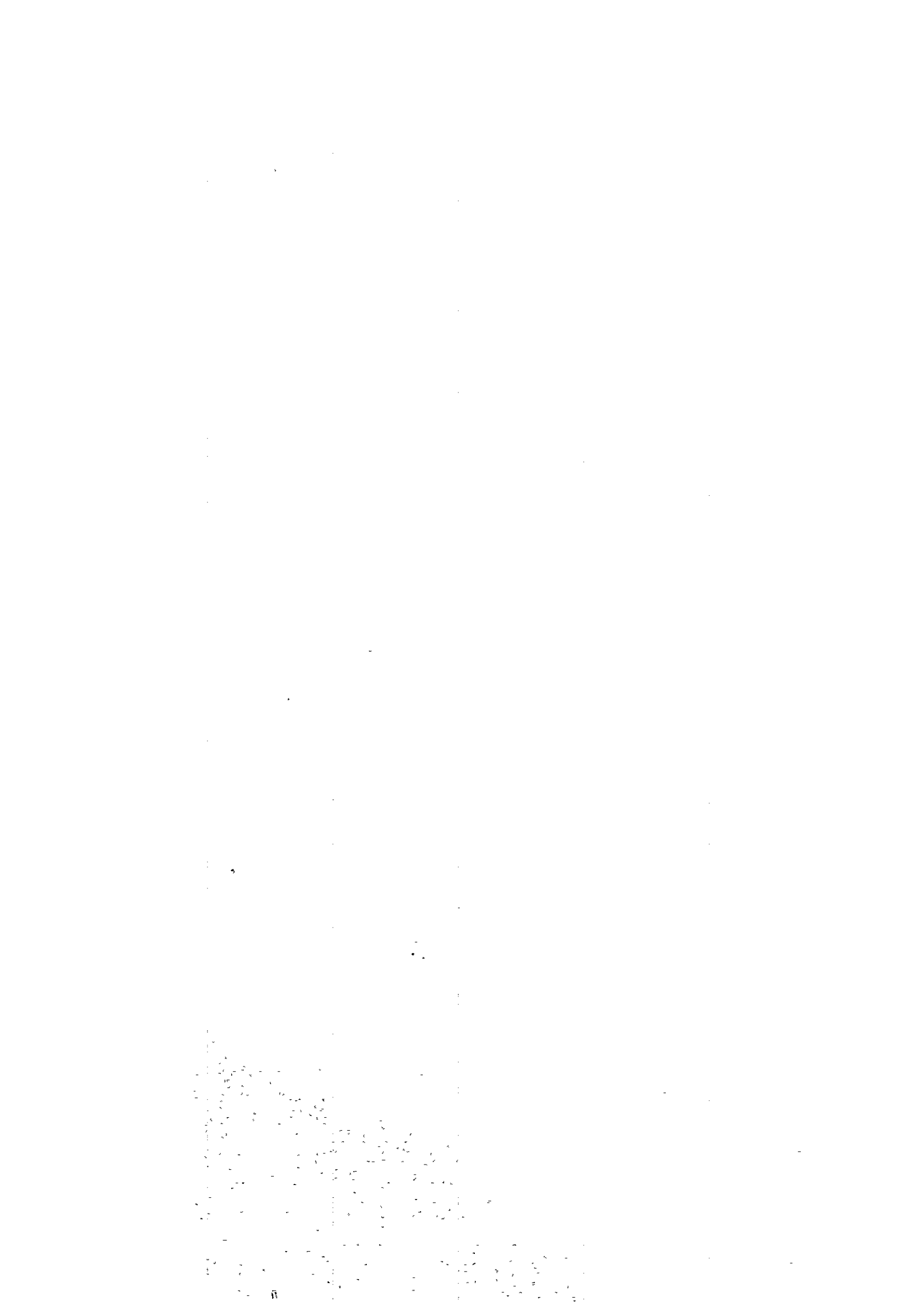


タイかんがい農業開発計画 帰国専門家総合報告書 I

(宮本・木村・大久保・難波専門家)

昭和56年 1 月

国際協力事業団



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(宮本・木村・大久保・難波専門家)

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昭和56年1月

国際協力事業団
総務部情報管理課長

※昭和53年6月6日付規程第9号（国際協力事業団報告書の作成及び管理に関する規程）

は し が き

タイかんがい農業開発計画は、水稻単位面積収量の増大及び水稻二期作面積の拡大による米作増産を図るため、ほ場整備の推進及び営農技術の改善普及並びに営農組織の育成等を行うことを目的としており、協力期間は52年4月8日から5年間である。

本報告書は、宮本和美（かんがい排水、52年8月31日～55年8月30日、プロジェクトセンター担当）、木村和夫（ほ場整備、52年10月31日～55年10月13日、チャオピア地区担当）、大久保富之（かんがい排水、53年11月2日～56年1月15日、メクロン地区担当）及び難波一郎専門家（栽培、53年10月20日～55年10月19日、チャオピア地区担当）の帰国総合報告書を取りまとめたものである。

宮本専門家は、今後多くの事業量が予測されるタイにおけるほ場整備について、どのような実施方式をとるべきかをIntensive方式とExtensive方式の比較を主体として考察し、その結果等を取りまとめている。

木村専門家は、チャオピア地区で実施されたローカルコスト負担事業（プロジェクト基盤整備事業）であるモデルインフラ整備（6.5haの試験ほ場整備）及びパイロフトインフラ整備（80haの農家のほ場の整備）において、日本の予算で工事発注、施工管理を行うという貴重な経験を基に、「タイ国における請負契約事例報告」及び「Machinery Plan For Irrigation Project」を取りまとめている。現在、プロジェクト基盤整備事業については、各プロジェクトとも、その完了までかなり苦勞をしているので、本書がその参考となれば幸いである。

大久保専門家は、メクロン地区でのほ場整備（Intensive方式）の設計、施工等の実績をもとに、Intensive方式によるほ場整備の設計基準（案）を検討したものである。宮本、木村及び大久保専門家等の成果をふまえ、今後、タイにおけるほ場整備の設計指針等が作成されることを切に願うものである。

難波専門家は、水道、電気もなく、生活条件の劣悪なチャオピア地区に、試験ほ場での田植時期等に泊り込みで指導をするなどの苦勞を重ねて栽培試験を行った結果を取りまとめている。

本報告書が今後派遣される後任専門家等の参考資料として広く関係者に活用され、本プロジェクトの運営に役立つことを願うとともに、総合本報告書をまとめられた上記4名の専門家の方々に対し、ここに深甚の謝意を表するものである。

昭和56年1月

国際協力事業団

農業開発協力部長 村田稔尚

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES

PHYSICS DEPARTMENT
5720 S. UNIVERSITY AVE.
CHICAGO, ILL. 60637
TEL: 773-936-3700
FAX: 773-936-3701
WWW: WWW.PHYSICS.UCHICAGO.EDU

タイかんがい農業開発計画
帰国専門家総合報告書 I
(宮本、木村、大久保、難波専門家)

目 次

はじめに

I 宮本和美専門家総合報告書	1
(指導分野：かんがい排水)	
BRIFE REPORT OF TECHNICAL COOPERATION PROJECT ON IRRIGATED AGRICULTURE DEVELOPMENT IN THE KINGDOM OF THAILAND	
1. Foreword	5
2. Function of the project Center and my Terms of Reference	
3. Recommendation	6
4. Outline of the Project	6
(1) Japan's Technical Cooperation for the Irrigated... 8 Agriculture Development in Thailand(Draft Report 1)	
(2) Outline of Technical Cooperation Project on Irrigated Agriculture Development in the Kingdom of Thailand (Draft 2)	30
5. Brief Study of Land Consolidation Method in Thailand	44
II 木村和夫専門家総合報告書	59
(指導分野：ほ場整備)	
II-1 タイ国に於る請負契約の事例報告	61
1. はじめに	61
2. 経過と準備過程	61
3. タイ国に於る請負契約	62
4. 契約書の作成	63
4-1 契約者及び証人	64
4-2 契約方式	64
4-3 保証金	65
4-4 支払方法	65
4-5 物価上昇率	66

4 - 6. 工期	67
4 - 7. 罰則金	68
4 - 8. 質権の設定	68
4 - 9. 工事中止の場合の受注者の義務	68
4 - 10 検査委員会	69
4 - 11 瑕疵担保	69
4 - 12 設計変更	70
4 - 13. 工事の受取り	70
4 - 14. 主任技術者及び下請	71
4 - 15. 紛争	72
5. 契約条件	71
6. 工事仕様書	72
7. 施工管理基準	74
8. 工事費積算	74
9. 公告から入札まで	75
10. 入札、Price Negotiationから契約	76
11 施工管理から竣工検査	77
12. あとがき	78

資料 - 1 Contract for Land Consolidation at Lad Bua Luang

資料 - 2

資料 - 3

資料 - 4 Contractor's Proposal

資料 - 5 Bank Guarantee

資料 - 6 Pledge Agreement

資料 - 7 Information on the bidding

資料 - 8

II - 2 Machinery Plan For Irrigation Project	140
1 Outline of bidding system	143
1 - 1 Forward	143
1 - 2 Outline of estimation method for bid	143
1 - 3 Machinery plan	144
2. Machinery plan	145
2 - 1 Choice of suitable equipment	145
2 - 2 Bulk factor of soil	147

2 - 3	Example	148
2 - 4	Working efficiency	149
2 - 5	Combination of equipment	149
3.	Working ability of each machine	151
3 - 1	Bulldozer	151
3 - 1 - 1	Bulldozer, swamp bulldozer and super swamp bulldozer	151
3 - 1 - 2	Working ability of bulldozer for land levelling	154
3 - 2	Shovel type excavator	156
3 - 2 - 1	Power shovel	156
3 - 2 - 2	Back hoe	158
3 - 2 - 3	Dragline	159
3 - 2 - 4	Clamshell	161
3 - 3	Tractor shovel	163
3 - 3 - 1	Crawler type tractor shovel	163
3 - 3 - 2	Wheel type tractor shovel	164
3 - 4	Dump truck	166
3 - 5	Motor scraper	168
3 - 6	Banking and compaction	169
3 - 6 - 1	Optimum kind and size of compaction equipment according to construction condition	169
3 - 6 - 2	Working ability of compaction	172
3 - 6 - 3	Motor grader	174
3 - 6 - 4	Working ability of bulldozer for Ban- king and spreading	175
3 - 6 - 5	Combination work	175
4.	Expense of equipment	176
4 - 1	Rent for equipment	177
4 - 2	Operation in one day	179
4 - 3	Compulsory days	180
4 - 4	Fuel consumption	180

III	大久保富之専門家総合報告書	187
	(指導分野：かんがい排水)	
	実績に基づく設計基準(案)	192
1.	設計の手順	192
2.	ホ場の形状	193
2.1	用語の定義	193
2.2	区画規模の検討	193
3.	各施設の設計	197
3.1	単位用排水量の決定	197
3.2	用水路の設計	201
3.3	排水路の設計	203
3.4	農道の設計	204
4.	初年度施工における問題点と対策	205
5.	添付資料	208
- 1	水田内排水状況曲線	
- 2	THA MUONG 降雨状況と確率雨量	
- 3	粗度係数の測定	
- 4	土水路流量曲線	
- 5	水路法面侵食状況写真	
- 6	水路草生状況写真	
- 7	収穫量調査 施工前-施工後	
IV	難波一郎専門家総合報告書	221
	(指導分野：栽培)	
1.	はじめに	225
2.	稲作概況	227
3.	イライアルファーム当面の方針	229
4.	稲の第1作栽培結果	231
5.	畑の均一栽培について	238
6.	トライアルファーム栽培関係問題点	241
付1	図面	
付2	トライアルファームに行く途中の沿道田植調査	
付3	農家栽培調査の抜すい	

I 宮本和美専門家総合報告書

指導分野：かんがい排水

派遣期間：昭和52年8月31日

～ 55年8月30日

プロジェクトセンター担当

BRIEF REPORT
OF
TECHNICAL COOPERATION PROJECT
ON
IRRIGATED AGRICULTURE DEVELOPMENT
IN
THE KINGDOM OF THAILAND

AUGUST , 1980

KAZUMI MIYAMOTO
IRRIGATION & DRAINAGE EXPERT
I.A.D.P. PROJECT CENTER

Content

	<u>Page</u>
1. Foreword	5
2. Function of the Project Center and my Terms of Reference	6
3. Recommendation	6
4. Outline of the Project	8
(1) Japan's Technical Cooperation for the Irrigated Agriculture Development in Thailand (Draft Report 1)	
(2) Outline of Technical Cooperation Project on Irrigated Agriculture Development in the Kingdom of Thailand (Draft 2)	
5. Brief Study of Land Consolidation Method in Thailand	44

1. Foreword

I, the undersigned, have worked for three years from August 1977 to August 1980 as the Irrigation and Drainage Expert at the Project Center of the Technical Cooperation Project on the Irrigated Agriculture Development in Thailand.

This Project is going to implement to 1982, and the final report will submit in that time by the Team.

However, when I will leave here, I would like to submit herewith the part of the brief report, which might help managerially and technically the implementation of the Project under close cooperation of two countries.

I have also concerned indirectly the Greater Mae Klong River Basin Master Plan Survey and the feasibility study conducted by JICA for irrigation and on-farm development projects and the coordination for connecting OECF Loan.

I hope that the Projects completed the feasibility study will implement by the OECF Loan in very near future.

Taking the advantage of this opportunity I sincerely wish to express my heartiest thanks for the kind cooperation and various help given by the Ministry of Agriculture and Cooperatives, Thailand, and its concerned agencies of the Government of Thailand. The assistances extended by the Royal Irrigation Department, Central Office of Land Consolidation, Agricultural Land Reform Office and Department of Agriculture were particularly of great help in carrying out my assignment.

Very truly yours,

Kazumi Miyamoto

Kazumi Miyamoto
Irrigation and Drainage Expert
Project Center
Irrigated Agriculture Development
Project

30 August, 1980

2. Function of the Project Center and my Terms of Reference showed in the Record of Discussions and the Tentative Implementation Program

The Project Center has been established in Bangkok as the headquarter, and function as below.

- 1) To give necessary technical advices for planning and implementation of the Irrigated Agriculture Development Plan in the lower Greater Chao Phya Basin and the Greater Mae Klong Basin;
- 2) To conduct managerial and coordinating works in order to promote smooth and effective implementation of three sub-projects

In the Project Center, my terms of reference are as follows.

- 1) To assist the Team Leader and to represent him when the necessity arises;
- 2) To consult with, and advise to other land consolidation experts to be stationed in each sub-project on layout, design criteria, implementation program and other related matters on land consolidation and irrigation and drainage development;
- 3) To offer comments and advice to Thai officials on matters related with land consolidation and others in and around the Project areas.

My activities have been done based on above my duties as a member of the Team.

3. Recommendation

- 1) The Project period of the Project Center, the Chao Phya and the Mae Klong Pilot Project and the Experiment & Training Project, should be extend about three (3) years. And the Master Plan of the Project should be restudied in that time.
- 2) Investigations and surveys should be conducted at the Mae Klong Pilot Project No. 1 and No. 2 to compare with Intensive and Extensive method.
- 3) I hope Intensive (II) type, I mentioned in the Brief Study Report of Land Consolidation method in Thailand, try to implement in some area.
- 4) I hope the RID (MOAC) will submit the Form A-1 requesting the Advisers for irrigation & drainage projects.

- 5) I hope the DTEC (RID) will requests our Government the Grant aid for the Kamphaeng Saen On-Farm Development Center.
- 6) I hope the feasibility study on the Phetchaburi, the Pasak River the Mae Kuang and the East Coast Project will implement smoothly.
- 7) I hope the RID will request the 8th Yen Loan for implementation including detail design of the Kamphaeng Saen and the Mae Wang Project which the feasibility study have already finished.

4. Outline of the Project
(1) Japan's Technical Cooperation
for
the Irrigated Agriculture Development
in
the Kingdom of Thailand
(Draft Report 1)

Dec., 1978

KAZUMI MIYAMOTO
Irrigation & Drainage Expert
I.A.D.P. Project Center

OUTLINE OF TECHNICAL COOPERATION PROJECT
ON IRRIGATED AGRICULTURE DEVELOPMENT
IN THE KINGDOM OF THAILAND

(Provisional Edition)

JAPANESE EXPERTS' TEAM AT THE CENTRAL OFFICE OF
THAI IRRIGATED AGRICULTURE DEVELOPMENT PROJECT

Contents

	<u>Page</u>
I. Introduction	1 1
II. Statistical Information	1 3
III. The 4th National Economic and Social Development Plan (1977-1981)	1 8
IV. Background and Aim of Cooperation	2 0
V. Cooperation in the Past	2 3
VI. Features of Project Type Cooperation	2 4
VII. Organization and Functions	2 4
VIII. Organization Chart	2 8
IX. Project Cost	2 9

I. Introduction

1. Natural Conditions

Thailand is located in the central part of Indochina peninsula within latitude 5° - 21° N and longitude 97° - 106° E. The climate belongs to the tropical monsoon zone with wet season from May to October and dry season from November to April. The temperature averages 28° C, humidity, 75 %, and precipitation, 1,500 mm annually. Daily scores of one to two hours in wet season are common.

The total land area of Thailand is 514,000 KM² with agricultural farm land of 116 million rai, 36 % of the total area. The paddy field area occupies 63 % of the farm land, which is 73 million rai.

The Chao Phya river is the main stream in this country and it flows through the central plain from north to south into the Gulf of Thailand. In the western plain of Thailand the rivers, Nakhonchaishi and Mae Klong, and in the north-eastern part the rivers, Mun and Chi, branch streams of the Mae Khong river, flow through the country.

2. Economic and Social Conditions

The form of government is constitutional monarchism and 95 % of total population of 43 million is of Buddhism, with population growth rate of 3.1 % in the years, 1963 - 1970. In spite of the decrease of the rate in 1976 into 2.6 %, still the rate is comparatively high.

The growth rate of GNP in the years 1976 - 1977 was 8.8 % nominally and 6.8 % actually. In the year 1977 the GNP per capital in nominal figure was US\$ 411 and average rate of consumers' price increase was 12.5 % in the years, 1972 - 1975.

The agriculture is the most important industry in this country and it occupies 27 % of GDP. The 77 % of labor population is engaged in agriculture and more than 50 % of export products are of agriculture.

3. Agriculture

The major crops of production are rice and such tropical crops as maizs, sugar cane, rubber, tapioca, etc. The productivity of agriculture, however, may be said to be comparatively low. The net income from the production of rice is the lowest compared with that from the production of other major crops, which may be causing one of

the problems to the farmers in upgrading their income.

Thailand may be divided into 4 different regions of agriculture on such natural conditions as precipitation, soil characteristics, topography, etc.

- a) Northern region is developed since ancient times with certain irrigation facilities. The double cropping of paddy rice, as well as wet season paddy rice with second cropping in dry season has been prevailed in this region with the concept of crops diversification.
- b) North-eastern region consists of comparatively poor soil conditions and is less developed with less production yield per rai. In addition to rice, tapioca, kenaf, cotton, etc. are produced in this region. Agriculture, however, is rather unstable due to the poor distribution of a rainfall.
- c) Central region is of fertile alluvial soil and plays an important role in the agriculture in this country. Yearly flooding conditions from rivers are utilized for irrigation through the facilities constructed with rather advanced technology.
- d) Southern region belongs climatically and topographically to Malaya peninsula with production of coconuts and pineapples in northern part and rubber in the south due to greater precipitation.

4. Agricultural Development

The land area available for dry season rice production occupies only 5 % of the total paddy, though 75 % of irrigable area has already been irrigated. Only 130,000 rai of irrigated land has so far been land consolidated, which signifies large amount of area is still left for future development. It is reported that the Fourth National Economic and Social Development Plan aims at enhancement of agricultural production 1.7 times with annual growth rate of 5 % and special emphasis is placed upon development of irrigation and drainage facilities combined with land consolidation. The amount of investment for this purpose is twice of that in the Third Plan and proposed area planned for land consolidation is 1.39 million rai.

II. Statistical Information

1. Climate

Items	Unit	Whole Kingdom	Lower Chao Phya	Mae Klong
Annual mean temperature	C	28.0	28.2	28.0
" " rainfall	mm	1,492	1,300	1,117

2. The Growth rate of population etc.

Items	Unit	Growth rate	Growth rate
Population	%	3.1 (1963-70)	2.6 (1976)
GNP and GDP	"	GNP 7.2 (1976-71)	GNP 6.8 (8.8) (1976-1977)
Consumers' price	"	-	GNP 6.2 (1972-75) 12.5 (1972-75)

3. GNP per capita US# 185 (1971) US# 411 (259) (1977)

4. Workers' population ratio

Items	Unit	Agriculture	Mining & Industry	Commerce & Service
Workers' population ratio (1972)	%	77.4	5.6	17.0

5. Number of farm household

Items	Total	Farm	Ratio
(Unit)	1,000 household	1,000 household	%
Number of household (1974)	6,568	3,838	58

6. Land and Population, etc.

	Unit	Whole Kingdom	North	%	North-east	%	Central	%	South	%	Remarks
Total land	Km ²	514,000	170,006	33	170,226	33	103,579	20	70,189	14	1975/76
Farm holding land	1,000 rai	116,165	23,816	21	50,465	43	27,493	24	14,391	12	"
Paddy land	"	73,266	15,609	21	35,770	49	16,819	23	5,068	7	"
Under field Crops	"	20,880	6,120	29	8,608	41	6,039	29	113	1	"
Under fruit tree etc.	"	11,401	562	5	776	7	2,270	20	7,793	68	"
Paddy											
Planted area	"	53,595	10,795	20	23,760	45	15,149	28	3,891	7	1976/77
Production	1,000 ton	15,068	4,111	27	4,686	31	5,103	34	1,168	8	Export 2,885
Yield per rai	Kg/Rai	281	381		197		337		300		"
Sugar cane											
Planted area	1,000 rai	2,804	395	14	283	10	2,126	76	-	-	1976/77
Production	1,000 ton	22,564	3,091	14	1,703	7	17,770	79	-	-	"
Yield per rai	Ton/Rai	8.0	7.8		6.0		8.4		-	-	"
Population	1,000 person	43,214	9,048	21	14,793	34	14,044	33	5,329	12	"
Density of population	Person/Km ²	84	53		87		136		76		"
Workers 15-64 years age	1,000 person	14,680	3,402	23	5,268	36	4,251	29	1,759	12	1970
Agriculture Workers	"	11,419	2,891	25	4,788	42	2,312	20	1,428	13	"
Non-agriculture "	"	3,262	511	16	480	15	1,940	59	331	10	Concerned
Ratio of agriculture	%	77.8	85.0		90.9		54.4		81.2		"
Actual agriculture Workers	1,000 person	8,368	1,926	23	3,145	38	2,300	27	997	12	"
Cultivated area	Mil Rai	109.41	24.04	22	47.80	44	26.09	24	11.48	10	1975
Irrigable area	"	20.07	3.56	18	2.38	12	12.42	62	1.71	8	"
Irrigated area	"	15.12	2.37	16	1.49	10	10.34	68	0.92	6	"
Ratio of Irrigation	%	75.3	66.6		62.6		83.3		53.8		"
Land Consolidation	Mil Rai	0.0531	-	-	0.0006	1	0.0525	99	-	-	"
"	"	0.130	0.010	8	0.005	4	0.115	88	-	-	1977

7. Principal crops planted area and production (1976/1977)

Kind of crop	Planted area	Production	Yield per rai
(Unit)	1,000 rai	1,000 ton	Kg/Rai
Paddy (Rice)	53,395	15,068	281
Wet Season	50,859	13,678	269
Dry Season	2,736	1,390	508
Maize	8,029	2,675	333
Sugar cane	2,804	22,564	8,047
Cassava	4,359	10,138	2,326
Para-rubber	9,099	419	46
Kenaf	1,009	183.3	182
Soybeans	635	113.6	179
Mungbeans	1,392	125.0	90
Sorghum	892	148.4	166
Cotton	154	26.8	174

8. Agriculture income per each crops (1975)

Kind of crop (Unit)	Price Ton/Baht	Income Baht/Rai	Production cost Baht/Rai	Net earnings Baht/Rai
Sugar cane	288	2,308	1,756	548
Tapioca	420	992	643	399
Tobacco	1,350	2,095	1,800	295
Rubber	6,280	465	222	242
Soybeans	3,600	512	274	208
Maize	2,020	755	560	195
Kenaf	3,000	415	377	70
Rice	2,095	752	701	51

9. Irrigated area (Unit: 1,000 ha, 1972)

Region	Irrigable Area (A)	Irrigated Area (B)	Ratio (B/A)
North	260	237	0.91
Upper Central	245	113	0.46
Lower Central	1,209	1,140	0.94
East	213	179	0.84
West	490	222	0.45
Upper Northeast	254	123	0.48
Lower Northeast	122	82	0.67
South	254	100	0.44
Total	3,018	2,196	0.73

10. Major storage dams

Project	River Basin	Dam Capacity (MCM)	Irrigable Area (1,000 ha)	Construction Year Start-Complete
Kiu Lom Dam	Mae Wang	112.0	8.3	1962-1975
Bhumibol Dam	Mae Ping	13,400.0	400.0	1958-1964
Sirikit Dam	Mae Nan	10,550.0	288.8	1963-1972
Huai Somlek Dam	Pasah Canal	10.6	1.0	1954-1955
Huai Som Tank	Upper Pasak	12.5	1.4	1956-1958
Bong Krai Tank	East Coast	100.0	1.4	1971-1974
Dok Krai Tank	Rayong	58.0	4.8	1969-1973
Khao Rakam Tank	Rayong	23.0	2.7	1968-1972
Kaeng Krachan Dam	Phetchaburi	710.0	27.0	1961-1966
Pran Buri Dam	Pran Buri	445.0	32.0	1967-1979
Yang Chum Dam	Pran Buri	32.0	1.6	1969-1973
Huai Luang Dam	Huai Luang	113.3	12.8	1970-1976
Nam Un Dam	Songkhram	524.0	32.0	1967-1976
Lam Pao Dam	Lam Pao	1,340.0	54.1	1963-1975
Total		27,430.4	869.6	
Sinakharin Dam	Quae Yai	17,745	(400)	1974-1980

11. Budget for irrigation project (1978)

Irrigation Project	Budget	Number of Project
Large Project	1,327,341,000	17
Medium Project	290,000,000	35
Small Project	170,247,600	
Land Consolidation	132,038,900	7
Operation & Maintenance	658,123,800	112

III. The 4th National Economic and Social Development Plan (1977-1981)

1. Prospect of G.D.P.

Items	Third Plan 1976 (1972-76)			Fourth Plan 1981 (1977-81)		
	Quantity	Share	Mean Growth rate	Quantity	Share	Mean Growth rate
(Unit)	Mil ₪	%	%	Mil ₪	%	%
G.D.P.	174,866	100	6.2	245,258	100	7.0
Agriculture	46,113	26.4	3.9	58,706	23.9	5.0
Manufacturing Industry	35,575	20.3	8.6	56,277	22.9	9.5

2. Target of agricultural Production

Items	1976	1981	Ratio
(Unit)	Mil ton	Mil ton	%
Paddy (Rice)	14.7	16.5	112
Wet season	13.4	14.6	109
Dry "	1.3	1.9	146
Sugarcane	20.3	28.6	141

3. Plan of investment

Items	Third Revised Plan		Fourth Plan		Ratio
	Quantity	Share	Quantity	Share	
(Unit)	Mil ₪	%	Mil ₪	%	%
Agriculture Irrigation	19,985	15.2	39,100	15.5	196
Industry Mining Commerce	4,258	3.2	3,605	1.4	85
Transportation Communication	22,543	17.1	37,175	14.7	165
Electricity	14,751	11.2	15,950	6.3	108
Sub total Economic Development	61,537	46.9	95,830	37.9	156
Sub total Social Development	69,726	53.1	156,620	62.1	225
Grand total	131,263	100.0	252,450	100.0	192

4. Implementation plans of land consolidation projects

Project	Irrigation Area	Implemented by 1976	5 Year Plan	Year				
				1977	1978	1979	1980	1981
Phisanulok (IBRD)	900,000	3,500	359,000	9,000	25,000	75,000	125,000	125,000
Nong Mai Pioneer Project (N.E.) (A.D.B.)	300,000	1,625	72,000	7,000	15,000	15,000	20,000	15,000
Namoon (N.E.) (VSAID)	225,000	500	60,000	5,000	15,000	20,000	20,000	-
Greater Chaophya Project	5,700,000	58,100	537,000	41,000	98,000	118,000	130,000	150,000
Mae Wang (NORTH)	77,000		68,000	1,000	5,000	12,000	20,000	30,000
Greater Mae Klong Project	2,500,000		157,000	20,000	20,000	30,000	42,000	45,000
Phetchaburi Project	336,000		98,000	1,000	12,000	20,000	30,000	35,000
Multiple Purpose Cooperation Project	45,000	11,120	39,000	6,000	10,000	10,000	13,000	-
Total (Rai)	10,083,000	74,845	1,390,000	90,000	200,000	300,000	400,000	400,000
(ha)	1,613,280	11,975	222,400	14,400	32,000	48,000	64,000	64,000

IV. Background and Aim of the Technical Cooperation

The paddy cultivation in Thailand which has been carried out in the vast paddy fields of about 6.8 million hectares, produces its annual yield of approximately 12.0 million tons of rice (unhusked rice equivalent), and about one million tons of the annual production have been exported to those southeast Asian countries which have been suffering from the chronic shortage of foodstuff.

