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**IRRIGATION SYSTEMS MANAGEMENT - II
(391-0467)**

REVISED PLAN OF WORK

PREPARED FOR THE

**UNITED STATES AGENCY FOR
INTERNATIONAL DEVELOPMENT
ISLAMABAD, PAKISTAN**

BY

HARZA ENGINEERING COMPANY

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LIST OF ACRONYMS

ACE	Associated Consulting Engineers
ACOP	Alluvial Channels Observation Project
AMU	Administrative Management Unit
DAI	Development Alternatives Incorporated
FCC	Federal Coordination Cell
GOP	Government of Pakistan
ISM	Irrigation Systems Management
ISRP	Irrigation Systems Rehabilitation Project
MIFC	Management Information Flow Center
M&E	Monitoring and Evaluation
NESPAK	National Engineering Services, Pakistan
NWFP	Northwest Frontier Province
O&M	Operation and Maintenance
PEA	Punjab Engineering Academy
PERI	Punjab Economic Research Institute
PID	Provincial Irrigation Department
PLM	Purpose Level Monitoring
SDO	Sub-Divisional Officer
TA	Technical Assistance (consultants)
USAID	United States Agency for International Development
WAPDA	Water and Power Development Authority
WMED	Watercourse Monitoring and Evaluation Directorate
XEN	Executive Engineer

EXECUTIVE SUMMARY

The second phase of the Irrigation Systems Management Project (ISM-II) was begun in October, 1989. A project workshop attended by GOP and USAID staff as well as by the Harza/DAI/ACE Technical Assistance Team and by a representative of NESPAK was held in March, 1990. Understandings reached during this meeting were incorporated in an initial Plan of Work that outlined project objectives, priorities, organization and methods.

This document is a revision of the initial Plan of Work, written to modify the initial plan based on experiences and developments of the past year. Two primary factors motivate this revision. First, as expressed in the initial plan of work, the Project must concentrate efforts on areas where we believe sustainable contributions can be made to the PIDs. As the project has matured, our perceptions of how best to strengthen the PIDs has evolved. This work plan presents an opportunity to articulate ways in which involvement in the project has refocused some priorities. Second, shifts in the USAID agenda have reduced the project budget, resulting in further reassessment of resources and priorities. Overall, this Revised Plan of Work is designed to apply the experience and the resources now available to ISM-II to areas where we can make the greatest contribution during the project's remaining months.

ISM-II is designed to improve operation of irrigation systems by supporting development of the institutions responsible for system management, namely, the four Provincial Irrigation Departments (PIDs) and the Federal Coordination Cell. As in the initial Plan of Work, this revision will focus on the six project components described in the project paper. These components are briefly described below. Exhibit 1 displays the overall project structure; Exhibit 2 presents the current composition of the project team; Exhibit 3 gives a general timeline for major activities during the remainder of the project period.

Rehabilitation/Civil Works is aimed at improving the PIDs' data collection, design, review, quality control, and supervisory functions required for system rehabilitation, and leaving behind portions of the irrigation system which are in good condition and properly maintained.

Operation and Maintenance emphasizes strengthening the PIDs' planning and performance of routine maintenance of canals and ancillary structures.

Equipment Management and Utilization is designed to institutionalize the active management and maintenance of mechanical equipment

and facilities and to upgrade the skills of workshop personnel and equipment operators.

Monitoring and Evaluation tests the effectiveness of canal and drain rehabilitation and of introduction of light mechanized equipment for routine maintenance, and supports effective tracking and management of ISM-II.

Training builds management, planning, and technical skills of PID staff through local and overseas training. The Project will focus on institutionalizing training activities within the PIDs.

Computerization provides facilities and develops computer skills, and identifies and promotes uses of computer applications that have the greatest potential for improving planning, design, and management.

Overview of the ISM-II Project

OVERALL GOALS

*Equitable, Reliable
Water Delivery*

*Financially Sustainable
System Operation*

Through

. Improved Cost
Recovery

. Improved Maintenance
Efficiency

THREE PRINCIPAL PROJECT OBJECTIVES

. Strengthen O&M
Effectiveness

. Support Rehabilitation
of Canals & Drains

. Improve Utilization
of Equipment

SIX PRINCIPAL PROJECT COMPONENTS

CIVIL WORKS/REHABILITATION

- . Strengthen PIDs' Capability in Subsystem Rehabilitation
- . Improve Data Collection and Analysis; Standardize Design Procedures

MONITORING & EVALUATION

- . Strengthen Hydraulic Monitoring Capabilities within the PIDs
- . Monitor and Evaluate Project Related Activities
- . Evaluate Impact of Canal and Drain Rehabilitation

OPERATION AND MAINTENANCE

- . Improve PIDs' Planning and Performance of Routine O&M
- . Implement O&M Equipment Trial
- . Revise O&M Manuals, Update Yardsticks

COMPUTERIZATION

- . Encourage Computer Usage to Improve Planning, Design and Management
- . Develop Hardware, Software and Personnel Resources of the PIDs

