

付 図



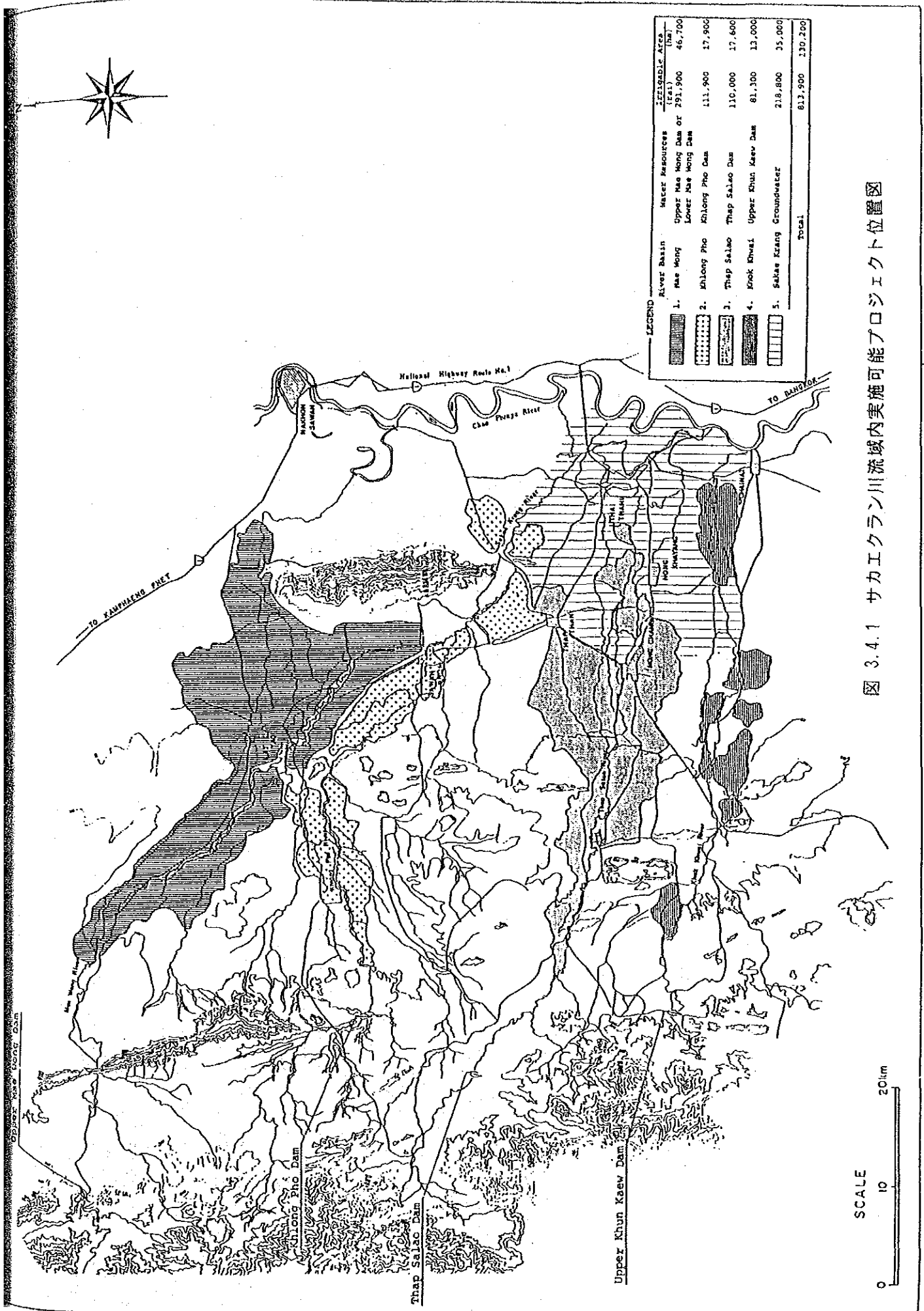


図 3.4.1 サカエクラシ川流域内実施可能プロジェクト位置図

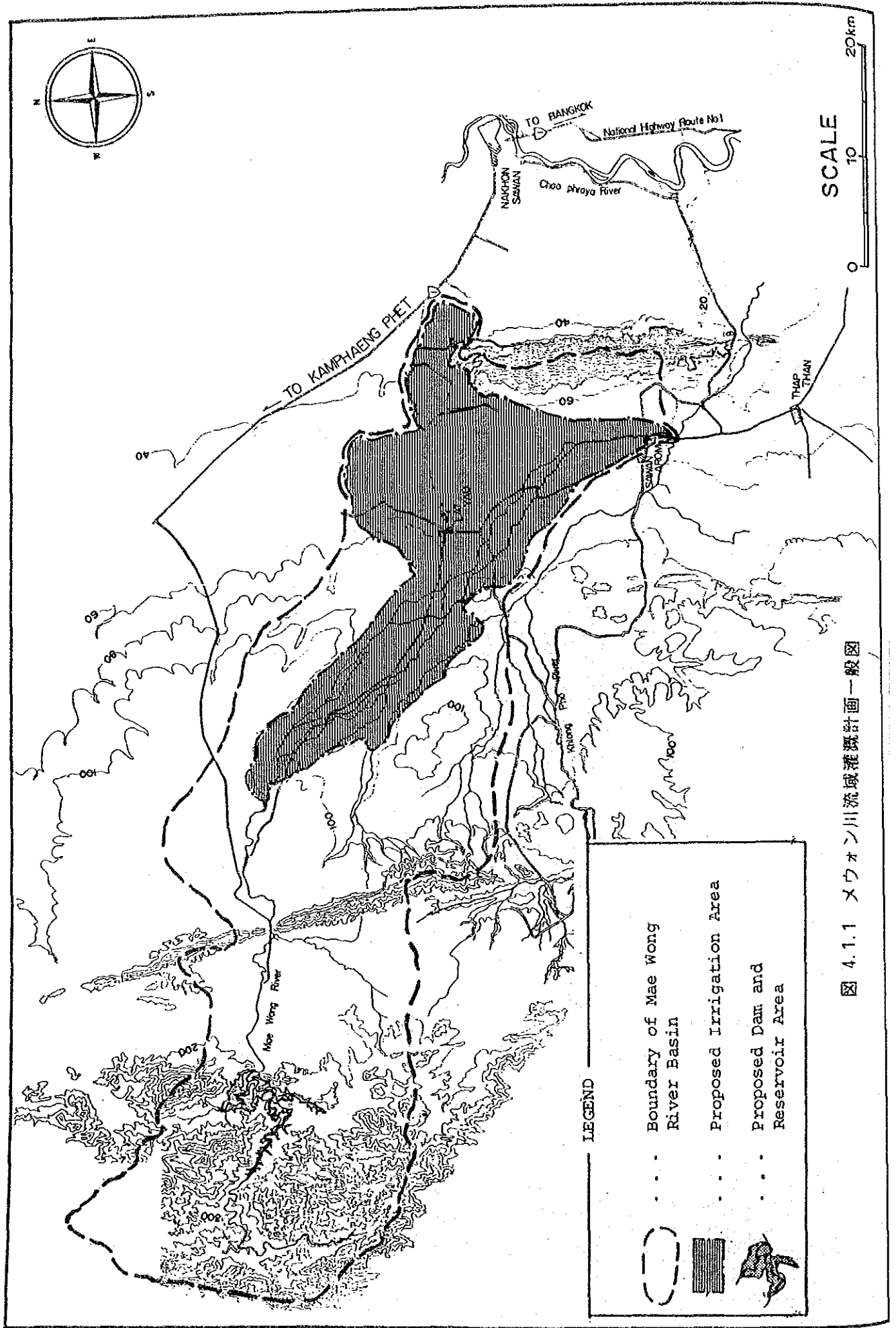
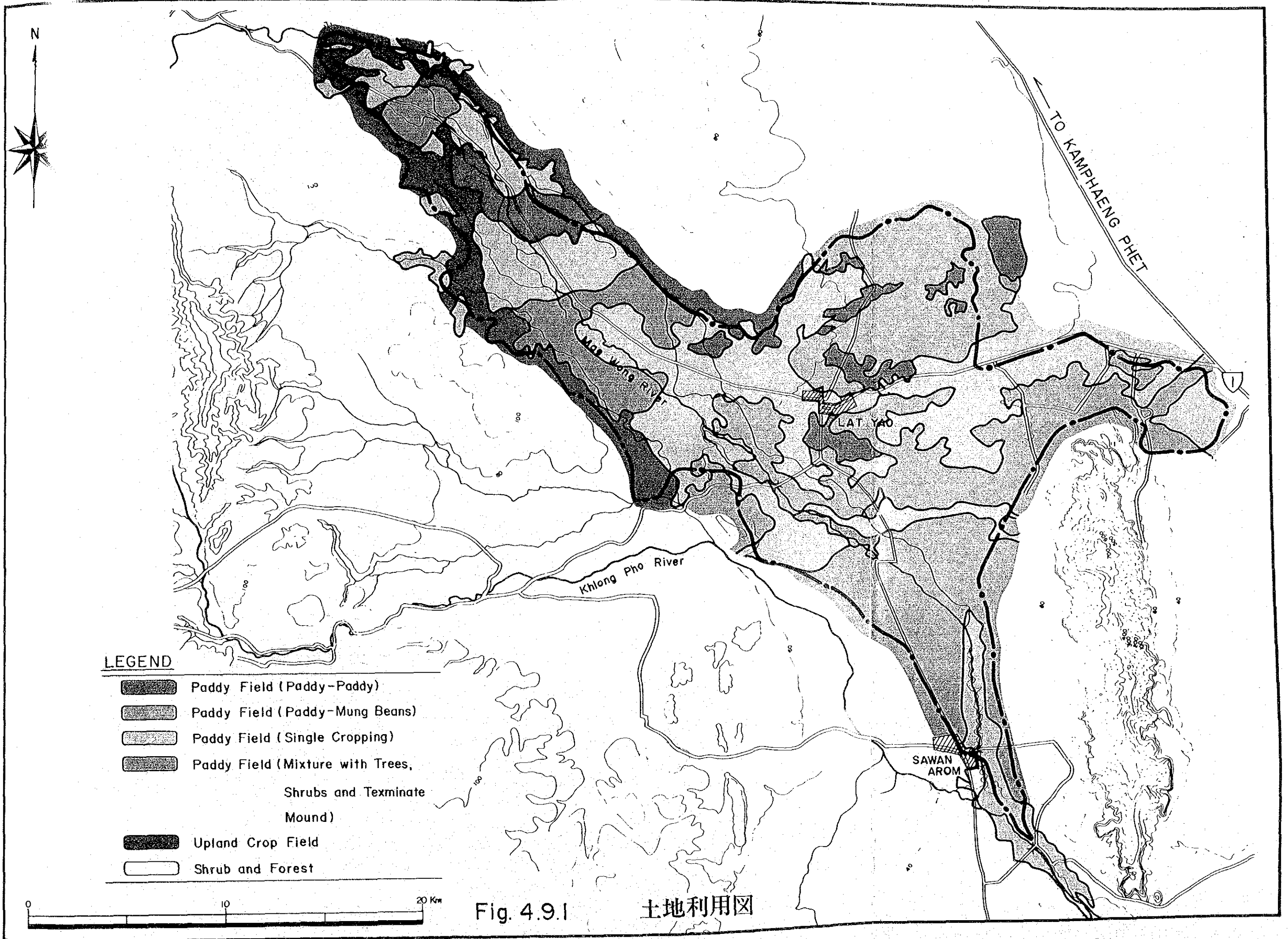


