

PRELIMINARY SURVEY REPORT

ON

PILOT SCHEME

OF

TADJUM IRRIGATION PROJECT

January 1970

Overseas Technical Cooperation Agency

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FOREWORD

Indonesia has a population of 180 million with more than 70% of its working labour engaged in agriculture to form a gigantic agricultural country. Its agriculture is characterized, however, by the efforts towards self-sustenance in foods, and the absolute shortage of rice yield makes it imperative for the country to resort to import each year. In an effort to bring remedy to the prevailing situation, the Government enforced in April 1969 the Five Year Economic Development Plan under which a number of policies are being implemented with the view to increasing the rice yield by 50% and achieving, in the ultimate, self-sustenance in foods.

The Tadjum Irrigation Project, initiated in 1965 under the direct control of the Government, has been given top priority together with a series of other key irrigation programmes in the national budget of Indonesia. With the financial aid of the Asian Development Bank made available in June 1969, it is now strongly hoped that the Project will be materialized at an early date.

For the successful implementation of the Tadjum Irrigation Project in which a pilot farm is recognized to play an important role, the Government of Indonesia requested the Government of Japan for its technical cooperation in the establishment and management of the Pilot Scheme. Responding to this request, the Government of Japan despatched a five-man Preliminary Survey Mission headed by Dr. H. Fukuda, Professor Emeritus of Tokyo University, to Indonesia for a period of about one month from October 4, 1969. The mission engaged in the field survey to formulate a workable plan for the Pilot Scheme.

The Tadjum Irrigation Project which embraces the Pilot Scheme covers an area of 3,600 ha and is expected to be completed in 1971. The project aims at pushing forward the agricultural development as from 1971 when the irrigation water becomes available through provision of instructions and guidances in water management and modern farming techniques. The Project may be regarded as a unique and significant venture in that it represents the joint cooperation of the Asian Development Bank which offers the financial support and the Government of Japan which extends the technical assistances.

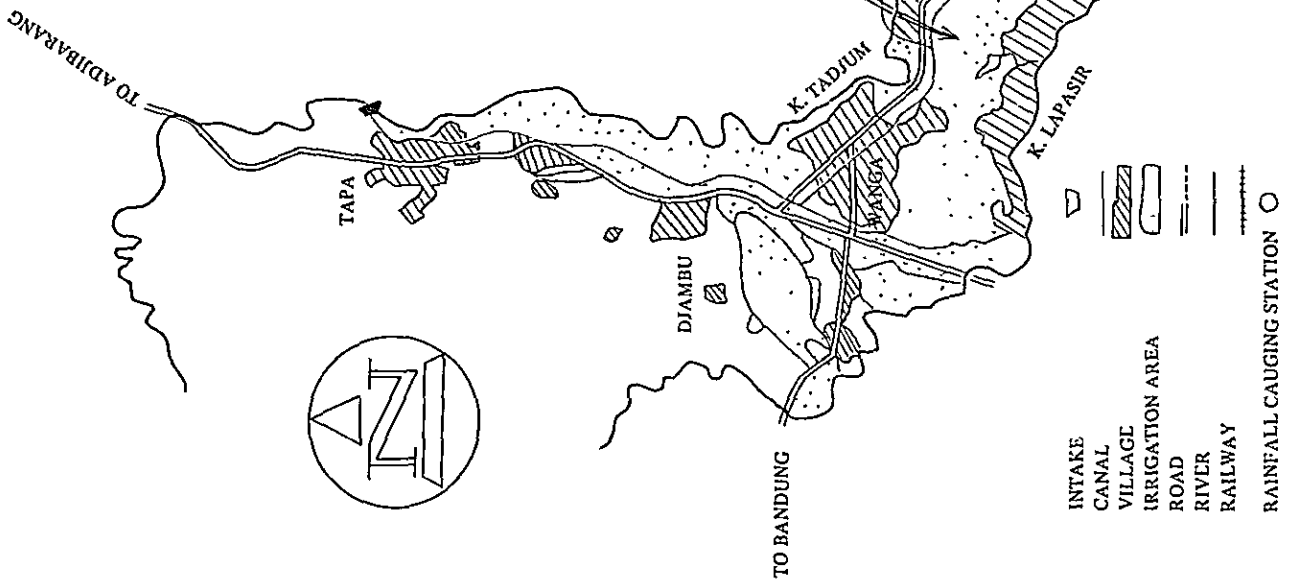
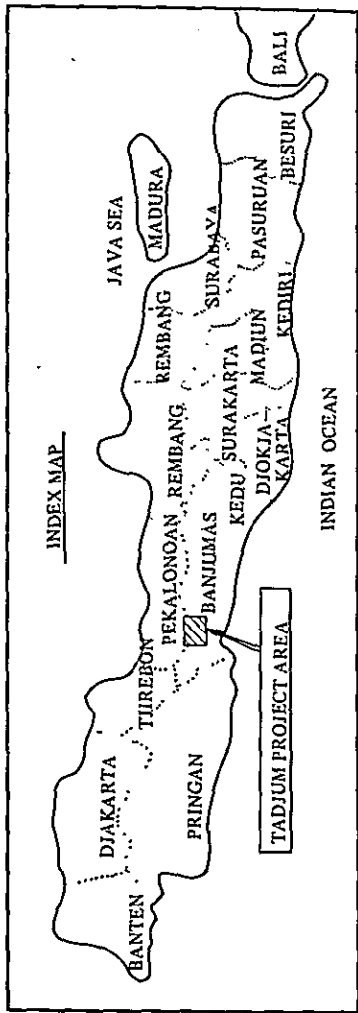
It is sincerely hoped that this report, which gives a summary of Japan's cooperation in the establishment and management of the Pilot Scheme as clarified by the Mission's findings during the field survey, will be of some help to the Government of Indonesia in its endeavours towards increased rice yield, and will at once contribute to strengthening the friendly relations and economic cooperation between the two countries.

I am deeply indebted to Mr. Sujono, Directorate-General of Water Resources Development, and other officials of the Indonesian Ministry of Agriculture, and to the Japanese Embassy in Djakarta for their valuable cooperation extended to the Mission. Acknowledgement is made with gratitude to the arrangements made by the Ministry of Foreign Affairs and the Ministry of Agriculture and Forestry of the Government of Japan for the despatch of the Mission. My appreciation also goes to the Mission members whose laborious work has made the survey successful as scheduled.