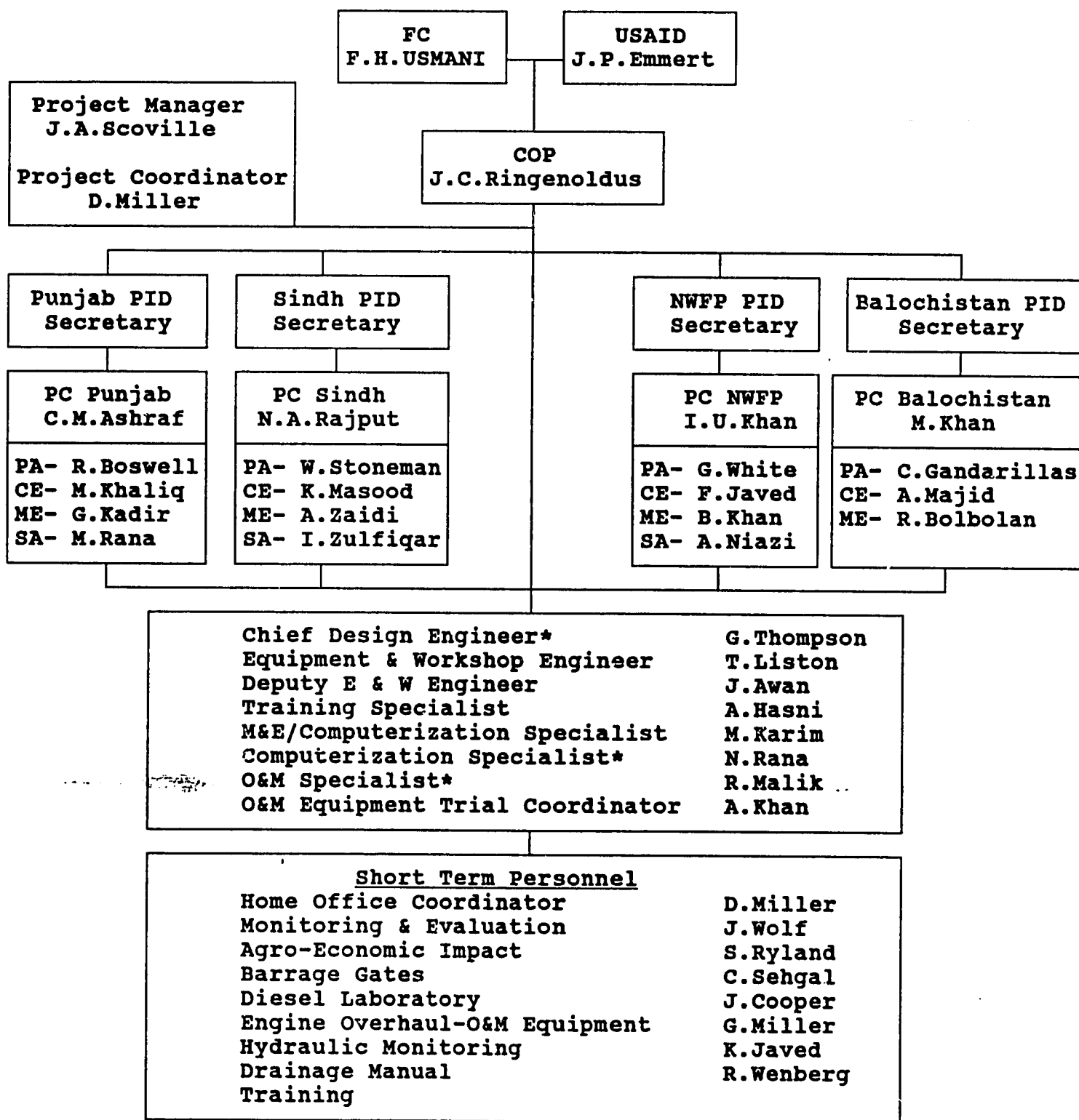
EQUIPMENT MANAGEMENT AND UTILIZATION

- . Improve PIDs' Use and Maintenance of Equipment
- . Mobilize Workshops: Increase Inventory of Operational Equipment
- . Improve Equipment Management

TRAINING

- . Develop the PIDs' Capacity to assess Training Needs and Plan Training Programs
- . Train PID Personnel in Maintenance Design and Management Functions

