

APPENDICES

APPENDIX A

TERMS OF REFERENCE FOR FEASIBILITY STUDY OF ULAR RIVER
FLOOD CONTROL AND IMPROVEMENT OF IRRIGATION PROJECT
JULY 1977

1. BACKGROUND INFORMATION.

The Ular river originates in the Bukit Barisan mountains, and runs almost to the north and debouchs into the Strait of Malaka at a point about 30 km east from Medan, the capital city of North Sumatra Province. The river has a catchment area of about 1,000 km² and a length of about 115 km and the basin stretches over both Kabupaten of Deli / Serdang and Simalungun.

The flat area in the downstream of the Ular river has developed plantations, 8700 ha of palm oil, 3500 ha of rubber and 1200 ha of coconut and 18500 ha of cultivated paddy field, 7000 ha of irrigation area and 11500 ha of rain-fed area. Almost in every rainy season, flooding has repeatedly occurred due to breaches of the dikes, and caused great damages to agricultural land, the rail way, the high-way and other public facilities as well as inhabitants.

In such a productive area, control of river water is one of the most important problems. That is to say, flooding from the Ular river which through this productive plain should be prevented and at the same time the water should be used effectively in order to increase the agricultural production.

With the view to preventing these disasters emergently, a flood control project was planned over a stretch of 10 km upstream from the Perbaungan high-way bridge in view of the fact that very frequent breaches of the dikes occurred on this stretch.

This project was started in 1971 as Ular River Urgent Flood Control Project with the aid of a Loan from the Overseas Economic Cooperation Fund, Japan, estimating the temporary design discharge at 600 m³/s. The emergency works were finished in March 1976. Elimination of the constriction formed by the highway and railway bridges was also recommended and the rebuilding works are now underway by the Directorate General Bina Marga and Railways State Company respectively.

As the result of this Urgent Flood Control Project, damages to be caused by floods in the midstream were markedly decreased, and the productivity in the downstream agricultural area was fairly increased.

In view of the fact that the above mentioned works are the emergency ones, therefore, the Government of Indonesia has intended to formulate a master plan which contains not only flood control measures but also improvement and development of the irrigation and drainage in the downstream plain area, and requested to the Government of Japan to extend a technical aid in conducting the study for making the Overall Ular River Improvement Plan. In response to the request, the Japan International Cooperation Agency carried out the Master Plan Study. The result of study was reported in 1977. It was concluded that the master plan must be the one that includes both the flood control and the improvement of irrigation and drainage and was also concluded that the master plan for the Overall Ular River Improvement Project will thus be composed of the river channel improvement at the design discharge of 800 M³ and the improvement of irrigation and drainage over an area of 18,500 ha.

The project area is shown in Fig. 1.

2. TERMS OF REFERENCE FOR THE SERVICES.

2.1. OBJECTIVE.

The purpose of the services is to assist the Government of Indonesia in conducting a feasibility study for the Ular river Flood Control project and improvement of irrigation and drainage system in the downstream area of the Ular river.

The study should be carried out based on the Master Plan which was proposed on 1977 by the Japan International Cooperation Agency and the objective of the following items:

- a. Study for improvement work of about 32 km of downstream of the Ular river.
- b. Study for improvement of the existing 7,000 ha technical irrigation system and construction of new irrigation system for 11,500 ha.
- c. Study for improvement of drainage system on the downstream area of the Ular river.
- d. Study of erosion control upper parts of Ular River basin.
- e. Study of flood forecasting and flood warning system in Ular River Project.

2.2. SCOPE OF WORKS.

The activities undertaken in the feasibility study are consisted of two main program namely.

- Main works program
- Transfer of knowledge program.

1. Main works program is specified as follows:

1.1. Mapping and surveying.

- To review the existing maps and surveying data (1/10,000 topographic map for project are will be provided by the Japan International Cooperation Agency).
- to review the existing bench mark in the project area.
- to assist the survey works for irrigation and drainage canal line, and mapping of the intake structures for the feasibility study programs.
- to assist the surveying works for river channel improvement.
- to assist preparation of specifications for the mapping surveying works, need for the design stage of the project if necessary.

1.2. Collection of additional data and recent information.

- Hydrology and meteorology.
- agricultural and irrigation.
- regional economy.
- river improvement.
- others.

1.3. Analysis and Estimation of hydrological and hydrologic quantities.

- rainfall and evaporation for river improvement irrigation and drainage improvement.
- design year for irrigation planning.
- river water discharge.
- study of flood discharge.
- sedimentation and siltation of irrigation water supply.

- study of sediment transportation in the river channel.
- tidal level for river improvement plan.
- water quality.
- others.

1.4. Soil mechanic investigation.

- assistance on the planning and survey works such as machine boring, sounding test and other for foundation layer of embankment and structures to be planned.
- sampling and laboratory test for foundation structures and borrow area.
- to assist preparation of specification for soil mechanic investigation need for design stage of the project.

1.5. Construction material study.

- study on construction materials for the project.

1.6. Agriculture and irrigation & drainage study.

- a. additional study on the agronomy and soil capability of the project area.
- b. additional study on the agro-economy condition in the project area.
- c. conformation of irrigable area, cropping pattern, irrigation water requirement and irrigation water supply.
- d. preparation of the basic layout of irrigation and drainage canal system and basic design of the standard structure.
- e. study whether the irrigation and drainage project is dividable or not as stages.
- f. study and analysis of the farm budget in the project area.
- g. estimation of construction cost, operation and maintenance costs and expected benefit.

1.7. Flood control study.

- alternative study in the downstream of Pulau Gambar area.
- study whether the river channel improvement is dividable or not as stage.
- flood study to decided the design discharge which haved corelation with economical condition.
- estimation of construction cost and benefits.
- preparation of the basic layout of river channel improvement and basic designs of structures.

1.8. Erosion control study.

- study of river bed movement at the steep part of the upper course.
- study of erosion resources in upper part of Ular River basin.
- to make proposal the possibility location of erosion control structure.

1.9. Resettlement study.

- inventory and study the existing population that will be affected by the project.
- inventory and study the resettlement area to be proposed for resettling the people that will be affected by the project.

1.10. Construction planning.

- investigation of construction equipment availability, construction materials, and transportation for construction works.
- study on kinds and quantity of the construction equipment and materials and their cost estimates.
- study on construction method and construction schedule.

1.11. Economic evaluation.

- estimation of economic prices concerning the construction costs and benefits.
- study of cost benefit analysis and in time rate

of return of the project for whole project and divided ones if any preparation of disbursement schedule.

2. Transfer of knowledge program is as follows:

- 2.1. Training the local staff and counterparts of the Indonesian Government.
- 2.2. Transfer of knowledge and technical know-how to the Indonesian counterparts in the course of the main works.
- 2.3. Expertise.

A total of man-months of assistance is required for the study, with the following specification of experts:

- a. One team-leader with experience at least 10 years in planning, designing, implementation, operation and maintenance of flood control and irrigation project. He is experienced also as a leader of concerned project in the country and abroad.
- b. Three surveying engineers with experience in ground surveying for river and irrigation improvement works.
- c. Two Hydrologists with experience in analysing of flood discharge, low water discharge and sediment transportation calculation in the channel, flood forecasting & warning system analysis.
- d. One soil mechanic engineer with experience in investigation the quality of soil used for banking and with experience of boring work and soil mechanic characteristic study for foundation of embankment and structure.
- e. One river engineer with experience in designing, implementation, operation and maintenance of river improvement works including structure.
- f. Two irrigation and drainage engineer with experience in planning designing, construction, operation and maintenance of irrigation and drainage system.
- g. One structure engineer with experience in designing irrigation structure hydraulic, drainage structure, bridge and other crossing structure at canals.
- h. One equipment engineer with experience in selection of construction equipment for similar works.

- i. Two agricultural expert with experience in exploration of agronomy, planning crop and exploration of agroeconomy.
- j. One Sabo / Dam engineer with experience in Sabo works.
- k. Project economist with experience in project cost evaluation.

The proposed assignment schedule of the experts is shown in annex. I.

3. ORGANIZATION FOR THE FEASIBILITY STUDY.

For carry out the Feasibility Study, the JICA and the Government of Indonesia have established the Organization shown in Fig. 2, in accordance with the Scope of Work submitted to the Government of Indonesia.

The Feasibility Study Team consists of the members mentioned below (attached).

4. UNDERTAKINGS OF THE GOVERNMENT OF INDONESIA.

Equipment and materials to be provided by the Government of Indonesia.

4.1. Assuring the security of the Study Team.

4.2. Seven (7) vehicles with drivers and their maintenance for official use by the Team, and their counterparts, and will dispatched as follows:

- a. Four (4) vehicles will be dispatched during surveying and soil mechanics survey from the beginning of August, 1977.
- b. Three (3) vehicles will be dispatched from the beginning of October, 1977.

4.3. Exemption from taxes and duties for the study team and the equipment to be carried into Indonesia for the study.

4.4. Providing a suitable office space in Medan with office equipment necessary for the study.

4.5. Making arrangements for accomodations and office in the field required for the study, when necessary.

- 4.6. Providing one Indonesia Counterpart for each Japanese expert.
- 4.7. Providing nine (9) surveying teams, each of which will consist of one surveyor, one assistant and four laborers.
- 4.8. Providing three (3) soil mechanics survey team, A, B, C,
- A will consist of one engineer, one assistant and about 6 (six) laborers.
- B will consist of one engineer, one assistant and about 10 (ten) laborers.
- C will consist of one engineer, one assistant and about 2 (two) laborers.
- Note : A will work for sounding test, auger boring, cone penetration, vane test and soil samplings.
- : B will work for machine boring.
- : C will work for soil test in laboratory.
- 4.9. Providing equipment and materials for surveying and soil mechanics surveys as shown in the attached papers.

Equipment and materials to be provided by the Government of Indonesia for surveyings.

1.	Boats	2 units
2.	Level with tripod	4 units
3.	Leveling staff, 5 m	10 sets.
4.	Esron tape, 50 m	4 pcs.
5.	Esron rope	3 pcs.
6.	Wooden stakes, (10 cm × 10 cm × 100 cm)	520 pcs.
7.	Wooden stakes, (6 cm × 6 cm × 100 cm)	1,520 pcs.
8.	Paint, black	5 kgs.
9.	Paint, red	25 kgs.
10.	Brush for painting	20 pcs.
11.	Nail, 6 -- 8 cm length	2,500 pcs.
12.	Maul/wooden hammer	4 pcs.
13.	Sickel for cutting grass	some

Equipment and materials to be provided by the Government of Indonesia for soil mechanics surveys.

1.	Boring machine, capacity more than 50 m	1 unit
2.	Scaffold and tripod for machine boring	1 suit
3.	Truck	1 set
4.	Boat	3 sets
5.	Auger-boring apparatus, 10 m	1 set
6.	Swedish sounding test apparatus, 20 m	1 set
7.	Cone penetrometer 5 m	1 set
8.	Oven	1 set
9.	Sieves	1 suit
10.	Liquid limit test apparatus	1 set
11.	Plastic limit test apparatus	1 set
12.	Balance; 500 g, 1 kg, 10 kg	1 set each
13.	Chain block with tripod for swedish	1 unit

5. UNDERTAKINGS OF THE GOVERNMENT OF JAPAN.

- 5.1. To send the Japanese Experts Team for about 10 (ten) months.
- 5.2. To carry out the Feasibility Study for both flood control and improvement of irrigation and drainage system.
- 5.3. To provide training for the Government staff, during the study period.
- 5.4. To provide the equipment.
- | | |
|---------------------------|------------|
| - Leveling with tripod | - 10 units |
| - Leveling staff, 5 m | - 20 units |
| - Core penetrometer (5 m) | - 2 sets |
| - Theodolit | - 5 units. |

6. REPORTING.

In the course of the project operation, the Team, shall submit Technical Reports and Technical Notes in English language to the Director General of Water Resources Development.

6.1. Technical Report consist of :

6.1.1. Interim Report.

The Team will prepare and submit to the Government of Indonesia 30 copies of Interim Report (in English) together with the economic and technical priority order of the individual projects within 6 months after the commencement of the Feasibility Study.

The Government of Indonesia will provide its comments to the Team within 30 days after the receipt of the Interim Report.

6.1.2. Draft Final Report.

The Team will prepare and submit to the Government of Indonesia 30 copies of Draft Final Report (in English) within 4 months after the receipt of the comments on the Interim Report.

The Government of Indonesia will provide its comments to the Team within 30 days after the receipt of the Draft Final Report.

6.1.3. Final Report.

The Team will prepare and submit to the Government of Indonesia 50 copies of Final Report within 60 days after the receipt of the comments on the Draft Final Report.

6.2. Technical.

The Team will submit to the Government of Indonesia 50 copies of Technical Notes consisting of :

6.2.1. Approach of study.

6.2.2. Procedures.

6.2.3. Equipment and their use.

6.2.4. Formula used and calculation.

6.2.5. Surveying Notes, and others.

APPENDIX B

LETTER OF MR. K. ICHIKAWA,
FIRST SECRETARY OF EMBASSY OF JAPAN,
DATED OCTOBER 6, 1977.

