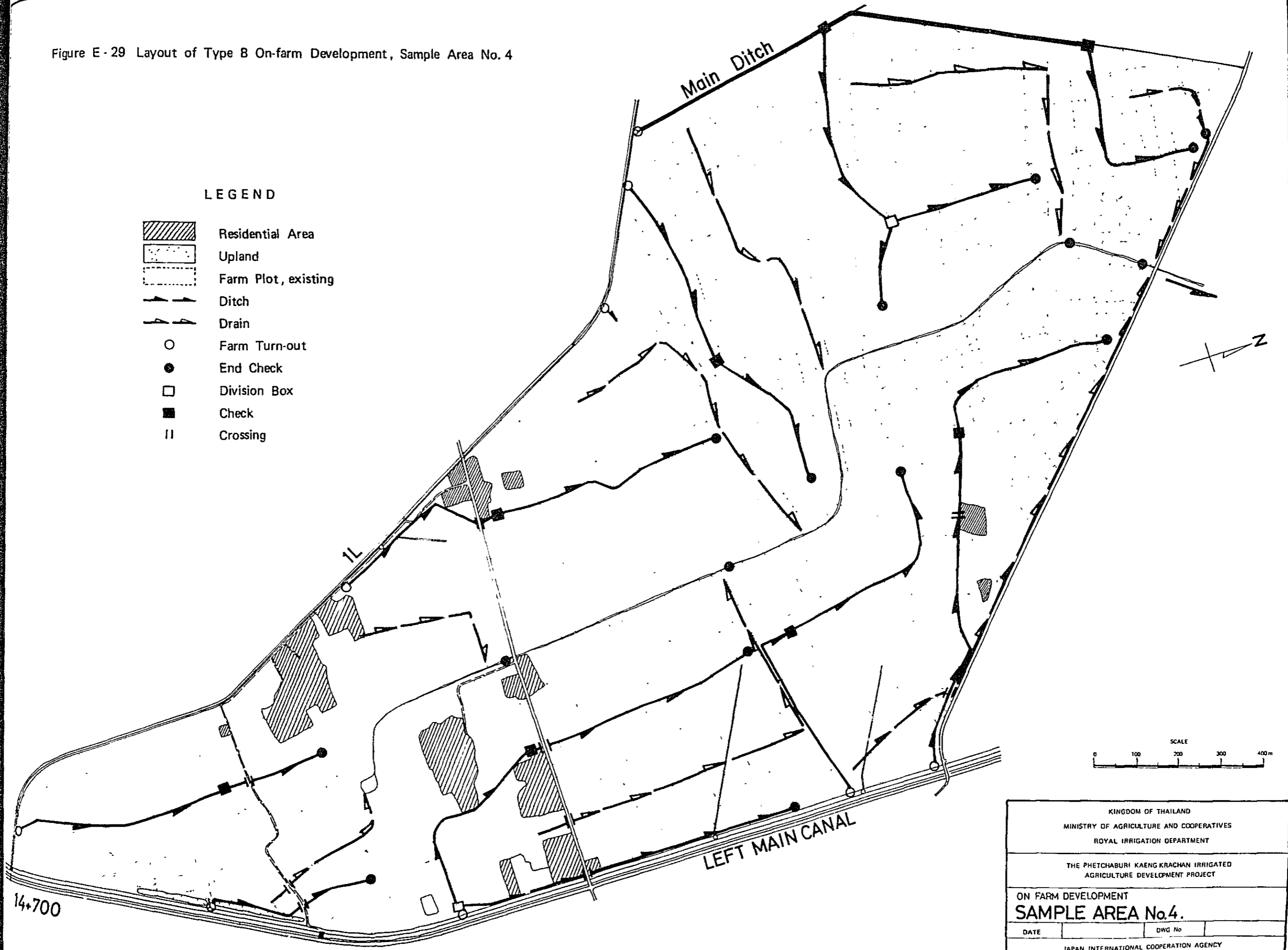

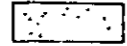
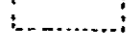







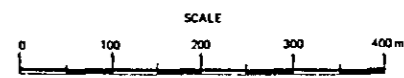


Figure E-29 Layout of Type B On-farm Development, Sample Area No. 4



LEGEND

-  Residential Area
-  Upland
-  Farm Plot, existing
-  Ditch
-  Drain
-  Farm Turn-out
-  End Check
-  Division Box
-  Check
-  Crossing


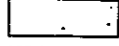
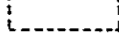


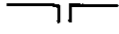




KINGDOM OF THAILAND MINISTRY OF AGRICULTURE AND COOPERATIVES ROYAL IRRIGATION DEPARTMENT		
THE PHETCHABURI KAENG KRACHAN IRRIGATED AGRICULTURE DEVELOPMENT PROJECT		
ON FARM DEVELOPMENT SAMPLE AREA No.4.		
DATE	DWG No	
JAPAN INTERNATIONAL COOPERATION AGENCY		

Figure E-30 Layout of Type C On-farm Development, Sample Area No. 4

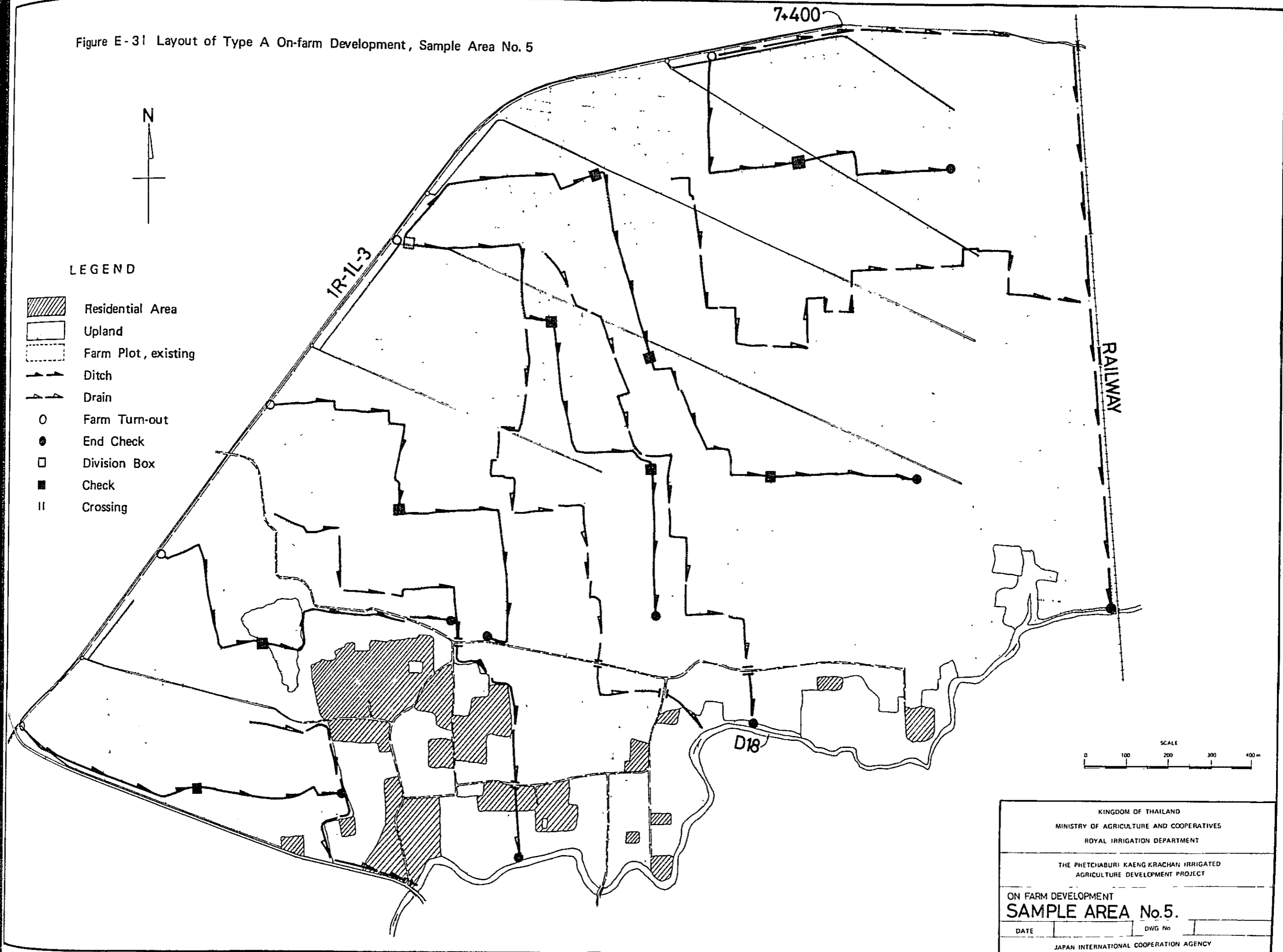


LEGEND











-  Residential Area
-  Upland
-  Farm Plot, existing
-  Ditch
-  Drain
-  Farm Road
-  Farm Turn-out
-  End Check

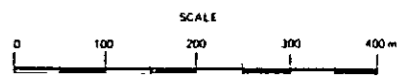
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THE PHETCHABURI KAENG KRACHAN IRRIGATED AGRICULTURE DEVELOPMENT PROJECT	
ON FARM DEVELOPMENT SAMPLE AREA No.4.	
DATE	DWG No
JAPAN INTERNATIONAL COOPERATION AGENCY	

Figure E-31 Layout of Type A On-farm Development, Sample Area No. 5



LEGEND

-  Residential Area
-  Upland
-  Farm Plot, existing
-  Ditch
-  Drain
-  Farm Turn-out
-  End Check
-  Division Box
-  Check
-  Crossing



KINGDOM OF THAILAND
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 ROYAL IRRIGATION DEPARTMENT

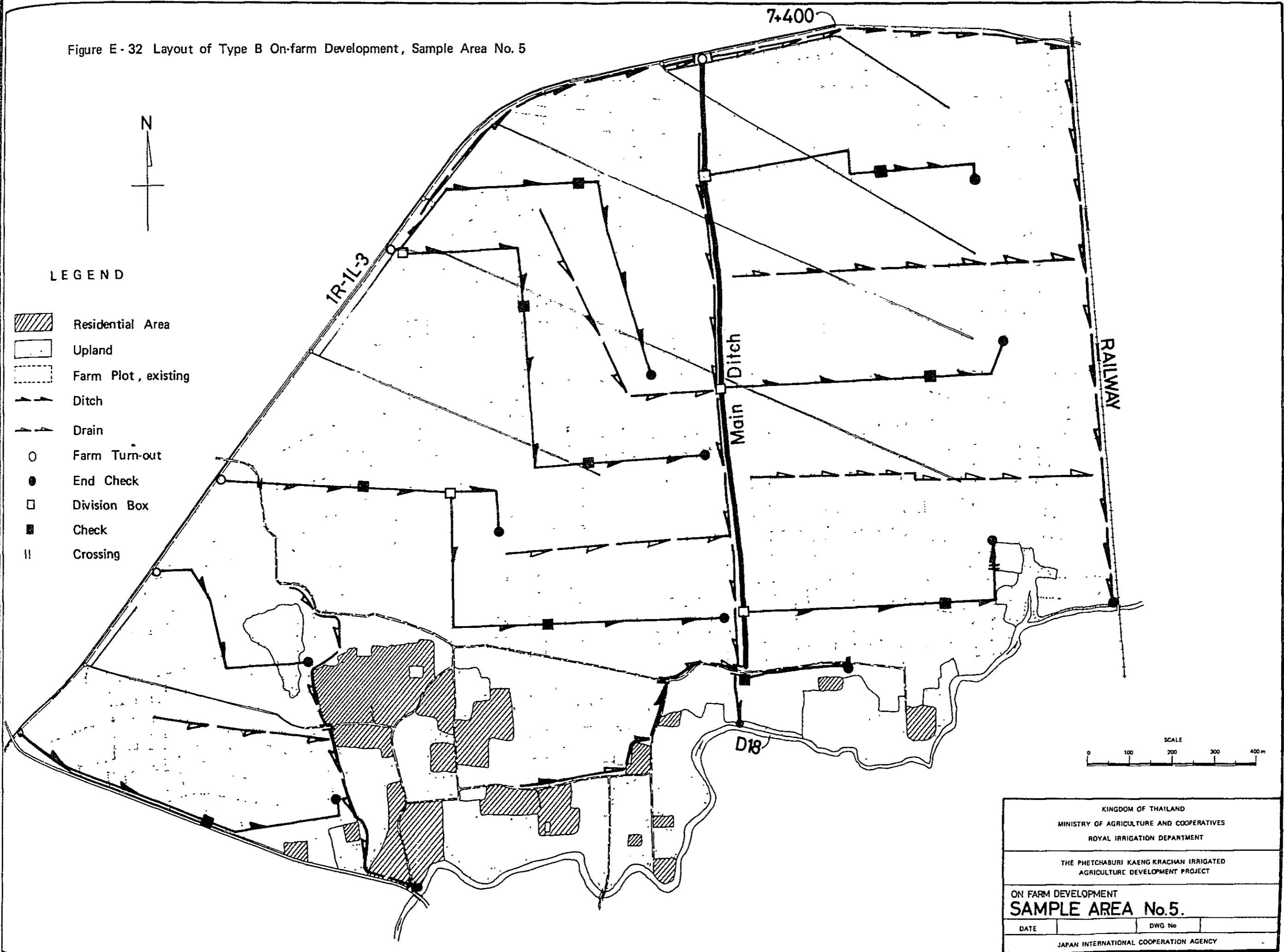
THE PHETCHABURI KAENG KRACHAN IRRIGATED
 AGRICULTURE DEVELOPMENT PROJECT

ON FARM DEVELOPMENT
SAMPLE AREA No.5.











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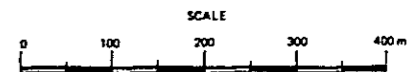
JAPAN INTERNATIONAL COOPERATION AGENCY

Figure E-32 Layout of Type B On-farm Development, Sample Area No. 5



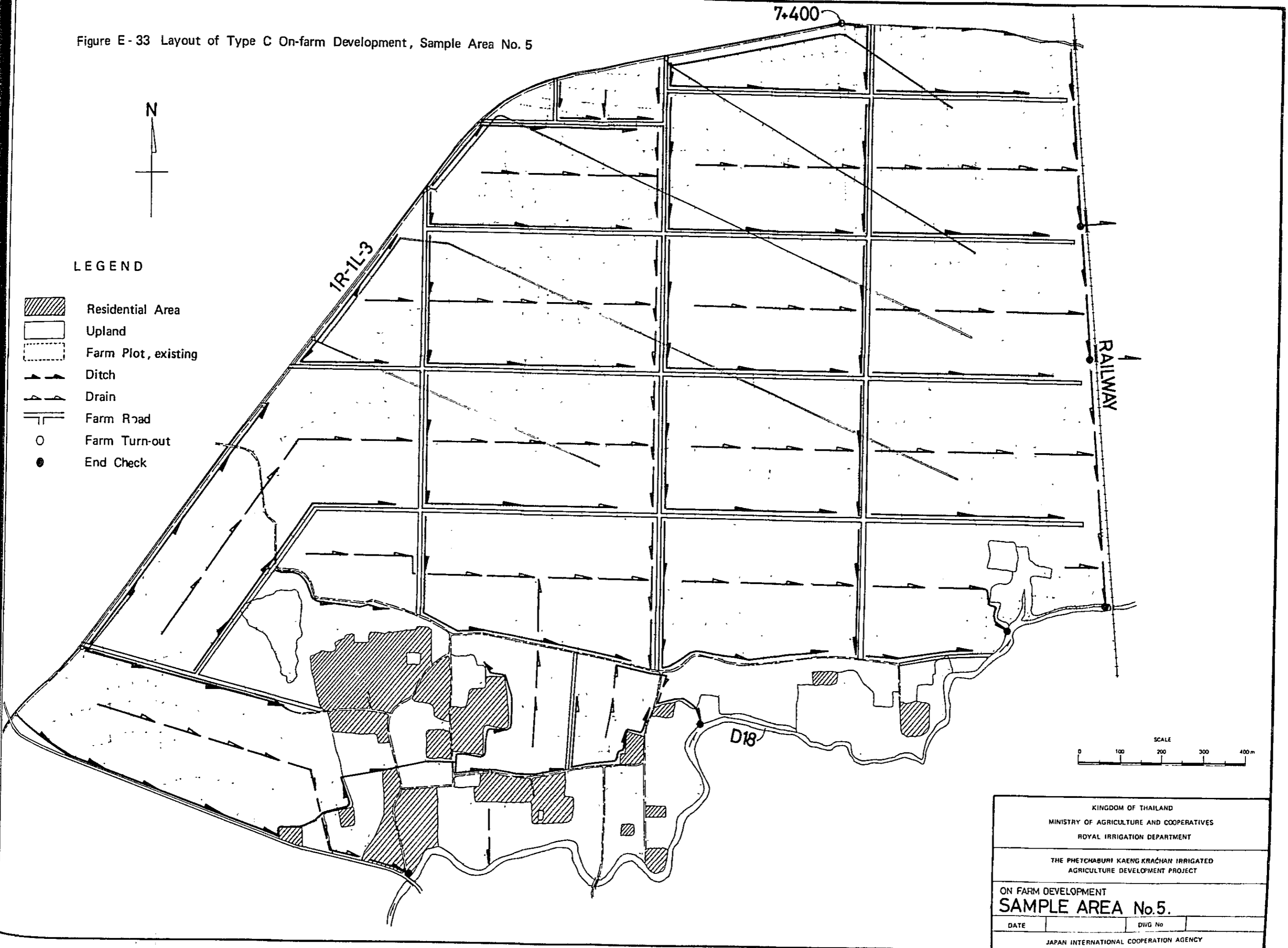
LEGEND

-  Residential Area
-  Upland
-  Farm Plot, existing
-  Ditch
-  Drain
-  Farm Turn-out
-  End Check
-  Division Box
-  Check
-  Crossing











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THE PHETCHABURI KAENG KRACHAN IRRIGATED AGRICULTURE DEVELOPMENT PROJECT			
ON FARM DEVELOPMENT SAMPLE AREA No.5.			
DATE		DWG No	
JAPAN INTERNATIONAL COOPERATION AGENCY			

Figure E-33 Layout of Type C On-farm Development, Sample Area No. 5



LEGEND

-  Residential Area
-  Upland
-  Farm Plot, existing
-  Ditch
-  Drain
-  Farm Road
-  Farm Turn-out
-  End Check

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ON FARM DEVELOPMENT SAMPLE AREA No.5.		
DATE	DWG No	
JAPAN INTERNATIONAL COOPERATION AGENCY		

APPENDIX F AGRICULTURAL SUPPORTING SERVICES

APPENDIX F AGRICULTURAL SUPPORTING SERVICES

Contents

F-1. Present Conditions	F - 3
F-1-1. Water Management	F - 3
F-1-2. Agricultural Extension Services	F - 4
(1) Demonstration Farm	F - 4
(2) Agricultural Extension Services	F - 4
F-1-3. Agricultural Cooperatives	F - 6
F-1-4. Water Users' Association	F - 7
F-1-5. Farmers' Understanding on the Farmers' Organization	F - 8
F-1-6. Social Environment of Changwat Phetchaburi ..	F - 9
(1) Industries	F - 9
(2) Domestic Water Supply	F - 9
(3) Roads	F - 10
F-2. Promotion Plan of Agricultural Supporting Service	F - 10
F-2-1. Agricultural Cooperatives	F - 10
(1) Organizational Support	F - 10
(2) Cooperation with Authorities Concerned ..	F - 12
F-2-2. Processing and Marketing	F - 12
(1) Rice Mill	F - 12
(2) Transportation and Storage	F - 13
F-2-3. Agricultural Extension Services	F - 14
(1) Education and Training of Extension Agents	F - 15
(2) Training of Farmers	F - 16
(3) Furnishing of Audio Visual Equipments ...	F - 17
F-2-4. Water Use Committee	F - 18
(1) Operating Committee	F - 18
(2) Tail Unit in Organization	F - 19

List of Table

F-1.	Existing Works of Agricultural Extension, 1980 ..	F - 20
F-2.	Existing Situation of Agricultural Cooperatives, 1980	F - 21
F-3.	Industries in Phetchaburi Province, 1979	F - 22
F-4.	Number of Farmers' Group on Agricultural Extension, Amphoe Muang, 1980	F - 23
F-5.	Number of Farmers' Group on Agricultural Extension, Amphoe Ban Laem, 1980	F - 24
F-6.	Number of Farmers' Group on Agricultural Extension, Amphoe Ban Lat, 1979	F - 25
F-7.	Number of Farmers' Group on Agricultural Extension, Amphoe Cha-am, 1980	F - 26
F-8.	Number of Farmers' Group on Agricultural Extension, Amphoe Tha Yang, 1980	F - 27
F-9.	Number of Farmers' Group on Agricultural Cooperatives, Amphoe Ban Laem, 1980	F - 28
F-10.	Number of Farmers' Group on Agricultural Cooperatives, Amphoe Ban Lat, 1980	F - 29
F-11.	Number of Farmers' Group on Agricultural Cooperatives, Amphoe Cha-am, 1980	F - 31
F-12.	Number of Farmers' Group on Agricultural Cooperatives, Amphoe Tha Yang, 1980	F - 32
F-13.	Number of Farmers' Group on Agricultural Cooperatives, Amphoe Khao Yoi, 1980	F - 33

List of Figure

F-1.	Present Operation and Maintenance Organization, Phetchaburi Project, 1981	F - 34
F-2.(A,B)	Present Organization Chart of Phetchaburi Project, 1981	F - 35
F-3.	Present Organization Chart of Ban Lat Cooperatives Ltd.	F - 37
F-4.	Proposed Organization Chart for Agricultural Cooperatives Ltd.	F - 38
F-5.	Proposed Member of the Agricultural Cooperatives Promotion Committee	F - 39
F-6.	Agricultural Extension Agent and Farmers' Training System	F - 40
F-7.	Training Schedule for Agricultural Extension Agents	F - 41
F-8.	Proposed Water Users' Association Committee	F - 42

APPENDIX F AGRICULTURAL SUPPORTING SERVICES

F-1 Present Conditions

F-1-1 Water Management

The management, operation and maintenance of complete irrigation projects in the RID is under the O & M Division with some activities under the joint effort of the Water Operation Board and Center. The Water Operation Board established in 1967 is to formulate a general policy on water operation considering irrigation requirements under different crop patterns, flood control, power generation, navigation, domestic water supply, and salt water intrusion control. Under the Board, there is the Water Operation Center which is responsible for the execution of the Board decisions. The Operation Center collects and analyses information on rainfall, river stage and flow, and crop condition from the field offices. A weekly diversion requirement will be made as a basis on which to check the request from the projects. During water shortage periods, the intake to the main canals will be reduced.

The O & M of the Phetchaburi Project is taken care of by the Phetchaburi O & M Office having 522 staffs under the Project Engineer. The organization of management personnel is shown in Figure F-1. The Project Area is subdivided into three areas consisting of 33 zones so far O & M is concerned; area A (134,000 rai), area B (89,000 rai) and area C (113,000 rai).

RID has the Phetchaburi Road Construction Office for the construction and maintenance of feeder roads and maintenance roads. The total length of feeder roads is 325 km (a part of it is paved with asphalt) and that of maintenance roads is 45 km (not paved) in the Project Area. The office has 149 staffs (Figure F-2).

F-1-2 Agricultural Extension Services

(1) Demonstration Farm

There is one demonstration farm directly managed by the Ministry of Agriculture and Cooperatives in Tambon Tha Yang of Amphoe Tha Yang. It has the trial and demonstration farms of 25 rai for paddy and 5 rai for beans, cabbages, lemons and banana. The major activities covered by the demonstration farm are as follows:

- (a) Experiment of the improved agricultural techniques for paddy.
- (b) Demonstration of the improved agricultural techniques in the farmers' field.
- (c) Advise to farmers and extension staffs on the improved agricultural techniques.

There are about 100 demonstration plots in the farmers' farm. Unfortunately, there has so far been no appreciable effects on the improvement of farmers' agricultural techniques due to poor farmers' interest shown on these demonstration activities.

(2) Agricultural Extension Services

The budget for the agricultural extension services has been steadily increased year by year, amounting to 913 million Baht in 1981 which is 230 percent of the amount in 1976. The whole country of Thailand is divided into six regions for the promotion of agricultural extension services by the Department of Agricultural Extension, MOAC. This survey area belongs to the Ratchaburi Area. Extension offices in Changwat are in charge of administrative management of the offices in Amphoe and giving technical advices to the extension staff of the Amphoe offices. Each Amphoe office has about five or six extension staffs and one or two secretary (s). The offices in Amphoe Ban Lat, Amphoe Khao Yoi and Amphoe Cha-am have their own volunteer extension staffs who are in charge of Muban Unit. Extension Staffs are getting in-service training about three times

a year, each time lasting for about two weeks. The number of the farmers' households which are taken care of by one extension staff ranges from 1,100 to 1,800. This situation means that the extension service to be extended to each farmer are not enough. The equipments and materials including vehicles and audiovisual aids are seriously in short (Table F-1).

The Government of Thailand secured a financial assistance from World Bank for the implementation of the Agricultural Extension Services Project. The Phase I of this Project has covered 33 Changwat and is to end in 1981. The Phase II, which started in 1980, has the plan to increase the number of extension agents in Changwat Phetchaburi in 1982. The major objective of this Project is to increase the number of extension agents in Tambon and to promote in-service training.

The final target of the project is to have enough number of extension staff so that each group of 1,000 farm households can be served by one extension staff. In Phetchaburi Changwat it plans to have 80 extension agents who serve 46,592 households. It means that 600 households can be served by one extension staff. It is expected that this project for the promotion of extension services can contribute much to the increase of the yield per a unit area, which is one of the main targets of the current agricultural policy in Thailand.

Presently, each Amphoe extension office is promoting extension works, however, there is insufficient staff. Therefore, it is very difficult to carry out efficient extension works. In Amphoe extension office, the farmers' groups have been registered as members qualified for having loans for farming. Those members of farmers' group are mostly progressive farmers and received priority for treatment from extension office. Members of farmers' group, amount of loans and main crops are shown in Tables F-4 to F-8.

F-1-3 Agricultural Cooperatives

Department of Agricultural Cooperatives Promotion of the MOAC is in charge of the administration (guidance & control) of the agricultural cooperatives, and has its own offices at Changwat & Amphoe levels for this purpose. Amphoe offices are generally located in the same offices of the cooperatives and are always in a close contact with the cooperatives in their daily activities. About 41 percent of farmers' households in Amphoe Ban Lat are members of the Ban Lat Amphoe cooperatives. Even in the case of inactive cooperatives in other Amphoes, about 15 percent of farmers in the area are members. These ratios are same as national average of about 15 percent.

While, with regard to the business activities of those Amphoe cooperatives, it was found that only the cooperatives in Amphoe Ban Lat is active in the various business fields including the marketing, purchasing and financing. The cooperatives in other Amphoe are rather inactive in their business activities, and their business performances are limited only to the field of finance and almost negligible in the fields of marketing and purchasing.

Amphoe cooperatives will provide the agricultural management fund for cooperative groups under the mutual guarantee of farmers. In this connection, farmers will be organized as a group for crediting and purchasing of the production materials. Farmers' groups of Amphoe are as shown in Tables F-9 to F-13.

The Ban Lat Amphoe cooperative, one of the most progressive cooperatives in the country, is outlined as follows:

The cooperative has a progressive organization and has a capability to take in the various business fields such as credit, marketing of agricultural production, supply of productive materials, agricultural processing and extension services of agricultural techniques.

Farmers have improved their techniques of production increase through the cooperatives organization. And the cooperative has expanded in its business year by year.

The Ban Lat Amphoe cooperative was established in 1940. At that time, the purpose of establishing this cooperative was only to finance cooperative business to the farmer. Afterward, this cooperative became an integrated organization including rice mills and funeral services in 1972. In the general meeting, this cooperative is authorized to decide the direction of activities and work programmes, and has the general power to select the executive director. The executive director will manage the cooperatives activities based on the opinion of the general meeting. Details of the activities are shown in Table F-2 and organization chart in Figure F-3.

F-1-4 Water Users' Association

Water users' associations were established under the guidance of RID for the purpose of encouraging farmers to maintain the irrigation system and construct farm ditches by themselves. One water users' association generally covers the beneficiary areas of one main canal and is managed by the board of representatives of each lateral. There are 185 water users' associations in whole Thailand covering an area of about 4.1 million rai, and the number of member farmers is about 77,000. Their activities are, however, not very active and there are many nominal associations. Five water users' associations were established in Phetchaburi project area in 1969 with the membership of 4,402 farmers covering the area of 319,576 rai. But they have not been providing any service since 1973 because of ineffective dike and ditch and big arrears of water fee.

RID has been trying to make the new system of the water users' association regulation for the purpose of making these association more active. The Government is also considering to amend the State Irrigation Act to collect $\text{฿}20/\text{rai}$ for each crop as maintenance

and or water charge from farmers in the irrigation project areas. This amount is equivalent to about 1.17 percent of farmers' production of paddy, counted basing on the government purchase price of paddy of ₱ 3,400/ton and yield of 500 kg/rai. The collection of maintenance and or water charge directly from farmers through the amendment of the Act will have the effect to vitalize the nominal water users' association and to encourage farmers to make the best effort to promote agricultural production by themselves. However, for the purpose to make the present nominal associations more active, it may be necessary to grant to those associations some financial and technical aids together with the above mentioned new system. In the case of on-farm development, it is considered to collect maintenance fee directly from farmers through the agricultural cooperatives. This is believed to help promote the activities of agricultural cooperatives through the close contact with the member farmers.

F-1-5 Farmers' Understanding on the Farmers' Organization

Farmer's survey of their understanding on the farmers' organization was made on 50 farm households selected at random in this feasibility study. The results show that about 40-86 percent of the total farmers know the activities of farmers' organization.

This means that a large number of farmers does not know about this organization. About 14-22 percent of farmer does not know the agricultural cooperatives and group of agricultural extension which are close to farmer. There were 32 farm households (64 percent) out of 50 farm households who participated in any of farmers' groups. These 32 farm households had recognized the necessity of farmers' organization and got available information from them. All the cooperative members have ever attended the general meeting, through which the members of the cooperative have recognized the necessity of the farmers' organization. The results of survey on the familiarity with the farmers' organization are summarized below;

Familiarity with the Farmers' Organization

	<u>Familiarity</u> (%)
1. Farmers' group for agricultural cooperatives	86
2. Farmers' group for extension office	78
3. Farmers' group for bank of agricultural and agri-cooperative	64
4. Farmers' group for ordinary bank	50
5. Farmers' group for sugar cane production	60
6. Peoples' irrigation association (Ministry of Interior)	42
7. Water users' association (RID, MOAC)	40

F-1-6 Social Environment of Changwat Phetchaburi

(1) Industries

The Changwat Phetchaburi is a typical agricultural production area, in which there are small scaled factories related to agricultural production such as rice mills (363), noodle producing factories (16), auto repair shops (13), sawmills (11) and so on, and rather large scaled industries of one cement factory, two pineapple canning factories and one fluorite processing factory.

According to the data of the province commerce office, there are about 500 industries in total and the number of employees is estimated at about 3,700 persons, as shown in Table F-3.

(2) Domestic Water Supply

The water supply system of the municipal Phetchaburi serves the inhabitants of about 6,000 households with domestic water in good condition with a capacity of 730 cu.m/hour, depending its water source

on the Phetchaburi river. The Ban Laem water supply system for the area of Ban Thabun is expected to start the operation in the end of 1981.

The domestic water for other districts depends on such different sources as groundwater for the area of Amphoe Khao Yoi, the Phetchaburi river for the areas of Amphoe Ban Lat and Tha Yang, and the Phetchaburi irrigation system for the area of Amphoe Cha-am.

(3) Roads

The total length of the main roads in the project area is 744 km, consisting of the Asia highway of 64 km, provincial roads of 122 km under the Highway Department, regional roads of 94 km under the Public Works Department, and feeder roads of 325 km, canal maintenance roads of 45 km and seadikes of 91 km under RID, with a road density of 10 m/ha.

