IMPLEMENTATION SURVEY REPORT
FOR
ESTABLISHMENT & OPERATION
OF
THA NGON PILOT-FARM
IN THE KINGDOM OF LAOS

December 1969

THE OVERSEAS TECHNICAL COOPERATION
AGENCY

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ADDRESS

Intensive development of agriculture has been given top-priority by the Royal Government of Laos, in view of solving an acute food-shortage problem and of consolidating, at the same time, a sound foundation for full-fledged socio-economic development of the Kingdom; its efforts at agricultural development have been most emphatically directed, with a sense of urgency, at the Vientiane Plain which forms the Kingdom's politico-economic center with the capital-city of Vientiane at its pivot.

It was in the autumn of the year 1967 that the Royal Government of Laos approached Japan for technical cooperation towards its agricultural development project at Tha Ngon district (800 ha) on the Vientiane Plain and the Government of Japan took decision to comply with Laotian request and assigned its executive task to the Overseas Technical Cooperation Agency.

Field survey mission consisting of ten members under the leader-ship of Mr. Tatsuichi Fukuzawa (Senior Research Officer, Agricultural Land Bureau, Ministry of Agriculture & Forestry) was thereby dispatched by the OTCA on January 2 1968 for techno-economic survey to ascertain feasibility of the project for a period of about one month. The Royal Government of Laos which scrutinized the report submitted by the said mission was prompted to ask for deputation of another term of ten members headed by the same Mr. Fukuzawa for field survey to obtain both the basic data called for detailed designing of the construction plan and the firsthand information on the local practices at agirulcutal cultivation and farm-management to work out implementation program.

This Detailed Designing Team spent about two months on the project-area since November 5, 1968 and prepared a design report covering construction plan as well as the tender documents, through some revisions to the original plan.

Finally, a seven-member survey team headed by Mr. Tadashi Sakamoto (Head, Agricultural Development Cooperation Office, OTCA) was deputed to Laos on June 19, 1969 for field surveys called for establishment and operation of the Pilot-Farm in the project-area and

negotiations with the authorities concerned of the Royal Government of Laos on implementation of the project; within the period of about a month, this team completed its terms of reference and returned to Japan after signing the Record of Discussions dealing with the implementation of the Five Year Pilot-Farm Project in Tha Ngon district.

This Project as visualized in the present Report, aspires to attain an overall agricultural development in the project-area as a model case for national extension: a Pilot-Farm of some 100 ha established within the project-area, with the Laos-Japanese Agriculture & Livestocks Training Center as its nucleus, would become an arena where Japanese experts work at the selection of appropriate varieties of seeds and the establishment of cultivation standards for irrigation-farming (fertilizer-application, pest & diseases control and rational cropping pattern), with the aid of machinery, equipment and materials supplied by Japan and wherefrom the improved technology would be extended elsewhere through the local staff who should undergo in-service training under the Japanese experts. Such a new approach towards development might as well be termed "bridgehead operation tactics". It is therefore very much hoped for that this Project would serve as one of the living examples for agricultural development of the Vientiane Plain.

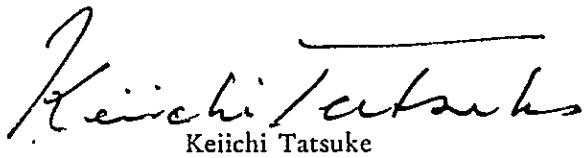
This Report containing information oas to the contents and the background of the Japanese technical cooperation which is going to be provided with the Royal Government of Laos is expected to furnish necessary guide to the Japanese experts and those who are concerned with the present Project.

Sincere thanks are due to Mr. Sakamoto, the leader, and the other Members of the Team for their streneous efforts in survey works as well as the officials concerned of the Ministry of Foreign Affairs and the Ministry of Agriculture & Forestry for their kind cooperation in deputing the same Team.

I fully appreciate the allout assistance given to the Term by the authorities concerned of the Royal Government of Laos, officers and staff of the USAID, the ADO, the Japanese

Embassy, the Laos-Japanese Agriculture & Livestocks Training Center and the members of the Japan's Overseas Cooperation Volunteers in Laos, without which the Team's success would not have been as fruitful.

December 1969



Keiichi Tatsuke

Director–General

Overseas Technical Cooperation Agency

INTRODUCTION

The Implementation Survey Team which has been deputed to the Kingdom of Laos under my leadership for 23 days (June 26 to July 18 1969) was assigned with a specific duty to undertake final survey in connection with the Pilot-Farm to be established and operated in Tha Ngon whose agricultural development project has now reached implementation stage, with a good prospect for the financial endorsement towards its construction cost, after deputation of the feasibility survey team in January 1968 and the detailed designing team in its wake, by the Overseas Technical Cooperation Agency, under the aegis of the Government of Japan which had previously accepted the request of the Royal Government of Laos for its technical cooperation in agricultural development there.

Determination of the scale of the Pilot-Farm which would play a pivotal role for the successful implementation of Tha Ngon Project and its location, field survey for obtaining basic data called for working out of such programs as infrastructural renovation, cropping and farm-management guidance, training on hehalf of the local technical personnel and organization of the local farmers, etc., was the main achievement of my Team which, at the same time, had a series of negotiations with the authorities concerned of the Royal Government of Laos through which the Record of Discussions giving substance to the five-year technical co-operation project centerring at establishment and operation of the Pilot-Farm came to be inked.

The Pilot-Farm in question aims at integration of multi-phased developmental efforts as referred to in the above into a coherent system of modern agricultural technique based on irrigation-farming which, if extended among the farmers in every confine of the project-area, would prove itself to be the most effective means for agricultural production increase in the country.

It is hoped that this Report will help supply the Japanese experts as well as those who are going to be associated with Tha Ngon Agricultural Development Project the necessary information as to the contents and the background of the Japanese technical cooperation.

I wish to express my sincere-most thanks to the Members of my Team who did not spare efforts for fulfilment of their mission and to the officers and staff of the Japanese Embassy in Laos whose assistance was extremely valuable for us. The cooperation rendered by the officials concerned, particularly of the Ministry of Foreign Affairs and the Ministry of Agriculture & Forestry, is hereby recorded with full appreciation.

December 1969

Tadashi Sakamoto
Leader
Implementation Survey Team
for establishment of Pilot-Farm
in Tha Ngon Project—Area

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1.– Background and Precedent Cooperation

Plentiful water resources and spacious arable land endowed in the Kingdom of Laos are only modestly utilized for productive purposes. With 90% or more of its people being engaged in farming, the country is heavily dependent on food imports including rice because its agricultural productivity is kept extremely low, primarily due to an overall lack of irrigation facilities. The Royal Government of Laos is naturally keen at agricultural development, particularly in the Vientiane Plain, the hinterland of the Kingdom's capital, and thereby to restore its economic stability and to level up its people's living.

Not less than a quarter of a million people, including the citizen of Vientiane, are steaming on the Vientiane Plain to make it not only the most densely populated area in the country but also the most important zone from all of the political, social and economic aspects. Yet, the agricultural production there can hardly feed its populace, the deficit being chiefly supplemented by imports from Thailand. Nam Ngum Project (initially 5,000 ha and ultimately, 32,000 ha) and FAO-aided Pilot Farm (about 300 ha) are instrumental in fostering agricultural development of the Plain.

USAID (United States Agency for International Development) seconded the official strategy of selecting the agricultural development of the Vientiane Plain as the urgent-most project among all economic development programs elsewhere in the country by opening two 100 ha- Pilot-Farms, the one in the neighborhood of Ban Sithan Tay and the other nearby Ban Kok Kieng, 20 km southeast and 80 km north to Vientiane City, respectively, both of which being irrigated by the water pumped up, from the Mekong River in case of the former and from the Nam Lik in the latter case.

Farmers' recognition of the merits of irrigated-farming is thus rapidly spreading on the Plain so much so many farmers are now trying to irrigate their own fields, on individual basis.

Table 2 : Meteorological Records (Monthly Means) for the Last Ten Years (1958 – 1967) obtained at Vientiane City

Month	Temperature (°C)					Relative Humidity (%)			Evaporation (mm)		Cloudiness
	Monthly Mean	Minimum		Maximum					Mean Monthly	Mean Daily	
		Average	Extreme	Average	Extreme	Mean	Minimum	Maximum			
January	21.0	15.1	4.7	28.0	34.0	74.1	42.2	94.7	122.9	4.0	3.4
February	23.3	17.8	10.5	29.8	36.0	71.9	42.7	93.2	123.9	4.4	3.4
March	26.4	21.0	11.7	32.6	38.6	69.3	41.8	91.9	156.7	5.1	3.0
April	28.1	23.4	18.7	34.3	40.7	69.8	43.1	91.9	178.6	6.1	4.0
May	28.0	24.3	20.0	32.9	39.0	81.2	55.4	95.4	114.3	3.7	6.2
June	27.6	24.7	21.5	32.3	36.8	84.1	62.4	96.3	97.8	3.3	7.6
July	27.3	24.5	21.0	31.0	34.8	84.5	64.1	96.2	89.2	2.9	7.5
August	27.0	24.6	21.9	30.8	34.5	86.3	65.5	96.6	81.1	2.6	8.1
September	26.4	23.8	21.5	30.3	34.8	86.6	65.7	96.7	58.2	2.8	8.0
October	26.0	22.5	16.6	30.6	34.4	81.6	54.4	95.4	107.5	3.5	5.5
November	23.7	19.7	12.0	29.9	34.8	77.4	47.8	94.9	114.2	3.8	4.5
December	21.2	16.4	9.2	28.0	34.5	75.3	44.5	95.1	110.4	3.6	3.9

Month	Rain fall (mm)			Rainy Days			Sunshine			Solar Radiation	
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Sunlit hr. N (hr)	Dunliy ht. n (hr)	(n/N) %	Out of the atmosphere	Calculated value
January	5.0	0.0	35.2	1.2	0	6	11.22	8.4	74.7	671.4	429.7
February	10.4	0.0	29.9	2.3	0	6	11.61	7.9	67.2	754.3	452.6
March	27.3	2.7	78.9	4.6	0	8	12.05	6.8	556.4	843.8	
April	97.2	25.3	241.5	7.6	4	13	12.53	7.0	54.8	900.0	
May	247.4	97.4	407.3	16.0	9	23	12.98	6.3	49.5	918.7	
June	249.0	116.4	430.7	18.0	11	26	13.17	5.1	38.7	918.7	
July	269.5	137.2	437.1	18.7	11	23	13.09	5.1	39.0	916.7	
August	350.1	188.7	646.7	23.1	16	27	12.70	4 6	36.2	896.5	
September	387.5	119.5	638.7	20.2	15	25	12.24	4.9	40.0	850.0	
October	66.3	0.0	152.1	13.0	0	17	11.75	7.9	67.2	773.8	
November	6.6	0.0	21.2	22.0	0	10	11.33	8.2	72.3	683.8	
December	0.9	0.0	6.3	0.2	0	1	11.06	8.3	85.1	641.3	

Japanese cooperation, on the other hand, dates back to the time of her participation at the Development Project of the Nam Ngum River, a tributary of the Mekong, which is flowing down through the Vientiane Plain, which was taken up by the U.N. Mekong Committee. Japanese Government made contributions towards the fund required for implementation of the Nam Ngum Development Project which aims at irrigation of some 32,000 ha of land. The construction–work of Nam Ngum Dam is now progressing by the hand of the Japanese contractors, under the supervision of the Japanese consulting engineers.

It was in 1966 that the Laos–Japanese Agriculture & Livestocks Training Center was established at Tha Ngon on the Nam Ngum River, where five agricultural experts (at present two) and six Overseas Cooperation Volunteers from Japan are actively at work. This Center has made worthy contributions for agricultural development of the country through experimentation and demonstration of the improved methods of producing paddy, vegetables, fruits, sericulture, livestock, etc., and by training young generation of the rural population in advanced techniques of their production.

On the occasion of the Prime Minister Mr. Sato's formal visit at the Kingdom of Laos in the autumn of 1967. Premier H.R.H.Souvanna Phouma of the host Government intimated his guest of his Government's desire to obtain Japan's assistance in its nation-building program, including that meant for development of the Vietiane Plain. The Royal Government of Laos did not waste time thereafter in selecting a few specific projects wherein Japanese cooperation was sought after. Two project-sites for agricultural development of the Vientiane Plain were, suggested, the one in Phon Hong district (project–area being 2,000 ha in size), 70 km north to Vientiane City and the other in Tha Ngon district (800 ha) on the Nam Ngum River, 25 km north to the capital. The choice of the Japanese Government fell upon Tha Ngon, where a certain Japanese private consulting engineering company had already made a preliminary survey, on the ground of the three following reasons:

(1) Vicinity to the Laos-Japanese Agriculture & Livestocks Training Center whose experimental facilities, experiences and installations would be of great help for agricultural development cooperation;

(2) Strategical position which would help making successful project there a model for agricultural development in the Vientiane Plain, particularly in its low-lying region along the Nam Ngum River, and

(3) International team-work among various agricultural development efforts in the neighborhood of Tha Ngon, such as the plan to establish an Agricultural College by France and the similar project to open the Soil & Pest-Control Institute by USA and UK, would turn Tha Ngon a center for agricultural technology in Laos in near future.

1.1 : Feasibility Survey

Feasibility Survey Team comprising of ten members under the leadership of Mr. Tatsuichi Fukuzawa, Senior Research Officer, Agricultural Land Bureau, Ministry of Agriculture & Forestry, was deputed to the project-area in January 1968, in replay to the Laotian Government's request. The same Team made, within the period of a month, field surveys in such as (i) hydrology, (ii) irrigation planning and land surveying, (iii) designing of various structures, (iv) pattern of cultivation and land-use, (v) soil classification and soil map preparation, and (vi) regional agricultural study, and brought about conclusions as to technical feasibility and economic justification of the development project there.

1.2 : Detailed Designing

Prior to starting at detailed designing of the project requested by the Laotian Government in pursuance of the Feasibility Survey Team's findings, it was believed necessary to secure a certain financial source of construction fund called for implementation of the project. After studying various pertinent cases, approaches for provision of loan were made towards the Asian Development Bank which, upon scrutinization of the Fesibility Report of the project, made unofficial reference to the following points:

(1) More persuading explanation as to why 800 ha was selected as its project-site at Tha Ngon district is needed;

(2) Construction-cost totalling at $ 1,500/ha seems to be too much and it is uneconomical to spend 1/3 of the construction-cost for flood-control works alone;

(3) Raising of paddy-yield from the current level of 0.9 ton/ha to the Japanese level of 5.5 tons/ha might be possible on an experimental basis but not on the extent of 32,000 ha all at once; high yield prospect would better be restricted within 100 ha-wide Pilot Farm, and that for the remaining 700 ha should be rated something less than that ;

(4) Water-charge amounting to $ 350/ha ($ 36/ha in the second year) to be borne by the local farmers for repayment of the loan as specified in the Report seems to be unrealistic; provided the special Fund of the Asian Development Bank should be made available to the Laotian Government for the purpose, it is possible to expect its recovery from the loanee ?

Upon receipt of such unofficial remarks from the Asian Development Bank, another Team of ten members headed by the same Mr. Fukuzawa returned to the project-site in November 1968 and for two months engaged at :

(i) soil survey; (ii) hydrological check; (iii) topographic surveying around the pumping-station site; (iv) profile– & cross-section surveying of the water canals; (v) preparation of Design Report, terms and conditions as well as contract-forms needful for tender; (vi) analysis of the pattern of cultivation, and (vii) market research.

Consequently, amendments were made to the original plan which had been worked out on data assimilated in the previous Feasibility Survey and on such a revised plan were prepared: (i) designing of the structures, (ii) construction plan, (iii) construction-cost estimate, and (iv) specifications. Design Report and Tender Documents (documents required for tender, such as specifications, terms and conditions of contract, instructions to the contractors, drawings, etc) were also completed.

1.3 : Agricultural Development Survey in the Vientiane Plain by the Asian Development Bank

The Asian Development Bank dispatched to Laos in January 1969 a team of specialists (nine Dutch, three German, one Thai, one Philippino, and one Japanese = Mr. Kazuma

Nojima, Deputy Director of Agricultural Experiment Station, Ministry of Agriculture & Forestry)) to make priority-decision as to the order of implementing various agricultural development schemes in the Vientiane Plain. Recommendations as to giving top-priority to Tha Ngon district were submitted by the ADB Team in April 1969 on the following grounds:

> ADB Team scrutinized nine agricultural development projects under consideration in the Vientiane Plain and, according to its rating, the internal rate of return range between 6 to 8.5% among them, and none satisfies the Bank's loan providing standard. The internal rate of return of Tha Ngon project would be 7%, less than 8% of that of Hat dok Keo project for 5,000 ha to be taken up by Israel but, judging from the soundness of the Japanese plan endorsed by detailed designing and other preparations for immediate implementation, Tha Ngon should be given the first chance.

ADB Team was understandably of the opinion that 800 ha might be too modest for the Bank's loan and it would be more advisable to make the project bigger by adjoining 1,300 ha on its south. The idea was eventually dropped on the ground that the bigger project would be of no avail as the adjacent plot of 1,300 ha would not return more than 4% internal rate. According to the ADB Team's evaluation, the plot of 2,300 ha spreading on east has a higher internal rate of return at around 8% and, therefore, it might as well be utilized for a separate development project after implementing 800 ha project.

2. Outiline of Tha Ngon Agricultural Development Project

The project– area is spreading on an extremely flat terrain of about 1,000 ha at an elevation of 163 – 167 m, being extensively covered by a mixed vegetation of shrubs, reeds and grasses. To the north of the project-area is flowing the Nam Ngum, a tributary of the Mekong, which submerges most of the area under water during the flooding period of August and September.

The soil covering the project-area is mostly made up of the recent alluvial immature soil originating from the parent-material of fluvial deposits which was transported rather re-

cently by the Nam Ngum and its tributaries. This soil-group can be further subgrouped into the natural levee soil and the hydromorphic soil, both being suitable for paddy cultivation because of their chemical as well as physical properties.

This project aims at developing 800 ha of land into an irrigated farmland where modern agricultural techniques would be acclimatized to the local conditions and demonstrated on behalf of the local farmers so that it could stand as a model-farm for exploitation of the virgin land extending along the Nam Ngum for an increased paddy production.

Farm program to be implemented thereupon was worked out upon careful consideration of the environmental conditions prevailing in Laotian agriculture. The "standard unit of farm operation" there was made 2 ha after comparing merits and demerits of that of 5 ha. Double cropping of paddy was accepted as a major premise for farm program and partial mechanization of farming is accordingly visualized. Irrigation of the farm would be effected by pumping up 1.2ℓ/sec/ha water at the maximum from the Nam Ngum which would be conducted to the field through irrigation canal.

The major facilities planned for the project implementation are summarized on Table 1, as follows :

Table 1 : Major Facilities on the Project-area

Facilities		Original plan	Revised plan
(i)	Area under Irrigation	800 ha	same
(ii)	Pumping Station :		
	Head	20.0 m (actual 15.25 m)	same
	Capacity	145 kW x 2	
	Maximum output	28.5 m^3/ min x 2	
(iii)	Irrigation Canals		
	Main canal, length	8.5 km	9.0 km
	Lateral, "	11.3 km	10.0 km
(iv)	Drainage Canals :		
	Main canal, length	4.3 km	4.0 km
	Lateral, "	4.8 km	6.0 km
(v)	Protective Embankment	9.4 km	9.0 km
(vi)	Flood Gate	2 m x 5 m	same
(vii)	Drainage Pump		
	Head	4.5 m	dropped
	Capacity	55 kW x 2	
	Mean discharge	52 m^3/min x 2	
(viii)	Nong Samkha Barrage :		
	Crest length	approx. 700 m	
	Crest height	5.5 m	
	Crest bulk	35,000 m^3	
(ix)	Road :		
	Main	9.3 km	10.0 km
	Branch	29.6 km	30.0 km
(x)	Power Distribution Line	11 km	same
(xi)	Construction Cost	$ 1,200,000	$ 860,000
	Breakdown		
	Foreign-exchange part	$ 855,000	$ 610,000
	Local currency part (equivalent)	$ 345,000	$ 250,000
(xii)	Construction Period	30 months	24 months

2.1 Benefits

Upon completion of the project, the agricultural productivity would steadily increase up to 8,000 tons in paddy (main crop) after 5 years. This-much output corresponds to approx. 10% of the rice being imported to Laos. Balance-sheet of individual farmhousehold and of the project-area as a whole would read as follows:

	per farmhousehold (2 ha)	whole Project-area (800 ha)
Gross Income	US$ 1,395	US$ 555,000
Cost of Production	676	270,400
Net Receipt	719	287,600
Livelihood Expenses	420	168,000
Solvency	299	119,600

2.2 Justifications

a. Economic

Annual Cost	US$	53,200
Annual Receipt		111,700
Benefit–Cost Ratio		2.1

b. Financial:

Cost Aspect		Loan Aspect	
Construction Cost	$ 860,000	Annual Interest	3%
Initial Working Cost	300,000	Deferment	7 years
		Redemption	8 – 25th year
		Term of Borrowing	25 years
		(Agricultural Special Fund of ADB)	
Annual Benefit :	$ 106,100		
Annual Cost :	85,700		
Benefit–Cost Ratio :	1.24		

3. Aims of the Present Survey

The Team had two principal terms of reference: the first was to carry out the-field surveys required for implementation of the Pilot-Farm, its establishment and operation, and the second was to conclude, through discussions with the authorities concerned of the Royal Government of Laos, the mutually acceptable terms and conditions pertinent to the bilateral Agreement called for execution of the project. As the Pilot-Farm in question means to be a center for the integrated technical cooperation covering the infrastructural renovation (construction of irrigation and drainage facilities, fields and a network of roads, etc), the consolidation of paddy cultivation techniques acclimatized to the local conditions, the extension of farm-management knowhow to the neighboring farmers, the training of local technical personnel and the organization of the rural population, the Team's survey activities were directed at the following seven items :

(i) Current paddy cultivation practices and their improvement methods;
(ii) Farmers' organization;
(iii) Settlement Scheme;
(iv) Field preparation;
(v) Degree of mechanization;
(vi) Marketing of farm-produce, and
(vii) Environmental situations for the Experts' livelihood.

Negotiations with the authorities concerned of the Royal Government of Laos were conducted on the prepared draft of the Record of.Discussions, with occational contacts as required with the Ministry of Foreign Affairs, Tokyo. Record of Discussions which was signed between Mr. Pane Rassavong Vongkoth, Director-General on Planning, on the part of Laos, and Mr. Sakamoto, on the part of Japan, is the outcome of such negotiations through which much of the Loatian Government's views and opinions and local conditions were fully considerec of and librerally accommodated into.

The course of our discussions took the following progress :

Art	Laotian Views	Japanese Views	Agreement reached
1	Agreed		
2	Agreed		
3	Agreed		In Note (1), "upon the request of the Royal Government of Laos" has been inserted immediately after "in the Project".
4	Agreed		
5	(1) Transport-cost of machinery, equipment, tools, spare parts and other materials to be provided by Japan will be borne by Japan only upto Ban Tha Nalen, but we hope Japan will extend her obligation upto Ban Tha Ngon.	(1) Extension of transport responsibilities beyond Ban Tha Nalen is difficult as a rule. Definite answer will be given in the next meeting	Decided upon in the final meeting to keep the wording intact.
	(2) Request the deletion of the latter part commencing with "through . . . ", on the ground that, inspite of the of the assistance offered by the Japanese experts on the technical matters, an overall responsibility shall rest with the Laotian Director and, in considera-	(2) As this is a matter deserving for most careful treatment, we will agree to discuss it fuller in connection with Art. 11.	

Art	Laotian Views	Japanese Views	Agreement reached
	tion of the Farm's future when full responsibility of its operation will come to fall on Laotian part, the Laotian Director will better be held responsible for not only administrative matters but technical matters as well. As this has bearing on Art. 11, further discussion may take place then and there.		
	(3) Request insertion of "in accordance with the financial laws and regulations in force in Laos", on the ground that in Laos all the revenue and expenditure need to be appropriated in its budget by law and it is the matter of policy not to set up any special account outside the budget. Special Account could be constituted, nevertheless, provided that the Ministry of Finance approved the	(3) Upon checking the Laotian laws and regulations, the Laotian request has been proved reasonable and, therefore, accepted.	(3) It was mutually agreed upon to insert the following at the end of the sentence: ". . . . in accordance with the financial laws and regulations in force in Laos."

Art	Laotian Views	Japanese Views	Agreement reach
	budgetary plan prepared at the outset of the fiscal year.		
6	Agreed		
7	As the expression is not inducuve to an easy understanding, it would better to limit the claims only to those related to official function.	Agreed to limit the claims to only those directly related to official function.	It was mutually agreed upon to alter "their functions" on the fourth line from the above the "their official functions."
8	(1) Agreed		
	(2) Agreed		
	(3) With least intension to escape such responsibility but hoping to make effective contribution, we wish it to be rewritten as "to the best capacity" or "as far as possible."	(3) The term "as far as possible" or "to the best capacity" is not enough to guarantee, for example, adequate storage facilities for safe custody of plentiful machinery, equipment, tools and materials sent from Japan.	(3) It was agreed upon to put "in accordance with the programme to be determined between the the two Governments", at the end of the sentence.
	(4) We presume that the supplies from Japan will be good enough for all the requirement, leaving no space for Laotian replenishment.	(4) As those which are unavailable in Laos would, in fact, be furnished from Japan, the sentence may well be kept intact.	(4) Agreement was reached to put "other than those provided by the Government of Japan", at the end of the sentence.
	(5) It is not possible to build houses for the Japanese experts in	(5) In case the experts' families will be living in Vientiane only to be	

Art.	Laotian View	Japanese View	Agreement reached
	Vientiane nor secure transport conveniences on their behalf. But all the conveniences that are ordinarily provided to the foreign experts will be offered. Explanation was made as to the fact that no foreign expert is being provided with housing accommodation by the Laotian Government.	joined by the experts themselves on holidays, how the experts can be accommodated at Tha Ngon : This question was answered by Laotian Government's preparedness in offering the boarding facilities currently used as boarding facilities of local trainees.	
9	(1) Agreed (2) Agreed (3) Agreed to keep this sentence intact but similar arrangement as with Art. 8-4 is desirable. (4) Agreed (5) Agreed (6) Agreed	(3) Those not available in Laos would possibly be supplied from Japan.	(3) Add "other than those provided by the Government of Japan.
10	Agreed		
11	Amendment as suggested in the meeting held on July 8 is still being hoped for. As a matter of fact, farm-machinery operation in ADO is not smooth enough, often jeopardizing the imple-	The spirit of cooperation could be safeguarded without major alterations to the original draft. Laotian argument is not without reason which could attain its purpose by shifting technical	Final agreement was reached as to make this Article reading as follows : "The management of the Farm will be assumed by the Laotian Director. The Director

Art.	Laotian View	Japanese View	Agreement reached
	mentation of the project because of joint-management with USA. As the project will be handed over to Laotian Gobt. after some time, full responsibility of its operation not only managerial and maintenance part but technical aspect also shall reasonably rest upon the Laotian Director. This decision has been approved by the high command and is favored by the past experiences. In case of need, Japanese Govt. could afford to control the Laotian Director through its Ambassador in Laos. Final Laotian proposal reads as follows: "The managerial authority of the Farm will rest with the Laotian Director who shall, however, maintain the closest cooperation with the Japanese experts in technical matters."	part of the Farm operation to joint-management between the Laotian Director and the Leader of the Japanese experts.	will consult on technical matters with the Japanese Project Leader for making the work programmes of the Farm. In execution of these programmes, the Director will work in close cooperation with all of the Japanese experts."

