

附 属 资 料

資 料 一 1

団長レター (英文)

Irrigation Engineering Center
Samsen, Dusit, Bangkok 10300

March 23, 1989

Mr. Chari Tulayanond
Director General
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Subject : Report of the Japanese Technical Guidance Team for the
Irrigation Engineering Center Project

Dear Sir,

It is my great pleasure to submit to you herewith the report of the Japanese Technical Guidance Team (hereinafter referred to as "the Team") for the Irrigation Engineering Center Project (hereinafter referred to as "the Project") in Thailand, as seen in the attached paper.

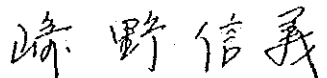
This report involves the results of survey and discussion on the Project's performance over the past four years as well as some impressions and recommendations from the Team.

The Team, organized by the Japan International Cooperation Agency (JICA), visited Thailand from March 15 to March 24, 1989.

The members of the Team are listed in Annex 1. The activities executed by the Team on the schedule are listed in Annex 2.

I would like to take this opportunity to express my sincere appreciation for the warm cooperation rendered to us during our stay in the Kingdom of Thailand.

Yours sincerely,



Nobuyoshi SAKINO

Team Leader

The Japanese Technical Guidance Team
for the Irrigation Engineering Center Project

cc. Mr. Wanchai Sirirattna
Director General
Department of Technical Economic Cooperation

Mr. Roongrueng Chulajata
Deputy Director General for Construction
Royal Irrigation Department

Mr. Kitcha Polpasri
Director of Irrigation Engineering Center

Mr. Kazuo Hirashima
First Secretary
Embassy of Japan

Mr. Tsutomu Saito
Resident Representative
JICA Bangkok Office

Mr. Akinori Masuda
Team Leader
Irrigation Engineering Center

MEMBERS' LIST

ASSIGNMENT	NAME	PRESENT POSITION
Team Leader	Mr. Nobuyoshi SAKINO	Director, Office of Overseas Land Improvement Techniques, Design Division, Construction Dep. Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries
Irrigation	Mr. Katsuro SHIODA	Assistant Director, Conduct Office of Public Corpora- tions (Water Resources Development Public Corp.) General Affairs Division, Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries
Cooperation Planning	Mr. Yukio SUZUKI	Section Chief, International Cooperation Division, International Affairs Department, Economic Affairs Bureau, Ministry of Agriculture, Forestry and Fisheries
Coordinator	Mr. Akihiko IHARA	Staff, Technical Cooperation Division, Agricultural Development Cooperation Department, Japan International Cooperation Agency

DATE	SCHEDULE
March 15 (Wed)	Arrival at Bangkok Arrival (Tokyo ---> Bangkok, CX751)
March 16 (Thr)	Courtesy call to The Royal Irrigation Department The Embassy of Japan JICA Thailand Office
March 17 (Fri)	Meeting with IEC staff and Japanese experts
March 18 (Sat)	Field survey
March 19 (Sun)	Field survey
March 20 (Mon)	Meeting with IEC staff and experts
March 21 (Tue)	Field survey, meeting with IEC staff and experts Courtesy call to DTEC
March 22 (Wed)	Fourth Joint Committee Meeting
March 23 (Thr)	Courtesy call to MOAC Reporting to RID, the Embassy of Japan and JICA
March 24 (Fri)	Leave for Japan (Bangkok ---> Tokyo, TG641)

SUMMARY REPORT
ON THE IRRIGATION ENGINEERING CENTER
BY THE JAPANESE TECHNICAL GUIDANCE TEAM

1. Introduction

With the aim of contributing to agricultural development through the development of irrigation engineering, the Irrigation Engineering Center Project (the Project) was started through the joint cooperation of the Japan International Cooperation Agency (JICA) and the Royal Irrigation Department (RID) for five years from April 1, 1985.

The Record of Discussion (R/D) signed on March 8, 1985 mentioned the scope of cooperation in accordance with the needs of RID. The First Joint Committee Meeting held on February 3, 1986 authorized the Plan of Activities (P/A) as a five-year target of technical cooperation.

IEC consists of four divisions and has five technical fields as follows:

The four divisions :

- 1) General Management Division
- 2) System Engineering Division
- 3) Engineering Development Division
- 4) Research and Laboratory Division

The five technical fields:

- 1) Examination of Criteria
- 2) Hydraulic Model Analysis
- 3) Construction Material Tests and Analysis
- 4) System Development
- 5) Training

2. Scope of Work of Japanese Technical Guidance Team

The Japanese Technical Guidance Team (the Team) has been dispatched to the Project from March 15 to March 24, 1989.

The Team has the following scope of work:

- 1) To monitor the progress of fields of cooperation over the past four years
- 2) To discuss the scope of work in the final year of the Project
- 3) To monitor the progress of the Model Infrastructure Project
- 4) To analyze the Project management aspect
- 5) To grasp how to put the achievements of the Project to practical use after the termination of the Project.

3. Project Progress

3.1 Examination of Criteria

- 1) Examination of planning and design criteria

- (1) Collection and arrangement of existing planning and design criteria

Progress

RID have organized working groups for every item and the working groups are conducting preparation work for planning and design criteria.

Out of 28 items, 19 items covering collection and arrangement work for planning and design criteria have already been completed.

Plan

The collection and arrangement work for the remaining 9 items will be continued.

(2) Examination of criteria

Progress

Out of 28 items, 12 items covering drafts for planning and design criteria have already been prepared, and 10 items covering draft preparation work are ongoing.

Plan

Draft preparation work for the 10 items mentioned above will be continued. Draft preparation work for the remaining 6 items will be conducted.

2) System design for planning and design criteria

(1) Development of design system

Progress

The data base for the safety of existing dams has been conducted as a case study of data base systems. In this fiscal year, a mapping system for irrigation projects has been introduced to the IEC computer system.

Plan

The mapping system introduced this fiscal year will be utilized by the divisions concerned.

(2) System design of technical calculation systems

Progress

The slope stability analysis programs and seismic interpretation program series have been set up as standard technical calculation systems. As advanced technical calculation systems, the Earth Application Program Series and the Structural Application Program Series using the Finite Element Method (FEM) have been introduced for design work of irrigation structures.

In this fiscal year, the seismic interpretation program series mentioned above, monitoring systems and a FEM analysis program using the elastoviscoplastic model have been set up.

Plan

Computer programs mentioned above will be improved when and if necessary.

The Model Infrastructure Project for the study of soft soil foundation which focuses on the stability of excavated canals on soft soil foundation is being carried out. Through this project, investigation and design methods for the facilities on soft soil foundation will be examined, and some of the results obtained from this project will be reflected in criteria preparation work.

Computer-Aided Design programs (CAD) are currently being introduced in order to rationalize and support the planning and design work.

(3) System design of technical information retrieval system

Progress

The first step of engineering administration supporting information system using micrographics has been completed. Lots of microfilm for hydrographs, etc. and microfiche for geotechnical investigations of RID projects were collected using this system.

Plan

Useful data for RID projects will be stored on microfilm and microfiche in ever increasing amounts when they are received from the divisions concerned. It is desirable to utilize them for planning, design and construction work.

3) Conclusions and Comments

(1) Conclusions

- ① The activities mentioned in the Plan of Activities have been conducted as was expected, and the know-how involved in the establishment work for planning and design criteria has been transferred.
- ② The preparation work for the establishment of criteria is evaluated as being of a very high standard. This was achieved by setting up working groups, colloquiums, seminars and brainstorming meetings, all of which were enthusiastically conducted.
- ③ The establishment of improved construction methods on soft soil foundation is one of the most serious technical problems facing RID. Therefore, it is expected that the Model Infrastructure Project will be carried out success-

fully and fruitfully.

(2) Comments

- ① As regards the examination of criteria, the achievements will be remarkable. It is necessary that the results obtained from the foregoing activities should be diffused and applied practically in the field. Consequently, after the termination of the Project, it is necessary to consider that technical cooperation for preparing practical design and construction manuals for project-site engineers will be needed as the next step.
- ② In order to establish design standards and construction methods for irrigation and drainage facilities on soft soil foundation based on the results of the Model Infrastructure Project, it is desirable to continue the investigation and analysis work after the termination of the IEC project.

