

附 属 資 料

1. 団 長 レ タ ー	63
2. 合 同 委 員 会 議 事 録	81
3. ミ ャ ン マ ー 側 活 動 状 況 報 告	87
4. ワ ー ク プ ラ ン (活 動 計 画)	145
5. 1992 年 度 活 動 計 画	190
6. 1993 年 度 活 動 計 画	229
7. 供 与 機 材 リ ス ト	293
8. 参 考 資 料 一 覧	308

November 18, 1993

U Kyaw Tin
Director General
Irrigation Department
Ministry of Agriculture

Dear Sir :

It is my great pleasure to submit to you herewith the summary report of the Technical Guidance Survey Team (hereinafter referred to as "the Team") for the Irrigation Technology Center Project (hereinafter referred to as "the Project") in the Union of Myanmar, shown in the attached paper.

This report includes the results of survey and discussion on the Project's performance over the past two and half years as well as some impressions from the Team.

The Team, organized by the Japan International Cooperation Agency (JICA), visited the Union of Myanmar from November 10 to 20, 1993.

The members of the Team are as in Annex 1.

The schedule of the Team is as 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 Union of Myanmar.

Sincerely yours,

山崎隆信

Takanobu YAMASAKI

Team Leader

The Technical Guidance Survey Team for
the Irrigation Technology Center Project

**THE SUMMARY REPORT
OF
THE TECHNICAL GUIDANCE SURVEY TEAM
FOR
THE IRRIGATION TECHNOLOGY CENTER PROJECT
IN
THE UNION OF MYANMAR**

YANGON, THE UNION OF MYANMAR

NOVEMBER 18, 1993

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

CONTENTS

I. INTRODUCTION

- 1. Outline of the Irrigation Technology Center Project**
- 2. Objectives of the Team**

II. PROGRESS AND PLAN OF EACH FIELD

- 1. Irrigation Engineering**
- 2. Data Analysis**
- 3. Design Criteria**
- 4. Construction Material Tests and Analysis**
- 5. Hydraulic Model Tests and Analysis**
- 6. Training Program**

III. CONCLUSIONS

IV. ANNEX

- 1. The Members of the Team**
- 2. The Schedule of the Team**

I. INTRODUCTION

1. Outline of the Irrigation Technology Center Project

The Irrigation Technology Center Project in the Union of Myanmar (hereinafter referred to as "the Project") aims at contributing to upgrade irrigation technology through the following activities.

- 1) Irrigation Engineering
- 2) Data Analysis
- 3) Design Criteria
- 4) Construction Material Tests and Analysis
- 5) Hydraulic Model Tests and Analysis
- 6) Training Program

On December 23, 1987 the Record of Discussions (hereinafter referred to as "the R/D") on the Technical Cooperation for the Project was signed between Mr. Hitoshi Nakajima, Leader, the Implementation Survey Team, JICA and U Saw Vawter Loo, Director General, Irrigation Department (hereinafter referred to as "ID"), Ministry of Agriculture and Forests, the Union of Myanmar.

According to the R/D, the Project began from April 1, 1988 and five Japanese experts were dispatched by JICA to the Union of Myanmar in June and July of 1988. However these five experts had to return to Japan in September 1988 due to the unfortunate political situation then. So the Technical Cooperation for the Project had been brought to a temporary halt except for the field of Construction Material Tests and Analysis.

In November 1990, the Japanese Technical guidance Team, headed by Mr. Yoshimichi Ito, visited the Union of Myanmar to review the progress and discussed about the extension of Technical Cooperation to achieve the objectives of the Project. As a result, the duration of the technical cooperation under the R/D amended to extend from April 1, 1992 to March 31, 1995 was signed between JICA and ID in Tokyo, May 31, 1991 and in Yangon, September 27, 1991 respectively.

In November 1991, the Japanese Consultation Survey Team, headed by Mr. Eiji Okano, visited the Project in order to formulate the Tentative Schedule of Implementation (hereinafter referred to as "the TSI"), the Technical Cooperation Program (hereinafter referred to as "the TCP") and the Work Plan (Framework) (hereinafter referred to as "the Framework").

After that, Japanese experts and Myanmar counterparts have worked out the Work Plan (hereinafter referred to as "the W/P") based on the TSI, the TCP and the Framework. On August 26, 1992, the W/P was submitted to the Second Joint Committee Meeting. Now, the Project has been implementing according to the R/D, the TSI and the W/P.

2. Objectives of the Team

The Technical Guidance Survey Team (hereinafter referred to as "the Team") consisting of Mr. Takanobu YAMASAKI, Deputy Director, Construction Department, Kinki Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries with three (3) members is dispatched to carry out the following discussions and survey.

- 1) To study and review the progress of the Project activities
 - through the exchange of opinions with Myanmar counterparts and Japanese experts
 - through the observations of the Field survey
- 2) To discuss the cooperation programs for the remaining period
- 3) To exchange views on major issues for promotion of the cooperation program
- 4) To discuss the other matters necessary for the successful implementation of the Project

II. PROGRESS AND PLAN OF EACH FIELD

II-1. IRRIGATION ENGINEERING

1. Collection and analysis of data & information on irrigation projects

Much data and information have been collected. Analysis of data and information will be implemented from now on with supplemental collection of data and information.

2. Survey and study on practice of field irrigation management

Some surveys and studies have been carried out. It is necessary to continue and concentrate efforts on some model areas to make programs on water management clear.

Short-term expert on water management will be dispatched by JICA.

3. Case study on model project

This case study has not been implemented due to some difficulties in this cooperation field. This case study is difficult to achieve during the project period.

4. Comments of this field

(1) It is necessary to make the main objectives of data analysis on irrigation projects clear for efficient implementation.

(2) Survey and study on practice of field irrigation management also needs to be implemented in the same way mentioned above.

(3) It is recommended that those two subjects should be given the priority than the case study on model project.

(4) Study on design, construction and operation & maintenance of irrigation network model in ITC campus has been strongly requested by ITC to be replaced as a case study.

However, it is rather difficult to assist the network model because of some existing difficulties in the remaining term of cooperation, but advice would be provided by Japanese experts.

II-2. DATA ANALYSIS

1. Case study of system development for data analysis

1) Data base management system on technical data

Plan of DBMS utilization for the ID and DBMS for Hydrology is being carried out through the case study.

After this technical know-how has been mastered, applying DBMS into irrigation technology is to be started in substance.

2) Analysis on data stored DBMS

Introduction of basic knowledge on hydrometeorological analysis has been carried out since 92 fiscal year.

After establishment of DBMS on case study, analysis on it is to be carried out

3) Study of information exchange on data stored DBMS

Concept of data communication technology is going to be introduced in this fiscal year.

After improvement of existing telephone line condition, this technology is to be introduced between ITC and Yangon ID head office as a case study.

2. System development of technical calculation program library

1) Study of the existing technical programs

Program Library System including example program manual is under preparation.

2) Cooperation on computer utilization

Improvement and addition of program library is to be carried out according to the established Program Library System under the cooperation of other technical sections.

3. Study on other technical supporting system

Super mini computer system NEC MS-4100 for Data Bank has been improved. Necessary computer systems for implementing TCP have also been introduced according to the planned schedule. Plan of Computer Utilization is under preparation.

4. Training on computer utilization

Various kinds of computer training courses such as Basic course, Intermediate course and Operator course have been held for staff personnel since 1989 fiscal year. Total number of courses and trainees are 18 courses and 206 participants respectively up to October 1993.

Manual of Training System is under preparation.

5. Comments of this field

(1) Computer utilization consists of two parts; the part of foundation: facilities, human resources and organization and the part of technology: application for irrigation technology. These two parts and involved four elements have mutual relationship each other.

For upgrading the part of application, it is indispensable to establish the part of foundation. Therefore the part of foundation should be given the first priority for establishment of computer utilization in the ID.

(2) It is supposed that the delay of progress of this field is caused by the elements of human resources and organization. Therefore, it is recommended to strengthen these elements further.

The most important thing is for the engineers to become skilled person who can apply computer utilization into irrigation technology in daily office work.

For this purpose, leader for computer utilization should be trained in concerned sections, and counterpart should be assigned properly, and that the assigned person should be engaged in the same work continuously for a long term.

II-3. DESIGN CRITERIA

1. Design Criteria

1) Fill dam

Two items for the first draft have been prepared and two items are under examination of adaptation out of six items which are stipulated in the W/P. In the annual Work Plan 1993/94, schedule of this subject was prolonged for six month comparing with previous Work Plan.

Four items of the first draft preparation and total final check will be performed in the remaining project period.

2) Canal

Only primary draft has been prepared. The discussion for adaptation is going to start from now on. All items will be prepared according to the planned procedure.

3) Headworks

This subject has not been started yet. It is planned to start in December 1993. The activities will be proceeded taking the same method as another two subjects.

2. Computer utilization

The facility for computer utilization has been already prepared by ID and JICA. The establishment of Master Plan in ID is expected urgently. Based on this plan, the detail activities of this field will be authorized.

3. Comments of this field

(1) First of all, the first draft of planned three subjects on Design Criteria should be prepared according to the priority considering the remaining period.

(2) The load allocation in the counterparts should be considered in order to accelerate the planned procedure. Furthermore, it is necessary to strengthen the cooperation system both in counterparts and with other sections in ID.

Though the nature of Design Criteria preparation is complicated and time-consumable, it won't be accomplished without past experience and careful examination.

(3) It is beneficial to establish the Master Plan in the department in the initial stage, because computer utilization is the new field for ID and relationship with concerning sections is important.

The performance should be proceeded in close cooperation with the computer section in ITC.

II-4. CONSTRUCTION MATERIAL TESTS & ANALYSIS

1. Construction material test

1) Material testing and handling of equipment

Material testing and handling of equipment has been well transferred except in some subjects. But they are expected to be started and transferred soon.

Therefore, with some retrials for promoting better understanding, this work plan will be completed by March 1994.

2) Quality tests and mix design of concrete

Quality tests and mix design of concrete has been well transferred except in a few of subjects. But they are expected to be started and transferred soon.

Therefore, this work plan will be completed by March 1994.

3) Concrete manufacturing and quality control

Concrete manufacturing and quality control have been done. But the understanding of this work plan takes many years because there are a few fundamental knowledge in Myanmar. Therefore, it is required to put the emphasis on quality control in the rest of project cooperation period. Concrete manufacturing is expected to be done with the implementation of subject 4).

For promoting better understanding, a short term expert on the quality control will be dispatched in this November.

4) Reinforcing steel and concrete in construction works

Reinforcing steel and concrete in construction works have been done. But this work plan takes many years because of its extent. Therefore, it should be done with finding and examining several subjects to be solved through the field survey which is closely related with construction material tests.

2. Soil test

1) Geological survey

Geological survey has been transferred well except the boring test and its operation of machine. The boring test and its operation of machine is expected to be done by March 1994.

2) Field survey and sampling

Field survey and sampling has been transfered well and already finished up to now. This work plan is expected to be completed by March 1994.

3) Method of soil tests and handling of equipment

Method of soil tests and handling of equipment has been transferred well. But next following years, chemical tests will be done mainly. This work plan is expected to be completed by March 1994.

4) Tests on foundations, subgrade, soil used in construction and quality control

Tests on foundations, subgrade, soil used in construction and quality control has been done. But the understanding of this subject takes many years in this country because there are a few fundamental knowledge in Myanmar. Therefore, it is required to put the emphasis on quality control. The tests on foundations, subgrade, soil in construction may be transferred by the implementation of case studies.

3. Water quality test

1) Water quality testing method and handling of equipment

Water quality testing method and handling of equipment has not been started up to now. But it will be done by March 1995 with dispatching a short term expert in 1994.

2) Survey of water quality

Survey of water quality has not been started up to now. But it will be started soon after the implementation of water quality test. This work plan is expected to be finished by March 1995.

4. Case study on irrigation projects

The case studies on the construction materials and soil of irrigation projects has been transferred well and are expected to be finished by March 1995. But the case study on both subjects should be done with not only analyzing well but understanding the deep relations between the research and the actual planning.

5. Comments of this field

Generally, construction material tests and analysis has been carried out well. But for making sure of its success during the rest of the project cooperation periods, it is expected to implement as follows;

- a) To carry out all the remaining subjects and retrials of testing, handling of equipments for complete understanding.
- b) To understand the important relations among these material tests, actual planing construction and management through many case studies.
- c) To prevent the technical transfer from being delayed, it is necessary to prepare the apparatus, spare parts and expendable supplies sufficiently which is necessary for construction material tests. And it is also required to have the knowledge for repairing the grant equipments.
- d) To get accurate test data, the maintenance and inspection of machinery and their gauges should be done before the completion of the project period.
- e) To consider the most of subjects will be finished by March 1994, it will be possible to consider about bringing new equipments (changing old equipments to new one) and carrying out new subjects for more detailed research on this working plan. And in order to confirm these detailed research, short term experts are expected to be dispatched.