The RID and PWD have planned to construct 107 km of the roads until 1986, of which 37 km would be constructed by the RID and 70 km by the PWD.

F-2 Promotion Plan of Agricultural Supporting Service

F-2-1 Agricultural Cooperatives

(1) Organizational Support

The project area is divided into six Amphoes as administrative division, and each Amphoe has one agricultural cooperative. Of those, Ban Lat Agricultural Cooperative has active comprehensive cooperative activities, but others are not yet operating actively.

After the completion of on-farm development works which is the main target of this Irrigated Agriculture Development Project, the

activities of agricultural cooperatives are to be reinforced to achieve the increase of agricultural products, mainly rice production. And the measurement for reinforcing the activities and the plan of new organization are proposed as below:

- To hold the general assembly and the meeting of board of directors more frequently to make the member of cooperative be understood the activities of cooperative.
- To establish an expertized committee constituted with exemplary good farmers.
- To hold operative meetings constituted with the managing director, counsellor, and division chiefs of extension services, economy, credit, general affairs and planning, etc. to provide smooth operation of cooperative activities.
- To establish a counsellor room for farmer to receive the consultation about agricultural activities.
- To establish the planning division to provide future plans based on the problems and the opinions obtained at other divisions and the counsellor room.
- To establish a farming mechanization center.
- To establish a cooperative service section for improvement of farmers living, promotion section for cooperative activities and mutual aid section against drought, etc.
- To furnish the required facilities for cooperative activities such as pick-up type vehicles for daily services, large tracks for collecting the agricultural products, large tractors for cultivation, etc.

The proposed organization of agricultural cooperative is shown in Figure F-4.

(2) Cooperation with Authorities Concerned

The establishment of Agricultural Cooperatives Promotion Committee which is proposed to tighten the horizontal collaboration amongst Agricultural Extension Services, Water Management Unit and other agricultural authorities is recommended in parallel with the aforementioned supporting to agricultural cooperative organizations as shown in Figure F-5. The Committee will consist of a Promotion Committee of Changwat levels and a Executive Committee of Amphoe levels to unify the guidance of administrative authorities to the farmer.

F-2-2 Processing and Marketing

After the completion of the Project, the increase of crop production could be expected through introducing HYV, application of fertilizer and chemicals, extension of advanced farming technique. Moreover, the farming will become more intensive and utility of market by farmer will be more increased for procurement of agricultural input materials and selling the agricultural products. Therefore, reinforcement of procurement, marketing and credit services by the cooperatives as well as self operation of agro-products processing, especially the rice mill, etc., are to be taken into consideration for proper use of market by farmer to receive reasonable profits by means of selling the agricultural products.

(1) Rice Mill

The present annual products of paddy in the Changwat Phetchaburi, is approximately 180,000 tons, and 130,000 tons or 70 percent of which is produced in the Project Area. The paddy production at fifth year after completion of the Project is expected as 240,000 tons in the Project Area, and total production in the Changwat will amount to more than 300,000 tons. On the other hand, present rice polishing capacities in the Changwat Phetchaburi are about 180,000 tons with 12

hours operation as reported by the Changwat office of Ministry of Industries. But, about one third or 60,000 tons are polished at small scaled rice mills.

It will be recommendable for the cooperatives concerned to establish rice mills to handle a portion of paddy production to be increased, through which the supply of high quality polished rice can also be expected. The required capacity to be increased is forecasted as much as about 100,000 tons, or equivalent to a capacity of 500 tons/day, which might be allotted to the following three cooperatives of the Ban Lat, the Muang and the Khao Yoi as shown below:

Capacity of Rice Polishing

- Unit: ton/day -

<u>Cooperatives</u>	<u>Existing Capacity</u>	<u>Additional Capacity</u>	<u>Total</u>
1) Amphoe Ban Lat Cooperative Ltd.	40	200	240
2) Amphoe Muang Cooperative Ltd.	24	200	224
3) Amphoe Khao Yoi Cooperative Ltd.	-	100	100
<u>Total</u>	<u>64</u>	<u>500</u>	<u>504</u>

(2) Transportation and Storage

Considering the increase of production, the capacity of grain storage is also to be increased accordingly for collection and marketing of agri-products and for polished rice storage, and each cooperative is to have storage of some thousands tons capacity. At the same time, each cooperative is to be furnished with transportation facilities for agri-products such as tracks, etc.

F-2-3 Agricultural Extension Services

Agricultural Extension Services in the Changwat Phetchaburi is presently extending by Changwat and Amphoe Unit Extension Services and/or Demonstration Farm, but there are considerable shortage of staff, budget and materials for extension services.

As stated above, the NAESP is scheduled to cover the Changwat Phetchaburi in 1982, to increase extension agents from the present rate of one agent per 1,100 - 1,800 households of farming families to one agent per 600 households.

There are some educational organizations for agricultural extension services and technical training facilities in and around the Project Area as below:

- Suphanburi Education and Training Center for
Agricultural Extension (Suphanburi)
- Agricultural Extension Center of Kasetsat
University (Nakhonpatom)
- Western Extension Center of Agricultural
Extension Department (Ratchaburi)
- Agricultural Experimental Station of Rice
Cultivation Division (Suphanburi-
Ratchaburi)
- Agricultural Experimental Station of Field
Crops Division (Suphanburi)
- Sugar cane Experimental Station of Ministry
of Industries (Kanchanaburi)

- Water Use Experimental Station of Irrigation Department (Nakhonpatom, Phetchaburi)
- Extension Model Farm (Phetchaburi)

The education and training to extension agents and farmer is to be performed using these experimental stations & extension facilities as far as possible.

(1) Education and Training of Extension Agents

The training of extension agents is planned to perform in short, medium and long-term training courses aiming at Tambon Unit Extension Agents mainly.

- Long Term Study and Training

Technical and wide ranged training and education for extension services are to be performed in six to 10 months periods wither in home country or at abroad for the extension agents who will serve in this Project. Under this scheme, three to six extension agents are to be re-trained annually at the Suphanburi Education and Training Center, Agricultural Extension Center of Kasetsat University, etc. as home country training or by dispatching them to the training course of agricultural extension services provided by the advanced agricultural countries.

- Medium Term Study and Training

Field training of practical extension activities is to be performed in one to three months periods either in home country or at abroad for the extension agents who sill serve in this Project. More than 10 extension agents are to be re-trained annually at the Western Extension Center, Mae Klong Pilot Farm, Phetchaburi Demonstration Farm, etc. and/or training courses of other countries.

- Short Term Study and Training

Technical training of irrigation practice, water management, crop rotation and others required for agricultural extension services are to be performed in several days at experimental stations and/or other relative organizations.

The training schedule for extension agents and of training courses are to be prepared by the Chief of Extension Unit of Phetchaburi Changwat in collaboration with the Chief of Phetchaburi Irrigation Project Office to tighten mutual collaboration of extension services and irrigation scheme, but the training is to be performed under the superintendence of Extension Department.

The aforementioned study and training programs are illustrated as Figures F-6 and F-7.

(2) Training of Farmers

- Medium Term Training

As medium term training some 10 farmers per Amphoe Unit Extension Services are to be trained annually for water management, crop rotation, application of fertilizer and chemicals, etc. at the Suphanburi Education & Training Center, Mae Klong Pilot Farm, etc. aiming those exemplary good farmers recommended by Amphoe Unit Extension Services. The period may be one to two months. And short term training 10-20 farmers per Amphoe Unit are to be trained monthly for one to two weeks periods at the aforementioned stations and/or other places.

To accelerate the willing to promote productive activities of farmers, agricultural study touring to visit well managed private farms, experimental stations, research institutes, etc. either in or out of the Changwat is to be planned by providing medium size buses at each Amphoe Unit Extension Services to aim at whole farmers. Farmer's training and study touring are to be prepared by the chief of Amphoe Unit Extension Services from its planning to the performance.

(3) Furnishing of Audio Visual Equipments

As agricultural extension services to accelerate increase of agricultural production after the completion of on-farm scheme of the Project, the audio visual materials are required as its mean of performance.

The aforementioned reinforcement of Agricultural Cooperative System and the improvement of Agricultural Extension Services are most basical and vital means of supporting the farmer in this Project, and the arrangement of means of extension activities is requested in the first instance, therefore, the following materials and equipments are to be provided under the Project of on-farm development.

<u>Descriptions</u>	<u>Required Number</u>		
	<u>Changwat Unit</u>	<u>Amphoe Unit (6 Amphoes)</u>	<u>Total</u>
Medium size bus for Farmer's Study Touring (for 20 persons)	2	6	8
Station Wagon with loud speaker	1	6	7
Taperecorder	2	6	8
Rotary mimeograph	1	6	7
Automatic Copying equipment	1	6	7
Vehicle mounted movie projector	1	-	1
Movie film for cultivation practice	20	-	20
Movie film for marketing, etc.	10	-	10
Movie camera	2	-	2

F-2-4 Water Use Committee

The water users' associations which have been established under the guidance of Irrigation Department are organized by farmer's representatives called as common irrigators selected from beneficiant of some irrigation ditches of 1,000 Rai unit, and the main purpose of such association is to convey the farmer's opinion to the Irrigation Department. Consequently, the Irrigation Department has been distributing irrigation water employing Aonemen of District Units under the superintendent of water Masters of O & M Offices which are district sub-divisions of Irrigation Department.

But, there are a few activity of water users' association presently because of lack of communication between Irrigation Department and the farmers due to insufficient water supply to the demand with the existing deficient irrigation ditches.

At the completion of on-farm project in future, the reinforcement of organization and activities of water users' association which is to be formed by the beneficiant farmers is initially requested for carrying out effective irrigation. For such purpose, it is recommended to organized a committee of representatives of those regional administrative authorities related to agriculture and farmers to reinforce the joint guidance to the water users' association as shown in Figure F-8.

(1) Operating Committee

The Operating Committee will be established to study the direction of association's activities, problems related to water use and others based on the water allocation scheme and cropping scheme of Phetchaburi Irrigation Project, and to be operated by the members of committee.

The chairman of committee will be in charged by the Project Engineer of Phetchaburi Irrigation Project Office and the members of committee will consist of selected area checkers, water masters of

Irrigation Department, the Counsellors of Amphoe Unit Agricultural Cooperatives, Chiefs of Amphoe Unit Extension Services, experts of associations, etc. The committee meeting is to be held monthly during the irrigation period.

(2) Tail Unit in Organization

The water users' association is to be established to operate and maintain the on-farm facilities under the direction of the Phetchaburi O & M Office. The area of one operating unit is planned as 400-800 rai (90-120 ha) and larger area is divided in two or more.

The check leader will be elected by the unit as representative of the unit. A zone checker in charge of the irrigation water allocation of a zone that is the water management unit of Irrigation Department will be elected among the check leaders, and the zone checker performs water allocation planning and water management as user of water in collaboration with the Zonemen of Irrigation Department.

Table F-1 Existing Works of Agricultural Extension, 1980

Items	Amphoe							Khao Yoi incl. Nong Ya Plong
	Muang	Ban Laem	Ban Lat	Cha-Am	Tha Yang			
Tambon number	24	10	17	6	11		10	
Muban number	172	62	107	50	117		52	
Municipality	2	-	-	1	-		-	
Sanitary	2	-	1	1	2		1	
Cultivated acreage								
in rai	124,445	70,643	100,492	250,708	263,553		128,850	
Paddy (wet)	121,471	40,800	64,414	42,252	95,187		88,710	
" (dry)	-	340	-	-	-		-	
Fruits	950	6,129	10,174	5,808	53,599		7,536	
Vegetables	231	23,700	4,570	3,732	3,352		1,301	
Upland crops	690	14	18,358	124,572	101,415		16,303	
Others	1,103	(34,657)*	2,976	74,344	10,000		15,000	
Fallow land	56,855	16,000	90,000	171,793	1,795,207		144,888	
Extension staff	6	5	6	6	6		5	
Tambon agents	-	-	8	4	-		5	
Extension scope								
(Amphoe acreage in rai)	181,300	121,300	190,400	422,500	2,058,760		273,738	
(for one staff)	30,200	24,200	31,700	70,400	343,100		54,800	
Staff training	3-12 days/yr.	7 days/yr.	-	-	7 days/yr.		5-7 days/yr.	
	3 persons/yr.	2 persons/yr.	-	-	3 persons/yr.		5 persons/yr.	
Staff activity								
In field	15-20 days	20 days	18 days	16 days	15 days		16 days	
At Office	3-8 days	3 days	5 days	7 days	8 days		7 days	
Equipment								
Cars	-	-	-	-	-		-	
Motor cycles	5	6	6	5	6		4	
Pumps	-	-	-	-	-		-	
Sprayer	-	2	-	-	2		-	
Others	-	-	-	-	-		-	
Problems	Not enough vehicles staff equipment	shortage water salty soil	Not enough equipment	Not enough equipment	Not enough equipment		Not enough budget staff equipment**	
Agriculture household (46,592)	9,952	5,715	6,160	7,826	10,783		6,156	
Total household (60,007)	15,806	8,165	7,520	8,756	12,274		7,486	
Total population	66,679	51,158	43,650	42,827	81,344		-	

Note: Tambon agents are all volunteers.
Tambon agents of National Extension Service Project (NESP) in Phetchaburi province is under project Phase II, to be set up in 1982.

*: Salt farm. **: No good road conditions - lack of marketing
Source: Amphoe Extension Offices

Table F-2 Existing Situation of Agricultural Cooperatives, 1980

Items	Amphoe						Khae Yoi Incl. Nong Ya Plong
	Muang	Ban Laem	Ban Lat	Cha-Am	Tha Yang		
Coops official	4	2	4	2	3	2	6
Coops staff	16	5	25	3	2	3	6
Agriculture household	9,952	5,715	6,160	7,826	10,783	10,783	6,156
Members' number	2,195	886	2,557	884	1,515	1,515	1,355
Ratio	22%	15%	41%	11%	14%	14%	22%
Purchasing:							
Agri-chemical	฿ 54,690	-	฿ 415,744	-	฿ 305,707	฿ 305,707	฿ 2,927
Chemil-fertilizer	฿ 1,500,000	5 tons	฿ 1,573,051 (430 tons)	5 tons	฿ 174,430	฿ 174,430	฿ 335,495
Agri-machine	฿ 110,000	-	฿ 554,921	-	฿ 430,498	฿ 430,498	฿ 192,850
Seeds (paddy)	-	-	800 kg	-	-	-	-
Others	฿ 93,000	฿ 1,594,964	฿ 284,187	100 tons	฿ 814,585	฿ 814,585	-
Marketing:							
Paddy	(2,157 tons)	(650 tons)	(1,226 tons)	-	6 tons	6 tons	฿ 1,040,780
Fruits	-	-	฿ 3,421,462	-	-	-	-
Vegetable	-	-	(banana)	-	-	-	-
Livestock	-	-	฿ 342,885	-	-	-	-
Others	-	(salt 800 kg)	-	(cotton)	(cotton)	(cotton)	(cotton, maize & sugarcane)
Storage house	-	฿ 170,000	-	20 tons	65 tons	65 tons	฿ 3,110,054
Capacity (ton)	1	1	2	-	-	-	1
Credit:							
Short-term used							
Number	859	345	274	597	505	505	73
Amount	฿ 3,874,502	฿ 1,490,510	฿ 1,870,500	฿ 3,524,203	฿ 5,860,000	฿ 5,860,000	฿ 337,767
Middle-term used							
Number	820	279	816	102	113	113	192
Amount	฿ 6,941,644	฿ 1,533,752	฿ 10,048,800	฿ 1,368,195	฿ 2,379,000	฿ 2,379,000	฿ 4,626,250
Long-term used							
Number	-	-	-	-	-	-	-
Rice mill	20 tons/day	-	40 tons/day	-	-	-	-
Banana processing	-	-	270 kg/day	-	-	-	-
Others	-	-	-	-	-	-	-
Problems	/-	shortage water in field	shortage operated fund	shortage water in field	shortage operated fund	shortage operated fund	shortage operated fund

/-: (a) no budget for the activities
(d) employee problem with payment

(b) no marketing at the production (c) small number of a society member

Source: Amphoe Cooperatives

Table F-3 Industries in Phetchaburi Province, 1979

No.	Type of Factory	No. of Factory	Laborer (person)	No.	Type of Factory	No. of Factory	Laborer (person)
1.	Rice mill	363	260	18.	Ice factory	5	34
2.	Fruit canning	3	1,619	19.	Stone crushing mills	1	18
3.	Cement factory	1	394	20.	Tile maker	1	9
4.	White sugar producer	1	392	21.	Fiber spinning & pressing	3	61
5.	Cassava (shredded)	2	15	22.	Cassava chips mills	4	41
6.	Rice noodle product	16	156	23.	Table salt product	2	13
7.	Vermicelli	2	60	24.	Noodle maker	4	2
8.	Furniture shops	2	40	25.	Car body maker	2	9
9.	Machine shops	6	41	26.	Repairing machine	7	25
10.	Saw mills	11	71	27.	Car maintenance	13	46
11.	Silk textiles	3	-	28.	Fish sauce	2	7
12.	Cold store	2	9	29.	Squid, shrimp redrying	2	38
13.	Shellfish & crab drying	10	67	30.	Furniture production	1	13
14.	Pottery earthenware & ceramics	4	49	31.	Mattress making	1	7
15.	Sour juice	1	3	32.	Animal feed product	2	10
16.	Distilleries - liquor	1	94	33.	Wood lumber	13	55
17.	Lime processing	1	12	34.	Banana drying	5	9
					Total	497	5,679

Source: Provincial Office of the Ministry of Commerce

Table F-4 Number of Farmers' Group on Agricultural Extension, Amphoe Muang, 1980

No.	Name of Farmer's Group	Location at Tambon	Number of members 1980	Loans (Baht) 1980	Main Crop
1.	Farmer group Chong Sa Kae	Chong Sa Kae	165	307,170	Paddy
2.	" " Hat Chao Samran	Hat Chao Samran	56	-	
3.	" " Hua Sa Pan	Hua Sa Pan	74	181,550	Paddy
4.	" " Na Pan Sam	Na Pan Sam	89	207,900	"
5.	" " Wang Ta Ko	Wang Ta Ko	82	175,500	"
6.	" " Nong Sano	Nong Sano	61	101,457	"
7.	" " Don Yang	Don Yang	50	-	"
8.	" " Nong Phlap	Nong Phlap	87	-	"
9.	" " Nong Khanan	Nong Khanan	98	-	"
10.	" " Bang Chan	Bang Chan	39	-	"
11.	" " Po Pra	Po Pra	52	-	"
	<u>Total</u>		<u>853</u>	<u>973,577</u>	

Source: Extension Office, Amphoe Muang

Table F-5 Number of Farmers' Group on Agricultural Extension, Amphoe Ban Laem, 1980

No.	Name of Farmer's Group	Location at Tambon	Number of members 1980	Loans (Baht) 1980	Main Crop
1.	Paddy group Tambon Tha Rang	Tha Rang	112	300,000	Paddy
2.	" " Bang Kun Sai	Bang Kun Sai	136	500,000	"
3.	" " East Tha Rang	East Tha Rang	54	180,000	"
4.	" " Bang Kaew	Bang Kaew	62	-	"
5.	Thai Muslim 4 H group	East Tha Rang	32	-	"
6.	Develop Muslim 4 H group	Tha Rang	20	-	"
7.	Lam Pak Bia 4 H group	Lam Pak Bia	39	-	"
8.	M ₉ Bang Kun Sai 4 H group	Bang Kun Sai	27	-	"
9.	M ₇ Bang Kun Sai 4 H group	Bang Kun Sai	25	-	"
10.	M ₁ Pak Tha Le 4 H group	Pak Tha Le	20	-	"
11.	M ₅ Bang Krok 4 H group	Bang Krok	35	-	"
12.	M ₁₀ Bang Krok	Bang Krok	37	-	"
	<u>Total</u>		<u>599</u>	<u>980,000</u>	

Source: Extension Office, Amphoe Ban Laem

Table F-6 Number of Farmers' Group on Agricultural Extension, Amphoe Ban Lat, 1979

No.	Name of Farmer's Group	Location at Tambon	Number of members 1979	Loans (Baht) 1979	Main Crop
1.	Famer group	Rai cook	88	595,000	Paddy and lemon
2.	"	Bantan	65	455,000	"
3.	"	Raisarton	60	420,000	"
4.	"	Tasean	57	-	"
5.	House wife group	Rai cook	36	-	
6.	"	Bantan	50	-	
7.	"	Raisarton	23	-	
8.	"	Ban Had	32	-	
9.	"	Nonggrajet	23	-	
10.	Youth farmer group	Rai cook	35	-	Paddy
11.	"	Bantan	23	-	"
12.	"	Raisarton	41	-	"
13.	"	Tasean	27	-	"
14.	"	Ban Had	27	-	"
15.	"	Nonggarpur	51	-	"
	<u>Total</u>		<u>598</u>	<u>1,470,000</u>	

Source: Extension Office, Amphoe Ban Lat

Table F-7 Number of Farmers' Group on Agricultural Extension, Amphoe Cha-am, 1980

<u>No.</u>	<u>Name of Farmer's Group</u>	<u>Location at Tambon</u>	<u>Number of members 1980</u>	<u>Laons (Baht) 1980</u>	<u>Main Crop</u>
1.	Farmer's Group Na Yang	Na Yang	151	225,500	Paddy
2.	" Huai Sai Nua	Huai Sai Nua	212	Short-term 497,000 Medium-term 173,000	Upland crop
3.	" Cha-am	Cha-am	176	259,000	"
4.	" Cha-am	Cha-am	79	Short-term 267,000 Medium-term 53,000	Paddy
	<u>Total</u>		<u>618</u>	<u>1,474,500</u>	

Source: Extension Office, Amphoe Cha-am

Table F-8 Number of Farmers' Group on Agricultural Extension, Amphoe Tha Yang, 1980

No.	Name of Farmer's Group		Location at Tambon		Number of members 1980	Loans (Baht) 1980	Main Crop
	(Upland crop)	Song Pi Nong	Song Pi Nong				
1.	Farmer group	(Upland crop) Song Pi Nong		Song Pi Nong	256	777,424	Upland crops,
2.	"	" Wang Khai		Wang Khai	63	109,473	cassava, sugar-
3.	"	" Kalat Luang		Kalat Luang	120	-	cane, pineapple,
4.	Farmer group	(Paddy) Mab Par Kao		Mab Par Kao	79	-	soybean, banana,
5.	"	" Tha Yang		Tha Yang	80	-	paddy, lemon,
6.	"	" Tha Koy		Tha Koy	50	-	mungbean,
7.	"	" Yang Yong		Yang Yong	60	-	
8.	Farmer group	(Orchard) Tha Mai Rok		Tha Mai Rok	136	-	
9.	Farmer group	(Livestock) Nong Chok		Nong Chok	28	-	
10.	House wife group	Kiriwong		Wang Khai	42	-	
11.	"	" Tha Lo		Yang Yong	20	-	
12.	"	" Kho Kar Chiu		Tha Yang	32	-	
13.	"	" Kang Kar Chan		Kang Kar Chan	45	-	
14.	"	" Nong Hong		Kang Kar Chan	38	-	
15.	"	" Mab Par Kao		Mab Par Kao	-	-	
16.	"	" Yang Chum		Klat Luang	30	-	
17.	"	" Tha Rua		Kang Kar Chan	34	-	
18.	Youth farmer group	Mae Par Chan		Wang Khai	28	-	
19.	"	" Tha Yang Vitava		Tha Koy	36	-	
20.	"	" Tha Lo		Yang Yong	38	-	
21.	"	" Mab Par Kao		Mab Par Kao	49	-	
22.	"	" Chan Na		Mab Par Kao	38	-	
23.	"	" Wang Chan		Wang Chan	50	-	
				<u>Total</u>	<u>1,352</u>	<u>886,897</u>	

Source: Extension Office, Amphoe Tha Yang

Table F-9 Number of Farmers' Group on Agricultural Cooperatives, Amphoe Ban Laem, 1980

No.	Name of Farmer's Group	Location at Tambon	Number of members 1980	Loans (Baht) 1980
1.	Don Ping Dad			
2.	Bang Khung Sai	Bang Khun Sai	103	
3.	Bang In			
4.	Thung Phua			
5.	Bang Khok	Ban Khok	98	
6.	Wat Khao Tar Kho			
7.	Ban Laem			
8.	Klong Chak			
9.	Yan Chu	Ban Laem	468	
10.	Pak Aow Ban Laem			
11.	Somlet Pon			
12.	Muang Klang			
13.	Dom Na-Ram	Ban Kaew	96	
14.	Tha Rang	Tha Rang Kok	25	
15.	Bang Ta Bun	Ban Ta Bun	51	
16.	Na Klua	Ban Laem	45	
	<u>Total</u>		<u>886</u>	<u>3,024,262</u>

Source: Cooperatives at Amphoe Ban Laem

Table F-10 Number of Farmers' Group on Agricultural Cooperatives, Amphoe Ban Lat, 1980

No.	Name of Farmers' Group	Location at Tambon	Number of members 1980	Loans (Baht)		Remarks
				1980	1980	
1.	Salakham	Tamrhu	34	170,000		Purpose of loan
2.	Muangngam	Tamrhu	84	570,000		1. Purchase land
3.	Rainok	Banlard	54	570,000		2. Paddy upland crop
4.	Bantachang	Tachang	60	170,000		3. Purchase Agri-equip-ment
5.	Tasen	Tasen	90	400,000		
6.	Thumrong	Tamrhu	82	510,000		
7.	Sapankrai	Sapankrai	45	390,000		4. Purchase Agri-machine
8.	Hauykong	Hauykong	93	440,000		
9.	Nongka	Raisaton	124	1,130,000		5. Purchase buffalo & cattle
10.	Talo	Yangyong	91	740,000		
11.	Chongca	Banhard	76	490,000		6. Others
12.	Bannongky	Tayang	54	450,000		
13.	Banca	Nongkrajed	60	410,000		
14.	Raica	Nongkapu	63	600,000		
15.	Bancoong	Nongkrajed	54	340,000		
16.	Wattankong	Mabplakhao	55	420,000		
17.	Raisaton	Raisaton	135	170,000		
18.	Rahannoi	Tamrhu	56	350,000		
19.	Watkum	Banhard	66	570,000		
20.	Pooyai	Banhard	64	240,000		

(Cont'd)

<u>No.</u>	<u>Name of Farmer's Group</u>	<u>Location at Tambon</u>	<u>Number of members 1980</u>	<u>Loans (Baht) 1980</u>	<u>Remarks</u>
21.	Watpookru	Tachang	86	720,000	
22.	Raipoo	Tasen-Raimakam	72	260,000	
23.	Banlardpoo	Lardpoo	82	1,080,000	
24.	Bansrapang	Banhard	38	210,000	
25.	Roongkae	Roongkae	72	550,000	
26.	Watpooloi	Nongkapu	52	320,000	
27.	Bantankoong	Mabplakhao	42	360,000	
28.	Smshoreplaur	Smshoreplaur	48	130,000	
29.	Bantan	Bantan	92	1,010,000	
30.	Rahanyai	Tamrhu	42	250,000	
31.	Banraicoak	Raicoak	16	180,000	
32.	Banboon	Nongkapu	73	600,000	
33.	Raipoom	Nongkrajed-Raimakam	59	520,000	
34.	Nongkrajed	Nongkrajed	30	300,000	
35.	Bankauy	Raicoak	15	70,000	
36.	Tamrhu	Tamrhu	38	350,000	
37.	Nongjok	Raisaton	29	140,000	
38.	Hauytagla	Yangyong	31	250,000	
39.	Nongtawpoon	Tayang	22	100,000	
40.	Donghauyloong	Bantan	27	110,000	
41.	Watpapan	Banlard	67	420,000	
	<u>Total</u>		<u>2,473</u>	<u>17,860,000</u>	

Source: Cooperatives at Amphoe Ban Lat

Table 1-11 Number of Farmers' Group on Agricultural Cooperatives, Amphoe Cha-am, 1980

No.	Name of Farmer's Group	Location at Tambon	Number of members		Loans (Baht) 1980	Main Crop
			1980	1980		
1.	Ban Na Yang	Na Yang	106	285,930	Paddy	
2.	Ban Ong Num (Tha Yang District)	Tha Yang	54	60,000	"	
3.	Nong Sa La	Nong Sa La	88	54,317	"	
4.	Ban Huai Sai Tai	Huai Sai Tai	45	270,500	Upland crop (pineapple)	
5.	Ban Nan Sai	Na Yang	55	240,000	Paddy	
6.	Ban Rang Chik	Huai Sai Nua	56	477,690	Upland crop (cotton)	
7.	Ban Cha-am	Cha-am	44	261,500	Paddy	
8.	Ban Rai Mai Patana	Huai Sai Nua	68	589,400	Upland crop (cotton)	
9.	Ban Rai Mai Samakhe	Huai Sai Nua	38	422,595	"	
10.	Ban Rai Mai Sam Parya	Huai Sai Tai	44	336,900	Upland crop (pineapple)	
11.	Ban Bo Khem	Cha-am	64	578,888	Paddy	
12.	Ban Nong Thai	Huai Sai Tai	30	335,200	Upland crop (pineapple)	
13.	Ban Nikom Cha-am	Khao Yai	48	291,755	Paddy & upland crop	
14.	Ban Rong Ra Kham	Khao Yai	79	391,530	Paddy	
15.	Ban Bo Rai	Nong Sa La	32	43,392	"	
16.	Ban Nong Chaeng	Cha-am	33	156,500	"	
	<u>Total</u>		<u>884</u>	<u>4,796,097</u>		

Source: Cooperatives at Amphoe Cha-am

Table F-12 Number of Farmers' Group on Agricultural Cooperatives,
Amphoe Tha Yang, 1980

No.	Name of Farmers' Group	Location at Tambon	Number of members 1980	Loans (Baht) 1980	Main Crop
1.	Ban Kao Chao	Wang Khai	61	155,000	
2.	Ban Song Pi Nong	Song Pi Nong	26	25,000	
3.	Ban Kao Kling	Wang Khai	30	5,000	
4.	Ban Chong	Wang Chan	56	107,000	
5.	Wat Wang Chan	Wang Chan	37	19,000	
6.	Sa Yay Non	Wang Chan	41	106,000	
7.	Ban Tha Hua Lop	Wang Chan	31	10,000	
8.	Nong Kar Tum	Wang Khai	39	44,000	
9.	Ban Wang Khai	Wang Khai	61	93,000	
10.	Ban Huai Sua	Wang Khai	58	82,000	
11.	Kao Luk Chang	Tha Mai Kok	38	52,000	
12.	Sa La Had	Tha Mai Kok	85	166,000	
13.	Nong Chum Sang	Klat Luang	26	74,000	
14.	Nong Kao On	Klat Luang	65	111,000	
15.	Ban Tha Koy	Tha Koy	44	29,000	
16.	Nong Sa Kae	Wang Chan	58	60,000	
17.	Tha Mai Rok	Tha Mai Rok	67	75,000	
18.	Mae Par Chan	Wang Khai	80	83,000	
19.	Nong Ma Kok	Wang Chan	54	73,000	
20.	Nong Chok	Nong Chok	20	73,000	
21.	Mab Par Kao	Mab Par Kao	39	21,000	
22.	Ban Nong Tian	Tha Mai Rok	77	198,000	
23.	Ban Tha Heow	Yang Yong	79	66,000	
24.	Ban Bo Takaw	Yang Yong	43	45,000	
25.	Ban Makram Plong	Wang Chan	54	113,000	
26.	Ban Plong Khea	Klat Luang	41	71,000	
27.	Ban Nong Fab	Tha Yang	20	51,000	
28.	Ban Tung Talat	Wang Khai	34	31,000	
29.	Huai Klang Chin	Wang Chan	38	162,000	
30.	Ban Tak Kong	Mab Par Kao	24	10,000	
31.	Ban Kao Palay	Kang Kar Chan	31	115,000	
32.	Ban Wang Marako	Klat Luang	38	76,000	
	Total		1,495	2,401,000	

Source: Cooperatives at Amphoe Tha Yang

Table F-13 Number of Farmers' Group on Agricultural Cooperatives,
Amphoe Khao Yoi, 1980