3.2 Hydraulic Model Analysis

- 1) Case study of hydraulic tests and simulation analysis for design

(1) Basic hydraulic model tests

Progress

Basic technology transfer was almost completed through the use of basic hydraulic model test facilities provided in 1988.

Plan

None

(2) The Phrakanong regulator pumping station

Progress

The regulator station was handed over to another government agency. The activity was cancelled.

Plan

None

(3) Canals related to the Phrakanong regulator

Progress

Model tests have been carried out to compare the calculated hydraulic phenomenon with the actual one and to identify the coefficient of roughness in the canals. In 1988, these were carried out in non-uniform cross-sectional canals.

Plan

None

(4) Dam spillway

Progress

Technical recommendations were made covering design aspects based on the results of a model test of the Mae Kuang dam.

Plan

None

(5) Scouring and sedimentation around diversion works

Progress

The scope of the work was decided.

Plan

Basic technology transfer will be done through field study of projects in Thailand and the introduction of technical experience from Japan.

(6) Other hydraulic tests

Progress

The model tests of the Mae Song dam spillway and qualitative analysis have almost been completed.

Plan

Based on the test results, technical recommendations will be made after quantitative analysis.

2) Simulation analysis through computer utilization

(1) Phrakanong regulator at upper and lower stream model

Progress

Adding a lower model, the upper simulation model by unsteady flow was completed in 1988.

Plan

None

(2) Chao Phraya River at lower stream model

Progress

Technology transfer using unsteady flow was completed in order to apply the simulation model for practical purposes.

Plan

None

(3) Irrigation canals for proper water distribution

Progress

The case study area has already been selected and basic data has been being collected for the study.

Plan

Basic methods of approach and simulation programs will be developed through the case study.

(4) Others simulation models

Progress

The case study of the Petchaburi project has been completed. The case study of Song Phi-Nong has just started. Two case studies are aimed at applying mathematical simulation models for practical purposes.

Plan

Through the case study of the Song Phi-Nong project, the technology of how to measure hydraulic phenomena and how to develop simulation programs which are suitable for irrigation canal systems will be transferred.

3) Conclusions and Comments

(1) Conclusions

The activities in the Plan of Activities have been running smoothly

- ① The testing results of the hydraulic model tests were planned to improve design works and they achieved their intended purposes.
- ② The basic technology on hydraulic simulation model was transferred effectively as a new field.
- ③ The technical results of hydraulic model tests and simulation models were used as the basis for training courses and are expected to be diffused to irrigation engineers.
- ④ The importance of data collection and arrangement was fully realized through hydraulic simulation analysis.

(2) Comments

- ① Of all the activities, technology transfer on the activity of "Irrigation canal for proper water distribution" is essential from the water management point of view.
- ② It is desirable to make the best use of basic technology on hydraulic and simulation model developed by the Project in order to contribute to the executing agencies in RID from theoretical and technical viewpoints.

3.3 Construction Material Tests and Analysis

1) Soil tests and analysis

(1) Case study of the Tapsalao dam and other fill dams.

Progress

The case study has been completed. The FEM analysis used for the case study is being applied to other dams.

Plan

The case study will be conducted in order to set up a method for using monitoring equipment through the ongoing Model Infrastructure Project.

(2) Case study of soft soil foundation

Progress

Soil tests and geotechnical investigations have been conducted to decide soil properties necessary for canal design on soft soil foundation. Soil tests on soil cement and sand were done for improvement of the soft soil foundation.

Plan

Soil tests and geotechnical investigation works will be continued through the Model Infrastructure Project to set up a system of soil tests, geotechnical investigations and construction management.

(3) Soil Test Method

Progress

Technology transfer on the operation of soil testing equipment has been completed. The auto-measuring systems for the main soil tests are being improved.

Plan

The auto-measuring systems will be completed and soil testing methods will be standardized.

(4) Test data provision for design criteria

Progress

Soil data about Bangkok clay have been being collected through the Model Infrastructure Project.

Plan

Soil data collected will be analyzed to study the soil properties of Bangkok clay for design criteria through the Model Infrastructure Project.

2) Concrete and Construction Material Tests and Analysis

(1) Case study of concrete aggregation

Progress

The case study on correlation of compression strength between cylindrical and cubic specimens has been finished.

Plan

None

(2) Case study on concrete non-destructive tests

Progress

Technology transfer on operation of ultrasonic wave non-destructive equipment has been finished.

Plan

Comparison tests between compression test and the above equipment will be continued in order to set up a standard.

(3) Concrete and construction material test method

Progress

Basic technology transfer on concrete tests has been completed.

Plan

A slide set of concrete and cement tests will be provided as training material.

(4) Test data provision for design material

Progress

Testing data of compression tests have been collected from project sites.

Plan

In order to provide data for mixing design of laboratory tests, testing data about concrete mixture at project sites and concrete compression tests will be continually collected.

3) Conclusions and Comments

(1) Conclusions

- ① In line with the Plan of Activities, cooperative activities are being conducted smoothly under the cooperation of the counterparts, and it is expected that the primary aims of the project will be reached by the time of the termination of the Project.
- ② The counterparts's technology level has been improved thanks to the Project's activities. The main activities have now become introduction and study regarding new technology and utilization methods obtained from testing methods.
- ③ The positions of the counterparts in IEC are organized suitably and equipment provided by JICA is used effectively by counterparts. The equipment has also been utilized under the careful supervision of RID staff using the Thai local budget.

(2) Comments

- ① As the case study regarding the soft soil foundation has a lot of essential components which must be solved through cooperative activities, it is considered that a long period of study and analysis is needed in order to complete this case study satisfactorily, particularly in the field of analysing work using the monitored data and in the field of establishment of construction control methods based on the results of analysis.

3.4 System Development

- 1) Case study of system development for technical calculation
- (1) System development of technical information data base system

Progress

As regards the hydrological data base system, two kind of data base system have been developed using Rdb and DSM. The Rainfall Statistical System and the Stream Gauging/Discharge and the Suspended Sediment System have been improved by means of DSM in this fiscal year.

Application programs concerning hydrological works have been converted to be applied to the IEC computer system. And the Huay Luang project and some other irrigation projects have been selected as model projects to carry out hydrological analysis for practical hydrological programs. In this fiscal year IEC and the Hydrology Division have installed hydrological instruments in the Huay Luang project area to collect the necessary data for analysis and preparation of programs, and a Ration Curve Analysis system has been developed.

Hydrological analysis on two basins in the south of Thailand has been carried out.

A model data base (Dam safety data base) has already been developed as an activity of system development of the Technical Information Data Base. Basic data communication programs for personal computers have been developed and three sets of personal computers which were set up at

Regional Offices have been connected with IEC by telephone lines. Furthermore, data communication examinations have already been carried out successfully.

In this fiscal year discussions with regional office engineers were held in order to grasp the necessities and requirements of the data communication system between IEC and Regional Offices.

Plan

Documentation on the Hydrological Data Base will be printed and disseminated.

System development of application programs for the Hydrological Data Base will be carried out through case studies concerning the Huay Lung project and other irrigation projects in Northeast Thailand. The programs which will be developed are as follows.

- Runoff analysis programs
- Water balance programs
- Relevant technical calculation programs

Other activities concerning the Technical Information Data Base and data communication, etc. will also be carried out to improve and make the systems developed more practical.

- (2) System development of technical calculation program library

Progress

A study of existing technical calculation programs was completed by means of summarizing questionnaires sent to all divisions of RID.

Four sets of technical calculation program manuals developed by the Project have been prepared and printed as a program library.

Training of personal computer utilization for engineers from Regional Offices has been carried out.

The documentation method has been improved in accordance with Thai conditions.

Plan

Technical calculation programs developed through the Project's activities will have manuals prepared and printed for them.

