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FROM: AID/Washington

SUBJECT: Non-Capital Project Paper (PROP)

REFERENCE: State 65005 (PROP Approval)

CHARGE
AGRI/EMB, ECON, CHRON, RF.

Country: PAKISTAN Project No.

Submission Date: January 3, 1973 Original X Revision No.

Project Title: Precision Land Leveling

U.S. Obligation Span: FY 1973 through FY 1975

Physical Implementation Span: FY 1973 through FY 1975

Gross Life of Project Financial Requirements: ($000)

U.S. Dollars ---------- $1,022

U.S.-Owned Local Currency ---------- $ 590
(Rs. 6.5 million at 11.1)

Cooperating Country Cash Contribution: ------ $ 545

Other Donors ---------- $ -

TOTAL ---------- $2,157

ACTION
Due Date: 5/17
Action Taken: NAN
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I. SUMMARY:

The Government of Pakistan has requested U.S. assistance in testing and demonstrating improved techniques for on-farm water management. In particular, the desire is to concentrate on precision land leveling as a technology possessing high complimentarity to the technical inputs and useages already in place among the irrigated areas of Pakistan.

This project is designed to:

a) Test the economic costs and benefits of precision land leveling in different parts of the country.

b) Identify the social benefits and institutional requirements of effective precision land leveling.

c) Test various equipment, organizational, and management configurations for effective precision land leveling.

d) Elicit the interest and support of progressive farmers and private enterprise.

e) Build up skills and techniques applicable when farmers become convinced that it is economically feasible and desirable to level their lands precisely.

f) Generate research data helpful to provinces and the private sector when organizing and operating precision land leveling on a major scale in irrigated areas.

At the end of this project, a number of expectations must be met if the effort is to be considered a success. It must be demonstrated that modern mechanical technology (including locally developed technologies) significantly lowers the real cost of leveling to farmers and, with a combination of marginal improvement in yields, water efficiency and increased availability of land generated by removal of bunds increases the benefits sufficiently to provide a relatively high benefit cost ratio.

A small but representative group of farmers should be convinced of the benefits derivable from precision land leveling either from an economic or a prestige point of view or both. As a result, they will be looking for more assistance to help them with the engineering and agronomic advice they need to level their lands; and to introduce the appropriate agronomic practices that accompany precision land leveling.

Government will be sensitized to the characteristics of precision land leveling including the fact that: speed of expansion depends upon

convinced farmer demand; services, either public or private, must be readily available to interested smaller farmers; and progressive farmers must be the principal initial targets since they already possess essential technological components including seeds, fertilizers, water, pesticides, and cultivation practices of high complementarity to precision land leveling useages and potentials.

A. The Project Goal:

1. Goal Statement:

Acceleration of productivity in irrigated areas accompanied by water useage measures designed to equitably expand farmer access to the next appropriate technologies is an important goal in Pakistan's further development.

2. Measurement of Goal Achievement:

a. Existence and implementation of policies for improving on-farm water use efficiencies so that government investment occurs only where private investment is unlikely or where there are problems which direct investment may help solve.

b. Existence of reliable data, permitting insights from a number of different perspectives (labor-intensity, income distribution, rates of return, etc.) concerning interrelated technological inputs essential to improved on-farm water supplies and useages.

c. Data organized so as to assist water development, useage, and management policy-makers when examining options based upon comparisons of net private economic benefits (assuming water not to be a serious constraint in many areas) with net social benefits (assuming all water users to be entitled to long-term recharge).

e. Indigenous technologies developed, tested, costed, demonstrated, and institutionalized.

f. Policies promoting employment and entrepreneurship.

g. Necessary supportive systems (prices, markets, incentives, technical assistance, etc.) installed, encouraged, or operated by government.

h. Within rational intensity rates, water useage and agronomic practices resulting in expanded production per acre on irrigated land.