ISM-II Technical Assistance Organization Chart

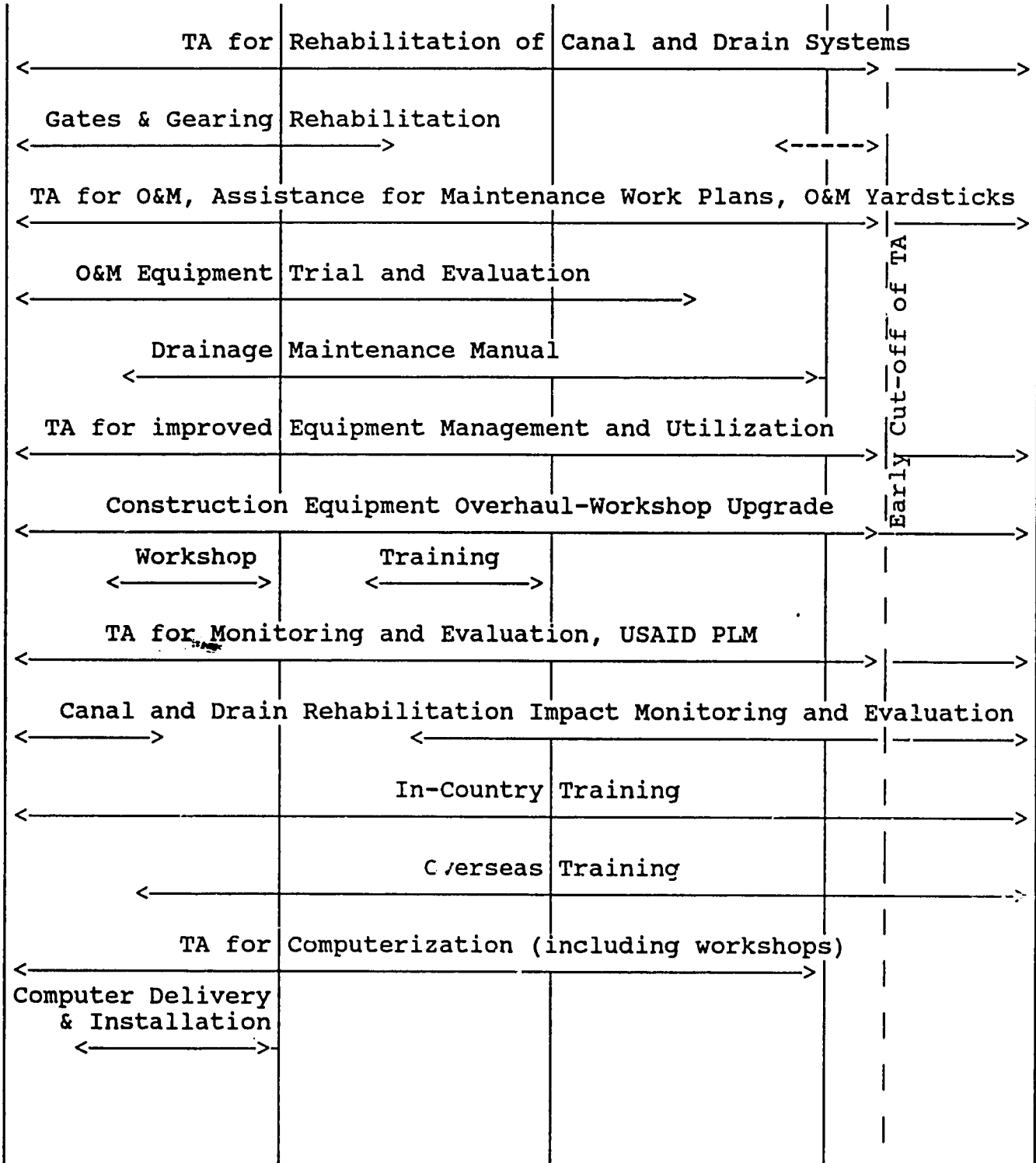


PID: Provincial Irrigation Department
FC : Federal Coordinator
PC : Provincial Coordinator
PA : Provincial Advisor
*** :** Assignment Completed

COP: Chief of Party
CE : Civil Engineer
ME : Mechanical Engineer
SA : Systems Analyst

GENERAL TIMELINE FOR REMAINING PROJECT PERIOD

July 91 Dec 91 Jan 92 June 92 July 92 Dec 92 Jan 93 May 93



CHAPTER I.

COMPONENTS OF ISM-II.

Introduction

Experience from the first year of ISM-II has led us to significantly change our approach to sustainable institutional development within the PIDs. While the emphasis in ISM-I and in the project paper for ISM-II had been on modifying the structure of the PIDs by introducing new management cells, such as the Design Cell and the Administrative Management Unit, to perform specific tasks, our experience in ISM-II has been that new cells increase the staffing burden on the PIDs while often duplicating activities performed by existing units. For this reason, the most fundamental change we will adopt for the remainder of the project will be to focus our efforts on improving the capability of existing PID units and of the personnel who staff these units. The goal of this approach will be to improve the operation of the PIDs without modifying their structure.

Rehabilitation/Civil Works

The Rehabilitation/Civil Works component has undergone considerable redirection since the project's inception. A major concern of the project paper was establishment of a viable design cell within each PID to handle the redesign of problematic channels and to provide specialized back-up and support to the field staff in difficult design problems. Considerable effort was expended in ISM-I and the early stages of ISM-II in developing these cells. However, while these efforts met with sporadic success, none of the design cells has achieved the critical mass of staffing or of work needed to justify continued efforts to support them now let alone to suggest that they would survive after completion of the project.

Although the project paper for ISM-II asserts that "the Punjab and Sindh Design Cells are now able to maintain applications developed by the consultants, develop new applications, and manage their computer facilities effectively", we believe this to have been an unrealistic appraisal of a sustainable level of support for the Design Cells. Activity in the Sindh Design Cell collapsed during the bridging period and two key staff of the Punjab Cell departed for long term academic training at the start of ISM-II. In all provinces, readily acknowledged but never resolved staffing difficulties testify to the problems inherent with these cells. Stemming from our assessment that the concept of the design cell is not sustainable, the most significant change in the rehabilita-

tion\civil works component is the redirection of our design support efforts to the division level, where the bulk of design work continues to go on.

The project's Chief Design Engineer completed his 18 month assignment in April, 1991. Rehabilitation/Civil Works assistance for the remainder of the project will be carried out primarily by the Provincial Advisors and will incorporate recommendations developed by the Chief Design Engineer.

Design Training Because the bulk of design work continues to be carried out at the division level where PID staff are involved in both design and construction, we recommend that the project redirect its design efforts to providing design training and assistance to division level staff.

We recognize that many of the prospective trainees do not now have access to computers. Therefore, design training will encourage computer utilization but not require it. Computer usage will be limited to applications of well understood design concepts such as using spreadsheets to computerize Lacy's Regime theory, to solve Manning's equation, or to estimate bidding quantities. Computer programming and use of CAD for design will not be covered in these courses.

Training programs will be tailored to the requirements of the particular provinces. Because of the relatively small size of the NWFP and Balochistan PIDs, design training run under the auspices of ISM-II may be able to improve the skills of a significant proportion of the staff of these PIDs. By contrast, the much larger Punjab and Sindh PIDs will demand greater resources and a longer period of time to complete a program of design training. This difference in scale will require that design training be successfully institutionalized in the larger PIDs so that training will continue after the project has ended.

Standard Designs The emphasis on developing a catalogue of standard designs and construction guidelines will vary according to the interests of the provinces. For example, in Balochistan, efforts will concentrate on semi-standard design using computerized spreadsheet templates combined with standard drawings.

Canal and Drain System Rehabilitation Although the USAID funding for new canal and drain system rehabilitation projects has been severely reduced, efforts and funding will continue for many schemes that are in progress, and the World Bank/Dutch funded program is unaffected. Technical Assistance Team will continue to seek opportunities to facilitate the work. Inputs to the rehabilitation activities will vary in the provinces depending on the desires of the PIDs. In NWFP, contributions will continue in the area of construction quality control, and in Balochistan, in design and construction quality improvements. The Drainage Manual,

discussed under Operations and Maintenance, will include sections on planning, design, and construction quality control.

