

提として、現在（平成5年7月末）総ての予算措置は要求していない。

この為、特に、農業農村基盤整備の関連業務については、今後、派遣予定されている中間評価調査団等の協議内容を重点として、変更実施計画を再構築して、新たな実施計画を策定することが重要であると判断している。

5-3 プロジェクトの開発目標

本プロジェクトの農業農村基盤整備の専門家として、計画の策定から生産基盤、土地基盤、農業用施設等の整備の実施、各種建設機械等の導入そして水利用組合の指導に関する農業農村の総合開発の技術協力を実施してきた。

カウンターパートのラフマン氏とともに、郡長、村長、普及員、かんがい指導員等の地方政府職員や農民組織代表そして地元農家と直接対話による計画から実施まで一連の開発構想に参加してもらいながら地域開発を実践してきた。

当プロジェクトの地域開発を実施するために、住民参加の方式を模索し、そしてプロジェクトの開発目標をどの様に考えたかを本項で報告する。

本プロジェクトは、農民参加型プロジェクトと呼ばれている。現在、技術協力における新たな方向として住民参加の開発プロジェクトの重要性が高まることや要望が起こることは時勢にそくしたものだとは考慮していた。

即ち、地域開発に伴う住民とのトラブルの発生や都市への人口の過剰な流入に伴う環境の悪化あるいは社会問題を抱える国においては解決しなければならない問題を避けてとおることは出来ない課題であり当然の帰趨だと判断していた。

しかしながら、受益者や関係者等があらゆる開発計画プロジェクトに、その技術協力の立案から計画、強いては設計、実施あるいは評価に参加することは大変難しい課題だと判断していた。

当プロジェクトの実施を通して住民参加と住民参画とは異なることだと判断した。一般的定義として、住民参加とは行政が住民のリーダー（村長、農民組織の代表、特に、インフォーマル・リーダーを探し出し参加させること）を通じて一般の住民や農民に働きかけていくことと定義づけられる。

一方、住民参画は住民の多くがこの開発プロジェクトが少しでも、自分達に役にたつものに作り上げていく過程に参加するということと定義づけられる。

従って、住民が計画策定に直接参加する、話し合いの場に不特定の住民が一丸となって参加する住民参画型のプロジェクトもあると判断しているが、しかしながら、この場合、見方を代えて言えば、その開発計画をめぐって住民同士の利害が対立することもあるし、開発計画そのものを拒否、否定することもでてくると考慮される。

南東スラウェシ州農業農村総合開発計画については、長期調査員をとおして調査を実施して、そしてプロジェクトを実践した結果、本プロジェクトは行政指導型の農民参加型プロジェクトと位置付けされていると判断している。

当プロジェクトの長期調査員として派遣され、農業省地域事務所、公共事業部の関係職員とともに、実施村の郡長、村長、農業普及員及び中核農民の関係者より調査表に基づき意見を徴収した。回答の中には、鍬や手動の消毒噴霧器が欲しいとした農民達の多くの素朴な要望が提出され、それらを取りまとめ供与機械等の導入計画が策定されている。

農業農村基盤整備に関しては、かんがい施設を中心とする土地基盤施設の整備、精米所や研修施設等をはじめとする農業用施設の建設について、農業省関係者や州政府関係者及び実施村の郡長、村長等からの要望をとりまとめ農業農村基盤整備の全体計画を策定した。又、これら事業実施に必要な開墾用機械の導入を計画した。

長期調査の実施に際して、国家開発企画庁(BAPPENAS)の農業かんがい局長アリラフマン氏との面談の中で、局長より、インドネシアにおいては現在まで多くの資金を投入して基幹かんがい施設を建設したが、何故それに伴って水田開発が行われないのかという素朴な質問が投げかけられた。又、今後わが国の投資は、かんがい施設においてはリハビリ工事を中心とすると言明していた。しかしながら、局長は農地開発、水田造成をどの様にするかについて大いに模索していた。

ここクダリ県の北部では、大規模かんがいプロジェクトが実施、完了している。しかしながら、その計画面積、13,500haの内、約2,000haが農民によって開発されたに過ぎない。公共事業による幹線水路はすでに完成しているため、配水は末端支配面積の上流まで到達しているが、残りの水田開発や3次水路の建設は全て農民自身のマンパワーに委ねているのがこの国の現状である。

この国の1つの労働雇用政策として、有り余る労働人口を吸収するために人力による公共事業の工事積算体目が確立している。例えば、コンクリート容積配合による手練り作業や道路工事の岩掘削等全て人力による積算であり、未だ、碎石採取現場では、大石塊を火で温めた後、水で冷却して小割作業をし石積割石を採取しており、あたかも先人の斧鉞や鑿鑿による道路の開鑿を行っているのが現状である。

即ち、機械使用の積算は未整備であり、言い替えれば機械作業による工事はまだ必要とされていないのが当地域の積算の技術水準である。

畢竟、農地や水田開発については、農家個々に割り当てられた、約2haの土地は全て自力開墾することになっている。しかしながら、地形条件や地形勾配はその場所により大きく異なり、土地や水田の整地を人力のみにより開墾させるのであれば、人力作業の限界を大きく逸脱している。

特に、当地域のように、稲作技術が未熟な先住民族が混在する地区や集団作業が必要となる水路掘削に関しては、本来、相互扶助（ゴトンロヨン）の組織的活動以外の何らかの政策が必要と判断されるが、何等の対策もなく、農家は自らの労力や体力に従って、開墾することを余儀なくされているのが一般の現状である。

勿論、農家個々は自らの農業生産に従事することであり、これらの事がこの地域の農地開発のネックとなっていると判断していた。

このプロジェクトの特徴は、焼畑農耕民のトラキ族が多く居住する村を対象としてスタートしている。このトラキ族は水田稲作農業を知らない先住民族である。この州の民族構成は現在およそ以下のような四つのグループからなっている。

- (1) 南スラウェシ州からの州内移住民；35%
- (2) ジャワ/バリからの政策移住民；18%
- (3) その他の州からの移住民；5%
- (4) 先住民（トラキ族）；42%

南スラウェシ州を含む移住民は全て稲作農業を熟知しており、かんがい稲作農業を行う移住民の村と先住民の村とは水田に関して大きな相違が厳然としてある。

プロジェクトサイトの一つである、サブラコア村を訪問すれば歴然としてその相違が判断でき、村の境界を境にして移住民の美田地帯と先住民の荒涼たる地帯とがあたかも民族の違いを如実にものがたっていることを知ることが出来る。

特に、トラキの先住民族と接して感じたことは、農耕作業に必要な役畜の利用を知らない民族である。このことが何を意味するかを全て説明することは出来ないが、一つだけ知ることが出来るのは、役畜としてバリ牛を使いこなせない親からバリ牛を使いこなせる子は育たないと思ったことである。

依然、先住民族の使いこなせる農具が、一種類の鋤のみであり、先住民族の多くがこの鋤のみで耕作を行っていること、畜力を利用しない水田耕作は、水田の耕起、代かき等が全て人力作業によっていること、そしてトラキ族が労力を必要としないで収穫できるサゴ椰子からのサゴ澱分を食していることなど、他のインドネシア人から、農業について、いまだに愚者として呼ばれていることも事実である。

しかしながら、先住民が低所得者に甘んじている訳ではなく、逆に、多くの地位を占めていること、例えば、村長、郡長そして県知事のほとんどが地元、先住民族である事実もまた現実でもある。

特に、この州を支配していたサルタン（王族）の子孫と称する人達は高い誇りを持っていることも厳粛な真実であり、軍人から就任した新州知事はこの州のムナ島のムナ族のサルタンの子孫であるがトラキ族から見ると傍系と見られている。

先住民が移住民を見ている様子から判断して、どちらの民族が、選民意識や良民意識を強く持っているかを知ることは不可能であったが、ジャワ及び他州からの民族を女中奉公や女でも道路等の土方作業をするものと見ているように感じた。

現在まで実施した、2村のプロジェクトの活動を通して強く思ったことは、この先住民族の農耕あるいは労働意欲が希薄であるとする意見は事実であると思う反面、最初の実施村のラノメト村での供与機材として導入した、歩行トラクターの利用者、操作熟練者が数十名に達していると営農分野から知らされた時は、役畜を使役出来ない農耕民が、小型耕運機を利用した機械化農業に取り組む農民の姿勢には真摯なものがあると痛く感じられた。勿論、反面、機械に関しては、エンジンオイル名との補給も疎かにして、その結果、機械の故障や欠陥のトラブルが続出していることも機械管理分野から数多く知らされていることも事実であった。

現在、この地域の他の多くの場所では、公共事業省によりかんがいプロジェクトが実施されている。しかしながら、先住民族に対する評価は決して高いものではなかった。焼畑農耕民族がどのような変遷の過程から、稲作農耕民族に変貌出来るかといった課題は別として、このプロジェクトは、この先住民族を対象とした農業農村総合開発プロジェクトであり、農業省、州政府及び農村社会が当プロジェクト、特に、日本人に寄せる期待がどの辺にあるのか知ることが出来たと思っている。

農業農村基盤整備の業務を担当したものとしては、当地域の農地開発に関して、地域のニーズにマッチした開発手法を考慮するとともに、機械造成による地域開発計画を策定し、それらの計画に基づき、当プロジェクトでは、ブルドーザ等の開墾機械による農地開発、特に、水田造成を実践展示し、併せて、展示圃場や農道等についても機械による建設工事を導入し農民とともに実践することを計画した。

今後、インドネシアにおいては、農地開発に対して多くの資金援助が行われると判断しているが、当プロジェクトが実践した行政指導型の農地開発手法も農民参加型プロジェクトとして持続性のあるプロジェクト形態と判断している。

このプロジェクトは、農業省官房計画局及び同省地域事務所がその窓口で、この組織は日本式に言えば、地方農政局から計画部と建設部を取り除いた組織となっている。このため同事務所関係者には公共事業の実施計画及び事業費積算の実務経験者は皆無なため、農業農村基盤整備の分野の技術移転を図るため、土木技術系のカウンターパートの参加要請を強力に同事務所にしていた。

一方、州公共事業部の土木系技術員は、日本であれば建設省地方建設部河川課の職員で、土木系職員の本プロジェクトへの参加は、現在行っている供与機械による農地造成や農民グループのプロジェクト活動への参加には是非とも必要と判断していたことと、地方レベルの

組織では地縁血縁が大きいことや、職員の多くはこの州から移動することも余りなく、長期調査員での調査を通じて各省間の軋轢もほとんど感じられないことなどから地元での合同会議の席上、州公共事業部の所長の内諾を得て、同部から農業農村基盤整備のカウンターパートが派遣され配置された。

当プロジェクトで実施した農村開発を言い替えば、海外での土地改良あるいは村づくりと呼べると思う。ハード面の支援においては州公共事業部が行っている、かんがい施設や農業用施設をより一層効果的かつ総合的な建設を一体的に行った。

農地開発については、農業省が主務官庁であることを考慮して、将来の開発計画の策定に必要な、農業農村の開発手法を実践展示した。

プロジェクトでは農民参加方式として、農民自身が開墾機械のブルドーザを操作運転し、水田造成を行い、その後、農家自らが営農機械の歩行トラクターや耕運機を操り水田を耕起し、代かきをして田植えを実施した。

これら一連のプロセスを農業省や公共事業省の職員が共に経験したことによる他地域への啓蒙あるいは農民が農地や農道の開発に対する手法を学びとっていく過程から、一步前進した地域開発の知識を習得出来るよう心がけてきた。

プロジェクトの開発目標が広く周辺地域に波及伝達するようにまた省庁間の枠内で出来る範囲の事業を計画し、指導し、支援してきたつもりである。

現在、州政府や開発企画部（バベダ）が本プロジェクトによせる期待は多大なものがあり当面のプロジェクトの関連としては、州予算による事務所会議室の増設、現地の宿泊施設の新設及び地図作成等、当プロジェクトの計画、目的及び総合開発の重要性が認識されていると判断している。

特に、州政府そして公共事業部は、この南東スラウェシ州農業農村総合開発計画の小規模プロジェクトの総合開発の実践展示から啓蒙及び啓発され、ワオトビ郡及びウナハ郡の大規模かんがいプロジェクト地区の一部の地区を当プロジェクト地区へと追加編入としての要請が現在なされている。

この要請は以下の三つの要旨からなっていると考慮している。

- (1) 営農・栽培技術の指導
- (2) 営農機械の維持・管理と研修
- (3) 機械による土地開墾・農地開発

現在、本要請に関しては、当プロジェクトの実施機関は農業省地域事務所が管轄しており、今後、地元での合同会議を踏まえて、JICAより派遣される中間評価調査団の判断に委ねることとしている。

しかしながら、農業農村基盤整備を担当したのものとしては、インドネシアの公共事業を担

当しているものから本要請がなされたことに対して州政府及び公共事業部の開発政策を実施している関係各位に敬愛の念と敬意を表している。

当プロジェクトは、前州知事の地域開発プロジェクト政策である、ゲルサマタの総合農村開発としては位置付けされスタートしている。

この政策の基本的目的は、農業部門における生産性の向上、社会経済的インフラの整備、農業技術の発展とその応用、社会環境の質の改善、農村社会生活の向上を目標としたものである。

即ち、地域社会がストックする財及び農具の効率的な活用を図ることによってローコストの農村開発を実現させるとした基本姿勢を貫こうとしており、この政策は、地域の均衡ある発展を目指したものであり、大規模な資本や高度な技術を必要としないで地域あるいは経済開発を実践したいとしたものである。

当プロジェクトは農民参加型或いは現地密着型プロジェクトとして、それぞれの観点から、現地事情を把握しながらこれらを考慮して、地域開発、営農指導、農業農村基盤整備、施工管理・農地開発、機械操作・維持管理そして農民組織強化の各日本人専門家が直接現地に入り込み「肌理の細かな配慮」と「心のこもった援助」を検証そして実践しているものである。

今後、当プロジェクトが持続していくためには、州政府の地域開発政策が大きく係わってくると思っている。また州政府農業省地域事務所の予算措置がどの様に推移するか今後を待たなくてはならないとも思っている。

当地域には広大な未利用地、低利用地の丘陵地が数多く賦存している。しかしながら、これらの地域は先住民族による焼畑農業により、その森林の多くが焼却あるいは破壊されたアラランの耕作放棄地である。これら地域の有効利用、農用地の改良、農地開発、自然環境や森林保全等の対策が急務であると思われる。

幸いなことに、新州知事のもと、州政府の新たな開発政策が農村の地域開発と森林の保護を促進する計画となっており、将来、州政府や農業省地域事務所の地域開発政策として、当プロジェクト開発援助のプロセスが反映されることを希望するとともに、農用地の改良、開発、自然環境保全等を適正に実施する開発事業そのものを当地域で実践展示されることを関係各位に期待している。

F I N A L R E P O R T

**INTEGRATED AGRICULTURAL AND RURAL
DEVELOPMENT PROJECT
IN
SOUTHEAST SULAWESI PROVINCE
THE REPUBLIC OF INDONESIA**

July 1993

Tatsuo MATSUNAKA

JICA expert in Agricultural and Rural Infrastructure

Japan International Cooperation Agency

Preface

At the request of the Government of Indonesia, I was dispatched as an expert on agricultural and rural infrastructure by Japan International Cooperation Agency (JICA) to Indonesia for a period of two years and two months from June 5, 1991 for the Integrated Agricultural and Rural Development Project in Southeast Sulawesi Province.

As is well known, this project is carried out for the project type technical cooperation during development for the five years period from March 1, 1991 to February 28, 1996 through JICA between the Government of Japan and the Government of Indonesia. The Provincial Government of Southeast Sulawesi is implementing to improve the agricultural productivity and technology, rural infrastructure, farmers' living standard of village in accordance with the rural development program. In this project, eight villages are chosen as model villages from surrounding regional areas.

I have been engaged in the development of two villages as JICA expert and I have been working together with my counterpart such as formulation of development and structure planning, structure design and cost estimation, implementation of construction works, training and so on.

Working in JICA project office the past about two years has given me great deal of experience as well as pleasure. I have enjoyed being able to work with you, and I would like to take this opportunity to thank you for everything you have done for me during these years.