II-5. HYDRAULIC MODEL TEST & ANALYSIS

1. Physical (scale) models

1) Case study on dam spillway

The objective of this subject is to experiment about the model of spillway of Yin Dam and Sadon Dam.

The experiment of Yin Dam Spillway has been almost completed. The final report for the model study is now under preparation.

The experiment of Sadon Dam Spillway is ongoing and will be finished within the remaining project period.

2) Case study on Yin Weir

The objective of this subject is to conduct the experiment of movable bed models on Yin Weir. But it has not been started yet.

The experiment of Yin Weir is different from that of Dam Spillway. Therefore, for the smooth implementation of this subject, it is necessary to consider the following matters.

a) With regard to the method of making plan of Yin Weir, C/P needs to train by the well organized laboratory in Japan.

b) Based on the result of above C/P training, it is necessary to make the detailed implementation plan of Yin Weir by the guide of short-term expert who will be dispatched by JICA.

2. Mathematical models

For the smooth implementation of simulation analysis through the computer utilization, it needs the knowledge both hydraulic formula and computer programming techniques.

From now, it is necessary mainly to study the computer programming techniques about this subject by the guide of short-term experts who will be dispatched by JICA.

3. Comments of this field

(1) In this field, first of all, it is necessary to complete the experiment of Sadon Dam Spillway within the remaining period.

(2) After that, the experiment of Yin Weir should be started. But both experiment is quite different. Therefore, C/P who will be guided by the short-term expert needs to make a detailed implementation plan until the remaining period.

(3) To accomplish the above two subjects, it is necessary to assign the full-time C/P for each subject and to train the full-time technician who makes the physical models.

And smooth implementation and making up for lack of assistance, it is necessary to provide the equipment from JICA within allowable budget.

(4) In case of actual application, both the Physical models and the Mathematical models are equally necessary.

Therefore, it is necessary to carry out each subjects with good balance.

(5) It is necessary to implement the feedback system from the result of experiment to actual construction field.

II-6. TRAINING PROGRAM

1. Progress

Since 1989/90 budget year, various kinds of training have been conducted at ITC and it has achieved good result. The budget for the Middle Level Manpower Training Program is shared between ID and JICA. In this November, proper training section has been formed at ITC and the full-time C/P has been assigned.

2. Comments of this field

(1) The Team appreciates that C/P assignment will contribute greatly to the smooth implementation of this field.

(2) In future, it is necessary that the training programs will be improved not only in quantity but also in quality. For this matter, it is necessary to re-examine the budgetary support by JICA and should make better use of instructors invited from institution other than ID. (i.e. for well experimented special guest lecturers.)

(3) It is hoped that ID's budgetary allocation for training will cover the decrease in the budget provided by JICA which is in accordance with JICA regulations.

(4) To raise the technical level of irrigation engineer in Myanmar, it is necessary to train not only ID Head Quarter's staff but also ID regional officers.

For that reason, it is hoped that the Travel Allowance to and from training sites for training participants and the Daily Allowance provided by JICA would be more effective.

III. CONCLUSIONS

1. The Team further appreciates the efforts made by ID which is guided and led by Joint Committee.
2. The implementation and progress of some activities in many fields is pretty behind the W/P. Consequently, in the process of survey and discussion, the necessity to extend the project period was suggested by C/P. However, now, we should make effort to carry out the activities based on the R/D. Therefore it is desirable to consider the following matters for the fulfillment of the Project object based on the R/D.
 - (1) It is important to carry out the activities based on the comments of each field of above mentioned II.
 - (2) Myanmar counterparts and Japanese experts should make necessary arrangements of detailed activities for next year so that the remaining items can be carried out efficiently.
3. The Team was impressed with the fact that the equipment provided by JICA for the purpose of transfer of technology has been maintained in good condition. From now, it is desirable that those equipment should be used more efficiently.
4. The Team further appreciates that a number of counterparts was assigned to the Projects after 3rd Joint Committee Meeting in this August. From now, with regard to C/P allocation, it is desirable to consider the following matters for the smooth implementation of the Project.
 - (1) It is recommended that C/P who is assigned in each field should not be changed during the Project period.
 - (2) It is necessary that C/P should not be assigned dual responsibility with another work.
5. It is inclined to delay in decision making and its handling procedures on subject matters. Consequently, it causes negative results such as delaying experts' dispatch, late provision of equipment and missing beneficial opportunities of training in Japan. Thus ID should take necessary measures to meet the dead line fixed by JICA with the guidance and advice of Japanese experts.
6. Information together with data and knowledge is considerably important to all subjects. As a total technology, irrigation engineering requires exchange and feedback of technical information among the concerning sections at various stages, including research, planning and construction of technology development. It seems that there is not enough information exchange in ITC project. For successful implementation of the activities, positive and free environment for information exchange, feedback and its supporting system is essential.

IV. ANNEX

THE MEMBERS OF THE TEAM

<u>Assignment</u>	<u>Name</u>	<u>Present Position</u>
Leader	Mr. Takanobu YAMASAKI	Deputy Director, Construction Department, Kinki Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries
Irrigation	Mr. Shigeru MORI	Deputy Director, Office of Construction Planning and Coordination, Design Division, Construction Department, Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries
Construction Material Tests	Mr. Yasunari UEDA	Technical Officer, Overseas Land Improvement Cooperation Office, Design Division, Construction Department, Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries
Coordinator & Training	Mr. Tatsuji ONIMARU	Staff, Agricultural Technical Cooperation Division, Agricultural Development Cooperation Department, Japan International Cooperation Agency

THE SCHEDULE OF THE TEAM

<u>Order of the date</u>	<u>Date</u>	<u>Time</u>	<u>Activities</u>
1st day	Nov. 9 (Tue.)	10:30-15:25	Leave Tokyo and arrive at Bangkok (TG641)
2nd day	Nov. 10 (Wed.)	15:00-15:40	Leave Bangkok and arrive at Yangon (TG305)
3rd day	Nov. 11 (Thu.)	a.m. 14:30-15:30	Courtesy call to JICA Office, I.D. and F.E.R.D. Courtesy call to Embassy of Japan
4th day	Nov. 12 (Fri.)	10:00-16:30	Meeting with Japanese experts and Myanmar counterparts
5th day	Nov. 13 (Sat.)		Leave Yangon and arrive at Pagan
6th day	Nov. 14 (Sun.)		Leave Pagan and arrive at Pyay
7th day	Nov. 15 (Mon.)	8:00-12:00 12:00-17:30	Field survey at South Nawin Dam Project Leave Pyay and arrive at Bago. Visit to ITC
8th day	Nov. 16 (Tue.)	9:30-15:00 15:00-17:00	Meeting with Japanese experts and Myanmar counterparts Return to Yangon
9th day	Nov. 17 (Wed.)	9:30-17:00	Meeting with Japanese experts and preparation for the Team Report
10th day	Nov. 18 (Thu.)	a.m. 14:00-15:00	Preparation for Joint Committee Discussion Joint Committee Discussion
11th day	Nov. 19 (Fri.)		Report to JICA Office and Embassy of Japan
12th day	Nov. 20 (Sat.)	16:40-18:20	Leave Yangon and arrive at Bangkok (TG306)
13th day	Nov. 21 (Sun.)	11:15-19:00	Leave Bangkok and arrive at Tokyo (TG640)

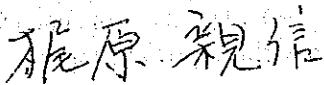
MINUTES OF DISCUSSION
BETWEEN THE JAPANESE CONSULTATION SURVEY TEAM
AND
THE AUTHORITIES CONCERNED OF
THE GOVERNMENT OF THE UNION OF MYANMAR ON
THE IRRIGATION TECHNOLOGY CENTER PROJECT

The Japanese Technical Guidance Survey Team (hereinafter referred to as "the Team"), organized by the Japan International Cooperation Agency (JICA), headed by Mr. Takanobu Yamasaki, visited the Union of Myanmar from November 10 to November 20, 1993 in order to assess the progress of the Irrigation Technology Center Project and to give recommendation. The summary report was submitted to the Irrigation Department by the Team.

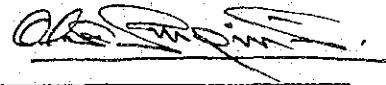
The Team gave comments that the progress of the cooperation program is considerably behind the schedule in the Work Plan. The Team suggested that it is necessary to fulfill the project objectives based on the Record of Discussion (R/D) within the predetermined period. Consequently, the Team recommended to consider some substantial matters for the effective implementation of the project. The Team also stated that integration of technical information among the sections is essential for irrigation technology.

The Irrigation Department submitted the status report and proposed the extension of the project period. The Team commented that the request made by the Myanmar side was out of references given to the Team, but the Team would convey the request to the concerning authorities of the Japanese Government.

November 18, 1993



Mr. C. Kajiwara
Team Leader
Colombo Plan Expert
ITC Project



U Ohn Myint
Director
Head of Program
ITC Project

MINUTES OF DISCUSSION
BETWEEN THE JAPANESE CONSULTATION SURVEY TEAM
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THE IRRIGATION TECHNOLOGY CENTER PROJECT

The minutes of discussion between the Japanese consultation survey team and the authorities concerned of the government of the Union of Myanmar on the Irrigation Technology Center Project have been completed. We have pleasure enclosing them herewith for your consideration.

Date: November 18, 1993

Time: 14:00-16:45

Place: Meeting hall No.1, Head Office, Irrigation Department

Participants: 1) Joint Committee members
2) Japanese Technical Guidance Survey Team
3) Invited ID personnel
(detailed list attached)

Subjects: Following subjects were discussed.

1. Problem on short-coming of qualification (or) skillfulness of counterparts for Data Analysis

U Kyaw Myint, the Head of ITC, requested JICA personnel to dispatch some short-term JICA experts to ITC project to be able to teach the main counterparts of the computer section to upgrade their level of understanding in computer programing languages except "Basic Language" for two to three months.

Mr.Kashiwabara, JICA expert for "Data Analysis", explained about the conditions of the existing training system. Further discussions among the expert and main counterparts would be made for this matter.

2. Master Plan of computer utilization in ID

U Maung Maung Thwin, the Head of Program (Acting), requested to be explained about its progress.

Mr.Ogi, JICA expert for "Design Criteria", explained that the specially arranged meeting had been held at the ID Head Office in February of this year and Directors from each working branch, JICA experts, and counterparts attended to discuss about introduction of computer utilization in ID. Since then the master plan of computer utilization has been discussed among the counterparts and experts, and the draft of master plan will be submitted to the responsible authorities in the near future.

3. Short-term expert for Water Quality Tests

U Kyaw Myint, the Director of Investigation, quoted that, due to the delay of technical transfer on Water Quality Tests according to the counterpart's report, short term expert in this field should be dispatched to fill the gap in this technology.

This matter has been agreed by JICA expert.

4. Quality Control (Q.C.) works in construction projects

U Kyaw San Win, the Deputy Director of Administration, requested that Q.C. works in some specific projects are better to be included in the work plan of the construction material test and analysis. Consequently, ITC would be able to receive some facilities which can then be shared among the laboratories of ID.

Mr. Ueda, the member of the Team, explained that the proposal can not be included in the Work Plan. However, the possible support from the Japanese Government would be sought in the future plan.

5. Introduction of Concrete Dam Technology

U Kyaw Myint, the Director of Investigation, suggested to include the Concrete Dam portion in the preparation of "Design Criteria" for Myanmar Irrigation Works since this subject becomes necessary in the future.

Mr. Mori, the member of the Team, explained that the subject should be included in next stage of program, but it could not be included in the present program because of its limitation in progress.

6. Hydraulic Model Test for Yin Weir

U Maung Maung Than, the Assistant Director of ITC, explained that, although counterparts are suggested to start the Yin Weir Model study by the Team, it is difficult to start because of the situation that the counterparts have had no experience in this field of technology.

Mr. Onimaru, the member of the Team, replied that the activity could be started after completion of training for a main counterpart in Japan. A short-term expert will be dispatched to give guidance and advice in this field.

U Kyaw Myint, the Head of ITC, asked whether it is possible to send the technician level staff of Hydraulic Laboratory to Japan together with his supervisor, a counterpart of the section, to have experience on construction of hydraulic models.

