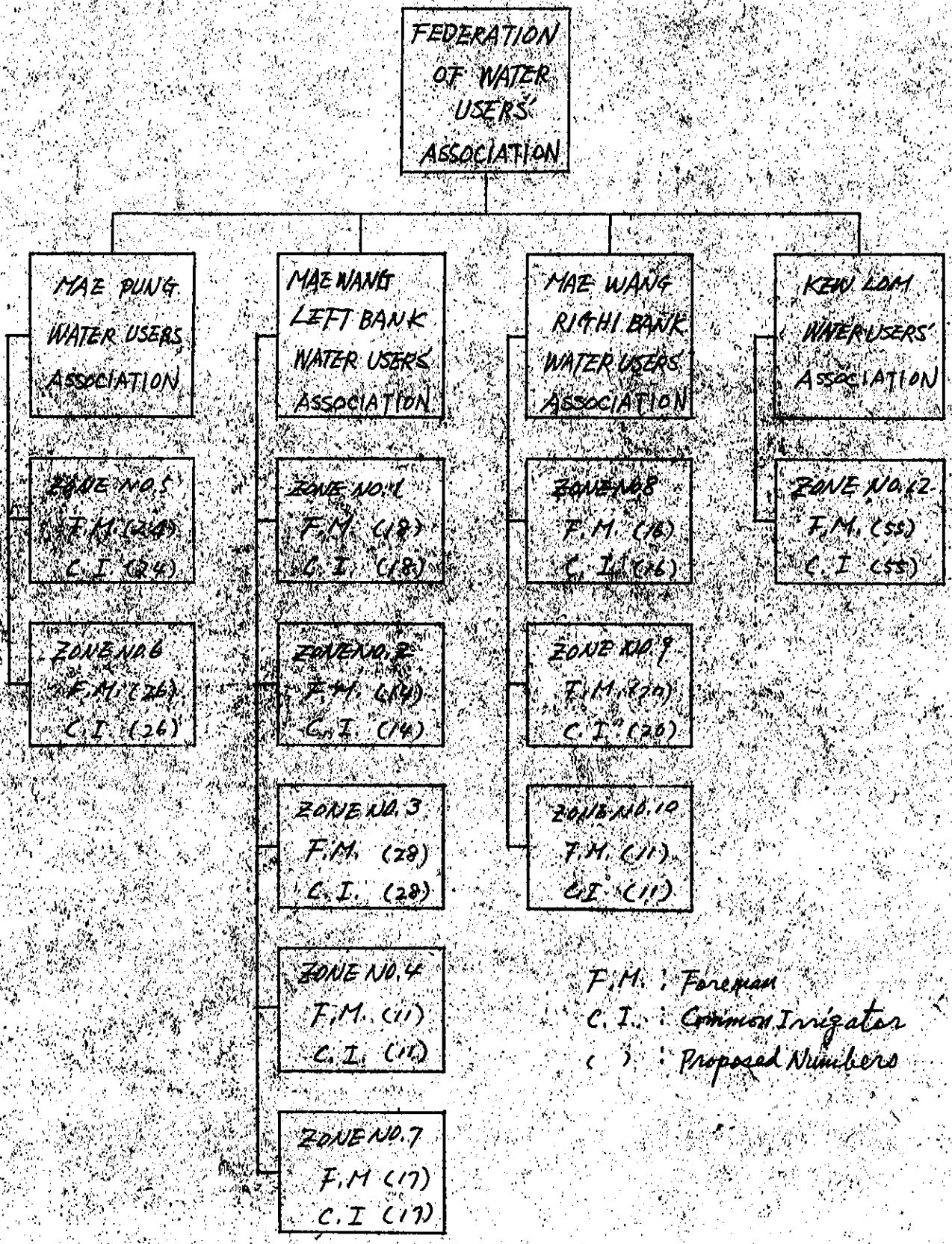
ANNE-7
Figure 7-4

Fig 7-4 Proposed Organization for Operation & Maintenance



ANNEX 7
Figure 7-5

Proposed Farmers' Organization on Operation and Maintenance



ANNEX 8. Project Evaluation and Farm Economics.

Table 8-1-1. Structure of paddy price.
" 8-1-2. Structure of peanut price.
" 8-1-3. Structure of Sugarcane price.
" 8-1-4. Farm-gate price of Inputs and Outputs.
" 8-2. Economic Crop production Costs. (Excluded labor cost)
" 8-3-1 ①. Average Monthly Manpower Requirments by Crop.
" 8-3-1 ②. Average Monthly Manpower Requirments by Crop.
" 8-3-2. Monthly Manpower Requirements by Crop.
" 8-4. Internal Rate of Return.
" 8-4-1. Economic Cost and Return, Case I.
" 8-4-2. Incremental Benifits, Case I.
" 8-4-3. Economic Cost and Return, Case II.
" 8-4-4. Incremental Benifits, Case II.
" 8-5. Sensitivity Test.
" 8-6. Crop Budgets

Table 8-1-1 Structure of paddy price

	Present (1980)		Future (1990)	
	Financial	Economic	Financial	Economic
Bangkok FOB price US$@ton	320	320	480	480
Baht@ton	6,400	6,400	9,600	9,600
Rice premjum	835	–	835	–
Export duty	270	–	440	–
Municipal tax	10	–	15	–
Exporter's margin a/	400	190	450	210
Wholesaler's margin b/	170	115	185	125
Transport and handling c/	380	290	460	350
Ex-mill price of rice	4,335	5,805	7,215	8,915
Ex-mill price of paddy	2,860	3,830	4,760	5,880
Milling cost d/	120	100	150	120
Miller's margin	220	100	265	120
Milling tax	60	–	70	–
Transport to mill c/	50	40	60	50
Input price of paddy at mill	2,410	3,590	4,215	5,590
Merchants margin	300	–	360	–
Price of by-product	200	200	240	240
Farm gate price of paddy	2,310	3,790	4,095	5,830

Note : a/---- Conversion factor of 0.47 was used to convert from financial to economic price.
b/---- Conversion factor of 0.69 was used to convert from financial to economic price.
c/----- The conversion factor for transports ets. was put 0.76 to use
d/----- The conversion factor for industry was put 0.8 to use.