<u>Group No.</u>	<u>Tambon Location</u>	<u>No. of Members</u>
1	Huai Tha Chang	63
2	Nong Prong	71
3	Thap Khang	83
4	Thap Khang	74
5	Khao Yoi	102
6	Bang Khem	88
7	Bang Khem	91
8	Nong Chumphon	47
9	Nong Chumphon	64
10	Huai Rong	13
11		56
12	King Amphoe Nong Ya Plong	41
13		20
14		35
15	Nong Chumphon	51
16	"	26
17	"	44
18	"	49
19	"	39
20	"	12
21	"	17
22	"	35
23	Sra-phang	79
24	Nong Pla Lai	29
25	Sra-phang	62
26	Nong Chumphon	21
27	Thap Khang	48
	<u>Total</u>	<u>1,359</u>

Source: Cooperatives of Amphoe Khao Yoi

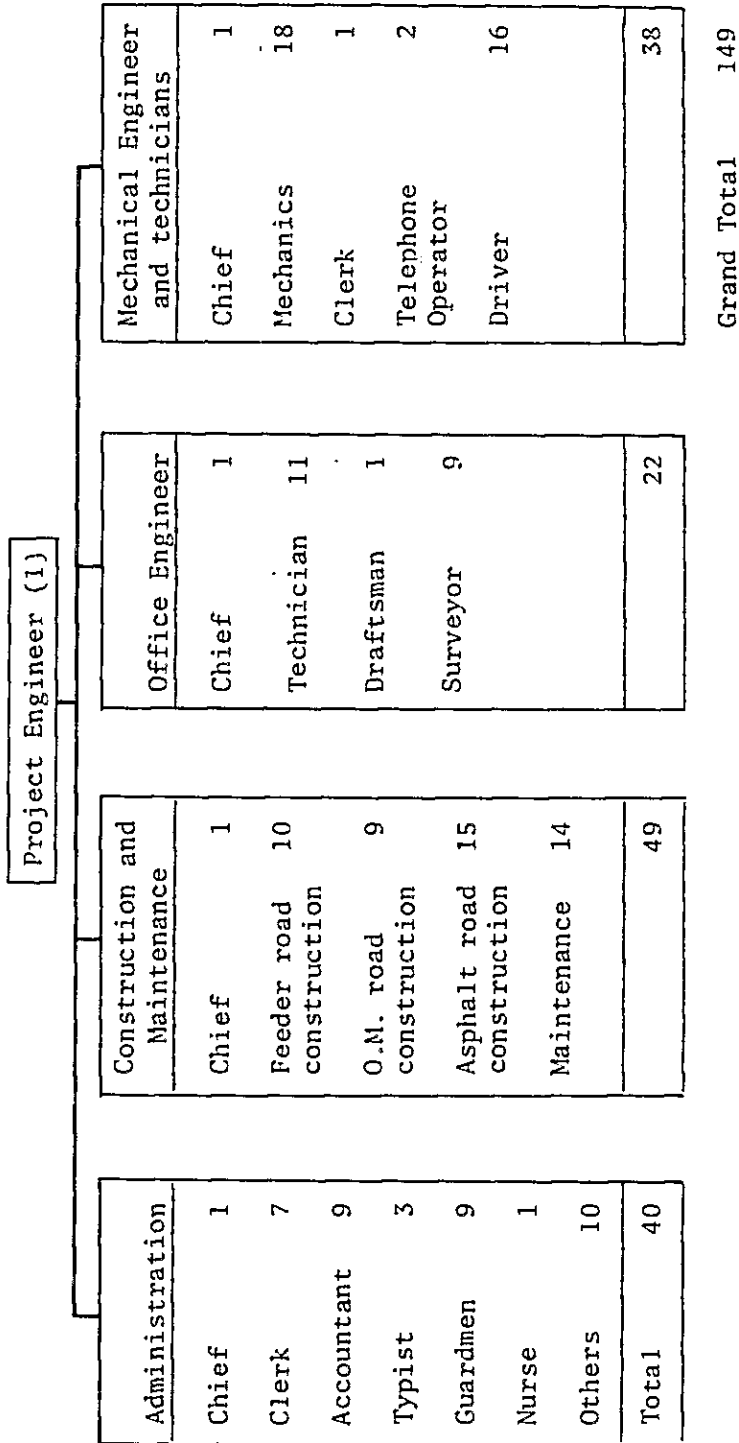
Figure F-1 Present Operation and Maintenance Organization,
Phetchaburi Project, 1981

Project Engineer (1)						-----other project-----				
		Area A (Phetchaburi) Zone 1-14	Area B (Prieng) Zone 15.24-31	Area C (Bang Chak) Zone 16-23.32.33	Hupkrapong	Don Kum Huai				
Administration										
Chief	1	Chief 1	"	"	"	"	"	"	"	"
Clerk	2	Clerk -	"	"	"	"	"	"	"	"
Accountant	2	Irrigation (1) Engineer	"	"	"	"	"	"	"	"
Typist	2	Technician 2	"	"	"	"	"	"	"	"
Guardmen	16	Draftsman 2	"	"	"	"	"	"	"	"
Storekeeper	3	Surveyor 1	"	"	"	"	"	"	"	"
Nurse	1	Irrigation 2 Agronomist	"	"	"	"	"	"	"	"
		and	"	"	"	"	"	"	"	"
		Assistants 2	"	"	"	"	"	"	"	"
		Hydro- grapher	"	"	"	"	"	"	"	"
Others	3	Laborer 4	"	"	"	"	"	"	"	"
Total	30	15	189	132	127	6	4	3	4	4

Grand Total 522

Source: O & M, Phetchaburi Office, Royal Irrigation Department

Figure F-2 Present Organization Chart of Phetchaburi Project, 1981
A. Roadway Construction Organization



Source: Roadway Construction Phetchaburi Office, Royal Irrigation Department

- to be continued -

- continued -

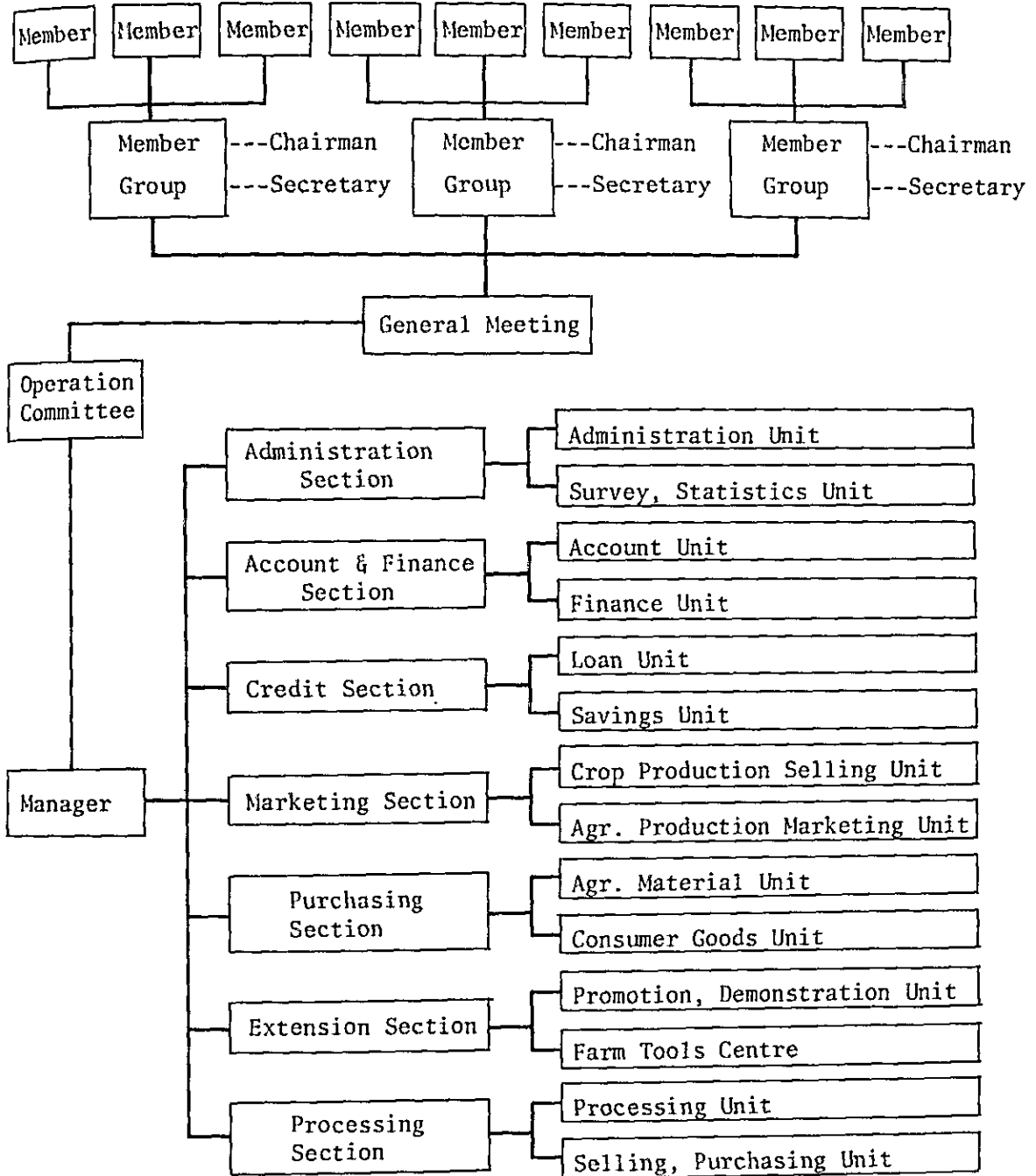
B. Operation and Maintenance Organization

Project Engineer (1)		Office Engineer		Mechanical Maintenance		Head Work and Dam Maintenance		Security	
Administration		Chief	1	Chief	1	Chief	1	Chief	1
Chief	1	Mechanical Technician	1	Clerk	1	Maintenance Technician	6	Guard Men	34
Clerk	3	Draftsmen	2	Electrician	2	Gatemen	2		
Accountant	1	Surveyor	1	Radio Operator	6	Laborer	80		
Typist	2	Laborer	3	Driver(car)	5				
Storekeeper	2			" (boat)	4				
Nurse	1			Boat mechanic	2				
Laborer	9			Laborer	2				
Total	19		8		23		89		35

Grand Total 175

Source: O & M, Kaeng-Krachan Office, Royal Irrigation Department

Figure F-3 Present Organization Chart of Ban Lat Cooperatives Ltd.



Source: Ban Lat Cooperative Ltd.

Figure F-4 Proposed Organization Chart for Agricultural Cooperatives Ltd.

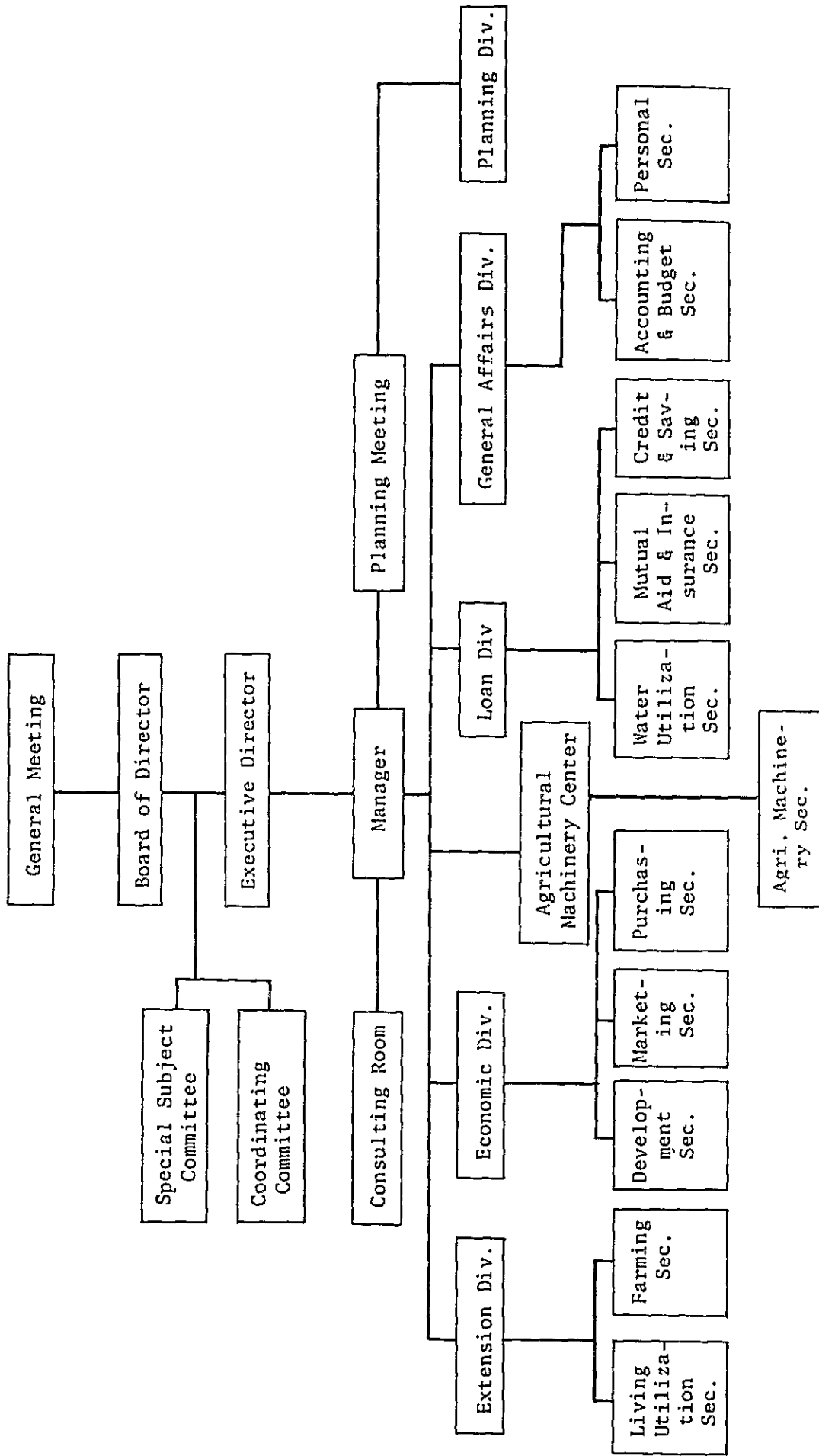


Figure 1-5 Proposed Member of the Agricultural Cooperatives Promotion Committee

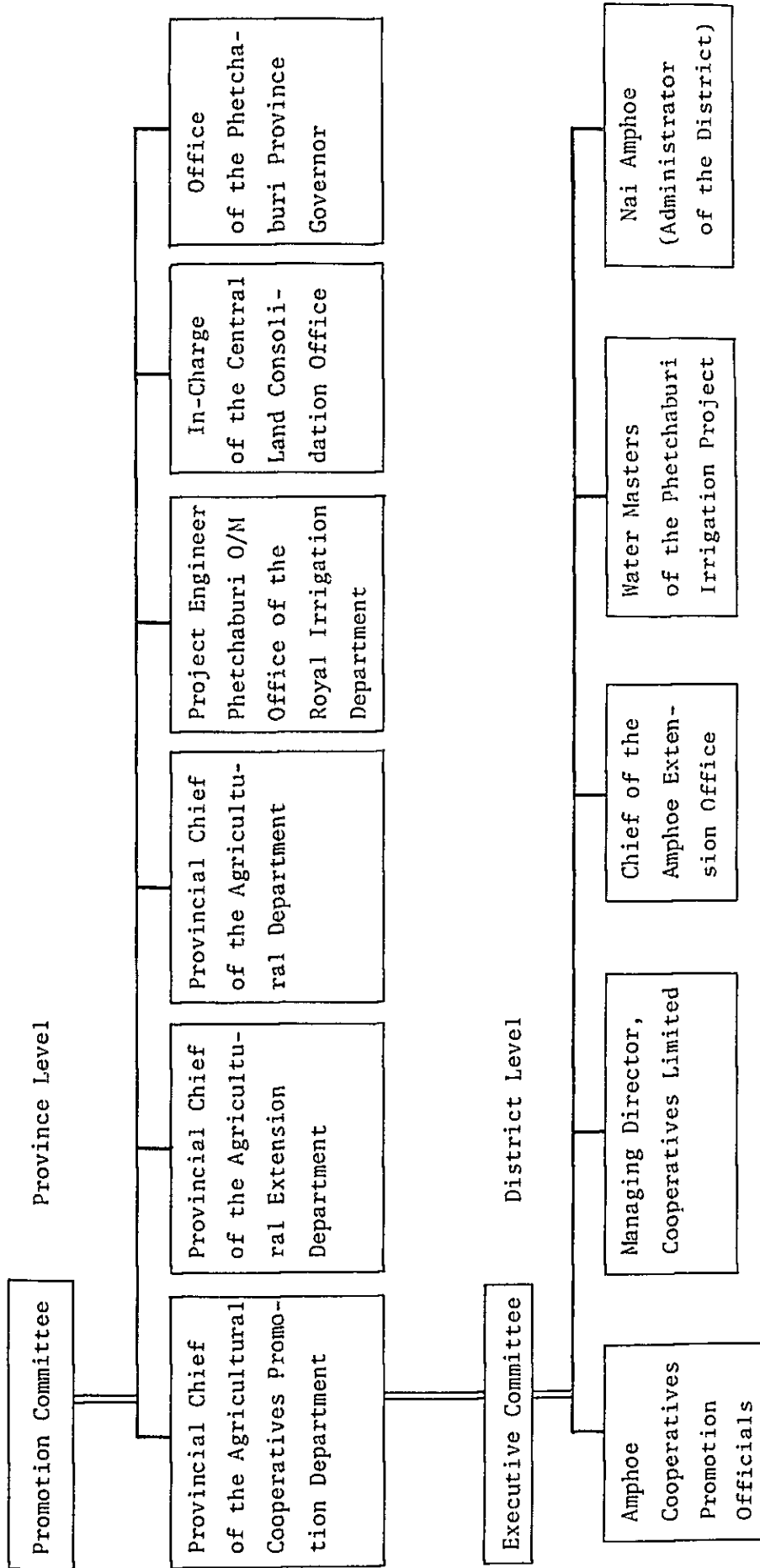


Figure F-6 Agricultural Extension Agent and Farmers' Training System

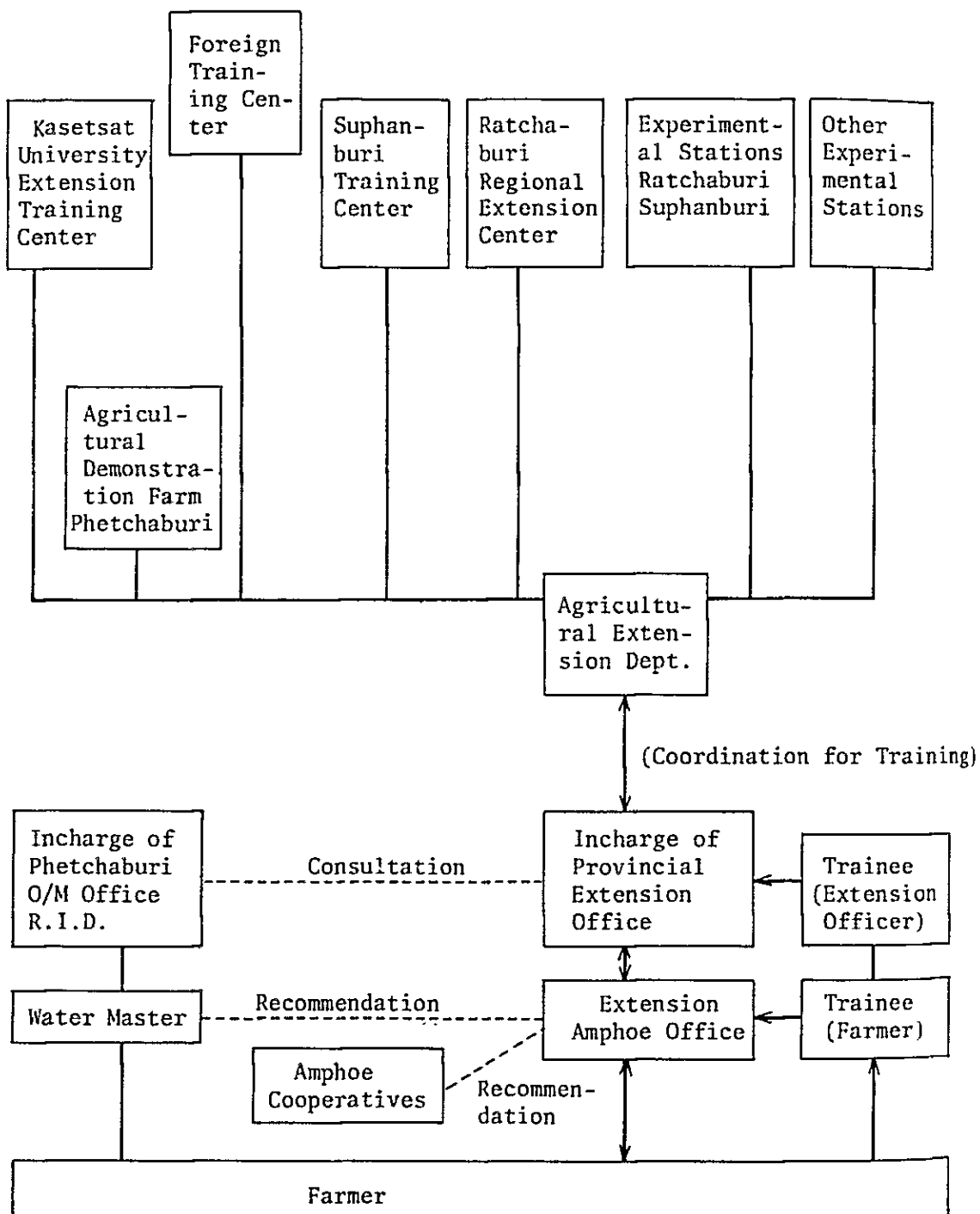
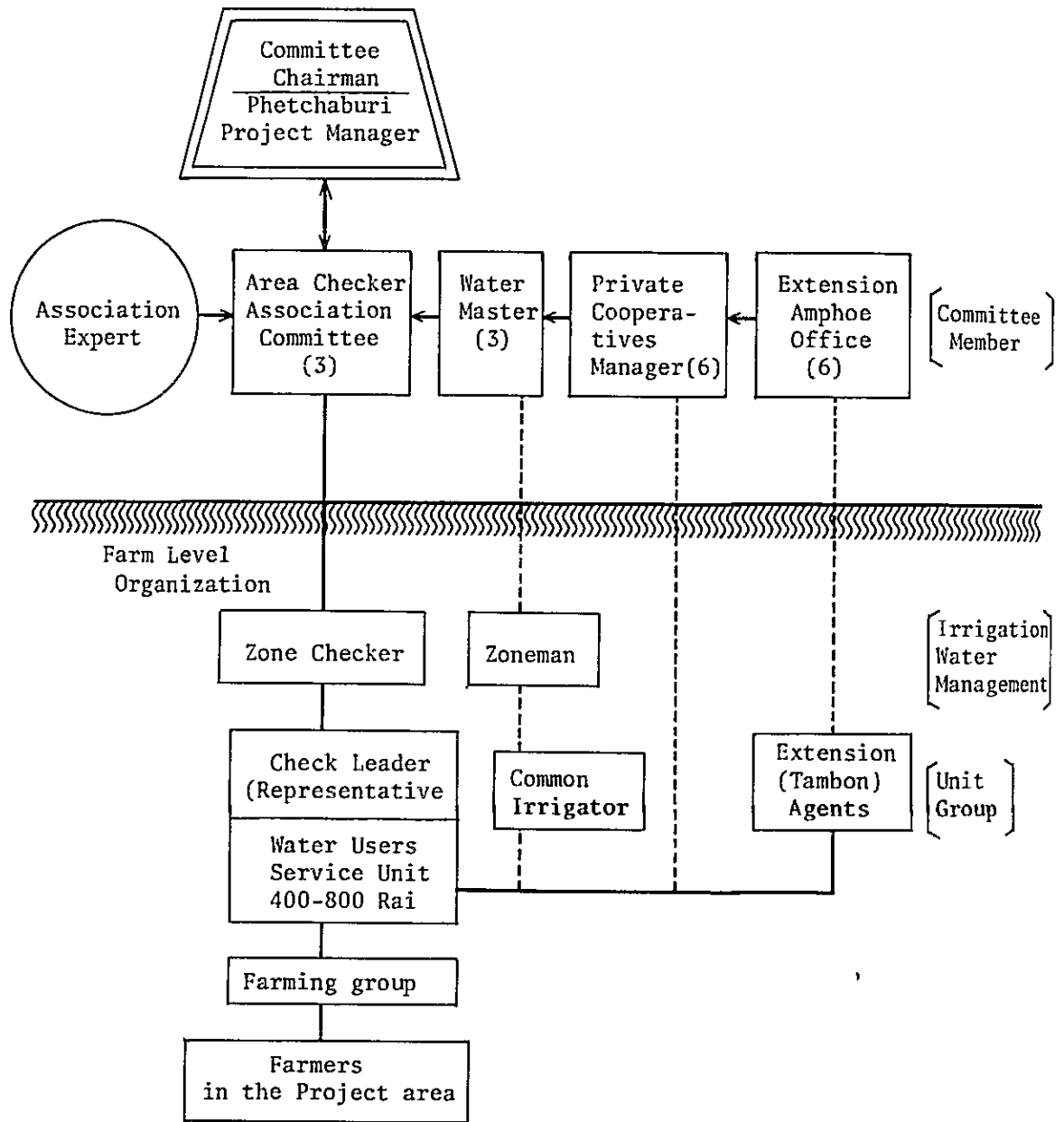


Figure F-7 Training Schedule for Agricultural Extension Agents

Amphoe	Training Course		1	2	3	4	5	6	7	8	9	10	11	12
	Year	Course												
Muang	a	—												
	b	---												
	c	---												
Ban Laem	a	—												
	b	---												
	c	---												
Ban Lat	a	—												
	b	---												
	c	---												
Cha-Am	a	—												
	b	---												
	c	---												
Tha Yang	a	—												
	b	---												
	c	---												
Khao Yoi	a	—												
	b	---												
	c	---												

a — Long-term training
 Training Course a)
 1. Suphanburi Training Center
 2. Foreign Training
 3. Kasetsat Training Center
 b --- Middle-term training
 Course b)
 1. Regional Extension Center
 2. Mae Kiong Pilot Farm
 3. Phetchaburi Demonstration Farm
 c -- Short-term training
 Course c)
 1. Experimental Stations
 2. Extension Provincial Station
 3. Others

Figure F-8 Proposed Water Users' Association Committee



APPENDIX G PROJECT COST ESTIMATION

APPENDIX G PROJECT COST ESTIMATION

Contents

G-1. Project Works	G - 3
G-1-1. Irrigation Improvement Project	G - 3
(1) Rehabilitation of the Existing Canals ...	G - 3
(2) Construction of Canals	G - 3
G-1-2. On-farm Development Project	G - 4
G-2. Project Costs	G - 5
G-2-1. Construction Costs	G - 5
(1) General	G - 5
(2) Civil Works	G - 7
(3) Other Costs	G - 9
G-2-2. Schedule of Expenditure	G - 11
(1) Construction Schedule	G - 11
(2) Schedule of Expenditure	G - 13
G-2-3. Operation and Maintenance Costs	G - 14

List of Tables

G-1. Civil Works for Rehabilitation of Existing Canal	G - 16
G-2. On-farm Development Area by Type	G - 17
G-3. Costs of Civil Works for Rehabilitation	G - 18
G-4. Costs of Civil Works for Construction of Canals	G - 19
G-5.(1-5) Cost Estimation of On-farm Development Works	G - 20
G-6. Construction Equipment	G - 25
G-7. Operation and Maintenance Equipment	G - 26
G-8. Consulting Services	G - 27
G-9. Schedule of Project Implementation	G - 28
G-10. Schedule of Equipment Procurement	G - 29
G-11. Manning Schedule of Consulting Services	G - 30
G-12. Schedule of Expenditures for Investment Cost	G - 31

G-13.	Schedule of Expenditures for Investment Cost	
	- Irrigation Improvement Project -	G - 32
G-14.	Schedule of Expenditures for Investment Cost	
	- On-farm Development Project -	G - 33
G-15.	Working Expenses of O & M	G - 34
G-16.	Operation and Maintenance Costs	G - 34

List of Figures

G-1.	Typical Cross Section of Irrigation Canal ...	G - 35
G-2.	Heightening of Existing Canal Wall	G - 36
G-3.	Typical Structure, Road Crossing	G - 37
G-4.	Typical Structure, Road Bridge	G - 38
G-5.	Typical Structure, Bridge for Feeder Canal ..	G - 39
G-6.	Typical Structure, Tide Gate	G - 40
G-7.	Typical Cross Section of Main Ditch	G - 41
G-8.	Typical Cross Section of Ditch	G - 42
G-9.	Typical Structure, Farm Turn-out	G - 43
G-10.	Typical Cross Section of Drain	G - 44
G-11.	Typical Structures, Check Gate, Division and End Check	G - 45

APPENDIX G PROJECT COST ESTIMATION

G-1. Project Works

G-1-1. Irrigation Improvement Project

(1) Rehabilitation of the Existing Canals

Five-centimeter thick concrete lining shall be executed for the existing earth canal system with total length of 166,553 m so as to upgrade their functions (See Figure G-1). On the other hand, the canal lining wall shall be heightened with the existing concrete lined canals of 128,294 m in total length so as to increase the commandable area with gravity. The study was made based on the topographic maps (Scale: 1/10,000) and the design drawings of the canals and resulted in contemplating a plan to heighten the canal side walls by 0.1 - 0.5 m. The heightening was designed to be made by 0.5 m at maximum in taking into account the stability of the existing canal structures. The design of structures is illustrated in Figure G-2. Table G-1 shows the expected work volumes to be required in these rehabilitation.

(2) Construction of Canals

Construction of three concrete lined canals was planned in the mid-stream of the left bank where the irrigation canals have been provided with low density. The canal sections were determined by applying the Manning's formula and the unit water requirements of 1.19 l/sec/ha. The earth canals functioning dually for irrigation/drainage shall be constructed for irrigating the Extension Area of 7,100 ha, which will be subdivided into five sub-areas, naming I, II, III, IV and V from the north to the south. The general dimensions of the canals are shown below ;

Proposed New Canal

<u>Irrigation System</u>	<u>Canal</u>	<u>Length (m)</u>	<u>Capacity</u>	
Left Main	2R-Extra	4,300	1.57	cu.m/s
	1R-2R	2,550	0.63	cu.m/s
	2R-1R	4,200	0.61	cu.m/s
<u>Sub-total</u>		<u>11,050</u>		
Extension Area	I	17,400	1.04	MCM
	II	19,800	1.18	MCM
	III	33,150	1.98	MCM
	IV	22,050	1.32	MCM
	V	16,400	0.98	MCM
<u>Sub-total</u>		<u>108,800</u>	<u>6.50</u>	<u>MCM</u>
<u>Total</u>		<u>119,850</u>		

The typical structures of the facilities are illustrated in Figures G-1, G-3 to G-6.

G-1-2. On-farm Development Project

Construction of the on-farm facilities shall be made in two different development levels of A and B. In taking into account the soils, drainage conditions, field elevations, etc., the Type A - extensive development will be applied to the area of about 16,510 ha, while the Type B - the one improved from Type A will be applied to the area of 36,090 ha. The on-farm development areas by Types are presented in Table G-2. Typical structures for the works are illustrated in Figures G-7 to G-11.

G-2. Project Costs

G-2-I. Construction Costs

(1) General

The construction costs comprise those for i) civil works, ii) procurement of machinery and equipment, iii) construction of project office, iv) land acquisition, v) consulting services and vi) project administration.

The costs of the civil works for irrigation improvement were estimated based on the necessary quantities and the unit prices quoted by RID, while those for on-farm development were estimated by the average cost per hectare that was obtained through the study on the selected sample areas. These costs include the depreciation costs of the construction machinery and equipment to be procured. The construction costs also include the procurement costs for the aforesaid construction machinery and equipment. Accordingly, the total construction cost can be obtained only by deducting the depreciation costs of the machinery and equipment from the sum of the estimated costs for the civil works.