Mr. Onimaru replied that, according to the JICA's rule, only the counterparts could be sent to Japan for training.

7. Travel allowance and Daily allowance provided to trainees by JICA.

U Maung Maung Thwin, the Director of Planning and Works, explained that receiving this budget under the Middle Level Manpower Training has been a long standing issue to be solved.

Mr. Onimaru and Mr. Niino explained about the JICA regulation that the budget can not be used for procurement of equipment and machinery, but for trainees to attend training courses as travel and daily allowances and for procurement of necessary consumable items.

U Than Myint, the Director General (Acting) and U Aye Ko, the Deputy Director General of Planning and Statistics Department agreed to present the case to the Ministry of Agriculture with detailed explanation since the budget has been used in proper manner in Central Forestry Development and Training Center Project of JICA in the Ministry of Forest. The budget also includes necessary expence for visiting lecturers.

8. Nomination of counterpart training in Japan

Mr. Onimaru and Mr. Niino suggested to improve the current condition of counterpart nomination for training in Japan since it tends to delay from a deadline, and, consequently, it has been inclined to miss opportunities. The problem also affect other important proceedings, including dispatching experts, provision of equipment, and allocation of budget, as it delays.

U Than Myint, the Director General (Acting) and U Aye Ko, the Deputy Director General of Planning and Statistics Department explained the situation of in the Irrigation Department and the Ministry of Agriculture.

The Team suggested to solve the problems for efficient implementation of the program.

LIST OF PARTICIPANTS IN
JOINT COMMITTEE DISCUSSION

18 November 1993

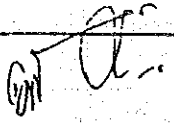
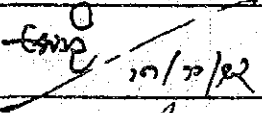
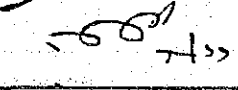
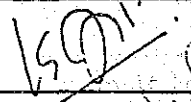

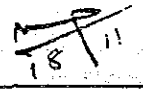
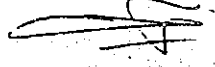
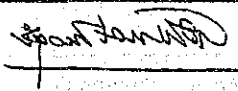

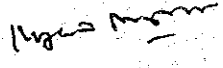
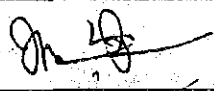
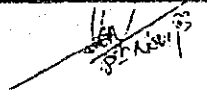
Japanese Side

No	Name	Designation	Signature
13.	Mr. T. Yamasaki	Team Leader Technical Guidance Team	山崎隆信
14.	Mr. S. Mori	Irrigation Engineer Technical Guidance Team	森 繁
15.	Mr. Y. Ueda	Construction Material Test Technical Guidance Team	J. Ueda.
16.	Mr. T. Onimaru	Coordinator Technical Guidance Team	鬼丸竜治
17.	Mr. M. Horihata	First Secretary Embassy of Japan	M. Horihata
18.	Mr. H. Izaki	Officer JICA, Yangon	井崎 浩
19.	U Kyaw Soe	Senior Programmer JICA, Yangon	U Kyaw Soe
20.	Mr. C. Kajiwara	Team Leader Colombo Plan Expert	梶原親信
21.	Mr. M. Takahashi	Construction Material Test Colombo Plan Expert	M. Takahashi
22.	Mr. M. Kashiwabara	Data Analyst Colombo Plan Expert	河野 昌
23.	Mr. F. Ogi	Design Criteria Colombo Plan Expert	仰木文男
24.	Mr. Y. Niino	Coordinator Colombo Plan Expert	Y. Niino

**LIST OF PARTICIPANTS IN
JOINT COMMITTEE DISCUSSION**

18 November 1993

Myanmar Side

No	Name	Designation	Signature
1.	U Than Myint	Director General Irrigation Department	
2.	Lt. Colonel Aye Ko	Deputy Director General Ministry of Agriculture	 20/11/93
3.	U Maung Maung Thwin	Director, P & W Irrigation Department	
4.	U Kyaw Myint	Director, Investigation Irrigation Department	
5.	U Khin Maung Lwin	Director, Bago Division Irrigation Department	
6.	U Maung Maung	Director, Hydrology Irrigation Department	
7.	U Sein Win	Deputy Director, Investigation Irrigation Department	
8.	U Kyaw San Win	Deputy Director, Admin. Irrigation Department	
9.	U Ohn Gaing	Deputy Director, P & D Irrigation Department	
10.	U Kyaw Myint	Head of ITC Irrigation Department	
11.	U Maung Maung Than	Assistant Director, ITC Irrigation Department	
12.	U Thein Win	Staff Officer, ITC Irrigation Department	

附属資料 3. ミャンマー側活動状況報告書

MINISTRY OF AGRICULTURE

IRRIGATION DEPARTMENT

REPORT ON IRRIGATION TECHNOLOGY CENTRE

NOVEMBER 18, 1993

CONTENTS

1. The Background	
2. Review of the Project	
2-1. Problems	
2-2. Countermeasures	
3. Conclusion toward better future.....	
4. Annexes	
4-1. Report on Irrigation Engineering	
4-2. Report on Data Analysis	
4-3. Report on Design Criteria	
4-4. Report on Construction Material Test and Analysis	
4-5. Report on Hydraulic Model Test and Analysis	
4-6. Report on Training program	

1. The Background

Pursuant to the original record of discussion (the R/D) agreed in December 1987 and amended in September 1991, the Tentative Schedule of Implementation (TSI), the Technical Cooperation Program (TCP) and the Work Plan (Frame Work) have been formulated. All such formulation addressed to the implementation and carrying out of the Irrigation Technology Center (ITC) Project (the Project).

The main objectives of ITC are upgrading and enhancing the Irrigation Technology incorporating the cooperation of the Japan International Cooperation Agency (JICA) experts for training the local engineers and installing the required facilities in conformity with the training.

According to the agreement, the main activities of ITC would be centered and focused on the six fields of activity. Intrinsicly the programs and functions of the six areas are carried out under the guide lines and frame works of the TSI and the R/D.

The six fields of activity formulated and the experts to the each section would be classified as follows.

- | | |
|---|--------------------------|
| 1. Irrigation Engineering | Team Leader, dual charge |
| 2. Data Analysis | JICA long term expert |
| 3. Design Criteria | JICA long term expert |
| 4. Construction Material Test and Analysis | JICA long term expert |
| 5. Hydraulic Model Test and Analysis | JICA short term expert |
| 6. Training (Periodical and special training) | JICA short term experts |

The detailed programs of activity under each field are as framed up in TSI and TCP composing of Japanese assistance and Myanmar responsibilities were also outlined in TSI. In the outlines of TCP, the Japanese assistance is made up of experts in respective areas as mentioned above besides the coordinator, equipment, and training in Japan. The Myanmar responsibilities would lie with the fulfillment of counterparts, administrative personnel and the office facilities.

In the course of implementing and carrying out the Work Plan (Frame Work) both sides cooperate in line with the TSI and as such the performance of ITC is carried out to achieve the targeted levels in terms of technical knowledge in scheduled time.

In regular fortnightly meetings of ITC staff with the Japanese experts, the issues and problems were discussed. Some of the issues were put up to the higher levels of the Irrigation Department (ID) to be handled by such authorities.

Besides such regular meetings, the performance and achievement of ITC were assessed in annual Joint Committee Meetings composing of members as outlined in the R/D. The meetings also formulated the Annual Work Plan of the program in line with the

TSI and the frame work of the R/D. It was also reviewed and exchanged views of major issues arising from in connection with the Program. The Joint Committee meetings had been held on the following dates.

First Joint Committee Meeting	October 9, 1991
Second Joint Committee Meeting	August 26, 1992
Third Joint Committee Meeting	August 26, 1993

The major presentations and topics of discussion usually highlighted in the Joint Committee Meetings covered among other things the following items. It could be taken as general format as well.

1. The annual assessment of progress of activities
The annual progress of activities of each field was assessed in comparison with the laid down plan. The planned activities were drawn till the end of the project in March 1995, and the performance assessment would be required till the end of the project. Such assessment was made in each sub item of the main activities.
2. The status of procurement of equipment under TCP for the last fiscal year
Such procurement was made both in local and in Japan. Both procurement are stated in foreign currencies.
3. The status of expenditure on Middle Level Manpower Training
The expenditures for the fiscal year are stated in foreign currency mostly on consumable items.
4. The planned arrangements of implementation in the next fiscal year
The arrangements covered the engagement statement of short term and long term JICA experts, the posting and placement of local counterparts, the present and proposed counterparts training in Japan, the proposed procurement of Technical Cooperation Equipment in the next fiscal year, middle level manpower training program for the next fiscal year in terms of expenditure and man power, proposed training courses at ITC and study tour program.
5. The work Plan each field of the six areas for the next fiscal year
6. Review of the project
The review was made in retrospective manner on all the main outstanding issues such as in counterpart allocation, organizational and institutional aspects, and mutual cooperation. The detailed progress in each section will be shown in the attached report presented by the sections.

2. Review of the Project

The review of the project was based on the issues encountered in the course of cooperation in carrying out the project. Some issues sometimes drag due to involvement of organizational and institutional arrangement of the ID. Since the last Joint Committee Meeting, a number of regular fortnightly meetings had been held and the latest was on 21 October. In the meeting the status (study) report for each field was received and reviewed with the comments of the experts and as such each report presented the planned, performed and outstanding activities to be performed and fulfilled. The countermeasures and solutions were also explored section wise.

2-1. Problems

The study reports are attached here with this report. The short-comings usually stemmed from the local side and can be briefly summarized as follows.

1. Manpower

Counterpart Allocation - At the time of the reporting, there was shortage of four counterpart staff officers to be posted at ITC and some additional experienced engineers in the Computer Section of the ITC.

2. Lack of provision of Facilities

Telephone Line - At the time of the Report, out of the two existing lines, one line had been out of order quite for some times. In addition, it was requested to install a new line to be used with data communication for future Computer terminal arrangement.

3. Facilitating the Organizational arrangement

Delays in procedures are as such postings of counterparts, arrangement for accepting experts and provision of equipment.

4. Technical Level Performance

Especially in Computer technology transfer, the receiving local counterparts could not keep up with the full understanding.

2-2. Countermeasure (Solution)

The ID, even though it heavily engaged in its own works, is concerting much of its effort to keep up with the short comings and exploring the required counter measures. To meet the above mentioned issues and short falls the following counter measures have been done by the ID.

1. Counterparts

Four counterpart staff officers have been assigned to the requested sections, such as Data Analysis, Design Criteria, Construction Material Test and Analysis and Irrigation Engineering Section of ITC. Now the total staff officers assigned to the ITC is already twenty out of required twenty persons according to ITC organizational set up. It is difficult to recruit the qualified software and hardware personnel for meeting the short coming in ITC computer section, due to scarcity of qualified people outside.

2. Facilities

The arrangement and repair to the out of order telephone line were already underway and will be in order again very soon. Instead of adding another line to the existing two of ITC, this matter has been put-up to the DG of ID for possibility of installing mobile radio telephone.

3. Organizational arrangement

The organizational procedures will be expedited accordingly in future.

4. Technical Level Performance

Since ID has received full facilities of computer and its technology, it has not yet fully prepared to utilize all the facilities with the required knowledge. However the local staff are steadily picking up and expression of computer facilities and broader use of it in the department will be arranged in cooperation with JICA experts.