October 6, 1977

Mr. Gempo Seojono
Head
Bureau for International
Cooperation
Cabinet Secretariate
Indonesia

No. 106/TH/77

Dear Sir:

Ular River Flood Control and
Improvement of Irrigation Project

I have the pleasure to send you herewith a final draft Scope of Work for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project. This Scope of Work is based on the meeting between Mr. Kasama, Japanese Team Leader and Ir. Soedaryoko, Director for Rivers, DGW RD, DPUTL on August 24, 1977.

It would be appreciated if you could agree to our proposal, and take necessary steps.

Thank you very much for your kind attention and cooperation.

Sincerely yours,

K. Ichikawa
First Secretary
(Technical Cooperation)

APPENDIX C

SCOPE OF WORK
FOR
FEASIBILITY STUDY
OF
ULAR RIVER FLOOD CONTROL
AND IMPROVEMENT OF IRRIGATION PROJECT

September 1977

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INTRODUCTION.

In response to the request of the Government of Indonesia, the Government of Japan has decided to conduct a feasibility study of ULAR RIVER FLOOD CONTROL AND IMPROVEMENT OF IRRIGATION PROJECT in Indonesia, in accordance with laws and regulations in force in Japan and the Japan International Cooperation Agency (JICA), an official agency responsible for the implementation of technical cooperation programme of the Government of Japan, will carry out the study. The present document sets forth the scope of work in regard to the above mentioned study which is to be carried out in close cooperation with the Government of Indonesia and authorities concerned.

BACKGROUND INFORMATION.

The Ular river originates in the Bukit Barsian mountains, and runs almost to the north and debouches into the Strait of Malaka at a point about 30 km east from Medan, the capital city of North Sumatra Province. The river has a catchment area of about 1,000 km² and a length of about 115 km and the basin stretches over both Kabupaten of Deli/Serdang and Simalungun.

The flat area in the downstream of the Ular river has developed plantations, 8,700 ha of palm oil, 3,500 ha of rubber and 1,200 ha of coconut and 18,500 ha of cultivated paddy field, 7,000 ha of irrigation area and 11,500 ha of rain-fed area. Almost in every rainy season, flooding has repeatedly occurred due to breaches of dikes, and caused great damages to agricultural land, the rail way, the high-way and other public facilities as well as inhabitants.

In such a productive area, control of river water is one of the most important problem. That is to say, flooding from the Ular river which through this productive plain should be prevented and at the same time the water should be used effectively in order to increase the agricultural production.

With the view to preventing these disasters emergently, a flood control project was planned over a stretch of 10 km upstream from the Perbaungan high-way bridge in view of the fact that very frequent breaches of the dikes occurred on this stretch.

This project was started in 1971 as Ular River Urgent Flood Control Project with the aid of loan from the Overseas Economic Cooperation Fund, Japan, estimating the temporary design discharge at 600 m³/s. The emergency works were finished in March 1976. Elimination of the constriction formed by the highway and railway bridges was also recommended and the rebuilding works are now underway by the Directorate General Bina Marga and railways State Company respectively.

As the result of this Urgent Flood Control Project, damages to be caused by flood in the midstream were markedly decreased, and the productivity in the downstream agricultural area was fairly increased.

In view of the fact that the above mentioned works are the emergency ones, therefore, the government of Indonesia has intended to formulate a master plan which contains not only flood control measures but also improvement and development of the irrigation and drainage in the downstream plain area, and requested to the Government of Japan to extend a technical aid in conducting the study for making the Overall Ular River Improvement Plan. In response to the request, the Japan International Cooperation Agency carried out the Study. The result of study was reported in 1977. It was concluded that the plan must be the one that includes both the flood control and the improvement of irrigation and drainage and also concluded that the plan for the Overall Ular River Improvement Project will thus be composed of the river channel improvement at the design discharge of 800 m^3 and the improvement of irrigation and drainage over an area of 18,500 ha.

The project are is shown in Fig. 1.

I. OBJECTIVE OF THE STUDY.

The study on OVERALL ULAR RIVER IMPROVEMENT PROJECT made by the Japan International Cooperation Agency concluded in its report that the project should include both the flood control of the Ular river and the improvement of irrigation and drainage over an area downstream from Pulau Gambar and between the two neighboring rivers. The objective of the present study is to justify the feasibility of the proposed project in consideration of phasing of the two components of flood control and improvement of irrigation and drainage if necessary.

The flood control component will contain the river channel improvement of a stretch about 32 km in length upward from the river mouth at the design discharge of $800 \text{ m}^3/\text{s}$ and the irrigation and drainage component will contain the improvement of irrigation and drainage systems over an area of about 18,500 ha on the downstream plain of the Ular river.

II. SCOPE OF WORK.

The activities undertaken in the survey and study are divided into two main programs, namely;

- Main works program
- Transfer of knowledge program

1. MAIN WORKS PROGRAM.

The main works program is specified as follows:

1.1. Mapping and surveying.

- a. to review the existing maps and surveying data (1 : 10,000 topographic map for the project area will be provided by the Japan International Cooperation Agency).
- b. to review the existing bench marks in the project area.
- c. to assist the surveying works for river channel improvement.
- d. to assist the surveying works for irrigation and drainage canal lines and mapping of the intake structures for the feasibility study programs.
- e. to assist preparation of specification for the mapping and surveying works which will be needed at the design stage of the project if necessary.
- f. the specification for the works are shown in Annex A.

1.2. Soil-mechanics investigation.

- a. to assist the planning and survey works such as machine boring, sounding test and others for investigation of foundation layer of embankment and structures to be planned.
- b. to assist sampling and laboratory test for foundation structures and borrow area.
- c. to assist preparation of specification for soil-mechanics investigation need at the design stage of the project if necessary.
- d. the specification for the works are shown in Annex B.

1.3. Hydrology.

- a. review and supplement of data for irrigation planning.
- b. review and supplement of data for drainage planning.
- c. study of sediment and water quality in intakes and irrigation canal.
- d. review and supplement of data for river planning.
- e. study of carrying capacity of river channel.
- f. study of design highwater level.

- g. supplementary study of tide level at the river mouth.
- h. study of treatment of the confluence of the Ular river and Pulau Gambar canal.
- i. study of sediment transportation in the designed channel.
- j. study of network of hydrological observation stations for establishment of flood forecasting and warning system and for additional data collection in future.

1.4. River Improvement.

- a. study of the results of surveyings and soil mechanics surveys.
- b. alternative study for treatment of the confluence of Pular Gambar canal and the Ular river.
- c. basic design of river improvement works.
- d. study of construction plan, construction method and construction schedule.
- e. cost estimates.

1.5. Irrigation.

- a. review of irrigation area.
- b. review of irrigation water requirement.
- c. basic design of irrigation facilities.
- d. study of construction plan, construction method and construction schedule.
- e. cost estimates.

1.6. Drainage.

- a. review of drainage area.
- b. review of drainage water requirement to be taken in the drainage plan.
- c. basic design of drainage facilities.
- d. study of construction plan, construction method and construction schedule.
- e. cost estimates.

1.7. Construction planning.

- a. study of construction method and construction schedule.
- b. check of availability of the existing equipment.
- c. study of necessary equipment and materials.
- d. cost estimates.

1.8. Agriculture and Agro-economic Study.

- a. collection of supplementary data.
- b. study of cropping pattern for each irrigation system.
- c. study of boundary of salinity intrusion.
- d. estimate of agricultural benefits.
- e. study of farm economy.
- f. study of the organizations for water management and others.

1.9. Resettlement Study.

- a. inventory and study the existing population that will be affected by the project.
- b. assistance of resettlement study which is carried out by agencies concerned.

1.10. Project Economy.

- a. collection of supplementary data.
- b. Study of economic feasibility and study of financial aspects.

1.11. Study of Organization for Operation and Management of the Project.

2. TRANSFER OF KNOWLEDGE PROGRAM.

- 2.1. Knowledge will be transferred to the Indonesian counterpart through daily work in the field.
- 2.2. Transfer of knowledge and training for Indonesian counterparts in the course of the works in Japan.

III. EXPERTIES.

For conducting the survey and study, a total of man-month of assistance is required with the following specification of experties:

- a. Team leader/Co-leader.
- b. Three surveying engineers.
- c. One hydrologist for river improvement.
- d. One hydrologist for irrigation and drainage.
- e. One Soil mechanics engineer.
- f. One river engineer.
- g. One irrigation engineer.
- h. One drainage engineer.
- i. One structure engineer.
- j. One equipment engineer.
- k. One agronomist.
- l. One agro-economist.
- m. One Project economist.
- n. One assistant/liaison officer.

IV. ORGANIZATION.

The Government of Japan and the Government of Indonesia, through their respective executive authorities shall jointly be responsible for the execution of the survey and study.

The Government of Indonesia puts in charge of the implementation of the survey and study the Directorate General of Water Resources Development, Ministry of Public Works and Electric Power as the executive authority while the Government of Japan puts in charge the President of Japan International Cooperation Agency (JICA) as the Japanese executive authority.

For the execution of the survey and study, the Government of Japan and the Government of Indonesia will establish the organization as shown in Annex 1.

V. REPORT.

1. Inception Report.

The JICA will prepare and submit to the Government of Indonesia 20 copies of Inception Report (in English) within three (3) months after commencement of the survey.

2. Interim Report.

The JICA will prepare and submit to the Government of Indonesia 30 copies of Interim Report (in English) within six (6) months after the commencement of the survey and study. The Government of Indonesia will provide the JICA with its comments within 30 days after receiving the Interim Report.

3. Draft Final Report.

The JICA will prepare and submit to the Government of Indonesia 30 copies of Draft Final Report (in English) within four and half (4.5) months after receiving the comments to the Interim Report. The Government of Indonesia will provide the JICA with its comments within 30 days after receiving the Draft Final Report.

4. Final Report.

The JICA will prepare and submit to the Government of Indonesia 50 copies of Final Report within three (3) months after receiving the comment to the Draft Final Report.

VI. UNDERTAKINGS OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA.

For the purpose of carrying out the survey and study, the Government of Indonesia will cooperate by

1. Providing the Japanese study team (hereinafter referred to as the Team) with a counterpart team with the data and information concerned for its use in connection with the survey and study.
2. Assuring the security of safety for the Team.
3. Exempting the Team from taxes and duties together with the equipment to be carried into Indonesia for the survey and study.

4. Providing the Team with a suitable office space in Medan with office furniture for the survey and study.
5. Providing the Team with 7 vehicles with drivers and maintenance thereof for exclusive use by the Team.
6. Making arrangements of accommodations and field office required for the survey and study.
7. Providing the Team with 9 surveying teams, each of which will consist of one surveyor, one assistant and four laborers.
8. Providing the Team with 3 soil-mechanics survey teams, A, B and C, each of which will consist of one engineer, one assistant and some laborers.
 - i A will be for sounding test, penetration tests, vane tests and samplings.
 - i B will be for machine boring.
 - i C will be for tests in laboratory.
9. Arranging transportation for the above items 7 and 8.
10. Carrying out necessary samplings for soil tests, water quality tests for irrigation water and sediment load survey for irrigation water, and their laboratory tests.
11. Providing the Team with necessary equipment and materials as shown in Table 1 and 2.
12. Providing the Team with 5 typists and 3 tracers for preparing the draft interim report.