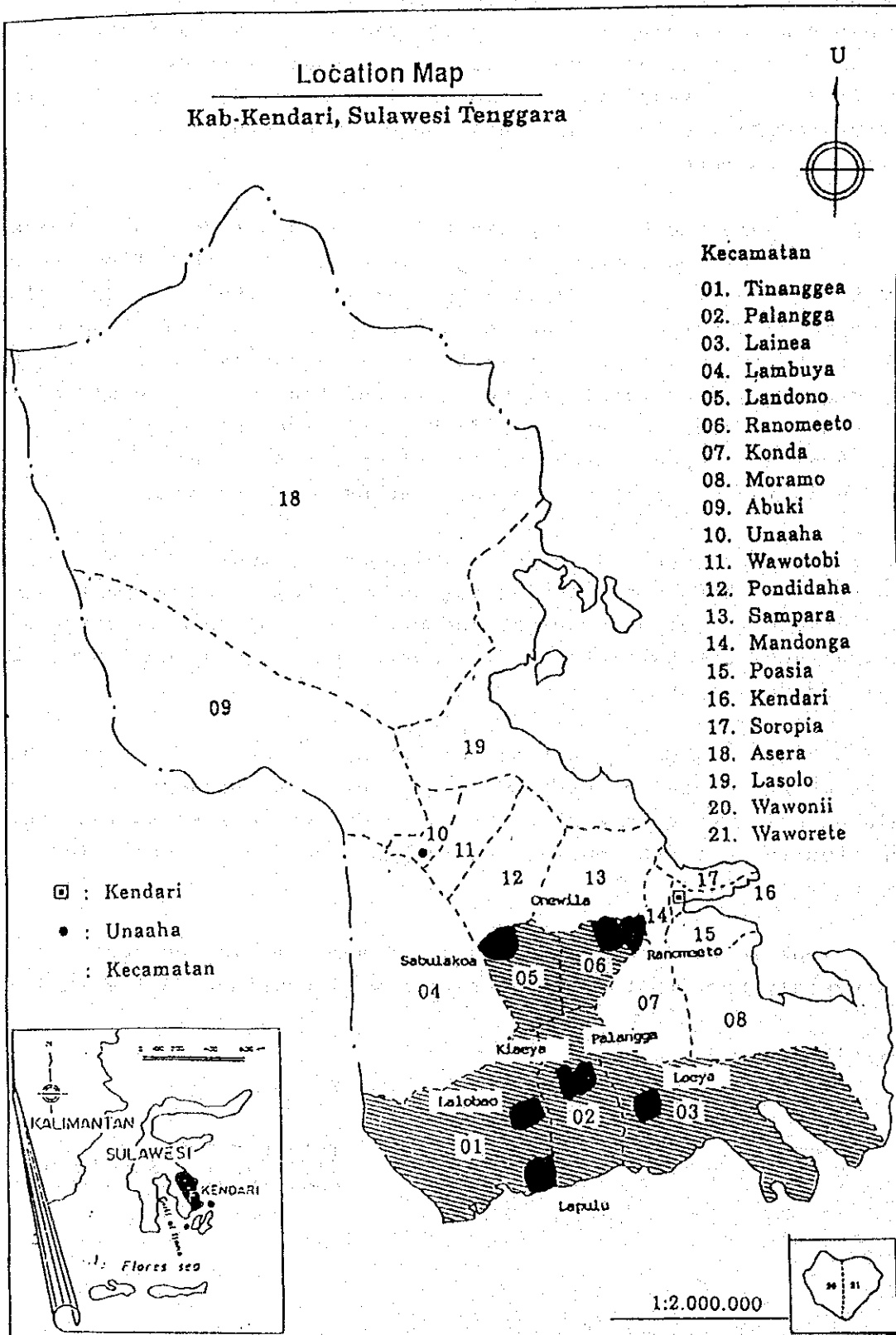
I look forward to seeing you again sometime in the Japan, and I sincerely hope that our cooperation will continue in the future.

July 1993

Yours sincerely,

Tatsuo MATSUNAKA
JICA Expert, Agricultural
and rural infrastructure

Fig 1



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I Introduction

1. Background

The Government of Indonesia is trying to establish the appropriate methods of rural and regional development which is useful for the promotion of the Integrated Agricultural and Rural Development Plan in Southeast Sulawesi in line with GERSAMATA Program, and to the balanced regional development and poverty alleviation which occupies important positions in the 5th Five-Years National Development Plan (REPELITA V) of Indonesia.

The implementation of rural development by the GERSAMATA strategy gives priority to five basic targets, as follows;

- (1) Increasing the productivity of all aspects of the agricultural sector.
- (2) Supplying and increasing the physical and socioeconomic infrastructure
- (3) Developing and applying rural technology.
- (4) Improving the quality of the environment
- (5) Increasing the quality of life of the rural society.

The Integrated Agricultural and Rural Development Project is surely now carried out for the project type technical cooperation between the Government of Japan and the Government of Indonesia. This technical cooperation project accept as the grass roots project in line with GERSAMATA program in the Southeast Sulawesi Province, and progress of study are as follows:

The Ministry of Agriculture carried out basic study for rural agriculture development together with Japan basic survey team in the Southeast Sulawesi Province from August 1989 to March 1990. As a result of basic study, the Government of Indonesia requested development study and technical cooperation for the integrated agricultural and rural development plan to Japan.

The project formulation team was dispatched by Japan International Cooperation Agency (JICA) through the Government of Japan at March, 1990, and this project was adopted the 14th annual consultation on technical cooperation and grant aid between both Governments at June, 1990, and long term survey team dispatched at September, 1990.

The Japanese Implementation Survey Team organized by JICA visited for the result of long term survey to the Republic of Indonesia from January 16, 1991 to January 26, 1991. This project are started base on the Record of Discussion and Tentative Schedule of Implementation between the two governments which was agreed at March 1, 1991 for the term of five years cooperation.

The Provincial Government is implementing to improve the agricultural productivity and technology, rural infrastructure, farmers' living standard of village in accordance with the rural development program in regional areas. The Japanese Technical Cooperation shall be implemented to assist on this trial of rural development program in the Southeast Sulawesi Province.

2. Location

The Integrated Agricultural and Rural Development Project set up 8 villages in 5 sub-district of Kendari district, southeast Sulawesi Province located south eastern part of Sulawesi Island (See Fig 1).

Location of kendari, which is capital city of its province, is direct distance approximately 1,800 km from capital city Jakarta, and time difference is 1 hour.

Each project sites are good connection by provincial main road or district road and Ranomeeto, Onewila villages are near form kendari city, but other villages namely, Palangga, Kiaea, Lalobao, Lapulu, Laeya, Sabulakoa is very far from capital city.

Each villages is not electric facilities, water supply, telephone and the physical infrastructure is still very limited. The income of agriculture is still very low and the living environment is still very poor condition in the villages.

Total areas of kendari district are approximately 16,480 km², and its population is 488 thousand persons in 1989 and over 27% of total population live into the three sub district around kendari bay.

Its agricultural land area is approximately 230 thousand ha, and paddy area call about 30 thousand ha, but existing paddy field is over 11 thousand ha and also irrigation paddy field is only 27% in existing areas.

Secondary food crop area is 56.8 thousand ha and estate crop area is 142 thousand ha, its total upland crop area cover 95% in agricultural land areas, and also paddy field is only its 5%.

Each villages is situated along the provincial main road, and there are extensive along-along area between villages, and it is found small paddy field and upland crop field around areas.

This project will make the land reclamation for paddy and secondary crop of the total area about 230 ha by machinery, and the total development area with the project is about 1,500 ha.

3. Purpose

The project will be carried out for the purpose of introducing the knowledge and technology for the appropriate agricultural and rural development in low developed regions. It is based on the natural and social conditions in rural area, aiming at the increase of farmers' income and the improvement of their living standard by the higher productivity and the diversification of agricultural production.

The project will be also implemented for the objective of strengthening the ability of local government staff and key farmers, the farmers who live in rural area of project site will participate the project implementation and activity by themselves.

In accordance with the purpose of project, the technical cooperation project by Japanese side, four items are as follows;

(1) Dispatched of Japanese expert

Team leader (regional planning), Coordinator, Agricultural and rural infrastructure, Construction and land reclamation, Farming guidance, Operation and maintenance of machinery, Farmers' group strengthening. Short term experts are dispatched when necessity arises for the smooth implementation of the project.

(2) Training of counterpart in Japan

Indonesian counterpart connected with the project can acquire necessary knowledge and experience from technical training in Japan

(3) Provision of equipment and machinery

Construction machinery, Agricultural machinery, Instruments & materials for the training activities, Vehicles & Motorcycles, Other necessary equipment and materials for the project.

(4) Special measures

For the smooth implementation of the project, Japanese side take necessary measures for a portion of local cost expenditure of middle-level technicians and key-farmers and for the construction and improvement works of physical infrastructure.

4. Activities of technical cooperation

The Record of Discussion for the project was signed by both Government at January 26, 1991 for the implementation of the Integrated Agricultural and Rural Development Project in Southeast Sulawesi Province. Technical cooperation is implementing in line with the following five activities.

(1) Planning of integrated agricultural and rural development

- Land use plan, cultivation and farming plan
- Agricultural and rural infrastructure development plan

(2) Development of agricultural and rural infrastructure

- Basic agricultural infrastructure
- Agricultural and rural facilities

(3) Demonstration of cultivation and farming techniques

- Paddy
- Secondary food crops
- Estate crops

(4) Strengthening of farmers' group

(5) Training of regional and provincial government officials, extension workers and key farmers

In accordance with five (5) years frame work plan, the Minutes of Discussions was signed by consultation survey team, at Jakarta on March 6, 1992 and attached next page.

FIVE (5) - YEARS FRAME WORK PLAN
IN THE INTEGRATED AGRICULTURAL AND RURAL DEVELOPMENT PROJECT IN SOUTHEAST SULAWESI PROVINCE (ATA-481)

(1/3)

	First (1st) Year 4/91	Second (2nd) Year 4/92	Third (3rd) Year 4/93	Fourth (4th) Year 4/94	Fifth (5th) Year 4/95
<p>I. t e a</p> <p>I. Planning of the integrated agricultural and rural development</p> <p>1. Planning of land use farming system</p> <p>1) Land use</p> <p>a. Survey on land use</p> <p>b. Land use plan</p> <p>2) Farming system</p> <p>a. Study on farm management technology</p> <p>b. Farming plan</p> <p>2. Development planning of agricultural and rural infrastructure</p> <p>1) Land survey</p> <p>a. Field survey on sites</p> <p>b. Topographical mapping</p> <p>2) Plan and design</p> <p>a. Land reclamation</p> <p>b. Basic agricultural infrastructure</p> <p>c. Agricultural and rural facilities</p> <p>II. Development of agricultural and rural infrastructure</p> <p>1. Development of basic agricultural infrastructure</p> <p>1) Land reclamation</p> <p>a. Land reclamation by machinery</p> <p>b. Construction management</p> <p>c. Machinery operation and maintenance</p> <p>2) Basic agricultural infrastructure</p> <p>a. Work execution</p> <p>b. Construction management</p> <p>2. Development of agricultural and rural facilities</p> <p>1) Work execution</p> <p>2) Construction management</p>	-----	-----	-----	-----	-----

(Remarks): -----; Desa Ramecto -----; Desa Palangga -----; Desa Kiaeva, Desa Lalobdo -----; Desa Laveya, Desa Lapulu -----; Desa Onewila, Desa Sabulakoa -----

I t e m	First (1st) Year 4/91	Second (2nd) Year 4/92	Third (3rd) Year 4/93	Fourth (4th) Year 4/94	Fifth (5th) Year 4/95
III. Demonstration of cultivation and farming techniques 1. Trials on improved farming technology					
2. Demonstration and extension of farming technology 1) Paddy 2) Secondary food crops 3) Estate crops					
IV. Strengthening of farmers' group 1. Study of farmers' group activities 1) Present activities in the village 2) Review of the village formation					
2. Formation and strengthening of farmers' group on the construction activities 1) Group formation 2) Counseling					
3. Supporting activities for strengthening of farmers' group					

(Remarks): _____; Desa Raoneeto _____; Desa Palangga _____; Desa Kiaeva, _____; Desa Lapulu _____; Desa Onevila, _____; Others _____
 _____; Desa Laloabao _____; Desa Sabulakoa _____

I t e m	First (1st) Year 4/91	Second (2nd) Year 4/92	Third (3rd) Year 4/93	Forth (4th) Year 4/94	Fifht (5th) Year 4/95
<p>V. Training of government officials, key farmers and farmers' group</p> <p>1. Planning method of agricultural and rural development</p> <p>1) Agricultural and rural development plan</p> <p>2) Land reclamation</p> <p>3) Machinery operation and maintenance</p> <p>2. Farm management and cultivation techniques</p> <p>1) Paddy</p> <p>2) Secondary food crops</p> <p>3) Estate crops</p> <p>4) Diversification system</p> <p>5) Water management</p> <p>3. Farmers' group</p> <p>1) Strengthening of farmers' group</p> <p>2) Strengthening of rural women's group</p> <p>3) Improvement of rural life</p> <p>4. Other training</p> <p>1) Farmer's youth training</p> <p>2) Less experienced farmers training</p> <p>3) Farmers' day</p> <p>4) Study tour to improved farming area</p>					

(Remarks): _____ :Desa Raoneeto _____ :Desa Palangga _____ :Desa Kiaera, _____ :Desa Laeya, _____ :Desa Onevila, _____ :Desa Sabulakoa _____ :Desa Lapulu _____ :Desa Lalloao _____ ; All desa

5. Assignment of agricultural and rural infrastructure

In accordance with the purpose and activities of technical cooperation for the project, the field of the agricultural and rural infrastructure will carry out the technical guidance in respect of following items.

(1) Formulation of development and structure plan

- Survey planning
- Infrastructure facilities planning
(Irrigation, Farm road, Land reclamation, etc.)
- Agricultural and rural facilities planning
(Seed storage facilities, Rice mill & Dry yard, Auction yard & Cattle fattening yard, Training hall, etc.)

(2) Structure design and cost estimation

- Survey work and design
- Infrastructure facilities design
(Irrigation system, Farm road, Land reclamation, including provided equipment and machinery)
- Agricultural and rural facilities design
- Cost estimation
(Estimated criteria, Basic price, Unit price)

(3) Executing method of construction works

- Directed construction works
(Farmers' participation, Foremans' construction, Direct works by machinery)
- Contract works
(Contractor, Contract document)

(4) Training plan

- Water management
- Study tour

(5) Others

The assignment of agricultural and rural infrastructure is implemented in accordance with the land development plan and agricultural and rural infrastructure improvement plan for the eight (8) villages in five (5) sub districts of kendari district which is summarized in the cooperated contents. (See table.1)

The technical guidance will be carried out within the term of five years cooperation that is based on the five (5) years frame work plan (Tentative Schedule of Implementation: TSI) for the Integrated Agricultural and Rural Development Project.

Consequently, It is important that personnel concerned of the project shall develop mutual understanding and cooperating for the technical guidance and leadership of the related special each field which is shown in outline of the plan. (See Fig.2)

For the agricultural and rural infrastructure, according to regional development plan and progress of the executed project, is working out the total plan such as formulation of development and structure plan from consensus of farmers opinion, farmers participation for planning, review for planning factor, collect for observation data and structure design.

In accordance with the total plan of each villages, guidance for operation & maintenance and implementation of construction works will be carried out by the portion of local expenditure of middle-level technicians and key-farmers and of the improvement works of physical infrastructure from Japanese side.

Especially, For the formulation of farmers' institution, when irrigation works completed at executing village, shall implement to hold technical guidance for the training of water management and to be establishment of water users' association through the farmers' participation and cooperation for the project.