The project offices, which include the head office and three branches, shall be constructed for successful implementation of the Project, and also the necessary office equipment shall be procured. Employment of consultants was planned for smooth execution of the works.

In the on-farm development project, lands to be required for public use shall be offered voluntarily by farmers concerned according to the Land Consolidation Act, whereas the lands used for canal construction shall be purchased by the Government. The costs for surveying, detailed designing and the construction supervision are included in the project administration costs. The

physical contingency was estimated at 10 percent of the total amount of the costs covering items i) through iv), in taking into consideration that the plan was worked out based on the topographic maps prepared latest (1:10,000) and a greater part of the civil works is rehabilitation of the existing facilities.

The civil construction works was planned to be executed on the RID's force account basis, the costs of which were estimated at the 1981 price level. The exchange rate of the foreign currency was taken at US\$1.00 = B23.

The summary of the construction costs including the price escalation can be illustrated as follows: The detailed information of the price escalation and the share of the local currency and foreign currency can be referred to Appendix H.

Item	<u>Cost Summary</u>					
	Million Baht			Million US\$		
	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
1. Civil Works	995.1	236.1	1,231.2	43.3	10.3	53.6
2. Machinery and Equipment	33.9	393.7	427.6	1.5	17.1	18.6
3. Project Office	7.3	3.6	10.9	0.3	0.2	0.5
4. Land Acquisition	58.3	-	58.3	2.5	-	2.5
5. Consulting Services	30.8	83.0	113.8	1.3	3.6	4.9
6. Project Administration	146.9	26.2	173.1	6.4	1.1	7.5
7. Physical Contingencies	127.5	74.3	201.8	5.5	3.2	8.7
<u>Sub-total</u>	<u>1,399.8</u>	<u>816.9</u>	<u>2,216.7</u>	<u>60.8</u>	<u>35.5</u>	<u>96.3</u>
8. Price Escalation	2,358.3	803.9	3,162.2	102.5	35.0	137.5
<u>Total</u>	<u>3,758.1</u>	<u>1,620.8</u>	<u>5,378.9</u>	<u>163.3</u>	<u>70.5</u>	<u>233.8</u>

(2) Civil Works

The construction costs of the civil works involved in the irrigation improvement project comprise the cost for rehabilitation of the existing canals and those for construction of new canals. The costs of the civil works involved in the on-farm development project were estimated at $\text{฿}7,200/\text{ha}$ for the Type A and $\text{฿}9,355/\text{ha}$ for the Type B, respectively. The rough breakdown of the costs of the civil works of the both projects is shown as follows with total amount of $\text{฿}1,437.1$ million, including the machinery depreciation costs of $\text{฿}205.9$ million.

Cost Summary of Civil Works

- Unit: million Baht -

<u>Item</u>	<u>Cost</u>	<u>Remarks</u>
a. Irrigation Improvement Project		
a-1. Rehabilitation	588.9	Table G-3
a-2. Construction	392.1	
<u>Sub-total</u>	<u>981.0</u>	
b. On-farm Development Project		
a-1. Type A	118.9	16,510 ha
a-2. Type B	337.2	36,090 ha
<u>Sub-total</u>	<u>456.1</u>	
<u>Total</u>	<u>1,437.1</u>	

The construction of eight new canals, three in the left bank and five in the Extension Area, will cost about $\text{฿}392.1$ million, the breakdown of which is shown below and the detailed information can be referred to Table G-4.

Costs of Civil Works for
Canal Construction

<u>Canal</u>	<u>Length (m)</u>	<u>Cost (Million ₪)</u>
2R-Extra-Left	4,300	12.1
1R-1R-Left	2,550	4.4
2R-1R-Left	4,200	9.6
<u>Sub-total</u>	<u>11,050</u>	<u>26.1</u>
Extension Area		
I	17,400	64.9
II	19,800	72.0
III	33,150	121.3
IV	22,050	61.6
V	16,400	46.2
<u>Sub-total</u>	<u>108,800</u>	<u>366.0</u>
<u>Total</u>	<u>119,850</u>	<u>392.1</u>

The costs of the civil works involved in the on-farm development project were estimated based on the data of following five sample areas on their average. Table G-5 shows the details of the estimation.

Average Costs of On-farm Development
Works for Sample Areas

<u>Sample No.</u>	<u>ha</u>	<u>Cost (₪/ha)</u>	
		<u>Type A</u>	<u>Type B</u>
1	203	9,122	13,332
2	244	4,718	5,972
3	232	6,859	9,825
4	247	8,790	8,833
5	250	6,512	8,814
<u>Average</u>		<u>7,200</u>	<u>9,355</u>

(3) Other Costs

Procurement of machinery and equipment

The machinery and equipment costing 427.6 million will be procured for construction works and O & M works of the Project after completion. The details are listed in Tables G-6 and G-7.

Procurement of Machinery and Equipment

<u>Item</u>	<u>Million Baht</u>
Construction Equipment	
a. Irrigation Improvement	
- Rehabilitation	150.0
- Construction	108.2
<u>Sub-total</u>	<u>258.2</u>
b. On-farm Development	151.2
<u>Total</u>	<u>409.4</u>
Operation and Maintenance	
a. O & M for Irrigation System	11.2
b. Agricultural Extension	7.0
<u>Total</u>	<u>18.2</u>
<u>Grand Total</u>	<u>427.6</u>

Project office

Project Office

<u>Item</u>	<u>1,000 Baht</u>
Head office: Civil works, 3 ha	2,290
Buildings, 800 sq.m	3,658
Office equipment	300
Communication equipment	300
<u>Sub-total</u>	<u>6,548</u>
Branch offices (3): Civil works, 2.4 ha	1,550
Buildings, 900 sq.m	2,700
Office equipment	100
Communication equipment	30
<u>Sub-total</u>	<u>4,380</u>
<u>Total</u>	<u>10,928</u>

Consulting services Refer to Table G-8.

Costs for Consulting Services

<u>Item</u>	<u>1,000 Baht</u>
Irrigation Improvement	
Detailed design	23,230
Supervision	31,418
On-farm Development	
Detailed design	30,015
Supervision	29,164
<u>Total</u>	<u>113,827</u>

Project administration

The efficient implementation of the Project works requires those costs for engineering works such as cross-sectional and longitudinal surveying of both the existing and proposed canals, preparation of detailed topographic maps (1/4,000) for the on-farm development areas, detailed design, construction supervision as well as the administration costs. The costs defrayable for these items were estimated at \$173.1 million.

G-2-2. Schedule of Expenditure

(1) Construction Schedule

Prior to construction works, surveying, mapping and the detailed design for the whole Project Area shall be carried out in taking three years for completion. The civil works for construction shall be implemented, in parallel with the detailed design works, to start with the rehabilitation works of the existing canals. The on-farm development works shall be implemented site by site where the rehabilitation or construction of the canals is completed. These works will take 12 years, and 15 years will be needed for completion of the total project works. Time schedule of the construction by kinds of works is shown below. Table G-9 illustrates the schedule of the Project implementation.

Civil works

The irrigation improvement project shall be implemented prior to the on-farm development project. The top priority for rehabilitation should be given to the left main canals which have been suffering from heavy erosion of the embankment slopes and critical sediments in the canals. The construction works of the dual-purpose irrigation canals in the Extension Area shall be commenced in the 11th and 12th year in view that these dual-purpose canals can successfully function only after the rehabilitation/construction of the canal systems and on-farm development works in the upstream areas are completed. The time schedule of the construction works for the irrigation improvement project is shown as follows:

Construction Schedule of Irrigation Improvement

<u>Year</u>	<u>Canal</u>
4th	Left main, 1L, 2R (Left bank)
5th	Left main, 2R-Extra(*), 2L, 1R-2L, 3R ... (Left bank) Main No.3, 1L-3(Right bank)
6th	1R, 1L-1R, 1R-1R(*), 2R-1R(*)..... (Left bank) 1R-3, 2R-3, 3R-3, 1R-1L-3, 2R-1L-3, 3R-1L-3, 1R-3R- 1L-3, 4R-1L-3(Right bank)
7th	Main No.3, 5R-1L-3, 1L-5R-1L-3, 2L-5R-1L-3, 6R-1L-3, 7R-1L-3, 8R-1L-3, 9R-1L-3, 1L-9R-1L-3, 10R-1L-3, 11R-1L-3, 2L-3, 1L-2L-3, 2L-2L-3, 1R-1R-2, 1R-1.
8th	Main No.2, 1R-2, 1R-1R-1R-2, Main No.1, 1L-1, 2R-1, 1R-2R-1, 1L-2R-1.
11th	Dual-purpose canals of I and II
12th	Dual-purpose canals of III, IV and V

Note: (*) indicates the construction of proposed canals.

<u>Year</u>	<u>Quantity (m)</u>		
	<u>Rehabilitation</u>	<u>Construction</u>	<u>Total</u>
4th	33,387	-	33,387
5th	59,448	4,300	63,748
6th	79,950	6,750	86,700
7th	81,170	-	81,170
8th	39,792	-	39,792
11th	-	37,200	37,200
12th	-	71,600	71,600
<u>Total</u>	<u>293,747</u>	<u>119,850</u>	<u>413,597</u>

Implementation of the on-farm development project shall be started three years after the irrigation improvement project is commenced, and the on-farm development shall be implemented in the order that those sites where the rehabilitation/construction of the irrigation system is completed, come first. The construction schedule of on-farm development in volume on the yearly basis is shown as follows:

Construction Schedule of On-farm Development

- Unit: ha -

<u>Type</u>	<u>6th</u>	<u>7th</u>	<u>8th</u>	<u>9th</u>	<u>10th</u>	<u>11th</u>	<u>12th</u>	<u>13th</u>	<u>14th</u>	<u>15th</u>	<u>Total</u>
A	1,130	3,760	510	442	975	1,318	924	-	351	7,100	16,510
B	2,944	2,121	2,351	4,516	4,890	4,686	3,242	4,163	4,922	1,255	36,090
Total	4,074	5,881	3,861	4,958	5,865	6,004	4,166	4,163	5,273	8,355	52,600

Procurement of machinery and equipment

Refer to Table G-10.

Project offices

In the third project year, prior to the construction works, the head office building shall be constructed and three branches in the fourth project year.

Land acquisition

Land acquisition should be executed one year preceding to the construction works of the due site.

Consulting services

Refer to Table G-11.

(2) Schedule of Expenditure

the annual expenditure was estimated based on the aforesaid time schedule and unit costs of the works. As a result, the

implementation of the total project requires the amount of $\text{฿}2,014.9$ million (US\$80.60 million equivalent) at the 1981 price level, including physical contingency. When the commencement of implementation is started in 1984 and the following conditions are imposed on price escalation, the total investment to be required will be $\text{฿}5,378.9$ million (US\$233.97 million equivalent). Table G-12 illustrates the annual investment schedule.

<u>Items</u>	<u>Price Index (%)</u>									
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
International Price Index	9.0	8.0	7.0	6.7	6.5	6.3	6.2	6.0	5.8	5.7
Domestic Price Index	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

G-2-3. Operation and Maintenance Costs

The O & M costs for the main systems and on-farm facilities to be provided under the Project comprise those costs for regular expenditures such as direct salaries of the staff concerned and regular repair of the facilities, and those for the renewal or replacement of the machinery and equipment. In estimation of the renewal costs of machinery and equipment, the scrap value by 10 percent of the purchase price was deducted.

The O & M works for the main irrigation and drainage systems will be carried out by the existing RID Phetchaburi O & M Offices. The personnel expenditures for 100 persons of engineers and staff and other various expenditures will amount to $\text{฿}5.86$ million per annum. The annual repair costs of the main facilities will be $\text{฿}7.46$ million (or equivalent to 0.5 percent of the construction costs of the civil works), including the labourers' wages.

The O & M works for the on-farm facilities shall be made by the water users' associations that are to be established under the Project. The establishment of the associations and reinforcement of their functions will require the following expenditures in the first project year.

	(¥1,000)
Buildings of 3 offices	6,600
Office equipment	1,500
Preparation of cadaster	590
Cost before inauguration of association	670
Cost for training of staff	200
<u>Total</u>	<u>9,560</u>

The unit of water management acreage should be defined to 250 ha, and 205 water management sections shall be established. Each section shall provide one section chief and three executive members. The payment for these personnel and the per diem of leader of the water management will reach ¥2.77 per annum. Furthermore, those costs for office works and repair of the on-farm facilities will be needed. These working expenses will amount to ¥3.80 million per annum, accordingly.

The working expenses of O & M for the Project will be required from the following year of the completion of the Project at the rate of ¥13.4 million for the main facilities and ¥3.80 million for the on-farm facilities per annum, totaling ¥17.2 million per annum. The O & M costs for the construction period was estimated in proportion to the progress of the works and the working expenses for the whole project is tabulated in Table G-13. The necessary costs for the renewal of the machinery and equipment can be estimated based on the procurement schedule of the machinery and equipment in Table G-10 and their life and the result is shown in Table G-14.

Table G-1 Civil Works for Rehabilitation of Existing Canal

- Unit: m -

Canal	Linging	Heightening of Side Wall (m)				
		0.1	0.2	0.3	0.4	0.5
Left Main	33,730	-	-	-	-	-
1R	26,460	-	-	-	-	-
1L-1R	2,824	-	-	-	-	-
2R	8,087	-	-	-	-	-
3R	-	-	-	5,660	-	-
1L	5,300	-	-	-	-	-
2L	-	-	-	11,600	-	-
1R-2L	5,810	-	-	-	-	-
<u>Sub-total</u>	<u>82,211</u>	<u>-</u>	<u>-</u>	<u>17,260</u>	<u>-</u>	<u>-</u>
Main No.1	7,560	-	1,325	-	-	-
1R-1	-	-	-	-	-	-
2R-1	-	-	-	1,300	-	4,850
1R-2R-1	2,526	-	-	-	-	-
1L-2R-1	2,300	-	-	-	-	-
1L-1	2,600	-	-	-	-	-
<u>Sub-total</u>	<u>14,986</u>	<u>-</u>	<u>1,325</u>	<u>1,500</u>	<u>-</u>	<u>4,850</u>
Main No.2	7,056	1,100	-	-	-	-
1R-2	6,500	-	-	-	-	-
1R-1R-2	-	-	-	-	-	-
1R-1R-1R-2	3,775	-	-	-	-	-
<u>Sub-total</u>	<u>17,331</u>	<u>1,100</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Main No.3	15,400	-	-	-	-	-
1R-3	4,000	-	-	-	-	-
2R-3	3,075	-	-	-	-	-
3R-3	8,000	-	-	-	-	-
1L-3	-	2,822	4,371	1,780	4,475	-
1R-1L-3	-	-	-	-	4,125	-
2R-1L-3	-	-	2,860	-	-	-
3R-1L-3	-	-	9,340	1,952	-	-
1R-3R-1L-3	-	-	-	-	8,664	-
4R-1L-3	-	-	5,800	2,850	-	-
5R-1L-3	-	-	-	2,784	6,140	-
1L-5R-1L-3	-	-	2,000	6,431	-	-
2L-5R-1L-3	-	-	-	5,940	-	-
6R-1L-3	-	-	-	8,150	-	-
7R-1L-3	-	-	-	-	3,990	-
8R-1L-3	-	-	-	5,665	-	-
9R-1L-3	-	-	-	3,800	-	-
1L-9R-1L-3	-	-	2,940	-	-	-
10R-1L-3	-	-	3,060	-	-	-
11R-1L-3	-	-	-	2,520	-	-
2L-3	14,000	-	-	-	-	-
1L-2L-3	4,675	-	-	-	-	-
2L-2L-3	2,875	-	-	-	-	-
<u>Sub-total</u>	<u>52,025</u>	<u>2,822</u>	<u>30,371</u>	<u>41,872</u>	<u>27,394</u>	<u>-</u>
<u>Total</u>	<u>166,553</u>	<u>3,922</u>	<u>31,696</u>	<u>60,432</u>	<u>27,394</u>	<u>4,850</u>

Table G-2 On-farm Development Area by Type

- Unit: ha -

Canal System	Area by Type			Canal System	Area by Type		
	A	B	Total		A	B	Total
Main No.1	156	2,981	3,137	7R-1L-3	-	570	570
1R-1	-	1,382	1,382	8R-1L-3	154	601	755
2R-1	197	995	1,192	9R-1L-3	378	-	378
1R-2R-1	-	200	200	1L-9R-1L-3	154	-	154
1L-2R-1	-	294	294	10R-1L-3	151	-	151
1L-1	-	255	255	11R-1L-3	166	-	166
<u>Sub-total</u>	<u>353</u>	<u>6,107</u>	<u>6,460</u>	2L-3	695	1,135	1,830
Main No.2	25	3,723	3,748	1L-2L-3	-	662	662
1R-2	84	670	754	2L-2L-3	-	511	511
1R-1R-2	120	750	870	<u>Sub-total</u>	<u>3,430</u>	<u>17,040</u>	<u>20,470</u>
1R-1R-1R-2	-	408	408	Left Main	1,130	2,930	4,060
<u>Sub-total</u>	<u>229</u>	<u>5,551</u>	<u>5,780</u>	1R	-	1,450	1,450
Main No.3	126	2,944	3,070	1L-1R	-	388	388
1R-3	-	254	254	2R	-	732	732
2R-3	-	300	300	3R	891	-	891
3R-3	-	780	780	1L	-	753	753
1L-3	316	1,612	1,928	2L	1,205	200	1,405
1R-1L-3	-	1,228	1,228	1R-2L	751	-	751
2R-1L-3	-	603	603	2R-EX	913	407	1,320
3R-1L-3	364	1,382	1,746	1R-1R	-	530	530
1R-3R-1L-3	466	832	1,298	2R-1R	510	-	510
4R-1L-3	145	983	1,128	<u>Sub-total</u>	<u>5,400</u>	<u>7,390</u>	<u>12,790</u>
5R-1L-3	106	438	544	Ext. Area	<u>7,100</u>	<u>-</u>	<u>7,100</u>
1L-5R-1L-3	66	991	1,057	<u>Total</u>	<u>16,512</u>	<u>36,088</u>	<u>52,600</u>
2L-5R-1L-3	65	647	712				
6R-1L-3	78	567	645				

Table G-3 Costs of Civil Works for Rehabilitation
- Heightening of Side Wall and Others - Canal Lining

Canal	Length (m)	Cost (Million฿)	Canal	Length (m)	Cost (Million฿)
3R-Left	5,660	5.4	Left Main	33,730	82.9
2L-Left	11,600	9.0	1R	26,460	49.1
<u>Sub-total</u>	<u>17,260</u>	<u>14.4</u>	1L-1R	2,824	4.3
Main No.1	1,325	1.7	2R	8,087	6.7
1R-1	-	1.0	1L	5,300	4.4
2R-1	6,150	24.5	1R-2L	5,810	10.3
<u>Sub-total</u>	<u>7,475</u>	<u>27.2</u>	<u>Sub-total</u>	<u>82,211</u>	<u>157.7</u>
Main No.2	1,100	1.2	Main No.1	7,560	25.5
1R-1R-2	-	1.0	1R-2R-1	2,526	5.0
<u>Sub-total</u>	<u>1,100</u>	<u>2.2</u>	1L-2R-1	2,300	4.5
1L-3	13,448	13.6	1L-1	2,600	2.3
1R-1L-3	4,125	5.3	<u>Sub-total</u>	<u>14,986</u>	<u>37.3</u>
2R-1L-3	2,860	2.9	Main No.2	7,056	31.7
3R-1L-3	11,292	11.6	1R-2	6,500	5.3
7R-3R-1L-3	8,664	13.3	1R-1R-1R-2	3,775	9.1
4R-1L-3	8,650	11.3	<u>Sub-total</u>	<u>17,331</u>	<u>46.1</u>
5R-1L-3	8,924	12.6	Main No.3	15,400	78.5
1L-5R-1L-3	8,431	9.3	1R-3	4,000	9.0
2L-5R-1L-3	5,940	6.1	2R-3	3,075	4.5
6R-1L-3	8,150	9.3	3R-3	8,000	18.0
7R-1L-3	3,990	5.4	2L-3	14,000	56.3
8R-1L-3	5,665	5.6	1L-2L-3	4,675	12.8
9R-1L-3	3,800	3.0	2L-2L-3	2,875	10.9
1L-9R-1L-3	2,940	1.3	<u>Sub-total</u>	<u>52,025</u>	<u>189.8</u>
10R-1L-3	3,060	1.4	<u>Total</u>	<u>166,553</u>	<u>430.9</u>
11R-1L-3	2,520	2.2			
<u>Sub-total</u>	<u>102,459</u>	<u>114.2</u>			
<u>Total</u>	<u>128,294</u>	<u>158.0</u>			

Costs for Rehabilitation:
588.9 Million Baht

Table G-4 Costs of Civil Works for Construction of Canals

Cost Item	Quantity	Unit	Unit Price(\$)	Amount (1,000\$)	Cost Item	Quantity	Unit	Unit Price(\$)	Amount (1,000\$)
2R-Extra-Left					Brock II				
Concrete, Lining	923	m ³	1,677	1,548	Excavation, A	238,000	m ³	47	11,186
Embankment	42,700	"	218	9,309	Excavation, B	1,428,000	"	18	25,704
Excavation, A	45,476	"	17	773	C	714,000	"	32	22,848
B	11,547	"	23	266	Embankment	158,400	"	33	5,227
C	11,923	"	22	20	Bridges	2	place	547,610	1,095
In-take	1	place	42,380	42	Tide Gates	2	"	452,092	904
Bridge, B	2	"	62,045	124	Laterite	99,000	m ²	38	3,762
Check, B	1	"	27,895	28	Miscellaneous Costs				1,281
Crossing, B	1	"	9,823	10	Total				72,007
Total				12,120	Brock III				
1R-IL-Left					Excavation, A	397,700	m ³	47	18,692
Concrete, Lining	602	m ³	1,677	1,010	Excavation, B	2,386,200	"	18	42,952
Embankment	14,055	"	218	3,064	C	1,193,100	"	32	38,179
Excavation, A	3,112	"	17	53	Embankment	265,200	"	33	8,752
B	3,228	"	23	74	Bridges	3	place	547,610	1,643
C	602	"	22	13	Tide Gates	6	"	452,092	2,713
In-take	1	place	42,380	42	Laterite	165,750	m ²	38	6,299
Bridge, B	2	"	62,045	124	Miscellaneous Cost				2,118
Check, B	1	"	27,895	28	Total				121,348
Crossing, B	1	"	9,823	10	Brock IV				
Total				4,418	Excavation, B	1,338,500	m ³	18	24,093
2R-1R					Excavation, D	1,338,500	"	17	22,755
Concrete, Lining	1,079	m ³	1,677	1,809	Embankment	176,400	"	33	5,821
Embankment	33,284	"	218	7,256	Bridges	2	place	547,610	1,095
Excavation, A	5,470	"	17	93	Tide Gates	5	"	452,092	2,260
B	9,421	"	23	217	Laterite	110,250	m ²	38	4,190
C	1,079	"	22	24	Miscellaneous Costs				1,343
In-take	1	place	42,380	42	Total				61,557
Bridge, B	2	"	62,045	124	Brock V				
Check, B	1	"	27,895	28	Excavation, B	988,000	m ³	18	17,784
Crossing, B	1	"	9,823	10	Excavation, D	988,000	"	17	16,706
Total				9,603	Embankment	131,200	"	33	4,330
Brock I					Bridges	4	place	547,610	2,190
Excavation, A	213,000	m ³	47	10,011	Tide Gates	2	"	452,092	904
B	1,278,000	"	18	23,004	Laterite	82,000	m ²	38	3,116
C	639,000	"	32	20,448	Miscellaneous Costs				1,077
Embankment	139,200	"	33	4,594	Total				46,197
Bridges	2	place	547,610	1,095					
Tide Gates	3	"	452,092	1,356					
Laterite	87,000	m ²	38	3,306					
Miscellaneous Costs				1,041					
Total				64,855					

Table G-5-1 Cost Estimation of On-farm Development Works
Sample Area: No.1, 203 ha

- Unit: Baht -

Cost Items	Type A				Type B			
	Quantity	Unit	Unit Price	Amount (1,000 ฿)	Quantity	Unit	Unit Price	Amount (1,000 ฿)
Site Clearing	10.59	ha	6,200	65.6	11.10	ha	6,200	68.8
Main ditch; d=0.35	-	m	325	-	-	m	325	-
d=0.40	-	"	337	-	640	"	337	215.7
d=0.45	-	"	351	-	1,970	"	351	691.5
Ditch; d=0.30	5,232	"	90	470.9	-	"	90	-
d=0.35	-	"	107	-	2,360	"	107	252.5
d=0.40	3,936	"	112	440.8	4,770	"	112	534.2
d=0.45	1,860	"	124	230.6	-	"	124	-
Farm road	-	"	107	-	2,034	"	107	217.6
Farm turn-out; d=0.30	1	place	32,752	32.8	2	place	32,752	65.5
d=0.50	-	"	35,495	-	-	"	35,495	-
d=0.60	2	"	37,296	74.6	2	"	37,296	74.6
Check gate; d=0.40	12	"	916	11.0	8	"	916	7.3
d=0.45	2	"	1,001	2.0	1	"	1,001	1.0
End check; d=0.30	7	"	752	5.3	-	"	752	-
d=0.35	-	"	835	-	3	"	835	2.5
d=0.40	-	"	916	-	-	"	916	-
d=0.45	-	"	1,001	-	6	"	1,001	6.0
Division box; d=0.40	-	"	1,832	-	-	"	1,832	-
d=0.45	1	"	2,002	2.0	3	"	2,002	6.0
Crossing	14	"	9,823	137.5	15	"	9,823	147.3
Drain; Type A	5,380	m	55	295.9	4,790	m	55	263.5
Type B	2,350	m	33	77.6	4,500	"	33	148.5
Outlet	4	place	1,290	5.2	3	place	1,290	3.9
Total				<u>1,851.8</u>				<u>2,706.4</u>
				<u>9,112 ฿/ha</u>				<u>13,332 ฿/ha</u>

Table G-5-2 Cost Estimation of On-farm Development Works
Sample Area: No.2, 244 ha

- Unit: Baht -

Cost Items	Type A				Type B			
	Quantity	Unit	Unit Price	Amount (1,000 B)	Quantity	Unit	Unit Price	Amount (1,000 B)
Site clearing	6.10	ha	6,200	37.8	7.95	ha	6,200	49.3
Main ditch; d=0.35	-	m	325	-	-	m	325	-
d=0.40	-	"	337	-	-	"	337	-
d=0.45	-	"	351	-	-	"	351	-
Ditch; d=0.30	660	"	90	59.4	-	"	90	-
d=0.35	-	"	107	-	1,140	"	107	122.0
d=0.40	2,310	"	112	258.7	3,600	"	112	403.2
d=0.45	2,740	"	124	339.8	2,340	"	124	290.2
Farm road	-	"	107	-	-	"	107	-
Farm turn-out; d=0.30	2	place	32,752	65.5	1	place	32,752	32.8
d=0.50	4	"	35,495	142.0	5	"	35,495	177.5
d=0.60	-	"	37,296	-	-	"	37,296	-
Check gate; d=0.40	-	"	916	-	3	"	916	2.7
d=0.45	6	"	1,001	6.0	4	"	1,001	4.0
End check d=0.30	5	"	752	3.8	-	"	752	-
d=0.35	-	"	835	-	3	"	835	2.5
d=0.40	-	"	916	-	4	"	916	3.7
d=0.45	-	"	1,001	-	-	"	1,001	-
Division box; d=0.40	-	"	1,832	-	1	"	1,832	1.8
d=0.45	-	"	2,002	-	-	"	2,002	-
Crossing	2	"	9,823	19.6	2	"	9,823	19.6
Drain; Type A	1,750	m	55	96.3	4,780	m	55	262.9
Type B	3,590	"	33	118.5	2,340	"	33	77.2
Outlet	3	place	1,290	3.9	6	place	1,290	7.7
Total				<u>1,151.3</u>				<u>1,457.1</u>
				<u>4,718 B/ha</u>				<u>5,972 B/ha</u>

Table G-5-3 Cost Estimation of On-farm Development Works
Sample Area: No.3, 232 ha

- Unit: Baht -

Cost Items	Type A				Type B			
	Quantity	Unit	Unit Price	Amount (1,000 ฿)	Quantity	Unit	Unit Price	Amount (1,000 ฿)
Site clearing	6.96	ha	6,200	43.2	99.10	ha	6,200	68.1
Main ditch;								
d=0.35	-	m	325	-	360	m	325	117.0
d=0.40	-	"	337	-	-	"	337	-
d=0.45	-	"	351	-	1,030	"	351	361.5
Ditch;								
d=0.30	-	"	90	-	2,110	"	90	189.9
d=0.35	-	"	107	-	-	"	107	-
d=0.40	1,540	"	112	172.5	5,860	"	112	656.3
d=0.45	6,110	"	124	757.6	1,220	"	124	151.3
Farm road	-	"	107	-	1,390	"	107	148.7
Farm turn-out;								
d=0.30	1	place	32,752	32.8	-	place	32,752	-
d=0.50	3	"	35,495	106.5	2	"	35,495	71.0
d=0.60	2	"	37,296	74.6	1	"	37,296	37.3
Check gate;								
d=0.40	4	"	916	3.7	8	"	916	7.3
d=0.45	3	"	1,001	3.0	1	"	1,001	1.0
End check;								
d=0.30	-	"	752	-	-	"	752	-
d=0.35	-	"	835	-	-	"	835	-
d=0.40	5	"	916	4.6	9	"	916	8.2
d=0.45	-	"	1,001	-	-	"	1,001	-
Division box;								
d=0.40	1	"	1,832	1.8	-	"	1,832	-
d=0.45	-	"	2,002	-	5	"	2,002	10.0
Crossing	10	"	9,823	98.2	7	"	9,823	68.8
Drain; Type A	4,170	m	55	229.4	4,310	m	55	237.1
Type B	1,760	"	33	58.1	4,220	"	33	139.3
Outlet	4	place	1,290	5.2	5	place	1,290	6.5
<u>Total</u>				<u>1,591.2</u>				<u>2,279.3</u>
				<u>6,859 ฿/ha</u>				<u>9,825 ฿/ha</u>

Table G-5-4 Cost Estimation of On-farm Development Works
Sample Area: No.4, 247 ha

- Unit: Baht -

Cost Items	Type A				Type B			
	Quantity	Unit	Unit Price	Amount (1,000 ฿)	Quantity	Unit	Unit Price	Amount (1,000 ฿)
Site clearing	8.37	ha	6,200	51.9	8.46	ha	6,200	52.5
Main ditch; d=0.35	-	m	325	-	-	m	325	-
d=0.40	1,140	"	337	384.2	1,140	"	337	384.2
d=0.45	-	"	351	-	-	"	351	-
Ditch; d=0.30	1,260	"	90	113.4	2,380	"	90	214.2
d=0.35	-	"	107	-	-	"	107	-
d=0.40	7,020	"	112	786.2	5,950	"	112	666.4
d=0.45	1,100	"	124	136.4	500	"	124	62.0
Farm road	1,140	"	107	122.0	1,140	"	107	122.0
Farm turn-out; d=0.30	1	place	32,752	32.8	3	place	32,752	98.3
d=0.50	7	"	35,495	248.5	6	"	35,495	213.0
d=0.60	-	"	37,296	-	-	"	37,296	-
Check gate; d=0.40	6	"	916	5.5	6	"	916	5.5
d=0.45	-	"	1,001	-	-	"	1,001	-
End check; d=0.30	-	"	752	-	9	"	752	6.8
d=0.35	-	"	835	-	-	"	835	-
d=0.40	10	"	916	9.2	-	"	916	-
d=0.45	-	"	1,001	-	-	"	1,001	-
Division box; d=0.40	2	"	1,832	3.7	3	"	1,832	5.5
d=0.45	-	"	2,002	-	-	"	2,002	-
Crossing	5	"	9,823	49.1	8	"	9,823	78.6
Drain; Type A	2,510	m	55	138.1	3,100	m	55	170.5
Type B	2,650	"	33	87.5	2,980	"	33	98.3
Outlet	2	place	1,290	2.6	3	place	1,290	3.9
<u>Total</u>				<u>2,171.1</u>				<u>2,181.7</u>
				<u>8,790 ฿/ha</u>				<u>8,833 ฿/ha</u>