Thus, as compared with other southeast Asian countries, the Thailand agriculture has been maintaining considerably stable paddy production, which, as nucleus of the agriculture, is playing a vital role in the national economy, contributing to the improvement of the balance of payment to a great extent.

The latest achievement of the country's rice farming depends on not only the blessed natural conditions but also on the investment made for the infrastructural water use facilities since long years ago. Particularly, the main irrigation and drainage canals provided by the Royal Irrigation Department have been highly evaluated internationally.

Recently, however, the population of Thailand have been explosively increasing, exceeding three percent of annual growth rate, as other southeast Asian countries. If the population grows on keeping the current pace, the surplus capacity for the rice export will become feeble to difficulties in the self-sufficiency of rice in the country within less than 10 years.

The 4th National Economic and Social Development Plan (1977 - 1981) involves the schedule for diversification and stabilization of exports by farm production increase and multiple cropping so as to take counter-measure to the expected severe situation.

The farm production increase, particularly in the paddy production, will indispensably require production increase per unit acreage for double cropping. In order to realize the program, the following measures should perhaps be taken:

- a) The high yielding varieties (e.g. the RD strain in Thailand) should be introduced to possibly large acreage and the land consolidation should be provided so as to carry out the proper water management.

- b) The irrigation water should be secured for dry season cropping and the terminal irrigation facilities should be completely provided for efficient water utilization.
- c) The agriculture supporting services should be positively promoted for improvement and extension of the farming techniques and farmers' organization along with the above mentioned direction.

As mentioned already, since the end of World War II, the consolidation of main irrigation and drainage facilities has been expedited to produce good effect for securing the waters. The better water utilization, however, has not been made yet due to the absence of on-farm facilities such as secondary, and tertiary canals, water intake systems to the fields and land consolidation.

Then, the Government of Thailand has come to recognize the fact that the increase in paddy yield should inevitably require to realize the on-farm development as early as possible.

Under such circumstances, the Government has formulated the plan of on-farm development, particularly the land consolidation progress as core of the plan, (so-called Irrigated Agriculture Development), and took necessary legal and institutional measures in enforcement of Land Consolidation Act (1974) and Agricultural Land Reform Act (1975) for smooth execution of the development program. The Government carried out the administrative reorganization that had transferred the Royal Irrigation Department to have belonged to the Ministry of Interior into the Ministry of Agriculture and Cooperatives, and newly established the Central Land Consolidation Office in Charge of planning and Execution of land consolidation projects, and the Agricultural Land Reform Office for promotion of the land reform.

In parallel with those positive measures for irrigated agriculture development, in February 1976, the government of Thailand requested the government of Japan, the one of the most countries in the on-farm development technology, to extend the technical cooperation in implementation of the land consolidation program.

The said request of Thailand has certainly come from not only its reliance on Japanese advanced technology but from close contacts and mutual good understandings through many occasions of symposiums and seminars, and exchange of related engineers and officers between the two countries.

In the future process of technical cooperation by Japan, much care should be taken in the following points:

- a) The land consolidation technology in Japan, which has highly been developed, might not be applied directly to the cases in Thailand, although it could be a model. In view of economy special attention should be paid to minimum investment, quick yielding and large scale extention activities;
- b) As mentioned previously, Thailand, as its national policy, is trying to promote multiple cropping, as well as increase of production from paddy, in order to promote farmers' income. The crops diversification would stabilize the farmers' income as well as the export of agricultural products. In this respect land consolidation would enable them to conduct convertible cropping between paddy and upland. It is needless to say that selection suitable crops for local conditions, as well as the improvement of farming technology are of quite importance.

V. Cooperation in the Past

In response to the request from the Government of Thailand the Government of Japan has dispatched the Mission and long term experts as follows:

Date	Name of the Mission, etc.	Name of Leader
May 1976	Preliminary Survey Teams	Dr. T. Kimura
October 1976	Chao Phya Feasibility Study Survey Team	Mr. S. Watanabe
November 1976	Preliminary Pilot Project Detail Design Survey Team	Mr. Y. Ohata
February 1977	Chao Phya Pilot Project Detail Design Survey Team	Mr. M. Nakahara
April 1977	The Record of Discussion about Pilot Project signed	" "
June 1977	The Record of Discussion about development survey for Irrigated Agriculture Development Project in Mae Klong River Basin and grant aid for construction of Suphanburi Training Center	Mr. S. Kowata
July 1977	Preliminary the Greater Mae Klong River Basin Master Plan Study Survey Team	Mr. J. Sakurai
August 1977	Japanese Long Term Experts Team for IADP (Project Center)	Mr. M. Furuya
September 1977	Mae Klong Pilot Project Detail Design Survey Team	Mr. K. Iki
November 1977	Study Tour of Thai Officers (4)	
November 1977	The Greater Mae Klong River Basin Master Plan Study Survey Team and Advisory Group	Mr. I. Iwamoto
March 1978	The Annual Planning Survey Team for IADP	Mr. R. Sudo
" "	The Advisory Group of The Greater Mae Klong River Basin Master Plan Study Survey	Mr. F. Seko
" "	The Construction equipments, etc. of 1977 fiscal year of Japan shipped to Thailand	

VI. Features of Project Type Cooperation

The operational scale of this project is so large compared with conventional technical cooperation in agriculture so far put into operation in this country, thus requiring more comprehensive and integrated management with close relationship with economic cooperation, which might be itemized as follows:

- (1) Integration of the technical cooperation and economic cooperation
- (2) Cooperation of agencies and departments concerned
- (3) Good timing of cooperation and consistent plan for project implementation
- (4) Importance of development in socio economic aspects

VII. Organization and Functions

The purpose of this project is the Irrigated Agriculture Development, especially on-farm Development in the Lower Greater Chao Phya Basin and the Greater Mae Klong River Basin. The project consists of followings.

1. Project Center

The Project Center will be established in Bangkok as the headquarter, and function as below.

- (i) To give necessary technical advices for planning and implementation of the Irrigated Agriculture Development Plan in the Lower Greater Chao Phya Basin and the Greater Mae Klong Basin.
- (ii) To conduct managerial and coordinating works in order to promote smooth and effective implementation of three sub-projects.

2. Three Sub Project

- (i) Chao Phya Pilot Project of about 500 ha will be set up for agriculture development of the flood irrigation area in Tambol Phraya Banlu, Amphoe Lat Bua Luang, Changwat Ayutthaya.
- (ii) Mae Klong Pilot Project

The Mae Klong Pilot Project (No. 1) of about 400 ha and the Mae Klong Pilot Project (No. 2) of about 500 ha will be set up in Tambol Maunghum and Banmai, Amphoe Tha Muang, Changwat Kanchanaburi and in

Tumbol Taklamen, Aumphoe Tha Maka, Changwat Kanchanaburi respectively for agricultural development by means of Multi-cropping.

The activities in the Pilot Project mentioned in ii) and iii) above are as follows:

- a) To Plan of execute the improvement works of agricultural physical infrastructure, such as field rearrangement, farm roads, irrigation and drainage facilities and empoldering dikes L = Km (as required in chao Phya), in each pilot area;
- b) To advise on technical matters to farmers in the pilot areas and staff concerned for effective water management;
- c) To conduct trails with improved agricultural techniques of rice cultivation mainly at the trail farm of about 10 ha;
- d) To provide training and guidance to farmers in the pilot areas and their vicinities on improved agricultural techniques;
- e) To introduce and demonstrate improved agricultural techniques at a few model farms which will be selected in the pilot areas;
- f) To foster and strengthen farmers' organizations for water management, joint cooperative activities for distribution of agricultural materials, collection and forwarding of agricultural products and other activities necessary in the pilot areas including their vicinities when necessity arises.

The implementation of the Mae Klong Pilot Project (No. 2) will be of extensive method.

(iii) Experiment and Training Project

The activities of the Suphan Buri Station located in Thambol Rua Yai, Amphoe Muang, Changwat Suphan Buri are as follows:

To Conduct experiments and training on improved agricultural techniques for the successful implementation of the Irrigated Agriculture Development in the pilot areas and their vicinities.

The experiment mentioned above will be primarily carried out by the Government of Thailand and the trainees will be agriculture officers and staff concerned.

3. Survey Activities

(i) Master Plan Survey

- a) The Greater Mae Klong River Basin
A = 500,000 ha P = 12-1977 3-1979
- b) The Lower Greater Chao Phya Basin (The West Bank Tract)
A = 300,000 ha

(ii) Feasibility Study

- a) The West Bank Tract
A = 12,000 ha P = 10-1976 2-1977
- b) The Greater Mae Klong

(iii) Detail Design Survey

- a) The Chao Phya Pilot Project
A = 500 ha P = 2-1977 8-1979
- b) The Mae Klong Pilot Project
A = 900 ha P = 9-1977 3-1978

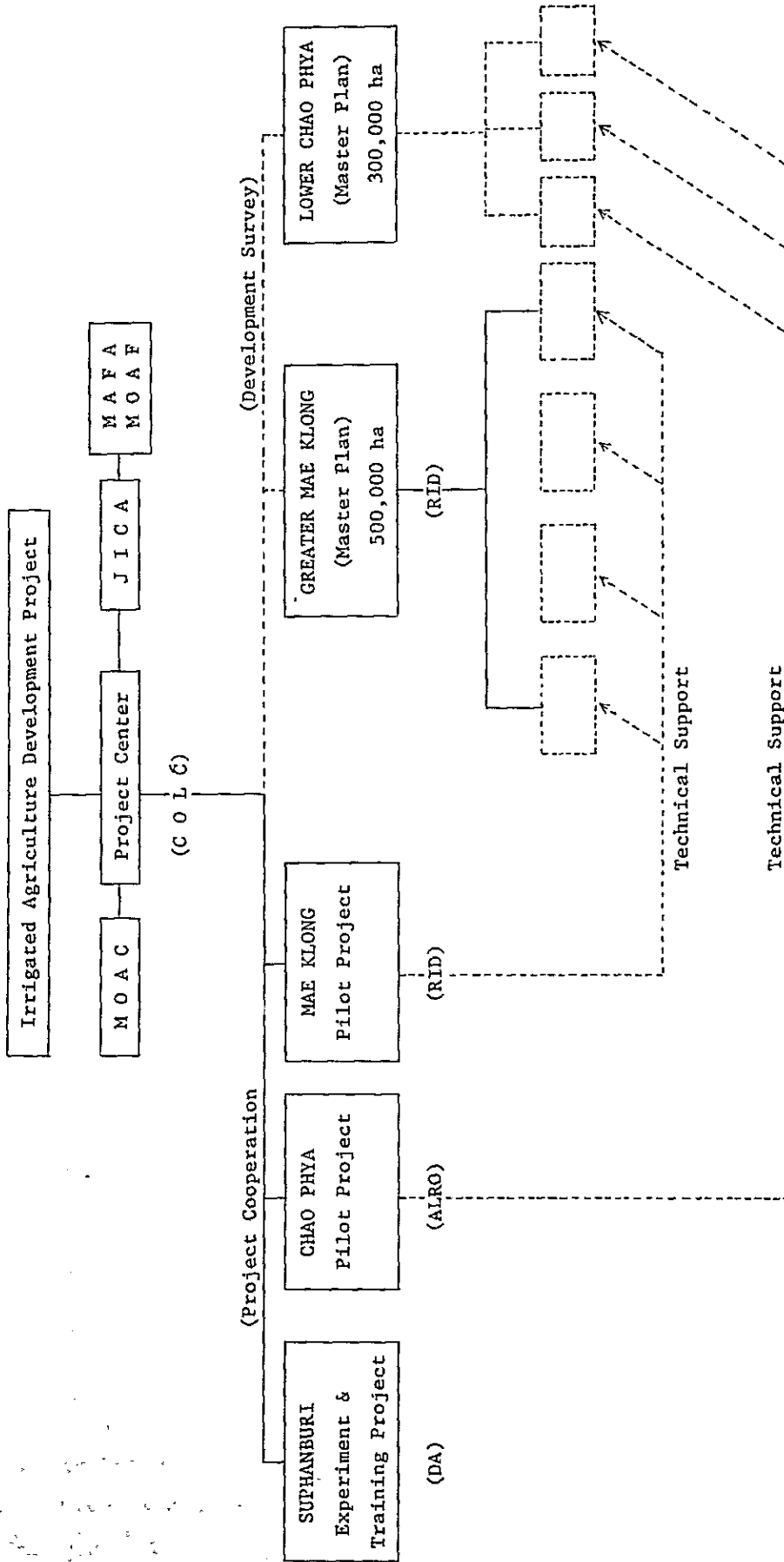
(iv) Preliminary Study Survey etc.

4. Items of Japan's Cooperation

- (i) Dispatching the experts: The experts will be dispatched to the Project Center in Bang-ok and other three sub-projects, including such long-term assigned staff as Term Leader, Irrigation & Drainage Engineers, Land Consolidation Engineers, Agro-economists, Agronomists, Liaison Officer, etc., but not exceeding 20 members in total.
- (ii) Machineries, equipment, and agri-chemicals to be granted: The Government of Japan will grant the construction machineries for land consolidation works, farming machines, fertilizers, agri-chemicals and vehicles to be required for the Project execution.
- (iii) Training and study in Japan: The Thai counterparts personnel assigned to the Project will be trained in Japan to master techniques of irrigation & drainage, paddy cropping, etc. to be necessitated in the Project implementation.

- (iv) Dispatching the survey teams: The survey teams will be dispatched for the master plan survey, the feasibility study, the detail design and others.
- (v) Loan from OECF etc. for the implementation of the project aside from the Technical Cooperation Project.

VIII. Organization Chart



Irrigated Agriculture Development Project
in the West Bank Tract of the Greater CHAO PHYA

IX. Project Cost

Project Costs for Technical Cooperation Project

(Unit: 1,000 B)

Items	Total							
	Costs	1977	1978	1979	1980	1981	L.C.	F.C.
A. Chao Phya Pilot Project								
1. Infrastructure Development	19,132	1,037	11,072	3,193	2,082	1,748	13,184	5,948
2. Construction Machineries	31,783	12,037	8,842	8,137	2,767	-	6,355	25,428
3. Supporting Services	13,841	1,656	7,095	2,023	1,606	1,461	7,672	6,169
4. Project Administration	19,844	2,768	3,624	4,483	4,793	4,176	18,558	1,286
Total	<u>84,600</u>	<u>17,498</u>	<u>30,633</u>	<u>17,836</u>	<u>11,248</u>	<u>7,385</u>	<u>45,769</u>	<u>38,831</u>
B. Mae Klong Pilot Project								
B.1 No. 1 District								
1) Land Consolidation	4,050	-	540	1,620	1,890	-	4,050	-
2) Construction Machineries	19,091	-	4,037	8,138	6,916	-	3,817	15,274
3) Supporting Services	12,425	-	3,016	4,526	3,385	1,498	6,633	5,792
4) Project Administration	12,334	-	2,212	3,543	3,637	2,942	11,801	533
Sub-total	47,900	-	9,805	17,827	15,828	4,440	26,301	21,599
B.2 No. 2 District								
1) Land Consolidation	1,830	-	-	-	730	1,100	1,830	-
2) Project Administration	570	-	-	-	230	340	570	-
Sub-total	2,400	-	-	-	960	1,440	2,400	-
Total	<u>50,300</u>	-	<u>9,805</u>	<u>17,827</u>	<u>16,788</u>	<u>5,880</u>	<u>28,701</u>	<u>21,599</u>
C. Suphan Buri Station	<u>7,200</u>	-	<u>1,271</u>	<u>2,034</u>	<u>2,454</u>	<u>1,441</u>	<u>4,675</u>	<u>2,525</u>
D. Project Center	<u>3,100</u>	<u>667</u>	<u>579</u>	<u>618</u>	<u>618</u>	<u>618</u>	<u>2,700</u>	<u>400</u>
Total (A B C D)	<u>145,200</u>	<u>18,165</u>	<u>42,288</u>	<u>38,315</u>	<u>31,108</u>	<u>15,324</u>	<u>81,845</u>	<u>63,355</u>
E. Expenditure for Technical Cooperation								
1. Japanese Experts	40,076	1,543	5,596	9,880	11,765	11,292	-	40,076
2. Survey Team	6,349	4,573	444	444	444	444	-	6,349
3. Training in Japan	1,775	187	397	397	397	397	-	1,775
Total	<u>48,200</u>	<u>6,303</u>	<u>6,437</u>	<u>10,701</u>	<u>12,606</u>	<u>12,133</u>	-	<u>48,200</u>
F. Grand Total	<u>193,400</u>	<u>24,468</u>	<u>48,725</u>	<u>49,036</u>	<u>43,714</u>	<u>27,457</u>	<u>81,845</u>	<u>111,555</u>

(N.B.) (1) These costs do not include the cost for Master Plan Survey and Feasibility Study.

(2) The period of this project is from 1977 to 1981, 5 years.

(2) Outline of technical cooperation project on irrigated
agriculture development in the Kingdom of Thailand

(Draft 2)

by

KAZUMI MIYAMOTO

Irrigation and Drainage Expert

I.A.D.P. Project Center in Thailand

Preface

The domestic consumption of food in Thailand has been increasing remarkably in response to the rapid increase in her population in recent years. If this trend continues, Thailand, big exporter of agricultural products, will face food shortage even in her own country in the future.

To cope with this situation, both increase in and diversification of the agricultural products become imperative so that Thailand can continue self-supplying of food to her people and secure the capacity of exporting agricultural products abroad.

Besides, this realizes the enhancement of farmers' standard of living and stabilizes their living conditions.

Taking the above situation into consideration, the Irrigated Agricultural Development Project was planned and signed to be implemented between Thai Government and Japanese Government as one of the development and cooperation schemes in order to tackle the above mentioned task at the Greater Mae-Klong River Basin and Lower Great Chao Phya River Basin.

1. Objectives

The Project has such objectives as so-called on-farm development and introduction of improved farming techniques.

In the former, construction of minor irrigation and drainage facilities, construction of and improvement to the farm road and arrangement of field plots and their land consolidation are designed so that sufficient water be secured even at the minor paddy field and expansion of irrigated field during dry season be made possible.

In the latter, both introduction of high yielding paddy and improved farming techniques are aimed, by which enhancement of agricultural productivity and expansion of acreage for paddy double cropping are aimed.

2. Region and Area

The Greater Mae Klong River Basin 500,000 ha

The Lower Greater Chao Phya Basin 300,000 ha (The West Bank Tract)

3. Cooperation in the Past

Date	Name of the Mission etc.
Feb. 1976	Thai Government requested Japanese Government for the cooperation
May 1976	Preliminary Survey (formulation of plan and recommendation)
Oct. 1976	Feasibility Study for the West Bank Tract in the Greater Lower Chao Phya Basin
Feb. 1977	Detailed Design Survey for the Project Cooperation
Apr. 1977	Record of Discussion for the Project Cooperation
Aug. 1977	Dispatch of Japanese Long Term Expert
Sep. 1977	Detailed Design Survey for the Mae Klong Pilot Project
Nov. 1977	Master Plan Study for the Greater Mae Klong River Basin
Apr. 1978	Model Infrastructure Survey
Jan. 1978	Feasibility Study for Kamphaeng Saen Project
Jun. 1979	Pilot Infrastructure Survey
Jul. 1979	Feasibility Study for Mae Wang Project

4. Main Crops

Rice, Sugarcane, Bean and others.

5. Feature of this Project

The operational scale of the Project is so large compared with the conventional technical cooperation in the agricultural sector so far put into operation in this country. The Project requires more comprehensive and integrated management in close relationship with economic cooperation. Furthermore, in the binds of technical cooperation, the Pilot Project, the Experiment Training Project and Development Survey should be promoted side by side. Together with this, the technical cooperation coupled with the capital cooperation for this Project accelerates the development in this great region.

6. Organization and Function of the Project

(1) Project type cooperation

(a) Project center

- i) To give necessary technical advices for planning and implementation of the Irrigated Agriculture Development Plan especially in the Lower Greater Chao Phya Basin and the Greater Mae Klong Basin.
- ii) To conduct managerial and coordinating works in order to promote smooth and effective implementation of three sub-project.

(b) Chao Phya Pilot Project (Area 500 ha)

(c) Mae Klong Pilot Project (Area No. 1: 400 ha, No. 2: 500 ha)

- i) To plan and execute the improvement works of agricultural physical infrastructure, such as field rearrangement, farm roads, irrigation and drainage facilities and empoldering dikes (as required in Chao Phya), in each pilot areas;
- ii) To advise on technical matters to farmers in the pilot areas and staff concerned for effective water management;
- iii) To conduct trials with improved agricultural techniques of rice cultivation mainly at the trail farm of about 10 ha;
- iv) To provide training and guidance to farmers in the pilot areas and their vicinities on improved agricultural techniques;
- v) To introduce and demonstrate improved agricultural techniques at a few model farms which will be selected in the pilot areas;
- vi) To foster and strengthen farmers' organizations for water management. Joint co-operative activities for distribution of agricultural materials, collection and forwarding of agricultural products and other necessary activities in the pilot areas including their vicinities when necessary arises.

The implementation of the Mae Klong Pilot Project (No. 2) will be of extensive method.

(d) Experiment and training project

To conduct experiments and training on improved agricultural techniques for the successful implementation of the Irrigated Agriculture Development in the pilot areas and their vicinities.

(2) Development survey

Japanese Government implements development survey based on the request of Thai Government by dispatching the survey teams. The Project Center gives the necessary technical advices.

(a) The Greater Mae Klong River Basin Master Plan Survey

(Area 50,000 ha) This survey studies of this Project area based on On-Farm Development

Item of Survey and Study: 1) land utilization 2) irrigation and drainage 3) water resources 4) cropping patterns 5) land consolidation 6) Rehabilitation of main facilities 7) Water management and operation and maintenance of facilities 8) cost 9) Benefits 10) Evaluation 11) Development priority etc.

(b) The West Bank Tract of the Greater Lower Chao Phya Feasibility Study (Area 12,300 ha)

(c) The Feasibilities Study of the Kamphaeng Saen Project (Area 30,000 ha)

(d) The Feasibilities Study of the Mae Wang Project (Area 20,000 ha)

(e) The Feasibilites Study of the Pherchaburi Project (Area 50,000 ha)

The Feasibility Study conducts majorly on-farm development.

(3) Capital cooperation

To implement the project which has finished the Feasibility Study already, the government of Japan provide the Yen-Loan (OECF) based on the request of the government of Tahiland.

(a) The detailed design of the West Bank Tract of the Greater Lower Chao Phya (Area 12,300 ha).

Detailed design majorly on-farm development.

7. Items of Japan's Cooperation

(1) Project type cooperation

(a) Dispatching the experts

(b) Grant of the machineries etc.