3. Assumption of Goal Achievement:

a. Central and provincial governments of Pakistan assign a reasonable priority to the goal.

b. The private sector is relied upon to support much of the effort and the policies adopted elicit that support.

c. Both the central and provincial governments are prepared to commit resources where needed.

d. Policies concerning labor-intensity, equitable income distribution, and broadened access to technologies are of interest to and pursued by the central and provincial governments.

e. Appropriate attention is devoted to developing the necessary local data, technologies, and institutional arrangements.

f. Farmers will be convinced that important 'next steps' in water use technologies for irrigated areas are feasible both economically and technically, and then demand the necessary services, systems.

B. The Project Purpose:

1. Statement of the Purpose:

Precision land leveling which is technically suited to local conditions, economically viable, income distributive, and organizationally applicable can improve the efficiency of on-farm water use. It is the purpose of this project to develop the appropriate on-farm techniques and local supportive technologies, test their economic, social, and institutional characteristics, elicit private sector interest, establish some trained cadre and management systems in provincial governments, and demonstrate the potentials of precision land leveling to selected farmers.

2. Conditions Expected at the End of the Project:

a. Data will have been developed and carefully organized concerning:

* socio-economic and cultural factors affecting the acceptance of land leveling by various farmer groups.

* the likely effects of wide or medium-scale land leveling and adoption of associated agronomic practices on the relative income of small farmers.

* relationships between acceptance of land leveling and the adoption of improved agronomic practices.

* implications of land leveling on plot sizes and possible future needs for land consolidation.

* relationships between farmer investment in land leveling and land ownership.

*probable implications of land leveling and increased production on farm labor and marketing infrastructure.

* demands for water-courses and other water distribution improvements likely to be engendered as a result of land leveling efforts.

* the most effective ways in which the land leveling program can be skewed to favor the small farmer.

* the benefits/costs of precision land leveling under a variety of conditions, i.e., with various crops, plot sizes, soil conditions, agronomic practices and site locations.

b. Approximately 3,000 - 4,000 farmers will have participated in demonstrations, on their farms, of precision land leveling and learned at first hand the economies/advantages to be gained through precision land leveling on irrigated lands.

c. An institutional framework will exist within four provinces, and it will be capable of:

* training provincial agricultural agents and private entrepreneurs in the techniques of land leveling, which includes the procedures for staking appropriate grades, the proper use of surveying instruments to identify with precision high and low areas, methods of staking individual plots in preparation for the leveling operation, and the use of simple scrapers and land planes for mechanical leveling.

* organizing and managing: surveying and staking services; inspection of land leveled by private concerns; systems of cost sharing for initial land levelled; advice and assistance on improved agronomic techniques; and incentive/insurance systems designed to both elicit farmer interest and assure quality performance in precision land leveling.

* encouraging the establishment of small equipment pools (public and private) for use by farmers on a rental

basis. The first among these pools would be government owned and operated; but their size and numbers would be held to a minimum.

* eliciting and sustaining the interest of private enterprise in land leveling (i.e., custom tractor services, rental of leveling equipment, provision of surveying and staging services.) This will be done through such means as: offering free training to private entrepreneurs, possibly offering favorable credit to prospective investors in the kinds of equipment required; and encouraging small-scale manufacturers in the design and production of implements suited to precision land leveling under local conditions.

d. The foundations for precision land leveling technology will be in place and so designed that the speed of expansion can be accelerated or moderated according to experience earned and conditions prevailing at the time. The foundations will include:

* A bank of research data designed for ready reference and use by policy-makers.

* A field tested set of techniques and equipment.

* A cadre of at least 300 agricultural technicians trained in precision land leveling.

* A private and public sector fund of experience with precision land leveling.

* A growing constituency of progressive farmers who perceive advantages demonstrated by precision land leveling.

3. Basic Assumptions:

a. Precision land leveling does offer economic gain potentials sufficient to arouse the interest of progressive farmers and private enterprise.

b. Precision land leveling and related agronomic practices are, indeed, the 'next steps' in moving agricultural production functions outward beyond the innovations introduced to date in irrigated areas.

c. Data concerning experience earned with precision land leveling can be systematically gathered, evaluated, and used to affect

further experimentation and policy-planning.

d. The central and provincial governments will sustain a degree of interest sufficient to permit the tests, demonstrations, and training to go forward in an orderly manner.

e. Policy-makers will be able to clearly perceive positive or negative experience earned during the project and make the appropriate adjustments and decisions.

f. Incentives, training, and technique or equipment development will be effective and timely.

g. Any pressures for speedy expansion or extension of precision land leveling will be resisted successfully during the life of the project so as to permit careful concentration on obtaining and evaluating initial results.