Table 8-1-2 Structure of Peanut price

	Present (1980)		Future (1990)	
	Financial	Economic	Financial	Economic
Bangkok FOB price US$@ton	579	579	808.5	808.5
Baht@ton	11,580	11,580	16,170	16,170
Export tax	490	—	310	—
Exporter's margin a/	400	190	450	210
Wholesaler's margin b/	400	275	505	350
Transport and handling c/	380	290	460	350
Price of without shell	9,910	10,825	14,445	15,260
Price of with shell	6,440	7,035	9,390	9,910
Shelling cost d/	500	400	480	385
Shelling factory's margin	350	155	420	190
Tax	170	—	165	—
Transport to shelling factory c/	100	75	120	90
Input price of peanut at factory	5,320	6,405	8,205	9,245
Merchants margin	500	—	600	—
Farm gate price of peanut -dried-	4,820	6,405	7,605	9,245
Farm gate price of peanut -fresh-	2,410	3,200	3,800	4,620

Note : a/ ---- Conversion factor of 0.47 used to convert from financial to economic price.
b/ ---- Conversion factor of 0.69 used to convert from financial to economic price.
c/ ---- The conversion factor for transports etc. was put 0.76 to use.
d/ ---- The conversion factor for industry was put 0.8 to use.

Table 8-1-3 Structure of sugarcane price

	Present (1980)		Future (1990)	
	Financial	Economic	Financial	Economic
International price				
US$@ton	225.5	225.5	337.8	337.8
Baht@ton	4,510	4,510	6,760	6,760
Production cost	1,540	1,540	2,000	2,000
Transport and handling a/	380	290	460	350
Miller's margin b/	30	–	800	–
Exportor's margin b/	80	–	400	–
Export tax	–	–	760	–
Total cost	2,030	1,830	4,420	2,350
Price of sugar	2,480	2,680	2,340	4,410
By product	870	870	1,200	1,200
Farm gate price of sugar	3,350	3,550	3,540	5,610
Price of cane	285	300	300	480

Note : a/ ····· Conversion factor of 0.76 was used to convert from financial to economic price.
b/ ····· The conversion factor of 0.46 was used for trade.

Table 8-1-4 Farm-gate Prices of Inputs and Outputs

Unit: Baht@ton

Inputs and Outputs	1980		1990	
	Financial	Economic	Financial	Economic
Crops				
Paddy	2,310	3,790	4,095	5,830
Peanut -fresh in shell-	2,410	3,200	3,800	4,620
Tobacco -fresh-	1,825	1,825	2,780	2,780
Soybean	8,140	8,140	12,350	12,350
Chilli -fresh-	4,095	4,095	6,210	6,210
Garlic -fresh-	8,935	8,935	13,560	13,560
Sugarcane	285	300	300	480
Orchard (Pineapple)	1,920	1,920	2,930	2,930
Vegetable (Cabbage)	2,050	2,050	3,110	3,110
Seed or Seedling				
Paddy	2,200	3,600	2,900	4,500
Peanut	3,300	4,600	3,900	4,800
Tobacco (1000 seedling)	270	378	319	446
Soybean	5,600	7,900	6,600	9,300
Chilli	50,000	70,000	59,000	83,000
Garlic	30,000	42,000	35,000	50,000
Sugarcane (1000 seedling)	70	98	83	116
Orchard (1000 seedling)	25	105	89	124
Vegetable (1000 seedling)	13	19	16	22
Fertilizer				
Ammonium phosphate (16-20-0)	5,180	4,650	7000	6,285
Ammonium sulphate (20-21% N)	3210	2,880	4330	3,890
Potash (60% K_2O)	4560	4,090	6160	5,530
Super phosphate (36-38% P_2O_5)	5800	5,210	7840	7,035
N-P-K-Mg (4-16-24-4)	6740	6,050	9100	8,170

Note: Prices expressed in 1980 constant values

Table 8-2 Economic Crop Production Costs (excluded labor cost)

Unit: Baht@Ha

	Item	1. Paddy (Wet Season)	2. Paddy (Dry Season)	3. Peanut (Wet Season)	4. Peanut (Dry Season)	5. Tobacco	6. Soybean	7. Chilli	8. Garlic	9. Sugar cane	10. Orchard -Pineapple-	11. Vegetable -Cabbage-
Present	Cultivation	478	478	232	232	333	232	333	333	232	232	333
	Seed (Nursery)	274	274	589	728	1,229	269	350	3,186	741	720	742
	Fertilizer	28	440	—	—	3024	93	1,066	163	312	461	771
	Chemicals	—	30	—	—	440	30	370	120	—	—	600
	Others	1,170	808	819	960	3,344	416	3,171	4478	1050	1,152	614
	Total	1,950	2030	1,640	1,920	8,370	1,040	5290	14940	2335	2,565	3080
Future Without Project	Cultivation	478	478	232	232	333	232	333	333	232	232	333
	Seed (Nursery)	342	342	614	758	1,450	316	415	11,650	827	812	876
	Fertilizer	38	577	—	—	4085	126	1,439	220	421	622	1068
	Chemicals	—	40	—	—	615	40	518	260	—	—	840
	Others	1282	973	844	990	4,322	476	4055	5337	1210	1354	773
	Total	2,140	2430	1,690	1,980	10805	1,190	6760	17790	2690	3020	3890
Future With Project	Cultivation	507	507	375	375	446	375	446	446	375	375	446
	Seed (Nursery)	158	158	576	576	1450	307	415	15,000	406	767	876
	Fertilizer	1,432	2,163	691	691	4,902	691	1,683	1,623	1923	1,923	2.643
	Chemicals	—	48	—	—	707	46	596	288	—	—	966
	Others	1533	1224	928	1088	4755	521	4460	5873	1337	1490	1017
	Total	3630	4100	2570	2730	12,260	1940	7,600	23,270	4035	4555	5750