As regards personal computers, a training plan will be prepared including curriculums of training courses.

Preparation of documents will go ahead for programs that prove useful and are in frequent use.

(3) Examination of other technical supporting systems

Progress

A new draft of system management rules has been prepared based on the RID/IEC Computer System Guide prepared last year.

Plan

The system management rules will be checked and improved through actual use.

2) Conclusions and comments

(1) Conclusions

- ① Activities mentioned in the Plan of Activities have been satisfactorily carried out and the necessary technology has also been transferred to counterparts. It is expected that planned activities will be completed by the termination of the project.
- ② Equipment and software which were provided by JICA are used well by counterparts, and they have also been maintained in good condition using the Thai local budget.
- ③ The counterparts' technology level has been raised through the Project's activities.

(2) Comments

- ① As system engineering technology is developing rapidly and many divisions in RID wish to improve their job performance by computers, the Thai side has strongly requested new technical cooperation in this field.
- ② From now on not only rather simple system development but also systematization of jobs, which can be called establishment of systems, should be considered as being the purpose of activities in this field. And each system, which is a component of a total system, should be developed at the same time in order to achieve complete systematization.

3.5 Training

1) Guidance and advice for technical training

Progress

Training activities in the Project are aimed at raising the technical level of middle grade engineers and diffusing irrigation engineering technology so that it is transferred to counterparts more widely. The training program was divided into three categories, namely technical seminars, management training and computer training.

This was the second year since JICA initiated the Middle Grade Engineer's Program in 1987. JICA provided the training budget of 10 Million Yen in Japanese F/Y 1988. RID allocated a training budget of 400,000 Baht in Thai F/Y 1988. They were 12 technical seminar courses, 3 management training courses and 6 computer training courses.

Plan

The total number of training courses in the fields of technical seminars, management training and computer training will be reduced because this is the final year of the Project.

2) Conclusions and Comments

(1) Conclusions

- ① The training courses sponsored by JICA started in 1987. Financial assistance was useful in enabling participation from regional areas and for grading up middle grade engineers in RID.

- ② It was appreciated as a sign of RID's counter effort that it allocated a counter budget of 400,000 Baht for the Training Courses in 1988.

(2) Comments

- ① It is desirable to allocate the training budget from JICA at an early time because 1989 is the final year of the Project.
- ② The counter budget supplied by RID is required to be allocated continuously.
- ③ In order to diffuse the developed technology more widely, it is desirable that text books published by the Project are translated from English to Thai.

4. Conclusions

With the Project in its final year, the Team went on survey and held discussions on the Project's performance over the past four years with RID and Japanese Experts and also considered plans for the one remaining year. Consequently, the Team was able to gain various impressions and offer recommendations, as follows.

- 1) The budgetary allocation by the Thai side and the effective organization of counterparts in the Project are gratefully acknowledged and appreciated by the Team. Such a situation is vital for the smooth implementation of the Project and for project activities to be carried out successfully in the final year.

- 2) The Team further appreciates the efforts made by RID which is guided and lead by the Board of Directors.
- 3) The Team is impressed that the equipment provided by JICA for the purpose of transfer of technology has been maintained in good condition and has been used well.
- 4) The implementation and progress of activities is also running smoothly in accordance with the Plan of Activities. The activities remaining in each field will be completed within the term of the Project.
- 5) It is hoped that RID's budgetary allocation for training will cover the decrease in the budget provided by JICA which is in accordance with JICA regulations.
- 6) It is desirable that the achievements of the Project will be spread for wider practical application.

5. Request from RID

- 1) RID strongly requested the Team in order that it could offer technical assistance concerning IEC Phase II and had already set up a working group for the planning of technical cooperation in IEC phase II. The Team understood the background of the request and RID's intentions for IEC Phase II. In other words, the Team understood that it was important to provide technical assistance from the points of effective utilization and further diffusion of that which has been achieved by IEC. The Team also recognized the importance of providing technical assistance in the field of water management.
- 2) The principle of technical cooperation from the Government of Japan is on a request basis. Consequently, it is essential that the Thai government requests the IEC Phase II Project through the official diplomatic channel.
- 3) The Team will be sure to convey RID's intention for IEC phase II to the authorities concerned in the Government of Japan.

資 料 一 2

第4回Joint Committee要約

Shorthand Record of Agenda 4
at
The Fourth Joint Committee Meeting

AGENDA 4: Project Type Technical Cooperation for IEC Phase II

4.1 Dr. Boonyok Vadanaphuti, Special Expert for Water Resources Planning and Development explains the details.

Dr. Boonyok reported the past four-year activities, performance and achievements to the meeting. He said that the activities of IEC were mainly on design criteria, computer and research & laboratory aspects, but not focused on operation and maintenance. Therefore, he suggested to emphasize the Water Management aspect in IEC Phase II. He also mentioned the scope of work of Technical Cooperation for IEC Phase II including 6 sections as in the distributed document.

He explained the official procedures of request that Thai side had to ask for approval from DTEC first and then request JICA to support this matter.

After that Thai representatives had inner discussion about this issue as concluded hereunder.

- Dr. Boonyok asked Thai representatives how to accelerate IEC Phase II to be passed official channel as soon as possible.
- Mr. Achari, representative of DTEC, informed the meeting that the request for IEC Phase II was already passed Thai official steps and was being to be submitted to the Embassy of Japan within next week. He also asked Japanese side to make an effort for this matter to come up for discussion at this year Annual Consultation Meeting to be held in May.
- Mr. Suthi, Deputy Director of IEC, explained how to connect the overlap period between IEC Phase I and II. He suggested that RID should emphasize on water management aspect which became more important instead of structure construction.

4.2 Mr. K. MATSUDO, the RID expert gave some comments concerning this matter.

Referred to the time schedule of the Project, he thought that IEC Phase I and II should be carried out continuously, starting by April 1990.

He said that the necessary measures for Phase II Project should be started as soon as possible. He said that it is desirable that the request of IEC Phase II will be a topic of discussion at annual session to be held this May or June.

4.3 The Chairman asked any advices from Thai representatives of the authorities concerned as follows.

- Miss Pinida, representative of Budget Bureau, agreed with the requested project regarding water management point of view. She said that it was in accordance with Thai government policy emphasizing on water resources and river basin development. As for the counterpart budget, she would like the Board to prepare the Tentative Plan of Activities about IEC Phase II so that the Budget Bureau would allocate the budget as required.
- Mr. Thavatchai, representative of MOAC, would like to ask Japanese side to take this matter into consideration before the coming of the Mission.

Some comments about the budget were given by Thai representatives as follows.

- Dr. Boonyok said that to implement IEC Phase II, counterpart budget would be increased owing to more activities to be carried out by Thai counterparts. He added that Thai side would review the Plan of Activities before the next meeting in May so that the Budget Bureau would allocate local budget sufficiently.
- Mr. Kitcha said that the present problem of IEC was about manpower. He suggested that RID should discuss with the Civil Service Commission about the condition of IEC staff. And so the problem about budget would be overcome.

In addition, the Japanese side expressed their opinions.

- Mr. N. SAKINO, Leader of Technical Guidance Team, told that he recognized the importance of providing technical assistance concerning technical utilization and further diffusion achieved by IEC and water management aspect. He is sure to convey RID's intention about this matter to the authorities concerned in the Japanese Government.
- Mr. K. HIRASHIMA, First Secretary, Embassy of Japan, said that he already got some information about this topic. He made sure that he will report Japanese side the probability of IEC Phase II as soon as possible.
- Mr. H. MIYAMOTO, Representative of JICA, told that the authorities concerned of JICA had discussed with the team leader of IEC Project many times. Regarding the tendency of IEC Phase II, he would like the Thai side to put the request in the official channel as soon as possible.

- Mr. A. KAWAMATA, Colombo Plan Expert, MOAC, would like to make a clear understanding that the request for IEC Phase II is going to be discussed in this year (1989) or next year (1990) annual session. He worried that the request cannot put through all the official channel at the termination of IEC Project next March.
- Mr. Achari replied that the request for IEC Phase II is included in the requesting list for 1990. Normally, the request would be discussed at the next year annual session. However, it would be considered as a special session for this year annual consultation.