VII. UNDERTAKING OF THE GOVERNMENT OF JAPAN.

For the purpose of carry out the survey and study, the Government of Japan will assist to the extent possible:

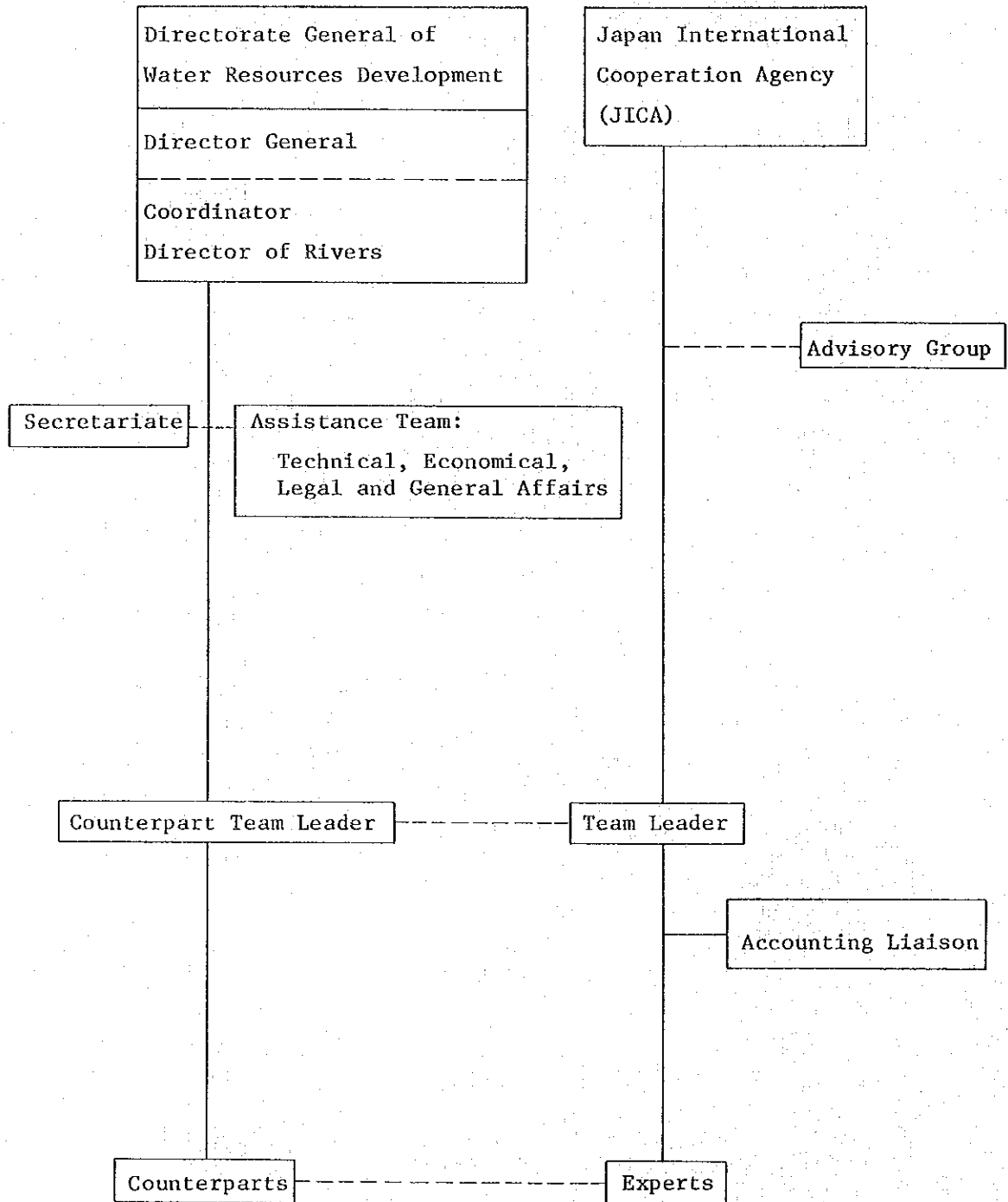
1. Sending a Japanese expert team to conduct the survey and study.
2. Transferring the knowledge to the Indonesian Counterparts

3. Making available the equipment, materials and spare parts necessary for the survey and study as shown in Table 3.

VIII. WORK SCHEDULE.

The survey and study will be carried out based on the work schedule shown in Annex 2.

ORGANIZATION CHART



Annex A

SPECIFICATION FOR MAPPING AND SURVEYING

The following surveying will be conducted by use of the 1:10,000 topographic map which was provided by the Japan International Cooperation Agency.

i. Longitudinal and cross leveling of the Ular river.

- a. The required distance for surveying is about 38 km of a stretch along the Ular river upward from the river mouth except about 10 km stretch from the Ular bridge.
- b. The interval of cross leveling will be 250 m each.
- c. The average width for cross leveling will be about 450 m or more and the cross leveling between 10 km and 13 km of the installed stakes should be made over the whole stretch of the paddy field in Pulau Gambar.
- d. The scale of drawings will be as follows;

cross leveling	: V = 1/100	H = 1/1,000
longitudinal leveling	: V = 1/100	H = 1/20,000

ii. Longitudinal and cross leveling for Pulau Gambar canal.

- a. The required distance for surveying is about 8 km of a stretch along the canal from the confluence with the Ular river.
- b. The interval of cross leveling will be 200 m each.
- c. The scale of drawings will be as follows;

cross leveling	: V = 1/100	H = 1/500
longitudinal leveling	: V = 1/100	H = 1/20,000

iii. Longitudinal and cross leveling for irrigation and drainage systems to be planned.

- a. The required distance for surveying is about 150 km in total.
- b. The interval of cross leveling will be 200 m each.
- c. The scale of drawings will be as follows;

cross leveling	: V = 1/200	H = 1/200
longitudinal leveling	: V = 1/100	H = 1/20,000

iv. Plane table surveying for intakes.

9 places, scale 1/500

v. Plane table surveying for drainage sluice to be studied as an alternative at the confluence of the Ular river and Pulau Gambar canal, the scale of drawing will be 1/500.

vi. Leveling of Bench Marks.

a. The elevation of the bench marks installed in the project area will be checked.

b. The whole length of leveling route will be about 200 km.

Annex B

SPECIFICATION FOR SOIL-MECHANICS INVESTIGATION

- i. The required works for planning cross section of embankment, studying foundation and studying dredging works are as follows:
 - a. sounding test or vane test at 10 sections of the river.
 - b. sampling of soil.
 - c. soil test (grain size analysis, moisture content, liquid limit, plastic limit and, if necessary, compaction test).
- ii. The required works for planning intake structures are as follows:
 - a. sounding test at 9 places to be adopted as sites of intakes.
 - b. sampling of soil.
 - c. soil test (grain size analysis, moisture content, liquid limit, plastic limit and, if necessary, compaction test).
- iii. The required work for planning a drainage sluice as an alternative is as follows:
 - a. one hole of machine boring including standard penetration tests.

APPENDIX D

CONTENTS

1. Note of Meeting on Draft Final Study Report for Overall Ular River Improvement Project and Inception Report for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project, signed on November 14, 1977.
2. Attachment A : List of Attendance.
3. Attachment B : Record of Meeting in Medan, signed November 8, 1977.

NOTE OF MEETING
ON
DRAFT FINAL STUDY REPORT
FOR
OVERALL ULAR RIVER IMPROVEMENT PROJECT
AND
INCEPTION REPORT
FOR
FEASIBILITY STUDY OF ULAR RIVER FLOOD CONTROL
AND IMPROVEMENT OF IRRIGATION PROJECT

Held on : Friday, November 11, 1977
Time : 9:30 - 12:00
Place : Meeting Room, Directorate of Rivers,
Directorate General of Water
Resources Development, Jakarta
Attendances : Attachment A.

On the arrival of the Advisory Group for the Feasibility Study Team, JICA, for the Ular River Flood Control and Improvement of Irrigation Project, meetings were held on 8th and 11th November 1977 at Medan and Jakarta, respectively between the Directorate of Rivers and the Feasibility Study Team, JICA for the following items :

- (1) Draft Final Report on the Overall Ular River Improvement Project which was submitted on 18th of August 1977.
- (2) Draft Inception Report for the Feasibility Study for the Ular River Flood Control and Improvement of Irrigation Project.

The record of the meeting on 8th of November 1977 in Medan was attached as reference shown in Attachment B, while the conclusion of the meeting on 11th of November 1977 is recorded as follows :

1. Ir. Y. Sudaryoko, Director of Rivers, Directorate General of Water Resources Development gave the following explanations :
 - a. The Draft Final Report submitted on 18th of August 1977 by the Study Team, JICA, has been agreed by the Government of Indonesia and the Study Team is expected to proceed to prepare the Final Report. However, a word of "a master plan" should be changed into "an overall plan" based on the Notes of Meeting on 24th August 1977.
 - b. The scope of work submitted by the Government of Japan through the Embassy of Japan, Jakarta, by No. 106/TH dated October 6, 1977 has been accepted by the Government of Indonesia and the Study Team is

expected to proceed to execute the feasibility study with some considerations.

A word of "a master plan" in the Scope of Work submitted from Embassy of Japan, Jakarta by No. 106/TH/77 dated October 6, 1977 should be read as "an overall plan".

2. The Study Team, JICA agreed as follows :

- a. The Final Report will be prepared in Japan based on the Draft Final Report which was submitted on 18th of August 1977 and the matter as stated in paragraph 1. a mentioned above.
- b. The Feasibility Study will be conducted based on the considerations agreed by both the Government of Indonesia and the Study Team, JICA, as mentioned in the next paragraph.

3. Considerations for the Feasibility Study.

- a. In the Overall Ular River Improvement Project, the flood control scheme is the most important aspect; therefore the study will be conducted considering the principle mentioned above.
- b. For the study of improvement of irrigation system, the following items will be considered.
 - i. to review the existing irrigation system.
 - ii. to improve the existing irrigation system.
 - iii. to extend the existing irrigation system.
- c. On the flood control scheme, an artificial retarding basin will be studied as an alternative for natural retarding basin reported in the draft final report. A review of the carrying capacity of the river channel upstream of the Perbaungan Highway Bridge will be made in order to make sure that the carrying capacity is relevant to the design discharge of $600 \text{ m}^3/\text{sec}$.
- d. In the course of the feasibility study on the improvement of the existing irrigation scheme, the following studies will be made as alternatives :
 - i. the overall plan as formulated in the draft final report.
 - ii. the plan formulated in consideration of reducing reconstruction of the existing intakes.
 - iii. An alternative, in which all necessary irrigation water will be provided by one new weir located upstream of the Serbajadi Bridge, was requested by the Directorate of Rivers. However it was concluded that the weir plan could not be conducted in the present feasibility study due to shortage of fundamental data, but discussion concerning this matter will be made in the course of the study.
- e. For the drainage scheme to be included in the Feasibility study, only the surface drainage will be taken into consideration.

4. In the course of the study, meetings will be held once a month at Medan with representatives from the Directorate of Rivers, DGWRD, Jakarta.
5. It is acceptable that three counterparts will be dispatched for two months each, for the purpose of transfer of knowledge in Japan.
6. The following equipment and materials will be left after completion of the study in the field.
 - a. one set of the item No.2 shown in page 20 of the Inception Report.
 - b. one set of the item No.4 - " -
 - c. five sets of the item No.5 - " -
 - d. ten pcs. of the item No.6 - " -
 - e. one set of the item No.14 - " -
 - f. one set of the item No.15 - " -
 - g. one set of the item No.17 - " -
 - h. four pcs. of the item No.18 - " -
 - i. six pcs. of the item No.19 - " -
 - j. eight pcs. of the item No.21 - " -
 - k. six pcs. of the item No.22 - " -
 - l. all of the items No.23 to No.28 - " -
7. Three survey parties were requested for supplemental surveying for about two months in the field.
8. 20 copies of Inception Report will be submitted on 14th of November 1977.

Jakarta, November 14, 1977

K. Kasama

Co-Leader of the
Feasibility Study Team,
J I C A.

Ir. Y. Sudaryoko

Director of Rivers,
Directorate General of Water
Resources Development, Ministry
of Public Works and Electric
Power.

Attachment A

LIST OF ATTENDANCE

Held on : Friday, 11th November 1977.

Time : 9.30 - 12.30

Place : Meeting Room, Directorate of Rivers, Jakarta

INDONESIA

Mr. Y. Sudaryoko
Mr. Sarbini Ronodibroto
Mr. Mardjono Notodihardjo
Mr. Kusdaryono
Mr. Soekrisno Rammelau
Mr. Suradji
Mr. Raaydi
Mr. M. Nainggolan
Mr. Dj. Siahaan
Mr. Bambang Prayitno
Mr. Nakahiro
Mr. Watanabe
Mr. Kasri Kansrah
Mr. Waluyo Sabarno

JAPAN

Mr. S. Inoue
Mr. Y. Takeuchi
Mr. K. Tanaka
Mr. Y. Suematsu
Mr. K. Kasama
Mr. K. Ohno
Mr. T. Kawaguchi
Mr. K. Onaka
Mr. K. Nakajima

Attachment B

RECORD OF MEETING

IN MEDAN

Concerning Draft Study Report on Overall Ular River Improvement Project and Scope of Work for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project.

Held on : Tuesday, November 8, 1977.

Time : 9.00 - 12.00.

Place : Meeting room of DPU, Medan.

Attendance List is attached herewith.

On the arrival of Advisory Group for the JICA Study Team, a meeting was held concerning the following items.

- (1) Draft Study Report on Overall Ular River Improvement Project.
- (2) Draft of Scope of Work for Feasibility Study for Ular River Flood Control and Improvement of Irrigation Project.

Note of meeting is as follows.

I. Draft Study Report.

1.1. The Project Manager of Ular River Improvement Project gave an explanation and requested as follows.

1.1.1. The Project Manager principally agreed to the study result of flood control scheme.

1.1.2. For irrigation scheme, the Project Manager strongly requested 2 (two) items mentioned below.

(a) Reduction of reconstruction of intakes.

(1) The existing whole intakes along the lower reaches of the Ular river except Pulau Gambar, Singosari and Wonosari will be left as they are, due to social conditions.

(2) Singosari & Wonosari which are proposed as Singosari intake will newly be constructed.

(3) Extension of irrigable area in Swadaya, Buluh, Perbaungan irrigation systems will depend upon the capacity of the existing intakes and improvement of the existing and necessary irrigation canals will be rehabilitated based on the above-mentioned matter.

- (4) The remaining area which is not covered by item 3 except Singosari area on the right side of the Ular river will be irrigated from Pulau Gambar intake. Pulau Gambar intake will be reconstructed for the above-mentioned purpose.
- (5) Extension of irrigable area on Timbang Deli, Sumber Rejo and Ramonia intakes depends upon the capacity of the existing intakes and improvement of the existing and necessary irrigation canals will be rehabilitated. The existing aqueduct in Sumber Rejo area should be left as it is.
- (6) If the existing capacities of Timbang Deli and Sumber Rejo intakes are not enough for proposed irrigable area in Timbang Deli and Sumber Rejo area, reconstruction of the above-mentioned intakes and necessary canals will be considered.