Table 1

Land development plan and Agricultural & Rural infrastructure improvement plan

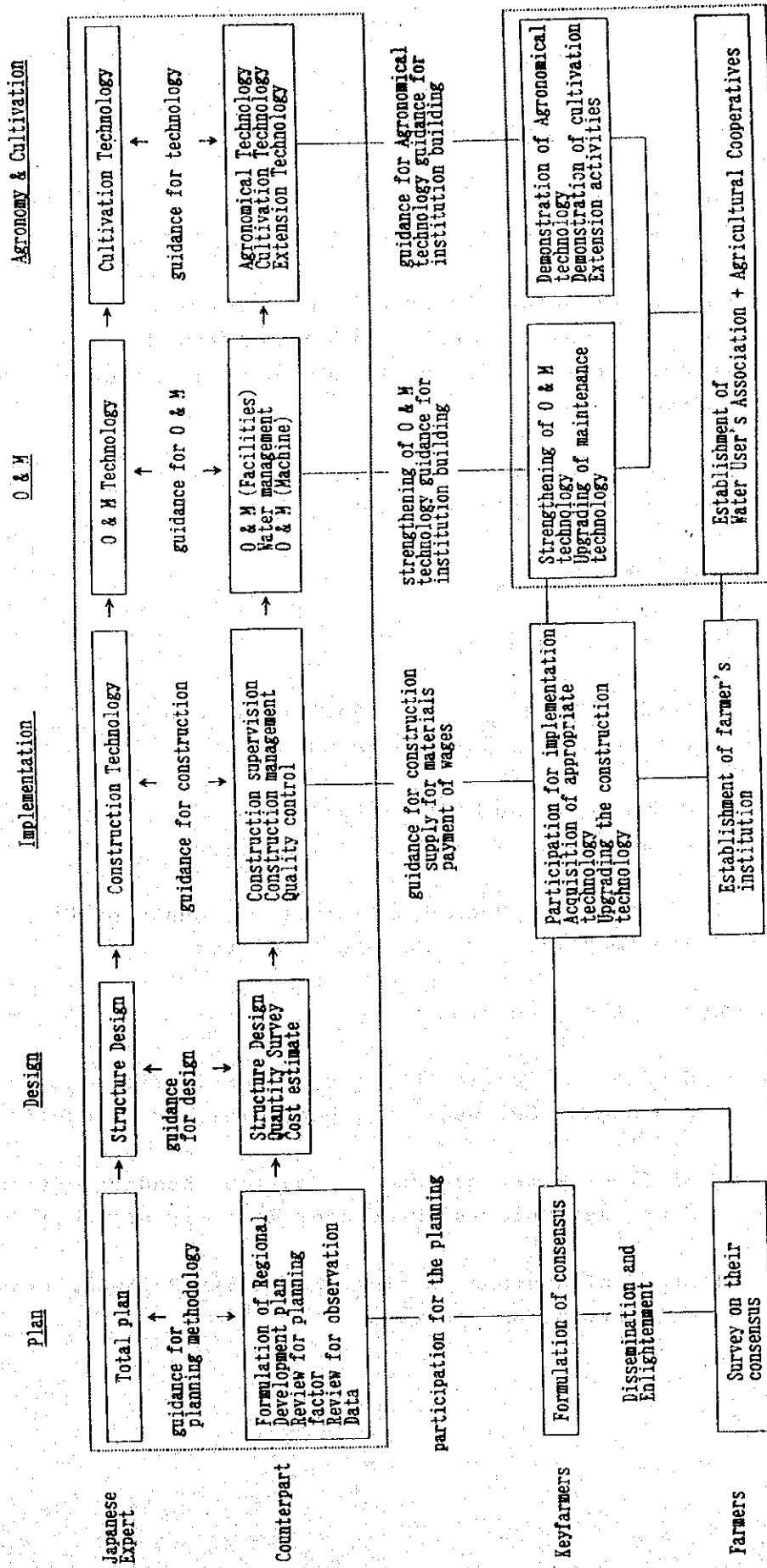
No	Name of sub district	Tinangga		Palangga		Lainea		Landong		Ranoneeto		Total
		Lalobao	Lapulu	Palangga	Kiaea	Laeya	Sabulakoa	Ranoneeto	Onewila			
I	Agricultural Land Area in Project											
I-1	Existing & development potential area	26ha	139ha	60ha	30ha	--	--	--	--	35ha	7ha	297ha
a	Area of existing paddy field	120ha	100ha	120ha	200ha	--	--	250ha	--	150ha	100ha	1,040ha
b	Potential area for paddy field	50ha	80ha	80ha	70ha	--	180ha	--	--	--	--	460ha
c	Potential area for secondary food crops and estate crops											
I-2	Development area with the Project	25ha	30ha	20ha	20ha	--	--	30ha	--	25ha	20ha	170ha
a	Land reclamation for paddy field	10ha	10ha	10ha	10ha	--	20ha	--	--	--	--	60ha
b	Reclamation of sleeping land for secondary food crop & estate crop											
II	Infrastructure facilities											
1	Improvement	3,500m	2	1,300m	2,000m							11
2	Intake weir (check dam)	6	4,000m	1,300m	4,700m			5,500m		2,500m	4,000m	24,800m
3	Irrigation canal (earth canal)	9	6	3	7			7		6	5	40
4	Diversion structure	9	5	3	17			12		6	2	59
5	Drop structure											
6	Drainage canal	2,600m	3,000m	1,700m	2,900m		6,200m	5,000m		1,500m	4,000m	5,500m
7	Farm road	4	4	7	3		5	1		5	6	25,300m
8	Bridge (semi permanent)	10	12	7	8		25	20		15	8	30
	Culvert											105
III	Agricultural and rural facilities											
1	Improvement	--	--	--	--							2
2	Auction yard for cattle	--	1	1	1		1	1		1	--	5
3	Cattle fattening yard	--	1	1	1		1	1		1	--	5
4	Seed storage facilities	--	1	1	1		1	1		1	--	5
5	Rice mill house	1	5	2	1		5	2		2	1	13
6	Dry yard	1	1	2	1		2	2		2	1	10
7	Training hall	1	5	2	1		5	2		2	1	13
	Well facilities	1	1	2	1		2	2		2	1	10

Development Type in the Villages

Ranoneeto Village : Integrated agricultural and rural improvement in suburban city
 Palangga & Kiaea Villages : Rural improvement by compound farming such as secondary crop, estate crop and paddy
 Lapulu & Lalobao Villages : Integrated agricultural development in rural area by secondary crop promotion
 Laeya Village : Sleeping land development for secondary crop, estate crop, livestock and livestock promotion
 Sabulakoa Village : Land development for paddy field by agricultural infrastructure improvement
 Onewila Village : Land development for paddy by drainage improvement

Fig 2

Outline of the Integrated Agricultural and Rural Development Project in Southeast Sulawesi Province



6. Specification for the post

1) Post title

Expert on Agricultural and Rural Infrastructure

2) Duties for which the expert was responsible

To be responsible for transfer to knowledge and technology through training in the field of agricultural and rural infrastructure

3) Period of service

From June 5, 1991 to August 2, 1993

7. Counterpart

1) Name of the counterpart

a) Suyadi, M.Eg (Part time counterpart)

From June 15, 1991 to August 2, 1993

b) Rahman Garahama, BE (Full time counterpart)

From October 4, 1991 to May 12, 1993

c) Ir. Prasetyo Budi R (Full time counterpart)

From May 12, 1993 to August 2, 1993

2) Post of the counterpart

a) Haed of Irrigation Section, Kendari office,
Southeast Sulawesi Province, Ministry of Public Work

b) Staff of Water Management Section, Kendari office
Southeast Sulawesi Province, Ministry of Public work

c) Staff of Regional office, Southeast Sulawesi Province
Ministry of Agriculture

II. Ranomeeto village

1. Outline

Ranomeeto village of Ranomeeto sub-district located south western part of kendari district is about 22 km from kendari city and along the provincial main road on the way to kendari airfield. The development type of Ranomeeto village, which is first priority of this project, is the integrated agricultural and rural improvement in suburban city.

As shown in Fig.3, the project site is into central flat land, and there are district office, village office and other public institution along the provincial main road, and the topography of Ranomeeto is low mountainous area of 200 m about sea level in the northern part and flat land area thus rather gradient of 1/200 in the southern part. The small several rivers, rising in the hill area, flow down in the village and empty into the poor drainage area where is on the lower reaches in the river.

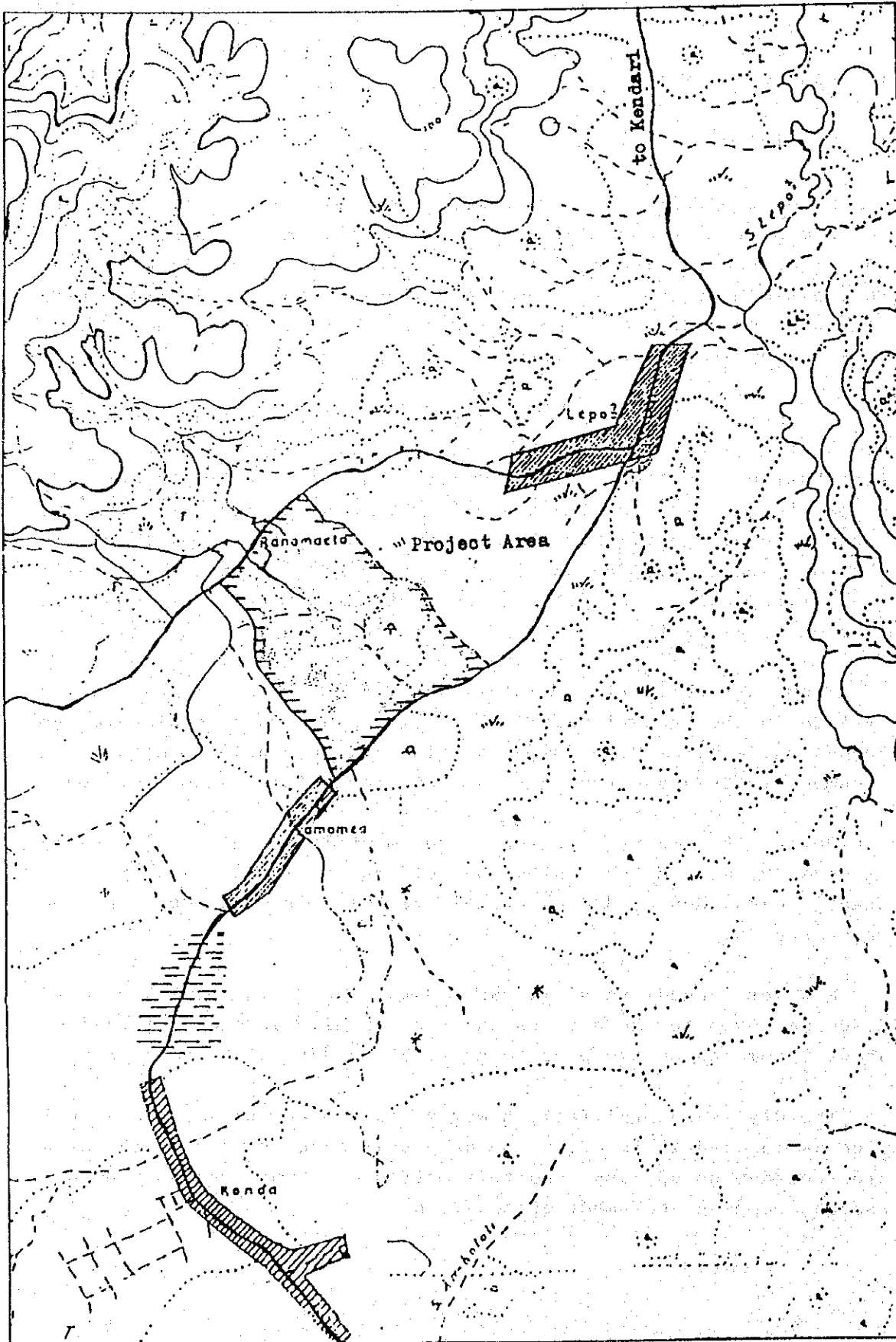
From past 20 yearly rainfall data (Annex Data) of observation station in the kendari airfield, this area has total average annual rainfall of 2,000 mm, the rainy season usually lasts from December to July and the dry season from August to November.

During the rainy season, the monthly rainfall generally exceeds 200 mm and the monthly day of rainfall is usually more than 15 days. Hence, 3/4 of annual rainfall is recorded in the rainy season.

However, annual rainfall has a data recording from 1,300 mm to 2,700 mm, even in the dry season, the monthly average rainfall of about 70 mm can be expected to cultivate paddy with rain water.

The dry season rainfall, however, is subject to a large annual fluctuation and it is often the case that succession no-rain days are recorded on 60 days, and this matter can not make the dry season cropping and paddy cultivation.

Fig 3



At present, a part of the area is used for paddy cultivation, and the remainder is composed of village areas, secondary crop garden, and the great part of other area is along-along fields and swamp areas which the rainy season can not use boundary farm road in the village.

Its population is about 1.8 thousand persons, according to statistics are 326 households and 312 farmers' households at period 1992, there are 9 farmers' group in the Ranoneeto village. Tribes of villages' farmers, 54% of the farmers living village are for aborigine who call Tolakinese and 34% for Javanese immigrants from Java island and 12% for other provincial settlers.

2. Planning

The long term survey team, which was dispatched by JICA at September 1990, formulated the framework of land development plan and agricultural & rural development infrastructure improvement plan for the project, during its stay in the Indonesia, the team exchanged views and had discussion with the Indonesian agencies concerned through the reconnaissance and field study of present condition in the project regional areas.

In accordance with progress of the study, the project plan formulation is working out the detail total plan and implementation plan in respect of the farmers' participation and cooperation. The procedures of this project planning are as shown in Fig.4.

Field investigation grasp at first step the problem in the project area, and project feasibility is evaluated from the result of field investigation, and the basic policy for the project is established in the relation to the future rural development policy and related future plan that are prepared by provincial government and public works.

The detailed survey plan is made in line with the basic policy for the future project and the result of field reconnaissance. Project planning and design is made based on this detailed survey.

Fig 4

Flow - chart of planning, design, cost estimate and implementation

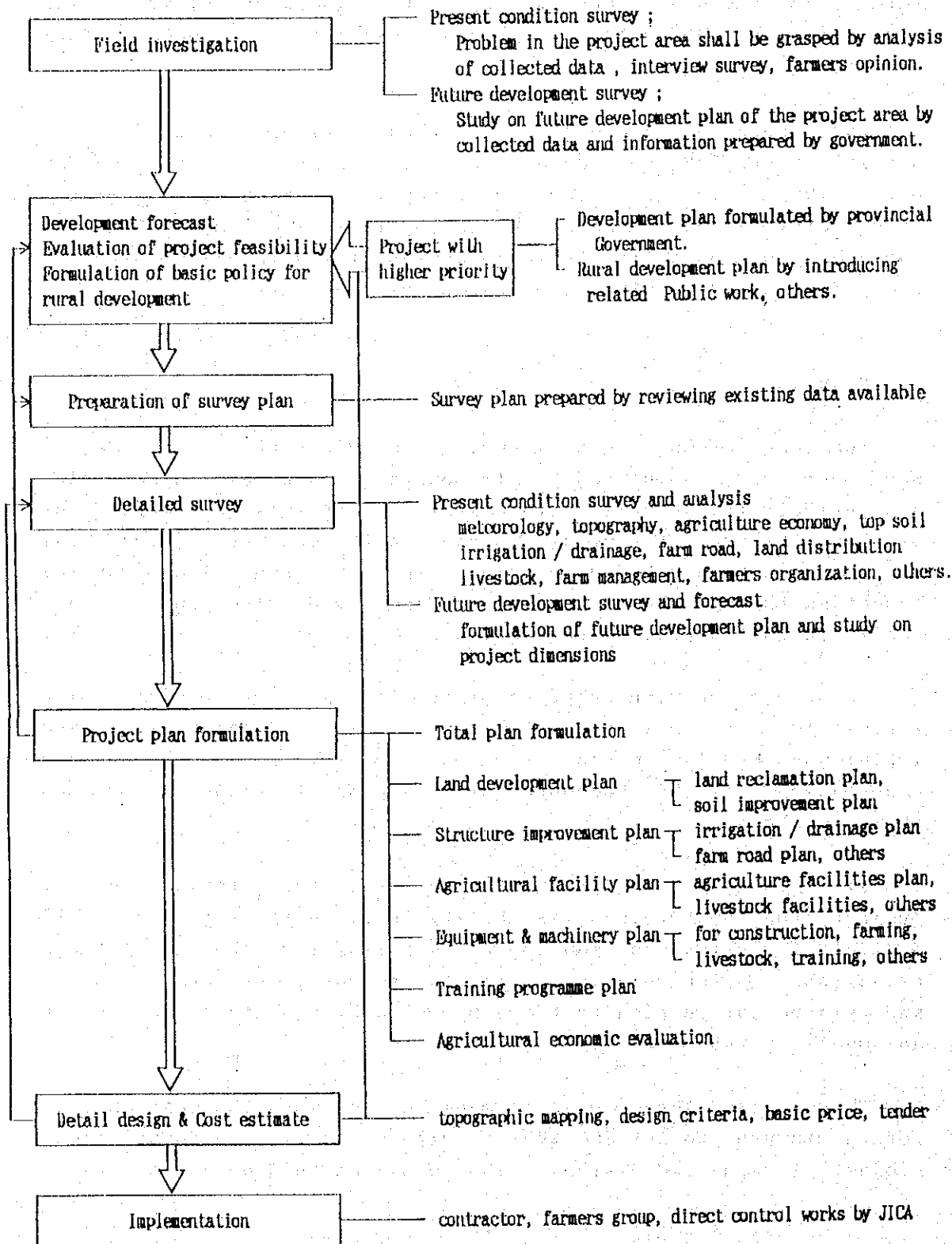
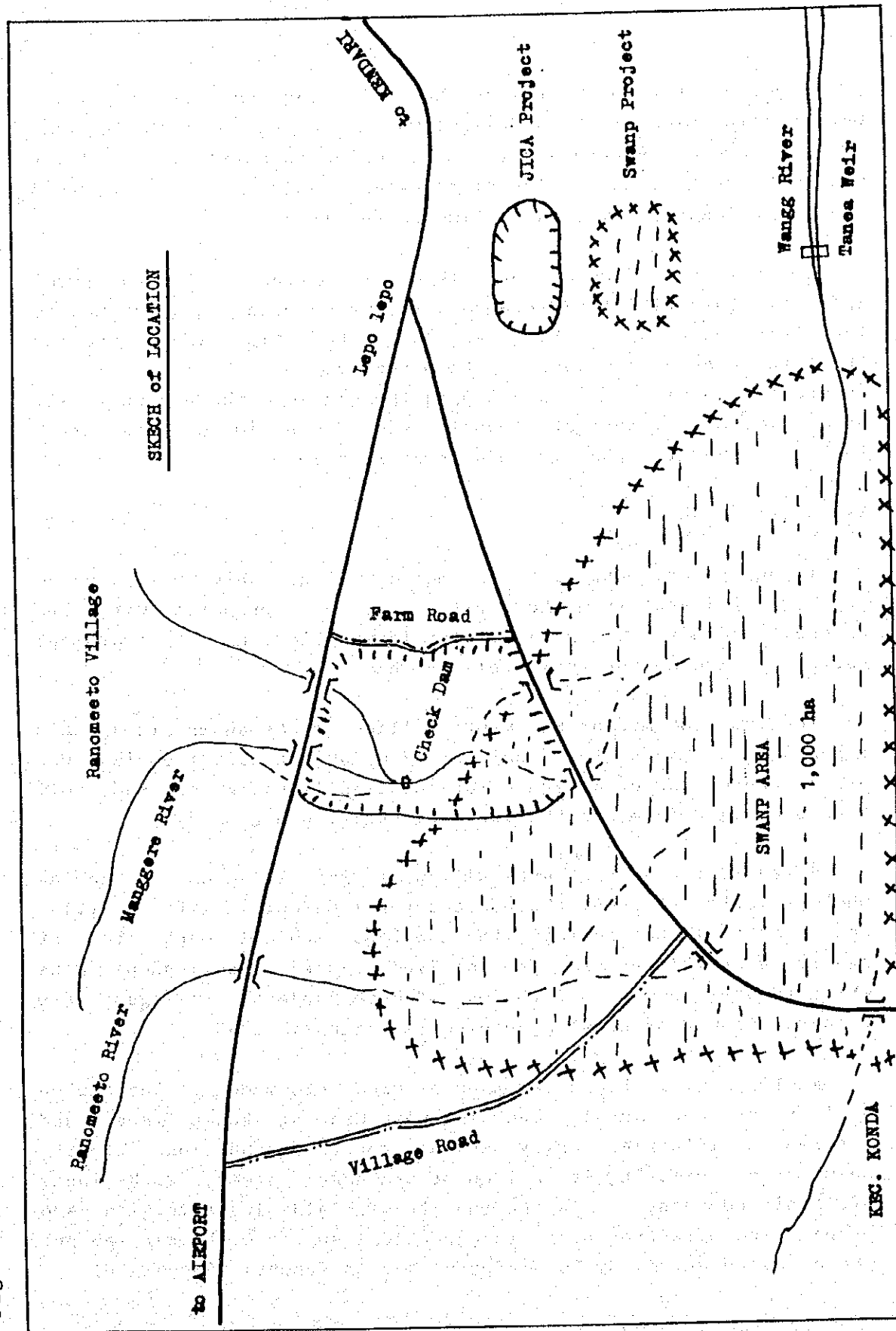