4. Team–Members and Laotian Counterpart Officers

4.1 Members of the Japanese Survey Team

Assignment	Name	Affiliation	Duration of Stay
Leader	SAKAMOTO, Tadashi	Head, agricultural Development Cooperation Office, OTCA	14
Sub-Leader (irrigation)	KANATSU, Shoji	Technical Counsellor, Agricultural Development Cooperation Office, OTCA	25
Paddy cultivation	TASHIRO, Hideomi	Resources Div., Planning Dept. Agricultural Land Bureau, MAF	25
Famers Organization	YAMAMOTO, Toshio	Settlement & Farm Management Div., Agric. Land Bureau	25
Field rearrangement	OGAWAWARA, Akira	Irrigation & Draianage Div. Construction Dept. Agric. Land Bureau	25
Farm-machinery	ZUIRIN, Yoshie	Agric. Experimental Farm, Tokyo University of Agric. Sciences	25
Liaison & Agricultural Economy	GOTOH, Ryonosuke	Agricultural Development Cooperation Office, OTCA	25

4.2 Laotian Counterpart Officers

Mr. Tiao Somsavath Vongkot	Directeur de l'Agriculture
Mr. Houane Sihapanya	Directeur du Service Veterinaire
Mr. Souanthong Phenglamphanh	Directeur du Budget et du Controle
Mr. Pane Rassvong	Commissaire General au Plan

Mr. Khamphanh Simmalavong	Directeur des Etudes Techniques et Economiques
Mr. Khamphiou Vissapra	Co-Directeurs Lao au Centre d'Application de Tha Ngon
Mr. Vetsouvanh Kamsoumphoh	"

6. Record of Discussions

Record of Discussions

Under instructions from the Government of Japan, the Japanese Agricultural Survey Mission organized by the Overseas Technical Cooperation Agency and headed by Mr. T. Sakamoto visited Laos from 26 June to 18 July, 1969, for the purpose of working out the details of the implementation of the Pilot Farm project in Tha Ngon district. The Mission discussed the matters concerning the above Project with the authorities concerned of the Royal Government of Laos.

Attached hereto is the Record of Discussions between the Mission and the authorities concerned of the Royal Government of Laos.

The contents of the attached Record of Discussions are not binding legally either on the Government of Japan or on the Royal Government of Laos as the final decision on the implementation of the said Project is to be made after the two Governments have studied the said Record of Discussions. The gist of the Record of Discussions should, however, form the basis of the official agreement concerning the implementation of the Project between the two Governments.

Vientiane, July 18, 1969

Tadashi SAKAMOTO
Head of the Japanese
Agricultural Survey Mission

Pane RASSAVONG
Commissaire General
au Plan

Tiao Somsavath VONGKOTH
Directeur General de
l'Agriculture

RECORD OF DISCUSSIONS

The Japanese Agricultural Survey Mission and the authorities concerned of the Royal Government of Laos, promising mutual cooperation in the implementation of the Pilot Farm Project in Tha Ngon district (hereinafter referred to as "the Project"), have agreed as follows:

1. There shall be established a Pilot Farm (hereinafter referred to as "the Farm") of about 100 ha. in Tha Ngon district, 25 km north of Vientiane. The Farm will function as a pilot farm of the 800 ha area in the above district (hereinafter referred to as "the Area") where the Royal Government of Laos plans to lay out a model area of modern irrigation agriculture in the Vientiane Plain. For the purpose of opening and operating the Farm, the two Governments will cooperate with each in carrying out the followings :

(1) Construction of roads, irrigation and drainage facilities in the Farm;
(2) Improvement of techniques of rice cultivation, livestocks, horticulture, through farming and extension work in the Farm;
(3) Technical training in the Farm as well as in Japan for the Laotian technicians engaged in the Project;
(4) Farming instructions for the Laotian farmers in the Area.

2. The existing Lao-Japanese Agriculture and Livestocks Training Centre will be incorporated into the above Pilot Farm Project and function as the base of the Farm.

3. In accordance with laws and regulations in force in Japan, the Government of Japan will take necessary measures to provide at her own expense the services of Japanese experts mentioned in Annex I.

NOTE : (1) The Japanese experts will be dispatched to engage in the Project upon the request of the Royal Government of Laos at the earliest possible date after an agreement between the two Governments has been reached.

(2) The Japn's Overseas Cooperation Volunteers can also usefully join in the Project, the details of which will be separately agreed upon between the two Governments.

4. The Japanese experts and their families will be granted privileges, exemptions and benefits no less favourable than those granted to the experts of the Colombo Plan or of the United Nations stationed in Laos.

5. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures to provide at her own expense such machinery, equipment, tools, spare parts and other materials listed in Annex II as are required for the operation of the Farm.

(1) The articles referred to above will become the property of the Royal Government of Laos upon being delivered c.i.f. at the ports of disembarkation or at the Laotian border to the Laotian authorities concerned.

(2) The articles referred to above will be utilized exclusively for the purpose of operating the Farm through consultation between the Japanese Project Leader referred to in Annex I and the Laotian Project Director referred to in Annex III.

(3) A part of the articles referred to in Annex II may be rented at reasonable rates to the farmers in the Farm and a part of such articles other than equipment, machinery, vehicles, tools and spare parts may also be transferred at reasonable prices to the farmers in the Farm. The proceeds from such rentals or transfers will constitute a special fund under the Royal Government of Laos, which will be used exclusively for the implementation of the Project in accordance with the financial laws and regulations in force in Laos.

6. In accordance with the Technical Cooperation Scheme of the Government of Japan, the Government of Japan will take necessary measures to receive in Japan Laotian technicians engaged in the Project for their technical training.

7. The Royal Government of Laos will undertake to bear claims, if any arise, against the Japanese experts resulting from, occuring in the course of, or otherwise connected with the bona fide discharge of their official functions in Laos covered by the present Record of Discussions.

8. The Royal Government of Laos will provide at her own expense :

(1) The expenses necessary for the construction of roads, irrigation and drainage

facilities except for such machinery, equipment, tools, spare parts and other materials as are provided by the Government of Japan;

(2) Requisite Laotian counterparts, technicians and other personnel as listed in Annex III;

(3) Besides the land and existing buildings of the present Lao–Japanese Agriculture and Livestocks Training Center, requisite land and buildings as listed in Annex IV as well as incidental facilities required therefore in accordance with the programme to be determined between the two Governments;

(4) Supply or replacement of such machinery, equipment, tools and any other materials necessary for operating the Farm other than those provided by the Government of Japan;

(5) Suitable housing accommodations for the Japanese experts as listed in Annex IV.

9. The Royal Government of Laos will bear :

(1) Expenses necessary for the transportation of the articles provided by Japan within Laos as well as for their installation, operation and maintenance;

(2) All running expenses necessary for the operation of the Farm.

NOTE: "All running expenses necessary for the operation of the Farm" include:

(1) Expenses for official travel of the Japanese experts within Laos;

(2) Electricity and water charges;

(3) Farming materials necessary for the operation of the Farm such as seeds, fertilizers and pesticides, other than those provided by the Government of Japan;

(4) Fuel for the operation of machinery, equipment and vehicles;

(5) Expenses for maintenance, repair of machinery, equipment and vehicles;

(6) Expendables such as stationery, etc.

10. In connection with the Japan's Pilot Farm Project, the Royal Government of Laos will take necessary measures to materialize the agricultural development plan of the Area.

11. The management of the Farm will be assumed by the Lao Project Director. The Director will consult on technical matters with the Japanese Project Leader for making the work programmes of the Farm. In execution of these programmes, the Director will work in close cooperation with all of the Japanese experts.

12. The Royal Government of Laos, the Government of Japan and the international organization concerned with the agricultural development plan of the Area will consult among themselves from time to time whenever necessity arises and will closely cooperate among themselves for the successful implementation of the Pilot Farm Project as well as of the agricultural development plan in the Area.

13. The Japanese cooperation for the operation of the Farm will be rendered for the period of five (5) years in principle, but by mutual agreement the above period may be extended for a further specified period. The Laotian authorities concerned will take over the responsibilities of the operation of the Project after the expiry of the term of the Japanese cooperation.

ANNEX I

List of the Japanese technical experts

Experts	Number of persons
Project Leader	1
Irrigation Engineer	1
Agronomist	2
Expert on Farmers' Organization	1
Expert on Livestocks	1

Note : Besides the experts mentioned above, some experts as necessity arises, may be temporarily dispatched under the Colombo Plan.

ANNEX II

Machinery, Equipment, Tools, Spare Parts and other Materials

(1) Construction equipment and spare parts
(2) Agricultural machinery and implements and their spare parts
(3) Pesticides and fertilizers
(4) Machine tools for repair work
(5) Tools and implements for testing work
(6) Vehicles
(7) Other necessary minor equipment and materials

ANNEX III

List of the Lao Personnel

(1)	Project Director	1
(2)	Irrigation engineer	1
(3)	Agronomist	1
(4)	Extension agent	1
(5)	Livestocks agent	1
(6)	Agricultural economist	1
(7)	Labourers for the testing farm	
(8)	Clerical and service employees	
	Clerk–typist	1
	Storekeeper	1
	Driver–mechanic	1
	Heavy equipment and truck operators	2
	Janitor-messenger	1
	Watchman	1
	Others	2

ANNEX IV

Land and buildings to be provided by :

(1)	Farm land for the testing work (5.0 ha.)	June 1972
(2)	Shed for machinery and equipment (330 m^2)	March 1970
(3)	Store-house for farming materials (100 m^2)	March 1970
(4)	Milling house (100 m^2)	February 1973
(5)	Drying house (200 m^2)	February 1973
(6)	Dormitory (100 m^2)	One month after the signature of the official agreement referred to in the preamble

Note : These dates may be midified subject to the date of the approval of the ADB loan.

Chapter II : Field Survey and Its Findings

1. Location of the Pilot-Farm

The Pilot-Farm project, the core of Tha Ngon Agricultural Development Programme, for whose final designing and pre-project survey the present Team was dispatched to Laos, has been attracting due developmental attention and the preparatory cooperation measures had already been commenced since 1968 in term of deputation of the feasibility survey team and the designing survey team as well as the negotiations with the Asian Development Bank as for its financing. Determination of its location was to be made in consideration of its raison-detre for five years to come as a center for demonstration and extension of the modern irrigation-based farming. The criteria for site-selection were as follows :

a) Site shall be found within Tha Ngon Agricultural Development Project Area, covered by the previous feasibility survey and designing survey;
b) It shall be in the vicinity of the Laos-Japanese Agriculture & Livestocks Training Center as well as the water intake facilities (pumping station);
c) It shall be situated at relatively higher elevation;
d) It shall be given full demonstration effects; and
e) It shall embrace, within its 800 ha site, different types of soil.

Accordingly, the plot marked as 0003 on the map has been selected as a site for the Pilot-Farm. It is situated to the north of Vientiane by the distance of about 25 km, and the Laos-Japanese Agriculture & Livestocks Training Center is within the distance of 1 km. As soon as the Agreement between the two Governments of Laos and Japan will be concluded, this place shall become the bridgehead for agricultural development project in the region.

The site is spreading on an extremely flat land extending well over 1,000 ha, at an elevation of 162.55 m to 166.55 m, mostly covered by a mixed vegetation of shrubs, reeds and other grasses. Nam Ngum River, a tributary of the Mekong, is flowing to its north and the soil is mostly made of the recent alluvial immature soil originating from the parent material of fluvial deposits being transported rather recently by the Nam Ngum and the Nong Samkha, its tributary. The soil can be further sub-divided into the natural leves soil (upper loam and lower loam) and the hydromorphic soil (upper clay, lower clay: upper loam, lower loam), bo th suitable for paddy cultivation because of their chemical as well as physical properties.

2. Paddy Cultivation Practices and Their Improvement

Paddyfields spreading on Tha Ngon district are mostly rain-fed fields without irrigation and drainage facilities. Accordingly, paddy cultivation there is regulated by the natural rainfall.. While the temperature is adequate, as will be seen from Table 2, for paddy cultivation all through the year, the local farmers are getting only a single crop of paddy per year because they have had to prevail upon the cyclic clamatic conditions ruling over there, that is planting and growing of paddy during the rainy season which starts in May and ends in September every year when monthly rainfall is over 200 mm, and maturing and harvesting of paddy during the ensuing months of the dry season.

Transplantation of local varienties of paddy is the general practice there but direct-sowing of floating-rice is seen to a limited extent. In the neighborhood of the project-area, the farmers are used to plough their fields during April and May, either sheerly by human labor or by using cattles; after rains come to fill their paddyfields to an adequate depth, they start puddling them one after another; then follows the transplantation. While sowing on the nursery bed takes place at mid-June, it is only in the early part of August that they transplant the young plants by hand in a rather disorderly way. Thanks to high photo-sensibility inherent to the varieties they use, heading takes place between comparatively shorter period of time, from the latter part of October to the early part of November, and a month later harvesting begins.

Fertilizer-application is scarcely being known and weeding after transplantation, inter-tillage, pest control, etc., are almost completely ignored. Paddy is harvested by cutting the upper half of the culms which they dry on the ground of the paddyfield itself before threshing and winnowing by hand. Yield per ha is accordingly on a lower level of 1.5 tons to 2 tons.

The customary paddy cultivation practices will need to be improved along three basic directions: (a) independence from natural rainfall; (b) divorce from cultivation habits of growing local varieties without fertilizers, and (c) more efficient use of human labor for rational farming. The guiding principles for technical improvement of paddy cultivation,

Table 2 : Meteorological Records (Monthly Means) for the Last Ten Years (1958 – 1967) obtained at Vientiane City

Month	Temperature (°C)					Relative Humidity (%)			Evaporation (mm)		Cloudiness
	Monthly Mean	Minimum		Maximum		Mean	Minimum	Maximum	Meam Monthly	Mean Daily	
		Average	Extreme	Average	Extreme						
January	21.0	15.1	4.7	28 0	34 0	74.1	42.2	94.7	122.9	4 0	3.4
February	23 3	17.8	10 5	29.8	36.0	71.9	42.7	93.2	123.9	4 4	3.4
March	26.4	21.0	11.7	32.6	38 6	69.3	41.8	91.9	156.7	5.1	3.0
April	28.1	23.4	18.7	34 3	40.7	69.8	43.1	91.9	178.6	6.1	4 0
May	28 0	24.3	20 0	32 9	39.0	81.2	55.4	95.4	114.3	3.7	6.2
June	27.6	24.7	21.5	32 3	36.8	84 1	62.4	96.3	97.8	3.3	7.6
July	27.3	24.5	21 0	31 0	34.8	84 5	64.1	96.2	89.2	2.9	7.5
August	27.0	24 6	21.9	30 8	34 5	86.3	65.5	96 6	81.1	2.6	8.1
September	26.4	23.8	21.5	30 3	34.8	86.6	65.7	96.7	58.2	2.8	8.0
October	26.0	22.5	16.6	30 6	34.4	81.6	54.4	95.4	107.5	3.5	5.5
November	23 7	19.7	12 0	29.9	34.8	77.4	47 8	94.9	114.2	3.8	4.5
December	21.2	16.4	9.2	28 0	34.5	75 3	44.5	95.1	110.4	3.6	3 9

Month	Rainfall (mm)			Rainy Days			Sunshine			Solar Radiation	
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Sunlit hr. N (hr)	Sunlit hr. n (hr)	(n/N) I	Out of the atmosphere	Calculated Value
January	5.0	0 0	35 2	1.2	0	6	11.22	8.4	74.7	671.4	429.7
February	10.4	0.0	29.9	2.3	0	6	11.61	7.9	67.2	754.3	452.6
March	27.3	2 7	78 9	4.6	0	8	12.05	6 8	56.4	843.8	
April	97.2	25.3	241.5	7.6	4	13	12.53	7.0	54.8	900.0	
May	247 4	97.4	407.3	16.0	9	23	12 98	6 3	49.5	918.7	
June	249.0	116,4	430 7	18 0	11	26	13.17	5.1	38.7	918.7	
July	269.5	137.2	437.1	18 7	11	23	13 09	5.1	39.0	916.7	
August	350.1	188.7	646 7	23.1	16	27	12.70	4.6	36.2	896.5	
September	387.5	119 5	638.7	20.2	15	25	12 24	4.9	40.0	850.0	
October	66.3	0.0	152.1	13 0	0	17	11.75	7.9	67.2	773.8	
November	6.6	0.0	21.2	22.0	0	10	11.33	8.2	72.3	683.8	
December	0.9	0.0	6.3	0.2	0	1	11.06	8.3	75.1	641.3	

therefore, lie in (a) readjustment of paddyfield by installation of irrigation and drainage facilities to make water controllable at human will; (b) introduction of improved varieties of seeds side by side with establishment of high-yielding paddy cultivation techniques, and (c) economization of human labor through introduction of farm-machinery.

Through deliberate implementation of the above-mentioned improvement programmes, modern paddy cultivation techniques woven into an established system would come to stay, and a remarkable production increase would follow as the result of double-cropping based on advanced methods.

3. Laos-Japanese Agriculture & Livestocks Training Center

The Laos–Japanese Agriculture & Livestocks Training Center or 'Centre d'Application del'Agriculture et del'Elevage Lao-Japonais' (hereinafter referred to as "the Center") is situated at about 2 km southwest of the project-area. The Center was founded on April 8 1966 through the Agreement signed between the Royal Government of Laos and and since operated in a manner which might be termed "overseas technical cooperation on non-governmental basis".

3.1 Historical Background

The late-Mr. Tokuhisa MORI founded " " in October 1956, being promoted by a firm belief that since socio-economic betterment of Laos is basically conditioned by the development of agriculture which is the mainstay of the national economy, utmost efforts need to be directed at technical improvement attributable to increased agricultural production; establishment of a model-farm at a convenient place which is meant for practical experimentation related to agricultural techniques and training of young technical personnel thus serving for dissemination of advanced techniques among the rural community far and near should be the first step to be taken. This Society, in deciding upon a proper site for such a model farm, sent three specialists, viz: Yoshihisa Mori (farm-management), Shoichi Seki (agricultural engineering) and Jun Adachi (farm-machinery) to Laos in November 1965.

After exploring various candidate-sites, the said three experts finally decided upon Tha Ngon district as the ideal spot and submitted a report to this effect to the Royal Government of Laos in February 1966. It was on April 8 1966 that "Agreement on establishing the Laos-Japanese Agriculture & Livestocks Training Center" was reached between the Minister for Planning of the Royal Government of Laos and Mr.Araya, the President of the same Society. According to this Agreement, the Center was to be operated jointly for three years till April 7 1969.

Gist of the Agreement between the Royal Government of Laos and the Society on establishment and operation of the Center is as follows:

(1) The Royal Government of Laos will establish in the suburbs of Vientiane City, with the cooperation offered by the Society, the Laos–Japanese Agriculture & Livestocks Training Center, whose aims and purposes will read as follows :
   (a) Research as well as practical training on the means for quantitative and qualitative improvement upon agricultural and livestock production in the field of cereals, fruits, and their processing;
   (b) Commercial production of agricultural and livestock items in the Center and their sales to secure better supply of those products to the local markets;
   (c) Practical education and field training on behalf of the young Laotian cultivators in modern methods of cultivation, irrigation–farming, management of agricultural and livestocks development, and commercialization and marketing of these products.

(2) The Society and the Laotian Government will, in view of attaining the above aims and purposes, cooperate with each other in the items given below :
   (a) The Laotian Government will undertake, with the cooperation of the Society, the following responsibility in establishing and operating the same Center:
      (i) Reclamation and levelling of the land;
      (ii) Construction of roads and buildings;
      (iii) Establishment of irrigation and drainage facilities;
      (iv) Whole expense required for eduction and training of the trainees, and
      (v) The entire expense required for operation of the Center.

(b) The Society will bear total cost and expenses of the follwing :

(i) Procurement of farm-machinery, tools and equipment as well as seeds and seedlings required by the Center;

(ii) Materials and installations to be imported and transportation-cost of its products.

(c) The Laotian Government will supply the followings to the Center:

(i) 120 ha of land, 28 ha of which will be given as a first lot immediately after signing of the Agreement;

(ii) Two Deputy-Directors (agriculture & livestocks);

(iii) Exemption of customs duty and domestic tax upon the articles and materials to be imported under this Agreement, and

(iv) All the possible conveniences for operation of the Center.

(3) Management of the Center will be taken over by the Director who will be appointed by the Society and approved by the Laotian Government and two Deputy-Directors appointed by the Laotian Government.

(4) The independent budget of this project will be met by the income from the sales of the agricultural and livestocks products of the Center which needs to be operated on a self-paying basis.

(5) This Agreement will come into effect on the day of signing by the two concerned parties and remain valid for three (3) years.

This Center had no more than three specialists at its outset and its equipment was limited to that carried along by them; its fund was far from plentiful. Its development has been slow but steady, with the joining of three more specialists (Mr. Noboru Hashimoto (horticulture) in October 1966 and Messrs. Kohei Sato (paddy-cultivation) and Tokuo Tokutome (livestocks) in July 1967) and sixteen Overseas Cooperation Volunteers from Japan. Most of the machinery, equipment and materials have been furnished by the Government of Japan.

The operational cost of the Center has been paid from FEOF (Currency Stabilization Fund) of Laos, 40,000,000 kip (US$ 80,000) in April 1966, and 38,000,000 kip

(US$ 76,000) in June 1976, totalling to 78,000,000 kip (US$ 156,000. The Center has now started full-fledged activities after consolidating its basic facilities such as buildings and infrastructural renovation of the field, within three years' time since its inauguration.

According to the Agreement, the Center.s term of operation as a joint-venture between the Laotian Government and the Society came to expire on April 7, 1969, and the payment from FEOF was simultaneously suspended. To avoid an abrupt suspension of its operation, however, the Agreement was so amended that the Center would continue to function for another year, that is till April 7, 1970. It would surely be arguable, with a considerable fairness, that the practical experiments and demonstrations carried on by the Center in agricultural and animal husbandry fields are definitely meaningful and quite useful, although a lack of agricultural extension service network in the country did not help disseminating advanced techniques so developed among the grass-root farmers, and that the Center has good capacity to function as a bridgehead for agricultural development of Tha Ngon district and surely as the base for the present Project.

3.2 Present Position

3.2.1 Location

Ban Tha Ngon, Vientiane Province (approximately 25 km north of Vientiane City)

3.2.2 Designation

'Centre d'Application del'Agriculture et del'Elevage Lao–Japonais', commonly known in the name of "Laos–Japanese Agriculture & Livestocks Training Center.

3.2.3 Fields of Activity

Paddy-cultivation; Animal husbandry (cow, pig, poultry, fodder–crops); Fruits; Vegetables; Sericulture; Fish–culture, and Farm–machinery.

3.2.4 Facilities

(a) Land: 120 ha. 28 ha of which is now reclaimed and under use as an initial allotment.

(b) Buildings: as per Table 3.

Table 3 : Buildings of the Training Center

Main building	one unit	279.5 m^2	(Office)
Living Quarters	–"–	228 "	(for Experts)
–"–	–"–	228 "	(for Japan's Overseas Cooperation Volunteers)
–"–	–"–	150 "	(for Lao technicians)
Stores–House	two units	175 "	(Farm-machinery and Fertilizers)
Repair–Shop	one unit	200 "	(used as garage too)
Work–Shop	–"–	160 "	
Fuel–Store	–"–	24 "	(for storage of fuels)
Cattle Shed	one unit	331.2 "	(capacity: 20 adult cows)
Swine Shed	–"–	395.6 "	(capacity: 140 adult pigs)
Poultry Pen:			
Brooding shed	–"–	48 "	
Adult Hen Shed	–"–	178.5"	(capacity: 400 birds)

(c) Irrigation facilities :

Pumping Station (pontoon type)

18 PS Diesel Engine Q=0.9 m^3/sec

Irrigation canal approx. 1,000 m

Reservoir

3.2.5 Organization

The Center's management is entrusted with one Director (Directeur du Project) appointed by the Society on approval of the Laotian Government and two Laotian Deputy–Directors (Co-Directeur) appointed by their Government. The work programme is to be prepared by the Director and Deputy-Directors and implemented by 14 Laotian Government officers deputed from the Directorate

of Agriculture and the Directorate of Animal Husbandry, under the technical guidance and advices of the Japanese experts and the Japan's Overseas Cooperation Volunteers. In fact, however, due to the resourcefulness and capacity as of the Laotian staff, the major part of the Center's work is substantially carried out by the Japanese experts and the Volunteers who are there in advisory capacity.