Table 8-3 Financial Crop Production Costs (excluded labor cost)

Unit: Baht@Ha

	Item	1. Paddy (Wet Season)	2. Paddy (Dry Season)	3. Peanut (Wet Season)	4. Peanut (Dry Season)	5. Tobacco	6. Soybean	7. Chilli	8. Garlic	9. Sugar cane	10. Orchard -Pineapple-	11. Vegetable -Cabbage-
Present	Cultivation	730	730	230	230	330	230	330	330	230	230	330
	Seed (Nursery)	167	167	422	521	872	190	250	6990	500	470	530
	Fertilizer	31	492	—	—	3370	104	1,188	181	347	514	881
	Chemicals	—	34	—	—	497	34	418	203	—	—	678
	Others	1227	847	858	1009	3510	437	3329	4701	1103	1206	641
	Total	2155	2270	1510	1760	8585	995	5515	12405	2180	2440	3060
Future Without Project	Cultivation	730	730	230	230	330	230	330	330	230	230	330
	Seed (Nursery)	220	220	500	615	1,035	225	295	8155	590	580	640
	Fertilizer	42	665			4550	140	1602	245	470	693	1190
	Chemicals	—	45	—	—	695	45	585	283		—	949
	Others	1343	1020	885	1040	4535	500	4258	5602	1410	1422	811
	Total	2335	2680	1615	1885	11145	1140	7070	14615	2700	2925	3920
Future With Project	Cultivation	775	775	575	575	680	575	680	680	575	575	680
	Seed (Nursery)	145	145	470	470	1,035	220	295	10500	290	550	640
	Fertilizer	1593	2408	770	770	5460	770	1,874	1274	2140	2140	2819
	Chemicals	—	54	—	—	799	54	673	325	—	—	1092
	Others	1607	1278	970	1140	4991	546	4678	6161	1230	1345	1069
	Total	4120	4660	2785	2955	12,965	2165	8200	19540	4235	4610	6300

Table 8-3-10 Average Monthly Manpower Requirements by Crop

(Man-days / Ha)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1. Paddy, Wet													
Present	5.5			0.5	5.4	18.6	24.5	14.8	3.7	2.0	19.3	25.8	119.0
Future Without Project	5.8			0.3	5.5	18.7	24.7	15.1	3.9	2.1	21.3	28.4	125.0
Future With Project	8.2					8.2	29.9	24.6	4.8	1.5	36.3	35.5	160.0
2. Paddy, Dry													
Present	12.1	36.7	16.9	8.4	10.8	10.8	2.3						127.0
Future Without Project	12.2	38.9	17.8	9.0	11.9	11.9	2.5						123.9
Future With Project	11.5	31.7	26.8	10.9	8.9.0	14.2							181.2
3. Peanut, Wet													
Present	2.6	22.2	18.6	22.6	23.9	15.8	10.9	12.4					136.0
Future Without Project	2.7	23.6	23.3	32.0	32.0	16.2	11.3	12.9					161.5
Future With Project						8.2	21.7	28.9	10.3	9.6	40.0	39.9	159.6
4. Peanut, Dry													
Present	38.8	42.2	28.4	32.8	10.6	2.5				1.6	1.1	19.8	182.0
Future Without Project	39.2	42.6	28.8	33.2	10.7	2.6				1.6	1.1	19.9	184.0
Future With Project	23.1	46.8	40.6	33.1	26.5	10.9							181.2
5. Tobacco													
Present	36.8	38.8	27.8	24.9			2.0	125.5	65.6	38.9	28.3	23.8	457.0
Future Without Project	37.2	39.6	28.3	25.6			2.0	128.0	67.6	36.0	28.6	24.8	457.2
Future With Project	30.2	27.9	30.0	42.9	30.1	8.6	21.1	29.7	44.2	32.0	24.5	55.2	471.0
6. Soybean													
Present	48.2	9.8	4.3	28.5	7.6			93.9	42.8	130.3		7.2	372.0
Future Without Project	50.2	8.8	4.6	30.0	7.9			95.1	32.4	127.8		2.3	386.9
Future With Project	10.0	25.3	18.8	1.6	22.0	36.6	22.0	57.1	28.7	28.2	140.4	22.3	422.8

Table 8-3-10 ②

Table 8-3-1 ② Average Monthly Manpower Requirements by Crop

(Man-days / Ha)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
7. Chilli													
Present	118.3	122.2	97.2						4.2	72.8	127.3	102.0	644.0
Future Without Project	120.5	128.0	102.1						4.4	74.5	130.9	107.1	670.8
Future With Project	29.8	28.9	69.7	79.8	97.5	30.8	19.9	19.4	11.5	38.2	54.9		379.6
8. Garlic													
Present	75.6	23.4	39.4	9.1	0.1					1.9	5.1	48.4	202.0
Future Without Project	70.8	24.3	41.4	9.2	0.1					1.8	5.2	54.8	206.7
Future With Project	51.9	10.1	40.9	9.2							19.4	66.8	212.3
9. Sugar cane													
Present	9.1	27.2	18.9	48.2	40.0	23.0	2.6	8.3	4.2	3.0	0.5		178.0
Future Without Project	9.2	28.6	19.8	49.9	40.4	24.0	1.7	8.6	4.4	3.2	0.5		184.8
	58.6	25.8	20.8	11.7	5.6	5.5	5.4	5.4	5.4	3.9	0.7	25.5	194.3
10. Orchard - Pineapple -													
Present		2.5	2.4	16.9	22.6	7.1	18.4	20.8	6.6	0.8	5.4	0.5	109.0
Future Without Project		2.5	2.5	17.2	28.9	7.2	19.2	21.8	6.9	0.8	5.5	0.5	113.0
Future With Project	-0.9	0.9	17.5	20.8	26.7	32.7	16.1	9.2	0.9	0.9	0.9	0.9	122.4
11. Vegetable - Cabbage -													
Present	48.6	49.3	19.2	59.3	7.8	52.9	30.7			10.3	55.7	21.2	381.0
Future Without Project	50.5	51.2	19.7	61.0	8.2	60.1	32.6			11.4	57.1	22.3	394.1
Future With Project	25.5	46.0	17.0	28.9	59.9	69.5	43.4			19.0	23.0	61.9	238.0
Vacant Land													
Present													
Future Without Project													
Future With Project													