FIG 5



However, this does not mean that planning and design start before completion of the detailed. On the contrary, planning and design can always proceed parallel to the investigation, and any new problems happened during planning and design may be surveyed and investigated from time to time as required.

Above mentioned here, the field of agricultural and rural infrastructure will formulate such as survey plan, infrastructure facilities plan, agricultural and rural facilities plan based on the total plan considered long term survey.

In accordance with the project plan formulation, the project will be carried out by the detail design and cost estimate, and after that also executed the implementation works.

2.1 Survey plan

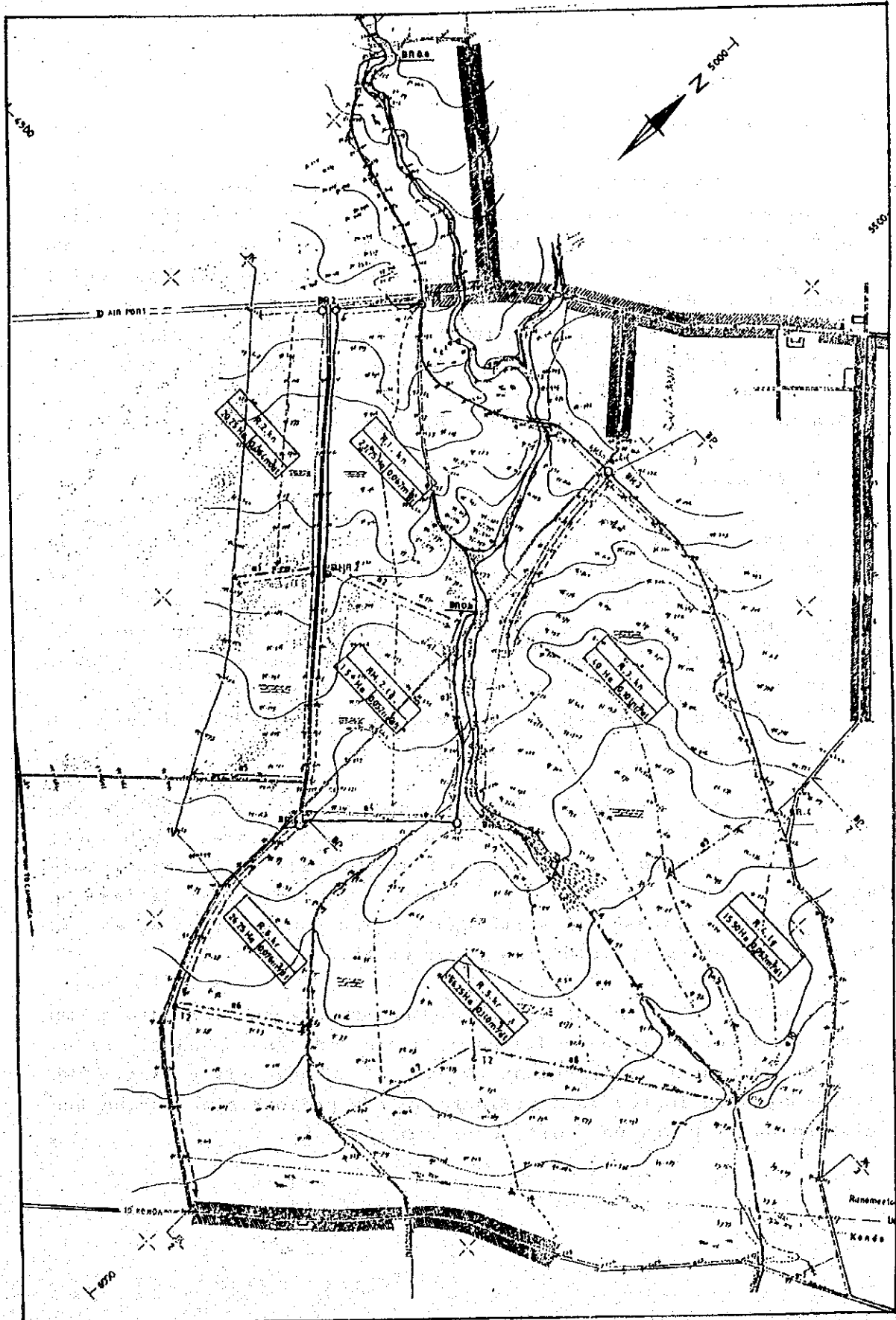
Topographical mapping of Ranomeeto village, which was selected as "Model village" from the rural area, was prepared with the necessity required for project plan formulation, and topographical survey carried out approximately 250 ha.

The location map of Ranomeeto village are as shown Fig 3, this topographical map on the scale of 1/50,000 can gain from land use office where draw up a figure for the classification of land, soil analysis, land-form and the land registration etc.,.

However, these topographical maps is made based on the aerial photogrammetry at 1966, there are several defect in its plotting and it is still not perfect, the now topographical maps are not available in this areas. The received figure, these land use maps which request to make out the map of each project villages, are prepared from provincial government at January, 1993.

At first, for the survey plan of Ranomeeto made out the sketch of location (See Fig.5), according with drawing sketch maps, and carried out interview survey such as general conditions of the swamp areas, existing irrigation or drainage systems, with local officials concerned. As the results of field investigation and preparation of survey plan, topographical survey works carried out the detailed survey by local consultant in kendari (See Fig 6)

Fig 6



2.2 Infrastructure facilities plan

In accordance with the results of the detail field survey, for the infrastructure facilities plan of Ranomeeto formulated with the counterpart on the agricultural and rural infrastructure, and also work out the irrigation planning such as intake weir, diversion and drop structure, irrigation canals, and so on. For the planning of farm road in the site carried out with local officials concerned and interview survey from farmers' group, and for the land reclamation of the paddy or demonstration field is planning to the discussion with other experts field .

(1) Irrigation

Irrigation facilities improvement plan of Ranomeeto village worked out the development potential areas about 200 ha, and site of intake weir planned to obtain from the Mununggere river, and its catchment areas are about 18 km², but based on the data of hydrology, normal discharge in this river can be say 0.36 m³/sec. The method of detail design in irrigation project are using based on the planning and design criteria from directorate of irrigation section, Ministry of Public Works.

The planning of the irrigation scheme carried out during the discussion with irrigation office in southeast sulawesi province. Intake weirs' (head works) structure is to build by the wet stone masonry of gravity fixed type. Main and secondary irrigation canal are to make out all earth canal. The construction works is to plan executing by mainly manpower works.

As shown in sketch of location, the Mununggere flow into swamp areas, and there are poor drainage basin in the project site. For the drainage improvement works of Wangg river shall be implemented to improve the drainage in the project site during the discussion with drainage office of public works.

(2) Farm road

Farm road plan of Ranomeeto village formulated the main access road for the management of irrigation facilities and basic design of road structures planned gravel pavement type, but other farm roads worked out earth pavement, and embankment materials of the road obtained from borrow pit in the project area. For the abutment of the road bridge is to build by the wet stone masonry, and also the slab of bridge make out by wooden. Route plan of road is present route line of existing road, and construction works is carried out by machinery.

(3) Land reclamation

Land reclamation plan of Ranomeeto village, determined to develop the paddy field of about 25 ha, and one field lot area of paddy field planned about 1,000 m² for one unit area. The layout of irrigation canal, farm road and farm land block are all closely related with natural condition of the existing paddy field in this areas, and it is necessary to consider the present executing development plan and the future formulated development policy.

For the this project, based on the result of consideration for present condition of paddy field and farming technics of paddy cultivation, the irrigation system of terminal lots are rotational irrigation and plot to plot irrigation, so it is necessary to make out the embankment of ridge and the excavation of tertiary unit canal by farmer themselves (Swadaya or Gotong Royong).

Swadaya consists of two words that is, Swa meaning "Self" and Daya meaning "Power" or "Capability". Swadaya means, to do or to complete an activity for achieving the certain goal through the cooperation and the capability of farmers group without external assistance. Swadaya arise from the basic characteristic of the Indonesian culture of Gotong Royong.

Soil improvement plan for the land reclamation of secondary crop or estate crop are formulated from soil analysis by short term expert together with counterpart.

2.3 Agricultural and rural facilities plan

In accordance with the detail total plan, agricultural and rural facilities plan of Ranomeeto village is planning such as seed storage facilities, rice mill, dry yard, auction yard, cattle fattening yard, training hall and well facilities.

The main items of the agricultural and rural facilities plan, how to decide the location of each facilities and how to manage the operation and maintenance for the after constructed structure, and this project should plan together with village haed, extension worker and key-farmers.

Consequently, for the planning of these facilities, the short term expert for livestock development and building works was dispatched from Japan.

(1) Seed storage facilities

Seed storage facility plan of Ranomeeto village planned to keep the soybeans' seed etc., and capacity of storage volume are about 10 kg per farmer and total capacity are about 500 kg, and about 50 farmers' households.

For the plan of seed storage facility shall keep below 25 degrees centigrade into storage rooms and never use the electric power.

(2) Rice mill and Dry yard

Rice mill facility plan of Ranomeeto village planned to polish rice all produced paddy from the project areas into the village and dry yard build near rice mill house.

Input capacity of rice mill machinery are about 700 kg per hour for long grain of local paddy, total production of paddy yields are planning about 600 ton in the wet season, and workable period of rice mill machinery are planning about 3 mouths according to do about 8 hours per workable day.

(3) Auction yard and Cattle fattening yard

Auction yard and Cattle fattening yard plan of Ranomeeto village planned to improve the transport condition of beef cattle, and to establish the fattening technology in the project areas.

Auction yard facilities are planning a auctioning capacity of about 50 heads beef cattle. Cattle fattening yard facilities are also planning a fattening capacity of about 10 heads beef cattle in the rural areas.

(4) Training hall

There are two extension workers each villages into the project site, and in parallel with training of extension workers, the training facilities shall also provide training of key-farmers and water users' association and etc.,

Training office are planning a working room capacity of about 5 person. Training hall are also planning a meeting hall capacity of about 20 farmers.

(5) Well facilities

Well facilities plan of Ranomeeto village planned to improve living standard condition for the water supply in the village. Well facilities are planning a using capacity of about 5 farmers household.

3. Design and Cost estimation

As mentioned before (I.5), the basic technical guidance of the agricultural and rural infrastructure, which is based on the law and regulation of Japan for execution of the implementation works of physical infrastructure, is to execute a technical cooperation such as survey works, infrastructure and rural facilities design, cost estimation of survey or works, executing construction works and annual budget planning.

However there are many final reports and drawing maps which was made from the executed survey works, infrastructure facilities works, agricultural facilities works in Ranomeeto village and etc. At present, these documents are kept in JICA Indonesia office for original documents of this project type technical cooperation.

Consequently, for the document of design and cost estimation mentioned with the summarized main points and attached for the necessary items in this report as shown in annex data.

3.1 Survey

Topographical survey carried out approximately 250 ha for the planning areas in Ranomeeto village, and topographical mapping made after completed field survey in accordance with survey plan. The detail design of irrigation system planned after finished field survey and mapping works.

The Implementation Agency of this technical cooperation is the Regional Office of Southeast Sulawesi Province, Bureau of planning the Ministry of Agriculture. Regional offices' staff never engaged such any field survey works. Therefore, the design criteria of the survey works decided to study the existing estimated method and to discuss with the counterpart who join from Regional Office of this Province, the Ministry of Public Work.

(1) Survey works

The survey works was carried out by local consultant and main works of consultant are as follows,

- data collection
- field survey
- topographical mapping
- lay out of irrigation system
- detail design of irrigation system

The technical specification of survey works, however, made out to study the technical condition and regulation of survey works which is carried out by the public works in this province and before executed survey works. For the technical specification decided based on the accuracy of survey and drawing standards (KP-07) for drawing method which was established by regional office, Ministry of Public Work. But, it is very difficult for us to use the topographical maps on a scale made of 1/5,000 by drawing standard for land improvement.

Topographical maps of the project area should be prepared with the necessary scale for planning and designing works in Japan. Especially, it is very important for us to prepare topographical maps on a scale of 1/1,000 for plan and design as well as project implementation such as land reclamation and development.

Survey works of Ranomeeto village, before mentioned on survey plan, carried out to adjust the Bench-Mark (leveling point) and to control the survey works of drainage project for the downstream in its village.

(2) Cost estimation

Cost estimation of survey works calculated based on man-mouth which is summarized from total areas for survey work, and also total cost of survey works estimated based on personnel rate of basic price. (See Annex Data) Main item of survey works consist of preparation work, topographical surveying, river surveying and detail design of irrigation system, final report for survey works, and grand total add the 10 % government tax to total cost.

Contract of survey works carried out the bid by invitation of three consultants to the contract documents which is consisted from bill of quantities, technical specification and etc,.

3.2 Infrastructure facilities design

The design of infrastructure facilities should be based on a established developing plans as well as natural and socio-economic conditions in the project areas. The overall design are necessary to confirm the design criteria and designed method, construction method, difficulty of gained material, estimate of suitable works and to consider the effect as a result of completed facilities.

For the field of agricultural and rural infrastructure carried out the technical guidance in respect of appropriate technology and farmers participation for planning in the project areas.

(1) Irrigation

The many irrigation structures which are constructed by public works made the permanent structure of wet stone masonry based on the standard design criteria published by Ministry of Public Work. Design criteria of irrigation design standards consist seven chapters and technical items are as follow;

- KP-01 IRRIGATION SYSTEM DESIGN
- KP-02 HEADWORKS
- KP-03 CANALS
- KP-04 STRUCTURES
- KP-05 TERTIARY UNITS
- KP-06 STRUCTURAL PARAMETERS
- KP-07 DRAWING STANDARDS

The irrigation areas of Ranomeeto village planned about 200 ha and irrigation system designed based on the its design criteria. This project planned two weirs in project site, existing weir was constructed by provincial government, and the old weir need some rehabilitation for the improvement construction.