(b) Sediment problem.

- (1) Sedimentation in the existing irrigation system is important problem for the Project.

1.2. The JICA Team gave explanations as follows.

- 1.2.1. Preparation of the final study report will be proceeded based on the Draft Study Report.
- 1.2.2. The requested items as shown in 1.1.2. will be studied in more detail during the Feasibility Study period.

II. Scope of Work.

- 2.1. The study for the items as mentioned in paragraph 1.1.2. will be carried out in more detail during the Feasibility Study period. The irrigation Plan mentioned in paragraph 1.1.2. leads the final concepts for the Feasibility Study.
- 2.2. If the alignment of proposed irrigation canal is in plantation area, it should be considered to use lining canal in order to reduce the seepage.
- 2.3. Sediment control devices will be studied in more detail during the Feasibility Study. The approach of study would be as follows.
 - (a) Approaching velocity shall be reduced by means of some energy dissipation devices at the head of approaching canal.
 - (b) Counter measure against sediment which deposits in canal would be solved by settling basin with gravity flushing canal if possible.
 - (c) If it is not possible, maintenance of the settling basin will be considered by use of man-power or some equipment.

- 2.4. Improvement of drainage in the plantation area will not be included in the Project. It is desirable to give general descriptions for about improvement of drainage in consideration of lowering of ground water table.
- 2.5. In order to get electric conductivity and pH, field test should be conducted.
- 2.6. An artificial retarding basin in Pulau Gambar area will be considered as an alternative for flood control device.

Mr. K. Kasama
Co-Leader of the Feasibility
Study Team, JICA

Mr. Machmudin Makdurah
Project Manager of Ular
River Improvement Project

AttachmentLIST OF ATTENDANCE

Held on : Tuesday 8th November 1977.
 Time : 9.00 - 12.00.
 Place : Meeting Room DPUP - Medan.

INDONESIA

Mr. Machmudin Makdurah
 Mr. B. Harahap
 Mr. M. Nainggolan
 Mr. Nakahiro
 Mr. Waluyo Sabarno
 Mr. B. W. Limbong
 Mr. Dartawan S.
 Mr. J. Banjarnahor
 Mr. Dj. Siahaan
 Mr. N. Ginting
 Mr. N. Bangun
 Mr. B. Tampubolon
 Mr. Sahar
 Mr. L. Sibarani
 Mr. L. Pardosi
 Mrs. Aisyah Nasution

JAPAN

Mr. S. Inoue
 (Chairman of Advisory
 Committee)
 Mr. Y. Takeuchi
 (Advisory Committee)
 Mr. K. Tanaka
 (Advisory Committee)
 Mr. Y. Suematsu
 (Advisory Committee)
 Mr. K. Kasama
 Mr. K. Onaka
 Mr. T. Kawaguchi
 Mr. M. Shono
 Mr. A. Takubo
 Mr. M. Yonai
 Mr. K. Nakajima
 Mr. S. Ohtsuki
 Mr. M. Kodama

APPENDIX E

CONTENTS

1. Letter of Submission of Inception Report for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project, dated November 14, 1977.
2. Inception Report on Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project, dated November 1977, JICA.

Jakarta, November 14, 1977

Ir. Suyono Sosrodarsono
Director General of Water
Resources Development
Ministry of Public Works
and Electric Power

Dear Sir: Submission of Inception Report for Feasibility Study
of Ular River Flood Control and Improvement of
Irrigation Project.

We have the pleasure to submit you herewith twenty(20) copies of Inception Report for the Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project in accordance with the Scope of Work which was submitted to the Government of Indonesia from the Government of Japan through the Embassy of Japan, Jakarta, by No. 106/TH dated October 6, 1977.

We hope the study will be performed successfully on schedule. Thank you very much for your kind attention and cooperation.

Sincerely yours,

Mr. Kiyomi Kasama
Co-leader of Feasibility Study
Team of the Ular River Flood
Control and Improvement of
Irrigation Project.

REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS AND ELECTRIC POWER

INCEPTION REPORT
ON
FEASIBILITY STUDY
OF
ULAR RIVER FLOOD CONTROL
AND IMPROVEMENT OF IRRIGATION PROJECT

NOVEMBER 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

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- III. PLAN OF APPROACH
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X. EQUIPMENT AND MATERIALS FOR THE SURVEY AND STUDY

XI. UNDERTAKING OF THE GOVERNMENT OF INDONESIA

I. BACKGROUND OF THE STUDY

The Ular river originates in the Bukit Barisan mountains, and runs almost to the north and debouches into the Strait of Malacca at a point about 30 km east from Medan, the capital city of North Sumatra Province. The river has a catchment area of about 1,000 km² and a length of about 115 km and the basin stretches over both Kabupaten of Deli/Serdang and Simalungun.

The flat area in the downstream of the Ular river has developed plantations, 8,700 ha of palm oil, 3,500 ha of rubber and 1,200 ha of coconut and 18,500 ha of cultivated paddy field, 7,000 ha of irrigated area and 11,500 ha of rain-fed area. Almost in every rainy season, flooding had repeatedly occurred due to breaches of dikes, and caused great damages to agricultural land, the rail way, the high-way and other public facilities as well as inhabitants.

In such a productive area, control of river water is one of the most important problem. That is to say, flooding from the Ular river which through this productive plain should be prevented and at the same time the water should be used effectively in order to increase the agricultural production.

With the view to preventing these disasters emergently, a flood control project was planned over a stretch of 10 km upstream from the Perbaungan high-way bridge in view of the fact that very frequent breaches of the dikes occurred on this stretch.

This project was started in 1971 as Ular River Urgent Flood Control Project with the aid of loan from the Overseas Economic Cooperation Fund, Japan, estimating the temporary design discharge at 600 m³/s. The emergency works were finished in March 1976. Elimination of the constriction formed by the highway and railway bridges was also recommended and the rebuilding works are now underway by the Directorate General Bina Marga and Railways State Company respectively.

As the result of this Urgent Flood Control Project, damages to be caused by flood in the midstream were markedly decreased, and the productivity in the downstream agricultural area was fairly increased.

In view of the fact that the above mentioned works are the emergency ones, therefore, the government of Indonesia has intended to formulate an overall plan which contains not only flood control measures but also improvement and development of the irrigation and drainage in the downstream plain area, and requested to the Government of Japan to extend a technical aid in conducting the study for making the Overall Ular River Improvement Plan. In response to the request, the Japan International Cooperation Agency carried out the Study.

The result of study was reported in 1977. It was concluded that the plan must be the one that includes both the flood control and the improvement of irrigation and drainage and also concluded that the plan for the Overall Ular River Improvement Project will thus be composed of the river channel improvement at the design discharge of 800 m³ and the improvement of irrigation and drainage over an area of 18,500 ha.

The project area is shown in Fig.-1 (omitted).

II. OBJECTIVE OF THE STUDY.

The study, on Overall Ular River Improvement Project, made by the Japan International Cooperation Agency concluded in its report that the project should include both the flood control of the Ular river and the improvement of irrigation and drainage over an area downstream from Pulau Gambar and between the two neighboring rivers. The objective of the present study is to justify the feasibility of the proposed project in consideration of phasing of the two components of flood control and improvement of irrigation and drainage.

The flood control component will contain the river channel improvement of a stretch about 32 km in length upward from the river mouth at the design discharge of 800 m³/s and the irrigation and drainage component will contain the improvement of irrigation and drainage systems over an area of about 18,500 ha on the downstream plain of the Ular river.

III. PLAN OF APPROACH.

The activities to be taken in the present study shall be divided into two parts: (1) main works for carrying out the study and (2) transfer of knowledge to the counterparts during the study.

1. Main Works.

As a first step, mapping & surveying and soil-mechanics investigation will be carried out in order to collect data for the study. The 1:10,000 topographic map provided by the Japan International Cooperation Agency (JICA) will be utilized for the Study.

Next, the supplementary data for planning channel improvement, irrigation improvement and drainage improvement will be collected in the field.

The following studies will be carried out in the course of the present study by use of the supplemented data as well as the results of surveyings and the soil-mechanics investigation

mentioned above.

- (1) to review the plan proposed in Overall River Improvement Project by use of supplemented data.
- (2) to make the basic design for the channel improvement plan considering alternative study for treatment of the confluence of the Pulau Gambar canal and the Ular river.
- (3) to make restudy of the project area of improvement irrigation by use of supplemented data mainly about salinity intrusion.
- (4) to study the basic design of irrigation plan in connection with the proposed irrigation system.
- (5) to study the basic design of drainage plan in connection with the proposed drainage plan.
- (6) to study the water requirement and its supply on the basis of the proposed cropping pattern.
- (7) to study network of hydrological observation stations including radio telephone communication stations for establishment of flood forecasting and warning system and to estimate its cost.
- (8) to assist study concerning resettlement/relocation for the existing population that will be affected by the project.
- (9) to study the construction method, construction plan and the construction schedule considering the availability of the existing construction equipment.
- (10) to estimate the construction cost in connection with the study for necessary equipment and materials and for estimation of the construction cost, the cost shall cover land acquisition and compensation, and other necessary matters needed within the framework of the relocation of the people.
- (11) to study the expected benefit by the project.

Finally, economic evaluation will be made in consideration of phasing of the two components of flood control and improvement of irrigation and drainage and the study of financial aspects will be made.

Moreover, Organization for operation and maintenance will be studied.

2. Transfer of knowledge.

Knowledge will be transferred to the Indonesian Counterparts

through the actual study work to be done in cooperation with both the teams in the Study Team's home office as well as in the field.

IV. STUDY IN THE FIELD.

1. Mapping and Surveyings.

The following surveying will be conducted by use of the 1:10,000 topographic map which was provided by the Japan International Cooperation Agency.

- (1) to review the existing maps and the results of surveyings.
- (2) to make longitudinal and cross leveling survey of the Ular river.
 - a. the required distance for surveying is about 38 km of a stretch along the Ular river upward from the river mouth except about 10 km stretch from the Ular bridge.
 - b. the interval of cross leveling will be 250 m each.
 - c. the average width for cross leveling will be about 450 m or more and the cross leveling between 10 km and 13 km of the installed stakes should be made over the whole stretch of the paddy field in Pulau Gambar.
 - d. the scale of drawings will be as follows:

cross leveling	:V = 1/100	H = 1/1,000
longitudinal leveling	:V = 1/100	H = 1/20,000
- (3) to make longitudinal and cross leveling survey for Pulau Gambar canal.
 - a. the required distance for surveying is about 8 km of stretch along the canal from the confluence with the Ular river.
 - b. the interval of cross leveling will be 200 m each.
 - c. the scale of the drawings will be as follows:

cross leveling	:V = 1/100	H = 1/500
longitudinal leveling	:V = 1/100	H = 1/20,000
- (4) to make longitudinal and cross leveling survey for irrigation and drainage system.
 - a. the required distance for surveying is about 150 km in total.

b. the interval of cross leveling will be 200 m each.

c. the scale of drawing will be as follows:

cross leveling :V = 1/200 H = 1/200
longitudinal leveling :V = 1/100 H = 1/20,000

(5) to make plane table surveying for intakes.

9 places, scale 1/500

(6) to make plane table surveying for drainage sluice to be studied as an alternative at the confluence of the Ular river and Pulau Gambar canal, the scale of drawing will be 1/500.

(7) to make leveling of Bench Marks.

a. the elevation of the bench marks installed in the project area will be checked.

b. the whole length of leveling route will be about 200 km.

2. Soil-mechanics Investigation.

The following works will be conducted.

(1) to make investigation for planning cross section of embankment, studying foundation and studying dredging works.

a. sounding test or vane test at 10 sections of the river.

b. sampling of soil.

c. soil test (grain size analysis, moisture content, liquid limit, plastic limit and, if necessary, compaction test).

(2) to make investigation for planning intake structure.

a. sounding test at 9 places to be adopted as sites of intakes.

b. sampling of soil.

c. soil test (grain size analysis, moisture content, liquid limit, plastic limit and, if necessary, compaction test).

(3) to make investigation for planning a drainage sluice as an alternative of treatment the confluence of the Ular river and Pulau Gambar canal.

a. one hole of machine boring including standard penetration test.

- b. soil sampling.
- c. soil test (grain size analysis, moisture content, liquid limit, plastic limit).
- d. studying bearing power.

3. Study of Hydrology.

The following works will be conducted.

- (1) review and supplement of hydrological data for irrigation planning.
- (2) review and supplement of hydrological data for drainage planning and study of application of hydrological data to each divided drainage area.
- (3) study of sediment and water quality in intakes and irrigation canals.
- (4) review and supplement of data for river planning.
- (5) study of carrying capacity of river channel.
- (6) study of design highwater level.
- (7) supplementary study of tide level at the river mouth.
- (8) Study of sediment transportation in the designed channel.
- (9) study of treatment of the confluence of the Ular river and Pulau Gambar canal.
- (10) study of network of hydrological observation stations including radio telephone communication stations for establishment of flood forecasting and warning system and for additional data collection in future.