図 4.1.1 メウオン川流域灌漑計画一般図







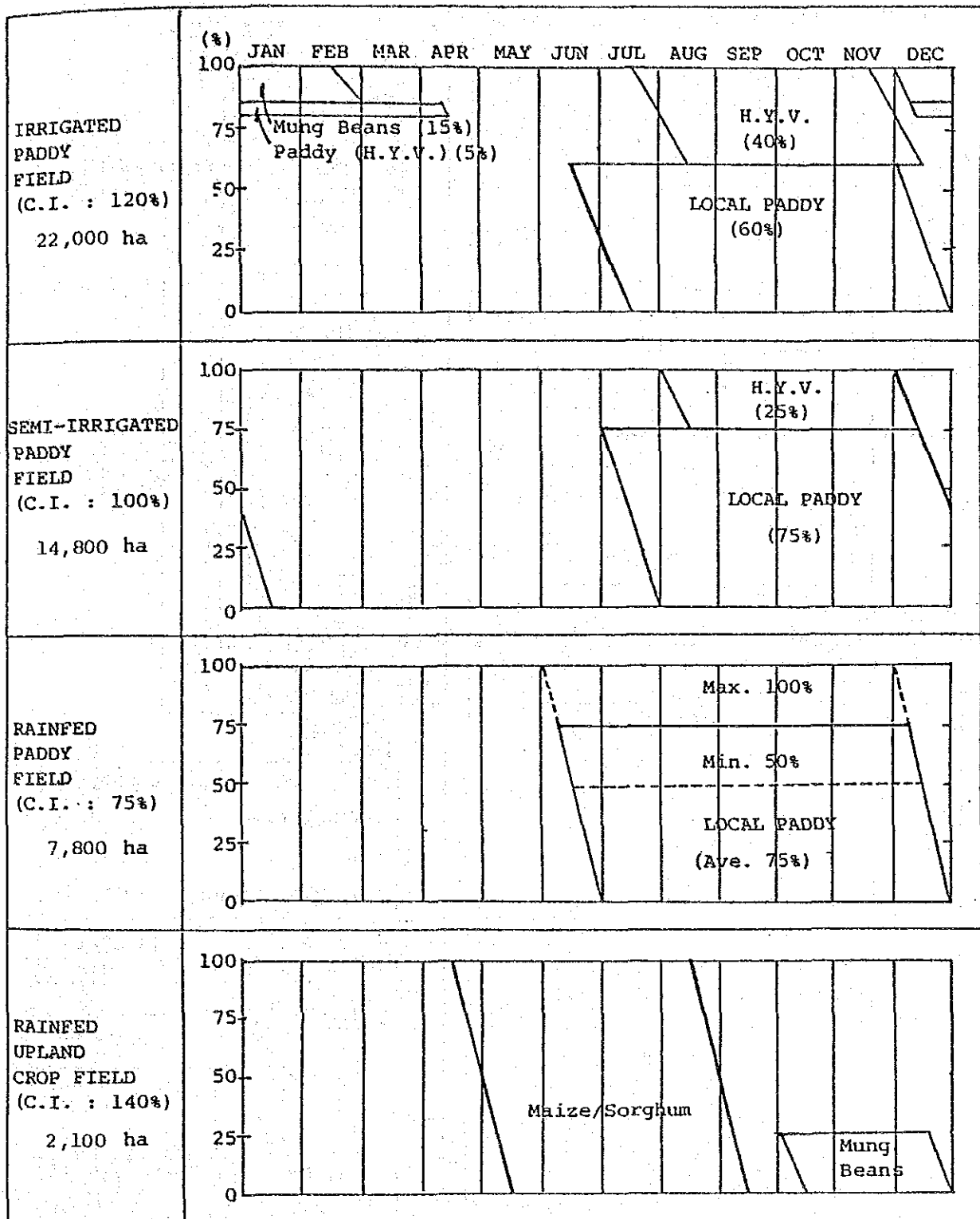


图 4.9.2 現況作付体系



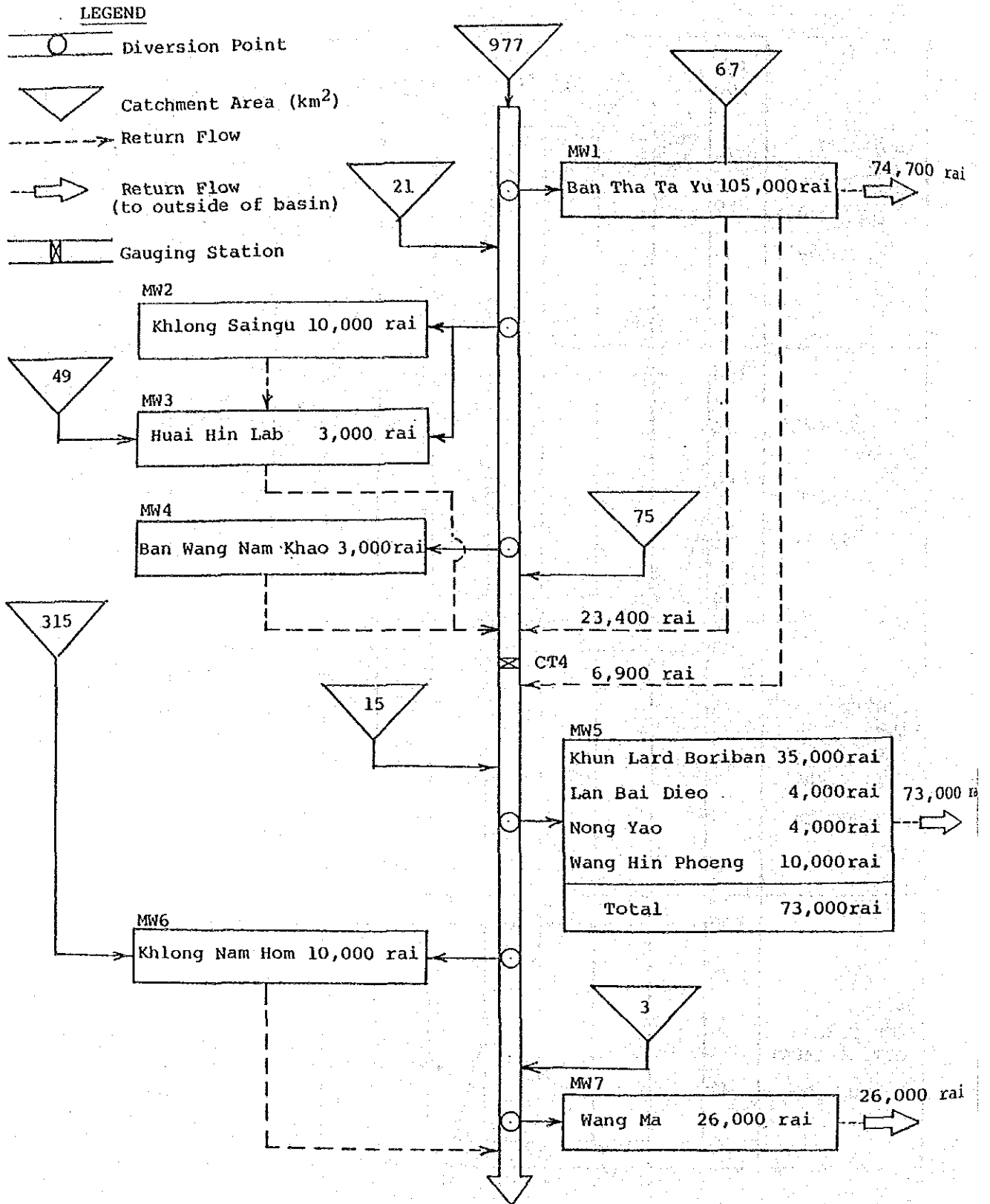


図 5.2.1 メウオン川流域の現況水収支系統図

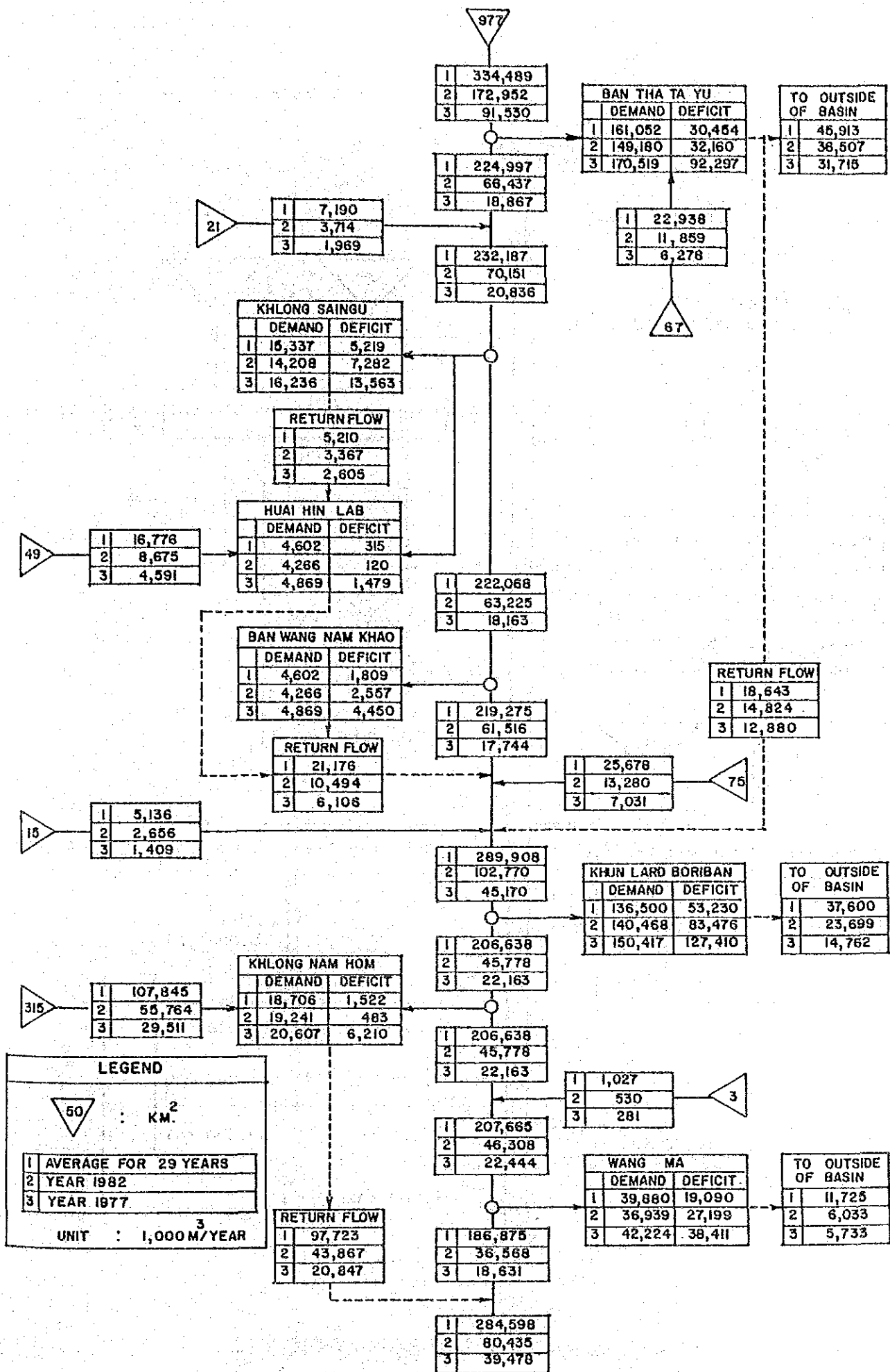


図 5.2.2 メウオン川流域における水利用状況

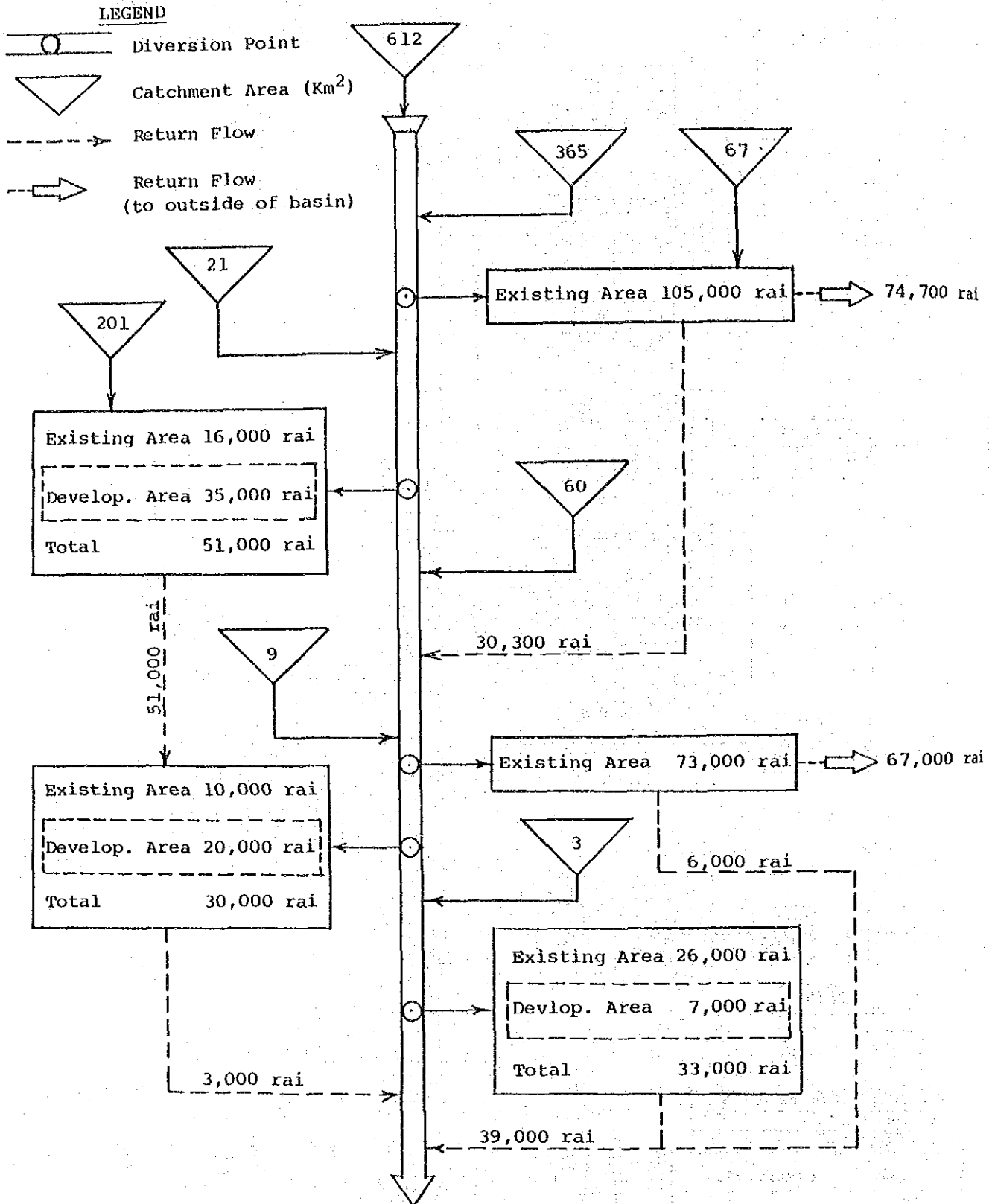


図 5.2.3 メウオン川流域の計画水収支系統図

Calculation Condition

Cropping Pattern : Wet Season Paddy

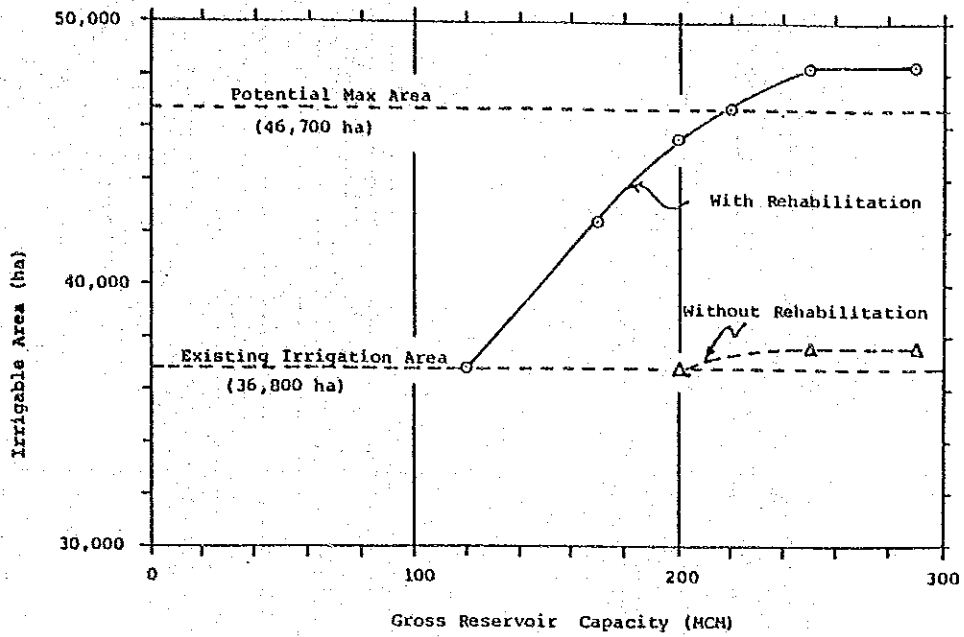
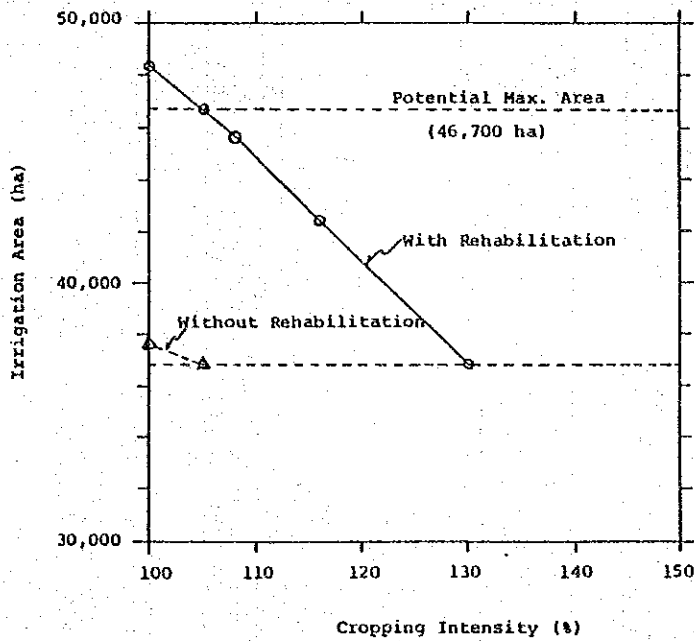