C. Project Outputs:

1. Outputs:

a. At the close of the project (i.e., end of two years) four provinces will have adopted experimentation and test of precision land leveling as an important on-going activity.

b. Approximately 3,000 - 4,000 farmers located in diverse areas of the four provinces will have experimented with, and perhaps adopted, precision land leveling and associated agronomic practices.

c. Private enterprise engagement in precision land leveling services, equipment supply, etc. will have been aroused.

d. An institutional framework will exist in each of the four provinces capable of providing basic precision land leveling and agronomic services and administering a system of cost sharing within the Integrated Rural Development project areas.

e. Special techniques, equipment, and standards suited to local provincial conditions will have been developed and proven workable.

f. Approximately 300 provincial agricultural technicians will have been fully trained in the locally adapted special techniques of precision land leveling and associated agronomic methods.

g. A bank of research data on the costs/benefits of precision land leveling will have been assembled together with a series of case studies on the acceptability of precision land leveling in the provinces. See Annex E for evaluation points.

h. Knowledgeable specialists and systems of data analysis will have been developed sufficiently to permit policy-makers in the central and provincial governments to determine the content, pace, and style of future options concerning the role and importance attached to precision land leveling in Pakistan's irrigated agriculture.

2. Output Indicators:

a. Kinds of Outputs	b. Indicators
* Interdisciplinary studies organized, mounted, and productive.	* Studies defined Pakistani scholars engaged Foreign advisory support engaged Reprints and case studies scheduled and produced.
* Responsible agencies assigned by central and provincial governments.	* Orders of assignment, tables of organization, job descriptions issued and/or completed.
* Central and provincial governments allocate appropriate budgets.	* Funding and manpower budgets developed, approved, and operational.
* Precision land leveling and agronomic practice objectives defined.	* Adoption, by central government and provincial governments of local-specific objectives.
* Creation of equipment pools.	* Organizing, procuring, staffing, training of necessary equipment pools.
* Development of local techniques and equipment.	* Programs for assisting local experiments with locally tested/developed techniques and equipment.
* Development of trained staffs.	* Training facilities provided, budgeted, staffed, and personnel assigned for training.

Kinds of Outputs (continued)	Indicators
* Sets of manuals and guidelines for precision land leveling and associated agronomic practices developed.	Manuals and guidelines adopted, printed, and in use by trained staff.
* Development of criteria and methods for selecting farmers.	Application of criteria, activation of accompanying training, test, expand to farmers.
* Private sector engaged.	Training of private sector personnel; systems of guidance for private enterprisers; incentive systems.
* Evaluation.	Review of lessons learned, collate with research data, evolve policy guidance and systems referrents.

3. Basic Assumptions:

a. Interdisciplinary research studies will be set up and staffed, at least partially, by competent Pakistani scholars.

b. Scholars, operators, and administrators will be able to work together as a cooperative basis so that the 'test' orientation of the project can be maintained throughout.

c. Administrative arrangements and performance in each of the cooperating provinces will be of sufficient quality as well as magnitude to permit effective operation of the scheme as planned.

d. Locally developed techniques and implements will be a strong and continuing matter of interest throughout the life of the project.

e. Experiments with different kinds of incentives will be possible under provincial government rules and regulations.

f. Experience earned can be generalized for applications both by the public and the private sectors.

D. Project Inputs:

1. U.S.

Inputs from the U.S. will consist primarily of advisory services,

provided under contract and consisting of agricultural engineers and irrigation agronomists, to: (a) train provincial officials and private sector individuals, in precision land leveling technology, (b) assist the provincial governments in planning and organizing their land leveling efforts and in encouraging private enterprise interest/participation, and (c) to gather relevant information pertaining to the profitability and acceptability of precision land leveling in Pakistan for use by the GOP as well as the provincial governments when determining their courses of future action concerning precision land leveling and related agronomic practices.