ANNEX 8 Table 8-3-1 ②

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Table 8-3-2 Monthly Manpower Requirements by Crop
(1,000 mandays)

Crop		Ha	Jan.	Feb.	Mar.	Apri.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1. Paddy (Wet Season)	Present (P)	11,993	53	—	—	6	65	223	294	177	44	24	231	309	1,427
	Future Without Project (WO)	11,993	58	—	—	6	66	224	296	181	47	25	255	341	1,499
	Future With Project (W)	12,729	—	—	—	—	—	104	378	312	55	19	462	452	1,782
2. Paddy (Dry Season)	P	460	6	16	8	4	19	5	1	—	—	—	—	—	58
	WO	460	6	17	8	4	21	5	1	—	—	—	—	—	62
	W	4,504	52	143	107	49	401	65	—	—	—	—	—	—	816
3. Peanut (Wet Season)	P	391	1	11	7	14	13	6	4	5	—	—	—	—	61
	WO	391	1	11	8	14	13	6	4	5	—	—	—	—	63
	W	315	—	—	—	—	—	3	7	8	3	3	13	13	49
4. Peanut (Dry Season)	P	1,243	48	18	17	71	13	3	—	—	—	2	1	25	198
	WO	1,243	49	18	18	74	14	3	—	—	—	2	1	25	204
	W	2,942	39	137	31	70	225	32	—	—	—	—	—	—	533
5. Tobacco	P	779	28	30	21	19	—	—	2	98	51	27	22	57	356
	WO	779	29	31	22	20	—	—	2	100	53	28	22	58	364
	W	1,131	61	32	37	49	34	10	24	31	50	36	107	62	533
6. Soybean	P	590	24	6	3	17	4	—	—	55	29	77	—	4	221
	WO	590	24	6	3	18	5	—	—	56	31	81	—	4	228
	W	1,002	10	25	18	2	27	37	32	51	29	29	141	33	435
7. Chilli	P	204	24	25	20	—	—	—	—	—	1	15	26	21	131
	WO	204	25	26	21	—	—	—	—	—	1	15	27	22	137
	W	751	15	18	51	60	73	23	15	69	84	104	41	—	552
8. Garlic	P	518	39	12	20	2	0	—	—	—	—	1	3	28	105
	WO	518	40	13	21	2	0	—	—	—	—	1	3	28	107
	W	1,425	74	14	58	47	—	—	—	—	—	—	28	81	303
9. Sugar cane	P	195	1	5	4	9	8	4	0	2	1	1	0	—	35
	WO	195	1	6	4	10	8	5	0	2	1	1	0	—	36
	W	190	11	9	4	2	1	1	1	1	1	1	0	5	37
10. Orchard -Pineapple-	P	342	—	1	1	6	9	2	6	7	2	0	2	0	37
	WO	342	—	1	1	6	10	2	7	7	2	0	2	0	39
	W	334	0	0	6	7	9	11	5	1	0	0	0	0	41
11. Vegetable -Cabbage-	P	699	34	34	13	41	5	40	35	—	—	8	39	15	266
	WO	699	35	36	14	43	6	42	37	—	—	8	40	16	275
	W	848	63	39	14	21	51	59	37	—	—	15	20	52	371
Total Manpower Requirement	P	17,414	258	158	113	189	137	285	343	344	128	155	324	459	2,895
	WO	17,414	267	163	118	197	142	288	347	351	134	162	350	493	3,014
	W	26,171	324	416	327	307	821	344	499	473	222	208	811	699	5,451

8-4. Internal Rate of Return

Table 8-4-1 Economic Cost and Return, Case I

Year	Cost: Construction cost	Cost: O&M Cost	Incremental Benefits	Benefit-Cost	Discount Rate: 25 %	Discount Rate: 26 %	Discount Rate: %
	million Baht						
1981	37.43	—	—	Δ 37.43	Δ 29.94	Δ 29.71	
1982	89.96	—	—	Δ 89.96	Δ 57.54	Δ 56.67	
1983	102.49	1.12	Δ 8.41	Δ 110.02	Δ 56.33	Δ 55.00	
1984	102.63	5.02	Δ 3.88	Δ 109.53	Δ 44.86	Δ 43.46	
1985	117.31	4.70	39.77	Δ 82.24	Δ 26.95	Δ 25.90	
1986	99.22	6.32	105.04	19.50	5.03	4.80	
1987	77.56	8.35	166.42	80.51	16.88	15.97	
1988	—	8.35	221.42	213.07	35.75	33.54	
1989	—	8.35	236.86	228.51	30.67	28.54	
1990	—	8.35	247.71	239.36	25.71	23.74	
1991	—	8.35	254.53	246.18	21.15	19.37	
1992 ~2030	—	8.35	260.60	252.25	8.665	7.620	
Total	606.60				6.25	Δ 8.58	

$$IRR = 25\% + \frac{6.25}{6.25 + 8.58} \times 1\% = 25.4\%$$

ANNEX 8
Table 8-4-1

Table 8-4-2 Incremental Benefits, Case I

Unit: Million Baht

Year	Future Without Project				Future With Project				Incremental Benefits
	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	
1982	242.03	48.21	40.43	153.39	242.03	48.21	40.43	153.39	0
1983	255.15	48.92	40.37	165.86	245.23	39.75	46.03	159.45	Δ 6.41
1984	268.41	49.63	40.31	178.47	271.69	45.48	51.62	174.59	Δ 3.88
1985	282.12	50.34	40.25	191.53	346.15	52.63	57.22	231.30	39.77
1986	295.38	51.05	40.20	204.13	447.59	75.61	62.81	309.17	105.04
1987	309.08	51.76	40.14	217.18	545.43	93.42	68.41	383.60	166.42
1988	322.93	52.47	40.18	230.28	638.07	111.37	76.00	451.70	221.42
1989	336.81	53.18	40.02	243.61	681.72	121.65	79.60	480.47	236.86
1990	351.05	52.90	39.96	257.19	718.62	128.43	85.19	504.90	247.71
1991	365.34	54.47	39.90	270.96	749.45	133.17	90.79	525.49	254.53
1992	379.78	55.04	39.84	284.90	778.02	136.14	96.38	545.50	260.60
1993									