(c) Training and study in Japan

(d) Others

i) Model infrastructure: Construction of trail farm

ii) Pilot infrastructure: Land consolidation works on a part
of area in Pilot Project

(2) Development survey

(a) Implementation of the survey by dispatching the survey teams

(b) Grant of the instruments for the survey and training in Japan

(3) Grant cooperation

(a) Building expenses of Suphan Buri Experiment & Training Station

8. Project Period

(1) Project type cooperation: 1977 - 1981 (5 years)

(2) Development survey: 1976 -

(3) Capital cooperation: 1979 -

N.B. Year shows Japanese fiscal year

9. Project Cost

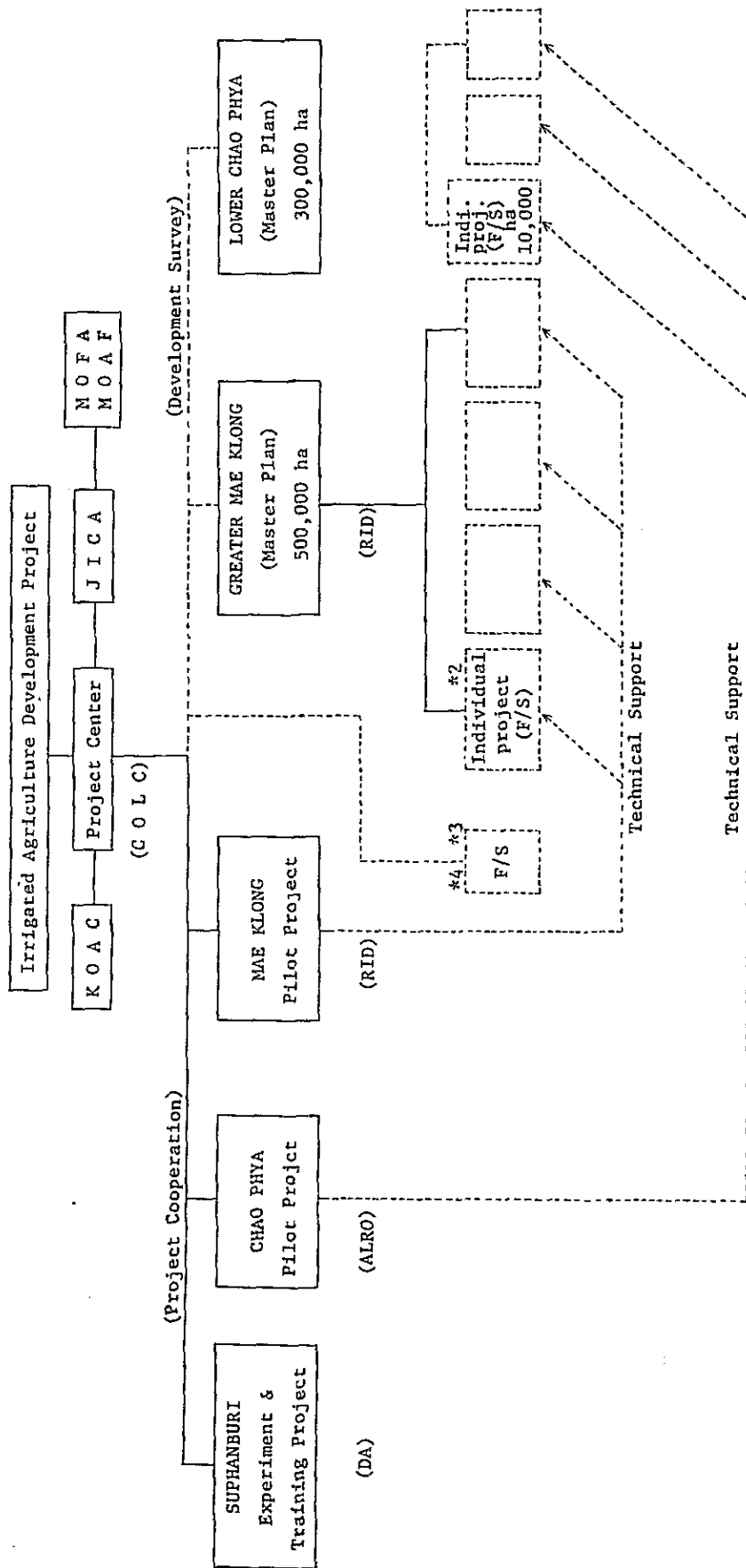
(1) Project type cooperation

Total cost 193.4 Mil ฿ (2,610.9 Mil Yen)

Within above foreign currency 111.6 Mil ฿ (1,506.0 Mil Yen)

N.B. Exchange rate 1 ฿ = 13.5 Yen

6. Organization Diagram



* Irrigated Agriculture Development Project in the West Bank Tract of the Greater CHAO PHYA

*2 The Kamphaeng Saen Irrigated Agriculture Development Project

*3 The Mae Wang - Kew Lom Project

*4 The Phetchaburi - Kaeng Krachan Project

7. Project Cost

Project Costs for Technical Cooperation Project

(Unit: 1,000 B)

Items	Total Costs	Fiscal Year					L.C.	F.C.
		1977	1978	1979	1980	1981		
A. Chao Phya Pilot Project								
1. Infrastructure Development	19,132	1,037	11,072	3,193	2,082	1,748	13,184	5,948
2. Construction Machineries	31,783	12,037	8,842	8,137	2,767	-	6,355	25,428
3. Supporting Services	13,841	1,656	7,095	2,023	1,606	1,461	7,672	6,169
4. Project Administration	19,884	2,768	3,624	4,483	4,793	4,176	18,558	1,886
Total	<u>84,600</u>	<u>17,498</u>	<u>30,633</u>	<u>17,836</u>	<u>11,248</u>	<u>7,385</u>	<u>45,769</u>	<u>38,831</u>
B. Mae Klong Pilot Project								
B.1 No. 1 District								
1) Land Consolidation	4,050	-	540	1,620	1,890	-	4,050	-
2) Construction Machineries	19,091	-	4,037	8,138	6,916	-	3,817	15,274
3) Supporting Services	12,425	-	3,016	4,526	3,385	1,498	6,633	5,792
4) Project Administration	12,334	-	2,212	3,543	3,637	2,942	11,801	533
Sub-total	47,900	-	9,805	17,827	15,828	4,440	26,301	21,599
B.2 No. 2 District								
1) Land Consolidation	1,830	-	-	-	730	1,100	1,830	-
2) Project Administration	570	-	-	-	230	340	570	-
Sub-total	2,400	-	-	-	960	1,440	2,400	-
Total	<u>50,300</u>	-	<u>9,805</u>	<u>17,827</u>	<u>16,788</u>	<u>5,880</u>	<u>28,701</u>	<u>21,599</u>
C. Suphan Buri Station								
	<u>7,200</u>	-	<u>1,271</u>	<u>2,034</u>	<u>2,454</u>	<u>1,441</u>	<u>4,675</u>	<u>2,525</u>
D. Project Center								
	<u>3,100</u>	<u>667</u>	<u>579</u>	<u>618</u>	<u>618</u>	<u>618</u>	<u>2,700</u>	<u>400</u>
Totals (A B C D)	<u>145,200</u>	<u>18,165</u>	<u>42,288</u>	<u>38,315</u>	<u>31,108</u>	<u>15,324</u>	<u>81,845</u>	<u>63,355</u>
E. Expenditure for Technical Cooperation								
1. Japanese Experts	40,076	1,543	5,596	9,880	11,765	11,292	-	40,076
2. Survey Team	6,349	4,573	444	444	444	444	-	6,349
3. Training in Japan	1,775	187	397	397	397	397	-	1,775
Total	<u>48,200</u>	<u>6,303</u>	<u>6,437</u>	<u>10,721</u>	<u>12,606</u>	<u>12,133</u>	-	<u>48,200</u>
F. Grand Total								
	<u>193,400</u>	<u>24,468</u>	<u>48,725</u>	<u>49,036</u>	<u>43,714</u>	<u>27,457</u>	<u>81,845</u>	<u>111,555</u>

(N.B.) (1) These costs do not include the cost for Master Plan Survey and feasibility Study.

(2) The period of this project is from 1977 to 1981, 5 years.

Project type cooperation implementation schedule

		The upper row: Plan, the under row: Past record or alternative plan, calendar year.						Remark
Item	Quantity	1977	1978	1979	1980	1981	1982	
I. Chao Phya Construction Work								
1. Polder dike, Main canal	9,160 m		2,400	6,760				
	8,884			8,884				
2. Pumping station	6 station							
3. Land consolidation	451.4 ha				101.7	194.5	155.5	
					91.2+81.3=			
					172.5			
4. Trial farm	9.6 ha							
II. Mae Klong Construction Work								
A. No. 1								
1. Land consolidation	362.1 ha			46	168.4	147.7		
				37	117			
2. Trial farm	8.6 ha							
B. No. 2								
1. Land consolidation	504.0 ha					212.9	291.1	
III. Training in Suphenburi								
1. Long term (A)	60 persons		30	45	45	45	45	
	5 month							
2. Long term (B)	180 "			45	45	45	45	
	5 "							
3. Midium term	180 "							
	4 "							
4. Short term	540 "							
	2 weeks			40				

Assignment schedule of experts

upper row: plan, under row: past records
Japanese fisical year, unit: person

Item	1977	1978	1979	1980	1981
1. Project Center	3	4	4	4	4
	4	4+1	4		
2. Chao Phya Pilot Project	2	4	5	6	6
	2	4	4+2		
3. Mae Klong Pilot Project		2	4	4	4
		2	3		
4. Suphanburi Center			3	3	3
		1	2		
Total	5	10	16	17	17
	6	11+1	13+2		

N.B. +1 shows a short term expert.

Study tower and training in Japan.

upper row: plan, under row: past records
Japanese fisical year, unit: person

Item	1977	1978	1979	1980	1981	Total
I. Project type cooperation	3	5	5	5	5	23
	4	5	5			
1. Study tour	2	1	1	1	1	6
	4	2	2			
2. Training	1	4	4	4	4	17
	-	3	3			
II. Development survey		3	6			
1. Previous arrangement and study tour		3	1			
		3	-			
2. Home office work assistant and training						
III. Total (past records)	4	8	11			

N.B. Development survey shows only past records.

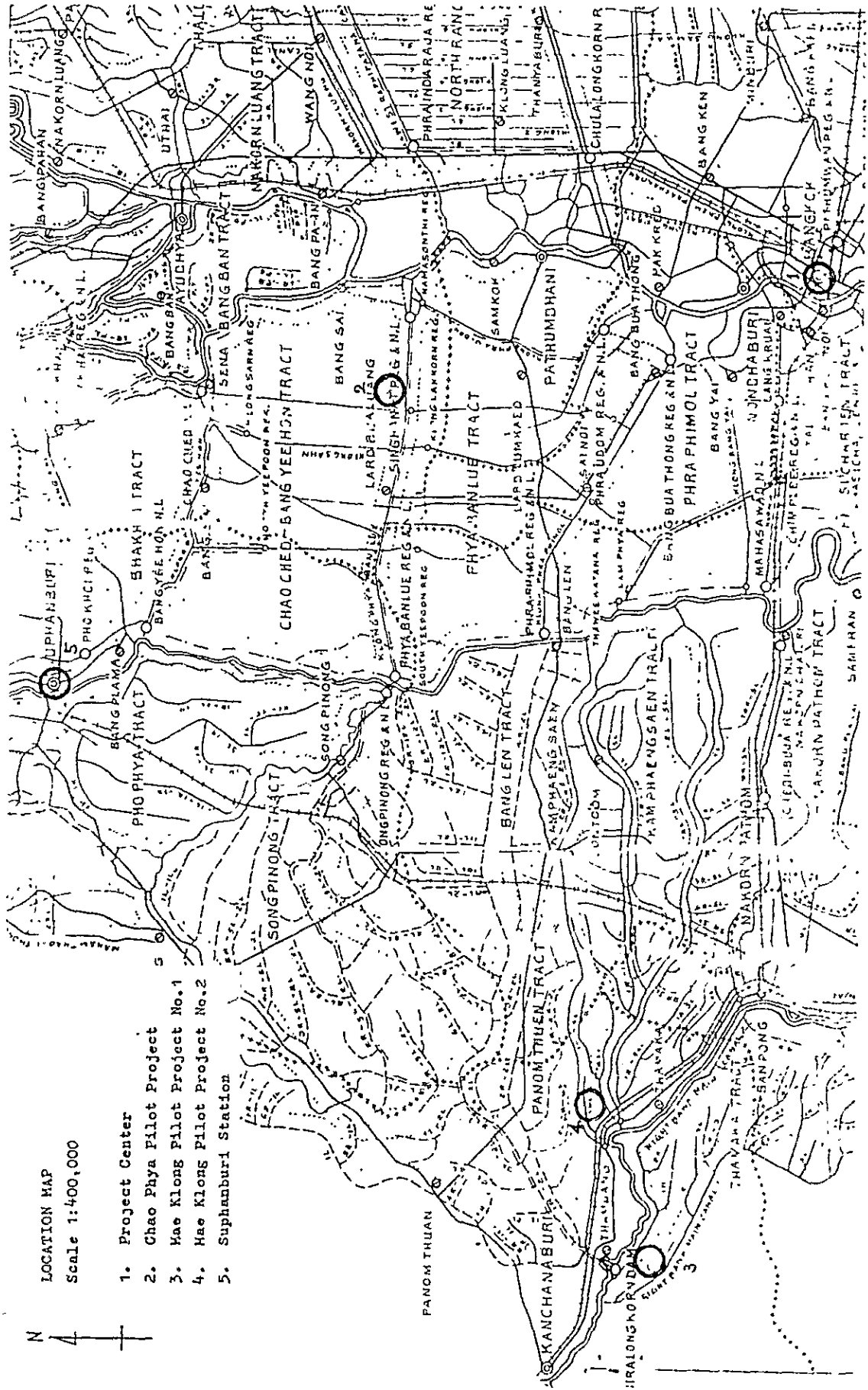
Survey and project implementation schedule (1) Line: past records, dotted line: plan, calendar year

Item	1976	1976	1977	1978	1979	1980	1981	1982	1984	Remark
I. Preliminary survey (fundamental plan)										
II. Project type cooperation										
1. Preliminary survey										
2. Detail design survey										
3. Annual plan, guidance and evaluation survey										
4. Others										
III. Development survey and Yen loan project										
1. The Grater Mae Klong River Basin										
a) Preliminary survey for master plan										Final Report did not submit yet to Thai Government
b) Master plan study										
2. The West Bank Tract of the Greater Chao Phya										
a) Preliminary survey for feasibility study										
b) Feasibility study										
c) Detail design										by Yen Loan
d) Construction work										
3. The Kamphaeng Saen Project										
a) Preliminary survey for feasibility study										
b) Feasibility study										Final Report Submitted already
c) Detail design										Final Report Submitted already
d) Construction work										Eighth (8) Yen loan should be requested
4. The Mae Wang Project										
a) Preliminary survey for feasibility study										
b) Feasibility study										Final Report Submitted already
c) Detail design										Final Report Submitted already
d) Construction work										Eighth (8) Yen loan should be requested
5. The Phetchaburi Project										
a) Preliminary survey for feasibility study										
b) Feasibility study										
c) Detail design										
d) Construction work										

Project Cost Expenditure for Cooperation Project

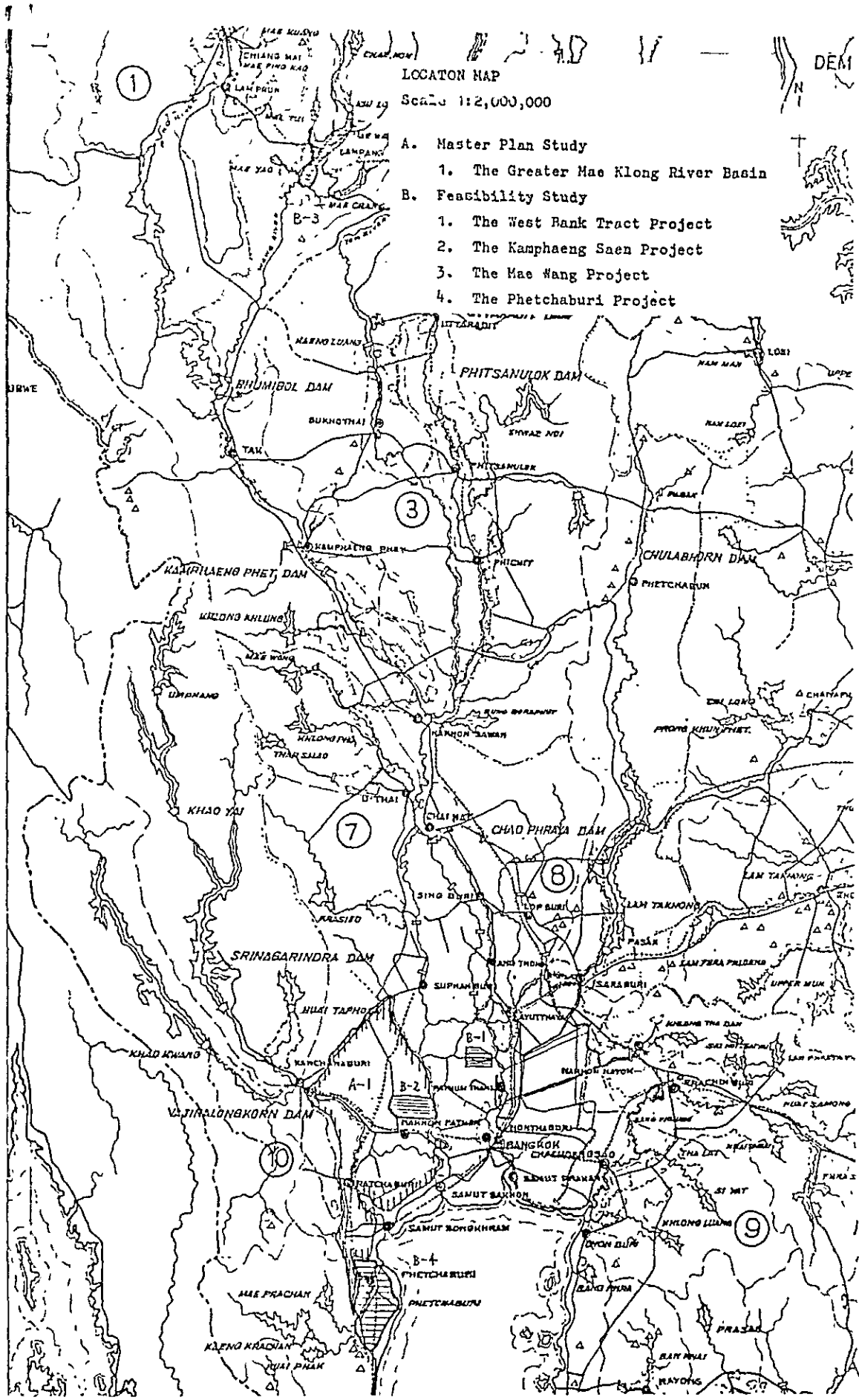
Item	1976/77	1977/78	1978/79	1979/80	Total	Total Cost	Remarks
I. Protect Cooperation							
1. Plan							
a. Japan							
i) Experts		18,411	23,088	29,344	70,843		
ii) Machineries		1,543	5,596	9,880	17,019	40,076	
iii) Training		12,108	16,651	18,623	47,382	63,355	
iv) Others		187	397	397	981	1,775	
b. Thailand		4,573	444	444	5,461	4,349	
i) Project center		6,057	25,637	19,692	51,386		
ii) Chao Phya		267	579	618	1,464	2,702	
iii) Mae Klong		5,790	18,754	7,738	33,746	45,769	
iv) Suphanburi		-	6,160	9,822	15,982	28,701	
2. Past record		-	144	1,514	1,658	4,675	
a. Japan							
i) Experts		16,996	229,448	20,586	277,912	28,700	387,454
ii) Machineries		2,141	28,905	5,512	74,410	7,929	107,042
iii) Training		10,684	144,237	12,357	166,815	13,778	186,000
iv) Others		89	1,200	211	2,850	3,074	41,500
b. Thailand		4,082	55,106	2,506	33,837	3,919	52,912
i) Project center							
ii) Chao Phya			1,545	15,404			
iii) Mae Klong			2,154	7,513			
iv) Suphan buri			134	2,369			
II. Development Survey							
1. Past record							
a. Japan		6,281	84,800	7,997	107,956	14,388	194,236
i) Master plan study		-	-	7,997	107,956	11,308	152,661
ii) Feasibility study		6,281	84,800	-	-	3,080	41,575
OECE Loan		-	-	-	-	11,111	150,000
IV. Grant Aid		-	8,889	120,000	-	8,889	120,000

• Unit: 1,000¥, 1,000 Yen
 • Left side: ¥, Right side side: Yen
 • 1976/77: Japan/Thailand fiscal year
 • 1¥ = 13.5 Yen



LOCATION MAP
Scale 1:400,000

1. Project Center
2. Chao Phya Pilot Project
3. Mae Klong Pilot Project No. 1
4. Mae Klong Pilot Project No. 2
5. Suphanburi Station



LOCATION MAP

Scale 1:2,000,000

- A. Master Plan Study
 - 1. The Greater Mae Klong River Basin
- B. Feasibility Study
 - 1. The West Bank Tract Project
 - 2. The Kamphaeng Saen Project
 - 3. The Mae Wang Project
 - 4. The Phetchaburi Project

5. Brief Study of Land Consolidation Method
in Thailand

23 July, 1980

KAZUMI MIYAMOTO

Irrigation and Drainage Expert

Project Center

Irrigated Agriculture Development Project

Content

	<u>Page</u>
1. Preface	4 6
2. Present situation	4 9
1) Completed area	4 9
2) Unit cost	4 9
3) Density of facilities	5 0
4) Increase of production and benefit	5 0
3. Economical comparison by A.D.B data	5 3
4. Summary of comparison	5 4
5. Problem and recommendation	5 5

The Land Consolidation in Thailand

1. Preface

In the Project of land consolidation in Thailand, a Pilot Project on the Northern Chao Phya region has been commenced since 1969 and then the law and systems have also been completed so as to make the project industrialized until the present.

As to area of execution of the project, the area has amounted to about 30,000 ha in the end of 1978 and about 17,000 ha is executed for 1979. The area of execution of project have being enlarged year by year.

Further, the main purpose of the land consolidation in Thailand is to complete the termination of irrigation facilities so as to enable water management on the irrigations terminations, distribute smoothly the water for irrigation to the individual farms and try to better the yield of the land.

In order to accomplish the above mentioned purpose, commencement and completion of the termination of irrigation project is quite sufficient to serve the purpose. So that RID has commenced the Dike and Ditch Project since 1961 and tried to complete the intermination facilities and the area executed has amounted to 1,200,000 ha. However, arrangement of the irrigation water ways in these facilites have been made routinely to an interval of about 400 m and be insufficiency in the section part and the level of water unable to rise to full height thus making it uneasy to maintain and supervise and the density of waterways are quite insufficient. Moreover, in connection to that the irrigation waterways may be not on the land of public use etc., the termination of irrigation will be unable to give the full function.

On the fact mentioned, as a measurement of improvement for the termination of irrigation facilities of RID, it is not only for the part of improvement of the dike and ditch project but also that the more active method of Land Consolidation (On farm Development) shall be employed so as to accomplish the above mentioned purpose.

On the reason mentioned above, for land consolidation in Thailand, the purpose shall be accomplished with both of intensive method as to consider the conditions of spot, cost etc. and perform construction of irrigation and drainage facilities, farm roads, plan and consolidation (accompanied by land substitutuín) and levelling known as for land consolidation project

and execute the extensive method by attaching importance to completion of irrigation and drainage facilities together with completion of farm roads.

The extensive method mentioned ranges from completion of irrigation facilities to construction of irrigation and drainage facilities, farm roads including ensuring quantity of earth for use in construction of roads, waterways etc., a part of land levelling. The extent is quite large. Although the consolidation project has been executed since 1978, it is rather new in the history the data of result relating to the effect have not yet been fully gathered. It, therefore, is important to investigate and gather the data for analysis so as to make the effect clear.

Especially, in the end of last year, the RID has held as that the cost of works by extensive method is cheaper by $1/2 - 1/3$ than that by intensive method and it appears to perform the land consolidation project only by extensive method.

As the policy of the Government, it can be comprehended as that, in the present situation of that agricultural technics is not so high, it intends to use smaller investment to cover much areas in short time and to heighten the productivity. This is not necessarily wrong and it is rather a proper way as from the stand point of completion of facilities.

On the other hand, as for the extensive method, since that this method is quite new in the history of execution, it is in the stage of that the data of result relating to the effect has not yet been fully seized, that to take a plunge on the project worked under this method in large scale may leave a problem to the works in the future.

In the end of 1978, the irrigated area has been in about 2,700,000 ha and let us presume that a 40% of 1,000,000 has of them may have been put to field consolidation project. The result of execution in 1979 has been in about 19,000 ha and if the land has been once put to field consolidation by the style of great operation of land. This land may be able to be put to reconsolidation only about after 50 years. Even at the present, the agricultural mechanization is fairly proceeding in the so called granary region of Thailand the Central Plain, the farmers in that region are hopping and strongly requiring the completion of irrigation and drainage waterways cooperated with completion of farm roads.

Further, in consideration of the standard of completion, as to density of waterway, it is 100 m/ha in the case of farm in Japan. The work of execution in Japan has been cooperated by the technics. In the case of Mae

Klong Pilot Project No. 1 Area (Intensive) it is 60 m/ha and No. 2 Area (Extensive), it is 40 m/ha. So that it can be roughly presumed as that, for Intensive it is about 50 - 70 m/ha and Extensive, it is about 30 - 50 m/ha.

As in the present, it is understood that, in the South-east Asia, as it is in order to make water management on the termination to be in full efficiency so as to make the paddy give high yield, it is necessary to make the irrigation waterways to the density of over 50 m/ha and, in the case of extensive, if it falls below this value, it is afraid that the effect can not give full play and, under certain circumstances, it may be feared to lead same result as of the Dike and Ditch Project (25 m/ha).

As for the works mentioned above and paddy agriculture, land consolidation etc., when we consider about that Japan who has had years' experience will give technical cooperation to Thailand in addition to that the agricultural technics will become better in the future and the facilities completed at the present can be used for scores of years in the future and, even though it will be reconsolidated in the future, the repeat works as well as the cost in construction will be not so high because of that the lands are rather plain. So that we think it is necessary to execute with intensive method. As for me, I should like to give my personal opinion in very superficial idea. I propose that about 30% will be execute In intensive method and 70% in extensive method.

2. Present Situation

1) Completed area

As to the completed area as shown in the Table 3, it has been in 31,208 ha at the end of 1978 and the result of completion of 1978 is 10,285 ha. For this completed area, irrigation area till the end of 1978 has been in 2,741.421 ha only equal to 1.1%.