(a) Intake weir

In Ranomeeto new intake weir, it is planned that headworks will be constructed on the project site to obtain 0.173 m³/sec of design intake volume for irrigation of 92.5 ha potential areas. Design water intake level planned 44.4 m and dam length 6.7 m, dam height 1.0 m (See Annex Data). For existing intake weir for irrigation of 112.5 ha, it is planned that 0.197 m³/sec of design intake volume will be obtained from headwork rehabilitated. The planned total of irrigation area is approximately 205 ha.

For calculation of design flood, flood discharge are used formula as follows;

1. $V = C \sqrt{R \cdot S}$ Chezy formula
V : Velocity
C : Bazin formula
R : Hydraulic mean depth
S : Slope of energy line

2. $C = \frac{87}{1 + \frac{\gamma}{\sqrt{R}}}$ Bazin formula
 $\gamma = 1.6$: sigma for soil

For design of intake weir, the booklet for the basic design of fixed weirs was prepared as a part of the technical cooperation from Japan, and the design method of headworks was introduced a series of technical guidance activities into provincial government staff from technical assistance committee in JICA.

(b) Canal

For calculation of canals' dimensions and irrigation schemes, the water requirement of gravity irrigation are used experimental formula as follows;

1. $Q = \alpha \cdot a \cdot A$ Experimental formula
Q : Discharge l/sec
 α : Coefficient of Tegal curve
a : Water requirement 1.65 l/sec/ha
from table of Tegal
A : Areas to be irrigated ha

2. $V = K \cdot R^{2/3} \cdot S^{1/2}$ Stricler formula
V : Velocity m/sec
K : Coefficient of roughness
R : Hydraulic mean depth
S : Slope of canals

Water requirement in the project area varies by meteorological conditions such as rainfall, evaporation, topographic conditions, hydrological condition, size of the project area, etc.,. In Indonesia, however, the standard unit gross water requirement is set at 1.65 l/sec/ha for an area of 141 ha ($\alpha = 1.0$).

(c) Wet stone masonry

In Indonesia, they are constructing from wet stone masonry many irrigation structure such as intake weir and division works, drop structure, wall canal, abutment of bridge and etc.,. There are three kind of mix mortar for wet stone masonry as follows;

Stone masonry	1 PC	:	4 Sand
Plastering / Covering	1 PC	:	3 Sand
Pointing / Jointing	1 PC	:	2 Sand

Diameter of stone is maximum 30 cm, heap up stone like neat, level, and the interval is filled with mortar of 1 PC : 4 Sand. Surfaces of stone masonry is plastered with mortar of 1 PC : 3 Sand and a thickness of 3 cm. Surfaces of slope stone masonry is used with pointing mortar of 1 PC : 2 Sand, it is called "Siaran".

(2) Farm road

Farm road of Ranomeeto village which is access road for the intake weir designed as gravel pavement, and width of farm roads are 5 m, gravel layer thickness are 20 cm, total length of access roads are about 300 m. For farm road bridge constructed beside intake weir, and the design vehicle load was 9 ton.

As a general condition, many related structure of farm road works designed to use reinforced concrete pipe, but manufactures of reinforced concrete is very difficult to gain in this area, and plain mortar pipe can only get here, culvert of farm road is all in-site concrete.

(3) Land reclamation

Before mentioned planning (2.2), Land reclamation for paddy of Ranomeeto village planned about 25 ha to construct by machinery, and operator of machine planned to employ from farmers in village. The normal construction procedure is carried out with appropriate technology to present condition.

Setting up of survey stakes, and then removal of obstruction or along-alang, leveling and cutting or banking of paddy field, plowing and harrowing of field by small bulldozer, excavation of drainage canals and small pond for supply water by back hoe.

For the equipment requirement per unit works are as follows;

- | | | |
|-------------------|-------------------------------|------------------------|
| a. leveling | ; 6 ton bull (bulldozer) | 12.1 h/ha |
| b. cut & banking; | 9 ton bull | 16.9 m ³ /h |
| c. plowing | ; 6 ton bull + plowing harrow | 9.7 h/ha |
| d. harrowing | ; 6 ton bull + disk harrow | 5.7 h/ha |
| e. excavation | ; 0.4 m ³ back hoe | 18.1 m ³ /h |

Data; Design criteria of MAFF, Japan

- | | | |
|----------------|--|--|
| f. other works | ; 3 inch drainage pump, concrete mixer | |
|----------------|--|--|

Demonstration field for secondary crop of Ranomeeto village planned about 2 ha in the project site, and soil improvement plan was formulated from soil analysis. For demonstration field added calcium carbonate about 5.6 ton/ha based on result of the survey.

3.3 Agricultural and rural facilities design

Agricultural and rural facilities design of Ranomeeto village was carried out by short term experts to be dispatched from Japan.

At first, the short term expert who has enough technology for construction building works as the architect was required for the implementation of the project, because it is very difficult to keep a suitable degrees into rooms without any electric facilities for the design of seed storage facilities, its facilities planned to utilize the insulation of Styrofoam, and also rice mill and dry yard, training hall each facilities were designed by short term expert of architect.

On the other hand, the expert for livestock development was required for the technical guidance of beef cattle. Design of livestock facilities such as auction yard and cattle fattening yard, however, designed to discuss the home building of regional office, Ministry of Public Work. For design of these facilities was planned for loading / unloading facilities and pipe fence of cattle by officials concerned.

3.4 Cost estimation

In the field of agricultural and rural infrastructure spent most of its time for cost estimation of the construction and improvement works of physical infrastructure such as irrigation works and agricultural facilities and so on. In this project implemented three kinds of construction works, one of their works contracted direct leader of farmers' group and/or other works employed local contractor.

Consequently, there is necessity to make out a many document of budget concerned for cost estimation of construction works, and it is very important for us to estimate the construction cost. In this chapter report for the estimated criteria and basic price.

(1) Estimated criteria

In Indonesia, the method of cost estimation calculate to multiply each numbers by each unit prices every each description of construction work items. For instance, contents are follows: Bill of quantity for irrigation works in Ranomeeto village are composed of preparation work and temporary work, earth work, stone masonry / concrete work, timber / steel work, access road work, and general means field expenses (See Table 2, 3).

Consequently, the government price of contract add multiplied the construction costs by Indonesia value added tax of 10 % to the construction costs.

On the other hand, bill of quantity for building works such as seed storage facilities are composed of preparation works and soil / sand works, working stone, concrete, floor / plaster works, wood / roof works, paint / read lead works, work of sanitary / hanging tools (See Table 4, 5).

One difference, however, between irrigation works and building works are that cost estimation for building works calculate to add field expenses of 10 % to the construction cost, after addition of this profit, the government price of contract estimate the same method for construction works.

There is a difference of opinion for cost estimation between civil work and building work, and the point of view is as follows;

The net construction cost of irrigation works estimate based on present field condition, and also consider to calculate the indirect field cost such as preparation work and temporary work include diversion river, dewatering works and etc.,

For the building work only estimate a part of preparation work and other items do not calculate. The point of difference for the method of cost estimation is the same in Japan,

In Indonesia, however, the overhead cost never estimate in construction cost. These overhead cost and profit include in the direct field cost which is estimated based on the requirement per unit work and material price and so on.

Table 2

BILL OF QUANTITY FOR IRRIGATION WORKS

LIST OF QUANTITY AND PRICE

LOCATION : DESA RANOMEETO

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE (Rp)	TOTAL (Rp)
1	2	3	4	5	6 = 4 x 5
I.	PREPARATION WORK				
1	Land Clearing	LS	-	1,750,000	1,750,000
2	Stake out	M	3,627.000	500	1,813,500
3	Access road/Logistic	LS	-	2,000,000	2,000,000
4	Store house	LS	-	3,000,000	3,000,000
5	Mobilization	LS	-	500,000	500,000
					9,063,500
II.	DEWATERING WORK				
1	Diversion river	LS	-	3,750,000	3,750,000
2	Dewatering	LS	-	3,750,000	3,750,000
					7,500,000
III.	EARTH WORKS				
1	Excavation soft soil	M3	1,691.24	2,725	4,608,829
2	Excavation mud soil	M3	1,040.06	5,450	5,668,327
3	Back fill	M3	270.21	915	247,242
4	Embankment soil	M3	1,374.44	3,640	5,002,962
					15,527,160
IV.	STONE MASONRY WORK/CONCRETE				
1	Masonry Stone 1 : 4	M3	792.03	86,150	68,233,385
2	Reinforcement concrete 1:2:3	M3	11.325	568,978	6,443,670
3	Building concrete 1:3:5	M3	1.278	99,100	126,650
4	Plastering 1 : 3	M2	1,013.02	4,403	4,460,327
5	Pointing 1 : 2	M2	378.47	3,115.50	1,179,123
6	Pipe P.V.C	PCS	6	250,000	1,500,000
					81,943,155
V.	TIMBER/STEEL WORK				
1	Weir gate	PCS	2	15,000,000	30,000,000
2	Timber works	M3	4.5	440,000	1,980,000
					31,980,000

Table 3

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE (Rp)	TOTAL (Rp)
1	2	3	4	5	6 = 4 x 5
VI.	ACCESSES ROAD				
1	Selected soil	M3	850	18,212.950	15,481,008
2	Aggregate class B	M3	135	26,392.980	3,563,052
					19,044,060
VII.	GENERAL				
1	Transport foreman/tools	LS	-	500,000	500,000
2	Preparation of tools	LS	-	500,000	500,000
3	Budget for administration/ Documentation	LS	-	1,000,000	1,000,000
					2,000,000
					167,057,874

I. PREPARATION WORK.....	Rp.	9,063,506
II. DEWATERING WORK.....	Rp.	7,500,000
III. EARTH WORKS.....	Rp.	15,527,160
IV. STONE MASONRY WORK/CONCRETE.....	Rp.	81,943,155
V. TIMBER/STEEL WORK.....	Rp.	31,980,000
VI. ACCESSES ROAD.....	Rp.	19,044,060
VII. GENERAL.....	Rp.	2,000,000
TOTAL I+II+III+IV+V+VI+VII	Rp.	167,057,874
P.P.N 10% [PROVINCAL TAX]	Rp.	16,705,787
GRANT TOTAL	Rp.	183,763,662

Table 4

BILL OF QUANTITY FOR BUILDING WORKS

LIST OF QUANTITY AND PRICE
BUILDING FOR SEED STORAGE FACILITIES

LOCATION : DESA RANOMEETO (BPP DF KECAMATAN)

NO.	WORK DESCRIPTION	UNIT	VOLUME	UNIT PRICE (Rp.)	TOTAL (Rp.)
I. Preparation Works					
1	Work of site cleaning	LS	-		50,000
2	To dig land/soil level	LS	-		75,000
3	To pair baw plank/measures	LS	-		75,000
4	To make work shed	LS	-		200,000
					400,000
II. Soil/sand work					
1	To dig land foundation	m3	27.36	1,962.50	53,694
2	Pile of soil base floor/foundation base	m3	6.33	6,785.00	42,949
3	Pile of sand under floor	m3	3.16	9,185.00	29,025
4	Pile to pair crack floor	m3	6.33	19,025.00	120,428
					246,096
III. Working stone, concrete, floor and plaster					
1	To pair empty stone	m3	4.50	19,025.00	85,613
2	Foundation of coral stone	m3	20.10	58,680.80	1,179,484
3	To pair trasram brick	m3	1.92	75,274.10	144,526
4	To pair brick 1:5	m3	14.18	53,821.00	763,182
5	To pair bony concrete 1:2:3	m3	10.63	478,030.00	5,081,459
6	To pair plaster 1:2	m3	30.36	4,206.05	127,696
7	Plaster 1:5	m3	15.50	2,569.70	39,830
8	Pair of floor without bone 1:2:3	m3	6.33	99,710.00	631,164
9	Smooth plaster with same water viscous	m2	105.50	1,750.00	184,625
					8,237,579
IV. Wood/roof work					
1	To pair cap/trestle	m3	3.50	370,625.00	1,297,188
2	Work of poles, door/window frame	m3	1.50	370,625.00	555,938
3	Work of board wall	m3	2.10	75,000.00	157,500
4	Work of roof, frame galvanized steel roof	m2	105.50	675.00	71,213
5	Work of galvanized steel roof	m2	105.50	6,834.50	721,040
6	Work of ridge galvanized steel	m	11.50	6,712.50	77,194
7	To pair kelapi wood lesplank	m2	11.60	13,674.00	158,618
8	To pair plywood door and formica layer	m2	4.60	48,323.75	222,289
9	To pair panel door	m2	3.68	48,349.65	177,927
					3,438,905

Table 5

NO.	WORK DESCRIPTION	UNIT	VOLUME	UNIT PRICE (Rp.)	TOTAL (Rp.)
V.	Paint/Read lead work				
1	Work of roof red lead paint	m2	105.50	1,635.50	172,545
2	Work of basic paint	m2	28.16	1,635.50	46,056
3	Work of soft paint	m2	56.32	2,705.25	152,360
4	Work of wall paint/board wall paint	m2	288.00	1,796.25	517,320
					888,281
VI.	Work of saniter/hanging tools				
1	To pair door key lock	unit	3	17,500	52,500
2	To pair door handle	unit	12	1,500	18,000
3	To pair grendel	unit	2	1,250	2,500
4	To pair bolt/anchor for pole	unit			0
5	To pair wire screen	m2	26	2,500	65,000
6	To pair cupboard for seed	m2	26	15,000	390,000
7	To pair foaming agent (upper)	unit	4	100,000	400,000
					928,000
VII.	T O T A L				14,138,861

I. PREPARATION WORKS	Rp.	400,000
II. SOIL/SAND WORK	Rp.	246,096
III. WORKING STONE, CONCRETE, FLOOR AND PLASTER	Rp.	8,237,579
IV. WOOD/ROOF WORK	Rp.	3,438,905
V. PAINT/READ LEAD WORK	Rp.	888,281
VI. WORK OF SANITER/HANGING TOOLS	Rp.	928,000
TOTAL I+II+III+IV+V+VI		14,138,861
PROFIT FOR BUILDING WORKS : TOTAL x 10%		1,413,886
SUB TOTAL		15,552,747
P.P.N 10% [PROVINCAL TAX]		1,555,275
GRANT TOTAL		17,108,021

(2) Unit price

The unit price which is revised the material and labour price every three months is determined by the building works division of Regional Office in the Southeast Sulawesi Province, Ministry of Public Work, and official unit price deliver to the other public works' divisions concerned of the four district in this province. There are two kind of booklet for the unit price and basic price (See Annex data).

The labour price is able to use without revision of price, but the material price is ex borrow pit and ex shop prices.

Consequently, if we contract the irrigation works, it is need to add the transportation fee to the main material price using large quantities such as cement and sand, stone, aggregate.

On the other hand, the building works is no need to add any transportation fee to material price because building works estimate to add a field expenses of 10 % to the construction cost.

(3) Requirement per unit work

In Indonesia, Standard requirement per unit work is published from Ministry of Public Work. Regional office of each province calculate all necessary unit price and contract the civil works. Irrigation work division of regional office in this province estimate the official unit price in line with standard requirement per unit work (See Annex data).

Requirement per unit work is to use all labour requirement per unit work at present in Indonesia, so that we do not use equipment requirement per unit work yet.

Consequently, stone masonry and concrete works carry out by man power without concrete mixer. Earth works is same methods.

4. Executing method of construction works

In this project, as mentioned assignment of agricultural and rural infrastructure (A.5), the improvement works of physical infrastructure is planned to implement through the participation and cooperation of farmers group for a part of construction works such as earth canal and agricultural facilities.

This project show the practical effect through the process of hardware activity, and promote a comprehensive management of water users' association and strengthening of farmers' group activity.

Executing method of construction works in this project are the contract works and directed construction works which implement through the participation of experts, counterparts and farmers themselves who are the receiver of this project benefit.

4.1 Directed construction works

The directed construction works employ farmers group and farmer themselves, in this chapter report on the payment method of labour wages as the result of discussion with experts on the construction and land reclamation, farmers' group strengthening, their each counterparts and village officials concerned.

Directed construction works are three kinds of content; (1) farmers' participation, (2) foremans' construction and (3) direct works by machine and explanation are as following.

(1) Farmers' participation

Before implementation of directed construction works, there is a good system called "Gotong Royong" in Indonesia, project concerned studied Swakelola (with outside funds) and Swadaya (without outside funds) in line with the basic characteristic of Indonesia culture of Gotong Royong.

Gotong Royong is a system of cooperation and preparation of materials and working together among village and neighbors to be mutual assistance and hand in hand to complete wished goals.