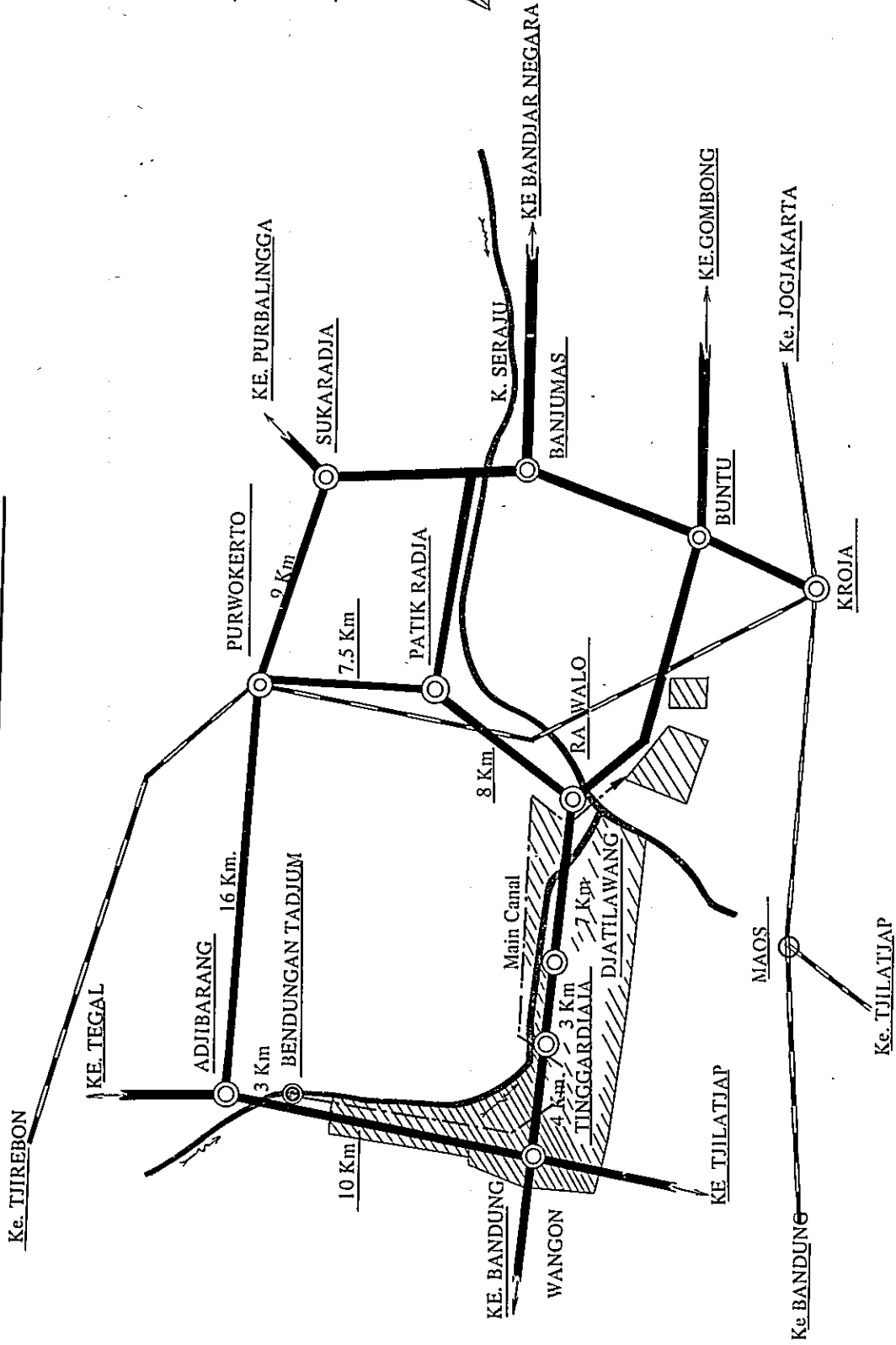


Keiichi Tatsuke
Director General
Overseas Technical Cooperation
Agency

January 1970



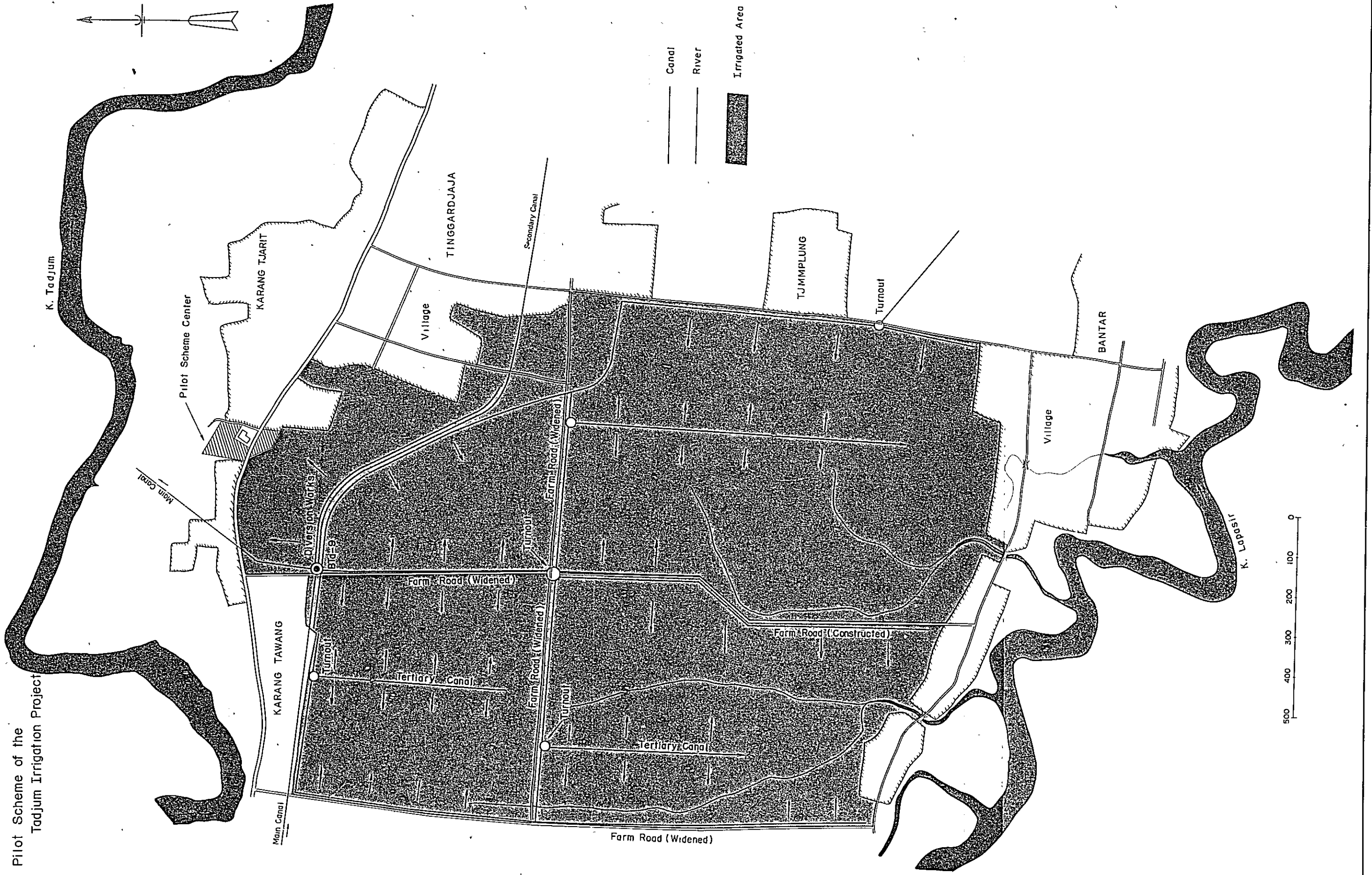
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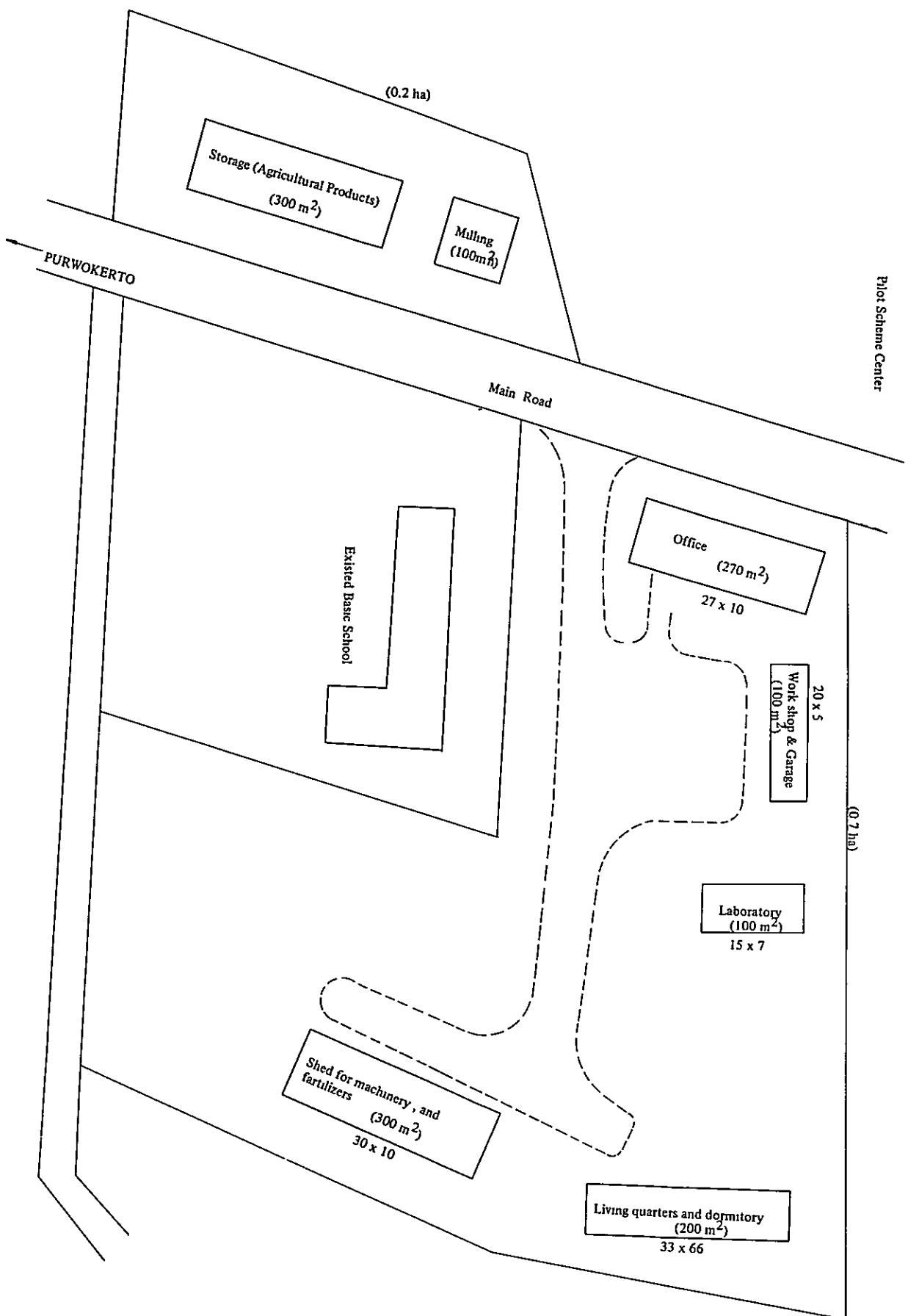
KETERANGAN

- Kota
- == Djalan Raja
- Djalan kereta api
- - - Saluran Induk
- ▬ Sungai
- ⊙ Bendungan
- ▨ Irrigated Area

Pilot Scheme of the
Tadjum Irrigation Project



500 400 300 200 100 0



Pilot Scheme Center

PURWOKERTO

Main Road

(0.2 ha)

(0.7 ha)

Storage (Agricultural Products)
(300 m²)

Milling
(100 m²)

Existed Basic School

Office
(270 m²)
27 x 10

Work shop & Garage
(100 m²)
20 x 5

Laboratory
(100 m²)
15 x 7

Shed for machinery, and
fertilizers
(300 m²)
30 x 10

Living quarters and dormitory
(200 m²)
33 x 66

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General Understanding Among Japanese and
Indonesian Government and ADB on the Tadjum Pilot
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Chapter I - INTRODUCTION

1-1 Background of the Pilot Scheme

The Government of Indonesia commenced the construction of the Tadjum Irrigation Project in the Regency of Banjumas, Central Java, in August 1965. In 1968, the Government requested the Asian Development Bank (here after referred to as "ADB") for its financial support to the Project. The request was approved at the meeting of directors of ADB held in June 1969 subsequent upon the ADB's field survey conducted during the October-November period in 1968.

Following the ADB's approval, the Government of Indonesia requested Japan's cooperation in the establishment of a pilot scheme which would form a part of the Tadjum Irrigation Project. Acceding to this request, the Government of Japan despatched a Preliminary Survey Mission to Indonesia, which was welcomed by ADB.

Indonesia today must resort to import for the supply of 0.5 - 1 million tons of rice each year to cover the shortage of its rice production. Dependence on the overseas supply of rice is a sheer necessity for the country since its rice production during the period from 1953 to 1967 registered an annual increase rate of as small as 0.25% in Java Is. which is inhabited by more than 70% of the total population.

In an attempt to save the situation, the Government inaugurated the BIMAS Programme in 1963 under which strenuous efforts have been exerted in the group guidance designed for the attainment of self-sustenance in foods particularly in Java Is. Further, the Five Year Economic Development Plan (FY 1969 - 1973) was put in practice in April 1969 with the view to increasing the rice yield by 50% and achieving, in the ultimate, complete self-sustenance in foods. The Plan accordingly gives the top priority to the agricultural development, and inter alia, to the increased rice yield through construction of irrigation facilities.

The Tadjum Irrigation Project covers an area of 3,600 ha, and is incorporated in the Five Year Economic Development Plan as one of its special programmes. The Project is expected to play an important role in the country's endeavours towards increased food production. While its execution is under the direct control of the Directorate-General of Water Resources Development, Ministry of Public Works and Electricity, the consulting services are being provided by ADB through Sanyu Consultants International Inc. which has been engaged in the field survey since September 1969 to formulate a detailed design.

1-2 Scope of Preliminary Survey

Construction of the Tadjum Irrigation Project is expected to be completed in the latter half of 1971. Japan's cooperation, as agreed upon between the two countries, is to extend technical assistances required for the establishment and management of the Pilot Scheme prior to the completion of the Project within the framework of the agricultural cooperation programme of the Government of Japan. The Pilot Scheme is envisaged to present itself as a model case of improved farming which would serve, on the one hand, for the proper utilization and control of irrigation facilities, and accelerate, on the other, the development and

extension of practical farming techniques in the entire Project Area.