Further, the result of completion of intensive and extensive method in the 3 Projects of Northern Chao Phya, Nong Wai and Phitsanulok on which the land consolidation have been executed in large scale as shown in the Table 4, at the end of 1979, the intensive has been 283,284 rai against the extensive has been 40,492 rai so that extensive has been only in 13% of the whole area.

2) Unit cost

As to the unit cost, there is scattering and it can not be stated sweepingly, but according to the unit price calculated in 1980 as shown in the Table 6. The cost of extensive are in about 1/3 - 1/2 of that of intensive. In this case, that the sum is corresponding to about 1/3 is owing to that it is considered that the land is in sharp slope and in poor drainage condition.

Table 6 Estimated Unit Cost in F.Y. 1980

Item		(A) Unit Cost (฿/rai)	(B) Average (฿/rai)	(A) Ratio (%)	(B) Ratio (%)
Intensive	FA	2,100 - 3,000	2,550	100	100 - 100
- do -	CO	2,900 - 3,800	2,950	100	100 - 100
Extensive	FA	671 - 1,210	941	37	32 - 40
- do -	CO	984 - 1,728	1,356	46	34 - 45

Remarks: 1) Average = Simple average value

2) In some case, these Unit Cost may be not including the material cost and foreign loan.

Further, we shall pay attention. On circumstance of land consolidation in Thailand, except that to work of basic irrigation are operated together with the drainage facilities such as the case of Phitsanulok Project, when land consolidation are executed on the regions on which the basic irrigation and drainage facilities have generally been completed, the worn-out basic facilities must be improved or changed in the sametime. On this connection, the expenses of work will be about be about to the land consolidation cost. So that the construction charge per unit of the region is about twice to numerical value mentioned above.

3) Density of facilities

As to the density of facilities as shown in Table 7, in the case of Mae Klong Pilot Project, the No. 1 which has been executed with intensive method, the density of irrigation waterways are 60 m/ha, drainage ways, 54 m/ha and the roads are in 62 m/ha. On the other hand, in the case of No. 2 which is scheduled to executed by extensive method, the density of irrigation waterways are 40 m/ha; drainage ways, 29 m/ha; roads 31 m/ha. The ratio of extensive against intensive is 60% - 70%.

Further, for the standard of plan of Nong Wai Project as shown in the Table 8, in the case of intensive, irrigation waterways is 53 - 59 m/ha; drainage ways, 38 - 50 m/ha; roads, 50 - 56 m/ha while, in case of extensive (2), irrigation waterways, 50 - 69 m/ha; drainage ways 22 - 28 m/ha; roads, 34 - 41 m/ha and the supplemental ditches is 19 - 25 m/ha. As to the ratio of extensive against intensive, the irrigation is about 100%, drainage ways and roads, about 60 - 70%.

4) Increase of production and benefit

According to the investment made on the Northern Chao Phya, in case of intensive, the production prior to land consolidation and after that appears change as shown in the Table 9.

Table Increase of production by land consolidation

Item	(A) Before	(B) After	(B/A) Increase ratio
Cropping intensity	110%	195%	177%
Yield Wet	2,250 kg/ha	3,250 kg/ha	144%
Dry	2,500 kg/ha	3,500 kg/ha	140%
Production per year	2,650 kg/ha	6,600 kg/ha	249%
Net value of production	US\$210	US\$510	243%
Net income of farmers			
Owing 1.5 ha	US\$335	US\$680	203%
Owing 3.0 ha	US\$670	US\$980	146%
	1973/74	1977/78	
Private ownership of tractors	10%	70%	700%

- N.B. 1) Source: Land Consolidation in Thailand.
 2) 1977 prices
 3) Chandsutr Project in Northern Chao Phya

The quantity of production per year are 2,650 kg/ha on the time prior to land consolidation and become 6,600 kg/ha on time after land consolidation, and it is increased by about 2.5 times. The remarkable matter is that, for a yearly yield, the target of yield for South-east Asia at the present is held as 6 t/ha but that in Thailand has gone up over the target to 6.6 t/ha and the private owner of tractors has suddenly risen from 10% to 70%. On the result mentioned above, in case of intensive, it will accomplish the purpose of bettering the yield of land on the land consolidation project in addition to giving much contribution to bettering the productive labors by agricultural mechanization.

As to extensive mentioned above, unfortunately, the data of increased production and result relating to the effect are not available at the present. So that we can only base on the target estimated on Feasibility Study of Khamphang Saen Area and try to compute the ratio of extensive against intensive. The result are shown in Table 10.

It is 67% - 88% and the ratio of extensive is estimated about 60% - 90% of tht of intensive.

Table 10 Presumed Yield Ratio between Intensive and Extensive

Item	Target of yield in wet season	Ratio
Intensive (C type)	4.8 t/ha	100%
Extensive (B type)	4.2 t/ha	88%
Extensive (A type)	3.3 t/ha	67%

We shall take the actual yield of 3.25 t/ha of the Northern Chao Phya in the time of after land consolidation or actual additional yield 1.0 t/ha of Khamphaeng Saen and add to the present average yield in present state of 2 t/ha and base on the ratio for estimating the yield of extensive after projected. It will be as shown in the Table 11; for the case of extensive (A type), the yield in present stage may be no much change and the effect may be not go up.

Table 11 Presumed Yield in Extensive

Item	Ratio	Yield (a)	Yield (b)
Intensive (C)	1.00	3.25 t/ha	3.00 t/ha
Extensive (B)	0.88	2.86 t/ha	2.64 t/ha
Extensive (A)	0.67	2.18 t/ha	2.01 t/ha

N.B. 1) Yield (a); Past record 3.25 t/ha x Ratio

Yield (b); (Present yield 2.0 t/ha + Increased past record 1.0 t/ha) x Ratio

Present yield 2.0 t/ha was supposed from F/S Report.

3. Economical Comparison by A.D.B data

The Drawing 1 is the figures of comparison in 6 cases showing the cost for increase of paddy production in South-east Asia in 1 ton/ha yearly. Then we apply these figures to the Land consolidation in Thailand, in the case of Intensive, it is held as corresponding to Alternative (B), and for the increase of production 5 ton/ha/year, the cost is US\$300/ton. As to Extensive, it is corresponding to Alternative (E), and for the increase of production 5 ton/ha/year, the cost is US\$367/ton. So that the Intensive method will be profitable.

Further, when the target of paddy production is made to 6 ton/ha/year in the future, the place which was executed with Extensive method is possible to be entirely done over again. The cost will be not Alternative (C) but it will be Alternative (B) which is possible to require investment of US\$1,500/ha. In consideration to the agricultural mechanization in the future and on the viewpoint of national economics, the Extensive method may be profitable.

However, should the Extensive method is executed we must consider the work of reconsolidation in to Intensive so that the main roads and waterways facilities ought to be executed to the method of Intensive which will become a part of work of reconsolidation. It will be as the execution of Alternative (C) and can be completed only by investment of US\$400/ha. According to example of estimate made for Mae Klong Project No. 2. When we consolidate by this method as shown in the Table 12 2/3 of whole cost will not be thrown away so that it will need reconsolidation for only the part of 1/3.

Further, in the case of Japan, the density of roads, waterways after land consolidation are over than 100 m and the yield is also about 10 ton/ha/year (1 crop). If we compare that of Japan with the field executed by Intensive in Thailand, the standard of consolidation is estimated as in proportion of 1/2.

4. Summary of Comparison

Table 13 Comparison and study of intensive and extensive

Item	Intensive	Extensive
Cost	High 100 %	Cheap 30 - 50 %
Yield	High 100 %	Low 60 - 90 %
Water management	Profitable, Technique can be bettered by unifying, rationalization.	Unprofitable; there is state of plot of plot in a part of them.
Maintenance	Profitable	Unprofitable
Cropping intensity	Great	Little
Agri. mechanization	Great	Little
Design. construction	Easy to go into rationalization by its standardization.	Uneasy
Land reduction ratio	Equal	In some case there is inequality and in such a case, it is difficult to obtain the farmer's consent.
Re-land consolidation	Unnecessary	Most parts shall be done over again.
Land title deed	Necessary	Necessary
Burden to farmers	Great	Little
Land leveling	Having	None
Partition readjustment, land substitution.	Having	None
Density of facilities	High	Low

5. Problem and Recommendation

"Irrigation" means to draw the water from reservoir or river and canal as irrigating water and be conveyed by the main waterway or branching ditch and, finally, leaded to the last termination irrigating ditches for supplying each block of farms.

So far the irrigation system in Thailand, the government has place importance on the construction of reservoir, water source, main and cross waterways but has left out the work of termination facilities of leading ditch or minor ditch. So that although there may be water in the main waterways but the irrigation water can not be fully supplied to various farm excepting the farms situated along the waterways. Thus the fund invested has not give full effect. The RID has also recognized this defect and has made its way to completion of intermination irrigation facilities of dike and ditch project but it is understood as not quite sufficient. In recent years, when the land consolidation project is started the construction of the intermination irrigation and drainage and preparation of farm roads shall be also be proceeded.

So far, the cost of land consolidation by intensive method have been high and the cost of land leveling shall fall on the farmer in 100%. So that they prefer the land consolidation by the extensive method on account of lower cost.

However, this execution of project by extensive method have only started since 1978. The data of result relating to effect is still not available. So that to perform the project by this method in large scale may arise a question.

On this connection, it is necessary to collect the data of result relating the effect of Extensive and analyze so as to seize the effect urgently.

Moreover, land consolidation project is one of the enterprises of great renovation and it can be held as that when it is once executed and, then it will be unable to be repeated for scores of years. So that it is necessary to fully consult this project with the farmers as well as consider and study about water management, maintenance and supervision, agricultural mechanization and agricultural operation.

In my private opinion, I should like to propose the following 4 consolidation methods and proportion in execution as shown in the Table 14.

A. Intensive (I)

To perform construction of irrigation and drainage waterways, farm roads, land leveling, planning and readjustment, land substitution and make 100% of the owners directly joining to the irrigation and drainage waterways and farm roads.

B. Intensive (II)

To perform construction of irrigation and drainage waterways, farm roads, planning and readjustment, land substitute and make 100% of the owners directly jointing to the irrigation and drainage waterways but the new small dike between the plot will be set up along the border of the owners and, as for the old border, we shall keep the oil border as much as possible excepting those which is held as quite useless will be removed. Land Smoothing will be executed on the trace of the small dike removed.

C. Extensive (I)

To set up irrigation waterway and farm road along all the border and, in this case, importance will place on the completion of irrigation waterway and make 100% of the owners joining directly to the irrigation water. But the completion of drainage way and farm road will be left off.

D. Extensive (II)

To set up irrigation and farm road along all the border and, in this case, importance will place on the completion of irrigation waterway and make 70% of the owners joining directly to the irrigation water. But the completion of drainage way and farm road will be left off as much as possible and put necessity of them to minimum and maintain only those the farmers will want specially. We will take the land of sharp slope and poor drainage condition as object of consideration.

Table 14 Proposed implementation ration in each types

Item	Proposed Implementation Ratio	Presumed Cost Ratio
A	10 %	100 %
B	20	70
C	40	50
D	30	30

Additionally, in the case of land consolidation has being executed by Intensive at the present, owing to that the distance from irrigation waterway to the drainage is limited to the rate of reduction of under 7% by the Land Consolidation for Agriculture Law and the length is made to 150 ~ 250m on account of cost etc. So that the land leveling is difficult to perform with precision of 5cm in addition to that it is held that water management and size of the agricultural operation are held as to be too large size so that, as a matter of fact, the small dike of about 1 - 4 have been set up on most of the land and made to each plot of 2 rai respectively.

On the other hand, about 30 - 40% of the working expenses must be invested to the land leveling and, according to the Land Consolidation for Agriculture Law, 100% of this cost will be burden of the farmers. In order to lesson the burden on the farmers, if it is executed by Intensive of A-type, beside all the small dike in the long-side-ward along the border, the small dike in the short-side-ward in between the long-side-ward shall be planed so as to lesson land leveling cost to minimum. It also hold as that, on the even plain, it is able to made land leveling work unnecessary by setting up the small dikes between the farm.

As to the Intensive of B-type, in consideration for the future, the road and waterways will be completed to the shape same as that of Intensive of A-type and, also by the same reason mentioned above, land leveling will not be performed. We shall only build the small dike for the border of the ownership caused by the land substitution and leave old small dikes as what they are. Although in such a case, any small dike left will be held as unsuitable, it shall be removed and in order to remove dissension, land smoothing will be executed according to necessity. Further, in this case, any land among the land of owners becomes a high plot to which the irrigation water can not reach. The earth will be scrapped off and used for construction of the road etc.

In such a type, if there are good condition and well executed, the Presumed cost ratio as showing in Table 14 may be made to the same as in Extensive of C-type to be able to lesson by approx. 50% Unfortunately, an exmaple of land consolidation executed by this type is still not available in Thailand.

As to execution of Extensive of C-type, we shall place importance on the completion of irrigation waterways which is the important factor in bettering the productivity of land in order to make 100% of the owner can take water directly from the irrigation waterways. We set a target of the density of irrigation waterways to over 50 m/ha same as that of Intensive. As to the completion of drainage ways and roads, we shall curb it to the standard of about 1/2 - 1/3 of that of irrigation waterways and the work expenses in doing over again in the future will be able to pay in small sum.

As to execution of extensive of D-type, we take the land of sharp slope or in condition of poor drainage as object. We shall perform only completion of the irrigation waterways and make over 70% of the owner can take water directly from the waterways. In case of consolidation by this method, the effect may be unable to be much expected.

As to the Intensive and Extensive mentioned above, I have try to compare and study but it is not yet determined. It is different to judge as which is suitable to apply in Thailand. I should like to take liberty to say that the execution by Intensive method may be held as premature for Thailand at the present.

However, regarding the investment in the irrigation and drainage waterways project of land consolidation, no matter in what period, investment is always first made and thus the foundation of agriculture may be prepared, subsequently, the agricultural techniques may gradually be bettered and the productivity may be improved. The Thai government with its farseeing on this matter, it has promulgated the Land Consolidation for Agriculture Law and composed the system in order to propell to project of land consolidation. We, therefore, should like to express our respect to the administration.

Ⅱ 木村和夫専門家総合報告書

指導分野：劇場整備

派遣期間：昭和52年10月31日
～55年10月13日

チャオピア地区担当

Ⅱ-1 タイ国に於る請負契約の事例報告

タイかんがい
農業開発プロジェクト

圃場整備専門家
木村和夫

1 はじめに

昭和52年度よりモデルインフラ整備事業として始まったインフラストラクチャ整備事業は次いでパイロット・インフラ整備事業としてより規模の大きい工事まで海外において施工出来ることになった。いままで日本の建設業者が海外において受注者として建設工事を行うことはあっても、日本の技術者が外国において発注者の立場で仕事をするとはなかったのではないかと思ひここに事例を報告することとした。今後技術協力の中でこの事例のように日本側（JICA 国際協力事業団）が日本の予算で工事発注、施工管理を行い、勿論これらの作業は相手国カウンターパートとの共同作業であるが、完成した工事を相手国に引渡すという種類の技術援助が増えてくることも予想されるので、その参考にもなるものと考えられる。

2 経過と準備過程

国際協力事業団の行う技術協力事業のうち農林業協力に於て近年途上国よりの要請内容も大規模な基盤整備や地域開発にまで及んできており必然的に相手国が負担すべきローカルコストも増大の一途をたどってきている。本来技術協力とは相手国の自助努力を支援することを目的としており、この種のローカルコストの援助国側の負担は積極的に行われていなかった。

一方前述のように相手国からの援助内容の大規模化、ローカル・コストの負担増が隘路となり専門家の活動基盤の整備が遅々として進まず、ひいてはプロジェクトの運営に支障をきたす可能性も考えられ、ローカルコストの援助国による一部負担が国際協力事業団により企画されモデルインフラ整備事業として発足した。これはプロジェクトの中で特にモデル的な基盤となるインフラストラクチャで試験圃場、展示圃場、試験林、その他の施設の整備に係る費用を日本側が全額負担し、国際協力事業団海外事務所が発注者としてこのモデルインフラ整備工事を行い、出来上った工事成果品を相手国政府に引渡すという事業である。

又これに引続き昭和54年度よりプロジェクトに於て中間の普及段階に於て必要であり、かつ改良技術の地域農民等への普及に不可欠なインフラストラクチャであつて圃場の整備及び造成、森林の整備及び造成等に関し、前述のモデル・インフラ整備事業と同様の手続、経過を

たどって工事成果品が相手国政府に引渡される。

又これらの施行に伴う諸問題、すなわち相手国政府による直営工事とするか、又国際協力事業団海外事務所を発注者にする請負工事方式にするか、施工管理、竣工検査は誰が行うか、もしこれに係る予算が相手国政府の中へ引渡されれば運用上問題はないか等々が本事業施工前に論議されたが最終的には国際協力事業団海外事務所を発注者とする請負工事方式とし、施工管理はそのため派遣される短期専門家の手により行われることとし、竣工検査は専門家の助言のもとに国際協力事業団海外事務所長が行うことと決定した。

3 タイ国に於る請負契約

これらの決定をうけて契約準備を進めるにあたり事前にタイ国に於る契約工事の実情を調査を行った。勿論設計等純技術的な問題に関しては現地の特殊条件を把握していれば問題はなくここで論述するつもりはない。

最初に述べなければならないことはこの国に於て日本でいう建設業法に相当する法律がないことである。すなわち建設業に於る特殊条件は考慮する必要がなく、商法等に抵触しない限りどのような契約をも締結出来る可能性もある。話は少くし予談になるがモデル・インフラ及びパイロット・インフラと二度に渡り契約書を作製した際に、在タイ国日本大使館が仕事を依頼しているタイ人弁護士に国際協力事業団バンコック事務所長の紹介で契約書のチェック、点検を依頼した。この弁護士は当時の法務大臣を友人に持ち、イギリス留学の経験を持つ非常に優秀な弁護士であるが、彼が契約書のチェックを終え小生と論議を始めるに際し最初に言ったことは契約の本源、この国に於る契約の実情を端的にあらわしていると思われる。すなわち、もしあなたがタイ大林、タイ西松のような信頼出来る日・タイ合弁企業あるいは Italthai 社（タイに於る最大企業の一つで建設業ばかりでなくセメント製造、自動車組立を初めとした複合企業体）のような会社と契約するのならば契約書にたくさんの条件は必要ないでしょう。

極端な言い方をすれば契約金額、工期その他これに付随する数条でことたりるので。

しかしこの程度の工事に対しては大手建設業者は興味を示さないし、応札者は必然的に中小業者に限られてくるでしょう。

すなわち信頼性の低い業者に対して発注者の権利を擁護するのが契約書でありその目的のために契約書は作られなければなりません。

この事自体は目新しいこととは考えられないが日本に居て特に契約書を作るという機会が皆無であった小生にとっては眼が洗われる思いであった。このことは契約するに当って発注者は非常に大きな自由度を持つということである。

次に述べなければならないのは双務契約の原則が常に買かれていることである。これも実際工事を行っている間に痛切に感じたことであるが契約書、仕様書を初めとする契約図書の不備に起因する業者が受けた損害、周辺工事との調整による手待、その他について業者は文書でも

って損害に対する支払いを要求し決して請負（うけまけ：受注した者がこの種の紛争で勝てないという意味での）業者ではない。この点に関しては日本官庁技術者は日本の請負工事に於ては非常にシビアな紛争に巻きこまれた経験がほとんどないので小生などを覚えた。しかしこのことは双務契約においては正常な姿であり我々も学ぶべき点があると思われる。

契約方式は大きく二つに分けられ、個々の単価で契約する Unit Price Contract と一括で全工事の価格を決定する Lump Sum Contract があり、特に Unit Price Contract では道路 1 m 当り単価、水路 1 m 当り単価というように複合単価で契約する方法と掘削 1 m³ 当り、コンクリート 1 m³ 当りというように純単価で契約する方法があるが公共事業関係では Unit Price Contract が多いように見うけられた。

次に入札方式に関して言えば、政府関係の請負工事は法律 The negotiation of inventories, Office Of Prime minister, 2523 により一般競争入札を行うことが義務づけられており、特殊な事情のある場合や予定価格が 500,000 Baht (約 600 万円) を上廻らない場合は随意契約を行うことが可能である。一般に 15 日間以上新聞、官報等により入札が告示され希望する応札者はそれぞれの官庁で入札図書（図面、契約書、仕様書等）を購入し、積算后応札する。通常最低価格を応札した業者が落札するが必ずしも最低価格イコール落札ということではなく、入札后行れる Technical Evaluation 及び Price negotiation に対する最優先順位を確保することが出来ると考えた方がよい。

これらが事前の調査により明らかになったことであるが、これに基づき契約書の作成にとりかかった。

4 契約書の作成

モデルインフラ整備事業、パイロット・インフラ整備事業と二つの請負工事に伴い契約書を作成してきたのであるが前者の不備を補い、不必要な部分を切捨てたので後者の方がより良い契約書になっていると思われる。

ここに後者の契約書を資料-1として添付し条項順に説明を加えたい。この契約図書は契約書契約条件 Terms and conditions of this contract, 工事仕様書、施工管理基準より成り立ち前二者は契約そのものに関係し後二者は技術的問題に関係する。契約書、工事仕様書施工管理基準は日本に於ては多数の先輩技術者の経験と英知により作り上げられたものであり条件の異なる海外において個人の力で同一水準のものを作ることが不可能なことは自明の理であるが請負工事を行う上で最低の要件だけでも満足するものと心掛け、作製後は前述の弁護士にチェックを依頼し、その後弁護士と逐条、一字一句まで論議し（実際は当方がこちらの意図するところを十分に説明し、弁護士が文章を直し小生の同意により前に進むというような具合であったが）作り上げられた。

4-1 契約者及び証人 Witness

勿論この契約は国際協力事業団バンコック事務所長と落札業者 successful bidder (契約後 contractor 以後業者 contractor と呼ぶ)の間で行れるものであるが業者側において誰が契約する権利を有するかをチェックする必要がある。これは小生不勉強で明らかでないが多分会社の代表権を誰が持つかをチェックすることと考えられる。商法に基づき登記されているので弁護士に依頼し取寄せ確認することとし、取寄せた証書を資料-2として添付する。会社の代表権者が必ずしも契約に参加出来るとは限らないので委任状 Power of attorney の所持者は契約を行う権利を有しこの委任状は番号と代表権者のサインを記載する必要がある。本二件に関しては代表権者が契約に出席したので委任状を取得出来なかつたが別種の契約で取得した委任状があるので資料-3として添付する。

次に証人 Witness について述べる。当初国際協力事業団本部は契約にあたって相手国政府の Counterpart agency の長が連帯保証人又は連署人になることを希望していた。しかし現実の問題として契約において発注者側に連帯保証人が居るといのは全くおかしな話で何を誰が保証するかという議論になると連帯保証人が国際協力事業団の支払能力を contractor に保証するということになり、その必要は全くないという結論に達した。

又連署人についてはもし国際協力事業団が支払能力に支障をきたした場合、それに替り支払いを保証することを意味すると思われるが、この両者とも counterpoint agency の長になることは法律上難かしく、万一この様なケースが起れば外交ルートで解決することとし今回は counterpoint agency の長を契約時の証人とするにとどまった。契約書にサインをする場合国際協力事業団バンコック事務所長及び contractor の代表者は互に見ず知らずの仲であり国際協力事業団バンコック事務所 A 氏が A 氏であること、又 contractor の代表である B 氏が B 氏であることをお互に知らない。そこでお互に A 氏が A 氏であり、B 氏が B 氏であることを証明する証人 witness を1人ずつ契約に立合せることにより、それが原因で起こるトラブルを回避出来る。証人 witness はその範囲内での責任は持つが契約の内容に関する責任は通常ないとみなされている。

4-2 契約方式

前述のようにタイ国に於ては単価契約 unit cost contract , と一括契約 Lumpsum contract があり本件については単位契約でおこなうこととした。

契約書第1条にみられるように単価表 Bill of Quantities を作成し数量は発注者側で記入し、入札時に入札者が単価、金額を記入し提出する。その後発注者と入札者が話し合い negotiation を行い合意に達した金額を単価表 Bill of Quantities に記入しこれを契約書の一部とする。単価表 Bill of Quantities を参考資料-4として添付する。入札条件 Instruction and condition of proposal によると入札者は事

前に図面及び現場を踏査して、発注者が提示した数量に対し異議を申し立てることも可能である。又かならずしも最低価格を提示した入札者が落札出来るとはかぎらない。これは通常国際入札等で使われる方法で入札后技術審査 Technical Evaluation 及び価格に対する話し合い Price negotiation が行れ、この過程で不適確であれば最低価格提示者も除外されることもある。本件においては予想される応札者が資本、保有機械、技術力等において十分といひ難い地元業者 local contractor であるので上述の方法をとり危険性を少なくした。この単価表は中間払い及び数量変更の基礎となり、支払いはこれに応じて行れる。

4-3 保証金 Performance Bond

日本に於る建設業界と異りこの国に於ては業界としてのまとまりに欠くところがあると思える。すなわち業界としての組織がなく一業者が他業者の工事完成を保証するということが難しく請負工事を契約する場合通常工事保証金 Performance Bond を発注者側に積むこととなる。工事完成保証という商行為上数量化しにくいものを契約に持ち込む日本の請負契約がむしろ例外的なものかとも思えるが、この国でこの点に関しスマートかつビジネスライクに行れている。

通常契約時に契約額の5%の現金又は銀行保証書 Bank Guarantee を発注者側に提出し、これは工事期間中及び完成后一年間の保証期間中に生じる受注者側の責任により起る被害や瑕疵に対する弁済を保証する。すなわち前記の被害や瑕疵が生じた場合は無条件に発注はこの保証金を没収し被害や瑕疵の回復のための工事に充当することが出来る。この5%の保証金は弁済の上限額を意味するものでなく、これら被害、瑕疵に対しは全面的に弁済する義務があるので、もし受注者の経営内容、保証能力に不安があれば5%以上の保証金を要求することも可能である。ここに銀行保証 Bank Guarantee を資料-5として添付する。これによると発注者側が受注者による原因でいかなる被害を受けた場合でも、それが契約により弁済要求が可能なものであれば銀行に対し保証金額内で支払を要求することが出来銀行も受注者に通告することなしに支払はなければならない。このことは受けた被害、瑕疵に対してその責任の有無を発注者が一方的に判定する権利を有しているということとなり紛争の原因になる可能性もあるが、これは後述の条項に述べられている。