Table 4 : Staff List of the Center

(a) Staff commissioned by the Royal Government of Laos :

Status and Position	Name	Duty
Directeur du Project (concurrent) (Colombo Plan expert) (Staff of the Society)	MORI, Yoshihisa	General
Co-Directeur (Directorate of Agric)	Khamphion Vissapra	Agriculture in general
Co-Directeur (Directorate of Animal Husbandry)	Vetsouvanh Kamgowmphar	Animal Husbandry in general
Deputation from the Directorate of Agriculture	Khamphone	Administration
—"—	Khamsene	Farm-machinery
—"—	Thonchanh	Soil
—"—	Boriboun	Farm-machinery
—"—	Somphieng	Irrigation
—"—	Sengphet	Sericulture
—"—	Hov	—"—
—"—	Changpheng	Paddy—cultivation
—"—	Nhong	Vegetables
—"—	Phouvath	Agric. Engineering
—"—	Sisamouth	Fruits
Deputation from the Directorate of Animal Husbandry	Thonysa	Poultry
—"—	Lome	Pig
—"—	Singkeo	Vattle

(b) Japanese Experts

Status and Position	Name	Term of Assignm't	Duty
Colombo Plan Expert (The Society's staff)	MORI, Yoshihisa	Nov 23 65/ Apr 7 69	Agricultural Economics
Colombo Plan Expert (The Society's staff)	ADACHI, Jun	Nov. 23 65/ Apr. 7 69 (gone home)	Farm Machinery
Colombo Plan Expert	HASHIMOTO,Takushi	Oct 28 66/ Apr 7 69	Horticulture
–"–	SATO, Kohei	Jul 20 67/ Jul 19 69	Paddy-cultivation
–"–	TOKUTOME,Tokuo	Jul 20 67/ Jul 19 69	Animal Husbandry

(c) Japan's Overseas Cooperation Volunteers:

Status	Name	Term of Assignment	Duty
Japan's Over seas Coop. Volunteer	NAKADA, Takeji	Mar 31 69/ Mar 30 71	Farm Machinery
–"–	NAKAGOME, Tatsundo	Mar 31 69/ Mar 30 71	Agric. Engineering
–"–	ODAJIMA, Seiichi	Dec 12 68/ Dec 11 70	Sericulture
–"–	NARA, Teruyuki	Sept 12 68/ Sept 11 70/	Animal Husbandry
–"–	GOTOH, Ikumitsu	Mar 30 67/ Mar 29 70	Horticulture (one year extension)

3.2.6 Machinery, Equipment, Tools and Materials supplied

Since the Center's inauguration on April 8 1968, machinery, equipment, tools and materials amounting to approx. US$ 40,342 have been supplied in three instalments :

First Instalment				
The Society	US$	3,751.40		
Japanese Government		12,625.28		
Mitsui Bussan KK		3,631.35	US$	20,008.03
Second Instalment				
Japanese Government	(accompanying to the experts)			16,322.54
Third Instalment				
Japanese Government	(- do -)			4,001.54
		Total :	US$	40,342.11

Table 5 : Table of Equipment & Materials supplied to the Center

(First Instalment) Supplier: The Society (arrived on April 20 1966)

FARM MACHINERY

Kind and Type		Specification	Unit	Value ($) Fob.Japan	Remarks
CULTIVATOR	Iseki KF-850	8.5 HP Air cooled Dies el engine mounted	1 set	1,077.78	Spare-parts etc incl.
PUMP	Ebara SGM	Dia 4" Q=1.03 m^3/min H= 16 m	1 "	527.78	
SEEDER	Nikerin D-20	Non-automatic	1 "	25.00	
DUSTER	Kyoritsu SETE-11	Knapsack-type/hand operated	1 "	16,67	
SPRAYER	Kyoritus		1 "	19.45	
MIST-BLOWER POWER DUSTER	Kyoritsu DM-3B	Knapsack-type/power	1 "	102.80	
SPRINKLER	Oregon	Dia: 4" canal pump 02-2 12 pipes	1 "	306.58	spare-parts
ENGINE	Musashi M90L	8 HP Kerosine Engine	1 "	208.40	"
-"-	Musashi K-37	6 HP -"-	3 "	166.70	"
-"-	Musashi H-5	4 HP 2 cycle gasoline	1 "	72.30	"
-"-	J-5	4 HP 2 " kerosene	1 "	72.30	"
-"-	J-11	2.5 HP "	2	125;1-	"
STUMP PULLER	Nikko Hipo	Weight : 3 tons	1	41.70	
			16 units	$ 2,762.56	

FERTILIZERS & CHEMICALS

Kinds		Quantity	Value ($) Fob. Japan
Ammonium sulphate	(40 kg/sack)	150 sacks	366.00
Calcium cyanamide	(25 " ")	40 "	83.20
Superphosphate	(40 "	25 "	40.75
Fused phosphatic fertilizer	(30 " ")	33 "	48.84
Experimental instruments		1 set	133.40
Measuring "		1 "	145.11
Agricultural chemicals			107.40
Seeds			64.14
			US$ 988.84
	The Society's Total =		$ 3,751.40

(First Installment) Supplier : Japanese Government (arrived on Nov. 28, 1966)

FARM MACHINERY

Kind & Type		Specifications	Unit	Value ($) Fob. Japan
Tractor	Iseki TB-20	20 HP Air-cooled diesel	1	6,028.00
Cultivator	" KF-850	8.5 HP " "	1	1,342,47
"	Satoh LB-17		1	1,342.47
"	Yammar TC-42B		1	876.71
Tiller	Kubota KA-650	6 HP air-cooled gasoline	1	764.39
"	Mitsubishi	-do-	1	764.39
Thresher	Iseki 02-LES	Full automatic	1	205.48
"		-do-	1	205.48
Huller-cum-Finisher	Satake	-do-	1	547.95
Mist Blower	Kyoritsu		1	54.79
"	Maruyama		1	54.79
Pump	Kubota	Dia: 3" Centrifugal	1	136.99
Mower	Kyoritsu RM-21	Shoulder-type	1	136.99
Cutter	Yamamoto Able		1	164.38
		Total	14	$ 12,625.28

(First Installment)

Supplier : Mitsui Bussan KK (arrived on November 28 1966)

FARM MACHINERY

Kind & Type		Specifications	Unit	Value ($) Fob. Japan
Pump	Ebara 75 SOFE	Yammar diesel-engine/3"dia	1 set	$ 534.80
Hand Pump	Tsuda	Dia: 1 - ¼"	1 "	10.00
"	Keibo	Dia: 1 - ¼"	1 "	11.00
"	Delta	Dia: 1 - ¼"	1 "	7.00
Overboard-Propeller	Yammar TO Pet 3 PC	Yammar engine F-4	1 "	368.70
Duster	Kyoritsu K-5	Hand-operated	1 "	12.10
"	" SETE-11	Knapsack-type/hand operated	1 "	22.10
Mist Blower	" MSA	Full automatic	1 "	30.20
"	" PS-3	Shoulder-type	1 "	10.45
Mist Blower-cum-Power Duster	Kyoritsu DM-8	Knapsack-type/automatic	1 "	61.40
Tractor	Iseki TB-20		1 "	2,109.66
Tiller	" KT-600-R		1 "	445.94
			13 units	$ 3,631.35

(Second Installment)

Supplier : Japanese Government (arrived on January 11 1967)

FARM MACHINERY

Kind & Type		Specifications	Unit	Value ($) Fob. Japan
Tractor	Hinomoto Miniature		1	$ 1,644.00
"	Kubota	L-20R 20 HP air cooled diesel	1	2,063.00
"	Komatsu	LT-1200	1	2,192.00
Tiller	Kubota	MP	1	1,315.00
"	Komatsu	LM-500	1	685.00
"	"	LM-600	1	1,150.00
"	Daikin	TL-20	1	959.00
Japanese-type plough		drawn by cattle	1	54.80
Mist Blower-cum Power Duster	Arimitsu MD-35	Knapsack-type/power	1	104.12
Sprayer	" SK-25	"		

Kind & Type		Specifications	Unit	Value ($) Fob. Japan
Mist Blower-cum Power Duster	Arimitsu MD-35	Knapsack-type/power	1	$ 104.12
Sprayer	" SK-25	"	1	68.50
Chain Saw	Kyoritsu Echo CS-60		1	95.90
Mower	Kyoritsu RM-3		1	109.00
Dryer	Ronriko 40 KBK		1	150.70
Forage Cutter	Star New Pet	Blown-up type	1	164.40
Corn Sheller	" CS-2	2 holes/power driven	1	82.20
Field Grinder	" FO-51		1	506.90
Feed Cutter	Yamamoto		1	123.30
Pump	Ebara	Q=0.9m^3/min. H=45m	1	1,545.95
Plastic Pipe	Sekisui	Dia=3" P VC AW 344x80	1	353.95
Generator	Showa	AC 100V 3KVA	1	515.12
Trailor	Hanaoka 43D-400-16		1	191.80
Power Sprayer	Hatta DP		1	123.30
Huller-cum-Polisher	Kokuyo		1	178.10
"	Satake SB-2B		1	411.00
			24	$ 16,332.54

(Third Installment)

Supplier : Japanese Government (arrived in May 1968)

FARM MACHINERY

Pump	Ebara 800 MS	Yammar diesel engine	1	2,083.34
Plastic Hose, etc			1	704.10
			2	$ 2,787.44

OTHERS

Measuring instrument		704.10
Veterinary drugs & medicines		510.00
		$ 1,214.10
	Total :	$ 4,001.54

3.2.7 Construction-Cost & Operational Expenses

Both non-reccurent and recurrent costs of the Center were met by releases from FEOF (Currency Stabilization Fund) as follows :

First release	April 1966	40,000,000 kip
Second release	June 1967	38,000,000 kip
	Total	78,000,000 kip

Table 6 : Breakdown of Releases from FEOF

First release : 40,000,000 kip

Period of release : April 1966-May 1967

Head	Amount	Descriptions
Reclamation & Farm-operation Cost	7,879,569 k	Reclamation cost : 3,386,754 k (7 ha) Farm operation cost: 4,492,842 k (Salaries & waves, fuels, materials, cattles, fertilizers, fodders, repairing, etc.)
Road Construction	3,374,600	Road 6m x 400 m Farm-road 5m x 3,999 m
Irrigation & Drainage Cost	3,876,500	Irrigation/drainage canals 2,500 m Well
Reservoir Construction Cost	457,500	Reservoir 4,000 m
Training Expenses	62,109	Laotian technicians' training
Accommodation & Building Cost	24,214,121	Office 3,800,000 Experts' Quarters 3,320,000 Volunteers' " 3,470,000 Laotian " 2,210,000 Warehouse 2,670,000 Pig shed 1,111,881 Poultry shed 1,388,200 Water distribution 401,500 Floating boat 621,500 Lighting facilities 490,370 Furnitures, etc 2,137,025 Miscellaneous 2,593,645
Total	39,864,426	

Second release : 38,000,000 kip

Period of release : June 1967 – March 1969

(Breakdown as of September 16, 1968)

Head	Amount	Descriptions
Common Account		
Construction-cost	10,412,159	Construction-cost of one Warehouse, one Fuel Storehouse, two Colombo Plan Experts Quarters, Materials, Stores and Transport-cost
Maintenance-cost	8,694,283	Salaries & Wages, Fuels
Agricultural Cost		
Costruction-cost	4,632,837	Road, Canal, Field-maintenance, Stores
Maintenance-cost	3,802,710	Fertilizers, Seeds & Seedlings, Machine-repairs
Livestocks Cost		
Construction-cost	4,749,944	Sheds for Cattles, Pigs & Poultry, Fish-culture & seri culture facilities
Maintenance-cost	1,359,295	Feedstuff
Total	33,648,228	

38,000,000 kip for the second release will be paid in entirety by April 1969. The actual farm operation of this Center was commenced in April 1967 and income from the sales of its agricultural and livestocks products came to be earned since 1968. All the receipts therefore have been appropriated for the Center's operational expenses as per the Agreement.

The total receipt during 1968 amounted to 829,000 kip as per Table 7.

Table 7 : Receipt of the Center during 1968

Item	Commodity	Amout	Unit Price	Value	Time of Sales	Note
Paddy	Rice	2,100 kg	44-50 kip/kg	94,500	Jan/68	Polished
		524 "	60-90 "	39,510	Aug/68	
Vegetables	Tomato, Cabbage, Water Melon, Lettuce, etc			154,510	Aug/Sept	
Fruits	Mango	136 pcs	30-50 k/pce	4,180	June	
	Pineapple	366 "	25-50 "	15,440	Jul/Sept	
	Banana	6,094 "	5-10 "	53,075	-"-	
Agriculture Sub-Total				361,215		
Piggery	Meat-Pig	15 heads	220-240 k/kg	301,070	Aug/Sept	
	Small pig	8 "	500-550 "	47,400	May/Aug	
Poultry	Eggs	5,589 pcs	15-20 k/pcs	108,415	Apr/Sept	
	Meat	14.1 kg	280 k/kg	2,700	May	
Fish-culture	Salmon	21.5 kg	350-500 k/kg	9,100	May	
Livestock Sub-Total				468,185		
Grand Total				829,400		

3.3 Problematic Points of the Center

As already referred to in the above, the Center has been in operation for the last three years and half. Commendable works have been carried on in practical experimentation and research, training of Laotian technical staff and agricultural extension. Before discussing on its future function, it is deemed necessary to review the major problematic points observed with the Center.

(a) Wideness of the Scope of the Work

Laotian agriculture is extremely backward boubtlessly leaving much space for improvement. Technical development and managerial betterment of Laotian agriculture in every needful branch within a short period of time is, however, extremely difficult or almost impossible at the present moment. The Center's attention has been widely but rather thinly spread on such as :

Fiedls of work : Paddy-cultivation, Livestock (cattles, pigs & poultry), Fruits, Vegetables, Sericulture, Fish-culture and Farm Machinery.

Contents of work : Practical experimentation and researches, Demonstration, Training of Laotian technical staff, Agricultural Extension and Marketing of its Products.

Consequently, programme-implementation often lacks smoothness and operational expences tend to go up. Many of its problems seem to originate at such a lack of concentration.

(b) Inadequacy of its Location for Farming

The Center is located at an elevation of 180 m, on the alluvial sandy soil which is very much acidic and yet devoid of organic matters. On and above the adverse chemico-physical properties of the soil which is not suitable for paddy cultivation, irrigation water required during the dry-season has to come from the Nam Ngum River on its north through pumping-up of some 45 m head which makes it imperative to spend an enormous amount of money for installation as well as operation cost. Similar difficulties in management and cost-calculation would be unavoidable with other crops grown under irrigation.

(c) Unadaptability of its Experiment and Demonstration towards the Laotian Farmers

Ultimate purpose of the Center being focussed at levelling-up of the Laotian agricultural standard through extension of rational techniques relating to agriculture and animal husbandry, the environmental situations, the apptitudes and the tastes of the Laotian farmers need to be fully taken into consideration in designing its programmes for practical experiment and demonstration. On that condition, the Center's demonstration-effects would have immediate appeals towards the neighboring farmers who should feel less resistance in adopting such techniques accompanying but inconsiderable additional investment.

(d) Lack of Patience and Scarcity of Leadership

Improvement upon agricultural technique and its extension is a time-consuming process. Starting from quasi-primitive combination of three productive elements of land, sun and water, people were induced to advance to a higher level – from the necessity to increase their farm productivity – where infrastructural renovation and the more effective use of water through its control would combinedly bring better return; they would then aspire for perfection of so-called "irrigation-Farming" which involves introduction of improved varieties of seeds, fertilizer-application, pest & diseases control and other relevant technical improvements. Such technical improvement, however, cannot be isolated from the institutional setup such as education, administration, banking, land tenure system, etc., because the completion of agricultural technique is conditional to simultaneous development of environmental institutions and organizations. Introduction of improved techniques attributable to high-levelled "irrigation-farming" and their instantaneous extension will find little response in today's Laos.

Establishment of a system of irrigation-farming in the Vientiane Plain and its extension among the farmers there will definitely contribute for the country's agricultural development, and the efforts to consolidate the Center's autonomous accounting system in attainment of such a goal are fully justifiable. Nevertheless, the manner in which the Center's work is actually managed fails to give people an impression that it is abiding to a consistently sound and perspective plan aiming at attainment of its ultimate purpose. It would have to be frankly admitted that the Center's management and operation has been at the whim of the Japanese experts who have chanced to come to work there. It was

previously acknowledged that their services have been quite commendable and the achievements of the Center owe very heavily to their efforts. Planning and systematic implementation of the program would have helped making the Center a more valuable institution.

A major stumbling block seems to lie in the lack of unanimous guiding principle between the Society which is the formal project promotor and the OTCA which has been cooperating the project through deputation of experts and Volunteers as well as in supply of machinery, equipment and materials. Disunity of views and opinions among the Japanese staff and lack of efforts for mutual understanding and genuine collaboration among them seems to be no insignificant reason, too.

(e) Lukewarm Attitudes maintained by the Laotian Technicians

The Center's management is made up of a Japanese Director nominated, with the concurrence of the Laotian Government, by the Society (who is simultaneously a Colombo Plan Expert), two Laotian Deputy-Directors and fourteen Farm-operators deputed from the same Government. Five Japanese technical experts headed by Mr. Sato have been sent there on advisory capacity and yet they consititute the substantial work-force of the Center due, if not entirely, to the lack of enthusiasm on the part of the Laotian technical staff. This apathy among the Laotian staff seems to stem, apart from their personal apptitude, at a common belief that acquisition of technical knowhow is scarcely related to their promotion.

In view of the unmistakable purpose of this Center to contribute for technical development of Laotian agriculture on the one hand and of the legal interpretation as to synchronizing the acquisition of technical knowhow by the Laotian technical staff to the time of the Center's handover to the Royal Government of Laos, the above-mentioned difficulties would deserve the serious-most attention and action for their satisfactory solution.

(f) Project Implementation

Following to the feasibility survey and designing survey which had been completed between 1968 and 1969, and the commitment by the Asian Development Bank for bearing its construction-cost being awaited in near future, our Project is almost ready for

implementation. And it is strongly recommended that the Laos-Japanese Agriculture & Livestocks Training Center should be better utilized as a bas-camp of the forthcoming Project.

4. Agricultural Population in the Neighborhood of the Pilot-Farm

4.1 Administrative Units, Households and Population

The project-area administratively belongs to Tha Ngon Tasseng, in Saitany Muong of the Vientiane Khoeng. Tha Ngon Tasseng consists of following eight villages (Ban):

Name of the Villages	Households	Population
Tha Ngon	173	981
Tha Ngone Na	97	454
Tha Som Mo	26	137
Voeum Kahm	27	166
Lat Khonei	69	199
Ban Hay	48	260
Nong Kheng	41	177
Nong No	22	114
Total =	503	2,488

Villagers of Tha Ngon, Tha Som Mo and Lat Khonei, particularly those of the last two, are engaged at farming inside the project-area.

4.2 Public Institutions in Tha Ngon Tasseng

The central village of this Tasseng is Ban Tha Ngon where are concentrated the Tasseng Office, school, hospital and a permanent market. This market is under the Government management dealing in foodstuff, clothings and sundry goods with the inhabitants of the Tasseng and the travellors because of its location basides the ferry-quay across the Nam Ngum, on the thoroughfare running between Vientiane City and Pa Kamoung. Perishables like vegetables, fruits and fish sold there are supplied by the local farmers. Ban Tha Ngon has two more institutions of agricultural importance: the Laos-Japanese Agriculture & Livestocks Training Center and the Uplandcrop Experiment Farm of the Royal Government of Laos. Out of two private rice-mills available

in the Tasseng, one is in Ban Tha Ngon. Its daily output is 1 – 2 tons.

4.3 Land-Use

800 ha project-area has at its center a mixed vegetation of grassy-land and shrubby forest which is encircled by a ring of forest-neighboring villagers look for the firewood, charcoal and lumber in the forest and keep their cattles grazing on the grassy land. Apart from pasturing and collection of reeds for thatching their roofs, they use a limited portion of the grassyland for paddy cultivation. Use of the grassyland for paddy cultivation is thus limited to only a portion of it because of yearly innundation of the Nam Ngum during the rainy season. Out of 20 ha improvised paddyfield (because of make-do borders here and there), people would be happy if one half of the land brings any yield once over several years.

Villagers utilization of the project-area is as follows¾

4.3.1 Ban Tha Ngon

On the bund along the Nam Ngum River, there are eight (8) households belonging to Ban Tha Ngon. They depend on the forest in the project-area for their lumber, fire-wood and charcoal. They have their paddyfields, however, outside of the project-area.

4.3.2 Ban Tha Som Mo

Besides pasturing of their cattles, villagers are trying to cultivate paddy on the flat part of the project-area. There are found many paddy-fields abandoned there because of negligible yields. Because they can not depend on the paddy-field in the project-area for their own food requirements, they are cultivating upland rice on the bund of the Nam Ngum or even go across the river to the opposite bank for tillage. They get their lumber, firewood and charcoal from the forestinside the project-area.

4.3.3 Ban Lat Khonei

Except two who are trying paddy cultivation, villagers seldomly use the project-area besides pasturing of their cattles.

4.4 Brief Description of the Villagers

4.4.1 Ban Lat Khoei:

About 60 households are paddy-cultivators through transplantation method. No joint cultivation on their fields excepting ad-hoc cooperation among the blood-relations at the time of labour paucity. No conspicuous development has been in their paddy cultivation techniques for the last several decades, although a poster for improved paddy cultivation distributed by the Directorate of Agriculture was seen posted on the house of the village-headman, showing that the village is not at all isolated from agricultural extension media. Villagers show eagerness to adopt double-cropping of paddy.

Most of the males marry into the brides' families. They prefer to do without betrothal presents and, instead, bear a yoke to feed their wives' parents, brothers and sisters, plus their own children all through their life.

There seems to exist no rigid communal restrictions on the villagers' individual beliefs or their agricultural and fishing practices, as observed by the officer in-charge of USAID. While rain lasts, their meagre commercial relations with neighboring villagers are left severed. Not a few villagers take taxies at Ban Tha Ngon to go to the morning market in Vientiane City. There is a primary school in this this village.

4.4.2 Ban Tha Som Mo

13 out of 26 households are cultivating paddy, 10 of them doing so on the grassy land of the project-area (during 1968). The floating rice is sown, according to the traditional style, inside the fence prepared on the grassyland. Their paddy cultivation is primarily meant for their own consumption and no hired labour is used for commercial production. Labour-exchange is limited among the blood-relations, without material payment. Village-headman is thus used to help two of the villagers. He is prepared to toil himself as often as water is available but he was seemingly not quite sure of the general opinion of the villagers. It is not that they are ignorant of the utility of farm-machinery but lack of fund that they have none.

Village-headman has no objection to the Japanese people to open paddyfield in the project-area.

Village-headman is in his third yerar of term which runs for five years. Election sends anybody to the post of Nai-Ban (village-headman) through ballot-box. The head of Ban Tha Ngon supervises over such election. Electred person needs to be approved by the Muong Office before assuming his post. Village-headman may be re-elected. One Secretary is also chosen by the villagers through election. Village can never be evacuated by both village-headman and secretary at the same time; either one must stay in the village all the time. Election method of village-headman and secretary is common to all the villages. Election time is a rare opportunity when the whole villagers meet all at one place.

Tasseng Head is indirectly elected by the village-headmen in the Tassent who are supposed to represent their villagers' opinion. Villagers are generally obedient to the Government order. Village-headman has chances to visit the Directorate of Agriculture. Villagers also go to Vientiane City to sell their cormorants and fish but not rice. 16 village youngmen are in military service on voluntary basis. Ban Tha Som Mo has one primary school.

5. Land Tenure System

Laotian law specifies that the land in the country belongs to the state and individual ownership of land can be claimed only when he opens virgin land or virgin forest on the condition that such land shall be restored to the state if left uncultivated for three consecutive years.

He who is desirous of opening new land has to submit application for reclamation, specifying the plot which he intends to reclaim, to Nai Ban (village-headman), who sends the paper up to the Governor of his Province through the heads of Tasseng and Muong. In case his application will be approved of, the Governor of the Province sends him a cultivation-permit, while the name of the applicant and the location of the land to be reclaimed by him will be duly enterred into the Land Register of the Provincial Government. Cultivation Permit holder has to pay registration-tax and its receipt stands for the culti-

vation permit paper.

Cultivation Permit is given on the following conditions :

(a) The area cultivable will not be more than 10 ha per familty;

(b) Land thus reclaimed shall be devoted for food production;

(c) The maximum period of time a permit-holder can cultivate under this law shall be 10 years; upon termination of which the land has to be restored by the state. Removal of cultivation period may be allowed upon application, and

(d) Cultivation permit is valid only for the bearer of the licence and transfer or fragmentation of the land is precluded.

Such rules and regulations are not the common knowledge of the farmers nor many farmers have even applied for such permit to the Government for the land which has been put under plough. Many farmers claim onwership of land in the project-area but few can produce legal permits to authenticate their claims.

6. Farmers' Organization

Farmers' association in Hat dok keo has been studied with the following findings:

6.1 Significance of our Study

Farmers' association in Hat dok Keo district is the first of its kind in the Kingdom of Laos, organized under the guidance of Israeli experts. Colonists into our project-area in Tha Ngon district will need to be organized in some proper form.

It was, therefore, deemed appropriate for the Survey Team to explore into the texture of Hat dok Keo Farmers association and the guiding principles of its organization followed by the experts deputed by the Israeli Government. Israeli experiences are highly instructive for discovering effective policies and measures for organizing Laotian farmers coming under the development project to be propelled by the Japanese Government in Tha Ngon district.

6.2 Process of Farmers' Organization

Hat dok Keo Farmers Association started with 42 interested farmers in December 1968, from amongst 200 farmers residing in the irrigation project-area taken up jointly by the Israeli Government and the Royal Government of Laos. Fund-raising was started simultaneously with its formation and the member-families increased to 54 by April, 1969. Very intensive guidance has doubtlessly been renderned for its successful organization by the Israeli Farm.

6.3 Objectives of the Farmers Association

(a) Smooth supply of credit ;

(b) Advantageous marketing of the farmers' produce (rice), and

(c) Supply of farmers' necessities in linkage with marketing.