Fig. 5. 図 5.2.4 ダム規模と灌漑可能面積の関係図



Calculation Condition

Gross Reservoir Capacity : 250 MCH

Cropping Pattern : Paddy + Mung Bean

図 5.2.5 灌漑可能面積と作付率の関係図

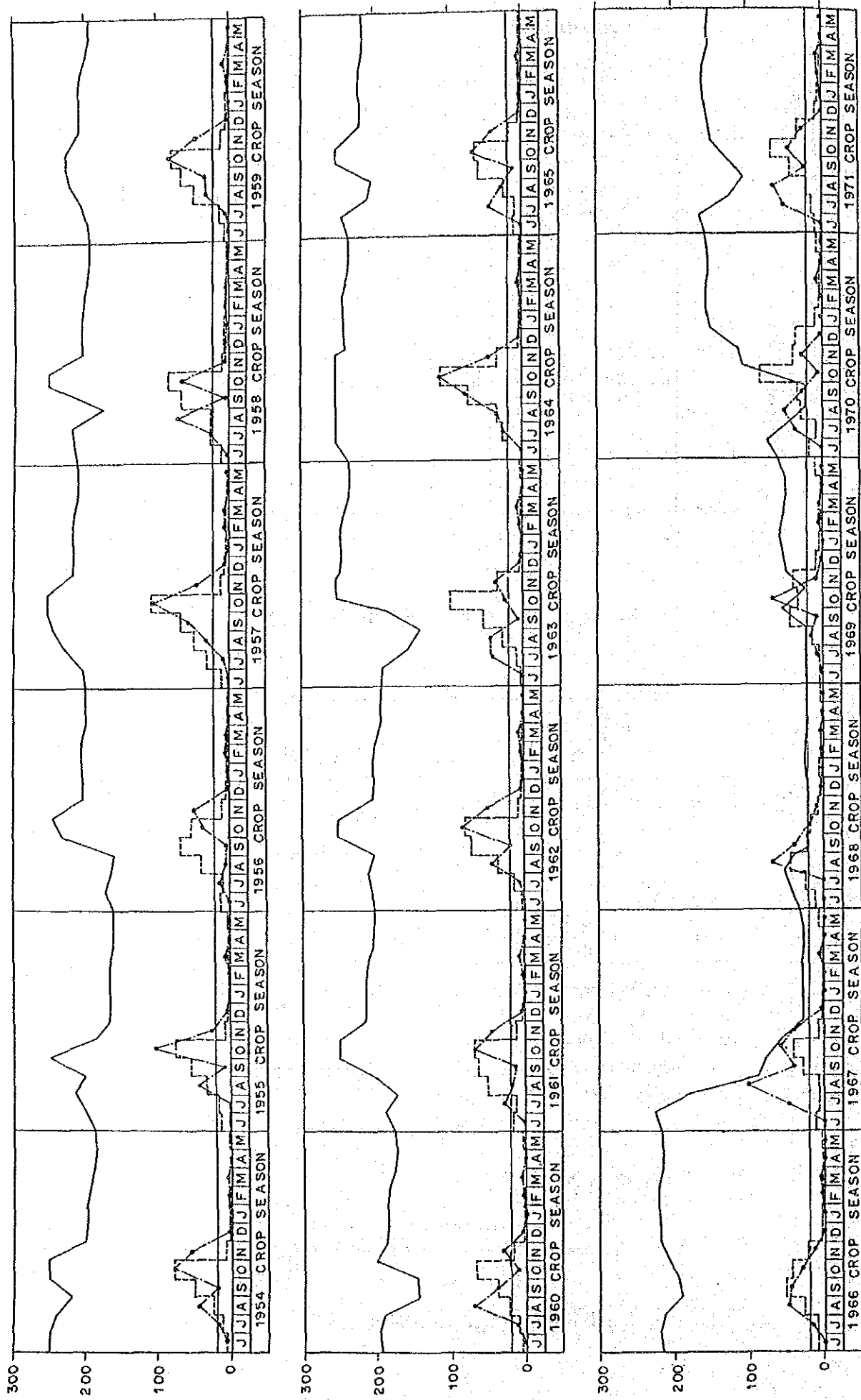
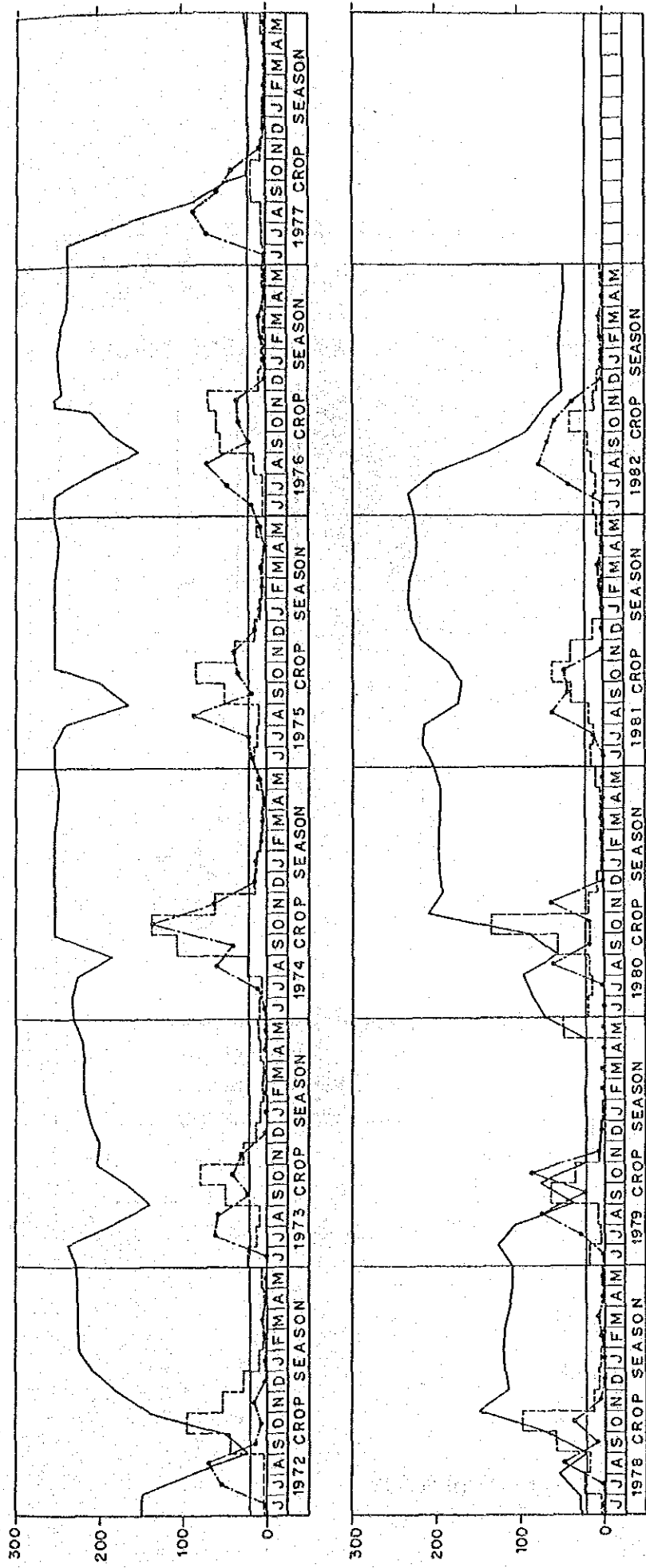


図 5.2.6 アッパーメウオン・ダムの貯水量変化図 (1/2)



—: Reservoir Capacity  
 - - - : Inflow  
 —: Release Water including Spillover Water

図 5.2.6 アッパーメウオン・ダム貯水量変化図 (2/2)

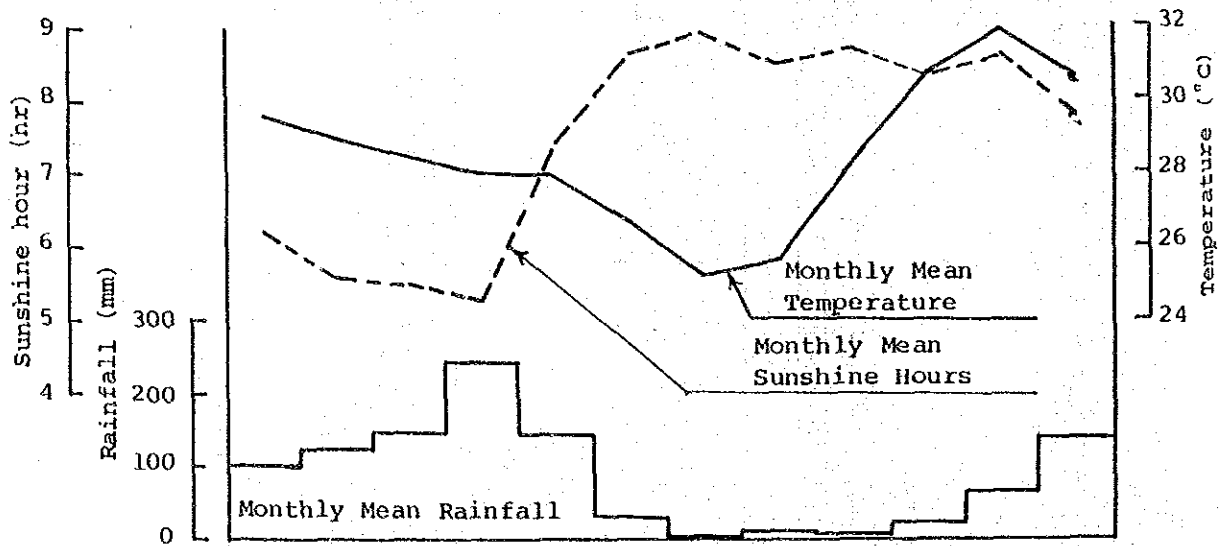
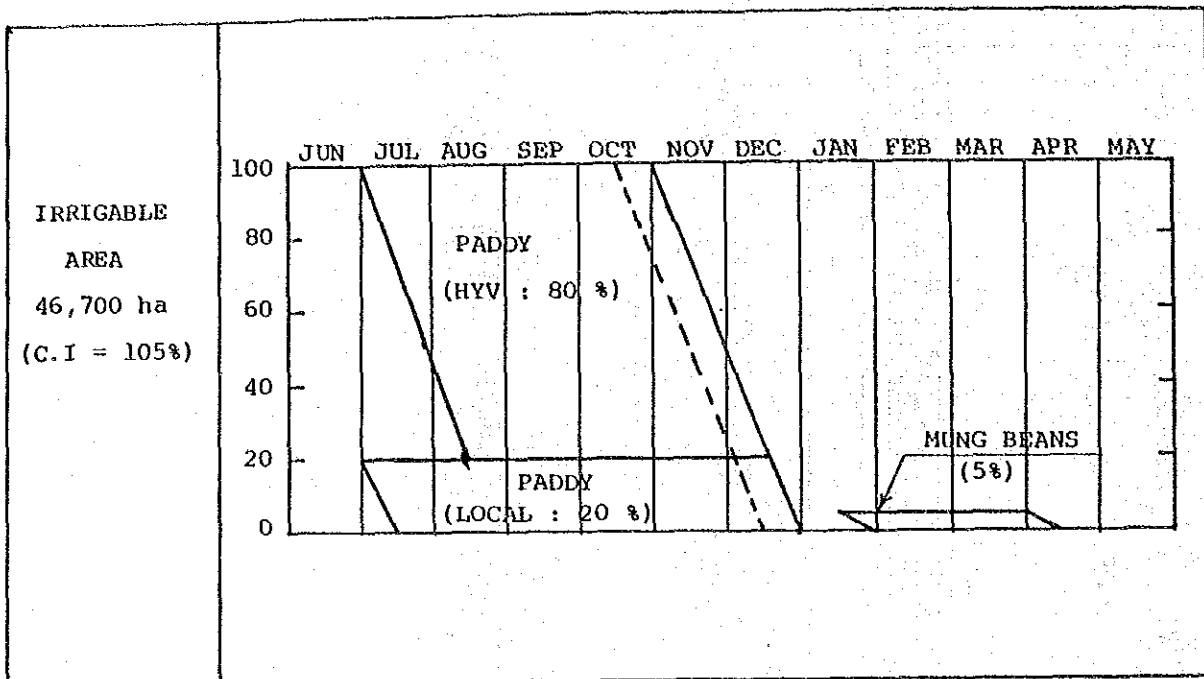
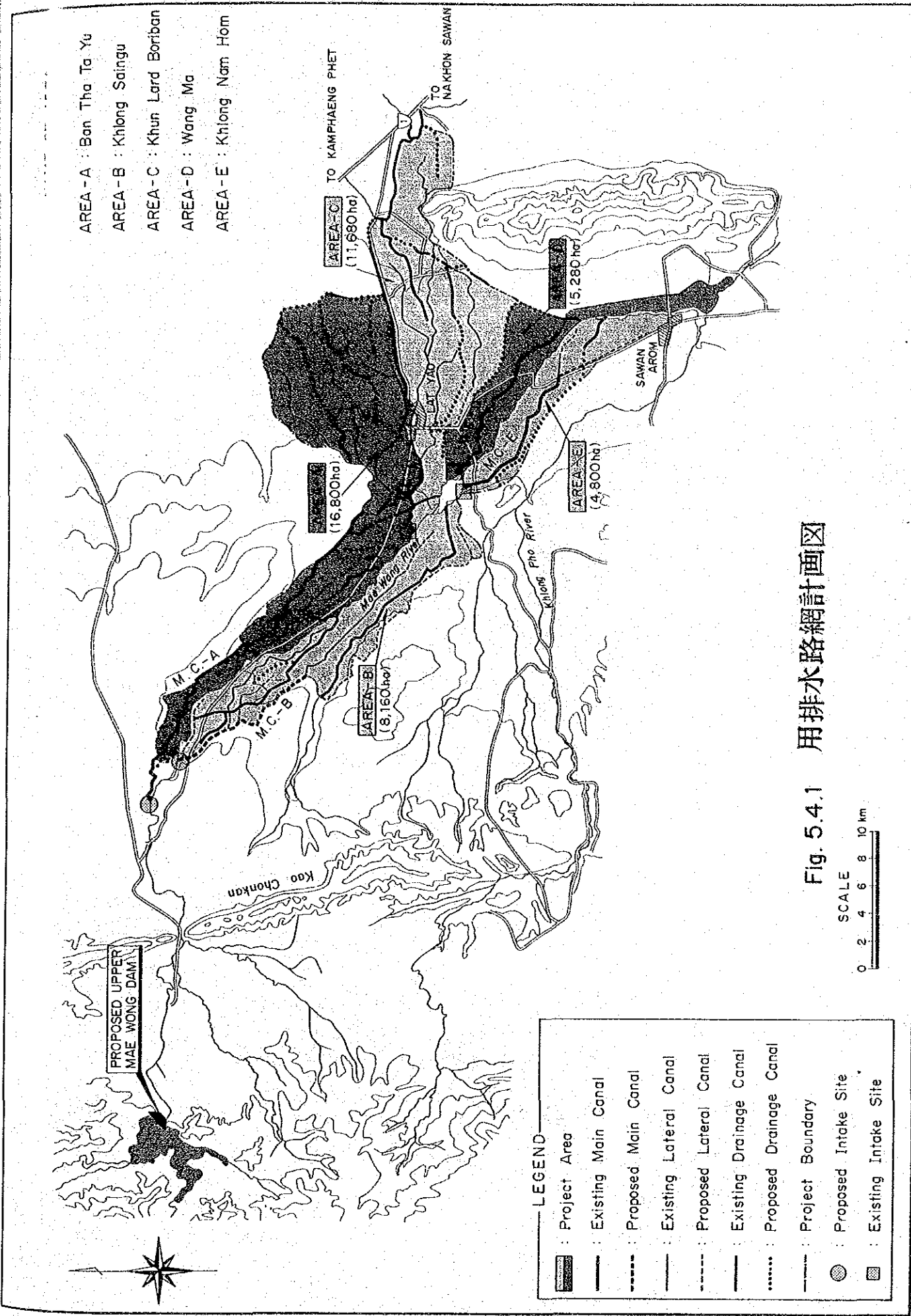


図 5.3.1 計画作付体系



AREA - A : Ban Tha Ta Yu  
 AREA - B : Khlong Saingu  
 AREA - C : Khun Lard Boriban  
 AREA - D : Wang Ma  
 AREA - E : Khlong Nam Hom

**LEGEND**

	Project Area
	Existing Main Canal
	Proposed Main Canal
	Existing Lateral Canal
	Proposed Lateral Canal
	Existing Drainage Canal
	Proposed Drainage Canal
	Project Boundary
	Proposed Intake Site
	Existing Intake Site