4-4 支払方法 Payment

支払は通常3つの形式に分けて行れる。

工事着手前に前渡金 advance payment, 出来高に応じて中間払 Subsequent payment, 最終払 Final payment である。前渡金は契約額の10%を越えない範囲で支払われるが、ここでは受注者側の安全のため工事に用諸資機材が工事現場に搬入され、

後述の検査委員会 Inspection Committee が検査し搬入資機材の見積り総額が契約額の10%、すなわち前渡金の額を上回ると判定すれば前渡金を支払うことが出来る。なおなぜこのような手続を行うかについては後述の質権設定 pledge agreement の項で述べる。

中間払は出来高を検査委員会が査定し、それに基づきその90%を支払うことが出来る。残り10%についてはすべての工事完了後最終払の一部として支払い、これはある種の保証金 Performance bond と考えられている。中間払の支払回数については任意に発注者が決定することが出来るがここでは3回を越えない範囲としている。タイ国政府関係の契約に於ては毎月中間払が出来るとされているケースも見かけることがあるが、開発途上国の通例として市中銀行の利子率が高く受注者は中間払の回数を多くすることを希望することが多い。

最終払はすべての工事が完了し検査委員会が竣工検査を行って、契約書、仕様書に基づき完全に工事が行われたと確認された後、中間払の際支払われなかった10% Retention money も含め工事契約額の残額がすべて支払われる。支払は前渡金、中間払、最終払の各々について検査請求書 invoice を検査委員会が受取り、検査を行ったのち40日以内に現金又は小切手で行うこととしている。

中間払時に於て工事出来高を受取ることとなるが、受注者はこれにより責任を回避することは出来なく残工事期間中に生じた被害については受注者は修復する義務からまのがれない。受注者の責任は最終受取り后1ケ年を経て保証期間が終了したのちはじめてその責任から全面的に解放される。

4-5 物価上昇率 Escalation Factor

非産油国であるこの国に於ては石油価格値をはじめとして鉄筋、セメント等の建設資材の物価変動が激しく、工期の長い工事については工期内に物価変動の影響を予測出来ないため応札者は彼自身のリスクにより工事価格を見積らなければならない。そのため応々にして見積価格が高くなり、price negotiation の際発注者側が物価上昇率について応札者との合意を得ることが難しく、落札価格が高くなる傾向にある。これを防ぐために工事期間内の物価上昇分を補償する方法がとられている。

これは単価表 Bill of Quantities の項目別に物価上昇率 Escalation Factor Kを定め、それを契約額に乗じて支払価格を決定するものであり物価上昇率Kを決定する方法を2・3述べれば

① 土工事等コンクリート工事を伴わない項目

$$K = 0.30 + 0.45 \frac{I_t}{I_0} + 0.25 \frac{P_t}{P_0}$$

I_t : 支払月に於て商業省より出される消費者物価指数

I_0 : 契約月に於て商業省より出された消費者物価指数

F_t : 支払月に於るディーゼルエンジン用軽油価格 (Baht/ℓ)

F_0 : 契約月に於るディーゼルエンジン用軽油価格 (Baht/ℓ)

② ポンプ場のような大規模な鉄筋コンクリート工事を伴う項目

$$K = 0.48 + 0.18 \frac{C_t}{C_0} + 0.34 \frac{S_t}{S_0}$$

C_t : 支払月に於るセメント価格 (Baht/ton)

C_0 : 契約月に於るセメント価格 (Baht/ton)

S_t : 支払月に於る鉄筋価格 (Baht/ton)

S_0 : 契約月に於る鉄筋価格 (Baht/ton)

本件工事に於ては工期が短いこともあり物価上昇率の適用を行なわなかった。これを適用するにあたっては軽油、セメント、鉄筋等の価格を適確に把握すること、商業省から出される消費者物価指数が毎月確実に入手出来ることが前提となるが、これらを確実に入手することが難しいことが、この物価上昇率の適用を困難にしている。

4-6 工期 Completion Time

積算された工期に従いが決定されている。工事の開始時期は契約後1週以内とし、契約後1週間目が工期の算出起日になっている。

受注者がこの期日までに工事を開始しない場合、工事期間内に工事完了の見込みがないと発注者が判断した場合等々、発注者は契約を打ち切りそれにより生じた被害の弁済を発注者に求めることが出来る。又同時に工事の遅延が発注者の悪意又は能力の欠如と考えられない場合には工期の延長を認めることもある。

熱帯モンスーン地帯の気候特色として、雨季、乾季が明確に区別出来ることがあげられる。特に低湿地においては雨季後半から乾季にかけて洪水の影響をうけ湛水する地帯が方々で見られ、これらの地帯に於る建設工期の取り方については十分な注意を払わなければならない。通常雨期の始まる前に全工事が完了するように工期を設定すべきであり、やむおえず雨季にかかる場合、湛水のおこる以前には少なくとも工事を完了すべきである。もし工事の遅延により雨季工事になる場合、やむおえず工事を休止する期間の取扱い特に罰則金 Penalty の取扱い、湛水しそち乾季に入り工事可能になった場合の部分完成した出来形の修復、部分引取の可否等々につき契約条項の中で十分論述されていなければ紛争の原因となるものと考えられる。特に受注者に苛酷な条件を課した場合、当然入札価格に反映し工事費の増大を招く恐れがあるので注意しなければならない。本件契約工事については Technical evaluation の際に応札者と十分な話し合いの後上述の項目については

削除することに合意した。

4-7 罰則金 Penalty

受注者が定められた期間内に工事を開始しない場合、工期内に発注者が受注者によって工事の完成が不可能であると判断した場合、又発注者の同意のもとに工期を延長した場合等は発注者は罰則金を支払わなければならない。通常1日の遅延に対して契約額の0.1%を罰則金として定めるが、本件については遅延1日に対し最初の2週間は0.1%、2週間目から4週間目までは0.2%、4週間を上回る遅延に対しては0.3%の罰則金を課しており、工事の遅延が長びかないよう受注者に対する警告としている。

工事開始の遅延、工期内において工事の完工を危ぶみ契約を解除した場合、実害をこうむった期間に応じ1日契約金額の0.1%の割合で罰則金を課している。これらについて発注者は保証金 Performance Bond 及び最終支払金 Final Payment の中から徴集することが可能であり受注者はこのことについて拒否出来ない。

4-8 質権の設定

第7条に於ては工事中に発注者がこうむったすべての被害額が、受注者が受けとるべきすべての額（前渡金及び中間払分）と保証金を上回った場合について論述されている。

この場合明らかに受注者の損得勘定は赤字となり、発注者はそれに見合う担保を留保していないため、発注者側の危険回避の目的で現場で使用されている資機材に対し質権の設定を行った。これは資料-6のように質権設定の同意書 Pledge agreement を契約の外に交わし、契約書第7条に論述されている事態の発生した場合は受注者側から資機材を没収しそれを売却することにより被害額相当分を充当することが出来る。この条項に関連して第10条では受注者は発注者の許可なく資機材を搬出することは禁じられており現場に於る質権を留保している。質権は商法で認められている債権であり、質権が設定された物権に対しては債権者のもとで管理され、債務者はその管理を行うことが出来ない。ただし所有権は債務者にあり質権の設定条件が満足されなかった時、初めて所有権が債権者に移る。これはまさしく質屋 Pawn shop を考えてみればよく理解出来ると思う。

4-9 工事中止の場合の受注者の義務

前述4-6工期の中で述べたように工期内に受注者が原因で工事を中止し契約を打切った場合、受注者は次に述べるような義務を負う。受注者は工事中止時までに行った出来高に対してその全額を要求することが出来ない、すなわち工事の中止により発注者は残工事を行う新しい業者を選択しなければならずそれに要する費用、又工事が2つに分れることにより通常増える機械輸送費、諸係費等すべて最初の業者の負担となり、新規の契約と当

初契約額の差額の範囲でのみ支払を要求することが出来る。勿論前述の如く工事中止に伴う罰則金、もし発注者に何らかの被害を与えているならばその弁済金は支払う必要がありこれらの支払が遅延した場合には年率15%の利息をも支払う義務がある。

上述の如く工期内に契約を打切ることに對しては苛酷な罰則をもうけてあり、外国に於て社会的背景の理解が難しく、受注者の信用度も不明な中で契約しなければならないことを考え、極力いわゆる“業者の尻割”を防ぐようにした。

4-10 検査委員会 Inspection Committee

これは日本でいう業者選定委員会、監督職員、竣工検査職員を兼ねた様な組織で発注者より指名された数名の委員により構成される。そしてこの契約に於ては発注者が行うすべてのことを代行する権利を有し、実質的には受注者はこの検査委員会の指示のもとで契約を履行しなければならない。実際本件契約に於ては指名業者の信用チェックに始まり見積合せ、Price negotiation, technical evaluation, 契約準備、施工管理、竣工検査とすべてに亘る作業がこの検査委員会のもとで行れた。又この構成委員としては国際協力事業団バンコック専務所長の指名のもとでバンコック事務所職員1名、派遣専門家2名、タイ側プロジェクト・マネージャー1名、カウンターパート2名の6名より成り立っており、実際の業務にあたった。

この委員会方式により契約から竣工検査まで行う方法については、本件工事のように全額日本側が負担し発注者が日本の政府機関であり、日本の法律、制度の制約を受ける場合必ずしも完全なものと言ひ難い点があると考えられる。例えば工事に関する種々の権限を現地側カウンターパートに与えること、又何かあった場合の責任の所在等。しかし工事により出来上った成果品を相手国政府に提供することのみがこの仕事の目的でなく、その過程をカウンターパートと共同で行い、その中で技術移転 transfer of technology を行うことが最も重要なことと考えられるので best way でないが better way としてこの委員会方式をとった。

4-11 瑕疵担保 Defective Constructin

工事完成后一年間を保証期間と定めこの期間内に生じた受注者が原因で生じた瑕疵に対しては受注者はそれ自身の責任で瑕疵の修復を行わなければならない。この修復に要する費用はすべて受注者の負担とし、もし受注者が定められた期間内にその修復を完了出来なかつたり、修復工事を拒否した場合には前述の保証金 Performance Bond でもって第三者の施工業者に修復させる権利を発注者が保留することが出来る。

4-12 設計変更 Modification of Plan

工事中に生じた必要な設計変更に対して、受注者は発注者の指示に従わなければならない。設計変更により生じる工事価格の変更に関しては検査委員会がすべてを決定する権利を有しているが、検査委員会により提示された価格の変更に対して受注者は検査委員会と協議する権利を有する。但し単価表 Bill of Quantities に明示された工種に関する数量変更に関しては単価表に於て合意に達した単価に基づき金額変更を行う。新しく追加された工種や単価表中に Lamp sam で表示された工種例えばポンプ場のような工事の一部変更に関しては検査委員会が持つ積算基準に基づき積算し受注者に提示し、必要があれば協議し変更価格が決定される。

設計変更に伴う工期の変更も検査委員会がこれを決定する権利を有する。

4-13 工事の受取り

すべての工事が完成した時、受注者は書面をもって工事の完工を検査委員会に通知しなければならない。その書面 Invoice を受けたのち検査委員会は関係契約図書、仕様書、図面と完成工事の間に相違点がないかを検査し、工事の完成が認められた場合書面の提出日をもって工事の受取りがなされたとする。

そしてそのうち40日以内に発注者より工事代金の支払いが行れる。

中間払いに際して行れた出来高検査は工事受取りの対象にならず、中間払後の部分完成工事についてもその維持管理に関しては最終受取りまでの期間受注者は責任を持たなければならない。

一方工事に欠陥があったり、契約図書等と相違が認められる場合は受注者はその修復を行わなければならないが、それに要する期間も罰則金の対象となり、工期を越えて修復工事を行った場合、その日数に応じて罰則金を支払わなければならない。

工期内又は前述「4-6 工期」で述べた延期された工期中に発注者の都合で工事の一部を受取る権利を発注者は有する。この場合は受取られた一部工事出来高は最終受取りがなされたと考えられるが、その後の全面的な最終受取までの維持管理については発注者と受注者が両方で協議することとする。これは例えば次のようなことを想定して考えられている。すなわち圃場整備工事に於てポンプ場を除く面工事がすべて出来上り、ポンプ場の工事の遅延により農民が作付を行うことが出来ない場合、仮設用水ポンプにより農民が作付を希望すれば工事の部分受取により作付が可能となる。この場合受取られた面工事中道路は工事用にも農作業用にも使われることとなりその維持管理に関しては発注者及び受注者の協議事項となる。

部分受取により、農民の活動、政府関係者の活動、例えば換地や普及活動などが受注者の残工事に対する障害となることが考えられるがそのための工期延長は行なわない。

4-14 主任技術者及び下請

契約後受注者は主任技術者を指名し検査委員会の承認を受けなければならない。主任技術者は工事期間中必ず工事現場に常駐していなければならない。現場においては会社を代表しすべての行為を行う権利を有していなければならない。すなわち日本における請負契約の主任技術者と現場代理人を兼ねた性格を持っており、この任免に関しては検査委員会は関与する権利を有している。すなわち検査委員会が主任技術者が適当でないとした場合は受注者として主任技術者の交替を要求することが出来る。

又契約に明示されている工事の一部及び全部を下請契約により第三者に譲渡することは原則的に禁止されている。ただしポンプ据付、配線工事など特殊な技術を必要とする工程に関しては検査委員会の承認のもとで下請契約により第三者に下請させることが可能である。ただし勿論すべての契約上の責任は元請の受注者にありそれを回避することは出来ない。

4-15 紛争 Dispute

契約期間内に契約書、仕様書等の解釈の相違、技術的な意見の相違などにより発注者と受注者の間に紛争が生じた場合、両者は善意と信義を持って問題の解決に当らなければならない。もしこれにより問題を解決することが出来ない場合はタイ国商業調停法 Thai Commercial Arbitration Rule に基づき相方が調停者 Arbitrator を指名しその調停者同志で話し合うことにより紛争を解決することが出来る。

この過程に於てどちらか一方が7日間以内に調停者の指名を行うことが出来ない場合、両者の調停者が指名されたが15日間以内にその調停者間で合意に達することが出来ない場合、又調停者同志の話し合では解決出来ないため新たな仲裁者 Umpire を選ばなければならないがその指名が15日間以内に行なわれなかった場合、上述の一つのケースに該当する場合はその解決はタイ国の裁判所に委ねられタイ国の法律に基づきその解決をはかることが出来る。

5 契約条件 Terms and Conditions of the Contract

契約書本体とは別に本件請負契約に掛る契約条件を別記し契約書の一部としている。

これは原則的には契約書本体はすべての請負契約に使えるものとし、この契約条件は各件契約毎に持つ特殊条件を記し、契約のより完全さを期すものとする。すなわち共通仕様書と特別仕様書の関係を思い浮べていただければ容易に理解していただけると思う。

本件請負工事に関して契約条件と簡単な説明を加えると次のようになる。

1) 一般情報

1-1 目的

1-2 工事現場の位置

1-3 協力体制

ここでは国際協力事業団がタイ国に於てタイ政府のカウンターパートの協力に基づき工事を行う特殊性を述べている。

1-4 工事の特殊性

圃場整備工事の特殊性すなわち工事用地が買収されていないこと、工事成果が発注者でなく農民に手渡される、などが述べられている。

2) 書面の提出

2-1 工程計画

2-2 必要な書面手続

3) 機材の支給

本件契約に於てはポンプを別件契約で購入し、受注者に支給し据付を行なわせた。

4) 現場試験及び検査

5) 設計変更

6) 跡片け

7) 受注者の義務

7-1 進入路及び回路

7-2 仮設事務所及び仮設宿舍

7-3 燃料庫

7-4 その他施設

8) 一般的事項

契約期間中に生じた紛争に対する発注者の権利について述べられている。

6 工事仕様書 Technical Specifications

通常工事仕様書は一般工事仕様書と特別工事仕様書に分けられ、前者はすべての工事に適用可能なものであり日本における土地改良事業では土木工事等共通仕様書がこれに相当する。本件工事の仕様書作成にあたっては一般仕様書を作るための余裕がなかったため工事仕様書は一本にまとめ一般工事仕様書の必要な部分を提出し特別仕様書と合せ作った。この国に於ては、特に土地改良事業関係では日本における土木工事等共通仕様書に相当する一般工事仕様書が作られておらず、仕様書作成の際はそれ以前に行れた工事の仕様書を参考にし毎回新しい工事仕様書が作られる。但し他種工事においては、例えば水道工事のように国際入札を度々行っている政府機関においては立派な一般工事仕様書が作られており将来は我々の分野においても一般仕様書の作成が必要となろう。

ここではタイ国で使われている工事仕様書と日本の土木工事等共通仕様書、圃場整備事業便

覧等を参考に作ったが、実際に工事を行った際に生じた問題点を若干述べてみる。

6-1 材料試験

コンクリートをはじめとする種々の材料の試験についてはJISによる規格とASTM (American Society for Testing and materials) の規格を併記し、そのいずれかでもって行うよう指示した。現実にはJISを受注者が入手し理解することは困難であり工事の施工管理の中ではJISの規格は使われない。又ASTMについても一般に入手が難しく、これらの規格にしたがって試験を行うという思想はまるでなく、材料試験室的なものも大企業、2・3の政府関係機関を除き利用出来るところがなく、現実の施工管理の中で仕様書の規定にしたがい材料試験を行うことは困難であった。

6-2 管理基準

圃場は160m×50m 0.8haの大区画でその均平は非常に難しい工事であろう。ここではタイで一般に行われている均平規格を使用し、±10cmの均平化が行われなければならないとしている。ただしその75%が±5cmの均平を満足していなければならない、この程度の均平が行われておれば一般営農に対して支障がないと考えられる。

農道の締固めについては最適含水比における最大乾燥密度の80%、場所においては85%、90%に締固めることを要求している。

これらを初めすべての工種について種々の規格をもうけ仕様書に列記したが、前年度工事、モデルインフラ整備工事では施工管理基準を作らなかったためどの程度の頻度で試験を行うかが明確でなく紛争の種となったため後述の施工管理基準を作った。

6-3 欠落事項

仕様書においては工事中におこるすべてを網羅しており、これにしたがって工事を進めれば完全な工事が出来るよう作られるべきであるが、完全無欠のものを作るのは不可能である。それを補うために工事途中で受注者と打合せを行い打合せ簿に記入しこれを契約図書の一部と考えるのが通常日本で行われるやり方である。当然この方法はタイ国においてもとられており我々もとったのであるが、厳密な意味で相務契約である請負契約においては発注者、受注者相方が全く対等の立場で話し合い、打合せなければならない。受注者は工事仕様書に従い忠実に施工する義務があり、又発注者の設計変更等の工事仕様書に記されていない工事に対してもこれを行う義務があるが、その対価を対等な立場で要求することが出来る。例えば監督職員の不適当な指示に対して手戻り工事になったような場合にはその弁済を要求するし、工事の細部に関する質問に対し回答が遅れた場合その手待ち期間に対する工期の延長を要求するというような非常に合理的でドライな行動に終始する。

これに対し工事仕様書を作る側の立場とすれば仕様書に欠落事項がないようにし打合せにより extra paymentの支払が生じないよう努力することであり、又仕様書の条項はすべて明確にし複数の解釈が出来るような文章にすべきでない。

7 施工管理基準 Guideline for Control Construction

日本の土木工事施工管理基準を踏襲して作ったが、日本の施工管理と異り原則的には監督職員は現場に常駐し、確認の必要な部分はすべて現場で確認される。そのため記録写真による出来高管理は行っていない。

P・CパイプやR・C杭などコンクリート二次製品の工場における品質管理がよくないため受注者が現場搬入後検査をすれば、明らかに変曲した杭、クラックの入ったパイプなどが少なからず混入しており、調べてみると通常これらのコンクリート二次製品はメーカーにより若しくは品質が異っており、よい製品を使用したい場合は必ずメーカーを指定（勿論低品質製品よりは高価であるが。）する必要がある。圃場整備工事は大部分が土工事でありその施工管理は主として出来形管理と締固めを中心とする品質管理であるが、締固めについては十分な施工管理を必要とするが道路、圃場などの出来形については、広い国土を持つタイ人にとっては日本流の細かい出来形管理はなじまず、施工中その機能が設計に対して十分なものであれば許容する場合もあった。例えば道路についてはその高さは設計高さ±許容誤差以内で管理するが道路巾については設計に対しプラス側で許容誤差を上回っていても常識的に許容出来る範囲では可とした。勿論道路巾が大きくなければ圃場面積が小さくなるということであるが、タイ農民、役人の土地に対する考え方が日本人と異なるためほとんど問題とならない。

施工管理基準については日本の管理基準をそのまま導入したため、タイ国の実情に合わない点もあり、特に土工事については見直す必要があると考えている。

8 工事費積算 Cost Estimation

本件工事の積算に先立ちタイ国においてどのような積算方式が取られているかを調べてみた。この国の予算システムとして通常一件工事の設計積算が完了すると予算執行の示達を要請するため大蔵省予算局 Budget Bureau, Ministry of Finance に設計図書を提出しそこで審査を受け予算示達となるが、予算局における審査は積算の一部内容に触れるものであり、それが積算体系に重要な意味を持つように思える。すなわち各省庁から上ってきた積算資料を予算局でチェックするため、特に技術屋でない役人がチェックするため、コンクリート1㎡当り単価、掘削1㎡当り単価というような複合単価になっており年度初めに作られたこの単価を変更することは非常に難しい。（勿論技術屋でない役人がチェックするため単純な複合単価がとられているというのは小生の臆測ではあるが）年度初めに各省庁は自らの積算データをもとに予算局と単価の交渉をして決められるが、一般に大事業量をもち実力のある省庁例えば王立

かんがい局 Royal Irrigation Department, 道路局 Highway Department などとの交渉で決められた単価が他省庁に適用され、特殊な場合を除いてこの単価の壁を破るのは難しい。このためタイ国においては積算作業は非常に簡単で日本の技術者のように積算ミス、即会計検査員の指摘というコースを心配することなく積算が出来るようになってきている。ここで働き出した当初タイ人カウンターパート達が積算に対して非常に楽観しており、もうすぐ入札が近づくとというのに「大丈夫、3・4日もあれば積算など出来る」という話でとても信用出来なかったが、後この複合単価の事実を知り納得した次第である。又例え積算にミスがあったり、積算過剰で予算局から指摘された場合でも、落札者 Successful bidder を呼び値下げ交渉をし辻褄を合せるのが普通である。

このような状況の中で本件工事においては出来る限り日本流の積算方法を使って積算したが、建設物価版等に相当するものも完備しておらず、又労務単価についても普通作業員については政府の決る最低賃金を適用出来るとしても熟練工、特殊作業員等については聞取により決定する他なかった。そこで積算された工事価格はかなりの精度を持って工事原価を表現しているとの確信は持てなかったが、後述のように入札から落札、契約のプロセスが日本と異なるため工事価格は一応の目安の積算と考えた方が妥当と考えられる。

9 公告から入札まで Aunavucement ts Openning Bid

通常設計積算作業が終れば新聞等を通じ入札者の募集を行う。その際契約図書以外に入札要領を作り、入札希望者に配布する。

その一部を資料-7として添付する。ここでは入札の要領、必要書類、見積条件等が記述されており入札希望者は所定のフォームにおいて入札書を作り添付書類を添え検査委員会に提出しなければならない。それは下記のような書類である。

- ① 委任状 Power of Attoney
- ② 入札書 Bid Letter
- ③ 単価表 Bill of Quantities
- ④ 工事工程表 Construction Schedule
- ⑤ 機械計画 Equipment Schedule
- ⑥ 主任技術者の経歴書 Record of Construction Engineer
- ⑦ 入札保証金 Bid Bond
- ⑧ その他

入札保証金は入札額 Proposed Price の5%以上でなくてはならず、現金又は銀行保証 Bank Guaranttee の形で提出しなければならない。

その他の資料として会社の経歴書、入札者が以前に行った工事に対する発注者による完工証明書などが要求される場合がある。

又この入札要領においては失格条項、Price Negotiation、Technical Lvaluationの方法その他について記述されている。

10 入札，Price Negotiation から契約

いよいよ入札である。設計積算者として、特に日本のように積算体系のはっきりしないところで、又積算資料が十分整備されないところで行った積算が入札者の積算と大きな差異があるか不安な気持ちで入札に臨んだが、結果は無残にも積算額を大巾に上廻るものであった。その後入札結果を検討すれば不審な点、例えば我々の積算に対し5倍にもなるような工種がみられたり、明らかに図面の読み違いと推測出来るようなところもあるので入札者を呼びNegotiationに入った。この間出来る限りの情報を収集し、日系建設会社よりタイ国の建設業の実情を聞いた結果、通常我々が得た入札者程度の建設業者はその工事積算能力は低く、入札前の積算は事前にその会社の行った同種工事で利益のあるなし、損失のあるなしを考え全くどんぶり勘定で積算する場合がほとんどである。このような情報をもとに入札者とNegotiationを始めたが、出された資料は予想に違わぬお粗末なもので単位の交渉ではその内訳を聞いても内訳がなく、この工種については以前どこどこでやった経験がありいくらでやって損失が出たので例え発注者側でいくらに積算しても減額出来ないという返事が返ってきた。又数量の読み間違については減額に同意するが全体として発注者側の積算額と一致するに至らなかった。

我々にとっても我々の積算額が完全なものであるという確信がなく（前述のように積算データの不備のため）再入札を行って予定価格で落札する可能性を確信することが出来なかったためNegotiationを一担中止して、再び情報の収集を始めた。その中で本件に関しては全く第三者である日系建設会社に見積を依頼して発注者、受注者の積算の妥当性をチェックすることとした。その結果日本の積算体系上認められていないが、通常この国では認められている経費、積算方式については認めることとして、再びNegotiationを行い工事金額の妥結をみた。これらの過程で得た情報の中に不確で、かつ噂ではあるが二三流会社が行う請負工事においては入札前にしかるべき情報を入手しそれにもとづき得失を考え入札に参加するとか。勿論噂であり信 性については疑しいが入札、Negotiationを通じてこのことを考慮すれば、納得出来る場所が多々あった。