Gates and Gearing Rehabilitation One of the major successes of ISM-II has been repair of roller tracks on 16 bays of Jinnah Barrage. The process for conducting the repair was developed during the first year of the project and was successfully applied during the canal closure period of 1990-1991. This technique will be repeated during the 1991-92 closure period to repair gate tracks on the Jinnah Barrage's remaining 40 bays. Because of the experience gained during the first phase of the repairs, we believe the ambitious rate of production required to complete the Jinnah Barrage repairs during the coming closure period is achievable. If not, any remaining repairs could be completed in the winter of 1992-93.

Along with the track repairs at Jinnah Barrage, repairs of structural members of gates at Balloki Headworks are scheduled for the 1991-92 closure period. As with Jinnah, any work remaining after this closure can be completed the following year.

Operation and Maintenance

Operation and Maintenance activities for the remainder of the project resemble those outlined in the initial Plan of Work. These activities were given better definition during an Operation and Maintenance Planning Workshop held in early December, 1990. Participants in this workshop agreed that annual maintenance plans should identify routine and preventive maintenance and give an assessment of system condition. The participants also agreed that useful plans require information from the lowest field level and should oblige field personnel to routinely inspect facilities.

The basic unit for maintenance planning is the Division. An institutional goal of the project will be to encourage each Division to highlight existing or developing problems and to apply frequently updated yardsticks to estimating budget requirements for routine maintenance activities. The sequence of planning steps should start in September of the preceding year and be finalized by the end of July of the fiscal year.

Annual Workplans Annual O&M workplans will continue to be prepared in each of the PIDs. Balochistan has developed a computer template for the O&M workplan which will be proposed as a model for computerizing workplan preparation in the other PIDs. Because the other PIDs, particularly the Punjab and the Sindh, are much larger organizations than the Balochistan PID with many times the miles of canal and number of structures to maintain, modification of the Balochistan procedure for use in the other PIDs will require a serious effort.

O&M Yardsticks Work continues on development of O&M yardsticks for use in preparation of annual budgets and workplans. Although participants in the O&M Workshop recommended that yardsticks be updated at two year intervals, it has been difficult to institutionalize these regular updates in provinces other than Balochistan. In the Sindh, we will emphasize development of the annual workplans using available yardsticks. We believe that once preparation of the workplan has been institutionalized, a stronger rationale will exist for regular updating of yardsticks. This approach may also be useful in the Punjab and the NWFP.

Maintenance Manuals General maintenance manuals prepared during ISM-I have been revised and adapted for the NWFP and the Sindh. Conditions in Balochistan differ so greatly from those described in the general manual that the Balochistan PID determined that a revision of the existing manual would not be satisfactory. The Punjab has expressed interest in updating the Punjab Manual of Irrigation Practice. However, due to the magnitude of this task, we do not envision undertaking this as part of the ISM effort.

Drainage Manual The project paper remarks on the very poor maintenance of drains and specifies that technical assistance be provided to help the PIDs prepare a drainage manual addressing surface and subsurface drainage. Because of the many theories of subsurface drainage design and construction now practiced in Pakistan and because the requirements for maintenance of tubewells and subsurface drains are specific to their design, manufacture, and installation, development of a definitive manual covering subsurface drainage would be an enormous task which would be unlikely to produce a useful document. We believe a more useful product would be a manual of drainage maintenance that reinforces the importance of well-designed, well-maintained drains to the functioning of the irrigation/drainage system and that emphasizes problems such as weed control and bank sloughing associated with surface drains. This work will be carried out by an expatriate drainage expert who will work closely with a Pakistani counterpart provided through ACE.

Telecommunications Assessments USAID does not plan to fund the development of telecommunications systems within the PIDs. Therefore, we do not anticipate any further assessments of telecommunications needs under ISM-II.

O&M Equipment Trial Light mechanized equipment will be distributed in the coming months to begin the O&M Equipment Trial Program. Although the equipment provided in this program is suitable primarily for maintaining canal banks, implementing and monitoring this trial should indicate to the PIDs the feasibility of operating and maintaining equipment at the subdivision and division level.

The basic O&M equipment package at the sub-division level consists of a farm tractor, and several tractor-mounted or tractor-drawn

implements including a grader blade, dozer blade, tipping trolley, and a water bowser. This equipment is supplemented at the division level by an additional tractor, a tractor-mounted front-end loader, a chisel plow and a flat-bed truck. With the exception of the flat-bed truck, this equipment is of local manufacture.

The equipment will be allocated and tested in 26 sub-divisions contained within 9 divisions. Table 1 presents the quantities, types and distribution of equipment on order for the trial equipment program.

Table 1.

List of Trial Equipment

<u>Description</u>	<u>NWFP</u>	<u>Punjab</u>	<u>Sindh</u>	<u>Balochistan</u>	<u>Total</u>
Subdivision Level					
Tractor 50 HP	2	12	9	3	26
Dozer Blade	2	12	9	3	26
Grader Blade	2	12	9	3	26
Tipping Trailer	2	12	9	3	26
Water Bowser	2	12	9	3	26
Vibratory Compactor	2	12	9	3	26
Pickup Truck	2	12	9	3	26
Suzuki Jeep	2	12	9	3	26
Division Level					
Tractor 50 HP	1	4	3	1	9
Loader Attachment	1	4	3	1	9
Chisel Plough	1	4	3	1	9
Flat-bed Truck	1	4	3	1	9
Suzuki Jeep	1	4	3	1	9

The trial is designed to assess the suitability and effectiveness of the equipment package in maintaining the banks of canals and drains. Issues to be resolved in the trial include personnel training requirements, ability of the existing organizations to meet equipment operation and maintenance requirements, ability to fund operation costs, cost effectiveness in comparison to traditional methods, and, most importantly, physical condition of the maintained works at the end of the trial. The trial will be monitored by the TA team and participating irrigation officials. An evaluation will be made after the one-year trial by the TA team and irrigation officials. The TA team will coordinate the implementation of the O&M Equipment Trial, including orientation,

monitoring, and final evaluation. A full-time Pakistani coordinator has been added to the TA team and guidance will be provided by an expatriate TDY.