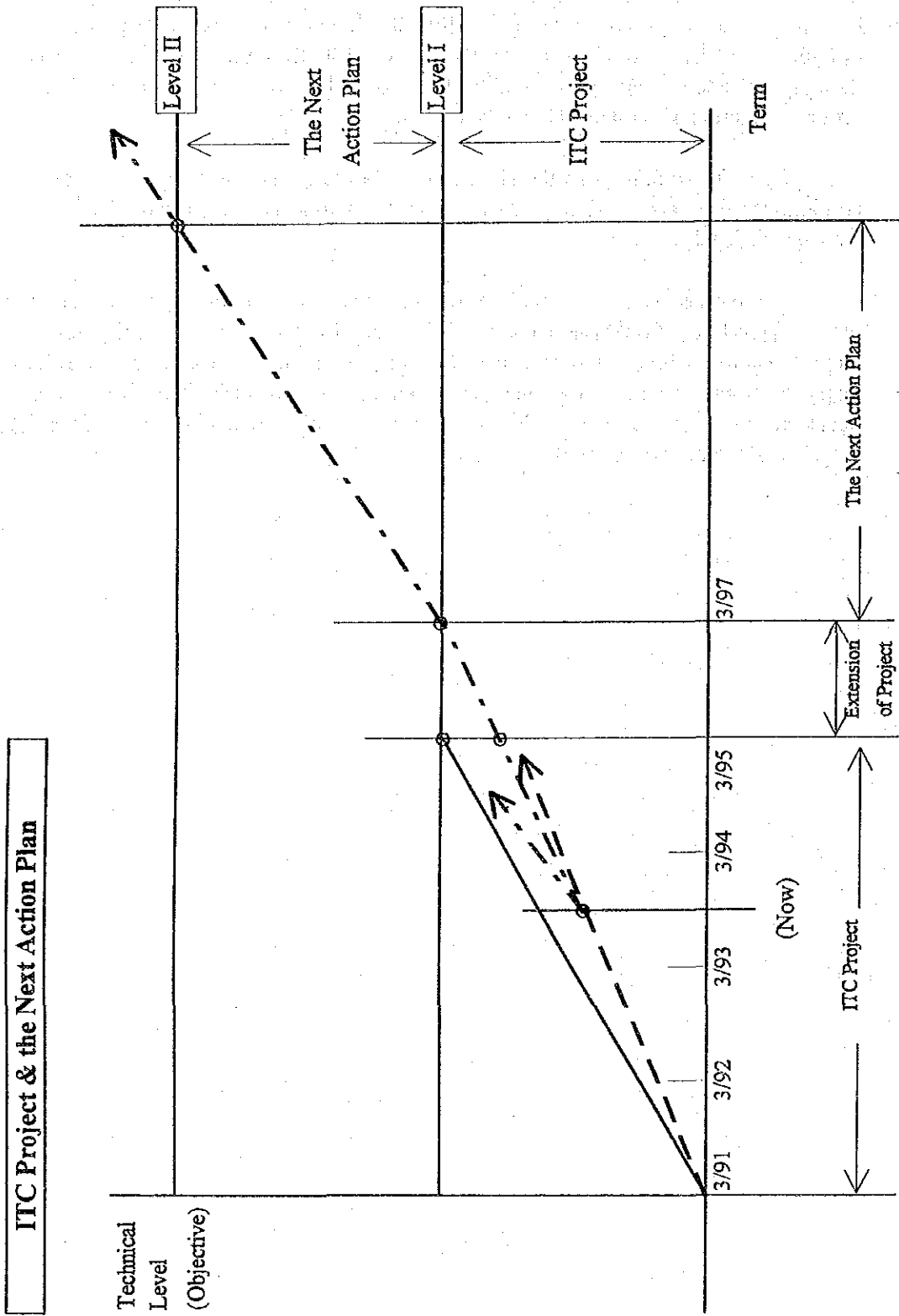
3. Conclusion toward better future

For the whole performance of the ITC project the attached graphical presentation (Fig. 1) will show the plan performed and the short comings. To meet the required target level which was originally set by March 1995, it is imperative to extend the present term of cooperation for a few years, preferably for two years from the present terms, even though local side is exerting much of its effort now. The JICA on its side usually met its program in terms of service and facilities.

The ID also noted that the ITC Project, started effectively from 1991 is of continuous nature and must be persued continuously to achieve the required self-manageable level.

It is earnestly believed that by extending the above mentioned period , the required technical level of not only the Irrigation Technology Center but also the Irrigation Department as a whole could be achieved in due course. In the mean time the Irrigation Department will do all it can to meet the present requirement and will also solve the occasional problems and issues which could still arise in future performance of the ITC Project and in cooperation with the JICA experts.

Figure 1



4. Annexe

**REPORT
ON
IRRIGATION ENGINEERING**

IRRIGATION ENGINEERING

1. BACKGROUND

To upgrade the technical knowledges and field experiences of irrigation facilities and water management, irrigation engineering, one of six field activities in I.T.C, is very important and essential to agricultural development in Myanmar.

The main objectives of this field consists of collection and analysis of data information on irrigation projects, survey and study on practice of field irrigation management and conducting case study on a model project.

According to the record of discussion between Japan & Myanmar, all irrigation projects will be examined in accordance with the following items depending on features of the each project.

1. Irrigation Practices
2. On-farm irrigation and drainage system
3. Operation and maintenance
4. On-farm water management

2. PROGRESS

2.1 Collection and analysis of data information on irrigation projects

Dams and projects are listed in the number of 42, according to the main objectives of this field. The following data / information of nineteen dams and projects had been collected up to now.

- Sources and storage of irrigation water
- Main structures (works)
- Water resources
- Topographical and geographical data
- Agro-economic data
- Others

Collection and analysis of data information on these nineteen dams and projects took the time of 2 years, 1991 to 1993.

Above dams and projects are listed in Table (1).

2.2 Survey and study on practice of field irrigation management

Four irrigation and drainage studied practically by field trips of the JICA Expert and his counterpart by collecting data / information of irrigation practices, on-farm irrigation and drainage system, operation and maintenance, on-farm water management and these projects are :

1. Flood protection and drainage in Ayeyarwady delta

2. Shwebo irrigation system
3. Zawgyi Area irrigation system
4. Yankin Taung land consolidation project
(Refer to report in 1992-93 by Mr. N. Tamura & UMD Than Aung)

This task should also be continued by JICA Expert and his counterparts by arranging field trips to remaining part of irrigation and drainage project areas in Myanmar. This survey and study program should consist of

- Pump irrigation system
- Ground water irrigation system
- Bago Sittoung canal irrigation system
- Reservoir irrigation system and so on

2.3 Case study on model project

At first, case study on the model of Ngamoeyeik dam project has been chosen and studies are to be made from hydrology, design criteria, soil test and other aspects in order to make the counterparts acquire practical technology. Unfortunately case study on model of Ngamoeyeik dam project was not yet being implemented due to some difficulties in this field. Design, construction and operation & maintenance network in I.T.C campus is to be replaced as a case study in the field of Irrigation Engineering.

3. PROBLEMS

Although it is an important field for the Irrigation Department, it had not yet been completed in collection datas, examining the project features and studying on practice of full-time long-term expert and full-time counterpart personal for him. The collection and analysis of datas for remaining twenty three dams and projects will take the time up to March, 1995. It will take 3 (or) 4 years to solve the above problems. In remaining time, we are not sure about the solution to meet its target with T.S.I. (The remaining dams & projects are listed in Table 2.)

According to the Record of discussion, the field of Irrigation Engineering is covered by the team leader. Since team leaders are very busy with their administrative matter in nature, they can not concentrate on this additional field. On other side, Irrigation Department could not share full-time counterpart personnel because of many duties and insufficient staff officers in the department.

4. SOLUTION AND PLAN

Irrigation Engineering field is very important and very wide field in the I.D. But due to short comings of full-time long-term JICA Expert and his Myanmar counterparts, work plan laid down for this field cannot cover wide scope and even the progress of this work plan cannot be said as satisfactory.

Therefore following solutions should be proposed to get significant progress later on.

- Time for remaining works are very short.
- Short-term JICA expert should also be dispatched whenever necessary.
- Skillful long-term counterparts should be assigned to JICA expert.
- Irrigation Technology of Japan and related equipments and facilities should be supported by JICA.
- On-farm water management system and reservoir water management system should be introduced practically to Myanmar counterpart engineers by JICA expert.
- For the above mentioned remaining tasks and new proposals, the extension of the project term beyond 1995 should be considered.

5. CONCLUSION

The scope of the Irrigation Engineering field laid down in the work plan is supposed to be narrow because of lack of short-term JICA expert and full-time counterpart personnels. Since the field itself is a very wide and the most important field for ID, the points mentioned in the previous section should be carefully considered and solved by both sides of ID and JICA.

TABLE (1)

List of Dams and Projects

Completed Dams and Projects

1. Lower Myanmar Paddy land development project (1)
2. Koepin chaung Dam
3. Pump Irrigation (State owned) in Minbu
4. Ngalaik Dam
5. Rakhine state flood protection - 2
6. Chaung U Township Chindwin river flood protection
7. Pyingyikyun Embankment
8. Mondaing Tank - Meiktila lake irrigation canal
9. Shwelay irrigation
10. Sedawgyi Dam
11. Lower Myanmar Paddy land development project (2)
12. Small tanks Irrigation
13. Ground water Irrigation project (1)
14. Pump Irrigation project in Chauk, Myayde and Shwedaung
15. Kinda Multi-purpose dam project
16. Thaphan Chaung dam
17. Lettet Chaung dam
18. Singu Chaung Gaung dam
19. Pyinbongyi dam

TABLE (2)

On Going Dams and Projects

1. South Nawin dam project
2. Ye-U Irrigation rehabilitation and modernization project
3. Laive dam
4. Samon weir
5. Small scale irrigation project (1)
 - (a) Myaing chaung dam project
 - (b) Taung-Khayan dam project
6. Shwedaung dam
7. Mu river valley irrigation project
8. Sittoung vally irrigation project

Proposed Projects

1. Small-scale irrigation project (Phase 2)
2. Lepyu dam
3. Small tanks irrigation project (2)
4. Mongmit weir
5. Mindon weir
6. Lower Myanmar Paddy land development project (3)
7. Pump irrigation project (2)
8. Ye Nwe dam project
9. Waba dam project
10. Pinle (south) dam project
11. Palow dam

Survey for some river valley development projects

1. Mu river valley development irrigation project
2. Sittoung valley development irrigation project
3. Mon, Man and Salin Reservoir projects
4. Yin chaung basin tank series

**REPORT
ON
DATA ANALYSIS**

CONTENT

1. Back ground

2. Progress

2.1 Case study of System Development for Data Analysis

2.2 System Development of Technology Calculation Program Library

2.3 Study on Other Technical Supporting System

2.4 Training on Computer Utilization

3. Problems

4. Solution and Plan

5. Conclusion

ANNEX -

I - Actual condition and progress of Case Study of System Development for Data Analysis.

II -Actual condition and progress of System Development of Technology Calculation Program Library.

III - Actual condition and progress of Study on Other Technical Supporting System .

IV - Actual condition and progress of Training on Computer Utilization.

V - Computer Training Program Conducted at ITC.

REPORT ON DATA ANALYSIS

1. Back ground

The Irrigation Department takes the responsibility such as planning, designing, estimating and constructing, operating and maintaining of the water resources facilities and flood control. Nowadays, computer technology in the world is progressing remarkably. Therefore, further utilization of the computer in these fields is absolutely essential for upgrading and rationalizing irrigation technology in future.

The Irrigation Department has strongly desired to introduce computer utilization into the field of irrigation technology and in daily office work. The field of Data Analysis has been included in the ITC project to establish computer utilization in future.

Establishment of computer utilization is to improve the following elements;

- * Computer facility : Equipment for computer utilization.
- * Human resources : Person who has an ability to use computer effectively in his work.
- * Organization : Computer, data and program are utilized effectively in the Irrigation Department.
- * Technology : Application of computer utilization in irrigation technology such as DBMS and program Library System.

When these elements effectively function together in the Irrigation Department, stored data, developed technical calculation program and so on will be utilized sufficiently in daily office work through systematic utilization of computer.

The most important part of this field is that engineers become skilled persons who can systematically put the computer utilization into practice on irrigation technology and can manage and maintain it by themselves. Accomplishing this work takes a little long time and needs stable efforts.

The following know-how is to be transferred by the field of Data Analysis through the service stipulated in the Work Plan;

1. Know-how of System Development for Data Analysis.
2. Know-how of System Development for Technical Calculation Program Library.
3. Know-how of Maintenance and Improvement of The Existing Computer System.
4. Know-how of Training Technique on Computer Utilization.

The following tasks are stipulated in the work plan and each task has been assigned to each counterpart personnel.

1. Case Study of System Development for Data Analysis.
2. System Development of Technical Calculation Program Library.
3. Study on Other Technical Supporting System.
4. Training on Computer Utilization.

2. Progress

ITC project has carried out the activities according to the work plan in order to improve and upgrade computer utilization in I.D. The work plan to be carried out during the project term has been decided by both the JICA expert and counterpart personnel.

The general progress except for tasks (3) and (4) mentioned above is slower than scheduled.

Detail progress of each task is shown in ANNEX - I, II, III and IV.

2.1. Case study of system development for data analysis.

Assigned counterpart has to master fundamental knowledge and plan for data Base Management System being studied.

The remaining portions of Analysis on Data Stored DBMS and Study of Information Exchange on Data Stored DBMS are in preparation stage.

2.2. System Development of Technical Calculation Program Library.

Study of the Existing Technical Program is at on-going stage. Program Library system is under preparation. Example of program manual has been prepared and modification of it is to be reviewed again and again until final program manual can be published.