In order to cover representative areas of the country where land leveling technology is relevant and to satisfy the economic (and political) interests of all four provinces in this technology, it will be necessary to place advisory teams in each of the provinces. Each team will consist of an agricultural engineer with experience in precision land leveling plus an irrigation agronomist (with experience in irrigating precision-leveled land). While each province will have a team assigned to it, it is recognized that varying workloads in the provinces (i.e., the bulk of the work is expected in the Punjab and Sind Provinces) where most of the irrigated lands are concentrated as well as differences in growing seasons (which determine when land leveling work can be done), will necessitate temporary shifts of personnel from province to province at various times during the year.

In addition to the eight principal technicians (four Agricultural Engineers and four Irrigation Agronomists) the project will require a Team Leader with experience in administering a large government agency, as well as experience with land leveling, in order to work with Central and Provincial administrators for institution building and to coordinate the activities of the Team members. An Agricultural Economist will also be required. He will structure studies in collaboration, where possible, with engaged Pakistani economists and other necessary disciplines, supervise the collection of data, analyze these data and develop evaluative reports which address cost/benefit as well as other criteria pertinent to governmental decision-making concerning future courses of action on precision land leveling and accompanying agronomic practices.

Twelve months for TDY consultants will also be provided in order to allow the Team to have access to additional expert advice as needs arise.

The Team members will spend two years each in the country over a three-year period from the beginning of the contract. In addition

to the training and demonstration sessions which the Team members will conduct as one of their first tasks, the Team will prepare a bench-mark survey of selected areas which will include all institutions involved, costs, farm income, impact on small farmers, and other pertinent data.

It is recognized that the implementation plans for each province will vary; and each may require separate PERT networks. These separate work or implementation plans will be submitted to AID/W for review prior to activation of USAID support to the specific Province under the terms and conditions of this PROP. In this connection, the U.S. advisory teams for specific Provinces will not be sent forward until the work or implementation plan for that Province has been reviewed by AID/W. However, these variations may affect scheduling and assignments, the Team members will marshall a specific set of skills as stated in Job Descriptions to be attached, Annex D, to this PROP.

The project will also provide $24,000 to pay per diem expenses of trainees sent by the GOP to Turkey for observation tours of land leveling activities in that country.

Finally, the U.S. will provide Rs. 6.5 million in Mondale funds for the procurement of locally manufactured scrapers, land planes, survey kits, and for the financing of cost sharing for initial acreage leveled. Details are given in Annex C.

2. Government of Pakistan (GOP)

The GOP will provide all operating costs of training and field work. This will include all salaries of individuals engaged in the land leveling effort, current account expenses such as gasoline, oil, maintenance and depreciation (or rental) of vehicles, incidental supplies and equipment, and the costs of international travel for participants. The GOP will also pay and support the U.S. advisors via the USAID Trust Fund. It is estimated that this will total approximately Rs. 6 million over the length of the project. The provincial governments of the Sind and the Punjab are currently in the process of preparing PC-1 documents for their project. These are the documents utilized for obtaining Planning Commission approval and commitment of funds. These documents assume provision by the U.S. of specialists for training of local personnel and of U.S. owned rupees for the procurement of land leveling equipment and the funding of cost sharing payments.

E. The Problem:

Water is a major limiting resource for increased agricultural production in Pakistan. There are approximately 45 million acres of land in cultivation, of which nearly 35 million are under irrigation. Of this about 25 million acres are served by the government canal system with the remainder obtaining water supplies from wells.

Average water availability is currently estimated at slightly less than two acre feet per irrigated acre. Consumptive use and leaching requirements from crops such as rice and cotton are about 4 to 4½ acre feet per cropped acre. Sugarcane requires even more. About 1½ to 2 acre feet are needed to produce a good wheat crop. With the pressures of population growth, farm land has increased and crop acreages have expanded everywhere to the present limits of water availability. Over vast areas covered by older parts of the irrigation system, the area cropped has gone beyond the water supplies, based on original design intensities, resulting in widespread underwatering.