8-10

ANNEX 8
Table 8-4-2

Table 8-4-3 Economic Cost and Return, Case II

Year	Cost: Construction Cost	Cost: O&M Cost	Incremental Benefits	Benefit-Cost	Discount Rate: 23%	Discount Rate: 25%	Discount Rate: 24%
			Million Baht				
1981	37.43	—	—	Δ 37.43	Δ 30.43	Δ 29.94	Δ 30.19
1982	89.96	—	—	Δ 89.96	Δ 59.46	Δ 57.57	Δ 58.51
1983	124.49	1.12	Δ 6.41	Δ 119.20	Δ 64.06	Δ 61.03	Δ 62.52
1984	124.63	3.02	Δ 3.88	Δ 121.53	Δ 53.47	Δ 53.87	Δ 55.64
1985	139.31	4.70	Δ 39.27	Δ 104.24	Δ 37.03	Δ 34.16	Δ 35.56
1986	101.22	6.62	105.04	Δ 2.80	Δ 0.81	Δ 0.73	Δ 0.74
1987	89.36	8.35	167.98	60.07	14.10	12.60	13.32
1988	—	8.35	228.23	219.88	41.98	36.90	39.34
1989	—	8.35	246.21	237.86	36.92	31.92	34.32
1990	—	8.35	269.89	258.04	32.89	27.72	29.80
1991	—	8.35	270.25	261.90	26.87	22.50	24.57
1992 ~2030	—	8.35	277.50	269.15	128.28	92.45	105.21
Total	716.60				30.86	Δ 13.81	3.60

$$IRR = 24\% + \frac{3.60}{30.86 + 13.81} \times 1\% = 24.2\%$$

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ANNEX 8
Table 8-4-3

Table 8-4-4

Incremental Benefits Case II

Unit : Million Baht

Year	Future Without Project				Future With Project				Incremental Benefits
	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	
1982	242.03	48.21	40.43	153.39	242.03	48.21	40.43	153.39	0
1983	255.15	48.92	40.37	165.86	248.23	39.75	46.03	159.45	Δ 6.41
1984	268.41	49.63	40.31	178.49	271.69	45.48	41.62	174.59	Δ 3.88
1985	282.12	50.34	40.25	191.53	346.15	57.63	57.22	231.30	39.77
1986	295.38	51.05	40.20	204.13	447.39	75.61	62.81	309.17	105.04
1987	308.08	51.76	40.14	216.18	548.19	94.62	68.41	385.16	167.98
1988	322.93	52.47	40.18	230.28	646.56	114.05	74.00	458.51	228.23
1989	336.81	53.18	40.02	243.61	694.34	124.92	77.60	489.82	246.21
1990	351.05	53.90	37.96	259.19	735.21	132.24	85.19	517.78	258.59
1991	365.74	54.47	39.90	270.96	768.22	137.37	90.79	540.31	270.35
1992	379.78	55.04	38.84	284.90	797.29	140.49	96.38	560.40	277.50
1993									

8-5 Sensitivity Test

Table 8-5-1 Incremental Benefits, Case I

(2-years delay in reaching full benefit)

Unit : Million Baht

Year	Future Without Project				Future With Project				Incremental Benefits
	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	
1982	242.03	48.21	40.43	153.39	242.03	48.21	40.43	153.39	0
1983	255.15	48.92	40.37	165.86	245.33	39.75	46.03	159.45	Δ 6.41
1984	268.41	49.63	40.31	178.47	251.47	45.48	51.62	174.59	Δ 3.88
1985	282.12	50.34	40.25	191.53	345.16	57.63	57.22	231.30	Δ 39.77
1986	295.38	51.05	40.20	204.12	440.88	73.61	62.81	304.46	100.33
1987	309.08	51.76	40.14	217.18	534.82	93.42	68.41	373.76	156.58
1988	322.93	52.47	40.18	230.28	629.72	111.37	74.00	444.55	214.27
1989	336.81	53.18	40.02	243.61	690.93	121.65	79.60	488.98	225.37
1990	354.05	53.90	39.96	259.19	764.94	128.43	85.19	491.32	232.13
1991	365.34	54.47	39.90	270.96	937.53	133.17	90.79	513.57	242.61
1992	379.78	55.04	39.84	284.90	988.96	136.14	96.38	536.44	251.54
1993	379.78	55.04	39.84	284.90	774.38	135.14	96.38	542.86	256.76
1994	379.78	55.04	39.84	284.90	778.02	134.14	96.38	546.50	260.60

ANNEX 8
Table 8-5-2

Table 8-5-2 Economic Cost and Return, Case I
(2 years delay in reaching full benefit)