結論として積算作業は厳密な意味で予定価格を作るための作業には成り難く、又タイ国政府の積算体系も積算→予定価格→入札→落札という過程の中で必ずPrice Negotiationがあり必ずしも最終同意価格が積算価格以下になっていると限らないので、積算価格は契約価格に対する一応のTargetとして考えざるを得ない。このことが日本国政府の予算を使って工事を行う場合、日本の法律上いかなる取扱いになるかは問題であるが次善の策として積算即目安価格のうちNegotiationにより契約価格を決定するという体系は現在の場合容認せざるを得ないと考えている。

11 施工管理から竣工検査 Control Construction to Inspection

施工管理は検査委員会 Inspection Committee によりなされたが、タイ側メンバーも含め委員会のメンバーが少なくとも一人は現場に常駐することを原則とし行われた。これは施工管理の方法としては理想的なものと考えられ、受注者の行いすべての工事を監督することが可能である。しかし工事仕様書が完全なものであれば問題はないが通常着工前には考えられなかったことが起るのが普通でありそれらをどう処理するかが施工監督の肝要なところであるが、これが現場のメンバー一人では決定出来ない場合がある。特にタイ側直営工事、タイ側契約工事、日本側請負工事と三種、四種の工事が出合張場になった場合、起った問題の処理に時間がかかり、受注者に工事の手待ちを余儀なくさせることになる。これらの紛争においては必ず受注者は工期の延長を要求し、こうむった被害の弁済を要求する。資料-8に受注者側からの書面を例示する。又工事仕様書、図面等の解釈の相違についても同様の手続がなされ発注者側の非に対しては弁済、工期の延長の要求がなされる。例を挙げれば、指定した土取場が他の工事との関連で土が取れなくなったことがある。他の土取場を探すため十数日を要しその間若干の手待ちとなった。勿論土工事以外の工事がある訳で、全面的な工事の中止をした訳でないが、受注者はその間の工期延長、手待ち機械のリース代その他の弁済を要求して来た。勿論発注者側としては全面的にこれを認める訳にいかず Negotiation をする訳であるが、これが日本におけるやり方と違って堂々と権利を主張し、あわよくば自分の非を隠しより長い工期延長、より多くの弁済を勝ちとろうとする。それを論破するために十分な資料を用意することが肝要である。同種の工事を昭和52～54年に二度おこなったが、これらの点では対照的な二つの受注者であり、一方は割合紳士的でそれほど強硬な申し入れもなくスムーズに工事を完了した。工事を行っている際の受注者とのやりとり、雰囲気の中で感じたことであるが、その業者は利益をあげることが出来、他の業者は十分な利益をあげえなかったために態度の差になってあらわれたのではないかと思われる。

結論から言えば積算の精度が十分確信のもてるものでなく例え Price Negotiation において同意を得ても、工事途中で受注者が適正な利益を得れないと判断すれば、利益を得るためにかなり強硬を申し入れをすることが予想される。設計、契約図書は常に完全無欠と言い難いため、又必ず設計変更要因を含んでいるため紛争の因となり易く、これを避けるためには経験ある優良業者と契約し、受注者が適正な利益をあげえるようにするのが非常に便宜的ではあるがスムーズに工事を進める方法でなかるうか。勿論今后積算資料等が整ってくれば当然それに沿い変えていかねばならないであろうが。

12 あとがき

タイ国に派遣された3年の間に幸か不幸か契約工事の「甲」になる機会を二度も持つことが出来た。このような機会は日本の農業土木技術者として稀なものであり、何か残しておくことが義務のように思えレポートを作り始めたのであるが、任期がせまって来て、あわただしく十分な報告になっていないかと心配しているのであるが特に前半の請負契約書の部分はともかく後半の諸手続から竣工検査までについては十分意をつくしきらないところもあり雑駁なものになってしまったのを残念に思っている。

今後の海外援助、技術協力の中で小生のケースと同じく工事発注をすることが生じてくると予想されるが、その際の一助にこのレポートがなれば幸甚に思う。

Contract
for Land Consolidation at Lad Bua Luang

Japan International Cooperation Agency

Chao Phya Pilot Project

CONTENTS

	Page
1. CONTRACT	8 2
Article 1. Purpose of Agreement and Contract Price	8 2
Article 2. Performance Bond	8 3
Article 3. Payment	8 3
Article 4. Completion Time	8 4
Article 5. Penalty	8 5
Article 6. Compensation	8 6
Article 7. The JICA's Right for Default	8 6
Article 8. Contractor's Responsibility on Termination of this Contract	8 6
Article 9. Inspection Committee	8 7
Article 10. Prohibition for the Equipment Removal	8 7
Article 11. Rectification of the Defective Construction	8 8
Article 12. Discrepancies Among the Contract Documents	8 8
Article 13. Temporary Facilities and Method of Construction	8 8
Article 14. Modification of Plan	8 8
Article 15. Acceptance of the Works	8 9
Article 16. Construction Engineer	9 0
Article 17. Replacement of Engineer and Foreman	9 0
Article 18. Sub-Contractor	9 0
Article 19. Notice	9 1
Article 20. Dispute	9 1
 2. TERMS AND CONDITIONS OF THIS CONTRACT	 9 3
Section 1. General Information	9 3
Section 2. Submission of Notices	9 4
Section 3. Equipments Supply	9 5
Section 4. Field Test and Inspection	9 5

	Page
Section 5. Modification of Plan	96
Section 6. Release from the Works	96
Section 7. General Obligations of the Contractor	96
Section 8. General Text	97
3. Technical Specifications	98
Article 1. Alignment and Elevation	98
Article 2. Land Clearing	98
Article 3. Land Levelling on the Paddy Field	98
Article 4. Leading Ditch and Drainage Ditch	99
Article 5. Road with Lateral or Irrigation Ditch	100
Article 6. Compaction Test	101
Article 7. Concrete	101
Article 8. Reinforcement	106
Article 9. Culvert for Access Road	108
Article 10. Small Facility	109
Article 11. Secondary Pumping Station	109
4. Guideline for Dimension Control	111
1. Guideline (1)	112
Guideline (2)	113
Guideline (3)	114
Guideline (4)	115
Guideline (5)	116
2. Guideline for Quality Control	117
3. Standard Test	118
1) Concrete	118
2) Embankment	120

CONTRACT

For Construction of

.....

No.

This Contract is executed on this day of 1980 at the JICA Bangkok Office between

Japan International Cooperation Agency, Bangkok Office

by Title as its authorized representative of the JICA Bangkok Office, hereinafter called "The JICA" of the one part, and whose office is situated at Road Tambon Amphoe Changwat Tel. represented by nationality Title authorized to act on behalf of According to Power of Attorney No. dated which is attached to this Contract, hereinafter called "the Contractor" of the other part.

Both parties mutually agree under the terms of this Contract as follows:

Article 1. Purpose of Agreement and Contract Price

The JICA agrees to employ the Contractor and the Contractor agrees to perform the Works for the execution of as esumerated in this Contract Terms and Conditions of the Contract, Bill of Quantities and all Documents attached herewith located at Tambon Amphoe Changwat Total items, for the total amount of Baht. (.....) hereinafter called "Contract Price"

The following documents shall form integral part of this Contract.

.....
.....
.....

.....
.....
.....
.....

Article 2. Performance Bond

As a security for the faithful performance of the Works under this Contract, the Contractor has on the execution of this Contract deposited a performance bond with the JICA (.....) in cash, or in lieu thereof a Bank Guarantee issued by the bearing the number and dated in the amount of Baht (.....) which represents 5 (five) percent of the Contract Price, the name of the issuing bank and the form of the bank guarantee are to be approved by the JICA.

The JICA will return the performance Bond in cash or the Bank Guarantee to the Contractor as the case may be at the end of the 12 (twelve) months after final acceptance of the Works by the JICA as stipulated in Article 15 of this Contract, provided that the completed Works shall not show any defect or damage caused through the fault of the Contractor, or through the fault of any new Contractor in the case of termination of Contract by the JICA under Article 4 and Article 8.

Should the Contractor be in default, the JICA shall have the right to demand payment from all or any part of the performance Bond. In addition, the Contractor shall remain liable for the full loss sustained by the JICA.

Article 3. Payment

The JICA agrees to effect payments for the Works to the Contractor in the following manner:

- a. Advance Payment, to be effected upon the bringing of equipment and materials required for the Works and properly stored at the job site by the Contractor not later than 1980 and of value estimated by the Inspection Committee not less than 10 (ten) percent of the Contract Price, not later than days after the estimation is

made by the Inspection Committee for the amount percent of the Contract Price.

- b. Subsequent Payments, to be effected according to the progress of the Works satisfactorily executed by the Contractor and accepted by the Inspection Committee, by not more than 3 instalments. Each payment shall be deducted by the full amount of advance payment, balance of which shall be further deducted by 10 percent as Retention money on each payment.
- c. Final Payment, to be effected upon the satisfactory completion of the Works by the Contractor and accepted by the Inspection Committee, of the remaining amount of the Contract Price plus all Retention money deducted under (b) above.

Payments under (b) and (c) shall be effected within 40 (forty) days after the respective acceptance of the Works by the Inspection Committee.

Taxes payable by the Contractor, if any, shall be deducted at source by the JICA on each payment.

It is expressly understood that payments by the JICA do not mean acceptance of the Works by the Inspection Committee nor relieve the Contractor from its responsibilities under the Contract.

Article 4. Completion Time

The Contractor agrees to satisfactorily complete the Work within days (completion time) from the date hereof which will become due on 1980 (completion date) and he agrees to commence the Works at the site on or before 1980 (commencement date) which will be within 7 days after the date hereof.

If the Contractor fails to commence the Works by the commencement date, or should in the course of the Construction any event occurs which may reasonably cause the JICA to believe that the Contractor will not be able to complete the Works on the completion date, or should the Contractor fail to complete the Works by the completion date, or should the contractor fail to meet any of the Contract requirements, the JICA shall have the right to terminate this Contract by giving written notice to the Contractor.

However, in case that the Contractor fails to complete the Works by the completion date, or to meet any of the Contract requirements, if the Inspection

Committee thinks that the Contractor has the ability for completion of the Works within reasonably extended period, the Contractor may be permitted by the JICA to continue the Works beyond the completion date but within the extended time.

Article 5. Penalty

In case the Contractor is in default as mentioned in Article 4 the Contractor agrees to be responsible to the JICA as follows:

- 5.1 In case of the termination by the default of commencement for the Works, the Contractor shall pay a penalty of Baht Baht (.....) per day counting from the commencement date until the new Contract is completely executed with a new contractor for this Works, the period of which includes the time spent for finding the new Contractor and executing the new Contract etc.

- 5.2 In case the JICA thinks that the Contractor will not be able to complete the Works within the completion time and thereby terminates this Contract, the Contractor shall pay a penalty of Baht (.....) per day counting the number of days in the same manner as prescribed in 5.1 above. However, the JICA may reduce such number of days according to the ratio between the Works completed by the Contractor and the total Works as may be decided by the Inspection Committee.

- 5.3 In case the Contractor fails to complete the Works by the completion date or to meet any Contract requirement, the Contractor shall pay a penalty of Baht (.....) per day counting from the date following the completion date or the date of failing to meet such requirement until the Works are satisfactorily completed and accepted by the Inspection Committee or the requirement is fully not by the Contractor as the case may be. However, should the delay continues beyond the completion time in excess of 2 (two) weeks, the Contractor shall pay, in addition to the penalty of Baht (.....) per day counting from the date following the completion date to the 14th day thereafter, a penalty of Baht (.....) per day counting from the 15 (fifteen)th day

after the completion date until the Works are satisfactorily completed and accepted by the Inspection Committee. Should the delay continues to exceed 4 (four) weeks from the completion date, the Contractor shall pay, in addition to the penalty of Baht (.....) per day counting from the date following the completion date to the 14th day thereafter and also the penalty of Baht (.....) per day counting from the 15th day following the completion date to the 28th day following the completion date, a penalty of Baht (.....) per day counting from the 29th (twenty ninth) day following the completion date until the Works are satisfactorily completed and accepted by the Inspection Committee.

Article 6. Compensation

If the JICA sustains any losses either direct or indirect caused by the Contractor's failure, the Contractor shall compensate the JICA for such losses. The parties agree that time is essential for the completion of the Works.

Article 7. The JICA's Right for Default

The JICA has the sole and absolute right to decide whether to terminate the Contract, to impose only the penalty on the Contractor or to claim the compensation for the damage as stated in Article 5 or Article 6. The money due to the JICA exercising its right under this article shall be retained and deducted from any money due to the Contractor but yet unpaid, including from the performance bond. If the total amount of the loss is larger than the money above-mentioned, the Contractor agrees that the JICA has the right to retain the construction equipment, materials and supplies etc. and demand payment of the balance from such equipment etc. or proceeds of sale thereof.

Article 8. Contractor's Responsibility on Termination of this Contract

After the Contract has been terminated in accordance with the foregoing Article 4, the JICA shall have the right to employ another Contractor (hereinafter called the "New Contractor") to carry on the remaining parts of the

Works, and the payment for the Contractor that fail to complete the Work shall be made out of the necessary Contract price for the remaining Works. Should the remaining amount after payment of the advance and subsequent payments from the Contract price, to the original Contractor be insufficient to effect payment to the new Contractor, shall be deemed as direct loss sustained by the JICA, and the Contractor shall pay such difference to the JICA within days from the date of request by the JICA, failing which interest at the rate of percent per annum shall be charged thereon.

Article 9. Inspection Committee

The Inspection Committee, authorized to act on behalf of the JICA will be appointed by the JICA and the Inspection Committee is entitled to do all things that the JICA may do so. The Inspection Committee shall control and supervise the Works all the times whether it is the preparation or implementation of the Works and the Contractor shall promptly furnish all necessary facilities for proper inspections of the Works in accordance with the Inspection Committee's request. At any moment the Inspection Committee can request the Contractor to stop the Works, if necessary and the Contractor shall have no claim on the JICA for extension of the completion time or any damage whatsoever due to such suspension of the Works under this Article.

The Inspection will not be deemed as the acceptance of the Works, and the Contractor shall not be relieved from his responsibility to meet the Contract requirements by the fact that the Inspection Committee exercise their duties. Should it be found that the Works have not been satisfactorily performed in the faithful manner, the Contractor shall correct any part of the Works indicated by the Inspection Committee within the period specified by the Inspection Committee.

Article 10. Prohibition for the Equipment Removal

Should the Contractor fail to complete the Works during the completion time or the Inspection Committee thinks that the Contractor will not be able to satisfactorily complete the Work, any equipment and materials brought at the site for use on the Work shall not be removed without the prior approval of the Inspection Committee in writing.

Article 11. Rectification of the Defective Construction

For a further period of 1 (one) year after satisfactory completion and final acceptance of the Works by the JICA, whether completed by the Contractor or by the new Contractor in case of termination of Contract under Article 4, any damage to the Works which is caused by the Contractor's fault, either because of defective workmanship or the use of inferior materials or any other cause, shall be made good as necessary by the Contractor to the satisfaction of the JICA at no extra cost.

In case of the termination of the Contract, the JICA may decide which part of the Works should come under the Contractor's responsibility, and requests the Contractor to make good of the damaged works. Should the Contractor fail to do so within period specified after receipt of written request to do so from the JICA, the JICA shall have the right to employ another person to carry out such work and the Contractor agrees to bear all expenses incurred.

Article 12. Discrepancies Among the Contract Documents

If, prior to or during the course of construction, any discrepancies are found in the drawings and/or the Technical Specifications etc. attached to this Contract, the Contractor shall follow the ruling given by the Inspection Committee at no additional cost to the JICA.

Article 13. Temporary Facilities and Method of Construction

The Contractor may decide the temporary facilities, office, warehouse, etc. and the methods of construction by itself without the approval by the Inspection Committee. However, the Inspection Committee reserves the right to suggest the Contractor more suitable facilities and/or methods. If the Inspection Committee suggests them to the Contractor, the Contractor shall negotiate with the Inspection Committee but without being required to follow such suggestion.

Article 14. Modification of Plan

If the Inspection Committee finds it necessary to make modification of construction design and/or materials and so forth during the course of

construction, the JICA has the right to order the modification of the Works to the Contractor, and such order shall be made in writing from the Inspection Committee to the Contractor.

The JICA agrees to adjust upwards or downwards the necessary expense for such modification to be made by the Contractor, which will be estimated by unit price in the Contractor's proposal in case of modification of quantities of construction works, in the case of additional works which are not quoted by unit price in the Contractor's proposal, the Inspection Committee will make estimation thereof and the JICA will pay to the Contractor for such additional works accordingly. But if the Contractor does not agree to such estimation, the Contractor is then entitled to negotiate with the JICA, also the extension of the completion time due to the modification shall be given by the JICA who shall have the sole right to decide the number of days of such extension.

Article 15. Acceptance of the Works

When the entire Work has been completed, the Contractor shall submit the invoice in written form indicating the Work actually completed to the Inspection Committee. If full compliance with drawings or Technical Specifications is made or no defects in the completed Works is found, the Inspection Committee shall accept the Works as the final acceptance of satisfactory completion Works within 10 (ten) day after the receipt of the written form and it shall be deemed that the final acceptance has been made on such date of the receipt of the written form.

On the other hand, should non-compliance with drawings or Technical Specifications or defects be found in the Works executed by the Contractor, the Inspection Committee will have the right not to accept the Works and to order the rectification of the Works. If the required period for the rectification of the Works is beyond the completion date, the Contractor shall not be relieved from its responsibility to pay the penalty as stipulated under clause 5.3, and after the completion of rectification of the Works, then the final acceptance will be made in the same manner as described in the first paragraph of this Article.

During the course of construction, whether in the construction period or extension period specified in the last paragraph of Article 4, the JICA has the right to accept part of the Works already completed in the written form which shall be considered as part of final acceptance. However, both parties

shall negotiate with each other for the maintenance and usage of the accepted part of the Works, and the Contractor is not entitled to request the extension of the completion time due to any interruption caused by the use of such accepted Works by the farmers the JICA, the Inspection Committee or the officers of Thai government authorities, or any delay in repairing such accepted Works.

Article 16. Construction Engineer

The Contractor shall appoint a construction engineer at his own expense for the supervision of the Work performance, who shall be authorized to act on behalf of the Contractor, such construction engineer shall be a good English-speaking person and accepted by the Inspection Committee, who shall stay at the job site all the time and shall not leave without obtaining the prior approval of the Inspection Committee. If the Contractor replaces the construction engineer, the Contractor shall obtain the prior approval from the Inspection Committee in writing.

Article 17. Replacement of Engineer and Foreman

The Inspection Committee may request the Contractor to remove any of the Contractor's foremen or engineers if it appears to the Inspection Committee that such foreman or engineer is incompetent for his job or is not suitable or is not capable of handling his workmen or staff, and the Contractor shall promptly replace any such foreman or engineer. No extra cost or claim for extension of time will be allowed because of such replacement.

Article 18. Sub-Contractor

The Contractor shall not sub-contract or assign any portion of the Works under this Contract without obtaining the prior approval of the JICA who has the sole right to decide which portion of the Works may be sub-contracted or assigned to the Sub-Contractor. However, the Contractor shall be fully responsible for the Works done by the Sub-Contractor.

Article 19. Notice

All notice required by this contract shall be effective only at the time of receipt thereof, and only when received by the parties concerned at following address:

The JICA
.....
.....
.....
.....

The Contractor
.....
.....
.....
.....

All notices required by the terms of this Contract shall be made in writing in English Language, and delivered by registered mail or hand delivery.

Article 20. Dispute

In the event of any dispute arising from the interpretation and performance of the terms of this Contract, both parties agree to make the best attempt with sincerity and in good faith to negotiate and amicably settle such dispute, failing which the parties agree to refer such dispute to arbitration under Thai Commercial Arbitration Rules and Regulation, c/o Board of Trade of Thailand Bangkok, by 2 arbitrators, each of which is to be appointed by each party. If either party fails to appoint its arbitrator within 7 days or should the arbitrators fail, within 15 days after their appointment, to agree upon the decision of the dispute or no decision is reached on the appointment of an umpire, then the dispute shall be brought before the Court in Thailand for decision under the laws and procedures of the Kingdom of Thailand.

This Contract is executed in duplicate of the same tenor, one of the original copy to be kept by JICA and the other original copy to be kept by the Contractor. Both the JICA and the Contractor have set their signatures and affixed the seals thereto in the presence of the witnesses.

..... JICA.
Mr. Yasuo Kitano, Director, Bangkok Office, Japan
International Cooperation Agency.

..... Contractor.

..... Witness.
Mr. Charin Atthayodhin, Secretary General, Agricultural Land Reform Office,
Ministry of Agriculture and Cooperatives.

..... Witness.

Stamp Duty

Baht.

Terms and Conditions of this Contract

Section 1. General Information.

1.1 Objective

According to the agreement between the Government of Thailand and the Government of Japan, since 1977 the on-farm development project has been implemented as the technical cooperation project in a total area of 550 hectares by the Agricultural Land Reform Office (hereinafter called the ALRO) and the JICA. The JICA intends to accelerate the implementation for this project and to construct the infrastructures as the aid from Japan this year. Accordingly to serve above-mentioned purpose, the JICA executes this Contract for the construction of the Land consolidation (hereinafter defined as a kind of land improvement in cultivated area for high productivity of labor including arrangement of plot, farm road, irrigation and drainage canal, under drain and so on in a total area 81.31 hectares (508.2 rais) in the Chao Phya Pilot Project Located in Changwat Ayudhaya.

1.2 Location of the job site

The job site is located in Muu 3, 4, Tambol Phraya Banlu and Muu 4, Tambol Kuslod, Amphoe Lad Bua Luang, Changwat Pranakorn Sri Ayudhaya, as shown in map. Dwg. No. B-1, which is within the scope of the technical cooperation project area above-mentioned in Section 1.1.

1.3 Collaboration

Accordingly the objective of the technical cooperation, the ALRO, counterpart agency of the JICA is executing the technical cooperation programmes around the job site such as the land consolidation, construction of main pumping station and so forth. Prior to or during the course of construction, the Contractor shall make the good relation with the ALRO for the satisfactory implementation of the Works as to secure full collaboration. Should it happen that the relation between the ALRO and the Contractor is disturbed, the Contractor shall inform the Inspection Committee who will conciliate the both parties.

1.4 Characteristics of the Works

There are the special characteristics of the Works in the land consolidation that are not similar to the ordinary civil work, because the farmers may be the land owners or tenants who can make use of the land, and it is considered that the farmers have the right to demand the benefit from the Works, in terms of both quality of the Works and the Work schedule. If the Contractor receives the claims from the farmers, the Contractor shall inform immediately the Inspection Committee in order to solve the problems arising from the farmers.

Section 2. Submission of Notices

2.1 Work schedule

The Contractor shall submit the Work schedule in following items before the commencement of the Works at the job site. If the Contractor intends to change the Work schedule, the approval from the Inspection Committee shall be obtained prior to the modification of schedule.

1. Preparation of facilities and transportation of equipment etc. to the job site.
2. Land clearing.
3. Road with lateral, and farm ditch.
4. Drainage ditch (including leading ditch).
5. Land Leveling with plot boader.
6. Small facilities.
7. Access road.
8. Secondary pumping station.
9. Laterite paving.
10. Clearing away.

Also the Contractor shall submit the machinaries scheme including the number, and kind of machinaries and using period of them.

2.2 Notices

The JICA and the Contractor shall submit the notices to each other, as necessary, in accordance with Article 19 in the Construction Contract

Document within reasonable time except that special articles are provided in Construction Contract Document and Terms and Conditions of this Contract.

Section 3. Equipments Supply

The JICA shall have responsibility to supply the following equipment to the Contractor until June 7, 1980. However, installation of the equipment shall be the Contractor's duty and at its expense.

- | | |
|--|---------|
| 1. Horizontal type mix-flow volute pump. | 1 Unit |
| 2. Electric Motor. | 1 Unit |
| 3. 300 mm. ϕ foot valve. | 1 Unit |
| 4. 300 mm. ϕ x 1,800 mm. length pipe with flanges for suction | 1 Unit |
| 5. 90° elbow for suction. | 1 Unit |
| 6. 300 mm. ϕ x 180 mm length pipe with flanges for discharge | 1 Unit |
| 7. 300 mm. ϕ rubber expansion joint for discharge. | 1 Unit |
| 8. V-pullies having suitable size. | 2 Units |
| 9. V-Velts set having suitable size. | 1 Unit |
| 10. Screen as shown in Dwg. No. _____ | 1 Unit |

All steel pipes and fittings above-mentioned are completed with necessary bolts, nuts and washers.

Section 4. Field Test and Inspection

The field tests in accordance with the Technical Specifications and the demands from the Inspection Committee shall be the responsibility for the Contractor. The charges for such field Test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

Section 5. Modification of Plan

In case the JICA estimates the cost for the modification in accordance with Article 14, and if there are two portions, one for the increase and the other for the decrease of the construction cost resulting from such modification, the JICA shall have the right to offset them in the payment and pay or claim the difference between the increase and decrease of the construction cost as the case may be.

Section 6. Release from the Works

After the final acceptance of the Works by the JICA, the Contractor shall remove its own temporary facilities, Office, warehouses, surplus material, debris and so forth which were provided by itself within 15 (fifteen) days. Upon approval of the Inspection Committee for the removal of the above-mentioned, facilities etc. the Contractor will be released from its responsibility of the Works but remains responsible under 1 (one) year guarantee of the Works as specified in Article 11 in this Construction Contract Document.

Section 7. General Obligations of the Contractor.

7.1 Access road and/or detour

The Contractor shall construct an access road and/or detour in order to connect the existing road on its own account, if it is necessary, and keep them good condition including the existing road. In case that the ALRO uses the same access road, detour and/or existing road, the Contractor may allocate the maintenance cost of them with the ALRO by the Inspection Committee's apportionment.

7.2 Temporary office and residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Inspection Committee for approval at least 10 (ten) days in advance of the commencement of such works.

The Contractor is required to always keep the buildings and facilities in good condition and to make proper drainage and sanitary system.

Should the Contractor build them outside of the job site, the Contractor shall arrange with the owner of such land and at its own expense.

7.3 Fuel storage

In area of temporary office and residence, the fuel tank capacity shall not exceed 10,000 litres and shall be far away from the buildings.

Fuel storage and transportation shall be done with care and shall have a good system of fire prevention. If storage licence is required, the Contractor shall arrange for obtaining it.