資 料 一 3

活動計画達成度表

凡例： ○既に完了 △概ね完了見込み
 ○完了見込み ×未完了

協分分野・内容 R/D, TIS, P/A	達成度・活動項目 (1889年 3月)	達成度・活動項目 (1890年 3月)	備考
1. 基準の検討 1) 計画・設計基準の検討 (1) 既存の計画・設計基準の収集・整理 (2) 基準の検討 ①調査業務 a. 地形測量 b. 地質調査 c. 建設材料調査 d. 水文調査 e. 土地分級調査 f. 水利用 g. 実験 (試験) h. かんがい地における塩分対策 ②事業計画指針 ③事業報告指針 a. 詳細設計書 b. 実施設計書 c. 事業実施報告書 d. 事業完了報告書 ④設計基準及びマニュアル	28工種中19工種について資料収集は完了した。 原案完了 " " " " (国内支援委員会査読済) 資料未収集 " " " " " " 原案完了 原案部分完了 " " 原案完了 " " 15工種中 原案完了工種： 5工種 "部分完了工種： 5工種 未作成： 5工種	残りの9工種につき資料の収集を行う。 必要に応じ国内支援委員会により査読を行う。 資料収集を行い、基準の検討を進める。 " " " " " " 若干修正の後、国内支援委員会による査読を行う。 残りの部分を完成させる。 " " 完了 " " 部分完了工種の完成を目指す。未作成工種については資料収集を行い完成を目指す。	90 ・ 3 ○ ○ ○ ○ ○ △ △ △ △ ○ ○ ○ ○ △

協力分野・内容 R/D, IIS, P/A	達成度・活動項目 (1889年 3月)	達成度・活動項目 (1990年 3月)	備考
⑤施工マニュアル ⑥維持管理マニュアル ⑦既存ダム安全管理 2) 計画・設計基準のためのシステム設計 (1) 設計システム開発 ①技術データベースシステム構築のためのデータベース ②情報加工及びサービスシステムの利用 (2) 技術計算システムのためのシステム設計 ①貯水池、頭首工、送排水施設、その他のかんがい施設等標準(基準)的技術計算システムの構築 (F. E. M. 及び CADシステムを含む)	部分完了 原案完了 原案完了 ケーススタディとして既存ダムの安全管理のためのデータベースを完成。 かんがい事業のためのマッピングシステムを導入中である。	完成を目指す。 完了 国内支援委員会による査読を行う。 マッピングシステムの活用を図る。このため必要に応じスタッフトレーニングを行う。 左記計算システムの活用を図る。 ・左記計算システムの活用を図る。 〃 ・モデルインフラ整備事業を通じ、軟弱地盤上に建設する構造物の調査、設計手法を検討する。 ・モデルインフラ事業の成果の一部を標準化することを検討する。	90 ・ 3 △ ○ ○ ○ ○ ○ ○

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1889年3月)	達成度・活動項目 (1990年3月)	備考
3) 技術情報検索システムに対するシステム設計 ① マイクロフィリング及びコンピュータを利用した技術管理支援情報システム構築のためのケーススタディ	<ul style="list-style-type: none"> ・ マイクログラフィックスのシステムを完了した。 ・ 多量の技術情報をマイクロフィルム及びマイクローフィッシュ等に蓄積した。 	左記システムの利活用を図る。 △	90 ・ 3

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1989年 3月)	達成度・活動項目 (1990年 3月)	備考
<p>2. 水理モデル解析</p> <p>1. 水理模型実験とシミュレーション解析のケース・スタディ</p> <p>(1) 水理模型実験</p> <p>①基本水理模型実験</p> <p>②ブラカノン・ポンプ場</p> <p>③ブラカノン・関連水路</p> <p>④ダム余水吐</p> <p>⑤頭首工の洗堀と堆砂</p> <p>⑥その他</p>	<p>当初予定されていた基礎推理実験は、ほぼ予定通り終了した。</p> <p>ポンプ施設の管理が他の局に移管された為、取り止めた。</p> <p>ブラカノンの配水路に多数存在する柱、ウォーター・ヒヤシンス等が、どの程度粗度係数に影響するかを不定流実験を通じ明らかにした。終了。</p> <p>本実験はメクワンダムのスビルウェイについて行われ、すでに終了している。本実験に基づき、当初設計の平面形状、フリップバケットの形状等が修正された。</p> <p>取組方針を定めた。</p> <p>メソンドムのスビルウェイを対象として実験を行っている。設計部案について模型実験を行ったところ、主な問題点として以下の2点があったため、改善案について検討してきた。</p> <p>①越流堰の洪水処理能力 ②放流湾曲部での溢流、衝撃波の発生</p>	<p>○</p> <p>-</p> <p>○</p> <p>○</p> <p>△</p> <p>○</p> <p>現地調査と日本における対策事例の紹介を通じて、基礎的な技術移転を行う。</p> <p>定性的には概ね良好な結果が得られており、今後最終的な整理を行う。</p>	

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1889年 3月)	達成度・活動項目 (1990年 3月)	備考
(2) コンピューター・シミュレーション ① プラカノン上・下流域モデル ② チャオ・ブラヤ川下流域モデル ③ 用水適正配分のための水路モデル	<p>バンコクの洪水問題の主要地区を題材として、数値モデルシミュレーションによる問題説明へのアプローチ手法、解決策の樹立等について技術移転を行った。終了。</p> <p>バンコク周辺の排水不良改善の足掛かりを掴むため、チャオ・ブラヤ川の蛇行ショートカット等を含め、本川の不定流解析により主要地点の流量・水位予測を行い、課題説明の道筋を明らかにした。終了。</p> <p>灌漑事業における水利用の適正化へのアプローチを通じて、不定流解析の水路システムへの応用について技術移転を図る。</p> <p>これまで、モデル地区の選定を行うとともに、現状把握のため現地調査を行い、データ収集の準備を進めている。</p> <p>ベチャブリ・プロジェクトの幹線水路における通水量増強の可能性について、数値モデルシミュレーションを行った。終了。</p> <p>また、かんがい水路における不定流解析の基礎的数値モデル開発の題材として、ソンビノン・プロジェクトを選定した。</p>	<p>○</p> <p>○</p> <p>△</p> <p>最終年度でもあるが、必要なデータ収集を行うとともに、現況が利用状況の把握のための数値モデル・解析プログラムの開発を行う。</p> <p>問題点としては、モデル地区に限らず、既存データに乏しく、今後長期にわたるデータ収集が不可欠であるが、予算・期間の面で制約があり、プロジェクト終了までの1年間で成し得る技術移転には限界がある。しかし、ケース・スタディを通じての解析手法等に関する基礎的な技術移転までは可能と見込まれる。</p> <p>○</p> <p>○</p> <p>ソンビノン・プロジェクトの数値モデルシミュレーションを通じ、観測手法、かんがい水路における基礎的なプログラム開発の技術移転を行う。</p>	