6.4 Organizational Setup

The Association is managed by a Committee elected by the member-ship. Two General Meetings a year, with an emergency meeting as required. Committee submits report at the general meeting. There is no full-time office-worker. Day-to-day work of the Association is done by the members. The Association has no independent office as yet and its headquarters is currently accommodated in the Israeli Farm.

Organization of the Committee

President

,

Vice-Preident

,

Treasurer

,

Secretary

,

Supervisor

6.5 Guidance by the Israeli Farm

The Farmers Association is autonomously managed and operated but under the direct and personal guidance of a Laotian Association technician attached to the

Israeli Farm. Keynotes of his guidance are as follows :

(a) Upkeeping and maintenance of organizational setup;

(b) Turning the implicit wishes and desires of the member-formers into the explicit ones, and

(c) Organizational guidance shall be extended beyond marketing of the members' produce and farming.

6.6 Busines Aspects

(a) Marketing: The Association enters into a contract with ADO in regard to the price of rice prior to transplanting. The contract purchase-price by ADO for this season (rainy season of 1969) is 30 kip per pilo of paddy. Individual sales of paddy by the producing farmer fetches only 25 kip per kilo. The amount of paddy thus marketed by the Farmers Association at the end of this season will be 100 tons.

Yield of the traditional variety is 1.7 ton/ha for a single crop in this district but majority of the farmers who adopted IR-8 or C-463 through the guidance of the Israeli Farm are raising an assured yield of 6.0 tons/ha per season.

(b) Credit: The Association will be financed by ADO upto 1,290,000 kip this year. When a member borrows a tractor from the Israeli Farm, he is encouraged to save 100 kip per rai in this bank account for procurement of farm-machinery in future, besides payment of the tractor hirage. Such arrangement is done by the Association.

6.7 Perspectives for Future

6.7.1 Membership's Increase

By next season, the membership will increase from the present 54 to 100 – 150 families. 100 % affiliation of total farmhouseholds in the irrigation project-area, that is 200, is neither planned nor expected.

6.7.2 Expansion of Activities

Procurement of a tractor in the name of the Association is planned as a Special Program. Lao Developing Bank is prepared to finance one-half of the amount

if the Association will raise another half of it in cash. When the rainy season is over, a tractor will be brought in and a godown attached with the Association office will be constructed.

6.7.3 Establishment of Central Cooperative

In case similar farmers associations will come to be organized in other parts of the country, the Central Cooperative or a Federation of them may be established in Vientiane City for marketing and other services. Its significance for general development of the Laotian farmers will no doubt be considerable.

6.8 Some Remarks pertinent to Farmers' Organization in Laos

(a) Membership shall be 40 as a minimum; strength less than this will mean financial weakness of the organization;

(b) Credit in kinds such as seeds, fertilizers, etc is preferred to cash credit;

(c) Extension service is indispensable; and

(d) Organization and function of the farmers organization shall be voluntary; no outside pressure nor coercion needs to be given.

7. Marketing of Rice

7.1 Demand and Supply of Rice

7.1.1 Production

According to the statistical figures compiled in 1968, the area under paddy cultivation in the Province of Vientiane was 43,798 ha (29,099 ha wet paddy and 14,699 ha upland rice) and paddy production was 44,500 tons (32,800 tons of wet paddy and 12,200 tons of upland paddy). Yield per ha. is thus around 1.9 ton (1.1 tons with wet paddy and 0.8 ton with upland paddy). Such figures pertinent to paddy production in the "Rice Bowl" of Laos can find their equals only among the lowest rank when southeast Asia is taken as

as a whole. With very little venture in bringing the spacious forestland and plain under ploughing and with the farming technique remaining in the same obsolete manner entirely under the naked influences of Nature, inspite of recent introduction of advanced agricultural techniques and the means of double-cropping, rice production in the country has shown no conspicuous upward trend for the last several years.

7.1.2 Demand

Consumption of polished rice in the Province of Vientiane over a year is estimated at 68,210 tons or 110,016 tons in term of paddy. This is based on the population figure reported as some 310,000 in 1968 and pre-capita consumption figure of 219 kg/year as estimated by USAID. Polishing loss is supposed to be 49 %.

7.1.3 Demand-Supply Balance

As in the year 1968, Vientiane was a rice deficit Province by 65,516 tons in paddy and 41,065 tons in polished rice. Another rice-producing Province of Pakse was in surplus of 36,017 tons in paddy and 22,233 tons in polished rice in the same year (based on the similar calculation as in the Vientiane Province). The Province of Vientiane can, therefore, expect to cover a little more than one half of its rice shortage from the adjoining Province of Pakse and the remainder from Thai across the Mekong River.

7.2 Current Situations of Agricultural Products Marketing

Rice and maize are two major farm products in Laos, each producing 570,000 tons and 20,000 tons. Besides them, only few kinds with negligible output are being known. Their marketing system is the most unsophisticated producer-consumer type, as withnessed in the country's biggest farm produce market: Morning Market in Vientiane City. Only limited kinds of farm products are obtainable in the Market and grading, standardization or processing which would enhance their sales-value is the least concern of the sellers. No shop in Vientiane City handles perishables which are available in the Morning Market alone. Production and marketing has not yet been differentiated with her agricultural products and rice, the only exception, has very

limited sphere of marketing because smooth transactions between the deficit and surplus districts are seriously handicapped by bad roads, poor means of transport and deteriorating peace and order.

These and other domestic situations allow a large import of Thai rice which controls its market both in circulation and price-determination. Rice price in Vientiane fluctuates at the whim of rice price in Thailand, making it hopeless to control it from the conveniences of Vientiane or, for that matter, of Laos.

Rice merchants are overwhelmingly Chinese (Overseas) – by 65% or so -. then Thai (25%) and the remants consist of the Vietnamese and Laotian contingemts;

Extremely low as the rice productivity is in Laos, only uncertain surplus left over the producers' family consumption is being marketed admitting no or few permanent rice-collecting system under the merchant's control. Chances for organized procurement of marketable rice through supply-demand relations of the farmers' necessities or offering of credit is also meagre, excepting at a few more flourishing producing centers, as most of the farmers are satisfied with the traditional pattern of farming precluding any meaningful factor-input. Additional difficulty for systematic rice-collection lies in the fact that the producers have little means of transporting their products and thus necessitates an enormous amount of labour and cost for collection, on and above the bad roads and disquieting situations ruling in the countryside.

Shortage of warehouses in good conditions is evident; rice milling facilities are likewise far from satisfactory, with daily capacity of only 75 tons being available within 20 km radius of Vientiane city.

Rice merchants have established clients only among relatively rich but numerically few citizens (majority of the Laotians Living in the suburbs of Vientiane are producing their own rice) and foreigners. Price payable to producers is as low as 25 kip/kg (in paddy), while its retail price is 80–90 kip/kg (polished, June – July 1969), Big margin between producer price and consumer price admits ample space for ratio-nalization, and yet, the

current retailer price does not sound simply absurd because what one gets in return is a fairly high standard rice.

Smooth collection of rice and its fair price formation needs to be endorsed by a sound credit which is conditional to importation of rice from Thailand, apart from Unorganized system as for local produce. Under these circumstances, an intermediary exploitation upon the cultivators through marketing as well as supply of materials and credit is becoming the more aggressive, working against an increased production of rice. The farmers' cry for adequate means to be arranged for more advantageous marketing of their paddy is increasing its seriousness on many good grounds. ADO, a joint organization between the Royal Government of Laos and USAID, was established in 1965 with the view of bringing an increased number of farmers into money-economy through an increased production of paddy and is engaged at multi-phased activities such as systematization of rice-marketing, supply of agricultural necessities, financing of production loans and dissemination of better seeds. It launched upon procurement of a bulk of paddy from the Laotian farmers since 1968. Its rice procurement scheme is motivated, among other things, by two immediate purposes; the one is to supply rice, through USAID, to the army and the refugees and the other, to check middlement's plundering of the paddy in the countryside at unreasonably low price.

ADO's function as a rice-collecting agency equipped with transport conveniences and storage facilities for even supply of rice all through the year is particularly significant. Merchants are thus expected to operate mills and distribute ploished rice among the consumers. ADO is of the opinion that the paucity of rice milling facilities is partly responsible to rice shortage and its officer i/c marketing is planning to construct additional rice milling facilities.

Chapter Ⅲ : Implementation Program of the Pilot-Farm

1. Guiding Principles for Establishment and Operation of the Pilot-Farm

1.1 Scale of Paddy Production and System of Its Technical Guidance

1.1.1 Scale of the unit of operation on 100 ha of farmland to be developed as the Pilot-Farm and the technical guidance system thereof will be as follows:

(a) Scale of the operational unit and the Colonists' Organization

(i) Each colonist shall be allocated with 2 ha of land;

(ii) 12 Colonists on 24 ha will form one group, electing one representative who shall be held responsible for control and operation of farm-machinery for the group's common use, and

(iii) From amongst such group-representatives, one who is well versed with managerial problems of the colonists shall be elected; he shall try to make such problems known to the Laotian and Japanese technicians and discuss with them ways and means for solving such problems. (He is identical to "Technical Consultant" of the Farmers' Organization as discussed under the heading of Ⅲ-3: Organization of the Farmers, below)

(b) Technical Guidance System by Technical Experts

(i) Technical Experts will be appointed by the Royal Laotian Government and the Japanese Government;

(ii) Laotian and Japanese technical experts will deliberately chalk out the basic policies and concrete methodology of technical guidance on the colonists' behalf, and

(iii) Laotian technicians will share responsibility of technical guidance over the colonists' groups, according to the technical guidance policies and methodology, with the advices of the Japanese experts.

1.1.2 Experiment-Farms and Training-Farms

(a) Experiment-Farms

(i) Size of the Experiment-farm: 1 a per farm (1 ha in total);

(ii) Purpose:

Two groups of soil available in this area, viz: recent alluvial immature soil and ancient lateritic soil, have been proven through chemical analysis to contain least available phosphoric acid. It is, therefore, feared if the paddy grown here may not develop undesirable phenomenon of low yield due to phosphoric acid deficiency, on the ground that these soils have similar tendencies as of the volcanic acid soil prevalent in Japan. (Such phenomenon was already observed in the paddyfield of the Laos-Japanese Agriculture & Livestocks Training Center.) The following experiments are deemed both desirable and necessary in the Experiment Farms:

(1) Volume Test of Phosphoric Acid;

(2) Volume Test of Nitrogen;

(3) Timely Test of nitrogenous top-dressings - timing of top-dressings (tillering stage, younger formation period, etc.), and

(4) Volume Test of Potassium.

(b) Training Farms

(i) Size of the Training farm: 1 ha per farm (3 ha in total)

(ii) Purpose:

(1) Training on Mechanized Farming (ploughing, harrowing, puddling and harvesting);

(2) Demonstrative crop cultivation (incl. test cultivation).

1.2 Preparation of the Farm

Each plot of paddyfield shall be $200^{m} \times 50^{m} = 1$ ha., to satisfy the undermentioned conditions:

(a) To facilitate for effective employment of large-sized farm-machinery thereon;

(b) To meet with more or less unevenness in topographical condition of the area;

(c) To enable efficient water-control in term of irrigation and drainage for paddy cultivation;

(d) To economize construction-cost, and

(e) To assure even allocation of 2 ha per colonist.

The above conditions are binding in case any alterations are to be made to the standard plot or plots. Plan for preparation of paddyfield is attached.

Secondary Farm Roads will be constructed with 400^{m} intervals along the shorter side of the paddyfield. They shall be assured with 3 meter effective width. The surface of the road should be 0.3 meter higher than the field-level for the good maintenance of its course base, but 0.2 to 0.3 meter would be the ideal height to ensure easy passage of farm-machinery in and out of the paddyfields. In case the secondary farm road needs to be kept higher than 0.3 meter, at least a portion of it shall have its longitudinal slope so arranged as to have its height regulated within 0.3 meter above the paddyfield.

Metalling of the secondary farm-road is not planned at the moment but some sort of road-surface protection may become imperative at the low land, in view of innundation there.

Plot-to-plot irrigation system will not be adopted here and paddyfields will be constructed anew each with farm-lateral along its shorter side. This will facilitate for plot-wise water-control but an overall water-control by all the colonists in the area becomes imperative to avoid general water shortage.

As farm-lateral will run along the shorter side of the plot, tracter-passage has to run over the lateral to enter the opposite plot. Such tracter-passage will have to be built by the colonists themselves with available materials under the guidance of the technical experts.

The type of the lateral is earth-canal, as a rule, and the careful maintenance by the organized efforts of the colonists is very much required to avoid diminuition of its section.

There shall be built an independent drainage canal on each plot so that water-supply may be regulated for timely airing of the surface of the paddyfield and liquid fertilizers

can also be used therein. As such drainage canal is earth-canal, good maintenance as careful as with the irrigation-canal is most important.

For some time soon after the paddyfield will be newly prepared with fresh borders, percolaration through and collapse of borders often takes place. In anticipation of such inconveniences, the border needs to be built at a height of 30cm, with crest-width of 50cm and its embankment slope must be 1:1. A border with enough space will provide necessary earth for adjusting differential settlements when such occur on the surface of paddyfield.

In preparing paddyfield of 1 ha with 200m on one side and 50m on the other, it is assumed to be extremely difficult to maintain an evenness of its surface at ±5cm all along the length of 200m, and settlement due to consolidation would occur where earth-filling work might have been done. Accordingly, levelling should be conducted so that the inlet side would be made somewhat higher than the outlet side. Even this-much arrangement may prove fairly difficult and expensive if tried all over a plot of 1 ha; in such a case, an alternative measure would be to sub-divide 1 ha paddyfield into several smaller plots by building improvised borders so that the difference of surface levels may be kept at 10cm between one to the other. The same care to make the inlet side higher than the outlet side is called for. When settlement due to consolidation would complete its course at some later date, wetland bulldozer might be put on duty for another levelling work.

Under the present plan, the number of inlet corresponds to that of plot, but as each plot is designed to be 1 ha with 200m along its longer side, it may become necessary to build additional inlets if too much time is required for the water in spreading over towards outlet point. To facilitate the water reaching the peripheral end, a temporary irrigation ditch will have to be dug (15cm wide and 5cm deep) from the inlet to the peripheral end; a large-sized tractor will do this job rather easily.

Drainage canal is planned to be dug along the shorter side of the plot to collect the water which spreads over 200m on its longer side, but this may not be good enough to drain water within a short period of time. This problem will be solved by digging a

temporary drainage ditch (15cm wide and 15cm deep) on the paddyfield and connect it to the outlet. For better drainage, it is adviseable to dig a secondary drainage canal (open ditch) along the longer side of the plot so that the drainage distance will be shortened from 200m to 50cm. To ensure efficient farm-work and good yield on a large plot with the distance of 200m along its longer side, the maximum attention is to be directed at its drainage and, therefore, either a mole drain or an open drainage canal along the longer side of the plot may as well be built, although such is not considered under the present plan.

1.3 Net Contents of the Improved Method of Paddy Cultivation

1.3.1 Cultivation period

Double cropping of paddy is what is designed on the Pilot-Farm. The first crop of the two will be planted in the earlier part of October and harvested in March and the second crop will be planted in the earlier part of April and harvested in the earlier part of July. Two rainy months of August and September will not give us any chance as the field would be submerged under the flood-water. The above will be illustrated on Table 8 below:

Table 8 Paddy Planting Order

Crop \ Month	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.
	(s) 10/10	(t) 1/11				(h) 1/3						
First Crop												
							(s) 1/4	(t) 20/4		(h) 5/7		
Second Crop												

(s) = sowing (t) = transplantation (h) = harvesting

1.3.2 Method of Cultivation and Varieties

For both crops, transplantation of young plants grown on the nursery bed onto the paddyfield is the ruling method. Indica verieties such as IR-5, IR-8, or, possibly, some high-yielding local varieties will be used for the first crop and Japonica varieties such as Norin-17, early ripening Koshiji, Hatsunishiki, etc. will be used for the second crop.

1.3.3 Problematic Points

(a) First crop (dry season)

As the paddyfield is kept under flood-water during August and September, ploughing for the first crop needs to be effected as soon as the field will have been drained. The nursery bed will have to be prepared where water recedes at the first instance and sowing on the nursery bed needs to be completed by the early part of October. Earing period of the first crop falls in January when the atmospheric temperature tends to drop lower than desirable for paddy cultivation, often responsible for its sterility. Ample application of phosphoric fertilizer onto the paddyfield would provide low temperature resistance to the paddy.

(b) Second crop (rainy season)

As Indica varieties require 135 to 140 days for their maturity, the first crop will be harvestable by the early part of March; to obtain good second harvest within some 120 days of April, May, June and July, the early ripening varieties need to be used. Japonica varieties are recommended for the second crop because "Hatsunishiki", for instance, which was tried in the Laos-Japanese Agriculture & Livestocks Training Center required only 95 to 100 days for maturing in this season of the year and is not unwelcomed from the taste point-of-view also.

Orderly farm-work is very much required as the interval of time between the first crop is rather short. As harvesting enters into the rainy season, excrescence (viviparity) of the harvested paddy needs to be avoided through careful drying. Harvested paddy bundles must never be left on the ground; they can rather be hung on the branches of nearby standing bamboos or trees. If necessary, multilayered scaffolds may be built in the neighborhood of the paddyfield, on which

harvested paddy bundles will be dried within shorter time and properly threshed and winnowed.

1.3.4 Cultivation Order and Use of Farm Machinery

Table 9 shows the group-wise cultivation order among the colonists.

1.3.5 Projected Yield and Yield Determining Factors

The projected yield in the Pilot-Farm is upkept at the level of 5 tons/ha in paddy. Factor-wise targets in attaining this much yield are: 300 ears in 1 square-meter, each ear bearing 80 grains, each grain weighing 24 g/thousand. (300 ears x 80 grains $\times \frac{24g}{1,000} \times 10,000 = 5,760$ kg/ha)

Yield determining factors have general tendencies as briefed in the below:

* Poor soil-nutrients work against tillering of each stock, resulting at decreased number of the ears in total. The number of ears, however, can be artificially maintained on higher level by increasing the number of fruitful culms through application of chemical fertilizer and by regulating the planting density.

* The number of grains on each ear is determined by the density of nutrients maintained inside the plant itself some 35 days prior to its ear-formation. Less density of nutrients brings less number of grains.

* Over-nutrition, an excess of nitrogen in particular, in this stage works upon an increase of the number of grains, but its artificial control through application of chemical fertilizer is of no avail as such will have influences upon the plant only in its later stage of growth (ripening and lodging).

* Weight of the grains is apt to be influenced by the climatic conditions, particularly sunshine and temperature, after the ears will be formed: shorter sunlit hour and lower temperature helps bring down the weight of the grains.

Table 9 : Cultivation Pattern & Use of Farm Machinery = Schedule for the First Crop

Item	Description : Dosage per ha/kind of machinery	Farm Machinery & Tools			Time of Farming and Working Days							Amount of Labor
		Kind	Joint Use	Individual use	Sept	Oct	Nov	Dec	Jan	Feb	Mar	
NURSERY-BED												
Nursery bed	Flat flooded bed	-	-	+								-
Seed sown	Soaked seeds weigh 45 kg when dry	-	-	+								-
Size of nursery-bed	1/20 of the field = 5a	-	-	+								-
Ploughing	Tractor	50 HP w/disc plough	+	-		1 day x						0,2ha/hr 1.2ha=6 hrs
Fertilizing	N=80/P=300/K=80 (kg)	-	-	+		1_x day						-
Harrowing	Tractor	20HP w/disc harror	+	-		1_x day						0.4ha/hr 1.2ha=3 hrs
Puddling	Tiller	6 HP	+	-		2 day x						0.15ha/hr 1.2ha=8 hrs
Sowing	In 3 lots	-	-	+		x1 day x1 day x1 day						-
PADDY-FIELD												
Ploughing	Tractor	50HP w/disc plough	+	-		20 days						0 2ha/hr 2.4ha=20 days
Fertilizing	N=50/P=300/K=80 (kg)	-	-	+		10 dyas						0.2ha/manday 2ha = 10 days
Harrowing	Tractor	20 HP w/disc harrow	+	-		10 days						0.4ha/hr 24ha=10 days
Pudding	Tiller	6 HP	+	-			6 days		-			0.15ha/hr 6ha=6 day
Transplanting	Man power	-	-	+			20 days					10a=2 mandays 2 ha=20 mandays
Planting Density	25 cm x 20 cm	-	-	-								-
Weeding/Inter-tillage	Man power	Hand-operated Weeder	-	+			5 days 5 days					0.4a=2 mandays 2 ha=5 days
Pest/Disease Control	Man power	Hand-operating duster	-	+			4 days					0.5ha=manday 2ha = 4 days
Harvesting	" "	Hand-driven harvester	-	+							8 days	0.15ha=monday 2 ha = 8 days
Threshing	Thresher	Thresher	+	-								-

Note: a) Number of Working Days is f or 24 ha per group (6 hrs per day) ; b) Each one Tractor is allotted for 24 ha per group, c) 4 Tillers per group or 1 Tiller for 3 colonists.

Therefore, yield determining factors could be divided into those more amenable to artificial control and those more prone to natural phenomena. The number of ears does belong to the former, but not others. The form of paddy-growth in this part of the country will need to be carefully studied so that its yield determining factors may be adequately worked upon to realize the highest possible yield.

1.3.6 Input of Vitalizing Elements into the Soil

Extreme paucity of available phosphoric acid in the soil available in the Pilot-Farm, as explained in the above (under 'Experiment-Farm'), makes it absolutely necessary to supply phosphatic fertilizer (fused magnecium phosphate) as much as 1.5 tons/ha.

2. Settlement Scheme

2.1 Policy

Settllers into Tha Ngon Development Project-area shall be recruited from amongst the nationwide applicants and only those who are well qualified in both their personal disposition and willingness to establish a pattern of agricultural management which will prove to be of such a high productivity and income that it may stand as a model for developmental efforts in Laotian agriculture, need to be selected.

2.2 Qualifications

Those who will be settled into the project-area are desired to meet, as a rule, all the qualifications given below, from (a) through (f):

(a) A couple who can jointly operate 2 ha paddyfield by themselves, or a bachelor who, by getting married rather soon, can expect to have enough labor to do so;

(b) Those who are currently engaged in farming or who have had experiences in farming over a year, with the strong desire to establish temselves as cultivators, in both cases;

(c) Those who are capable of farm-management, or those who are expected to acquire such capacity through necessary training in the Laos-Japanese Agriculture & Livestocks Training Center;

(d) Those who have more or less operational capital to start with but not necessarily the full amount required for the purpose;

(e) Those who are cooperative, with little fear to cause disharmony in joint-farming practices with the other workers, and

(f) Those who are healthy enough to participate at vigorous farmwork.

Those who can satisfy all the conditions mentioned in the above can be the ideal settlers, although judgement as to (b), (c) and (e) is rather difficult and those who are actually cultivating inside the area may not be totally exampted even though they are not fully qualified.

2.3 The Would-Be Settlors

2.3.1 Settlers into the Pilot-Farm

(a) Capable farmers in the neighboring villages who are willing to join:
To be discovered in a course of agricultural extension work by the Laos-Japanese Agriculture & Livestocks Training Center. Approval of the Project Working Committee will be necessary.

(b) Those who are desirous of joining among the cultivators in the project-area:
To be determined within a specific period of time (only those who are actually engaged in farming at the specific time will be considered). Intimation through the use of notice-board and administrative channels.

(c) Others:
Even those who are engaged in farming in distant districts, for instance, farmers in the neighborhood of the Rice-Center at Salakham or those in Hat dok Keo district may be admitted if they so desire, with necessary qualifications.

Good care is required to select the best-possible settlers as they are going to populate the Pilot-Farm which shall have the deciding influences upon the whole Project-area.

2.3.2 Settlers into the Project-area as a Whole:

(a) Candidates from the neighboring villages;
(b) Candidates from those cultivating in the project-area;
(c) Those recruited at national level. Newspapers, radio and Tasseng Offices may be used in full for this purpose; and
(d) Trainees of the Training Center at Ban Amon.

2.4 Recruitment and Selection

2.4.1 Method of Recruitment

(a) Application Form for Allotment and Accompanying Papers:
Candidates shall fill in the Application Forms (original and two copies) for Allotment and send them to the Tha Ngon Project Working Committee, either directly or through Tasseng Offices.

(b) Items to be enterred into the Application Form:
Name, address, occupation (current and past) and family-relations of the applicant and observations (see Sample Form 1)

(c) Entry of Observations on the Application Form:
Observation column of the Application Form shall be enterred by the Laos-Japanese Agriculture & Livestocks Training Center chiefly in connection with the applicants from amongst the villagers in the neighborhood of the project-area:

(i) Whether the applicant is actually engaged in farming within the project-area: whether he is encircling his plot; if he is prepared to waiver such rights when colonizing into the project-area ?

(ii) Whether the applicant is assuming or has assumed in the past any official position (village-headman, secretary, etc.) in his own village ?

(iii) What can be the applicant's status (in leadership, speech and action) among his own villagers ?

(d) Papers accompanying to the Application Form:
(i) Personal History
(ii) Oath (see Sample Form 2)
(iii) Declaration of Assets & Liabilities (see Sample Form 3)
(iv) Driver's Licence, if any
(v) Certificate of Matrimonial Engagement (for bachelor) (see Sample Form 4)

2.4.2 Method of Selection

(a) Screening on Papers

Tha Ngon Project Working Committee will screen the applicants' Forms and their accompanying papers to make preliminary selection.

(b) Interview

Tha Ngon Project Working Committee will interview those candidates who successfully pass the paper-screening. They will be asked to produce documents such as the savings certificate and negotiable papers to prove their possession of operational fund. Doctor who sits among the interviewers will examine the candidates medically as well as physically.

(c) The interviewing Committee members will fill in their marks on the Selection Paper (see Sample Form 5) according to the Marking Standard (see Table 10) to conduct a fair selection of the candidates:

(i) Each interviewing Committee member will fill in Selection Criteria Column (1 through 6) of the Selection Paper in accordance with Marking Standard. Any candidate who may be rated as "D" in any of his Selection Criteria Column by more than one examiner needs to be re-checked upon deliberation among the whole examiners.

(ii) Total of the arithmetic means of the criterion-wise marking by each examiner will stand as a composite mark of the examinee.