The preliminary Survey Mission, whose primary task was to select the site of the Pilot Farm and determine its size, also studied the outline of arrangements of irrigation-drainage facilities and farm roads in addition to such other aspects as the existing state of farm management, paddy cultivating techniques, organization of agricultural extension services, and Farmers' Association in the Project Area. The Mission's activities further involved the studies for formulating the basic policy for the management of the Pilot Scheme examinations into the scope of the detailed design to be prepared for the Pilot Scheme Center in the next stage, and preliminary discussions with the Indonesian authorities with respect to the number and specialty of experts to be despatched in the future and to the selection and estimation of farm implements, equipment and chemicals to be offered.

Upon its arrival in Indonesia, the Mission had a discussion with Mr. Sujono, Directorate-General of Water Resources Development, to clarify the scope of its survey activities on the basis of relevant documents prepared in Japan. After this initial discussion, the Mission contacted the Ministry of Foreign Affairs, Ministry of Agriculture and Forestry, and the Overseas Technical Cooperation Agency of the Japanese Government whenever occasion so demanded, and had two more follow-up discussions with Mr. Sujono with account taken of the intentions of the Indonesian authorities and the prevailing situation in the Project Area. The last discussion held with Mr. Sujono was attended by Dr. K. Takase, representative of ADB, who expressed the overall views of ADB on the Project.

1-3 Formation of the Preliminary Survey Mission

<u>Name</u>	<u>Specialty</u>	<u>Organization or Position</u>	<u>Period</u>
Dr. H. Fukuda	Leader	Professor Emeritus, Tokyo University; Advisor to the Overseas Technical Cooperation Agency	Oct 28 - Nov 7
Mr. K. Sugimoto	Agronomy	Central Agricultural Experiment Station, Ministry of Agriculture and Forestry	Oct 4 - Nov 4
Mr. A. Morita	Extension & Farmers' Association	Tokyo Regional Bureau of Agricultural Administration, Ministry of Agriculture and Forestry	- Ditto -
Mr. Y. Ohata	Farm Management	International Cooperation Division, Economic Affairs Bureau, Ministry of Agriculture and Forestry	Oct 4 - Nov 7
Mr. M. Kawamata	Irrigation Engineering	Overseas Technical Cooperation Agency	- Ditto -

1-4 Itinerary of the Survey Mission

<u>Date and Day</u>	<u>Events</u>
Oct 4, Sat	Departure from Haneda International Airport at 9:00 p. m. by JAL 117, and arrival in Djakarta on the same night. (Four members not including Dr. Fukuda, Leader)
Oct 5, Sun	Visit to Mr. Sugo, Leader of the Japanese Colombo Plan Experts, at Bogor to obtain information on the problems relating to paddy cultivation in Java Is.
Oct 6, Mon	Courtesy call on Minister Arita at the Japanese Embassy. Courtesy call on Dr. J. Hutabarat, Chief of Foreign Relations, Ministry of Agriculture, accompanied by Mr. Sasanuma, Secretary of the Japanese Embassy.
Oct 7, Tue	Visit to Mr. Tagawa of Sanyu Consultants International Inc. and Messrs. Arai and Koshiba of Nihon Koei Co., Ltd. to gather information on the past development of the Tadjum Irrigation Project.
Oct 8, Wed	Discussions with Mr. Sujono, Directorate-General of Water Resources Development, Mr. Oesman, Director of Irrigation, and Mr. Bambang, Tadjum Project Manager, about the purpose, scope and schedule of the preliminary survey. Request made by the Survey Mission for early signing of the Plan of Operation.
Oct 9, Thu	Departure for Bandung by car.
Oct 10, Fri	Departure from Bandung and arrival in Purwokerto in the evening.
Oct 11, Sat	Overnight stay at Grand Hotel. Courtesy call on Hon. Sukarno Agung, Bupati, Regency of Banjumas. Reconnaissance in the Tadjum Project Area under the guidance of Messrs. Bambang, Isomojo, Sugeng and Soekarso.
Oct 12, Sun	Arrangements among the Mission members.
Oct 13, Mon	Visit to the Kepala Desa of the Desa of Tinggardjaja, the proposed site of the Pilot Scheme, under the conduct of the Indonesian counterpart team. Studies on the general agricultural conditions in the Desa.
Oct 14, Tue	Discussions with the Kepala Desa and Secretary Tjarik of the Desa of Bantar about the general agricultural conditions there.
Oct 15, Wed	Information obtained from Ir. Darono, Chief of Agricultural Extension Service, Regency of Banjumas, on the organization and activities of agricultural extension service, and on the agricultural facilities of the local government in the Regency. Survey on the farm management in the two Desas of Tinggardjaja and Bantar. Prof. Iso of Gadjah Mada University, specialist in

farm management, joined the counterpart team as from this day.

Oct 16, Thu Visit to and on-the-spot survey of the seed farm belonging to the Agricultural Extension Service of the Regency. Departure of two Mission members, Messrs. Sugimoto and Ohata, for Djakarta by Bima, a special express night train.

Oct 17, Fri Discussions between Messrs. Sugimoto and Ohata, and Ir. Oesman, Director of Irrigation, about the area of the Pilot Farm.
Field survey.

Oct 18, Sat Field survey.

Oct 19, Sun Spent for recreation.

Oct 20, Mon Courtesy call by all 4 members on the Wedanan of the District of Djatilawang, followed by the explanations given to the farmers' representatives of the Desas of Tinggardjaja and Bantar about the significance of the Pilot Scheme and the purpose of the farm management survey.
Field survey.

Oct 21, Tue Field survey.

Oct 22, Wed Field survey.

Oct 23, Thu Field survey.

Oct 24, Fri Arrangement of the survey results.

Oct 25, Sat Departure from Purwokerto in the morning by car, and arrival in Bandung towards the evening.
Overnight stay in Bandung.

Oct 26, Sun Return to Djakarta.

Oct 27, Mon Arrangement of survey results.

Oct 28, Tue Arrangement of survey results.
Arrival of Dr. Fukuda, Leader, at the Djakarta Airport at 9:00 p. m.

Oct 29, Wed Courtesy call by Dr. Fukuda on Ambassador Yagi. Results of field survey reviewed by the Mission members and Dr. Fukuda.

Oct 30, Thu Visit to Mr. Soegandhi, Director of Agricultural Production, and officials in charge of the Department of Agricultural Techniques and the Department of Agricultural Extension.
Departure of Dr. Fukuda and two Mission members for Purwokerto via Bandung by car.

Oct 31, Fri Reconnaissance by Dr. Fukuda and two Mission members in the Tadjum Irrigation Project Area.

Nov 1, Sat Joint Field survey of the proposed site of the Pilot Farm by the Preliminary Survey Mission, ADB and the Indonesian Government authorities.

Nov 2, Sun Return to Djakarta in the morning.

Nov 3, Mon Plan of Operation signed between Ir. Oesman and Dr. Fukuda at the office of the Directorate-General of Water Resources Development.
Final discussions held with Ir. Sujono with the attendance of Dr. Takase of ADB regarding the basic plan for the management of the Pilot Farm and the schedule

of Japan's cooperation in the Pilot Scheme.
 ADB's views on the Scheme also expressed by Dr. Takase.

Nov 4, Tue Departure of Messrs. Sugimoto and Morita from Djakarta in the morning for Tokyo.

Nov 5, Wed Arrival of Dr. Fukuda and Messrs. Ohata and Kawamata in Manila.

Nov 6, Thu Discussions between the Survey Mission and ADB on the Pilot Scheme.

Nov 7, Fri Arrival of Dr. Fukuda and two Mission members in Tokyo.

1-5 Cooperation Extended to the Mission in Indonesia

Cordial thanks are expressed to the valuable cooperation and assistance extended to the Survey Mission by the officials of the Indonesian Government, members of the counterpart team, and the staff of ADB and Sanyu Consultants International Inc., whose names are given hereunder.

Indonesian Government Authorities:

Ir. Sujono	Directorate-General, Water Resources Development
Ir. Oesman	Director of Irrigation
Ir. Bambang	Tadjum Project Manager
Mr. Soegandhi	Director of Agricultural Production
Mr. Sukarno Agung	Bupati, Regency of Banjumas
Mr. Darono	Chief of Agricultural Extension Service, Regency of Banjumas

Counterpart Team:

Prof. Iso	Gadjah Mada University, Jogjakarta
Ir. Isomojo	Ditto
Mr. Sugeng	University of Bandung
Mr. Soekarso	Universitas Djendral Soedirman

Asian Development Bank:

Prof. T. Motooka	Coordinator, Ministry of Agriculture, Indonesia
Dr. K. Takase	Irrigation Engineer

Sanyu Consultants International Inc.:

Mr. M. Matsui	Tadjum Project Leader
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CHAPTER II ESTABLISHMENT OF PILOT SCHEME

2-1 Guiding Principles

Rice is the staple food of the Indonesian people and constitutes the main source of income of farmers. In the Tadjum Irrigation Project Area, single cropping pattern in puddy fields is still prevalent and the unit size of operational holding of farmers is extremely small. This is the main cause of the poor paddy yield in the Area which is hardly enough even for the family consumption of farmers. Increase in paddy production through the introduction of the double-cropping system, combined with the efforts to elevate the agricultural productivity, is therefore the key factor conducive to the solution of existing problems and to the increase of farmers' income.

It is to be remembered, however, that the desired agricultural development in the Project Area can never be accomplished unless the irrigation scheme and the improvement of farming techniques are introduced in harmonious combination. Past experience explicitly indicates that the irrigation water for double-cropping system, if made available in areas where farmers have not been enlightened with the improved farming techniques, often failed to produce the expected yield due to the improper farming practice on the part of farmers.

If the double-cropping of paddy is to be materialized at all, the traditional rain-fed cultivation not resorting to fertilizers must be transformed into the modern cultivation using fertilizers, agricultural chemicals and small farm machines. It would also be demanded to make arrangements for advancing farming funds to farmers who are not financially capable of procuring the necessary materials and equipment.

The Pilot Scheme Area is intended to serve as the nucleus for the extension of farming techniques and should contribute to organizing the Farmers' Association which undertakes the maintenance and management of tertiary and field channels. The Association is visualized as an organ which would systematically carry out, under the close guidance and instructions of the extension workers, a comprehensive and up-to-date paddy cultivation and other activities that should be copied by the farmers in the surrounding areas.

2-2 Scope of the Pilot Scheme

The scope of work for which the Government of Japan despatches experts and offers equipment and materials is as briefed below.

i) Arrangement and Development of Irrigation-Drainage Facilities and Farm Roads.