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1988年3月)	達成度・活動項目 (1990年3月)	備考
<p>3. 建設材料試験と解析</p> <p>1) 設計・施工管理のための土質及び建設材料試験及び解析</p> <p>(1) 土質試験と解析</p> <p>① タブサラオダムと他のフィルダムに関するケーススタディ</p> <p>② 軟弱地盤基礎に関するケーススタディ</p> <p>③ 土質に関する諸試験</p> <p>④ 設計基準に資するデータの蓄積</p>	<ul style="list-style-type: none"> ・タブサラオダムの築堤材料及び基礎地盤の土質試験を実施し、設計部、地質の協力の元にF. E. M. 解析に必要なパラメーターの決定手法、及び、試験手法を確立した。 ・上記試験実施の為、中型三軸圧縮試験機を導入した。 ・モデルインフラ事業の実施を通じ軟弱粘土、砂、の土質試験及び現位置試験を実施している。 ・上記試験実施の為の機材を整備。 ・無償、供与機材として導入された土質試験機器に関する試験手法は確立され、現在、基準整備の一環として土質試験法を作成中。 ・土質力学試験を基準に基づいて自動計測化（パソコン利用）する。 ・モデルインフラ事業を通じ、軟弱粘土に関する土質データを収集、整理する。 	<ul style="list-style-type: none"> ○ タブサラオダムでの成果を踏えR. I. D. 独自で他ダムに応用している。 ○ モデルインフラ事業で実施する埋設計器モニタリングに関するケーススタディを実施。 ○ 軟弱粘土に関する室内・現位置土質試験手法、施工管理手法を検討する。 ○ モデルインフラ事業で実施する地盤改良工の現位置での改良効果測定する。 ○ 土質試験法（基準）の完成 ○ 自動計測化の整備し定着化を図る。 ○ バンコク軟弱粘土の性状を把握する。 	<p>90 ・ 3</p>

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1889年3月)	達成度・活動項目 (1990年3月)	備考
(2) コンクリート及び建設材料に関する試験と解析 ① コンクリート骨材に関するケーススタディー ② コンクリート非破壊試験に関するケーススタディー ③ コンクリート及び建設材料に関する諸試験 ④ 設計基準に資するデータの蓄積	<ul style="list-style-type: none"> ・現場での圧縮強度試験をキューブ供試体で実施するため、キューブとシリンドラ供試体の強度相関を求める試験を実施し終了。 ・超音波による非破壊試験器の現場での使用基準、適用範囲を明確にする為の室内試験を実施。 ・操作使用法の技術移転は完了。 ・コンクリートに関する諸試験について技術指導。 ・基礎試験手法についての技術移転は完了。 ・コンクリート圧縮試験結果データを収集。 	<ul style="list-style-type: none"> ○ △ ○ △ 	
	達成度・活動項目 (1889年3月)	達成度・活動項目 (1990年3月)	備考

協力分野・内容 R/D, IIS, P/A	達成度・活動項目 (1889年3月)	達成度・活動項目 (1990年3月)	90 ・ 3 考 備
<p>4. システム開発</p> <p>1) 技術計算のためのシステム開発のケーススタディ</p> <p>(1) 技術情報データベースの構築</p> <p>① チャオプラヤ川流域等を対象とした水文データベースシステムの開発</p> <p>② 水文データベースに対する適用プログラムの開発</p> <p>③ 技術情報データベースのためのシステム開発</p> <p>④ データ収集及びデータ提供にかかわるデータ通信及びネットワークシステムの為の調査</p>	<p>システム開発が完了 実務を通じてのシステムの改良を進めている。</p> <p>7種類の適用プログラムが完成</p> <p>流出解析等の解析用プログラムの開発を進めている。</p> <p>モデルデータベースの開発技術移転が完了 (水文データベース、ダムセフィティ、データベース)</p> <p>パーソナルコンピュータ間のデータ通信テストが完了</p>	<p>完了予定 ドキュメントの整備を行う。</p> <p>完了予定 流出解析・広域水収支解析に係る基本的な技術移転プログラムの開発を進める。</p> <p>データの収集・入力を行う。</p> <p>完了予定 活動成果の取りまとめを行う。</p>	○ ○ ○ ○

協力分野・内容 R/D, TIS, P/A	達成度・活動項目 (1889年3月)	達成度・活動項目 (1990年3月)	備考
(2) 技術計算プログラムライブラリーの開発 ① 既存技術計算プログラムの検討 ② 集中型コンピュータに対するシステム開発の支援 ③ パーソナルコンピュータの利用に対する支援 ④ プログラムライブラリーのためのドキュメントの整理 (3) その他の技術支援について ① 既存のコンピュータシステムの評価について ② かんがい局のコンピュータ利用に対する指導助言	完了 土質、構造、水理シミュレーション等に関するプログラムが整備されている。 研修を実施した。 ドキュメント技法についての技術移転を完了。 技術移転を完了 利用規程(案)の作成を完了	○ ○ ○ ○ ○ ○ ○	90 3
	完了予定 現在までに開発されたプログラムを汎用的に利用できるように整備(ライブラリー化)を進める。 完了予定 研修の制度化、ライブラリーの開発(モデル)を進める。 完了予定 実務を通じてドキュメント技術の定着を図る。 完了予 利用規程に沿った運用体制の確立を図る。		

協力分野・内容 R/D, IIS, P/A	達成度・活動項目 (1889年 3月)	達成度・活動項目 (1990年 3月)	備考
5. 研修 中堅技術者養成対策費による研修	各種研修21コースの中、9コース完了。 残り12コースは5月を目途に完了。	来年度については未定であるが、10コース程度を予定している。	90 ・ 3 ○

資 料 一 4

IECフェーズII要請書

REQUEST FOR TECHNICAL ASSISTANCE PROJECT

PROPOSED SOURCE OF ASSISTANCE
THE GOVERNMENT OF JAPAN

PROJECT TITLE

PROJECT TYPE TECHNICAL COOPERATION FOR
IRRIGATION ENGINEERING CENTER PHASE II

REQUESTING AGENCY

ROYAL IRRIGATION DEPARTMENT
MINISTRY OF AGRICULTURE AND COOPERATIVES

PROJECT TITLE: PROJECT TYPE TECHNICAL COOPERATION FOR IRRIGATION
ENGINEERING CENTER PROJECT PHASE II

PROPOSED SOURCE OF ASSISTANCE: The Government of Japan

REQUESTING AGENCY: Royal Irrigation Department
MINISTRY OF AGRICULTURE AND COOPERATIVES

1. BACKGROUND

1.1 Irrigation Engineering Center Project

The Irrigation Engineering Center (IEC) has been in existence for five years since April 1, 1985. It is a project run through cooperation between the Royal Irrigation Department (RID) and the Japan International Cooperation Agency (JICA). IEC has been established to contribute to agricultural development in Thailand through the application of the irrigation engineering field and the transfer of knowledge, experience and technology to RID.

IEC undertakes work in five technical fields, namely Examination of Criteria, Hydraulic Model Analysis, Construction and Material Testing and Analysis, System Engineering and Training.

IEC has been running smoothly and efficiently in accordance with details laid down in the Record of Discussion and the Tentative Schedule of Implementation. The achievements and activities of IEC have contributed positively and effectively to RID in field of irrigation engineering. In addition, IEC has gained a good reputation as a technical development center of irrigation engineering in RID.

1.2 Need for Further Technical Cooperation

Based on the understanding that almost all the activities of the present IEC will be finished successfully within the cooperation period, RID fully intends to request for further technical cooperation from the Government of Japan under the umbrella of the present IEC.

The components of further cooperation consist of two elements which are intended to cope with agricultural conditions which are changing drastically. The first one is to develop further some of the results that have been ranging from the dissemination of basic technology to technology suited to specific agricultural situations found in Thailand. Such knowledge and technology will be applied in the field and disseminated to the appropriate persons in IEC and RID.

The second component is technical cooperation in the field of water management which is a new field for the present IEC but important for RID.

Having mainly focussed on technical cooperation on technology transfer and development of basic irrigation engineering concerning design criteria, testing methods and computer system, IEC has produced valuable results up to now. From the point of comprehensive technical systematization, it is, however, important to IEC to develop its knowledge and results further by systematically combining all the above-mentioned fields in irrigation practical ends.

2. IMPORTANCE OF WATER MANAGEMENT

Water resource development is one of the important major roles of RID. Up to 1987, RID has developed about 3.34 million hectares of irrigable areas under large, medium and small-scale irrigation projects.

In accordance with the expansion of irrigable areas and the diversification of water demand, the technical development and technology transfer of effective water management are becoming more essential in solving the problem of limited water resources.

From this point of view, JICA sent a Study Team to investigate the Water Management System and Monitoring Program in the Chao Phraya River Basin. The Study Team gave useful recommendations from both short-term and long-term perspectives to RID in order to improve present water management.