Fig. 5.4.1 用排水路網計画図

SCALE  
 0 2 4 6 8 10 km





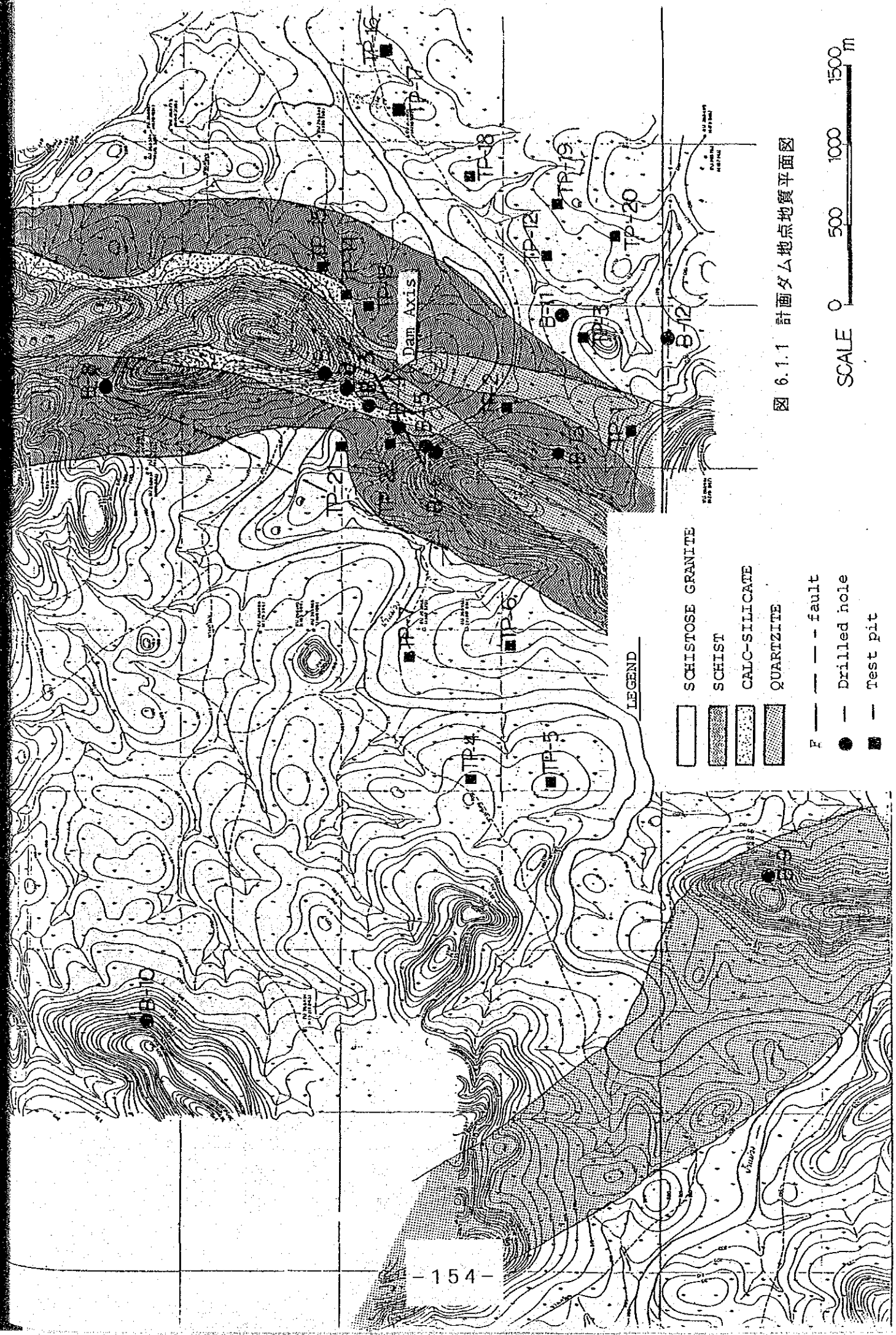


图 6.1.1 計画ダム地点地質平面図

SCALE 0 500 1000 1500 m

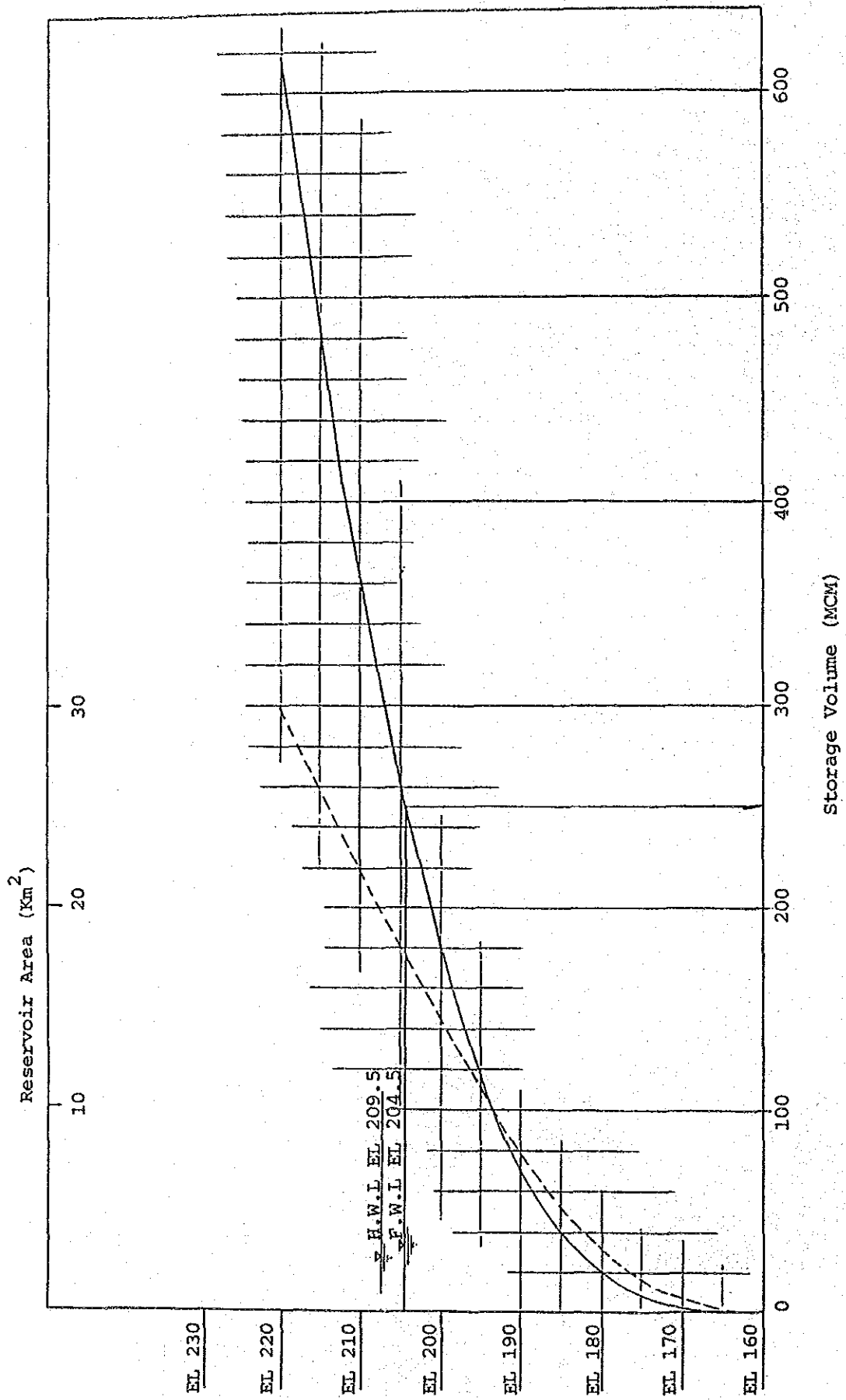


图 6.1.2 貯水面積 - 容積曲線

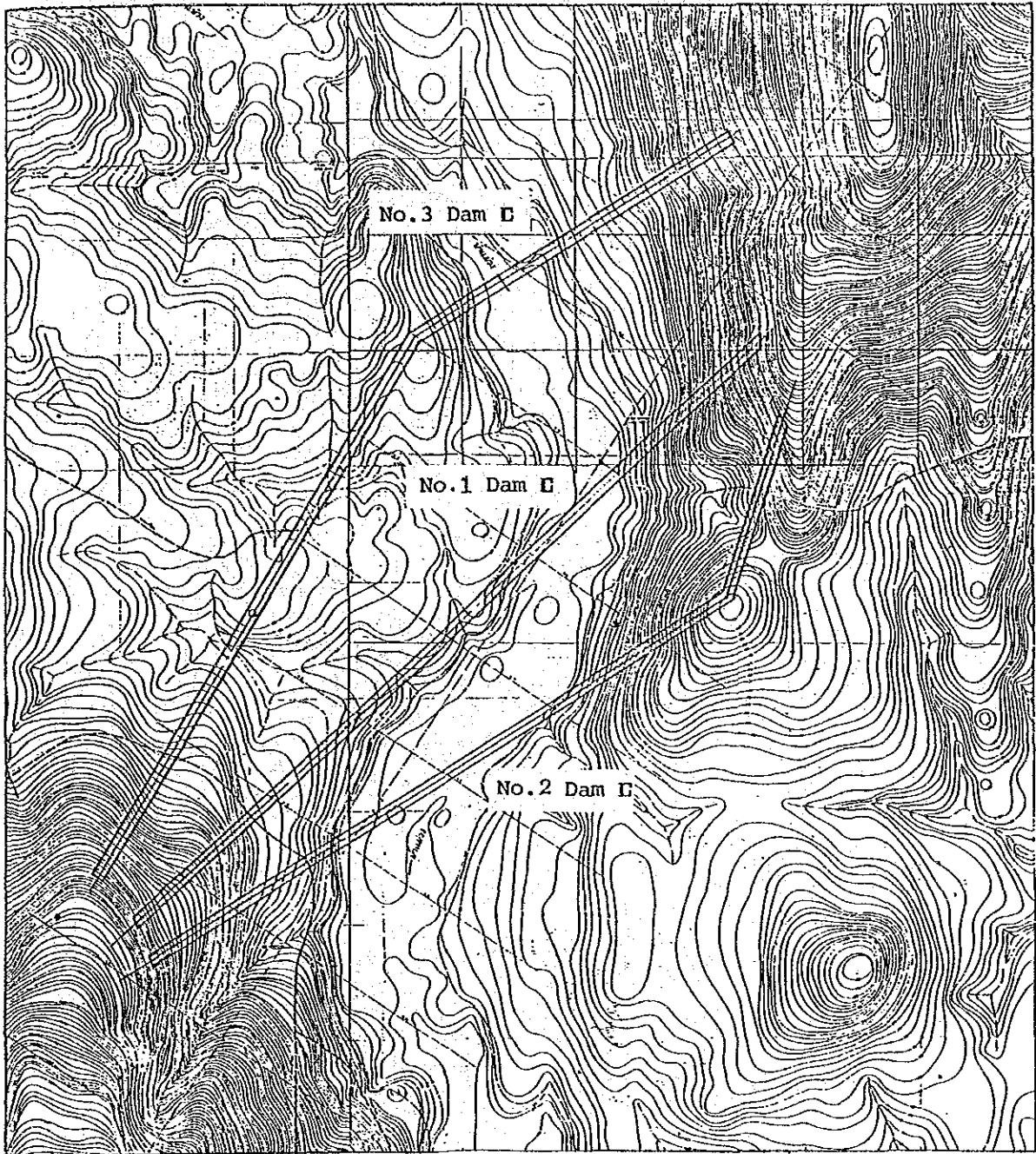


図 6.1.3 比較ダム軸

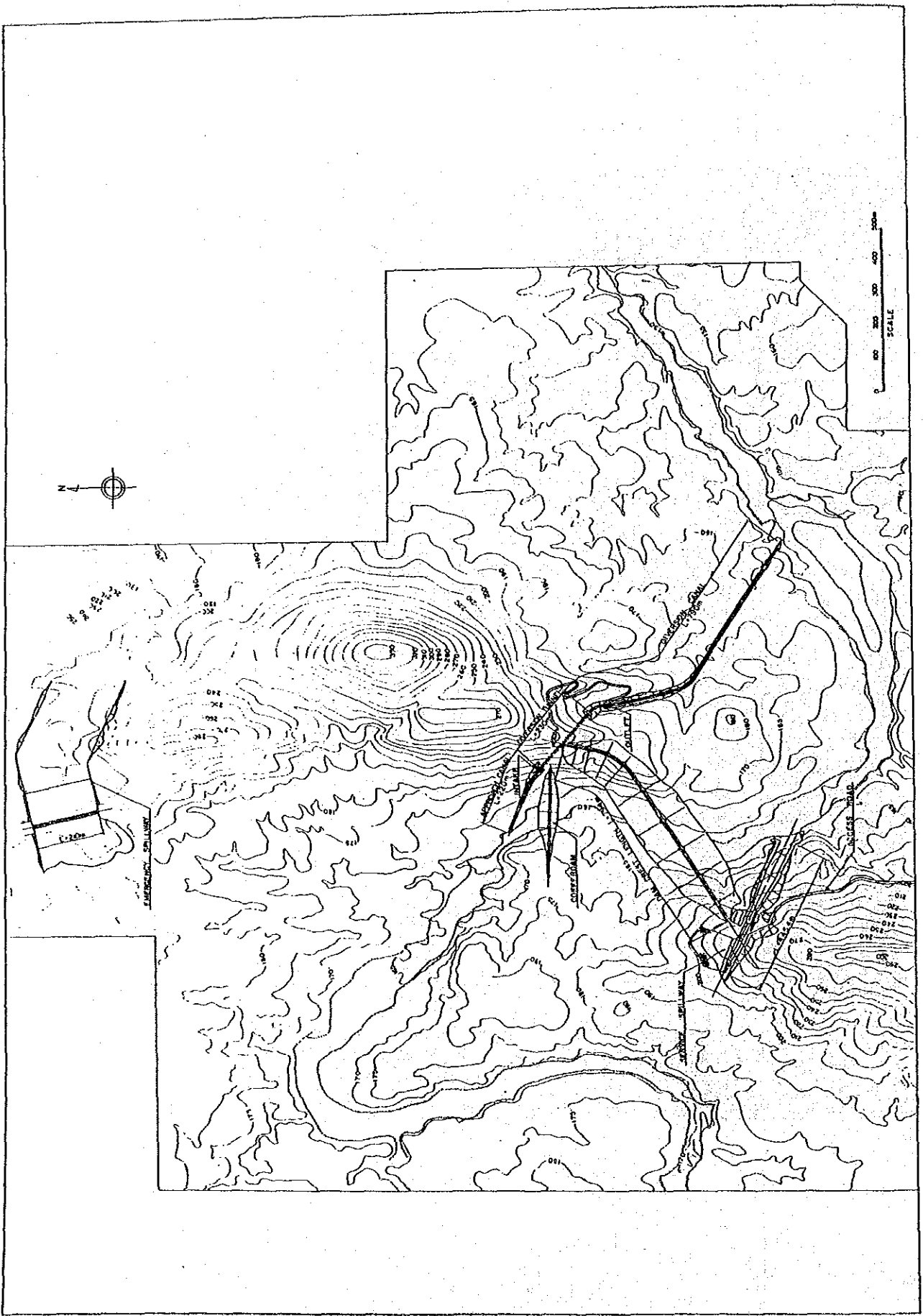


图 6.1.4 大坝位置图

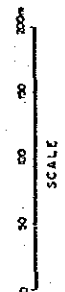
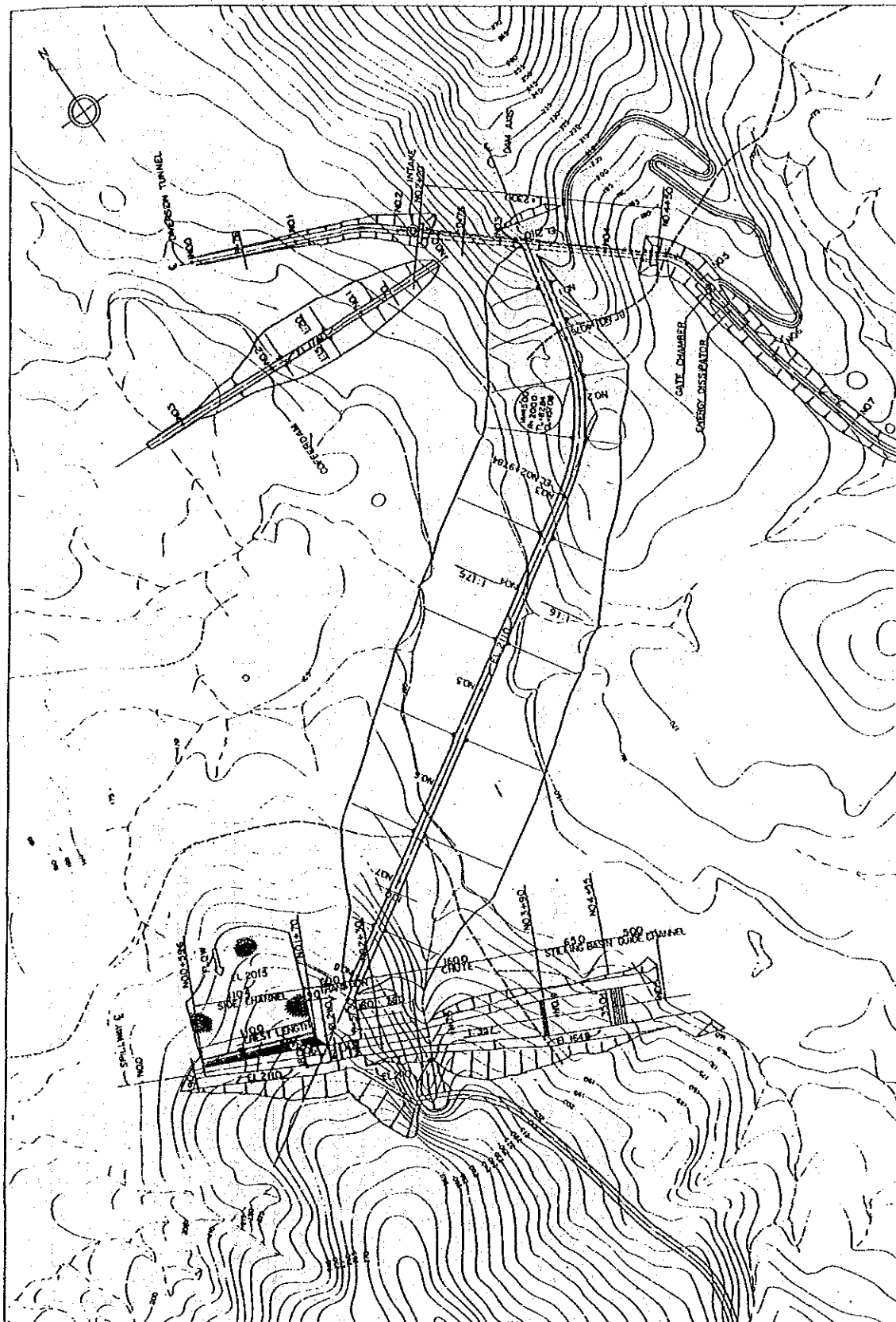