(iii) Examiners will give priority to the examinees by order of their composite marks.

(iv) Examinee whose mark falls below standard or below an average point of 6 with any one of the Selection Criteria, will be dropped unless special remarks in the Observation Column will cover his short-comings.

(v) The whole examiners will compare the examinees' priorities and observations and observations thereof and the settlers will be finally selected after good deliberations among the examiners.

(d) Settlement Contract

Notice of Land Allotment (see Sample Form 6) will be granted to such farmers who will have been selected as the qualified persons and a contract on the land thus allotted will be concluded.

Sample Form 1: Application Form for Allotment

Form No. 1

Application for Allotment

Date received: _____ Date of Application: _____
(day) (month) (year)

To: Tha Ngon Project Working Committee

Applicant's Name : .....
Applicant's Date of Birth: .....
Applicant's Address : .....

I do hereby apply for allotment of land (2 ha) in Tha Ngon Development Project-site.

OCCUPATION	Kind of Occupation		Duration	Place of Occupation		
	Current					
	Previous					
FAMILY RELATIONS	Name		Relations	Occupation	Health condition	Others
OBSERVATION						

Sample Form 2: Oath

Form No. 2

O A T H

Date: .....

To: Tha Nogon Project Working Committee

Address: .....

Name : .....

I hereby make an oath that, once I shall be granted the Notice of Allotment and allowed to settle into Tha Ngon Development Project-site, I will honestly engage at farming by abiding to the undermentioned terms and conditions:

Terms and Conditions

1. Waivering of all the rights pertaining to farming, pasturing and/or collection of woods and grasses in the customary ways in the project-area and denouncing of every claim thereto to the Royal Government of Laos;

2. Farming according to the policies due to the basic programme to be established, enforced and implemented by the Working Committee of Tha Ngon Agricultural Development Project;

3. No alternative utilization of the alloted land;

4. Spirit of cooperation will be uplifted and demonstrated on the occasion of water-use, planting agreement, joint-use of farm-machinery and such other occasions.

Sample Form 3: Declaration of Assets & Liabilities

Form No. 3

Declaration of Assets & Liabilities

Date: .....

To: Tha Ngon Project Working Committee

Address: .....

Name: .....

On this occasion of my filing application for Land Allotment in Tha Ngon Development Project-site, I do declare my assets and liabilities as follows.

I will gladly appropriate these assets for livelihood expenses as well as operational fund in the initial year of my settlement there.

Declaration

ASSETS (Value or Quantity)

In monetary form In monetary form	Cash Savings Others Total	
In term of articles	Paddy	

LIABILITIES

Debited to:	Outstanding Balance	When Borrowed	Due on	Remarks
Bank Individuals Others Total				

Sample Form 4: Certificate of Matrimonial Engagement

Form No. 4

Certificate of Matrimonial Engagement

Date: .....

To: Tha Ngon Project Working Committee

Applicant for Settlement :
Address:
Name :

Applicant's Betrothed:
Address:
Name :

In filing the Land Allotment Application for Tha Ngon Development Project-site, we make an oath that we are going to be married by the time of settlement.

Witness:
Address:
Name :
Occupation:

I certify that the above two are duly engaged to each other and will be married rather soon.

Sample Form 5 : Selection Paper

Form No.5

SELECTION PAPER

Examiner's Name : .....

Examinee's Name :					
" Date of Birth :					
" Address :					
Occupational Career					
	Kind	Duration	Place	Others	
Current					
Previous					
Family Relations					
Name	Sex	Re-lation	Age	Job	Health
Applicant					
Assets & Liabilities					
	Assets		Liabilities		
Cash			Bank		
Savings			Individuals		
Others			Others		
Total Paddy			Total		

Section Criteria	Mark	Note
1. Labor Force		
2. Working Spirit		
3. Apptitude for advanced tech-nology		
4. Financial Position		
5. Cooperative Indisposition		
6. Physical Conditions		
TOTAL		

Observations

Composite Judgement

Composite Mark	Priority	
		Passed :
.....Pts.	No.	Rejected :

Examiner's Views & Opinions :

Remarks :

Transcription from the Observation Column of the Application Form for Land Allotment.

Table 10 : Marking Standard

Selection Criteria	Mark	Description
1. Labour-Force	A (10 points)	Having the requisile labour-fource or, even though the labour-force is somewhat less, having good qualifications otherwise
	D (0 point)	Not having enough labour-force required for a settler family
2. Working Spirit	A (10 points)	Having strong aspirations for farming in Tha Ngon district and extremely willful to work
	B (8 points)	Having aspirations for farming and willful to work
	C (6 points)	Having somewhat negative aspirations for farming and willfulness to work
	D (0 point)	Lacking in aspirations for farming and willingness to work
3. Appitudes for Advanced Technology	A (10 points)	Having received necessary training on farming and equipped with capacity to learn needful technology for farm-operation
	B (8 points)	Good capacity to learn technology required for farm-operation
	C (6 points)	Though having capacity to learn technology needful for farm-operation, streneous efforts will be required
	D (0 point)	Having little apptitudes for learning necessary technology for farm-operation
4. Financial Position	A (10 points)	Having assured fund over and above a specific amount or, though the amount is not considerable, having favorable conditions otherwise
	D (0 point)	Having not enough fund or whose fund is not assured
5. Cooperative Indisposition	A (10 points)	Excellent
	B (8 points)	Good
	C (6 points)	Fair
	D (0 point)	Bad
6. Physical Conditions	A (10 points)	Very healthy and physically fit
	B (8 points)	Ordinary in health and physical conditions
	C (6 points)	Somewhat less healthy and small degree of physical fitness
	D (0 point)	Either disabled or sick

Sample Form 6 : Notice of Land Allotment

Form No.6

NOTICE OF LAND ALLOTMENT

No. _____

Allottee's Address :

Allottee's Name :

Allotment of land in Tha Ngon Agricultural Development Projectsite is hereby made on the terms and conditions given below :

Tha Ngon Project Working Committee

Date : _____

1. Location, Size and Use of the Alloted Land :

Location	Size	Use of the Land

2. Terms and Conditions of Alloted Land :

(1) Allottee will undergo trainings at the Laos-Japanese Agriculture & Livestocks Training Center for a specific period of time, before or after settling on the allotted land ;

(2) Allottee will not use the allocated land for other purposes than mentioned in the above;

(3) No transfer of the cultivation rights to others;

(4) No other person or persons shall be allowed to cultivate the land and get proceeds out of it;

(5) Careful maintenance of the land and effective use of it ;

(6) Allottee shall abide to the policies due to the basic programme to be established by the Working Committee of Tha Ngon Agricultural Development Project ;

(7) Allottee will cooperate among eath other in water-control, planting agreement, joint-use of farm-machinery and such other cooperative works, and

(8) Allottee who may act against the above terms and conditions from (1) to (7), will loose his entitlement to the allotted land.

3. Organization of the Farmers

3.1 Setters' Organization in the Pilot-Farm

3.1.1 The whole setters' on 100 ha of the Pilot-Farm will be organized into a single body.

3.1.2 A group of each 12 households will make a unit of the Organization; each group will also function as a unit for joint-utilization of farm-machinery.

3.1.3 Activities of the Setters' Organization:

(a) Clearance of indebtedness;
(b) Supply of capital and/or producer-goods required for farm-operation;
(c) Storage, processing and marketing of the farm-produce;
(d) Maintenance and control of various facilities, farm-machinery, pumps and network of roads and canals;
(e) Savings;
(f) Joint purchase of livelihood necessities;
(g) Education and training on agriculture; and
(h) Other activities aimed at promotion of the members' farm-management and strengthening of their organization.

3.1.4 To start with, (a) to (d) of the above will need to be taken up and the others will follow.

3.1.5 When every one of the above mentioned activities will come to be efficiently put into practice and the Organization's management will run satisfactorily, the following activities may be taken up in addition:

(a) Agro-industry;
(b) Establishment of facilities desirable for better-living of the members;
(c) Establishment of medical facilities; and
(d) Activities meant for promotion of the members' livelihood and their cultural standards.

3.1.6 Financial Basis of the Farmers' Organization

(a) Initial Fund

Initial fund for such as Office, office facilities, storehouse, etc., will be raised as follows:

(1) Share-Capital

Equal share will be paid up by the members, the same amount of share-capital shall be paid by those joining the organization at later stage.
Average share-capital of the Japanese multi-purpose agricultural cooperatives having 1,014 members is ¥18,708,000 (for 1967).

(2) Government grants and subsidies

A considerable portion of its initial fund may be provided, either in cash or in kinds, with the organization which is expected to plây an important part for successful implementation of the Project.

(b) Operational Fund

(1) Levies

A part of the organization's operational expenses will be levied upon each of its constituent-members on either monthly or semi-annual basis. If the maintenance cost of the farm-roads and water-control facilities within the project-area needs to be borne by the settlers, it will be levied on the members together with the above. Japanese agricultural cooperatives usually levey promotional and guidance cost among the members, including land improvement levies, which jointly amount to ¥769,000 per co-op.
(for 1967).

(2) Proceeds from Organization's Activities

(i) Interest-margin

When the farmers' organization handles banking activities on behalf of its members, it is entitled for banking-fee. Such banking-fee may be paid to the farmers' organization either by the Government or any other financial instructions, or else recoverable from the members who borrow money through the organization.

In Japan, the Settlers' Co-opertives are paid by the State a fee of ¥ 100 per case of Settlement Loan, plus handling commission of 2% on its recovery (1% in case of recovery of the total loan at a single instance). In case of Settlement Guarantee Fund, the member-colonist pays 8.3% interest, while 0.3 % of which will be retained by the Settlers' Co-op.

(ii) Rentals of Farm Machinery and Others

A part of the rental of the tractors or the fee for ploughing the members' field by tractors will be appropriated for operational expenses of the organization.

(iii) Commission for Marketing & Supply Services

The organization can expect for income in term of sales-commission for its services in marketing its members' products and supply-commission of producer-goods on their behalf. In case no sizeable grants or subsidies are forthcoming from the Government, the farmers organization will have to pay off its operational expenses primarily from the levies and handling commissions.

In Japan, agricultural co-op . is paid by the Goverment ¥ 112 (for 1969) per 60 kg of unpolished rice as collection-fee. Multi-purpose agricultural co-op. in Japan charges the following percentages on the value as commission for its marketing and supply services on behalf of its members :

Marketing-commission :	1.5% for general items
	1.1% for rice
Supply-commission	:	8.4%

(These figures are the averages of 337 co-ops. during 1967)

(3) Government's Assistances

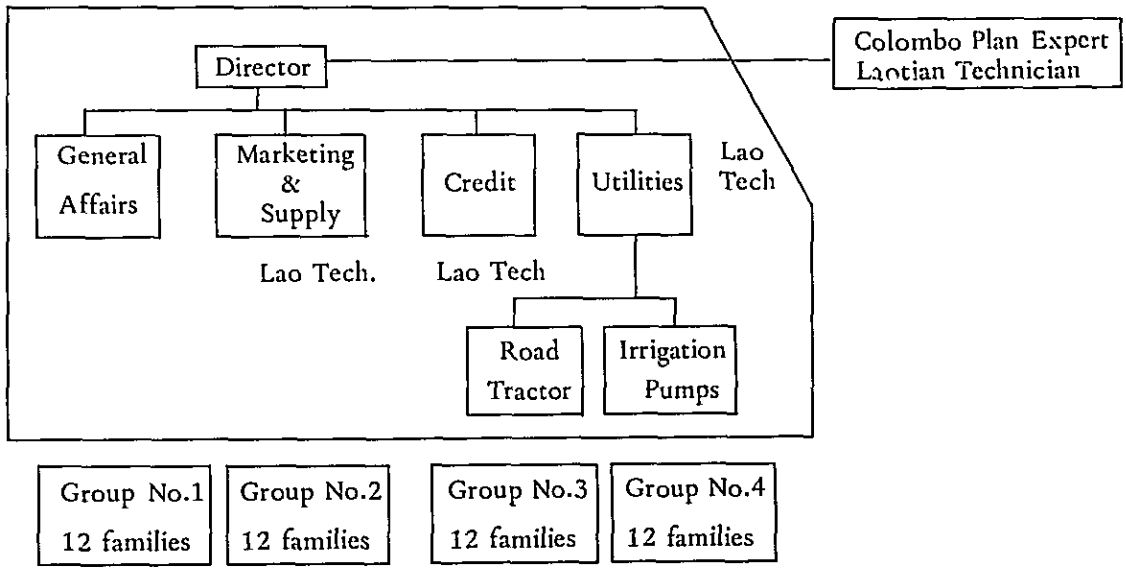
Government may offer assistances to the farmers' organization not only on the occasion of its formation but also for its operation by providing either financial or material aids as required.

3.1.7 The actual management and operation of the farmers' organization will not be undertaken by the Japanese side, although it will obviously require an overall orientation and day-to-day guidance by the Japanese experts and Laotian technicians until the organization will come to stand on its own feet. Ultimately, however, the management and operation of the organization needs to be taken care of by its constituent-members.

3.1.8 Each group of the member- settles will nominate one person or two as their representatives and these representatives of the member-colonists will stand as the Committee-members of the organization. This Committee will manage the organization's work. Director will be elected either from amongst the Committee-members or from the whole members through general vote. Important issues having serious bearings on the management and operation of the organization need to be decided upon in the general meeting.

3.1.9 Specimen of the Organization's Setup

Fig. 2 : Committee of the Organization



3.1.10 Director of the farmers' organization and/or a few members of its Committee will sit among the membership of the Executive Comt. of Tha Ngon Agricultural Development Project.

3.1.11 One of the member- settlers' representatives who are the organization's Committee members will be held responsible for technical matters in charge of "Utilities" Section of the organization.

3.2 Farmers' Organization covering the Whole Project-area

Farmers' organization covering the whole 800 ha of the project-area will come to be formed in due course of time, on the following akeleton lines :

3.2.1 Basically same as the Farmers' Organization to be formed by the settlers into the Pilot-Farm:

(a) Each group of the member-farmers who are bound to cooperate among each other due to commonness in habitation, water-supply, joint-use of farm-machinery and other facilities, etc., will send one or two representatives to the Committee;

(b) Committee will take over responsibilities of the organization's management and operation.

3.2.2 This organization will have 400 settlers-families on 800 ha as its members. In case the whole settlers can not come under a single umbrella, they may come together into three separate organizations.

Average membership of the Japanese agricultural co-operative in primarily rice-growing area is 772.6 (during 1967).

3.2.3 Upon completion of the farmers' organization in Tha Ngon Project-area, it would be advisable to form federation of the farmers' organizations, hand in hand, with that in Hat dok Keo district.

3.3 Organization of Farmers and Guiding Principles

3.3.1 Itinerant Teacher-Adviser among the Neighboring Villagers

Japanese Experts, Overseas Cooperation Volunteers and Laotian technicians will organize an itinerant teacher-adviser group and make rounds of extension work through personal acquaintance with the neighboring villagers. Amicable human-relations are the best ground-works for any extension activities. In this connection, the following three will have to be kept in mind :

(a) Learning of the Laotian language by the Japanese workers;

(b) Establishment of satisfactory leadership pattern among the Japanese experts, Overseas Cooperation Volunteers and the Laotian technicians, and

(c) Discovery of the persons with leadership among the villagers.

In the initial stage of itinerant teacher-adviser group activities, individual farmhouseholds in the neighboring villages will have to be visited door to door but, gradually, group-guidance method will come to prove more effective.

Even after the farmers will be well organized and such organization will come to be managed satisfactorily by the local farmers themselves, personal guidance of each individual farmhousehold will need to be continued. (See Fig. 1)

3.3.2

Personal guidance of the farmhouseholds will be done primarily by a combined team of the Japan's Overseas Cooperation Volunteers and the Laotian technicians; Japanese experts will be called in whenever their expert-knowledge and experience is required.

3.3.3

Combined Guidance Team of the Japan's Overseas Cooperation Volunteers and the Laotian technicians will prove more workable if organized with the ratio of two from each side or more than one by one.

Specialized technical guidance team will also work efficiently if Japan's Overseas Cooperation Volunteers can be grouped together with Laotian counterpart technicians for each different purpose of cultivation, pest and disease control, farm-machinery , etc.

3.3.4 *Long-Term Training of the Laotian Technicians*

Training of the Laotian technicians who are held responsible for practical guidance of the farmers through personal contact needs to be conducted for a long time along the following guide-lines:

(a) Training will be given by the Japanese experts at the Laos-Japanese Agriculture & Livestocks Training Center;

(b) Training will be conducted on a long-term basis according to the curriculum prepared to meet the purpose of Tha Ngon Development Project (several times a week, each time for half-a-day);

(c) The contents, intensity and level of training will be decided upon, taking into consideration the trainings given at the Agricultural School run by the Directorate of Agriculture at Hat dok Keo, the Israeli Farm and the Rice Center at Salakham, and

(d) Training will consist of theoretical and practical lessons (operation of tractors and pumps, farmers guidance, use of equipment and materials for the purpose of extension, etc.)

3.3.4 Group Guidance

After preliminary guidance of the farmers on an individual basis, their group-guidance through the lecture-meetings at settlement-level or the Laos-Japanese Agriculture & Livestocks Training Center will be desirable. While the main theme of such meeting would remain with agricultural problems, it could also be usefully prevailed upon as so many means for adult eduction or social eduction. Besides the meetings gathering indefinite number of attendants, group-training with some special purposes and towards some specific people

(for instance, Youth Group and Women's Group) will be of significant value.

3.3.5 It is hoped for that through such group-guidance, farmers with leadership and capacity will be discovered and induced to become the settlers ; farmers will need to be taught of the necessity to organize themselves and the merit of joint-farming. When they will be coming forward to organize themselves, necessary knowhow of organization and its management shall be explained to them.

3.3.6 Education and Training of Key Personnel of the Farmers Organization and Farmers with Outstanding Leadership

As soon as the farmers inside the Project-area will organize themselves, its key personnel (Committee-members) and its members who are endowed with leadership will have to be given an intensive education and training. Organization's managerial knowhow and technical improvement of individual member-farmers through organization will be the two main subjects of education and training.

3.4 Items to be studied with the Laotian Technicians

(a) Possibility and methodology of deputing them for training in Japan.

(b) Promotion or equivalent incentives for those who undergo technical training, and

(c) Obligation to serve on duty, for specific period of time, at Tha Ngon Development Project, after receiving requisite training.

3.5 Other Advices and Recommendations

3.5.1 The success of this Project fatally depends on the availability of a specific number of excellent Laotian leaders who can raise the levels of the settlers through personal contact. "Excellent Laotian leaders" may be forthcoming

from amongst the officials of the Royal Government of Laos or, possibly, from amongst the settlers-farmers coming into the Project-area.

3.5.2 In case settlers-farmers of excellent leadership will be discovered, they need to be given intensive training and appointed as the extension service-men paid by the Government so that they will be employed for guidance of the settlers

3.5.3 Revolutionary as this Project may seem to the local farmers because of its introduction of modern equipment and materials for the advanced farming on almost instantaneously created paddyfields, the settlers will spend sometime to adjust themselves to the new mode of life and the new method of farming. Maladjustment is feared to bring about ill effects among them. Good care to avoid psychorogical irritations and mental frustrations among them, due to sudden change forced upon their traditional or customary way of life, is very much necessary, particularly in the initial period of their settlement .

	Calender	Construction work and Settlement	Process of Settlement and Organization of Settlers	Guidance	Schedule of Guidance by Japanese experts
	October, 1969	Commencement of the construction work		Individual Guidance	1. Itinerant Teacher-Adviser work among the neighboring villagers. 2. Commencement of a Long-term term training of the Laotian technicians.
First Year	1970				3. Commencement of Group-Guidance. 4. Deputation of Laotian technicians to Japan for training
Second Year	October, 1971 November, 1971	Main works and Pilot-Farm to be completed Settlement n into the Pilot-Farm	Selection of Settlers into the Pilot-Farm in the first-half of the year Organization of the Settlers into the Pilot-Farm	Group Guidance	5. Commencement of Training ing of the key personnel and the leading Settlers
Third Year	October, 1972 November, 1972	Completion of 300 ha paddy-field Settlementn into 300 ha paddyfield	Selection of the Settlers into 300 ha paddyfield and their training to be started Organization of the Settlers into 300 ha paddyfield		
Fourth Year					
Fifth Year	October, 1974	Settlement n into 400 ha	Selection of Settlers into 400 ha and their training to be started		

Fig. 3 : Schedule of Guidance (by Japanese Experts)

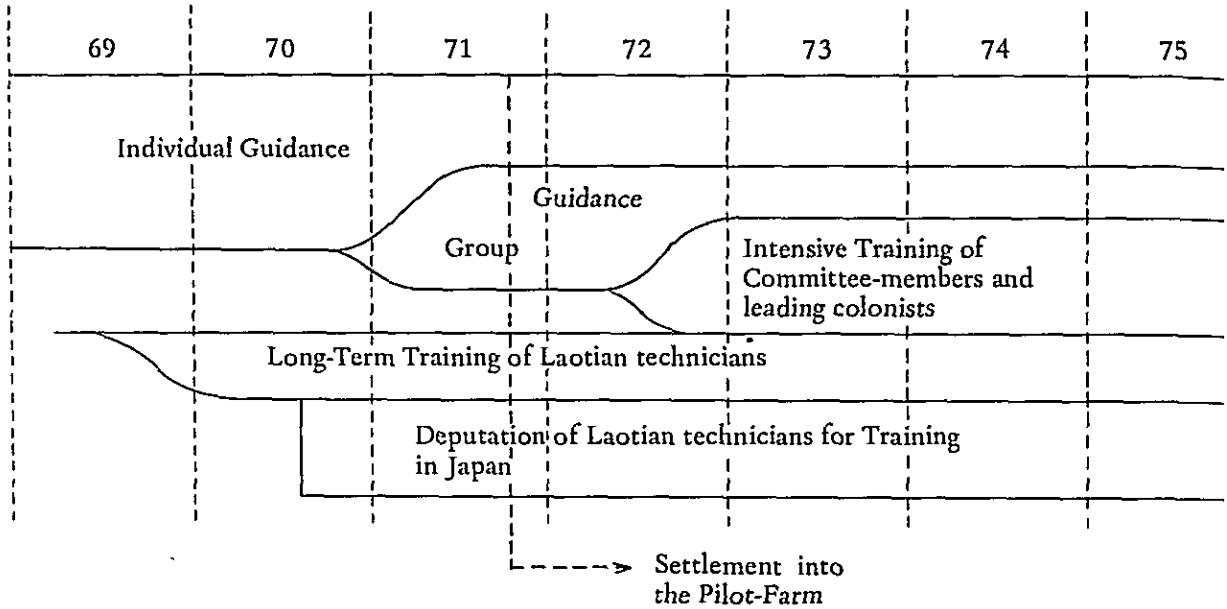
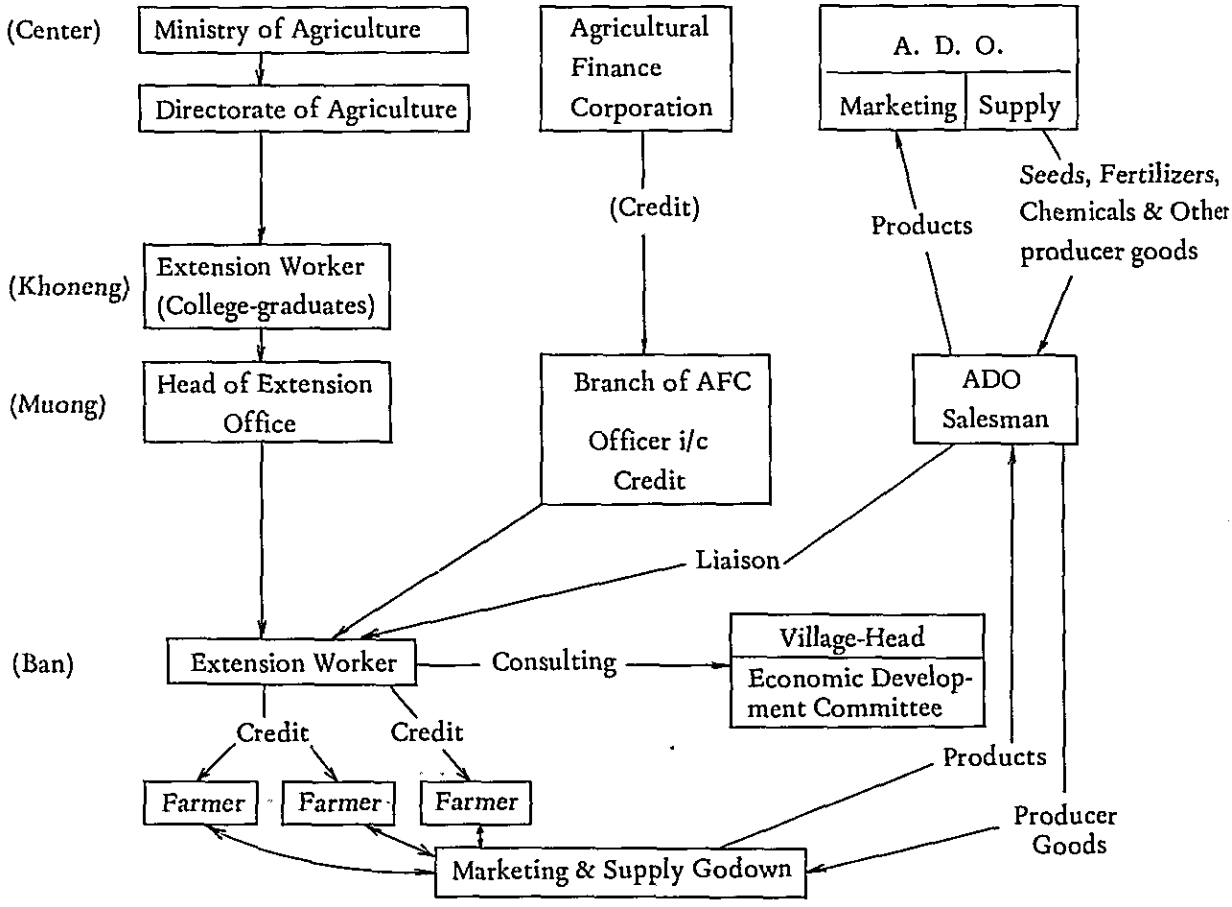


Fig. 4 : Organization Chart by ADB Mission (pro-forma)



4. Proposal for Establishment of Tha Ngon Project Working Committee

For a systematic and officient implementation of this Project, including establishment of Tha Ngon Project Working Committee at the center and of Tha Ngon Pilot-Farm Implementation Committee at the project-site is made with the following organizational setup:

(Center)

Tha Ngon Project Working Committee

	Comt. Members	Secretaries
Royal Government of Laos	Planning Minister	Commissary-General of Planning
	Economic Minister	Director of Agriculture
	Finance Minister	Director of Budget & Control
Government of Japan	Ambassador	Secretary i/c Tha Ngon Project
Asian Development Bank	Head of Agricultural Department	

(Tha Ngon)

Tha Ngon Pilot-Farm Implementation Committee

Laotian part :	Project Director
	Counterpart officers
	Settlers' representatives
Japanese part :	Project-Leader
	Technical Experts

The terms of reference of these Committees would be :

Tha Ngon Project Working Committee

a) Establishment of Settlementn Scheme;
b) Selection of the Settlers;
c) Implementation of the construction work;
d) Programming of ADB's loan and its repayment;

e) Supervision and control over machinery, equipment and materials supplied;

f) Coordination with other cooperation programmes (USAID, Kennedy Round Assistance, etc);

g) Disposal of the problems concerning land and

h) Other items relevant to Project Implementation.