The remaining portions of Cooperation on Computer Utilization is to be established in future.

2.3. Study on other Technical Supporting System.

Supporting for improvement of existing computer system has been established. JICA has supported latest personal computers, plotters, digitizer and application softwares for each TCP field. NEC MS - 4100 system has been improved by short - term experts.

Establishment of " Plan of Computer Utilization " still remains to be started, but data and necessary information have been collected for this job.

Necessary trainings on operation and maintenance, will be conducted by JICA short - term experts necessary at the request of Myanmar Counterparts.

2.4. Training on Computer Utilization.

Classification of training courses has been established. Up to now (18) computer training courses have been conducted at ITC and (206) participants have been trained. The list of computer training at ITC is shown in ANNEX - V.

Those trained personnel should continue to learn computer technology and use these computer facilities in their daily work.

" Training System " is to be prepared. The progress of Training on Computer Utilization is satisfactory.

3. Problem

For carrying out the field of data analysis effectively, it is essential that enough numbers of staff personnel such as programmers, hardware engineers and counterparts who have fundamental knowledge of computer utilization be assigned and enough computer facilities be equipped.

In the beginning stage, computer section faced problems: most assigned counterparts and staff were real beginners and installed computer facilities were requested to be improved.

Staff personnel of ITC computer section have been wrestling with these problem up to now. The computer section staff personnel have done our best to master basic knowledge of computer utilization. At the same time, we have tried to hold computer training courses for ID's staffs as much as possible. Computer facilities have been improved by JICA assistance.

However, there are two problems ;

1. Computer Section staff personnel have to master computer utilization more and more. This ability is cultivated by experience through daily office work and it takes a little long time for this.
2. The important Computer Technology into Irrigation Technology, it is difficult to accomplish work of applying within remaining project term, because this activity cannot materialize without fundamental knowledge of computer utilization and organization of it in the ID.

4. Solution and Plan.

Staff personnel of ITC computer section are taking necessary action to solve the problems mentioned above in the remaining project term. We are making every effort to accomplish remaining tasks. However, it is difficult to get advanced irrigation technology by using computer without fundamental elements such as human resources, organization of computer utilization and the following system and plan.

- Computer Utilization and Work Plan in Irrigation Department.
- Plan of Data Base Management System for Irrigation data.
- Program Library System.
- Training System for Computer Utilization.

They concentrate to establish this. Applying computer technology into irrigation technology is to start after establishing fundamental elements.

However, it is obvious that the remaining project term is too short to accomplish this.

Advanced Irrigation Technology mentioned above means analyzing irrigation data by using established system.

Referring to data by using Data Base Management system, and calculating data by using Program Library System. At the same time, it is necessary to develop new program library system and to hold advanced Computer Training Courses for engineers.

5. Conclusion

Computer section realizes that it is essential to have enough time, steady efforts and technical support to achieve our final aim, that is to apply computer technology into irrigation technology in the daily office work.

Needless to say, staff personnel of ITC computer section will do our best to accomplish our first aim stipulated in the Work Plan.

However, it is certain that Computer staff personnel have not enough time to fulfill our first aim within the remaining project term.

This field, Data Analysis, should be carried out continuously, step by step, through technical cooperation.

For this reason, computer section strongly desires to extend period and technical cooperation for upgrading this field smoothly. It is estimated two years for it.

1. Case study of system development for data analysis.

Objective - to establish systematization of data collection , data analysis and information exchange for case study.

Actual condition and progress of this task is shown below:

Sr. No	Task	Aim	Not started yet	Being preparation	On going	Have been established
A	Data Base Management System	Mastering know- how of DBMS and publishing year book regularly every year.				
1	- Establishment of "Plan of DBMS".				○	
2	- Collection of data for Case Study.				○	
3	- Creation of file management system and data structure for HYMOS.				○	
4	- Publishing a sample year book for hydrological and meteorological data.		○			
5	- Preparation of a user's guide for using HYMOS.		○			
B	Analysis on Data Stored DBMS	Mastering know-how of analysis system that engineer can easily analyze using computer on irrigation technology data.				
1	- Introduction of outline of analysis on case study.			○		
2	- Introduction of basic knowledge of hydrometeorological analysis by short term expert.			○		
C	Study of Information Exchange on Data Stored DBMS.	To establish data communication system by considering existing conditions				
1	- Investigation of possibility of data communication system.			○		
2	- Introduction of Basic knowledge on data communication.			○		
3	- Establishing data communication between ITC and Yangon ID Head Office.			○		

Progress of this task is behind the schedule.

2. System Development of Technical Calculation Program Library.

Objective - to establish development of systematic manual for Technical Calculation Program and development of a cooperation system between concerned sections.

Actual condition and progress of this task is shown below:

Sr. No.	Task	Aim	Not started yet	Being preparation	On going	Have been established
A	Study of the Existing Technical Programs.	Mastering know- how of editing and publishing on program library so that engineers can easily understand how to use technical calculation programs in their works. In addition , it heads to cooperate with concerned sections so that program library could be established by reflection of user's opinion.				
1	- Establishment "Program Library System".			○		
2	- Collection of programs using at ID etc.				○	
3	- Development sample program manual.				○	
4	- Publishing a program library.		○			
B	Cooperation on Computer Utilization. (This item is difficult to implement under the present condition)	To establish cooperation on computer utilization system for advanced technology requested by other technical sections such as Hydraulic design , Hydraulic simulation, structural design Irrigation project planning and so on.				
1	- Cooperation and assistance for other technical section.			○		
2	- Assisting the HID/UNDP Project in installation of Data Bank.		○			

Progress of this task is behind the schedule.

3. Study on other Technical Supporting System

Objective - to establish the plan of computer utilization and improvement of the existing computer system suitable for progress of the project. Accordingly, computer utilization in future should be studied through considering case study and other fields of technical cooperation.

Actual condition and progress of this task is shown below:

Sr. No.	Task	Aim	Not started yet	Being preparation	On going	Have been established
1	- Supporting for improvement of existing computer system					O
2	- Establishment of " Plan of Computer Utilization "				O	
3	- To train operation and maintenance.					O

Progress of this task is a little behind.

4. Training on Computer Utilization

Objective - to establish training system for computer utilization. accordingly, training on computer utilization is to be carried out for irrigation engineers and staff personnel to build up skilled engineers in this field according to the schedule. In addition, know - how of giving instruction for training should be studied.

Actual condition and progress of this task is shown below:

Sr. No.	Task	Aim	Not started yet	Being preparation	On going	Have been established
1	- Classification of training course.					O
2	- Establishment of " Training System "				O	
3	- Elementary Course (Basic Computer Training course)	For real beginners who have never used a computer and to have trainees take an interest in computer utilization. This training is to be carried out (2) times per year.				O
4	- Intermediate Course (Intermediate computer training Course)	For those have complete the elementary course or have used computers in their work. This training is to be carried out (2) times per year.				O
5	- Operator Course	For the staff personnel of the computer section who are to be engaged with MS - 4100 as expert operators utilizing MS - 4100 for the storage of future irrigation data. This training is to be carried out (1) time per year.				O
6	- Special Course	For mastering adation of special application software in the work. This training is to be carried out (1) time per year.				O

Progress of this task is Satisfactory.

Computer Training Program Conducted at IIC

November' 1993

Sr. No.	Tr. No.	Training Program	Education	No. of trainees					Total No. of Trainees	Weeks	Duration	
				89-90	90-91	91-92	92-93	93-94			94-95	From
I	1.	Computer Operator Course (1989)*	B.E	20					20	3	23.11.89	16.12.89
	2.	Computer Operator Course (1992)*	B.E			6			6	1	2. 3.92	6. 3.92
	3.	Computer Operator Course (1993)*	B.E				9		9	2.5	1. 3.93	16. 3.93
II	1.	Basic Computer Course for IIC staff personnel	10th Std.		21				21	4	14. 5.90	12. 6.90
III	2.	Workshop/seminar of Computer Section staff personnel	10th Std.		8				8	12	1. 8.90	31.10.90
IV	1.	Basic Computer Course No. (1)	B.E			20			20	1	4.11.91	8.11.91
	2.	Basic Computer Course No. (2)	B.E				10		10	1	18. 5.92	23. 5.92
	3.	Basic Computer Course No. (3)	B.Sc				9		9	2	28. 9.92	9.10.92
	4.	Basic Computer Course No. (4)	B.E				10		10	2	26.10.92	6.11.92
	5.	Basic Computer Course No. (5)	B.E				11		11	2	23.11.92	4.12.92
	6.	Basic Computer Course No. (6)	B.E					10	10	2	26. 4.93	7. 5.93
	7.	Basic Computer Course No. (7)	B.A,B.Sc					10	10	2	25.10.93	5.11.93
V	1.	Intermediate Computer Course No.(1)	B.E				10		10	3	20. 7.92	7. 8.92
	2.	Intermediate Computer Course No.(2)	B.Com, B.Sc				12		12	3	18. 1.93	5. 2.93
	3.	Intermediate Computer Course No.(3)	B.E					10	10	3	21. 6.93	9. 7.93
VI	1.	Special Computer Software Course	B.E,B.Sc				12		12	1	16.11.92	20.11.92
VII	1.	Special Computer Course Survey Software No.(1)	B.E				12		12	2	29.12.92	8. 1.93
	2.	Special Computer Course Survey Software No.(1)	B.E,B.Sc					6	6	3	9. 8.93	27. 8.93
Sub Total				20	29	26	95	36	206			

* Training Program conducted by short - term expert

**REPORT
ON
DESIGN CRITERIA**

1. Background

In Myanmar, many irrigation projects had been implemented adopting various criteria or technology of foreign countries in recent decades. Up to the present time, ID has been carrying out the design and construction of many projects without having a specific criteria of its own. At this situation, ID has intended to establish various kinds of Design Criteria and standards of its own for irrigation facilities.

According to the R/D, it has been agreed between the Government of Japan and Myanmar that the Japan Technical Cooperation would give technical guidance and advice to prepare the design criteria and standards for irrigation facilities by Technical Cooperation Program.

The performance of this field has been proposed as the work plan (Framework) in Tentative Schedule of Implementation, November 1991. The guide line of detailed work plan has been recommended as follows:

- 1) Reviews and findings report will be prepared through collection and study on present design criteria.
- 2) Japanese Design Criteria and design procedure will be introduced.
- 3) The introduced criteria will be adapted and modified according to the condition of Myanmar. The result will be prepared as a draft design criteria.
- 4) Technical calculation program will be introduced through computer utilization in cooperation with computer section, ITC.

JICA Expert for Design Criteria arrived at ITC on November 18, 1991 – three and a half year of project term rest at that time. At first he studied the actual conditions of Irrigation and Drainage works in Myanmar. After visualizing the present status of irrigation technology and irrigation works of the Department, by going field trips to various parts of the country, a suitable work plan has been laid down by the expert together with his counterpart personnel.

In the work plan, Fill Dam, Canal and Headworks are selected fields for preparation in priority. The expected contents of each field are described below:

1. Fill Dam
 - 1.1 General description
 - 1.2 Main features
 - 1.3 Investigations*

- 1.4 Dam Body and foundation
- 1.5 Outlet works and intake facilities
- 1.6 Instrumentation
- 1.7 Reservoir investigation
- 1.8 Construction and supervision*
- 1.9 Initial pounding of reservoir*
- 1.10 Operation and maintenance*

2. Canal

- 2.1 General description
- 2.2 Investigation
- 2.3 Design concepts
- 2.4 Hydraulic design
- 2.5 Structural design
- 2.6 Design of facilities*
- 2.7 Construction*
- 2.8 Operation and maintenance*

3. Headworks

- 3.1 General description
- 3.2 Investigation
- 3.3 Basic design
- 3.4 Detailed design
- 3.5 Construction execution*

At the first stage, some items of the above (asterisked items) were omitted because of lack of time against the work load.