図 6.1.5 ダム一般計画図

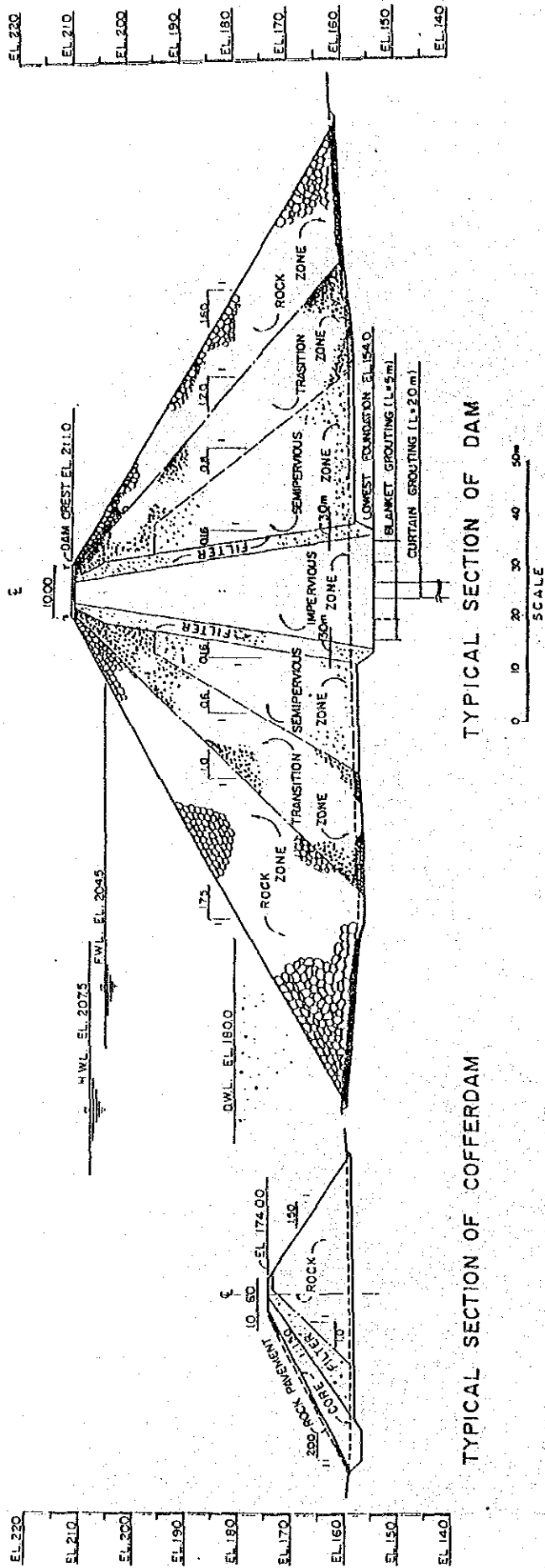


图 6.1.6 ダム標準断面図

	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	6 th Year	7 th Year
1. Engineering Services							
1-1 Additional Survey	██████████						
1-2 Detailed Design	██████████						
1-3 Preparation of tender	██████████						
2. Office and Quarter		██████████					
3. Dam Construction							
3-1 Preparatory Works		██████████					
3-2 River Diversion		██████████	██████████				
- diversion canal			██████████				
- diversion tunnel							
3-3 Dam				██████████			
- excavation							
- embankment							
3-4 Foundation Treatment				██████████			
3-5 Service Spillway					██████████		
- earth works							
- concrete works							
3-6 Emergency Spillway							
- earth works							
- concrete works							
3-7 Intake Facility							
3-8 Plug and Others							
4. Irrigation Facilities							
4-1 Preparation Works							
4-2 Weirs							
4-3 Canals							