7.4 Other facilities

All necessary facilities for the construction works and the Contractor's convenience shall be provided and maintained in good condition by the Contractor.

Section 8. General Text

The Contractor shall implement the Works in accordance with the Contract Documents in broad sense such as construction Contract Document in narrow sense, Terms and Conditions of Construction Contract, Technical Specification and Guideline for Supervision. Should the events occur that the both parties can not reach agreement on the interpretation of the above-mentioned Contract Documents in broad sense, both parties shall negotiate with sincerity and good faith for settlement of any disagreement, failing which the decision of the JICA shall prevail.

Technical Specifications

The Contractor shall execute the Works in accordance with this Technical Specifications, drawing maps and the Guideline for Construction Control for the technical matters such as shape, direction, size and so forth. Should the Contractor find the shortage of the articles in this Technical Specifications for the completion Works, the Contractor shall inform it to the Inspection Committee and follow the ruling by the Inspection Committee.

Article 1. Alignment and Elevation

The Inspection Committee will indicate the 1 (one) bench mark and 2 (two) fundamental stakes at the job site to the Contractor for alignment as shown in Dwg. map No. B-3 which are driven by the Inspection Committee before commencement of the construction, then it is the Contractor's duty to transfer the elevation and make alignment. The Contractor shall drive the spare pegs at least 4 (four) pegs for each above-mentioned in accordance with the indication of the Inspection Committee and also for the pegs that are indicated by the Inspection Committee.

For all mistakes appeared from the transferring elevation and making alignment, the Contractor shall be responsible and shall not move the pegs without prior permission of the Inspection Committee.

Article 2. Land Clearing

- 2.1 The Contractor shall clear the land including the rough levelling of existing boundary borders, trees, stumps, anthills and so forth.
- 2.2 The abandoned materials above-mentioned such as trees and stumps which are taken out shall be brought to the places where the Inspection Committee indicates, then buried in ground.

Article 3. Land Levelling on the Paddy Field

- 3.1 The Contractor shall cut, fill earth in the plots for the designed elevation, and in principle shall not carry the earth from, or to other plot. If the Contractor moves earth from the plot to other for making

specified elevation, the Contractor shall obtain the prior approval of the Inspection Committee. Should the event occur that there is lacking of or surplus earth, the Contractor shall follow the indication of the Inspection Committee and the carrying earth will be done in the area of the job site.

- 3.2 The range of allowable error of the designed elevation at each point in plot which is specified in the Guideline for Construction Control shall not exceed ± 10 (ten) cm and more than 75 (seventy-five) percent of the points shall show the elevation less than ± 5 (five) cm of designed one.
- 3.3 Earth Cutting in each plot shall not exceed 50 (fifty) cm by estimating from the original ground level as shown in Dwg. No. B-2, if it is necessary to cut exceeding 50 (fifty) cm, the Contractor shall obtain the prior permission of the Inspection Committee.
- 3.4 The Contractor shall compact earth that is embanked in the plot in order not to settle during and after the course of construction.
- 3.5 The Contractor shall make the good shape for the plot boader as shown in Dwg. No. B-5, the compaction of which shall be not less than 80 (eighty) percent of maximum dry density under optimum moisture content by ASTM D-698-66 T method or JISA-1210-1970 (hereinafter called maximum dry density).

Article 4. Leading Ditch and Drainage Ditch

- 4.1 The excavation of ditch shall have the same dimension. The Contractor shall not excavate larger than the dimension specified and shall not backfill the earth for making dimension specified.
- 4.2 The surface finishing of the ditch shall be done by man-power.
- 4.3 The compaction of small dike of ditch shall be in excess of 80 (eighty) percent of the maximum dry density.
- 4.4 During the course of construction, should the event occur that the ditch is broken down by the artificial or natural reason such as a trouble by

machine and heavy rainfall, the Contractor shall inform immediately to the Inspection Committee, and follow the indication of the Inspection Committee for the repairing way.

Article 5. Road with Lateral or Irrigation Ditch

- 5.1 The Contractor shall clear uproots, stumps, trees etc. and take out not required material along the alignment of the road, then shall strip top soil not less than 20 (twenty) cm before the embankment.
- 5.2 After stripping surface soil, the Contractor shall compact the road bed more than 85 (eighty-five) percent of the maximum dry density.
- 5.3 The Contractor shall fill earth that is suitable material for the embankment not including trees, roots, weeds and so forth. The depth of each layer for the embankment shall not exceed 30 (thirty) cm the compaction of which shall be more than 85 (eighty-five) percent of the maximum dry density.
- 5.4 The width of embankment shall be wider than the width for road plus the width for irrigation or lateral ditch. The Contractor shall embank earth and compact the filled earth of full width for road and ditch more than 85 (eighty-five) percent of the maximum dry density.
- 5.5 The Contractor shall excavate the irrigation and lateral ditch in the same dimension and shall not excavate larger than the dimension specified and shall not backfill earth for making dimension specified.
- 5.6 The surface finishing of ditch shall be done by man-power.
- 5.7 During the course of construction, should the event occur that the road and/or ditch are broken down by the artificial or natural reason such as a trouble by machine and heavy rainfall, the Contractor shall inform immediately to the Inspection Committee, and follow the indication of the Inspection Committee for the repairing way.
- 5.8 The Contractor shall measure the field density at the places where they are specified in the Guideline for Construction Control or the Inspection Committee requests to do so.

5.9 Laterite shall be compacted by roller for pavement, the depth of which shall not be less than 15 (fifteen) cm after compaction.

Article 6. Compaction Test

- 6.1 Before the course of compaction for road, small dike and plot boader, the Contractor shall test the standard compaction test according to ASTM D-698-66 T method A or JISA 1210-1970.
- 6.2 The sampling places for the standard compaction test are indicated by the Inspection Committee, and the Contractor shall take more than 3 (three) samples for the standard compaction test at any place indicated by the Inspection Committee.
- 6.3 The Contractor shall submit the results of the standard compaction test to the Inspection Committee, according to which, the Inspection Committee will decide the workable range of moisture content for the compaction.
- 6.4 The Contractor shall not compact earth in case actual moisture content is out of the workable range. Should the Contractor want to compact earth in the above-mentioned state, the Contractor shall obtain the prior permission of the Inspection Committee.

Article 7. Concrete

7.1 Cement

- 7.1.1 Cement used in Concrete mixture shall be normal portland cement, properties of which shall be in accordance with Vol. 15 1-2514 TISI, Science Department, Ministry of Industry of Thailand.
- 7.1.2 Cement shall be reliable brand, good quality and absolutely dry.
- 7.1.3 The Contractor shall construct a waterproof cement storage shed at the job site, floor of which shall be higher than the ground surface at least 30 (thirty) cm.

7.1.4 The Contractor shall not keep cement at the job site more than 1 (one) month, and storage period is counted from the date when cement is transported from the manufacturing factory to the job site.

7.1.5 During the course of construction, the Contractor shall not use cement for the Works properties of which are changed, especially consolidated.

7.2 Fine aggregate

7.2.1 Fine aggregate shall be river sand that is clean and rigid without organic matter and other substances.

Fine aggregate shall have the properties as shown in following table.

No.	Experimentation	Allowance Index	Remarks
1	Grading	95% of material shall pass through the sieve No.4 and 90% of material shall not pass through the sieve. No.100.	By weight
2	Dust passed through the sieve No.200.	Not exceeding 3%.	
3	Finess modules	Not less than 2.3 Not more than 3.1	
4	Organic unpurity (Tested by the method of soldium hydroxide 3% type).	The color of the material after the experiment shall show paler than the standard color No.3.	
5	Very mild material (ASTM C-142).	Not exceeding 1%.	By weight

7.2.2 The Contractor shall keep fine aggregate at clean and good drainage place, which shall be protect against the mixture with harmful substance such as clay, soil and so on.

7.3 Coarse aggregate

7.3.1 The Contractor shall use crushed stone as coarse aggregate which is rigid and endurable substance without organic and harmful materials.

7.3.2 Coarse aggregate shall have the grading as shown in the following table:

Sieve Size	Passing Percent by Weight
2"	100
$1\frac{1}{2}$ "	90 - 100
1"	20 - 55
$\frac{3}{4}$ "	0 - 15
$\frac{3}{8}$ "	0 - 5

7.3.3 Coarse aggregate shall have the properties as shown in following table:

No.	Experimentation	Allowance Index	Remarks
1	Dust passed through sieve No.200	Not exceeding 1.5%	By weight
2	Very mild material (ASTM C-142)	Not exceeding 0.25%	By weight
3	Other mild material	Not exceeding 5.0%	By weight
4	Stability test method	Lost part shall not exceeding 12% of total weight	Sodium sulphate method.
5	Abrasion	Lost part shall not exceed 40% of total weight	By Los-Angeles Abrasion Test method

7.4 Water

Water used concrete mixture shall not contain harmful substances such as oil, acid, salt and so on. Should the Inspection Committee thinks that water used for the concrete mixture is harmful, the Contractor shall inspect the water as following way; the Contractor makes two kinds of cylindrical mortar test pieces, one used actual field water that the Contractor will use, another used standard water that the Inspection Committee specifies. In case the compressive strength of former is larger than 90 (ninety) percent of the latter at 7th (seven) day and 28th (twenty-eight) day after making test pieces, the Contractor may use the actual field water. If not, the Contractor shall look for another water source by the Contractor's responsibility.

7.5 Mixing design of Concrete

Concrete shall have the proportion as follows:

	Compressive Strength 28 Days.	Mixing Portion Cement:Fine A: Coarse A.	Slump Value
Reinforce concrete	$f'_c = 210 \text{ kg/cm}^2$	1 : 2 : 4 (by volumn)	8 - 12 cm
Plain concrete	$f'_c = 180 \text{ kg/cm}^2$	1 : 2 : 4 (by volumn)	8 - 12 cm
Lean concrete	--	1 : 4 : 6 (by volumn)	--

Fine A. : Fine aggregate

Coarse A. : Coarse aggregate

Other proportions for mixed design may be indicated by the Inspection Committee at the job site, if it is necessary.

7.6 Slump test

The Contractor shall make slump test in each batch in accordance with JIA A 1101. In case the Contractor intends to place concrete, the Contractor shall not pour the concrete without prior inspection for the value of slump test by the Inspection Committee. After the completion

of the concrete Works, the Contractor shall submit the data of slump test to the Inspection Committee.

7.7 Mixing concrete

The Contractor shall use a power-driven concrete mixer and quantities of cement, aggregate and water in concrete mixture shall be measured correctly in each time. The driving time for mixing concrete shall be more than 2 (two) minutes and less than 5 (five) minutes in order to make concrete with constant consistency and good quality. Taken out from the concrete mixer, concrete shall be placed in concrete form within 30 (thirty) minutes. The concrete mixer shall be checked and cleaned every day and the Contractor shall remove concrete debris attached to the concrete mixer.

7.8 Concrete form work

7.8.1 Concrete form shall be rigid and strong enough to support the weight of concrete without deformation, and the Contractor shall make concrete form tightly in order to prevent water seepage from unsolid concrete.

7.8.2 The Contractor may use wood form, plywood form and steel form, in any case surface of form shall be smooth and have no damage.

7.8.3 In case the Contractor set up concrete form, the iron embedded within concrete to hold the form shall be cut at concrete surface.

7.8.4 Before placing concrete, concrete form shall be inspected by the Inspection Committee for correctness of size, good preparation and so on.

7.8.5 Before placing concrete, the Contractor shall paint oil on inner surface of concrete form for good separation between concrete and concrete form after solidness of concrete.

7.9 Placing concrete

7.9.1 Before placing concrete, the Contractor shall check and clean floor and the surface of concrete form.

7.9.2 After a batch of concrete is placed, the surface height of concrete in concrete form shall have same height in a block, and the height of placed concrete layer shall be less than 40 (fourty) cm in each placing.

7.9.3 The Contractor shall place concrete continuously into a block of structure such as wall, slab and so on.

7.9.4 In case the new concrete is placed on solid concrete, the Contractor shall take out laitance, loose aggregate, low quality concrete on the surface of solid concrete.

7.10 Compaction of concrete

After placing concrete, the Contractor shall compact concrete by using immersion type vibrator. Should the Contractor intends to use another type of vibrator, the Contractor shall obtain the prior permission of the Inspection Committee.

7.11 Curing

The Contractor shall cure concrete completely with water. If the Contractor intends to use curing chemical, the Contractor shall obtain the prior permission of the Inspection Committee.

Article 8. Reinforcement

8.1 Material

Reinforcement which is used in reinforce concrete Works shall be round bar or deformed bar in accordance with ASTM designation A-7-55 and A-141-55 or JIS G 3112, also it shall be good quality and never using before.

8.2 Shaping steel bar

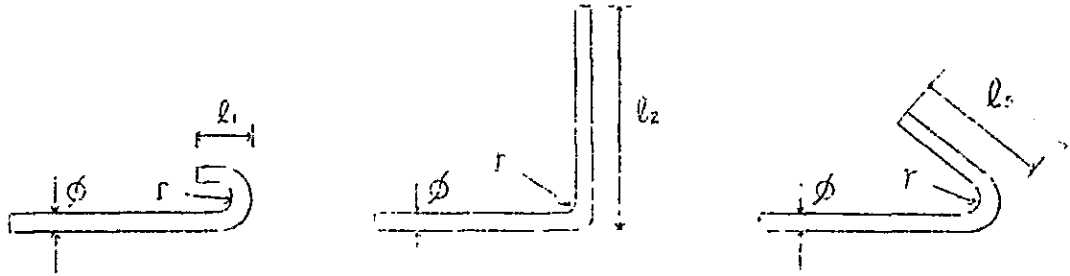
8.2.1 The Contractor shall make shape of steel bar in accordance with the drawings without heat. Should the Contractor heat material to make shape, the Contractor shall obtain the prior permission of the Inspection Committee.

8.2.2 The Contractor shall shape steel bar before assembling it and in case steel bar is bent for making hook and corner, the Contractor shall bend as follow:

l , shall be longer than 6 cm and 4ϕ (round and deform bar).

l , shall be longer than 12ϕ (deform bar).

l , shall be longer than 6 cm and 6ϕ (deform bar).



where ϕ : diameter of steel bar
 r : bent radio of steel bar

8.3 Assembling steel bar

8.3.1 Steel bar shall be connected in order not to move by wire not less than 2 rounds.

8.3.2 In case the Contractor set steel bar, it shall be supported by spacer that is made from mortar and its specification is as follow:

Ratio Cement : sand = 1 : 1

Thickness 1) in case bottom of structure, thickness is not less than 8 (eight) cm from ground surface to the steel bar.
 2) in case side of structure, thickness is not 5 (five) cm from concrete surface to steel bar.

8.4 Overlapping steel bar

In case that two straight steel bars are connected, the Contractor shall use wire for connection and bind the steel bars at several places,

especially in case tensile stress functions on steel bars, two steel bars shall overlap each other as follow:

$$l = \frac{\sigma_{sa}}{4 \tau_{oa}} \phi$$

When l = length of overlapping

σ_{sa} = tensile strength of steel bar

τ_{oa} = cohesive strength between concrete and steel bar

ϕ = diameter of steel bar

Article 9. Culvert for Access Road

- 9.1 The Contractor shall use reinforced concrete pipes according to ASTM grade No. 3 as the culvert materials which have no defects and no cracks and are never used before.
- 9.2 Sand bed shall be compacted completely enough not to settle ununiformly, especially the concentrated load shall not occur at the joint of concrete piles.
- 9.3 Before the Contractor set up the ladder type wooden foundation which shall be made by pine tree or equivalent, it shall be inspected by the Inspection Committee.
- 9.4 The Contractor shall not use the heavy equipment for backfilling and compaction of earth until 60 (sixty) cm above top of concrete pipe and may use handy compactor, rammer and so on for the compaction.

The compaction of earth between and above pipes shall not be less than 90 (ninety) percent of maximum dry density.
- 9.5 In case the Contractor intend to make coffer dam, the Contractor shall follow the Inspection Committee's indication on borrow pit, construction method and so on.

The borrow pit for coffer dam shall be located in the job site.

Article 10. Small Facility

- 10.1 The Contractor shall use the reinforced concrete pipes according to ASTM grade No. 3 for the small facility which have no defects, no cracks and are never used before.
- 10.2 The Contractor shall not use heavy equipment for backfilling and compaction of earth. The compaction of earth between and above pipes shall be less than 90 (ninety) percent of maximum dry density.
- 10.3 The Contractor shall use crushed stone about 20 (twenty) cm in diameter and use the plain concrete as specified in this Technical Specification section 7 for masonry works.
- 10.4 The Contractor shall provide wooden board for each control weir and inlet.

Article 11. Secondary Pumping Station

- 11.1 The Contractor shall use prestressed concrete piles for pile foundation, however, should the Contractor intend to make reinforced concrete piles at the job site, the Contractor shall submit the drawings for pile and other data that is designed by the Contractor to the Inspection Committee and shall obtain the prior approval of the Inspection Committee.
- 11.2 At driving the first pile, the Contractor shall test for the bearing strength of pile in accordance with the indication of the Inspection Committee. Should the bearing strength of pile have not enough, the Contractor shall follow the decision by the Inspection Committee such as extension of pile length, to drive the additional piles and so on.
- 11.3 At driving pile, the Contractor shall protect head of pile by using iron cap. In case the pile reaches to the hard layer and the Contractor intend to stop driving, the Contractor shall inform and obtain the approval from the Inspection Committee.
- 11.4 The number of piles that the Contractor haul to the job site shall be determined after the negotiation with the Inspection Committee because

the number, size and length of piles may be revised in accordance with the result of driving test.

- 11.5 The Contractor shall install the complete pumping unit and shall provide miscellaneous materials except facilities as shown in the Terms and Condition of this Contract section 4.

Guideline for Construction Control


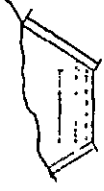
1. Objective

During the course of construction, the Contractor shall implement the Works according to the Technical Specifications, drawings and so on, however, it is very difficult to control the quality and dimensions exactly from the technical point of view. So the Inspection Committee determines the range of allowable error, and the Contractor shall control quality and dimensions within this range of allowable error.

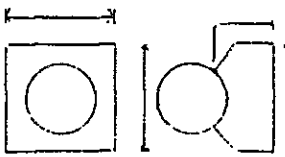

2. Method

For the dimensions of the Works such as length, width thickness of the facility, the Contractor shall measure them at the completion of the Works, write the dimensions on the drawings by red ink and submit them to the Inspection Committee. Should the dimensions of the facility are out of the range of allowable error, the Contractor shall rebuild for correct dimensions. For the quality control such as slump test, field density of compacted earth and so on, the Contractor shall obtain the data during course of construction and submit them to the Inspection Committee. The Contractor shall not use the material of not good quality out of the range of allowable error.

1. Guideline of dimension control (1)

Description	Item	Range of Allowable Error (mm)	Guideline				Remarks
			Measurement Section	*By Result Table	Written on the Drawing with Red Ink.	By Control Graph	
Earth work	Elevation	±50	One section every 60m length		Actual dimensions shall be written on the drawings.		
	Width B, B ₁ , B ₂	±100					
	Slope Length	ℓ < 5m	Bank -100				
		ℓ ≥ 5m	Cut -200				
Concrete foundation	Elevation	±30	One section every 40m length in case the length of a block is not more than 40m, 2 section a block.	Elevation, width, height, length shall be written in a table.	Actual dimensions shall be written on the drawings.		
	Width	-30					
	Height	-30					
	Length	-200					

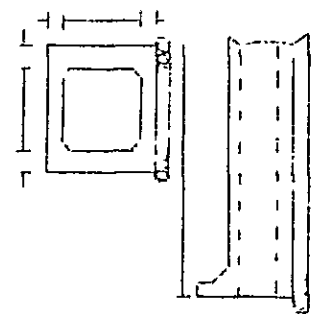
Guideline of dimension control (2)

Description	Item	Range of Allowable Error (mm)	Guideline			By Control Graph	Remarks	
			Measurement Section	*By Result Table	Written on the Drawing with Red Ink.			
Concrete pipe Culvert	Elevation	±30	2 section a block in case the length of a block is not less than 40m one section every 40m.	Elevation, width, height, length shall be written in a table.	Actual dimensions shall be written on the drawings.			
	Width a	-50						
	Height h	-30						
	Length L	-200						
Masonry Work, Concrete block Work	Elevation	±50	One section every 40m length in case the length of a block is not more than 40m, 2 section a block.	Elevation, thickness and length shall be written in a table.	<p>1) Actual dimensions shall be written on drawings.</p> <p>2) Indicate the measured sections and dimensions.</p>			
	Slope Length	$l < 3m$						-50
		$l \geq 3m$						-100
	Thickness t_1							-50
	Length L							-200

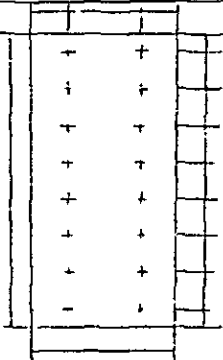
Guideline of dimension control (3)

Description	Item	Range of Allowable Error (mm)	Guideline				Remarks
			Measurement Section	*By Result Table	Written on the Drawing with Red Ink.	By Control Graph	
Retaining wall	Elevation	±50	One section every 40m length in case the length of a block is not more than 40m, 2 section a block.	Elevations, width, height, thickness and length are written in a table.	Actual dimensions shall be written on drawings.		
	Width a ₁ , a ₂	-30					
		Height h					-50
							-100
	Wall thickness	-20					
	Length L	-200					
Foundation Pile	Elevation	±50	Elevation, eccentric error, settlement by final driving for all piles.	Settlement by final driving.	Actual elevation and eccentric error shall be written on drawings.		
	Eccentric error	Less than the diameter of pipe.					
	Settlement by final driving.						

Guideline of dimension control (4)

Description	Item	Range of Allowable Error (mm)	Guideline				Remarks
			Measurement Section	*By Result Table	Written on the Drawing with Red Ink.	By Control Graph	
Siphon Culvert Flume	Error of center line in straight	50	One section every 50m length, in case the length is not more than 50m 2 section a block.	In case actual dimension can not be written on drawings, a table shall be made.	Actual dimensions shall be written on drawings.		
	Error of center line in curve	100					
	Elevation	±30					
	Thickness of member	-20					
	Inner dimension	-30					
Check Waste way Spill way	Error of center line in straight	50	Every place where the dimensions are indicated on designed drawings.	In case actual dimensions can not be written on the drawing, a table shall be made.	Actual dimensions shall be written on drawings.		
	Error of center line in curve	100					
	Elevation	±30					
Drop							

Guideline of dimension control (5)

Description	Item	Range of Allowable Error (mm)	Guideline				Remarks
			Measurement Section	*By Result Table	Written on the Drawing with Red Ink.	By Control Graph	
Intake	Elevation	±5					
	Thickness of member	-20					
	Dimension of inside	-30					
Land Levelling	Elevation	100 More than 75% of total points shall be in the range of 75mm.	Elevation at 14 point shall be measured in standard plot as specified in this remarks.		Actual elevations are written on the drawing which will be made by the Contractor at scale of 1:1,000.		
			*Table contains design dimension, actual dimension and difference between them.				

2. Guideline for quality control

Description	Work	Item	Test Item	Guideline	Remarks
Embankment	Road and dike	Road bed Embankment	Field density of compacted soil (road work). Field density of compacted soil (dike work).	The probability that the field density of compacted soil does not reach at 85% of maximum dry density, shall not be more than 10%. The probability that the field density of compacted soil does not reach at 80% of maximum dry density, shall not be more than 10%.	90% of maximum dry density for lining canal.
Concrete	Concrete Structure		Compressive strength (plain and reinforced concrete).	Designed strength is specified on the Technical Specifications. Probability that the strength of test piece does not reach at 80% of the designed strength, shall not more than 5% and probability that the strength of test piece does not reach to the designed strength shall not be more than 25%.	
Foundation	Concrete pile		Dimension of piles.	The range of allowable error of length shall be 0.3% of pile length, and the range of allowable error of diameter shall be - 2mm to 5mm.	

3. Standard test

1) Concrete

Description	Testing Item	Method	Guideline		Remarks
			Method	Guideline for Testing	
Material	1. Specific gravity test for aggregate.	JIS A 1109 JIS A 1110		The Contractor shall test once for each 300m ³ required volume. If the Contractor use if from different sources, the Contractor shall test once for each sources.	
	2. Absorption test for aggregate.	JIS A 1109 JIS A 1110		If necessary, the Inspection Committee will indicate.	
	3. Grading test for aggregate.	JIS A 1102		The Contractor shall test once for each 300m ³ required volume of fine aggregate, 50m ³ required volume of coarse aggregate. If the Contractor use it from different source, the Contractor shall test once for each source.	
	4. Physical test for cement.	JIS R 5201			
	5. Chemical test for cement.	JIS R 5202		If necessary, the Inspection Committee will indicate.	
	6. Abrasion test for coarse aggregate.	JIS A 1120 JIS A 1121			
	7. Harmful material test for aggregate.	JIS A 1126		If necessary, the Inspection Committee will indicate.	

Description	Testing Item	Method	Guideline		Remarks
			Method	Guideline for Testing	
Concrete work	1. Slump test.	JIS A 1101	It is shown in the Technical Specifications. If necessary, the Inspection Committee will indicate. The Inspection Committee will indicate number, time, batch and so on for making test pieces.		
	2. Surface water content test for aggregate.	JIS A 1111			
	3. Air entrained test.	JIS A 1116			
		JIS A 1117			
		JIS A 1118			
	4. Compressive strength of concrete.	JIS A 1108			
	5. Bending strength of concrete.	JIS A 1106			

2) Embankment

Description	Testing Item	Guideline		Remarks
		Method	Guideline for Testing	
Material	1. Specific gravity test.	JIS A 1202	The Contractor shall take samples each 5,000m ³ required volume and test in principle, if the Contractor use it from different source, the Contractor shall take samples and test once for each different source.	The Contractor shall take at least 3 samples for a point.
	2. Grading test.	JIS A 1204		
	3. Liquid limit test.	JIS A 1205		
	4. Plastic limit test.	JIS A 1206		
	5. Compaction test.	JIS A 1210 ASTM D 698-66 T		
Embankment	1. Water content test.	JIS A 1203	According to the day working schedule, the Contractor shall take at least 3 samples in the expected job area on that day, in the morning and in the afternoon and test the soil.	The workable range of water content will be shown by the Inspection Committee.
	2. Field density test.	JIS A 1214	In case of road, the Contractor shall test field density at center and both edges of each layer of road every 50m length. In case of plot boarder and dike, the Contractor shall test field density at center of them every 100m length. If the length is not more than 100m, the Contractor shall test field density twice for each structure.	