The rain-fed single-cropping paddy fields are to be redeveloped into double-cropping model fields with due consideration given to the rational utilization and management of irrigation and drainage facilities.

ii) Development and Extension of Practical Farming Techniques

Demonstration and guidance should be provided for the optimum application of fertilizers and chemicals to set an example for the farmers in the entire Project Area to follow; and the conventional manual farm

work should be improved by the partial inducement of mechanized culture using small farm machines so as to alleviate the heavy duty of manual operation which would otherwise accompany the introduction of the double-cropping system.

iii) Guidance of Farming Techniques for Farmers in the Pilot Scheme Area

Guidance for improved farming techniques is to be given not directly by the experts but by the members of the counterpart team and extension workers assigned to the Pilot Scheme Area through the Farmers' Association. No attempt should be made to replace the traditional farm practice with the new one within a short period. Instead, individual techniques for increasing the paddy production should be introduced in the first step, which should be followed by the gradual introduction of improved farming techniques and farm machinery in accordance with the predetermined annual improvement programme. It is to be remembered that the extension and guidance activities should be confined to the Pilot Scheme Area before the Scheme is recognized to be fully stabilized.

iv) Training and Guidance for Extension Workers and Agricultural Technicians

In the course of progress of the Pilot Scheme which is to be pushed forward in collaboration with the experts, training, guidance and lectures by the experts would be given to the members of the counterpart team and agricultural extension workers. The training and guidance would later be expanded with the stabilization of the Scheme to embrace all the extension workers serving in the Tadjum Project Area. The laboratory of the Pilot Scheme Center and the paddy field annexed thereto should be utilized for such training and guidance.

With respect to small farm machinery to be separately offered by the Government of Japan, the extension workers and a number of selected farmers are to be thoroughly trained until they are fully acquainted with their handling and maintenance.

v) Considerations on Equipment and Materials to be Offered

Farmers in the Tadjum Irrigation Project Area are invariably engaged in petty farming. In the Pilot Scheme Area, 70% of farmers are owner farmers, 10% are tenant farmers, and there are no large land owners. However, land owned or tenanted in the Pilot Scheme Area rarely exceed 0.5 ha per farm households. Thus, farmers in the Pilot Scheme Area unexceptionally gain so small an income that they can hardly afford agricultural machinery and materials which can never be dispensed with in the desired improvement of farm management. The situation clearly points to the necessity of providing credit loaned to farmers to enable them to purchase the much needed machinery and materials. Without such financial measures, it would never be possible to attain the desired improvement.

Under the Pilot Scheme, it is planned to provide farmers with fertilizers and agricultural chemicals to accelerate the improvement of farming techniques. This, however, will undoubtedly result in a gap of income between the farmers in the Pilot Scheme Area and those outside the Area. To counterbalance this gap, it is suggested, as a matter of principle, to recover a reasonable amount from the income of farmers in

the benefited area and appropriate it to funds needed for the management of the Pilot Scheme and for the establishment of the Farmers' Association.

2-3 Experts to be Despatched

5 experts with their respective specialty specified below will be stationed in Indonesia for long term service, with one of them acting concurrently as the leader. In addition, experts for short term service will be despatched if occasion so demands.

- Agronomist
- Irrigation engineer
- Agricultural extension expert
- Farmers' Association expert
- Mechanical engineer

Living quarters of these experts are to be arranged by the Government of Indonesia in Purwokerto in consideration of the availability of medical and educational institutions, convenience of purchasing daily necessities, availability of recreation facilities, and commutability by car.

2-4 Project Director and Managing Committee

A tripartite organ comprising the Ministry of Public Works and Electricity, the Ministry of Agriculture and the Local Government is to undertake all such works as the maintenance and management of irrigation facilities, improvement of farming techniques, and extension service in the Pilot Scheme Area.

The position of the Pilot Scheme Director is to be held by the representative of the Government who will undertake full responsibility for all the administrative and managerial works involved in the Scheme. He will be held responsible for the appointment of Indonesian staffs, provision and arrangement of necessary land, buildings and ancillary facilities, and disbursement of expenses in local currency.

The Japanese experts are expected to provide technical guidances and advices to the Indonesian staffs participating in the Scheme.

2-5 Duration of Japan's Cooperation

The period of Japan's cooperation in the establishment and management of the Pilot Scheme is set at five years, with the provision that it may be extended or shortened as necessity arises by mutual consent between the Governments of Indonesia and Japan prior to the expiration of the period.

CHAPTER III PILOT SCHEME AREA

3-1 General Description

An area of approximately 150 ha located at about the centre of 3,600 ha area of the Tadjum Irrigation Project has been delineated as the Pilot Scheme Area in view of the convenience of irrigation from turnout BTa9 of the main canal. The location of this area coincides with the ADB's proposal appearing in p. 9 of "Asian Development Bank Appraisal of the Tadjum Irrigation Project in Indonesia," and also conforms to the proposal of the Indonesian Government with the only exception that the southeastern portion of the proposed 380 ha, located far from the main road, has been excluded.

3-2 Advantages of the Proposed Location

The location of the Pilot Scheme Area has been determined in consideration of the following advantages.

- (1) Maximum demonstration effects can be expected since the Area is at about the center of the Tadjum Irrigation Project Area.
- (2) With no villages lying around the Area to impede the visibility, unobstructed view of the Area can be commanded from the main road.
- (3) Expected availability of irrigation water from turnout BTa9 in 1970 allows the Scheme to be undertaken at an early date.
- (4) The clayey soil covering the Pilot Scheme Area is considered typical of soils in the entire Tadjum Irrigation Project Area.
- (5) A small river found in the southern end of the Area can be used for the drainage purpose. The Tadjum Irrigation Project Area has similar small rivers that can be made use of for drainage purposes.

3-3 Delineation of the Pilot Scheme Area

The 380 ha area originally proposed by the Government of Indonesia has been reduced to about 150 ha by excluding its southeastern portion for the following reasons.

- (1) No appreciable demonstration effects can be expected in the southeastern portion since it lies far from the main road.
- (2) The originally proposed 380 ha area is too extensive to be covered by the limited availability of resources and experts' service. Concentrated efforts within the 150 ha area are expected to produce the maximum demonstration effects.
- (3) Bordered by the main road in the north and by farm roads in the east, west and south, the 150 ha area is considered ideal for the desired demonstration effects.

3-4 Topography and Soil

The Area is slanting gently from north to south with a gradient of 1/200 - 1/300 and from west to east with a gradient of 1/1,000 - 1/2,000. The topographical features observed in the Area are believed to be common to those of the entire Tadjum Irrigation Project Area.

The Area is covered with hydromorphic soils formed by the recent alluvial deposits of the Tadjum and the Lopasir. With such topographical and soil conditions, it is highly probable that the Area would turn into arable land capable of year-round paddy cultivation only if provided with sufficient irrigation water and suitable field layout.

It must be added that the desired materialization of the year-round irrigation must await the installation of an integrated irrigation and drainage system designed on the basis of the topographic and soil survey.

3-5 Composition of Cultivated Land

Surveys conducted on sampled farm households revealed that the land cultivated by them is composed of 70% paddy field and about 30% upland field.

In the northern part of the Area, however, the paddy field accounts for 75% and the upland field about 25%, while in the southern part, the paddy field decreases to about 60% and the upland field increases to about 40%.

A substantial portion of upland fields is observed to have been converted from paddy field by simple banking work. These upland fields are likely to be reverted to the high-yielding paddy cultivation once the irrigation water is made available. No coconut land is found in the Area.

3-6 Villages and Farm Households

In the north of the Pilot Scheme Area is Desa Tinggardjaja which is composed of three Kampongs having about 1,500 families, and in the south is Desa Bantar composed also of three Kampongs where approximately 700 families are found.

Farm households in Desa Tinggardjaja cultivating paddy or upland fields in the Pilot Scheme Area number about 170 and have their residential lots mostly in Kampongs I and II. Farm households in Desa Bantar having their paddy and upland fields in the Pilot Scheme Area are mostly located in Kampongs I and II, and number about 250. Including some farm households located in Kampong I of the two Desas but cultivating outside the Area, the total number of farmhouses associated with the Pilot Scheme Area is about 500.

The size of operational holdings of these 500 farm households is about 280 ha which comprises about 120 ha of paddy field, 100 ha of upland field and 60 ha of coconut land. It may therefore be justified to assume that the average size of operational holding of these farmhouses is in the neighbourhood of 0.55 ha (paddy field - 0.25 ha; upland field - 0.20 ha; and coconut land - 0.10 ha).

It is to be added that the coconut land referred to above is on high land where a number of residential lots are found.

CHAPTER IV INFRASTRUCTURAL IMPROVEMENT

4-1 Irrigation and Drainage

Water is to be drawn from turnout BTa-9 and distributed into the four tertiary canals to irrigate the 150 ha of the Pilot Scheme Area.

It is envisaged that the irrigation water would be drawn from the main or secondary canal into tertiary canal and further distributed into paddy fields. It is preferable to refrain from drawing water directly from the main canal; and insofar as the topographical conditions permit, the number of the main canal outlets should be limited to a minimum.

The tertiary canal should be arranged at an interval of at least 400 m to ensure that each paddy field is located within 200 m distance from, and served by, the intake entrance of the nearest tertiary canal. It deserves attention that the gravity irrigation is practicable throughout the Area by virtue of its gradient which ranges from 1/200 to 1/300 from north to south.

These tertiary canals, to be constructed into earth-canals having a gradient of 1/500 - 1/300, would have to be provided with a number of drops on account of the gradient of the Area. The intake entrance of the tertiary canal should be a fixed, wooden structure.

Drainage must generally be considered in terms of the normal operational drainage and the flood water drainage. In the Pilot Scheme Area, however, flood water in the entire 150 ha area drains into the Lopasir through the existing three drainage canals, creating no fear of flooding at any part of the Area. But since the new construction of a main or secondary canal in future is expected to impede smooth drainage in districts extending along the main road, it will be imperative to provide a subdrainage system with care taken not to divert the existing drainage system. With respect to the field drains for normal operational drainage, construction of new drains does not appear essential since the gradient of the Area is sufficient to allow for gravity irrigation.

4-2 Water Measurement and Control

Diversion from the main canal is to be carried out by means of a gate with which to control the duty at the outlet. A rectangular canal, lined with cement-concrete and connecting to the outlet of the main or secondary canal should be constructed in the tertiary canal for discharge measurement. This measurement does not demand a high accuracy since the discharge through the canal is about 0.05 m³/s. Discharge measurement should preferably be conducted also at an intermediate and terminal points of the canal by providing the cement-concrete canal at the two points. The measurements thus obtained serve to clarify the canal loss and distribution loss, and provide data with which to calculate the approximate irrigation efficiency which is needed for the water control in the entire Tadjum Irrigation Project Area.

Activities of the Preliminary Survey Mission included no studies on the water requirement in depth since they are involved in the survey for the Tadjum Irrigation Project. However, the Mission is of the opinion that further detailed survey on this matter is indispensable in view of the importance attached to the water control in the Pilot Scheme Area. The detailed

survey would have to be conducted with stress placed on the seasonal fluctuation of evaporation as well as on the difference in seepage caused by the difference in the underground water level.