図 6.3.1 メウオン灌漑計画の工事実施工程



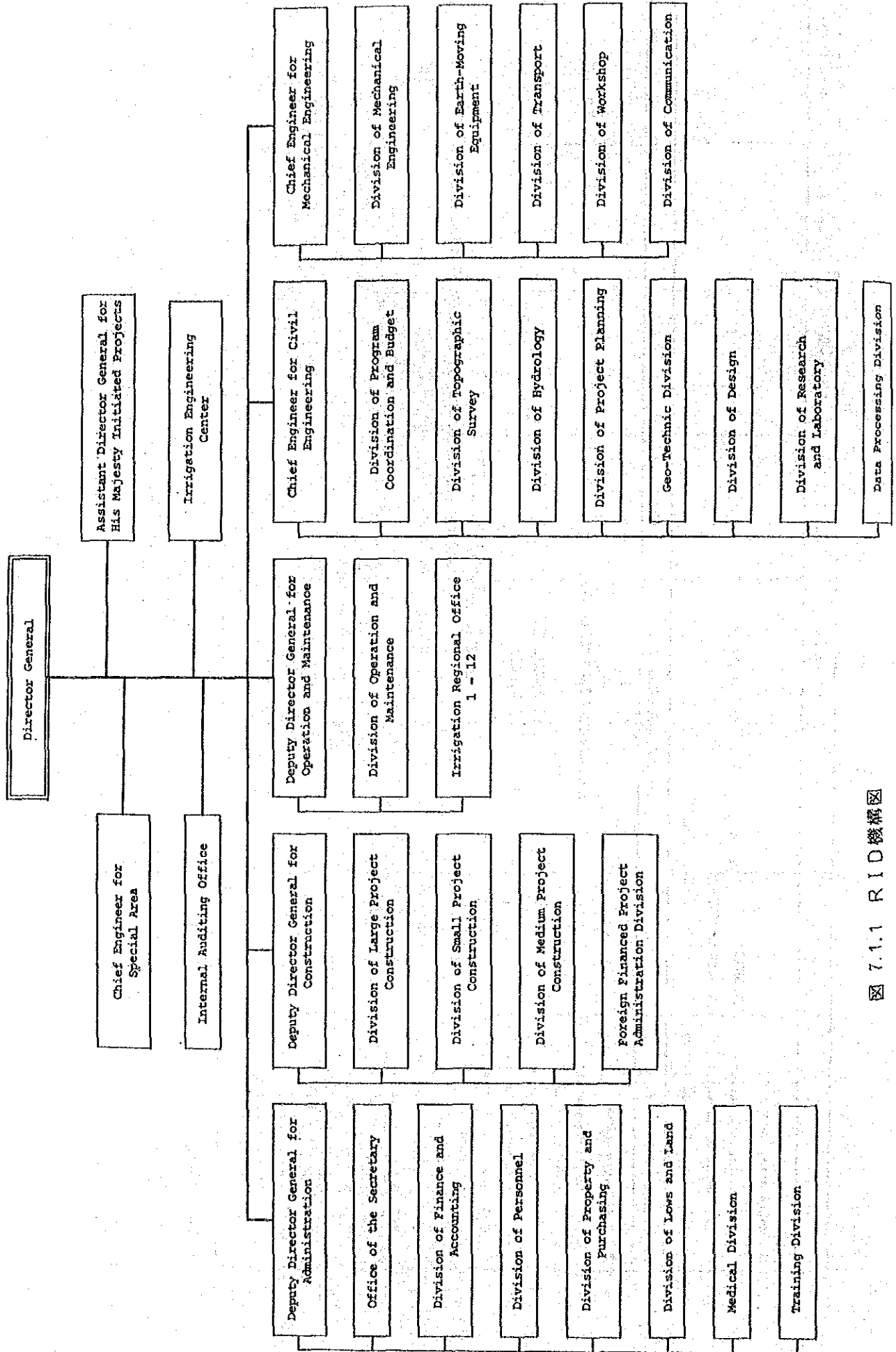


图 7.1.1 RID 机构图

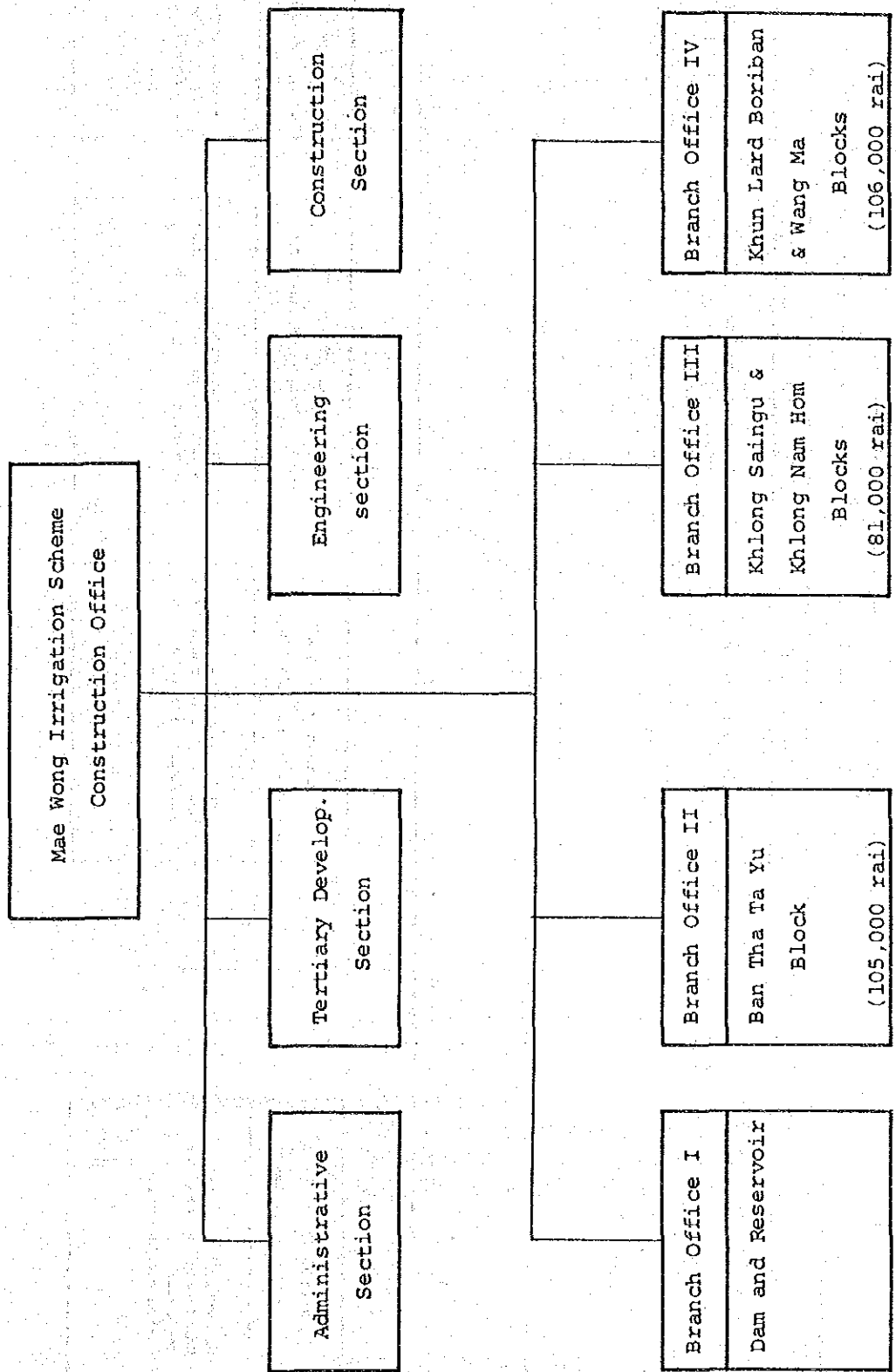


図 7.1.2 メウォン灌漑建設事務所組織図

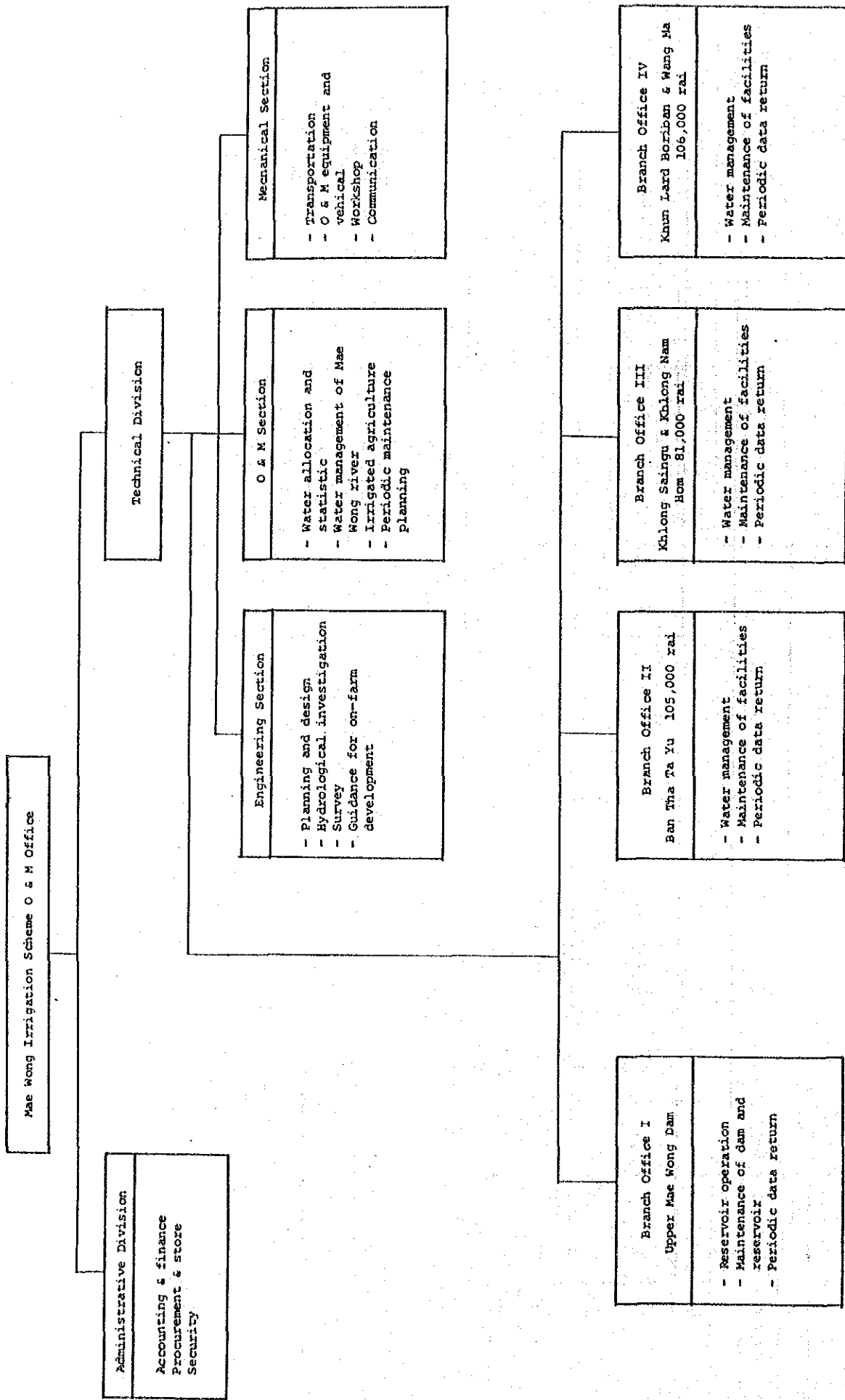


図 7.2.1 メウワン灌漑管理事務所組織図

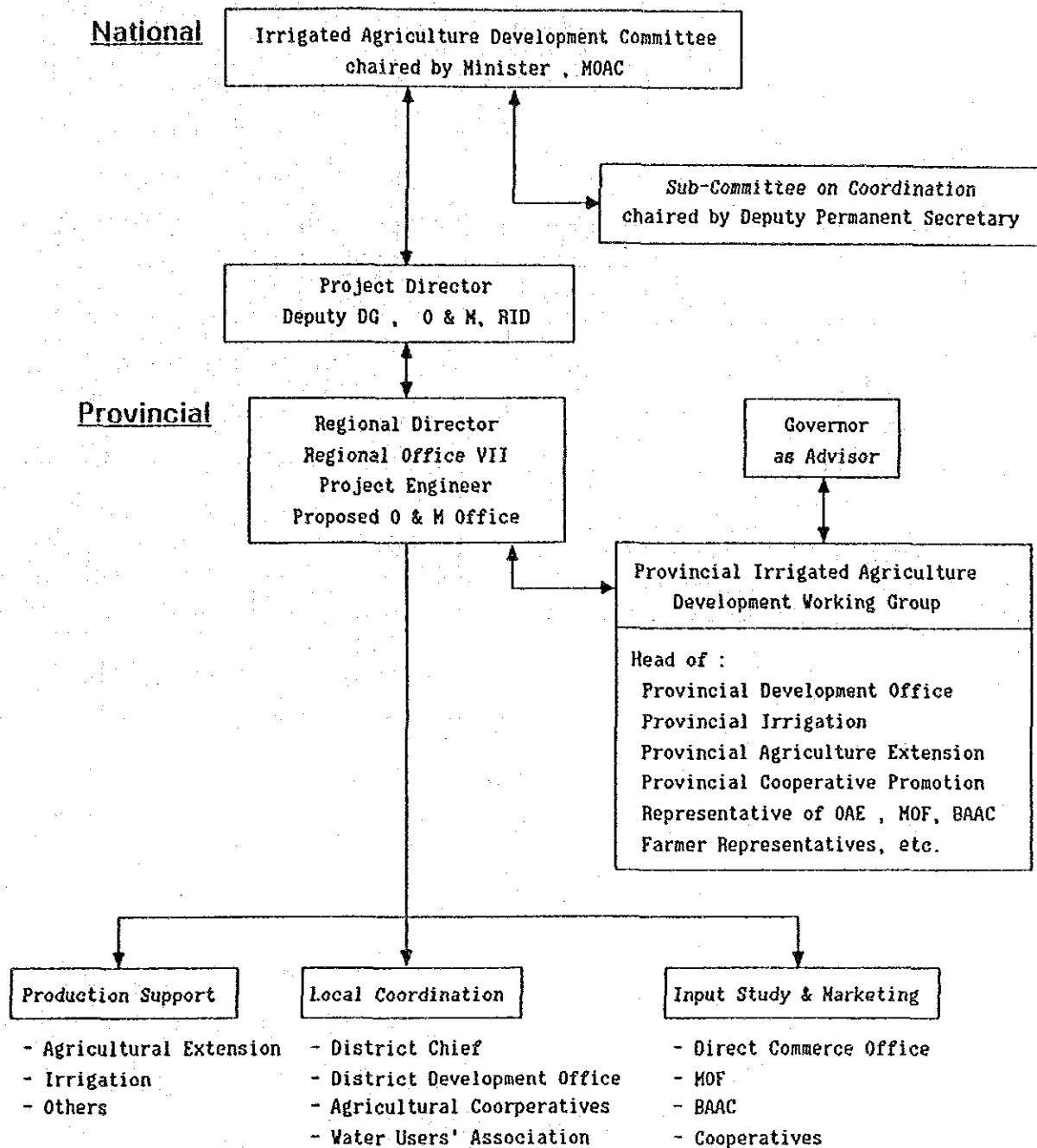


図 7.2.2 機構関連図

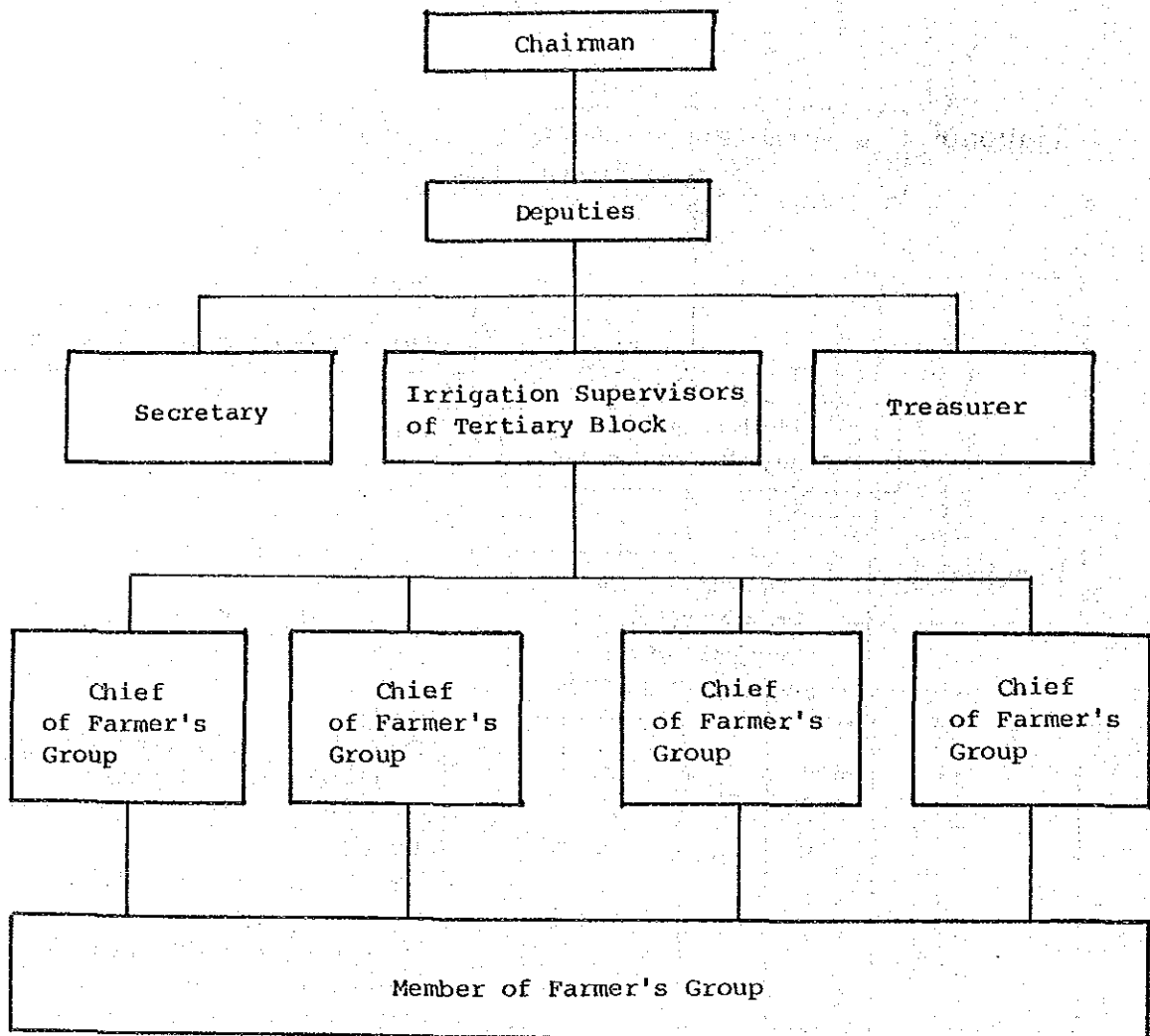


图 7.2.3 水利組合組織圖

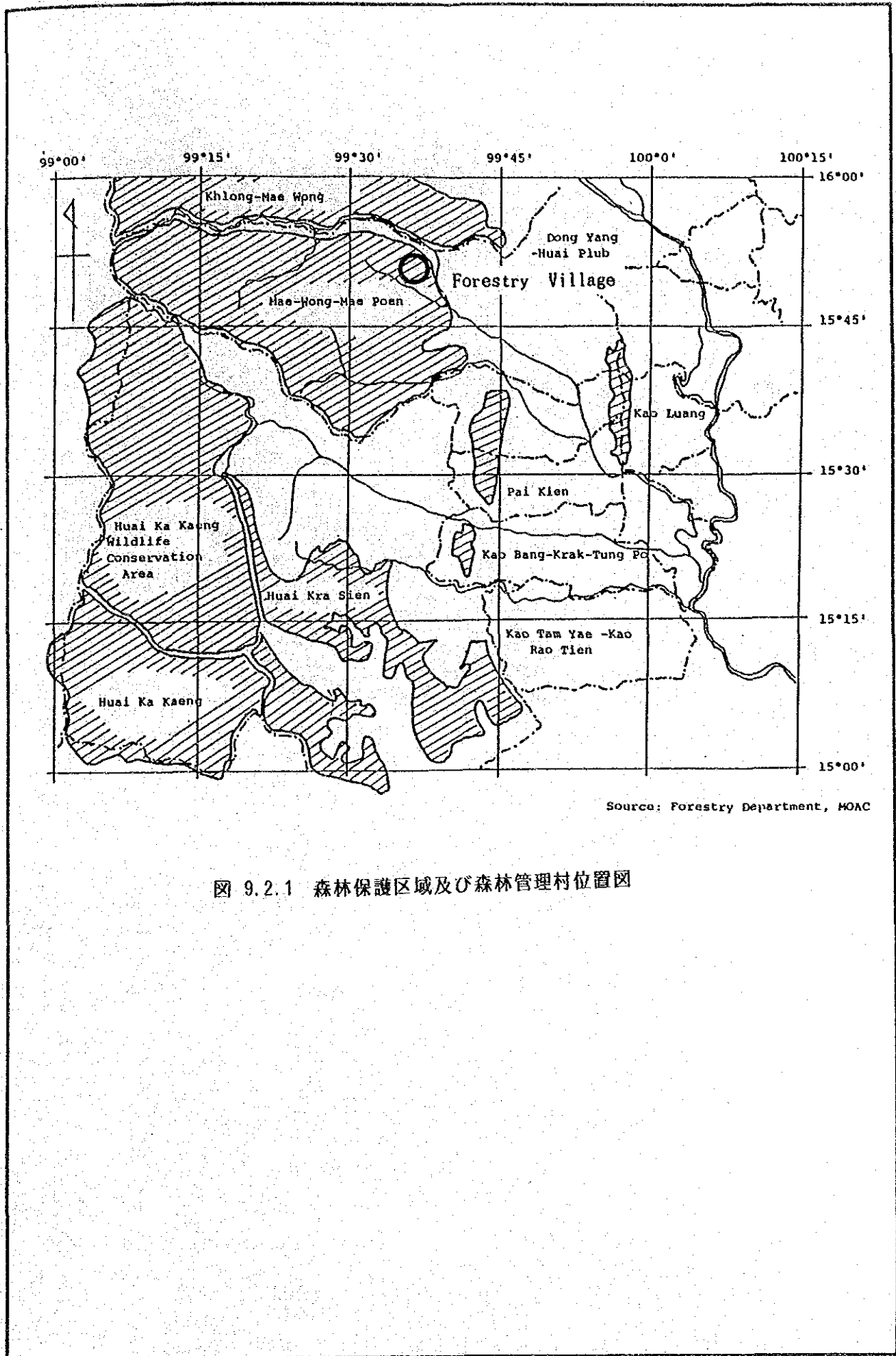


图 9.2.1 森林保護区域及び森林管理村位置図



付 属 資 料





SCOPE OF WORK  
FOR  
FEASIBILITY STUDY  
ON  
THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT  
IN  
THE KINGDOM OF THAILAND

AGREED UPON BETWEEN  
ROYAL IRRIGATION DEPARTMENT  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

BANGKOK, July 6 , 1984

*Chari Tulayanond*

MR. CHARI TULAYANOND  
CHIEF CIVIL ENGINEER  
ROYAL IRRIGATION DEPARTMENT  
MINISTRY OF AGRICULTURE  
AND COOPERATIVES

*H. Nakamichi*

DR. HIROSHI NAKAMICHI  
LEADER OF THE PRELIMINARY  
SURVEY TEAM,  
THE JAPAN INTERNATIONAL  
COOPERATION AGENCY

## I. INTRODUCTION

In response to the request of the Government of the Kingdom of Thailand (hereinafter referred to as "the Government"), the Government of Japan decided to implement the feasibility study on the Sakae Krang River Basin Irrigation Project (hereinafter referred to as "the Study"), within the general framework of technical cooperation between Japan and Thailand, which is set forth in the Agreement on Technical Cooperation between the Government of Japan and the Government of the Kingdom of Thailand signed on 5 November 1981.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study, in accordance with the relevant laws and regulations in force in Japan and in close cooperation with the authorities of Thailand.

Royal Irrigation Department (hereinafter referred to as "RID") shall act as counterpart agency to the Japanese study team and also as coordinating body to other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study.

## II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to review the overall Sakae Krang river basin water resources development plan.
2. to identify the possible projects and recommend the stage of development.
3. to conduct the pre-feasibility study on the potential project(s).
4. to conduct the feasibility study on the first priority project, and
5. to undertake on-the-job training of the government's officials in the course of the Study.

## III. OUTLINE OF THE STUDY

### 1. Study Area

The study area covers the Sakae Krang river basin with a gross area of 7,000 km<sup>2</sup>, which is composed of four sub-basins; the Mae Wong, the Klong Pho, the Thap Salao and the Khok Khwai.

### 2. Scope of the Study

The activities to be undertaken by the Team will be divided into two stages as follows:

- (1) Pre-Feasibility Study; to conduct the overall river basin development study on the Sakae Krang river basin (Part-A) and the pre-feasibility study on the project(s) to be selected in the Part-A study (Part-B).
- (2) Feasibility Study; to conduct the feasibility study on the project to be selected in the pre-feasibility study (Part-C).

## 2.1 Work Plan for the Pre-Feasibility Study

The study will cover the following items:

### Part-A

- (1) To review all existing and proposed irrigation projects in the basin.
- (2) To evaluate the agricultural land and water resources (surface water and groundwater) and identify the possible reservoirs and other water uses.
- (3) To study the basic concept for the plan of agricultural development and formulate possible irrigation projects.
- (4) To identify the possible project and recommend the implementation schedule of basin development, and select the project(s) to be studied at pre-feasibility level.
- (5) To study the environmental impact and recommend water and/or soil conservation.
- (6) To determine the hydropower development potential in the basin. Detail study should be carried out by others.

### Part-B

- (1) To collect and review the relevant existing data and information including;
  - a. Topography
  - b. Meteorology
  - c. Hydrology
  - d. Geology and Hydrogeology
  - e. Soil
  - f. Irrigation and Drainage
  - g. Agriculture
  - h. Agro and regional economy and institution
  - i. Flood control
  - j. Others

- (2) To survey in the project area including;
  - a. Topographical survey
  - b. Meteorological survey
  - c. Hydrological survey
  - d. Agricultural survey
  - e. Socio-economic survey
  - f. Regional economic and agro-institutional survey
  - g. Flood control survey
  - h. Construction material and cost survey
  - i. Other survey including resettlement
- (3) To formulate the development plan and estimate all project requirements at the pre-feasibility level.
- (4) To identify the project priority taking into account of the technical and economic feasibility as well as the social elements involved in each projects and select the project to be studied at the feasibility study level.
- (5) To recommend and suggest the further study or measures to be undertaken based on the results obtained from the pre-feasibility study.

## 2.2 Work Plan for the Feasibility Study

### Part-C

Based on the results of the pre-feasibility study, the study will cover the following items:

- (1) Additional field survey and data collection including;
  - a. Soil and land classification survey
  - b. Geological survey
  - c. Groundwater survey
  - d. Others
- (2) Determination of the basic items for the project planning in the field works including;
  - a. Project area
  - b. Land use and cropping pattern
  - c. Water requirements
  - d. Dam planning and design in view of irrigation, flood control, hydro-power development potential and other potential water uses

- e. Irrigation and drainage canal networks and facilities
  - f. Estimation of yields
  - g. Agro-institutional plan
  - h. Social-institutional services
  - i. Others
- (3) Formulation of the integrated development plan for the project
  - (4) Preliminary design of the major structure of the project
  - (5) Preparation of the implementation schedule
  - (6) Estimation of the project costs and benefits
  - (7) Evaluation of the project
  - (8) Operation and maintenance
  - (9) Recommendation

#### IV. WORK SCHEDULE

The Study will be executed in accordance with the attached tentative working schedule.

#### V. REPORTS

JICA will prepare and submit following reports in English to the Government:

- 1. Plan of Operation  
Twenty (20) copies at the commencement of the pre-feasibility study and the feasibility study.
- 2. Progress Report  
Twenty (20) copies at the end of the field works of the pre-feasibility study.
- 3. Pre-Feasibility Study Report  
Fifty (50) copies at the end of the pre-feasibility study.
- 4. Interim Report  
Fifty (50) copies at the end of the field works of the feasibility study.

5. Draft Final Feasibility Study Report

Fifty (50) copies within one (1) month after the end of the feasibility study.

The Government is requested to provide its comments on the Draft Final Report to JICA through JICA office in Bangkok within one (1) month after the submission of the Draft Final Report.

6. Final Feasibility Study Report

Hundred (100) copies within two (2) months after receiving the comments of the Government on the Draft Final Report.

VI. UNDERTAKING OF THE GOVERNMENT OF THE KINGDOM OF THAILAND

1. In accordance with the Agreement on Technical Cooperation between the Government of Japan and the Government of the Kingdom of Thailand, the Government of the Kingdom of Thailand shall accord benefits to the Japanese study team and, through the authorities concerned, take necessary measures to facilitate the smooth implementation of the Study.

2. RID shall make necessary arrangements with the cooperation of other relevant organizations for the followings:

(1) to secure the safety of the Study team,

(2) to permit the members of the Japanese study team to enter, leave and sojourn in Thailand for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees,

(3) to exempt the members of the Japanese study team from income tax and other fiscal charge imposed on or in connection with any emolument or allowance paid to the members of the Japanese study team for their services in connection with the implementation of the Study.

(4) to facilitate medical services as needed, its expenses will be chargeable on the member of the Japanese study team,

(5) to secure permission within its authority to take available data and documents related to the Study out of Thailand to Japan by the Study team.

3. RID shall, at its own expense, provide the Japanese study team with the followings, in cooperation with other relevant organizations:

(1) available data and information related to the Study,

- (2) topographical survey, for the first priority project (by the beginning of the feasibility study),
  - a. topographical maps
    - dam sites ; scale of 1/1,000
    - reservoir areas ; scale of 1/4,000
    - irrigation areas; scale of 1/10,000
    - resettlement areas; scale of 1/4,000
  - b. cross and vertical sectional survey
  - c. topographical maps of borrow areas for embankment material
- (3) geological and soil mechanical survey, for the first priority project (by the beginning of the feasibility study),
  - a. geological and soil mechanical survey
  - b. sampling and laboratory investigation of the embankment material
- (4) land acquisition and compensation,
  - a. survey of affected households, lands and public facilities in the proposed reservoir area
- (5) additional surveys related to the feasibility study if necessary,
- (6) counterpart personnel as follows,
  - a. General Planning Engineer
  - b. Irrigation and Drainage Engineer
  - c. Geologist and Hydrogeologist
  - d. Hydrologist
  - e. Soil Mechanical Engineer
  - f. Soil Scientist
  - g. Agronomist
  - h. Agro-economist
  - i. Agro-institutional Specialist
  - j. Dam Engineer
  - k. Construction Planning & Cost Engineer
  - l. Environmental Specialist
  - m. Survey Engineer

The number of counterpart personnel and their respective assignment should be decided by RID in consultation with the study team,



- (7) suitable office space with necessary equipment in Bangkok and project site,
  - (8) appropriate number of vehicles with driver in the project area,
  - (9) credentials or identification cards.
4. The Government of Kingdom of Thailand shall bear claims, if any arises against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

#### VII. UNDERTAKING OF THE GOVERNMENT OF JAPAN

For the implementation of the Study, the Government of Japan shall, in accordance with the relevant laws and regulations in force in Japan, take the following measures through JICA:

1. to dispatch, at its own expense, study teams to Thailand,
2. to perform technology transfer to the Thai counterpart personnel in the course of the Study.