The initial stage of the program will be a pre-test conducted in a subdivision in the Punjab under the guidance of the program coordinator and the TDY expert. The pre-test will identify any modifications needed in the equipment package, assess training needs for irrigation personnel in operation and maintenance of the equipment and in performing maintenance activities, explore potentials for involving participants and focussing attention at the XEN and SDO level on improvement of maintenance, and provide insights to developing the monitoring program. Based on experience during this pre-test, seminars will be conducted in all of the PIDs to acquaint staff with the specifics of the trial equipment program including the equipment itself and the guidelines for equipment use and monitoring.

Equipment Management and Utilization

Emphasis in this component will continue to be on improving equipment management and utilization through on-the-job training, assistance in planning and reporting equipment utilization, bringing mechanical workshops to full operational status, computerizing inventories and management operations, and maintenance and overhauling of construction equipment.

Although funding has been reduced, spare parts will be continue to be procured for overhaul of specific pieces of construction equipment. Efforts will continue to utilize spare parts already in stock or available locally for equipment overhaul. Techniques will also be introduced for rehabilitation of worn parts where possible, such as hard-facing and regrinding gears. Metal casting facilities in the Jamshoro (Sindh) workshop will be upgraded similarly to the Mughalpura and Bhalwal workshops in Punjab.

Training programs are anticipated in areas including gate manufacture and repair, overhaul of heavy equipment transmissions, and in use of the engine dynamometer. Work will continue on rehabilitating workshop equipment in order to make the shops fully operational. A specialist in engine overhaul equipment will provide training in the NWFP workshop similar to that already provided in the Jamshoro and Mughalpura workshops. In addition, shop manuals will be translated into Urdu to facilitate their use by workshop personnel.

As well as the gate fabrication and repair already discussed in the Punjab, the NWFP workshop will continue to upgrade its capability in repair and rehabilitation of small gates and associated structures including those on the Warsak canal at D.I. Khan. In the

Sindh, gate repairs for the Khalri Baghar barrage may be initiated.

Computerization of workshop inventory, work order preparation and other operations will continue. Implementation of the MAINSAVER equipment management database has been slowed by limitations of the program release available to the PIDs. For instance, the current version is limited to maintaining personnel records for fifteen people. However, the developers of the program have agreed to make some required modifications to the program free of charge. In the meantime, the NWFP now prepares work orders using the MAINSAVER program and other data base programs are being written for specific management and accounting requirements within the PIDs.

Monitoring and Evaluation

Although the goals of project monitoring activities are those expressed in the initial Plan of Work, many of the specific objectives will change to reflect modifications in other aspects of the Project.

As stated in the initial Plan of Work, monitoring activities will be supported by the TA team at several levels:

- Strengthening monitoring capabilities within the PIDs
- Coordinating the 3 Year Evaluation of the Impact of Canal and Drain Rehabilitation
- Coordinating the Evaluation of the O&M Equipment Trial
- Providing Purpose Level Monitoring information for USAID
- Providing progress monitoring for use by the project team

Monitoring Within the PIDs The M&E component will support use of computers in budgeting, maintenance of personnel records, use of MAINSAVER, and other activities that will assist in allocation and tracking of departmental resources. The project paper envisioned procurement of large quantities of hydraulic survey equipment for use in monitoring the condition and performance of hydraulic structures. However, large cuts in the ISM-II commodity budget have greatly reduced the quantity of hydraulic measuring equipment that will be procured. We now intend to fully equip one or more circles in each PID with monitoring equipment as a pilot project. One of the priorities for TDY assistance will be to provide an expatriate expert in hydraulic/sediment monitoring to train PID staff in use of this equipment. Continuing training and supervi-

sion will be available from a local expert provided through ACE as well as ACOP.

Evaluation of the Impact of Canal and Drain Rehabilitation The impact evaluation program is to evaluate improvements in reliability and equity of water delivery and changes in agro-economic performance in eight systems scheduled for rehabilitation. The program was designed to collect data describing the systems' performance during the year before rehabilitation and during the year following rehabilitation. Evaluation of hydraulic parameters is being performed by ACOP. In the Punjab, the Economic Research Institute (PERI) is evaluating agro-economic impacts, while the Watercourse Monitoring and Evaluation Directorate (WMED) is performing this function in the other provinces. Although, the initial Plan of Work had anticipated that the TA team would assist in this monitoring activity, this assistance has grown to be a priority involving active participation from the resident staff and several months of TDY time. Technical assistance will be provided to coordinate the program, to the participating agencies for data management and analysis, and for preparation of the final evaluation. The TA Team will prepare a final report on the Impact of Canal and Drain Rehabilitation.

Coordination of O&M Equipment Trial The monitoring and evaluation aspects of the O&M Equipment Trial are discussed in the preceding section on Operation and Maintenance.

Purpose Level Monitoring (PLM) To satisfy USAID monitoring requirements, the TA team has developed and implemented a PLM system for ISM-II and issued reports specifying progress with respect to indicators of achievement of project purposes. Reductions in project funding and reallocation of resources will require that purpose level indicators be adjusted so that they remain useful benchmarks. For instance, the Organizational Strength Index will be revised to reflect changes in the project approach toward design, O&M manual preparation and other activities. With the exception of necessary revisions in project objectives, the PLM program will continue in its current format.