Considerable resources have been expended in Pakistan during the last twenty years to develop additional water supplies and to improve the irrigation water distribution system. Notable among these are the storage facilities constructed at Mangala and Tarbela Dams and on lesser tributaries of the Indus River system, and the system of link canals. Additionally, nearly 100,000 tubewells have been developed to exploit ground water resources of the Indus Plains. By the 1980's Pakistan will likely approach the practical limits of irrigation water development; that is, most of the water resources available will have been tapped.

If agriculture is to continue to accelerate in productivity, ways will have to be found to increase yields and enhance returns from the valuable resource - water.

Greater use of chemical fertilizer and other capital inputs at the farm level will be helpful in increasing production; but heavier application of fertilizer without adequate irrigation to maintain soil moistures in compliment with the added plant nutrients can be economically and ecologically disastrous over the long run.

Improved on-farm water useages and related agronomic practices do, however, appear to offer some potentials as essential 'next steps' in agricultural technological development for the irrigated areas of Pakistan.

One must consider past and current efforts addressed to this:

a. Method of irrigation:

Basin flooding is the method used today. The topography over much of the irrigated area is well suited for this since the Indus Plain is very flat without abrupt topographic changes. On this plain there are essentially no natural drainage ways other than the rivers. Therefore irrigation water in excess of that required required for plant growth cannot be readily removed and it percolates through the soil to the ground water table. Ultimately this may cause the water table to rise into the plant root zone.

Even though river waters are of good quality, salinity problems have developed in many areas as a result of upward capillary movement of water from the high water table and subsequent evaporation which leaves dissolved salts in the upper layers of the soil. These salts remain in situ and accumulate during each successive basin-flooding irrigation. It is necessary to apply some excess of water to redissolve the salts and induce deep percolation to move them downward beyond the plant root zone. This process is known as leaching. If irrigation applications are excessive this may ultimately cause a further rise in the water table. Eventually, of course, such practices may lead to waterlogging and the necessity to abandon land due to salinity encroachments in the upper layers of the soil.

The SCRAP program is a partial answer to the waterlogging and salinity problem.

However, the ultimate answer is a complete water management program which utilizes all available water to its fullest and does not allow for over-irrigation and wastage. This requires more complete control of the water resource particularly at the farm level in order to insure that the proper amount of water is applied at each irrigation.1/

b. Land levels and irrigation:

At the present time it is estimated that only about three to four million acres or about 10 to 12 percent of the 33 million

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1/ For more complete discussion of the need for better water use and land leveling, see: draft USAID Agriculture Sector Analysis, May 1972; J.Blume, Report, September, 1972; and A.R. Baron to J.C. Wheeler memorandum of November 22, 1972.

acres under irrigation in the country consist of land that is sufficiently level to permit efficient irrigation. Generally speaking, for water to flow evenly across fields with the soil texture which exists in most areas of Pakistan, field level variation should be not greater than .2 feet. In an estimated 90% of the irrigated fields of Pakistan, this variation ranges between .5 and .8 feet, a condition which precludes efficient application of water, results in a water wastage factor of an estimated 30-50 percent, and contributes significently to salinity and waterlogging problems.

c. Leveling: (traditional)

To compensate for this unevenness of the land and as a device for moving water to those portions of a field which would normally remain dry, the Pakistani farmer has traditionally resorted to a system of subdividing his fields into a series of small areas, each surrounded by dykes (bunds). These bunds serve to hold the water in each successive basin area until it rises to a height sufficient to reach the higher spots in the basin - thus the derivation of the term 'basin flooding'.

In past efforts to precisely level fields, primitive bullock-drawn implements known as kerals have been developed to move soil in the field. However, these are ineffective when even moderate amounts of earth must be moved from one part of the field to another in order to get a more precise grade. Similarly, the traditional sohaga used for the final smoothing operation is not very effective for the precise finishing job which is required for good irrigation water control. This implement has only one line of contact with the surface of the ground and thus will not remove the minor undulations from one end of the field to the other.