4. Study for River Improvement.

The following works will be conducted for making the channel improvement plan.

- (1) supplementary study for planning the channel improvement.
 - a. study of the results of surveyings and soil-mechanics investigation.
 - b. alternative study for treatment of the confluence of Pulau Gambar canal and the Ular river.
- (2) to make basic design of river improvement works such as

the plan, longitudinal and cross sectional plan, sections of embankment and revetment.

- (3) to study construction method, construction plan and construction schedule in consideration of phasing of the improvement works if necessary.
- (4) to estimate construction cost based on the construction plan and construction schedule, the cost shall cover land acquisition and compensation and if necessary other necessary matters needed for relocation of the people.

5. Study for Improvement of Irrigation.

The following works will be conducted for making the irrigation improvement plan.

- (1) review of the proposed irrigation area in connection with the result of the study of salinity intrusion.
- (2) review of irrigation water requirement and supply in connection with the proposed irrigation improvement plan and cropping pattern.
- (3) to make basic design of irrigation facilities including structures.
- (4) to study construction method, construction plan and construction schedule in consideration of phasing of the improvement works if necessary.
- (5) to estimate construction cost based on the construction plan and the construction schedule; the cost shall cover land acquisition and compensation, and, if necessary, other matters needed for relocation of the people.

6. Study for Improvement of Drainage.

The following works will be conducted for making the drainage plan.

- (1) review of the proposed drainage area in connection with the irrigation area.
- (2) review of drainage water requirement to be taken in the drainage plan.
- (3) to make basic design drainage facilities including structures.
- (4) to study construction method, construction plan and construction schedule in consideration of phasing of the improvement works if necessary.

- (5) to estimate construction cost based on the construction plan and the construction schedule; the cost shall cover land acquisition and compensation, and, if necessary, other necessary matters needed for relocation of the people.

7. Study of Construction Plan.

The following works will be conducted for making the equipment plan.

- (1) to study construction method and construction schedule.
- (2) to check availability of the existing equipment.
- (3) to study necessary equipment materials.
- (4) to estimate necessary cost.

8. Study of Agriculture and Agroecconomy.

The following works will be conducted for irrigation and drainage plan from the view point of agricultural development and agroecconomy.

- (1) to collect supplementary data.
- (2) to study cropping pattern for each irrigation system.
- (3) to study salinity intrusion on the coastline.
- (4) to estimate agricultural benefit.
- (5) to study farm economy, organization for water management and others.

9. Resettlement Study.

The following works will be conducted in connection with the river improvement plan, and the irrigation and drainage improvement plan.

- a. to study the existing population that will be affected by the project.
- b. to assist study concerning resettlement/relocation which is carried out by agencies concerned.

10. Economic Evaluation.

The following works will be conducted for economic evaluation.

- (1) to collect supplementary data.
- (2) to study economic feasibility in consideration of phasing of the two component of flood control and improvement of irrigation and drainage.
- (3) to study financial aspects of the project.

11. Study of Organization for Operation and Maintenance of the Project.

Study of organization for operation of the project and for maintenance of the project will be conducted in the course of study in the field.

12. Interim Report.

The results of the field study will be reported as Interim Report at the last stage of the field study.

V. STUDY IN JAPAN.

The following works will be conducted in Japan.

(1) Preparation of Draft Final Report.

The study concerning the comments for the Interim Report to be sent from the Government of Indonesia will be conducted and the results of study will be compiled as Draft Final Report.

(2) Final Report.

The study concerning the comment for the Draft Final Report to be sent from the Government of Indonesia will be conducted together with finalization of the report and the results of study will be compiled as Final Report.

VI. TRANSFER OF KNOWLEDGE.

Knowledge will be transferred to the Indonesian counterparts through the study work to be done in cooperation with both the teams in Japan as well as in the field.

(1) Transfer of Knowledge in the field.

The Indonesian counterparts join the Japanese Study Team in making the necessary studies in the field and knowledge will be transferred to them through the actual study work.

(2) Transfer of Knowledge in Japan.

The Indonesian counterparts will join the Japanese Study Team in formulating the Draft Final Report in Japan and knowledge will be transferred to them on this occasion. For this purpose, the JICA has prepared a budget for the counterparting in Japan.

VII. WORK SCHEDULE.

The feasibility study will be carried out based on the work schedule shown in Fig. 1.

The study in Indonesia was started on 15th of August and will continue for about six months in Indonesia.

VIII. ORGANIZATION FOR THE STUDY.

For carrying out the study, the JICA and the Government of Indonesia have established the organization shown in Fig. 2.

The Study Team consists of the members mentioned below.

Chairman of Advisory Committee	Mr. Shohei Inoue
Member of Committee	Mr. Tetsuji Maruta
"	Mr. Yoichi Takeuchi
"	Mr. Kiichiro Tanaka
"	Mr. Shikatsugu Muraoka
"	Mr. Yuusuke Suematsu
"	Mr. Takanori Jibiki
Leader of Study Team	Dr. Seiichi Sato
Co-leader	Mr. Kiyomi Kasama
Surveying Engineer	Mr. Masaru Yonai
"	Mr. Tokio Imai
"	Mr. Yasuharu Suzuki
Soil mechanic Engineer	Mr. Masahiko Nakagami
Hydrologist (for river)	Mr. Toshikatsu Imai
Hydrologist (for irrigation and drainage)	Mr. Shinroku Ohtsuki
River Engineer	Mr. Shigeaki Hisajima
Irrigation Engineer	Mr. Takeshi Kawaguchi
Drainage Engineer	Mr. Masayuki Kodama
Structure Engineer	Mr. Akira Takubo

Equipment Engineer	Mr. Kiyohito Yamazaki
Agronomist	Mr. Kenjiro Onaka
Agroeconomist	Mr. Masashi Shono
Project Economist	Dr. Kin'ichi Ohno
Assistant. Liaison Officer	Mr. Kaoru Nakajima

IX. REPORTING.

The following reports will be provided by the JICA.

(1) Interim Report.

The JICA will prepare in the field and submit to the Government of Indonesia 30 copies of Interim Report (in English) within six (6) months after the commencement of the study. The Government of Indonesia will provide the JICA with its comments within 30 days after receiving the Interim Report.

(2) Draft Final Report.

The JICA will prepare in Japan and submit to the Government of Indonesia 30 copies Draft Final Report (in English) within four and half (4.5) months after receiving the comments to the Interim Report. The Government of Indonesia will provide the JICA with the comments within 30 days after receiving the Draft Final Report.

(3) Final Report.

The JICA will prepare in Japan and submit to the Government of Indonesia 50 copies of Final Report within three (3) months after receiving the comments to the Draft Final Report.

X. EQUIPMENT AND MATERIALS FOR THE SURVEY AND STUDY.

The following equipment has been made available by the JICA for the field study. Some of them will be carried out of Indonesia after finishing the field study.

1. Electro-optical distance meter	SOKKISHA:SDM 1-C	1 set
2. Level with tripod	SOKKISHA:B-1 and B-2	4 sets
3. Transit with tripod	SOKKISHA:TM-10C	1 set
4. Plane table survey apparatus		1 set

5. Hand level with telescope		5 sets
6. Calculator	Pocket-type	27 pcs
7. Planimeter		4 pcs
8. Curvimeter		4 pcs
9. PH meter	HM-1F	1 set
10. EC meter		1 set
11. Soil Auger	S-15-1A	1 set
12. Hardness meter		1 set
13. Silt sampler		1 set
14. Boring spade	S-F-54	1 set
15. Standard soil color chart	S-F-462	1 set
16. Glass electrode		1 set
17. Reagent set for water quality analysis		1 set
18. Leveling staff	MIKASA:3 m two-folding	4 pcs
19. Leveling staff	5 m telescopic	6 pcs
20. Handy talky for surveying	SONY:ICB-600	2 pcs
21. Plate for leveling staff		8 pcs
22. Esron tape, 50 m		6 pcs
23. Materials for machine boring		
i. metal bit, 86 mm		4 pcs
ii. metal bit, 101 mm		2 pcs
iii. thinwall tube, with cap 75 mm		5 pcs
24. Materials for Swedish-sounding test		
i. rod		30 pcs
ii. screw point		3 pcs
iii. cramp		1 pc
iv. canvas sack		3 pcs
25. Materials for vane test		
i. rod		10 pcs
ii. point		2 pcs

iii. vane	2 pcs
iv. providing ring	1 pc
v. graduated circle	1 ppc
vi. torque wrench	2 pcs
vii. carring case	2 pcs
26. Materials for density test	
i. tube with cap	10 pcs
ii. wire saw	1 pc
iii. edge	1 pc
iv. extruder	1 set
v. slide calipers	1 pc
27. Materials for compaction test	
i. mold	1 pc
ii. rammer, 2.5 kg	1 pc
iii. screw sample extruder	1 pc
28. Laboratory supplies for soil test	
i. evaporation dish, 12 mm	20 pcs
ii. Tray, 40 × 30 cm	5 pcs
iii. Tray, 36 × 27 cm	5 pcs
iv. Tray, 24 × 21 cm	5 pcs
v. sample bag, vinyl	500 pcs
vi. sieve, 74 μ	1 pc
vii. plastic limit plate, glass made and one side is frosted	1 pc
viii. spatula	2 pcs
ix. brush	2 pcs
x. hand scope	1 pc
xi. sprayer	1 pc
xii. thermometer	1 pc
xiii. volumetric cylinder, 500 cc	1 pc

XI. UNDERTAKING OF THE GOVERNMENT OF INDONESIA.

For the purpose of carrying out the survey and study, the Government of Indonesia will cooperate by

1. Providing the Japanese study team (hereinafter referred to as the Team) with a counterpart team with the data and information concerned for its use in connection with the survey and study.
2. Assuring the security of safety for the Team.
3. Exempting the Team from taxes and duties together with the equipment to be carried into Indonesia for the survey and study.
4. Providing the Team with a suitable office space in Medan with office furniture for the survey and study.
5. Providing the Team with 7 vehicles with drivers and maintenance thereof for exclusive use by the Team.

6. Making arrangements of accommodations and field office required for the survey and study.
7. Providing the Team with 9 surveying teams, each of which will consist of one surveyor, one assistant and four laborers.
8. Providing the Team with 3 soil-mechanics survey teams, A, B and C, each of which will consist of one engineer, one assistant and some laborers.
 - i A will be for sounding test, penetration tests, vane tests and samplings.
 - i B will be for machine boring.
 - i C will be for tests in laboratory.
9. Arranging transportation for the above items 7 and 8.
10. Carrying out necessary samplings for soil tests, water quality tests for irrigation water and sediment load survey for irrigation water, and their laboratory tests.
11. Providing the Team with necessary equipment and materials as shown in Table 1 and 2.
12. Providing the Team with 5 typists and 3 tracers for preparing the draft interim report.

Table 1.

Equipment and materials to be provided by the
Government of Indonesia for Surveyings.