VIII. JICA and RID will consult with each other in respect of any matter that is not agreed upon in this document and may arise from or in connection with the study.

RID OFFICIALS CONCERNED, LOCAL GOVERNMENT OFFICIALS CONCERNED  
MEMBERS OF SUPERVISORY COMMITTEE AND STUDY TEAM OF THE PROJECT

A. RID Officials Concerned

- |                               |   |
|-------------------------------|---|
| (1) Mr. Suthep Tingsabhat     | Chief Engineer of Civil Engineering                 |
| (2) Dr. Boonyok Wadhanaphuti  | Director, Project Planning Division                 |
| (3) Mr. Shoombhol Chaveesuk   | Director of Design Division                         |
| (4) Mr. Arom Khumkomkul       | Director of Program & Budget Division               |
| (5) Mr. Nukool Thongthawee    | Director of O & M Division                          |
| (6) Mr. Suthi Songvoravit     | Chief of Policy Branch, Project Planning Division   |
| (7) Mr. Jongrak Isarangkura   | Chief of Project Planning Sub-Division 2            |
| (8) Mr. Chanchai Klinhom      | Chief of Project Planning Sub-Division 3            |
| (9) Mr. Thriphan Makjaroon    | Chief of Environmental, Project Planning Division   |
| (10) Mr. Ruongrit Ammawat     | Design Division                                     |
| (11) Mrs. Nophakhun Somsin    | Hydrology Division                                  |
| (12) Mr. Taweechai Mackaman   | Hydrology Division                                  |
| (13) Mr. Klaus Lindner        | Advisor, Project Planning Division                  |
| (14) Mr. Kaiwan Devahasdin    | Program Co-ordination & Budget Division             |
| (15) Mr. Virat Khao-Uppatum   | O & M Division                                      |
| (16) Mr. Osot Charnvej        | Agronomist, O & M Division                          |
| (17) Mr. Vira Poomvises       | Geo-technic Division                                |
| (18) Mr. Maitri Poolsup       | Civil Engineer, Design Division                     |
| (19) Mr. Jumsak Tejasen       | Director, Research & Laboratory Division            |
| (20) Mr. Prasert Milintangul  | Chief of Research & Applied Division                |
| (21) Mr. Sagan Jamprawit      | Chief of Soil and Geology Division                  |
| (22) Mr. Silpachai Niyomsilpa | Director of Topographical Division                  |
| (23) Mr. Sompoch Pimonpun     | Chief of Ground Survey Sub-Division                 |
| (24) Mrs. Supha Sing Intara   | Chief of Economic Branch, Project Planning Division |
| (25) Mr. Supote Rujikakul     | Engineer, Project Planning Division                 |
| (26) Mr. Roungrit Ammawat     | Chief of Engineer, Dam Design Sub-Division          |
| (27) Mr. Prasart Chuntrniyom  | Director of Irrigation Region 7                     |

- |      |                             |   |
|------|-----------------------------|---|
| (28) | Mr. Chalermorn Phirunsarn   | Civil Engineer, Region 7                                      |
| (29) | Mr. Seni Wichitsiri         | Civil Engineer, Region 7                                      |
| (30) | Mr. Preecha Chotesangasa    | Topographical Survey  |
| (31) | Dr. Suphon Chirapuntu       | Geo-technical Division  |
| (32) | Mr. Awphai Muthitacharoen   | Chief, Geological Survey Branch<br>Geotechnical Division      |
| (33) | Mr. Donai Traitai           | Chief of Land Classification Branch<br>Geo-technical Division |
| (34) | Mr. Dacha Luangpitakchumpol | Geo-technical Division  |
| (35) | Mr. Runroj Chumthong        | Geo-technical Division  |
| (36) | Mr. Somkiat Subhadhadapong  | Geo-technical Division  |
| (37) | Mr. Supannee Rojanapornsak  | Geo-technical Division  |
| (38) | Mr. Direk Tongaram          | O & M Division  |
| (39) | Mr. Prompong Leesirisern    | Medium Scale Project Division                                 |
| (40) | Dr. Vachi Ramnarong         | Groundwater Division  |
| (41) | Mr. Dhongchait              | Economic Section, Project Planning<br>Division                |
| (42) | Dr. Siripong Hungspreug     | Planning Division   |
| (43) | Mr. Traibhun Nekjrson       | Project Planning Division                                     |
| (44) | Mr. Chaiyuth Suksri         | Project Planning Division                                     |
| (45) | Mr. Somsak Boonprajurb      | Engineer, Project Planning Division                           |
| (46) | Mr. Suwit Thanopanuwat      | Project Planning Division                                     |
| (47) | Mr. Lertviroj Kowatthana    | Engineer, Project Planning Division                           |
| (48) | Mr. Anan Phoonthawee        | Engineer, Project Planning Division                           |
| (49) | Mr. Prateep Kanchanalarb    | Engineer, Project Planning Division                           |
| (50) | Mr. Akkapon Boonmash        | Civil Engineer, O & M Division                                |
| (51) | Mr. Toshiki Saito           | Colombo Plan Expert, Project<br>Planning Division             |
| (52) | Mr. Katsuro Shioda          | Colombo Plan Expert, O & M Division                           |
| (53) | Mr. Fumio Ikeda             | Colombo Plan Expert, Design Division                          |
| (54) | Mr. Kazushige Matsuo        | Colombo Plan Expert, Irrigation Center                        |
| (55) | Mr. Yoji Ebihara            | Colombo Plan Expert, Irrigation Center                        |

B. Local Government Officials Concerned

NAKHON SAWAN PROVINCE

- |     |                           |                                       |
|-----|---------------------------|---------------------------------------|
| (1) | Mr. Prakrit Pinchareon    | Governor                              |
| (2) | Mr. Yuthana Buanwong      | Deputy Governor                       |
| (3) | Mr. Boonyun Supasansatorn | Officer of Lat Yao District           |
| (4) | Mr. Watana Lertdhamtavi   | Assistant Officer of Lat Yao District |

UTHA THANI PROVINCE

- |     |                          |                 |
|-----|--------------------------|-----------------|
| (5) | Mr. Yong Pakdee          | Governor        |
| (6) | Mr. Sangad Chan-Chanchoy | Vice Governor   |
| (7) | Mr. Precha Sirikawin     | Deputy Governor |

C. Supervisory Committee

- |     |                  |                      |   |
|-----|------------------|----------------------|---|
| (1) | Dr. H. Nakamichi | Leader               | Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries          |
| (2) | Mr. M. Kameda    | Irrigation/ Drainage | Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries          |
| (3) | Mr. Y. Kinoshita | Agriculture/ Soil    | Thokai Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries |
| (4) | Mr. T. Fujinuma  | Economy              | Loan Department I, The Overseas Economic Cooperation Fund (Japan)                                   |
| (5) | Mr. H. Arai      | Coordinator          | Technical Affairs Division, Japan International Cooperation Agency                                  |

D. Study Team

- |      |                 |  |
|------|-----------------|--|
| (1)  | Mr. T. Sakamoto | Team Leader                                |
| (2)  | Mr. T. Yamazaki | Agronomist/Agro-Economist (Co-Team Leader) |
| (3)  | Mr. I. Akizuki  | Irrigation and Drainage Engineer           |
| (4)  | Mr. T. Ohori    | Dam Engineer                               |
| (5)  | Mr. H. Tsuji    | Hydrologist                                |
| (6)  | Mr. H. Isogai   | Soil Mechanical Engineer                   |
| (7)  | Mr. M. Okamoto  | Geo-ogist                                  |
| (8)  | Mr. N. Ariga    | Pedologist                                 |
| (9)  | Mr. S. Azegami  | Design Engineer                            |
| (10) | Mr. M. Masaki   | Irrigation and Drainage Engineer           |
| (11) | Mr. Y. Yukawa   | Construction Planner                       |
| (12) | Mr. H. Sato     | Hydropower Engineer                        |
| (13) | Mr. J. Watanabe | Environmental Specialist                   |
| (14) | Mr. M. Sekine   | Environmental Specialist                   |
| (15) | Mr. H. Aoki     | Environmental Specialist                   |

MINUTES OF MEETING  
FOR  
DRAFT FINAL REPORT

ON  
FEASIBILITY STUDY

FOR

THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT

1. Date : January 9, 1986
2. Time : 14:00 - 15:30 p.m.
3. Place : RID Conference Room No.300
4. Attendants : See Attached List

In accordance with the "Scope of Work for Feasibility Study on the Sakae Krang River Basin Irrigation Project" agreed on July 6, 1984 between the Royal Irrigation Department (RID) and the Japan International Cooperation Agency (JICA), the JICA Study Team (Team) has submitted 50 copies of "Draft Final Report" on December 1985 and the meeting was held for discussion on the said Report.

At the request from the chairman, Dr. Boonyok Vadhanaphuti, Director of Project Planning Division, RID, Mr. T. Sakamoto, the Team Leader made a brief explanation on the draft final report and various discussions were made between RID representative and Team.

The followings were mutually agreed through discussions:

- (1) The secondary benefits of the project will be presented in the form of table in the summary.
- (2) The annual escalation rate for price contingency in the financial cost estimation will be examined by using additional data provided by RID.
- (3) The unit price of agricultural input and output will be examined by using the latest data on IBRD Commodity Price Projection.
- (4) Official Comments from RID on the draft final report will be submitted to JICA Bangkok Office by the end of January 1986.

January 14, 1986

Chari Tulayanond

Mr. Chari Tulayanond  
Deputy Director General  
for Construction,  
Royal Irrigation Department  
Ministry of Agriculture  
and Cooperatives

H. Nakamichi

Dr. Hiroshi Nakamichi  
Chairman of Supervisory  
Committee, Japan International  
Cooperation Agency

T. Sakamoto

Mr. Tadashi Sakamoto  
Leader of JICA Study Team

## Name of Attendants

## Division

R I D

- |                                |   |
|--------------------------------|---|
| 1. Dr. Boonyok Vadhanaphuti    | Director of Project Planning Division               |
| 2. Mr. Jumsak Tejasen          | Director of Research & Laboratory Division          |
| 3. Mr. Maitri Poolsup          | Acting for Director of Design Division              |
| 4. Mr. Vira Poomvises          | Director of Geo-technic Division                    |
| 5. Mr. Danai Triyadhen         | Chief of Land Classification Branch                 |
| 6. Mr. Taweechai Mackaman      | Director of Hydrology Division                      |
| 7. Mr. Scmkiat Subhadhadaphong | Geology Survey Branch                               |
| 8. Mr. Virat Khao-Uppatum      | Water Operation Branch, O & M Division              |
| 9. Mr. Sompoch Pimonpun        | Acting for Director of Topographic Survey Division  |
| 10. Mr. Preecha Chotesangasa   | Topographical Survey Division                       |
| 11. Mr. Traibhun Mekjaroon     | Environmental Impact Assessment Section             |
| 12. Mr. Surasak Sriksirin      | Regional Irrigation Office 7                        |
| 13. Mr. Chalernporn Phirunsarn | Regional Irrigation Office 7                        |
| 14. Mr. Vudhichai Chullakesa   | Sub-Division 3, Project Planning Division           |
| 15. Mr. Chaiporn Korprapun     | Sub-Division 2, Project Planning Division           |
| 16. Ms. Supha Sing-Intara      | Chief of Economic Branch, Project Planning Division |
| 17. Mr. Osot Charnvej          | Agronomist, O&M Division                            |
| 18. Mr. Jumvoen Panitying      | Chief of Program Branch, Program & Budget Division  |
| 19. Mr. Obeua Varatorn         | Design Division                                     |
| 20. Mr. Jomsak Boonprajvab     | Project Planning Division                           |
| 21. Mr. Suwit Thanopanuwat     | Sub-Division 1, Project Planning Division           |
| 22. Mr. Anan Phoonthawee       | Sub-Division, 1, Project Planning Division          |

JICA Study Team

- |                           |  |
|---------------------------|--|
| 1. Mr. Tadashi Sakamoto   | Team Leader                                |
| 2. Mr. Takayoshi Yamazaki | Agronomist/Agro-Economist (Co-Team Leader) |
| 3. Mr. Tadashi Ohori      | Dam Engineer                               |

MINUTES OF MEETING  
FOR  
INTERIM REPORT  
ON  
FEASIBILITY STUDY  
FOR  
THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT

1. Date : September 25, 1985
2. Time : 9:30 - 11:50 a.m.
3. Place : RID Conference Room
4. Attendants : See attached list
5. Summary of Discussion :

In accordance with the "Scope of Work for the Feasibility Study on the Sakae Krang River Basin Irrigation Project" agreed on July 6, 1984 between the Japan International Cooperation Agency (JICA) and the Royal Irrigation Department (RID), the JICA Study Team (Team) submitted to RID fifty (50) copies of "Interim Report" on September 19, 1985 and the meeting was held today for discussion on the said Interim Report.

At the request from the chairman, Mr. Suthep Tingsabhat, Chief Engineer for Civil Engineering, RID, Mr. T. Sakamoto, the Team Leader made a brief explanation on the Interim Report using overhead projector, and various discussions were made between RID attendants and Team.

The followings were mutually understood through discussions :

- (1) The proposed Mae Wong Irrigation Scheme should aim at covering the potential maximum irrigation area of 291,900 rai (46,700 ha) under the maximum exploitation of water resources. Dry season cropping should be considered as a secondary importance in order to expand the irrigation area in the wet season.
- (2) More detailed studies, particularly for environmental aspects and stagewise implementation plan, would be carried out by the Team in Japan, and the study results would be incorporated into the



Draft Final Report which would be submitted to RID by the mid-December, 1985.

- (3) The stagewise implementation would be studied on the proposed definite plan.

September 26, 1985

*Suthep Tingsabhat*

Mr. Suthep Tingsabhat  
Chief Engineer for  
Civil Engineering  
Royal Irrigation Department

*T. Sakamoto*

Mr. Tadashi SAKAMOTO  
Leader of JICA  
Study Team for the  
Irrigation Project

## LIST OF ATTENDANTS

### RID

1.	Mr. Suthep Tingsabhat	Chief Engineer for Civil Engineering
2.	Mr. Taweechai Mackaman	Director of Hydrology Division
3.	Mr. Arom Khumkomkul	Director of Program & Budget Division
4.	Mr. Prasaat Chuntronyom	Director of Region 7
5.	Mr. Vira Poomvises	Director of Geo-technical Division
6.	Mr. Jumsak Jejasen	Director of Research and Lab, Division
7.	Ms. Supha Sing-intara	Chief of Economic Branch, P.P.D.
8.	Mr. Thribhun Mekuaroom	Chief of Environmental Branch, P.P.D.
9.	Mr. Prasert Milintangul	Chief of Research & Applied Hydrology Branch
10.	Mr. Osot Charnvej	Agronomist, O/M Division
11.	Mr. Maitri Poolsup	Design Division
12.	Mr. Chalemporn Phirunsarn	Region 7
13.	Mr. Roungrit Ammawat	Chief of Engineer, Dam Design Sub-Division
14.	Mr. Preecha Chotesangasa	Survey Division
15.	Mr. Suttiphong Koonthong	Program & Budget Division
16.	Mr. Sompoch Pihonpun	Survey Division
17.	Mr. Chongrak Isarangkura	Chief of Sub-project Planning Division
18.	Mr. Vudhichai Chullakesa	Project Planning Division
19.	Mr. Somsak Boonprajuab	Project Planning Division
20.	Mr. Suwit Thanapanuwat	Project Planning Division
21.	Mr. Prateep Kancheralarb	Project Planning Division
22.	Mr. Anan Phoonthawee	Project Planning Division
23.	Mr. Toshiki Saito	Colombo Plan Expert (JICA), Project Planning Division
24.	Mr. Fumio Ideda	Colombo Plan Expert (JICA), Design Division

### JICA STUDY TEAM

1.	Mr. Tadashi Sakamoto	Team Leader
2.	Mr. Takayashi Yamazaki	Co-Leader
3.	Mr. Isao Akizuki	Irrigation Engineer
4.	Mr. Tadashi Ohori	Dam Engineer
5.	Mr. Naoki Ariga	Pedologist
6.	Mr. Shigeharu Azegami	Structural Design Engineer
7.	Mr. Manabu Masaki	Irrigation/Drainage Design Engineer
8.	Mr. Yoshimitsu Yukawa	Construction Planning Engineer

MINUTES OF MEETING  
FOR  
PLAN OF OPERATION  
ON  
FEASIBILITY STUDY  
FOR  
THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT

1. Date : July 9, 1985
2. Time : 9:00 - 11.30 a.m.
3. Place : RID Conference Room
4. Attendants : See Attached List
5. Summary of Discussion

In accordance with the "Scope of Work for the Feasibility Study on the Sakae Krang River Basin Irrigation Project" agreed on July 6, 1984 between the Japan International Cooperation Agency (JICA) and the Royal Irrigation Department (RID), the JICA Study Team (Team) has submitted 20 copies of "Plan of Operation for the Feasibility Study" and the meeting was held for discussion on the said plan of operation.