While some progress is being registered through use of these traditional land planing devices there are a number of negative factors affecting their potentials for the future. They are slow, inefficient, inadequate to the job which must be done if maximum water supply limits are soon reached, and their cost/benefits when measured by needed efficiencies as well as social benefit indicators may be misleading in the long run.

d. New technologies of leveling:

There are in existance relatively simple techniques for land leveling. These have been developed in Turkey, India, and other

countries and they appear to be applicable to Pakistan. The technique consists basically of the survey and marking of fields to be leveled and the use of locally fabricated scrapers and land planers suitable for use with an ordinary farm tractor.[2/] In the case of farmers with very small holdings who cannot afford rental equipment, precise leveling could even be accomplished by hand, once proper staking is done.

In recent years a number of private firms in Pakistan have begun to fabricate small numbers of simple machines (i.e., small scrapers and land planes such as those employed in Turkey) which are suitable to the task of precision land leveling on small and medium-size farms. This has been fostered by USAID through the arrangement of personnel and communication exchanges between Turkey and Pakistani land levelers, and by the National Council of Churches which operates a small land leveling project near Mianchannu in the Punjab.

These initial efforts have resulted in a rapidly increased demand for land leveling services and a small pocket of lively land leveling activity within the limited project area. Approximately 750 acres of land in this area have been precisely leveled over the past two years.

e. Needs:

If governmental and donor efforts in promoting precision land leveling continued only at the present modest rate, it can be predicted that a growing expansion of land leveling activity will occur in this area. It will also gradually extend to ther areas of the country as benefits are recognized and farmer demand for leveling services increase.

However, the pace and range of expansion will necessarily be very slow because of the limited base from which the 'take off' must occur. Furthermore, organizing the salient economic and social facts on an objective basis so that these may be understood and acted upon by policy-makers is not a major component of the present effort.

It is to speed the pace of the current rising interest in precision land leveling with its related agronomic practices, and spread the

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2/ For a more complete description of these techniques see N. Dimick, Guide for Precision Land Forming in Pakistan.

realization of benefits as well as any problems associated with this new technology, that the present proposal is addressed.

F. Strategy and Course of Action:

One critical constraint to more rapid forward movement in land leveling in Pakistan is identified as that of trained manpower. These are personnel capable of surveying and marking fields, advising the farmer on use of simple land leveling tools, and demonstrating to him the new cultivation techniques that precisely leveled fields will enable him to use.

Other constraints are of equal importance. One concerns a lack of proven economic costs/benefits to individual farmers adopting this technique. Another relates to a shortage of simple land leveling tools. A third is the absence of an institutional structure designed to make land leveling and agronomic advisory and support services available to farmers. There is also, probably, a shortage of 'risk' capital held by farmers who otherwise would be receptive to investment in land leveling.

In order to attack these various constraints, it is proposed that the following specific courses of action be followed:

a. Introduce precision land leveling and related agronomic practice know-how into the agricultural departments of four provinces.

b. Through (a) introduce extended application of this knowledge on individual farm sites for research and demonstration purposes.

c. Concentrate the introductions under (a) and (b) within Integrated Rural Development Areas.3/ This will insure the presence of other factors related to a successful precision land leveling effort, i.e., credit, tractors for rent, fertilizer, improved seeds, extension services, etc.

d. Formal as well as on-the-job training provided for provincial government agricultural engineers and private entrepreneurs engaged in custom land forming (most of this custom work is currently in land reclamation rather than precision leveling). The training will be given, initially, by U.S. technicians specialized in land leveling and associated agronomic techniques. Close on-the-job supervision of the newly trained technicians on initial farm sites will constitute an important part of the overall training.

e. Establishment of small government-operated pools of simple land leveling equipment in each of the Integrated Rural Development Areas

3/ (See annex A for map showing location of IRD sites in Pakistan.)

of concentration within provinces. These pools will make this equipment available to interested farmers on a rental basis at rates which amortize the equipment and make replacement possible (approximately Rs. 5.00 per day for land plane and Rs. 15.00 per day for land scraper).