Year	Cost: Construction Cost	Cost: O&M Cost	Incremental Benefits	Benefit-Cost	Discount Rate: 24 %	Discount Rate: 25 %	Discount Rate: %
	million Baht						
1981	32.43		0	△ 32.43	△ 30.19	△ 29.94	
1982	89.96		0	△ 89.96	△ 58.51	△ 57.57	
1983	102.49	1.12	1.41	△ 110.02	△ 57.67	△ 56.33	
1984	102.63	3.02	9.88	△ 109.53	△ 46.33	△ 44.86	
1985	117.31	4.70	39.77	△ 82.24	△ 28.05	△ 26.95	
1986	77.22	6.62	103.73	18.09	4.98	4.74	
1987	72.96	8.35	155.38	66.67	14.79	13.98	
1988		8.35	214.27	205.92	36.84	34.65	
1989		8.35	225.37	217.02	31.32	29.12	
1990		8.35	234.13	225.78	26.28	24.25	
1991		8.35	242.61	234.26	21.97	20.12	
1992		8.35	251.54	243.19	18.41	16.71	
1993		8.35	256.76	248.41	15.15	13.66	
1993 ~2030		8.35	260.60	252.25	69.02	55.44	
Total	606.60				18.01	△ 3.08	

$$IRR = 24\% - \frac{18.01}{18.01 + 3.08} \times 1\% = 24.9\%$$

Table 8-5-3

Economic Cost and Return, Case I
(10% increase in construction cost)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			23 %	24 %	%
	million Baht						
1981	41.17	—	—	Δ 41.17	Δ 33.47	Δ 33.20	
1982	98.96	—	—	Δ 98.96	Δ 65.41	Δ 64.36	
1983	112.74	1.12	Δ 6.41	Δ 120.27	Δ 64.63	Δ 63.08	
1984	112.89	3.02	Δ 3.88	Δ 119.79	Δ 52.34	Δ 50.67	
1985	129.04	4.70	39.77	Δ 93.97	Δ 33.38	Δ 32.05	
1986	87.14	6.62	105.04	11.28	3.26	3.10	
1987	85.32	8.35	166.42	72.75	17.08	16.14	
1988	—	8.35	221.42	213.07	40.68	38.12	
1989	—	8.35	236.86	228.51	35.46	32.97	
1990	—	8.35	247.71	239.36	30.21	27.86	
1991	—	8.35	254.53	246.18	25.26	23.09	
1992 ~2030	—	8.35	260.60	252.25	112.48	78.60	
Total	667.26				15.20	Δ 3.48	

$$IRR = 23\% + \frac{15.20}{15.20 + 3.48} \times 1\% \doteqdot 23.8\%$$

S/-8

ANNEX 8
Table 8-5-3

Table 8-5-4 Economic Cost and Return, Case I

(7 years delay in reaching full benefit and 10% increase in construction cost)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			23 %	24 %	%
	million Baht						
1981	41.17		0	Δ 41.17	Δ 33.47	Δ 33.20	
1982	98.96		0	Δ 98.96	Δ 65.41	Δ 64.36	
1983	112.74	1.12	Δ 241	Δ 120.27	Δ 64.63	Δ 63.05	
1984	112.89	3.02	Δ 388	Δ 119.79	Δ 52.34	Δ 50.67	
1985	129.04	4.70	37.77	Δ 93.97	Δ 33.38	Δ 32.05	
1986	87.14	6.62	103.93	10.17	2.94	2.80	
1987	85.32	8.35	152.58	58.91	13.83	13.07	
1988		8.35	214.27	205.92	39.31	36.84	
1989		8.35	225.37	217.02	33.68	31.32	
1990		8.35	234.13	225.78	28.49	26.28	
1991		8.35	242.61	234.26	24.04	21.97	
1992		8.35	251.54	243.19	20.28	18.41	
1993		8.35	256.76	248.41	16.84	15.15	
1993 ~2030		8.35	260.60	252.25	74.34	69.02	
Total	667.26				4.52	Δ 8.47	

$$IRR = 23\% - \frac{4.52}{4.52 + 8.47} \times 1\% \doteqdot 23.3\%$$

Table 8-5-5 Economic Cost and Return : Case I

(10% decrease in crops prices)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction cost	O&M Cost			23 %	24 %	%
	million Baht						
1981	37.43	–	–	Δ 37.43	Δ 30.43	Δ 30.19	
1982	89.96	–	–	Δ 89.96	Δ 59.46	Δ 58.51	
1983	102.49	1.12	Δ 6.31	Δ 109.92	Δ 59.07	Δ 57.65	
1984	102.63	3.02	Δ 3.94	Δ 109.59	Δ 47.88	Δ 46.36	
1985	117.31	4.70	37.85	Δ 84.16	Δ 29.89	Δ 28.71	
1986	79.22	6.62	88.96	13.12	3.79	3.61	
1987	77.56	8.35	154.60	68.69	16.13	15.24	
1988	–	8.35	203.52	195.17	37.26	34.92	
1989	–	8.35	212.92	204.57	31.72	29.49	
1990	–	8.35	218.31	209.96	26.50	24.44	
1991	–	8.35	219.95	201.60	21.71	19.85	
1992 ~2030	–	8.33	220.78	212.43	94.72	83.04	
Total	606.60				3.10	Δ 10.83	

$$IRR = 23\% + \frac{5.10}{5.10 + 10.83} \times 1\% \doteq 23.3\%$$

Table 8-5-6 Economic Cost and Return, Case I

(2-years delay in reaching full benefit and -10% decrease in crops prices)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			22 %	23 %	%
	Million Baht						
1981	37.43		0	Δ 37.43	Δ 30.68	Δ 30.43	
1982	89.96		0	Δ 89.96	Δ 60.44	Δ 59.46	
1983	102.49	1.12	Δ 6.31	Δ 109.92	Δ 60.53	Δ 59.07	
1984	102.63	3.02	Δ 3.94	Δ 109.59	Δ 49.47	Δ 47.88	
1985	117.31	4.70	37.85	Δ 84.16	Δ 31.14	Δ 29.89	
1986	79.22	6.62	97.89	12.05	3.65	3.48	
1987	77.56	8.35	141.45	56.54	13.81	13.04	
1988		8.35	195.85	187.50	38.21	35.79	
1989		8.35	202.03	193.68	32.34	30.06	
1990		8.35	205.81	197.46	27.03	24.92	
1991		8.35	209.10	200.75	22.52	20.60	
		8.35	212.62	204.27	18.79	17.04	
		8.35	217.32	207.76	15.67	14.09	
		8.35	220.78	212.43	72.74	62.60	
	606.60				12.50	Δ 5.11	

$$IRR = 22\% - \frac{12.50}{12.50 + 5.11} \times 1\% \doteq 22.7\%$$

ANNEX 8
Table 8-5-7

Table 8-5-7 Incremental Benefits Case II

(2-years delay in reaching full benefit)