Tha Ngon Pilot-Farm Implementation Committee

a) Infrastructural renovation, such as irrigation, dranaige, farm-road, etc;

b) Guidance on farmers organization;

c) Control over land improvement facilities;

d) Maintenance and control over machinery, equipment and materials supplied;

e) Farm-management guidance on the farmers;

f) Training of Laotian technicians;

g) Establishment of adoptable agricultural techniques and their Demonstration and Extension;

h) Guidance on repayment programme;

i) Coordinated distribution of aid-materials from K.R. Assistance and those from ADO, and

j) Other items relevant to the Pilot-Farm implementation.

5. Relationships with the Laos-Japanese Agriculture & Livestocks Training Center

5.1 How to deal with the Laos-Japanese Agriculture & Livestocks Training Center

As has been already mentioned in the above, this Center has now completed, within three years and a half since its inauguration on April 8 1966, its principal facilities, infrastructural renovation of its fields, introduction of cattles, crop-cultivation on the initial stage and accompanying works such as experiment and research as well as training of Laotian technicians. Its achievement has been fairly commendable.

For attainment of its proper objectives, however, there seem to exist many problems such as switching-over of its experimental work to that more adaptable to the local conditions, more effective training of its Laotian technicians and its neighboring farmers and efficient extention services on behalf of the common farmers. In a way, the Center's activities for the last three years have been a series of spade-work for commence-

ment of full-fledged agricultural development cooperation. It is believed that this Center will come to play more important role in developing Laotian agriculture, if it assumes the following course of revitalization:

(a) The Center will continue on functioning but on governmental basis and as a part and as a part and parcel of Tha Ngon Agricultural Development Project, since the latter will come to be implemented (probably after November 1969). The Agreement between the Lao-Japanese Cooperation Association for the Development of Laos and Royal Government of Laos was amended in view of extending the term of the Center's function on the original line for another year, by April 7, 1970;

(b) The Center's function would be somewhat altered once it starts servicing under governmental technical cooperation project:

(i) This Center will be reshuffled into an Agricultural Technical Center (provisional name) under Tha Ngon Agricultural Development Project and will function as a base for technical improvement and extension services centerring around paddy production and animal husbandry in and around the project-area. Sericultural section of the Center might be turned into a Branch-office of the Central Sericultural Station which would be established under a separate Sericultural Development Programme now under way;

(ii) Accordingly, the Center will come to function in the above capacity with five (5) sectors of paddy-cultivation, animal hustabdry, horticulture (including vegetables), sericulture and farm-machinery. To distribute its limited power among these five (5) different branches of work at equal proportion would not be so productive and, therefore, the Center might better concentrate its efforts in paddy- cultivation and animal husbandry (pig and poultry) in which the Center's experience and research have been quite fruitful. Its paddy cultivation work should be concentrated at the Pilot-Farm and about 4 ha of paddyfield would be marked out for the purpose. However, the Center would work on its own farm until the Pilot-Farm could have been completed. Animal husbandry and farm-machinery programmes towards Tha Ngon project-area, Ban Tha Ngon and its vicinity will be operated within the Center's compound.

(iii) The Center will put more emphasis on practical experiment, demonstration, technical training and extension rather than on research aspect, and these practical works will be undertaken by the Japanese experts and the Japan.s Overseas Cooperation Volunteers. The Volunteers are expected to work primarily at agricultural extension.

(iv) The following combination of the technical experts and Volunteers is belived to be workable. Additional strength of the Volunteers will be very much welcomed to make extension aspect the more powerful wing.

Table 12. : Combination of Technical Experts and Overseas Cooperation Volunteers

	Project Leader	Paddy cultivation	Horti-culture	Irri-gation	Animal Husbandry	Seri-culture	Farm-machinery
Experts :	1	2		1	1		
Volunteers:		3	1	3	1	1	1

	Farm's organization		Total
Experts :	1	=	6
Volunteers:	2	=	12

(v) The operational cost of this Center will be covered by the releases of FEOF.

(vi) It is believed to be of great significance to depute an appropriate expert to the concerned Central Government organ, to advise on such matters as establishment of internal organization for agricultural extension and collection and distribution of farm-products.

5.2 Construction-Cost and Operational Cost of the Center for the Remaining One Year

For the continuation of the Center's function for another year, the following cost will be incurrable :

Table 13 : Construction & Operation Cost

UNIT: YEN

	Head	Amount	Remarks
Suppliable by the Government of Japan	Farm operation materials	¥ 4,278,000	Details as per Table 23
	Fertilizer & Chemicals	1,236,000	Details as per Table 24
	Total	¥ 5,514,000	
Borne by the Royal Government of Laos	Construction-cost	3,700,000	Table 25
	Operational cost	4,000,000	Details as per Table 26
	Total	7,700,000	

Table 14 : Breakdown of Farm Operation Materials

UNIT: YEN

Kinds	Descriptions	Pce/set	Value
1.Farm-Machinery & Implements			
Truck	2 ton capacity w/diesel engine with spare parts	1	¥ 800.000
Diesel Generator	W=10/12 kW F=220V 50 c;s	1	700,000
Submersion-type Well Pump	Dia=21/2" H=65m Q=0.3^3/min	1	500.000
Portable Pump	Dia=2" H=30m Q=0.2m^3/min 1 of the two with engine	2	50,000
Sprinkler Set	Sprinkler, Engine-hose w/spare	1	150,000
Ridger	For Tracter TB-20	1	50,000
Tools	For repairing	1	100,000
Spare Parts		1	850,000

Animal Husbandry				
Implements				
Scale for Pig	FHK-FN 431	1	¥	195,000
Horticultural				
Cheese-cloth	White No.300 180 cm x 100 m	7 (rolls)		70,000
Plastic-sheet	For roofing 90 cm x 180 m	100 (sheets)		100,000
Total			¥	3,565,000
	Freight for the above (20%)		¥	713,000
	Grand Total :		¥	4,278,000

Table 15 : Fertilizers & Chemicals

UNIT: YEN

Kinds	Quantity	Unit Price/ton		Value
Synthetic Fertilizer (15.15.16)	101	32,000	¥	320,000
Superphosphate of Lime (16%)	2	15,000		30,000
Potassium Sulphate (4 %)	4	35,000		140,000
Fused Magnecium Phosphate	5	20,000		100,000
Ammonium Sulphate	5	22,000		110,000
			¥	700,000
Farm Chemicals				309,000
Seeds				30,000
	Total :		¥	1,030,000
	Freight for the above (20%)			206,000
	Grand Total :		¥	1,236,000

Table 16 : Construction - Cost

Kinds	Value	Descriptions
Irrigation :		
Floating Pump-Station	2,000,000	
Regulating Pond (southern) repair	300,000	Intake
Canal construction	600,000	Care-taker, border

- to be continued -

Kind	Value	Descriptions
Farm-road	400,000	Maintenance & Control
Pig-shed construction	300,000	Colony shed : 3 sheds ₹ 100,000/shed x 3
Seedling House Construction	100,000	For vegetables
Total :	3,700,000	

Table 17 : Operational Cost

(Unit = kip)

(Income)

Kinds	Scale	April	May	June	July	August	Sept
Paddy	480.8 a	30,800	30,800	30,800	330,800	30,800	30,800
Fruit	225.0 a	6,000	6,000	9,000	47,500	75,000	75,000
Vegetable	86.9 a	-	-	-	35,000	-	35,600
Pig	(Breader 14) (Meat 34,	470,000	281,000	27,000	200,000	125,000	125,000
Poultry	Laying 200	54,000	55,800	54,000	54,000	55,800	54,000
Fish	Carp 3,600	20,000	-	-	-	-	-
Total		580,800	373,600	120,800	367,300	286,600	320,400

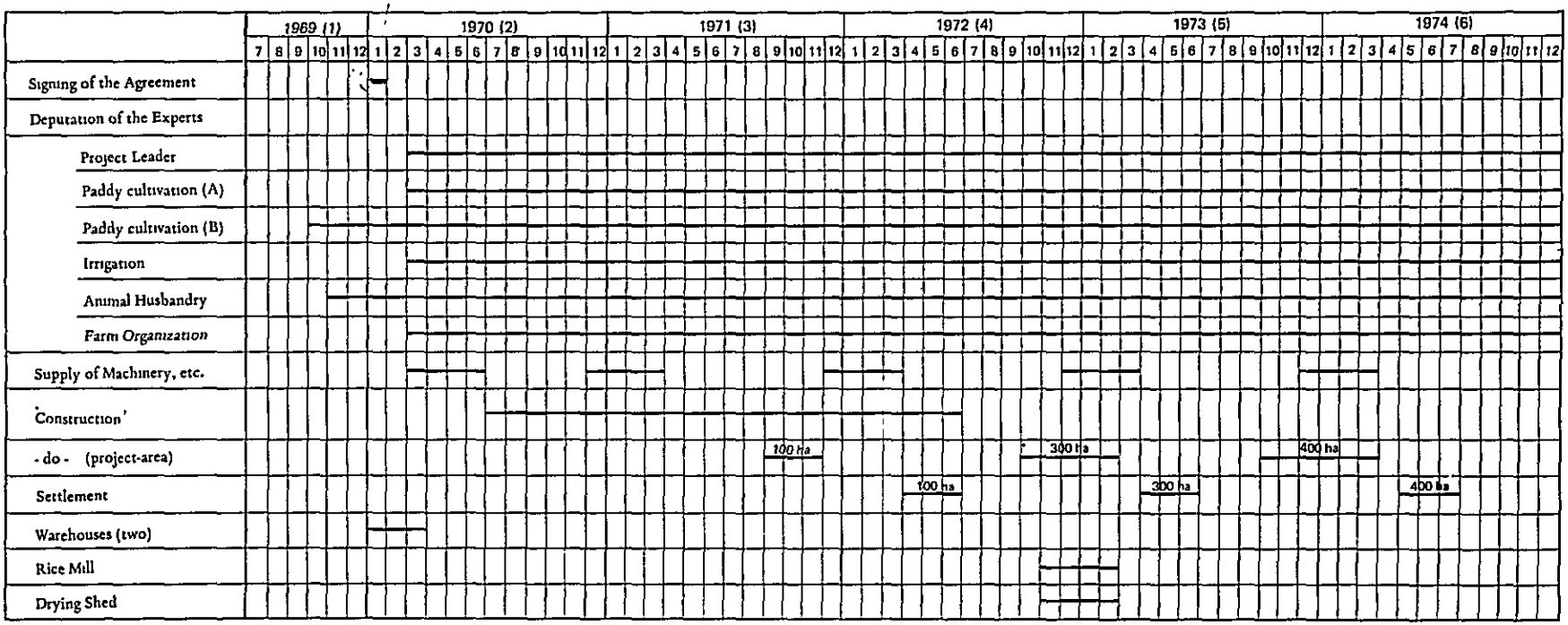
October	*November*	*December*	*January*	*February*	*March*	*Total*
30,800	30,800	220,760	30,800	30,800	30,800	559,560
47,500	25,000	10,000	10,000	10,000	10,000	331,000
56,800	42,400	137,500	56,000	94,500	40,000	497,800
250,000	55,000	445,000	470,000	490,000	415,000	3,353,000
55,800	54,000	55,800	55,800	52,200	55,800	657,000
-	-	-	-	100,000	150,000	270,000
440,900	207,200	869,060	622,600	777,500	701,600	5,668,360

(Expenditure)

Heads	Monthly value (average)	Annual	Descriptions
Personnel Expenses	350,000	4,200,000	Lao Technicians salary 30% subsidy 50,000 kip per month, plus 300,000 kip for wage
Fuel Cost	100,000	1,200,000	For operation of pumps, farm-machinery and automobiles
Material Cost	50,000	600,000	Stores, stationery, consumables, etc
Fartilizer, Chemicals, Seeds	50,000	600,000	Local procurement
Repair Cost	100,000	1,200,000	Farm=machinery, automobiles
Feedstuff	150,000	1,800,000	Cattles & their feeds
Total	800,000	9,600,000	

6. Operational Program

Table 18: Operational Program



7. Introduction of Farm Machinery

7.1 Prevalence of Farm Machinery

Survey has been concentratedly conducted in Vientiane district and Tha Ngon district in the vicinity of the Project-site, but reliable information was available neither from the local offices at Muong and Ban-level nor at the Directorate of Agriculture. In both districts, however, large-sized tracters were often seen working on the fields.

7.1.1 Domestic Production of Farm Machinery

No power-driven farm machinery is being produced in the country. Small-scale factories here and there are turning out minor agricultural implements, such as plough, hoe, hatchet and harrow. They are of manual operation or drawn by the animals. Technical level and unit of production of these minor implements is on cottage industry basis.

In many countries of southeast Asia, there are plants assembling foreign-made farm-machinery but none in Laos, primarily due to its territorial conditions, and basically because of the naive nature of its agriculture under the naked influences of Nature where no commercial farming aimed at increased return through employment of major machinery is dreamed of.

It scarcely seems probable, at least for sometime to come, that farm-machinery assembly plants will be built and their products will be put in use in a big scale.

7.1.2 Import of Farm-Machinery

Because of the complete lack of production at home, all the farm-machinery needs to be imported from abroad. Its import - by and large wheel-typed large-scale tracter - has been steadily increasing since 1965. Import of big tracters suitable for the soil and the duty in Laos is pushed by ADO as a part of USAID's programme in Laos.

Principal types and kinds of such tracters are:

(1)	International	65 HP
(2)	Farguson)	35 HP
(3)	Ford)	

As for the import of Japanese-made farm-machinery, there is no data available. Those being used in the Laos-Japanese Agriculture & Livestocks Training Center seem to be impressing the Laotian farmers rather favourably and demand for small tillers is in an increase. They are coming via Thailand as there is no agent in in Vientiane.

7.1.8 Prevalence of Farm-Machinery

There has been effected no Agricultural Census in Laos and even the basic data are nothing better than so many estimates. Farmhouseholds some 600,000 in number are spreading on approx. 2,500,000 ha. However, little of them own power-driven farm-machinery ; their equipment consist of a set of simple cattle-drawn plough and harrow, plus hoe, sickle and hatchet.

Farmers came to show some interest with farm-machinery only since a couple of years ago, mainly through introduction of big tractors which started ploughing their land on hire. While the demand for farm-machinery in Japan took the order of minor-medium-major, the case is just the opposite in Laos.

Power-driven farm-machinery is scarcely owned by individual farmers and most of them are jointly owned by group of people for ploughing only, and surface puddling is usually done by buffalo-drawn harrows. It also depends on the field conditions.

Two shops in Vientiane deal with farm-machinery but the order is seldomly met by stock on hand and, therefore, desired kind and type is normally arranged for import upon receipt of order. Under the circumstances, mechanical farming has many obstacles: general complacency among the Laotian farmers with conservative

mode of farming and subsistent way of life is the most basic. They are not prepared to pay their own money for farm-machinery and what they are using today are mostly those sent under aid-programmes of USA, Australia, Germany and Japan. Lack of experience and knowhow is responsible for frequent breakdown which is ç another important reason for unpopularity of farm-machinery.

Farm-Machinery and Implements owned by Tha Ngon Villagers (as surveyed by Muong Office)

Plough	1 per farmhousehold
Harrow (clod breaker)	1 " "
Harvesting equipment	none
Huller	1 for the whole village
Plosher	1 " "
Sprayer	On hire from the Directorate of Agriculture. Hoe, sickle, hatchet and other simple tools and implements are owned by each farmer.

7.2 Customary Farming Practices and Their Efficiency

Experiment made it known that as many as four crops of rice can be harvested per year only if water-supply is timely available. Water-control, however, is the difficultmost practice in the country under the circumstances and double-cropping is the best what they are doing in the vicinity of Ban Koun , 20 km north of Tha Ngon village and Ban Sithan Tay village, 18 km south of Vientiane.

Customary practices of paddy-cultivation are ruled by the rainy season which lasts from May to September, as follows:

7.2.1 Ploughing and Land Grading

Cultivators wait until rain which arrives in each May will fill their paddyfield with water as deep as 20cm; within five or six days, the soil will be softened enough for ploughing by use of a wooden plough drawn by buffalo, to the depth of 15 - 20cm.

Low ploughing efficiency is not due to any traction resistance along 20cm width of tillage but primarily to the slow speed of buffalo's movement. They are usually adopting rotary ploughing, starting from the fringe of their field. Through this ploughing, the earth is not turned over either due to the structural defect of the locally made plough or because ploughing is done under sufficient depth of water. The field is left intact for 10 - 14 days under water after ploughing, probably to prevent the weeds from growing. 3 - 4 days before transplanting, harrow is used for puddling; a considerable weeds grown after many days of ploughing are there to be removed through cross-puddling. The field is finally prepared into satisfactory conditions. (Nursery-bed is prepared through the similar method.)

7.2.2 Nursery Bed

Nursery-bed is prepared through the same method as mentioned the above but after the more meticulour puddling. It does not keep to rectangular form. Regulation of water is seldomly done after sowing.

7.2.3 Transplanting

30cm-tall young plants grown on the nursery-bed for 30 - 40 days will have their heads cut by 1/3 to 1/2 and transplanted onto the paddyfield with the intervals of 30cm x 30cm or 30cm x 40cm. Transplantation is done backward by a group of people.

Only about 10% of the paddyfield is orderly transplanted in regular row or in simple row. People do not recognize the need of regular planting as they are not accustomed to give additional fertilizers, neither post-control nor weeding, until harvest time.

7.2.4 Harvesting

Harvesting is done by a group of people as on the occasion of transplanting. No machinery is used. They chop the culms at 50cm - 80cm from the head, by using sickle. (They do not cut culms at the lower part as they do in Japan.) After bundling the harvested paddy, they keep these bundles on the bed of the

paddyfield for drying in the sun (as dry season is far advanced at the time of harvesting).

7.2.5 Threshing

After levelling the paddyfield by shovels and hoes, farmers smear buffalo dung diluted by water to the thickness of 2 - 3cm and wait for 2 - 3 days until the ground turns concrete-hard. In this way, no mat is required to avoid admixture of mud at the time of threshing.

At the center of this improvised threshing-yard, they put a hurdle made of bamboo set on stones. A bundle or two of the dried paddy are picked up on a rope pitched between two bamboo-poles and violently hit on the hurdle. A couple of hitting actions will remove all the grains because of the varieties of paddy they plant. Sometimes, but rather seldomly, a buffalo is driven around on the threshing-yard to trample upon the bundles of paddy for degraining purpose. Pedalling threshers are used nowadays.

7.2.6 Winnowing

Number of people around a heap of threshed paddy-grains use bamboo-fans to fan away undesired litters. No grader is in use.

7.2.7 Polishing

Each farmhousehold has a mortar in which paddy is polished for home consumption. Breaking of rice into pieces is unavoidable through this method. Many villagers came to have their common rice-mills nowadays. Fee charged for polishing 50 kg. of paddy is around 200 kip (¥ 140).

7.2.8 Storage

Ordinary farmer stores his own paddy in bamboo baskets which are either kept under the floor or hung from the ceiling. When he sells his paddy to the merchants, the paddy is usually in semi-dried conditions. Many instances of cracking of the grains are observed due to the direct drying in the sun.

Table 19 : Labour Requirement per 1 Ha

(as studied in the neighborhood of Salkham Rice Center)

Kind of Work	Labour Man-day		Remarks
	Manual	Animal	
Nursery-bed	5	5	
Ploughing & puddling	7	7	
Plucking of plants from the Nursery-bed	10	3	
Transplanting	30		
Additional transplanting	1		
Water-control	1		
Fertilizing	3		
Weeding	1		
Harvesting	20		
Threshing	14	5	
Transport	5		
Drying	(on the paddyfield)		

NOTE : * Variety : Photoperiodic response variety

* Growing period : 120 – 150 days

* Animal : Exclusively buffalo

Table 20 : Machinery Used & Their Efficiency in Laos

Kind of Work	Machinery Used	Efficiency in Laos (6 hours per day)
Ploughing	Big tractor 50 HP	20 a/hr 1.2ha/day
Clod-breaking	Medium " 20 HP	40 a/hr 2.4ha/day
Puddling	Hand " cage drum wheel	15 a/hr 0.9ha/day
Transplanting	Manual	0.5a/manday
Weeding	Hand-operated rotary wheel	0.5a/hr 0.3ha/day
Pest-control	Hand-operating duster	0.8a/hr 0.48ha/day
Harvesting	" " paddy repeater & sickle	2.5a/hr 0.15ha/day (5a/manday with sickle)
Threshing & winnowing	Power-thresher	unknown
Hulling	" huller	
Polishing	" polisher	
Transport	Trailor	

NOTE : Power Thresher = 30a/day Huller=1 ton/hr

Polisher=500-600 kg/hr

7.3 Conditions ruling in the Area meant for Mechanized Farming

The site where mechnized farming is extensively projected is a flat land covered by grasses and shrubs, at an elevation of about 164 - 166 m. Soils have been surveyed and found rich on the Laotian standard and, if paddyfield will be prepared according to the Japanese design, no serious difficulties are anticipated for introduction of farm-machinery. In the neighboring paddyfield, there is a solid plowsole 20 – 25 cm under-ground, allowing employment of heavy tractors. In the process of field-preparation, plot having less solid plowsole may be found where tractor-use needs to be done with a good care. In due course of time, its plowsole will come to be solidified, giving no special worry for introduction of machinery.

Grassy-land spreading over two-thirds of the site usually comes under water during the rainy season when the neighboring farmers sow floating rice there. Upon completion of the infrastructural renovation, the site will be spreaded over with clay-soil to its major extent so that mechanized farming is quite possible. Shrubby part to the north of the grassyland is made up of good soil.

As the Laotian electric company is going to work upon power transmission line rather soon, the electric power will be supplied to the site from Vientiane City across the distance of 26 km.

There is the Laos-Japanese Agriculture & Livestocks Training Center in the vicinity of the site and the local people are friendly to the Japanese. Transport conveniences between Tha Ngon and Vientiane City are rather good because of a wide road (though not paved yet), on which are running buses and taxies. The road between the Center and the project-site, however, is dilapidated with occasional muddy pools for safe drive on jeeps alone. Rainy season turns the same road passable only on bullock-cart or foot.

There is no fuel-shop on the spot but gasoline is freely available at many gasoline-stands in Vientiane City. They sell gasoline at ¥ 35/ℓ. Repair-shops in Vientiane City are for motor-cars only and none of them specializes on farm-machinery. Repair facilities available in the Laos-Japanese Agriculture & Livestocks Training Center need to be replenished to meet our purpose.

7.4 Kinds of Machinery to be Introduced

7.4.1 Machinery for Ploughing & Land Grading

For efficient and quick pre-transplanting farm work and to digest the bulky work-load inbetween the first and the second crops after completion of the irrigable paddyfield, one Disc Plough for primary ploughing and one medium-sized Tractor for inter-tillage will be introduced for each group of 12 settlers with 24 ha of land in total. As for puddling, one each Hand-Tractor will be provided with individual settlers. This combination of farm-machinery is meant for encouragement towards cultivating farmers and also diggestion of work-land accompanying double-cropping of paddy.

7.4.2 Pest-Control Equipment

It was originally planned to introduce power-driven Sprayer for common-use of the farmers but, upon studying the size of paddyfield allocated to each farmer and the number of days and frequencies of pest-control work, distribution of hand-operating sprayer among each cultivator for his personal use was finally decided upon. As for pest-control of paddy, pulverized chemicals than water-solubles or emulsion are preferred and, therefore, no mist-blower will be introduced. Granular chemicals spreader is under consideration in expectation of future use of granular insecticides and pesticides. Switch-over from power-dirven equipment to hand-operating one will also serve to lessen the burden on the farmers

7.4.3 Harvesting, Drying & Winnowing Facilities

Automatic binder and threshing combine will not be used. This decision was reached after deliberate study of paddy cultivation pattern, length of culms reaching 130 – 150 cm with the local varieties, their degraining tendency, etc. Even though operation of automatic harvesting machine will not be very difficult for the cultivators after some practical trainings, economic justification does not follow. Therefore, hand-operating paddy-reaper plus sickle will do the work. Drying method in the sun can be improved upon, for instance, by constructing paddy drying fences. Thresher will be provided with each settlers and Huller-Polisher will be used jointly by 102 settlers. The difference between the Japonica-type and the Indica-type may necessitate some special care in adjustment of Huller-Polisher.

7.5 Route of Introduction

The following route will be the shortest one from Japan to destination :

1)	Tokyo – Bangkok	(by sea)	2 weeks
2)	Bangkok – Vientiane	(by rail & boat on the Mekong)	2 – 3 weeks
3)	Vientiane-Tha Ngon	(by truck)	1 week

Passage through Thailand causes longer time for their transport.