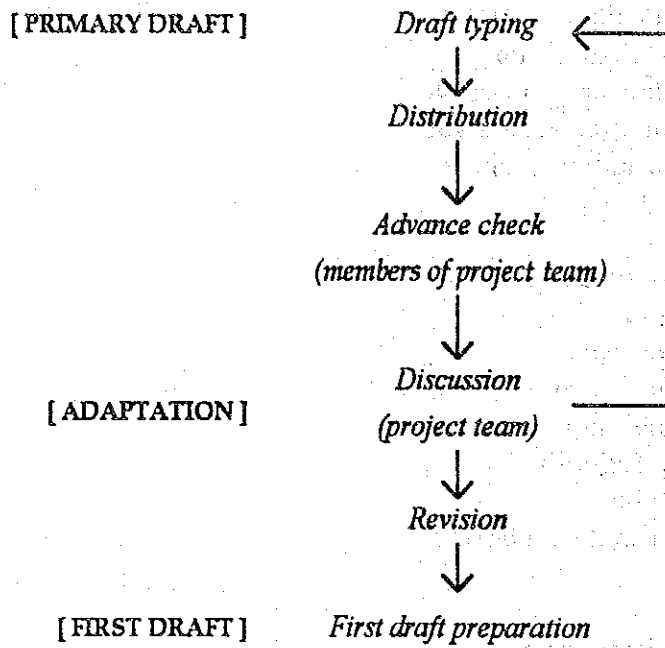
For the computer utilization, development of program library in the fields of project planning, surveying, hydrology, hydraulics and structural analysis were to be carried out in cooperation with the computer section of ITC.

2. Progress

For the preparation of Design Criteria, expert and counterpart group has formed, so called, a project team. At present, three full-time counterparts from ITC and four part-time counterparts from Design Branch have been assigned in the project team.

The team is carrying out the work by the routine procedure described in Fig-(1). According to this procedure, the work has to be preceded in two stages – preparation stage and authorization stage.

I. PREPARATION STAGE



II. AUTHORIZATION STAGE

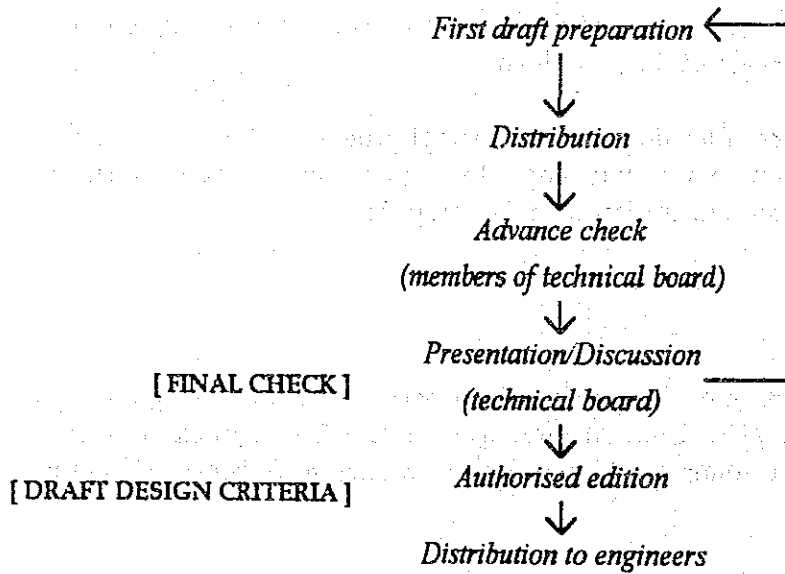


Figure- (1) Routine Working Procedure

Table-1 Progress in respective fields of Design Criteria preparation

	Primary Draft	Adaptation	First Draft	Final check
1. Fill Dam				
1.1 General description	○	○	○	
1.2 Main features	○	○	○	
1.3 Investigation*	-	-	-	-
1.4 Dam body and Foundation	△	△		
1.5 Outlet works and intake facilities	△	△		
1.6 Instrumentation				
1.7 Reservoir investigation				
1.8 Construction and supervision*	-	-	-	-
1.9 Initial pounding of reservoir*	-	-	-	-
1.10 Operation and maintenance*	-	-	-	-
2. Canal				
2.1 General description	○			
2.2 Investigation	○			
2.3 Design concepts	○			
2.4 Hydraulic design	△			
2.5 Structural design	△			
2.6 Design of a facilities*	-	-	-	-
2.7 Construction*	-	-	-	-
2.8 Operation and maintenance*	-	-	-	-
3. Headworks				
3.1 general description				
3.2 Investigation				
3.3 Basic design				
3.4 Detailed design				
3.5 Construction execution*	-	-	-	-

Notes:

Completed ○

In progress △

Out of scope -

Progress in preparation of Design Criteria is shown in Table-1. At present the progress is estimated to be 20% of the work plan.

For the implementation of computer utilization, the activities mentioned below are to be carried out during the technical cooperation program:

- 1) Planning on program library
- 2) Introduction of Programs
- 3) Arrangement of program library

Concerning with the activities mentioned above, the followings were performed up to the time being:

- Discussion for the establishment of master plan on computer utilization was made in the Design Branch.
- Two numbers of computer were installed at the Design Branch.
- GEO-COMP : Surveying software has been introduced

A short term expert was dispatched in the field of design criteria to introduce suitable advance technology supporting the implementation of design criteria preparation and computer utilization.

3. Remaining Portions

At present, the items (of progress) shown by Δ and blank marks in Table-1 are remaining items.

The remaining portions (items) of Fill Dam and Canal Works preparation are expected to be in schedule, if the project team could overcome the problems described (in 4. Problem) below.

Preparation of Headworks is planned to begin in the third quarter of this fiscal year.

The following are remaining activities in the implementation of the Computer Utilization relating to Design Criteria preparation:

- To make a plan on program library
- Development and adaptation of introduced programs, and improvement of existing programs

Additionally, the omitted items (shown by asterisked marks in Table-1) may also be taken as remaining portions. These items were omitted because of insufficient time of the project term.

4. Problems

The subject itself being very wide and complicated in nature, time allocation to finalize the suitable standards and criteria is practically insufficient.

Collection of necessary data usually takes much time in the procedure of preparation, for lack of data such as; hydro-meteorology, topography, geology etc. In this case, concerning counterpart has to spent some times and efforts besides his main job.

The expert and counterparts are implementing their work plan by holding weekly discussion meetings for progress and difficulties encountered. In the discussion meetings the project team performs the following activities :

- 1) Technology transfer from the expert to counterparts is made.
- 2) Decisions for adaptation are made up by the team, and if necessary senior experienced engineers are invited to the meeting to get important decisions.
- 3) In the discussion meeting, three fields of design criteria preparation (Fill Dam, Canal and Headworks) submitted by concerning counterparts are discussed for adaptation in parallel.

Thus, it is seen that the time available for discussions is not sufficient to fulfill for the performance of the above mentioned activities.

There may be series of discussions and/or arguments between experienced engineers on the drafts prepared by counterparts, and verifications have to be made repeatedly based on their comments and suggestions.

Time sharing from the part-time counterparts and experienced engineers are so limited in the procedure of discussion. Getting comments and suggestions from experienced engineers at preparation stage is a time consuming job – which is necessary in some cases, to obtain final decision.

At this situation, preparation of Fill Dam has already extended another six month in schedule, even though some items mentioned above (in 3. Remaining Portions) are omitted from the scope.

There is lack of counterpart personnel, who are qualified in programming, to undertake the tasks in the field of Computer utilization.

5. Solutions and plans

Organization of the project team was rearranged and expanded to get the management system improved.

Counterpart team has asked experienced persons to join enthusiastically in weekly discussion according to their expertise to achieve efficient results.

Although this kind of efforts has been done, some items of Canal and Headworks may be incomplete and authorization stage may also be delayed.

ID head office will take necessary action for the requirement of counterpart personnel to fulfill the procedures of computer utilization.

For the promotion of computer utilization field, the organization to execute computer utilization is now under planning.

The development of Technical Calculation Program should be carried out in sequence with the Design Criteria preparation.

6. Conclusion

The project team has been working up to fulfill the objectives of the initial plan, with their great efforts and knowledge of the counterpart personnel, even though problems and difficulties encountered in the process of preparation.

There is uncertainty of completion in the field of design criteria preparation, for the foresighted problems in the term of Technical Cooperation Program. Thus, the project team, on behalf of ID, would like to request extension for cooperation in this field beyond the end of the project term.

To fulfill the objectives of design criteria preparations, ID staff personnel have intention to extend the project another two year, since there is insufficient time to achieve the overall target in view with the present schedule.

**REPORT
ON
CONSTRUCTION MATERIAL TESTS AND ANALYSIS**

2.1.2 Mix Design of Concrete

Some of the tests for fresh concrete and hard concrete have been done which are as shown in Table - 1. The remaining test of Mix Design are as shown in Table - 2.

2.1.3 Quality Control of Construction Material Test

Quality Control for compressive strength of concrete have been made with the Schmidt Hammer in Ngamoeyeik Dam Project.

There is a little knowledge on Quality Control works so it is essential to upgrade the skillfulness of laboratory staffs to get more knowledge about Quality Control on Construction Material Test.

Quality Control works in construction site plays very important role in the ID since it can compromise three important factors of cost, time and risk as well.

2.1.4 Analysis of Construction Material Test

This method has not yet being touched up to now. Therefore it is still remaining to perform many analysis for hard concrete such as the comparison of compressive strength between the cylindrical mould and the cubic mould.

To be able to introduce the analysis of Construction Material Test, it is required to build a database of laboratory test results from various project area and it will take long time to collect these information. After collecting sufficient information, analysis and processing can be done by using computer. This job has been just started and it should be continued to meet the objective of computer utilization in the field of Construction Material Tests.

2.2 Soil Tests

2.2.1 Introduction of Geological Survey

Geophysical exploration, sounding and sampling have been made in Ngamoeyeik Dam Project. Short term expert of Geological Exploration has been conducted in ITC laboratory. The remaining test of this case is only boring test.

2.2.2. Field Survey and sampling

The In-situ test which has been finished is shown in Table-3 and the remaining test are shown in Table 4.

REPORT ON CONSTRUCTION MATERIAL TESTS & ANALYSIS

1. Background

All test data of Construction Material Laboratory are very useful in design and construction works of Irrigation Department (ID) to be able to guarantee safer irrigation structures. Therefore laboratory for Construction Material Tests which has been established at ITC from the beginning plays an important role in ID.

ITC project has been started since 1989/90 with the Technical Cooperation Program (TCP) and it is supposed to be terminated in March 1995. Myanmar counterpart personnel engaged at ITC in the field of construction material test are being given technical transfer by the long-term JICA Experts. Mr. N. Murayama had assumed his duty from 1989 to 1992 as the expert of Construction Material test and now Mr. M. Takahashi is working as the successor expert since May 1992 to April 1994.

The objectives of Construction Material Tests and Analysis are divided into four main tasks and they are :-

- (1) Construction Material Test.
- (2) Soil Test.
- (3) Water Quality Test.
- (4) Case Study of test and Survey of Irrigation Projects.

2. Progress

Technical transfer to the Myanmar counterparts are to be carried out by the JICA experts by giving the technical guidance and advice. Annual Work plans have been prepared in the framework of the TSI to be carried out by the counterparts as well as the JICA Expert.

The activities done in the past years can be classified as follows.

2.1 Construction Material Test.

Progress of technical transfer on Construction Material Tests have been achieved by two long-term JICA experts and the counterpart personnel during 1989 to 1993. These are as follows :-

2.1.1 Method of Construction Material Test and Handling of Equipment

The tests such as Physical Test of cement, Aggregate Test, Hard Concrete Test, Steel Material Test, Rock Test are performed by two long-term JICA Experts during 1989 to 1993 and detailed progress are shown in Table-1. The remaining Construction Material Test are shown in Table - 2.

2.2.3. Method of Soil Tests & Handling of Equipment.

These testings have been done and detailed lists are shown in Table 3. And then, the remaining lists of these testings are also shown in Table 4.

2.2.4. Quality Control of Soil Tests.

This portion have been finished and detailed list of tests are shown in Table 3. The remaining lists for this portion are shown in Table 4.

There is very little knowhow on this subject, therefore it is needed to promote the skillfulness of laboratory staffs to get more knowledge about Quality Control of Soil Tests.

Quality Control works in construction sites plays very important role in the ID since it can compromise three important factors of cost, time and risk as well.

2.2.5. Analysis of Soil Tests.

By using different moisture and density, the comparison was made on cohesive value (c), angle of internal friction (ϕ), and coefficient of permeability (k), as data analysis of soil.

There are many remaining analysis for Classification and Dynamics Quality of Soil Test.

To be able to introduce the analysis of Soil Test, it is required to build a database of laboratory test results from various project area and it will take long time to correct these information. After collecting sufficient informations, analysis and processing can be done by using computer. This job has been just started and it should be continued to meet the objectives of computer utilization in the field of Soil Test.

2.3 Water Quality Test.

Water Quality Test can be divided into two categories and they are :-

- (a) Method of Water Quality Test and Handling of Equipment.
- (b) Test & Survey for Quality of Irrigation water in Myanmar.