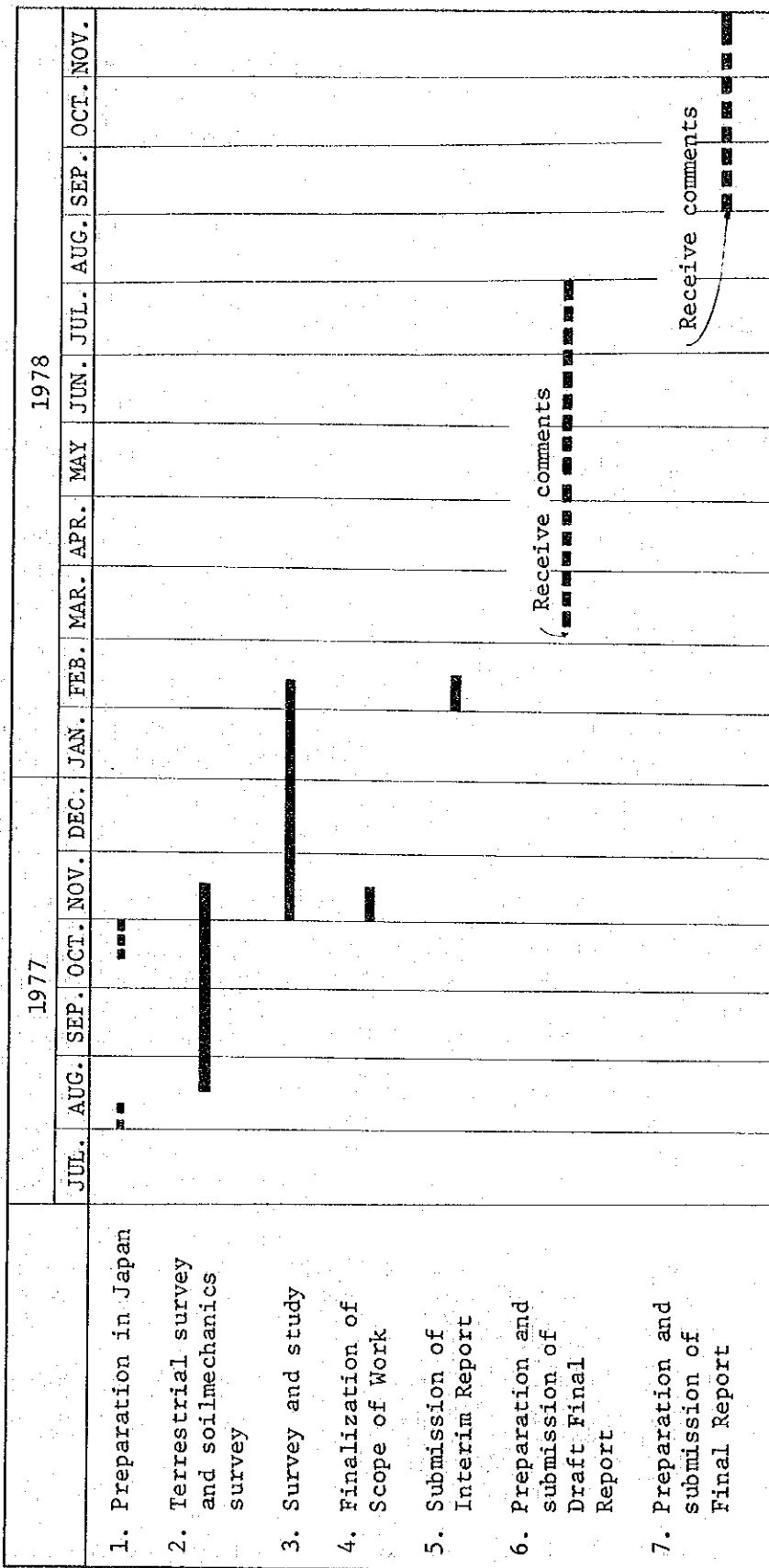
1. Boat	2 units
2. Level with tripod	4 sets
3. Leveling staff, 5 m	10 pcs
4. Esron tape, 50 m	4 pcs
5. Esron rope, 100 m	3 pcs
6. Wooden stake, (10 × 10 × 100 cm)	520 pcs
7. Wooden stake, (6 × 6 × 100 cm)	1,520 pcs
8. Paint, black	5 kgs
9. Paint, red	25 kgs
10. Brush for marking	20 pcs
11. Nail, 6-8 cm long	2,500 pcs
12. Maul/wooden hammer	4 pcs
13. Sickle for cutting grass	some

Table 2.

Equipment and materials to be provided by the
Government of Indonesia for soilmechanics survey.

1. Boring machine, capacity more than 50 m	1 unit
2. Scaffold and tripod for machine boring	1 suit
3. Truck	1 unit
4. Boat	3 units
5. Auger boring apparatus, 10 m	1 set
6. Swedish sounding test apparatus, 20 m	1 set
7. Cone penetrometer, 5 m	1 set
8. Oven	1 set
9. Sieve	1 suit
10. Liquid limit test apparatus	1 set
11. Plastic limit test apparatus	1 set
12. Balance; 500 g, 1 kg, 10 kg	1 set each
13. Chain block with tripod for swedish sounding test	1 unit

Fig. 1 (1) WORK SCHEDULE OF THE FEASIBILITY STUDY OF ULAR RIVER
FLOOD CONTROL AND IMPROVEMENT OF IRRIGATION PROJECT



APPENDIX F

RECORD OF MEETING IN MEDAN

FOR

FEASIBILITY STUDY OF ULAR RIVER FLOOD CONTROL
AND IMPROVEMENT OF IRRIGATION PROJECT

Held on : Tuesday, December 20, 1977.

Time : 9:30 - 12:00.

Place : Meeting Room, Ular River Project in Medan.

Attendance : Attachment A.

The first monthly progress meeting was held in accordance with Note of Meeting for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project dated November 14, 1977.

The record of the Meeting is as follows:

1. Tentative Schedule of the Study Team is as mentioned below.
 - a. At the beginning of January, 1978 (around January 10), the Study Team will visit BAPEDA (Planning Board of North Sumatra Province) and BUPATI (Chief of District Administration) Office in order to explain the Plan of the Project.
 - b. The 2nd progress meeting will be held in the middle of January, 1978 (around January 16). In this meeting, the Study Team, JICA will give an explanation of the study results for the Interim Report which will be submitted at the beginning of February, 1978.
 - c. Meeting for the Interim Report will be held after arrival of Advisory Group and Team Leader. Tentative schedule of meetings are as follows:

Meeting in Medan	: on 27 and 28th January, 1978.
Meeting in Jakarta	: on 1 and 2nd February, 1978.
Preparation of Note of Meeting	: on 3 and 4th February, 1978.

Advisory Group will leave Jakarta for Tokyo on 4th February 1978 and the Study Team, JICA will leave Jakarta for Tokyo on 6th February 1978.

- d. Concerning the preparation of the Interim Report, typists and draftmen will be requested from the beginning of January 1978.
2. Tentative Contents of Feasibility Study Report are reported as Attachment B (omitted).
 3. Comparison of construction costs of six alternative plans for irrigation system was made paying attention to the differences among the costs as shown in Attachment C, (omitted), and the Study Team, JICA reported that the alternative plan No.6 is recommendable one. In the course of the Meeting, the alternative plan No.6 was agreed as the irrigation plan.

In the Interim Report, cost for operation and maintenance for the other plans No.1, No.5 and No.6 will be described.

4. River Engineer arrived in the Site on December 11, 1977. He has needed to make reconnaissance up to now. Therefore, meeting for river engineering scheme, such as study of an artificial retarding basin and alternative plan for treatment of the confluence of Pulau Gambar Canal and Ular River, was requested by the Study Team, JICA to be held at the beginning of January, 1978.
5. The following experts will leave Medan for Tokyo through Jakarta in accordance with their assignment schedules. They will make explanation about their works before leaving.

<u>Expert</u>	<u>Assignment</u>	<u>Explanation</u>
Mr. M. SHONO	Agroeconomist	Dec.27, 1977.
Mr. K. YAMAZAKI	Equipment Engineer	Dec.27, 1977.
Mr. A. TAKUBO	Structure Engineer	Dec.28, 1977.
Mr. T. IMAI	Hydrologist (for river)	Dec.28, 1977.

Medan, December 21, 1977.

Mr. K. Kasama
Co-leader of the
Feasibility Study Team,
JICA.

Ir. B. Harahap
Leader of the Counterpart
Team.

Attachment A

LIST OF ATTENDANCE

INDONESIA

Ir. Djoko Sasongko
Ir. B. Harahap
Mr. M. Nainggolan M.E.
Ir. Dartawan S.
Ir. STP Tambunan
Ir. N. Bangun
Mr. L. Pardosi
Ir. Aisyah Nasution
Ir. Widiastuty
Mr. B. Tampubolon
Mr. L. Sibarani
Mr. Sahar
Mr. B.P.L. Tobing

JAPAN

Mr. K. Kasama
Mr. T. Kawaguchi
Mr. M. Shono
Mr. K. Onaka
Mr. M. Kodama
Mr. A. Takubo
Dr. K. Ohno
Mr. S. Hisajima
Mr. K. Yamazaki
Mr. T. Imai
Mr. K. Nakajima

APPENDIX G

RECORD OF MEETING IN MEDAN
FOR
FEASIBILITY STUDY OF ULAR RIVER FLOOD CONTROL
AND IMPROVEMENT OF IRRIGATION PROJECT

Held on : Tuesday, January 17, 1978.
Time : 10:00 to 13:30.
Place : Meeting Room, Ular River Project in Medan.
Attendance : Attachment A.

The second monthly progress meeting was held in accordance with the Note of Meeting for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project which was signed on November 14, 1977.

The record of this meeting is as follows.

1. Tentative schedule of the Advisory Group and the Team Leader who will come to Indonesia for Interim Report was explained by the Study Team and their names were presented.

Advisory Group:

Chairman	Mr. Shohei Inoue
Member	Mr. Yoichi Takeuchi
"	Mr. Yusuke Suematsu
"	Mr. Tadao Okazaki
"	Mr. Takanori Jibiki (coordinator)

Team Leader : Dr. Seiichi Sato.

And it was reported that they will arrive in Medan on January 24, 1978 and they will make a review of the Draft Interim Report up to January 28. The schedule of meeting for Interim Report will be confirmed later.

2. The Study Team, JICA explained the following activities which were made after the first progress meeting.
 - a. Explanation of the outline of the Project was made to the Governor together with BAPPEDA on January 6, 1978.

- b, Explanation of the outline of the Project was made to BUPATI.
 - c. The study results discussed in Medan on January 9, 1978 were reported by the Study Team, JICA. In this meeting, the recommendation presented by the Study Team, JICA was agreed basically.
3. The organization charts were revised partly.
 4. The Interim Report will be printed before January 24, 1978.
 5. It was requested that the Interim Report would be sent to Jakarta prior to meeting.

Medan, January 18, 1978.

Mr. K. Kasama
Co-leader of the
Feasibility Study
Team, JICA

Ir. B. Harahap
Leader of the Counterpart
Team

Attachment A

LIST OF ATTENDANCE

INDONESIA

Ir. Djoko Sasongko
Ir. B. Harahap
Mr. M. Nainggolan M. E.
Ir. Dartawan S.
Ir. STP Tambunan
Mr. L. Pardosi
Ir. N. Ginting
Mr. B. Tampubolon
Mr. Sahar
Mr. B. P. L. Tobing

JAPAN

Mr. K. Kasama
Mr. S. Hisajima
Mr. T. Kawaguchi
Mr. M. Kodama
Mr. K. Onaka
Dr. K. Ohno
Mr. K. Nakajima

APPENDIX H

CONTENTS

1. Note of Meeting on Feasibility Study of The Ular River Flood Control and Improvement of Irrigation Project, signed on February 4, 1978.
 2. Attachment A : List of Attendance.
 3. Attachment B : Record of Meeting in Medan for Discussion of Interim Report on Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project, signed on January 31, 1978.
- Attachment C : Necessary Data for Design of the Ular River Flood Control and Improvement of Irrigation Project.

NOTE OF MEETING
ON
FEASIBILITY STUDY OF
THE ULAR RIVER FLOOD CONTROL AND IMPROVEMENT OF IRRIGATION PROJECT

Held on : Thursday, February 2, 1978.
Time : 10:00 - 16:30.
Place : Meeting Room, Directorate of Rivers,
Directorate General of Water Resources
Development, Jakarta.
Attendance : Attachment A.

On submission of the Interim Report of the Feasibility Study for the Ular River Flood Control and Improvement of Irrigation Project, this meeting was held in Jakarta on February 2, 1978.

The record of the meeting held in Medan on January 30 and 31, 1978 attached herewith in Attachment B was explained by Ir. Sarbini in this meeting in Jakarta.

The conclusion of this meeting is as follows.

1. The above-mentioned Record of Meeting in Medan was accepted by both sides with some corrections and additions.
2. Concerning 1.3.b and 2.3 in the Record of Meeting in Medan, the JICA Team was requested to prepare the Final Report by the middle of July, 1978 on the following conditions.
 - a. Loan application for Detail Design will be separated from loan application for construction.
 - b. Equipment necessary for the execution of works will be procured by the Government of Indonesia.
 - c. It is assumed that the detail design will be commenced at the beginning of January, 1979.
 - d. The Final Report will be prepared, without Draft Final Report, based on the Interim Report provided that all changes and additional explanations as stated in this Note of Meeting and its attachments, supplemented with additional comments which will be sent to the JICA Team before March 31, 1978, could be fulfilled.
3. Concerning 1.6 and 2.6 in the Record of Meeting in Medan, the calculation result of water level by use of a discharge of $800 \text{ m}^3/\text{s}$ and a coefficient of roughness of 0.06 for high-water

channel will be sent by the JICA Team before the end of February, 1978.

4. Concerning 1.7. and 2.7. in the Record of Meeting in Medan, some additional explanations shall further be made by the JICA Team in the Final Report.
5. Concerning 1.10.1, 1.10.2 and 2.10.1 in the Record of Meeting in Medan, the JICA Team asked the reason of request, and the Indonesian side replied that the reason is to increase the opportunity of employment. The technically acceptable manpower rate to be taken in the Final Report will be informed by the JICA Team to the Indonesian side before the end of February, 1978.
6. Concerning 1.10.3 and 2.10.2 in the Record of Meeting in Medan, comment on the life time of equipment will be sent by writing by the Directorate of Rivers before the end of January, 1978.
7. A five years plan has been incorporated in the submitted Interim Report. However, since the Indonesian side decided to adopt a seven years plan, the seven years plan to be replaced for the five years plan will be prepared and sent by the JICA Team before the end of February, 1978.
8. Concerning concrete lining canals proposed by the JICA Team and described in Page 5-147 of the Interim Report, the following sentence shall be added in the Final Report.

"The necessity of this lining will be decided at the stage of the detail design".
9. The construction cost and the economic evaluation will be revised in the Final Report based on this Note of Meeting.
10. As an alternative for the statement 2.b of this Note of Meeting, the JICA Team was requested to prepare an alternative plan on the basis of construction method by full contracting system excluding on-farm works.
11. The JICA Team recommended to prepare data as shown in the Attachment C before starting the detail design so as to meet the construction schedule mentioned in the Interim Report.