7.6 Problems accompanying Machinery Introduction

a) Operation of thresher is more economical, if electric power is available ; until electric power supply is possible, the engine mounted on the Hand-Tracter provided with each settlers will be used for motivation of the thresher;

b) Local farmers have enough interest with, but poor knowledge about, farm-machinery and, therefore, need to be trained from the very beginning; in the meanwhile, youngmen who had undergone mechanical training in the Laos-Japanese Agriculture & Livestocks Training Center may be posted as their leaders;

c) For better operation of the farm-machinery, replenishment of repair facilities is quite important, side by side, with plentiful supply of spare-parts (the repair-shop attached to the Laos-Japanese Agriculture & Livestocks Training Center will meet this purpose); and

d) Simple operational schedule or time-table for joint-use of among 12 settlers of major and medium tractors will need to be established and smoothly kept to ; the Japanese experts will be requested to give appropriate guidance as to whether these joint-use machinery are better operated by specific operators or by cultivating farmers themselves in turn.

8. Construction Cost

8.1 Yearly Implementation Programme of the Pilot-Farm

Table 21 : Pilot-Farm Implementation Programme

Table 21 : Pilot-Farm Implementation Programme (Unit = ,000 Yen)

Heads	Total		First Year		Second Year		Third Year		Fourth Year		Fifth Year		Sixth Year	
	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan
A. Construction/ Renovation Work (Direct work of 100 ha only)														
Irrigation Canel					4,100		4,100							
Drainage Canal					1,000		1,000							
Farm-road					1,000		1,000							
Land Grading					1,100		1,100							
Common Machinery					7,500		7,500							
Others					3,300		3,300							
Total	36,000	0			18,000		18,000							
B. Machinery, Equipment & Materials Supplied														
Construction Equipment				36,200										
Farm-Machinery				11,600										
Farming materials				1,700		1,700		1,700		1,700		1,700		
Construction"				9,600		21,000								
Experimental equipment				1,630										
Measuring Instruments				365										
Spare parts						15,000		16,000		17,000		18,000		
Total		154,895		61,095		37,700		17,700		18,700		19,700		
C. Personnel Expenses														
			men month	men month	6 men	4 men	6 men	4 men	6 men	4 men	6 men	4 men	6 men	4 men
Experts & Counter-part Officers			6 x 1 215	6 x 1 7,100	2,600	30,202	2,600	30,202	2,600	30,202*	2,600	30,202	2,600	30,202
Local managerial cost				54		648		648		648		648		648
Employees' Salary			10		120		120		120		120		120	
Total	13,825	161,770	225	7,154	2,720	30,850	2,720	30,850	2,720	30,850	2,720	30,850	2,720	31,216
D Operational Cost														
Fuels for Machinery			150		710		710		710		710		710	
Maintenance of "			10		150		150		150	—	150		150	
Landing of Mach & Mater.			1,000											
Inland transport														
Electricity, Stationary			10		120		120		120		120		120	
Total	6,070		1,170		980		980		980		980		980	

Head	Total		First Year		Second Year		Third Year		Fourth Year		Fifth Year		Sixth Year	
	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan	Laos	Japan
E. Establishment (Building & Dismantling Cost & Material Cost)														
Machinery-shed 830 m^2			3,500											
Fertilizer - shed 100 m^2			1,400											
Rice-Mill 100 m^2			1,000											
Drying-shed 200 m^2			1,950											
Dormitory			3,600											
Land Rent			60		720		720		720		720		720	
Electric & Water Charges			10		120		120		120		120		120	
Total	15,720		11,520		840		840		840		840		840	
GRAND TOTAL	71,615	316,665	12,915	68,249	22,540	68,550	22,540	48,550	4,540	49,500	4,540	50,500	4,540	31,216

Entire Cost for vie (5) Years · Laotian side · 71,615 (35,615) @
Japanese side · 316,665

@ Figures in bracket stands for cost excluding construction cost.

8.2 Irrigation & Drainage Works

Major works under this heading are relating to construction of a pumping-station, protective embankment, flood gate, farm-road network and preparation of paddyfields. As the Pilot-Farm in question forms a part of 800 ha project-area, its construction is included in this whole work.

The pumping station, the main canals and laterals, the protective embankment and the drainage-gate will be completed in the initial stage, side by side. with a portion of the main road and the drainage canals. Reclamation work or preparation of the paddyfied will be continuous undertaking all through the construction-period. Construction of most of the sub-laterals, farm laterals, branch-roads and dranaige canals will be taken up in the second state.

8.2.1 Tha Ngon Pumping Station

Major works involved in construction of the pumping-station will be the excavation, the earthfilling and the concrete works, and installation of the pumps, motors and their attachements including discharge pipe-line. The works will be commenced at mid-October of the initial year and complted by mid-March of the following year. Bulldozers will be employed for such earth-works like the stripping of topsoil, excavation and earth filling, and dragline-excavator will be used for excavation of intake and culvert. Compaction of earthfill will be carried out by the Tamping Rollers drawn by the bulldozers.

8.2.2 Irrigation Canal System

Irrigation canal system comprises of 2.5 km main canal and 3.7 km laterals and sub-laterals. In connection with these canals and laterals, diversion works, spillway, regulating pond, etc., will be constructed, Main irrigation canal work will be completed in the first dry season, so that in the following dry season an experimental second crop cultivation will be made possible. Laterals, sub-laterals and and farm-laterals will be taken up only in the second dry-season. Al these works will move on from the western end towards the eastern.

8.2.3 Drainage Canal System

Construction of the drainage canal system extending for 4.9 km will be carried out, in parallel with the land preparation work, as a rule, but as some of the canals need to be constructed to facilitate the very land preparation work, the work shall be started in the early part of the dry-season. The excavation work for the drainage canals will be mostly undertaken by use of drag-shovels and the final shaping of the canal sections will be arranged by man-power.

8.2.4 Flood Gate

Flood Gate needs to be completed during the first dry-season so that no flood-water will invade into the site during the following rainy-season. Bulldozer will work at topsoil stripping and excavation of soil to the depth of 2 – 3 meters under the surface, then drag-shovels will be used. Excavation of cut-off will be done by man-power. A part of the earth thus excavated will be used for the embankment of main closure or the coffering work, and the remainings will be reserved for back-filling. Concrete works which follow the excavation work will be completed by mid-January of the second year.

Installation of fixed roller-gate itself will take only one month in January of the second year.

Installation of fixed roller-gate itself will take only one month in January of the second year but production of the gate and its miscellaneous metal works will take atleast six months.

8.2.5 Protective Embankment

Construction work of the protective embankment needs to be started in the first year and completed before the rainy season arrives so that flood-water of the Nam Ngum can be checked out of the site.

Topsoil stripping of the embankment for the first 6.3 km portion will be carried out side by side with that for the main irrigation canals, starting from the upstream towards the down-stream. The remaining part of the work will be completed by the end of February of the following year.

Earthfilling of the embankment is mostly done by the earth obtainable from a borrow-pit along the embankment but the material-earth available from excavation work of the irrigation-canals will also be utilized as much as possible.

8.2.6 Farm Roads

Farm roads are divided into 3.0 km long main road and 4.1 km secondary farm roads. The main roads will be built during the first and second dry-seasons. Bulldozer will be employed for both topsoil stripping and filling of the road. Filling material will come from the borrow-pits on both sides of the road.

Secondary farm roads will be constructed during the second dry-season, keeping pace with farm lateral construction.

8.2.7 Land Preparation or Reclamation

Land clearing or deforestation and levelling are two major works. The former work is made up of felling of the trees, pulling of their roots, burning out of bushes and thickets, as well as removal of large trashes of the trees. A greater part of these works will be undertaken by bulldozer during the first dry-season. The latter work which follows the former will be done by use of scrape-dozer in moving soil and levelling the land surface.

8.3 Construction Cost of Irrigation & Drainage Works

Cost-calculation has been done on the following conditions¾

(i) Exchange-rate will be at $ 1=500 kip;

(ii) Customs duty and other taxes as well as taxes and levies on the foreign technicians are not taken into consideration, and

(iii) Costs of lumbers, nails, iron wires and other metal products, fuels, sand and gravels are calculated in local currency on the assumption that they are locally available.

Table 22

	(A) Direct Work on 100 ha			(B) Common Work for 100 ha			Total (A+B)		
	Total	Foreign currency	Local currency	Total	Foreign currency	Local currency	Total	Foreign currency	Local currency
I. Preparatory Work				35,000	16,200	18,800	35,000	16,200	18,800
II. Irrigation/Drainage Facilities	41,250	19,900	21,350	237,250	171,150	66,100	278,500	19,050	87,450
A. Pumping-Station				79,600	63,700	15,900	79,600	63,700	15,700
A-a: Intake works, Sump and Substructure				18,400	12,050	6,350	18,400	12,050	6,350
A-b. Control house				6,700	2,600	4,100	6,700	2,600	4,100
A-c. Water-pipe & pump				45,200	43,400	1,800	45,200	43,400	1,800
A-d: Regulating Pond				9,300	5,650	3,650	9,300	5,650	3,650
B. Irrigation Canal	23,500	13,850	9,650				23,500	13,850	9,650
B-a: Main & laterals	l=2,526m 18,100	12,450	5,650				18,100	12,450	5,650
B-b: Sub-laterals									
B-c: Farm laterals	l=3,795m 5,400	1,400	4,000				5,400	1,400	4,000
C. Drainage Canal	l=4,955m 5,550	4,000	1,550				5,550	4,000	1,550
D. Farm Road	5,900	1,050	4,850				5,900	1,050	4,850
D-a: Main	l=2,970m 3,900	500	3,400				3,900	500	3,400
D-b: Secondary	l=4,151m 2,000	550	1,450				2,000	550	1,450
E. Protective Embankment				13,700	5,500	8,200	13,700	5,500	8,200
F. Flood Gate				40,750	27,100	13,050	40,150	27,100	13,050
G. Land Preparation	6,300	1,000	5,300				6,300	1,000	5,300
H. Power Distribation Line				103,800	74,850	28,950	103,800	74,850	28,950
III. Depreciation & Maintenance Cost of Construction Machinary	42,400	33,900	8,500	40,450	32,600	7,850	82,850	66,500	16,350
Sub-Total									

Table 22 (Cont'd)

Heading	(A) Direct Work on 100 ha			(B) Common Work for 100 ha			Total (A+B)		
	Total	Foreign currency	Local currency	Total Total	Foreign currency	Local currency	Total	Foreign currency	Local currency
IV. General Expense and Engineering services	13,600	10,000	3,600	51,000	40,800	10,200	64,600	50,800	13,800
V. Contingencies and Reserves	950	600	350	3,600	2,550	1,050	4,550	3,150	1,400
Total	98,200	64,400	33,800	367,300	263,300	104,000	465,500	327,700	137,800

(*) 1. One out of two pumps and its facilities;

2. Entire construction-cost of Pumping-Station;

3. " " " Regulating Pond;

4. " " " Protective Embankment;

5. " " " Power Distribution Line.

Table 23: Cost-Calculation (Tentative) of Tha Ngon Agricultural Development Project

(For Reference Only)

	Foreign Exchange Part		Local Currency Part		Total Amount
	Content	Amount	Content	Amount	
		($,000)		($,000)	($,000)
A. Construction cost	Equipment & materials for construction; consultant fee, etc.	610	Labour, fuel, locally available material	250	860
B. Initial operation cost	Farm-machinery, fertilizers & chemicals	185	Workshop, warehouse, seeds, fuels; initial operation cost of irrigation facilities	78	263
C. House-building cost		0	Settlers' houses 400 No.	80	80
D. Pilot-farm operation cost	Deputation of experts & supply of materials	860	Salaries & wages, transport cost of materials; their maintenance	100	960
E. Power transmission cost (Vientiane - Tha Ngon)	Construction Equipment & materials	62	Wages, fuels & other locally available materials	38	100
TOTAL		1,717		546	2,263

9. Environmental Situation of the Experts' Livelihood

Per-capital income of Laos is estimated at US$ 67.35 in the year 1967. This figure betrays that Laos ranks among the lowest of southeast Asian countries in its economic development and its people's living standard. Amenitiies of life in the advanced countries are grossly lacking in Laos whose socio-economic development efforst have seriously been handicapped by the internal war due to political instability.

The situations generally ruling in Laos will be dealt with separately; argument will be concentrated at those of immediate concern to the dialy life of the Japanese experts who shall be deputed there with their family-members. Assumption will be made that the experts be accommodated in Tha Ngon district to join their family-members in Vientiane on Saturdays and Sundays. What can be the environmental situations in Tha Ngon disrict for the former and in Vientiane for the latter ?

9.1 Tha Ngon district

Tha Ngon is no doubt most conveniently located for the Japanese experts to stay on duty, in view of its vicinity to the project-area. The Laos-Japanese Agriculture & Livestocks Training Center has been long since established here and its Director is residing there together with the Japanese experts and the Overseas Cooperation Volunteers. However, this place is about 25 km away from Vientiane City and its environmental situations are far from satisfactory. Water is available only from the well and electric power locally generated is not enough for full-time operation of big capacitied apparatus. This does not mean, however, that city-water and electricity will not be made available for many years to come. Daily necessities including food-stuff are obtainable from a single market which supplies only a limited range of commodities. One medical expert operating a clinic in Ban Tha Ngon will be called upon for medical treatment but his services are also very much handicapped due to lack of modern faiclities such as pipe-water and electric supply as mentioned in the above. As for educational or recreational facilities, people have to go to Vientiane City 25 km away. Trip to Vientiane City again is not easy; although there is bus-service running between the tow, it is not dependable as desired and the experts who are going to stay in Tha Ngon district will need to have their own cars.

Japanese experts who are at present living in the Government houses but, judging from their poor habitability, monthly rent of $ 80 seems to be rather high. New residential quarters will have to be built to accommodate the Japanese experts. Even though Tha Ngon district is favorably situated for the experts' it is deemed unadvisable for their family-members to live together for a considerable length of time within the poor environments there.

9.2 Vientiane City

Vientiane City is the capital of the Kingdom of Laos and with a population of some 130,000, life there is not necessarily dull. It is facing to Thai across the Mekong River. Thailand offers the important passage to the sea for this inland country of Laos and most of the goods shipped from Japan is brought into Laos across the Mekong after traversing Thai territory. No difference with other foreign goods imported into Laos. Thai influences are obviously felt in every aspect of Laotian life.

Japanese residents in Vientiane over year are generally of the opinion that life there is not very different from that in Japan. Daily necessities are obtainable in most lines and, apart from their prices necessarily higher because of import, there is no serious difficulties. Their opinions are not acceptable in their full face-value as some serious inconveniences are actually found there. Durable consumer goods including cars, in particular, need to be brought in upon careful comparison of the aggregate cost incurrable for their transport and import-duties. For the information of those going to work in Laos, brief introduction to the conditions ruling in the fields of housing, lighting and fuels, water, clothings, foodstuff, etc will be given in the below:

a) Housing :

Houses may be owned or rented. Unless people are going to spend many years or a new house bilt as a permanent residential quarters accommodating in-coming and outgoing experts, rented house will do. In case the duty period is not longer than five years, rented house will be better. Rented house with 2 to 3 rooms besides bed-room, drawing room, dining room, kitchen, toilet, servant quarters and attached garden is available at $ 100 – 150 per month. Western-style bath-tubs are on sale but many people prefer hot-shower.

b) Furnitures & Fixtures :

Wooden furnitures like wardrobe, cabinet, desk, table and chair are cheaper than in Japan due to the plentifulness of lumber in this country. Furnitures made of bamboo are also available in many kinds. Bed sells at about 30,000 kip.

c) Lighting, Fuels and Water-Supply :

Every kind of electrical goods are useful as there are 220V and 110V distribution facilities. 1 kwh costs 32 kip. Tropical climate in Vientiane City makes refrigerator indispensable for storage of foodstuff but locally available at around $ 220 for 140ℓ capacity. Constantly high temperature irrespective of the difference of seasons, days and nights often turns people's sleep uncomfortable without a room-cooler. Electric and water supplies in Vientiane are due to Japanese assistance but they say that water-charges are rather high. Where electricity and city-water are not available, people use propan gas at 3,500-4,000 kip per 15 kg. Well-water has its own problems.

d) Clothings :

Textile industry is not yet developed in Laos and almost all textile products are imported. Nearly all the requirements are met by those available in Vientiane City if people are not very particular to their own tastes. They are invariably higher because of import. Summer wears are used all through the year: sleeveless or half-sleeved one-piece for ladies and half-sleeved shirt and trousers for men.

e) Foodstuff :

Natural conditions, condiments and dietary customs are quite different from those in Japan. Staple food in term of Indica type rice and glutinous rice plus meat, fish and vegetables limited in their varieties are available for daily cooking. Morning Market is the sole supplier of vegetables, meats and fish. Soya-bean sauce is available at 1,000 kip per 1.8 ℓ but notsoya-bean paste. Japanese wives, however, will manage somehow with the locally available materials.

f) Education and Schooling;

Experts will have difficulties in their children's education there. Schools using English and French as medium of instruction are there but no Japanese school. English-speaking schools are the International School and American School, and a lycee managed by the Laotian Education Ministry is French-speaking school. International School admits children for kindergarten and 6-year primary education, without age limit. American school provides primary education for 6 years and secondary education for 3 years.

APPENDIX

Machinery, equipment and materials to be supplied by The Government of Japan

(1) Equipment for Construction Works

No.	Kind	Description	Amount	Unit price	Value
1	Bulldozer	18 ton class w/tilt cylinder, operational attachment: rake and back-hoe	1	¥7,300,000	¥7,300,000
2	Bulldozer	18 ton class, for marshy-land, w/operational attachment: back-hoe	1	7,300,000	7,300,000
3	Tractor-shoevel	0.7m^3-class for earth-loading	1	3,600,000	3,600,000
4	Damp-truck	6 ton-class over 125 Ps	2	2,000,000	2,000,000
5	Truck	5 ton-class over 110 Ps	2	1,850,000	3,700,000
6	Jeep	Station-wagon w/diesel engine for 7 passengers. With tools, spare tyres/tubes (4)	2	9,450,000	18,900,000
7	Motor-cycle	70 cc 2 cycle engine w/2 spare tyres & tubes	63	70,000	210,000
8	Trencher	Medium size; Ladder type	1	3,400,000	3,400,000
9	Chain-block	Triple type; 2.5m lifting height; 1 ton	1	20,000	20,000
10	Chain-block	Triple type; 3.0m lifting height; 3 tons	1	34,500	34,500
11	Truck-jack	10 ton; lifting height 33cm	1	26,400	26,400
	TOTAL:-				¥31,480,900

Those too poor in English are not allowed admission. Lycee offers education ranging from kindergarten, 6-year primary and 8-year middle and higher, in French. There is no University in Laos and those desirous of obtaining college education have to go abroad.

g) Health & Hygine :

There are five State Hospitals plus several clinies, specialized hospitals and private practioners. "Hakuai Byoin" operated by the Japanese doctors are very popular among the Japanese residents in Vientiane. State Hospitals are generally well equipped and are dependable for child-birth and simple operations.

(2) Farm Machinery

No.	Kind	Description	Amount	Unit price	Value
1	Large tractor	Wheel type diesel engine (riding) 50 HP	1	¥1,200,000	¥1,200,000
2	Attachment to the above	a. Rotary; cultivation width: 1,600-1,800mm	1	200,000	220,000
		b. Disc plough; 2 ways	1	160,000	160,000
		c. Auxiliary wheel (set)	1	60,000	60,000
		d. Trailor 2 tons	1	100,000	100,000
3	Medium size tractor	Wheel type diesel engine (riding) 20 HP	1	900,000	900,000
4	Attachment to the above	a. Trailor 1.5 - 2 tons	1	90,000	90,000
		b. Harrow (disc harrow)	1	70,000	70,000
		c. Plough (mould board, single ploughing)	1	70,000	70,000
5	Hand tractor	6 HP gasoline engine	12	220,000	2,640,000
6	Attachment to the above	a. Plough (mould board, single ploughing)	12	9,500	114,000
		b. Cage dram wheel (set)	12	5,000	60,000
		c. Rake (set)	12	3,000	36,000
		e. Trailor 0.5 ton	12	40,000	480,000
7	Transplanter	Power-driven transplanter of grown seedlings 3 - 4 HP	1	200,000	200,000
8	Weeder	Hand-operated double weeding type	24	3,000	72,000
9	Duster	Manual, chest-hanging type	12	10,000	120,000
10	Granule spreader	Marunaka type	4	15,000	60,000
11	Hand reaper	Manual, not binder	24	5,000	120,000

No.	Kind	Description	Amount	Unit price	Value
12	Sickle	For paddy; dental type (20% left-handers)	48	¥ 500	¥ 24,000
13	Power thresher	Common type, threshing width 600-800mm	12	72,000	864,000
14	Automatic huller	Roll-width: 5" vacuum dust blowing type	1	250,000	250,000
15	Rice pearler	Polishing capacity: ca 500kg/hour	1	300,000	300,000
16	Small milling machine		1	21,000	21,000
17	Moving sickle	w/wooden handle	60	500	30,000
18	Flat hoe	" "	24	2,000	48,000
19	Folk spade	w/3 tines and wooden handle	24	3,000	52,000
20	Shovel	Y-shaped, with wooden handle	12	2,000	24,000
21	Monocycle	w/rubber tyre	12	6,000	72,000
22	I.C. Arch-welder	200V 12°A	1	35,000	35,000
23	Car washer	w/iron-made circulating pump 450m x 1,200mm	1	28,000	28,000
24	Portable condenser	200V 2.2kW w/motor	1	50,000	50,000
25	Electric drilling machine	200V, 20mm chuck	1	12,000	12,000
26	Electric hoist	200V	1	20,000	20,000
27	Upright drilling machine	2.2kW 45mm chuck	1	250,000	250,000
28	Vice	300mm	1	13,000	13,000
29	Anvil		1	12,000	12,000
30	Iron board	20mm x 1,200mm x 2,400mm	1	8,000	8,000

No.	Kind	Description		Amount	Unit price	Value
31	Carpentry tools		(set)	1	¥15,000	¥15,000
32	Bearing remover			1	8,000	8,000
33	Electric portable jack	200V 10 30 50 100 w/spare		1	65,000	65,000
34	Electric bench grinder	250mm		1	30,000	30,000
35	Automatic leath	1,800mm		1	800,000	800,000
36	Electric soldering iron	200V		1	20,000	20,000
37	Spanner	Inch and mm	(set)	1	15,000	15,000
38	Electric metal saw	350mm		1	35,000	35,000
	TOTAL:-					¥10,068,000

(3) Fertilizers and Farm-chemicals

No.	Kind	Description	Amount	Unit price	Value
	Fertilizers		kg		
1	Synthetic fertilizer		120,000	¥ 35	¥ 4,200,000
2	Urea		48,000	40	1,920,000
	Sub-total:-				6,120,000
	Fungicides & Antibiotics				
3	Kasugamicin dust (Kasumin)	(14; 14; 14) in paper bags @20kg	1,500	65	97,500
4	Blasticisin S dust (Blaes)	(46%)	1,500	59	88,500
5	Mongare dust		1,500	57	85,500
6	Neo-asozin dust		1,500	65	97,500
7	Usplun tablet		25	870	21,750
8	Riogen tablet		25	870	21,750
	Insecticides				
9	Sumithion dust		1,500	65	97,500
10	BHC dust	For stem-borers	1,500	65	97,500
11	BHC granule	For hoppers	2,000	75	150,000
12	EPN dust		1,500	70	105,000

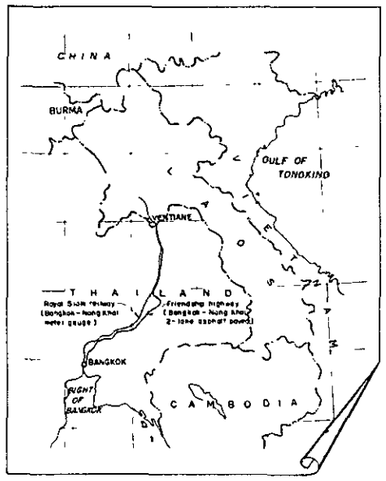
No.	Kind	Description	Amount	Unit price	Value
	Rodenticides				
13	Fratol		20	410	8,200
14	Zinc phosphide		150	360	54,000
	Herbicides				
15	PCP granule		3,000	65	195,000
16	Stam emulsion		500 (1)	500	250,000
	Sub-Total:-				1,369,700
	GRAND TOTAL:-				¥ 7,489,700