Table G-5-5 Cost Estimation of On-farm Development Works

Sample Area: No.5, 250 ha

- Unit: Baht -

Cost Items	Type A				Type B			
	Quantity	Unit	Unit Price	Amount (1,000 B)	Quantity	Unit	Unit Price	Amount (1,000 B)
Site clearing	8.26	ha	6,200	51.2	10.54	ha	6,200	65.3
Main ditch; d=0.35	-	m	325	-	770	m	325	250.3
d=0.40	-	"	337	-	-	"	337	-
d=0.45	-	"	351	-	640	"	351	224.6
Ditch; d=0.30	-	"	90	-	-	"	90	-
d=0.35	1,025	"	107	109.7	2,350	"	107	251.5
d=0.40	2,520	"	112	282.2	5,070	"	112	567.8
d=0.45	4,550	"	124	564.2	550	"	124	68.2
Farm road	-	"	107	-	1,410	"	107	150.9
Farm turn-out; d=0.30	-	place	32,752	-	-	place	32,752	-
d=0.50	5	"	35,495	177.5	3	"	35,495	106.5
d=0.60	-	"	37,296	-	1	"	37,296	37.3
Check gate; d=0.40	5	"	916	4.6	10	"	916	9.2
d=0.45	4	"	1,001	4.0	-	"	1,001	-
End check; d=0.30	-	"	752	-	-	"	752	-
d=0.35	6	"	835	5.0	10	"	835	8.4
d=0.40	-	"	916	-	-	"	916	-
d=0.45	-	"	1,001	-	-	"	1,001	-
Division box; d=0.40	-	"	1,832	-	-	"	1,832	-
d=0.45	1	"	2,002	2.0	6	"	2,002	12.0
Crossing	5	"	9,823	49.1	5	"	9,823	49.1
Drain; Type A	5,120	m	55	281.6	4,190	m	55	230.5
Type B	2,820	"	33	93.1	5,090	"	33	168.0
Outlet	3	place	1,290	3.9	3	place	1,290	3.9
<u>Total</u>				<u>1,628.1</u>				<u>2,203.5</u>
				<u>6,512 B/ha</u>				<u>8,814 B/ha</u>

Table G-6 Construction Equipment

Item	Number	Unit Cost --- 1,000 \$ ---	Total ----- -----	Item	Number	Unit Cost --- 1,000 \$ ---	Total ----- -----
<u>Rehabilitation</u>							
Truck, dump, 6.5 ton	230	397	91,310	Loader, 0.5 cu.m	1	488	488
Truck, dump, 2 ton	2	168	336	Roller, 3 ton	1	358	358
Truck, cargo, 3 ton	2	177	354	Concrete mixer, 0.5 cu.m	3	235	705
Truck, pickup, 1.5 ton	2	140	280	Concrete vibrator, 38 mm	7	10	70
Truck, water tank, 6 ton	4	520	2,080	Pump, φ 100 mm	10	17	170
Bulldozer, track, 8 ton	9	876	7,884	Sub-total			<u>108,156</u>
Bulldozer, track, 15 ton	6	1,528	9,168	Total for Irrigation Improvement			<u>258,182</u>
Motor grader, 3.1 m	8	1,082	8,656	<u>On-farm Development</u>			
Loader, 0.5 cu.m	12	488	5,856	Truck, dump, 6.5 ton	15	397	5,955
Backhoe, 0.8 cu.m	9	2,154	19,386	Truck, dump, 2 ton	2	168	336
Backhoe, 0.35 cu.m	2	1,114	2,228	Truck, cargo, 3 ton	2	177	354
Roller, 3 ton	1	358	358	Crane, truck mounted, 2 ton	2	403	806
Concrete Vibrator, 38 mm	20	10	200	Truck, pickup, 1.5 ton	2	140	280
Compactor, 100 kg	10	28	280	Backhoe, 0.8 cu.m	20	2,154	43,080
Concrete mixer, 0.5 cu.m	4	235	940	Backhoe, 0.35 cu.m	5	1,114	5,570
Concrete mixer, 0.35 cu.m	4	180	720	Bulldozer, 8 ton	70	876	61,320
Sub-total			<u>150,036</u>	Bulldozer, 15 ton	18	1,528	27,504
<u>Construction of Canal</u>							
Truck, dump, 6.5 ton	6	397	2,382	Loader, 0.5 cu.m	2	488	976
Truck, dump, 2 ton	2	168	336	Loader, 0.5 cu.m	3	358	1,074
Truck, 3 ton	3	177	531	Truck, water tank, 6 ton	3	520	1,560
Truck, pickup, 1.5 ton	2	140	280	Concrete mixer, 0.5 cu.m	2	235	470
Bulldozer, 8 ton	2	876	1,752	Concrete mixer, 0.35 cu.m	6	180	1,080
Bulldozer, 15 ton	27	1,528	41,256	Compactor, 100 kg	30	28	840
Drapeline, 0.8 cu.m	3	2,706	8,118	Total for On-farm Development			<u>151,205</u>
Scrapedozer, 6.4 cu.m	8	3,151	25,208	Grand-Total			<u>409,597</u>
Motor-scraper, 16 cu.m	4	6,355	25,420				
Motor grader, 3.1 m	1	1,082	1,082				

Table G-7 Operation and Maintenance Equipment

<u>Item</u>	<u>Number</u>	Unit Cost --- 1,000 ₪ ---	Total
<u>O & M for Irrigation System</u>			
Motor grader, 2.5 m	1	838	838
Dragline, 0.8 cu.m	2	2,706	5,412
Truck, dump, 6 ton	1	397	397
Truck, dump, 3 ton	2	168	336
Truck, pickup, 1.5 ton	2	140	280
Truck, water tank, 6 ton	1	520	520
Crane, track mounted, 2 ton	1	403	403
Station wagon, 4-wheel drive	2	180	360
Concrete mixer, 0.35 cu.m	3	180	540
Roller, 4 ton	1	384	384
Rammer, 100 kg	5	26	130
Compactor, 50 kg	5	28	140
Concrete vibrator, 38 mm	10	10	100
Motorcycle, 80 cc	20	18	360
Pump, ø 50 cc	3	43	129
Generator, 22 ps	1 lot		147
Workshop equipment	1 lot		117
Survey equipment	1 lot		550
<u>Sub-total</u>			<u>11,143</u>
<u>Agricultural Extension Service</u>			
Microbus, passenger, 20 persons	8	330	2,640
Station wagon, 4-wheel drive	7	330	2,310
Office equipment	1 lot		460
Audio-visual equipment	1 lot		800
Spare parts			800
<u>Sub-total</u>			<u>7,010</u>
<u>Total</u>			<u>18,153</u>

Table G-8 Consulting Services

<u>Item</u>	<u>Quantity (man-month)</u>	<u>Unit Price(฿)</u>	<u>Amount (1,000฿)</u>
Irrigation			
a. Detailed Design			
Foreign engineers	78	195,500	15,249
Local engineers	72	69,000	4,968
Living allowance	78	20,700	1,615
Transportation	38	18,400	699
Miscellaneous costs			699
			<u>23,230</u>
b. Supervision			
Foreign engineers	104	195,500	20,332
Local engineers	104	69,000	7,176
Living allowance	104	20,700	2,153
Transportation	62	18,400	1,141
Miscellaneous costs			616
			<u>31,418</u>
			<u>56,132</u>
On-farm			
a. Detailed Design			
Foreign engineers	102	195,500	19,941
Local engineers	84	69,000	6,486
Living allowance	102	20,700	2,111
Transportation	40	18,400	736
Miscellaneous costs			741
			<u>30,015</u>
b. Supervision			
Foreign engineers	94	195,500	18,377
Local engineers	94	69,000	6,486
Living allowance	94	20,700	1,946
Transportation	94	18,400	1,730
Miscellaneous costs			625
			<u>29,164</u>
			<u>59,179</u>

Table G-9 Schedule of Project Implementation

Work Items	Construction Year														
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th
1. <u>Pre-construction Works</u>															
a. <u>Survey and mapping</u>															
b. <u>Detailed design</u>															
2. <u>Project Office</u>															
3. <u>Land Acquisition</u>															
4. <u>Procurement of Machine and Equipment</u>															
a. <u>Construction</u>															
b. <u>Operation and maintenance</u>															
5. <u>Civil Works</u>															
a. <u>Irrigation improvement project</u>															
i) <u>Left bank</u>															
o Rehabilitation															
o Construction															
ii) <u>Right bank</u>															
o Rehabilitation															
o Construction															
b. <u>On-farm development project</u>															
i) <u>Left bank</u>															
ii) <u>Right bank</u>															
6. <u>Supervision and Administration</u>															
7. <u>Consulting Services</u>															

Table G-10 Schedule of Equipment Procurement

Item	Construction Year														Total
	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th			
<u>Irrigation Improvement</u>															
Tracs, dump, 6.5 ton	20	50	70	80	10	-	-	-	3	1	-	-	-	-	236
Track, dump, 2 ton	2	-	-	-	-	-	-	-	2	-	-	-	-	-	4
Track, cargo, 3 ton	2	-	-	-	-	-	-	-	3	-	-	-	-	-	5
Truck, pickup, 1.5 ton	2	-	-	-	-	-	-	-	2	-	-	-	-	-	4
Bulldozer, 8 ton	2	3	2	2	-	-	-	-	2	-	-	-	-	-	11
Bulldozer, 15 ton	2	2	2	-	-	-	-	-	10	17	-	-	-	-	33
Track, water tank	2	2	-	-	-	-	-	-	-	-	-	-	-	-	4
Motor grader, 3.1 m	3	3	2	-	-	-	-	-	1	-	-	-	-	-	9
Loader, 0.5 cu.m	3	3	3	3	-	-	-	-	1	-	-	-	-	-	13
Backhoe, 0.8 cu.m	3	3	3	-	-	-	-	-	-	-	-	-	-	-	9
Backhoe, 0.35 cu.m	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Dragline, 0.8 cu.m	-	-	-	-	-	-	-	-	1	2	-	-	-	-	3
Scrapedozer, 6.4 cu.m	-	-	-	-	-	-	-	-	4	4	-	-	-	-	8
Motorscraper, 16 cu.m	-	-	-	-	-	-	-	-	2	2	-	-	-	-	4
Roller, 3 ton	1	-	-	-	-	-	-	-	1	-	-	-	-	-	2
Concrete vibrator	10	10	-	-	-	-	-	-	7	-	-	-	-	-	27
Compactor, 100 kg	10	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Concrete mixer, 0.5 cu.m	4	-	-	-	-	-	-	-	3	-	-	-	-	-	7
Concrete mixer, 0.35 cu.m	4	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Pump, 4 100 mm	-	-	-	-	-	-	-	-	5	5	-	-	-	-	10
<u>On-farm Development</u>															
Track, dump, 6.5 ton	-	-	2	2	2	2	2	2	2	-	1	-	-	-	15
Track, dump, 2 ton	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Track, cargo, 3 ton	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Crane, track mounted	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Track, pickup, 1.5 ton	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Backhoe, 0.8 cu.m	-	-	3	3	3	3	3	3	-	-	2	-	-	-	20
Backhoe, 0.35 cu.m	-	-	1	1	1	1	-	-	-	-	1	-	-	-	5
Bulldozer, 8 ton	-	-	5	10	10	10	10	10	-	-	5	10	-	-	70
Bulldozer, 15 ton	-	-	2	3	3	3	3	3	-	-	1	-	-	-	18
Loader, 0.5 cu.m	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2
Roller, 4 ton	-	-	2	-	-	-	-	-	1	-	-	-	-	-	3
Track, water tank	-	-	2	-	-	-	-	-	1	-	-	-	-	-	3
Concrete mixer, 0.5 cu.m	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Concrete mixer, 0.35 cu.m	-	-	3	-	-	-	-	3	-	-	-	-	-	-	6
Compactor, 100 kg	-	-	10	-	-	-	-	10	-	-	10	-	-	-	30
<u>Operation and Maintenance</u>															
Motorgrader, 2.5 m	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Dragline, 0.8 cu.m	-	-	-	-	-	-	-	-	-	-	1	1	-	-	2
Track, dump, 6.5 ton	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Track, dump, 2 ton	1	-	-	-	-	1	-	-	-	-	-	-	-	-	2
Track, pickup, 1.5 ton	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Track, water tank	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Crane, track mounted	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Station wagon	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Concrete mixer	1	-	-	1	-	1	-	-	-	-	-	-	-	-	3
Roller, 4 ton	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Blower, 100 kg	-	-	-	-	-	5	-	-	-	-	-	-	-	-	5
Compactor, 50 kg	-	-	-	-	-	5	-	-	-	-	-	-	-	-	5
Concrete vibrator	-	-	-	-	-	10	-	-	-	-	-	-	-	-	10
Motorcycle, 80 cc	10	-	-	10	-	-	-	-	-	-	-	-	-	-	20
Pump, 4 50 mm	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3
Generator, 22 ps	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Workshop equip	1 lot	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Survey equip	-	-	-	-	-	1 lot	-	-	-	-	-	-	-	-	1
<u>Agricultural Extension Services</u>															
Microbus	-	-	8	-	-	-	-	-	-	-	-	-	-	-	8
Station wagon	-	-	7	-	-	-	-	-	-	-	-	-	-	-	7
Others	-	-	1 lot	-	-	-	-	-	-	-	-	-	-	-	1

Table G-11 Manning Schedule of Consulting Services

- Unit: man-month -

Item	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	Total
<u>Irrigation Improvement Project</u>																
a. Detailed Design																
Engineer(For.)	36	42	-	-	-	-	-	-	-	-	-	-	-	-	-	78
Engineer(Loc.)	32	40	-	-	-	-	-	-	-	-	-	-	-	-	-	72
<u>Sub-total</u>	<u>68</u>	<u>82</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	<u>150</u>
b. Supervision																
Engineer(For.)	-	-	-	16	18	18	18	20	-	-	-	14	-	-	-	104
Engineer(Loc.)	-	-	-	16	18	18	18	20	-	-	-	14	-	-	-	104
<u>Sub-total</u>	-	-	-	<u>32</u>	<u>36</u>	<u>36</u>	<u>36</u>	<u>40</u>	-	-	-	<u>28</u>	-	-	-	<u>208</u>
<u>Total</u>	<u>68</u>	<u>82</u>	-	<u>32</u>	<u>36</u>	<u>36</u>	<u>36</u>	<u>40</u>	-	-	-	<u>28</u>	-	-	-	<u>358</u>
<u>On-farm Development Project</u>																
a. Detailed Design																
Engineer(For.)	14	22	22	20	24	-	-	-	-	-	-	-	-	-	-	102
Engineer(Loc.)	12	20	18	20	24	-	-	-	-	-	-	-	-	-	-	94
<u>Sub-total</u>	<u>26</u>	<u>42</u>	<u>40</u>	<u>40</u>	<u>48</u>	-	-	-	-	-	-	-	-	-	-	<u>196</u>
b. Supervision																
Engineer(For.)	-	-	-	-	-	6	10	10	10	10	10	10	10	10	8	94
Engineer(Loc.)	-	-	-	-	-	6	10	10	10	10	10	10	10	10	8	94
<u>Sub-total</u>	-	-	-	-	-	<u>12</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>16</u>	<u>188</u>
<u>Total</u>	<u>26</u>	<u>42</u>	<u>40</u>	<u>40</u>	<u>48</u>	<u>12</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>16</u>	<u>384</u>

Table G-12 Schedule of Expenditures for Investment Cost

(unit: Million Baht)

Work Items	Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
1. Civil Works																	
a. Irrigation Improvement Project																	
a-1 Rehabilitation	-	-	-	-	61.1	121.2	129.4	166.5	110.7	-	-	-	-	-	-	-	588.9
a-2 Construction	-	-	-	-	-	12.1	14.0	-	-	-	-	136.9	229.1	-	-	-	392.1
Sub-total	-	-	-	-	61.1	133.3	143.4	166.5	110.7	-	-	136.9	229.1	-	-	-	981.0
b. On-farm Development Project	-	-	-	-	-	-	35.6	46.9	35.0	45.4	52.7	53.3	37.0	38.9	48.5	62.8	456.1
Total	-	-	-	-	61.1	133.3	179.0	213.4	145.7	45.4	52.7	190.2	266.1	38.9	48.5	62.8	1,457.1
c. Depreciation Cost of Machinery	-	-	-	-	(7.7)	(18.0)	(25.4)	(29.6)	(20.3)	(7.8)	(9.3)	(27.3)	(35.7)	(7.0)	(7.8)	(10.0)	(205.9)
Total(1)	-	-	-	-	53.4	115.3	153.6	183.8	125.4	37.6	43.4	162.9	230.4	31.9	40.7	52.8	1,231.2
2. Machinery and Equipment																	
a. Construction Machinery	-	-	-	28.3	40.1	62.5	56.7	25.7	21.7	21.7	21.5	52.4	58.3	11.7	8.8	-	409.4
b. O & M Equipment	-	-	-	1.7	-	7.0	0.4	-	3.7	-	-	-	-	2.7	2.7	-	18.2
Total(2)	-	-	-	30.0	40.1	69.5	57.1	25.7	25.4	21.7	21.5	52.4	58.3	14.4	11.5	-	427.6
3. Project Office (3)	-	-	-	6.5	4.4	-	-	-	-	-	-	-	-	-	-	-	10.9
4. Land Acquisition (4)	-	-	-	2.0	-	-	-	-	-	-	21.1	35.2	-	-	-	-	58.3
5. Consulting Services (5)	19.5	14.2	6.3	11.7	13.5	8.0	9.2	9.8	9.8	2.9	3.2	3.2	3.2	3.2	3.2	2.7	113.8
6. Project Administration (6)	37.4	27.3	12.1	18.9	21.7	10.3	11.5	12.4	12.4	2.9	3.2	3.2	3.2	3.2	3.2	2.6	173.1
Sub-total (1) - (6)	56.9	41.5	56.9	128.5	220.0	229.0	230.2	173.0	173.0	65.1	92.4	256.9	295.1	52.7	58.6	58.1	2,014.9
7. Physical Contingencies (7)	5.7	4.2	5.7	12.9	22.0	22.9	23.1	17.4	17.4	6.5	9.2	25.7	29.6	5.3	5.8	5.8	201.8
Sub-total (1) - (7)	62.6	45.7	62.6	141.4	242.0	251.9	253.3	190.4	190.4	71.6	101.6	282.6	324.7	58.0	64.4	63.9	2,216.7
8. Price Escalation	20.9	20.3	32.8	94.1	193.5	241.3	291.5	249.2	101.7	172.5	543.6	693.7	133.9	170.1	203.1	3,162.2	
TOTAL	53.5	68.0	95.4	235.5	435.5	493.2	544.8	439.6	439.6	173.3	274.1	826.2	1,018.4	191.9	234.5	267.0	5,375.9

Table G-13 Schedule of Expenditures for Investment Cost
- Irrigation Improvement Project -

Work Items	(unit: Million Baht)																
	Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
1. Civil Works																	
a. Rehabilitation	-	-	-	61.1	121.2	129.4	166.5	110.7	-	-	-	-	-	-	-	-	588.9
b. Construction	-	-	-	-	12.1	14.0	-	-	-	-	136.9	229.1	229.1	-	-	-	392.1
Total	-	-	-	61.1	133.3	143.4	166.5	110.7	-	-	136.9	229.1	229.1	-	-	-	981.0
(Depreciation Cost of Machinery)	-	-	-	(7.7)	(18.0)	(19.2)	(21.8)	(14.1)	(-)	(-)	(18.0)	(29.5)	(-)	(-)	(-)	(-)	(128.3)
Total (1)	-	-	-	53.4	115.3	124.2	144.7	96.6	-	-	118.9	199.6	-	-	-	-	852.7
2. Machinery and Equipment																	
a. Construction Machinery	-	-	28.3	40.1	42.7	35.0	4.0	-	-	-	50.2	58.0	-	-	-	-	258.3
b. O & M Equipment	-	-	1.7	-	4.8	0.3	-	-	-	-	-	-	-	-	-	-	6.8
Total (2)	-	-	30.0	40.1	47.5	35.3	4.0	-	-	-	50.2	58.0	-	-	-	-	265.1
3. Project Office (3)	-	-	4.5	3.0	-	-	-	-	-	-	-	-	-	-	-	-	7.5
4. Land Acquisition (4)	-	-	2.0	-	-	-	-	-	-	21.1	35.2	-	-	-	-	-	58.3
5. Consulting Services (5)	15.6	7.6	-	5.7	6.3	6.3	6.3	6.9	-	-	-	-	-	-	-	-	54.7
6. Project Administration (6)	22.4	16.4	7.3	14.5	16.5	8.6	8.6	9.5	-	-	-	-	-	-	-	-	103.8
Sub-total (1) ~ (6)	38.0	24.0	43.8	116.7	185.6	174.4	163.6	113.0	-	21.1	204.3	257.6	-	-	-	-	1,342.1
7. Physical Contingencies (7)	3.8	2.4	4.4	11.7	18.6	17.4	16.4	11.3	-	2.1	20.4	25.7	-	-	-	-	134.2
Sub-total (1) ~ (7)	41.8	26.4	48.2	128.4	204.2	191.8	180.0	124.3	-	23.2	224.7	283.3	-	-	-	-	1,476.3
8. Price Escalation	14.0	11.7	25.3	85.5	163.3	183.7	207.1	162.7	-	39.4	432.2	605.2	-	-	-	-	1,930.1
TOTAL	55.8	38.1	73.5	213.9	367.5	375.5	387.1	287.0	-	62.6	656.9	808.5	-	-	-	-	3,406.4

Table G-14 Schedule of Expenditures for Investment Cost
 - On-farm Development Project -

(unit: Million Baht)

Work Items	Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
1. Civil Works		-	-	-	-	-	35.6	46.9	35.0	45.4	52.7	53.3	37.0	38.9	48.5	62.8	456.1
(Depreciation Cost of Machinery)		-	-	-	-	-	(6.2)	(7.8)	(6.2)	(7.8)	(9.3)	(9.3)	(6.2)	(7.0)	(7.8)	(10.0)	(77.6)
<u>Total (1)</u>		-	-	-	-	-	29.4	39.1	28.8	37.6	43.4	44.0	30.8	31.9	40.7	52.8	378.5
2. Machinery and Equipment																	
a. Construction Machinery		-	-	-	-	19.8	21.7	21.7	21.7	21.7	21.5	2.2	0.3	11.7	8.8	-	151.1
b. O & M Equipment		-	-	-	-	2.2	0.1	-	3.7	-	-	-	-	2.7	2.7	-	11.4
<u>Total (2)</u>		-	-	-	-	22.0	21.8	21.7	25.4	21.7	21.5	2.2	0.3	14.4	11.5	-	162.5
3. Project Office (3)		-	-	2.0	1.4	-	-	-	-	-	-	-	-	-	-	-	3.4
4. Land Acquisition (4)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Consulting Services (5)		3.9	6.6	6.3	6.0	7.2	1.7	2.9	2.9	2.9	3.2	3.2	3.2	3.2	3.2	2.7	59.1
6. Project Administration (6)		15.0	10.9	4.8	4.4	5.2	1.7	2.9	2.9	2.9	3.2	3.2	3.2	3.2	3.2	2.6	69.3
<u>Sub-total (1) ~ (6)</u>		18.9	17.5	13.1	11.8	34.4	54.6	66.6	60.0	65.1	71.3	52.6	37.5	52.7	58.6	58.1	672.8
7. Physical Contingencies (7)		1.9	1.8	1.3	1.2	3.4	5.5	6.6	6.0	6.5	7.1	5.3	3.8	5.3	5.8	5.8	67.3
<u>Sub-total (1) ~ (7)</u>		20.8	19.3	14.4	13.0	37.8	60.1	73.2	66.0	71.6	78.4	57.9	41.3	58.0	64.4	63.9	740.1
8. Price Escalation		6.9	8.6	7.5	8.6	30.2	57.6	84.4	86.5	101.7	133.1	111.4	88.5	133.9	170.1	203.1	1,232.1
<u>TOTAL</u>		27.7	27.9	21.9	21.6	68.0	117.7	157.6	152.5	173.3	211.5	169.3	129.8	191.9	234.5	267.0	1,972.2

Table G-15 Working Expenses of O & M

- Unit: million Baht -

Year	Main system		On-farm Facilities		Total
	Administration	Repairs	Administration	Repairs	
1st	5.9	-	9.6	-	15.5
2nd	"	-	2.8	-	8.7
3rd	"	-	"	-	8.7
4th	"	-	"	-	8.7
5th	"	0.5	"	-	9.2
6th	"	1.5	"	-	10.2
7th	"	2.6	"	0.1	11.4
8th	"	3.8	"	0.2	12.7
9th	"	4.7	"	0.3	13.7
10th	"	4.7	"	0.4	13.8
11th	"	4.7	"	0.5	13.9
12th	"	4.7	"	0.7	14.1
13th	"	5.7	"	0.8	15.2
14th	"	7.5	"	0.8	17.0
15th	"	7.5	"	0.9	17.1
16th	"	7.5	"	1.0	17.2

Table G-16 Operation and Maintenance Costs

- Unit: million Baht -

Year	Main System	On-farm Facilities	Total	Year	Main System	On-farm Facilities	Total
1st	5.9	9.6	15.5	21th	15.8	3.8	19.6
2nd	5.9	2.8	8.7	22th	16.7	3.8	20.5
3rd	5.9	2.8	8.7	23th	13.4	3.8	17.2
4th	5.9	2.8	8.7	24th	14.9	3.8	18.7
5th	6.4	2.8	9.2	25th	13.4	3.8	17.2
6th	7.4	2.8	10.2	26th	19.7	3.8	23.5
7th	8.5	2.9	11.4	27th	16.2	3.8	20.0
8th	9.7	3.0	12.7	28th	15.8	3.8	19.6
9th	10.6	3.1	13.7	29th	16.7	3.8	20.5
10th	12.1	3.2	15.3	30th	13.4	3.8	17.2
11th	10.6	3.3	13.9	31th	14.9	3.8	18.7
12th	16.9	3.5	20.4	32th	13.4	3.8	17.2
13th	12.0	3.6	15.6	33th	17.9	3.8	21.7
14th	13.4	3.6	17.0	34th	15.0	3.8	18.8
15th	16.7	3.7	20.4	35th	14.4	3.8	18.2
16th	13.4	3.8	17.2	36th	14.3	.8	18.1
17th	14.9	3.8	18.7	37th	14.3	3.8	18.1
18th	13.4	3.8	17.2	38th	14.9	3.8	18.7
19th	19.7	3.8	23.5	39th	13.4	3.8	17.2
20th	16.2	3.8	20.0	40th	19.7	3.8	23.5

Figure G-1 Typical Cross Section of Irrigation Canal

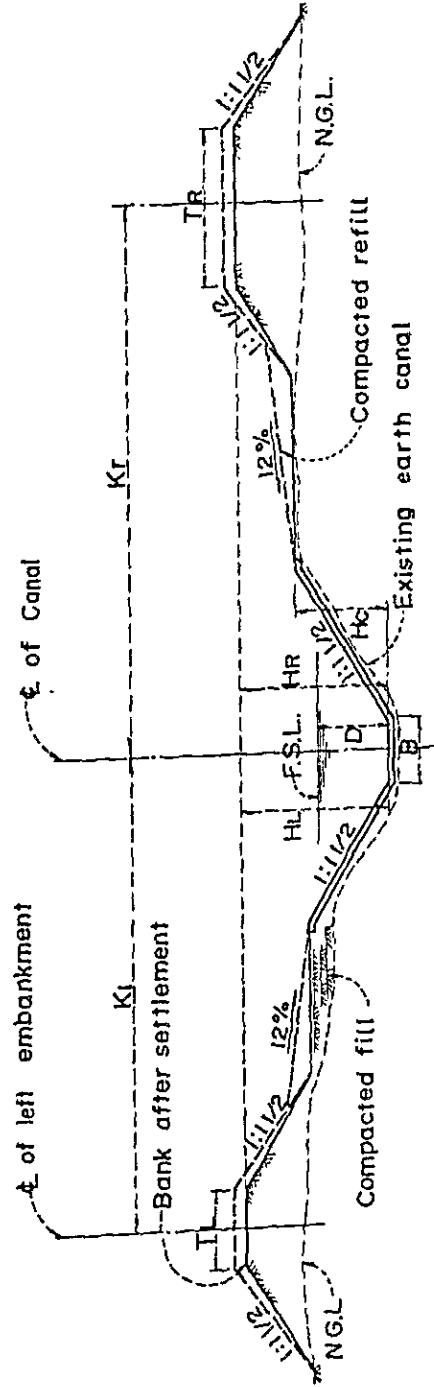


Figure G - 2 Heightening of Existing Canal Wall

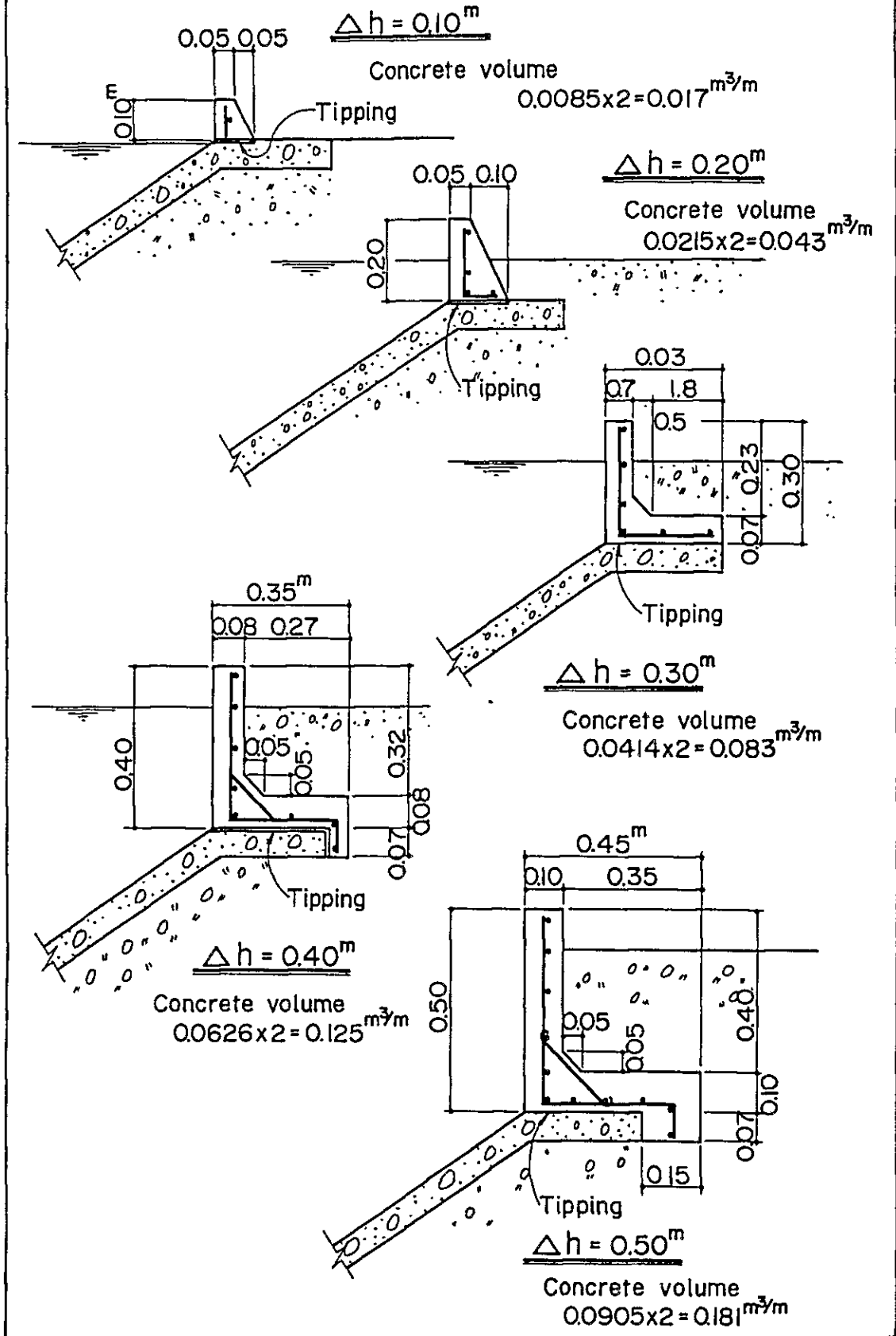
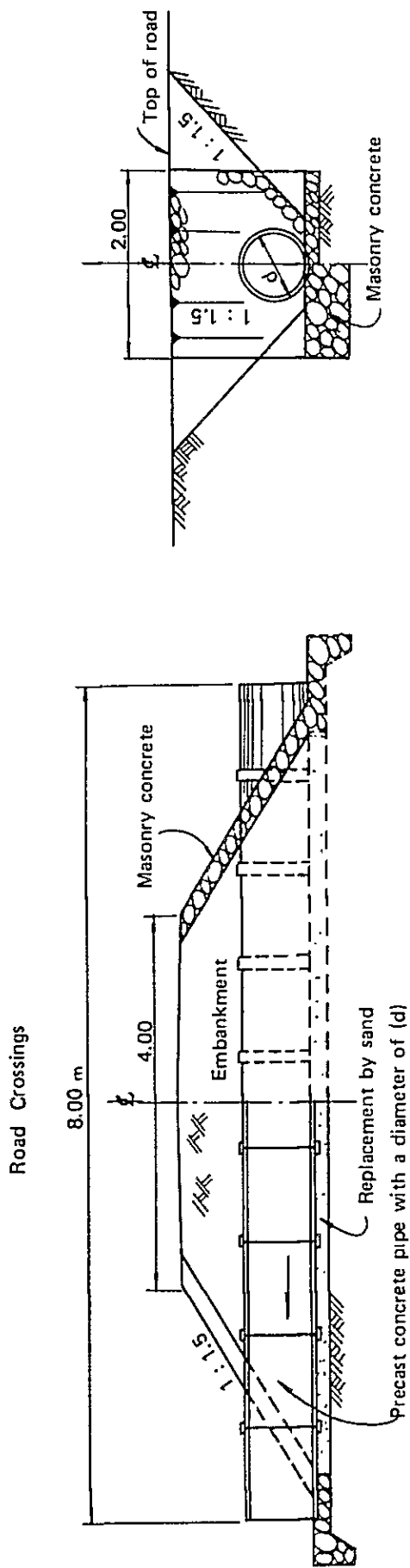