The total water requirements with the seasonal fluctuation taken into consideration have already been surveyed under the Tadjum Irrigation Project, of which the relevant report is expected to be made available in February 1970. It deserves attention here that the droughty water discharge is generally believed to necessitate the adoption of the rotation system for the dry season irrigation in the Tadjum Irrigation Project Area.

Unlike the areas 10 - 20 km upstream of the Pilot Scheme Area where the double-cropping is frequently observed, transplantation in the Pilot Scheme Area takes place all the year round by shifting the cropping time. Consequently, it does not appear to entail much difficulties to make the water requirements even throughout the year. This, however, should not be construed to indicate that the Pilot Scheme Area needs no irrigation on rotation during the dry season when the water level drops sharply.

Determination of an optimum size of unit irrigation area is prerequisite to the smooth operation of the rotation irrigation. The size of unit block to be irrigated on rotation is to be determined in due consideration of the diversion facilities, topographical conditions and farmers' intentions. In the Pilot Scheme Area, it is advisable to study on two alternative plans, one delineating 50 ha as one block, and the other considering the entire 150 - 200 ha area as one block to be irrigated from turnout BTa-9.

4-3 Farm Road

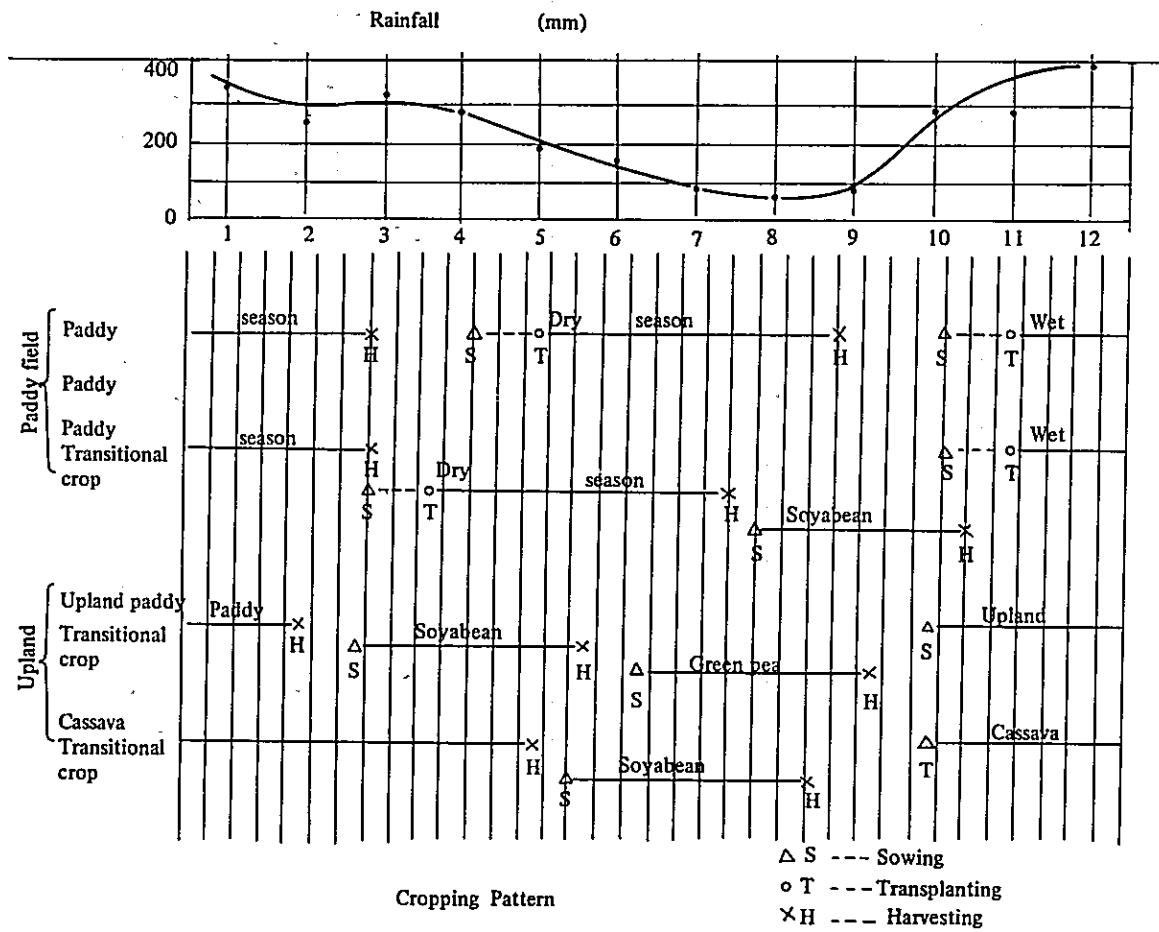
The Pilot Scheme Area has a 6-m wide paved main road running along its northern border and a 4-m wide road extending in the south that leads to Desa Bantar. In addition, the Area has 2-m wide farm roads arranged at an interval of 800 m. To facilitate the planned employment of 6-HP class handtractors, construction of a new farm road should be undertaken and the existing farm roads should be widened to 3.5m. Cement-concrete turnouts installed at several points on the existing farm roads should be left as they are for continued service in future.

4-4 Reclamation of Paddy Field

When the irrigation water becomes available, the existing single-cropping paddy fields and the wet season paddy fields where transitional crops are grown in the dry season will all be transformed into double-cropping paddy fields. Cautions must be exerted in converting upland fields into paddy fields so that the irrigable area would embrace only those new paddy fields that can be readily irrigated without incurring any excessive cost or land shaving. It must also be remembered that the distribution of irrigation water, though it may become abundantly available, it to be adjusted for the entire irrigation area rather than for the sake of a limited number of farmers. It follows, therefore, that the expansion of irrigable area, if demanded by individual farmers, is acceptable only if it is compatible with the purpose of the Tadjum Irrigation Project.

The present irrigation project counts on the water source available from the intake weir. Hence it leaves room for the development of a new water source in future which would make possible the further extension of the irrigable area and formulation of a new irrigation project designed for more efficient land use.

When irrigation water is made available, the irrigable area will cover an area 1.2 times as wide as the entire paddy field area of 150 ha now existing in the Pilot Scheme Area. It is to be noted that about 3 - 10% of the 3,600 ha Tadjum Irrigation Project Area is occupied by those upland fields whose inclusion in the irrigable area is not feasible even if tertiary canals are arranged in future. These upland fields should be precluded from the planned irrigable area.



CHAPTER V PLANNING AND ANALYSIS OF FARM MANAGEMENT

5-1 Outline

According to the 1963 agricultural census, the average cultivated land per farm household registered 0.7 ha, of which paddy field occupies 0.32 ha. The ADB's report states, on the other hand, that the unit holding of paddy field by farm households in the Tadjum Irrigation Project Area in Central Java ranges from 0.1 to 2.0 ha, averaging 0.5 ha. The preliminary survey conducted in the Pilot Scheme Area revealed that the unit cultivated land per family is much smaller than in the above two areas, with the paddy field averaging 0.25 ha and the upland field 0.2 - 0.3 ha, totalling 0.55 ha.

The Pilot Scheme is intended for the demonstration and extension of improved paddy production techniques through the introduction of the double-cropping system which is believed to be practicable for virtually all the farmers in the Tadjum Irrigation Project Area. This calls for the establishment of a technical paddy cultivation system suitable to the unit holding of paddy field which is assumed to be about 0.3 ha.

It must be noted that the efficiency of the prevailing manual operation does not at all promise the smooth shifting to the desired double cropping system. It is therefore recommended, for the efficiency of farm operation, to utilize cattle and power tillers in the plowing and puddling operation and to introduce the combined use of rotary weeders and 2, 4-d herbicides in the weeding operation.

The harvesting work, currently dependent on "Ani-ani" which is employed for cutting stalk paddy, should be improved through the introduction of pedal rotary threshers and sickles.

Introduction of the above-mentioned small type farm machinery is a must in alleviating the peak load as well as in improving the quality of farm labour which is now concentrated in the wet season on such works as grain cleaning and plowing of paddy fields for the following dry season. The improved paddy cultivation techniques discussed above is not only the prerequisite to the desired double-cropping of paddy but also is the fundamental condition for the effective use of the limited availability of irrigation water in the dry season.

The small type farm machinery mentioned above should be jointly owned by all farm households and paddy farmers should be given training on the practical mechanized paddy cultivation. If such possession of farm machinery and practical training are to be given at the expenses of individual farmers, efforts and should be made to cut down the expenses to the minimum possible amount.

5-2 Cropping Pattern and Crops to be Introduced

Cultivation of a common variety in both wet season (October - March) and dry season (April - September) would be most expedient for the desired materialization of double cropping of paddy. The improved local varieties do not meet this purpose because of their poor fertilizer response which incurs more than 150 days of vegetation period and an excessive water consumption.

The newly improved IR-5 and IR-8, bred by the International Rice Research Institute and are characterized by an exceedingly low photoperiodic response and are therefore the best non-seasonal varieties conceivable for the intended double cropping.

These two varieties present a marked contrast to each other in characteristics. To be precise, IR-8 has a higher fertilizer response as compared with IR-5 and its grain yield increases proportionately to the amount of fertilizer applied. But its grain quality is inferior to IR-5 and the selling price lower. In addition, it has the drawback that its culm is extremely short. IR-5, on the other hand, resembles the traditional varieties in its plant type, and is likely to be readily accepted by farmers. It is therefore recommended to adopt IR-5 as the main variety to be cultivated for the proposed double-cropping.

The vegetation period of IR-5 from the time of sowing to harvesting is approximately 140 days. This makes it quite feasible to cultivate IR-5 in both wet and dry seasons and establish the double-cropping as the basic cropping pattern of paddy. It is possible to grow soyabeans and the like in the transitional period from the middle of the dry season to the wet season under the cropping pattern of "paddy - paddy - soyabean." In this case, however, the yield of soyabeans would naturally be limited since its growing period should be cut down to provide for the paddy cultivation in the wet season to follow. It must also be added that the transitional crops cannot be successfully grown without the mechanized farm work because their harvesting operation and the plowing work for paddy cultivation must be completed within a limited time.

With respect to the upland field which occupies a considerable portion in the small unit size of operational holding, due consideration should be given to its cropping pattern from the standpoint of agronomical improvement. The recommendable pattern of upland field cultivation can be represented by the cropping cycle of "upland paddy (wet season) -- soyabeans (dry season) -- green peas (dry season)." It is also advisable to consider such other patterns of upland field cultivation as "cassava (more than 6 months) -- soyabeans" which may be partly practised for labour saving purpose, or "maize -- soyabeans -- soyabeans" which is recommendable though rather labour taking.

5-3 Target Yield of Crops

The target yield of crops is as given below.