About Swadaya mentioned chapter 2.2.(3) in this report, and Swakelola is mutual cooperation to be received the labour wages with external assistance.

Consequently, project concerned talked over the executing method with villages' head and head of farmers group, and then confirmed the sense of responsibility to have the farmers group and system of obligation to receive the labour wages.

As a result of discussion, about payment method of directed construction works were as follows.

(a) Preparation stage

Executed field survey, set up fixed ruler (at 25 m interval), project office make out bill of quantities for all earth canal.

Ranomeeto Village, Bill of Quantity (Draft)

No	Inte	Items	Number	Unit P	Total Price	Remake
1	2	3	4	5	6 = 4 x 5	
1 - 2	25 ^m	Cutting Banking	100.0 40.0	Rp 5,450 915	Rp 545,000 36,600	Head of farmers group A,
			Sub	- Total	581,600	Sign
2 - 3	25	- do -	- do -	- do -	-- do --	group B, C,...
X - End						Sign
Total					19,000,000	

Expert Counterpart Villages' Head Team Leader
Sign Sign Sign Sign

After calculation of total budget, show the works within a limits of the budget to villages' head and head of farmers group, and then all person concerned carry out the works by mutual consent.

For instance, farmers group A consent to the bill of quantity from No.1 to No.2, sub total is Rp. 581,600 and head of group A sign his name to the bill of quantity.

(b) Implementation stage

Farmers group carry out the agreed earth canal works, and inspection method of dimension control is checked based on the condition of cutting and banking by expert and counterpart at every weeks, and then progress inspection report is made out by project concerned.

Progress inspection of Dimension control (Draft)

No 1	Inte 2	Items 3	Number 4	Unit P 5	Dimen 6	Total Price 7 = 4x5x6	Remake
1 - 2	25 ^m	Cutting Banking	100.0 40.0	5,450 ^{Rp} 915	40% 0	218.000 ^{Rp} 0	Farmers group A
			Sub	- Total		218,000	
2 - 3 X - End	25	- do -	- do -	- do -	-do -	-- do --	group B, C,
Total						2,300,000	

Expert Counterpart Villages' Head Team Leader
Sign Sign Sign Sign

Dimension amount (Rp. 218,000) which is confirmed by expert and counterpart is payment amount to pay to farmers group.

(c) Payment stage

Project office pay the labour wages to farmers group every week. For instance, total amount (Rp. 2,300,000) report to project office, and then sub total amount (Rp. 218,000) pay to haed of farmers group, and after received labour wages, they submit the receipt to project office.

In this project, the payment method and construction control of directed construction works was the first case in Ranomeeto village.

Consequently, the working group which is organized and established by expert on the construction and land reclamation, farmers' group strengthening carried out supporting and leading part of these activities.

(2) Foremans' construction

Construction works of farmers participation are simple works such as cutting or banking of earth canal, but on the other hand foremans' construction such as wooden bridge works are not simple works, this works need to prepare the many materials such as cement and stone, sand and wooden or timber, and also to employ the many labour such as carpenter and masonry, skilled workers and unskilled labour and so on.

In this project nominate a parson living in village as foreman (in Indonesia, called "Mandor"), and also he will be recommended from villages' haed and official concerned.

There is community construction of self management called "Swakelola" in this area, at present, a part of the public works is carried out repair of concrete canals and construct of new box culvert by Swakelola, and Swakelola is carried out by Mandor. One different between contract works and Swakelola is that Swakelola is no necessary Indonesia value added tax. As a result of investigation and discussion, for the method of implementation of foremans' construction were as follows.

(a) Estimation of total works

Wooden Bridge (Draft)

Bill of quantity			Labour cost				Material cost				Works Total Rp
Items	Volum	Unit Price Rp	Uns kil led	Mas on/ Woo	For e- man	Chi ef- man	St- one m ³	Sa- nd m ³	Cem ent Zak	Wo- od m ³	
Cutt- ing	120m ³	5,450	187	-	6	-	-	-	-	-	654,000
Bank- ing	60m ³	915	16	-	1	-	-	-	-	-	54,000
Stone mason	150m ³	86,000	540	179	26	17	180	78	608	-	12,900,000
Plast ering	30m ²	4,500	6	6	1	1	-	1	6	-	135,000
Timbe rwork	16m ³	500,000	156	468	7	46	-	-	-	13	8,000,000
Dewat ering	1set										1,000,000
Total			905	653	41	54	180	79	614	13	22,743,000
Labour & Material			Rp. 6,800,000				Rp. 14,943,000				

Expert Counterpart Foreman Team Leader
 Sign Sign Sign Sign

After calculation of total works for wooden bridge (draft), the project show the bill of quantity for works within a limits of the budget to foreman, and its works carry out to control the management based on the working day of labour and deliver of materials, and the method of payments are as follows.

(b) Payment of labour

Working day of labour

Name	Basic Price Rp	1	2	3	4	5	6	7	8	9	10	11	12	..	15	Total	Total Rp
		M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	..	M		
Mr, A	5,000	1	1	.5	1	-	-	1	1	-	-	.5	1	..	1	10	50,000
Mr, B	8,000	-	-	-	-	-	-	-	1	1	1	1	1	..	-	6	48,000
-- do	--																- do -
Mr, X	3,000	1	1	1	1	1	1	1	1	1	1	1	1	..	1	14	45,000
Total																	800,000

Basic price of each labour and classification of worker decide by foreman pointed works, and payment times are twice a month.

(c) Payment of materials

Deliver of materials

Items	Volum	1	2	3	4	5	6	7	8	9	10	11	12	..	15	Sub Total	Total 10 ³ xRp
		M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	..	M		
Stone	180m ³					20			40				10			70	2,500
Sand	79m ³				10			10				10				30	1,000
Cemen	614 ^{zak}		80	80			80				80					240	2,000
Wood	13m ³									3						3	1,000
Total																	6,500

After delivered materials in project site, they are inspected for the quantity and quality by expert and counterpart.

Foremans' construction type was carrying out in the testing stage for the temporary work which is constructed the wooden bridge in Palangga village.

(3) Direct works by machinery

In this project implement land development such as paddy field reclamation and field reclamation, construction of farm road, excavation of pond and open ditch drainage by heavy machinery such as bulldozer and back hoe, plowing harrow and disk harrow etc.,

At present, the operator of these heavy machinery was employed by project office, they are chosen as operator from farmers living in village and have experience of operating and driving for these machinery, but they are not experienced in leveling for paddy field reclamation and plowing or harrowing for field reclamation by bulldozer, and technics for operation and maintenance of these machinery are guided by expert of each field.

4.2 Contract works

In this project carry out the construction works such as irrigation improvement works and agricultural facilities works, and project office ordered these construction works from the local contractor at Kendari in Southeast Sulawesi Province.

The method of contract works was the bid by invitation, and contract price was that the bidder submitted to the owner his price to estimate based on the bill of quantity for the works, and the contract was the unit price contract.

In this chapter describe the present situation of contractor and necessary contract documents such as bill of quantities and technical specifications and etc.,

(1) Contractor

There are two kinds of contractors in the country, one of them called P.T (Incorporated Company or Limited Company) and other one was C.V (Limited Partnership). P.T Name of Company carry out the contract works in the whole country, and C.V Name of Company is its in the provincial level. Both company are treated on the same level for the contract works.

For list up of the contractor, the project office carried out the contract works based on information from the qualification for the construction works of public works' office in the province and classification of contractor are as follows;

	Contract Price	(Rp)	Class
1.	more than 500 million		A
2.	500 million -- 200 million		B ₁
3.	200 million -- 100 million		B ₂
4.	100 million -- 50 million		C ₁
5.	50 million -- 20 million		C ₂
6.	20 million -- 5 million		C ₃

For the pre-qualification of the contractor, the following are the content of the judgments for this project.

1. Capital
2. Year of foundation
3. Number of engineer
4. Number of equipment
5. Result of main consulted for the past 3 years
6. Qualification by Government and so on.

(2) Contract document

The contract for the works of this project is executed by head of JICA Indonesia office. However the project office, on behalf of head of JICA Indonesia office, are doing all the office duties and the contract documents are as follows (See Annex Data);

1. Invitation to Bid
2. Instruction to Bidders
3. Terms and Conditions of this Contract
4. Contract
5. Technical Specification
6. Form of Bids
7. Bill of Quantity (include time schedule, list of personnel and equipment, basic price, unit price analysis, etc.,)
8. Drawings

For the contract price of more than 50 million at present, the contractor submit to the employer the bank guarantee in the amount which represent five (5) percent of the contract price, and the employer return to the contractor this bank guarantee at end of three (3) mouths after final acceptance of the works in Indonesia.

In this project concluded to agree the public work at six (6) mouths for the guarantee period of contract in accordance with the acceptance of JICA Indonesia office, and the performance guaranty was the bank guarantee within 5 percent of the contract price, and it were no necessary to submit other guaranties such as bid bond and advance payment bond. The contract consist as following items;

1. Contract price
2. Bank guarantee for performance
3. Description of works
4. Completion time
5. Compliance with statues and regulations
6. Construction method and temporary works
7. Care of works
8. Employment of workmen
9. Sub letting
10. Damages to persons or properties
11. Modification of plan
12. Price adjustment
13. Fulfillment of obligations by third party
14. Liquidated damages for delay
15. Damages caused by natural calamity, etc.
16. Report for completion of construction
17. Inspection
18. Date of completion of construction and obligation thereafter
19. Payment
20. Settlement of disputes

For the condition of payments, the advance payment is twenty (20) percent and the interim payment is forty (40) percent of the contract price based on the progress of the works, and also final payment is forty (40) percent.

5. Training plan

The project is trying to establish the appropriate technology of rural and regional development through training of construction works, operation and maintenance, and farming in accordance with Record of Discussions, and that training aims at strengthening and organizing of the farmers group.

There are fifteen (15) kind of training course as follows;

1. Planning method of agricultural and rural development
 - 1) Agricultural and rural development plan
 - 2) Land reclamation
 - 3) Machinery operation and maintenance
2. Farm management and cultivation techniques
 - 1) Paddy
 - 2) Secondary food crops
 - 3) Estate crops
 - 4) Diversification system (Livestock)
 - 5) Water management
3. Farmers' group
 - 1) Strengthening of farmers' group
 - 2) Strengthening of rural women's group
 - 3) Improvement of rural life
4. Other training
 - 1) Farmers' youth training
 - 2) Less experienced farmers training
 - 3) Farmers' day
 - 4) Study tour to improved farming area

After having completed the irrigation facilities of Ranomeeto, the field of agricultural and rural infrastructure carried out the training of water management and study tour to improved farming area in the central Java island.

5.1 Water management

(1) Planning

The project was the first case to do the training of water management in Ranomeeto. At present, the irrigation section of

Ministry of Public Work (PU) carry out to instruct the water users' association (P3A) for the training of water management. For the instruction of village level, irrigation worker (Juru) who is appointed by the regional office of PU guide a new established P3A, and a Juru is in charge of the irrigation area about 5,000 ha and several villages the case in Java or Bali island, but here his assignment is only its about 400 ha and tow villages.

In the case of this project, the regional office of Ministry of Agriculture is responsible for the training plan of operation and maintenance of P3A. However the planning of water management for this project worked out based on information from the training of the regional office of PU and formulated the detail schedule of training syllabus together with counterpart and the training plan were as follows;

(a) Purpose

The training of water management aims to achieve the operation and maintenance of disinterested water distribution system, and to strengthen the water users' association (P3A) and the irrigation committee, and to further the legal framework for the irrigation.

(b) Time period and place of training

Time period ; January 21,-- February 4, 1993. (15 days)
Place of training; Training hall and office

(c) Participant

Officials; 9 personnel

Head of Ranomeeto village (Kepala Kelurahan Ranomeeto)
Extension workers of man and woman (P.P.L)
Head of agricultural cooperative association (Ketua KUD)
Head of village development committee (Ketua LKMD)
Irrigation worker, Fishery concerned, Police and Army.

Farmers' group; 11 personnel

Head and vice of P3A, administration and secretary
Head of farmers' group (seven group)

(d) Syllabus

The training syllabus was six (6) kind of items as follows;

1. General (10 hours)
 - 1) Water distribution for paddy and secondary food crops
 - 2) The relation between soil, water and plant
 - 3) Annual cropping plan / Irrigation plan
2. Irrigation (26 hours)
 - 1) Complex irrigation system
 - 2) Maintenance of irrigation system
 - 3) Operation of the tertiary unit
 - 4) Change in cropping plan / Irrigation plan
 - 5) Measuring devices
 - 6) Irrigation planning of operational board
 - 7) Water distribution in tertiary unit water shortage
 - 8) Drainage canal
3. Legal framework (20 hours)
 - 1) Legal aspects of the irrigation main system
 - 2) P3A legal framework / Tasks
 - 3) Towards good irrigation management
 - 4) Irrigation committee
 - 5) Efforts to complete existing laws
 - 6) The role of the village head
 - 7) Village head and P3A
 - 8) Role of the ulu-ulu
4. P3A development (18 hours)
 - 1) Farmers involvement
 - 2) Factors determining the well functioning of the P3A
 - 3) Relations P3A with other village organizations
 - 4) Administration
 - 5) Internal organization of the P3A
5. Social skills (9 hours)
 - 1) How to supervise
 - 2) How to settle a dispute
 - 3) How to implement a well functioning P3A
6. Field trip (2 days)
 - 1) P3A (Tirta Mulya) of Ameroro irrigation project
 - 2) P3A (Sambodale) of Wawotobi irrigation project

5.2 Study tour

(1) Purpose

This project is held in the field of technology from hardware to software such as irrigation facilities, agricultural facilities and farming guidance such as paddy, secondary food crops, estate crops and livestock, and from local government officials concerned to farmers' level.

The technical cooperation is implemented comprehensively from the preliminary stage of planning followed by structure design, construction management, operation and maintenance of machinery, cultivation technology and farmers' group strengthening such as water users' association and agricultural cooperatives.

Consequently, the expert and the counterpart on the farmers' group strengthening formulated the detail schedule of study tour according to the purpose of above mentioned project activities.

The purpose of study tour aims to give to the local people the incentive to inspect the improved farming area, such as to acquire the new agronomy and cultivation technology, livestock facilities, and to learn the existing condition of farmers' organization and women's group activities, and to discuss the local problem with visited farmers.

(a) Schedule of study tour and visited place

16 Apr (Fri)	Move from Kendari to Yogyakarta
17 Apr (Sat)	Courtesy call to Yogyakarta Regional Office Visit to; Poultry farmers' group Kembangang water users' association Goat farmers' group Zalacca palm (Salak pondah) farmers' group,
18 Apr (Sun)	Move from Yogyakarta to Sukohardjo
19 Apr (Mon)	Visit to; Seed production farm station Seed inspection experiment station

Seed rice farmers' association
 Banana small plantation around the Solo basin
 Netted melon farmer
 Leather processing small factory
 Cracker / Chips (Emping melinji) producing by
 farmer women's group

20 Apr (Tues) Move from Sukoharjo to Semarang
 Visit to;
 Model farmers' group of Sidoharjo
 Tani mulyo water users' association activities
 Duyungan agricultural cooperative association
 Courtesy call to Jawa Tengah Regional Office

21 Apr (Wed) Move from Semarang to Surabaya
 Visit to;
 Processing marine factory
 Smoke fish production

22 Apr (Thurs) Move from Surabaya to Kendari

(b) Participant Officials ; 8 personnel,
 Farmers' group; 7 personnel

Ranomeeto village in Ranomeeto sub-district
 Haed of sub-district (Camat Ranomeeto)
 Head of village (Kepala Kelurahan Ranomeeto)
 Extension worker of woman (P.P.L)
 Head of water users' association (Ketua P3A)
 Head of farmers' group (two group)

Palangga village in Palangga sub-district
 Haed of sub-district (Camat Palangga)
 Head of village (Kepala Kelurahan Palangga)
 Extension worker of woman (P.P.L)
 Head of farmers' group (two group)

Kiaea village in Palangga sub-district
 Haed of village (Kepala Desa Kiaea)
 Extension worker of man (P.P.L)
 Head of farmers' group (two group)

This study tour was arranged with another regional office of agriculture about visited place based on the present condition in this area by the consideration of the Haed of Regional office of Southeast Sulawesi, the Ministry of Agriculture.

III. Palangga and Kiaea villages

1. Outline

Palangga and Kiaea villages of Palangga sub-district located southern part of Kendari district is about 75 km from Kendari city and the irrigation site of both villages are same area along the boundary farm road. The development type of these villages, which are second priority of this project, are the rural improvement by compound farming such as secondary crop, estate crop and paddy.