Jakarta, February 4, 1978

The Study Team of the Japan
International Cooperation Agency,

The Directorate of Rivers,

Dr. Seiichi Sato
Team Leader

Ir. Y. Sudaryoko
Director of the Directorate

Attachment A

LIST OF ATTENDANCE

<u>INDONESIA</u>		<u>JAPAN</u>	
Ir. Y. Sudaryoko	Director for River	Mr. S. Inoue	Chairman of Advisory Committee
Ir. Sarbini	Directorate of Rivers	Mr. Y. Suematsu	Advisor
Ir. Soerasto	Directorate of Peralatan	Mr. Y. Takeuchi	Ditto
Ir. Soekrisno R.	Project Offier Foreign Aid	Mr. T. Okazaki	Ditto
Mr. Hasan Basri BIE	Directorate of Irrigation	Mr. T. Jibiki	Ditto
Mr. A. Bockings MSc	ABLN Ditjen Air	Dr. S. Sato	Leader
Ir. Soeradji	Directorate of Rivers	Mr. K. Kasama	Co-leader
Ir. Dartawan	Project S. Ular	Mr. S. Hisajima	Member
Mr. M. Nainggolan ME	Ditto	Mr. T. Kawaguchi	Ditto
Mr. Darmanto	P3SA	Mr. K. Kodama	Ditto
Mr. M. Amron	P3SA	Mr. K. Onaka	Ditto
Mr. W. Sabarno	Directorate of Rivers	Dr. K. Ohno	Ditto
Mr. M. Nakahiro	Colombo Plan Expert	Mr. K. Nakajima	Ditto

Attachment B

RECORD OF MEETING IN MEDAN
FOR
DISCUSSION OF INTERIM REPORT ON FEASIBILITY STUDY
OF ULAR RIVER FLOOD CONTROL AND IMPROVEMENT
OF IRRIGATION PROJECT

Held on : Monday, January 30, 1978.
13:00 to 17:00
Tuesday, January 31, 1978
09:00 to 19:00

Place : Meeting Room of D.P.U. - Medan

Attendances : Annex A

On the arrival of the Advisory Group and the Leader of the Feasibility Study Team, JICA, for the Ular River Flood Control and Improvement of Irrigation Project, meetings were held on 30 and 31 January 1978 in Medan.

The record of the meetings is as follows:

- I. Explanation was made by Dr. S. Sato, Team Leader, about the summary of the results of the study.
- II. Questions and comments are stated in item 1. from 1.1. up to 1.11.
- III. Conclusions of the meeting have been agreed by both sides as stated in item 2, from 2.1. up to 2.11.
 1. List of Questions, Comments, etc.
 - 1.1. The JICA Feasibility Team was requested to divide the report as follows.
 - a. Main Report (Volume I).
 - b. River and Irrigation (Volume II).
 - c. Supporting Report (Volume III).
(i.e.) : Soil mechanics, hydrology, etc.
 - 1.2. Flood Forecasting.

Flood Warning System.

As the existing data for analysing the discharge and run-off relations was not suitable enough, it was understood that a study of flood warning and flood forecasting system still need a longer time.

Therefore necessity of future study on establishment of flood forecasting and warning system shall be mentioned in the report.

1.3. Time Schedule.

a. Alternative

- 5 (five)-years plan; and) This matter will be considered
- 7 (seven)-years plan to be discussed.

b. Detail Design

Are there any possibilities to start the detail design earlier than January 1979?

1.4. Land Acquisition.

To give more detail consideration concerning which system will be adopted in Ular River Flood Control for land acquisition, the JJCA Team is requested to prepare a comparison between Wampu and Ular system, giving their advantages and disadvantages.

1.5. Embankment.

The Team is requested to explain the necessity of erection of the embankment on down stream at Km -11.25 and Km -12.25.

1.6. The Team is requested to explain the following:

- a. The effect of grass and bushes on the high water channel for designing of Roughness Coefficient.
- b. The difference of the Design Roughness Coefficient and Real Roughness Coefficient on down stream (from Km 0 up to Km -10).

1.7. The Team is requested to note in the report, the reason on their selection of rehabilitation of the existing system as free intake system other than Single Weir, Technically and Economically by considering but not to be limited to the following matters.

- a. Sedimentation in the irrigation canal.

- Sedimentation along approaching canal.

- Sedimentation in the settling basin.

b. The Operation and Maintenance Cost and System.

1.8. The Team is requested to note the maintenance method, in order to reduce maintenance cost for approach channel in free intake system.

1.9. The Flood Area which is protected by the Project is about 25,000 ha. How many m³/sec. the design discharge for a same.

1.10. Considering the rate of percentage of machinery and man-power. In the Interim Report : The Indonesian side requests to evaluate the rate in % as follows:

1.10.1. For Irrigation Work (Equipment)

- a. Intakes, settling basin, main canals and new canals.

- by machinery - 30 %

- by man-power - 70 %

- b. Secondary Canals.

- Excavation and Embankment

- machinery - 50 %

- man-power - 50 %

- if possible would be considered to become 25 % and 75 %.

1.10.2. Drainage Work.

- a. Main Drainage Canal

- Excavation 100 %

- would be considered to become 50 % - machinery

- 50 % - man-power.

- b. Secondary Drainage Canal

- Excavation : 100 % by man-power.

1.10.3. Economic Life of Equipment.

- The Team is requested to provide a list of the life time of the equipment that will be used in the Project.

1.11. The Team is requested to note briefly concerning the Operation and Maintenance Cost and Manual of the Flood Control and Irrigation System.

2. Conclusion.

After the discussion, both sides came to the following agreement as stated below.

2.1. Concerning 1.1.

The Final Report will be compiled as follows;

1. Main Report (Volume I)
2. Flood Control and Irrigation and Drainage (Volume II)
3. Supporting Report (Volume III)

2.2. Concerning 1.2.

It was agreed by the JICA Team to mention the necessity of future study on establishment of flood forecasting and warning system in the report.

2.3. Concerning 1.3.

As for 1.3.a, the 7-years plan shall be adopted in the final report and the 5-years plan will be described in the supporting report.

As for 1.3.b, this item will be discussed again at Jakarta.

2.4. Concerning 1.4.

For low-water channel and embankment, land acquisition shall be considered, and for high-water channel, land compensation by per-unit-area shall be considered in the report. Because the method of compensation by per-unit-area will avoid changeability of cost compared with the method of compensation by each-plant.

2.5. Concerning 1.5.

For this area, further study shall be conducted at the detailed-design stage and should be included in the Terms of Reference.

2.6. The following coefficients of Roughness were adopted in the Interim Report on condition that maintenance of high-water channel shall be made

- 13.0 -	+10.0	0.040
+ 10.0 -	22.25	0.040

However, Indonesian side insisted that it is very difficult to maintain that state of condition of the high-water channel which will meet the above mentioned coefficients of Roughness.

Coefficient of Roughness for high-water channel shall be reviewed by the JICA Team in consideration of the condition that will be presumed corresponding to the level of maintenance.

2.7. Concerning 1.7.

1. The construction of a New Weir in the upstream of Serbajadi Bridge seems to be difficult due to the fact that much cost will be needed for foundation treatment because of alluvial fan.
2. Construction of new canal which connects a new weir with the existing irrigation canals seems to be very difficult economically due to undulating topography.
3. There are paddy fields in the upper stream of Serbajadi Bridge. Those paddy fields will be affected by back water of the new weir.
4. If a new fixed-type weir will be constructed, the new-weir will soon be buried by sand sediments. Accordingly the movable-type weir will be required to flush out deposited sand. The construction of movable-type weir will require much cost.
5. If a new fixed-type weir will be constructed in the upper part of the Ular River, the river bed in the lower reaches of the Ular River will be eroded.
6. Taking into consideration the existing social condition, change of irrigation systems by construction of a new weir does not seem to be possible.

2.8. Concerning 1.8.

To prevent from sand sediment in the approach channel, more detailed study should be carried out at the detail-design stage.

Some amount of sand deposit may probably be seen in the approach channel after occurrence of floods in the Ular River. The sand deposit can not be flushed out by use of gravity energy.

Consequently the sand deposit should be evaluated by man-power or some equipment.

2.9. Concerning 1.9.

The flood area which was assumed to be protected by the improvement of river channel with the design discharge of 800 m³/sec has been estimated at about 22,000 ha.

2.10. Concerning 1.10.

2.10.1. Concerning 1.10.1 and 1.10.2.

The JICA Team will further study the execution of irrigation and drainage works putting emphasis on increasing man-power rates and the result of this study shall be incorporated in the Supporting Report.

2.10.2. Concerning 1.10.3.

List of life time of equipment is as follows;

	<u>Life Time</u>
Bulldozer, Swamp w/winch 15 t class	6,500 hr
- do - 12 t class	6,500 hr
Backhoe, swamp type	6,500 hr
Amphibious dredger, w/pip 40 m ³ /hr	12,000 hr
Amphibious soft terrain, excavator	6,500 hr
Dump truck, 4 x 4, 6 t	6,000 hr
Vibrating roller 2.5 t	6,000 hr
- do - 1 t	6,600 hr
Vibrating plate compactor for slope	6,000 hr
Crawler type dump trailer	6,500 hr
Fuel tanker	5,500 hr
Service car	5,500 hr

2.11. Concerning 1.11.

The organization and cost required for operation and maintenance for the Project has already been described in the Interim Report.

However, method, manuals and cost should be studied at the detailed design stage.

Medan, 31th January 1978

The Study Team of JICA
International Cooperation
Agency,

The Directorate of Rivers,

Dr. S. Sato
Team Leader

Ir. Sarbini Rondibroto.

Annex A

ATTENDANCE LIST

Indonesia

Ir. Sarbini
Ir. Soeraji
Ir. B. Harahap
M. Nainggolan M.E.
Ir. Dartawan S.
Ir. S.T.P. Tambunan
Ir. N. Bangun
Ir. N. Ginting
Mr. P. Simatupang
Ir. B. Limbong
Ir. Widiastuty
Ir. Aisyah Nasution
Mr. B.P. Lumban Tobing B.A.
Mr. B. Tampubolon BIE
Mr. Sahar BE
Mr. L. Pardosi BIE
Mr. L. Sibarani BIE
Mr. M. Pasaribu BIE

Japan

Mr. S. Inoue
Mr. Y. Suematsu
Mr. Y. Takeuchi
Mr. T. Okazaki
Mr. T. Jibiki
Dr. S. Sato
Mr. K. Kasama
Mr. S. Hisajima
Mr. T. Kawaguchi
Mr. M. Kodama
Mr. K. Onaka
Dr. K. Ohno
Mr. K. Nakajima

Attachment C

NECESSARY DATA
FOR
DESIGN OF THE ULAR RIVER FLOOD CONTROL AND
IMPROVEMENT OF IRRIGATION PROJECT

1. Flood control component.

- a. Cross leveling (river channel) : at intervals of 100 m,
W = 450 m.
- b. Cross leveling (dike construction) : at intervals of 50 m.
- c. Profile leveling : about 37 km.
- d. Cross section (revetment) : about 2 km.

2. Irrigation and drainage component.

- a. Mapping for about 30,000 ha : scale of 1/5,000.
- b. Sea water level at the river mouth of Pantai Labu and
S. Buluh.
- c. Cross and profile leveling (irrigation canals)
: at intervals of 50 m
for about 300 km
(main and secondary).
- d. Cross and profile leveling (drainage canals)
at intervals of 100 m
for about 200 km.

APPENDIX I

LETTER OF RECEIPT OF EQUIPMENT

Medan, January 30, 1978

Mr. K. Kasama
Co-leader of the Feasibility
Study Team, JICA

Dear Sir:

RECEIPT OF THE EQUIPMENT FOR THE ULAR RIVER
FLOOD CONTROL AND IMPROVEMENT OF IRRIGATION PROJECT

We, the Counterpart Team for the Feasibility Study for the Ular River Flood Control and Improvement of Irrigation Project duly received the following equipment stipulated in the Note of Meeting on Draft Final Report and Inception Report for Feasibility Study of Ular River Flood Control and Improvement of Irrigation Project dated November 14, 1977.