(Unit: t/ha)

Wet paddy	:	5 (stalk paddy, per season)
Soyabean (paddy field)	:	0.5
Upland paddy	:	2.5
Soyabean (upland field)	:	0.8
Green pea	:	0.7
Cassava	:	6
Maize	:	1.5

With the exception of wet paddy, crops currently cultivated do not include many high yielding varieties. The Pilot Scheme Center will therefore be required to conduct a series of tests with the view to selecting the most recommendable and high yielding varieties from among the traditional varieties.

5-4 Improvement of Paddy Cultivation Techniques

o Period of Nursery

The nursery period is to be set at 20 - 25 days, and young seeding having 5 - 6 leaves should be planted.

o Planting Distance

IR-5	:	25 cm x 25 cm
IR-8	:	20 cm x 20 cm
Planting method	:	Regular shallow planting in both directions of about 3 seedlings per hill.

o Standard Amount of Fertilizer (Unit: kg/ha)

	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
IR-5	78	40	0
IR-8	92	40	0

Split application of nitrogen is to be practised, i. e. 40% of the total amount should be applied as the basal dressing, 30% should be applied 3 weeks after transplanting, and the remaining 30% should be applied 7 weeks (IR-8) or 9 weeks (IR-5) after transplanting.

o Control of Diseases, Pest, and Damages by Rodents

In prevention of insect damages caused chiefly by the stem borer, diazinon granule or sumithion emulsion should be sprayed; and for controlling the rice blast, kitazin emulsion should be sprayed before the time of heading.

The bacterial leaf blight to which both IR-5 and IR-8 are highly susceptible should be completely prevented by means of chemical control. This can be most effectively achieved by the application of a new agricultural chemical developed in Japan which will be available on the market in 1970.

To ensure positive practice of chemical control, it is necessary to provide the farmers with spraying equipment such as the knapsack type mist blower on the lease basis. It should be added that zinc phosphate and other suitable chemicals should also be applied to check the damages by rodents which otherwise increase hazardously in the dry season.

o Weed Control

In addition to the introduction of rotary weeders to be employed in the

weeding operation, hormone type herbicides should be sprayed at time of final weeding to save the weeding labour.

o Extension of Agricultural Techniques, inter alia, of Paddy Cultivation Techniques

Due to the lack of experience on the part of farmers in handling agricultural machinery, its introduction should be preceded by the training of extension workers and Pamong Tanis who would come in direct contact with individual farmers and disseminate the handling techniques among them.

Fertilizers and agricultural chemicals should not be offered free but should rather be provided against payment of a reasonable amount. Amount thus collected should be deposited jointly by the Government and the farmers' representatives, and utilized as the working funds of the Farmers' Association to be newly organized.

The high percentage occupied by upland fields in the entire cultivated land makes it imperative to give due consideration to the yield increase of upland crops. Experts to be despatched for the improvement of paddy cultivation techniques will therefore be requested to spare their time for providing guidances and instructions for improving the upland field cultivation. A certain amount of fertilizers and chemicals for application specifically in upland fields would have to be included in the materials to be offered by the Government of Japan.

5-5 Actual State of Farm Management

5-5-1 Land Tenure

In the Pilot Scheme Area, the majority or 70% of farmers are owner-farmers, followed by owner-tenants who account for 20%, and tenant farmers of about 10%.

5-5-2 Breakdown of Farmhouses by Operational Holding

As is clear in the following table which gives the breakdown of farm households by the size of operational holding of paddy field, about half of farmers own less than 0.2 ha of paddy field.

<u>0 - 0.2 ha</u>	<u>0.2 - 0.4 ha</u>	<u>0.4 - 0.6 ha</u>	<u>0.6 - 1.0 ha</u>	<u>1.0 - 2.0 ha</u>
45%	25%	15%	10%	5%

5-5-3 Consumption and Sales of Farm Produce

Survey of farm households disclosed that about 65% of paddy goes to farmers' own family consumption, and about 30% is set aside to be given to farm labourers as their wages in kind. No wet paddy nor upland paddy is put on the market for sale. Sales percentage of other crops registered 55% for

soyabeans, 90% for green peas, 30% for cassava, and 95% for coconut sugar. Farmers depend heavily on the sales of coconut sugar for their cash income. Of the total sales of farm produce which amounts to 10 - 20 thousand Rp, about 70% is brought about by the sales of coconut sugar.

5-5-4 Operational Cost

The farm rent (which accounts for several tenths of the total operational cost) and the land tax constitute the greater part of the farmer's expenditure. Cost of fertilizers and agricultural chemicals is quite small as their unit consumption is limited to 20 kg of urea and a very small amount of Endrin.

5-5-5 Consumption Pattern

The prevailing poor paddy production, which causes the farmers to consume almost all of their farm produce for their family use with the only exception of coconut sugar, incurs the expenses for purchasing rice and other foodstuffs, which accounts for about 50% of the farmer's total expenditure.

5-5-6 Outlook for Future

Of the average acreage of cultivated land which is currently composed of 0.25 ha of paddy field, 0.20 ha of upland field and 0.10 ha of coconut land, a portion of upland field will be converted into paddy field upon completion of the irrigation canal. Assuming that this acreage remains unchanged in future, the average farm households would attain the self-sufficiency in rice when the planned double-cropping is set under way, but would have no surplus yield of wet paddy that could be put on sale. However, it would become possible to put most of upland crops on the market to double the present level of cash income.

The double-cropping of paddy, if realized under the aforesaid improved farm management, would enable the average farm households to secure an output of 2.5 tons of stalked paddy as calculated below:

$$5 \text{ t} \times 2 \text{ seasons} \times 0.25 \text{ ha} = 2.5 \text{ t}$$

In other words, an output of about 1 ton in terms of polished rice would become available. Assuming again that the said average farm households is composed of 6 members, i. e., man and wife and their 4 children, their total consumption of rice would be about 0.6 tons or 0.9 tons, provided that the consumption per member is 100 kg or 150 kg, respectively. This suggests that not much sales of paddy can be expected even after the materialization of the double-cropping system.

A portion of transitional crops such as soyabeans and part of upland crops will be used for family consumption, but most of such crops will be sold to increase the cash income as; calculated below for the average farm-house on the basis of the current selling prices:

Wet paddy	0.5 t x 0.25 ha x Rp 60,000	= Rp 7,500
Upland paddy	2.5 t x 0.20 ha x Rp 25,000	= Rp 12,500
Soyabean (upland crop)	0.8 t x 0.20 ha x Rp 60,000	= Rp 9,600
Green pea	0.7 t x 0.20 ha x Rp 60,000	= Rp 8,400
Cassava	6 t x 0.20 ha x Rp 5,000	= Rp 6,000
Coconut sugar		= Rp 10,000

As will be clear from the above calculation, a total of Rp 54,000 can be expected as the future cash income of the average farm households.

In contrast to the substantial increase in cash income, the agricultural expenditure in cash would amount to no more than 10 - 15 thousand Rp as needed for the land tax and farm rent since the agricultural machinery, chemicals and fertilizers will be provided by the Government of Japan.

It may be added that the sales of a certain amount of wet paddy and of soyabeans and green peas grown in the coconut land could also serve for further raising the level of cash income.

CHAPTER VI PILOT SCHEME CENTER

6-1 Outline

In order to promote smoothly and effectively activities of the aforementioned Pilot Scheme, it is necessary to establish, in the Pilot Scheme area, buildings and facilities as well as Trial and Demonstration Field where dispatched experts will work, provided equipments and materials will be stored and which will be the base for trial, extension and training.

The scale and activities of the Trial and Demonstration Field and facilities of the Pilot Scheme Center are as detailed below:

6-2 Trial and Demonstration Field

It is very effective to set up a trial and demonstration field of about one hectare in the Pilot Scheme area near the main road where the maximum demonstration effects can be expected. It is desirable to have such a trial and demonstration field near buildings and facilities of the Pilot Scheme Center. The trial and demonstration field must be about five to ten aerea in area, with an irrigation channel and an overflow provided separately. It should also be provided with more farm roads than are found in ordinary paddy fields to ensure smooth control of irrigation and drainage. Though the main element of a trial and demonstration field is paddy field, it is necessary to allocate about one-fifth of its area to the upland field.

The trial and demonstration fields is to be used for the trial and demonstration of new varieties, the upkeeping of an original seed farm of recommended varieties and for the water saving culture trial to cope with the shortage of irrigation water. It is also to be used for the trial and demonstration of fertilizers and agricultural chemicals, and for preliminary confirmation of suitability of farm appliances for extension by tests and demonstrations.

In addition to demonstration of the above-mentioned individual techniques, comparison between the traditional farming technique and the combination of improved technique shall be carried out and their comprehensive results shall be demonstrated to draw the general farmers' attention to the example of new farming techniques thus set.

In the upland field, high yielding varieties suitable for Tadjum Irrigation Project area shall be selected from among the collected varieties of upland farm crops, trial shall be made on new cropping patterns for high productivity, with regard given to the existing cropping pattern. Such trial and demonstration must be made with the cooperation of the experts.

6-3 Buildings and Facilities of the Center

It is highly recommendable to set up a trial and demonstration field of about one hectare in the Pilot Scheme area near the main road where the

maximum demonstration effects can be expected. This must be set up near the buildings and facilities of the Center; and its main part must be the paddy field to be used for the performance of farm machines and implements, trial of new varieties, trial and demonstration of fertilizers and chemicals, and for preliminary confirmation of suitability of new techniques for extension. Besides, it is to be used for the demonstration of comprehensive results of the comparative trial of traditional farming method and improved farming method to provide a good example for the introduction of new technique.

Buildings and facilities of the Center are planned as follows:

Central office including meeting hall - - - - -	270 m ²
Laboratory - - - - -	100 "
Storage (agricultural products)- - - - -	300 "
Shed for machinery, fertilizers and chemicals - -	300 "
Workshop and garage - - - - -	100 "
Milling house including drying unit - - - - -	100 "
Living quarters and dormitory - - - - -	200 "

6-4 Training and Guidance for Extension Workers

Training of farming technique shall not be given directly by the dispatched experts to the farmers inside the Scheme area. It shall be given, through the Farmers' Association, by the members of the Counterpart Team attached to each expert and also by the active extension workers assigned closely all over the Pilot Scheme area.

In order to remodel the rain-fed paddy fields to irrigated double cropping paddy fields, adjustment of field conditions must be initiated with the construction of tertiary canals by the farmers. Not all the traditional culture technique is to be remodelled at a time; it is necessary to take up individual techniques of high productivity for the initial improvement, the gradual introduction of the comprehensive improvement and mechanization of farming techniques under annual programmes.

Guidance and extension of new techniques must be given to the farmers at the Pilot Scheme Center having the trial and demonstration field and at each farmer's field. It is necessary to give practical training as well as demonstration at the trial and demonstration field, together with visual training by distribution of pamphlets with illustrations and by the projection of slide films from time to time. Extension workers and Pamong Tanis should visit and inspect the farmers' fields as frequently as possible, and answer their questions and guide them on the actual rice plants.