Water management includes wide technical fields from dam to farm as well as the agricultural situation surrounding farmers. In addition, effective water management has to be planned so as to balance technical know how and provision of facilities.

Consequently, water management aspects included in IEC Phase II aim at technical cooperation for the short-term which is a part of the useful recommendations and results produced by the Study Team.

3. FRAMEWORK OF IRRIGATION ENGINEERING CENTER PROJECT PHASE II

3.1 Objectives

In order to contribute to RID's role in agricultural development, the Project aims at technical development of water management aspects as well as further technical cooperation on the basis of the results of the present Irrigation Engineering Center Project.

3.2 Cooperation Term

For five(5) years from April 1, 1990

3.3 Scope of Work of Technical Cooperation

(1) Water Management

This field deals with basic technical development concerning dam management and irrigation water distribution systems as well as water management data processing.

(2) Water Use Analysis

This field aims at study and analysis on water resources from hydrological and hydraulic viewpoints for more effective water management.

(3) Data Processing

The activity of this field consists of technical development on system management, the irrigation engineering information system and a supporting system for more effective water management.

(4) Improvement and Diffusion of Criteria

This field aims at preparing criteria and manuals covering the various aspects of water management and construction control as well as diffusion of design criteria.

(5) Soil Foundation and Earth Structure

These fields consist of technical development on maintenance and repair of irrigation structures as well as investigation and testing methods on earth structures and soft soil foundation.

(6) Training

Training is to be conducted in order to upgrade the competent irrigation engineers through technology transfer.

4. DETAIL OF THE IMPLEMENTING AGENCY

RID Officials working at IEC and staf of Operation & Maintenance Division are in charge of the proposed project with the cooperation of experts in specific fields.

5. REQUESTED ASSISTANCE

Experts in the concerned fields and necessary equipments are required. All these items may be changed after discussing in details.

Experts	No.	Man - month
1. Team Leader	1	60
2. Coordinator	1	60
3. Irrigation Engineer	1	60
4. Hydraulic Engineer	1	60
5. System Engineer	1	60
6. Design Engineer	1	60

6. RELATED PROJECT

Related Project will be implemented in the Irrigation Engineering Center. If special place is required for Water Management System, RID will manage this matter.

7. THAI GOVERNMENT COUNTERPART CONTRIBUTION TO THE PROJECT

RID uses annual budget for RID's expenses.

8. FUTURE WORK PLAN

RID will develop manpower so that RID officials can conduct water management by using high technology, especially in the Chao Phraya River Basin. And so water usage will be more effective. The plan covers collection the data about water management system and flood release.

Irrigation Engineering Center
Royal Irrigation Department
January, 1989
Tel: 243-1095

資 料 — 5

IEC フェーズⅡ ワーキング・グループ

RID ORDER
No. 161/1989

Appointment of Working Group for Planning of Technical Cooperation
Irrigation Engineering Center Project (Phase II)

Referred to the Record of Discussion on the Japanese Technical Cooperation for the Irrigation Engineering Center Project, the cooperation will be terminated on March 30, 1990. Thus, the Board of Directors of IEC and the Japanese experts discussed the project implementation and saw its bilateral benefits. Both sides, therefore, reached an agreement to lengthen the cooperation. To utmost RID benefits, a working group is appointed to design the technical cooperation of IEC Project Phase II namely.

- | | |
|--|-----------------|
| 1. Director General of RID | Chairman |
| 2. Chief Civil Engineer | Vice - Chairman |
| 3. Senior Expert for Water Resources
Planning & Development | - do - |
| 4. Director of Operation & Maintenance Division | Member |
| 5. Director of Hydrology Division | - do - |
| 6. Director of Design Division | - do - |
| 7. Director of Research & Laboratory Division | - do - |
| 8. Director of System Engineering Section | - do - |
| 9. Director of General Management Section, IEC | - do - |
- and Secretary

The Working Group is to set guidelines, objectives and to choose the interesting fields in which the cooperation will be taken between JICA and RID. And so RID will request for technical cooperation from Japanese Government by referring the above items. The Working Group has an authority to get some additional information and ideas from the authorities concerned if necessary.

The appointment is effective since then.

Dated February 15, 1989

(Chari Tulayanond)
Director General of RID

資 料 — 6

IEC BOOK LIST

IRRIGATION ENGINEERING CENTER PROJECT

No.	Title	Dated	By
*** 1	<u>Report and Presentation Materials</u> on the Flow Discharge Calibration of Open Channels Including the Calibra- tion Method in Tidal Channels	September 1985	Kazumi IWASAKI, Katsuro SHIODA, Virat Khao-Uppatham
*** 2	<u>Report and Presentation Materials</u> on the Proposal Concerning the Pre- paration and the Application of the Mathematical Model Simulation to Drainage System in the Phra Khanong	October 1985	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 3	<u>Standard for Agricultural Land</u> Consolidation		Ministry of Agriculture/ Forestry and Fisheries in JAPAN
** 4	<u>Water Management System Improvement</u> Study Main Report	March 1986	Katsuo SHIODA Ministry of Agriculture and Cooperatives
** 5	<u>Water Management System Improvement</u> Study (Appendix)	March 1986	Katsuo SHIODA
6	<u>Summary Report</u> on Micro-Graphics System	March 1986	Sirirat Temiyanond
7	<u>Lecture Note</u> on Basic Micro-Graphics Training Course	March 1986	Engineering Development Section of IEC
** 8	<u>Summary Report</u> on Micro-Graphics System	April 17, 1986	Yutaka TAKECHI, Takuji NAKANO, Sirirat Temiyanond
*** 9	<u>Working Paper for Assistance to</u> Criteria Development of IEC	April 1986	Yoshio ARAI Sunyu Consultants Inc.
*** 10	<u>Summary Report</u> on Micro-Graphics System	May 1, 1986	Yutaka TAKECHI, Takuji NAKANO, Sirirat Temiyanond, Supot Promnaret
*** 11	<u>Lecture Note</u> on Agricultural Development Project of the Coastal Area in Japan (Nakami Polder Reclamation Project)	May 15, 1986	Kazushige MATSUO

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No.	Title	Dated	By
** 12	<u>Final Report</u> (October 1983-May 1986) on General Planning of Water Resources	May 1986	Toshiki SAITO
*** 13	<u>Table of Contents</u> on Each Topics for Criteria Development	July 7, 1986	Engineering Development Section of IEC
14	<u>Report and Presentation Materials</u> on Hydrological Data Processing	August 1986	Toshisuke MARUYAMA, Yoshihiro KAIDO
15	<u>Standard for Agricultural Land</u> Consolidation	August 1986	Engineering Development Section of IEC
16	<u>Standard for Canal</u>	August 1986	Engineering Development Section of IEC
*** 17	<u>Lecture Note</u> (Appendix 1) on Hydraulic Structure Design	September 1-23, 1986	Kiyoji ASAI
18	<u>Design Manual on Headworks</u>	October 1986	Ministry of Agriculture Forestry and Fisheries
*** 19	<u>Lecture Note</u> on Hydraulic Analysis of Phra Khanong Upper Canal System	October 6, 1986	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 20	<u>Lecture Note</u> on Formulation of the Unsteady Mathematical Simulation Model in the Chao Phraya River	October 6, 1986	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 21	<u>Lecture Note</u> on Concept of Working Stress and Ultimate Strength Design Quality Control on the Construction Work	October 22-29, 1986	Yamaji SHIRAYAKI
22	<u>Lecture Note</u> on Semi-automatic Irrigation Control System	October 1986	Kazumi IWASAKI
*** 23	<u>Technical Comments</u> on Procedures and Data Processing of Triaxial Compression Test	October 28, 86	Masami YASUNAKA, Shoichi TAKEUCHI, Mondhian Kangsathiem, Paibool Siridamrong