Unit : Million Baht

Year	Future Without Project				Future With Project				Incremental Benefits
	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	Gross Value of Production	Production Cost: Input Material Costs	Production Cost: Labor Costs	Net Value of Production	
1982	242.03	48.21	40.43	153.39	242.03	48.21	40.43	153.39	0
1983	255.15	48.92	40.37	165.86	245.23	39.75	46.03	159.45	▲ 6.41
1984	268.41	49.63	40.31	178.47	270.59	45.48	51.62	174.59	▲ 3.88
1985	282.14	50.34	40.25	191.53	346.16	57.63	57.22	231.30	39.77
1986	295.38	51.05	40.20	204.13	448.83	75.61	62.81	308.41	104.28
1987	309.08	51.76	40.14	217.18	573.81	94.62	68.41	386.78	169.60
1988	322.93	52.47	40.18	230.28	538.21	114.05	74.00	450.36	220.08
1989	336.81	53.18	40.02	243.61	682.67	124.92	79.60	478.35	234.74
1990	354.05	53.90	39.96	260.19	730.85	132.24	85.19	513.42	253.23
1991	365.34	54.47	39.90	270.96	755.65	137.37	90.79	526.89	255.93
1992	379.78	55.04	39.84	284.90	788.16	140.49	96.38	551.29	266.39
1993	379.78	55.04	39.84	284.90	794.83	140.49	96.38	557.96	273.06
1994	379.78	55.04	39.84	284.90	799.27	140.49	96.38	562.40	277.50

Table 8-5-8 Economic Cost and Return Case II

(2-years delay in reaching full benefit)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction cost	O&M Cost			23 %	24 %	%
	million Baht						
1981	37.43		0	Δ 37.43	Δ 30.43	Δ 30.19	
1982	89.96		0	Δ 89.96	Δ 59.46	Δ 58.51	
1983	124.49	1.12	Δ 6.41	Δ 132.02	Δ 70.95	Δ 69.20	
1984	124.63	3.02	Δ 3.88	Δ 131.53	Δ 57.47	Δ 55.64	
1985	139.31	4.70	39.77	Δ 104.24	Δ 37.13	Δ 35.56	
1986	101.22	6.62	104.08	Δ 3.76	Δ 1.07	1.03	
1987	99.56	8.35	163.60	55.69	13.08	12.35	
1988		8.35	220.08	211.73	40.42	37.88	
1989		8.35	234.74	226.39	35.14	32.67	
1990		8.35	246.23	237.88	30.02	27.69	
1991		8.35	255.93	247.58	25.40	23.22	
1992		8.35	266.39	258.04	21.52	19.53	
1993		8.35	273.06	264.71	17.95	16.15	
1993 ~2030		8.35	277.50	269.15	79.32	73.64	
Total	716.60				6.34	Δ 4.94	

$$IRR = 23\% - \frac{634}{634 + 4.94} \times 1\% = 23.6\%$$

Table 8-5-9 Economic Cost and Return, Case II

(10% increase in construction cost)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			22 %	23 %	%
	million Baht						
1981	41.17	—	—	Δ 41.17	Δ 33.75	Δ 33.47	
1982	98.96	—	—	Δ 98.96	Δ 66.49	Δ 65.41	
1983	136.94	1.12	Δ 6.41	Δ 144.47	Δ 79.56	Δ 77.64	
1984	137.09	3.02	Δ 3.88	Δ 143.99	Δ 65.00	Δ 62.91	
1985	153.24	4.70	38.77	Δ 118.17	Δ 43.72	Δ 41.97	
1986	111.34	6.62	105.04	Δ 12.92	Δ 3.92	Δ 3.73	
1987	109.62	8.35	187.98	50.11	12.46	11.77	
1988	—	8.35	228.23	219.88	44.81	41.98	
1989	—	8.35	246.21	237.86	39.72	36.92	
1990	—	8.35	260.59	252.24	34.53	31.83	
1991	—	8.35	270.25	261.90	29.39	26.87	
1992 ~2030	—	8.35	277.50	269.15	137.21	120.01	
Total	788.26				5.68	Δ 15.75	

$$IRR = 22\% + \frac{5.68}{5.68 + 15.75} \times 1\% \doteqdot 22.3\%$$

ANNEX 8
Table 8-5-10

Table 8-5-10 Economic Cost and Return, Case II

(2 years delay in reaching full benefit and 10% increase in construction cost)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			21 %	22 %	%
	million Baht						
1981	41.17		0	Δ 41.17	Δ 34.02	Δ 33.75	
1982	98.96		0	Δ 98.96	Δ 67.59	Δ 66.49	
1983	136.94	1.12	Δ 6.41	Δ 144.47	Δ 81.55	Δ 79.56	
1984	137.09	3.02	Δ 3.88	Δ 143.99	Δ 67.17	Δ 65.00	
1985	153.24	4.70	39.77	Δ 118.17	Δ 45.55	Δ 43.72	
1986	111.34	6.62	104.08	Δ 13.88	Δ 4.42	Δ 4.21	
1987	109.52	8.35	163.60	45.73	12.04	11.37	
1988		8.35	220.08	211.73	46.07	43.15	
1989		8.35	234.74	226.39	40.73	37.81	
1990		8.35	246.23	237.88	35.35	32.57	
1991		8.35	255.93	247.58	30.40	27.78	
1992		8.35	266.39	258.04	26.19	23.74	
1993		8.35	273.06	264.71	22.21	19.96	
1993 ~2030		8.35	277.50	269.15	107.44	92.16	
Total	788.26				20.13	Δ 4.19	