Meanwhile, Pilot Scheme Center must be provided with a sample room where actual samples of varieties, fertilizers, chemicals or damage by blight and noxious insects, photographs and illustrated pictures are displayed so that the farmers will utilize them freely at an time. The Workshop will be used for repair and inspection of smaller farm machines. Training and guidance of such farming techniques should not be given to farmers outside the Pilot Scheme area before the pilot scheme is on the right track.

Training and guidance to extension workers and farming technicians must be given to them and the numbers of the Indonesian Counterpart Team mainly in the process of operation of the Pilot Scheme to be carried out in collaboration with the experts. Lectures by the experts will be given to them from time to time.

Training of extension workers for the entire Tadjum Irrigation Project area shall not be made positive at the beginning, because it is not the main object of this Pilot Scheme. Training activity shall be gradually expanded when the pilot scheme is on the right track. Training will be given at such places as laboratory, meeting hall of the Pilot Scheme Center and at the trial and demonstration field attached thereto.

Training must also be given to extension workers to be assigned and Pamong Tanis including leading farmers to help them master the operation and repair of small machines to be supplied to the Pilot Scheme area. For this purpose, it is desirable to include a person with the knowledge of farm machinery among experts to be dispatched.

CHAPTER VII FARMERS' ASSOCIATION

7-1 Outline

The Pilot Scheme area extends over the two Desas of Tinggardjaja and Banter, in Sub-district of Djatilawang with about 500 farming families to be guided and the total acreage under cultivation by those families is estimated to be about 280 ha.

The Pilot Scheme Center will give guidance and instructions to those farmers on culture of crops and control of water. In order to find out through what organization the guidance can be given to those farmers most effectively, comprehensive research was made about present conditions of agricultural guidance on the spot, community organization and farming condition, which led to the conclusion that it would be most desirable to give training and guidance to the farmers through the organization of Desa which presently has the full command of farmers and is capable of making autonomous decisions for the implementation of various matters.

7-2. Actual State of Agricultural Extension System

As for the assignment of extension workers in the Regency of Banjumas to which the Pilot Scheme area belongs, the Regency is divided into 6 Districts and 24 Sub-districts; one or two extension workers are assigned to each District, and three or one to each Sub-district.

In the District of Djatilawang, 5 Sub-districts with a total of 51 Desas are to be given guidance and training. Of the two extension workers assigned to this District, one is a female worker in charge of Home Economics.

Sub-district of Djatilawang has only one extension worker for 11 Desas with a total cultivated acreage of about 4,300 ha. and a total number of families of 8,500 (most of it must be farmers), it would be very difficult for only one extension worker to cover the whole area. It does not therefore seem feasible to recruit the extension workers now assigned to these Districts and Sub-districts for new duties at the Center.

7-3. Organization of Desa

Desa is the autonomous community organization. As shown in Fig. 1, Secretary and other staff are under Kepala Desa, and assigned to various duties of Desa. Pamong Tani is one of the staff member of Desa and responsible for agricultural guidance.

Desa includes Kampung (RK) as its infrastructure which has a number of neighborhood associations each embracing 40 to 50 families.

Head of Kampung is called Baw who controls the police and servants for self-vigilance.

Tinggardjaja includes 3 Kampung and 45 RT's with 26 staff members of Desa. Bantar has also 3 Kampung and 22 RT's with 23 staff members of Desa.

Fig. 2 shows the arrangement of Kampung in the two Desas.

Desa has the function of carrying out many-sided activities for community autonomy such as controlling land and inhabitants, compiling fairly good statistics about agriculture and others, and maintenance and management of roads, bridges and other public buildings.

7-4. Farmers' Association in Future

The number of farming families in the Pilot Scheme area is about 500 in the Desas, and most of them belong to Kampung RK 1 and RK II, of the two Desas. In RK 1 most of the farmers farm in the Pilot Scheme area, and a part of the farmers cultivate in RK II. In RK III, only several farmers cultivate in the area (about 10 in Tinggardjaja and about 3 in Bantar). Some of these farmers cultivate only in the Pilot Scheme area, and others both inside and outside the Pilot Scheme area. And, the Pilot Scheme area seems to include some farmland belonging to farmers outside the two Desas.

Since it seems very difficult to control the farmers scattered outside the two Desas and those in RK III, it is advisable to establish guidance policies for those farmers who cultivate in the Pilot Scheme area and have their residential lots in the four Kampung of RK I and RK II in Tinggardjaja and Bantar. In this regard, Kepala Desa and Secretary requested that all the farmers in RK I be organized and several farmers in RK III must not be excluded. It is advisable to discuss this matter, if necessary for the management of the organization in the future. Special consideration, however, must be given to this point, because it is of little necessity to organize a similar organization in RK III for the sake of only several farmers there.

Farmers' Association is needed for the Pilot Scheme area, as mentioned before, to control systematically the farmers in the Area, assure smooth guidance by the Center and operate properly cooperative activities by the farmers such as water control and others.

Such an organization is assumed to play practically the following roles:

- (1) Care and management of farm machinery to be supplied by the Center, and distribution of productive materials such as fertilizers and chemicals.
- (2) Construction, maintenance and control of end facilities such as irrigation channels, roads etc.
- (3) Communication and promotion of guidance particulars prepared by the Center about varieties, cultivation methods or techniques and farm management.

As for farmers' organization to fulfill these duties, an organization shown in Fig. 3 would be considered because it seems to be the best to utilize Desa's self-governing organization with its high administrative and guiding capability.

Kepara Desa shall be the highest executive of Desa, to be assisted by Pamong-Tani who is responsible for agricultural guidance in Desa. In each Kampung, Baw shall be the highest staff assisted by two responsible persons; one in charge of farm machinery, the other in charge of construction and management of irrigation channels and others. These staff members shall cooperate with each other and assume responsibilities for carrying out necessary activities such as agricultural guidance and others.

In the above-mentioned organization, activities on the level of Kampung are considered to have the controlling importance in achieving perfect control of the farmers and in the practical planning and enforcement. It is therefore advisable to assign 4 well-qualified agriculture extension workers, one for each Kampung, for direct guidance and advice needed for the successful operation of the farmers' organization and for the thoroughgoing guidance by the Center to those organizations and farmers.

Assignment of extension workers to Kampung is justifiable because it is very difficult for the staff of the Center to keep constant contact with individual farmers and guide them directly, and more effective guidance would be possible by assignment of extension workers closely to organizations where they can give guidance and advice directly and closely to the farmers.

Assignment of extension workers to Kampung would disclose clearly problems involved in the operation of farmers' organization and agricultural guidance, and furthermore it would serve to secure experienced persons in cultivating technicians and guidance of farmers' organization who can be entrusted with the extension of the results obtained by the Pilot Scheme throughout the Tadjum scheme area. Thus it is desirable to assign well-qualified extension workers who have graduated from university or other educational institutions of the same level to those Kampung.

It is advisable that farmers' organization be operated by the self-governing body under the control of Kepara Desa, and that advices or guidances be given by extension workers or by the Center only on matters which the farmers are not experienced with or which they find difficult to solve.

It is considered that the operation of organization will require some amount of expenses other than office expenses. Because it would not be proper in some cases to appropriate Desa's general accounts for such new expenses, it is preferable to collect, based upon the decision of the organization, money to be appropriated for such expenses in proportion to the amount of equipments and materials supplied by the Japanese side or to the beneficiary area.

When the principles of guidance by the Center on cultivating technique, distribution of materials and control of water are set up and enforced, it is desirable to translate them into action after Kepara Desa and other representatives of farmers' organization well understood the details of such principles.

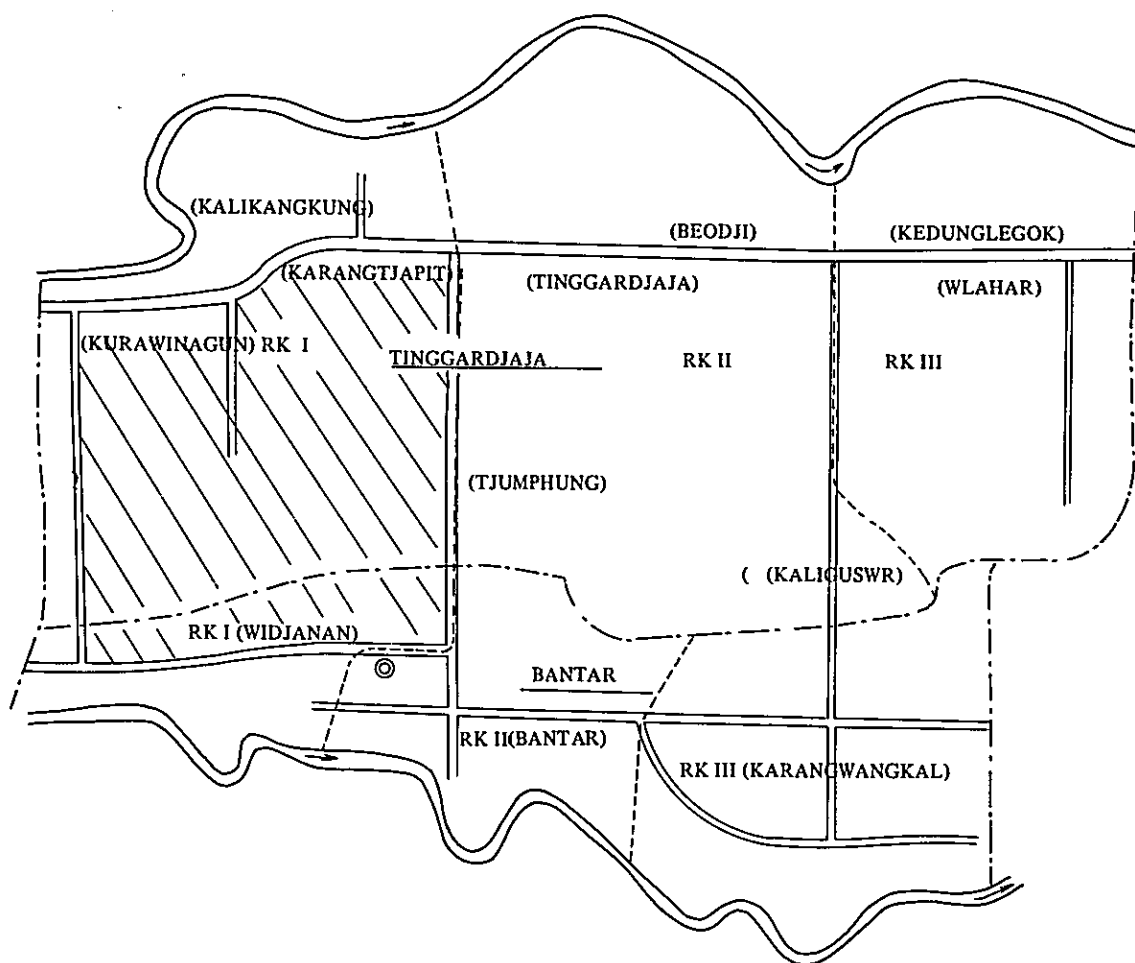
Accordingly, it would be necessary to convene periodical meetings for smooth communication between the Center and the representatives of farmers' organization such as the executives of the organization and advanced farmers.