Internal Monitoring of Project Team Frequent communication among the TA team as well as regular reporting, such as monthly memos prepared by the Provincial Advisors, have formed the basis for assessing progress and identifying impediments faced by the TA team. This combination of frequent, informal communications, scheduled reports and occasional memoranda has permitted the TA team to review and adjust project objectives and to respond to changing conditions. The present system of reporting is expected to continue through the life of the project.

Training

The theme that instituting sustainable improvements in the PIDs can best be achieved by strengthening the existing PID organizations will be followed in our training component. Earlier, the project had emphasized development of Administrative Management Units (AMUs) and Management Information Flow Cells (MIFCs) to institutionalize training and other administrative activities. For reasons discussed earlier in this paper, the creation of new units places additional burdens on the PIDs while frequently providing redundant services. Therefore, we now recommend that training administration (evaluation of services, training history, job assignments and other qualifications) be carried out by existing staff such as the Under-Secretary of Training in the Punjab, the Training Section Officer in the Sindh and NWFP and the Office of the Chief Engineer in Balochistan.

In-Country Training In-country training is progressing with the appointment of a USAID Training Engineer. There are five subject matter areas covered by this training.

- Sub-engineer training in NWFP and Balochistan. In Balochistan, training of sub-engineers in basic skills such as surveying and estimating is scheduled to begin late this year. Sub-engineers are to participate in a basic course conducted through the PID office and lasting approximately two months.
- Training modules. Arrangements are underway for six engineering training sessions to be held at the Punjab Engineering Academy (PEA) from August, 1991 until August, 1992 to train engineers from the Sindh, NWFP and Balochistan. Each session will have approximately 30 trainees and will be devoted to one of following training modules prepared during ISM-I.
 - Surveying
 - O&M
 - Design
 - Estimation
 - Construction Specifications
 - Contract Administration
 - Construction Planning

Four additional sessions are scheduled to be held between August 1992 and March 1993. About one hundred engineers from the Punjab have already received training at the PEA.

- Mid-level management. Several avenues are available for providing PID personnel with in-county management training. One of these is to work with the National Institute of Public Administration in the development of tailor made management programs. The project is already providing in-service training through publically offered courses of the Pakistan Institute of Management in subjects including organizational behavior, personnel management, administrative control and financial management. Additional courses on management will be offered throughout the life of the project.
- Workshop Equipment Management Training. Approximately 100 workshop staff have been trained by members of the TA team and by experts on TDY assignments. This training will continue at PID workshops throughout the life of the project. In addition, equipment operators are being trained at the Construction Machinery Training Center in Islamabad. Operators spend from three to five months at these sessions. Three courses have already been completed and an additional six are underway. Because of the length of this training, from three to six PID personnel are enrolled in each session.
- Computerization Training. Training in computer utilization is being conducted for many aspects of the project. Training of workshop staff in utilization of the MAINSAVER program continues. The NWFP has had success in training junior design engineers using civil engineering design software. Administrative staff will be trained in use of computers for such tasks as budgeting, preparation of standard reports, and maintaining various types of personnel records.

A key issue throughout the remainder of the project will be consolidating and institutionalizing the in-country training program within the PIDs and developing lasting institutional ties between the PIDs and training institutions such as the Punjab Engineering Academy. Development of annual training plans and provision of training budgets will be essential for sustained activity in this component.

Overseas Training Although the ISM-II Project Paper outlined an overseas training program consisting of doctoral, masters degree and non-degree programs in the United States, because of delays in instituting this activity, no doctoral programs will be offered. The emphasis will lie on masters and non-degree programs. Also because of delays, September 1991 may be the last possible date for starting masters degree programs. USAID, supported by the Academy for Educational Development (AED), is administering this branch of

training activity and expects to have students enrolled in masters programs by the fall of 1991.

Computerization

Issues in computerization revolve around the potential for sustainability in the PIDs. These issues include:

- Assigning appropriately qualified personnel to support computerization;
- Providing for maintenance and repair of hardware and procurement of supplies;
- Identify ways that computers can make existing PID functions (planning, management, design, etc) more effective or efficient;
- Defining institutional approaches to computerization for each PID;
- Determining appropriate types and durations of training for technical, administrative and management personnel;

The initial Plan of Work envisioned two phases of computer acquisition. The first phase, which is now underway, includes computerization at the Secretariat level and at Circles and Divisions selected through discussions with the Provincial Coordinators. Phase I procurement has also added one computer at the Federal Coordination Cell in the Chief Engineering Office. The second phase of computer purchases was to be aimed at filling out the placement of computers in the Circles and Divisions. However, because of budget reductions, the second phase of computer purchasing will not be carried out.

The central computer cells are functioning in all four provinces, and sanctioned staff are present in the Punjab, Balochistan and the NWFP. In the Punjab, six positions are now filled with one vacancy. Requests for additional staff are anticipated. The Provincial Finance Department has approved a budget for computer maintenance and for supplies. In addition to the 17 computers in place, 36 machines are on order as part of the Phase I procurement. In Balochistan computerization activities are being run by the PID with minimal outside technical assistance, three senior computer staff positions have been filled, and 13 new computer systems are being installed. In the NWFP, two staff positions have been filled, two senior positions are in the process of being sanctioned and 12 systems are on order.

Computerization in the Sindh has progressed more slowly than in the other provinces with computer facilities poorly maintained and underutilized. However, the PID expresses support for the concept of computerization, and we will continue our efforts to develop a sustainable level of computerization within this Province. Thirteen computers have been ordered in Phase I for the Sindh.

Throughout the remainder of the project the TA team will continue to support the development of the existing computer cells with particular attention being paid to developing a sustainable cell in the Sindh. In addition, the project will support training of computer users outside the computer cells including division level design staff responsible for design and administrative staff responsible for development of maintenance and training plans, personnel records, and budgets. The TA team will continue to develop user applications (computer programs) tailored to the needs of the PIDs. For example, an application is being developed in Punjab for calculating abianas (water user fees).