Technical transfer on Water Quality Test has not yet been started up to now.

2.4 Case Study of Test and Survey of Irrigation Projects

2.4.1 Construction Material Tests

The main objectives of Case Study is to collect basic datas on concrete such as cement, aggregate, fresh concrete, hard concrete, construction condition of placing, curing, vibrating and finishing of concrete.

- The analysis of compressive strength of different concrete blocks under the same condition of mixing materials.
- The analysis of specific gravity for cement which were stored under three kinds of packages.
- The analysis of concrete compressive strength under three types of curing condition which are non-curing, partially saturated curing and fully saturated curing.

The remaining case study for Construction Material Test are as follows :-

- the comparison of mass concrete measuring on different temperature
- The comparison of ice concrete mix design for mass concrete under the different kinds of water cement ratio.

2.4.2 Soil Test

- The test embankment of sandy soil was made to study the number of passes on different density conditions in ITC compound.
- The analysis of density has already been compared by using sand replacement and core cutter method at ITC test embankment and Ngamoeyeik Dam Site.
- The test embankment of clayey soil and mixed soil were to be constructed and to be studied as remaining job.
- As a case study, Standard Penetration Test & Sounding Test were carried out at the same location of Ngamoeyeik main canal.
- The comparison for the settlement of soft soil foundation has to be continued.

3. Problem

The workplan cannot be completely finished at the time of March 1995. There are not particular problems for each work plan but there are some general problems concerning with the field of Construction Material Tests and they are :

- Technical transfer received by the counterpart personnel are supposed to be insufficient as per expected in the RD, and they are found weak in technology especially in the construction control works.

Depend upon the knowledge and experience of laboratory staffs, new equipments which are not listed at the beginning of I.T.C project were requested and received from J.I.C.A. So the sufficient time is needed for the handling and testing of these additional equipment.

- And then, I.T.C had received the apparatus of Water Quality Test which has been supported by J.I.C.A. But the under-using instruments are not modernized and reagents are expired. Therefore modernized and sophisticated instruments for Construction Material Tests and new reagents for Water Quality Tests and Chemical Tests are essential.

Some major problems for delays of technical transfer are as follows

- Most of chemical reagent are expired.
- Incomplete set of instruction manuals for the test apparatus.
- Lack of spareparts for the substitution of damaged instruments.
- Unstable position of Myanmar counterpart personnel.
- Most of the counterparts are engaged in I.D projects and quality control

works at the various construction sites.

4. Solution and Plan

According to 93-94 work plan and discussion between Japan Experts and Myanmar counterparts, the remaining jobs attached as Table-2 and Table-4 can be finished at March 1994. During this time, Water Quality Test and Chemical Test which are very important and useful for I.D cannot be completely finished.

Short-term JICA Expert for Water Quality Test and Chemical Test should be despatched by JICA and training on these tests should be conducted at I.T.C by giving sufficient time. Before he come to I.T.C, reagent and testing equipments should also be made ready by the support of JICA.

The progress of Construction Material Tests especially in Quality Control Analysis Method and Case Study should not be finished at the end of March 1995.

To solve the above mentioned problems, it is to be requested continuous long term JICA Expert for Construction Material Tests & Analysis at least one year extension until March 1996.

5. Conclusion

- During the extension period of this project, high techniques on Quality Control must be introduced to the laboratory personnels.
- For the Analysis and Case Study Programme, the different types of testings must be introduced to the laboratory staffs.

Finally , Technical Transfer Program for Construction Material Tests is supposed to be finished at the end of March 1996 . After the completion of program, I . D should be beneficial to get the skillful personnel and the technology of Construction Material Tests.

Table - 1

List of Construction Material Tests on which Technical Transfer has been done in each year

Sr. No.	Contents	Fiscal year				
		89	90	91	92	93
1.	Physical Test of Cement					
	(a) -Specific Gravity Test.	*		*		*
	(b) -Fineness Test.	*				*
	(c) -Setting Time Test.	*				*
	(d) -Soundness Test.	*				*
	(e) -Compressive Strength Test.	*		*		
	-Flexural (Bending) Strength Test.	*		*		
(f) -Heat of Hydration Test					*	
2.	Aggregate Test					*
	(a) -Specific Gravity Test.					*
	(b) -Absorption Test.					*
	(c) -Sieve Analysis Test.	*	*			*
	(d) -Unit Weight Test.	*	*			*
	(e) -Test for Content of Surface Moisture of Fine Aggregate.	*		*		*
	(f) -Test for Amount of Material Finer than the sieve 0.074 mm in aggregate.	*	*			
	(g) -Organic Impurities in Fine Aggregate Test.	*	*			*
	(h) -Soundness of Aggregate Test.	*	*		*	*
	(i) -Abrasion Test.	*		*	*	*
	(j) -Soft Stone Test.	*		*	*	*
	(k) -Clay Lump Percentage in Aggregate Test.	*		*	*	*
	3.	Fresh Concrete Test				
(a) -Sampling of Fresh Concrete.		*		*	*	*
(b) -Construction of Fresh Concrete.		*		*		
(c) -Slump Test.		*		*	*	*
(d) -Air content of Fresh Concrete by the pressure test.				*		
(e) -Washing Analysis Test.						*
(f) -Bleeding Test.						*
(g) -Construct for Specimen of Concrete Strength.		*		*		*
(h) -Mix Design of Concrete.	*		*		*	

Table - 1

List of Construction Material Tests on which Technical Transfer has been done in each year

Sr. No.	Contents	Fiscal year				
		89	90	91	92	93
4.	Hard Concrete Test					
	(a) -Test for Compressive Strength of Concrete.	*		*		*
	(b) -Flexural Strength Test.	*		*	*	*
	(c) -Tensile Strength Test.	*		*	*	*
	(d) -Test for compressive strength of concrete using Portion of Beams broken in flexure.	*		*		
	(e) -Strength test and cutting for Core and Beams out of Concrete.	*		*		
	(f) -Test for Non-destructive Strength of Concrete (Ultrasonic Wave Test).			*		*
	(g) -Schmidt Hammer Test.	*				*
5.	Steel Material Test					
	(a) -Tension T.P of Steel Materials.	*		*	*	*
	(b) -Bending T.P of Steel Materials.	*				*
6.	Rock Test					
	(a) -Preparation for specimen and sampling of compression strength.			*		
	(b) -Compression Strength of Rocks.			*		*
	(c) -Tensile Strength of Rocks.			*		
7.	In-service Training					
	(a) -Basic Course.				*	*
	(b) -Intermediate Course.					*
8.	Quality Control					
	(a) -Ngamoeyek Dam Project .				*	*
	(b) -Waba Dam Project .				*	*

Table - 2

Remaining Construction Material Tests for Technical Transfer

Sr. No	Content	Remark
1	Aggregate Test (a) Test for salt content to sand.	not yet being started.
2	Hard Concrete Test (a) Flexural (Bending) Strength Test. (b) Test for compressive strength of concrete using portion of beams broken in flexure. (c) The strength test and cutting for core beam out of concrete. (d) Test of boring; sampling , cutting the core from concrete with portable core drilling machine. (e) Test for length changed on dry and wetting of mortar or concrete specimen. (f) Poisson's Ratio Test. (g) Test for compressive loading with spring type creep test apparatus.	Incomplete understanding idea. not yet being started
3.	Steel Material Test. (a) Bending T.P. of Steel Material.	Incomplete understanding idea.
4.	Rock Test (a) Preparation for specimen and sampling of compressive strength. (b) Compressive Strength Test. (c) Tensile Strength Test. (d) Polishing of Rocks. (e) Crystalization of Rocks with polarization microscope.	Incomplete understanding idea . not yet being started

Table - 3

List of Soil Tests on which Technical Transfer has been done in each year

Sr. No.	Contents	Fiscal year				
		89	90	91	92	93
1.	Discriminate & Classification of Soil Tests					
	(a) -Sample preparing for Grain Size Analysis and Physical Tests.	*	*			
	(b) -Moisture Content Test.	*	*			
	(c) -Specific Gravity Test.	*				
	(d) -Density Test.	*		*		
	(e) -Grain Size Analysis Test	*	*	*		
	(f) -Hydrometer Test.	*		*		
	(g) -Liquid Limit Test.	*	*			
	(h) -Plastic Limit Test.	*	*			
2.	Dynamics Quality of Soil Tests					
	(a) -Compaction Test.		*	*		
	(b) -C. B. R Test.			*		*
	(c) -Permeability Test.		*	*		
	(d) -Unconfined Compression Test.		*	*	*	
	(e) -Standard Triaxial Test.		*	*		
	(f) -Large Triaxial Test.			*		
	(g) -Large Permeability Test.					*
	(h) -Direct Shear Test.				*	
	(i) -Consolidation Test.		*	*		
3.	Construction Control Test					
	(a) -Moisture Content Test.					
	-Method of Alcohol Combustion.		*	*		
	-Method of Prying - Pan.		*	*		
	-Method of Microwave Oven.		*	*		
	(b) -Field Density Test.					
	-Sand Replacement Method.			*	*	*
	-Core Cutter Method.		*	*	*	

Table - 3

List of Soil Tests on which Technical Transfer has been done in each year

Sr. No.	Contents	Fiscal year				
		89	90	91	92	93
4.	In-Situ Test					
	(a) -Cone Penetration Test		*	*	*	
	(b) -Swedish Sounding Test			*		*
	(c) -Standard Penetration Test					*
5.	In-Service Training					
	(a) -Basic Course				*	*
	(b) -Intermediate Course					*
6.	Quality Control					
	(a) -Ngamocycik Dam Project				*	*
	(b) -Waba Dam Project				*	*

Remaining Soil Tests for Technical Transfer

Sr. No.	Content	Remark
1.	Discriminate and Classification of Soil. (a) pH and Slaking Test of Soil	Not yet being started
2.	Chemical Test (a) pH Test of Soil. (b) Organic Matter Content Test. (c) Salty Test.(Concentration Salts) (d) Sulphate Content. (e) Carbonate Content. (f) Chloride Content. (g) Total dissolved solid.	Not yet being started
3.	Dynamics Quality of Soil (a) Large Scale Triaxial Test. (b) Direct Shear Test.	Incomplete Under - standing Idea
4.	Construction Control (a) Moisture Content Test -Infrared Method. (b) Field Density -Compacted Sand Replacement Method. (c) Field Permeability Test. (d) Plate Bearing Test. (e) Cubic Permeability Test. (f) Field C . B . R Test.	Not yet being started Incomplete Under - standing Idea
5.	In-Situ Test (a) Vane Shear Test. (b) Dutch Cone Penetration Test. (c) Sampling for undisturbed soil of thin wall sampler of Stationary Piston Type. (d) Drilling Machine. (e) Speedy Moisture Test.	Not yet being started

REPORT

ON

HYDRAULIC MODEL TESTS AND ANALYSIS

Report on Hydraulic Laboratory

1. Background

Some hydraulic phenomena are so complex and cannot be solved only by analytic means. Then simulation of hydraulic phenomena in the laboratory is to be carried out by using scale models or mathematical models or both. Testing of physical model (or) analysing of Mathematical modelling is one of the advanced technique for studying of Hydraulic phenomena near the structures. Therefore it is essential to improve knowledge of modelling technique within the I.D personnels. Irrigation Technology Center (I.T.C) project laid down the following objectives for improvement and transferring of technical knowhow according to the Record of Discussion (R.D).

(a) Hydraulic Model Test.

The following models will be tested on physical (scale) model.

(1) Yin Dam Spillway

(2) Sadon Dam Spillway

(3) Yin Weir

(b) Simulation analysis

- To introduce the computer simulation analysis for hydraulic problems.

2. Progress

2.1 Hydraulic Model Test

According to one of the objectives of I.T.C project for hydraulic laboratory, a scale model for Yin Dam was constructed in the year 1991. The construction of model was completed in June 1991 and all required tests were finished for original design and alternate design such as different design of lip angle for flip bucket and etc.

To get comments on the model study on Yin spillway model from some experienced engineers, seminar on Yin spillway model was held on May 20, 1992. The report for the model study on Yin spillway is now under preparation.

The second scale model for Sadon dam spillway was started after finished of the testing of Yin spillway model. The construction works were completed in March 1993. To get more practice and experience, the same tests as Yin spillway model will be carried up to the end of December 1993.

2.2 Simulation analysis

The main objective of this field is to introduce the computer simulation analysis for solving of hydraulic problems. Up to now Only one short term expert was dispatched and had given (9) days lectures on unsteady flow simulation .