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No.	Title	Dated	By
* 24	Basic Concept of Hydraulic Analysis of Unsteady Flow for Computer Use and Case Study on Phra Khanong's Downstream Model	October 1986	Masaru SASAKI, Kanya Pothipiku, Prinya Kamolsin, Vidhaya Samaharn
*** 25	Lecture Note on Laboratory Testing Procedures for Duncan Parameters	November 3-6, 1986	Takuji NAKANO, Masami YASUNAKA
*** 26	Lecture Note on Static and Dynamic Finite Element Analysis for Embankments	November 10-14, 1986	Takuji NAKANO, Masami YASUNAKA
*** 27	Technical Report on Embankment Stability and Seepage Control of Thapsalao Dam	November 19, 86	Engineering Development Division and Research Laboratory Division
** 28	Summarizing Answers to Questionnaire "Questionnaire for System Management and Development in Irrigation Engineering Center"	December 1986	System Engineering Section of IEC
*** 29	Workshop (NEWSTRESS) on Finite Element Method for Stresses and Movements in Embankment	January 26-30, 1987	Takuji NAKANO
*** 30	Computer Program for Finite Element Analysis of Seepage (NEWSEEP)		Engineering Development Section and System Engineering Section
* 31	Listing of Finite Element Computer Program NEWSTRESS (Part 1-2)		
** 32	Drafts of Criteria	February 1987	Working Group, RID
*** 33	Workshop (NEWSEEP) on Finite Method for Seepage Analysis	February 2-6, 1987	Takuji NAKANO
*** 34	Lecture Note on Improvement of Chao Phraya Downstream Model	February 21, 87	Kazumi IWASAKI, Yuzo OSAKI, Masaru SASAKI, Vidhaya Samaharn
*** 35	Lecture Note on Improvement of Phra Khanong Upper stream Model	February 21, 87	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn

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*** 36	Design Report of the Computer Network for Hydrological and Related Data Processing	March 1987	Working Group, O&M Div. and Hydrology Division
*** 37	Summary Report on Soft Soil Foundation	April 22, 1987	Noritada KAWAGUCHI
*** 38	Summary Report on Data Base Management System	April 23, 1987	Yutaka SUZUKI
* 39	Workshop Note on In-Situ Testing Procedure for Soft Soil Foundation	April 1987	Takahiko TATEISHI, Shoichi TAKEUCHI, Mondhian Kangsasathiem
* 40	Workshop Note on Laboratory Testing Procedure for Soft Soil Foundation	April 1987	Takahiko TATEISHI, Shoichi TAKEUCHI, Mondhian Kangsasathiem
** 41	RID Practice on Hydrology Investigation	April 1987	Hydrology Division
*** 42	Lecture Note (Appendix 3) Application of In-Situ and Laboratory Testing Procedures for Soft Soil Foundation	May 1987	Takahiko TATEISHI, Shoichi TAKEUCHI
*** 43	Summary Report (Appendix 4) on Auto-Measuring System for Triaxial Compression Test	May 1987	Takahiko TATEISHI, Shoichi TAKEUCHI, Takuji NAKANO
*** 44	Suggestions and Recommendations (Appendix 5) on Improvement of Laboratory Testing Apparatus	May 1987	Takahiko TATEISHI, Shoichi TAKEUCHI
*** 45	Summary Report on Soft Soil Foundation Project	May 25, 1987	Takahiko TATEISHI
*** 46	Summary Report on Data Base Management System	June 26, 1987	Kazuo OTHANI
*** 47	Preparing for the Model of Phra Khanong Upstream Drainage System and Proposal of Improvement Plan (Phra Khanong Upstream Model-II)	July 1987	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
** 48	What is the Personal Computer? (Including the Explanation of the Items for the Personal Computer)	July 23, 1987	Data Processing Div.

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No.	Title	Dated	By
** 49	The Physical Hydraulic Model Test of Mae Kuang Dam Spillway	August 17, 1987	Tatsuo NAKA, Masaru SASAKI, Vidhaya Samaharn
* 50	Design and Quality Control of Massive Concrete	August 17-19, 1987	Yamaji SHIRATAKI
51	Soil Engineering Mechanics	August 17-19, 1987	Mondhian Kangsasithiem
** 52	Operation Manual (Appendix 4) for Triaxial Compression Test Apparatus	August 18, 1987	Masami YASUNAKA, Shoichi TAKEUCHI
* 53	Summary Report on Safety Criteria for Existing Dam	August 24, 1987	Kiyoji ASAI
*** 54	Summary Report on Concrete Testing	August 24, 1987	Yamaji SHIRATAKI
*** 55	Lecture Note (Appendix 2) on Quality Control Testing and Embankment Testing for Dam Construction	August 24 - September 4, 87	Masami YASUNAKA, Shoichi TAKEUCHI, Takuji NAKANO
56	Introductory Course (Appendix 1) on Seismic and Resistivity Surveys for Geotechnical Engineering Works	September 2-8, 1987	Hiroshi KUDO, Ryoichi KAWASAKI, and Associates
57	Introductory Course (Appendix 2) on Seismic and Resistivity Surveys for Geotechnical Engineering Works	September 2-8, 1987	Hiroshi KUDO, Ryoichi KAWASAKI, and Associates
*** 58	Demonstration of Seismic Response Analysis Program 'QUAD 4' (Appendix 4)	September 8, 87	Masami YASUNAKA
*** 59	Summary Report (Appendix 1) on Dam Construction	September 10, 1987	Masami YASUNAKA
** 60	The Summary of Study on the Method for Estimating Average Daily Discharge in Tidal River	September 1987	The Japanese Institute of Irrigation and Drainage
*** 61	Final Report (October 1985 - September 1987) on Construction Material Tests and Analysis	September 1987	Shoichi TAKEUCHI

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No.	Title	Dated	By
** 62	Design Manual on Headworks	October 1987	Ministry of Agriculture Forest and Fishers in JAPAN
63	Introduction to Computer Based Information System Development	October 5, 1987	Takuji NAKANO
64	<u>Presentation</u> on Concrete Work in Japan	November 18, 87	Hitoshi SUNAZAWA
65	<u>Training</u> on Nuclear Density and Moisture Gauge	December 1-3, 1987	Takuji NAKANO Supol Chirapan Mondhian Kangsasithiem
66	<u>Technical Presentation</u> on Hydrological investigation	December 15, 87	Takao MASUMOTO
67	<u>Summary Report</u> on Implementation Plan of Model Infrastructure Project for Soft Soil Foundation	December 23, 87	Hiroataka OCHI, Minoru YONEDA, Otohiko SUZUKI Takahiko TATEISHI
*** 68	<u>Report</u> on Hydrological Investigation (Improvement of Research Basin)	December 25, 87	Takao MASUMOTO
*** 69	<u>Training Course</u> on First Course of Unsteady Mathema- tical Simulation Model	February 2-4, 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn, Prinya Kamolsin
*** 70	<u>Case Study of the Phra Khanong Upstream</u> Developing a lowland Run-off Model by Mathematical Analysis of Unsteady Flow	February 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 71	<u>Final Report (MAIN REPORT)</u> of System Development Expert (Computer System Development)	October 1985 - March 1988	Haruoki EBE
*** 72	<u>Final Report (Appendix)</u> of System Development Expert (Computer System Development)	October 1985 -	Haruoki EBE