CHAPTER II.

PRIORITIES FOR THE REMAINDER OF THE PROJECT

Program Priorities

The initial ISM-II Plan of Work was organized to address the differing requirements of the four PIDs while maintaining a structure consistent with the overall project objectives. This revision maintains the same approach. For reasons discussed above, there has been some shifting of priorities within the program; however, the recognition of differing requirements and resources of the PIDs remains unchanged. The following section briefly describes our current assessment of priorities.

Rehabilitation/Civil Works The emphasis throughout the remainder of ISM-II will lie on working to improve the design capability of the PIDs at the division level and on completion of all infrastructure rehabilitation by project completion date for which funds have been committed by USAID and the World Bank. The specifics of implementation will vary from province to province and will include some or all of the following elements:

- Assistance in resolving obstacles to implementation of rehabilitation schemes and advice on design issues and construction quality improvement.
- Training of sub-engineers and engineers in surveying, estimating and design skills will continue. Instruction will be given in computer methods as appropriate.
- Assistance will continue in the development of standard designs and of computer software to solve specific design problems.
- In the Punjab, rehabilitation of gate tracks is scheduled to be completed at Jinnah Barrage and repair of gate parts is planned for Balloki Barrage.

Operation and Maintenance Priorities for the O&M component are little changed from those of the initial Plan of Work. Emphasis will be placed on developing the divisions as the basic unit of O&M planning. The current assessment of priorities for the remainder of the project includes the following activities:

- Institutionalization of annual work plan preparation will be a major emphasis during the remainder of the project. Utilization of computers to assist in this effort will be

encouraged. Periodic updating of O&M yardsticks will be a secondary objective.

- The Trial Maintenance Equipment Program will be carried out in 9 divisions and 26 subdivisions throughout the country. The pilot will be preceded by a pre-test of the equipment package conducted in one subdivision in the Punjab.
- A manual of surface drainage planning, design, and maintenance will be prepared by expatriate and local drainage experts

Equipment Management and Utilization Reductions of about 50 percent in commodity procurements have resulted in some realignment of activities under this component in favor of training and other technical assistance items. Priorities for this component now include:

- Overhaul of construction equipment, and associated on-the-job training, will continue using parts procured by USAID under reduced funding and parts already in stock with the PIDs.
- Emphasis on improved equipment and workshop management and utilization will continue through institutionalization of Equipment Task Force meetings, and equipment utilization planning and reporting.
- Computerization of workshop activities will continue using an upgraded version of the MAINSAVER program and other application software.
- In-country training provided by TDY experts in equipment repair and by the Construction Equipment Training Center in equipment utilization. Overseas training is scheduled for two senior engineers in gate and hoist repair.
- Upgrading of workshop facilities will continue using parts recently ordered.

Monitoring and Evaluation M&E activities will be adjusted to reflect changes in other project components. Despite these modifications, basic M&E priorities are little changed from the initial Plan of Work. These priorities include the following activities:

- Continuing to provide TDY and resident assistance to PERI, WMED and ACOP in implementation of the three-year

Evaluation of the Impact of Canal and Drain Rehabilitation.

- Monitor and evaluate the O&M Equipment Trial Program.
- Recommend, assist in procurement, and provide training in the use of hydraulic monitoring equipment.
- Continuing to conduct and report on purpose level monitoring for USAID.
- Providing information useful for decision making within the project team.

Training A substantial portion of TA effort will be devoted to training support of design, O&M, and workshop activities. An important activity of the training component will be to support increased institutionalization of training by the PIDs. Priorities of the training component include:

- Continuation of the in-country training program to be carried out during the remaining life of the project.
- Institutionalization of a systematic program of in-country training managed by the PIDs. This will entail developing associations with Pakistani management, engineering and workshop training institutions who would support in-country training of PID personnel. This might be facilitated by conducting a workshop for those responsible for training in the PIDs.
- The TA will assist the PIDs and USAID in administration of overseas training as needed.

Computerization The PIDs have generally supported institutionalized computerization programs. Priorities for the remainder of the project are designed to consolidate and reinforce this progress.

- Supporting training of a limited number of staff in computer utilization. Training will be provided to individuals having access to computers and whose work would benefit from computer utilization.
- Aiding the PIDs in use of computers for maintaining personnel records, budgets and other information necessary for planning and evaluation of departmental activities.

- Developing and introducing software to assist PID staff in performing design, management and administrative functions.

Priorities For Short-Term Assignments

The experiences of the first twenty months of project activity and the realities of the adjusted budget have led to a reduction in the level of effort to be supplied by TDYs and to more tightly defined areas to be served by these activities. The following paragraphs present concepts for short-term activities that were reviewed by the project team and provide our current assessment of the potential of each activity within the budget and schedule of ISM-II.

Irrigation System Mapping It is generally acknowledged that there is a great need for improved mapping of irrigation and drainage systems. In recognition of this need, the project paper specified that arrangements had been initiated for a local advisor to plan computer mapping activity and that USAID would reimburse the GOP for preparation of maps, using the Fixed Amount Reimbursement mechanism. Arrangements were begun for a TDY assignment to investigate the feasibility of computerized mapping of irrigation systems. However, when it became apparent that USAID funding would not be available to implement the mapping, preparation for the assignment was halted and is unlikely to be resumed.

Training for Mechanical Workshops Substantial progress has been made in training mechanical workshop staff, especially at Jamshoro and Mughalpur, in use of engine overhaul machines. However, a significant TDY effort is still required at other workshops. A total of six months of TDY effort has been allocated for this purpose, and to bring all of the remaining machines supplied by USAID in ISM-I to full operational status. Attention will be focussed on the NWFP and Bhalwal workshops and on the installation of the dynamometer at the Jamshoro workshop.