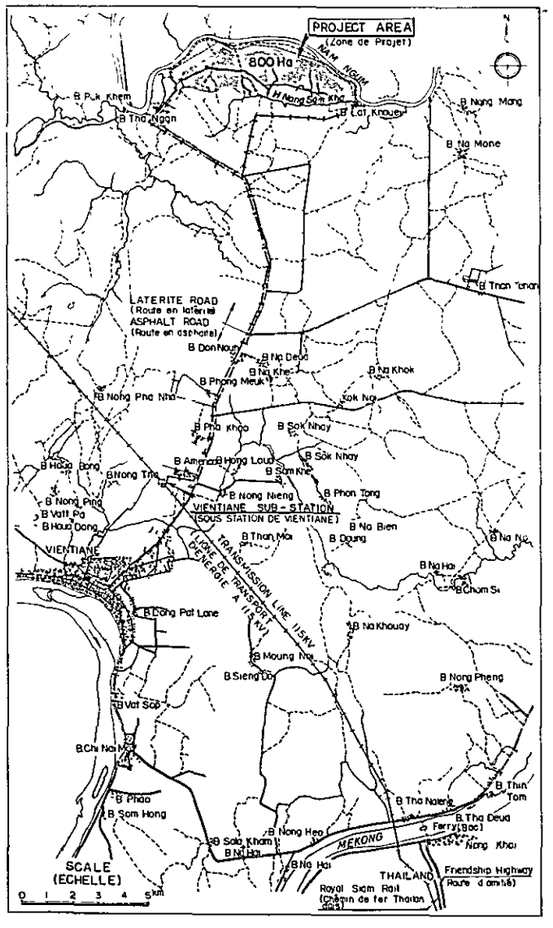
(4) Experimental Instruments & Material

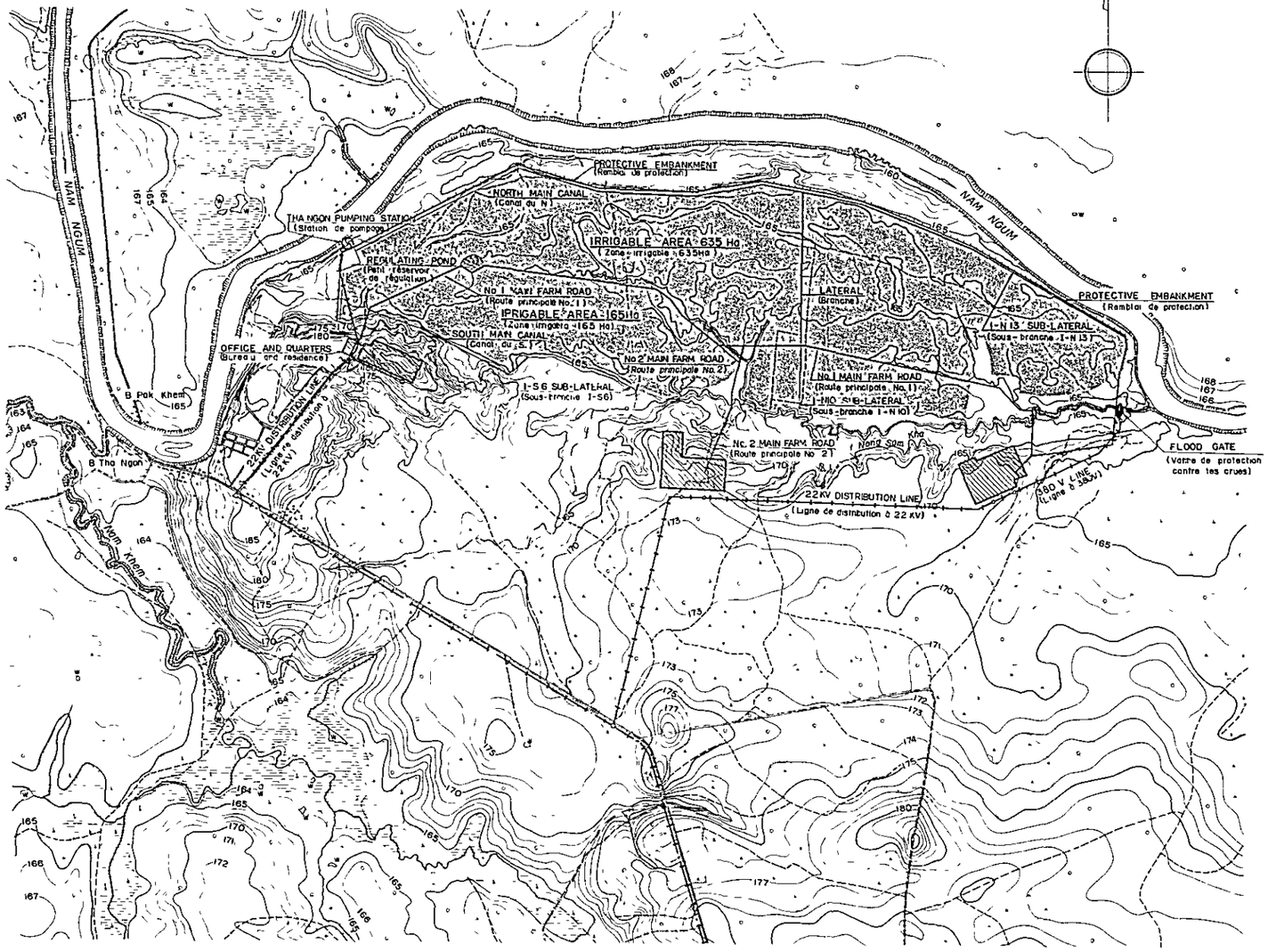
No.		Description	Amount	Unit price	Value
1	Microscope	Cylinder 10-20 x 2000 x Condenser Micrometer w/case (ocular and object)	1	175,300	175,300
2	Incision microscope	Binocular stereoscopic, 5 x 160 x illumination projector and case-box	1	65,000	65,000
3	- do -	- " - Zoom, 5 x 160	1	100,000	100,000
4	Plant anatomical mess	15 messes per set, stainless, w/case (set)	3	10,000	30,000
5	Platform balance	Weighing capacity: 50 kg minimum scale: 25gr w/wheels and balance weight	1	11,000	11,000
6	Quick dial balance	500gr sensitivity range: 0.1gr	1	200,000	200,000
7	Balance	1 kg sensitivity range: 0.5gr	1	3,200	3,200
8	- do -	10 kg " " 5.0gr	1	7,500	7,500
9	Hydrometer	Electrical resistance PB-1	3	50,000	150,000
10	Calculator	Handle rotation type	2	33,000	66,000
11	Typewriter	English, for office use, medium size	2	95,000	190,000
12	High boots		20	500	10,000
13	High boots to waist		20	2,000	40,000
14	Gloves	For 10 kV electric work	20	1,800	36,000
15	Distillation set	Ion exchange resin type 5 1/ha w/plastic tank 80 1 x 3	1	50,000	50,000
16	Drier	Inner size: 40 x 40 x 45cm maximum temperature: 300°C	1	55,000	55,000

No.	Kind	Description	Amount	Unit price	Value
17	Germination tester	Liebebberg type	1	Y 50,000	Y 50,000
18	Refrigerator	About 110 1	1	50,000	50,000
19	Grain shieve	A set of round mesh	1	3,000	3,000
20	PH meter	Glass electrode type, w/1 pair of spare electrodes & 2 aumiliary glass electrodes	1	90,000	90,000
21	Gravimeter	Standard pincnometer 19/set	1	35,000	35,000
	TOTAL:-				Y 1,417,000
	(5) Miscellaneous others				
	(Surveying & Drawing Instruments)				
1	Transit	25 w/tripod. w/20 second notch	1	134,000	134,000
2	Level	Tilting type, 25 x w/tripod	1	74,000	74,000
3.	Stuff	For 4 meters superior quality	2	2,700	5,400
4	Steel tape	50 meters	1	8,000	8,000
5	Drawing set	English type w/15 drawing pens, plus 21 items superior quality	1	15,000	15,000
6	Drafter	Medium sized flat plate length of arm: 550mm x 2 scales	1	36,000	36,000
	(Construction Materials)				
7	Pump	Underwater pump, exhaust pipe dia: 450mm (set)	1	2,016,000	2,016,000
8	Motor	145 kW electric driven valve	1	3,528,000	3,528,000
9	Water conducting Pipe	450mm 9mm (set)	1	1,296,000	1,296,000

No.	Kind	Description			Amount	Unit price	Value
10	- do -	700mm	12mm	(set)	1	2,916,000	2,916,000
11	Drainage pipe & sluice	150mm		(set)	1	108,000	108,000
12	Coupling tube	450mm			2	1,152,000	1,152,000
13	Check valve	450mm			1	432,000	432,000
14	Sluice valve	450mm			1	360,000	360,000
15	Oil tank & accessories				1	180,000	180,000
16	Screen				2	216,000	216,000
17	Intake gate	Sluice gate			1	1,836,000	1,836,000
18	- do -	- " -			2	979,200	979,000
19	Flood control gate & lifting	Roller gate 2.00 x 5.00m electric driven			1	3,420,000	3,420,000
20	Cement	Ordinary portland cement in paper bags (ton)			660	6,300	4,158,000
21	Enforcement	Round steel bar		(")	60	45,000	2,700,000
22	Colgate pipe	600mm length 2.7mm thick		(")	15	98,000	1,470,000
	TOTAL:-						27,037,000
	GRAND TOTAL:-						Y 77.495,200







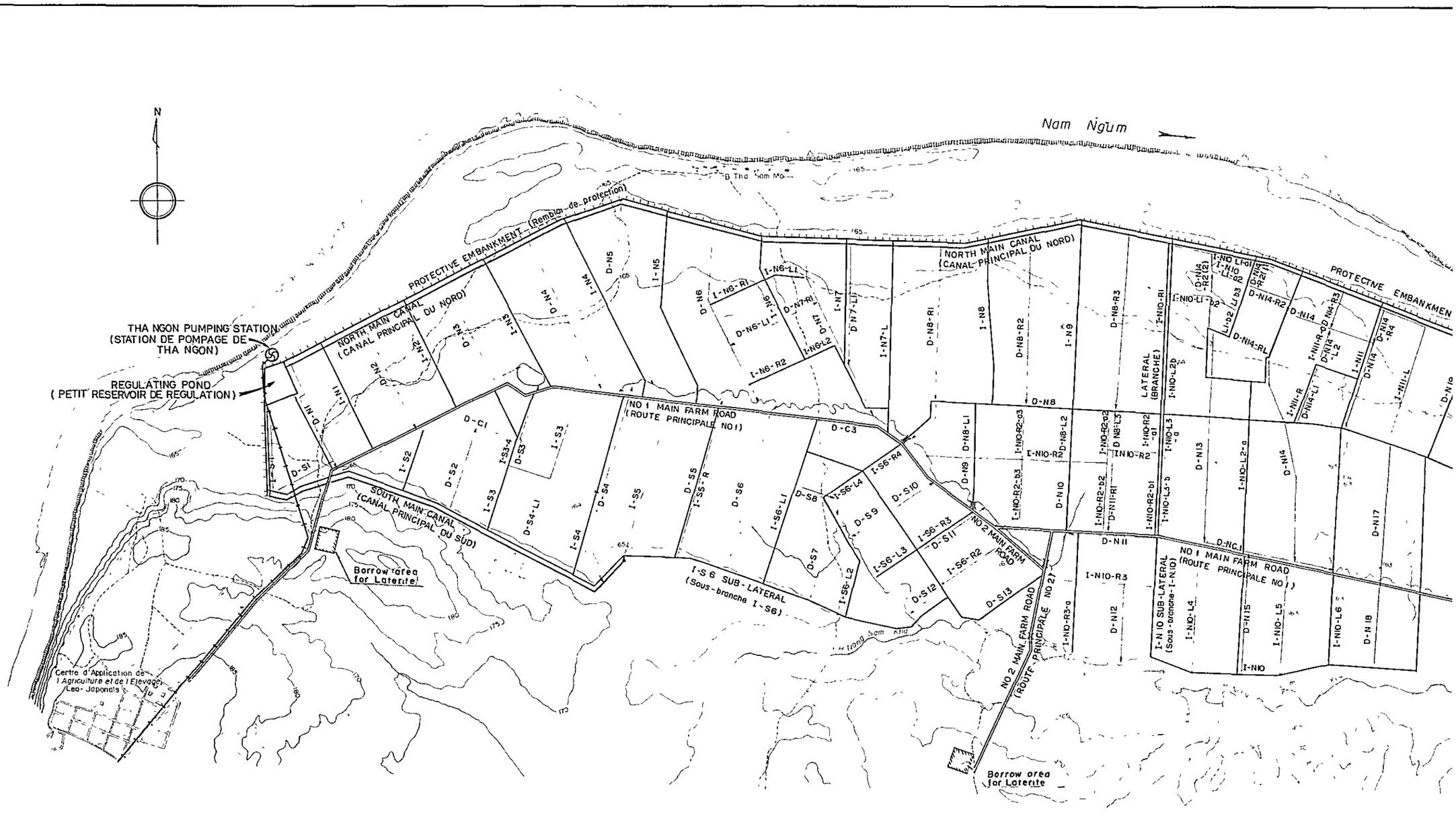
Main canal (Canaux principaux)
Lateral and sub-lateral (Branche et sous-branches)
Protective embankment (Remblai de protection)
Main farm road (Routes vicinales principales)
Power distribution line (Ligne de distribution électrique à 22 KV)
Power distribution line, not covered this project (Ligne de distribution électrique à 22 KV, non prévue dans ce projet)
Irrigable area (Zone irrigable)
Natural stream (Cours d'eau naturels)
Farmers residential area (Quartier résidentiel des fermiers)

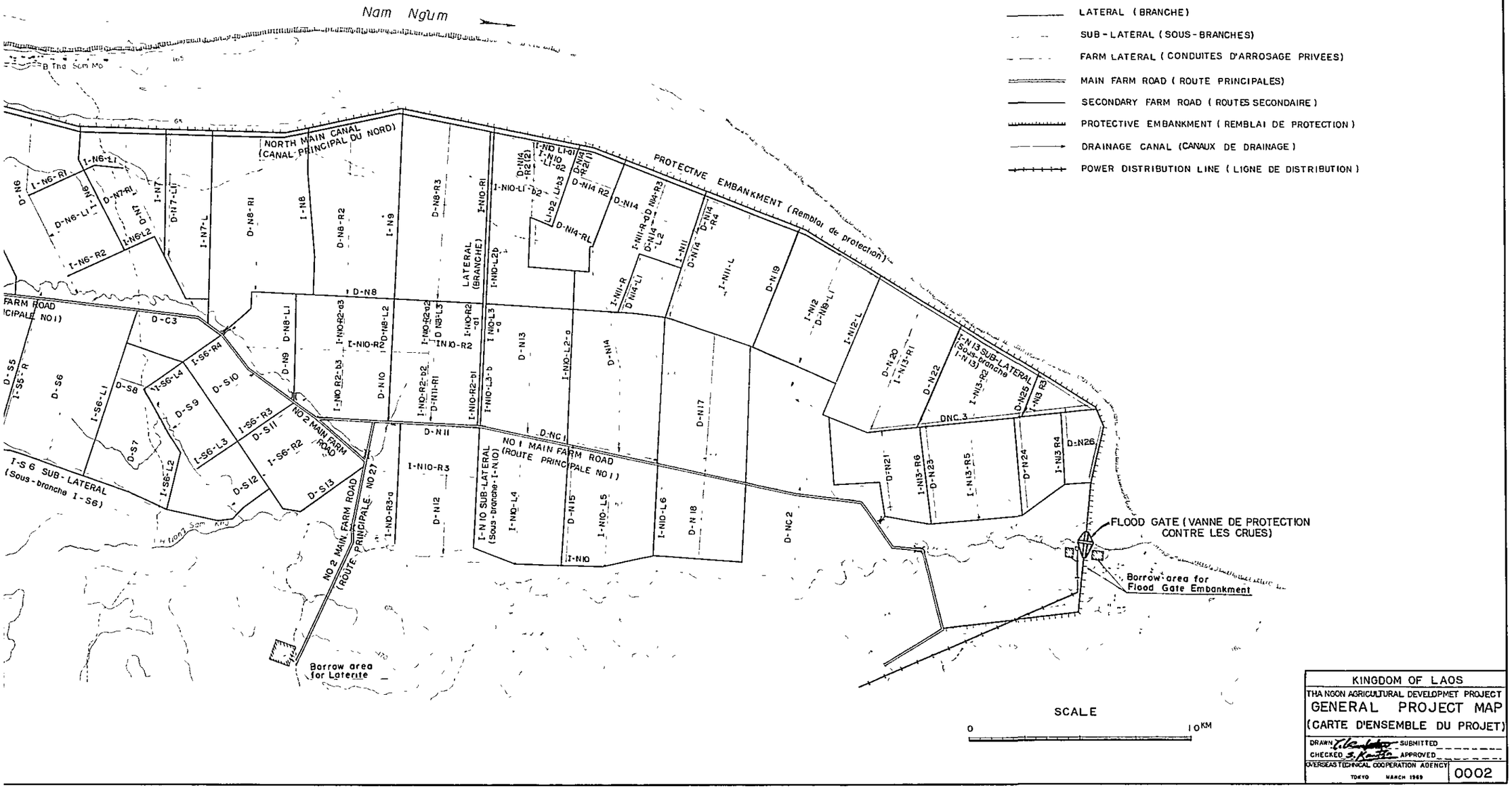
SCALE
0 1 2 km

KINGDOM OF LAOS
THA NGON AGRICULTURAL DEVELOPMENT PROJECT

LOCATION MAP
(CARTE DE SITUATION)

DRAWN SUBMITTED
CHECKED APPROVED
OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO MARCH 1969
0001


N
Nam Ngum
PROTECTIVE EMBANKMENT (Rempart de protection)
THA NGON PUMPING STATION (STATION DE POMPAGE DE THA NGON)
REGULATING POND (PETIT RESERVOIR DE REGULATION)
NORTH MAIN CANAL (CANAL PRINCIPAL DU NORD)
NO 1 MAIN FARM ROAD (ROUTE PRINCIPALE NO 1)
SOUTH MAIN CANAL (CANAL PRINCIPAL DU SUD)
I-S 6 SUB-LATERAL (Sous-branche I-S6)
LATERAL (BRANCHE)
I-N 10 SUB-LATERAL (Sous-branche I-N10)
NO 2 MAIN FARM ROAD (ROUTE PRINCIPALE NO 2)
Borrow area for Laterite
Centre d'Application de l'Agriculture et de l'Elevage Lao-Japonais



LEGEND (LEGENDE)

- MAIN CANAL (CANAUX D'IRRIGATION PRINCIPAL)
- LATERAL (BRANCHE)
- SUB - LATERAL (SOUS - BRANCHES)
- FARM LATERAL (CONDUITES D'ARROSAGE PRIVEES)
- MAIN FARM ROAD (ROUTE PRINCIPALES)
- SECONDARY FARM ROAD (ROUTES SECONDAIRE)
- PROTECTIVE EMBANKMENT (REMBLAI DE PROTECTION)
- DRAINAGE CANAL (CANAUX DE DRAINAGE)
- POWER DISTRIBUTION LINE (LIGNE DE DISTRIBUTION)

KINGDOM OF LAOS

THA NGON AGRICULTURAL DEVELOPMET PROJECT

GENERAL PROJECT MAP

(CARTE D'ENSEMBLE DU PROJET)

DRAWN _____ SUBMITTED _____

CHECKED S. Kaita APPROVED _____

OVERSEAS TECHNICAL COOPERATION AGENCY

TOKYO MARCH 1969

0002

Main canal and lateral

Farm lateral

Drainage canal

Main farm road

Secondary farm road

Protective embankment

Culvert

Culvert for access to field

Drop

Division box, Type A-1

Drainage crossing

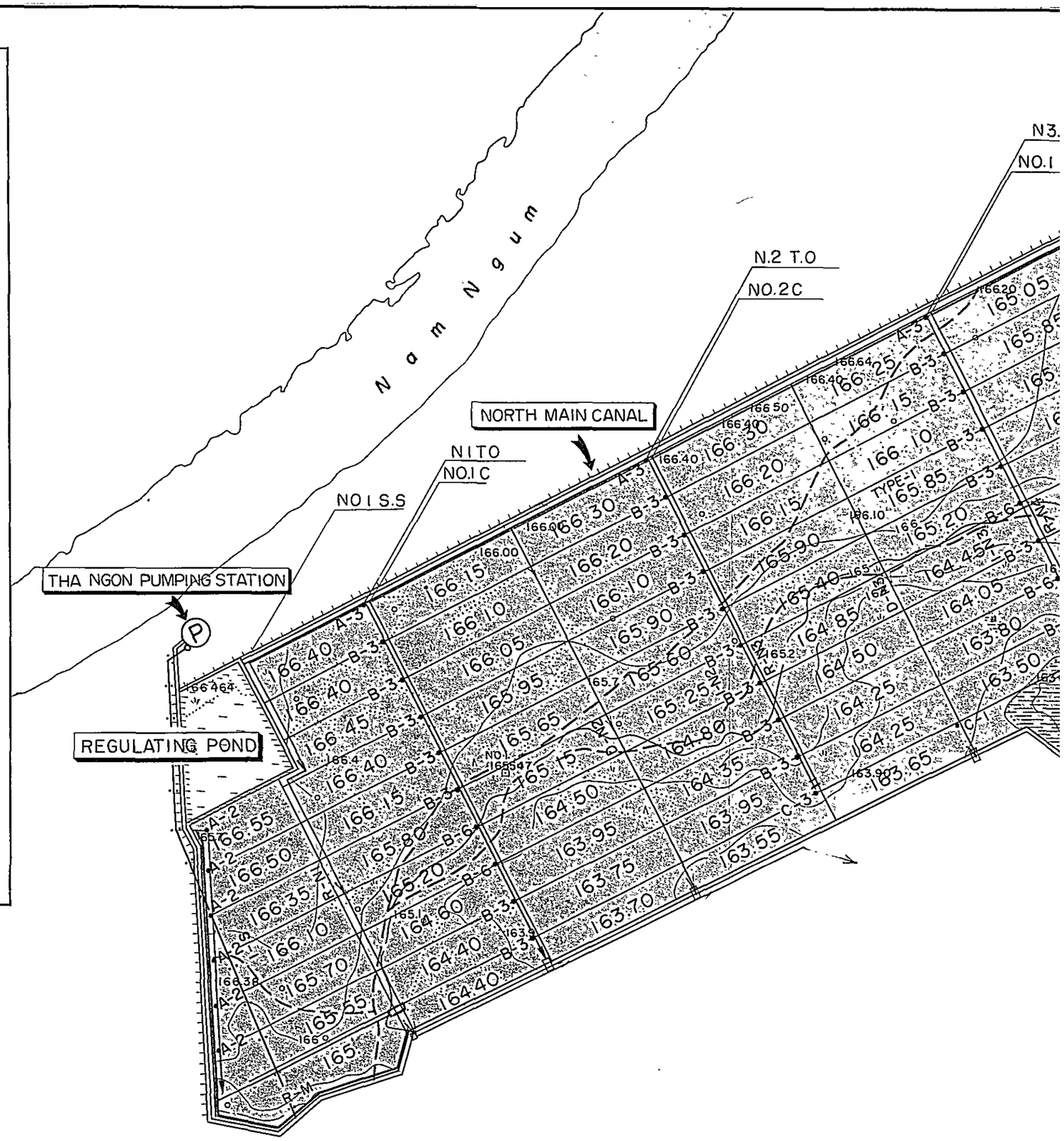
Bridge

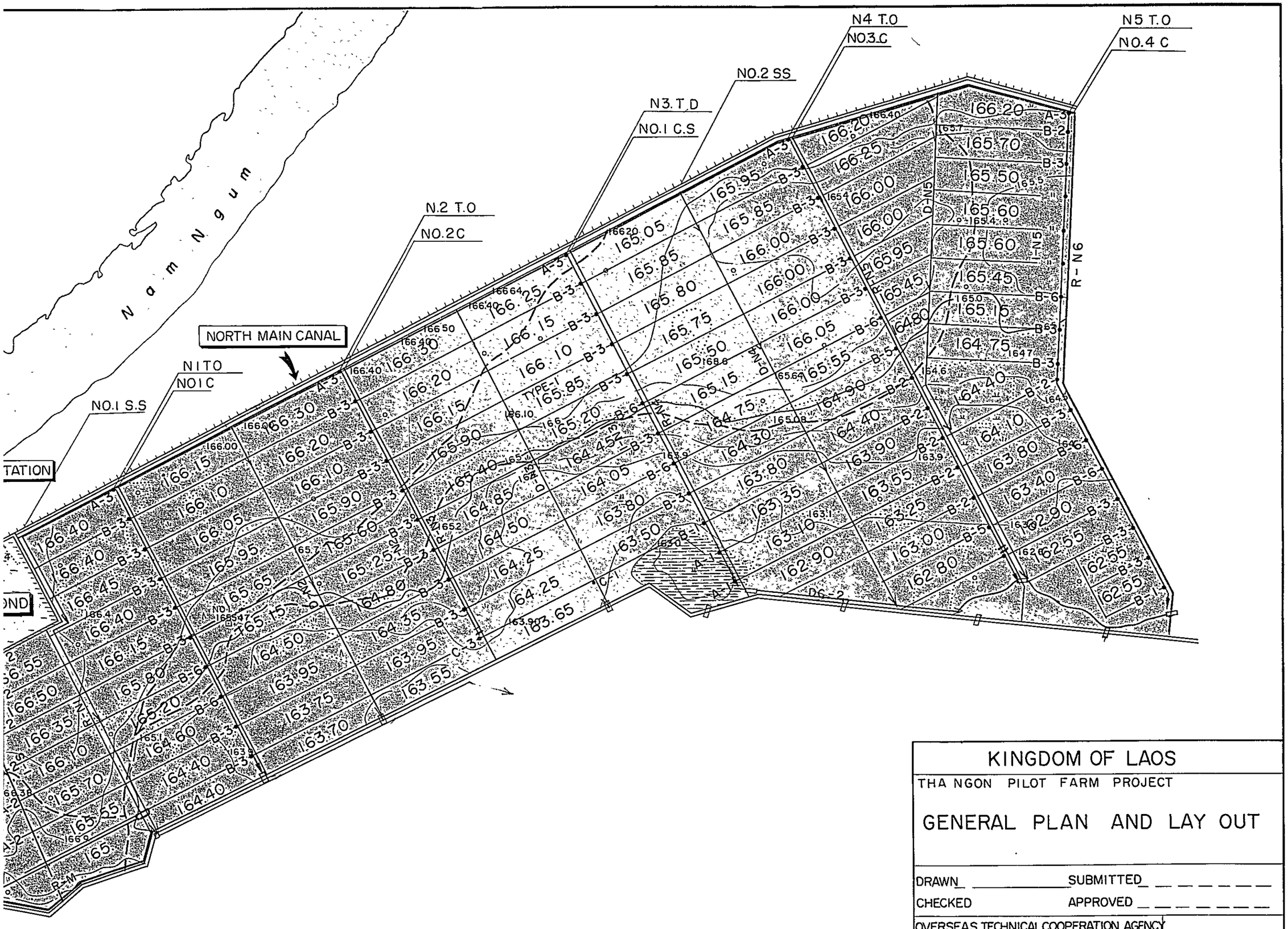
Structure on the main canal and lateral

T.O	Turnout
C.S	Check structure
C	Culvert
S.S	Side spillway
D.C	Drainage crossing

SCALE

0 100 200 300 400 500 M





KINGDOM OF LAOS

THA NGON PILOT FARM PROJECT

GENERAL PLAN AND LAY OUT

DRAWN _____ SUBMITTED _____

CHECKED APPROVED _____

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO SEPTEMBE 1969

0003