บริษัท บางกอก แอโรคร สตีล จำกัด

คำนำเสนองาน
ที่ ๒๒๖/๒๕๒๓
บริษัท บางกอก แอโรคร สตีล จำกัด

บริษัทจำกัด

281/2519

2519

- กรรมการ 1. นายสมพงษ์ นิกการภา 2. นายวิษณุ อิมวิบูลย์ 3. นางสาวพูนมาศ ไกรเลิศ
4. นายทอง อิมะถานนท์ 5. นายจันท อิมะถานนท์ 6. นายอักษะ ทองวานิช
7. นายราเนอร์ อิมะถานนท์ 8. นางสาวเพ็ญประภา นรานนทิกัตติกุล 9. นายแสวง ไชยศิริ/

กรรมการผู้ชำนาญการ ชื่อแทนบริษัทคือ นายสมพงษ์ นิกการภา หรือ
นางสาวพูนมาศ ไกรเลิศ หรือ นางสาวเพ็ญประภา นรานนทิกัตติกุล หรือ นายแสวง ไชยศิริ
คนหนึ่ง ลงชื่อลงลายมือชื่อร่วมกับ นายวิษณุ อิมวิบูลย์ หรือ นายทอง อิมะถานนท์ หรือ นายจันท อิมะถานนท์
หรือ นายอักษะ ทองวานิช หรือ นายราเนอร์ อิมะถานนท์ รวมเป็นสองคนและประทับตราสำคัญของบริษัท/
นายทะเบียน สืบลาเนนท/

สำนักงานแห่งใหม่ตั้งอยู่เลขที่ 92 อาคาร เค. ถนนวิภาวดีรังสิต แขวงทรายกองดิน
เขตทรายกองดิน กรุงเทพมหานคร/

วัตถุประสงค์ ตามหนังสือบริคณห์สนธิ ข้อ 3 (1)(4)(11) ว่า "(1) ทำการจำหน่ายสินค้า
รถยนต์ เครื่องจักร เครื่องยนต์ เครื่องมือเครื่องใช้ในการอุตสาหกรรมและกลกรรม เครื่องมือช่าง
อุตสาหกรรม เครื่องมือเครื่องอุปโภคบริโภค เครื่องเล่นวิทยุ เครื่องเล่นเสียง เครื่องเล่นโทรทัศน์
เครื่องใช้ไฟฟ้า เครื่องใช้อิเล็กทรอนิกส์ เครื่องทำความเย็น เครื่องปรับอากาศ วิทยุ โทรทัศน์ เครื่องดนตรี รวมทั้ง
เครื่องอุปโภคบริโภคและอะไหล่ของสินค้าดังกล่าว ตลอดจนทำการสั่งซื้อสินค้าเข้ามาจำหน่ายในประเทศและ
หรือส่งสินค้าออกนอกประเทศ เพื่อจำหน่ายสิ่งดังกล่าวดังกล่าว (2) ประกอบกิจการค้าขาย
แร่ ขาง น้ำมัน น้ำตาล ไม้ และพืชต่าง ๆ รวมทั้งการนำเข้าและส่งออกนอกประเทศ เพื่อจำหน่าย
(4) ทำการเช่า โถงเช่า จำนวน โถงเช่า อื่นๆ สิ้นค้าตามวัตถุประสงค์ของบริษัท และในกรณีที่เงิน
จ้างแรงงาน ค่าประกันสินค้า ค่าประกันเชื้อเพลิงในกิจการลงบริษัท และทำการเป็นนายหน้า
ตัวแทนในการก่อสร้าง (11) ทำการรับเหมาก่อสร้าง และงานโยธาทุกชนิด รับปรึกษา
งานก่อสร้าง ออกแบบแปลนและคำนวณงานก่อสร้าง รวมทั้งจำหน่ายเครื่องอุปโภคบริโภคก่อสร้างทุกชนิด"

ออกได้ ณ วันที่ มกราคม 2525

ถึงทางจวน/ท /ท นายทะเบียน
3/ พ.ค. 2523

Bangkok Motor Equipment Co., Ltd.

281/1976

March 17, 1976

Committee

1. Mr. Sompong Fukkarnka
2. Mr. Wissanu Limbiboon
3. Miss Patummat Krailertboon
4. Mr. Pong Lummakanonth
5. Mr. Jin Lummakanonth
6. Mr. Amphun Thongvanish
7. Mr. Ramate Lummakanonth
8. Miss Penprapha Naranonkitikul
9. Mr. Sawang Somsiri

Committee who can sign on behalf of the Company

Mr. Sompong Fukkarnka or Miss Patummat Krailertboon or Miss Penprapha Naranonkitikul or Mr. Sawang Somsiri, one of the above mentioned names sign together with Mr. Wissanu Limviboon or Mr. Pong Lummakanonth or Mr. Amphun Thongvanish or Mr. Ramate Lummakanonth to be included to 2 persons and stamped with the seal of the Company.

Registered budget 10 million Baht

Object

As specified in prospectus of the company, item No. 3 (1), (2), (4), (11), that

- (1) Distribute the merchandises which are machiner, engine, industrial and agricultural equipment, military instruments, military wares, toilet equipments, consumer goods, furnitures, cosmetics, electric appliances, electronic instruments, air-condition, radio, television, musical instruments including accessories and spare parts of those merchandises, and also import and export the above-mention.
- (2) To deal in rice, mineral, rubber, fuel, sugar, wood and plants including import and export.
- (4) To hire, rent, pawn, mortgage, hire-purchase any goods according to the object of the Company. Raise and lend loan for labour employment,

guarantee for loan and for benefit of the Company and to be broker for the above mentioned business.

- (11) To make contract for construction and all kind of civil works. To be the consultant for the construction, design and estimate the construction including distribute all kind of construction equipments.

This copy dated in January, 1980

ACME



CABLE "ACMECON" BANGKOK 72269 ACME TH
156/20-21 PHETCHBURI RD. PHAYATHAI BANGKOK THAILAND. TELEX 2269 SIAMELEC TH
156/20-21 ถนนเพชรบุรี เขตพญาไท กรุงเทพมหานคร 282-3130-5

OUR REF. 2522/SA.....

BANGKOK Feb. 29, 1980.....

TO WHOM IT MAY CONCERN

MR. PRAPAN CHATANAANAN, IS AUTHORISED TO ACT ON BEHALF OF
ACME CO., LTD. IN WELL-DRILLING WORK. HIS SIGNATURE IS AS BELOW


PRAPAN CHATANAANAN


TH. CHARNCHAI

MANAGING DIRECTOR
ACME CO., LTD.

SOMSAK VESARACHVIT

WITNESS

Contractor's Proposal

To

Construction of Date

Estimation Price and Completion Time

The undersigned proposer, having carefully examined in their entirety the Contract Documents in broad sense for this construction works, hereby offers and proposes to implement the Works in accordance with the Contract Documents in broad sense by this estimation price and within the completion time.

Completion Time

Instructions and Conditions of Proposal

1. The proposer shall investigate topography of the site and shall calculate the quantities from the drawings and details furnished. In the event that the Bill of Quantities calculated by the proposer should differ substantially from those of the JICA, the Inspection Committee will ask the proposer to make clarification and shall negotiate the price with the proposer. But if the clarification made by the proposer is not acceptable, the JICA has the right to reject the proposer.
2. After award of contract, the quantity of work as shown in the Bill of Quantities prepared by the proposer shall be used as guidance for the purpose of making payment for each item of works. If the actual work executed by the proposer are larger or smaller than the agreed quantities, the JICA shall have the right to revise the total price.
3. The price quoted under each item shall include materials, labours, supervision, profit and other costs.
4. The price quoted under each item will be verified for arithmetical accuracy. In case of arithmetical errors are found, the unit prices shall be considered as correct.
5. The proposer offering lowest estimation price need not be awarded the Contract by the JICA.

Bill of Quantities

Bid No. _____

Items	Description	Unit	Quantity	Unit Price		Total		Remarks
				Baht	Stg.	Baht	Stg.	
1.	Land clearing	ha	81.31					
2.	Road with irrigation ditch CR-1 (Community Road)	m.	334.0					
	CR-2 (")	m.	187.4					
	CR-3 (")	m.	160.0					
	CR-4 (")	m.	823.4					
	Farm Road (Sub-Total)	m.	2,509.0 (4,013.8)					
3.	Drainage ditch Leading ditch	m.	823.4					
	Drainage ditch (Sub-Total)	m.	2,513.8 (3,337.2)					
4.	Land levelling	ha	81.31					
5.	Access road		(L.S.)					
6.	Secondary Pumping Station		(L.S.)					

Items	Description	Unit	Quantity	Unit Price		Total	Remarks
				Baht Stg.	Baht Stg.		
7.	Small Facilities						
	7.1 Turn out (Type I)	piece	1				
	7.2 " " (Type II)	"	1				
	7.3 Irrigation culvert (Type I)	"	2				
	7.4 " " (Type II)	"	2				
	7.5 Drainage culvert (Type I)	"	2				
	7.6 " " (Type II)	"	2				
	7.7 Control weir	"	8				
	7.8 Inlet (Type I)	"	26				
	7.9 " (Type II)	"	25				
	7.10 Tractor Path	"	28				
	7.11 Outlet (Type I)	"	25				
	7.12 " (Type II)	"	74				
	(Sub-Total)						
8.	Laterite Paving	m ²	4,513				
9.	Transportation						
	(Total)						

Total Price Quoted

Baht

Signature

Proposer

(_____)



ธนาคารกสิกรไทย THAI FARMERS BANK

THAI FARMERS BIL. 140000๕๖๖๐๖๓๕๖



สัญญาค้ำประกันของธนาคาร

เลขที่ 23-42-0004-6

วันที่ 14 เดือน มีนาคม พ.ศ. 2523

ข้าพเจ้า ธนาคารกสิกรไทย สาขา นครปฐม สำนักงานเลขที่ 124/8 ถนนราชวิถี ตำบลพระปฐมเจดีย์ อำเภอเมืองนครปฐม จังหวัดนครปฐม ขอทำหนังสือสัญญาค้ำประกันไว้ให้คือ JICA Bangkok office มีข้อความต่อไปนี้:-

ข้อ 1. ตามที่ P.S.U. Construction Co., Ltd. ได้ทำสัญญา Land Consolidation at Ladbualueang

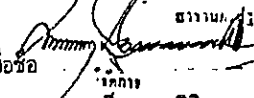
ลงวันที่ 14 เดือน มีนาคม พ.ศ. 2523 กับ JICA Bangkok office ซึ่ง P.S.U. Construction Co., Ltd. จะต้องวางเงินสดไว้เป็นหลักประกันการปฏิบัติ ตามสัญญาไว้คือ JICA Bangkok office เป็นเงิน -140,000.- บาท (-หนึ่งแสนสี่หมื่นบาทถ้วน-) นั้น

ข้าพเจ้าขอผูกพันตนเป็นผู้ค้ำประกัน P.S.U. Construction Co., Ltd. ต่อ JICA Bangkok office เป็นเงินไม่เกิน -140,000.- บาท (-หนึ่งแสนสี่หมื่นบาทถ้วน-) กล่าวคือหาก P.S.U. Construction Co., Ltd. ไม่ปฏิบัติตามสัญญาที่ทำไว้กับ JICA Bangkok office หรือปฏิบัติผิดสัญญาข้อใดข้อหนึ่งของสัญญาดังกล่าว ซึ่ง JICA Bangkok office มีสิทธิเรียกค่าปรับ และหรือค่าเสียหายใดๆ จาก P.S.U. Construction Co., Ltd. ได้แล้ว ข้าพเจ้ายอมชำระเงินแทนให้ทันที โดยไม่ต้องเรียกร้องให้ P.S.U. Construction Co., Ltd. ชำระก่อน


ข้อ 2. ข้าพเจ้ายอมรับและยินยอมด้วยในกรณีที่ JICA Bangkok office ได้ยินยอมให้ผิดหรือผ่อนเวลา หรือผ่อนผันการปฏิบัติตามสัญญาให้แก่ P.S.U. Construction Co., Ltd. โดยเพียงแต่ JICA Bangkok office แจ้งให้ข้าพเจ้าทราบโดยไม่ชักช้าเท่านั้น

ข้อ 3. ข้าพเจ้าจะไม่เพิกถอนการค้ำประกันในระหว่างเวลาที่ P.S.U. Construction Co., Ltd. ต้องรับผิดชอบอยู่ตามสัญญา


เพื่อเป็นหลักฐาน ข้าพเจ้า ธนาคารกสิกรไทย สาขา นครปฐม โดยผู้มีนามข้างท้ายนี้เป็นผู้มีอำนาจลงนามทำนิติกรรมแทนธนาคารได้ ได้ลงลายมือชื่อและประทับตราของธนาคารไว้เป็นสำคัญ.

ลงลายมือชื่อ  ผู้อำนวยการ

นายมนตรี คุณผลศิริ (นายภาคกร กันตอุทัย) ผู้ค้ำประกัน

ลงลายมือชื่อ  พยาน

(นายบำรุง ภูศิลากร)

ลงลายมือชื่อ  พยาน

(นายนครคนทอง ปานเกตุ)

เมื่อหนังสือค้ำประกันฉบับนี้หมดอายุบังคับ หรือจนผลการผูกพันแล้วโปรดส่งคืนธนาคาร

การติดต่อเกี่ยวกับหนังสือค้ำประกันฉบับนี้ โปรดอ้างเลขที่ร่างบันทึกข้อตกลง

Bank Guarantee

No. 23-42-0004-6

March 14, 1980

I, Thai Farmers Bank, at Changwat Nakornphatom, located at 124/8, Rajvitee Road, Tambol Phapathomjedi, Amphoe Muang, Changwat Nakornphatom, would like to submit this Bank Guarantee to JICA, Bangkok Office.

Details are as follows:

Item 1. According that P.S.U. Construction Co., Ltd. had signed the contract, for Land Consolidation at Lad Bua Luang which dated on March 14, 1980, to JICA Bangkok Office which P.S.U. has to guarantee by cash that he will adhere to the contract to JICA Bangkok Office and the amount is 140,000 ฿ (One hundred fourty thousand Baht).

I admit to guarantee for P.S.U. Construction Co., Ltd. to JICA Bangkok Office in the amount which is not more than 140,000 ฿ (One hundred fourty thousand Baht). If P.S.U. Construction Co., Ltd. do not adhere to the contract which was signed to JICA Bangkok Office or doing anything wrong with any item of that contract, when JICA Bangkok Office has the right to claim for penalty or any damage from P.S.U. Construction Co., Ltd., I will pay instead immediately without claim the P.S.U. Construction Co., Ltd. to pay first.

Item 2. I acknowledge and admit in the case that JICA Bangkok Office agree to postpone the period or the operation as specified in the contract for P.S.U. Construction Co., Ltd. Only that JICA Bangkok Office would inform me without being tarry.

Item 3. I will not give up this guaranty for during the time that P.S.U. Construction Co., Ltd. has taken the responsibility as specified in the contract.

For being evident, I, Thai Farmers Bank at Changwat Nakornphatom, by the names below who have the authority to make the legal act by the name of the Bank, had signed their names and stamped with the seal of the Bank.

(Signature)	Mr. Montri Subphapolsiri	
	Mr. Phasakorn Tunsukchai	Guaranty
	Mr. Bumrun Wutisath	
	Mr. Thassanapong Parnkerddi	Evidence

Pledge Agreement

To Japan International Cooperation
Agency, Bangkok Office

Date March 14, 1980

We P.S.U. Construction Co., Ltd., the Contractor hereby agree that all equipment, materials and supplies brought to the job site under the Construction Contract made with the JICA dated on, 1980, shall be pledged by us with the JICA as security for our execution of Works, and shall not be removed at any time without prior approval of the JICA in writing.

We further agree that should there be any loss or damage to pledged equipment, materials and supplies kept at the job site, the JICA shall bear no responsibility whatsoever for such loss or damage.

(Mr. Somsak Sirasoontorn)
Managing Director,
P.S.U. Construction Co., Ltd.

資料-7

I. Information on the Bidding

1. Introduction

The Bangkok Office of Japan International Cooperation Agency (JICA) in Embassy of Japan at 1674 New Petchuburi Road, Bangkok 10 extends invitation for this Bidding for construction of the Trial Farm at Chao Phya Pilot Project in accordance with following information.

In this documents the Inspection Committee and Sub-Inspection Committee indicate the board commissioned by JICA Bangkok Office which comprises the officers in charge of Agricultural Land Reform Office (ALRO), Ministry of Agriculture and Cooperatives, Government of Thailand and the JICA Bangkok Office, as well as the Japanese experts for the Thai Irrigated Agriculture Development Projects. The construction engineer, at the same time, signifies the chief engineer who is appointed by the Contractor and accepted by JICA Bangkok Office in order to supervise the performance of the Works and to act on behalf of the Contractor as its representative.

2. Preparatory Procedures

Before submitting the Bid Proposal, Bidders are required to;

- 1.1 Verify the Drawings, Specifications and other in informations, as well as the full items in the documents concerned.
- 1.2 Contact officers in charge of ALRO and JICA Bangkok Office for the explanation on location of the job-site, material to be used, transportational conditions, labor conditions, etc.
(in the official hours)

3. Necessary Documents and Bid Bond

A Bidder is required to submit the followings;

- 2.1 Data on the binding
- 2.2 Three copies of filled up Bid Letters
- 2.3 One copy of filled up Bill of Quantities
- 2.4 Construction schedule
- 2.5 Equipment schedule

2.6 Record of construction engineer

2.7 Bid Bond

2.8 Other necessary evidences

4. Bid Proposal

A Bidder is required to submit the above mentioned documents and evidences to the Inspection Committee of JICA Bangkok Office, together with Bid Bond by the time designated by JICA Bangkok Office.

Date

Time

Place

5. Witness

A Bidder is required to be a witness at the time of opening of the Bid.

II. Rights of JICA Bangkok Office

1. Right to accept the Bid Proposal

The Inspection Committee is entitled to accept the Bid Proposal consisting of the bid documents and Bid Bond.

2. Right to open the Bid

The Inspection Committee is entitled to open the Bid upon receipt of the Proposal. The result of the Bidding will be released upon request of a Bidder.

3. Right to consider the Bid

The Inspection Committee reserves the rights to:

3.1 Consider the proposed price based on the Bill of Quantities, and

3.2 Reject a Bid Proposal, in the event;

3.2.1 That the designated forms for the Bid proposal are not used

3.2.2 That the Bid Proposal documents are not complete

3.2.3 That the documents are not set with authorized signatures

3.2.4 That a correction in the documents is not proved by the authorized signatures, and

3.2.5 That the Bid Bond is less than 5 % of the proposed price

The Inspection Committee reserves the right, as well, to reject the Bid Proposal in the event that

3.3 The original construction design is changed or modified by a Bidder.

The Inspection Committee informs hereby that

3.4 The Bidder who proposed the lowest price does not always win the Bidding.

4. Result of Bidding

A Bidder who is interested in the result of the Bidding is entitled to ask it from the Inspection Committee in the office hours.

5. The Price to Consider

The Inspection Committee is obliged to consider one and only price proposed by each Bidder at the time of Bidding. Other prices proposed in any other occasions will not be considered in any way.

6. Refund of the Bid Bond

After conclusion of the contract the Bid Bond deposited by the Bidders will be refunded to respective Bidders.

7. Conclusion of the Contract

7.1 Before or during the process of conclusion of the contract, the Contractor is required to pay the Performance Bond in cash or submit the Letter of Bank Guarantee issued by a Bank to be approved by JICA Bangkok Office to the Inspection Committee filling up the form provided by the committee.

7.2 Before or during the process of conclusion of the contract, the Contractor is required to submit necessary documents and evidences to the Inspection Committee for the reconfirmation of the Bid Proposal documents.

III. Remarks on the Bidding

1. Invitation to the Negotiation

In the event that the Bill of Quantities calculated by a Bidder, whose price is of interest to the Inspection Committee, differs substantially from the price calculated by the Inspection Committee, the committee will invite such Bidder to the negotiation of price. The committee, however, reserves the right to reject the said Bid. The Bidders, therefore, are informed to prepare such calculation sheets may be used at the negotiation for clarification and adjustment of the calculation. In the event that the negotiations with the invited Bidders turned out unsuccessful, the Inspection Committee will cancel the once conducted Bidding and reserves the right to make a new invitation for a bidding.

2. Payment in Change of Quantities

After contract is awarded to a Contractor, the Bill of Quantities prepared by the said Contractor with the agreement of the Inspection Committee shall be used as a guide for the purpose of making payment based upon each of the items of work only. Even if the actual work executed by the Contractor should be greater or smaller than the agreed quantities of work, the Contractor shall have no right to revise his total price.

3. Price in the Bill of Quantities

The price quoted under each item of the Bill of Quantities shall comprise materials, labors, supervision duties, profit and other costs costs.

4. Priority of the Unit Cost

The price quoted under each item will be verified for arithmetical calculation. In case arithmetical errors are found, the unit price shall be considered as the bases for correction.

5. Suspension of the Work in Wet Season

Due to seasonal condition in Thailand it is expected that the Work should have to be suspended during the wet season.

Under such circumstances, the Inspection Committee shall have the right to suspend the Work until the time when the Committee considers that such a seasonal condition no longer become the hindrance to the Work.

The payment of the cost incurred to the Contractor due to such suspension and resumption of the Work shall be effected by the JICA within the amount stipulated in the item 38 of the Bill of Quantities.

A Bidder is advised, therefore, to quote the price in the said item considering the matter mentioned above.

Bid Letter

Invitation for Bids No.

To: Bangkok Office, Japan International Cooperation Agency

We, juristic person registered under the name of

(1)

Business AddressSoi.....Road.....

Tambon.....Amphoe.....Changwat.....

Tel.:Represented by (2)

Position.....Age.....Nationality.....

who is authorized to act on behalf of the said juristic person as evidenced by the accompanying copy of certificate or who is authorized representative of the said juristic person as evidenced by the accompanying.

Power of attorney No. (3).....dated.....are pleased to submit Bid Proposal to the JICA, as follows:

1. Total price for successful completion of the work under this Invitation for Bids as per Drawings and Specifications is Baht (4)..
.....(.....)
of which the relative Bill of Quantities, Construction Schedule, Equipment Schedule and Record of Construction Engineer, are attached herewith for consideration.
2. As a security of our Bid Proposal, we have provided a bid bond for an amount of Baht (5).....
..... which is attached to this Bid Letter.
3. Completion time within (6).....
.....from.....to.....
4. Our Bid stands (7).....days from the date following our submission of this Bid Letter.

In submitting our Bid Proposal to JICA as mentioned above we have studied and examined the Drawings, Specifications, site conditions and other information at the construction site, and we are fully aware of the obligations, instruction to bidders, contract conditions and the accompanying documents including the rights of JICA as per the criteria stipulated in this Bid Documents, all of which we accept and agree to follow in all respects.

บริษัท เอ็ม. วี. เอส. ก่อสร้าง จำกัด
M.V.S. CONSTRUCTION COMPANY LIMITED.

10-11 ซอยหน้าวัง ถนนเจริญกรุง (ตรงข้ามโรงพยาบาลเดลิมากรุง) กรุงเทพมหานคร

☎ 223515, 223516

June 4, 1979.

Japan International
Cooperation Agency
Bangkok.

Subject: 'Trial Farm'
Specification for Crush Rock & Location
[At Job Site] for Stock piling Crush Rock.

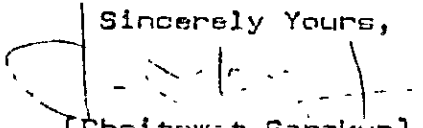
Dear Sir;

Reference is made of your letter date May 28th, 1979. We would like to tell you that, crushed rock is not produced by mixing many types of crushed rock together to achieve the required gradation, but they are produced by inputting the big boulder of rock into the crusher chamber, the output shall pass the screen which the over size aggregate shall be retained on, all of the passing aggregate shall be called crushed rock. The gradation of crushed rock shall be depended on both the texture of the rock and the type of crusher chamber. However, the gradation of crushed rock have always been within the requirement of State Highway Department of Thailand which are as shown on our attached sheets.

For the time being, we would like you to inform us about the exact location for stockpiling crushed rock at the job site. As what we used to discuss before, this location must be very close to the river (or klong) which crushed rock can be transported to be there by 60 cubic Metres Capacity boat, at least.

We are looking forward on your reply.

Sincerely Yours,


[Chaitawat Sarakun]
Chief Engineer

Enclosed: (1) Allowable Gradation of Subbase (A,B,C,D,E,F)

(2) Requirement for Base Course of State Highway Department of Thailand.

บริษัท เอ็ม. วี. เอส. ก่อสร้าง จำกัด
M.V.S. CONSTRUCTION COMPANY LIMITED.

10-11 ซอยหน้าวัง ถนนเจริญกรุง (ตรงข้ามโรงพยาบาลเดลิมากรุง) กรุงเทพมหานคร
☎ 223515, 223516

July 3, 1979.

Japan International
Cooperation Agency
Bangkok .

Subject: Trial Farm
'Stock Piling For Crushed Rocks'

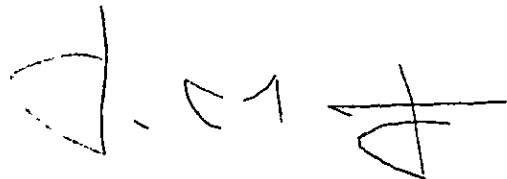
Dear Sir;

We would like to inform you that our first lot of crushed rock was already at job site since the end of last month.

We used to ask for the stock pile which should be very close to the river bank and we also asked for the location which the sixty cubic metres capacity boat would be able to get in there for unloading purpose. However, your specified area for stock piling our first lot crushed rock has been located at the place which the sixty cubic metres capacity boat can not get in there. We had to unloading our crushed rock at other place and hauled them to your specified area.

We would like you to reconsider more about this situation which seem to be unlike what we used to discuss before. We would expect for your kind co-operation for our next lots. Thank you very much.

Yours faithfully,



[Chaitawat Sarakun]
Chief Engineer