Figure G - 3 Typical Structure, Road Crossing



Quantities per place

d (m)	Pipe length (m)	Quantities per place				
		Pipe concrete (m ³)	Masonry concrete (m ³)	Sand (m ³)	Excava- tion (m ³)	Embank- ment (m ³)
0.50	8.00	0.950	4.00	1.80	30.0	28.00
0.60	8.00	1.368	4.00	2.40	30.0	26.70
0.70	8.00	1.863	4.00	2.70	30.0	25.60
1.00	8.00	3.801	4.00	3.60	30.0	20.90

Figure G-4 Typical Structure, Road Bridge

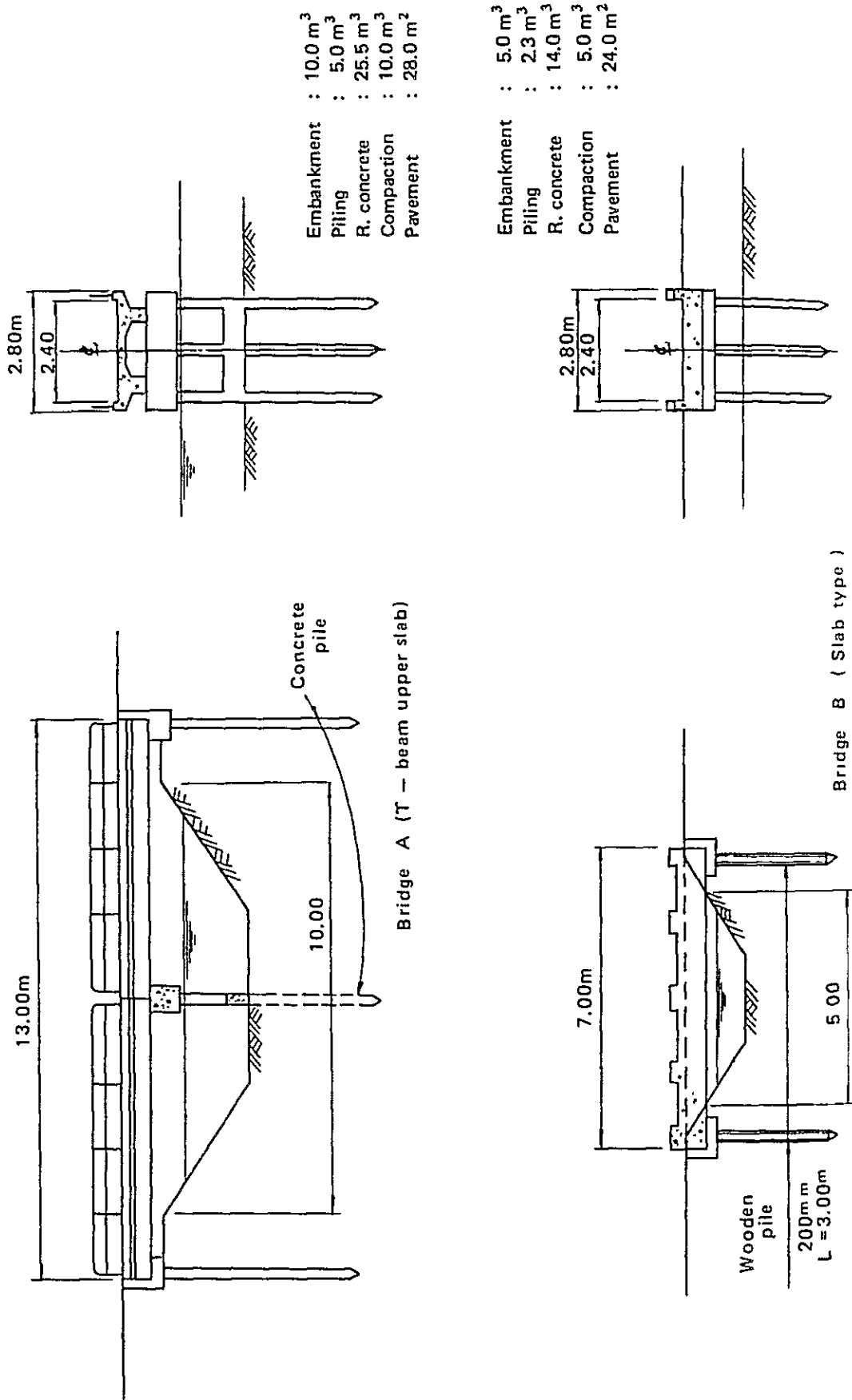


Figure G - 5 Typical Structure, Bridge for Feeder Canal

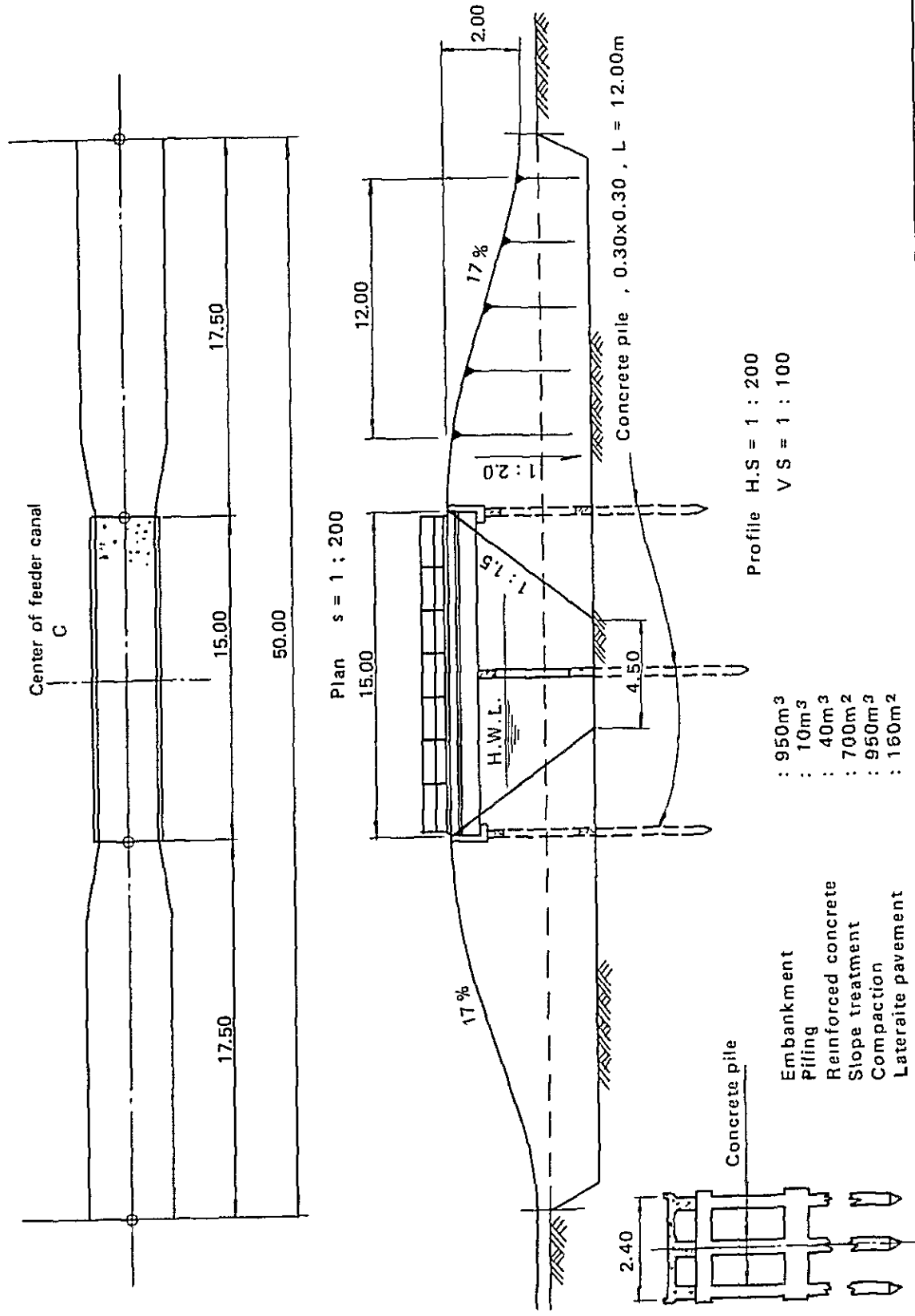
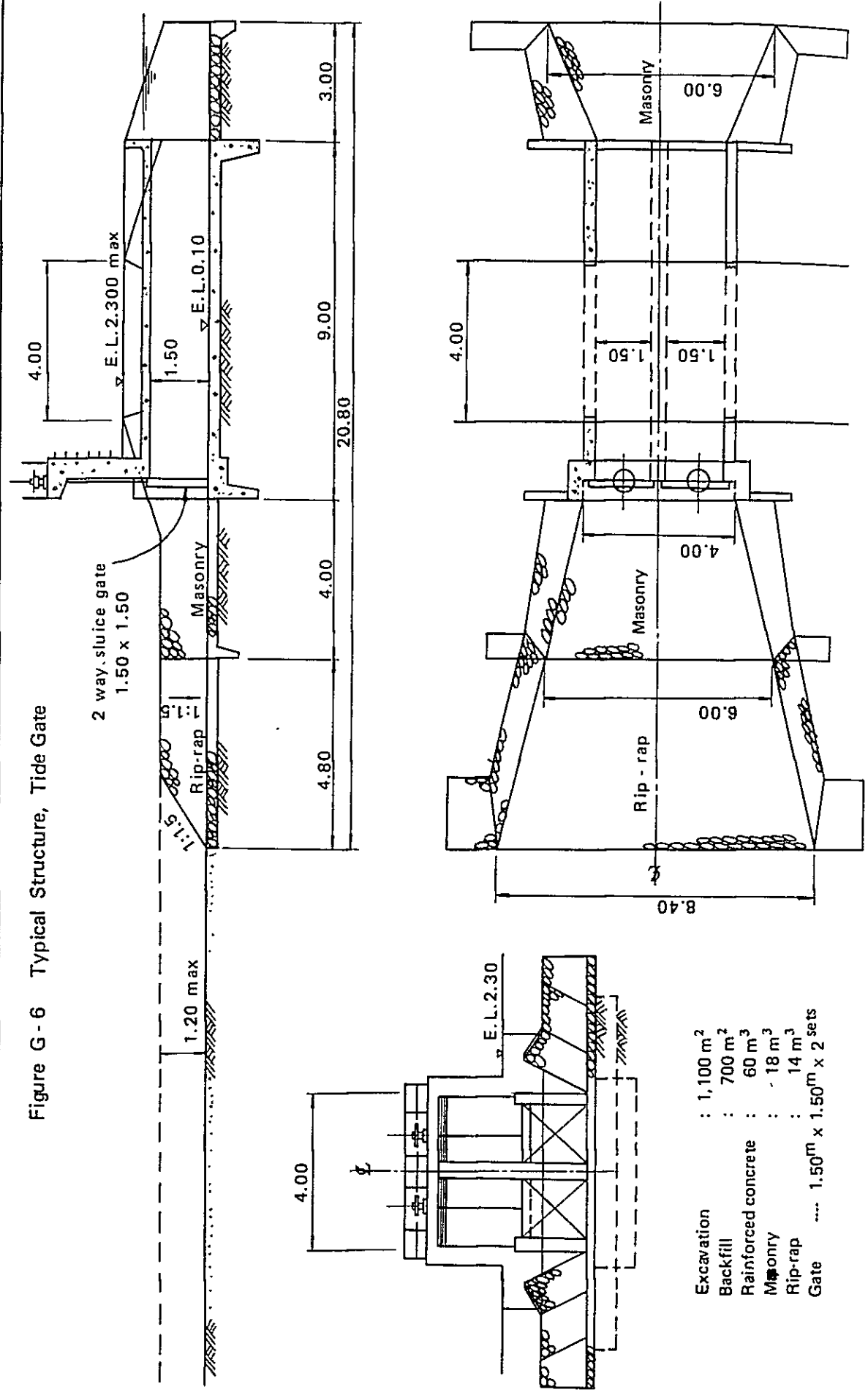


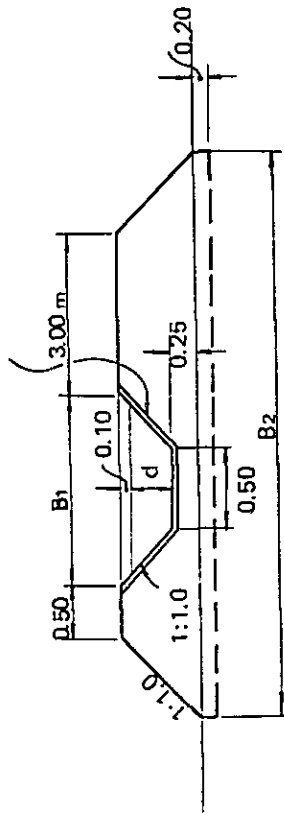
Figure G-6 Typical Structure, Tide Gate



Excavation	: 1,100 m ²
Backfill	: 700 m ³
Rainforced concrete	: 60 m ³
Masonry	: 18 m ³
Rip-rap	: 14 m ³
Gate 1.50m x 1.50m x 2 sets

Figure G-7 Typical Cross Section of Main Ditch

Concrete lining $t = 0.05$ m
 Concrete lining $t = 0.01$ m
 Concrete lining $t = 0.05$ m



$$A = (0.50+d) \times d \quad P = 0.50+2.828d$$

$$B_1 = 2d+0.7 \quad B_2 = 4d+4.9$$

Main Ditch

d = water depth (m), A = flow area (m^2), P = wetted perimeter (m)
 R = hydraulic radius = A/P , V = velocity (m/sec)
 Q = discharge (m^3/sec) = $V \cdot A$, n = roughness coefficient = 0.014

d	A	P	$R^{2/3}$	V_{5000}	Q_{5000}	V_{3000}	Q_{3000}
0.15	0.0975	0.9242	0.2233	0.226	0.022	0.299	0.029
0.20	0.1400	1.0656	0.2585	0.261	0.037	0.337	0.047
0.25	0.1875	1.2070	0.2890	0.292	0.055	0.377	0.071
0.30	0.2400	1.3484	0.3165	0.320	0.077	0.413	0.099
0.35	0.2975	1.4898	0.3417	0.345	0.103	0.446	0.133
0.40	0.3600	1.6312	0.3652	0.369	0.133	0.476	0.171
0.45	0.4275	1.7726	0.3875	0.391	0.167	0.505	0.216

$$V_{5000} = 1.010 \quad R^{2/3} \quad V_{3000} = 1.304 \quad R^{2/3}$$

d (m)	Quantities (m^3/m)					Notes
	Stripping	Embankment	Excavation	Side treatment (m^2)	Concrete lining	
0.15	1.1	2.8	0.2	1.4	0.06	2.8
0.20	1.1	3.0	0.2	1.6	0.07	2.8
0.25	1.2	3.3	0.3	1.7	0.08	2.8
0.30	1.2	3.6	0.4	1.8	0.08	2.8
0.35	1.3	4.0	0.4	2.0	0.09	2.8
0.40	1.3	4.3	0.5	2.1	0.10	2.8
0.45	1.3	4.7	0.6	2.3	0.10	2.8

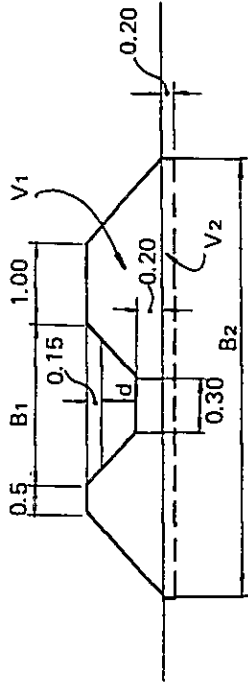
Stripping = $0.8d + 0.98$
 Bank = $3d^2 + 4.65d + 1.96$
 Excavation = $d^2 + 0.70d + 0.06$
 Side treatment = $2.83d + 0.99$
 Concrete = $0.141d + 0.04$
 Road pavement = 2.8

Figure G - 8 Typical Cross Section of Ditch

Farm Ditch

d	A	P	R ^{2/3}	V	Q
0.15	0.0675	0.7243	0.2056	0.150	0.010
0.20	0.1000	0.8657	0.2372	0.173	0.017
0.25	0.1375	1.0071	0.2652	0.194	0.027
0.30	0.1800	1.1485	0.2907	0.212	0.038
0.35	0.2275	1.2900	0.3145	0.230	0.052
0.40	0.2800	1.4314	0.3370	0.246	0.069
0.45	0.3375	1.5728	0.3585	0.262	0.088

$$V = 0.73 R^{2/3}$$

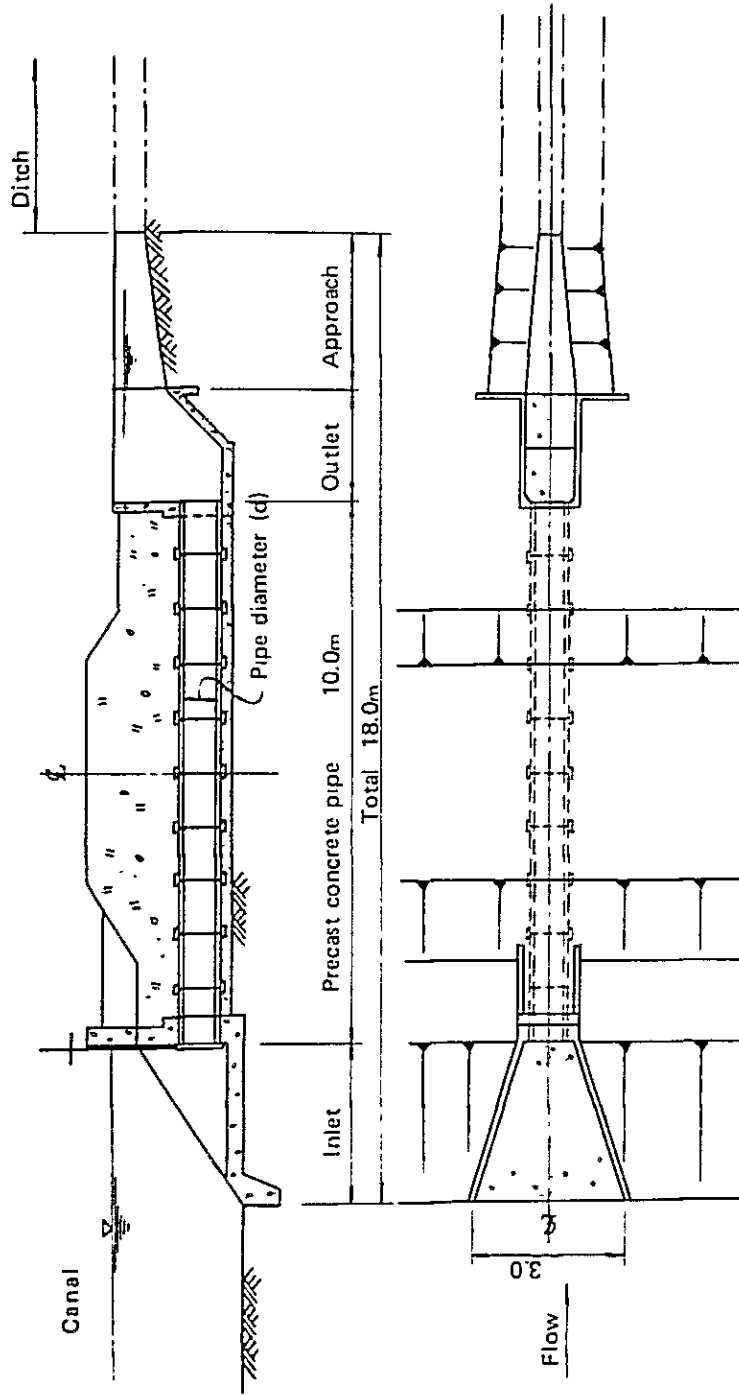


d = water depth (m) , A = flow area (m²)
 P = wetted perimeter (m) , R = hydraulic
 V = velocity (m/sec) , Q = discharge (m³/sec) = V.A
 n = roughness coefficient = 0.025

d (m)	Quantities (m ³ /m)		
	Stripping	Embankment	Excavation
0.15	0.6	1.5	0.3
0.20	0.6	1.7	0.3
0.25	0.7	1.9	0.4
0.30	0.7	2.2	0.5
0.35	0.8	2.4	0.6
0.40	0.8	2.7	0.7
0.45	0.8	3.0	0.8

Notes
Stripping = 0.8d + 0.48
Bank = 3d ² + 3.2d + 0.953
Excavation = 2d ² + 0.75d + 0.07
Side treatment = 2.83d + 0.99

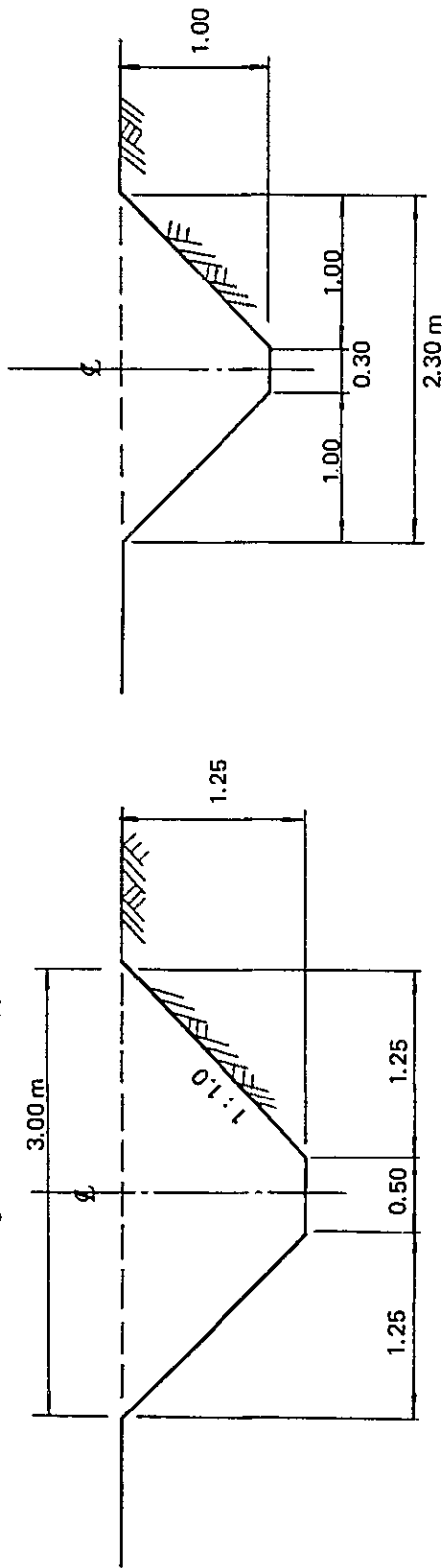
Figure G - 9 Typical Structure, Farm Turn-out



Quantities (m³/m)

d (m)	Excavation	Backfill	Reinforced Concrete	Concrete Pipe (m)	Gate m set	Compaction	
						Man power	Machinery
0.30	110.0	100.0	8.0	10.0	0.30 x 1	40.0	60.0
0.50	120.0	110.0	8.0	10.0	0.50 x 1	50.0	60.0
0.60	124.0	114.0	8.0	10.0	0.60 x 1	54.0	60.0

Figure G - 10 Typical Cross Section of Drain



Drain ; Type A

Drain ; Type B

- Excavation : 8.4 m³
- Backfill : 7.7 m³
- Precast conc. : 0.60 m³
- Concrete : 0.10 m³
- Steel : 20 kg.

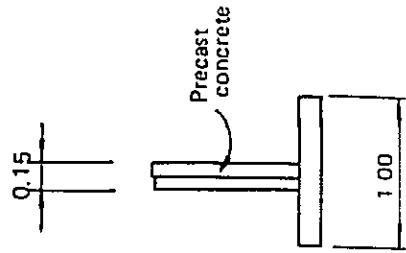
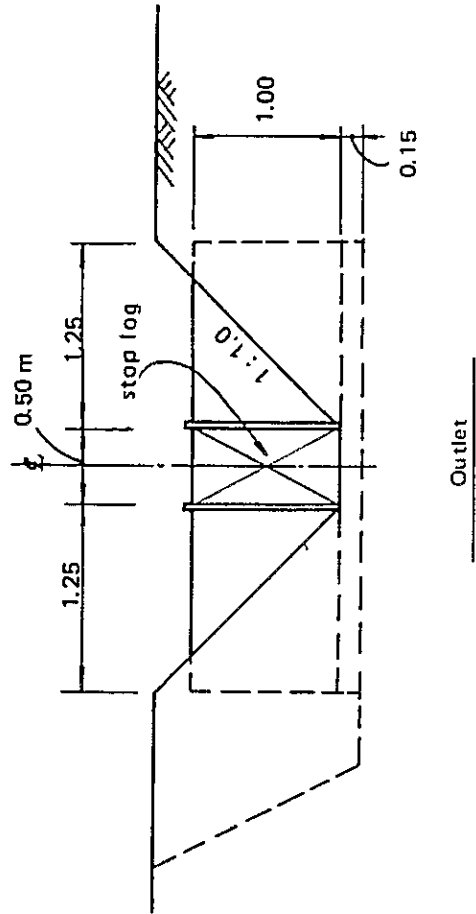
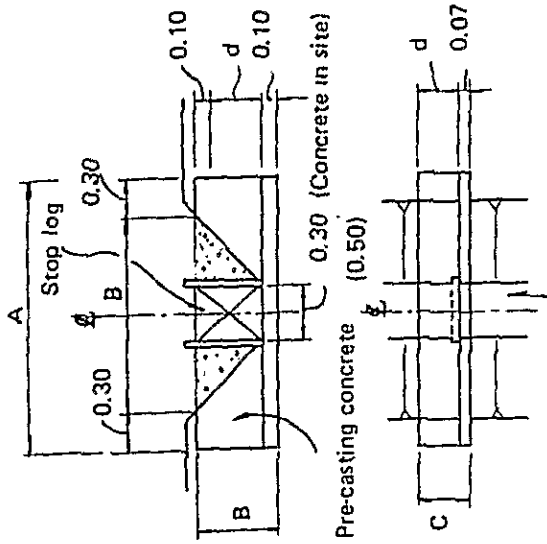


Figure G - 11 Typical Structures, Check Gate, Division and End Check

Quantities per place

d (m)	A (m)	B (m)	C (m)	Precast concrete (m ³)	Concrete in site (m ³)	Steel (kg)	Precast concrete (ton)
0.15	1.20	0.35	0.25	0.088	0.008 (0.013)	4.2	0.211
0.20	1.30	0.40	0.30	0.100	0.009 (0.015)	5.0	0.244
0.25	1.40	0.45	0.35	0.112	0.011 (0.018)	5.8	0.269
0.30	1.50	0.50	0.40	0.124	0.012 (0.020)	6.6	0.298
0.35	1.60	0.55	0.45	0.136	0.014 (0.023)	7.5	0.326
0.40	1.70	0.60	0.50	0.148	0.015 (0.025)	8.3	0.355
0.45	1.80	0.65	0.55	0.160	0.017 (0.028)	9.1	0.384

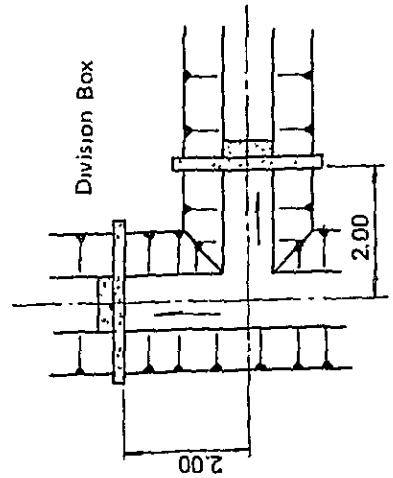
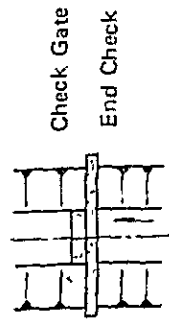
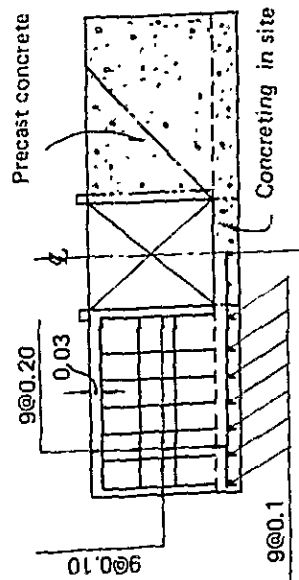
() Main ditch



$A = 0.60 + 0.30 + 2d = 0.90 + 2d$
 $B = 0.20 + d$
 $D = d + 0.07$

Precast concrete
 $V_p = (A - 0.30) \times 0.07 + C \times 0.10$
 Steel (75x40x5x7) = 6.92x1.20xLx2

Excavation
 $V_E = (d + 0.80)(d + 0.20)(A - 0.30)$
 Backfill
 $V_B = (d + 0.80)(d + 0.20)(A - 0.60)$
 $= 0.5 \times V_E$