Palangga sub-district is new sub-district which separate from Tinanggea sub-district at 1986. The project site of irrigation planned to be located about 2 km from provincial main road, and the topography condition of both villages are low mountainous area of 150 m about sea level in the southern part and development land for estate crop planned into Palangga village in northern part of irrigation project site and land reclamation for secondary crop planned into Kiaea village in southern part of irrigation project area (See Fig 7).

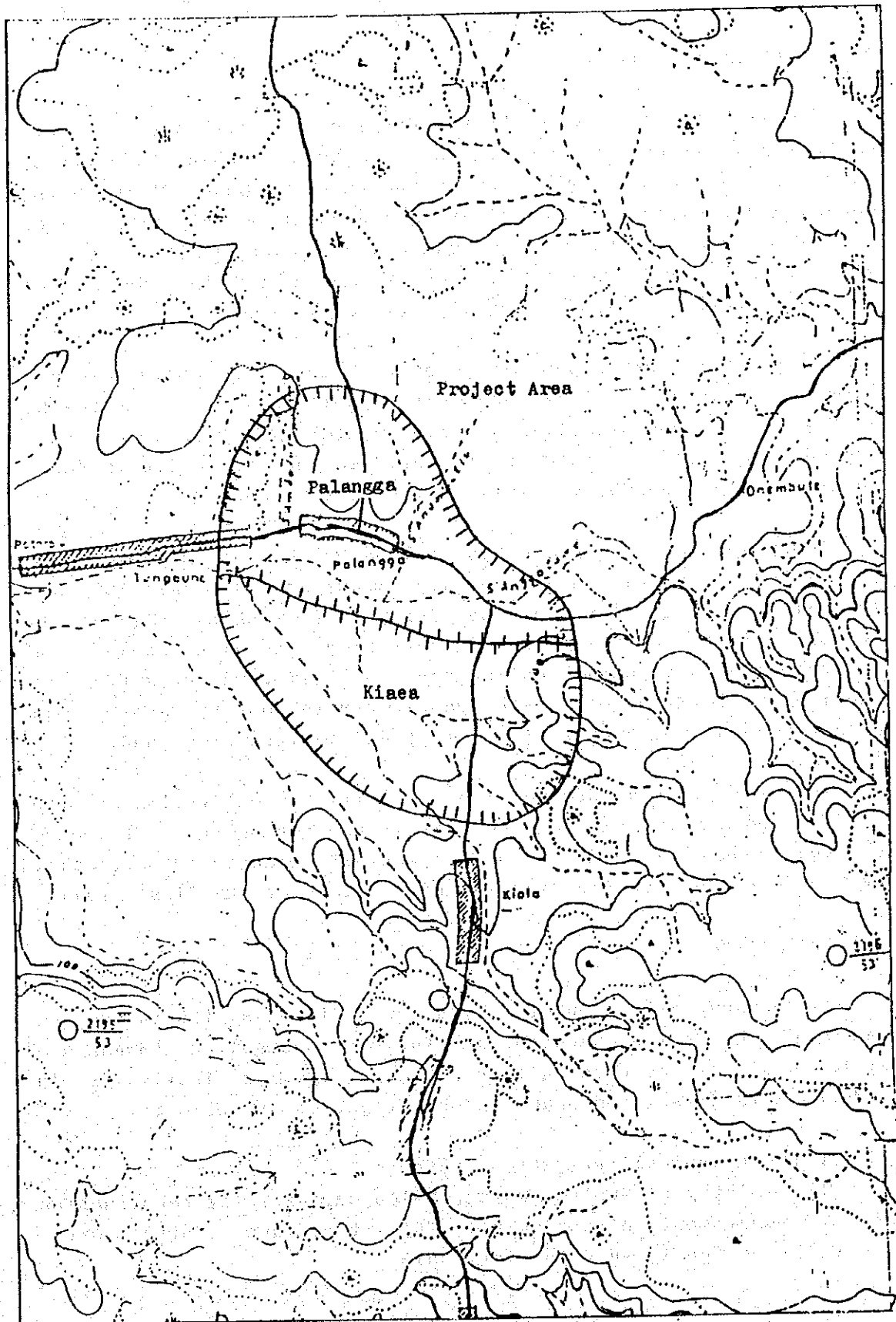
From past 14 yearly rainfall data of the setting observation station by the public work (See Annex Data), this area has total average annual rainfall of 1,640 mm, and annual rainfall has the data recording from 1,120 mm to 2,120 mm less than rainfall data of Ranomeeto village near Kendari city and the dry season are from August to November.

2. Planning and Implementation

The plan of Palangga village carried out together with plan of Ranomeeto village which started its survey work from October, 91, and on the other hand the plan of Kiaea village implemented with survey works of Lalobao village and Lapulu village in Tinanggea sub-district from July, 1992.

In this chapter only report upon the summarized planning and implementation of both villages because the design, cost estimated and method of construction works mentioned into the chapter II.

Fig 7



2.1 Palangga village

The irrigation area of the project located south eastern part of Palangga village is an earth intake structure which is built by Swadaya, and there are about 60 ha the existing paddy field in the downstream flat area of the river, and also the estate crops area is central part in the village, and there are sub-district office, village office and other public institution along the provincial road, the villages' land is mostly of alang-alang area.

This village has a population of 1,440, and households of 366, farmers' households of 344, and there are 11 farmers' group in the village. Tribes of villages' farmers, Tolakinese is 48 percent, and 43 percent of the farmers are Buginese who are active in South Sulawesi, and other provincial settler is 9 percent.

Topographical survey of this village which was necessary to formulate the irrigation scheme carried out approximately 100 ha. The main activities for the estate crop area of this village was to do the field investigation together with extension worker and farmers without topographical survey. Soil improvement survey for the land reclamation of estate crop is carried out by short term expert together with extension worker and farmers concerned.

Especially, in accordance with the field investigation of the existing boundary farm road and small river across the its road, the two wooden bridges into the project site planned to be built by the foremans' construction in this village at the first trail.

(1) Irrigation

The present situation of irrigation facilities, the intake of earth embankment is executed by farmers themselves (Swadaya). By the scale of the construction, the irrigation facilities in Indonesia is classified under three categories as follows;

1. In the technical irrigation system :

The Ministry of Public Works (PU) undertakes the construction and management of principal facilities and control water distribution to each tertiary unit.

2. In the semi-technical irrigation system :
PU carry out the construction of intake weir and main canal, but management of canal is the task left to village community.
3. In the simple irrigation system :
In this type of irrigation, called village irrigation, the all facilities including intake weir and canal are constructed by the village community (Swadaya).

All the paddy farmers who are mixed by several tribes in the village take a great interest the improved cultivation technology, but they think that irrigation facilities which are now built by Swadaya will be not any able to expect the higher productivity, so that they hope highly to improve the existing intake structure.

Consequently, for the irrigation planning of Palangga village considered not only to construct the permanent intake weir by wet stone masonry but also to improve the necessary related structure and earth canal, and also the training plan made out to execute a study tour of improved farming area as well as to do training plan of water management and strengthening of water users' association.

Irrigation facilities improvement plan of Palangga village worked out the development potential areas about 100 ha, and site of intake weir planned to obtain from the Areo river flowing into the village. In Palangga intake weir planned that the design intake volume is $0.132 \text{ m}^3/\text{sec}$, dam length 5.6 m, dam height 2.0 m, and structural design of intake weir was fixed type of wet stone masonry based on the standard design criteria published by Ministry of Public Works.

For the executing method of irrigation works in this village, main irrigation structure such as intake weir and canal related structure were carried out by the local contractor in Kendari, and also earth canal will be planned to execute the construction works of farmers' participation, and like this construction works have been implemented once at Ranomeeto village, so that construction works by farmers' participation have been known the many farmers and village concerned. On the other hand, the wooden bridge works planned to be carried out by the foremans' construction, and this method already mentioned chapter II-4.1-(2) in this report.

(2) Farm road

For the farm road planning of Palangga village, the irrigation area of the project located far from provincial road about 2 km, and connecting road is natural and hilly field road, so that it is very difficult to go by using car because there are not any bridge and culvert on the way to site, and the jeep will be able to pass unless it rain, if it rain, but the jeep is impossible to traffic in the site because of the muddy condition, and therefore field investigation often have to walk long distance to survey area.

Consequently, first of all, in this project planned to build temporary wooden bridge which aims to secure the transport in the project site, and to carry out for the emergency work by the foremans' construction. The two wooden bridge works by foremans' construction completed within about 2 month.

On the other hand, in this project formulate two kind of route plan as the main farm road, one of them is existing boundary road, other road is new route plan, and new farm road is very important for marketing of agricultural products, and along the this road is planned agricultural facilities such as training hall, rice mill house, dry yard, however this new route pass through the existing paddy field in Palangga village, so that development plan for farm road agree with villages' head and farmers concerned at present, but it is not completed for the route survey of the detail design yet, and therefore after harvesting paddy, it is necessary for the route survey to do together with land owners.

The earth work of farm road is carried out by heavy equipment such as bulldozer and back hoe, and then the embankment earth work on the existing paddy field work out to carry the dump truck and to load the shovel dozer, and therefore the project office propose these equipment and machinery and also the equipment requirement per unit works are as follows;

- | | | |
|-------------|-----------------------------------|-------------------------|
| a. loading | ; 0.8 m ³ shovel dozer | 18.43 m ³ /h |
| b. carrying | ; 4 ton dump truck | 12.18 m ³ /h |

Data; Design criteria of MAFF, Japan

In the same way of the employed operator in Ranomeeto village, operator of these machinery plan to employ from farmer in village.

(3) Land reclamation

Land reclamation for paddy field of Palangga village planned about 20 ha to construct by machinery such as bulldozer and other machinery, and also land development for estate crops area planned about 10 ha to work the same method by machinery such as plowing and harrowing and cutting of back hoe and so on,

Practically all farmers of Palangga village are cultivating in the land surrounding their upland field the estate crops such as cashew nuts, coconuts and coffee as well as perennial fruit trees like banana, and then some farmers grow maize and some vegetables. Estate crops is very important farm products as the cash crops in like this unsuitable water resources area.

Consequently, in the demonstration field for the cashew nut at Ranomeeto village now try to grow tiny seedlings of cashew nut as seedling experiment.

Land improvement of hillside farm in Palangga village work out to develop by heavy machinery, however at first estate crops area is to avoid the becoming bare ground, and to set up the green belt and also have to prevent the soil erosion and make the effort to keep on the forest conservation.

Land development and improvement by machinery have to make the scale of 1,000 topographic map, and also have to execute the plane table surveying.

(4) Agricultural facilities

Agricultural facilities of Palangga village planned to build the training hall and office by contract works at the second year, and then in the third year of this project work out to execute the other agricultural facilities such as rice mill house, dry yard, communal well, cattle fattening yard and seed storage facilities.

For the operation and management of these facilities, however, the working group of this project continue to discuss for the how to implement and how to establish on the this project at present.

2.2 Kiaea village

The irrigation area of the project located north eastern part of Kiaea village is an earth intake structure on small pond which is built by Swadaya, and there are about 30 ha the existing paddy field and terracing compound upland in the downstream hilly area of the river, and also the secondary crops area is central part in the village.

Southeast Sulawesi province is new independent province which separate from South Sulawesi province at 1964, the irrigation area of Palangga and kiaea both villages is called as nickname TOSIBA II village from farmers of these village, these farmers are the Juniors who settled from south Sulawesi to southeast Sulawesi.

This village has population of 1,370, 307 households and 292 farmers' households, and there are 6 farmers' group in the village and Tolakinese is about 74 percent, Buginese is about 26 percent.

Topographical survey of this village which was necessary to work out the irrigation planning executed approximately 200 ha. The main activities for the secondary crops area was to implement the field investigation together with extension worker and farmers like Palangga village without topographical survey.

Especially, soil improvement survey for the land development of secondary crops area is carried out to select the suitable study points together with short term expert and extension worker and farmers concerned.

(1) Irrigation

The farmers of Kiaea village have been carrying out the small village irrigation farming and the earth intake of pond is made by Swadaya, and almost all paddy farmers in the village are personal connection settlers and / or same provincial immigrants.

However they are not immigrants as the immigration policy from other province, an agricultural infrastructure are of very limited poor structure, and all the time these structure had been washed

away by the flood, so that they hope highly to improve the present existing irrigation structure.

Consequently, irrigation facilities improvement plan of Kiaea village worked out the development potential areas about 200 ha, and site of intake weir planned to obtain from the Kiaea river. In Kiaea intake weir planned that the design intake volume is $0.284 \text{ m}^3 / \text{sec}$, dam length 6.2 m, dam height 1.5 m, and structure design was the fixed type of wet stone masonry.

The decision of dam site determined to carry out the detail survey works based on the drawing map of the topographical survey. The topography of irrigation areas are the rugged sloping land and upstream of the river show the complicated drainage pattern and feather like basin.

The method of constructed intake weir is executing the cut-off meandering part of river under existing condition in the region. The earth works is the open dry works' method, and after completed intake weir is the short cut and cofferdam in the river.

The new intake weir of Kiaea village planned the upper stream of the existing Swadaya intake, and the detail structure of intake weir designed to set the riprap as downstream apron for scouring protection structure, and also part of the main canal lay out the lining canal by wet stone masonry.

(2) Farm road and Land reclamation

The farm road planning of Kiaea village planned the operation and maintenance road of the new main canal and the connection road of secondary crops area, and also mentioned in the farm road plan of Palangga village, the earth work of farm road plan to carry out the heavy equipment based on the method of construction works.

On the other hand, land reclamation for paddy field plan about 20 ha and also land development for secondary crops area lay out about 10 ha at present, but the detail planning is not formulated yet because these planning included agricultural facilities will decide after discussion for the implementation of this project.

IV. Lalobao and Lapulu villages

1. Outline

Lalobao and Lapulu both villages of Tinanggea sub-district are located southern part of kendari district, and the distance from Kendari city to Lalobao village is about 90 km and also between it to Lapulu village is about 126 km. The development type of these villages are planning the integrated agricultural development in rural area by secondary crop promotion.

The plan of Lalobao and Lapulu village carried out together with head of both the villages and extension worker, but these villages are located very far from Kendari city, the discussion of planning for farming road was a little meeting until now.

Topographical survey of both the villages carried out from the beginning of August, 1992. During the survey work and soil analyse survey of these villages, everybody of JICA concerned intensely felt that head of Tinanggea sub-district and head of both the villages earnestly desire to implement as quick the JICA project as possible.

The implementation schedule of Lalobao and Lapulu villages will plan to carry out at the fourth year (1994/1995) of this project, and at the beginning of this southern regional areas, the base camp for the accommodation of expert and counterpart is built near the house of Camat Palangga by the provincial government at March, 1993, and the third year (1993/1994) will just only carry out Kiaea village of third village, but the training hall and office of both the villages will carry out this fiscal year (1993/1994).

In this chapter only report upon the summarized planning of both villages because the design, cost estimated, and method of construction works will formulate the detail planning next stage based on the implementation schedule for the five years' planning of this project.

(1) Lalobao village

Population of the village is about 620 persons, 116 households and 110 farmers' households, and the cultivated area is about 8 ha / farmers' household and there are three sub-villages (Dusun) in the small village.

The irrigation site of the village is into the central low land of the village and there are village office, the other public institution and small estate areas along the main provincial road which run through the village from North to South (See Fig.9), the southern part of the village is low mountainous area of 150 m about sea level, and the small several rivers flow down in the village, however the greater part of the village is along-alang area which the forest was burnt by shifting cultivation.

Topographical survey of Lalobao village executed about 120 ha. During through the investigation survey of this village, there are not the existing irrigation structure, and the prospect of the location from the hill on the opposite can look the trace of paddy field, and by interview survey cultivated the paddy of about 25 ha until last year, however now abandon to cultivate the paddy field because the small earth dam flowed away by several flood.

Irrigation facilities improvement plan of Lalobao village worked out the development potential areas about 120 ha, and site of intake weir planned to obtain from the junction of the Motoupe and the Lalonggombu both the rivers. In Lalobao new intake weir planned that the design intake volume is $0.230 \text{ m}^3 / \text{sec}$, spillway length 5.0 m, spillway height 1.3 m, and structure design was the fixed type of wet stone masonry and earth embankment.

Land development for secondary crops and estate crops of this village planned about 10 ha, and soil improvement survey of the land development carried out together with extension worker and farmers without topographical survey, and this survey used the land use map which was made by provincial government. Farm road planning of this village planned the connection road for secondary crops and estate crops field.

(2) Lapulu village

Population of the village is about 1,420 persons, 285 households and 285 farmers' households, and cultivated area is about two (2) ha / farmers' household and also there are three sub-village in the village.

The irrigation site of the village is into the central land of the village along the Tiworo Straits and there are village office, small market and the other public institution along the main provincial road which run through the village from East to West (See Fig.10), and there are about 130 ha the paddy field near the project site, and also the northern part of the village is low mountainous area of 150 m about sea level and the small rivers flow into the coast.