7-5. Agricultural Cooperative Union

As for the necessity of setting up a farmers' cooperative organization for their joint purchase of production materials and living necessities and joint sale of products or credit cooperative activities, such an organized activity is not so necessary from the viewpoint of the present condition of farmers' economy. Thus, there is no need to start immediately cooperative union activity, and it is better to study the organizing of such an organization in proportion to increase in amounts of production and sales.

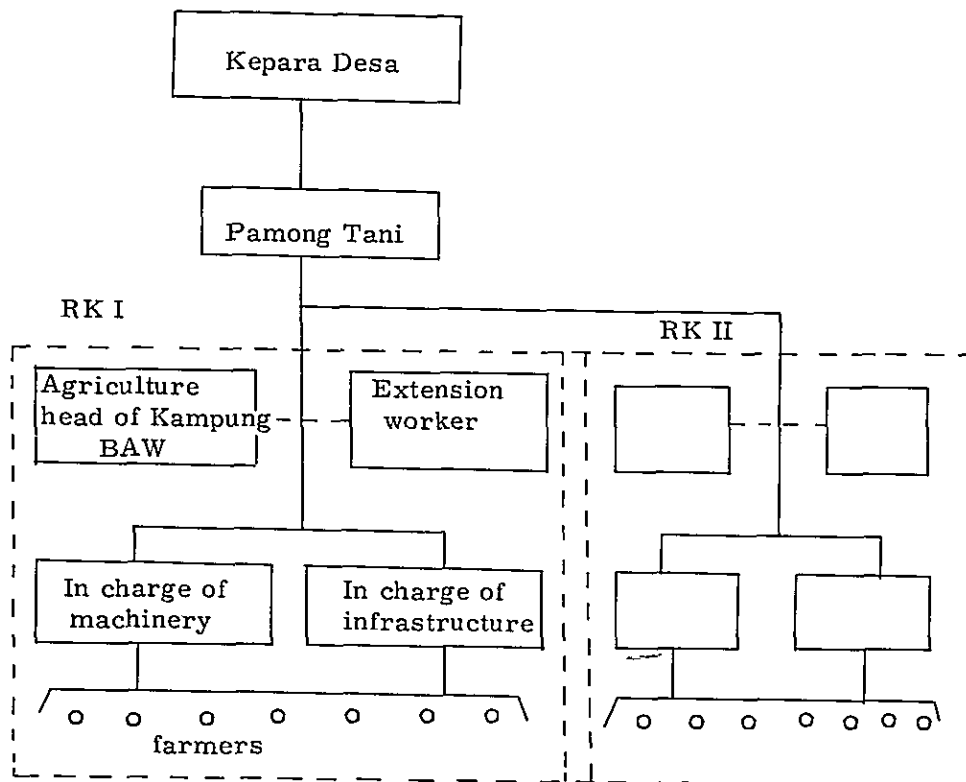
As for the irrigation association, control of water can be well done by the above-mentioned organization in the Area and in some cases it is better to carry out the control of water together with the productive activities, and it would not be always be proper to set up an organization for irrigation control separately. It must of course be understood that this observation is irrelevant to the necessity and the way of irrigation association of the whole Tadjum Scheme area.

Fig. 2 Arrangement of Kampung in Tinggardjaja and Banter



- Boundary of Desa
- Boundary of Kampung
- RK Kampung
- ⊙ Desa office
- ▨ Pilot area

Fig. 3 Organizational Chart of Farmers' Association



CHAPTER VIII ESTIMATE OF EXPENSES FOR THE SCHEME

A. Foreign Exchange

Item	1st year	2nd year	3rd - 5th year	Total
	US\$	US\$	US\$	US\$
1. Experts	42,400	38,400	119,200	200,000
2. Pilot Scheme Center	20,000	-	--	20,000
3. Farm Implements	100,000	10,000	30,000	140,000
4. Rice Processing	-	20,000	-	20,000
5. Fertilizers & Chemicals	15,000	15,000	45,000	75,000
6. Contingencies	32,600	16,600	35,800	85,000
Total	210,000	100,000	230,000	540,000

B. Local Fund

Item	1st year	2nd year	3rd - 5th year	Total
	US\$	US\$	US\$	US\$
1. Counterparts	9,600	9,600	28,800	48,000
2. Maintenance Cost of Pilot	3,000	3,000	9,000	15,000
3. Drivers, Typist, Clerk & Assistant Technicians	4,800	4,800	14,400	24,000
4. Construction of Building	53,000	-	-	53,000
5. Construction of Infrastructure	15,000	-	-	15,000
6. Contingencies	4,600	2,600	7,800	15,000
Total	90,000	20,000	60,000	170,000

CHAPTER IX SUMMARY AND RECOMMENDATION

The preliminary survey team was dispatched on Oct. 4, 1969 for a period of about one month to cooperate in promoting Tadjum Irrigation Project as a part of technical cooperation between the Indonesian Government and the Japanese Government. The following is main points considered to be required for establishing the Pilot Scheme which will be the base for the cooperation activities.

1. A Pilot Farm of about 150 ha must be set up around the central part of Tadjum Irrigation Project area with various conditions typical of the entire Irrigation Project area.
2. The idea of Rotation System was taken into consideration for consolidation of its foundation in expectation of irrigation and drainage in both rainy and dry seasons. Minimum block of rotation shall be about 50 ha, and canals shall be so arranged that operation of water diversion and checking up of diversion discharge for control of water be easier and distribution of water be made equal over the whole area. Width of farm roads shall be enlarged in consideration of utilization of hand tractors without rearranging the present network of road. Consolidation of the farm with leveling and others must be made minimum as required.
3. Improvement of rice cultivation shall be the main object of the farming scheme; cropping pattern shall be aquatic rice by double cropping; yield of stalked paddy per hectare shall be 5 tons in the dry season and other 5 tons in the rainy season; modern farming techniques shall be introduced with treadle thrashing machines and small tillers as well as fertilizers and chemicals. Consequently, rice as the staple food will be sufficiently supplied, farmers will be able to lead wealthier life than at present with about double cash income from rice as well as other products.
4. The Center as the nucleus of the Pilot Scheme shall be equipped with, not only various facilities for operation of the scheme, but also with trial and demonstration field where comparative tests are to be carried out on irrigation, chemicals and fertilizers and training are to be given for the purpose of extension of techniques to Tadjum Irrigation Project area.
5. It is hoped that Farmers' Association be connected with the present administrative system and farm management be made more feective with introduction of techniques of water control and modern farming. For this purpose, training must be planned and organized for extension workers and their assistants.
6. The total costs for the Scheme are estimated to be roughly 65,000,000 Rp (equivalent to US\$170,000) in local fund and US\$540,000 in foreign exchange. Important items are expenses for dispatch of experts --- US\$200,000, and equipments and materials to be supplied--US\$340,000.
7. A steering committee shall be set up to operate efficiently the above-mentioned function.

Appendix

GENERAL UNDERSTANDING AMONG
JAPANESE AND INDONESIAN GOVERNMENT AND ADB
ON THE TADJUM PILOT SCHEME

(Informal Document)

November 3, 1969
Djakarta

1. Status of the Scheme

1.1 The official name of the scheme is "The Tadjum pilot Scheme" (hereinafter called "The Scheme")

1.2 The Scheme is an integral part of the "Tadjum Irrigation project" (hereinafter called "The project") financed by the Asian Development Bank (ADB) in accordance with the Loan Agreement (Loan No. 12 INO/SF) 1/ and its Side Letters between the Republic of Indonesia and Asian Development Bank dated July 2, 1969.

1.3 The Scheme will be implemented by the bilateral agreement between tween the Government of Japan and the Government of the Republic of Indonesia which will be signed in 1970.

1.4 The periodical reports 2/ of the Scheme will be circulated to all concerned, including the ADB, which will also, from time to time, assist for the successful implementation of the Scheme in providing information and advice.

2. Site and Size of the Scheme

2.1 The site of the Scheme has been chosen at Tinggardjaja and Bantar arca after considering the following factors:

- (a) Representative area of the project (soil, topography, crop, farm size, etc.)
- (b) Visual demonstration effect (near the main road and village center)
- (c) Water control center of main, secondary and tertiary canals
- (d) Constraction schedule (irrigation water will be available in September 1970)

2.2 The size of the Scheme will be about 150 hectares of net irrigated aroa 3/.

3. Scope of Works

3.1 The Scheme aims at providing training and demonstration on the following items so that the practical high level which is also applicable to all the farmers in the project.

- (a) Design and construction supervision of terminal networks 4/
- (b) Operation of effective water management 5/
- (c) Extension of advanced year-round farming techniques
- (d) Organization and operation of farmers' association.

3.2 The farmers outside of the Scheme may also be assisted in receiving advice on the above items upon their request.

4. Work Program of the Scheme

4.1 The Second Japanese Mission will make a detailed design of the Scheme in January 1970. 6/

4.2 The substantial parts of construction work of the Scheme will be started after the agreement is signed 7/ between the Government of Japan and Indonesia, and will be completed in about three months after signing 8/.

4.3 The operation of the Scheme will be started soon after the signing and will continue about five years, subject to interim review, if necessary.

5. Experts and Counterparts

5.1 The Japanese Government will provide the best suited experts, taking into account:

- (a) The Indonesian Government's desire that some of the experts will come preferably from the same consulting firm as for the Tadjum project, and
- (b) The ADB's desire that the technical assistance team should include at least one expert with practical experiences in farmers' organization.

5.2 The Indonesian Government will provide a suitable counterpart for each expert, including several agricultural extension workers.

1/ In accordance with Section 4.03, it is desirable for the Ministry of public works and power to write a letter to the Ministry of Internal affairs requesting special cooperation on the Scheme and the project.

2/ The writer and the period of the report will be decided later.

3 / The gross area will be finalized between 150 to 190 hectares, subject to more detailed investigation to be made by the second Japanese Team in January, 1970.

4 / "Terminal networks" include certinary canals, drainage, ditches, water control works, water measuring facilities, water diversion devices, farm roads, etc.

5 / Including rotational irrigation, if the Sanyu Consultants' study on water requirements so desires.

6 // The Indonesian engineers will in parallel with this work make a detailed design of terminal networks outside of the Scheme, after completing detailed map in December 1969.

7 / From the past experiences, the agreement will be signed in the middle of 1970.

8 / The upstream portion of the main canal (up to B. Td 9) will be completed around September 1970, when the irrigation water is available at the Scheme.