f. To encourage the initial demand for land leveling services, and to insure the existence of early land leveling activity for research and demonstration purposes, a system of government cost-sharing will be introduced. To encourage small farmer participation, this sharing will be limited to the first five acres of any farmers' land (the median size for irrigated land holdings in Pakistan). This means that the smaller than average farmer will be able to obtain cost-sharing for his entire holdings, whereas the larger farmer is eligible for cost-sharing only for a portion of his fields. The amount of cost-sharing will vary from area to area depending on the degree to which demand for land leveling services already exists and the extent to which additional incentives are found necessary to move the program forward.

g. Research will be emphasized at all times. Careful 'before' data will be collected on each farm before leveling work commences. In the course of the leveling operation the farmer will be provided with a complete package of agronomic practices to be followed on his newly leveled land. This will include such matters as direction and width of furrow, size of border, crop rotation recommended, kinds of seeds to be utilized, precise amounts and mixtures of fertilizer to be employed, etc. Results to be measured, in addition to detailed economic factors, will include both the extent to which the prescribed agronomic practices are followed and the production change which has occurred with employment of the new technology.

h. The manner and timing of the implementation will be varied somewhat from province to province. Specific provincial plans are now being developed in the provinces of the Punjab and Sind with evaluation requirements built in, see Annex E. The remaining two provinces have indicated interest; but have not as yet begun to work out specific implementation details. It is conceivable that the U.S. assistance effort may by necessity be mounted first in the Sind and the Punjab with implementation in the Northwest Frontier and Baluchistan to follow on later.

ROGERS

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NON-CAPITAL PROJECT FUNDING

Fiscal Year	AP	LC	Total	Cont.	Personnel AID	Personnel PASA	Cont.	Participants	Commodities	Other Costs
Operational Year FY 1973	TC	G	100	-	-	100 1/	-	-	-	-
Budget Year FY 1974	TC	G	498	-	-	486	-	12 2/	-	-
Planning Year FY 1975	TC	G	424	-	-	411	-	13 2/	-	-
Total:	TC	C	1022	-	-	997	-	25 2/	-	-

1/ Assumes implementation to begin April 1, 1973.

2/ Based on 20 observation teams of approximately 60 day duration each year.

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Requirements for U.S. Owned Rupees

	(Rs. 000)
I. Summary	
A. Training Equipment	448.8
B. Implementation Equipment Parts	2,131.2
C. Cost Sharing	
1. First Year	960.0
2. Second Year	2,880.0
D. Contingency	80.0
E. Total Project	6,500.0
II. Training Equipment 2/	
A. 24 Survey Kits (Levels, Rods, Chains, Taypes, Hand Tools, etc.) @ R. 1,200 each	28.8
B. 24 Scrapers @ Rs. 5,000 each	120.0
C. 24 Land Planes @ Rs. 3,000	72.0
D. Miscellaneous Training Supplies and Equipment	36.0
E. Tractor Rental 2/	192.0
F. Total	448.8

1/ Assumes 16 training sessions each year with three teams trained at each session.
2/ Assumes 480 days per year (30 days per training session) at Rs. 25 per hour.

III. Implementation Equipment Parts 1/	
A. 288 Scrapers @ Rs. 5,000 each	1,440.0
B. 192 Land Planes @ Rs. 3,000 each	576.0
C. 96 Survey Kits @ Rs. 1,200	115.2
D. Total	2,131.2

1/ Assumes the establishment and equipping of pools on the ratio of one survey kit, two land planes and three scrapers per trained team.

IV. Cost Sharing

A. First Year 960.0

(Assumes an average of 200 acres levelled per survey team at cost sharing rate of 50% or Rs. 100 per acre)
48 teams x 200 acres x Rs. 100

B. Second Year 2,880.0

(Assumes an average of 300 acres levelled per survey team at cost sharing rate of 50% or Rs. 100 per acre)
96 teams x 300 acres x Rs. 100