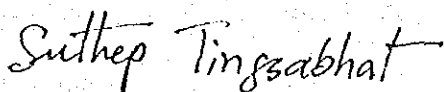
At the request from the chairman, Mr. Suthep Tingsabhat, Chief Engineer of Civil Engineering, RID, Mr. T. Sakamoto, the Team Leader explained the outline of the plan of operation. The chairman asked the attendants to make comments and suggestions, and various discussions were made between RID representatives and Team.

The followings were mutually agreed through discussions:

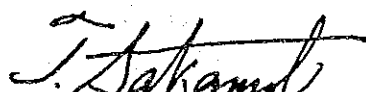
- (1) The feasibility study will be made for the Upper Mae Wong Project.
- (2) The irrigation area envisaged under the Project is to be limited to the downstream area, exclusive of the existing crop lands extending the upstream of the Lower Mae Wong dam site. In the water balance study, however, the water use for the people living in the Lower Mae Wong reservoir area will be considered in the form of allowance.

- (3) The environmental study will be carried out, following the "Plan of Operation" agreed on March 18, 1985. For discussions on detailed methodology and RID's requirement for environmental study, another technical meeting will be arranged after JICA environmental experts will arrive at Bangkok.
- (4) Effective storage of reservoir will be determined from the irrigation development plan. The dam height will be determined based on the alternative study on the hydropower development plan excluding the study of regulating reservoir.
- (5) Secondary and/or intangible benefits accrued from flood mitigation, inland fishery, etc. will be considered in the overall evaluation of the project.
- (6) Institutional aspects for agricultural support services will be studied in the agricultural development plan.

July 18, 1985



Mr. Suthep Tingsabhat  
Chief Engineer of  
Civil Engineering  
Royal Irrigation Department



Mr. Tadashi SAKAMOTO  
Leader of JICA  
Study Team

## Name of Attendants

## Division

RID

1. Mr. Suthep Tingsabhat	Chief Engineer of Civil Engineer RID
2. Dr. Boonyok Vadhanaphuti	Director of Project Planning Division
3. Mr. Sompoch Pimonpun	Director of Topographical Survey Division
4. Mr. Pra. Sart Chuntrniyom	Director of Irrigation Region 7
5. Mr. Jumsak Tejasen	Director of Lab & Research Division
6. Mr. Maitri Poolsup	Design Division
7. Ms. Supojana Rujirakul	Project Planning Division
8. Mr. Suttiiphong Koonthong	Program Coordination & Budget Division
9. Mr. Mongkol Kulyaruen	Project Planning Division
10. Mr. Toshiki Saito	JICA Colombo Plan Expert, P.P.D.
11. Mr. Katsuro Shioda	JICA Colombo Plan Expert, O & M Division
12. Mr. Yoji Ebihara	Coordinator, Irrigation Engineering Center
13. Mr. Snguan Jamprawit	Geotechnical Division
14. Mr. Somkiat Subhadhadapong	Geotechnical Division
15. Mr. Suchin Charoonsak	O & M Agronomist
16. Ms. Supanee Rojanapornsuk	Geotechnical Division
17. Ms. Supha Sing-Intara	Economic Branch, P.P.D.
18. Mr. Preecha Chotesangasa	Survey Division
19. Mr. Suthi Songvoravit	Project Planning Division
20. Dr. Suphon Chirapuntu	Geotechnical Division
21. Mr. Runroj Chumthong	Geotechnical Division
22. Mr. Dacha Luangpitakchumpol	Geotechnical Division
23. Mr. Chongrak Lsarangkura	Project Planning Division
24. Mr. Taweechai Mackaman	Hydrology Division
25. Mr. Traibhun Nekjrson	P.P.D.
26. Mr. Prateep Kanchanalarb	Engineer 4
27. Mr. Somsak Boonprajuab	P.P.D. Engineer
28. Mr. Anan Poonthawee	P.P.D. Engineer

JICA Study Team

29. Mr. Tadashi Sakamoto	Team Leader
30. Mr. Takayoshi Yamazaki	Agronomist/Agro-Economist (Co-Team Leader)
31. Mr. Isao Akizuki	Irrigation & Drainage Engineer
32. Mr. Tadashi Ohori	Dam Engineer
33. Mr. Hideo Tsuji	Hydrologist
34. Mr. Naoki Ariga	Pedologist
35. Mr. Manabu Masaki	Irrigation & Drainage Engineer

MINUTES OF THE MEETING  
FOR  
PRE-FEASIBILITY REPORT  
ON  
THE SEKAE KRANG RIVER BASIN IRRIGATION PROJECT

Date : March 18, 1985  
Time : 13.30 - 15.00  
Place : RID Conference Room No. 300  
Attendance : Attached List

In accordance with "SCOPE OF WORK FOR FEASIBILITY STUDY ON THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT IN THE KINGDOM OF THAILAND" agreed on July 6, 1984 between the Japan International Cooperation Agency (JICA) and the Royal Irrigation Department (RID), JICA has submitted Fifty (50) copies of Pre-Feasibility Report prepared by the Study Team (the Team) and the meeting was held for discussion on the said report.

Both sides have mutually agreed as follows :

1. Explanation on the Pre-Feasibility Report was made by the Team and it was generally accepted by RID.
2. The first priority project was recommended by the Team to be the Upper Mae Wong Project and it was agreed by RID attendance.
3. The RID explained that the additional surveys required for the Feasibility Study were on progress and the expected completion date will be informed to the Team by the end of March.
4. Feasibility Study on the selected first priority project will be commenced as soon as after the completion of the required additional surveys.

5. Plan of operation for environmental study submitted by the Team as per attached, was accepted by RID.

*Suthep Tingsabhat,*

Mr. Suthep Tingsabhat  
Chief Engineer for Civil  
Engineering  
Royal Irrigation Department

*T. Sakamoto*

Mr. Tadashi SAKAMOTO  
Leader of JICA Study Team

March 14, 1985

PLAN OF OPERATION FOR ENVIRONMENTAL STUDY  
ON SAKAE KRANG RIVER BASIN IRRIGATION PROJECT

(DRAFT)

JICA STUDY TEAM FOR  
SAKAE KRANG RIVER BASIN  
IRRIGATION PROJECT

1. General

The environmental study will be made as a part of the feasibility study on the first priority project, basically following the general guideline given by NEB.

2. Study Area

The study area covers the Mae Wong river basin of about 1,500 km<sup>2</sup> which may receive more or less environmental impacts by development of dam and irrigation under the first priority project.

3. Approach to the Study

The environmental study required by NEB comprises manifold items of environmental impacts evaluations. They are classified into three groups as listed in the attached table.

- 1) For the items already included in the original scope of the feasibility study, additional data collection will be made by JICA study team in close cooperation with RID and the study results in those fields obtained through the feasibility study will be fully utilized for the environmental study.
- 2) For the remaining items which are not included in the original scope, additional survey and data collection will be required. RID will be requested to make such survey and data collection to the extent that RID considers necessary.



- 3) JICA study team will assist RID to make the additional surveys and data collection in the following fields:
  - a. Resettlement
  - b. Aquaculture
  - c. Ecological resources including fisheries, aquatic biology, terrestrial wild life and forests
- 4) JICA study team will make the required study on the basis of the data and information to be collected in the above manner, and will prepare a report on the environmental impacts evaluations as a part of the feasibility study.
- 5) The environmental study will be made, in close coordination with RID, making the best possible use of the experience acquired in the similar projects of RID.

#### 4. Undertaking of RID

To facilitate smooth performance of the environmental study, RID will be requested:

- 1) to specify its requirement for environmental study through its own re-examination of the NEB guideline,
- 2) to make additional field survey and data collection and complete them by the end of May, 1985, and
- 3) to assign full-time counterpart experts who will secure the closest coordination between the study team and RID, and also fulfill the study requirements indicated in the attached table as the RID contribution.

Environmental Resources		Included Already in F/S	Proposed Additional Study Item in F/S	RID Contri- bution
Physical Resources	Surface Water Hydrology	○		
	Surface Water Quality	○		
	Ground Water Hydrology	○		
	Ground Water Quality	○		
	Soils	○		
	Geology/Seismology	○		
	Erosion/Sedimentation	○		
	Climate	○		
Ecological Resources	Fisheries		○	
	Aquatic Biology		○	
	Terrestrial Wildlife		○	
	Forests		○	
Human Use Values	Agriculture/Irrigation (if applicable)	○		
	Aquaculture		○	
	Water Supply	○		
	Recreation			○
	Power (if applicable)	○		
	Flood Control	○		
	Dedicated Area Uses	○		
	Industry			○
	Agri-Industry	○		
	Mineral Development			○
	Highways/Railways			○
Land Use	○			
Quality of Life Values	Socio-Economic	○		
	Resettlement	○	○	
	Cultural/Historical			○
	Aesthetic			○
	Archaeological			○
	Public Health			○
	Nutrition			○

Name of Attendants	Division
1. Mr. Suthep Thingsabhat	Chief Engineer for Civil Engineering
2. Dr. Boonyok Vadhanaphuti	Director of Project Planning Div.
3. Mr. Kaiwan Devahastin	Director of Program Coordination and Budget Div.
4. Mr. Chongrak Isarangkura	P.P.D.
5. Mr. Amphai Muthitacharoen	Geotechnical Div.
6. Mr. Maitri Poolsup	Design Div.
7. Mr. Jumsak Tejasen	Director of Research and Lab. Div.
8. Mr. Virat Khao-uppatum	O & M Div.
9. Mr. Lersak Rewtarkulpaiboon	O & M Div.
10. Mr. Chalernporn Phirunsarn	Regional 7
11. Mr. Sa-ngad Onnum	P.P.D.
12. Mr. Osot Charnvej	Agronomist, O & M Div.
13. Mr. Supojana Rujirakul	P.P.D.
14. Mr. Toshiki SAITO	Attached P.P.D. (JICA)
15. Mr. Sompoch Pimonpun	Topographical Div.
16. Mr. Taweechai Machaman	Hydrology Div.
17. Mr. Tadashi OHORI	Dam Engineer
18. Mr. Tadashi SAKAMOTO	Team Leader
19. Mr. Norio KUNIYASU	Technical Affairs Div., JICA
20. Mr. Masahiko KAMEDA	Chief Irrigation Engineer MAFF
21. Dr. Nakamichi HIROSHI	Chief Irrigation Engineer MAFF
22. Dr. Kazuji UNO	Geotechnic Div.
23. Mr. Suvit Thanopanuwat	P.P.D.
24. Mr. Somsak Boonprajuab	P.P.D.
25. Mr. Anan Poontawee	P.P.D.

MINUTES OF MEETING  
FOR  
DRAFT PROGRESS REPORT  
ON  
FEASIBILITY STUDY  
FOR  
THE SAKAE KRANG RIVER BASIN IRRIGATION PROJECT

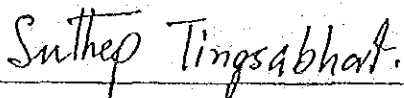
1. Date : December 13, 1984
2. Time : 2:00 - 3:30 P.M.
3. Place : RID Conference Room
4. Attendants : See Attached List
5. Summary of Discussion

The Chairman, Mr. Suthep Tingsabhat, Chief Engineer of Civil Engineering RID introduced Dr. Hiroshi Nakamichi, Chairman of JICA advisory committee and Mr. Tadashi Sakamoto, Leader of JICA Study Team, to the attendants. Dr. H. Nakamichi explained the present work progress and made a remark that the study is now in progress as scheduled.

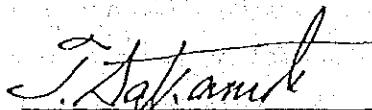
Mr. T. Sakamoto explained the outline of the progress report, following the summary of the draft report and supplementary note No. 1 and No. 2 which dealt with results of reservoir operation study and selection of high priority projects. He pointed out that the high priority projects should be selected through the discussion as the study team would leave for Japan to carry out the pre-feasibility study on high priority projects. The Chairman asked the attendants to make comments and suggestions on the report and notes, and several discussions were made between RID representatives and JICA study team. The followings were mutually confirmed through discussions:

- (1) High priority projects would be Upper Mae Wong, Lower Mae Wong and Khlong Pho projects.
- (2) Detailed technical discussions will be made for confirmation on the above selection of high priority projects. Selection of the first priority project will also be discussed. RID would make an arrangement of such technical meetings.

- (3) JICA study team agreed, on the request from RID, that the following alternative studies would be made in Part B programme:
- a. water balance studies for different cropping intensities, and
  - b. project alternative studies for irrigation development under two different development strategies; i.e.,
    - i. irrigation development with moderate investment on existing facilities for more effective use of water, and
    - ii. irrigation development with minor investment on existing facilities for minimizing the project costs.
- (4) For irrigation development, the first priority should be given to the existing irrigation areas.
- (5) Groundwater exploitation should be considered for future stage of development.



Suthep Tingsabhat  
Chief Engineer of Civil Engineering  
Royal Irrigation Department



Tadashi SAKAMOTO  
Leader of JICA  
Study Team

## LIST OF ATTENDANTS

- |     |                            |  |
|-----|----------------------------|--|
| 1.  | Mr. Suthep Tingsabhat      | Chief Engineer of Civil Engineering            |
| 2.  | Dr. Boonyok Wadhanaphuti   | Director, Project Planning Division            |
| 3.  | Mr. Shoombhol Chaveesuk    | Director of Design Division                    |
| 4.  | Mr. Ruongrit Ammawat       | Design Division                                |
| 5.  | Mrs. Nophakhun Somsin      | Hydrology Division                             |
| 6.  | Mr. Paweechai Mackaman     | Hydrology Division                             |
| 7.  | Mr. Klaus Lindner          | Advisor, Project Planning Division             |
| 8.  | Mr. Toshiki Saito          | Colombo Plan Expert, Project Planning Division |
| 9.  | Mr. Katsuro Shioda         | Colombo Plan Expert, O & M Division            |
| 10. | Mr. Fumio Ikeda            | Colombo Plan Expert, Design Division           |
| 11. | Mr. Kaiwan Devahasdin      | Program Co-ordination & Budget Division        |
| 12. | Mr. Virat Khao-Uppatum     | O & M Division                                 |
| 13. | Mr. Osot Charnvej          | Agronomist, O & M Division                     |
| 14. | Mr. Vira Poomvises         | Geo-technic Division                           |
| 15. | Mr. Maitri Poolsup         | Civil Engineer, Design Division                |
| 16. | Mr. Jumsak Tejasen         | Director, Research & Laboratory Division       |
| 17. | Mr. Supote Rujirakul       | Engineer, Project Planning Division            |
| 18. | Mr. Chalernporh Phirunsarn | Civil Engineer, Region 7                       |
| 19. | Mr. Sompoth Pimonpun       | Topographical Survey                           |
| 20. | Mr. Preecha Chotesangasa   | Topographical Survey                           |
| 21. | Mr. Chaiyuth Suksri        | Project Planning Division                      |
| 22. | Mr. Suwit Thanopannwat     | Project Planning Division                      |
| 23. | Dr. Nakamichi Horoshi      | Chief Irrigation Engineer, MAFF                |
| 24. | Mr. Norio Kuniyasu         | Technical Affairs Division, JICA               |
| 25. | Mr. Tadashi Sakamoto       | Team leader of Sakae Krang F/S team (JICA)     |
| 26. | Mr. Takayoshi Yamazaki     | Member of Sakae Krang F/S team (JICA)          |
| 27. | Mr. Isao Akizuki           | Member of Sakae Krang F/S team (JICA)          |
| 28. | Mr. Tadashi Ohori          | Member of Sakae Krang F/S team (JICA)          |
| 29. | Mr. Naoki Ariga            | Member of Sakae Krang F/S team (JICA)          |
| 30. | Mr. Hideo Sato             | Member of Sakae Krang F/S team (JICA)          |