Topographical survey of Lapulu village executed about 100 ha. The existing irrigation facilities are only an earth intake weir to be built by Swadaya, and there are about 50 ha the paddy field in the downstream of the earth canal about 3 km, however the earth canal is heavily damaged by the deep erosion because of the steep slope and nothing any structure such as drop structure, and the many farmers spend most of effort for the maintenance of canals.

Irrigation facilities improvement plan of Lapulu village made out the development areas about 100 ha, and site of intake weir planned to obtain from the Palaupe river flowing into the village. In Lapulu new intake weir planned that the design intake volume is $0.250 \text{ m}^3 / \text{sec}$, and spillway length 7.0 m, spillway height 2.5 m, and structure design was the fixed type of wet stone masonry and earth embankment.

Land development for secondary crops and estate crops of this village plan about 10 ha, and soil improvement survey carried out same time on Lalobao village. Farm road planning of this village planned the operation and maintenance road of the new canal and also the connection road for secondary crops and estate crops field.

Fig 8

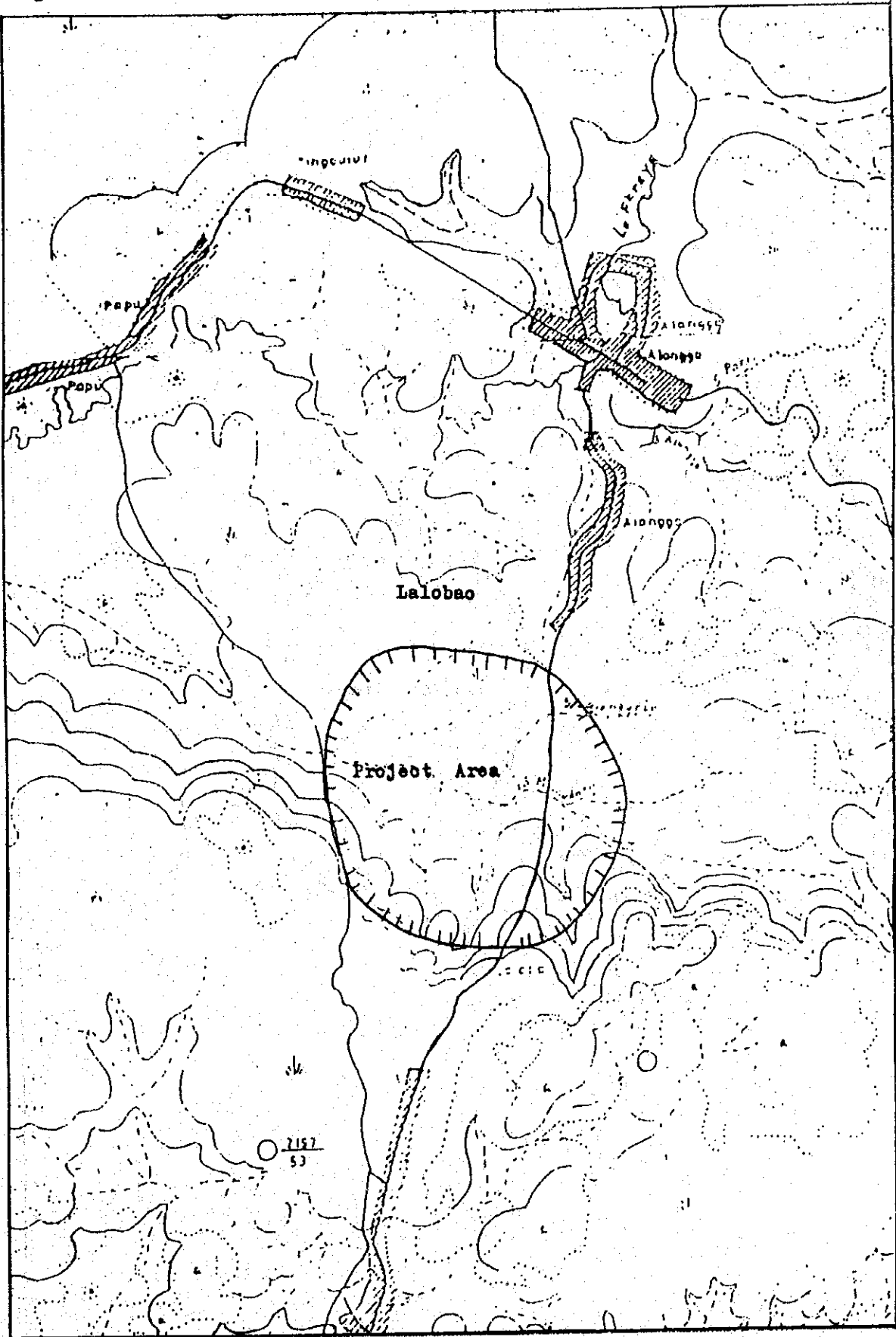
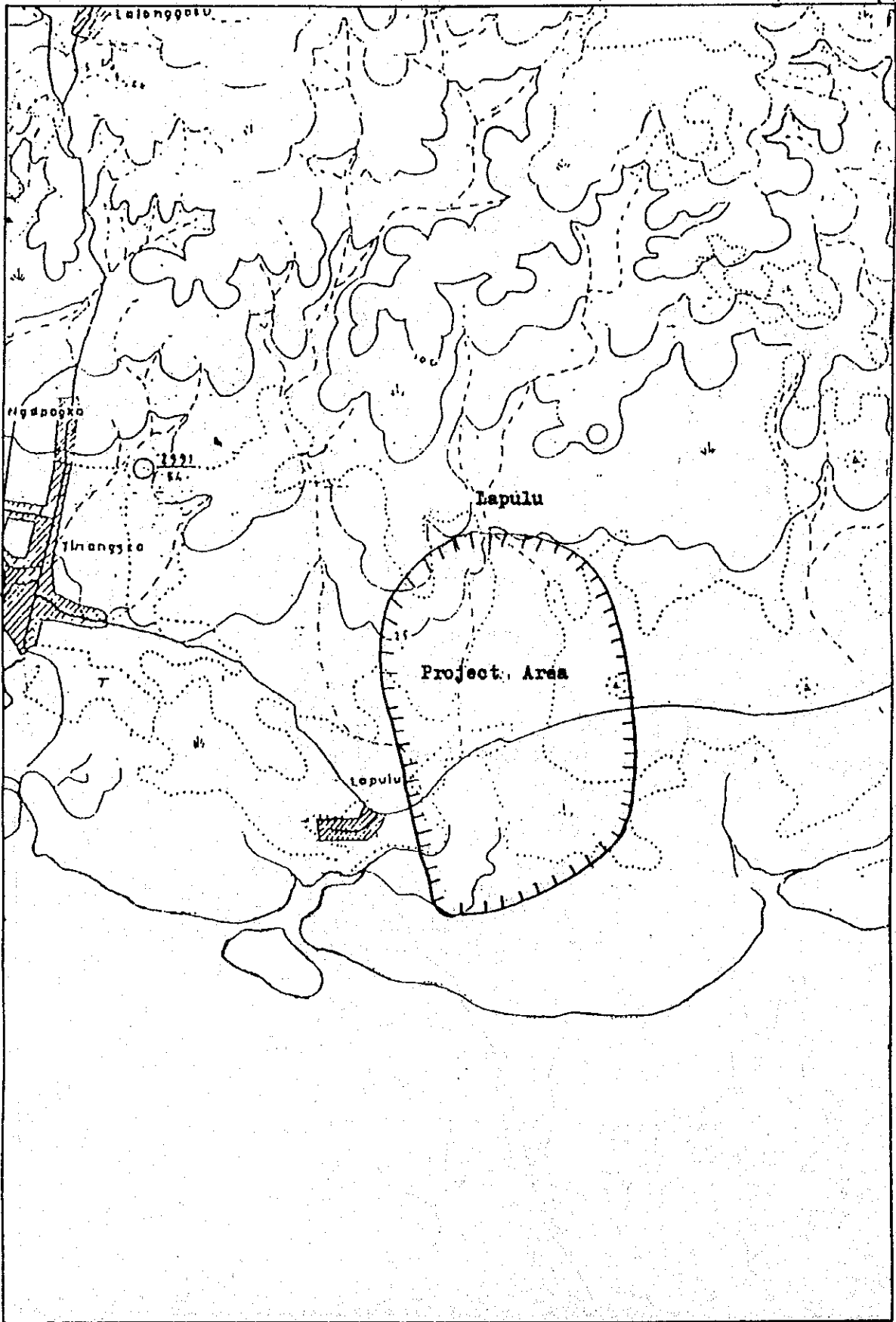


Fig 9



V. Achievement of the project

1. Result of the activities

In accordance with the purpose and activities of the project, I have been engaged in the assignment of agricultural and rural infrastructure for the past 2 years and 2 months, and I have been working together with my counterpart as follows;

(1) Formulation of development and structure plan

1.1 Survey work in the project site

- a. Finished five villages in the project site
- b. Total survey works : Approximately 770 ha
- c. Name of villages : Ranomeeto, Palangga, Kiaea, Lalobao, Lapulu

1.2 Infrastructure facilities plan

- a. Finished three villages in the project site
- b. Name of villages : Ranomeeto, Palangga, Kiaea

1.3 Agricultural and rural facilities plan

- a. Finished three villages in the project site
- b. Name of villages : Ranomeeto, Palangga, Kiaea

(2) Structure design and cost estimation

2.1 Topographical survey, Mapping of project areas

- a. Survey areas 1991 / 1992
Ranomeeto village : 250 ha, Palangga village : 100 ha
- b. Survey areas 1992 / 1993
Kiaea village : 200 ha, Lalobao village : 120 ha
Lapulu village : 100 ha,

2.2 Infrastructure facilities (irrigation, road, etc..)

- a. Detail design and cost estimation 1991 / 1992
 - a.1 The construction improvement work at Ranomeeto village
 - a.2 Farmers' participation work at Ranomeeto village
- b. Detail design and cost estimation 1992 / 1993

- b.1 The construction improvement work at Palangga village
- b.2 Foremans' construction work at Palangga village
- c. Detail design and cost estimation 1993 / 1994
 - c.1 The construction improvement work at Kiaea village

2.3 Agricultural and rural facilities

- a. Detail design and cost estimation 1991 / 1992
 - a.1 Supplied equipment and concrete pavement of the surrounding area at JICA project office
 - a.2 Seed storage facilities, training hall and office at Ranomeeto village
- b. Detail design and cost estimation 1992 / 1993
 - b.1 Auction yard, Cattle fattening yard, rice mill house dry yard at Ranomeeto village
 - b.2 Training hall and office at Palangga village
- c. Detail design and cost estimation 1993 / 1994
 - c.1 Cattle fattening yard, rice mill house, dry yard at Palangga village
 - c.2 Training hall and office, rice mill house, dry yard, at Kiaea village
 - c.3 Training hall and office at Lalobao village
 - c.4 Training hall and office at lapulu village

(3) Implementation of survey and construction work

3.1 Survey work

- a. Contracted survey work 1991 / 1992
 - a.1 PT. INDRA CONSULTANT Amount Rp. 20,000,000
- b. Contracted survey work 1992 / 1993
 - b.1 CV. IMANUEL CONSULTANT Amount Rp. 32,700,000

3.2 Construction work

- a. Contracted construction work 1991 / 1992
 - a.1 PT. PEMBANGUNAN PERUMAHAN Amount Rp. 228,330,000
 - a.2 CV. SIDO MUKTI Amount Rp. 23,400,000
- b. Contracted construction work 1992 / 1993
 - b.1 CV. CANANG SARI Amount Rp. 210,400,000
 - b.2 CV. DIAN Amount Rp. 97,000,000
- c. Contracted construction work 1993 / 1994
 - Under preparing and waiting

(4) Training

4.1 Water management training

a. Purpose

Establishment of Water Users' Association (P3A)

b. Time period and training place

From January 21 to February 4, 1993 (15th days)

Training hall and office at Ranomeeto village

c. Participant

Local government officials : 9 personnel

Farmers' group : 11 personnel

d. Training syllabus

d.1 General : 10 hours

d.2 Irrigation scheme : 26 hours

d.3 Legal framework : 20 hours

d.4 P3A development : 18 hours

d.5 Social skills : 9 hours

d.6 Field trip : 2 days

4.2 Study tour

a. Purpose

To aims to give to the local people the incentive to inspect the improved farming area

b. Schedule of study tour and visited place

From April 16 to April 22, 1993 (7 days)

In Yogyakarta, in Sukoharjo, in Semarang, in Surabaya and its around villages

c. Participant

Local government officials : 8 personnel

Farmers' group : 7 personnel

(5) Other : the cooperation for other officials concerned

2. Implementation schedule

In accordance with 5 years frame work plan for the Integrated Agricultural and Rural Development Project, I have been executing the assignment of agricultural and rural infrastructure and the comparison of implementation schedule is attached the next page.

The Integrated Agricultural and Rural Development Project in Southeast Sulawesi Province: Planning and Executing (Compare the work schedule)

Content	Item	Yearly plan			Second (2nd) Year			Third (3rd) Year		
		4/91'	6	9	4/92'	5	9	4/93'	6	12
Expert on Agricultural and Rural Infrastructure Extension Jun 5, 91 ~ Aug 2, 93										
I. Planning of the integrated agricultural and rural development										
1. Planning of land use farming systems										
1) Land use										
a. Survey on land use	Banawaeto, Palangga									
b. Land use plan	Kiaea, do, Lalobao, Lapulu									
2) Farming system	Laeya, do, Sabulakoa, Onewila									
2. Development planning of agricultural and rural infrastructure	Study on farm management									
1) Land survey										
a. Field survey on site	Banawaeto, Palangga									
b. Topographical mapping	Kiaea, do, Lalobao, Lapulu									
2) Plan and design	Laeya, do, Sabulakoa, Onewila									
a. Land reclamation	Banawaeto, Palangga									
b. Basic agricultural infrastructure	Kiaea, do, Lalobao									
c. Agricultural and rural facilities	Lapulu, do, Laeya									
II. Development of agricultural and rural infrastructure										
1. Development of basic agricultural infrastructure										
1) Land reclamation										
a. Land reclamation by machinery	Banawaeto, Land reclamation									
b. Construction management	- do - Secondary crops									
c. Machinery operation and maintenance	- do - Stable crops									
2) Basic agricultural infrastructure	Palangga, Land reclamation									
a. Work execution	Kiaea, Land reclamation									
b. Construction management	- do - Paddy and reclamation									
2. Development of agricultural and rural facilities	Lalobao, Land reclamation									
1) Work execution	Banawaeto, Construction work									
2) Construction management	- do - Construction work									
	Palangga, Construction work									
	- do - Foreman's work									
	Kiaea, Farmers group									
	- do - Construction work									
	Lalobao, Streets group									
	- do - Construction work									
	Banawaeto, Building work									
	- do - Contractor (1st)									
	Palangga, Building work									
	- do - Contractor (1st)									
	Kiaea, Building work									
	- do - Contractor									
	Lalobao, Building work									
	- do - Contractor (1st)									
	Lapulu, Building work									
	- do - Contractor (1st)									

Remarks: Planning. Executing. Expecting.

VI. General comment

Since June 1991, I have engaged in the technical cooperation with the Integrated Agricultural and Rural Development Project in Southeast Sulawesi Province in Indonesia.

This project aims at well balanced regional development and includes a variety of activities such as reclamation of agricultural and rural infrastructure, improvement of farming techniques and strengthening of farmers' organizations.

I would like to give my comment from the teaching experience in field on agricultural and rural infrastructure for the past about two years.

(1) Topographical maps

Topographical maps of the project site and its surrounding area should be prepared with the accuracy required for planning and design works, so that the maps of each stage for the works will be required accuracy as follows;

- National land topographical maps on a scale of 1/25,000 to 1/50,000 as prepared by the Government of Indonesia
- Maps on a scale of 1/2,500 to 1/5,000 for planning of farmland blocks, road networks, irrigation and drainage systems.
- Topographical maps on a scale of 1/1,000 for land reclamation of paddy field and water management (cadastral map) from the project formulation stage.

(2) Water users' association (P3A) in Ranomeeto village

The water management in Ranomeeto village may be summarized as the following two items.

- To study the basic data of long term to obtain the available intake volume for the dry as well as wet season.
- To determine the total water requirement by season and to make drawing the irrigation map based on the topographical survey on a scale of 1/1,000.

(3) Technical information

We prepared the technical booklet as a part of the activities of the technical transfer being extended from Japan in order to this project, and the technical information are prepared as following items;

- Basic design of fixed weirs printed in 1992
- Design of timber bridges and abutments printed in 1993

I would like to give an advice in my general comment by saying technical guidance as following items.

- Drainage design standard
- Construction control
- Land consolidation

I hope that these technical information serves effectively to the personnel concerned of the project involved in the process of technical transfer.