C. Total: 3,840.0

ANNEX D

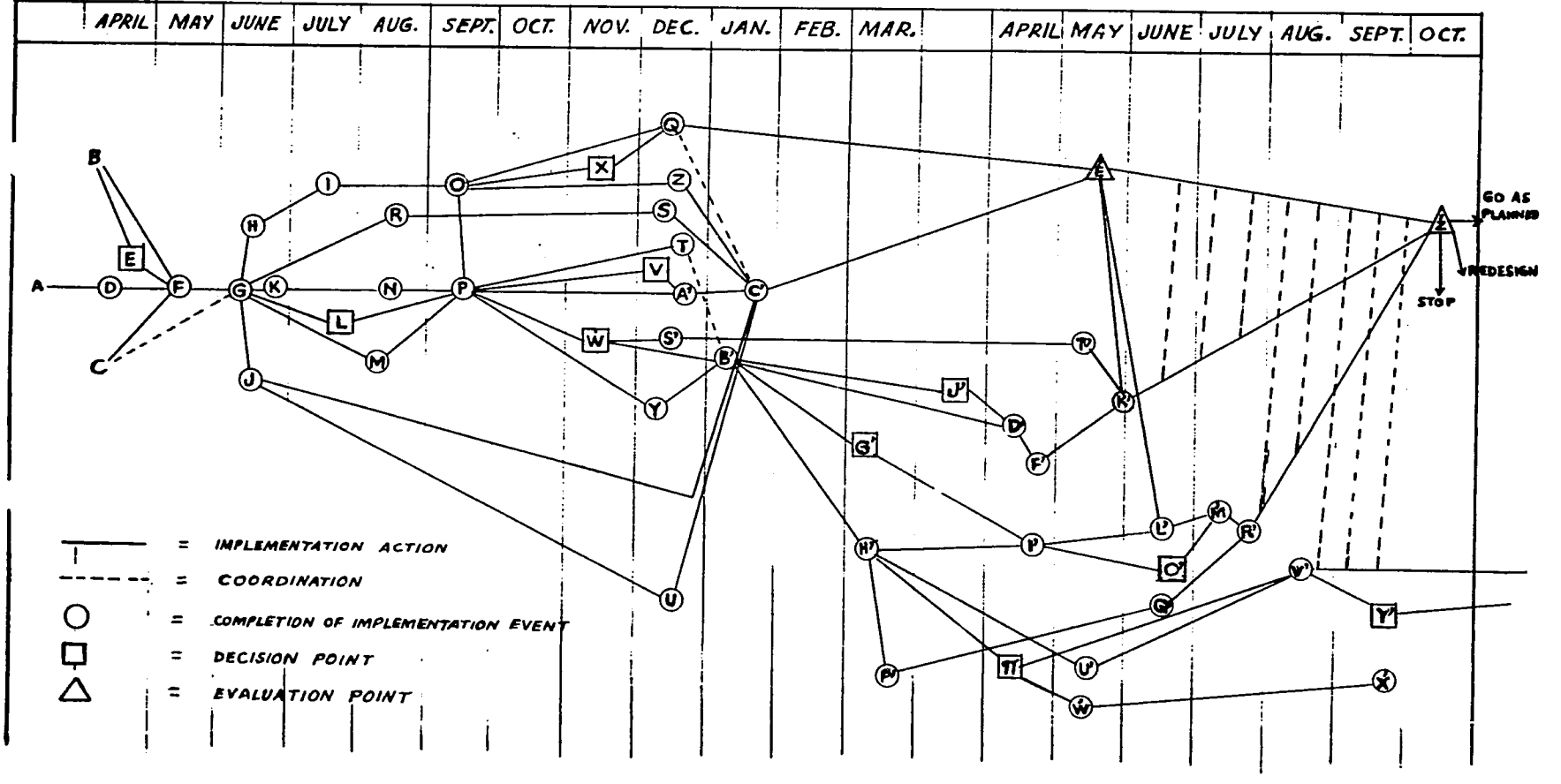
Job Description of U.S. Advisory Personnel

To be attached to PROP as soon as submitted by Mission.

ANNEX E

Implementation Plans and Evaluation

Evaluation to be an integral part of provincial implementation plans. These plans now being developed and relevant PERT networks will assign specific points in time for quantitative evaluation. These will be submitted by the Mission as a supplement to the PROP.

ROGERS

PRECISION LAND LEVELLING — PERT NETWORK — FIRST YEAR IMPLEMENTATION