$$IRR = 21\% - \frac{20.13}{20.13 + 4.19} \times 1\% \doteq 21.8\%$$

Table 8-5-11 Economic Cost and Return : Case II

(10% decrease in crops prices)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			21 %	22 %	%
	million Baht						
1981	37.43	—	—	Δ 37.43	Δ 30.93	Δ 30.68	
1982	89.96	—	—	Δ 89.96	Δ 61.44	Δ 60.44	
1983	124.49	1.12	Δ [illegible]	Δ [illegible]	Δ [illegible]	Δ 82.63	
1984	98.63	3.02	Δ [illegible]	Δ [illegible]	Δ 61.39	Δ 59.40	
1985	139.31	4.70	[illegible]	Δ 106.16	Δ 40.92	Δ 39.28	
1986	101.22	6.62	[illegible]	Δ 8.88	Δ 2.83	Δ 2.69	
1987	99.56	8.36	[illegible]	48.14	12.67	11.96	
1988	—	8.35	208.82	200.47	43.62	40.86	
1989	—	8.35	221.19	212.84	38.29	35.54	
1990	—	8.35	229.85	221.50	32.91	30.32	
1991	—	8.35	233.88	225.53	27.70	25.30	
1992 ~2030	—	8.35	[illegible]	227.20	132.84	115.83	
Total	716.60				16.05	Δ 5.33	

$$IRR = 21\% + \frac{16.05}{16.05 + 5.33} \times 1\% = 21.8\%$$

ANNEX 8
Table 8-5-11

Table 8-5-12 Economic Cost and Return, Case II

(2 years delay in reaching full benefit and 10% decrease in crops prices)

Year	Cost		Incremental Benefits	Benefit-Cost	Discount Rate		
	Construction Cost	O&M Cost			21 %	22 %	%
	million Baht						
1981	37.43		0	Δ 37.43	Δ 30.93	Δ 30.68	
1982	89.96		0	Δ 89.96	Δ 61.44	Δ 60.44	
1983	124.47	1.72	Δ 6.31	Δ 131.92	Δ 74.47	Δ 72.65	
1984	124.63	3.02	Δ 3.94	Δ 131.59	Δ 61.39	Δ 59.40	
1985	139.31	4.70	37.85	Δ 106.16	Δ 40.92	Δ 39.28	
1986	101.22	6.62	98.03	Δ 9.81	Δ 3.13	Δ 2.98	
1987	99.56	8.35	151.86	43.95	11.57	10.93	
1988		8.35	201.16	192.81	41.96	39.29	
1989		8.35	210.52	202.17	36.37	33.76	
1990		8.35	216.64	208.29	30.95	28.51	
1991		8.35	220.85	212.50	26.10	23.84	
		8.35	225.55	217.20	22.05	19.98	
		8.35	231.56	223.21	18.73	16.83	
		8.35	235.55	227.20	90.70	77.79	
	716.60				6.15	Δ 14.50	

$$IRR = 21\% - \frac{6.15}{6.15 + 14.50} \times 1\% \fallingdotseq 21.3\%$$

Table 8-6. Crop Budgets 1/

Item		1. Paddy (Wet Season)	2. Paddy (Dry Season)	3. Peanut (Wet Season)	4. Peanut (Dry Season)	5. Tobacco	6. Soybean	7. Chilli	8. Garlic	9. Sugar Cane	10. Orchard -Pineapple-	11. Vegetable -Cabbage-
Present												
Yield	ton/ha	2.8	2.4	2.4	3.4	10.9	1.5	2.6	4.8	28.6	13.3	8.0
Farm-gate Price	฿/ton	2,310	2,310	2,410	2,410	1,825	8,140	4,085	8,935	285	1,820	2,050
Gross Value of Production	฿/ha	6,468	5,544	5,784	8,194	19,893	12,210	10,647	42,888	8,151	25,536	16,400
Production Cost, exclud Labor	฿/ha	2,155	2,370	1,510	1,760	8,585	995	5,515	12,405	2,180	2,440	3,060
N.V.P. without accounting for Labor	฿/ha	4,313	3,174	4,274	6,434	11,308	11,215	5,132	30,483	5,971	23,096	13,340
Labor Requirements	manday/ha	118.0	127.0	156.0	158.0	457.0	378.0	684.0	202.0	178.0	109.0	381.0
Future Without Project												
Yield	ton/ha	3.0	2.5	2.5	3.5	11.0	1.5	2.7	4.9	29.0	13.7	8.2
Farm-gate Price	฿/ton	4,085	4,085	3,800	3,800	2,780	12,350	6,210	18,560	300	2,930	3,110
Gross Value of Production	฿/ha	12,285	10,238	9,500	13,300	30,580	18,525	16,767	66,444	8,700	40,141	25,502
Production Cost, exclud Labor	฿/ha	2,935	2,680	1,615	1,885	11,145	1,140	7,070	14,615	2,700	2,925	3,920
N.V.P without accounting for Labor	฿/ha	9,950	7,558	7,885	11,415	19,435	17,385	9,697	51,829	6,000	37,216	21,582
Labor Requirements	monday/ha	125.0	133.9	161.5	164.0	467.2	386.9	670.8	206.7	184.3	113.0	394.1
Future With Project												
Yield	ton/ha	4.0	4.5	3.1	4.5	12.0	2.0	3.4	6.3	34.6	16.1	16.1
Farm-gate Price	฿/ton	4,095	4,095	3,800	3,800	2,780	12,350	6,210	18,560	300	2,930	3,110
Gross Value of Production	฿/ha	16,380	18,428	11,780	17,100	33,360	24,700	21,114	85,428	10,380	47,173	50,071
Production Cost, exclud Labor	฿/ha	4,120	4,660	2,785	2,955	12,965	2,165	8,200	19,540	4,235	4,610	6,300
N.V.P. Without accounting for Labor	฿/ha	12,260	13,768	8,995	14,145	20,395	22,535	12,914	65,888	6,145	42,563	43,771
Labor Requirements	monday/ha	140.0	181.2	158.6	181.2	471.0	488.8	708.6	218.3	194.8	122.9	438.0

1/ .... Financial prices and costs are used