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No.	Title	Dated	By
** 73	<u>Progress Report</u> Master Plan Study on the Water Management System and Monitoring Program in the Chao Phraya River Basin	March 1988	Japan International Cooperation Agency
** 74	<u>Summary Report</u> on Technical Information System for Irrigation Projects (Data Base System for Existing Dam Safety)	March 12, 1988	Kazuo OTHANI
** 75	Report on Graphic Application Programs Development for Hydrological Data Base	March 1988	Norishige YAGI
** 76	Data Base System for existing dam Safety in RID	March 12, 1988	Kazuo OTHANI, Takuji NAKANO, Sirirat Temiyanond
*** 77	Design Criteria for Pumping Works	March 1988	Noritada KAWAGUCHI, Engineering Development Division
** 78	<u>Lecture Note</u> of Basic Micro-graphics Training Course	March 28, 1988	Engineering Development Division
** 79	<u>Final Report</u> (April 1986-1988) on Water Management in Thailand	April 1988	Yozo OSAKI
** 80	<u>Lecture Note</u> for Advance Course on Seismic Surveys for Geotechnical Engineering Investigation	April 19-May 19 1988	Yoshikazu MATSUBARA, Hiroshi KUDO, Takuji NAKANO, Toshiaki TAKEUCHI
** 81	<u>Detail Design Report</u> on the Model Infrastructure Improvement Work	May 1988	JICA (IEC Project in the Kingdom of Thailand)
*** 82	<u>General Report</u> (1985-1988) on Technical Transfer of IEC	May 1988	Kazushige MATSUO
** 83	<u>Progress Report</u> on Geotechnical Engineering Cooperation in RID (Thailand)		Hiroshi KUDO

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No.	Title	Dated	By
** 84	Final Report (June 1986-1988) on General Planning of Water Resources Development	June 1988	Narumi YAMADA
*** 85	Summary Report on Design Standard on Headworks	September 12, 1988	Kiyoji ASAI
** 86	Data Communication	September 16, 1988	System Engineering Section, IEC
*** 87	Final Report (September 1985-1988) on Engineering Development	September 1988	Takuji NAKANO
*** 88	Field Report No. 1 (October 15, 1985) on the Proposal Concerning the Preparation and the Application of a Mathematical Model Simulation to Drainage System in the Phra Khanong Drainage Area	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 89	Report No. 2 (October 1986) on Basic Concept of Hydraulic Analysis of Unsteady Flow for Computer Use and Case Study on Phra Khanong's Downstream Model	September 1988	Masaru SASAKI, Vidhaya Samaharn, Prinya Kamolsin, Kanya Pothipiku
*** 90	Report No. 3 (October 1986) on Hydraulic Analysis of Phra Khanong Upper Canal System	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 91	Report No. 4 (October 1986) on Formulation of the Unsteady Mathematical Simulation Model in the Chao Phraya River	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 92	Lecture Note No. 5 (February 21, 87) on Improvement of Phra Khanong Upper Stream Model	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 93	Lecture Note No. 6 (February 21, 87) on Improvement of Chao Phraya Downstream Model	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 94	Report No. 7 (December 1987) on Preparing for the Model of Phra Khanong Upstream Drainage System and Proposal of Improvement Plan (Phra Khanong Upstream Model II)	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn

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No.	Title	Dated	By
*** 95	<u>Report No. 8</u> (February 1988) on Developing a New Lowland Run-Off Model by Mathematical Analysis of Unsteady Flow (Case Study of the Phra Khanong Upstream)	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn
*** 96	<u>Final Report No. 9</u> (March 12, 1988) on the Physical Hydraulic Model Test for Spillway of Mae Kuang Dam	September 1988	Masaru SASAKI, Vidhaya Samaharn
*** 97	<u>Report No. 10</u> (August 1988) on Hydraulic Analysis on Phra Khanong Upstream Canals	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn, Prinya Kamolsin
*** 98	<u>Report No. 11</u> (August 1988) on the Analysis of Flow Discharge Under the Influence of Strong Tides in the Existing Chao Phraya Down Stream and the Chao Phraya II Plan	September 1988	Kazumi IWASAKI, Masaru SASAKI, Vidhaya Samaharn, Prinya Kamolsin
*** 99	<u>Attachment</u> (Experiment of Original Design Plan)	September 1988	Masaru SASAKI
***100	<u>Design Criteria for Irrigation System</u> Arrival Time of Water and Storage Capacity in Irrigation Canal System	December 26, 88	Hideo YOSHINO
***101	<u>Design Criteria for Irrigation System</u> Arrival Time of Water and Storage Capacity in Irrigation Canal System (Appendix)	December 26, 88	Hideo YOSHINO
***102	<u>Summary Report</u> on Design Standard on Headworks	January 1989	Kiyoji ASAI
* 103	<u>Field Survey Report</u> on the Huay Luang Project	January 30, 89	Hydrological Analysis Working Group
***104	<u>Summary Report</u> on System Management	November 25, 88	Shinya KUMADA

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OTHER ORGANIZATIONS

No.	Title	Date	By
1	MS-DOS Operation System	July 14-15, 1987	Yeun Phuvorawan, Surasak Sanyonpong
2	Basic Handbook	July 14-15, 1987	Vichi Punavat
3	Multiplan Practice	July 14-15, 1987	Yeun Phuvorawan, Pichit Sukchaloenpong
4	Micro Computer	July 14-15, 1987	Yeun Phuvorawan
5	Study on the Method for Estimating Average Daily Discharge in Tidal River	September 1987	The Japanese Institute of Irrigation and Drainage
** 6	VAX/VMS Utilities and Commands Administrator Guide Test Package	November 9-13,	Digital Equipment Corporation
** 7	VAX/VMS Utilities and Commands Student Workbook Volume I	November 2-6, and November 9-13, 87	Digital Equipment Corporation
** 8	VAX/VMS Utilities and Commands Student Workbook Volume II	November 2-6, and November 9-13, 87	Digital Equipment Corporation
** 9	Operator's Manual on 501 DR Depthprobe Moisture/Density Gauge	December 1-3, 87	CPN Corporation
** 10	Calcomp 9100 Series Digitizer Operator's Manual	January 1-5, 1987	California Computer Products, Inc.
** 11	Programming Calcomp Electromechani- cal Plotters	January 1-5, 1987	Calcomp A Sanders Company
12	PLOT 79 Subroutine Package Hidden- line and Contour Plotting Routines	February 19-26,	Digital Equipment Corporation
13	PLOT 79 Subroutine Package Core System	February 19-25,	Digital Equipment Corporation
14	VAX GKS User Manual Abstract	February 19-26,	Digital Equipment Corporation
** 15	Water Resources and Agriculture (SEATEC)		Southeast Asia Technology Co., Ltd.

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No.	Title	Date	By
** 16	Geotechnical Investigation for Model Infrastructure Project on Soft Soil Foundation in Samut-Songkram Province		STS Engineering Consultants Co., Ltd.
** 17	Table Showing Water Resources Development in Thailand Completed to the End of 1987 System Branch, RID and Under Construction 1988 (Large, Medium, and Small Scale Project)	July 1988	Data and Information
** 18	Interim Report (Main Report) The Feasibility Study on Sebai-Sebok Basin Development Project in the Northeast Region	March 1989	The Study Team for Sebai-Sebok Basin Development Project
** 19	Interim Report (Appendix) The Feasibility Study on Sebai-Sebok Basin Development Project in the Northeast Region	March 1989	The Study Team for Sebai-Sebok Basin Development Project
** 20	Summary of Interim Report The Feasibility Study on Sebai-Sebok Basin Development Project in the Northeast Region	March 1989	The Study Team for Sebai-Sebok Basin
** 21	Master Plan Study (KEYWORDS) on the Water Management System and Monitoring Program in the Chao Phraya River Basin	March 1989	JICA
** 22	Master Plan Study (Main Report) on the Water Management System and Monitoring Program in the Chao Phraya River Basin	March 1989	JICA
** 23	Master Plan Study (Annex-1) Meteorology/Hydrology	March 1989	JICA
** 24	Master Plan Study (Annex-2) Water Management Planning	March 1989	JICA
** 25	Master Plan Study (Annex-3) Water Management Model Project	March 1989	JICA

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No.	Title	Date	By
** 26	Master Plan Study (Annex-4) Monitoring/Communication/Data Management System	March 1989	JICA
** 27	Master Plan Study (Annex-5) Irrigation and Drainage Facilities	March 1989	JICA
** 28	Master Plan Study (Annex-6) Land Use/Agriculture	March 1989	JICA
** 29	Master Plan Study (Annex-7) Social System/Economy	March 1989	JICA
** 30	Master Plan Study (Appendices) on the Water Management System and Monitoring Program in the Chao Phraya River Basin	March 1989	JICA

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