<u>Items</u>	<u>Specifications</u>	<u>Quantity</u>
Level with tripod	SOKKISHA: SDM 1-C	1 set
Plane table survey apparatus		1 set
Hand level with telescope		5 sets
Calculator	Pocket-type	10 pcs
Boring spade	S-F-54	1 set
Standard soil color chart	S-F-462	1 set
Reagent set for water quality analysis		1 set
Leveling staff	MIKASA: 3m two-folding	4 pcs
Leveling staff	5m telescopic	6 pcs
Plate for leveling staff		8 pcs
Esron tape, 50 m		6 pcs
Materials for machine boring		
metal bit, 86 mm		4 pcs
metal bit, 101 mm		2 pcs
thinwall tube, with cap 75 mm		5 pcs
Materials for Swedish sounding test		
rod		30 pcs
screw point		3 pcs
cramp		1 pc
canvas sack		3 pcs

Materials for vane test

rod	10 pcs
point	2 pcs
vane	2 pcs
pruving ring	1 pc
graduated circle	1 pc
torque wrench	2 pcs
carrying case	2 pcs

Materials for density test

tube with cap	10 pcs
wire saw	1 pc
edge	1 pc
extruder	1 set
slide calipers	1 pc

Materials for compaction test

mold	1 pc
rammer, 2.5 kg	1 pc
screw sample extruder	1 pc

Laboratory supplies for soil test

evaporation dish, 12 mm	20 pcs
tray, 40 x 30 cm	5 pcs
tray, 36 x 27 cm	5 pcs
tray, 24 x 21 cm	5 pcs
sample bag, vinyl	500 pcs
sieve, 74	1 pc
plastic limit place, glass made and one side frosted	1 pc
spatula	2 pcs
brush	2 pcs
hand scope	1 pc
sprayer	1 pc
thermometer	1 pc
volumetric cylinder, 500 cc	1 pc

Thanking for your kind attention, we are,

Sincerely yours,

Ir. B. Harahap

Leader of the Counterpart
Team for the Feasibility
Study for the Ular River
Flood Control and Improve-
ment of Irrigation Project.

APPENDIX J

LETTER OF SENDING ADDITIONAL DATA

Tokyo, February 24, 1978

Ir. Y. Sudaryoko
Director of Rivers
Directorate General of Water
Resources Development

Dear Sir:

Additional Materials for the Interim Report for
the Feasibility Study of the Ular River Flood
Control and Improvement of Irrigation Project

We have the pleasure to send you herewith the additional materials for the Interim Report for the Feasibility Study of the Ular River Flood Control and Improvement of Irrigation Project in accordance with Note of Meeting dated on February 2, 1978 signed by you and Leader of the Study Team of JICA.

The additional materials consist of three groups mentioned below.

1. Concerning item 3 in the Note of Meeting.

Page 4-57, page 4-58 and page 4-68: materials to be replaced.

From page 4-59 to page 4-64 and page 4-69: materials for your reference.

2. Concerning item 5 in the Note of Meeting: materials to be incorporated in the Final Report. New two pages: they are page new-1 and page new-2.

3. Concerning item 7 in the Note of Meeting: materials to be replace.

From page 6-1 to page 6-14.

From page 7-1 to page 7-39.

Page 8-32 and page 8-34.

From page 9-1 to page 9-15.

From page 11-1 to page 11-3.

Thank you very much for your kind attention and cooperation.

Sincerely yours,

Dr. Seiichi Sato
Leader of Feasibility Study Team, JICA
for the Ular River Flood Control and
Improvement of Irrigation Project

APPENDIX K

LETTER OF ADDITIONAL COMMENTS

Jakarta, February 28, 1978

J.I.C.A., Tokyo
P.O.Box 216, Mitsui Building
2-1, Nishi-Shinjuku
Shinjuku-ku, Tokyo
160, Japan

Att. Dr. Seiichi Sato

Subject: Comments on Interim Report of the Feasibility
Study for the Ular River Flood Control and
Improvement of Irrigation Project

Dear Dr. Seiichi Sato,

In accordance with the Notes of Meeting held on February 2, 1978 at the Directorate of Rivers, Jakarta, I would like to submit my additional comments as follows:

1. The total and type of the equipment needed for the implementation of the Flood Control, Irrigation and Drainage of the Ular Project is shown on the list attached.
2. Concerning the implementation, the execution will be based on full contracting basis, therefore item No.10 mentioned in the Notes of Meeting held on February 2, 1978 is very important.

Thank you for your kind attention and close cooperation.

Sincerely yours,

Director of Rivers
Ir. Y. Sudaryoko

(Attachment is omitted)

APPENDIX L

LETTER OF QUESTION TO ADDITIONAL COMMENTS

Tokyo, March 20, 1978

Ir. Y. Sudaryoko
Director of Rivers
Directorate General of
Water Resources Development
Jakarta

Dear Sir:

Additional Comments on Interim Report
of the Feasibility Study for the Ular
River Flood Control and Improvement
of Irrigation Project

We acknowledge the receipt of your letter dated February 28, 1978 concerning additional comments on Interim Report of the Feasibility Study for the Ular River Flood Control and Improvement of Irrigation Project.

The number of equipment which were proposed in the Interim Report, JICA were estimate based on working days, operation hours, required work volume and capacity and life time of equipment as shown in ANNEX attached herewith as examples.

On the occasion of the meeting held on February 2, 1978, you were requested to send us your comments on the life time of equipment as described in item No.6 of the Note of Meeting. However, your comments mentioned in your letter only refer to number and capacities of equipment.

Without your comments on the life time of each equipment, we can not commence the review of number and capacities of equipment which are described in the Interim Report. We have to start the review on receiving your comment together with the following data concerning each equipment.

- i. Working days in a year which were applied in making the "Proposal by Indonesia" described in the list attached to your letter.
- ii. Average operation hours in a day which were applied in making the "Proposal by Indonesia" described in the list attached to your letter.
- iii. Life times which were applied in making the "Proposal by Indonesia" described in the list attached to your letter.

You are kindly requested to send us the above-mentioned data by your engineers who are going to visit Japan at the end of coming March 1978.

Concerning item No.2 mentioned in your letter, a plan for the implementation of execution on full-contracting system basis shall be incorporated in the Final Report as an alternative plan in accordance with item No.10 mentioned in the Note of Meeting held on February 2, 1978.

If you have further additional comments beside the above, we shall be pleased if you would kindly send us them by your engineers together with the above-mentioned data.

Thank you for your kind attention.

Sincerely yours,

Dr. Seiichi Sato
Leader of the Feasibility
Study Team, JICA for the
Ular River Flood Control
and Improvement of
Irrigation Project

APPENDIX M

BIBLIOGRAPHY AND DATA

LIST OF BIBLIOGRAPHY AND DATA

All bibliography and data used in the present study are listed below.

RIVER PLANNING

Seri. No.	Bibliography or Data	Source
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2.	Surat Perjanjian Pemborongaah Pekerjaan, Pembuatan Tanggul Kanan Bawah Pada Sungai Ular.	-ditto-
3.	Daftar Harga Satuan Bahan Bangunan di Indonesia, Triwulan I, 1976.	-ditto-
4.	Daftar Harga Satuan Pekerjaan di Indonesia, Triwulan I, 1976.	-ditto-
5.	Cross Section at the Ular Railway Bridge.	Kantor Kerata Api, Medan
6.	Cross Section at the Serbajadi Bridge	Directoral Jenderal Bina Marga
7.	Topographic Maps, 1/50,000 on the Ular River Basin.	Ular River Project Office
8.	Survey of Bank Erosion in the Ular River.	-ditto-
9.	Peta Situasi Daerah Upstream Sei Ular.	-ditto-
10.	Wampu River Flood Control and Development Project, Phase 1, Agrar und Hydrotechnik GMBH Sir William Halcrow & Partners.	Wampu River Project Office
11.	Final Report of Feasibility Study on Wampu River Flood Control Project, Volume II, Sanyu Consultants Intertional, Inc.	-ditto-

Seri. No.	Bibliography or Data	Source
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13.	Plan of the New Ular Railway Bridge, 2 sheets.	Kantor Kereta Api, Medan
14.	Dredging Plan of the Ular River Mouth.	Ular River Project Office
15.	Harga Tanah pada Pembebasan Tanah untuk Tanggul Sei Ular, 1972 s/d 1976.	-ditto-
16.	Revised Cross Section at 3 km, 7 km, 8 km, 9 km and 10 km.	-ditto-
17.	Cross Section at the Buaya and Karai Rivers near the Confluence.	-ditto-
18.	Tidal Level Data at the Place Near the Ular River Mouth.	-ditto-
19.	Cross Section of the Existing Dike from the -8.0 km to down.	-ditto-
20.	Cross Section of the Existing Dike at the Pular Gambar.	-ditto-
21.	Cross Section of the Karai River at the Negri Dorok.	-ditto-
22.	Perjanjian Pendorongan Pekerjaan No.03/SPP/PSU/76 "Pengerukan dan Penimbunan High Water Channel Sungai Ular".	-ditto-
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24.	Perjanjian Pendorongan Pekerjaan No.12/SPP/PSU/75 "Pengerukan dan Penimbunan di Alur High Water Channel Pada Sungai Ular".	-ditto-
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26.	SITUASI JEMBATAN SEI ULAR	-ditto-

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27.	PROFIL MEMAN TANG JALAN MASUK/ KELUAR JEMBATAN SEI ULAR	-ditto-
28.	LUAS TANAMAN REBOISASI & PENCHISAUAN DI DAS ULAR SELAMA I s/d II TH 1976/1977, with 1/250,000 drawing.	Forestation Office of North Sumatra
29.	Flood Control Projects in North Sumatra, Feasibility Study on the Ular River.	OTCA, Japan NIKKEN Consultants, Inc.
30.	Final Design Report on the Ular River Urgent Flood Control Pro- ject, August 1973.	NIKKEN Consultants, Inc.
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32.	Study Report on Overall Ular River Improvement Project (In- cluding Flood Control, Reclamation of Downstream Plain and Possible Irrigation Project), January 1978.	Japan International Cooperation Agency.
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34.	Amount of Principal Land Com- pensation for Ular River Urgent Flood Control Project	Ular River Project Office.
35.	Drawings of Sennah Diversion Dam	-ditto-

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2.	Ikhtisar Data Iklim, Sampali St.	Meteorologi Pertanian Utama, Sampali
3.	Daily Wind Speed, Sampali St.	-ditto-
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5.	Seri Laporan Teknis, No.5, Sampali St.	-ditto-
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7.	Hydrologic Records in the Ular River Basin, 1972-1977.	Ular River Project Office at Perbaungan
8.	Tide Tables, 1974-1977, Belawan Port.	Belawan Port
9.	Grafik Pasang Surut, Pelabuhan Belawan.	Belawan Port
10.	Rainfall Data by PNP.	RISPA
11.	Hourly Water Level Records, Bandar-Tiga, Perbaungan and Denai-Lama.	Ular River Project Office at Perbaungan
12.	Meteorologic and Hydrologic Observation Record, Perbaungan.	-ditto-
13.	Water Level Record by Staff Gage.	-ditto-
14.	Daily Rainfall Table, Aug. 1975-Oct. 1976.	-ditto-
15.	Discharge Measurement Records.	-ditto-
16.	Hourly Tide Records, Belawan Port.	Belawan Port

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3.	Longitudinal and Cross Section of Main Canal.	
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5.	Climatological Data.	L.M.G.J. & R.I.S.P.A.
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7.	Discharge Data.	DPMA
8.	Assessment of Irrigation Water Requirement (Possibility of Standardization)	NEDECO PROSIDA
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10.	Kebutuhan air tanaman Padi dan Hal-Hal yang berkaitan	-ditto-
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13.	Design Standard	Proyek Serbaguna Kedu Selapan
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2.	Survey Pertanian, January-April 1972, 1973 1974 and 1975.	-ditto-
3.	Population of North Sumatra, March 1974.	-ditto-
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12.	Kebun Benih Sentral (Murni), 1976.	-ditto-
13.	Daftar Biro Pusat Statistik, Maret 1976.	Biro Pusat Statistik
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23.	Potential Irrigated or Sawah Area for the Project Area, 1975 and 1976.	Dinas Pertanian Rakyat Daerah Tingkat II Deli Serdang
24.	Number of Extension Workers and KUD in the Project Area, 1975.	Office file in Deli Serdang, Dinas Pertanian Rakyat
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32.	Organization Chart of BRI in North Sumatra.	Office file in Deli Serdang, Dinas Perta- nian Rakyat
33.	List of KUD in North Sumatra.	-ditto-
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Seri. No.	Bibliography or Data	Source
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2.	Sistim Perhitungan Lalu Lintas Rutin Petunjuk Pelaksanaan P. Sumatera, Th. 1976/1977.	-ditto-
3.	Land Use Map, 1/50,000, 1/100,000.	Sub-Direktorat Tana Guna Tana, DAPSU
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2.	Cross section for discharge observation stations12 sections	-ditto-
3.	The result of leveling in inundated area 4 sheets	-ditto-
4.	Supplemental cross leveling of the river channel ... 6 sections (2 k, 3 k, 7 k, 8 k, 9 k, 10 k)	-ditto-
5.	Cross section for measuring a slope of water surface ... 2 sections	-ditto-
6.	Cross section on existing left dike 7 sections (From -8.0 k)	-ditto-
7.	Cross section on existing right dike 6 sections (From 11.5 k)	-ditto-
8.	Cross section on the bridge (Negeri Dolok) 1 section	-ditto-
9.	Plan 4 sheets	-ditto-
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11.	The result of bench mark leveling 12 points	-ditto-
12.	Cross section on Ular river ...103 sections	-ditto-
13.	Profile on Ular river ... 1 sheet	-ditto-
14.	Cross section on Pulau Gambar Canal 11 sections	-ditto-
15.	Profile on Pular Gambar Canal ... 1 sheet	-ditto-

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