It is still remain to complete the technical report of testing Yin spillway model and some tests for Sadon spillway model. And also, the construction of mobile bed model for Yin weir is not yet started.

It is also still remain for getting more knowledges about mathematical simulation such as collection of data and application of mathematical model.

3. Problems

Shortage of skill personnel in Hydraulic laboratory is one of the cause for delay of physical model tests.

For construction and testing of Yin weir model, it needs more experience and technical knowhow, since movable bed models are more complicated and have many problems for simulation of prototype. Without sufficient knowledge, it will be very difficult not only for construction of model but also for collection of data.

For simulation analysis, lack of trained personnels is the main problem. It is also not easy to understand all of the lectures given by short-term expert within a short period of time.

Insufficient equipment and apparatus is one of the problems for measuring of data from model testing. Without recording equipment such as paper recorder or tape recorder, it is difficult to get accurate data.

4. Solution and Plan

To get more skill personnel for Hydralic laboratory, it needs to give more trainings for testing of physical model by expert and if necessary study tour to well organized laboratory and oversea trainings for this field must be arranged for getting more experience and knowledge.

For construction and testing of Yin weir model, it is necessary to get more training and close guidance by long-term Expert. Counterparts should be also well experienced engineers for this field, otherwise it is difficult to follow all the instructions and guidelines given by experts.

For simulation analysis, it is necessary to get more knowledges about programming and computer utilization. And also it needs to practice by using some softwares developed by well organized laboratories. To give more training for this field by short-term or long-term expert is essentially required.

To get required equipment and apparatus for (I.T.C) Hydraulic laboratory, it is necessary to request JICA for providing within allowable budget.

Depend upon the condition of above mentioned solution of problems, tests of scale models will be carried over up to completion of report within the remaining

period of project, and also data collection and analysing for Yin weir model and computer simulation should be carried out within the remaining period.

5. Conclusion

It is expected that spillway model testing for Yin Dam and Sadon Dam will be finished within the remaining period of project time. But other two objectives of testing Yin weir model and simulation analysis cannot finish in project time and must be needed for extension.

Since testing of physical model (scale model) is the new subjects for I.D, it needs sufficient knowledge and experience for performing of objectives laid down by R.D. Moreover, at present condition only testing of rigid bed models (spillway models) can be finished within the project period. In the field of physical model test not only rigid bed model but also mobile bed model is important for studying of sedimentation and scouring problems. Technical transferring of testing for rigid bed model is not sufficient for this field of physical modelling and it should also be included for testing of movable bed model. Therefore it should be continued for testing of Yin weir model according to RD. To continue testing of Yin weir model, it must be needed not only long-term expert for guidance but also at least one and a half years extension after present project is terminated.

For simulation analysis, the progress is not so satisfactory up to now. Only one short term training given by short term expert is not sufficient for getting knowledges of mathematical modelling. Simulation analysis is also a very complicated subject and it needs more training by experts. Practical training using by softwares can be improved and gained technical knowledges about this field and one case study (e.g mathematical modelling for Twante canal) should be done for improvement of experience and technical knowhow. Since the activities for this field is delayed and one year behind after schedule, there is no sufficient time for more training, practice of softwares and to do case study before project is terminated. Therefore it must be extended at least (2) years after March 1995.

**Schedule for activities of Hydraulic Laboratory (I.T.C)
1994 - 1997**

JOB DESCRIPTION	1994			1995			1996			1997		
1. Yin weir model												
(a) Collection of data	4/94	10/94										
(b) Analysing of data		11/94	1/95									
(c) Estimate preparation		2/95	4/95									
(d) Construction of model		5/95	8/95									
(e) Testing of model												
(1) Original design			9/95			12/95						
(2) Alternative design					1/96				4/96			
(f) Report												
(1) Draft report									5/96			
(2) Final report									6/96	8/96		
2. Simulation analysis												
(a) Practice of software for solving of Hydraulic problems	4/94											
(b) Case study												
(1) Collection of data												
(2) Modelling and calibration									3/96			
(3) Reporting									4/96	12/96		
										1/97		3/97

**REPORT
ON
TRAINING PROGRAM**

REPORT ON TRAINING PROGRAM

1. Background

In the framework of the field "Training", training programs have been divided into two main programs namely:-

- (1) Periodical Training and
- (2) Special Training.

Periodical training consists of Pre-service training and In-service training. Main aim of Pre-service training is to offer trainees basic engineering knowledge for execution of their duties and trainees in In-service trainings are to be equipped with the capability of introducing and spreading new technologies among them.

Special training are to be conducted for the fields of:-

- (1) Computer
- (2) Design Criteria
- (3) Construction Material-Test and Analysis
- (4) Hydraulic Model Test and Analysis respectively.

2. Progress

Since 1989-90 budget year, various kinds of training have been conducted at ITC. Starting from 1992-93, schedule of yearly training programs have been prepared and almost all training courses have been opened one by one. More and more training programs could be conducted year after year and the list of the training programs for each year are shown in Table-1, Table-2 and Table-3 respectively.

In the list of the training programs, special training programs given by short-term JICA experts on each field can also be seen as well. Upto now total forty-two numbers of training courses have been opened and total 914 numbers of participant have been trained at ITC during the Project term.

Out of forty-two trainings, Computer Section itself had conducted eighteen trainings and total 206 numbers of engineers and staff personnel have attended these computer courses to enhance their knowledge on computer utilization.

Total four numbers of training could be conducted for soil and concrete laboratory test and one out of these four trainings was conducted on the Engineering Geology by the short-term JICA expert.

Upto now two training/seminars on Design Criteria and two training courses on Hydraulic Model Test could be conducted by the short-term JICA experts.

3. Problem

At ITC there is a shortcomings of counterpart personnel and therefore training section cannot be properly formed to carry out the training programs according to the schedule.

At ITC organisation there is lack of full-time well-experienced engineers to work as the permanent lecturers or instructors for the training courses. At present, almost all counterpart personnel from each section have to work as lecturers or instructors as temporary basis besides their own jobs.

Staff personnel or engineers in the ID are busy with their daily works at their respective offices or projects, and it was found difficult to get suitable trainees for each courses.

Since training section have not yet been properly formed, a systematic training system could not be set at ITC. However, the above problems could be solved by the ID locally to improve the quality of the training programs at ITC.

4. Solution and Plan

ID should take necessary actions to solve the problems mentioned above and then the training programs will be improved not only in quantity but also in quality. Four senior engineers have been transferred to ITC very recently by the ID Head Office and a proper training section is to be formed at ITC near future. A proper supervisory committee that manages and controls the syllabus and lecture notes for each training course should also be formed with the senior engineers in the department.

JICA should continue to support these training programs in terms of teaching facilities, consumable items and necessary guidance and advice which make the trainings more fruitful. At the same time JICA should accept more counterpart trainings in JAPAN to improve the status of Irrigation Technology Centre in terms of qualified and versatile counterpart engineers.

5. Conclusion

Training programs are very important for the establishment of man-power in the Irrigation Department. Therefore it is sole responsibility of ITC to conduct the various kinds of training courses not only in quantity but also in quality. This task will be accomplished more successfully by the continuous support of JICA.

Without the cooperation and support of JICA, ITC trainings cannot be in high standard like at present time and it will be more difficult to make the trainees interested in each course. Extension of the project term is also considerable for this reason.

**TABLE-1 TRAINING PROGRAMS CONDUCTED AT ITC
IN EACH BUDGET YEAR**

(Year 1989 - 90)

No.	Training Program	Education	No. of Trainees	Date		Duration (Weeks)
				From	To	
1.	Inservice training course No.(1) for tracer and draftsman Course.	10 th std.	26	3.7.89	27.7.89	5
2.	Inservice training course No.(2) for tracer and draftsman Course.	"	29	7.8.89	31.8.89	3
3.	Computer Operator Course (1989)*	B.E.	20	23.11.89	16.12.89	3

(Year 1990 - 91)

No.	Training Program	Education	No. of Trainees	Date		Duration (Weeks)
				From	To	
1.	Basic Computer course for ITC staff personnel.	10 th std.	21	14.5.90	12.6.90	4
2.	Workshop/seminar of computer section staff personnel.	"	8	1.8.90	31.10.90	12
3.	Preservice training course for Staff officer No.(1).	B.E.	50	17.12.90	6.1.91	3
4.	Preservice training course for Staff officer No.(2).	"	44	14.1.91	3.2.91	3
5.	Preservice training course for Staff officer No.(3).	"	50	18.2.91	8.3.91	3

(Year 1991 -92)

No.	Training Program	Education	No. of Trainees	Date		Duration (Weeks)
				From	To	
1.	Preservice training course for Staff officer No.(4)	B.E.	46	22.4.91	10.5.91	3
2.	Preservice training course for Staff officer No.(5)	"	45	27.5.91	14.6.91	3
3.	Preservice training course for Staff officer No.(6)	"	44	8.7.91	26.7.91	3
4.	Basic computer course No.(1)	"	20	4.11.91	8.11.91	1
5.	Preservice training course for Staff officer No.(7)	"	48	11.11.91	29.11.91	3
6.	Computer Operator course (1992) *	"	6	2.3.92	6.3.92	1

* Training program conducted by short-term expert

TABLE-2 TRAINING PROGRAMS CONDUCTED AT ITC IN 1992-93

No.	Training Program	Education	No. of Trainees	Date		Duration (Weeks)
				From	To	
1.	Basic Computer course No.(2)	B.E.	10	18.5.92	23.5.92	1
2.	Refresher course No.(3) for D.M(4)	10 th std.	47	22.6.92	10.7.92	3
3.	Intermediate Computer course No.(1)	B.E.	10	20.7.92	7.8.92	3
4.	Refresher course No(4) for D.M(4)	10 th std.	47	17.8.92	4.9.92	3
5.	Basic Computer course No.(3)	B.Sc.	9	28.9.92	9.10.92	2
6.	Basic Computer course No.(4)	"	10	26.10.92	6.11.92	2
7.	Special ComputerSoftware Course	B.E., B.Sc.	12	16.11.92	20.11.92	1
8.	Basic Computer course No.(5)	B.E.	11	23.11.92	4.12.92	2
9.	Basic Training course on Soil and Concrete Tests.	10 th std.	16	30.11.92	18.12.92	3
10.	Special Computer course for Survey Software No.(1)	B.E.	12	29.12.92	8.1.93	2
11.	Basic Training course No.(1) for Surveyors	10 th std.	20	28.12.92	5.2.93	6
12.	Intermediate Computer course No.(2)	B.Com ,B.sc.	12	18.1.93	5.2.93	3
13.	Refresher course No.(1) for D.M(3)	10 th std.	22	8.2.93	19.3.93	6
14.	Special Training course on Engineering Geology (1993)*	B.Sc(Geol.),B.E, B.Sc.	20	1.3.93	10.3.93	1.5
15.	Computer Operator Course (1993)*	B.E.	9	1.3.93	16.3.93	2.5
16.	Special Training course on Seepage Analysis (1993)*	B.E.	29	10.3.93	19.3.93	1.5

* Training program conducted by short - term expert

TABLE-3 TRAINING PROGRAMS CONDUCTED AT ITC IN 1993-94

(1993- November)

No.	Training Program	Education	No. of Trainees	Date		Duration (Weeks)
				From	To	
1.	Training course on applied Hydrology for Agricultural Land *	B.E.	6	29.3.93	6.4.93	1.5
2.	Training course on Computer Simulation in Hydraulic Test *	B.E.	8	29.3.93	6.4.93	1.5
3.	Basic Training course No.(2) for Surveyors	10 th std.	15	26.4.93	4.6.93	6
4.	Basic Computer course No.(6)	B.E.	10	26.4.93	7.5.93	2
5.	Refresher course No(2) for D.M(3)	10 th std.	19	17.5.93	25.6.93	6
6.	Intermediate Computer course No.(3)	B.E.	10	21.6.93	9.7.93	3
7.	Training course on Hydraulic Model Test	B.E.	14	12.7.93	23.7.93	2
8.	Basic Training course No.(2) on Soil and Concrete Tests	10 th std.	14	3.8.93	27.8.93	4
9.	Special Computer course No.(2) for Survey Software	B.E., B.Sc	6	9.8.93	27.8.93	3
10.	Intermediate Training course No.(1) on Soil and Concrete Tests	10 th std.	14	30.8.93	24.9.93	4
11.	Basic Computer Course No. (7)	B.Sc., B.Com	10	25.10.93	5.11.93	2
12.	Seminar on Design Criteria II *	B.E., B.Sc (Geology)	35	29.10.93	12.11.93	2

* Training program conducted by short - term expert