Hydraulic Monitoring Training Current plans call for equipping the PIDs with a pilot-level supply of hydraulic/sediment monitoring equipment; training in the use of this equipment for evaluation of system condition and performance is a priority. We now propose to provide two man-months of expatriate time, supplemented by a local expert under ACE to continue the training after the expatriate's departure. Training in hydraulic/sediment monitoring is also being provided by ACOP withing the ISM-II Project.

Impact of Canal and Drain Rehabilitation Eight man-months had originally been scheduled for technical assistance on the agro-economic aspect of the Impact Monitoring and Evaluation. Although, the first two-month assignment, related to start-up of field

activities could not be provided because of the ordered departure, agro-economic monitoring for the evaluation of canal and drain rehabilitation remains a high-priority activity. We propose to provide the remaining six man-months of TDY activity through several visits. Because of his qualifications and continuing association with this project, Dr. Shane Ryland will provide these services. Dr. James Wolf has been providing similar assistance for the hydraulic aspect of the evaluation, being performed by ACOP. He is scheduled for three months TDY in several visits. Emphasis during the visit by both consultants in September/October 1991 will be on establishing the framework for the final report because of the short time that will be available for completion of the report after post-rehabilitation data collection.

Operation of Irrigation Systems This subject may be considered the "O" of O&M. Emphasis in the Project has been given to the maintenance component of O&M. It was concluded that the PIDs would not be receptive to advice on operations and that our resources would, in any case, be insufficient for making a meaningful contribution.

Drainage System Maintenance The project paper remarks on the very poor maintenance of drains and specifies that technical assistance will be provided to help the PIDs to prepare a drainage manual addressing surface and subsurface drainage. Because of the many differing procedures for subsurface drainage design and construction now practiced in Pakistan and because of the requirements of tubewell drainage and subsurface drainage maintenance are specific to their design, manufacture, and installation, we believe development of a definitive manual covering subsurface drainage would be an enormous task which would be unlikely to produce particularly useful results. We propose that a more useful product would be a manual of open drainage maintenance which emphasizes problems such as weed control and bank sloughing associated with surface drains and which reinforces the importance of well-designed, well-maintained drains to the functioning of the overall irrigation/drainage system. To perform this task, we propose a 12 months assignment for an expatriate drainage expert who would work closely with a Pakistani counterpart, provided through ACE, on preparation of this manual.

Training Specialized assistance would be valuable to in preparing local trainers for teaching upcoming courses to engineers at the PEA and other local institutions. The expatriate's role would be to improve the skills of local trainers in teaching surveying, estimating and other topics covered in the training modules. Although the details of such assistance remain to be worked out, we propose that three man-months of TDY be reserved for this activity.

O&M Equipment Trial Implementation of the O&M equipment trial will be guided largely by resident TA and local staff. However, TDY assistance will be important in completing the design of the trial, both from the standpoint of equipment utilization and from that of performance monitoring. Therefore, we propose that George Miller, an equipment expert who has already completed a successful TDY assignment on this project, return for a one month TDY to assist in organizing the O&M equipment trial program. Arrangements have been completed to employ a local program coordinator for approximately 18 months through ACE. Mr. Miller would work with the local coordinator to complete plans for equipment utilization and to organizer a series of workshops for PID staff explaining the purpose and procedures of the trial. Dr. Shane Ryland, who is providing TDY assistance on Agro-economic Monitoring may be called upon to offer guidance on collection and analysis of data for evaluation of the equipment trial.

Telecommunications USAID is no longer in a position to finance purchase and installation of telecommunications equipment. Therefore, further TDY for assessing telecommunications needs and costs is not envisioned because other donors interested in carrying out this type of project would do their own initial evaluations and program design.

CHAPTER III.

SUMMARY

The Irrigation Systems Management-II Project is now at approximately its half-way point. From its outset, one of the project objectives has been to develop a close working relation among the technical assistance team, USAID, and the PID staff. This relation has enabled the TA team to develop insights into the operation of the PIDs and understandings of their organizational priorities. One of the functions of this revised plan of work is to capture these insights and translate them into attainable objectives.

USAID/Islamabad has effectively supported the TA team. Good communication between USAID and the TA team was particularly important during the ordered departure and in assisting revision of the project budget in response to cuts in USAID funding to Pakistan.

As was originally conceived for ISM-II, project activities continue to be designed to be responsive to conditions in each of the provinces. The four Provincial Advisors working in conjunction with the Provincial Coordinators and other PID staff have formulated programs designed to channel resources into areas where improvements are realistically attainable.

Project activities continue to be coordinated by the Chief of Party who represents the project before USAID and the FCC. With the completion of the assignment of the Chief Design Engineer, design activities are being led by the Provincial Advisors and project-supported Pakistani civil engineers posted in each province. Workshop activities will continue to be led by the Equipment and Workshop Specialist and by his staff of mechanical engineers. Experts available on TDY will assist in specific areas of this component. The assignment of the project Operation and Maintenance Specialist has also been completed. The Provincial Advisors will continue to assist in development of annual workplans and other province-specific activity. TDY and local assistance will be available for development of the drainage maintenance manual. Monitoring and Evaluation and Training activity will continue under the guidance of the M&E and Training Specialists with TDY experts supporting their activity. A USAID Training Engineer is also active in developing the training component. With the completion of the assignment of the project Computerization Specialist, the project M&E Specialist will coordinate computerization activities. He will be supported by the Provincial Advisors and by project and PID computer staff in each province. An O&M Equipment Trial Program will be carried out in selected PID divisions. A full time coordinator has been employed to organize, monitor, and evaluate the program.

The theme of the ISM-II Project continues to be strengthening the PID's capabilities to perform their institutional mission. The modifications discussed in this revised Plan of Work are intended to carry out this theme in light of our current understanding of the function of the PIDs and of the resources available to them and to the project.