APPENDIX H PROJECT ECONOMICS

APPENDIX II PROJECT ECONOMICS

Contents	(Page)
H-1. Farm Management Survey	II - 4
H-1-1. General	II - 4
H-1-2. Summary of Survey Results	II - 4
1) Manpower of Farm	II - 4
2) Land Holding and Land Tenure	II - 5
3) Crop Production	II - 6
4) Livestock	II - 7
5) Farm Tools and Equipment	II - 7
6) Off-farm Income and Living Cost	II - 8
7) Farm-gate Prices	II - 9
H-2. Price Analysis	II - 32
H-2-1. General	II - 32
H-2-2. Prices of the Farm Products	II - 32
H-2-3. Economic Cost of Farm Labor	II - 33
H-3. Analysis of Agricultural Benefits	II - 44
H-3-1. General	II - 44
H-3-2. Net Production Value	II - 45
H-4. Economic Evaluation	II - 54
H-4-1. Economic Benefits	II - 54
H-4-2. Economic Costs	II - 54
H-4-3. Internal Economic Rate of Return and Sensitivity Analysis	II - 55
H-5. Farm Budgets Analysis	II - 68
H-5-1. Sample Farms	II - 68
H-5-2. Crop Budget	II - 70
H-5-3. Farm Budget	II - 70

List of Table

H-1	List of Sample Muban and Number of Sample Farm for Farm Management Survey	II - 11
H-2	Number of Families by Age and Sex	II - 12
H-3	Number of Farm Households by Family Size	II - 13
H-4	Working Days by Age Group and Sex (Own Farm)	II - 14

H-5	Working Days by Age Group and Sex (Other Farm)	H - 15
H-6	Working Days by Age Group and Sex (Off-farm)	H - 16
H-7	Number of Farm Households by Farm Type	H - 17
H-8	Land Holding and Land Tenure	H - 18
H-9	Distribution of Land Holding	H - 19
H-10	Number of Farm Households by Land Tenure	H - 20
H-11	Distribution of Owner Farmer by Farm Size	H - 21
H-12	Distribution of Partial Tenant Farmer by Farm Size	H - 22
H-13	Distribution of Pure Tenant Farmer by Farm Size ...	H - 23
H-14	Fragmentation of Farm Land	H - 24
H-15	Distribution of Parcel by Land Size	H - 25
H-16	Crop Production	H - 26
H-17	Yield and Production; Wet Season Paddy, Local Varieties	H - 27
H-18	Yield and Production; Dry Season Paddy, HYV	H - 28
H-19	Average Household Expenditure per a Farm Household	H - 29
H-20	Farm-gate Prices of Agricultural Product	H - 30
H-21	Farm-gate Prices of Input Materials	H - 31
H-22	Paddy Rice and Mungbeans Export of Thailand	H - 35
H-23	Farm-gate Prices of Agricultural Inputs and Outputs	H - 36
H-24	Price Structure of Paddy	H - 37
H-25	Price Structure of Mungbeans	H - 38
H-26	Price Structure of Fertilizer	H - 39
H-27	Price Structure of Animal	H - 40
H-28	Price Structure of Agri-machinery	H - 41
H-29	Price Structure of Fuel	H - 42
H-30	Farm Labor Projections in the Project Area	H - 47
H-31	Monthly Farm Labor Requirement by Crop	H - 48
H-32	Total Monthly Farm Labor Requirement with Project .	H - 49
H-33	Wage Rate by Month with Project	H - 50
H-34	Net Production Value per Hectare	H - 51
H-35	Crop Production Cost per Hectare - with Project - .	H - 52

H-36	Crop Production Cost per Hectare - Present -	H - 53
H-37	Production and Gross Production Value (GPV)	H - 56
H-38	Crop Production Cost of Inputs Materials	H - 57
H-39	Monthly Farm Labor Cost	H - 58
H-40	Incremental Production Benefits	H - 59
H-41	Economic Value of Investment Cost	H - 60
H-42	Economic Value of Construction Cost	H - 61
H-43	Internal Economic Rate of Return (Irrigation Improvement Project and On-farm Development Project)	H - 65
H-44	Internal Economic Rate of Return for Irrigation improvement Project	H - 66
H-45	Internal Economic Rate of Return for On-farm Development Project	H - 67
H-46	Beneficial Farm Land with Project	H - 68
H-47	Cropping Area with Project	H - 69
H-48	Farm Budgets	H - 73
H-49	Number of Population, Households and Farm Households by Tambon in the Project Area	H - 74

List of Figure

H-1	Location of Sample Muban for the Farm Management Survey	H - 10
H-2	Marginal Opportunity Cost of Farm Labor	H - 43

APPENDIX H PROJECT ECONOMICS

H-1 Farm Management Survey

H-1-1 General

A farm management survey among farmers in the Project Area was made with the cooperation of the Economic Section, RID, in order to ascertain the internal structure of farms previous to the Project. Due to the vast area involved in the Project, a random sampling was made so as to select 300 farm households in 17 Tambons (Table H-1 and Figure H-1). Through interviews, the following items were verified;

1. Manpower of farm
2. Operated land
3. Crop production
4. Farm-gate prices of crop
5. Livestock
6. Prices of agricultural inputs
7. Labor requirement by crop
8. Farm tools and equipment
9. Off-farm income
10. Living cost

H-1-2 Summary of Survey Results

(1) Manpower of Farm

The total number of family member of 300 households is 1,709 persons (male: 832, female: 877), and average farm size is 5.7 persons per family. Distribution of the number of family member is shown as below (Tables H-2, H-3).

<u>Number of family member</u>	<u>Number of household</u>	<u>%</u>
6	60	20.0
5	59	19.7
4	54	18.0
3	32	10.7
7	31	10.3

The economically active population is taken as including all people between 15 and 65 years old and amounts to 1,060, or equivalent to 62 percent of the total population (1,709) of the sample households. Working status of 1,324 persons, 10 - 69 years old, is summarized as follows (Tables H-4 to H-6).

<u>Number of person</u>	<u>Status</u>	<u>%</u>
1,009	own farming	59.0
203	agricultural hired work	15.3
311	non agricultural work	23.5

Out of 300 farm households surveyed, full time farm shares only 27 percent by 82 households, while part time farm reveals at 73 percent by 218 households. Among those part time farms, 52 households (17 percent) hained income as hired labor from other farm and 166 households (55 percent form other industries than agriculture (Table H-7).

(2) Land Holding and Land Tenure

The area of agricultural land operated by the sample farms totals 1,183.1 ha. The agricultural land use and average size of operating land are given in the following table. Paddy fields account for 79 percent of the total area. Of the remainder, orchard accounts for 18.2 percent. Details are given in Tables H-8 and H-9.

	<u>Area</u>		<u>Average size(ha)</u>
	<u>(ha)</u>	<u>(%)</u>	
Paddy field	939.0	79.4	3.13
Upland field	27.7	2.3	0.09
Orchard	215.0	18.2	0.72
Pasture land	1.4	0.1	0.00
<u>Total</u>	<u>1,183.1</u>	<u>100.0</u>	<u>3.94</u>

The total number of farm households is 300 and average holding size is 3.94 ha, although there is considerable variation among the samples. The average size of 3.94 ha is a little larger

than the Changwat average of 3.26 ha (census 1978).

Out of 300 farm households, owner farmers account for 135 (45 percent), and partial tenant farmers accounts for 141 (47 percent), while pure tenant farmers for 24 (eight percent). Details are given in Table H-10. Distribution of farmers in terms of tenancy by farm size is given in Tables H-11 to H-13. 466.7 ha of paddy fields are rented in kind by paddy at 840 kg/ha on an average, which is corresponding to 40 percent of the average rainy season paddy yield of 2,112 kg/ha.

The information of fragmentation of farm land indicates that 250 farm households (83 percent) hold their farm land in less than five parcels, and average number of parcel is 3.7/household (Table H-14). The number of the parcels whose area are less than five ha occupies 90 percent of the total of 1,098 parcels. Average size of a parcel is 0.2 ha (Table H-15).

(3) Crop Production

The major crop, the areas cultivated, production levels and yields for last three years of 1978 to 1980 are given in Table H-16. Paddy accounts for 93 percent of the cultivated area including double cropping. Upland cropping is dominated by mungbeans which account for 73 percent of the total upland cropping (22 ha). Average yields of rainy season paddy (LV) and dry season paddy (HYV) are 2.15 and 2.96 ton/ha, respectively, although there is variation among the samples (Tables H-17, H-18). The average planted area by crop and yield are summarized as follows;

<u>Crop</u>	<u>Planted Area (ha)</u>	<u>Yield (ton/ha)</u>
Paddy, rainy season, LV	895.1	2.15
Paddy, rainy season, HYV	2.6	2.96
Paddy, dry season, HYV	63.5	2.96
Mungbeans	16.0	0.62
Other upland crops	6.0	
Tree crops	54.8	

(4) Livestock

A survey on livestock was made of 154 sample farms among 300 sample farms. About 56 percent of farm households raise chicken. Farmers raise a limited number of buffalo. Only five percent of farm households have buffaloes. The number and kind of animals and poultry bred by the sample farms are summarized below;

<u>Animal and Poultry</u>	<u>Number of Households</u>	<u>Number of Head</u>	
		<u>total</u>	<u>per Household</u>
Cattle	87	461	5.3
Buffalo	7	17	2.4
Swine	30	167	5.6
Chicken	112	2,640	23.6
Duck	18	94	5.2

(5) Farm Tools and Equipment

A survey on the possession of farm tools and equipment was conducted of 154 farm households. Only 18 percent of farm households own tractors. However, ownership of irrigation pump is higher at 53 percent. Farm tools and equipment possessed by 154 farm households are shown as follows;

<u>Tools and Equipment</u>	<u>Numbers</u>	
	<u>total</u>	<u>per Household</u>
Warehouse for rice storage	150	0.97
Shed for animal	45	0.29
Four-wheel tractor	1	0.00
Two-wheel tractor	28	0.18
Truck (small)	9	0.06
Irrigation pump	82	0.53
Sprayer	89	0.58
Tractor plow	6	0.04
Animal plow	58	0.38
Tractor harrow	9	0.06

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<u>Tools and Equipment</u>	<u>Numbers</u>	
	<u>total</u>	<u>per Household</u>
Animal harrow	52	0.34
Cart	47	0.31
Sickle	563	3.66
Knife	404	2.62
Spade	138	0.90
Hand cart	78	0.51
Thresher	11	0.07
Winnowing	62	0.40
Milling hand machine	2	0.01
Boat	29	0.19

(6) Off-farm Income and Living Cost

The average off-farm income per farm household amount to
 ₦ 11,805/annum as given as below;

Income from hired work for agriculture	
long term job	454
casual job	982
<u>Sub-total</u>	<u>₦ 1,436</u>
Income from non agricultural work	
long term job	4,563
casual job	1,926
<u>Sub-total</u>	<u>₦ 6,489</u>
Miscellaneous income	₦ 3,880
<u>Total</u>	<u>₦ 11,805</u>

The average annual living cost per household amounts to ₦20,284.
 Details are given in Table H-19.

(7) Farm-gate Prices

Farm-gate prices of agricultural product and input materials are shown in Table II-20 and Table II-21, respectively.

FIGURE H-1

Location of Sample Muban
for the Farm Management
Survey

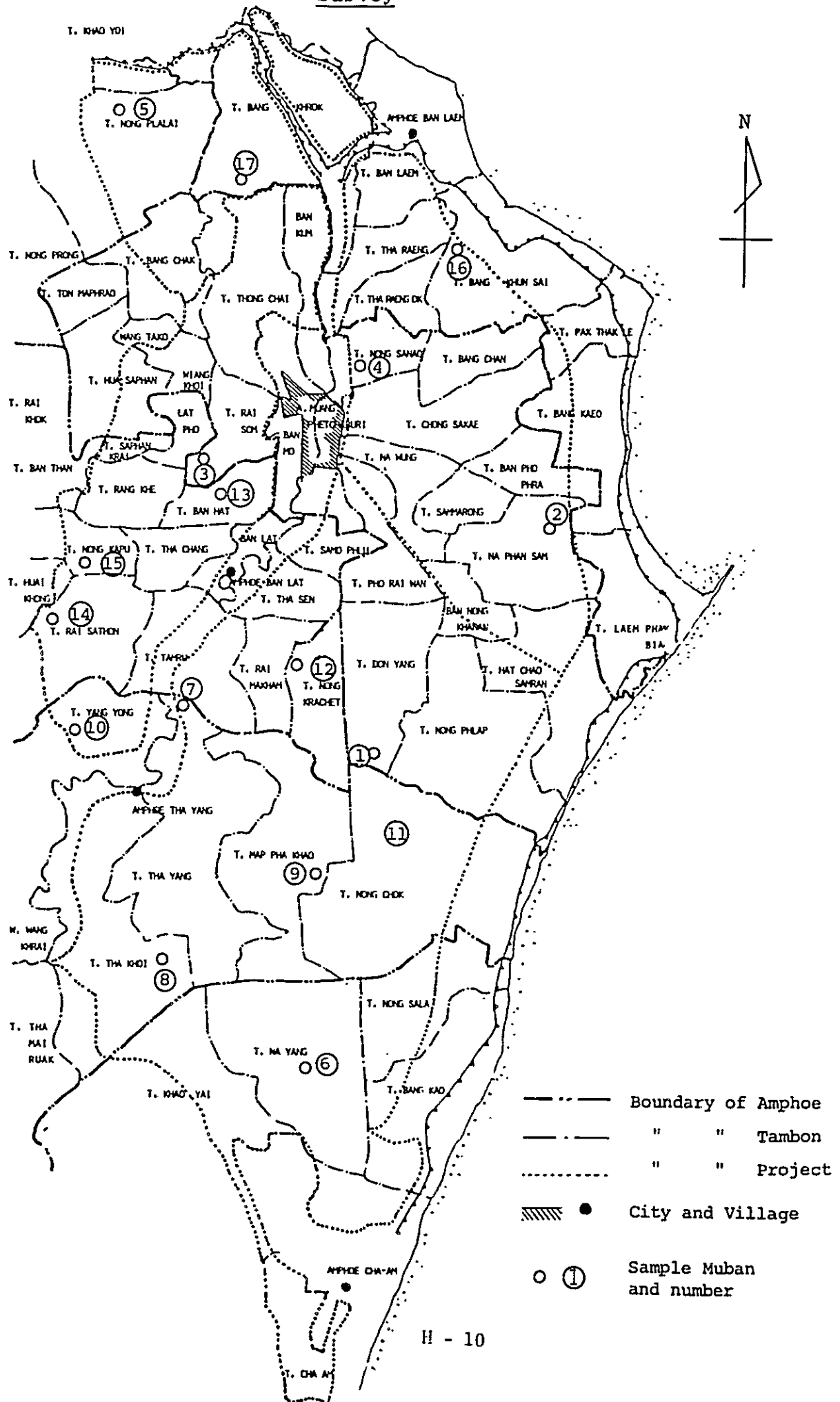


Table II-1 List of Sample Muban and Number of Sample Farm for Farm Management Survey

<u>Amphoe</u>	<u>Tambon</u>	<u>Sample Muban</u>	<u>Number of sample of farm</u>
1. Muang	1. Don Yang	1. Nong Bo	35
	2. Na Phan Sam	2. Bang Phrom	21
	3. Rai Som	3. Hua Non	11
	4. Nong Sano	4. Nong Sano	13
2. Khao Yoi	1. Nong Pla Lai	5. Kao Samo Rabang	10
3. Cha-am	1. Na-Yang	6. Na-Yang	15
4. Tha Yang	1. Tha Yang	7. Sai Khan	12
	2. Tha Khoi	8. Sa Phra	11
	3. Map Pla Khao	9. Nai Dong	27
	4. Yang Yong	10. Nong Nam Thai	15
	5. Nong chok	11. Nong Tao Pun	20
5. Ban Lat	1. Nong Krachet	12. Rai Phum	10
	2. Ban Hat	13. Chang Kae (Rai Nong)	32
	3. Rai Sathon	14. Rai Sathon	22
	4. Nong Kapu	15. Ban Rai Khae	16
6. Ban Laem	1. Ban Khun Sai	16. Pa Khat	18
	2. Bang Khrok	17. Thung Fua	12
<u>Total</u>			<u>300</u>

Table H-2 Number of Families by Age and Sex

(UNITE: PERSONS)

AGE	TOTAL PERSONS		SEX		AGE	TOTAL PERSONS		SEX		STUDENT	
	MALE	FEMALE	MALE	FEMALE		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
< 10	335	176	159	47	60	47	18	9	9	0	0
10	49	23	26	25	23	25	13	7	6	0	0
11	39	15	24	23	14	23	20	9	11	0	0
12	60	31	29	22	28	22	25	12	13	0	0
13	51	23	28	17	16	17	16	6	10	0	0
14	43	27	16	6	12	6	18	6	12	0	0
15	47	23	24	8	7	8	15	10	5	0	0
16	53	22	31	10	8	10	19	7	12	0	0
17	52	30	22	4	3	4	24	11	13	0	0
18	57	27	30	4	10	4	49	8	5	0	0
19	44	23	21	1	3	1	13	9	14	0	0
20	42	15	27	5	2	5	23	4	3	0	0
21	33	18	15	1	1	1	7	4	3	0	0
22	34	7	27	0	0	0	21	7	14	0	0
23	32	16	16	0	0	0	16	5	11	0	0
24	24	7	17	0	0	0	12	7	5	0	0
25	28	17	11	0	1	0	18	11	7	0	0
26	18	7	11	0	0	0	12	4	8	0	0
27	20	12	8	0	0	0	13	5	8	0	0
28	17	5	12	0	0	0	17	9	8	0	0
29	9	5	4	0	0	0	10	7	3	0	0
30	26	13	13	0	0	0	19	10	9	0	0
31	18	7	11	0	0	0	2	1	1	0	0
32	17	10	7	0	0	0	3	2	1	0	0
33	22	12	10	0	0	0	9	5	4	0	0
34	18	5	13	0	0	0	7	4	3	0	0
35	18	10	8	0	1	0	10	1	9	0	0
36	15	10	5	0	0	0	3	2	1	0	0
37	15	8	7	0	0	0	4	3	1	0	0
38	20	6	14	0	0	0	3	2	1	0	0
39	11	6	5	0	0	0	2	0	2	0	0
							50	29	21	0	0
TOTAL	1709	832	877	189	173						

Table H-3 Number of Farm Households by Family Size

SAMPLE MUBAN	FAMILY SIZE											TOTAL PERSONS		TOTAL FARM P / H
	1	2	3	4	5	6	7	8	9	10	11	12	13	
1. NONG BO	0	0	5	6	6	6	3	2	5	1	1	208	35	5.9
2. BANG PHROM	0	0	1	5	5	5	2	1	2	0	0	118	21	5.6
3. HUA NON	0	0	0	3	1	4	1	1	0	1	0	66	11	6.0
4. NONG SANG	0	0	0	2	2	5	4	0	0	0	0	76	13	5.8
5. KAO SAMO RABANG	0	0	3	1	2	0	2	1	0	1	0	55	10	5.5
6. NA-YANG	0	2	3	1	4	4	0	0	0	1	0	71	15	4.7
7. SAI KHAN	0	0	0	3	3	1	4	1	0	0	0	69	12	5.8
8. SA PHRA	0	0	1	3	4	0	2	1	0	0	0	57	11	5.2
9. NAI DONG	0	1	2	4	3	5	2	2	5	2	1	175	27	6.5
10. NONG NAM THAI	0	0	2	1	3	4	1	3	0	0	1	91	15	6.1
11. NONG TAO PUN	0	0	5	3	3	4	2	1	1	0	1	108	20	5.4
12. RAI PHUM	0	0	1	2	4	2	0	1	0	0	0	51	10	5.1
13. CHANG KAE	0	2	2	5	7	7	4	4	0	1	0	177	32	5.5
14. RAI SATHON	0	1	4	5	5	3	0	2	1	1	0	112	22	5.1
15. BAN RAI KHAE	0	0	1	5	2	5	0	2	0	0	1	91	16	5.7
16. PA KHAT	1	0	2	3	3	2	2	3	0	1	1	106	18	5.9
17. THUNG FUA	0	0	0	2	2	3	2	1	1	0	1	78	12	6.5
TOTAL	1	6	32	54	59	60	31	26	15	9	7	1709	300	5.7

Table H-4 Working Days by Age Group and Sex (Own Farm)

AGE GROUP	ITEM	PERSONS BY SEX	PERSONS MARKED	TOTAL DAYS	DAYS PER PERSON	(MAN-DAYS)										
						1-10	11-30	31-60	61-100	101-150	151-200	201-250	251-300	300-365		
10-14	TOTAL	242	35	1969	56	3	10	10	7	3	1	1	0	0		
	MALE	119	19	788	41	3	7	4	3	0	1	1	0	0		
	FEMALE	123	16	1181	73	0	3	6	4	3	0	0	0	0		
15-19	TOTAL	253	195	19879	101	6	24	41	46	41	27	6	2	2		
	MALE	125	96	9721	101	2	15	18	20	23	14	2	2	0		
	FEMALE	128	99	10158	102	4	9	23	26	18	13	4	0	2		
20-24	TOTAL	165	160	21976	137	4	10	16	38	27	35	16	11	3		
	MALE	63	69	9608	139	2	3	8	20	8	13	6	8	1		
	FEMALE	102	91	12368	136	2	7	8	18	19	22	10	3	2		
25-29	TOTAL	92	96	16121	167	0	2	10	19	15	17	17	12	4		
	MALE	46	42	7791	185	0	0	4	7	4	8	9	8	2		
	FEMALE	46	54	8330	154	0	2	6	12	11	9	8	4	2		
30-34	TOTAL	101	89	14659	164	2	4	6	13	17	21	15	9	2		
	MALE	47	46	8312	180	1	2	2	3	11	9	11	5	2		
	FEMALE	54	43	6347	147	1	2	4	10	6	12	4	4	0		
35-39	TOTAL	79	80	11629	145	2	3	11	12	13	23	10	4	2		
	MALE	40	36	5525	153	0	1	7	3	6	10	5	3	1		
	FEMALE	39	44	6104	138	2	2	4	9	7	13	5	1	1		
40-44	TOTAL	92	85	13638	160	1	2	12	13	10	24	14	8	1		
	MALE	43	42	7403	176	1	0	6	4	2	14	8	6	1		
	FEMALE	49	43	6235	145	0	2	6	9	8	10	6	2	0		
45-49	TOTAL	89	87	14515	166	0	4	7	13	14	19	21	5	4		
	MALE	42	40	7033	175	0	2	2	6	5	9	11	3	2		
	FEMALE	47	47	7482	159	0	2	5	7	9	10	10	2	2		
50-54	TOTAL	79	75	9588	127	1	6	10	14	18	13	9	4	0		
	MALE	32	33	5070	153	0	1	4	2	10	8	4	4	0		
	FEMALE	47	42	4518	107	1	5	6	12	8	5	5	0	0		
55-59	TOTAL	70	63	8696	138	0	4	7	10	20	13	5	3	1		
	MALE	40	39	5471	140	0	2	4	7	11	9	4	1	1		
	FEMALE	30	24	3225	134	0	2	3	3	9	4	1	2	0		
60-64	TOTAL	40	32	4529	141	0	3	4	5	9	4	4	2	1		
	MALE	22	21	2989	142	0	2	3	4	4	3	2	2	1		
	FEMALE	18	11	1540	140	0	1	1	1	5	1	2	0	0		
65-69	TOTAL	22	12	2325	193	0	0	3	3	3	2	0	1	0		
	MALE	8	9	1230	136	0	0	2	2	2	2	0	1	0		
	FEMALE	14	3	1095	365	0	0	1	1	1	0	0	0	0		
[TOTAL]	TOTAL	1324	1009	139544	138	19	72	137	193	190	199	118	61	20		
	MALE	627	492	70941	144	9	35	64	81	86	100	63	43	11		
	FEMALE	697	517	68603	132	10	37	73	112	104	99	55	18	9		

Table H-5 Working Days by Age Group and Sex (Other Farm)

AGE GROUP	ITEM	PERSONS BY SEX	PERSONS WORKED	TOTAL DAYS	DAYS PER PERSON	(MAN-DAYS)										
						1-10	11-30	31-60	61-100	101-150	151-200	201-250	251-300	300-365		
10-14	TOTAL	242	4	235	58	0	1	2	1	0	0	0	0	0	0	0
	MALE	119	3	205	68	0	0	2	1	0	0	0	0	0	0	0
	FEMALE	123	1	30	30	0	1	0	0	0	0	0	0	0	0	0
15-19	TOTAL	253	41	2389	58	7	8	15	6	4	0	0	0	0	0	1
	MALE	125	18	1193	66	2	5	7	1	2	0	0	0	0	0	1
	FEMALE	128	23	1196	52	5	3	8	5	2	0	0	0	0	0	0
20-24	TOTAL	165	44	2478	56	6	10	15	8	5	0	0	0	0	0	0
	MALE	63	16	1093	68	1	4	4	3	4	0	0	0	0	0	0
	FEMALE	102	28	1385	49	5	6	11	5	1	0	0	0	0	0	0
25-29	TOTAL	92	23	1587	69	5	5	7	2	4	0	0	0	0	0	0
	MALE	46	13	697	53	3	2	4	2	2	0	0	0	0	0	0
	FEMALE	46	10	890	89	2	3	3	0	2	0	0	0	0	0	0
30-34	TOTAL	101	20	1005	50	0	10	5	3	2	0	0	0	0	0	0
	MALE	47	10	430	43	0	6	2	1	1	0	0	0	0	0	0
	FEMALE	54	10	575	57	0	4	3	2	1	0	0	0	0	0	0
35-39	TOTAL	79	22	1177	53	4	7	5	2	3	1	0	0	0	0	0
	MALE	40	11	575	52	1	5	2	1	2	0	0	0	0	0	0
	FEMALE	39	11	602	54	3	2	3	1	1	1	0	0	0	0	0
40-44	TOTAL	92	16	1058	66	1	6	3	1	5	0	0	0	0	0	0
	MALE	43	8	635	79	1	1	2	1	3	0	0	0	0	0	0
	FEMALE	49	8	423	52	0	5	1	0	2	0	0	0	0	0	0
45-49	TOTAL	89	16	1952	122	1	3	6	4	1	1	0	0	0	0	0
	MALE	42	8	1563	195	0	2	2	2	1	1	0	0	0	0	0
	FEMALE	47	8	389	48	1	1	4	2	0	0	0	0	0	0	0
50-54	TOTAL	79	6	285	47	1	2	1	2	0	0	0	0	0	0	0
	MALE	32	3	139	46	1	0	1	1	0	0	0	0	0	0	0
	FEMALE	47	3	146	48	0	2	0	1	0	0	0	0	0	0	0
55-59	TOTAL	70	7	275	39	2	2	1	2	0	0	0	0	0	0	0
	MALE	40	6	255	42	2	1	1	2	0	0	0	0	0	0	0
	FEMALE	30	1	20	20	0	1	0	0	0	0	0	0	0	0	0
60-64	TOTAL	40	3	175	58	0	1	1	1	0	0	0	0	0	0	0
	MALE	22	2	75	37	0	1	1	0	0	0	0	0	0	0	0
	FEMALE	18	1	100	100	0	0	0	1	0	0	0	0	0	0	0
65-69	TOTAL	22	1	20	20	0	1	0	0	0	0	0	0	0	0	0
	MALE	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	FEMALE	14	1	20	20	0	1	0	0	0	0	0	0	0	0	0
[TOTAL]	TOTAL	1324	203	12636	62	27	56	61	32	24	2	0	0	0	1	0
	MALE	627	98	6860	70	11	27	28	15	15	1	0	0	0	1	0
	FEMALE	697	105	5776	55	16	29	33	17	9	1	0	0	0	0	0

Table H-6 Working Days by Age Group and Sex (Off-farm),

AGE GROUP	ITEM	PERSONS WORKED		TOTAL DAYS	DAYS PER PERSON	(MAN-DAYS)											
		PERSONS	PERSONS			1-	10	11-30	31-60	61-100	101-150	151-200	201-250	251-300	300-365		
10-14	TOTAL	242	2	85	42	0	1	1	0	0	0	0	0	0	0	0	0
	MALE	119	2	85	42	0	1	1	0	0	0	0	0	0	0	0	0
	FEMALE	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-19	TOTAL	253	52	8086	155	2	7	9	5	8	4	5	4	5	4	8	8
	MALE	125	25	3573	142	2	3	5	2	5	1	2	1	2	1	4	4
	FEMALE	128	27	4513	167	0	4	4	3	3	3	3	3	3	3	4	4
20-24	TOTAL	165	60	10954	182	1	9	5	4	12	3	5	6	15	15	15	15
	MALE	63	25	4457	178	1	4	2	0	6	2	1	2	7	7	7	7
	FEMALE	102	35	6497	185	0	5	3	4	6	1	4	8	8	8	8	8
25-29	TOTAL	92	35	5319	151	0	8	2	7	4	3	2	5	4	4	4	4
	MALE	46	18	3093	171	0	3	1	5	1	1	0	4	3	3	3	3
	FEMALE	46	17	2226	130	0	5	1	2	3	2	2	1	1	1	1	1
30-34	TOTAL	101	27	3069	113	0	7	5	6	2	2	2	2	1	2	2	2
	MALE	47	16	1792	112	0	2	4	5	1	2	1	0	1	0	1	1
	FEMALE	54	11	1277	116	0	5	1	1	1	0	1	1	1	1	1	1
35-39	TOTAL	79	33	4668	141	0	5	3	7	7	3	1	4	3	3	3	3
	MALE	40	19	2770	145	0	2	2	3	5	3	1	1	1	1	1	1
	FEMALE	39	14	1898	135	0	3	1	4	2	0	0	0	0	0	0	0
40-44	TOTAL	92	35	3141	89	0	6	8	9	8	4	0	0	0	0	0	0
	MALE	43	22	2021	91	0	4	3	7	6	2	0	0	0	0	0	0
	FEMALE	49	13	1120	86	0	2	5	2	2	2	0	0	0	0	0	0
45-49	TOTAL	89	25	3196	127	0	5	6	5	2	3	2	2	2	2	2	2
	MALE	42	17	1821	107	0	5	2	3	2	3	1	1	1	1	1	1
	FEMALE	47	8	1375	171	0	0	4	2	0	0	0	0	0	0	0	0
50-54	TOTAL	79	20	3310	165	0	2	4	2	4	3	3	1	1	1	1	1
	MALE	32	11	2005	182	0	1	3	1	1	1	1	3	1	1	1	1
	FEMALE	47	9	1305	145	0	1	1	1	3	2	0	0	0	0	0	0
55-59	TOTAL	70	15	1726	115	0	3	2	5	2	0	1	1	1	1	1	1
	MALE	40	11	1121	101	0	2	2	4	1	0	1	1	1	1	1	1
	FEMALE	30	4	605	151	0	1	0	1	1	0	0	0	0	0	0	0
60-64	TOTAL	40	7	1599	228	0	0	1	0	0	2	1	1	2	2	2	2
	MALE	22	4	793	198	0	0	1	0	0	1	1	1	1	1	1	1
	FEMALE	18	3	806	268	0	0	0	0	0	1	0	0	0	0	0	0
65-69	TOTAL	22	0	600	600	0	0	0	0	0	0	0	0	0	0	0	0
	MALE	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	FEMALE	14	0	600	600	0	0	0	0	0	0	0	0	0	0	0	0
[TOTAL]	TOTAL	1324	311	45753	147	3	53	46	50	49	27	22	25	36	36	36	36
	MALE	627	170	23531	156	3	27	26	30	28	16	11	11	18	18	18	18
	FEMALE	697	141	22222	157	0	26	20	20	21	11	14	18	18	18	18	18

Table H-7 Number of Farm Households by Farm Type

SAMPLE MUBAN	TOTAL FARM		FULL TIME FARM		PART TIME FARM		WORKED OTHER FARM		FROM OTHER REGURER		NON-FARM INCOME (BAHT/FARM)		FROM OTHER INDUSTRY		TOTAL	
	FARM	FARM	FARM	FARM	TOTAL	OTHER FARM	OTHER FARM	REGURER	TEMPORARY	REGURER	TEMPORARY	REGURER	TEMPORARY	REGURER	TEMPORARY	BAHT
1. NONG BO	35	8	27	12	206	310	2652	1139	4307							
2. BANG PHROM	21	2	19	1	0	352	6869	5645	12866							
3. HUA NON	11	4	7	1	2491	3444	9806	4309	20050							
4. NONG SANG	13	0	13	0	0	612	8497	4046	13155							
5. KAO SAMO RABANG	10	2	8	2	1190	1690	4715	2700	10295							
6. NA-YANG	15	4	11	1	0	47	5927	2299	8273							
7. SAI KHAN	12	4	8	3	1828	3199	6149	175	11351							
8. SA PHRA	11	4	7	4	0	1716	3516	1782	7014							
9. NAI DONG	27	8	19	4	955	2739	3139	1493	8326							
10. NONG NAM THAI	15	9	6	3	260	40	4512	80	4892							
11. NONG TAO PUN	20	3	17	12	1410	1794	135	760	4099							
12. RAI PHUM	10	7	3	1	0	210	626	1710	2546							
13. CHANG KAE	32	4	28	1	0	309	5338	998	6645							
14. RAI SATHON	22	10	12	1	0	255	3061	1272	4588							
15. BAN RAI KHAE	16	8	8	3	0	772	2628	2112	5512							
16. PA KHAT	18	0	18	1	250	494	9653	2817	13214							
17. THUNG FUA	12	5	7	2	450	542	2500	1492	4984							
[T O T A L]	300	82	218	52	454	982	4563	1926	7925							

Table H-8 Land Holding and Land Tenure

SAMPLE MUBAN	LAND ITEM	(UNIT: HA)				TOTAL
		PADDY FIELD	UPLAND FIELD	ORCHARD & TREE CROP	PASTURE LAND	
1. NONG BO	1. OWN LAND	23.0	0.0	13.3	0.0	36.3
	2. RENTED LAND	18.9	0.0	4.8	0.0	23.7
	3. LEASED LAND	1.9	0.0	0.0	0.0	1.9
	TOTAL (1+2+3)	40.0	0.0	18.1	0.0	58.1
2. BANQ PHROM	1. OWN LAND	48.8	0.0	0.0	0.0	48.8
	2. RENTED LAND	70.9	0.0	0.0	0.0	70.9
	3. LEASED LAND	5.1	0.0	0.0	0.0	5.1
	TOTAL (1+2+3)	114.6	0.0	0.0	0.0	114.6
3. HUA NON	1. OWN LAND	23.8	0.1	0.2	0.5	24.6
	2. RENTED LAND	83.9	0.0	0.0	0.0	83.9
	3. LEASED LAND	0.0	0.0	0.0	0.0	0.0
	TOTAL (1+2+3)	107.6	0.1	0.2	0.5	108.4
4. NONG BANQ	1. OWN LAND	31.6	0.3	80.1	0.2	112.1
	2. RENTED LAND	17.6	0.0	0.0	0.2	17.8
	3. LEASED LAND	0.0	0.0	0.0	0.0	0.0
	TOTAL (1+2+3)	49.2	0.3	80.1	0.4	130.0
5. KAO BANQ KASANO	1. OWN LAND	7.9	0.0	39.2	0.0	47.1
	2. RENTED LAND	11.8	0.0	0.0	0.0	11.8
	3. LEASED LAND	0.0	0.0	0.0	0.0	0.0
	TOTAL (1+2+3)	19.7	0.0	39.2	0.0	58.9
6. NA-YANG	1. OWN LAND	55.4	2.8	7.2	0.0	65.4
	2. RENTED LAND	18.1	0.0	0.8	0.0	18.9
	3. LEASED LAND	2.2	2.7	0.0	0.0	5.0
	TOTAL (1+2+3)	71.4	0.1	8.0	0.0	79.5
7. BAI KHAN	1. OWN LAND	11.4	8.7	5.0	0.0	25.2
	2. RENTED LAND	4.2	0.0	0.3	0.2	4.4
	3. LEASED LAND	2.7	0.0	0.0	0.0	2.7
	TOTAL (1+2+3)	12.8	8.7	5.4	0.2	27.1
8. BA PHRA	1. OWN LAND	27.5	3.8	6.7	0.0	38.0
	2. RENTED LAND	10.7	0.0	0.0	0.0	10.7
	3. LEASED LAND	2.0	0.0	0.0	0.0	2.0
	TOTAL (1+2+3)	36.2	3.8	6.7	0.0	46.8
9. NAI DOND	1. OWN LAND	49.2	3.5	9.8	0.0	62.5
	2. RENTED LAND	36.0	0.0	0.6	0.0	36.6
	3. LEASED LAND	1.8	1.0	0.0	0.0	2.7
	TOTAL (1+2+3)	83.5	2.5	10.4	0.0	96.4
10. NONG NAM THAI	1. OWN LAND	41.2	6.1	13.5	0.0	60.8
	2. RENTED LAND	4.8	0.2	0.2	0.0	5.1
	3. LEASED LAND	6.8	0.0	0.0	0.0	6.8
	TOTAL (1+2+3)	39.2	6.3	13.7	0.0	59.2
11. NONG TAO PUN	1. OWN LAND	30.9	2.7	7.0	0.3	40.9
	2. RENTED LAND	9.4	0.2	0.1	0.0	9.7
	3. LEASED LAND	8.2	0.0	0.4	0.0	8.6
	TOTAL (1+2+3)	37.2	2.8	4.8	0.3	42.1
12. RAI PHUM	1. OWN LAND	20.4	0.0	5.5	0.0	25.9
	2. RENTED LAND	8.2	0.0	0.0	0.0	8.2
	3. LEASED LAND	2.8	0.0	0.0	0.0	2.8
	TOTAL (1+2+3)	25.8	0.0	5.5	0.0	31.2
13. CHANG KAE	1. OWN LAND	42.0	0.7	6.4	0.0	49.1
	2. RENTED LAND	54.3	0.0	0.0	0.0	54.3
	3. LEASED LAND	11.8	0.0	0.0	0.0	11.8
	TOTAL (1+2+3)	104.6	0.7	6.4	0.0	111.7
14. RAI BATHON	1. OWN LAND	38.3	0.0	5.2	0.0	43.5
	2. RENTED LAND	12.4	0.0	0.0	0.0	12.4
	3. LEASED LAND	0.0	0.0	0.0	0.0	0.0
	TOTAL (1+2+3)	31.0	0.0	5.2	0.0	36.1
15. BAN RAI KHAE	1. OWN LAND	24.7	1.4	2.2	0.0	28.4
	2. RENTED LAND	8.2	0.8	0.0	0.0	9.0
	3. LEASED LAND	4.1	0.0	0.0	0.0	4.1
	TOTAL (1+2+3)	28.8	2.2	2.2	0.0	33.2
16. PA KHAT	1. OWN LAND	6.3	0.0	1.9	0.0	8.2
	2. RENTED LAND	60.0	0.1	0.0	0.0	60.1
	3. LEASED LAND	3.2	0.0	0.0	0.0	3.2
	TOTAL (1+2+3)	63.1	0.1	1.9	0.0	65.1
17. THUNG FUA	1. OWN LAND	38.8	0.0	5.2	0.0	44.1
	2. RENTED LAND	28.8	0.0	0.0	0.0	28.8
	3. LEASED LAND	6.0	0.0	0.0	0.0	6.0
	TOTAL (1+2+3)	59.6	0.0	5.2	0.0	64.9
[TOTAL]	1. OWN LAND	561.4	30.2	208.6	1.0	781.1
	2. RENTED LAND	458.2	1.2	6.9	0.4	466.7
	3. LEASED LAND	60.6	3.7	0.4	0.0	64.7
	TOTAL (1+2+3)	939.0	27.7	215.0	1.4	1183.1
[AVERAGE]	1. OWN LAND	1.8	0.1	0.7	0.0	2.4
	2. RENTED LAND	1.5	0.0	0.0	0.0	1.6
	3. LEASED LAND	0.2	0.0	0.0	0.0	0.2
	TOTAL (1+2+3)	3.1	0.1	0.7	0.0	3.9

Table H-9 Distribution of Land Holding

LAND SIZE (HA)	(UNIT HOUSEHOLDS)				TOTAL
	PADDY FIELD	UPLAND FIELD	ORCHARD & TREE CROP	PASTURE FARM LAND	
1. UNDER 0.49	12	39	76	3	9
2. 0.5 - 0.99	28	10	43	1	27
3. 1.0 - 1.49	22	5	14	0	21
4. 1.5 - 1.99	27	3	11	0	22
5. 2.0 - 2.49	27	0	2	0	26
6. 2.5 - 2.99	24	0	1	0	24
7. 3.0 - 3.49	31	1	1	0	27
8. 3.5 - 3.99	19	0	1	0	28
9. 4.0 - 4.49	15	0	0	0	18
10. 4.5 - 4.99	21	0	0	0	21
11. 5.0 - 5.49	8	0	1	0	11
12. 5.5 - 5.99	10	0	0	0	11
13. 6.0 - 6.49	7	0	0	0	10
14. 6.5 - 6.99	9	0	1	0	10
15. 7.0 - 7.49	1	0	0	0	3
16. 7.5 - 7.99	7	0	0	0	7
17. 8.0 - 8.49	6	0	1	0	6
18. 8.5 - 8.99	2	0	0	0	4
19. 9.0 - 9.49	3	0	0	0	1
20. 9.5 - 9.99	2	0	0	0	4
21. 10.0 - 10.49	1	0	0	0	3
22. 10.5 - 10.99	1	0	0	0	0
23. 11.0 - 11.49	1	0	1	0	2
24. 11.5 - 11.99	0	0	1	0	0
25. 12.0 - 12.49	0	0	0	0	1
26. 12.5 - 12.99	0	0	0	0	1
27. 13.0 - 13.49	0	0	0	0	0
28. 13.5 - 13.99	0	0	0	0	1
29. 14.0 - 14.49	0	0	0	0	0
30. 14.5 - 14.99	0	0	0	0	0
31. 15. AND OVER	1	0	1	0	2
[T O T A L]	285	52	155	4	300

Table H-10 Number of Farm Households by Land Tenure

SAMPLE MUBAN	OWNER FARM	(UNIT: HOUSEHOLDS)		
		PARTIAL TENANT F.	PURE TENANT F.	TOTAL
1. NONG BO	22	13	0	35
2. BANG PHROM	6	8	7	21
3. HUA NON	6	5	0	11
4. NONG SAND	4	7	2	13
5. KAO SAMO RABANG	4	6	0	10
6. NA-YANG	7	8	0	15
7. SAI KHAN	8	4	0	12
8. SA PHRA	7	4	0	11
9. NAI DONG	11	15	1	27
10. NONG NAM THAI	9	6	0	15
11. NONG TAO PUN	16	4	0	20
12. RAI PHUM	5	5	0	10
13. CHANG KAE	8	22	2	32
14. RAI SATHON	11	11	0	22
15. BAN RAI KHAE	5	11	0	16
16. PA KHAT	1	6	11	18
17. THUNG FUA	5	6	1	12
(T O T A L)	135	141	24	300

Table H-11 Distribution of Owner Farmer by Farm Size

LAND SIZE (HA)	PADDY FIELD	UPLAND FIELD	(UNIT: HOUSEHOLDS)		
			ORCHARD & TREE CROP	PASTURE FARM LAND	TOTAL
1. UNDER 0.49	10	16	32	1	6
2. 0.5 - 0.99	22	7	26	1	23
3. 1.0 - 1.49	15	4	10	0	18
4. 1.5 - 1.99	15	2	6	0	14
5. 2.0 - 2.49	8	0	1	0	10
6. 2.5 - 2.99	10	0	1	0	8
7. 3.0 - 3.49	13	0	1	0	13
8. 3.5 - 3.99	3	0	1	0	9
9. 4.0 - 4.49	6	0	0	0	5
10. 4.5 - 4.99	4	0	0	0	6
11. 5.0 - 5.49	1	0	1	0	4
12. 5.5 - 5.99	4	0	0	0	3
13. 6.0 - 6.49	2	0	0	0	4
14. 6.5 - 6.99	2	0	0	0	3
15. 7.0 - 7.49	1	0	0	0	2
16. 7.5 - 7.99	2	0	0	0	1
17. 8.0 - 8.49	0	0	0	0	0
18. 8.5 - 8.99	0	0	0	0	2
19. 9.0 - 9.49	1	0	0	0	0
20. 9.5 - 9.99	0	0	0	0	1
21. 10.0 - 10.49	0	0	0	0	0
22. 10.5 - 10.99	1	0	0	0	0
23. 11.0 - 11.49	1	0	0	0	1
24. 11.5 - 11.99	0	0	1	0	0
25. 12.0 - 12.49	0	0	0	0	1
26. 12.5 - 12.99	0	0	0	0	0
27. 13.0 - 13.49	0	0	0	0	0
28. 13.5 - 13.99	0	0	0	0	1
29. 14.0 - 14.49	0	0	0	0	0
30. 14.5 - 14.99	0	0	0	0	0
31. 15. AND OVER	0	0	0	0	0
(T O T A L)	121	29	80	2	135

Table H-12 Distribution of Partial Tenant Farmer by Farm Size

LAND SIZE (HA)	(UNIT: HOUSEHOLDS)				TOTAL
	PADDY FIELD	UPLAND FIELD	ORCHARD & TREE CROP	PASTURE FARM LAND	
1. UNDER 0.49	2	22	44	2	3
2. 0.5 - 0.99	4	3	17	0	2
3. 1.0 - 1.49	7	1	4	0	3
4. 1.5 - 1.99	10	1	5	0	6
5. 2.0 - 2.49	14	0	1	0	11
6. 2.5 - 2.99	13	0	0	0	15
7. 3.0 - 3.49	18	1	0	0	14
8. 3.5 - 3.99	13	0	0	0	16
9. 4.0 - 4.49	9	0	0	0	13
10. 4.5 - 4.99	12	0	0	0	10
11. 5.0 - 5.49	7	0	0	0	7
12. 5.5 - 5.99	5	0	0	0	7
13. 6.0 - 6.49	5	0	0	0	6
14. 6.5 - 6.99	4	0	1	0	4
15. 7.0 - 7.49	0	0	0	0	1
16. 7.5 - 7.99	4	0	0	0	5
17. 8.0 - 8.49	6	0	1	0	6
18. 8.5 - 8.99	1	0	0	0	1
19. 9.0 - 9.49	2	0	0	0	1
20. 9.5 - 9.99	2	0	0	0	3
21. 10.0 - 10.49	1	0	0	0	3
22. 10.5 - 10.99	0	0	0	0	0
23. 11.0 - 11.49	0	0	1	0	1
24. 11.5 - 11.99	0	0	0	0	0
25. 12.0 - 12.49	0	0	0	0	0
26. 12.5 - 12.99	0	0	0	0	1
27. 13.0 - 13.49	0	0	0	0	0
28. 13.5 - 13.99	0	0	0	0	0
29. 14.0 - 14.49	0	0	0	0	0
30. 14.5 - 14.99	0	0	0	0	0
31. 15. AND OVER	1	0	1	0	2
[T O T A L]	140	28	75	2	141

Table H-13 Distribution of Pure Tenant Farmer by Farm Size

LAND SIZE (HA)	(UNIT: HOUSEHOLDS)				TOTAL
	PADDY FIELD	UPLAND FIELD	ORCHARD & TREE CROP	PASTURE FARM LAND	
1. UNDER 0.49	0	1	0	0	0
2. 0.5 - 0.99	2	0	0	0	2
3. 1.0 - 1.49	0	0	0	0	0
4. 1.5 - 1.99	2	0	0	0	2
5. 2.0 - 2.49	5	0	0	0	5
6. 2.5 - 2.99	1	0	0	0	1
7. 3.0 - 3.49	0	0	0	0	0
8. 3.5 - 3.99	3	0	0	0	3
9. 4.0 - 4.49	0	0	0	0	0
10. 4.5 - 4.99	5	0	0	0	5
11. 5.0 - 5.49	0	0	0	0	0
12. 5.5 - 5.99	1	0	0	0	1
13. 6.0 - 6.49	0	0	0	0	0
14. 6.5 - 6.99	3	0	0	0	3
15. 7.0 - 7.49	0	0	0	0	0
16. 7.5 - 7.99	1	0	0	0	1
17. 8.0 - 8.49	0	0	0	0	0
18. 8.5 - 8.99	1	0	0	0	1
19. 9.0 - 9.49	0	0	0	0	0
20. 9.5 - 9.99	0	0	0	0	0
21. 10.0 - 10.49	0	0	0	0	0
22. 10.5 - 10.99	0	0	0	0	0
23. 11.0 - 11.49	0	0	0	0	0
24. 11.5 - 11.99	0	0	0	0	0
25. 12.0 - 12.49	0	0	0	0	0
26. 12.5 - 12.99	0	0	0	0	0
27. 13.0 - 13.49	0	0	0	0	0
28. 13.5 - 13.99	0	0	0	0	0
29. 14.0 - 14.49	0	0	0	0	0
30. 14.5 - 14.99	0	0	0	0	0
31. 15. AND OVER	0	0	0	0	0
[T O T A L]	24	1	0	0	24

Table H-14 Fragmentation of Farm Land

SAMPLE_MUBAN	NUMBER OF PARCELS											(UNIT: HOUSEHOLDS)		
	1	2	3	4	5	6	7	8	9	10	11	TOTAL PARCELS FARM	TOTAL P	
1. NONG BO	4	14	5	7	3	0	1	0	0	0	1	108	35	3.1
2. BANG PHROM	6	3	4	5	3	0	0	0	0	0	0	59	21	2.8
3. HUA NON	1	1	3	2	1	0	2	1	0	0	0	47	11	4.3
4. NONG SANG	5	3	0	1	3	1	0	0	0	0	0	36	13	2.8
5. KAO SAMO RABANG	0	3	1	3	2	1	0	0	0	0	0	37	10	3.7
6. NA-YANG	2	3	2	2	2	1	0	1	0	2	0	66	15	4.4
7. SAI KHAN	2	4	3	1	1	0	0	1	0	0	0	36	12	3.0
8. SA PHRA	2	0	4	2	3	0	0	0	0	0	0	37	11	3.4
9. NAI DONG	4	5	5	3	5	0	2	1	0	1	1	112	27	4.1
10. NONG NAM THAI	1	0	3	5	1	3	1	1	0	0	0	68	15	4.5
11. NONG TAO PUN	3	3	7	4	1	1	0	1	0	0	0	65	20	3.3
12. RAI PHUM	1	2	0	1	2	4	0	0	0	0	0	43	10	4.3
13. CHANG KAE	4	2	3	8	2	5	5	0	1	2	0	153	32	4.8
14. RAI SATHON	2	4	3	6	3	2	1	1	0	0	0	85	22	3.9
15. BAN RAI KHAE	0	4	4	4	2	1	0	0	0	1	0	62	16	3.9
16. PA KHAT	7	7	3	0	0	1	0	0	0	0	0	36	18	2.0
17. THUNG FUA	0	2	2	4	2	2	0	0	0	0	0	48	12	4.0
C T O T A L	44	60	52	58	36	22	12	7	1	6	2	1098	300	3.7

Table H-15 Distribution of Parcel by Land Size

SAMPLE MUBAN	LAND SIZE (HA)											(UNIT: PARCELS)				
	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	6.0-6.5	6.5-7.0	TOTAL PARCELS	TOTAL AREA (HA)	A/P (HA)
1. NONG BO	93	6	2	1	0	0	0	0	0	0	0	0	0	108	27.04	0.25
2. BANG PHROM	50	6	3	0	0	0	0	0	0	0	0	0	0	59	16.98	0.29
3. HUA NON	44	3	0	0	0	0	0	0	0	0	0	0	0	47	6.19	0.13
4. NONG SAND	34	0	2	0	0	0	0	0	0	0	0	0	0	36	7.20	0.20
5. KAO SAMO RABANG	35	1	0	0	1	0	0	0	0	0	0	0	0	37	8.26	0.22
6. NA-YANG	63	2	1	0	0	0	0	0	0	0	0	0	0	66	9.55	0.14
7. SAI KHAN	31	5	0	0	0	0	0	0	0	0	0	0	0	36	6.85	0.19
8. SA PHRA	31	3	0	2	1	0	0	0	0	0	0	0	0	37	11.95	0.32
9. NAI DONG	96	10	3	3	0	0	0	0	0	0	0	0	0	112	25.65	0.23
10. NONG NAM THAI	61	7	0	0	0	0	0	0	0	0	0	0	0	68	13.76	0.20
11. NONG TAO PUN	61	3	0	1	0	0	0	0	0	0	0	0	0	65	9.15	0.14
12. RAI PHUM	41	2	0	0	0	0	0	0	0	0	0	0	0	43	5.07	0.12
13. CHANG KAE	142	9	2	0	0	0	0	0	0	0	0	0	0	153	24.13	0.16
14. RAI SATHON	75	8	2	0	0	0	0	0	0	0	0	0	0	85	13.87	0.16
15. BAN RAI KHAE	59	1	1	0	1	0	0	0	0	0	0	0	0	62	10.43	0.17
16. PA KHAT	33	3	0	0	0	0	0	0	0	0	0	0	0	36	6.94	0.19
17. THUNG FUA	43	3	1	0	0	1	0	0	0	0	0	0	0	48	12.03	0.25
TOTAL	992	72	21	8	4	1	0	0	0	0	0	0	0	1098	215.05	0.20

Table H-16 Crop Production

CROPS	1978			1979			1980			AVERAGE YIELD 3 YEARS (AVERAGE)	
	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)		
1. Paddy, Wet, L.V.	875.69	810.25	1,797,454	895.72	846.71	1,980,029	913.96	863.61	1,993,614	2,181	2,149
2. Paddy, Wet, H.V.V.	1.60	1.20	3,130	2.40	2.32	8,280	3.84	3.57	11,790	3,070	2,959
3. Paddy, Dry, H.V.V.	75.12	72.69	223,535	106.63	100.63	313,070	8.88	8.88	27,550	3,102	2,964
4. Mungbean	18.32	17.04	11,147	18.48	18.48	13,374	6.21	11.33	7,788	628	618
5. String bean	1.49	0.85	6,050	1.74	1.74	10,785	3,936	1.22	6,462	3,801	3,927
6. Soy bean	0.24	0.24	2,000	0.24	0.24	1,825	7,604	1.20	5,550	4,625	5,580
7. Maize	0.80	0.77	10,429	13,036	0.56	9,128	16,300	0.48	13,352	20,863	16,455
8. Cucumber	1.49	1.49	17,883	12,002	3.26	34,585	10,609	3.33	27,482	8,253	9,895
9. Cabbage	-	-	-	0.32	0.32	3,750	11,719	1.12	17,950	16,027	15,069
10. Pumpkin	0.08	0.05	1,000	12,500	0.16	2,400	15,000	0.24	2,754	11,475	12,821
11. Pineapple	1.60	1.60	60,000	37,500	2.40	80,000	33,333	0.88	20,600	23,409	32,910
12. Banana (Namuwa)	9.70	8.26	51,465	5,308	12.75	56,542	4,435	15.60	66,465	4,261	4,585
13. Banana (Lady Finger)	7.54	7.25	54,383	7,213	11.76	77,964	6,630	17.04	93,258	5,473	6,208
14. Lime	17.79	8.90	288,747	16,231	21.84	319,335	14,622	27.42	291,485	10,630	13,416
15. Mango	2.90	2.61	13,769	4,748	2.82	14,787	5,243	3.06	15,140	4,948	4,977
16. Coconut	2.74	2.37	10,363	3,782	3.17	8,938	2,819	3.30	11,973	3,628	3,396
17. Sugar Palm (trees)	665.00	605.00	38,490	58	732.00	43,399	59	403.00	27,384	68	61

Source : Farm Management Survey in the Project Area, Dec. 1980

Table H-17 Yield and Production; Wet Season Paddy, Local Varieties

SAMPLE MURAN	1978			1979			1980			AVERAGE YIELD [AVERAGE]	NUMBER OF SAMPLE FARM
	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)	PLANT AREA (HA)	HARVEST AREA (HA)	PRODUC- TION (KG)		
1. NONG RO	109.38	98.61	236,250	108.34	100.02	258,740	110.74	103.25	253,600	2,279	35
2. BANG PIIRON	125.92	125.12	260,700	125.92	124.64	267,055	118.08	111.28	230,700	2,052	21
3. HUA NON	22.80	21.60	40,580	22.00	21.09	45,530	26.96	26.40	53,100	1,940	11
4. NONG SAND	50.00	46.93	87,100	50.32	49.97	103,840	51.52	48.21	101,550	1,926	13
5. KAO SAHO RABANG	17.60	13.28	26,400	17.60	13.04	26,550	19.68	16.40	33,400	1,573	9
6. NA-YANG	65.04	62.80	142,350	68.88	66.80	152,550	65.52	63.04	142,750	2,194	15
7. SAI KHAN	13.17	12.45	34,290	11.89	11.73	34,300	12.85	12.85	39,300	2,846	9
8. SA PHUA	39.22	37.25	106,450	33.41	36.02	97,400	39.22	37.62	102,000	2,735	9
9. NAI DONG	66.42	56.38	129,020	68.58	65.62	166,900	78.02	75.65	200,350	2,568	25
10. NONG NAM THAI	27.47	26.30	70,350	30.51	28.83	75,200	27.47	26.05	66,100	2,477	14
11. NONG TAO PUN	28.66	25.52	56,700	30.62	26.90	61,700	32.38	30.50	69,650	2,050	17
12. RAI PHUM	23.20	22.08	52,900	26.88	26.88	74,600	25.76	25.76	65,100	2,540	8
13. CHIANG KAF	91.54	86.66	168,050	100.90	96.82	220,050	102.02	97.70	217,400	2,056	32
14. RAI SATION	43.57	42.61	99,980	47.73	46.29	111,730	50.16	48.72	115,530	2,313	22
15. RAN RAI NIAP	25.62	25.14	60,700	28.94	27.98	69,700	29.90	26.74	69,100	2,362	16
16. PA NIAT	64.88	54.48	102,200	66.80	57.28	106,050	66.32	59.76	113,450	1,625	17
17. THUNG FUA	61.20	53.04	123,434	56.40	46.80	108,134	57.36	53.68	120,534	2,012	12
[T O T A L]	875.60	810.25	1,797,454	895.72	846.71	1,980,029	913.96	863.61	1,993,614	2,149	285

Source : Farm Management Survey in the Project Area, Dec. 1980.

Table H-18 Yield and Production; Dry Season Paddy, HVV

SAMPLE MUBAN	1978			1979			1980			AVERAGE YIELD [3 YEARS AVERAGE]	NUMBER OF SAMPLE FARM
	PLANT AREA (HA)	HARVEST AREA (HA)	YIELD (KG)(KG/HA)	PLANT AREA (HA)	HARVEST AREA (HA)	YIELD (KG)(KG/HA)	PLANT AREA (HA)	HARVEST AREA (HA)	YIELD (KG)(KG/HA)		
1. NONG BO	24.64	22.77	66,150 2,685	36.21	34.45	98,460 2,719	2.32	2.32	7,000 3,017	2,716	19
2. BANG PHROM	-	-	-	0.48	0.48	700 1,458	-	-	-	1,458	1
3. HUA NON	-	-	-	0.96	0.96	2,200 2,292	-	-	-	2,292	1
4. NONG SAND	-	-	-	-	-	-	-	-	-	-	-
5. KAO SAMO BABANG	-	-	-	-	-	-	-	-	-	-	-
6. NA-YANG	0.48	0.48	1,000 2,083	1.25	1.25	3,030 2,424	-	-	-	2,329	3
7. SAI KHIAN	0.48	0.48	1,700 3,542	0.48	0.48	2,040 4,250	1.28	1.28	3,500 2,934	3,232	2
8. SA PHRA	-	-	-	-	-	-	-	-	-	-	-
9. NAI DONG	10.48	10.24	31,950 3,049	11.92	11.36	39,850 3,343	-	-	-	3,205	11
10. NONG NAM THAI	0.48	0.48	2,000 4,167	1.28	1.28	4,260 3,281	-	-	-	3,523	2
11. NONG TAO PUN	8.96	8.64	26,600 2,969	10.48	10.16	35,700 3,406	2.24	2.24	8,300 3,705	3,256	14
12. RAI PHUM	-	-	-	-	-	-	-	-	-	-	-
13. CHIANG KAE	3.36	3.36	10,400 3,095	2.64	2.64	10,200 3,864	-	-	-	3,433	8
14. RAI SATHON	17.44	17.44	46,035 2,640	27.84	27.33	81,100 2,913	2.24	2.24	6,300 2,813	2,808	25
15. BAN RAI KHAE	2.40	2.40	8,000 3,667	3.36	3.36	8,900 2,649	0.80	0.80	2,450 3,063	2,950	7
16. PA KIAT	-	-	-	-	-	-	-	-	-	-	-
17. THUNG FUA	6.40	6.40	29,700 4,641	9.44	6.88	26,700 2,828	-	-	-	3,570	7
[T O T A L]	75.12	72.69	223,535 2,976	106.34	100.63	313,070 2,944	8.88	8.88	27,550 3,102	2,964	100

Source : Farm Management Survey in the Project Area, Dec. 1980.

Table II-19 Average Household Expenditure per a Farm Household

Item	Amount per year	
	₪	(%)
1. rice*	5,434	(26.8)
Rice and other cereals 2. others	258	(1.3)
Sub-total	5,692	(28.1)
Fish, meat, other viands	3,634	(17.9)
Soft drinks, beverages, etc.	539	(2.7)
Food ingredients	1,353	(6.7)
Tobacco/cigarettes	615	(3.0)
Housing	1,136	(5.6)
Clothing	1,553	(7.7)
Fuel, light and water	606	(3.0)
Household furnishing and equipment	302	(1.5)
Household operation	516	(2.5)
Personal and medical care	950	(4.7)
Transportation and communication	508	(2.5)
Recreation	645	(3.2)
Education	1,367	(6.7)
Tax	141	(0.6)
Others	727	(3.6)
Total	20,284	(100.0)

Note: * ... rice from own farm

Table H-20 Farm-gate Prices of Agricultural Product

<u>Agricultural Product</u>	<u>Unit</u>	<u>Farm-gate Price</u> (₱ / unit)
[Crop]		
1. Paddy (LV)	ton	3,400
2. Paddy (HYV)	"	3,210
3. Sugarcane	"	650
4. Mungbean	"	6,070
5. Soybean	"	2,500
6. Maize	"	950
7. Cucumber	"	5,020
8. Cabbage	"	5,000
9. Pumpkin	"	5,990
10. Banana (Namuwa)	1,000 hand	4,070
11. Banana (Lady finger)	"	3,280
12. Lime	ton	2,290
13. Mango	"	6,040
14. Coconut	"	3,230
15. Brown Sugar	"	9,250
[Livestock]		
1. Cattle	head	4,390
2. Hog	"	1,730
3. Chicken	"	50

Table H-21 Farm-gate Prices of Input Materials

I T E M S	U N I T E	FARM-GATE PRICE (B/UNIT)
1) SEEDS OR SEEDLING		
1. WET S. PADDY (LOCAL V.)	(KG)	4.29
2. WET S. PADDY (H. Y. V.)	(KG)	3.50
3. DRY S. PADDY (H. Y. V.)	(KG)	3.20
4. SUGARCANE	(SEEDLING)	530.70
5. MUNGBEAN	(KG)	50.63
6. STRING BEAN	(KG)	0.00
7. CASTOR BEAN	(KG)	19.33
8. SOY BEAN	(KG)	19.67
9. MAIZE	(KG)	43.39
10. CUCUMBER	(KG)	750.00
11. CABBAGE	(KG)	30.00
12. PUMPKIN	(KG)	0.00
13. PINE APPLE	(SEEDLING)	1.80
14. BANANA	(SEEDLING)	1.16
15. LIME	(SEEDLING)	4.02
2) FERTILIZER		
1. 16-20-0	(KG)	9.78
2. 15-15-15	(KG)	11.55
3. 16-16-16	(KG)	5.78
4. AMMONIUM SULPHATE	(KG)	6.51
5. 12-12-12	(KG)	4.89
6. 22-22-0	(KG)	3.40
7. 30-15-30	(KG)	35.00
8. UREA	(KG)	8.04
9. ANIMAL MANURE	(KG)	0.69
3) FUEL AND POWER		
1. GASOLINE	(LITER)	9.79
2. LIGHT OIL	(LITER)	7.43
3. LUBRICATING OIL	(LITER)	21.29
4. POWER	(KW)	4.91